2008-2015 BMW 7-SERIES F01 F02 F03 F04

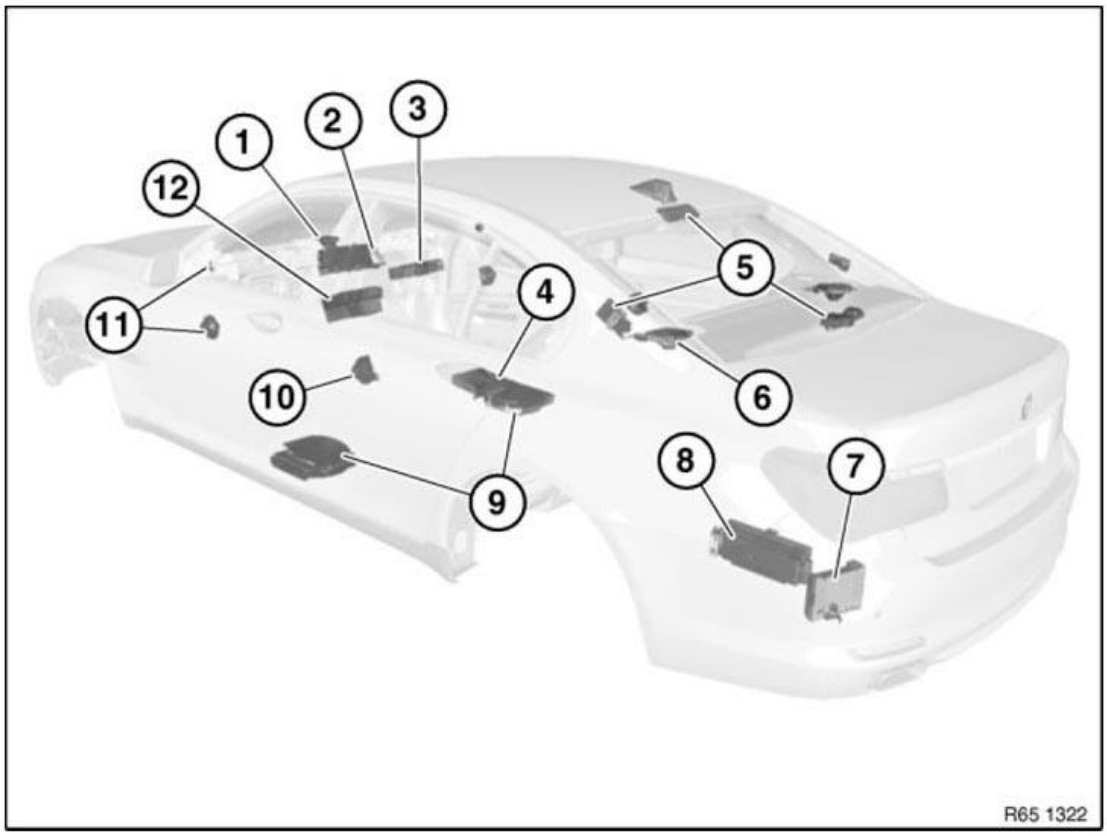


ACCESSORIES AND BODY, CAB

Audio, Navigation and Anti-Theft - Repair

6510 RADIO

65 00.. OVERVIEW OF AUDIO COMPONENTS

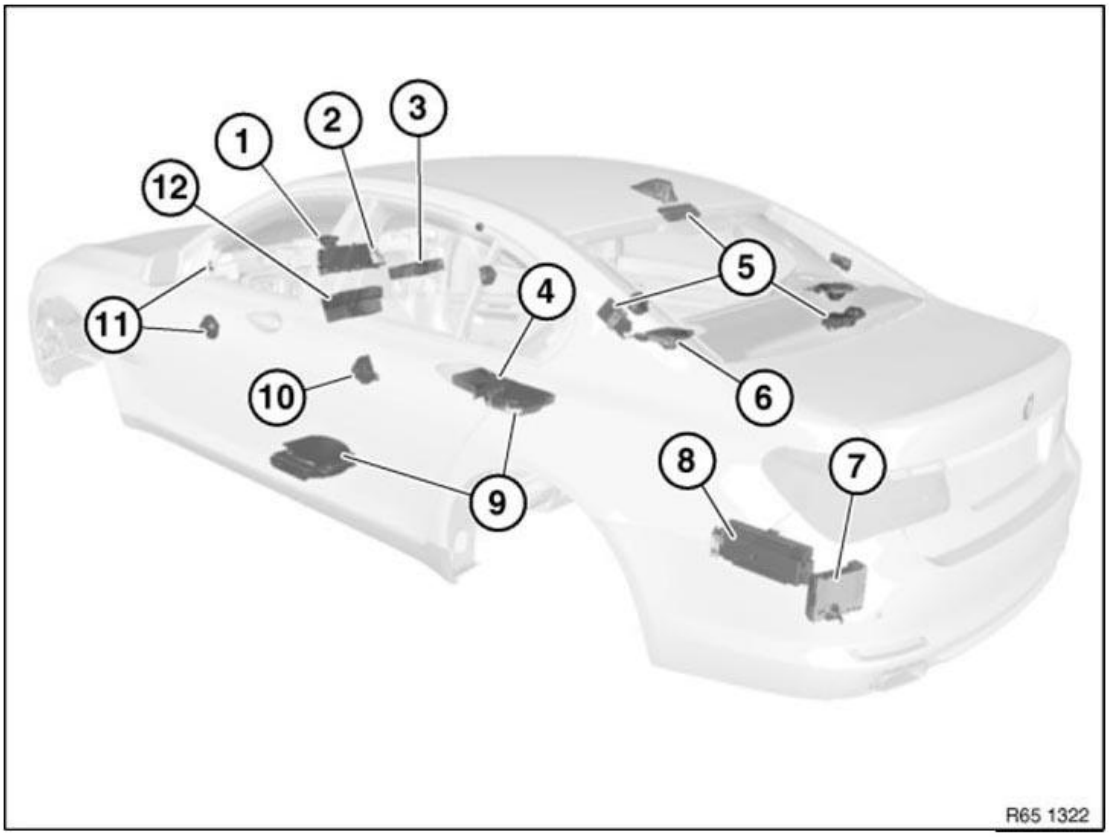


1	Speaker (in dashboard)	7	Satellite tuner
2	Central Information Display (CID)	8	Amplifier
3	DVD changer	9	Central bass speaker
4	DVD player, rear console	10	Speaker (door, rear)
5	Aerial diversity	11	Speaker (door, front)
6	Speaker (in storage shelf)	12	Car Information Computer (CIC)

Fig. 1: Overview Of Audio Components (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

6511 MONO RADIO

65 00.. OVERVIEW OF AUDIO COMPONENTS



1	Speaker (in dashboard)	7	Satellite tuner
2	Central Information Display (CID)	8	Amplifier
3	DVD changer	9	Central bass speaker
4	DVD player, rear console	10	Speaker (door, rear)
5	Aerial diversity	11	Speaker (door, front)
6	Speaker (in storage shelf)	12	Car Information Computer (CIC)

Fig. 2: Overview Of Audio Components (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

65 11 075 REMOVING AND INSTALLING/REPLACING DVD CHANGER

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

NOTE: Comply with notes and instructions on HANDLING OPTICAL FIBRES .

Necessary preliminary tasks

- **F01/02: DISCONNECT BATTERY EARTH CABLE** .
- **F03:** Disconnect both battery earth cables
- Remove **DECORATIVE STRIP ON STORAGE COMPARTMENT/DVD CHANGER**

INSTRUMENT PANEL

NOTE: Affects all vehicles from series introduction to 09/2009 with DVD changer (SA696)!

When a new DVD changer (2) is being replaced **(as of 09/09)** , conversion to ISTA/P must be carried out. (**"Converting replacement DVD changer** ")

If the old DVD changer (1) is installed (**up to 09/09**), this conversion to ISTA/P must **not** be carried out.

The old DVD changer (1) and the DVD changer (2) have an external difference in that the Load and Eject buttons are swapped round.

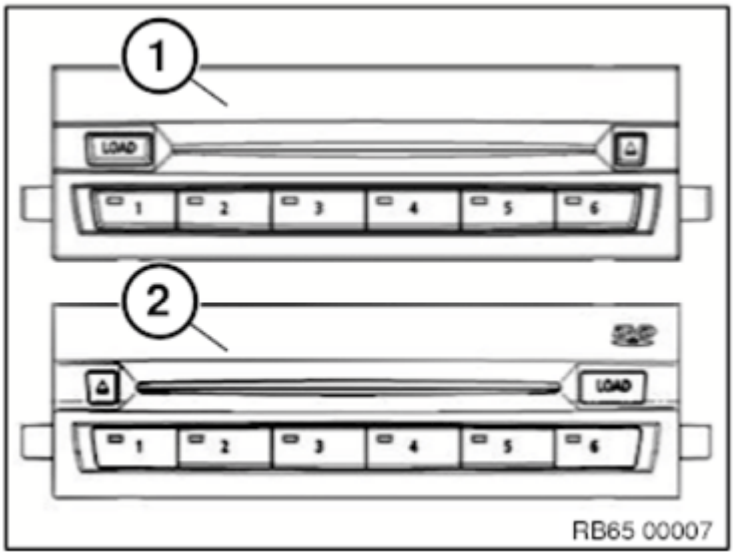


Fig. 3: Identifying New DVD Changer
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip trims (1) with a suitable tool and release screws behind.

Pull DVD changer (2) out of guide.

Unlock associated plug connection (3) and disconnect.

Remove DVD changer (2).

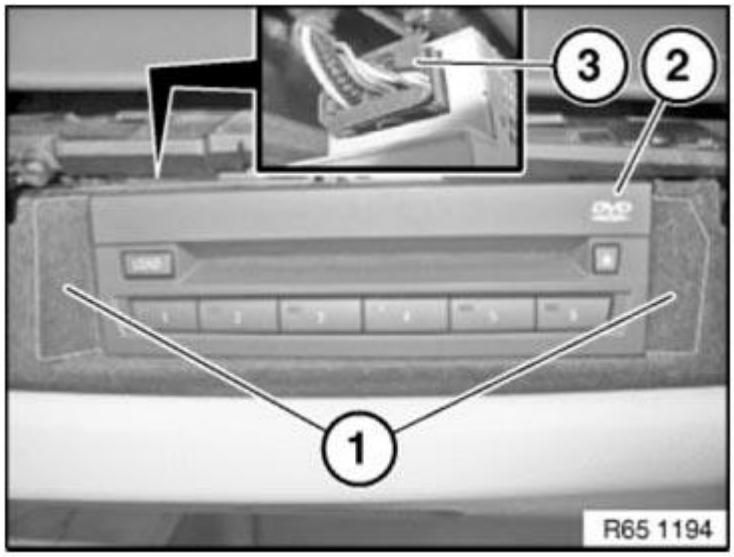


Fig. 4: Identifying Unclip Trims, DVD Changer And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING/CODING** .

61 31 823 REPLACING AUDIO UNIT

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

IMPORTANT: Use of supplied gloves is mandatory

Carry out installation in a dust-free workshop area only.

To avoid damage, do not touch or dirty the display field.

Necessary preliminary work

- Remove **RADIO AND IHKA CONTROLS**

IMPORTANT: Retrofitting must only be done in the supplied installation cassettes.

Use of supplied gloves is mandatory,

so that there is no damage to the display.

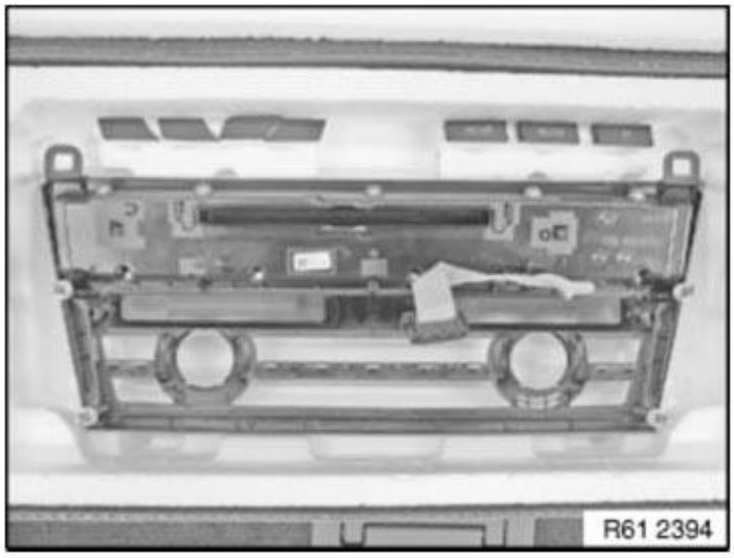


Fig. 5: Identifying Radio And IHKA Controls
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Modify **IHKA CONTROLS** on new audio unit.

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING** .

6512 STEREO RADIO, AMPLIFIER

65 12 315 REMOVING AND INSTALLING (REPLACING) HEAD UNIT

IMPORTANT: Risk of damage!

There is a hard disk installed in the head unit.

Carry out mechanical work on the head unit and adjacent components with care.

Avoid subjecting the head unit to vibration/shocks.

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

NOTE: Comply with notes and instructions on HANDLING OPTICAL FIBRES .

Necessary preliminary work:

- Remove **RADIO AND IHKA CONTROLS** .
- Disconnect **NEGATIVE BATTERY CABLE** (F03: disconnect both negative battery cables).

NOTE: Picture for example purposes only!

Unfasten screws (2).

Pull head unit (3) out of guide.

Installation note:

Make sure head unit (3) is correctly seated in guide lugs (1).

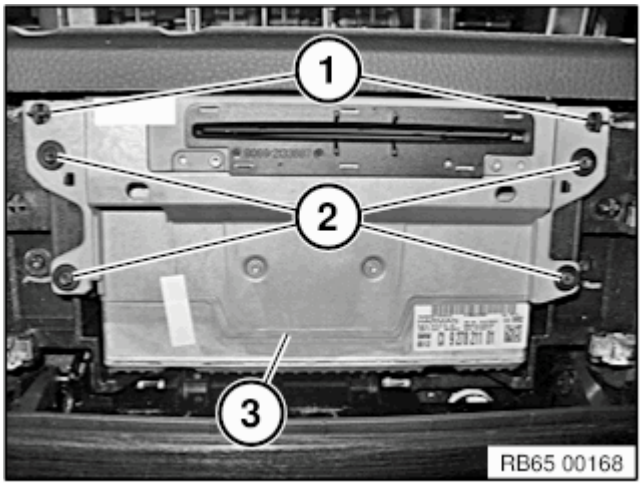


Fig. 6: Identifying Head Unit, Screws, And Guide Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Set the protective nonwoven material (1) aside as shown.

Unlock plug connections.(2) and disconnect.

Remove head unit (3).

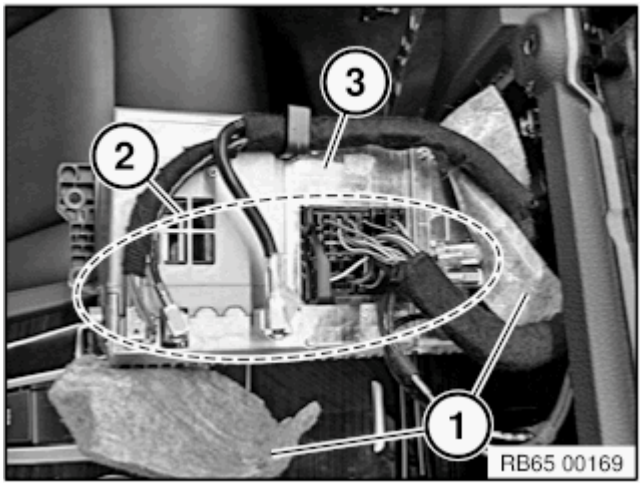


Fig. 7: Identifying Head Unit And Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Only for US models with satellite radio:

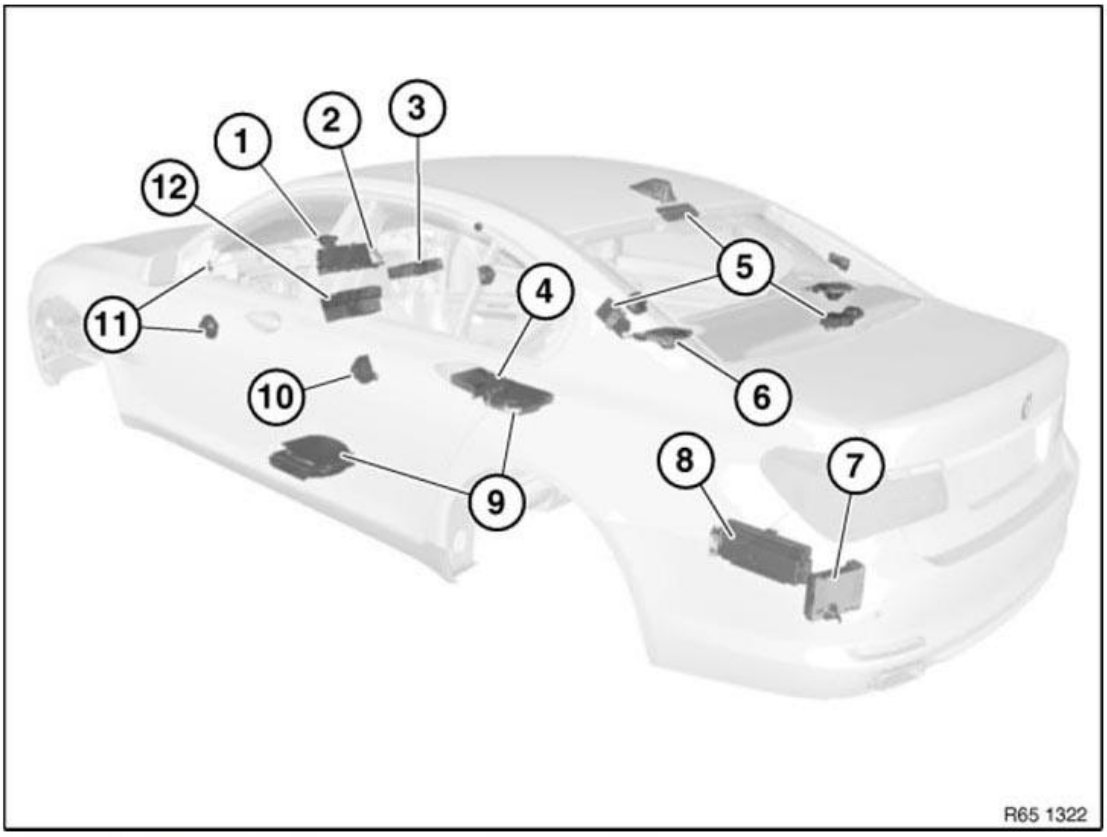
When replacing the head unit, additional work is required!

- Refer to **REMOVING AND INSTALLING/REPLACING SATELLITE TUNER (ONLY FOR US MODELS STARTING AT 09/2009)**.

Replacement:

Carry out **VEHICLE PROGRAMMING AND ENCODING** .

65 00.. OVERVIEW OF AUDIO COMPONENTS



1	Speaker (in dashboard)	7	Satellite tuner
2	Central Information Display (CID)	8	Amplifier
3	DVD changer	9	Central bass speaker
4	DVD player, rear console	10	Speaker (door, rear)
5	Aerial diversity	11	Speaker (door, front)
6	Speaker (in storage shelf)	12	Car Information Computer (CIC)

Fig. 8: Overview Of Audio Components
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 072 REMOVING AND INSTALLING (REPLACING) AMPLIFIER (TOP HIFI SYSTEM)

IMPORTANT: Read and comply with NOTES on protection against electrostatic discharge (ESD protection).

NOTE: Comply with notes and instructions on HANDLING OPTICAL FIBRES .

Necessary preliminary work

- Clamp off **NEGATIVE BATTERY CABLE** .
- Remove **LUGGAGE COMPARTMENT WHEEL ARCH PANEL ON LEFT** .

Release screw (1).

Remove amplifier (2) in direction of arrow from holder (3).

Unlock plug connections and disconnect.

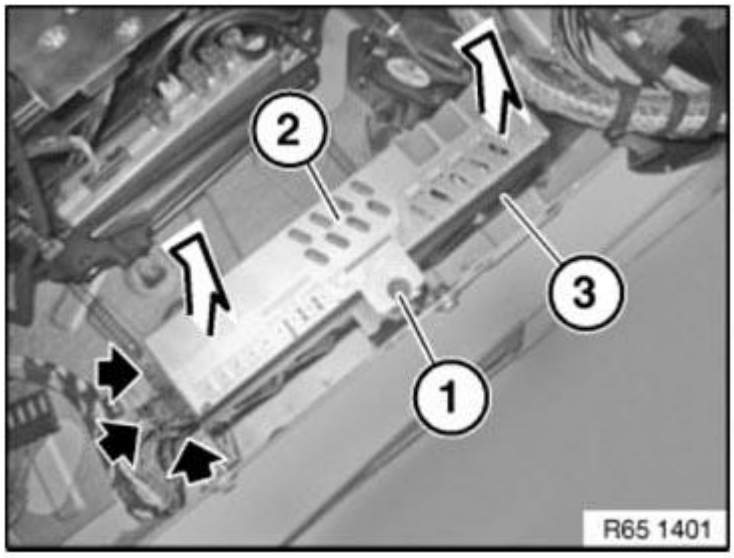


Fig. 9: Identifying Screw, Amplifier And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Until 09/2009 a Top Hifi amplifier with a different pin assignment is installed!

Install cable jumper consisting of socket (1) (BMW Parts Service 6901844) and wire jumper (2) in connector (3).

Create wire jumper (2) from wire (cross-section 0.75 mm^2) and two stops (BMW Parts Service 1393724). Then connect pins 1 and 2 in socket (1) with wire jumper (2).

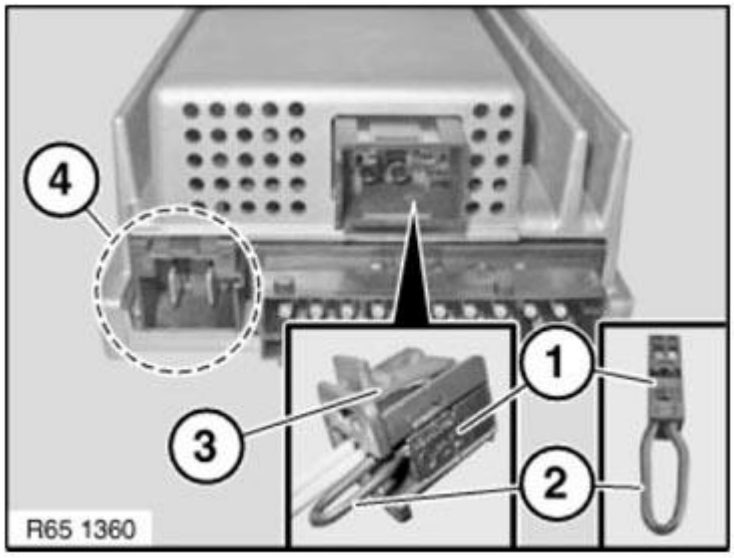


Fig. 10: Identifying Cable Jumper, Wire Jumper, Connector And Connector Chamber
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Connector chamber (4) is not included in current version and remains unused in new replacement Top HiFi amplifier!

NOTE: Picture for example purposes.

Installation note:

Tabs (1) must be correctly slid into guide (2).

Check that amplifier (3) is securely seated.

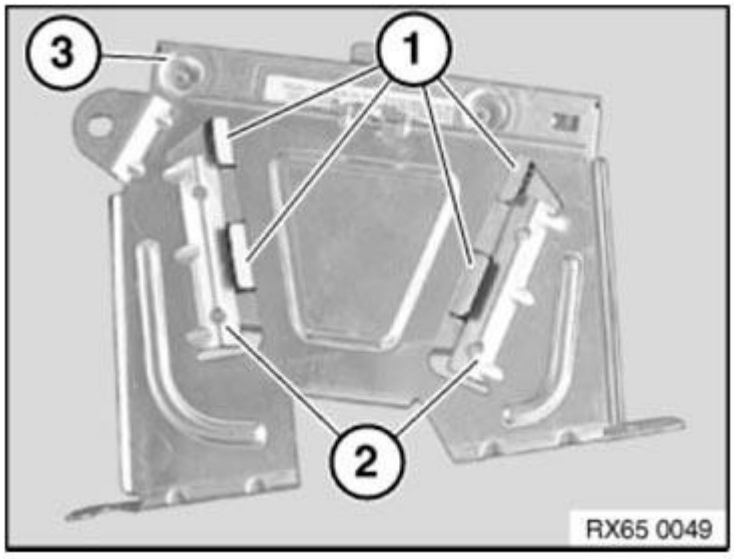


Fig. 11: Identifying Tabs, Guide And Amplifier
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out **VEHICLE PROGRAMMING AND ENCODING** .

65 12 051 REMOVING AND INSTALLING/RENEWING CENTRAL BASS SPEAKER-DRIVER'S SIDE- (UNDER FRONT SEAT)

Necessary preliminary tasks

- Remove **FRONT SEAT, DRIVER'S SIDE**
- Remove **PANEL FOR DOOR PILLAR** .

Pull trim (1) in direction of arrow towards rear and lift out.

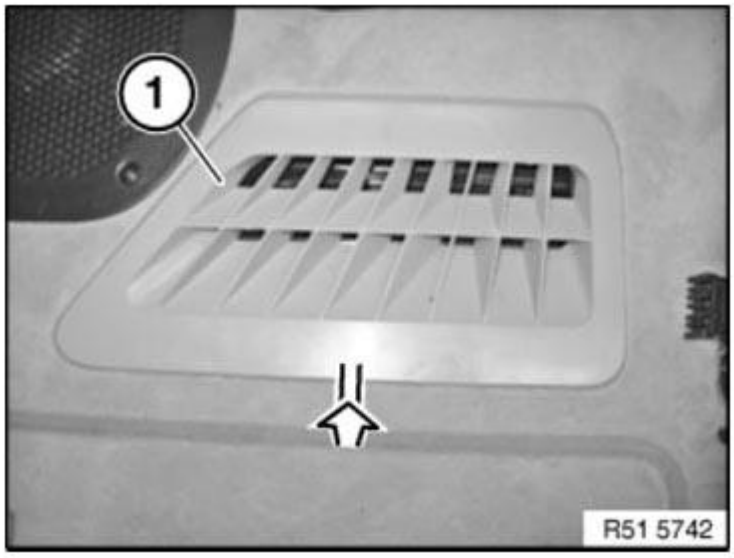


Fig. 12: Identifying Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Release plastic nut (1).

Feed out air duct (2).

Release screws (4).

Remove central bass speaker cover (3).

Fold back floor trims.

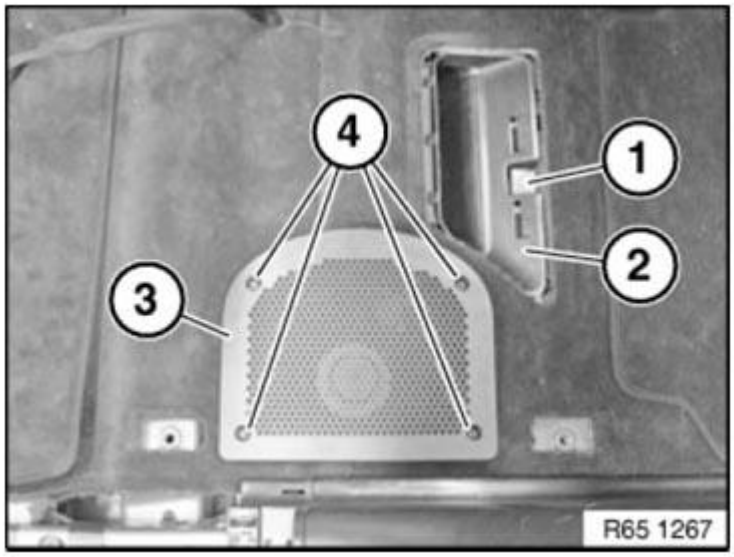


Fig. 13: Identifying Screws And Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Unfasten plug connection (2) and disconnect.

Feed out central bass carrier (3) in direction of arrow.

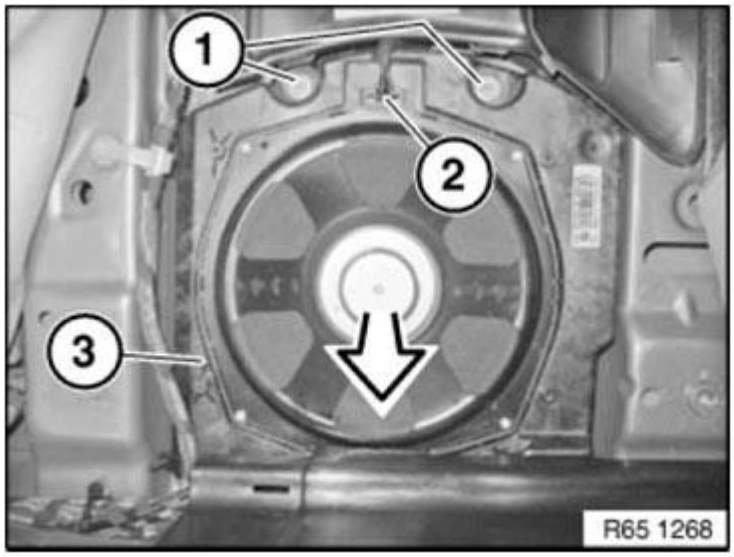


Fig. 14: Identifying Nuts, Plug Connection And Central Bass Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 053 REMOVING AND INSTALLING/RENEWING CENTRAL BASS SPEAKER - PASSENGER SIDE- (UNDER FRONT SEAT)

Necessary preliminary tasks

- Remove **FRONT PASSENGER SEAT** .
- Remove **PANEL FOR DOOR PILLAR** .

The following operations are described for the left side. The procedure for the right side is identical.

Pull trim (1) in direction of arrow towards rear and lift out.

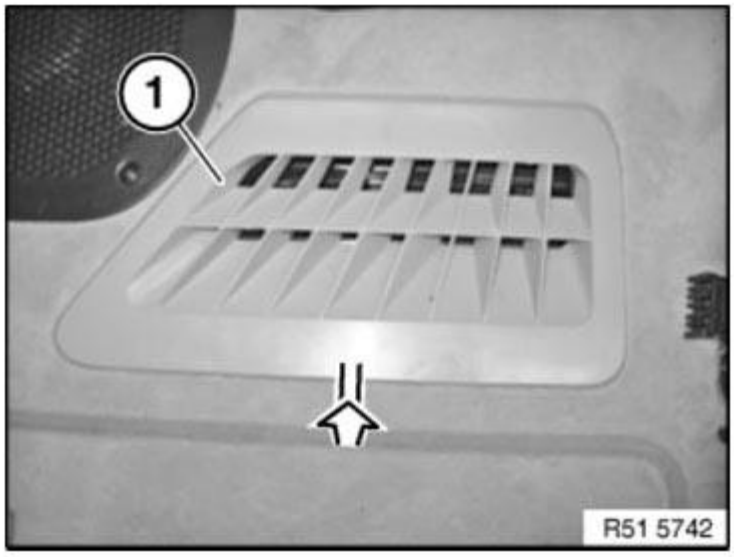


Fig. 15: Identifying Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Release plastic nut (1).

Feed out air duct (2).

Release screws (4).

Remove central bass speaker cover (3).

Fold back floor trims.

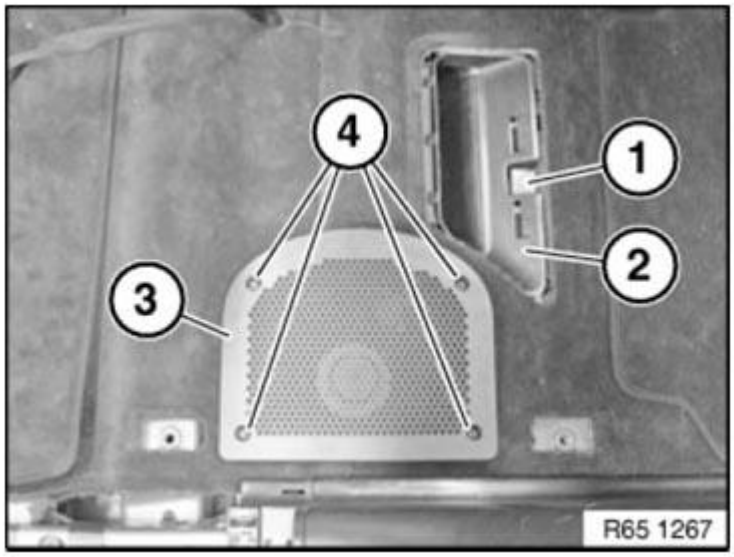


Fig. 16: Identifying Screws Plastic Nut, Air Duct And Central Bass Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Unfasten plug connection (2) and disconnect.

Feed out central bass carrier (3) in direction of arrow.

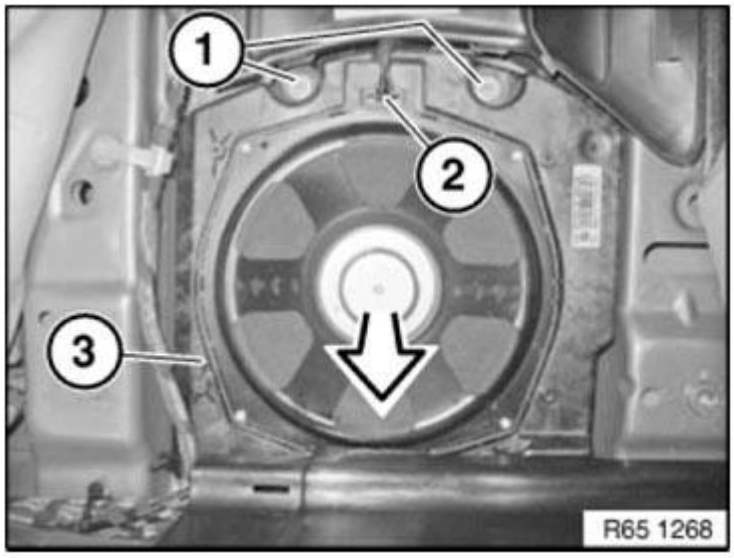


Fig. 17: Identifying Nuts, Plug Connection And Central Bass Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 265 REMOVING AND INSTALLING/REPLACING DVD PLAYER IN REAR CONSOLE

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

NOTE: Comply with notes and instructions on NOTES ON HANDLING OPTICAL FIBRES .

Necessary preliminary work

- F01/02: Clamp off **BATTERY EARTH LEAD**
- F03: Remove both battery earth leads
- Remove **REAR CENTRE CONSOLE TRIM**
- Remove **CENTRE ARMREST STORAGE COMPARTMENT**

Unlock plug connections (1) and (2) and disconnect.

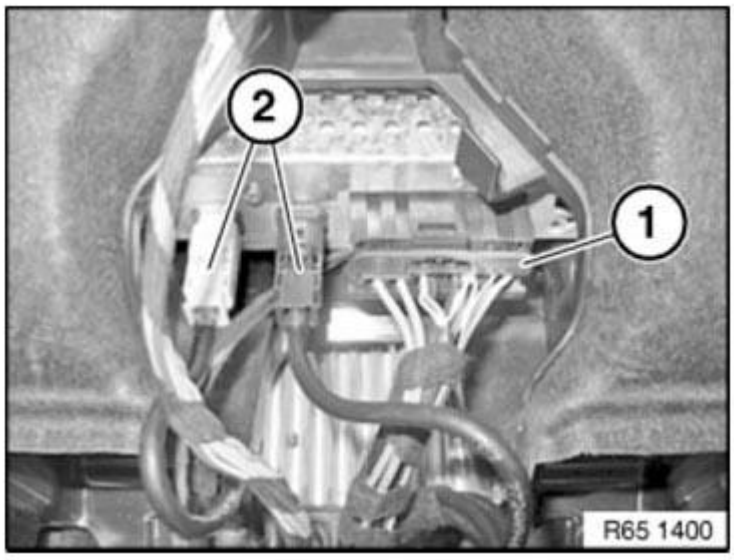


Fig. 18: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove DVD player (2).

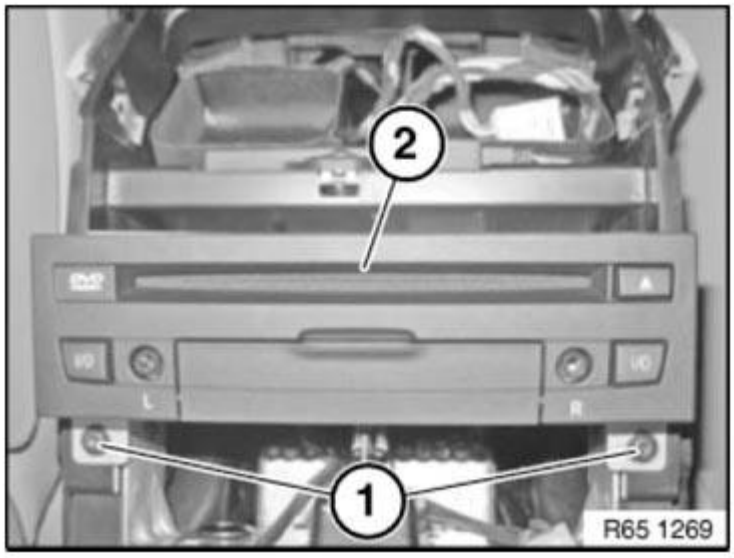


Fig. 19: Identifying Screws And DVD Player
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING** .

65 12 071 REMOVING AND INSTALLING/REPLACING AMPLIFIER

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

NOTE: Comply with notes and instructions on NOTES ON HANDLING OPTICAL FIBRES .

Necessary preliminary work

- Clamp off **NEGATIVE BATTERY CABLE** .
- Remove **LUGGAGE COMPARTMENT WHEEL ARCH PANEL ON LEFT** .

Release screw (1).

Remove amplifier (4) including holder (2).

Unfasten plug connections (3) and disconnect.

Replacement

Remove amplifier (4) including holder (3).

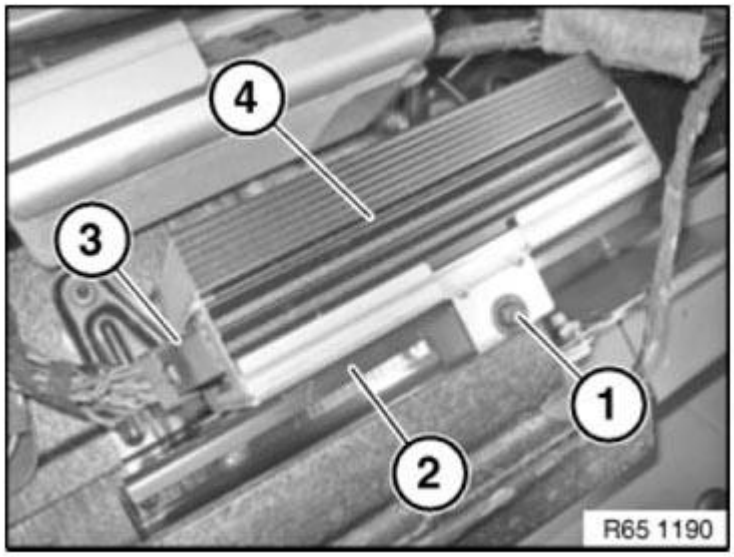


Fig. 20: Identifying Screw, Amplifier And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tabs (1) must be correctly slid into guide (2).

Check that amplifier (3) is securely seated.

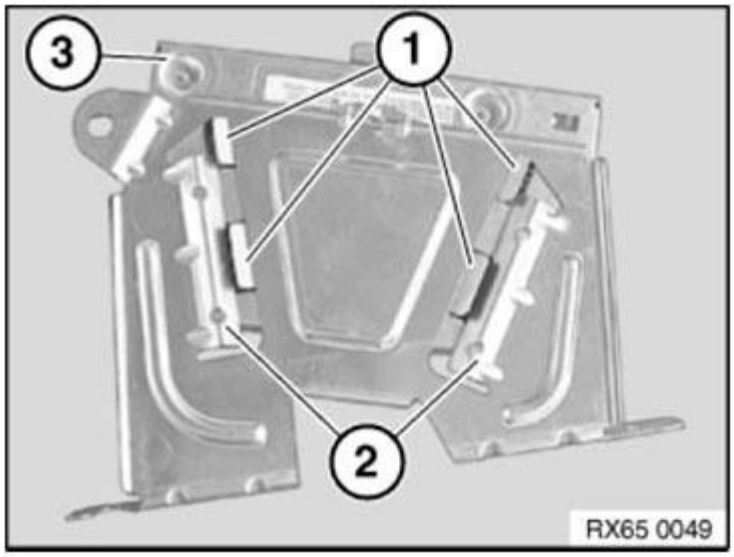


Fig. 21: Identifying Tabs, Guide And Amplifier
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

For vehicle with production date **up to 09/2010** , carry out conversion in the diagnosis system via path:

- Vehicle
- Conversions
- Conversion hi-fi system

NOTE: On vehicle with production date after 09/2010 , no vehicle programming/encoding needs to be carried out!

65 12 220 REMOVING AND INSTALLING/REPLACING SATELLITE RADIO (US VERSION ONLY UNTIL 09/2009)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

NOTE: See NOTES ON HANDLING OPTICAL FIBRES .

Necessary preliminary work

- Disconnect **BATTERY NEGATIVE LEAD** .
- Remove **LUGGAGE COMPARTMENT WHEEL ARCH TRIM ON LEFT** .

Unlock plug connections (1) and disconnect.

Unfasten screws (2).

Unscrew nut (3).

Remove satellite radio (4) with holder.

Replacement

Release screws (5).

Remove satellite radio (4) from holder.

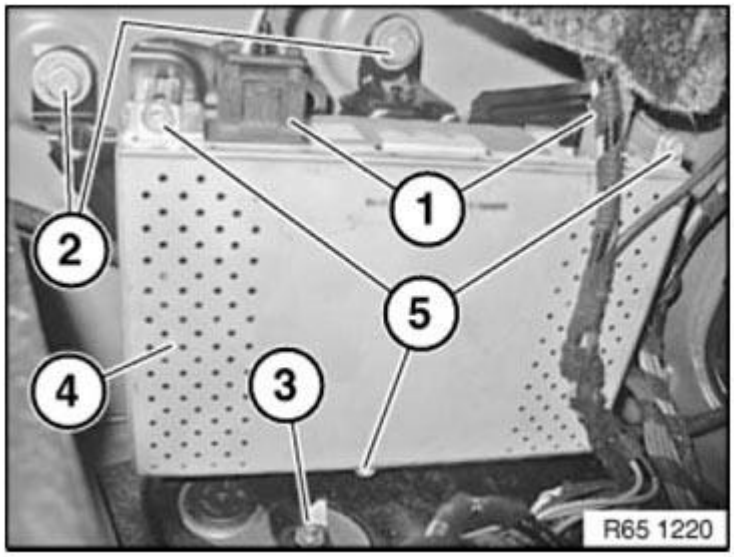


Fig. 22: Identifying Plug Connections, Screws, Nut And Satellite Radio
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing, please observe

Record ID number (2) of the removed device.

NOTE: The ID number (2) can be found on the label of the housing. Above the barcode the text reads "Sirius ID" (1) and next to it is the company's logo "Sirius Satellite Radio" (3).

Record ID number (2) of the new device.

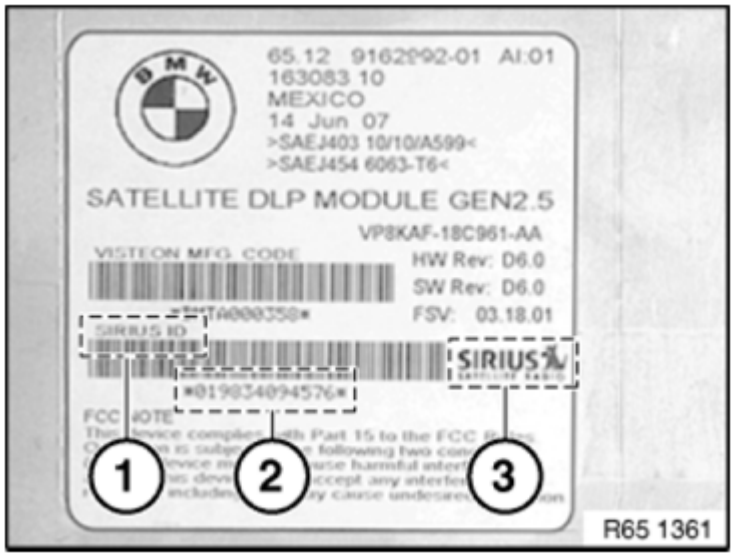


Fig. 23: Identifying Sirius ID, ID Number And Sirius Satellite Radio

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out **VEHICLE PROGRAMMING AND ENCODING** .

NOTE: Please contact Sirius. Use the ID number to cancel current device and register new one.

65 12 220 REMOVING AND INSTALLING/REPLACING SATELLITE TUNER (ONLY FOR US MODELS STARTING AT 09/2009)

Necessary preliminary work

- Remove **CAR INFOTAINMENT COMPUTER**

When replacing, please observe

Record SID number (1) of the removed device.

NOTE: The SID number (1) can be found on the label of the housing. Location may be different, depending on the manufacturer of the device.

Record SID number (1) of the new device.

Input enabling code from the ASAP portal.



Fig. 24: Identifying SID Number
Courtesy of BMW OF NORTH AMERICA, INC.

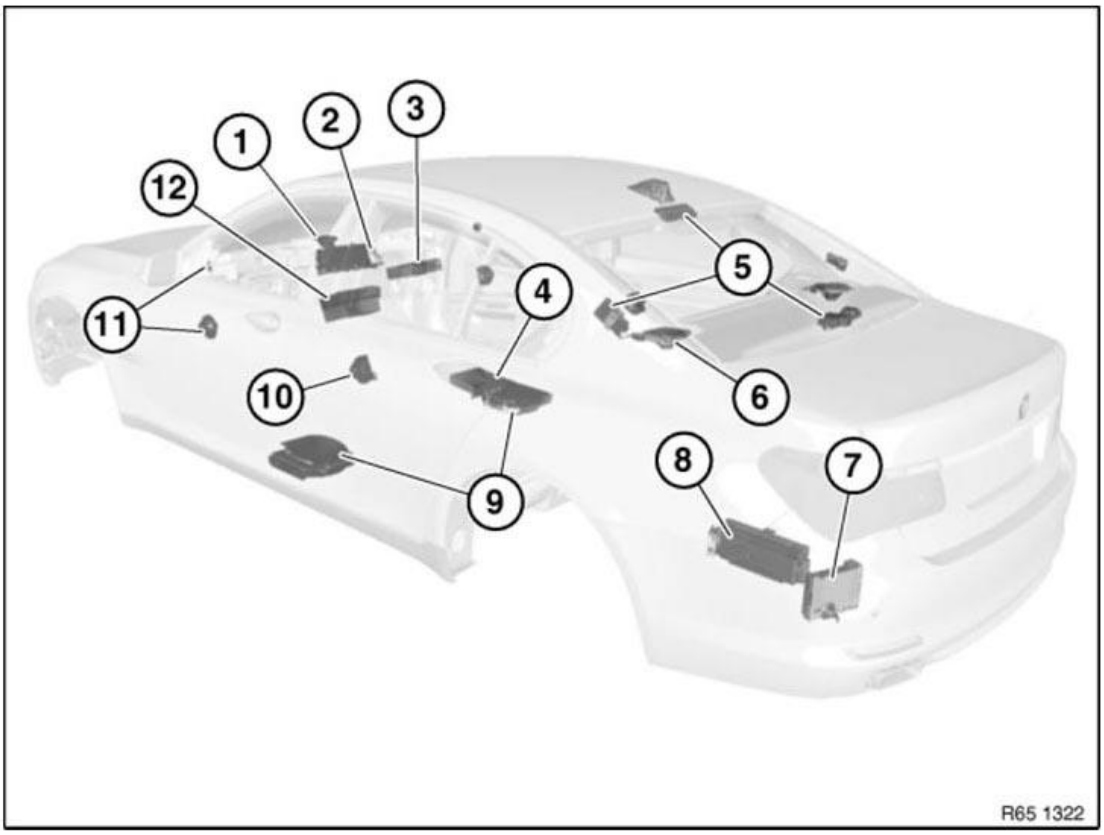
Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING** .

NOTE: Please contact Sirius. Use the SID number to cancel current device and register new one.

6513 SPEAKER AND COVER

65 00.. OVERVIEW OF AUDIO COMPONENTS



1	Speaker (in dashboard)	7	Satellite tuner
2	Central Information Display (CID)	8	Amplifier
3	DVD changer	9	Central bass speaker
4	DVD player, rear console	10	Speaker (door, rear)
5	Aerial diversity	11	Speaker (door, front)
6	Speaker (in storage shelf)	12	Car Information Computer (CIC)

Fig. 25: Overview Of Audio Components
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 060 REMOVING AND INSTALLING/RENEWING SPEAKER (MIDRANGE SPEAKER, IN INSTRUMENT PANEL)

Notes

Unclip trim (1) with special tool **00 9 325** from latch mechanisms and remove upwards.

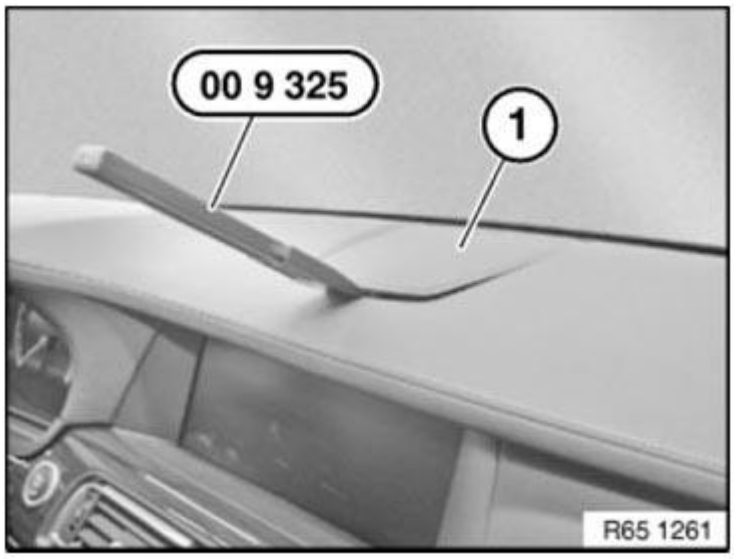


Fig. 26: Removing Trim From Latch Mechanisms Using Special Tool (00 9 325)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Marked retaining lugs must not be damaged.

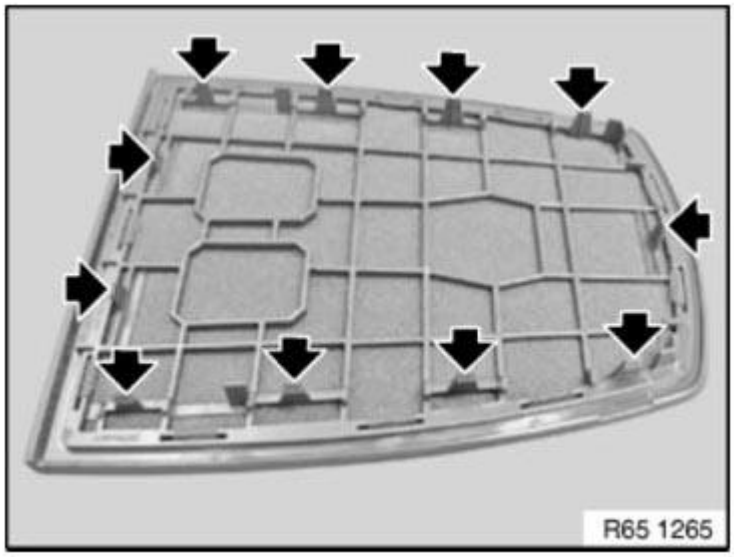


Fig. 27: Locating Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Graphic is an example!

Release screws (1).

Remove speaker (2).

Disconnect plug connection underneath and remove speaker (2).

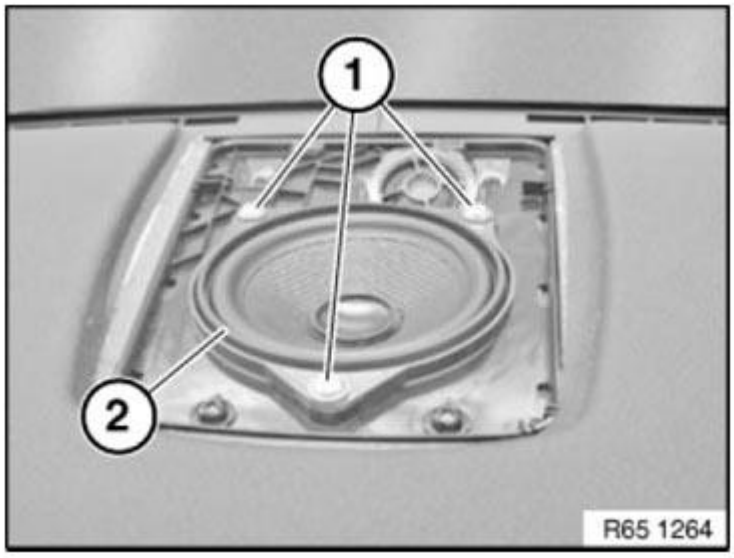


Fig. 28: Identifying Screws And Speaker
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 265 REMOVING AND INSTALLING/REPLACING DVD PLAYER IN REAR CONSOLE

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

NOTE: Comply with notes and instructions on NOTES ON HANDLING OPTICAL FIBRES .

Necessary preliminary work

- F01/02: Clamp off **BATTERY EARTH LEAD**
- F03: Remove both battery earth leads
- Remove **REAR CENTRE CONSOLE TRIM**
- Remove **CENTRE ARMREST STORAGE COMPARTMENT**

Unlock plug connections (1) and (2) and disconnect.

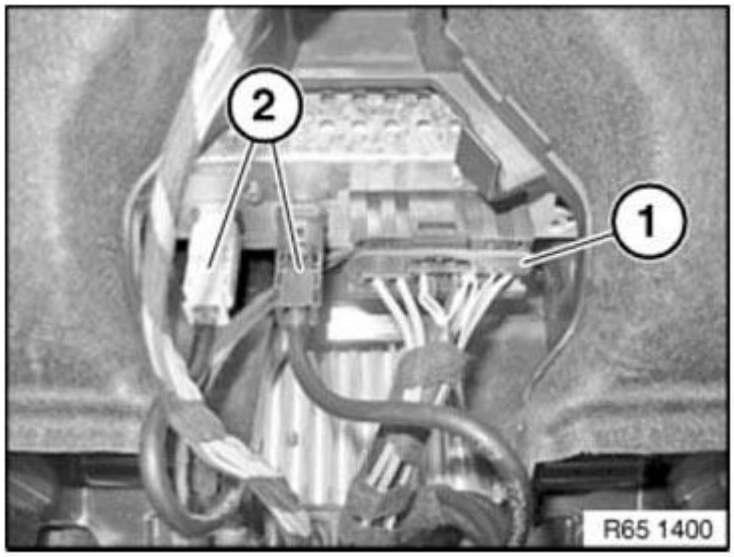


Fig. 29: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove DVD player (2).

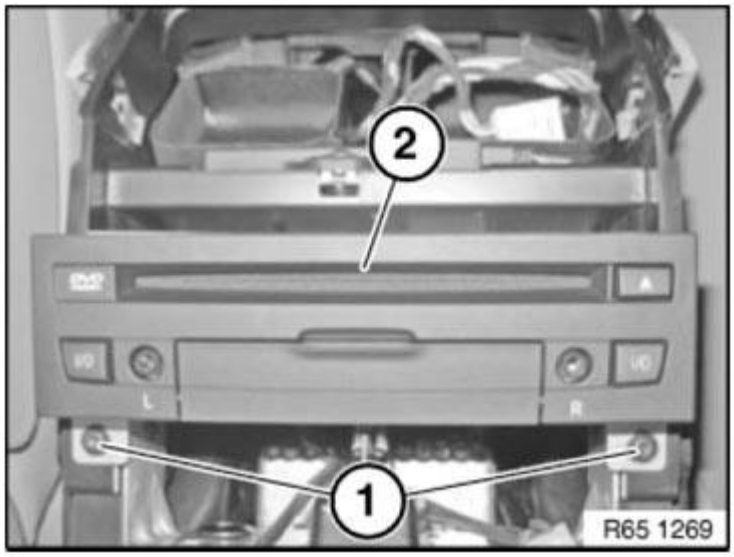


Fig. 30: Identifying Screws And DVD Player
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING** .

65 13 065 REMOVING AND INSTALLING/REPLACING FRONT SPEAKER CARRIER (INSTRUMENT PANEL)

Notes

Unclip trim (1) from latching mechanisms with special tool **00 9 325** .

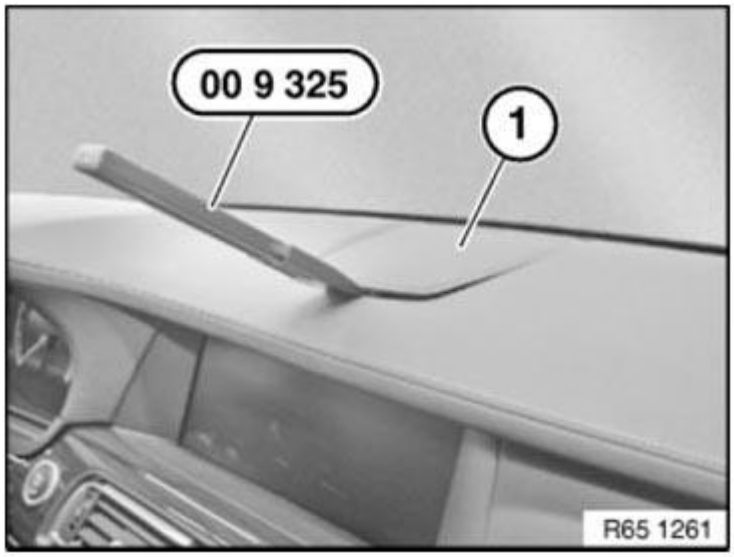


Fig. 31: Removing Trim From Latch Mechanisms Using Special Tool (00 9 325)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove speaker carrier (2) and disconnect associated plug connection.

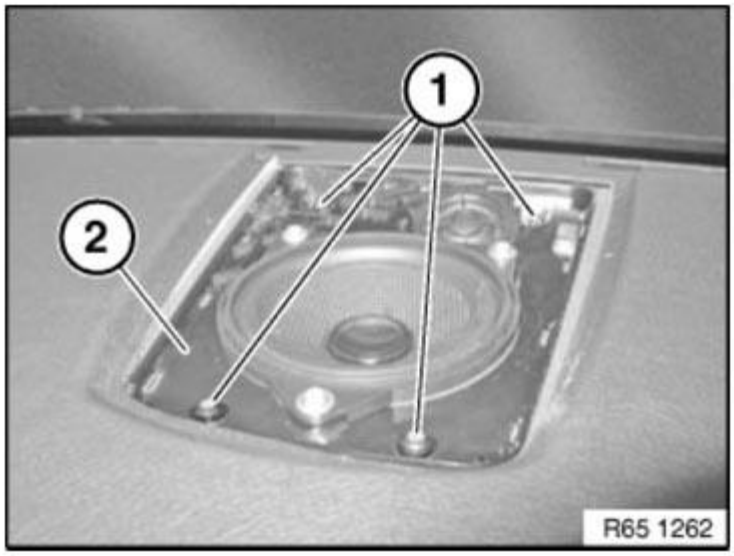


Fig. 32: Identifying Screws And Speaker Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Marked retaining lugs must not be damaged.

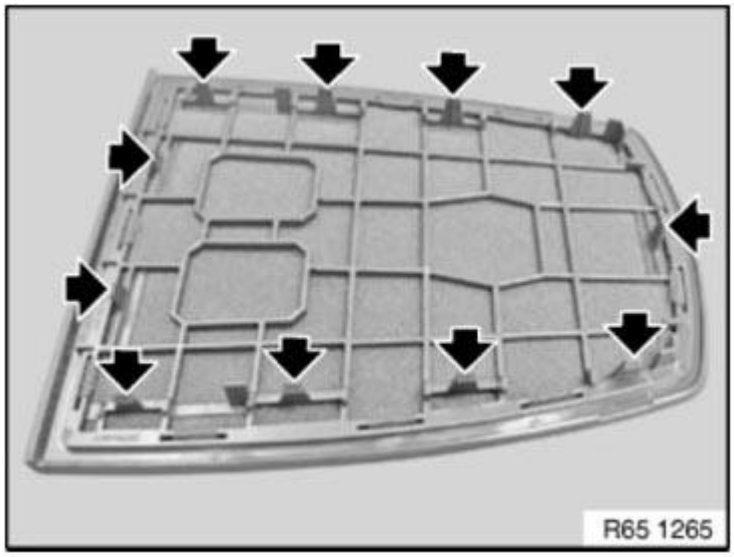


Fig. 33: Identifying Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Disconnect plug connection (1).
- Remove **MIDRANGE SPEAKER** (2).
- Remove **TWEETER** (3).

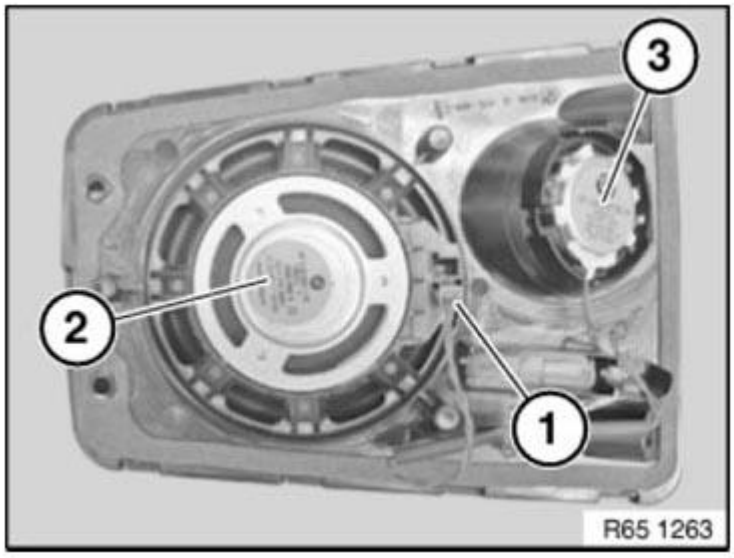


Fig. 34: Identifying Plug Connection, Mid-Range Speaker And Tweeter
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 188 REMOVING AND INSTALLING/REPLACING REAR MID-RANGE SPEAKER (IN STORAGE SHELF)

Notes

Lever out speaker cover (1) with special tool **00 9 325** .

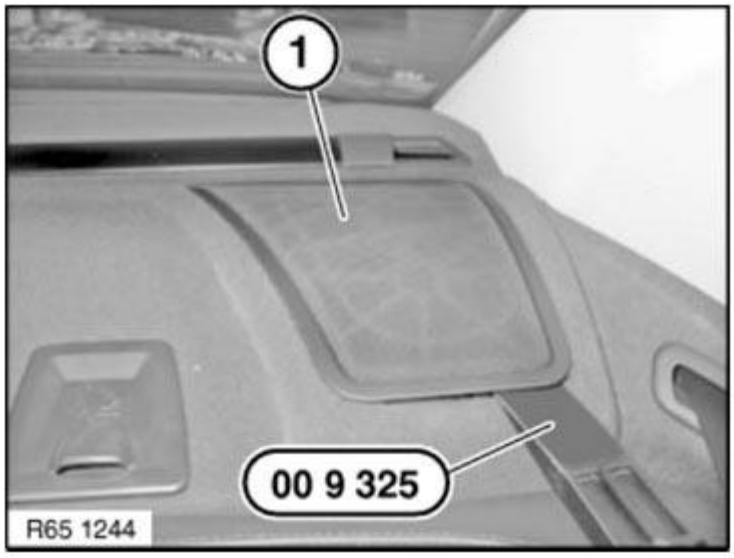


Fig. 35: Removing Speaker Cover Using Special Tool (00 9 325)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Retaining lugs on speaker cover (1) must not be damaged.

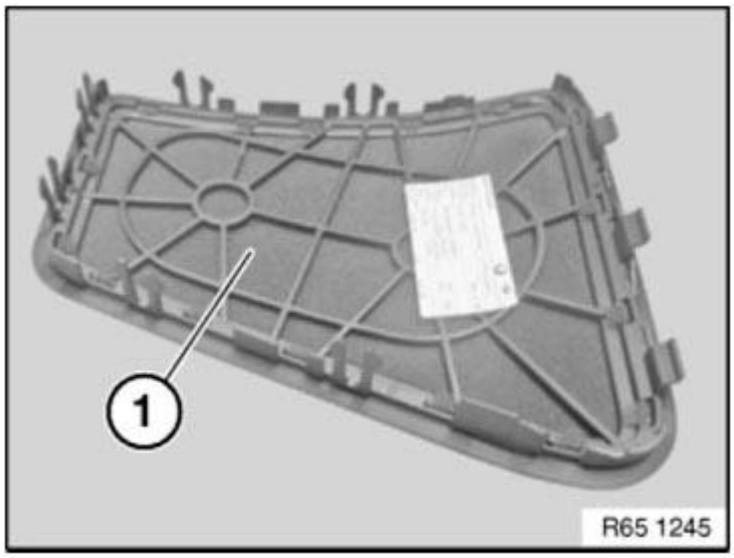


Fig. 36: Identifying Retaining Lugs On Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove mid-range speaker (2) in direction of arrow from speaker (3).

Disconnect plug connection underneath.

Remove mid-range speaker (2).

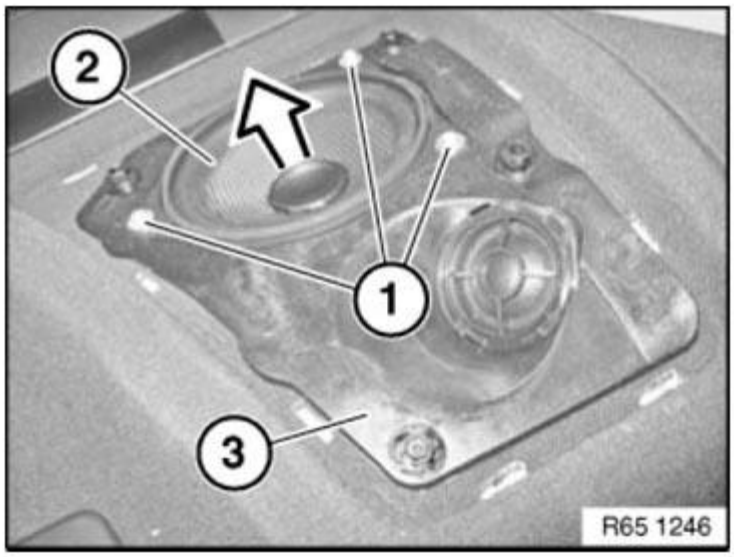


Fig. 37: Identifying Screws, Speaker And Mid-Range Speaker

Courtesy of BMW OF NORTH AMERICA, INC.

65 13 160 REMOVING AND INSTALLING/REPLACING REAR SPEAKER CARRIER (IN STORAGE SHELF)

Notes

Lever out speaker cover (1) with special tool **00 9 325** .

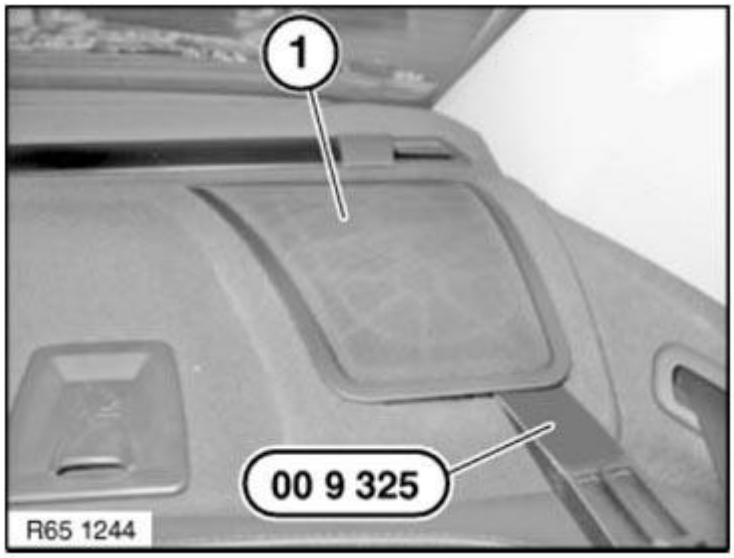


Fig. 38: Removing Speaker Cover Using Special Tool (00 9 325)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Retaining lugs on speaker cover (1) must not be damaged.

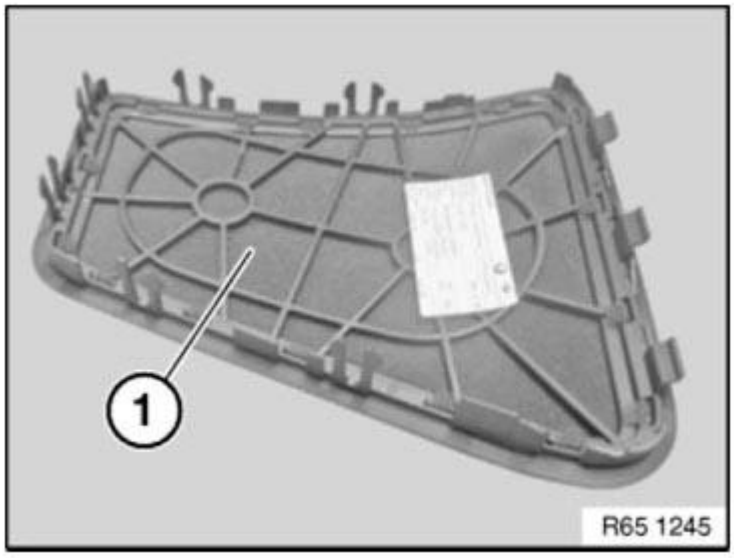


Fig. 39: Identifying Retaining Lugs On Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Take out speaker box (2).

Disconnect plug connection underneath and remove speaker box (2).

Installation note:

Speaker box (2) must be exactly seated in groove of storage shelf.

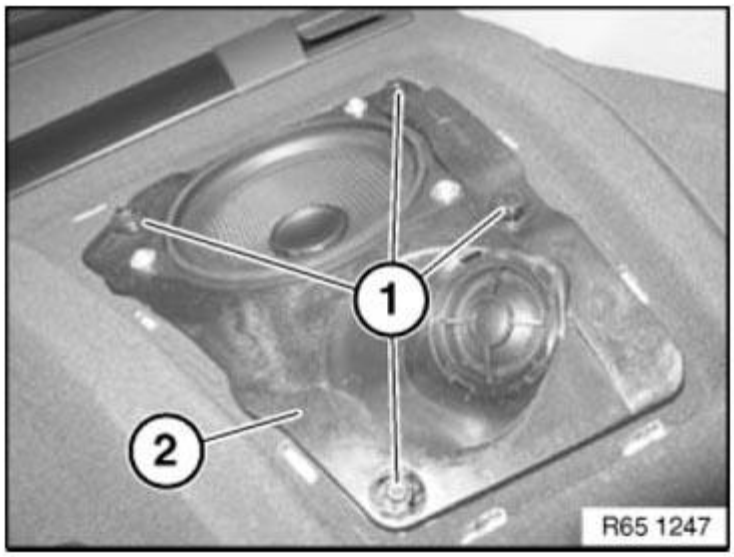


Fig. 40: Identifying Screws And Speaker Box

Courtesy of BMW OF NORTH AMERICA, INC.

65 13 195 REMOVING AND INSTALLING/REPLACING REAR TREBLE SPEAKER (IN REAR SHELF)

Installation:

- Remove **REAR SPEAKER CARRIER**

Disconnect plug connection (1).

Unclip tweeter (2) from speaker carrier (3) and remove in direction of arrow.

Installation:

Ensure correct cable routing.

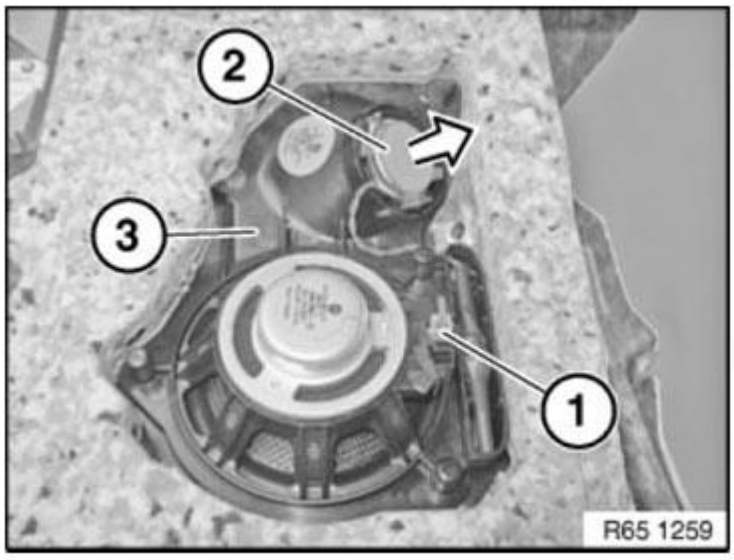


Fig. 41: Identifying Plug Connection, Unclip Tweeter And Speaker Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 090 REMOVING AND INSTALLING/REPLACING SPEAKER (MIDRANGE SPEAKER, DOOR AT REAR)

Necessary preliminary tasks

- Remove **REAR DOOR TRIM PANEL** .

Disconnect plug connection (1).

Unscrew nuts (2).

Remove speaker (3).

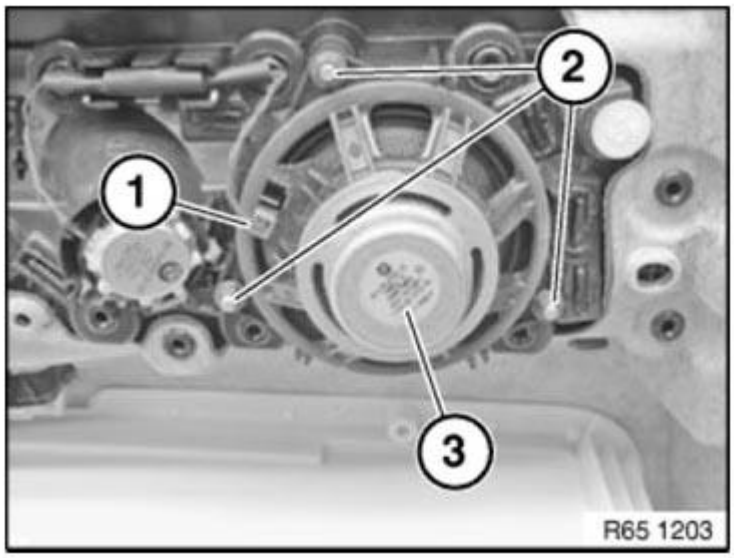


Fig. 42: Identifying Plug Connection, Nuts And Speaker
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 080 REMOVING AND INSTALLING/REPLACING SPEAKER (TWEETER, DOOR AT REAR)

Necessary preliminary tasks

- Remove **REAR DOOR TRIM PANEL** .

Disconnect plug connection (1).

Unlock retaining lugs (2).

Remove speaker (3) in direction of arrow.

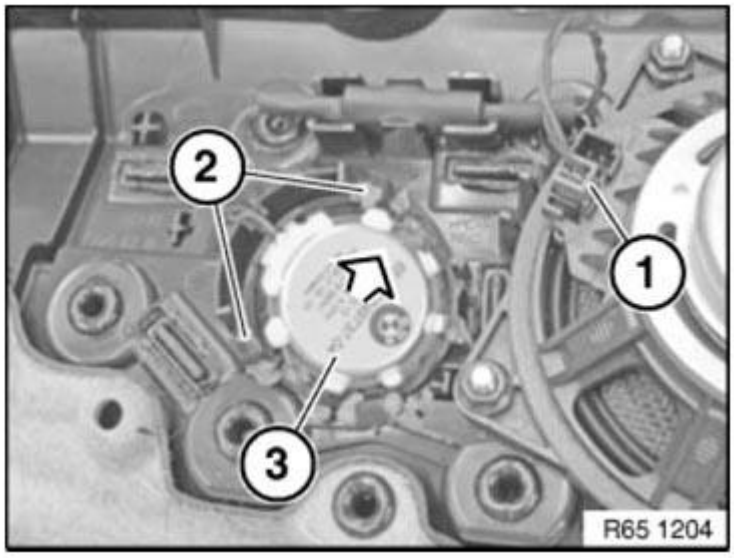


Fig. 43: Identifying Plug Connection, Retaining Lugs And Speaker
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 062 REMOVING AND INSTALLING/REPLACING SPEAKER (TWEETER, IN INSTRUMENT PANEL)

Necessary preliminary tasks

- Remove **FRONT SPEAKER CARRIER**

Disconnect plug connection (3).

Unclip speaker (1) at marked points and remove from carrier (2).

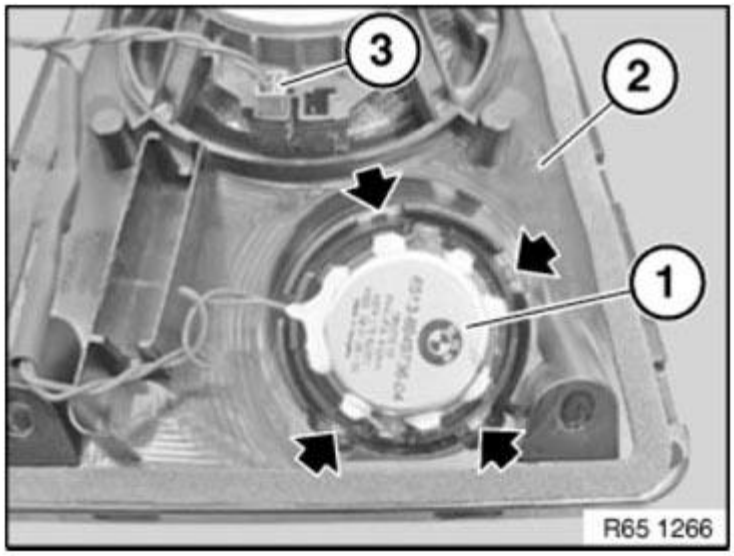


Fig. 44: Identifying Plug Connection, Speaker And Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 050 REMOVING AND INSTALLING/REPLACING SPEAKER (TWEETER, TRIANGULAR MIRROR SECTION, LEFT OR RIGHT)

Unclip window frame cover (1) in front area as shown.

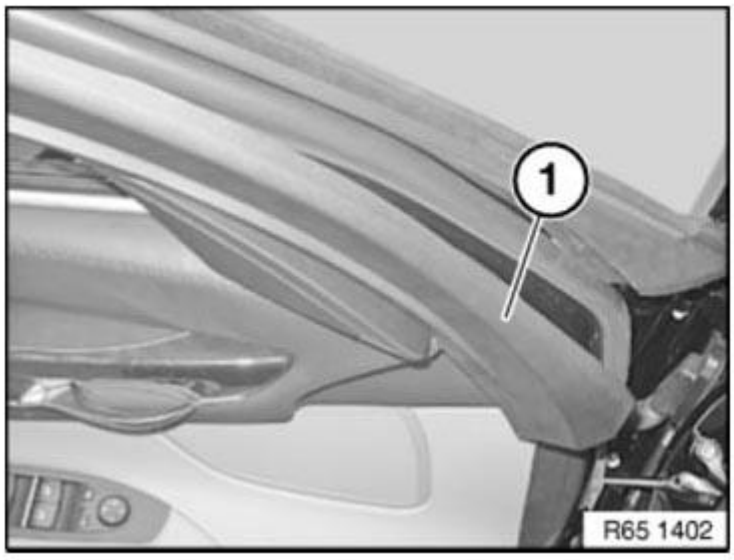


Fig. 45: Identifying Window Frame Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip mirror triangle cover (1) as shown from side window frame cover (2).

Installation:

Marked retaining lugs must be correctly engaged in guides on side window frame (2)

Ensure mirror triangle cover (1) is correctly seated.

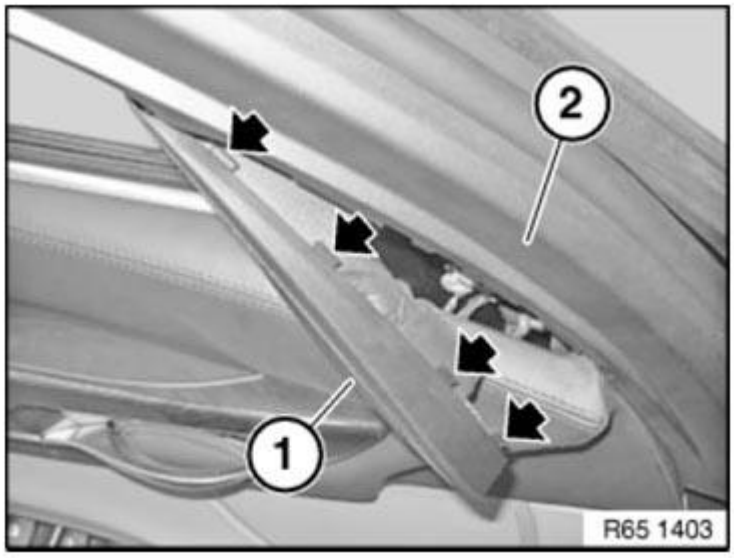


Fig. 46: Identifying Mirror Triangle Cover And Window Frame Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Remove sound insulation (3) from speaker cover (2).

Installation

Renew fastening (4) if necessary.

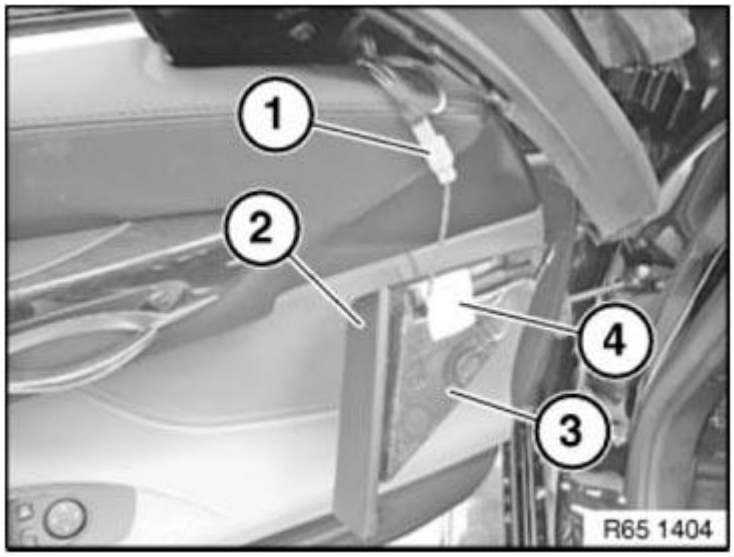


Fig. 47: Identifying Plug Connection, Sound Insulation And Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip tweeter (1) at retaining lugs (2) and remove from mirror triangle cover (3).

Installation:

Retaining lugs (2) must not be damaged.

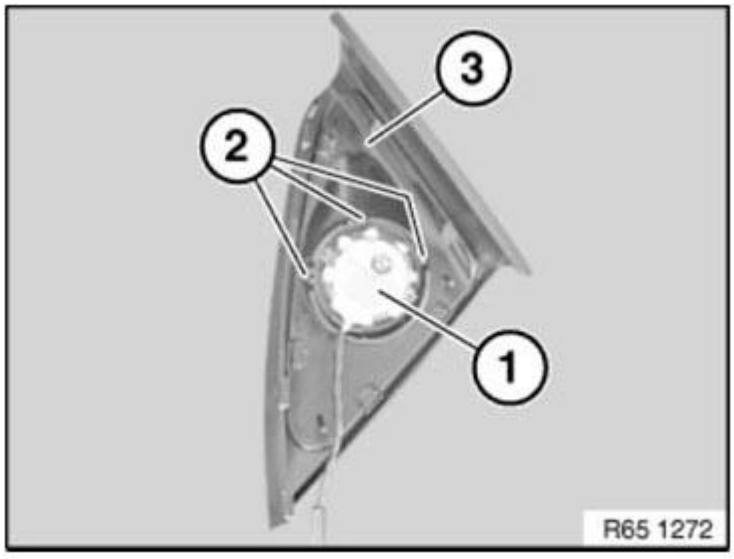


Fig. 48: Identifying Tweeter, Mirror Triangle Cover And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 070 REMOVING AND INSTALLING/REPLACING SPEAKERS (MIDRANGE SPEAKER, FRONT DOOR LEFT AND RIGHT)

Necessary preliminary work

- Remove front **DOOR TRIM PANEL** .

NOTE: Secure speaker against falling out.

Release nuts (1) and remove speaker (2) in direction of arrow from door trim (3).

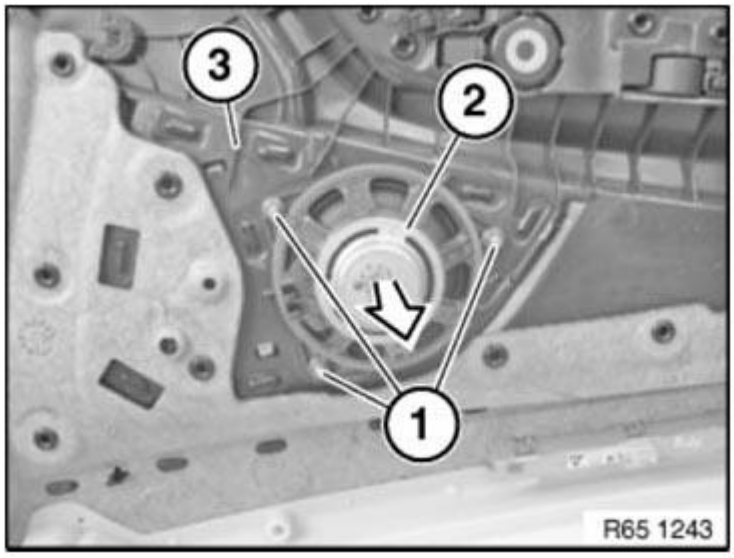
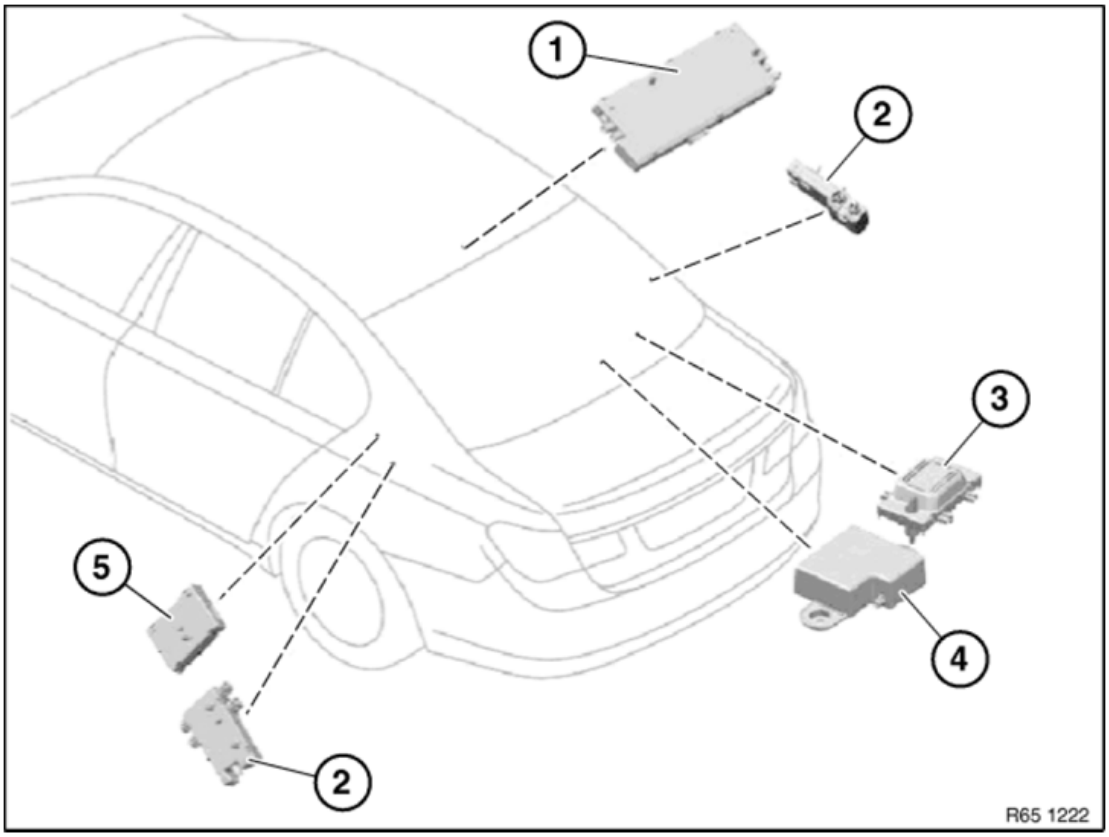


Fig. 49: Identifying Nuts, Speaker And Door Trim
Courtesy of BMW OF NORTH AMERICA, INC.

6520 AERIAL/ANTENNA

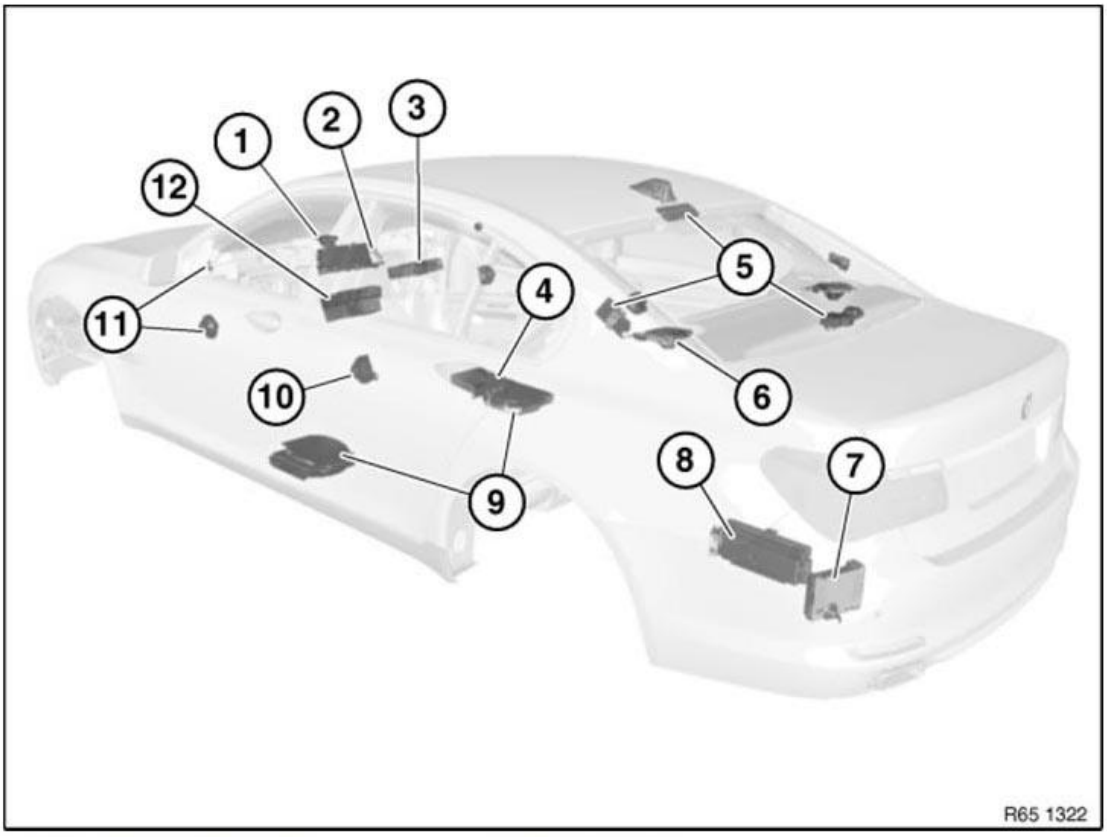
65 20... OVERVIEW OF AERIAL DIVERSITY



1. Aerial amplifier
2. Blocking circuit
3. AM choke (US vehicles only)
4. Back - up aerial
5. Interference suppression filter

Fig. 50: Overview Of Aerial Diversity
Courtesy of BMW OF NORTH AMERICA, INC.

65 00.. OVERVIEW OF AUDIO COMPONENTS



1	Speaker (in dashboard)	7	Satellite tuner
2	Central Information Display (CID)	8	Amplifier
3	DVD changer	9	Central bass speaker
4	DVD player, rear console	10	Speaker (door, rear)
5	Aerial diversity	11	Speaker (door, front)
6	Speaker (in storage shelf)	12	Car Information Computer (CIC)

Fig. 51: Overview Of Audio Components
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 090 REMOVING AND INSTALLING/RENEWING AERIAL AMPLIFIER (DIVERSITY)

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

NOTE: Picture for example purposes.

Component may vary within the different series.

Remove supplementary brake light cover (1) in direction of arrow from molded roofliner (2).

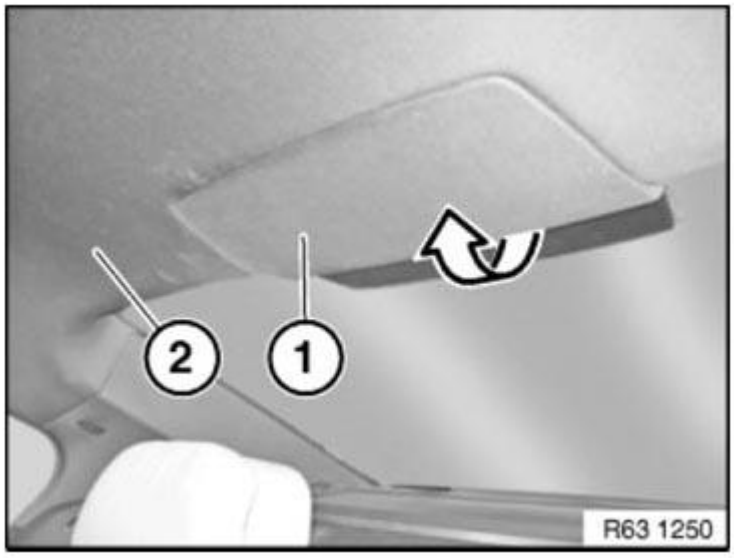


Fig. 52: Identifying Supplementary Brake Light Cover And Molded Roofliner
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Guides (1) and catches (2) must not be damaged.

Make sure cover is correctly seated on supplementary brake light (3).

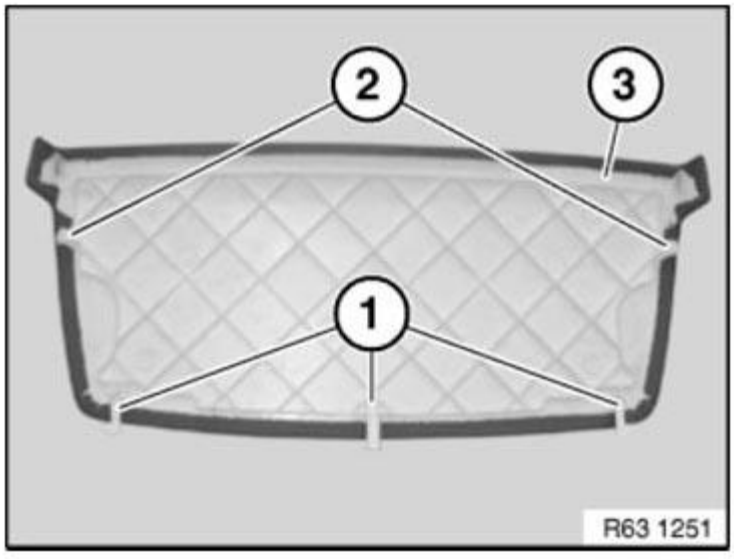


Fig. 53: Identifying Guides, Catches And Supplementary Brake Light
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug connections (3, 4, 5).

Release screws (1).

Remove aerial amplifier (2).

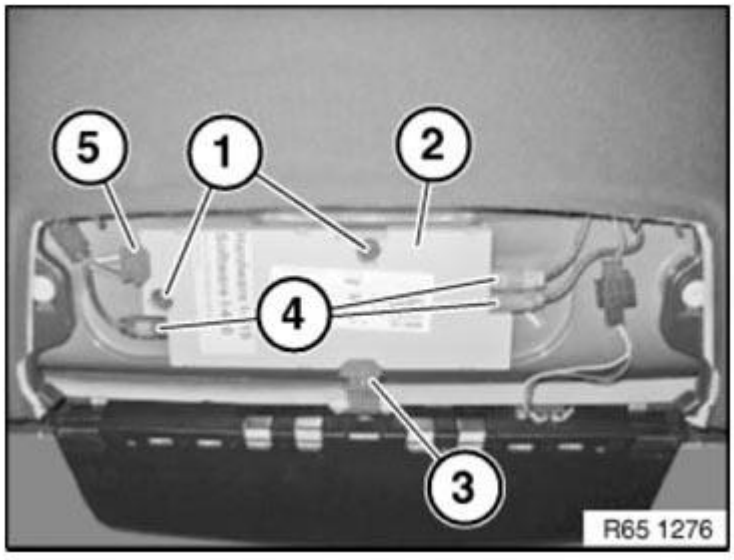


Fig. 54: Identifying Screws, Plug Connections And Aerial Amplifier
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 035 REMOVING AND INSTALLING/RENEWING ROOF AERIAL

Necessary preliminary tasks

- Remove **EMPTY HOUSING** for roof-mounted aerial

Release screw (1).

Slide roof-mounted aerial (2) in direction of arrow and feed out towards top.

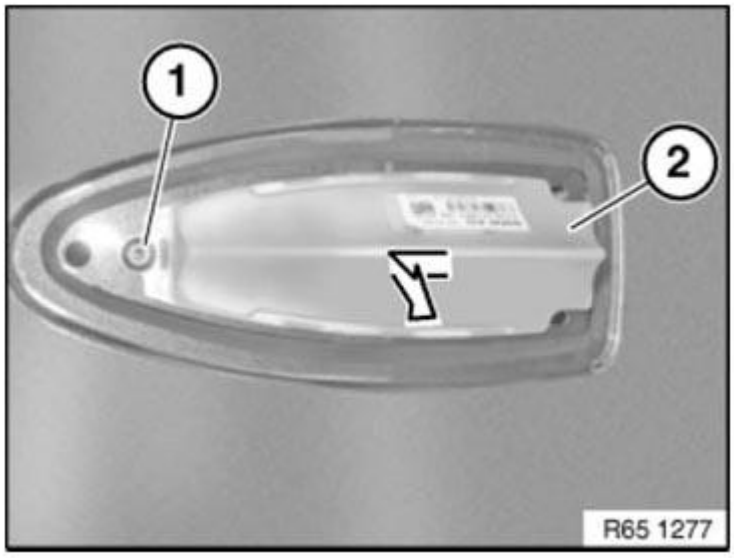


Fig. 55: Identifying Screw And Roof-Mounted Aerial
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) and remove aerial (2).

Retaining lug (3) must be correctly inserted under roof outer skin.

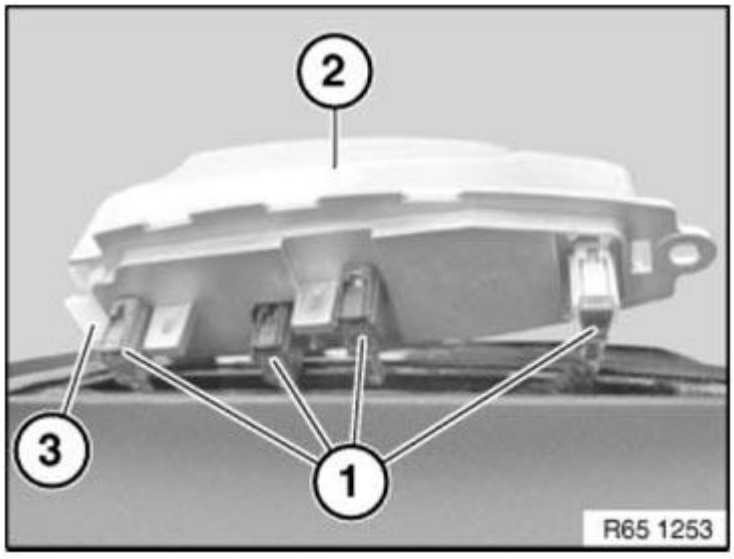


Fig. 56: Identifying Plug Connections, Aerial And Retaining Lug
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 840 REMOVING AND INSTALLING/REPLACING AM CHOKE (INTERFERENCE SUPPRESSION FILTER)

Necessary preliminary work

- Remove trim panel for rear storage shelf. See **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR STORAGE SHELF** or **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR STORAGE SHELF WITH ROLLER SUNBLIND** .

Unlock plug connections (1) and disconnect.

Release screws (3).

Remove AM choke (2) from rear storage shelf (4).

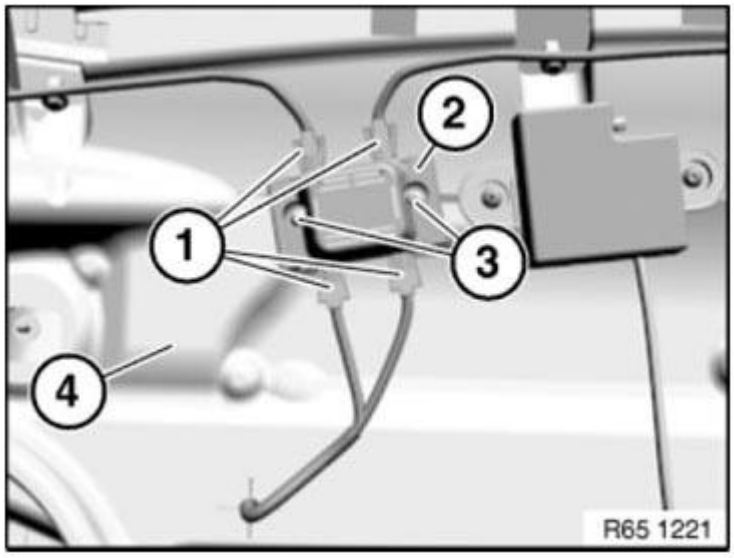


Fig. 57: Identifying Plug Connection, Screw, Rear Storage Shelf And AM Choke
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 150 REMOVING AND INSTALLING/REPLACING BACK-UP AERIAL

Necessary preliminary tasks

- Remove panel for rear window shelf. See **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR STORAGE SHELF** or **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR STORAGE SHELF WITH ROLLER SUNBLIND** .

Unfasten plug connection (1) and disconnect.

Unfasten screws (2).

Remove back-up aerial (3) from rear window shelf (4).

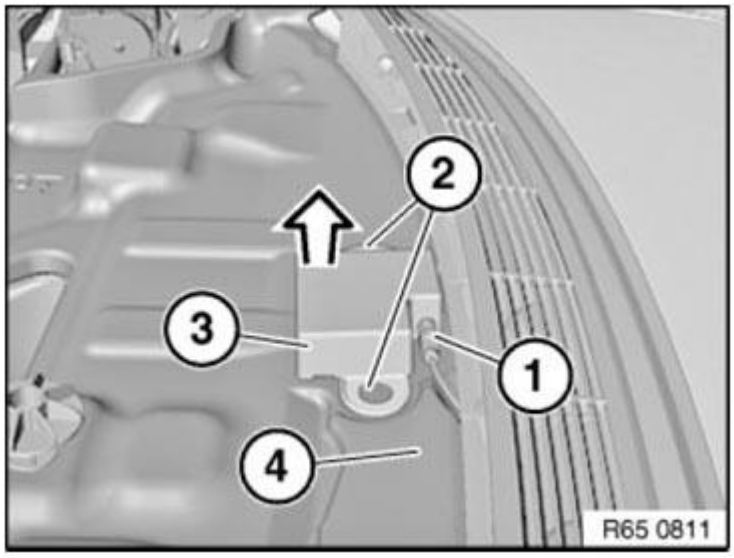


Fig. 58: Removing Back-Up Antenna From Rear Window Shelf
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 030 REMOVING AND INSTALLING/REPLACING EMPTY HOUSING FOR ROOF-MOUNTED AERIAL

Notes

WARNING: Risk of injury!

Special tool has sharp edges!

Adapt working height to vehicle height with non-tilting and non-slip platform.

Handle special tool correctly and make sure it is positioned without tilting or slipping on the vehicle.

Risk of damage!

In order to prevent dents in the roof, do not exert any pressure on the roof.

IMPORTANT: Note to customer:

In order to guarantee a permanent connection and adhesive curing:

After bonding the empty housing for the roof-mounted aerial, wait 24 hours before driving the vehicle through a car wash.

NOTE: Clean roof.

Mask roof (2) around empty housing for roof-mounted aerial (3) with yellow plastic adhesive tape (1). To do so, slide plastic adhesive tape under empty housing (3) slightly.

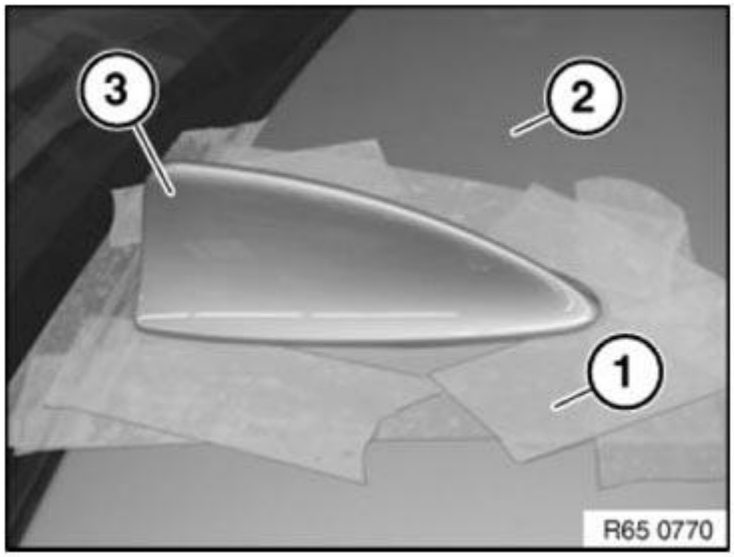


Fig. 59: Identifying Mask Roof, Roof-Mounted Aerial And Yellow Plastic Adhesive Tape
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Make sure your arms do not cross over (1) when holding special tool 65 2 010 .

Pull handle must always be ahead of the guiding hand (2).

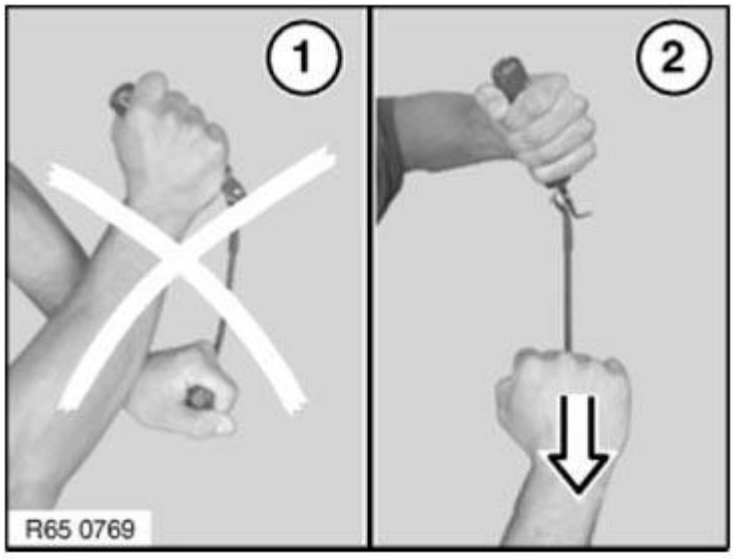


Fig. 60: Pulling Handle Must Always Be Ahead Of Guiding Hand
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

To avoid damaging the paintwork on the roof and empty housing (3), do not fit special tool 65 2 010 skew.

Cut through adhesive bead all round with special tool **65 2 010** .

Pull on handle (1) and align blade on handle (2).

NOTE: Use sharp blades only. Replace blade if necessary.

- Refer to **65 2 010** .

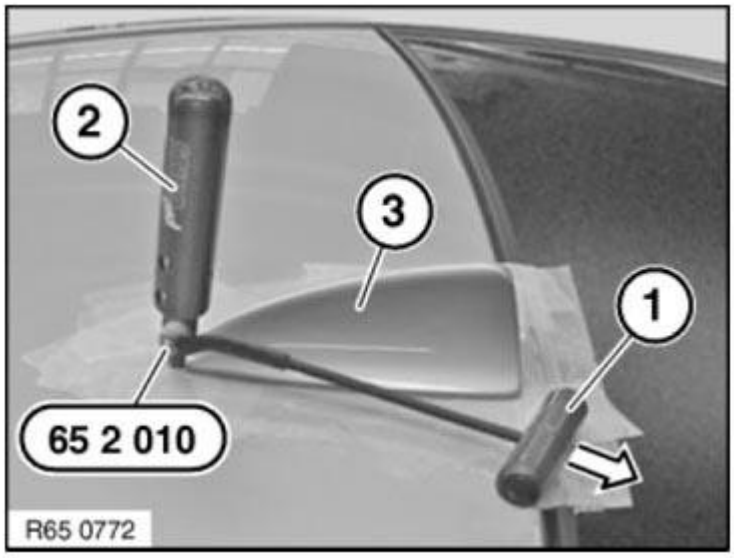


Fig. 61: Pulling On Handle And Align Blade On Handle
Courtesy of BMW OF NORTH AMERICA, INC.

Remove empty housing (3).

Installation

Empty housing for roof-mounted aerial is secured with window glass adhesive. All preparatory operations correspond to the **Window cementing instructions** .

NOTE: Replace empty housing for roof-mounted aerial if centering pins (1) on empty housing are damaged.

Bonding surface (2) must be clean and free from grease.

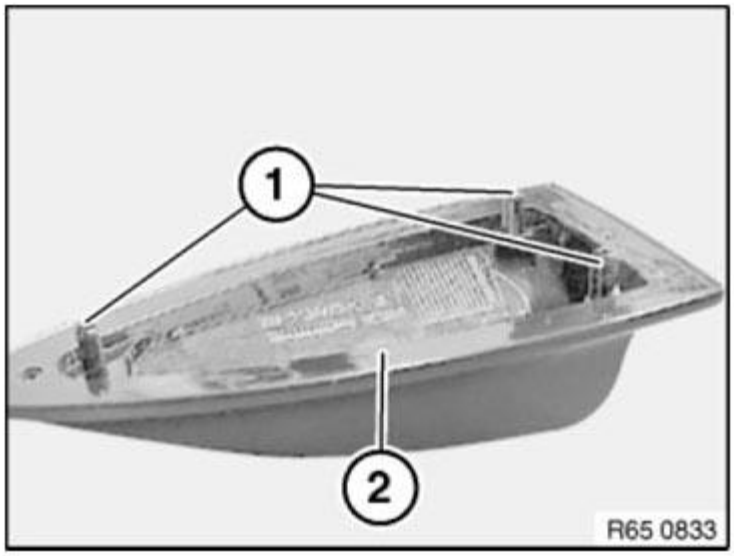


Fig. 62: Identifying Centering Pins And Bonding Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Position two spacers (1) on cleaned empty housing.

Dimensions:

A. 10 mm
B. 14 mm

Position spacer (2) centrally and flush with shoulder of adhesive flange.

IMPORTANT: Use spacers without fail!

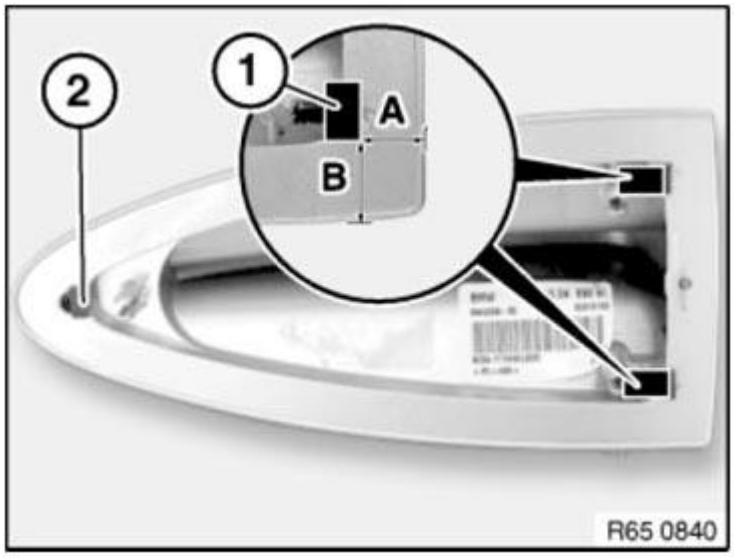


Fig. 63: Positioning Spacer Centrally And Flush With Shoulder Of Adhesive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

Apply trace of adhesive bead all round outer contour as follows.

Distance between adhesive bead and edge of aerial cover:

A. 6.5 mm ±1 mm

Start and end of bead trace must have an overlap length of max. 10 mm.

IMPORTANT: To prevent the adhesive from escaping, the adhesive bead diameter must not exceed max. 2.5 mm to 4.5 mm.

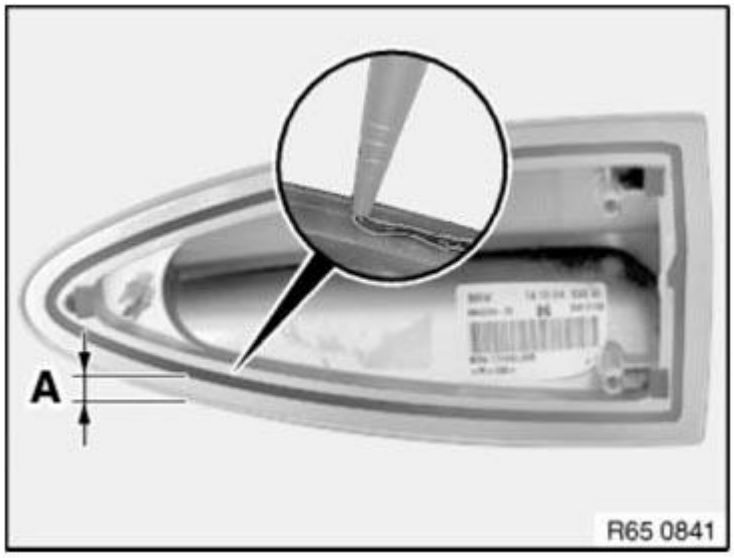


Fig. 64: Applying Trace Of Adhesive Bead All Round Outer Contour
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Attach the empty housing coated with adhesive by hand. To spread the adhesive better, move the housing back and forth horizontally slightly when pressing down.

Secure empty housing if necessary with adhesive tape and press down uniformly.

After bonding, leave vehicle to stand for at least 3 hours at room temperature.

65 20 350 REMOVING AND INSTALLING/REPLACING INTERFERENCE SUPPRESSION FILTER

Necessary preliminary work

- Remove **TRIM PANEL FOR ROOF PILLAR AT REAR LEFT**

Equipment specification with rear A/C system.

Release screw (1).

Slide lock (2) in direction of arrow.

Feed out air duct (3).

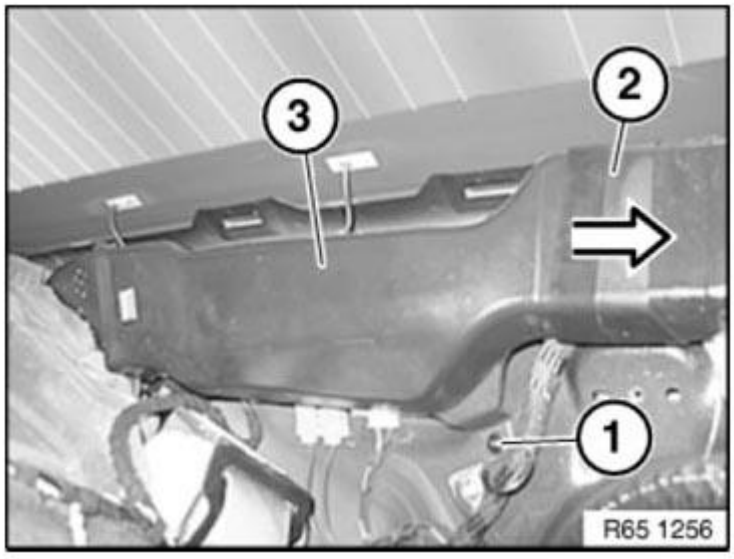


Fig. 65: Identifying Screw, Slide Lock And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Unlock plug connections (2) and disconnect.

Remove interference suppression filter (3) from C-pillar.

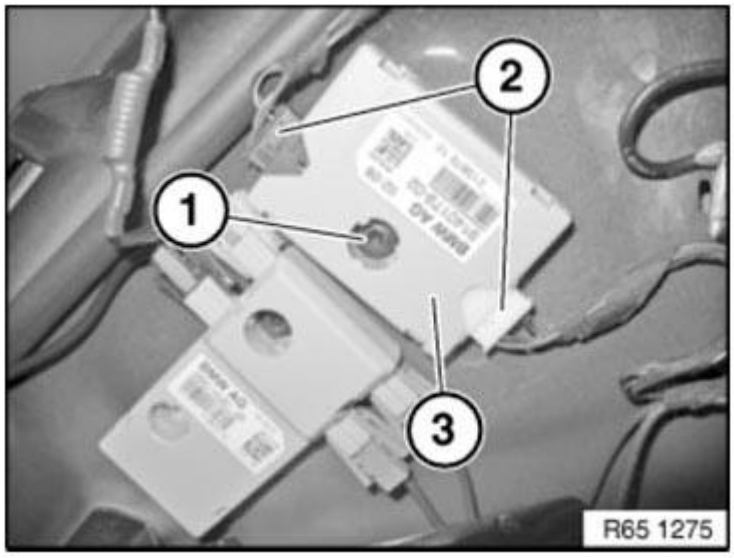


Fig. 66: Identifying Screw, Plug Connections And Interference Suppression Filter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Fit interference suppression filter (1) so that screw (2) engages thread (3) and locating pin (4) engages in bore hole (5).

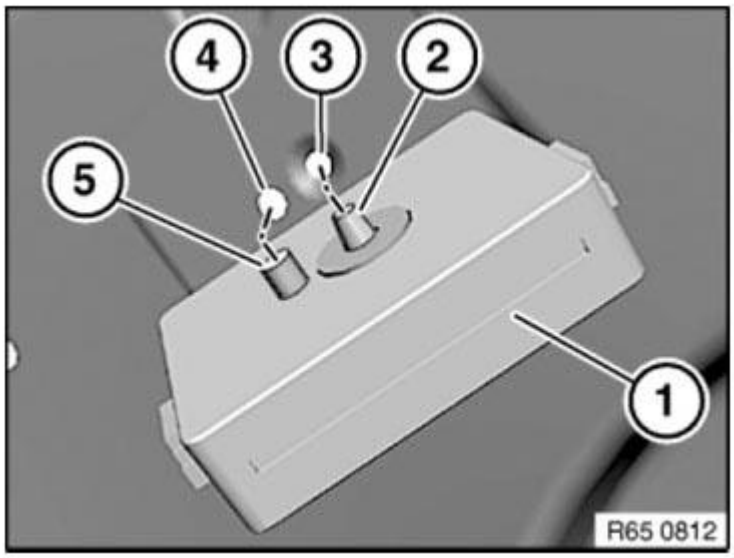


Fig. 67: Identifying Suppression Filter, Screws, Engages Thread, Bore Hole And Locating Pin
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 250 REMOVING AND INSTALLING/REPLACING REAR TELEPHONE AERIAL

Necessary preliminary tasks

- Remove **REAR BUMPER TRIM**
- Remove **LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM**

Unfasten plug connection (1) and disconnect.

Pull telephone aerial lead out of cable penetration (2) in tail panel (3).

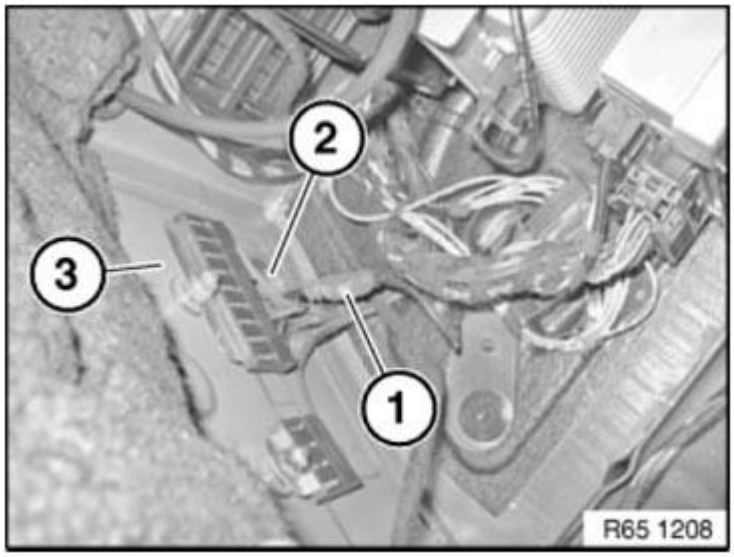


Fig. 68: Identifying Plug Connection, Cable Penetration And Tail Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove telephone aerial (2) from bumper guide (3).

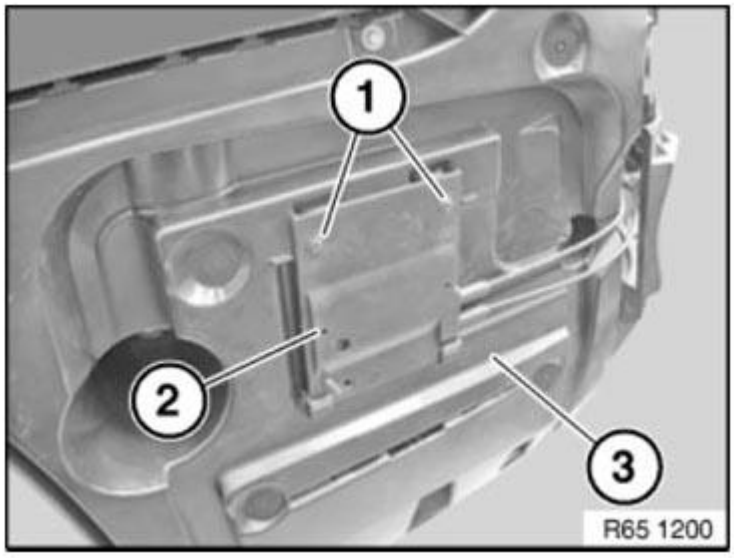
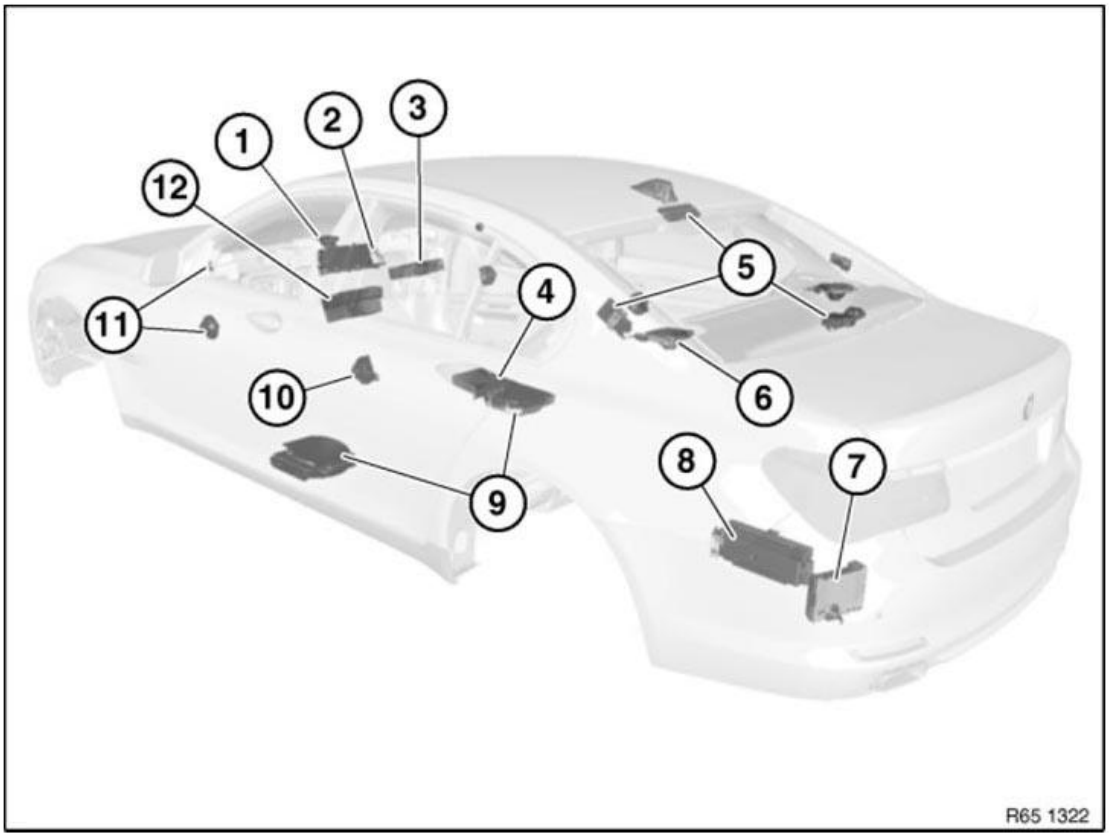


Fig. 69: Identifying Screws, Telephone Aerial And Bumper Guide
Courtesy of BMW OF NORTH AMERICA, INC.

6524 REAR WINDOW AERIAL/ANTENNA

65 00.. OVERVIEW OF AUDIO COMPONENTS



1	Speaker (in dashboard)	7	Satellite tuner
2	Central Information Display (CID)	8	Amplifier
3	DVD changer	9	Central bass speaker
4	DVD player, rear console	10	Speaker (door, rear)
5	Aerial diversity	11	Speaker (door, front)
6	Speaker (in storage shelf)	12	Car Information Computer (CIC)

Fig. 70: Overview Of Audio Components
Courtesy of BMW OF NORTH AMERICA, INC.

65 50 030 REMOVING AND INSTALLING/REPLACING TV MODULE

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

NOTE: Follow instructions for HANDLING OPTICAL FIBRES .

Necessary preliminary tasks:

- Clamp off **BATTERY NEGATIVE LEAD** .
- Remove **LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM** .

Release screws (1).

Remove TV module (2).

Unlock and detach plug connections (3 and 4).

Installation:

Make sure plug connections (4) are in correct color sequence.

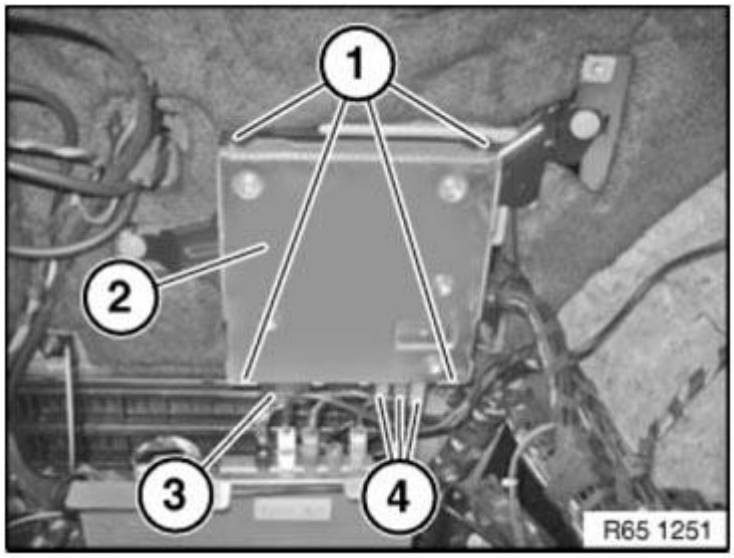


Fig. 71: Identifying Screws, TV Module And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

65 24 020 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT BLOCKING CIRCUIT

Necessary preliminary work

- Remove **TRIM PANEL FOR ROOF PILLAR AT REAR** .

Equipment specification with rear A/C system.

Release screw (1).

Slide lock (2) in direction of arrow.

Feed out air duct (3).

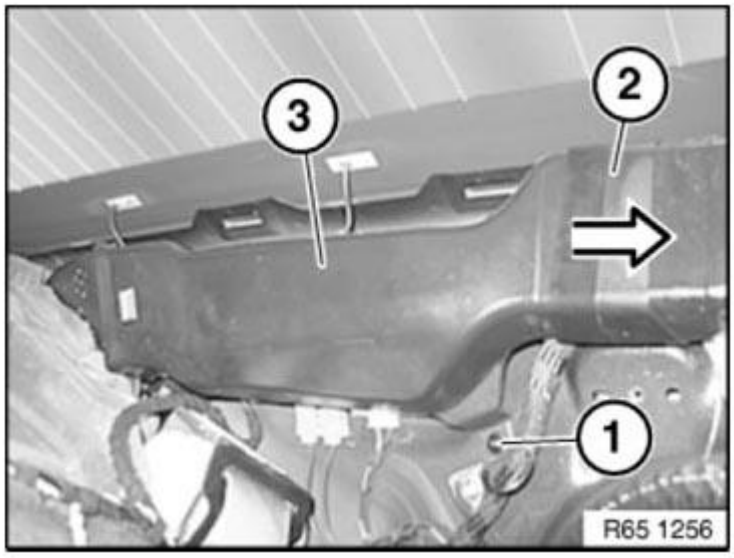


Fig. 72: Identifying Screw, Slide Lock And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

If necessary, release screw (4).

Unlock plug connections (2) and disconnect.

If necessary, disconnect plug connection (5).

Remove blocking circuit (3) from C-pillar.

Installation note:

Position blocking circuit (3) so that positioning pin on back engages in associated bore hole.

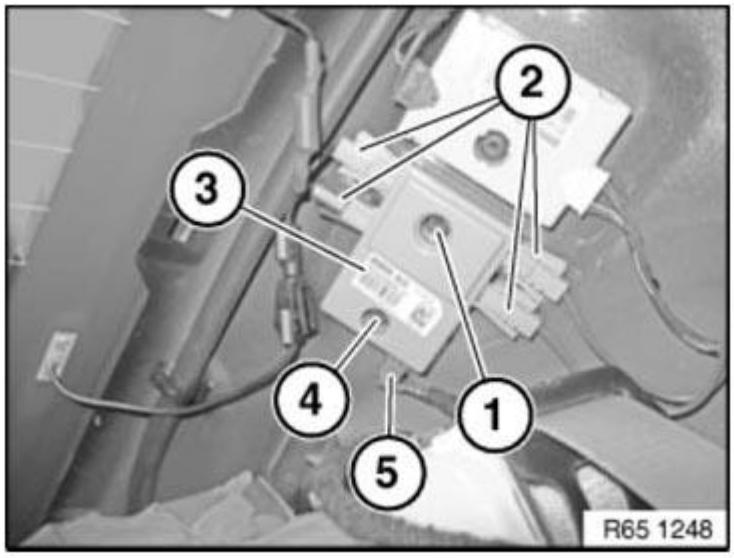


Fig. 73: Identifying Screw, Plug Connections, Blocking Circuit And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

65 24 020 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT BLOCKING CIRCUIT

Necessary preliminary tasks

- Remove **TRIM PANEL FOR ROOF PILLAR AT REAR** .

Release screw (1).

If necessary, release screw (4).

Unlock plug connections (2) and disconnect.

If necessary, disconnect plug connection (5).

Remove blocking circuit (3) from C-pillar.

Installation:

Position blocking circuit (3) so that positioning pin on back engages in associated hole.

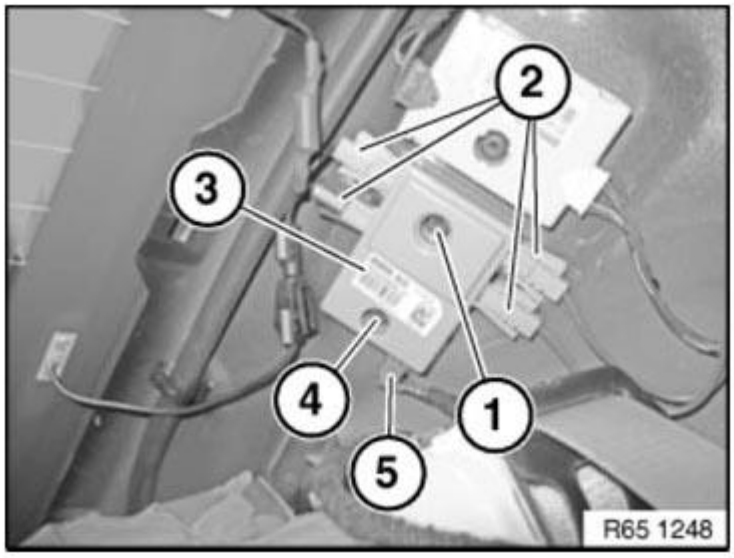
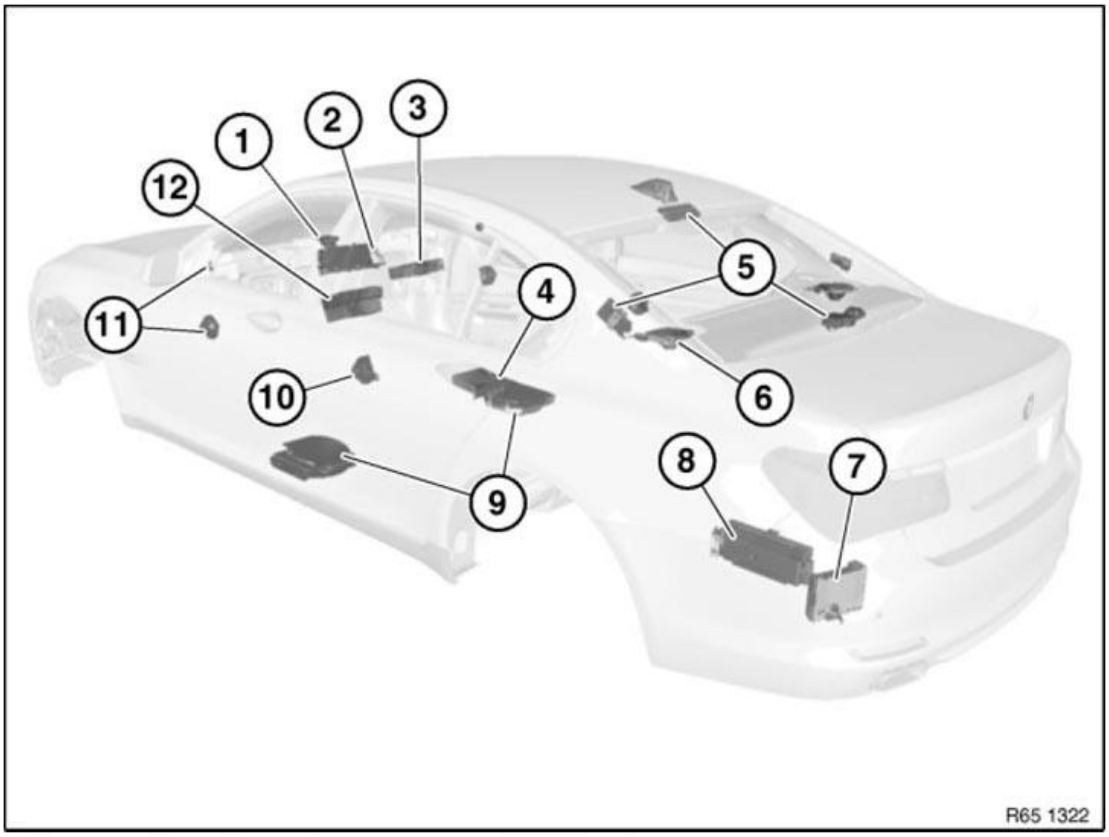


Fig. 74: Identifying Screw, Plug Connections, Blocking Circuit And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

6525 AERIAL/ANTENNA DIVERSITY

65 00.. OVERVIEW OF AUDIO COMPONENTS

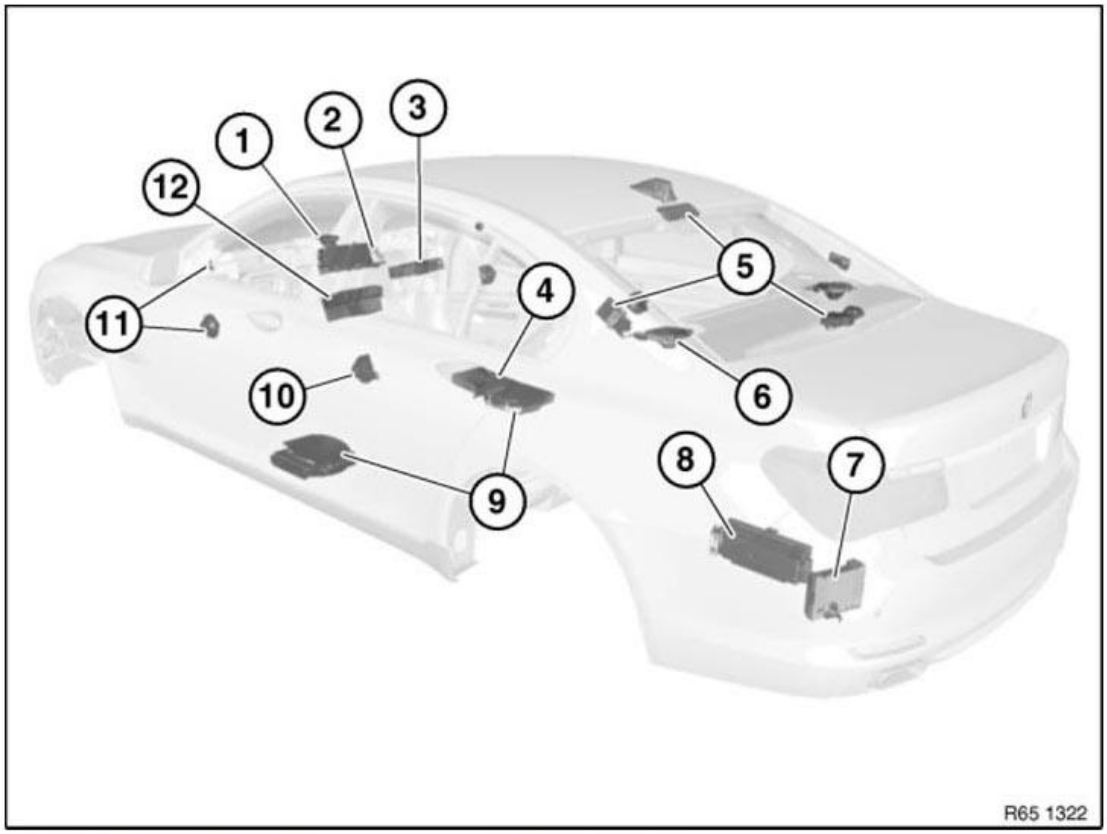


1 Speaker (in dashboard)
2 Central Information Display (CID)
3 DVD changer
4 DVD player, rear console
5 Aerial diversity
6 Speaker (in storage shelf)
7 Satellite tuner
8 Amplifier
9 Central bass speaker
10 Speaker (door, rear)
11 Speaker (door, front)
12 Car Information Computer (CIC)

Fig. 75: Overview Of Audio Components (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

6531 INTERFERENCE SUPPRESSION

65 00.. OVERVIEW OF AUDIO COMPONENTS



1 Speaker (in dashboard)
2 Central Information Display (CID)
3 DVD changer
4 DVD player, rear console
5 Aerial diversity
6 Speaker (in storage shelf)
7 Satellite tuner
8 Amplifier
9 Central bass speaker
10 Speaker (door, rear)
11 Speaker (door, front)
12 Car Information Computer (CIC)

Fig. 76: Overview Of Audio Components (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

6550 VIDEO AND TV EQUIPMENT

65 50 057 REMOVING AND INSTALLING/REPLACING CENTRAL INFORMATION DISPLAY (CID)

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

Necessary preliminary work

F01, 02, 03, 04:

- Remove **DECORATIVE STRIP ON DASHBOARD IN MIDDLE**

F07, 10, 11, 18:

- Remove decorative strip on dashboard on right

Release screws (1).

Tightening torque **65 50 1AZ** .

Guide out CID (2) in direction of arrow.

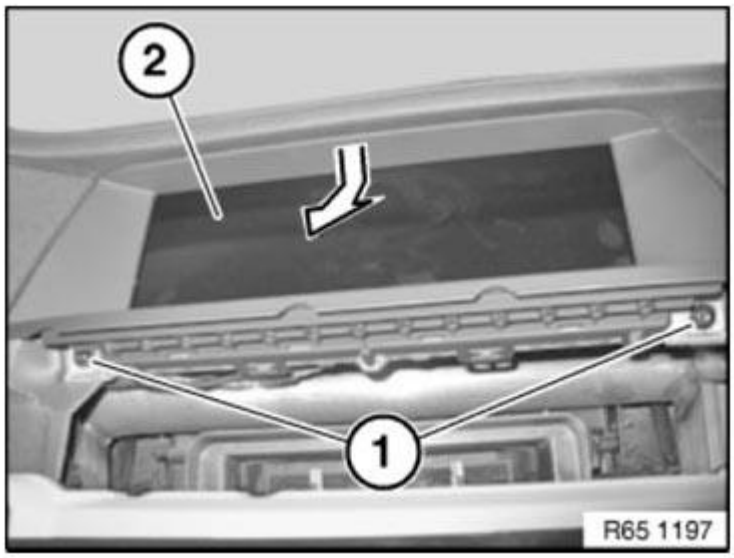


Fig. 77: Identifying Screws And CID
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and (2) and disconnect.

Remove CID (3).

Installation note:

Ensure correct cable routing.

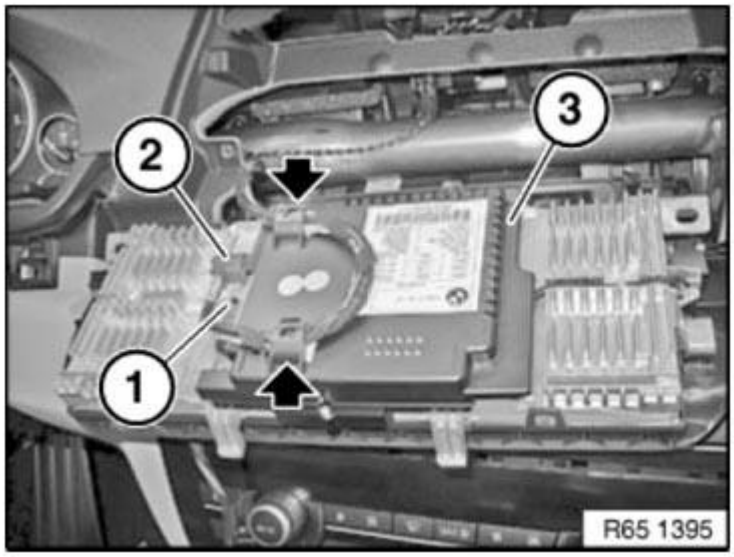


Fig. 78: Identifying Plug Connections And CID
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Brackets (1) on CID (2) must be seated correctly in intended dashboard guides.

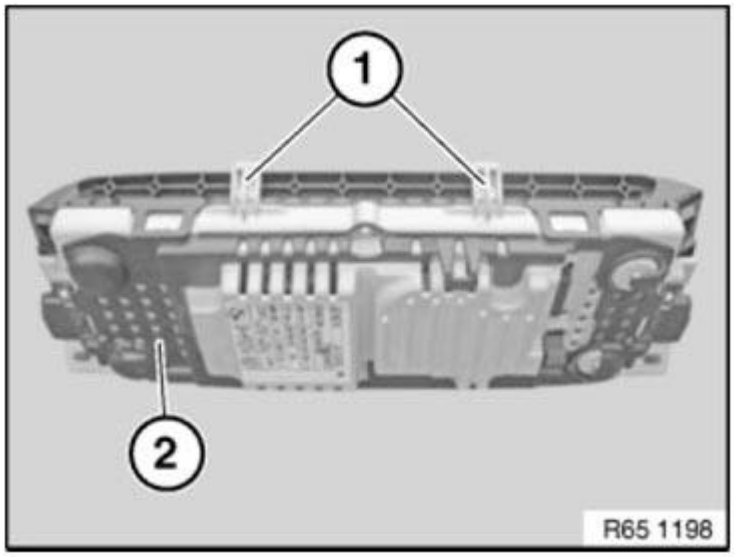


Fig. 79: Identifying Brackets And CID
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING** .

65 50 030 REMOVING AND INSTALLING/REPLACING TV MODULE

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

NOTE: Follow instructions for NOTES ON HANDLING OPTICAL FIBRES .

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM**

Release screws (1).

Remove TV module (2).

Unlock and detach plug connections (3 and 4).

Installation:

Make sure plug connections (4) are in correct color sequence.

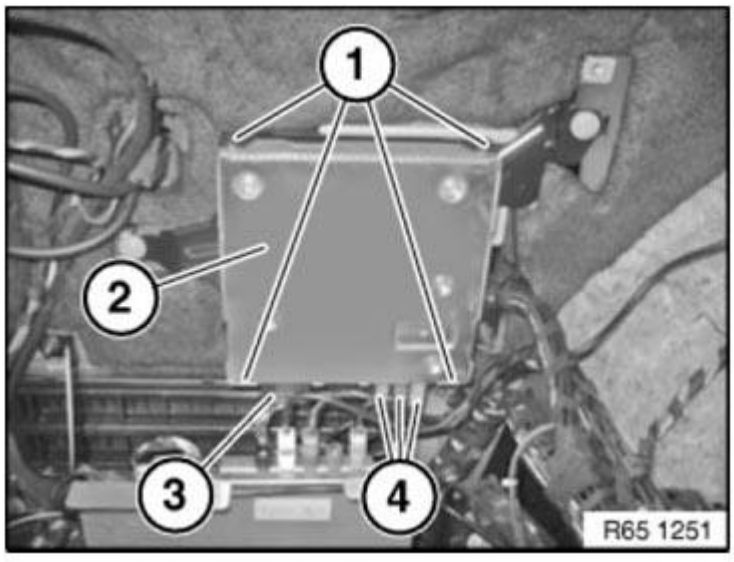


Fig. 80: Identifying Screws, TV Module And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

65 50 170 REMOVING AND INSTALLING/REPLACING COVER FOR CENTRAL INFORMATION DISPLAY (CID, JC)

Notes

NOTE: These repair instructions apply to the Central Information Display (CID) of the manufacturer Johnson Controls (JC).

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary work

- Remove **CENTRAL INFORMATION DISPLAY**

Release screws (1).

Tightening torque **65 50 2AZ**

NOTE: To tighten screws, use special tool 00 9 460 .

Remove rear cover (2) from

Central Information Display (3).

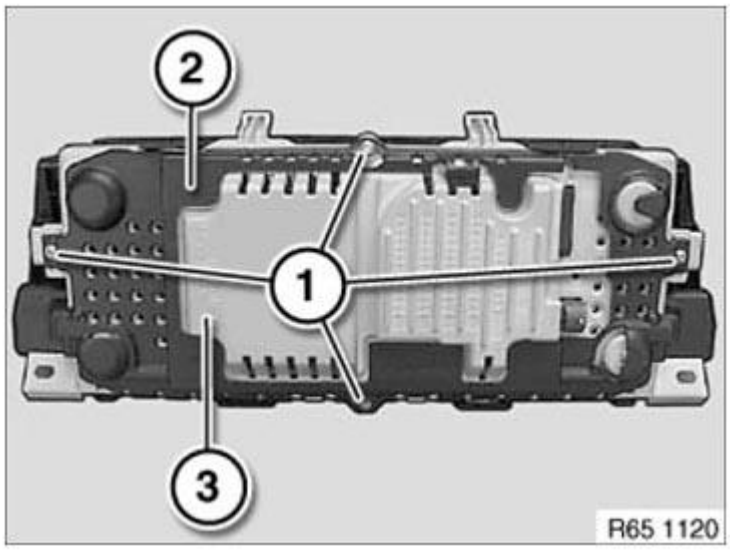


Fig. 81: Identifying Screws, Rear Cover And Central Information Display
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure rear cover (2) is correctly seated on Central Information Display (3).

IMPORTANT: Do not damage or scratch the display!

Carefully disconnect the plug connection (1) (**only F01, F02, F03, F04**).

Carefully raise latch mechanisms (2) and remove Central Information Display (3) from Central Information Display cover (4).

Installation note:

Make sure latch mechanisms (2) are heard to click into place.

Make sure rear Central Information Display cover (4) is correctly seated on Central Information Display (3).

Ensure correct cable routing in guide (5).

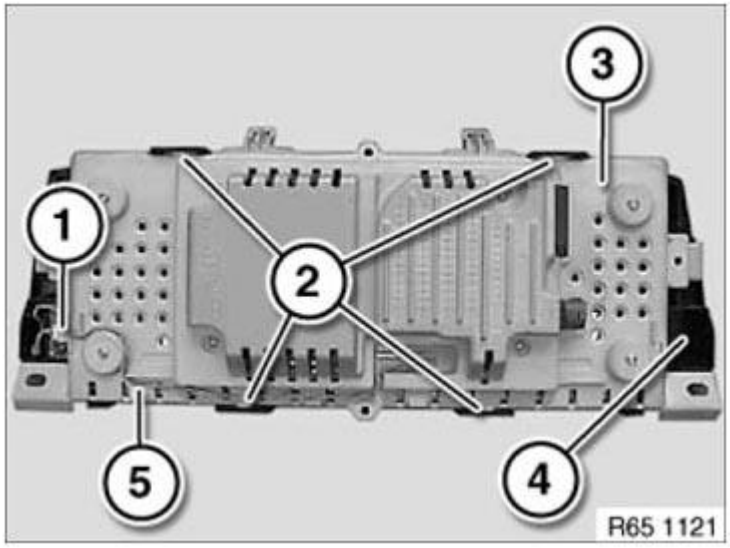


Fig. 82: Identifying Plug Connection, Latch Mechanisms, Central Information Display Cover And Guide
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before/after assembly, cover is bolted to the Central Information Display, correct installation position must first be checked!

Installation note:

Before connecting the screw connection, check whether latch mechanisms marked with an arrow are correctly seated.

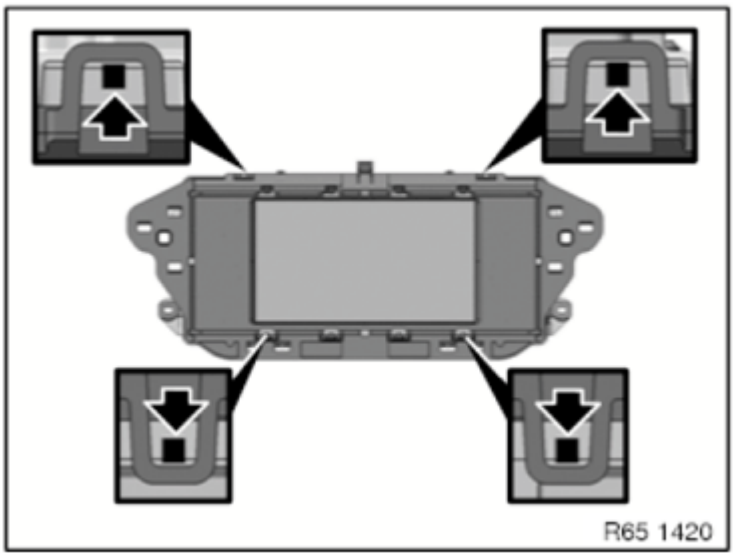


Fig. 83: Identifying Central Information Display Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Before connecting the screw connection, check all-round rim at the places marked with an arrow.

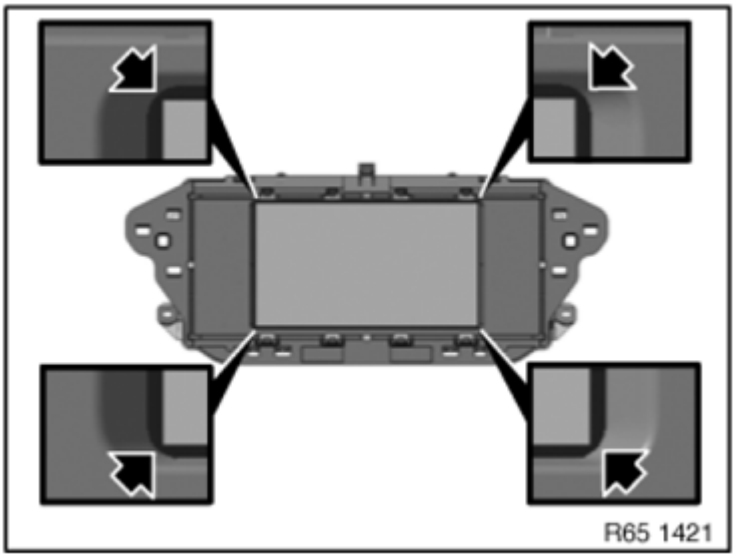


Fig. 84: Identifying Screw Connection Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

65 50 160 REMOVING AND INSTALLING/REPLACING COVER FOR REAR PASSENGER COMPARTMENT MONITOR AT FRONT

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD

protection).

Necessary preliminary work

- Remove **COVER FOR REAR PASSENGER COMPARTMENT MONITOR AT REAR**

IMPORTANT: Do not damage or scratch display.

Release screws (1).

Tightening torque **65 50 1AZ** .

Carefully disconnect plug connection (3).

Remove rear passenger compartment monitor (4) from cover (5).

Installation note:

Ensure correct cable routing in guides (2).

Make sure cover (5) is correctly seated on rear passenger compartment monitor (4).

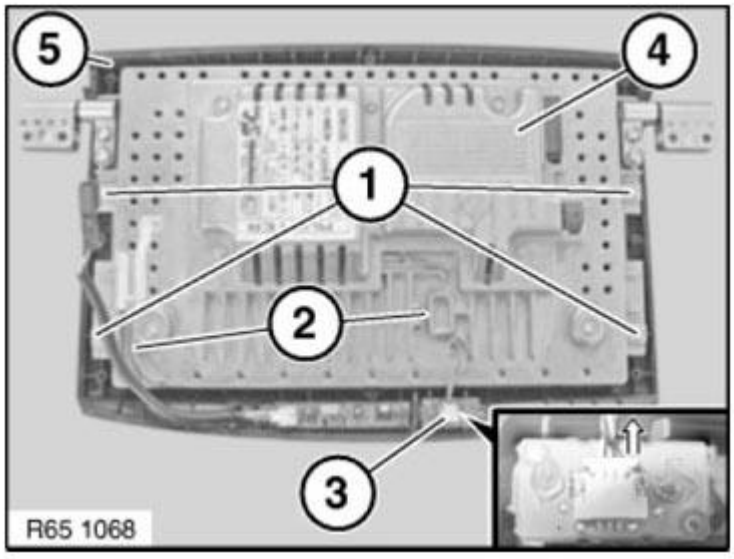


Fig. 85: Identifying Screws, Plug Connection, Rear Passenger Compartment Monitor, Guides And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

65 50... REMOVING AND INSTALLING/REPLACING FRICTION HINGES FOR REAR CABIN MONITOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC

DAMAGE (ESD PROTECTION)

Do not damage or scratch display.

Necessary preliminary tasks

- Remove **REAR CABIN MONITOR**

Release screws (1).

Tightening torque **65 50 1AZ** .

Remove cover (3) from rear cabin monitor (4), unclipping plug (2) and feed out cable.

Installation:

Make sure cover (3) is correctly seated on rear cabin monitor (4).

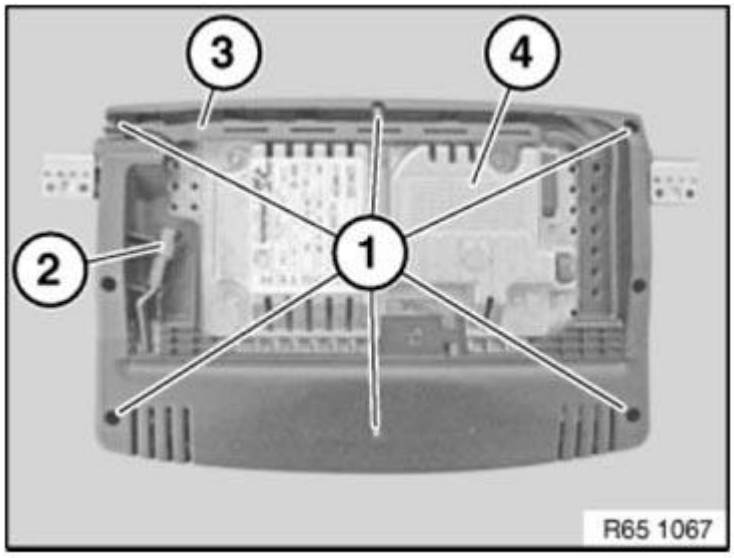


Fig. 86: Identifying Cover, Rear Cabin Monitor, Unclipping Plug And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque **65 50 2AZ** .

Remove friction hinges (1) from rear cabin monitor (3).

Installation

Observe gap dimension adjustment when screwing friction hinges (2) to rear cabin monitor (3) on left and right.

Gap dimensions:

A. 0.9 mm
B. 1.5 mm

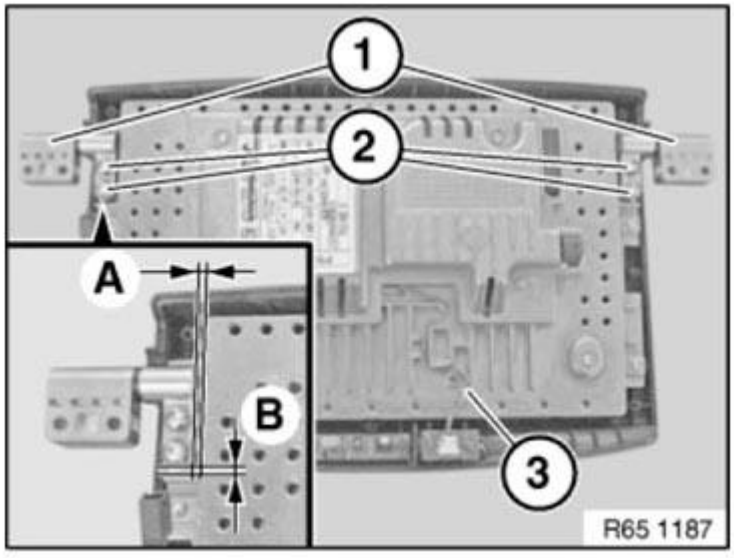


Fig. 87: Identifying Screws, Friction Hinges And Rear Cabin Monitor
Courtesy of BMW OF NORTH AMERICA, INC.

65 50 125 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR MONITOR

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Installation note:

- Remove **REAR PASSENGER COMPARTMENT MONITOR COVER**

Release screws (1).

Remove rear passenger compartment monitor (2) from holder (3).

Installation note:

Make sure rear passenger compartment monitor (2) is correctly seated on holder (3).

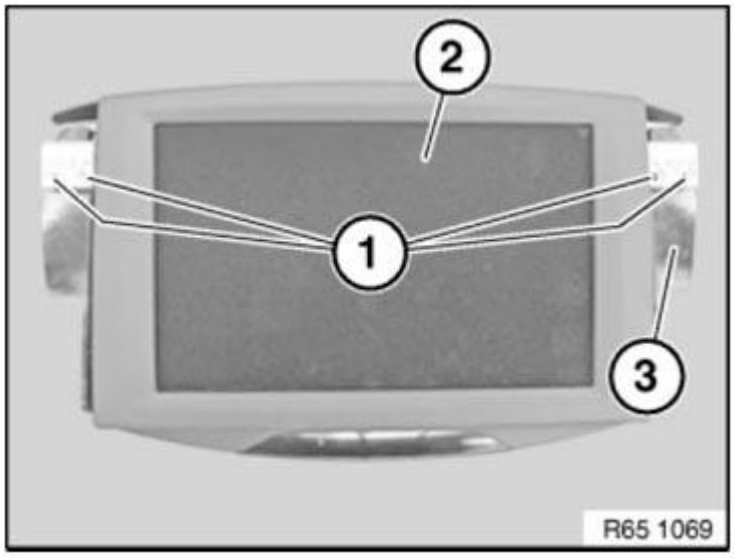


Fig. 88: Identifying Screws, Rear Passenger Compartment Monitor And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections and disconnect.

Remove monitor in rear (1).

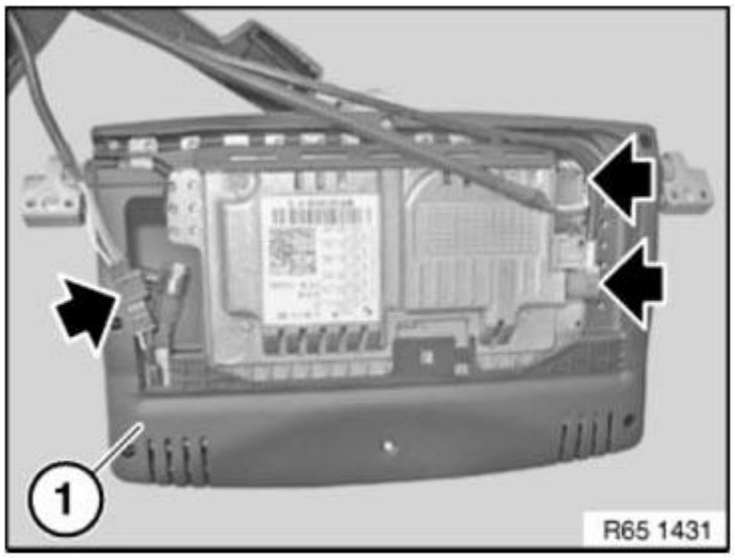


Fig. 89: Removing Plug Connections And Monitor
Courtesy of BMW OF NORTH AMERICA, INC.

65 50 165 REMOVING AND INSTALLING/REPLACING TRIM FOR REAR MONITOR DISPLAY AT REAR

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD

protection).

Necessary preliminary work

- **REMOVE REAR MONITOR**

Release screws (1).

Tightening torque **65 50 1AZ** .

Remove cover (3) from rear monitor (4), unclipping plug (2) and feed out cable.

Installation note:

Make sure cover (3) is correctly seated on rear monitor (4).

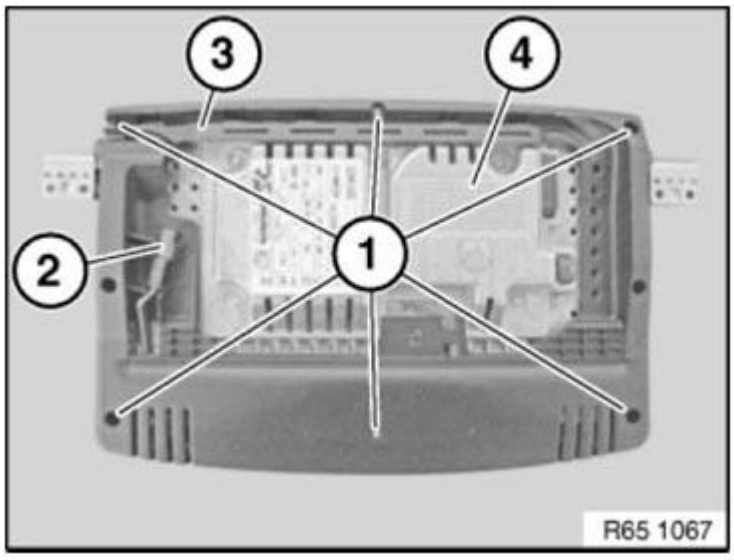


Fig. 90: Identifying Screws, Cover, Rear Monitor And Unclip Plug
Courtesy of BMW OF NORTH AMERICA, INC.

65 50 025 REMOVING AND INSTALLING/REPLACING VIDEO SWITCH

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

NOTE: Follow instructions for NOTES ON HANDLING OPTICAL FIBRES .

Necessary preliminary tasks

- Disconnect **BATTERY NEGATIVE LEAD**

- Remove **LUGGAGE COMPARTMENT WHEEL ARCH TRIM** on left.

NOTE: Video switch is located on the back of the bracket for the TV module.

Release screws (1) and nuts (2).

Remove TV module (3) including bracket.

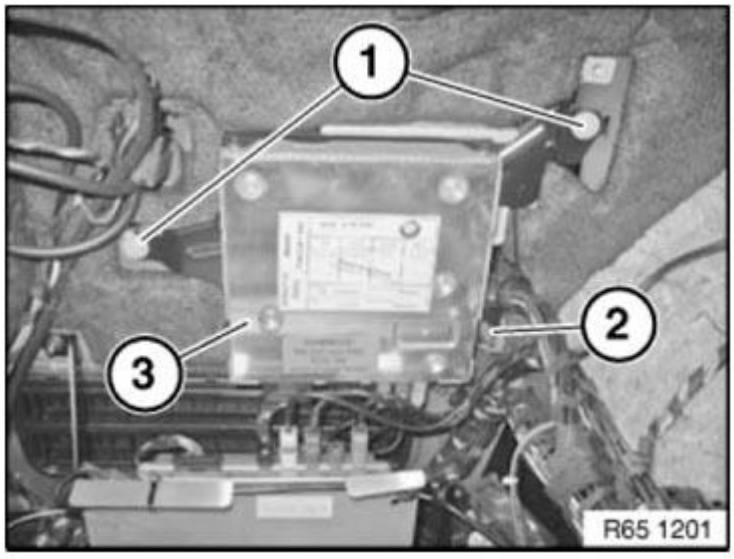


Fig. 91: Identifying Screws, Nuts And TV Module
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Unfasten plug connection (2) and disconnect.

Remove video switch (3).

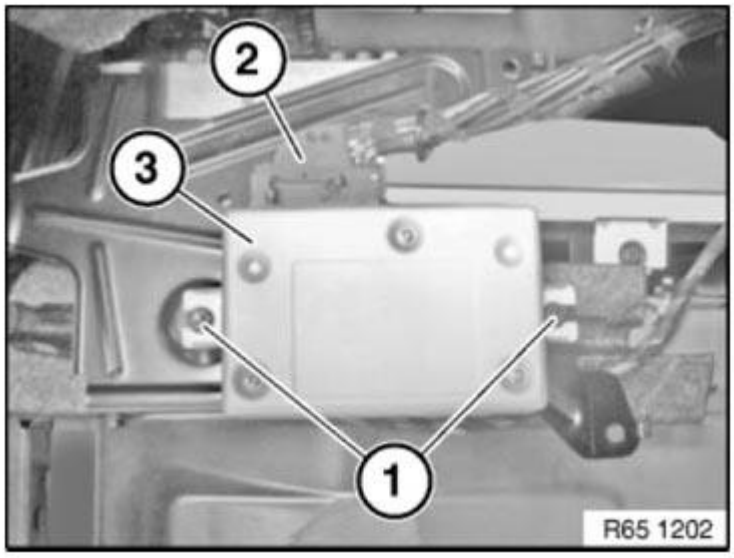


Fig. 92: Identifying Screws, Plug Connection And Video Switch
Courtesy of BMW OF NORTH AMERICA, INC.

6575 ANTI-THEFT ALARM SYSTEM

65 75 055 REMOVING AND INSTALLING/REPLACING EMERGENCY POWER SIREN WITH TILT SENSOR

Necessary preliminary work

- Remove **GUIDE FOR BUMPER AT REAR RIGHT**

Secure guide for bumper (3) against falling out.

Unfasten plug connection (1) and disconnect.

Slacken nut (1).

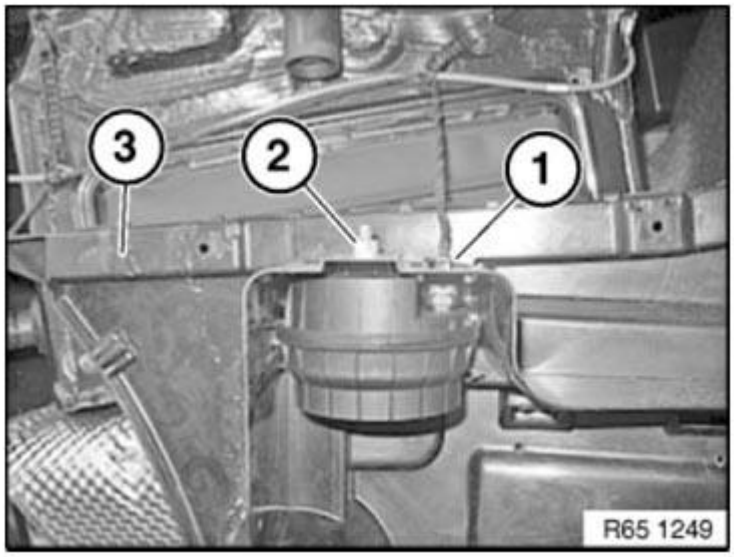


Fig. 93: Identifying Bumper, Plug Connection And Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock catch (1).

Remove emergency power siren (2) from guide for bumper (3).

Catch (1) must not be damaged.

Make sure emergency power siren (2) is correctly seated on guide for bumper (3).

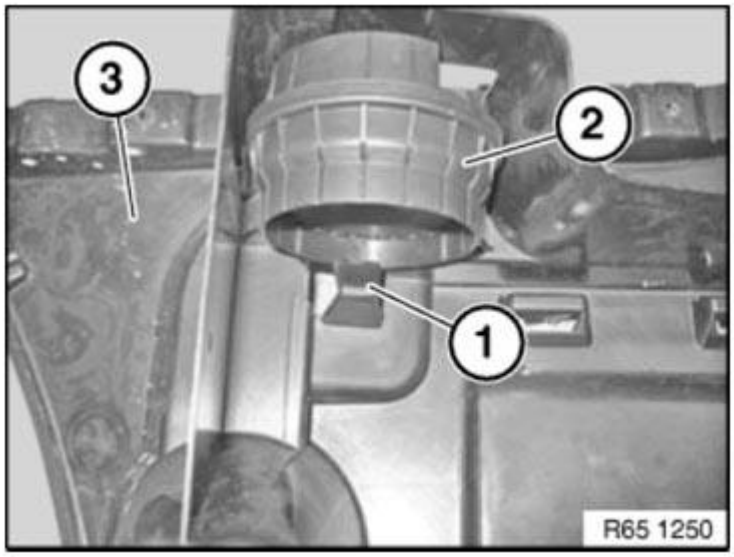


Fig. 94: Identifying Catch And Power Siren
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING** .

6576 PEDESTRIAN PROTECTION

65 76 600 REMOVING AND INSTALLING (REPLACING) LEFT PEDESTRIAN PROTECTION SENSOR

WARNING: Observe SAFETY INSTRUCTIONS for handling gas generators.

Incorrect handling can activate pedestrian protection and cause injury.

Necessary preliminary work

- Disconnect **BATTERY CABLE**
- Remove **ORNAMENTAL GRILLE IN BUMPER TRIM** .

Release screws (1).

Tightening torque **65 76 1AZ** .

Feed out sensor (2).

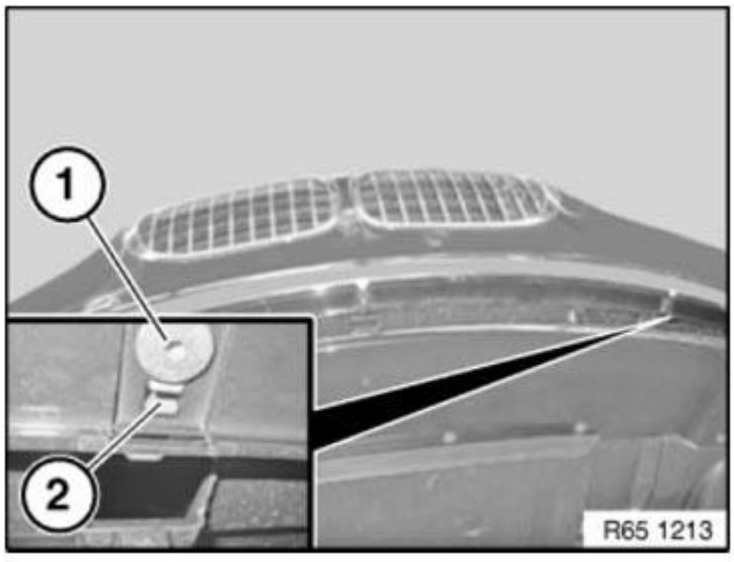


Fig. 95: Identifying Screws And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove sensor (2).

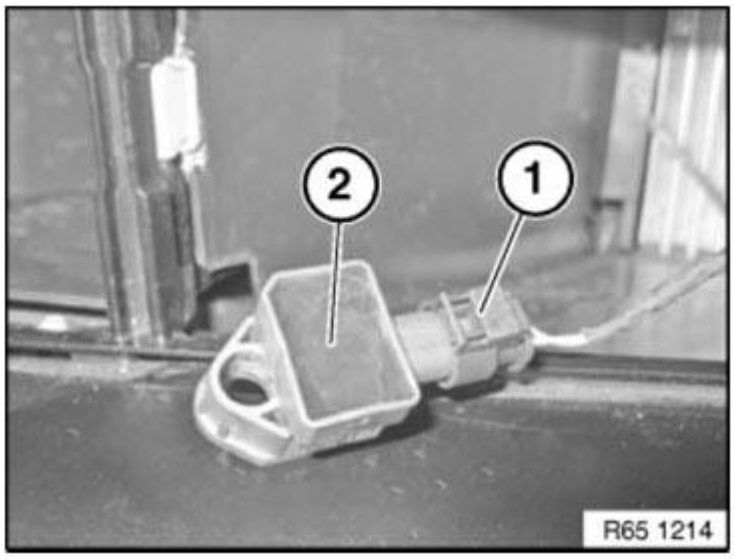


Fig. 96: Identifying Plug Connection And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

65 76 605 REMOVING AND INSTALLING/REPLACING MIDDLE PEDESTRIAN PROTECTION SENSOR

WARNING: Observe SAFETY INSTRUCTIONS for handling gas generators.

Incorrect handling can activate pedestrian protection and cause injury.

Necessary preliminary work

- Disconnect **BATTERY CABLE**
- Remove **BASEPLATE FOR NUMBER PLATE**
- Remove **ORNAMENTAL GRILLE IN BUMPER TRIM** .

Release screws (1).

Tightening torque **65 76 1AZ** .

Feed out sensor (2).

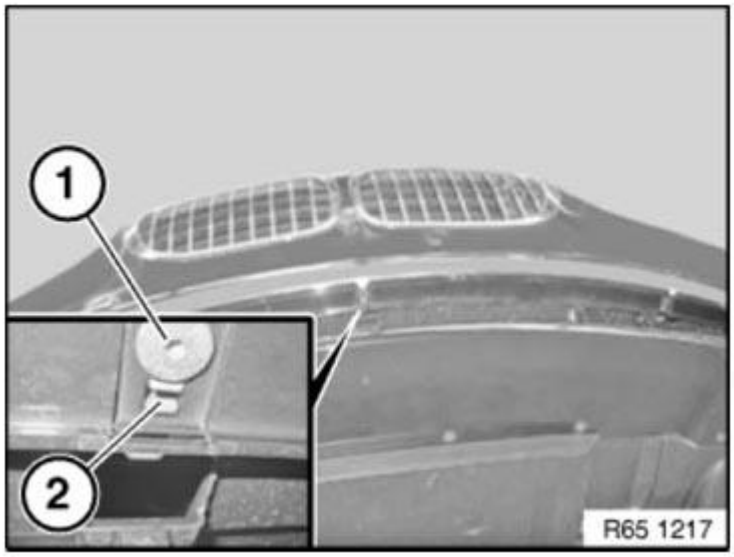


Fig. 97: Identifying Screws And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove sensor (2).

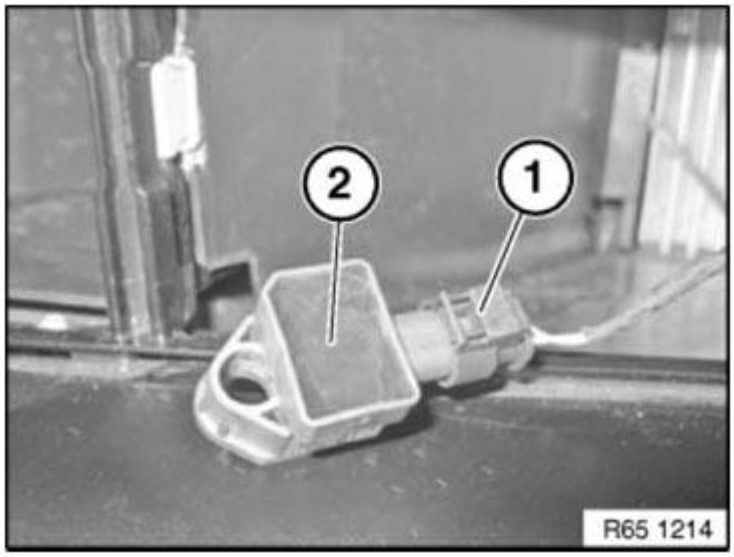


Fig. 98: Identifying Plug Connection And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

65 76 610 REMOVING AND INSTALLING/REPLACING RIGHT PEDESTRIAN PROTECTION SENSOR

WARNING: Observe SAFETY INSTRUCTIONS for handling gas generators.

Incorrect handling can activate pedestrian protection and cause injury.

Necessary preliminary work

- Disconnect **BATTERY CABLE**
- Remove **ORNAMENTAL GRILLE IN BUMPER TRIM** .

Release screws (1).

Tightening torque **65 76 1AZ** .

Feed out sensor (2).

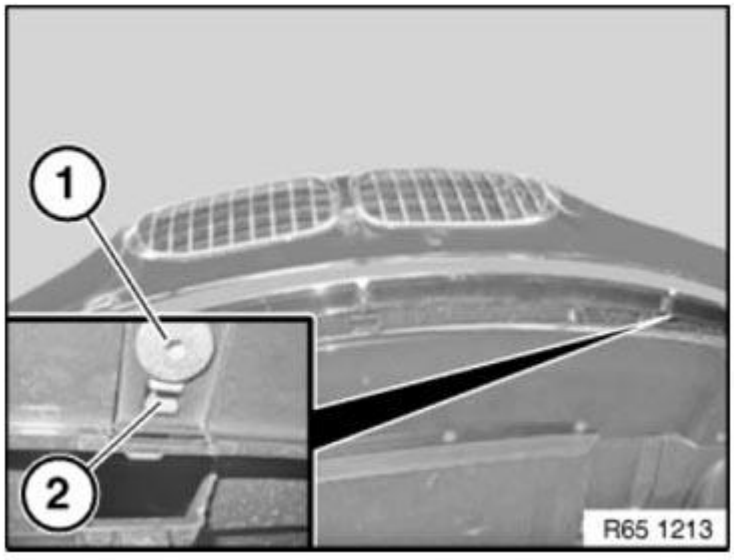


Fig. 99: Identifying Screws And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove sensor (2).

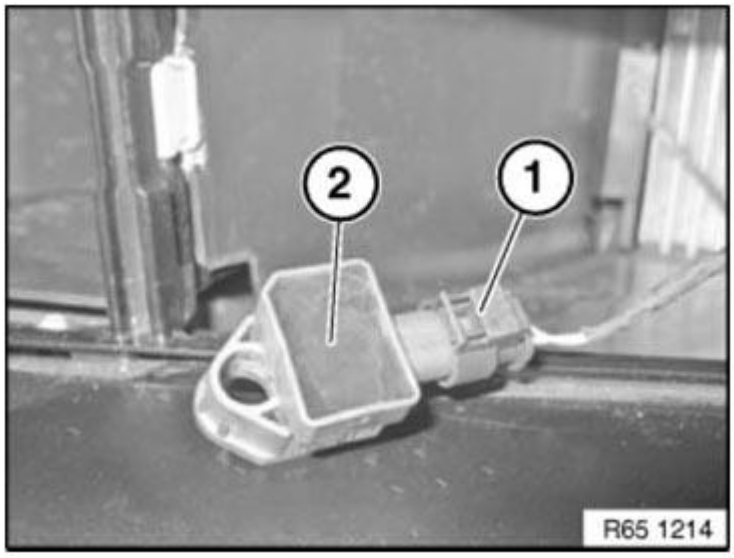
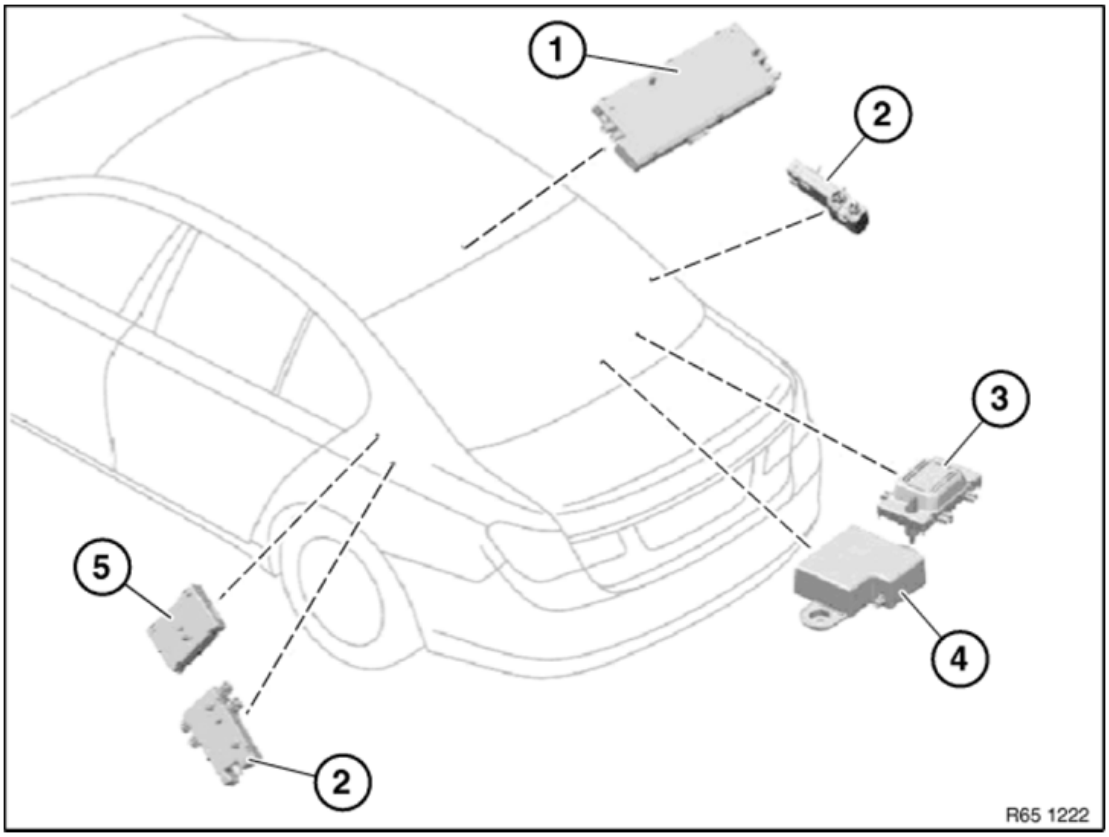


Fig. 100: Identifying Plug Connection And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

6577 AIRBAG TRIGGERING UNIT, DIAGNOSIS UNIT

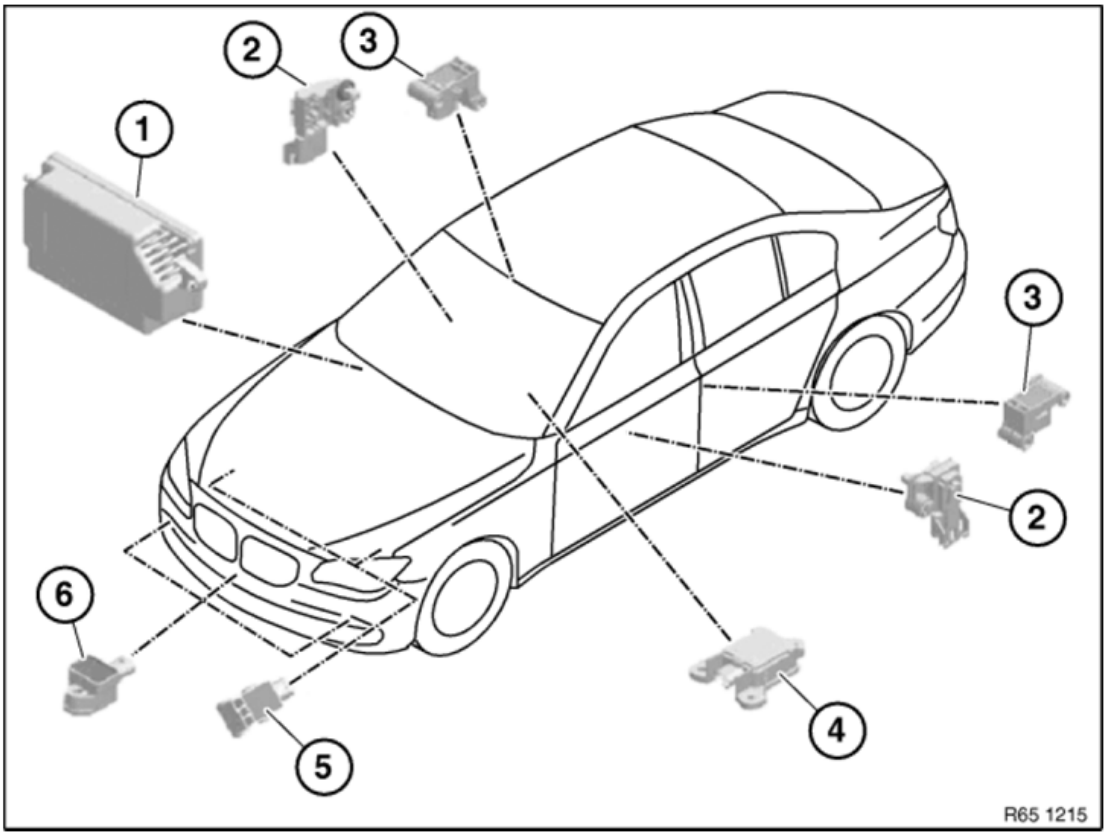
65 20... OVERVIEW OF AERIAL DIVERSITY



1. Aerial amplifier
2. Blocking circuit
3. AM choke (US vehicles only)
4. Back - up aerial
5. Interference suppression filter

Fig. 101: Overview Of Aerial Diversity
Courtesy of BMW OF NORTH AMERICA, INC.

65 77... OVERVIEW OF SENSORS FOR AIRBAG SYSTEM AND PEDESTRIAN PROTECTION



1. Airbag control unit (storage tray, passenger side)
2. Sensor, front door (left/right)
3. Sensor, B-pillar (left/right)
4. Central sensor (under centre console)
5. Acceleration sensors, front (left/right)
6. Sensor, pedestrian protection (middle/left/right)

Fig. 102: Overview Of Sensors For Airbag System And Pedestrian Protection
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 720 REMOVING AND INSTALLING (REPLACING) LEFT B-PILLAR SENSOR

WARNING: NOTE AIRBAG SAFETY INSTRUCTIONS !

Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **PANEL FOR DOOR PILLAR** .

Release screw (1) on B-pillar (3).

Release screw (2).

Installation:

Tightening torque **65 77 3AZ** .

Make sure sensor is mounted without play.

Feed out B-pillar sensor in downward direction.

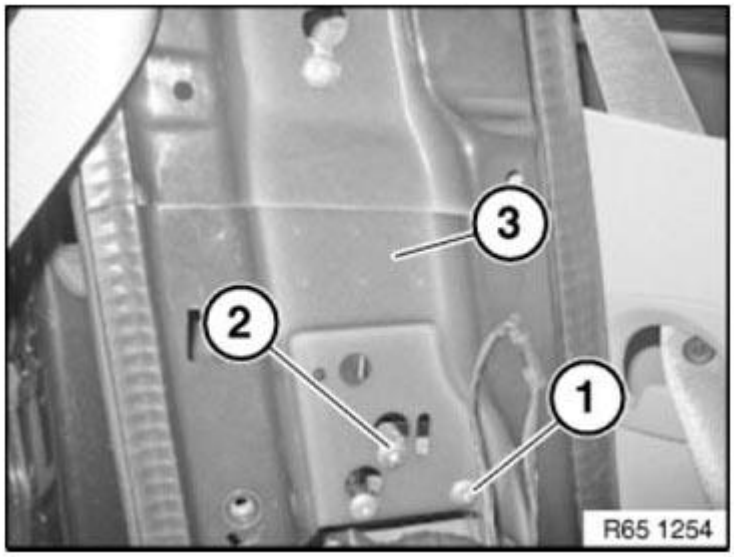


Fig. 103: Identifying Screws And B-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove B-pillar sensor (2).

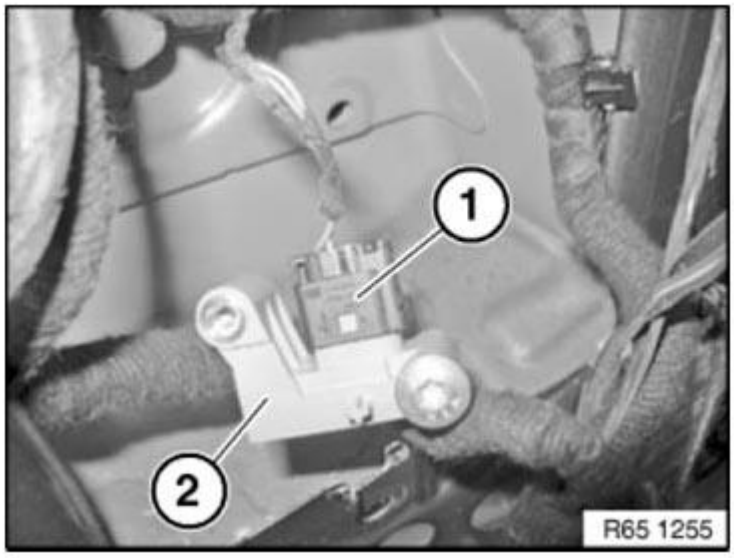


Fig. 104: Identifying Plug Connection And B-Pillar Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 740 REMOVING AND INSTALLING (REPLACING) LEFT FRONT DOOR SENSOR

WARNING: Note AIRBAG SAFETY REGULATIONS !

Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks

- Remove **SOUND INSULATION IN FRONT DOOR**

Release screw (1).

Tightening torque **65 77 4AZ** .

Feed out sensor towards bottom.

Unlock associated plug connection and disconnect.

Remove sensor.

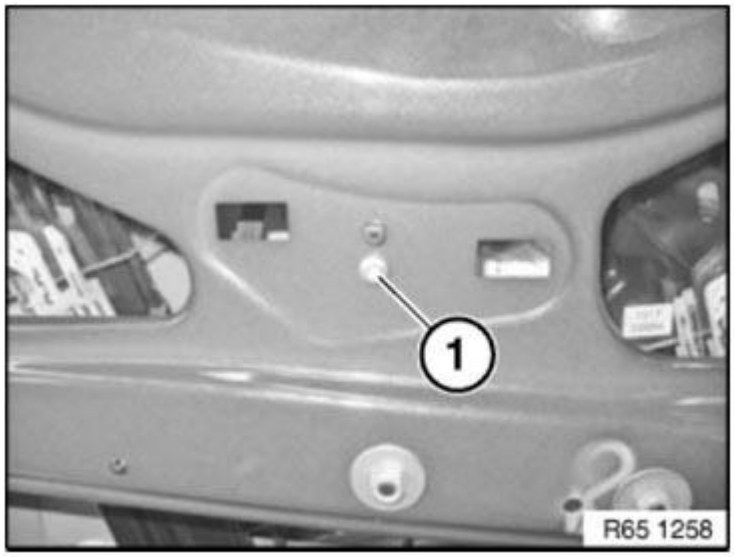


Fig. 105: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure front door sensor (1) is in correct installation position.

Guide lug (2) must be correctly seated in corresponding mounting on front door.

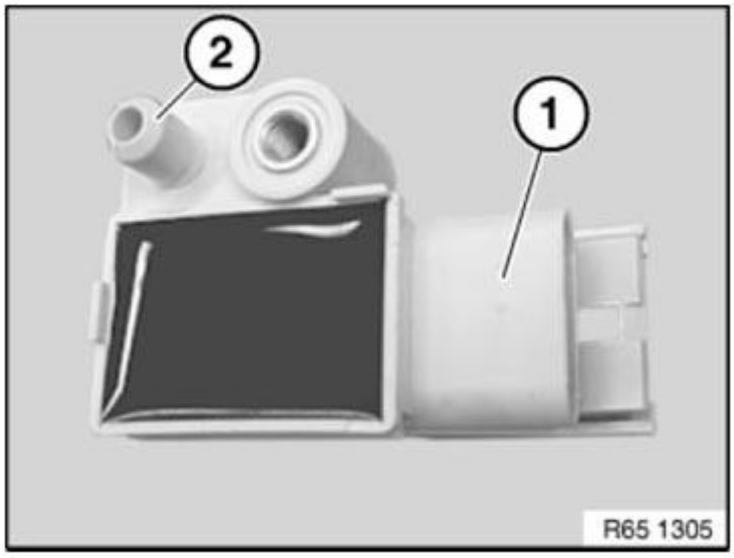


Fig. 106: Identifying Front Door Sensor And Guide Lug
Courtesy of BMW OF NORTH AMERICA, INC.

65 76 600 REMOVING AND INSTALLING (REPLACING) LEFT PEDESTRIAN PROTECTION SENSOR

WARNING: Observe SAFETY INSTRUCTIONS for handling gas generators.

Incorrect handling can activate pedestrian protection and cause injury.

Necessary preliminary work

- Disconnect **BATTERY CABLE**
- Remove **ORNAMENTAL GRILLE IN BUMPER TRIM** .

Release screws (1).

Tightening torque **65 76 1AZ** .

Feed out sensor (2).

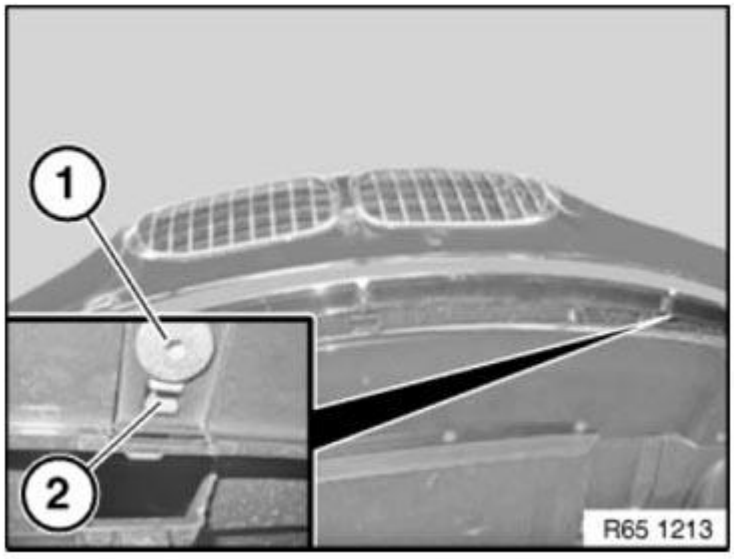


Fig. 107: Identifying Screws And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove sensor (2).

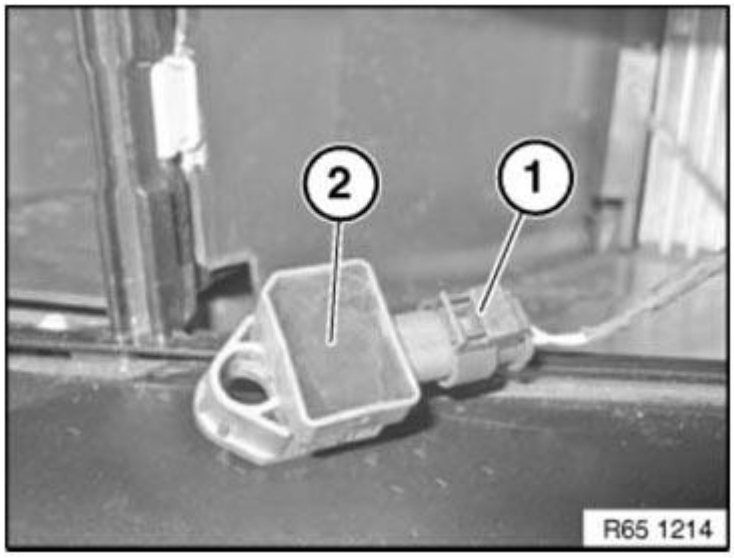


Fig. 108: Identifying Plug Connection And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 745 REMOVING AND INSTALLING/RENEWING RIGHT FRONT DOOR SENSOR

This operation is described in:

REMOVING AND INSTALLING (REPLACING) LEFT FRONT DOOR SENSOR

65 77 016 REMOVING AND INSTALLING/REPLACING AIRBAG CONTROL UNIT

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection)!

WARNING: NOTE AIRBAG SAFETY INSTRUCTIONS!

Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks

- F01/02: Clamp off **BATTERY NEGATIVE LEAD**
- F03Remove both negative battery cables

- Remove **UPPER INSTRUMENT PANEL STORAGE COMPARTMENT**
- Remove trim for instrument panel, bottom left. See **REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT TRIM FOR INSTRUMENT PANEL (US VERSION ONLY)** .

Release screw (1).

Tightening torque **65 77 1AZ.**

Press airbag control unit (2) in direction of arrow out of rubber mounts (3).

Feed out airbag control unit (2) towards bottom.

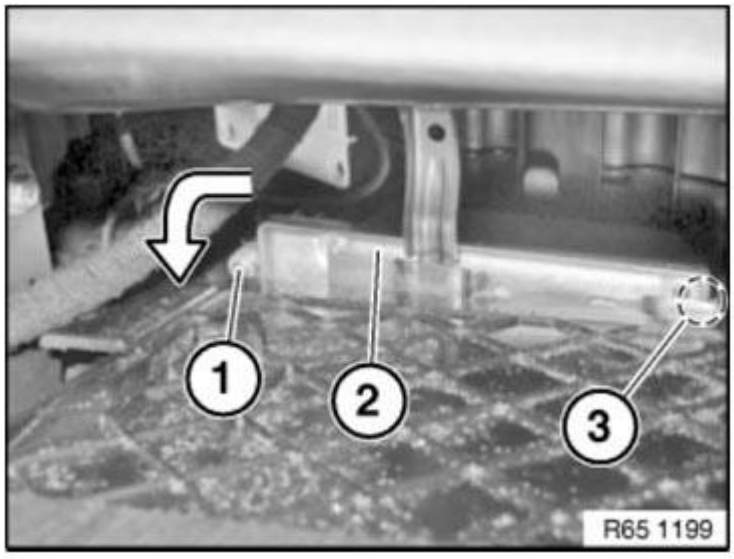


Fig. 109: Identifying Screw And Airbag Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and (2) on airbag control unit (3) and disconnect.

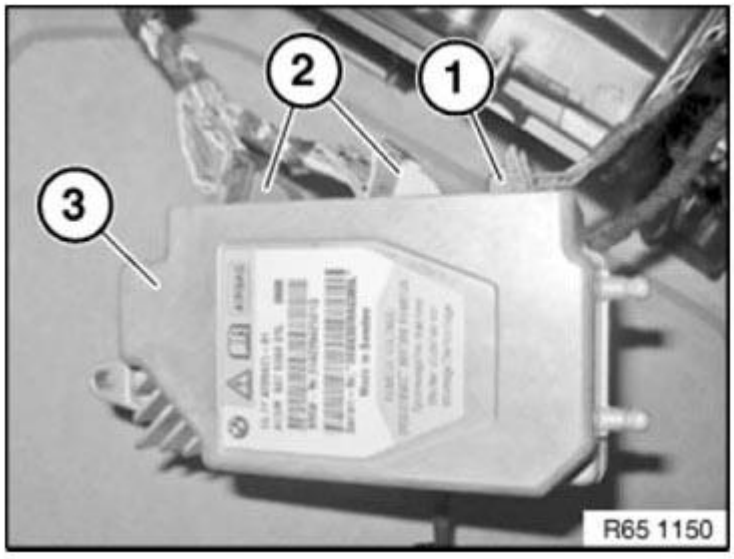


Fig. 110: Identifying Plug Connections And Airbag Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Make sure guides (1) are correctly seated in rubber mount (2).

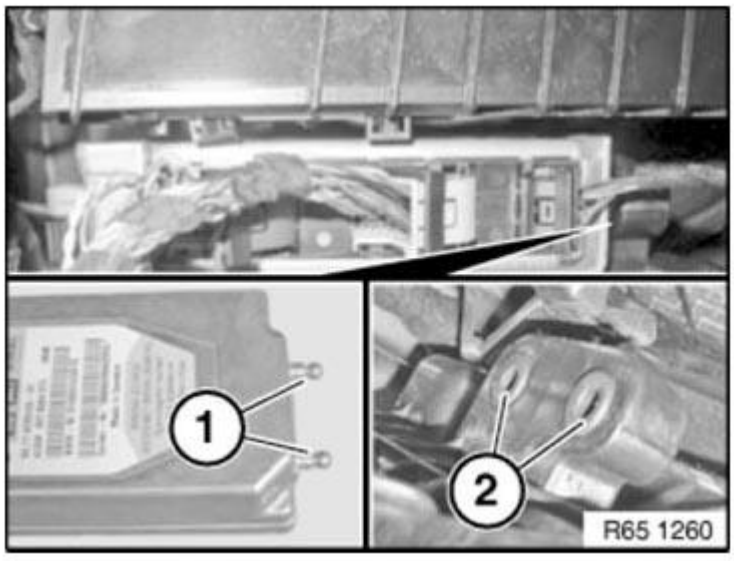


Fig. 111: Identifying Guides And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING** .

65 77 735 REMOVING AND INSTALLING/REPLACING CENTRAL SENSOR

WARNING: Note AIRBAG SAFETY INSTRUCTIONS !

Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **COMPLETE CENTRE CONSOLE**

Unscrew nuts (1).

Remove holder (2) from center console wiring harness (3).

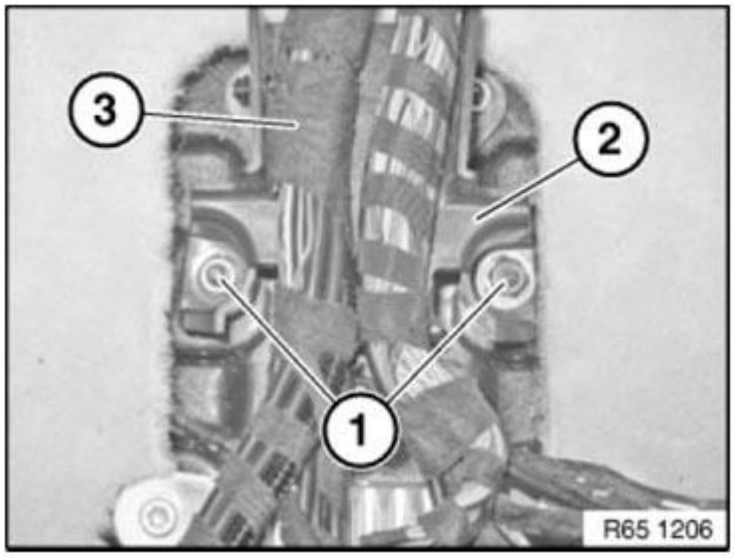


Fig. 112: Identifying Nuts, Holder And Centre Console Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **65 77 5AZ** .

Remove sensor (2).

Unlock plug connection (3) and disconnect.

Installation:

Make sure sensor is mounted without play.

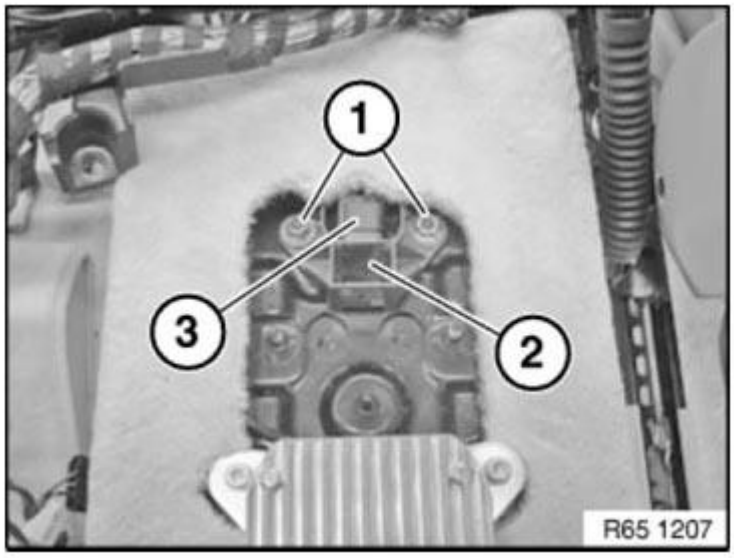


Fig. 113: Identifying Nuts, Sensor And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

65 75 055 REMOVING AND INSTALLING/REPLACING EMERGENCY POWER SIREN WITH TILT SENSOR

Necessary preliminary work

- Remove **GUIDE FOR BUMPER AT REAR RIGHT**

Secure guide for bumper (3) against falling out.

Unfasten plug connection (1) and disconnect.

Slacken nut (1).

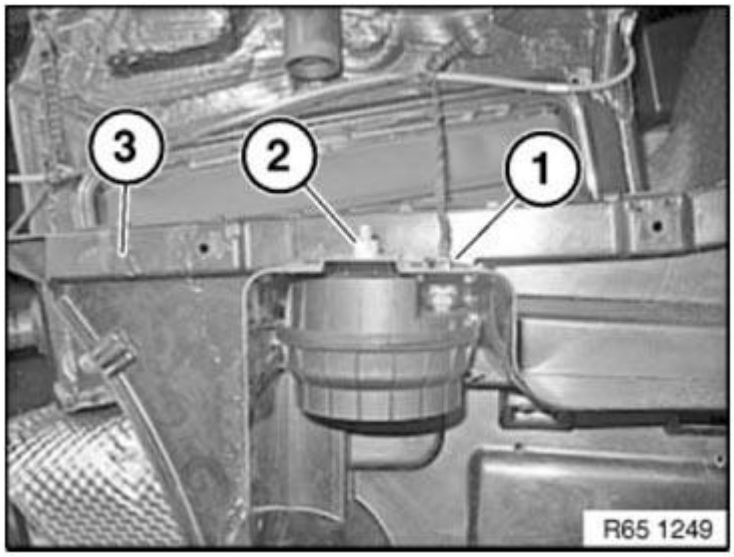


Fig. 114: Identifying Bumper, Plug Connection And Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock catch (1).

Remove emergency power siren (2) from guide for bumper (3).

Catch (1) must not be damaged.

Make sure emergency power siren (2) is correctly seated on guide for bumper (3).

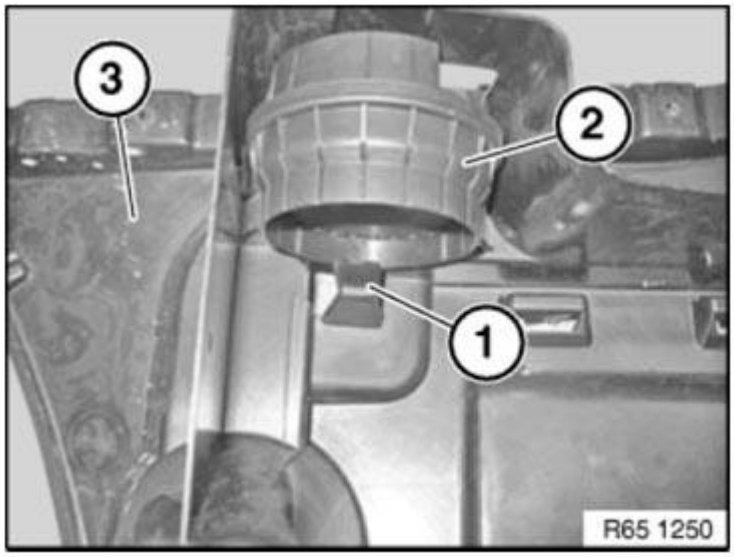


Fig. 115: Identifying Catch, Bumper And Power Siren
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING** .

65 77 532 REMOVING AND INSTALLING/REPLACING FRONT LEFT SENSOR (US VERSION ONLY)

Necessary preliminary tasks

- Remove **FRONT LEFT WHEEL ARCH COVER**

NOTE: This work step varies according to engine type.

Release screw (1) on auxiliary radiator bracket (2).

Remove holder (2) and carefully place to one side.

Installation

Holder (2) must be correctly seated in the designated guides.

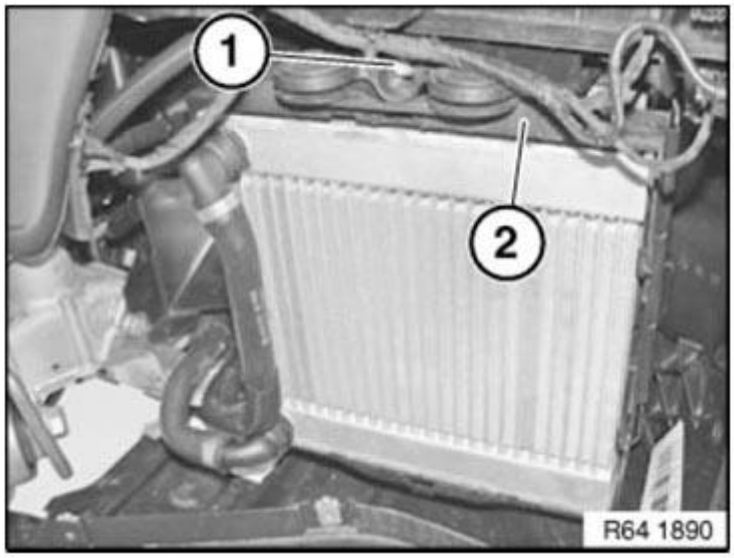


Fig. 116: Identifying Screw, Holder And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on lock carrier (2).

Tightening torque **65 77 2AZ** .

Feed out sensor (3).

Unfasten plug connection (2) and disconnect.

Installation:

Make sure sensor (3) is in correct installation position.

Sensor surface must point upwards.

Plug connection (2) must point in opposite direction to direction of travel.

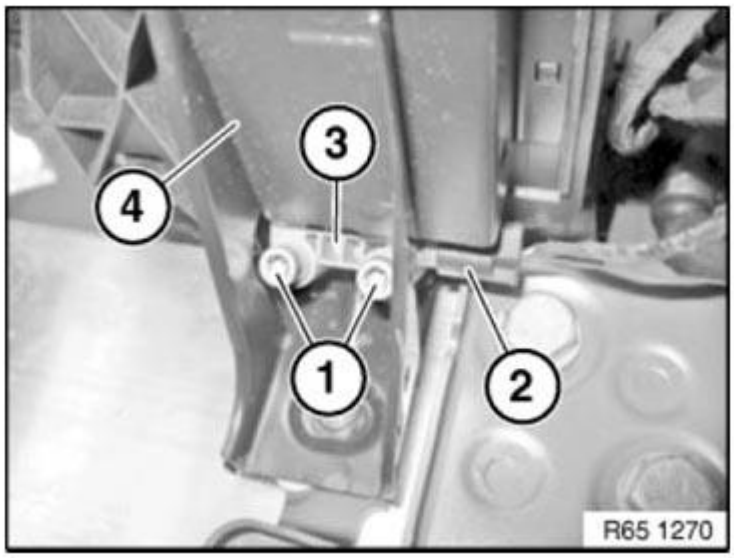


Fig. 117: Identifying Screws, Lock Carrier, Plug Connection And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 534 REMOVING AND INSTALLING/REPLACING FRONT RIGHT SENSOR (US VERSION ONLY)

Necessary preliminary tasks

- Remove **FRONT RIGHT WHEEL ARCH TRIM**

NOTE: This operation depends on the engine version.

Release screw (1) on auxiliary radiator bracket (2).

Remove auxiliary radiator bracket (2) and carefully place to one side.

Installation:

Auxiliary radiator bracket (2) must be correctly seated in the designated guides.

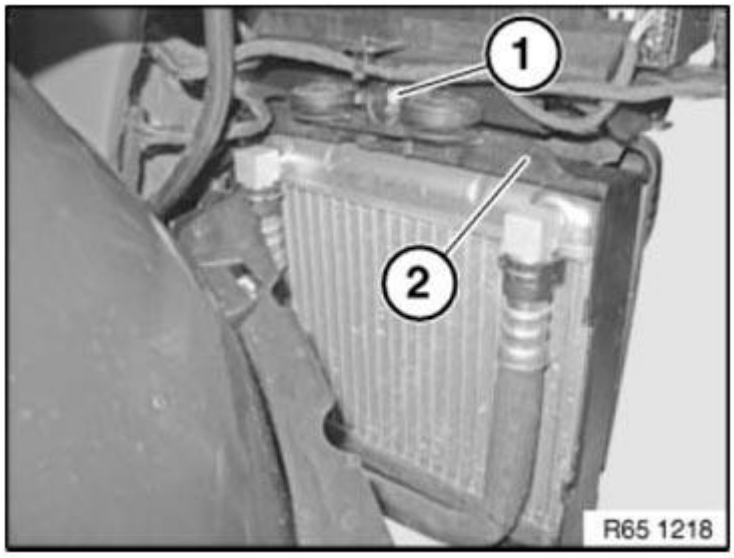


Fig. 118: Identifying Screw And Auxiliary Radiator Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **65 77 2AZ** .

Feed out acceleration sensor (2).

Unlock plug connection (3) and disconnect.

Installation:

Make sure acceleration sensor (2) is in correct installation position.

Sensor surface of acceleration sensor (2) must point upwards!

Plug connection (3) must point in opposite direction to direction of travel.

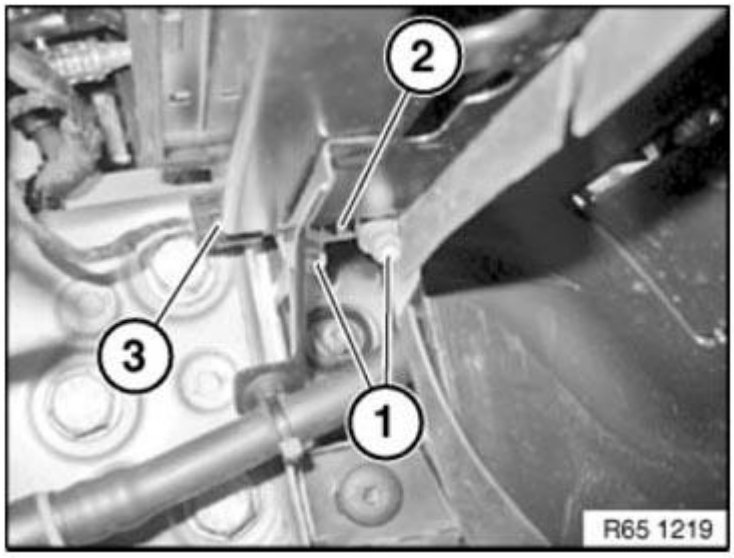


Fig. 119: Identifying Screws, Acceleration Sensor And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

65 76 605 REMOVING AND INSTALLING/REPLACING MIDDLE PEDESTRIAN PROTECTION SENSOR

WARNING: Observe SAFETY INSTRUCTIONS for handling gas generators.

Incorrect handling can activate pedestrian protection and cause injury.

Necessary preliminary work

- Disconnect **BATTERY CABLE**
- Remove **BASEPLATE FOR NUMBER PLATE**
- Remove **ORNAMENTAL GRILLE IN BUMPER TRIM** .

Release screws (1).

Tightening torque **65 76 1AZ** .

Feed out sensor (2).

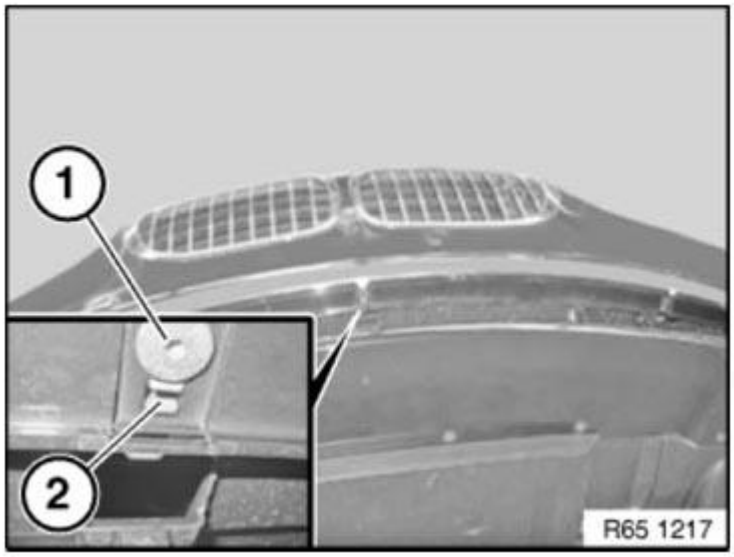


Fig. 120: Identifying Screws And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove sensor (2).

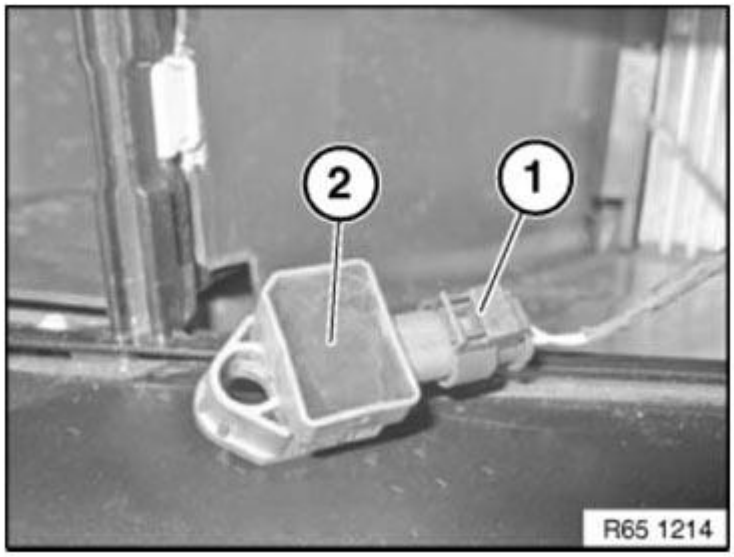


Fig. 121: Identifying Plug Connection And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 725 REMOVING AND INSTALLING/REPLACING RIGHT B-PILLAR SENSOR

Operation is identical to:

REMOVING AND INSTALLING LEFT B-PILLAR SENSOR

65 76 610 REMOVING AND INSTALLING/REPLACING RIGHT PEDESTRIAN PROTECTION SENSOR

WARNING: Observe SAFETY INSTRUCTIONS for handling gas generators.

Incorrect handling can activate pedestrian protection and cause injury.

Necessary preliminary work

- Disconnect **BATTERY CABLE**
- Remove **ORNAMENTAL GRILLE IN BUMPER TRIM** .

Release screws (1).

Tightening torque **65 76 1AZ** .

Feed out sensor (2).

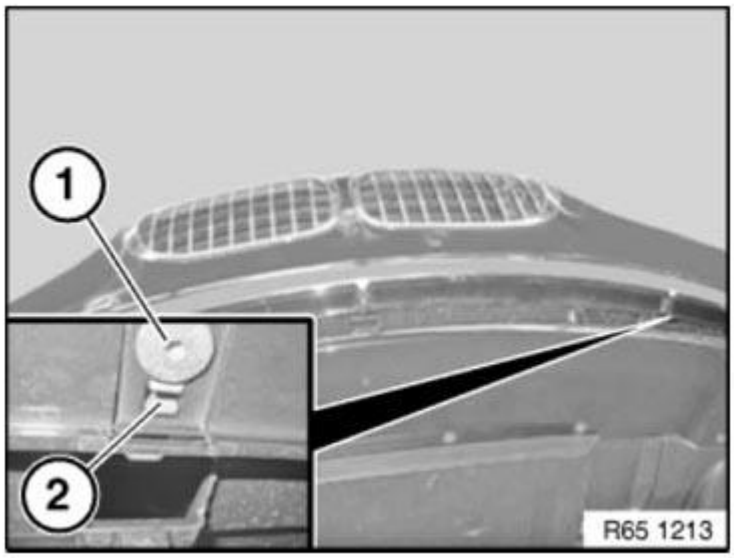


Fig. 122: Identifying Screws And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove sensor (2).

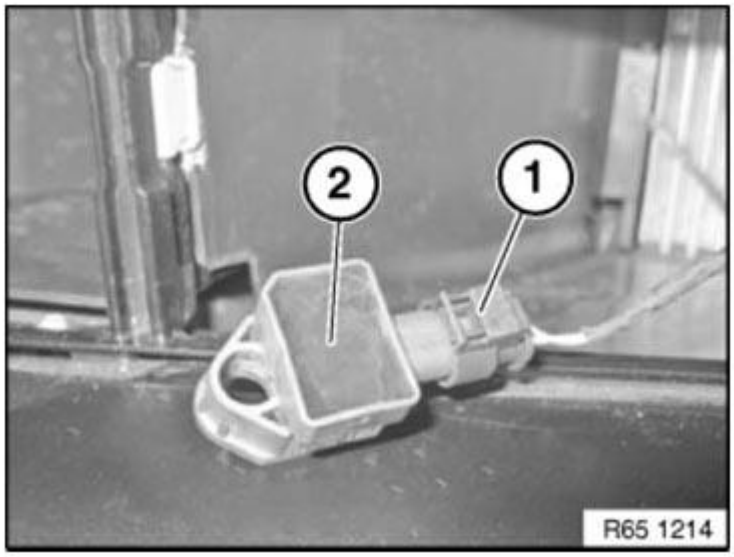


Fig. 123: Identifying Plug Connection And Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 604 REPLACING SEAT OCCUPANCY MAT FOR FRONT PASSENGER SEAT OCCUPANCY DETECTOR

WARNING: US/CDN front passenger seat (with CIS mat) only:

The CIS mat can only be removed from the upholstery together with the seat cover.

If CIS mat, seat cover or seat heating is defective, all parts may only be replaced together.

After fitting seat cover, enable CIS mat with BMW DIAGNOSIS SYSTEM .

Necessary preliminary work

- Remove seat cover for front passenger seat:
  - Normal, Electric: see **REPLACING SEAT COVER FOR PASSENGER SEAT (UP TO 08/09)** or **REPLACING SEAT COVER FOR FRONT PASSENGER SEAT (FROM 09/09)**
  - Sports, Electric: see **REPLACING SEAT COVER FOR PASSENGER SEAT (SPORT) (UP TO 08/09)** or **REPLACING SEAT COVER FOR FRONT PASSENGER SEAT (SPORTS, 09/09 ON)**
  - Comfort: see **REPLACING SEAT COVER FOR FRONT PASSENGER SEAT (COMFORT) (UP TO 08/09)** or **REPLACING SEAT COVER FOR PASSENGER SEAT (COMFORT) (FROM 09/09)**

NOTE: Graphic is an example.

Pull seat occupancy mat (1) off front passenger seat upholstery (4) and feed out connector housing (3).

Installation note:

- To avoid malfunctions, make sure seat occupancy mat (1) is cleanly laid:

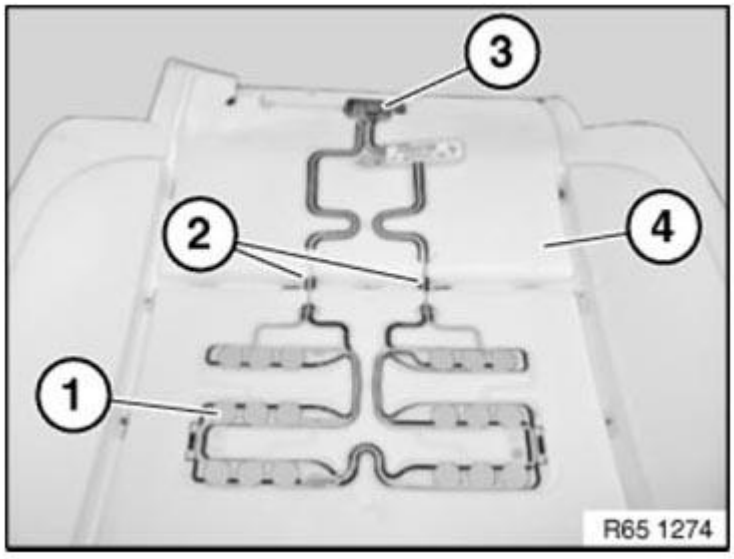


Fig. 124: Identifying Seat Occupancy Mat, Front Passenger Seat Upholstery, Connector Housing And Lay Seat Occupancy Mat Bridges
Courtesy of BMW OF NORTH AMERICA, INC.

- Lay connector housing (3) in designated recess
- Lay seat occupancy mat bridges (2) cleanly and feed into designated recesses
- Secure seat occupancy mat (1) to bonding surface
- Lay seat occupancy mat (1) straight and without kinks

65 77 604 REPLACING SENSOR MAT (CIS MAT) FOR FRONT PASSENGER SEAT OCCUPANCY DETECTION DETECTOR

F01 and F02 only:

Version with CIS mat from 09/09.

For vehicles built before 08/09, see version with **OC3 MAT** .

WARNING: **Note AIRBAG SAFETY REGULATIONS !**

Incorrect handling can lead to airbag deployment and cause injury.

WARNING: **Only US and Canadian version of front passenger seat (with CIS mat):**

The CIS mat can only be removed from the upholstery together with the seat cover.

If CIS mat, seat cover or seat heating is defective, all parts may only be replaced together.

After fitting the seat cover, the CIS mat must be enabled with the BMW PROGRAMMING SYSTEM .

- **Procedure for replacing the CIS mat together with the seat cover is described in seat cover replacement:**
  - Normal, Electric: see **REPLACING SEAT COVER FOR FRONT PASSENGER SEAT (FROM 09/09)**
  - Sports, Electric: see **REPLACING SEAT COVER FOR FRONT PASSENGER SEAT (SPORTS, 09/09 ON)**
  - Comfort: see **REPLACING SEAT COVER FOR PASSENGER SEAT (COMFORT) (FROM 09/09)**

The work scope with CIS mat is different for the following work steps:

Loosen the bolting point (1) of the ground cable on the seat pan.

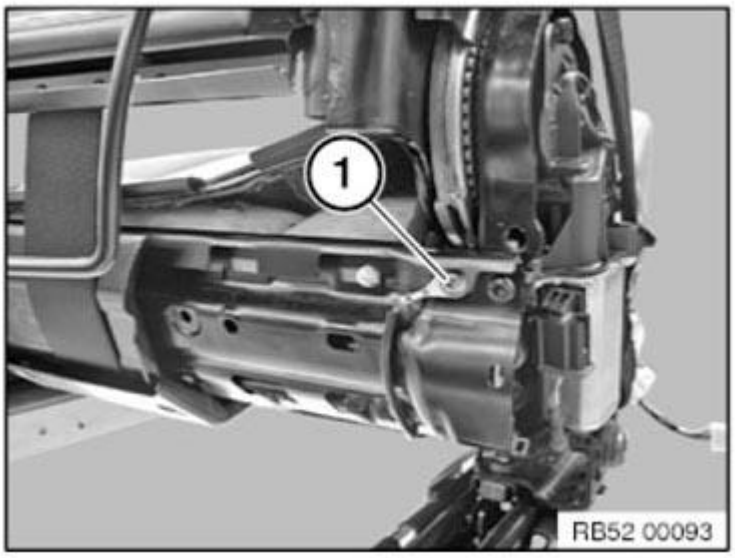


Fig. 125: Identifying Bolting Point
Courtesy of BMW OF NORTH AMERICA, INC.

Cut open cable strap (1).

Lift locking tab and pull the connector out of the side of the connector housing.

Installation note:

Replace cable tie (1).

Connector is encoded against incorrect assembly.

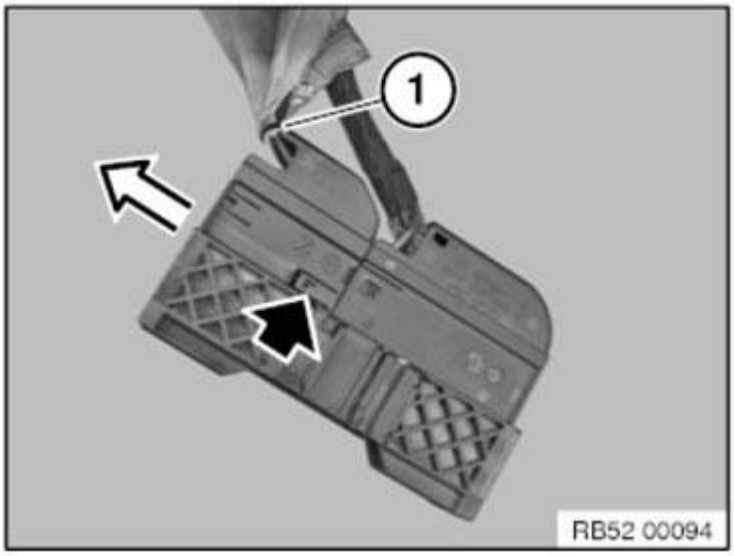


Fig. 126: Identifying Cable Strap And Tie
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Enabling seat occupancy detection (CIS mat):

- Connect **BMW PROGRAMMING SYSTEM**
- Encode airbag control unit
- Delete fault memory if necessary

65 77 604 REPLACING SENSOR MAT (OC3 MAT) FOR FRONT PASSENGER SEAT OCCUPANCY DETECTOR

NOTE: Version with OC3 mat up to version (build date) 08/09.

From version (build date) 09/09, see version with CIS MAT .

WARNING: Note AIRBAG SAFETY REGULATIONS !

Incorrect handling can activate the airbag and cause injury.

WARNING: US/CDN front passenger seat (with OC3 mat) only:

A faulty OC3 mat can only be removed in conjunction with the upholstery from the seat cover.

If OC3 mat or upholstery is defective, both parts may only be replaced together.

After fitting seat cover, enable OC3 mat with BMW diagnosis system.

- **The operation for removing the OC3 mat in conjunction with the upholstery is described in seat cover replacement:**
  - Normal, Electric: see **REPLACING SEAT COVER FOR PASSENGER SEAT (UP TO 08/09)**
  - Sports, Electric: see **REPLACING SEAT COVER FOR PASSENGER SEAT (SPORT) (UP TO 08/09)**
  - Comfort: see **REPLACING SEAT COVER FOR FRONT PASSENGER SEAT (COMFORT) (UP TO 08/09)**

Enabling seat occupancy detector (OC3 mat):

- Connect **BMW PROGRAMMING SYSTEM**
- Encode airbag control unit
- Delete fault memory if necessary

6581 ON-BOARD COMPUTER

65 81 060 REMOVE AND INSTALLING/REPLACING OUTSIDE TEMPERATURE SENSOR (N54, N55, N63, N74, N57S)

- Remove **FRONT RIGHT WHEEL ARCH COVER** (front section)

Unclip outside temperature sensor (1) in direction of arrow from mounting and pull out.

Disconnect plug connection (2) and remove outside temperature sensor (1).

Installation:

Clip temperature sensor (1) into place.

Close plug connection (2).

Make sure outside temperature sensor (1) is correctly engaged in mounting.

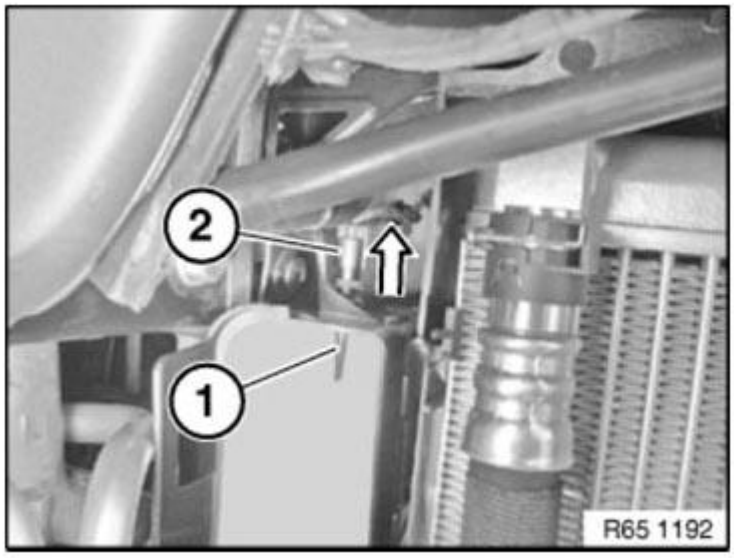


Fig. 127: Identifying Temperature Sensor And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

6583 CAR COMMUNICATION COMPUTER (CCC)

65 83 020 REMOVING AND INSTALLING (REPLACING) CAR INFORMATION COMPUTER (CIC)

IMPORTANT: Risk of damage!

A hard disk is installed in the Car Information Computer (CIC).

Carry out mechanical work on the CIC and adjacent components with care.

Avoid subjecting the CIC to vibration/shocks.

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

NOTE: Comply with notes and instructions on NOTES ON HANDLING OPTICAL FIBRES .

Necessary preliminary work

- F01/02/F07/F10/F11/F12/F13/F1 Disconnect **NEGATIVE BATTERY CAB**
- F03: Remove both negative batt cables
- Remove **RADIO AND A/C CONTROL PANEL**

NOTE: Picture for example purposes only!

Unfasten screws (2).

Pull CIC (3) out of guide.

Installation note:

Make sure CIC (3) is correctly seated in guide lugs (1).

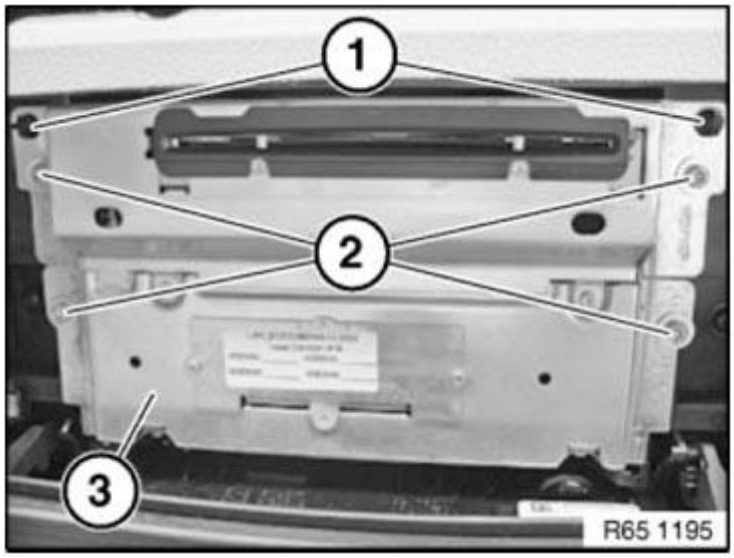


Fig. 128: Identifying Screws, Cic And Guide Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (2) and (3) and disconnect.

Remove CIC (1).

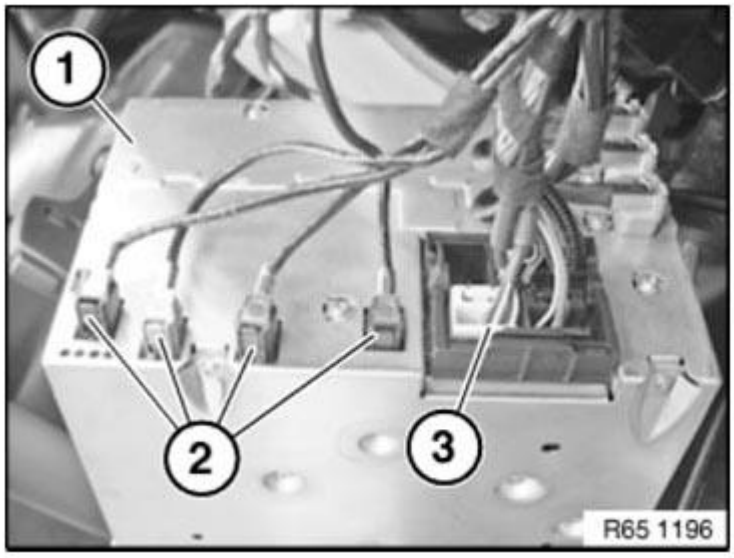


Fig. 129: Identifying Plug Connections And CIC
Courtesy of BMW OF NORTH AMERICA, INC.

Only for US models with satellite tuner:

When replacing the CIC unit, additional work is required!

- Refer to **REPLACING SATELLITE TUNER, AS OF 09/2009**.

Replacement

- Carry out **VEHICLE PROGRAMMING AND ENCODING** .

65 12 315 REMOVING AND INSTALLING (REPLACING) HU-H)

See **REMOVING AND INSTALLING (REPLACING) HEAD UNIT**.

65 50 160 REMOVING AND INSTALLING/REPLACING COVER FOR REAR PASSENGER COMPARTMENT MONITOR AT FRONT

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

Necessary preliminary work

- Remove **COVER FOR REAR PASSENGER COMPARTMENT MONITOR AT REAR**

IMPORTANT: Do not damage or scratch display.

Release screws (1).

Tightening torque **65 50 1AZ** .

Carefully disconnect plug connection (3).

Remove rear passenger compartment monitor (4) from cover (5).

Installation note:

Ensure correct cable routing in guides (2).

Make sure cover (5) is correctly seated on rear passenger compartment monitor (4).

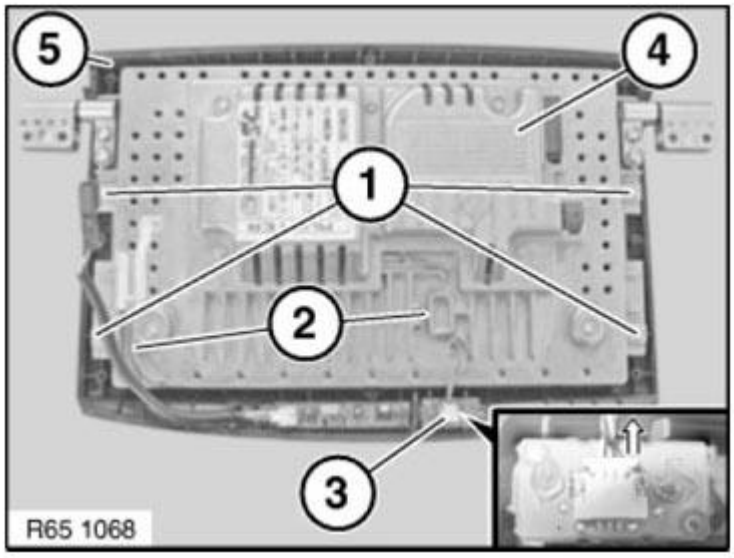


Fig. 130: Identifying Screws, Plug Connection, Guides, Cover And Cable
Courtesy of BMW OF NORTH AMERICA, INC.

65 50 125 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR MONITOR

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Installation note:

- Remove **REAR PASSENGER COMPARTMENT MONITOR COVER**

Release screws (1).

Remove rear passenger compartment monitor (2) from holder (3).

Installation note:

Make sure rear passenger compartment monitor (2) is correctly seated on holder (3).

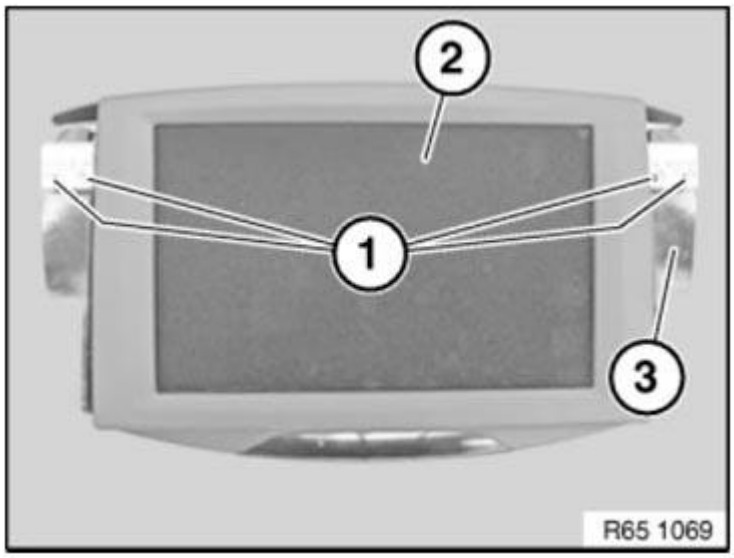


Fig. 131: Identifying Screws, Rear Passenger Compartment Monitor And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections and disconnect.

Remove monitor in rear (1).

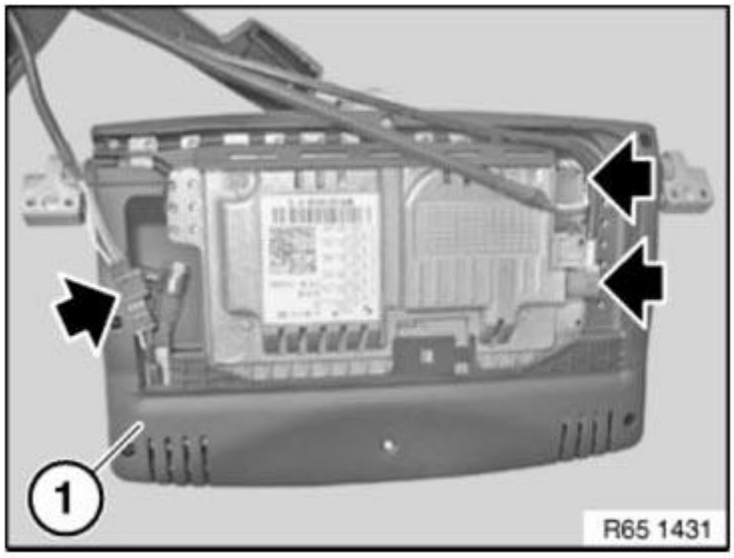


Fig. 132: Removing Plug Connection And Monitor
Courtesy of BMW OF NORTH AMERICA, INC.

65 50 165 REMOVING AND INSTALLING/REPLACING TRIM FOR REAR MONITOR DISPLAY AT REAR

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

Necessary preliminary work

- **REMOVE REAR MONITOR**

Release screws (1).

Tightening torque **65 50 1AZ** .

Remove cover (3) from rear monitor (4), unclipping plug (2) and feed out cable.

Installation note:

Make sure cover (3) is correctly seated on rear monitor (4).

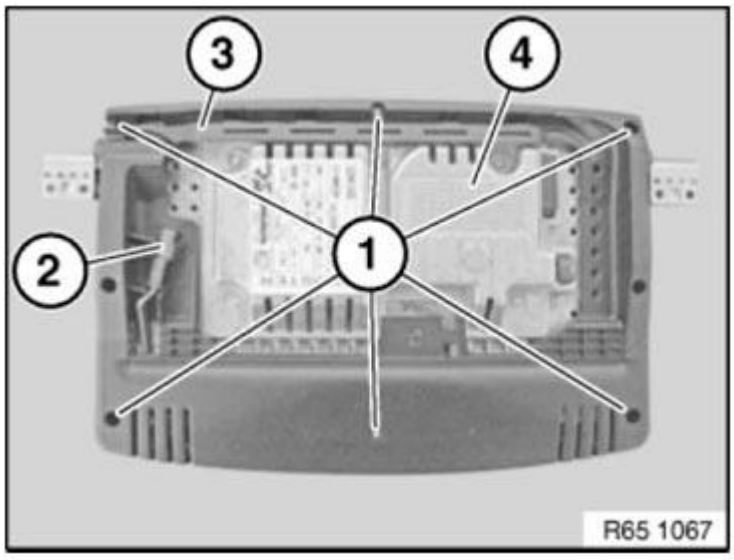


Fig. 133: Identifying Screws, Cover, Unclip Plug And Rear Monitor
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Audio, Navigation and Anti-Theft - Special Tools

65 AUDIO, NAVIGATION AND INFORMATION SYSTEMS

652010 KNIFE

0494968 652010 Knife MW

Note: (Cutting knife set for roof-mounted aerial (empty housing)) special tool for manual operation only. 65 2 011 Drawing knife with plastic sleeve; 65 2 012 Pull handle with plastic sleeve, 65 2 013. Special blade is replaced by 65 2 014 Special blade

SI number

01 15 08 (475)

Consisting of:

2 = 0495112 Handle

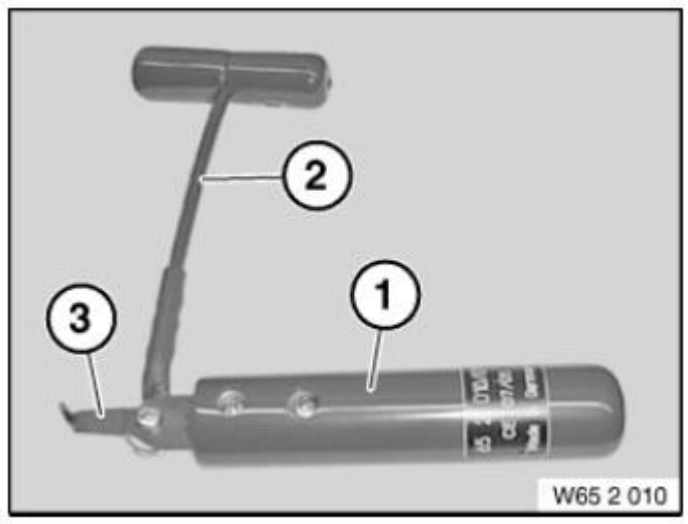


Fig. 1: Identifying Knife (652010)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (Pull handle)

1 = 0495113 Handle

NOTE: (Drawing knife with plastic sleeve)

3 = 0495114 Blade

NOTE: (Special blade) Replaced by 65 2 014 (0496 531)

4 = 0496531 Blade

NOTE: (Special blade) Replaced by special tool 65 2 013 since 08/2008.

ACCESSORIES AND BODY, CAB

Audio, Navigation and Information Systems - Tightening Torques

AIRBAG TRIGGERING CONTROL

65 77 AIRBAG TRIGGERING CONTROL

TIGHTENING TORQUE SPECIFICATION - AIRBAG TRIGGERING CONTROL

		Type	Thread	Tightening specifications	Dimension
1AZ	Airbag control unit	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18			2.5 Nm
2AZ	Acceleration sensor, front (Up Front sensor)	F01/F02/F04/F07	M6x35	Replace bolts	8 Nm
		F10/F11/F12/F13/F25	M6x35	Replace bolts	9 Nm
3AZ	Sensor, B-pillar	F01/F02/F03/F04/F07		Replace bolts	8 Nm
		F10/F11/F18/F12/F13/F25		Replace bolts	9 Nm
4AZ	Sensor, front door	F01/F02/F04/F07		Replace bolts	8 Nm
		F10/F11/F18		Replace bolts	9 Nm
		F12/F13/F25		Nut	9 Nm
5AZ	Central sensor	F01/F02/F03/F04/F07/F10/F11/F18		Replace hexagon nuts	8 Nm

CENTRAL INFORMATION DISPLAY (CID)

65 50 CENTRAL INFORMATION DISPLAY (CID)

TIGHTENING TORQUE SPECIFICATION - CENTRAL INFORMATION DISPLAY (CID)

		Type	Thread	Tightening specifications	Dimension
1AZ	Central Information Display (CID) to dashboard	F01/F02/F03/F04/F07/F10/F11/F18/F25			2.5 Nm
2AZ	Rear cover to Central Information Display (CID, JC)	F01/F02/F03/F04/F10/F11/F18			0.6 Nm
3AZ	Rear cover Central Information Display (CID, TPO)	F07/F10/F11/F18			0.35 Nm

PEDESTRIAN PROTECTION

65 76 PEDESTRIAN PROTECTION

TIGHTENING TORQUE SPECIFICATION - PEDESTRIAN PROTECTION

		Type	Thread	Tightening specifications	Dimension
1AZ	Sensor, pedestrian protection	F01/F02/F03/F04			8 Nm

REAR-COMPARTMENT MONITOR

65 50 REAR-COMPARTMENT MONITOR

TIGHTENING TORQUE SPECIFICATION - REAR-COMPARTMENT MONITOR

		Type	Thread	Tightening specifications	Dimension
1AZ	Cover to rear compartment monitor	F01/F02/F03/F04/F07/F10/F11/F18			0.6 Nm
2AZ	Friction hinges to cover	F01/F02/F03/F04/F07/F10/F11/F18			4.0 Nm

TRANSMISSION

Automatic Transmission

2400 TRANSMISSION IN GENERAL

2400018 ADJUSTING GEAR LEVER (PARKING LOCK EMERGENCY RELEASE)

NOTE: Check cable for ease of movement.
Move gear selector switch to "P" position.
Control for emergency release must not be actuated.

Unfasten nut.

Disconnect cable (1).

Installation:

- Release nut
- Adjust cable by means of holder (2) until spacing A > or = 1 mm is obtained.
- Tighten down nut

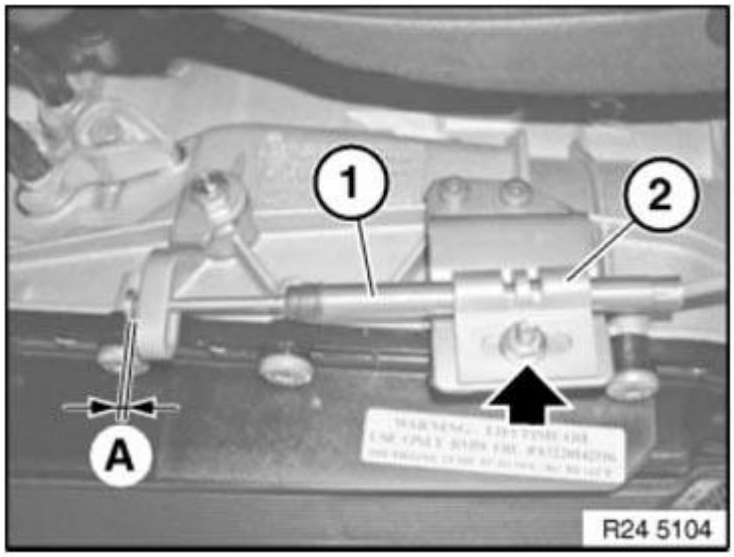


Fig. 1: Locating Cable Nut
Courtesy of BMW OF NORTH AMERICA, INC.

0011500 CHECKING/TOPPING UP FLUID LEVEL IN AUTOMATIC TRANSMISSION (GA6HP26Z/GA6HP32Z)

IMPORTANT: Use only the approved TRANSMISSION FLUID .

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Installation:

Tighten down filler plug using

1. Hexagon wrench 8 A/F
2. Torque wrench
3. Socket 8 A/F

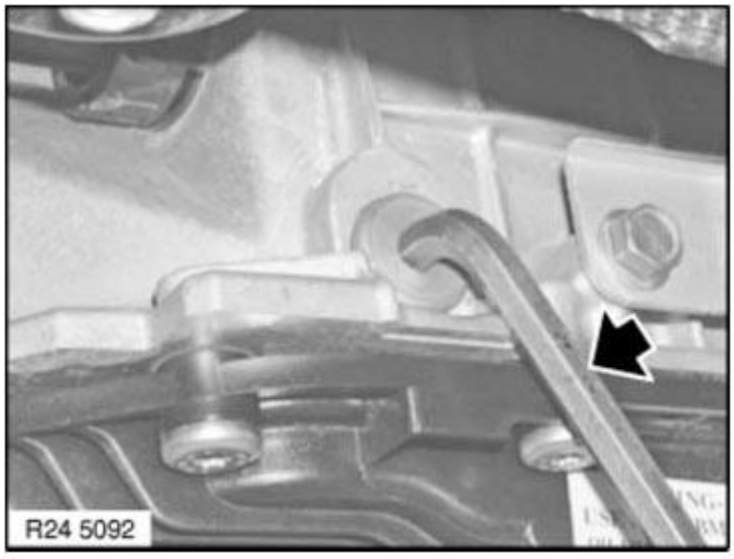


Fig. 2: Tightening Down Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Topping up transmission fluid after a repair

Stand vehicle on a level surface and secure against rolling off.

Undo filler plug (1).

Installation

Replace sealing ring.

Top up transmission fluid until it emerges from filling orifice.

Start engine.

Replenish transmission fluid until it emerges from filling orifice.

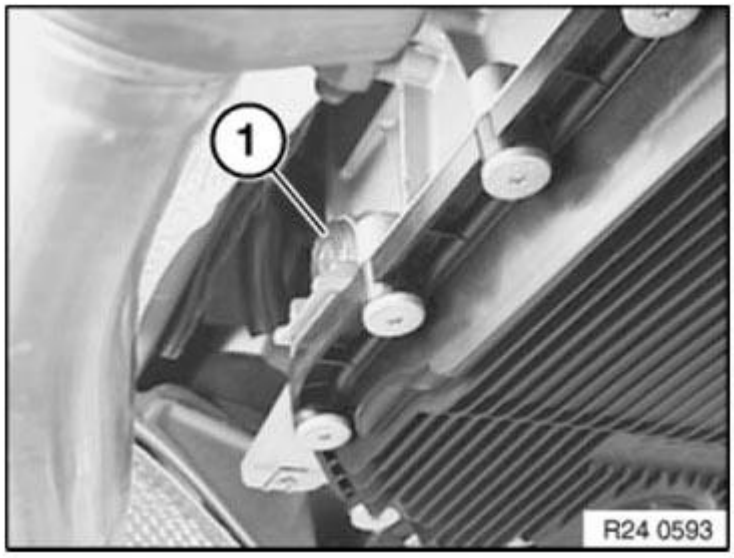


Fig. 3: Identifying Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in filler plug (1).

Tightening torque: **24 11 3AZ** .

Press brake pedal to floor and shift through gears 1 to 6 several times at idle speed. Then shift to "P" position (Park).

Then check fluid level.

Checking fluid level

- Connect BMW Diagnosis and Information System.
- Call up Service functions (drive).
- Carry out fluid level check in accordance with instructions.

00 11 500 CHECKING/TOPPING UP OIL LEVEL IN AUTOMATIC TRANSMISSION (GA8HP45Z, GA8HP70Z, GA8HP90Z)

- Do not let skin come in contact with transmission oil and do not inhale fuel vapors.
- Wear protective gloves.
- Ensure adequate ventilation.

IMPORTANT: Use only the approved TRANSMISSION OIL.

To set the correct level, it is mandatory that the service function "Transmission control unit: oil adjustment" is performed using the diagnosis system.

Failure to comply with this requirement will result in serious damage to the automatic transmission.

Conditions for the oil adjustment:

- **Initial condition: Transmission oil temperature 30 °C to 40 °C**
- **Final condition: Transmission oil temperature 40 °C to 50 °C**

Performing oil-level adjustment:

An oil-level adjustment is necessary for certain fault code entries in the automatic transmission and after repair (e. g. mechatronic replacement, converter replacement, transmission replacement).

- Connect diagnosis and information system.
- Service function (transmission control unit: Oil adjustment) call up
- Carry out oil level check in accordance with instructions

Adding transmission oil:

Stand vehicle on a level surface and secure against rolling off.

Undo oil filler plug (1).

Add automatic transmission fluid according to instructions in the BMW diagnosis system.

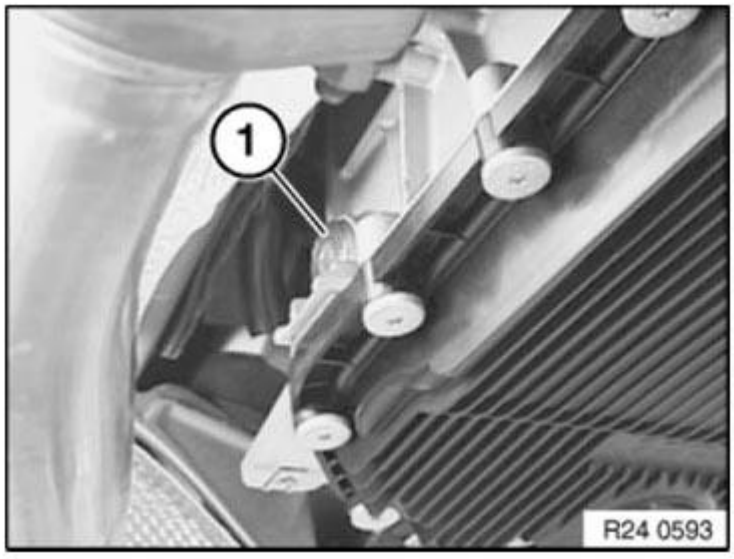


Fig. 4: Identifying Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing ring/oil filler plug

Tightening torque: **24 11 3AZ**

Tighten down oil filler plug using:

1. Hexagon wrench 8 A/F
2. Torque wrench
3. Socket 8 A/F

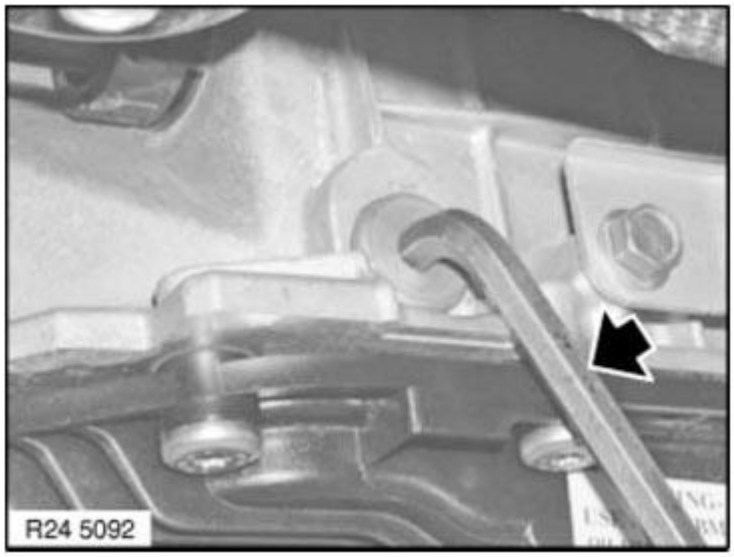


Fig. 5: Tightening Down Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Transmission oil

ATF oil Shell L12108*

BMW part number 83 22 2 152 426

container size 20 liters

*Can be substituted by the lifetime oil ATF -3:

BMW part number 83 22 2 305 397

container size 1 liter

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

2400043 INSTALLING REPLACEMENT TRANSMISSION (GA6HP26Z)

Drain automatic transmission fluid at oil drain plug.

Tightening torque **24 11 2AZ** .

IMPORTANT: After completion of work, program control unit for transmission.

Recycling

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations.

IMPORTANT:

- **Before installing replacement transmission, always flush TRANSMISSION FLUID COOLER TOGETHER WITH LINES .**

- **After completion of work, CHECK TRANSMISSION FLUID LEVEL .**
- **Use only approved TRANSMISSION OIL**

  Failure to comply with this requirement will result in serious damage to the automatic transmission

  Replacement transmissions come filled with transmission fluid

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION**

Modify gearshift lever (1).

Tightening torque **24 51 1AZ** .

Modify clip (2) for cable.

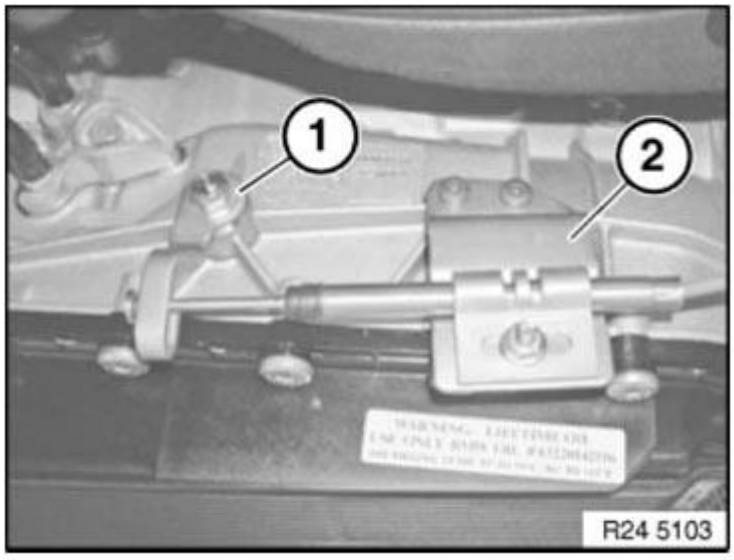


Fig. 6: Identifying Gearshift Lever And Cable Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Modify transportation retainers.

Convert all cable holders.

Convert all seal plugs.

Modify protective cap on output shaft.

IMPORTANT: After removing transportation lock, secure torque converter against slipping out.

Transmission identification:

- On type plate

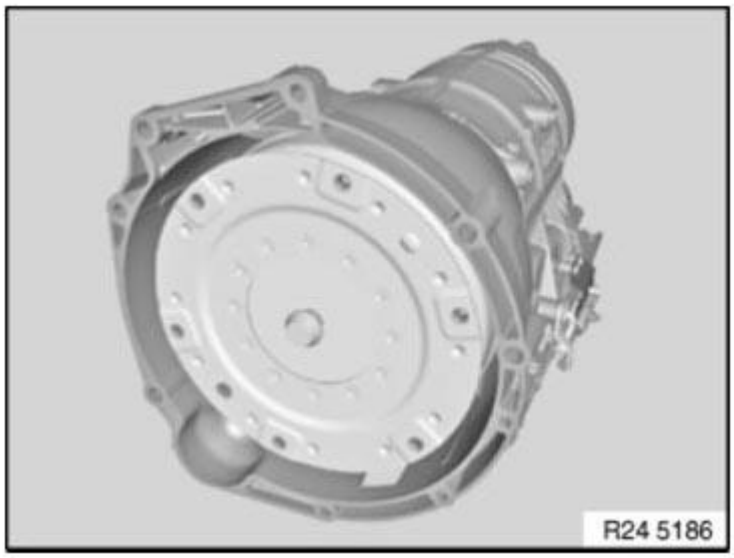
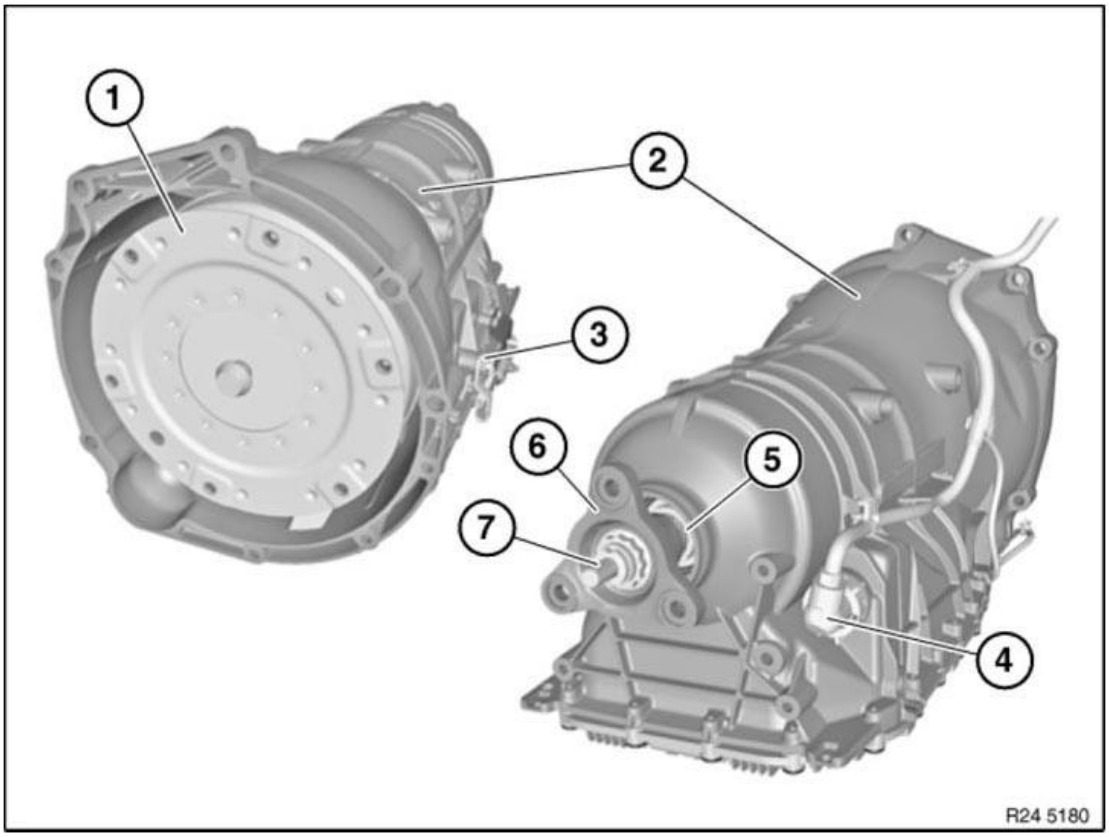


Fig. 7: Identifying Torque Converter
Courtesy of BMW OF NORTH AMERICA, INC.

2400... OVERVIEW OF TRANSMISSION HOUSING (GA6HP26Z)



1 Torque converter
2 Transmission housing, front section
3 Radial seal
4 Sealing sleeve for transmission housing
5 Radial seal
6 Output flange
7 Output shaft

Fig. 8: Exploded View Of Transmission Housing
Courtesy of BMW OF NORTH AMERICA, INC.

2400023 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (GA6HP26Z) (N63)

Notes

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only the approved TRANSMISSION FLUID .
Failure to comply with this requirement will result in serious damage to the

automatic transmission!

Necessary preliminary tasks

- Disconnect battery. See **DISCONNECTING AND CONNECTING NEGATIVE BATTERY CABLE**
- Remove **FAN COWL**
- Remove **BOTH INTAKE FILTER HOUSINGS**
- Remove **EXHAUST SYSTEM**
- Secure **ENGINE IN INSTALLATION POSITION**
- Remove underbody protection at front and rear. See **REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** and **REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION** .
- Remove **PROPELLER SHAFT**

Unfasten earth strap (1).

Remove plates (2).

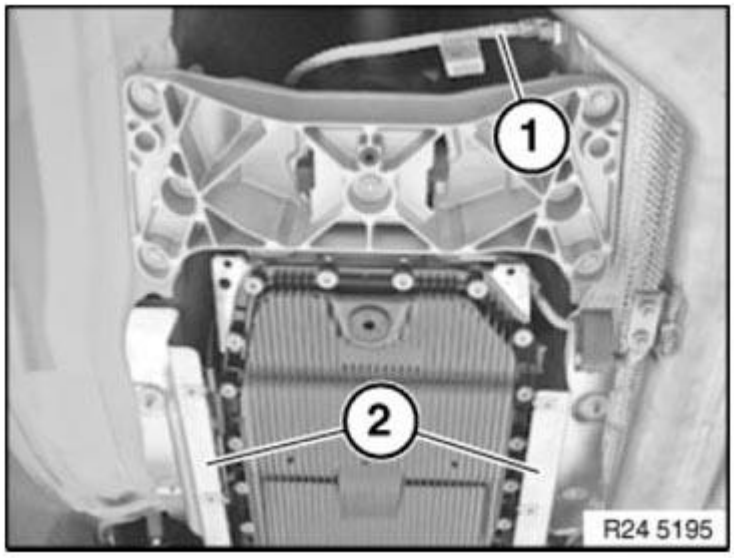


Fig. 9: Identifying Earth Strap And Plates
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Disconnect cable (1).

Installation:

- Unfasten nut.

- Adjust cable by means of holder (2) until spacing A = 1 mm is obtained.
- Tighten nut.

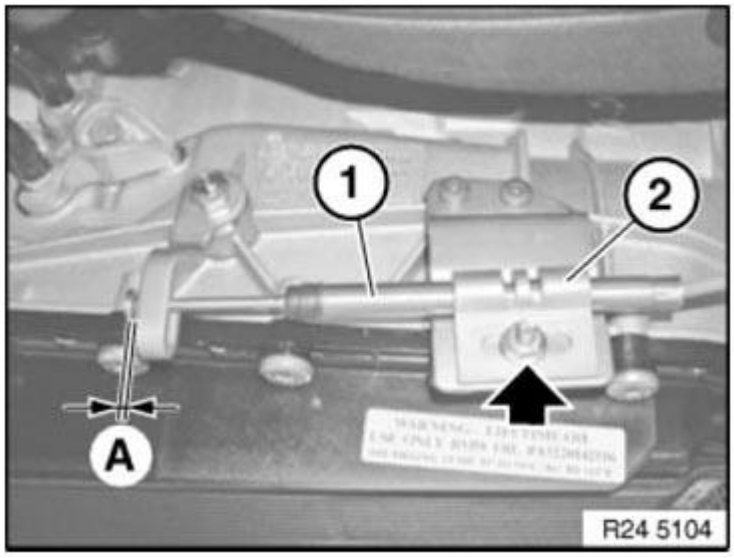


Fig. 10: Identifying Cable Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove cover (2).

Tightening torque **24 00 1AZ** .

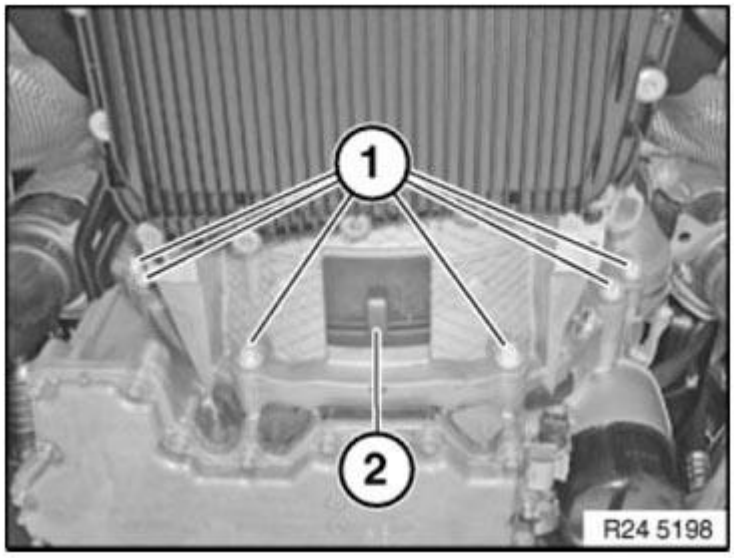


Fig. 11: Identifying Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

When unflanging the transmission, pay attention to installation position of rubber plugs (1).

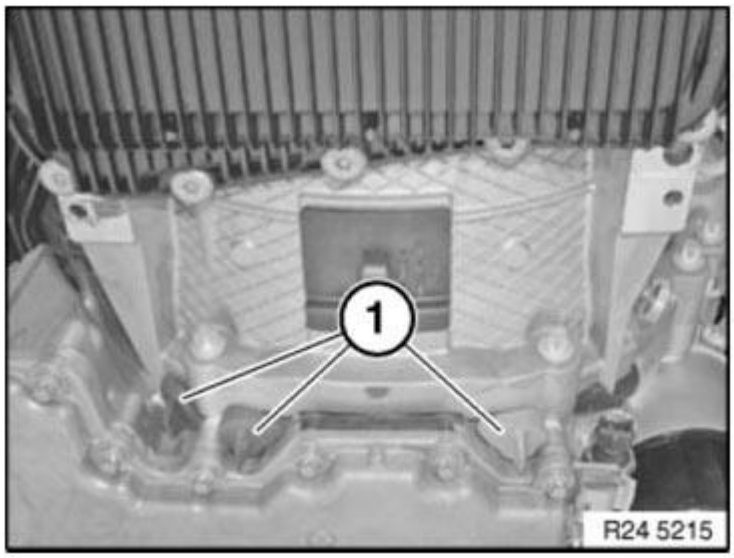


Fig. 12: Identifying Rubber Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove crankshaft sensor.

Disengage cable from holder (2).

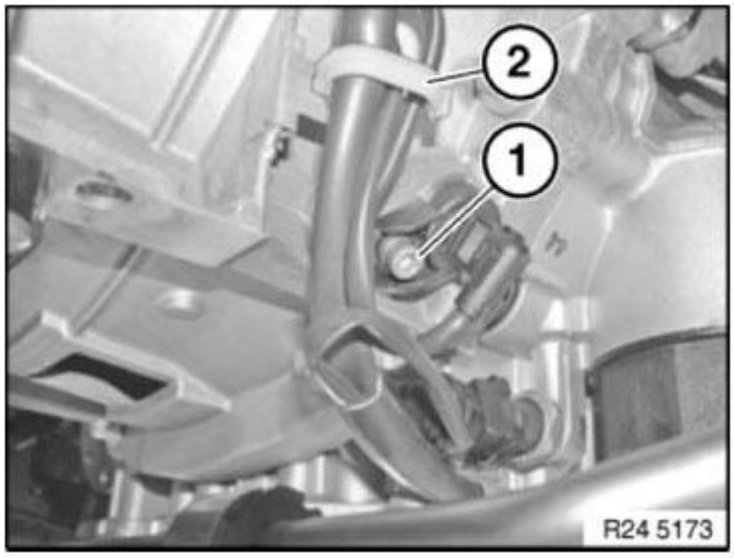


Fig. 13: Identifying Cable Holder And Crankshaft Sensor Screw
Courtesy of BMW OF NORTH AMERICA, INC.

- Unlock plug (1) by turning and disconnect
- Release cable from retainers

- Insert special tool **24 2 390** in sealing sleeve.

These tasks are described in **NOTES ON MECHATRONICS** .

(Important: Observe important note)

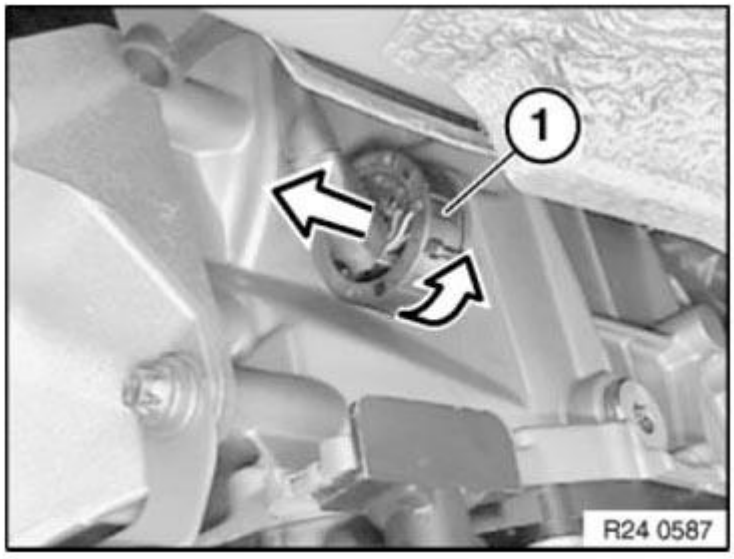


Fig. 14: Turning Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Disconnect hydraulic lines (2) to transmission fluid cooler.

Installation:

Replace sealing rings.

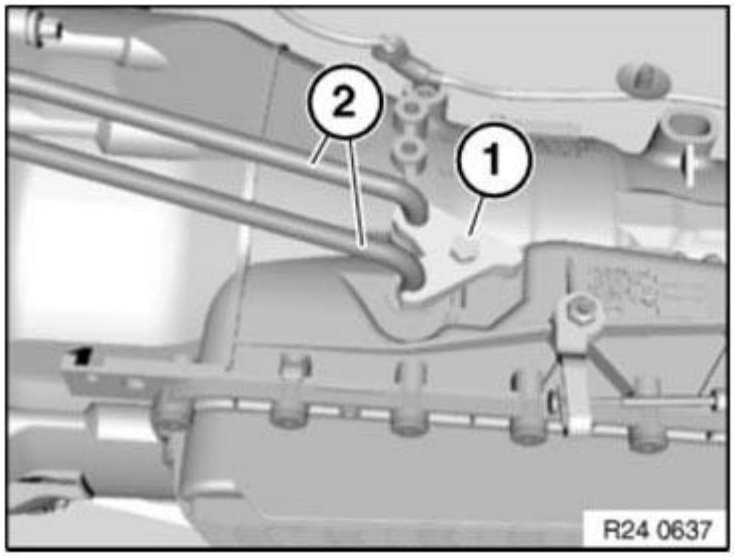


Fig. 15: Identifying Hydraulic Lines Of Transmission Fluid Cooler With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Release hydraulic lines with holder.

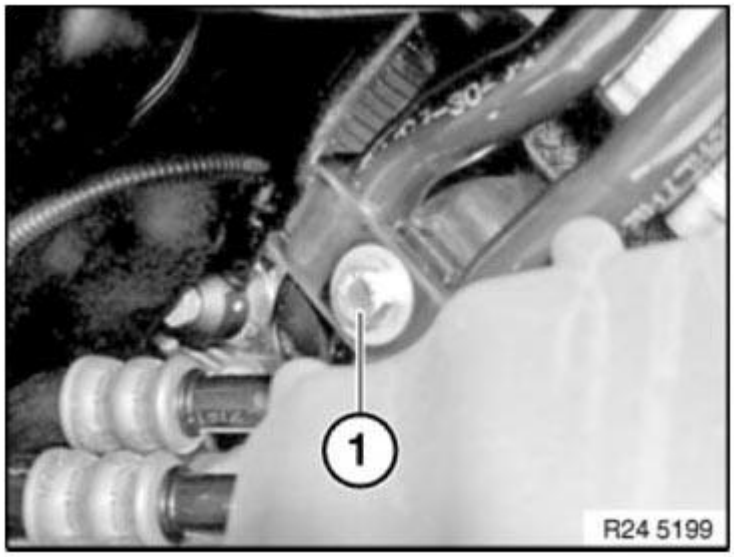


Fig. 16: Identifying Hydraulic Lines With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at vibration damper in direction of rotation until screw (1) is visible in opening.

Release all 6 screws (1) on torque converter.

Tightening torque **24 40 1AZ** .

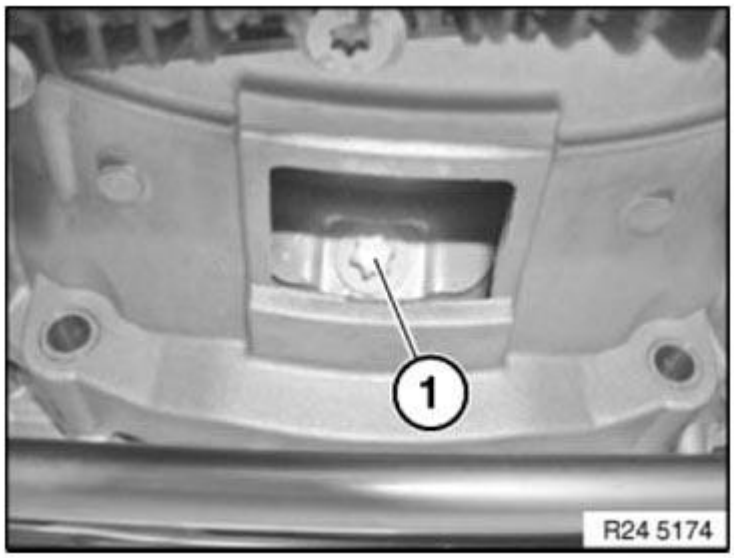


Fig. 17: Identifying Torque Converter Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool **24 1 380** together and insert into recess in transmission housing.



Fig. 18: Inserting Into Recess In Transmission Housing Using Special Tool 24 1 380
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on left and right of axle.

Remove cover plate (2) on left and right of axle.

Remove bolt (3) on left and right of axle.

Tightening torque **31 10 1AZ** .

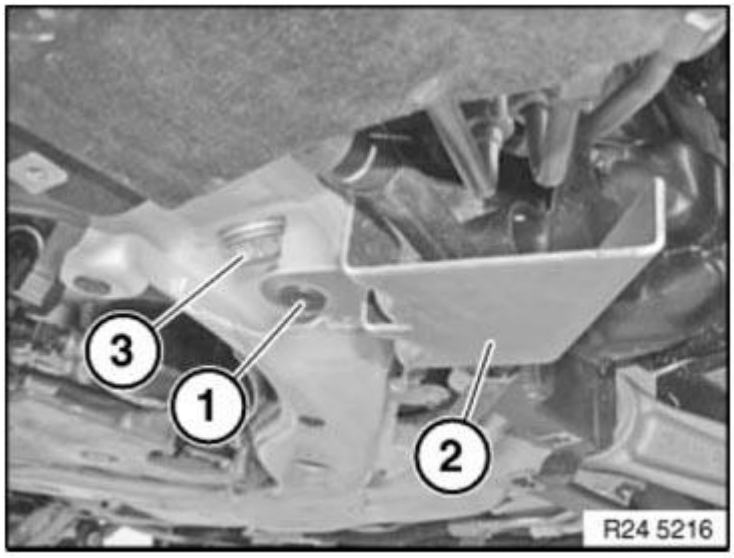


Fig. 19: Identifying Cover Plate, Bolt And Screws On Left And Right Of Axle
Courtesy of BMW OF NORTH AMERICA, INC.

Screw on special tool **11 8 910** .

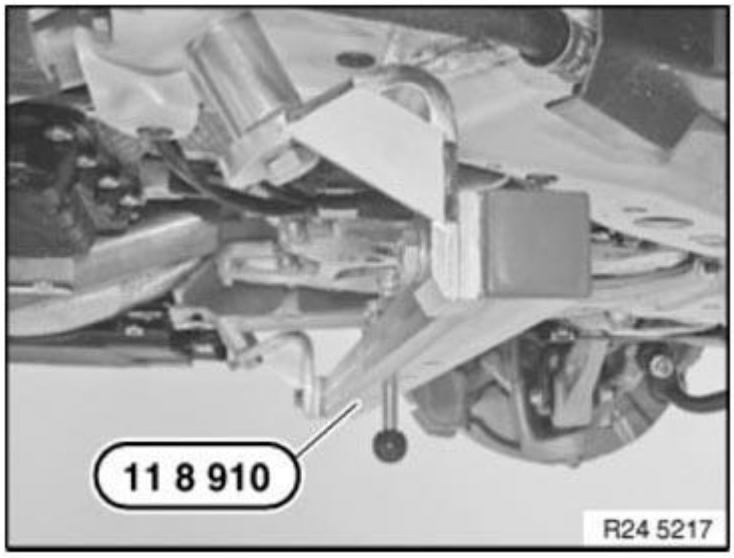


Fig. 20: Identifying Screw Of Special Tool 11 8 910
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust gap dimension (1) between transverse member and support using nuts (2).

Nuts (2) must be screwed down in opposite direction after gap dimension has been adjusted.

IMPORTANT: Gap dimension:
N54 38.5 mm
N57 37 mm
N63 38 mm

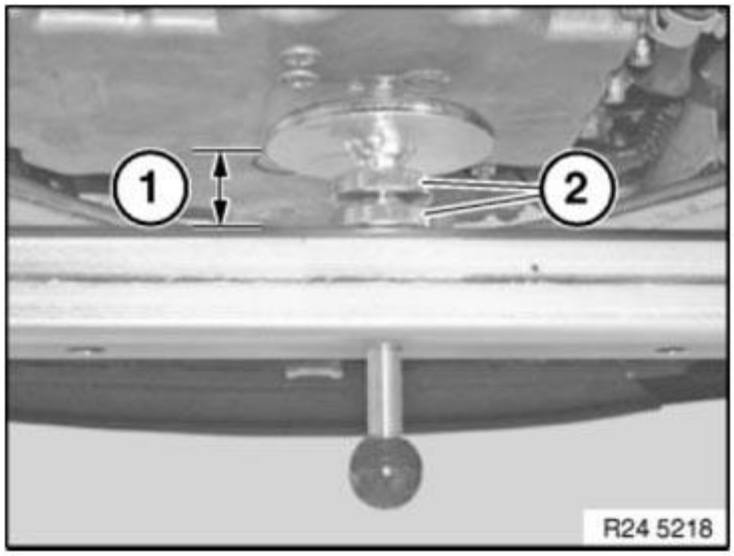


Fig. 21: Identifying Gap Dimension Between Transverse Member And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and (2).

Remove transmission cross-member.

Tightening torque **22 32 3/4AZ** .

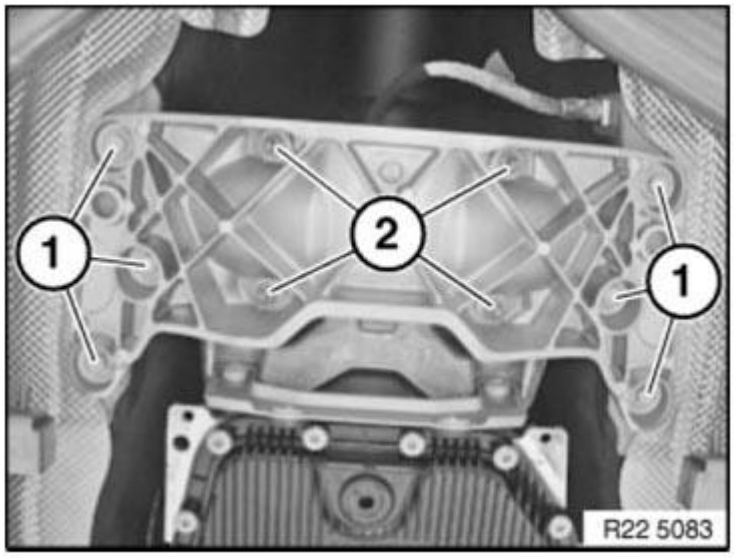


Fig. 22: Identifying Transmission Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Lower engine with transmission.

Secure engine and transmission in lowered position with engine bridge.

Then support transmission.

Supporting transmission

Support transmission with special tools **23 4 050** and **00 2 030** .

Secure transmission to mounting with tensioning strap (1).

Tasks are described in **UNIVERSAL BMW TRANSMISSION TAKE-UP**.

After completion of work, check transmission oil level.

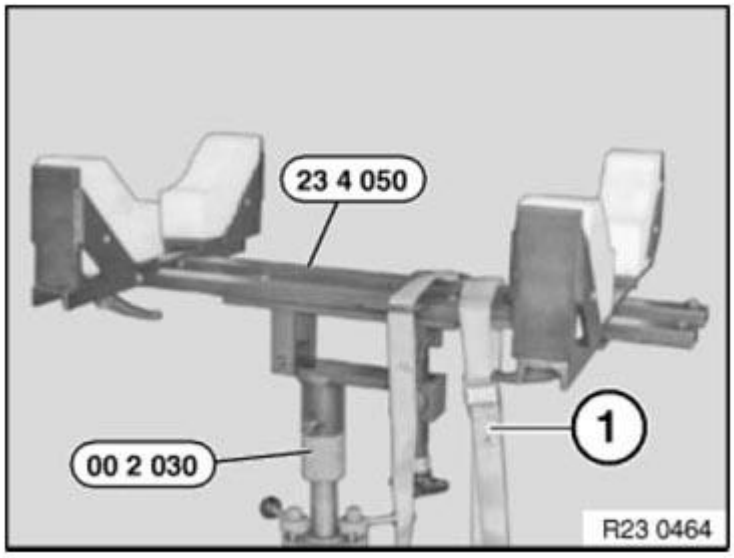


Fig. 23: Supporting Transmission With Special Tools 23 4 050
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 00 1AZ** .

Unflange transmission.

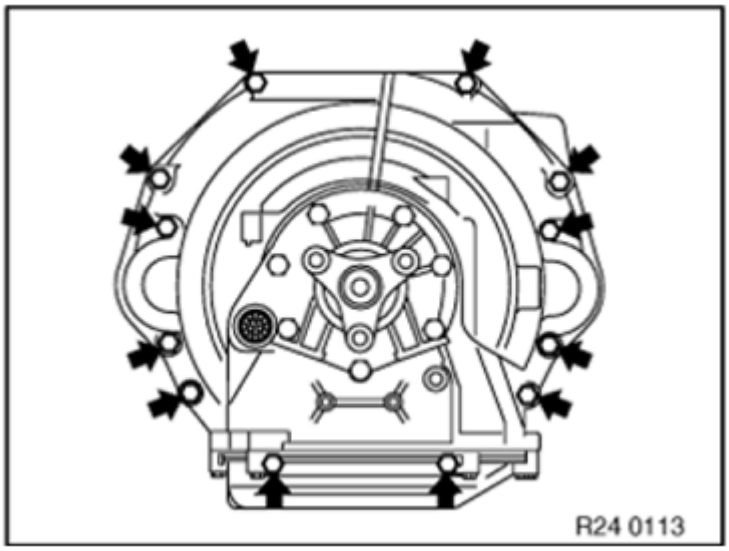


Fig. 24: Identifying Transmission Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bore (1) in driving disc must be accessible from opening on engine oil sump.

Check that adapter sleeves (2) are correctly seated.

Replace damaged fitting sleeves.

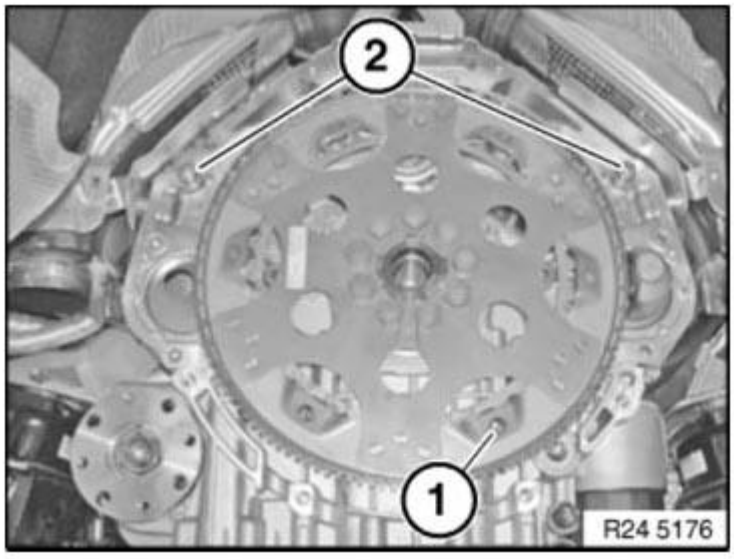


Fig. 25: Identifying Driving Disc Bore And Adapter Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rotate torque converter until bore in torque converter is flush with bore in driving disc.

Attach transmission input flange to engine output flange.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

23 TRANSMISSION DESIGNATIONS

Breakdown of BMW designation

BREAKDOWN OF BMW DESIGNATION

A5S 300J (former designation)		
A	Transmission type	○ S = Manual gearbox ○ A = Automatic transmission
5	Number of forward gears	
S	Type of top gear	○ D = Direct gear

		○ S = Overdrive gear
300	Max. input torque (Nm)	
J	Code letter of transmission manufacturer	○ G = Getrag ○ J = Jatco ○ R = GMPT (General Motors Powertrain) ○ Z = ZF (Zahnradfabrik Friedrichshafen)
SMG	Notes	SMG = Sequential M gearbox/transmission

M GEARBOX/TRANSMISSION DESIGNATION

GS6-37BZ (new designation according to BMW Group Standard GS 90007)		
G	Transmission	
S	Transmission type	○ S = Manual gearbox ○ A = Automatic transmission
6	Number of forward gears	
-		○ - = Standard with manual gearshift ○ HP = Hydraulic planetary gear train ○ DKG= Twin-clutch transmission/gearbox
37	Transmission type	○ 26 = D-transmission ○ 31 = C-transmission ○ 39 = F-transmission ○ 37 = H-transmission ○ 53 = G-transmission ○ 17 = I-transmission ○ 47= J transmission SMG -7-speed ○ 45 = K transmission ○ 36= Transmission DKG
B	Gear set	○ B = Gasoline gear ratio ○ D = Diesel gear ratio ○ S= Sport gear ratio
Z	Code letter of transmission manufacturer	○ G = Getrag ○ Z = ZF (Zahnradfabrik Friedrichshafen)

MANUAL GEARBOX DESIGNATION

BMW designation	Manufacturer	Manufacturer designation	Remarks
S5D 200G	Getrag	B transmission (220/5)	
S5D 200G	Getrag	B transmission (221/5)	for M41 engine only
S5D 250G	Getrag	B transmission (220/5)	Reinforced design
S5D 260Z	ZF	C-transmission (S5-31 D)	for M51 engine only
S5D 280Z	ZF	C-transmission (S5-31)	
S5D 310Z	ZF	C-transmission (S5-31)	up to 9.95
S5D 320Z	ZF	C-transmission (S5-31)	from 9.95 (reinforced design)
GS5S31BZ (SMG)	ZF	C transmission	SMG
GS5-39DZ	ZF	F transmission	
S6S 420G	Getrag	D-transmission (226/6)	
S6S 420G (SMG)	Getrag	D transmission	SMG
S6S 560G	Getrag	E-transmission (286/6)	
GS6-37BZ	ZF	H-transmission	
GS6S37BZ (SMG)	ZF	H-transmission	
GS6-37DZ	ZF	H-transmission	
GS6-37BG	Getrag	H-transmission	
GS6-53BZ	ZF	G-transmission	
GS6-53DZ	ZF	G-transmission	
GS6-17BG	Getrag	I-transmission	
GS6-17DG	Getrag	I-transmission	
GS7S47BG (SMG)	Getrag	J transmission (247)	SMG -7-speed
GS7D36SG	Getrag	DKG (436)	DKG -7-speed
GS6- 45BZ	ZF	K transmission	
GS6- 45DZ	ZF	K transmission	

Automatic transmission

AUTOMATIC TRANSMISSION DESIGNATION

BMW designation	Manufacturer	Manufacturer designation	Remarks
A4S 200R	GMPT	GM4	
A4S 270R	GMPT	THM-R1w	Transmission wide-stepped
A4S 310R	GMPT	THM-R1	
A5S 300J	Jatco	Jatco	
A5S 310Z	ZF	5HP-18	
A5S 325Z	ZF	5HP-19	
A5S 440Z	ZF	5HP-24	

A5S 560Z	ZF	5HP-30	
A5S 360R/390R	GM	GM5	
GA6HP19Z	ZF	6HP19	
GA6HP26Z	ZF	6HP26	
GA6HP32Z	ZF	6HP32	
GA6L45R	GM	GM6	
GA8HP45Z	ZF	8HP45	
GA8HP70Z	ZF	8HP70	
GA8HP90Z	ZF	8HP90	
GA7AHSCD	Daimler	AHS-C	Hybrid

23... UNIVERSAL BMW TRANSMISSION TAKE-UP

Notes

NOTE:

- **The universal transmission bracket is introduced for the E60 AWD**
- **Suitable for manual and automatic transmissions**

IMPORTANT: Front and rear supports (1) can be laterally adjusted by means of screws (2). Carrier (3) of rear supports (1) can be longitudinally adjusted by means of screw.
Supports must be adapted in length and width to the transmission.

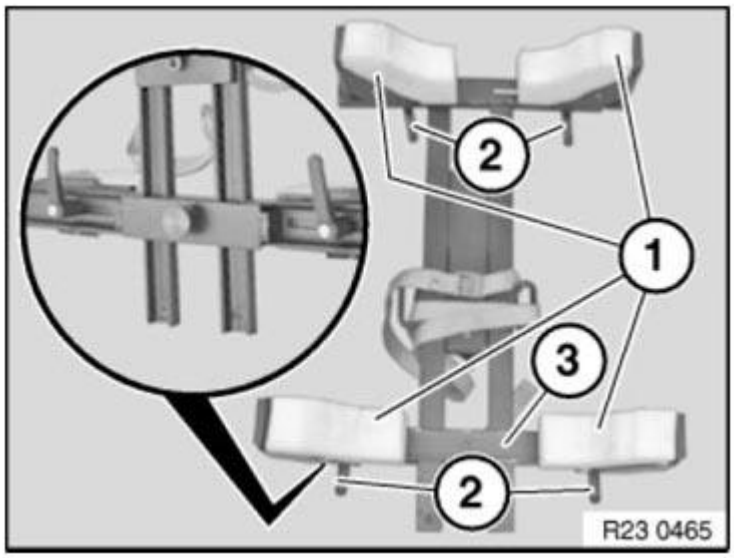


Fig. 26: Identifying Rear Support Carrier, Front And Rear Support Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission

Support transmission with special tools **23 4 050** and **00 2 030** .

IMPORTANT: Transmission must be secured with tensioning strap (1).

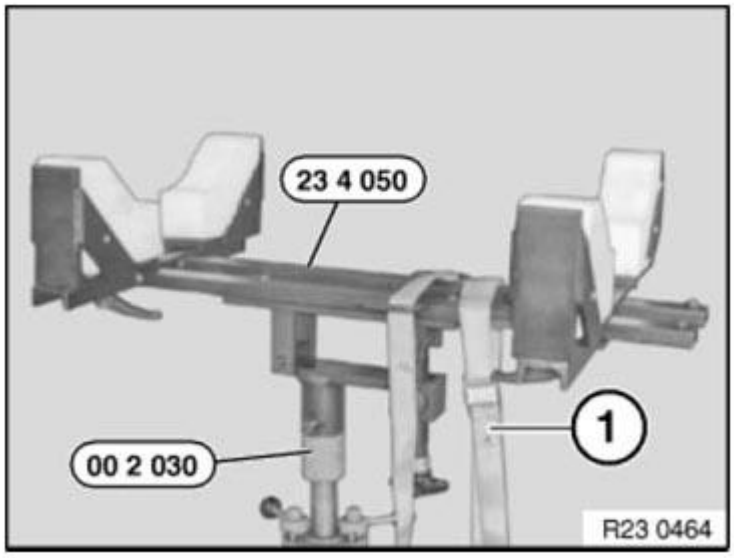


Fig. 27: Supporting Transmission Using Special Tools 23 4 050
Courtesy of BMW OF NORTH AMERICA, INC.

23..... UNIVERSAL TRANSMISSION RETAINING BRIDGE

Notes

NOTE:

- **The transmission retaining bridge 24 0 200 is suitable for both manual and automatic transmissions**

IMPORTANT: Adapters and spindles must be adapted for positive locking to the transmission.
(Risk of injury)

Adapt adapters (1) and spindle with thrust piece (3) to transmission.

Adapt length with slide (2).

Screw in spindle (4).

IMPORTANT: Before mounting on assembly stand 00 1 450, check retaining bridge for secure seating.

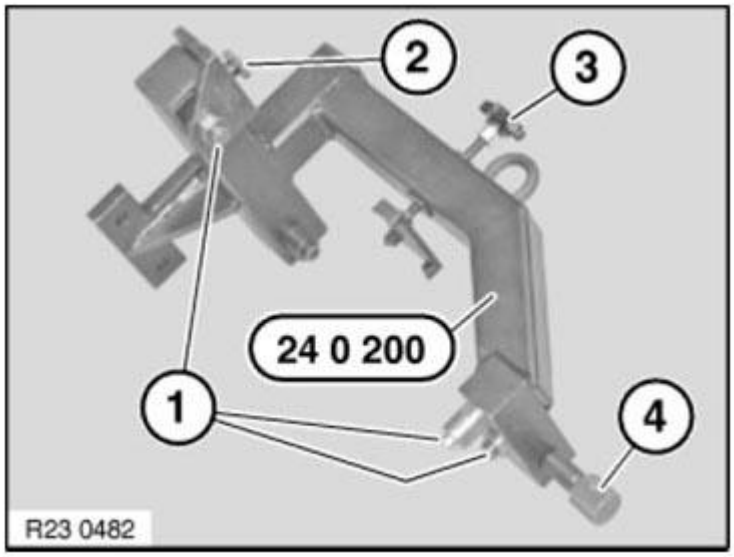


Fig. 28: Identifying Adapters, Spindle With Thrust Piece To Transmission And Spindle Screw
Courtesy of BMW OF NORTH AMERICA, INC.

2411 TRANSMISSION CASE, OIL SUMP

2411010 REMOVING AND INSTALLING/SEALING OR REPLACING TRANSMISSION SUMP (GA6HP26Z)

IMPORTANT: Remove transmission sump only after it has cooled down.
After completion of work, check TRANSMISSION OIL LEVEL .
Use only the approved TRANSMISSION FLUID .
Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks

- Remove rear **UNDERBODY PROTECTION** with side guides

Remove oil drain plug (1).

Tightening torque **24 11 2AZ** .

Drain automatic transmission fluid.

Installation

Replace oil drain plug.

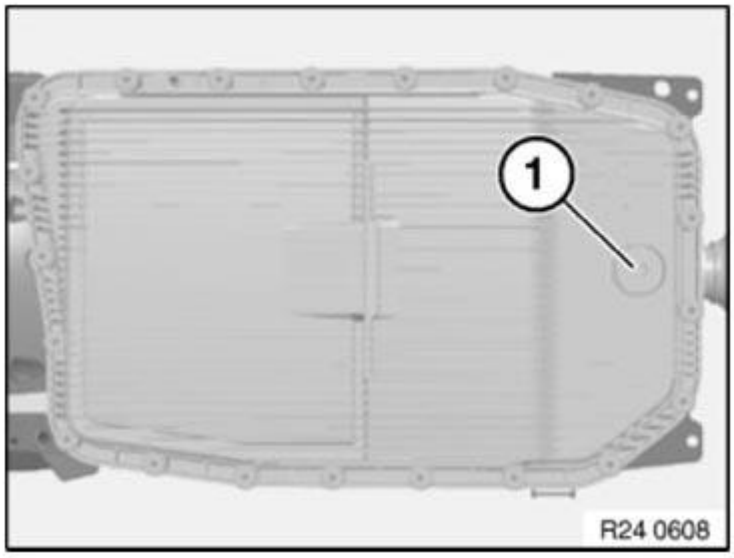


Fig. 29: Identifying Oil Drain Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Recycling

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations.

Unscrew all bolts.

Remove transmission sump (1).

Installation:

Insert screws (2) until screw heads make contact.

Insert all further screws in diagonal sequence from inside to outside until screw heads make contact.

Tightening torque **24 11 1AZ** .

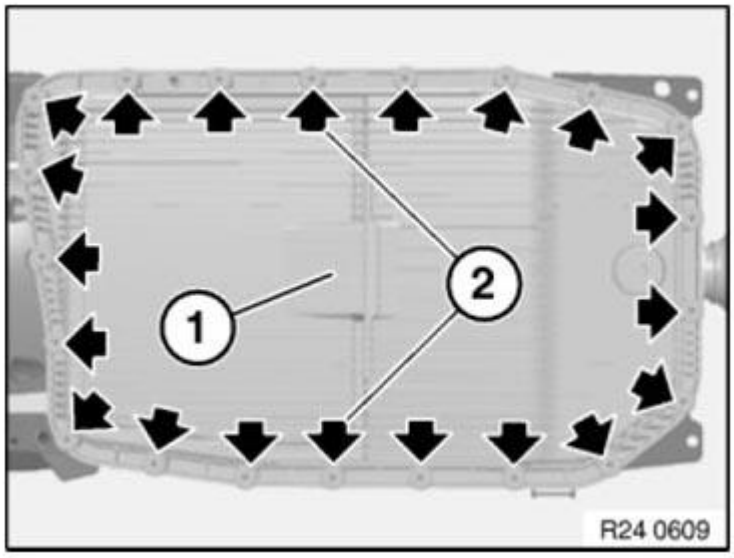


Fig. 30: Locating Transmission Oil Sump And Screw Head Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove gasket (1) from transmission sump.

Clean transmission oil sump to remove residual oil.

Clean sealing faces and groove with a cloth.

Insert new gasket in transmission sump groove.

IMPORTANT: Do not degrease transmission sump with cleaning agent.

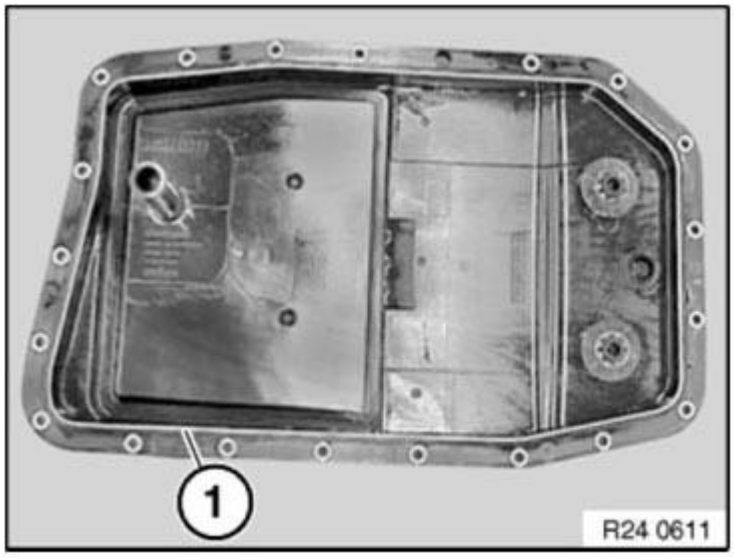


Fig. 31: Identifying Gasket Of Transmission Sump

Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing ring (1) on oil filter tube.

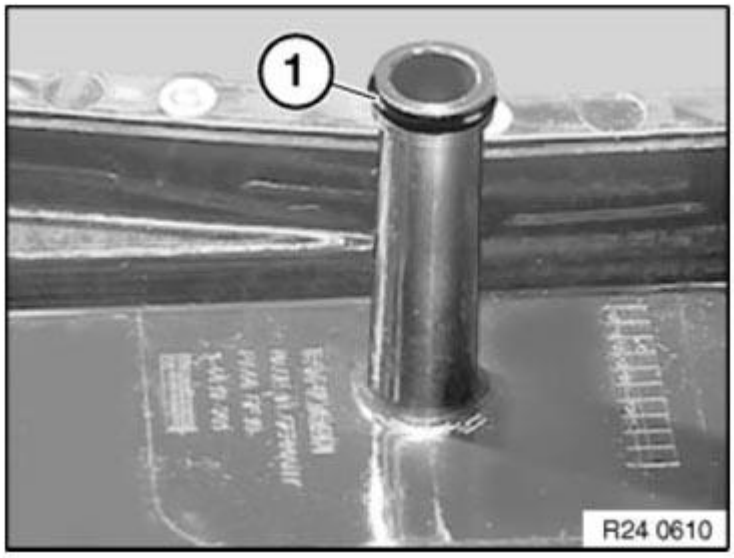


Fig. 32: Identifying Sealing Ring On Oil Filter Tube
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

The gasket is correctly installed when it is engaged in the locating opening of the transmission sump.

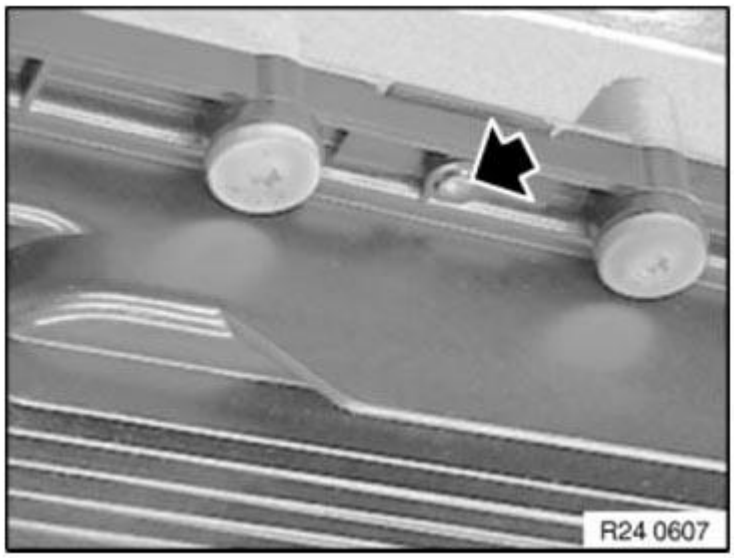


Fig. 33: Identifying Gasket Of Transmission Sump
Courtesy of BMW OF NORTH AMERICA, INC.

2412 TORQUE CONVERTER BEARING, SEAL

2431010 REPLACING TORQUE CONVERTER SHAFT SEAL (GA6HP26Z)

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION**

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved TRANSMISSION OIL .
Failure to comply with this instruction will result in serious damage to the transmission.

Secure transmission with special tool **24 0 200** on assembly stand 00 1 450.

Remove **TORQUE CONVERTER** .

NOTE: Read and comply with note on installation of TRANSMISSION RETAINING BRIDGE .

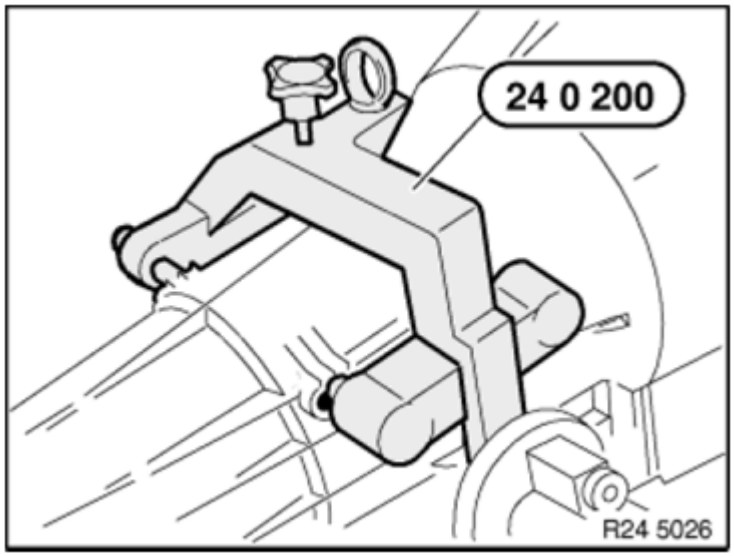


Fig. 34: Securing Transmission Using Special Tool 24 0 200
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 24 2 353 to input shaft (1).

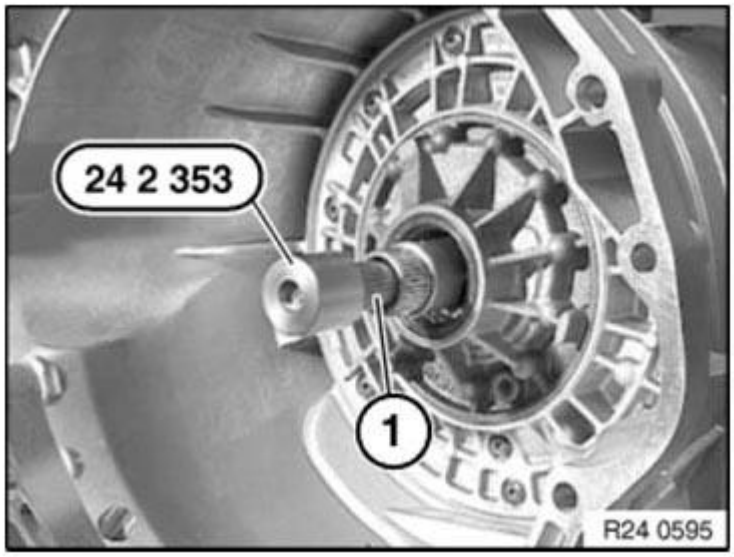


Fig. 35: Connecting Special Tool 24 2 353 To Input Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 2 351 until it is firmly connected with radial shaft seal.

Screw in special tool 24 2 352 to remove radial shaft seal.

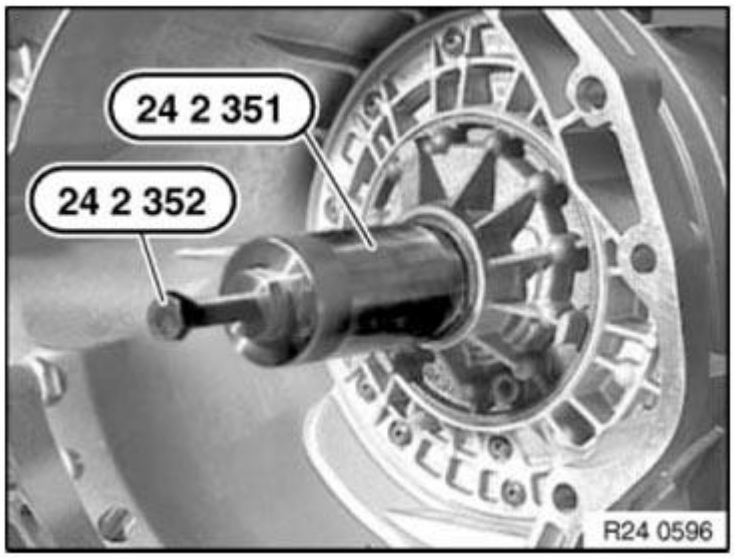


Fig. 36: Removing Radial Shaft Seal Using Special Tool 24 2 352 And 24 2 351
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip on shaft seal.

Drive in radial shaft seal (1) with special tool **24 2 400** as far as it will go.

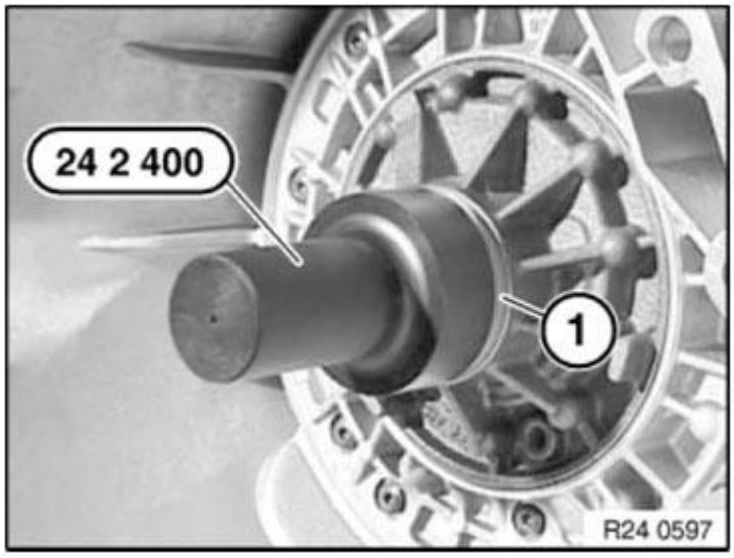


Fig. 37: Installing Radial Shaft Seal Using Special Tool 24 2 400
Courtesy of BMW OF NORTH AMERICA, INC.

2413 EXTENSION HOUSING, BEARINGS, SEAL

2413012 REPLACING OUTPUT FLANGE SHAFT SEAL (GA6HP26Z/GA6HP32

Notes

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only the approved TRANSMISSION FLUID .
Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks

- Remove underbody protection at front and rear. See **REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** and **REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION** .
- Remove complete **EXHAUST SYSTEM**
- Remove **TRANSMISSION CROSSMEMBER** .
- Remove **PROPELLER SHAFT**

Release transmission support block from transmission.

Tightening torque **22 32 1AZ** .

Grip output flange (1) with special tool **23 0 020** .

Release nut with special tool **24 2 380** .

Tightening torque **24 13 1AZ** .

Installation:

Replace nut and secure with a mandrel (8 mm) by caulking.

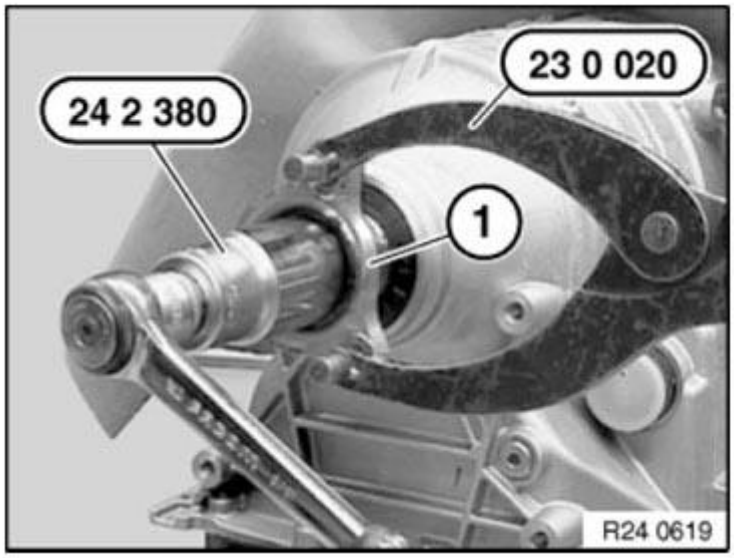


Fig. 38: Disconnecting Output Flange From Output Shaft Using Special Tool 23 0 020
Courtesy of BMW OF NORTH AMERICA, INC.

Detach output flange from output shaft.

Remove spacer.

Attach special tool 24 2 353 to output shaft (1).

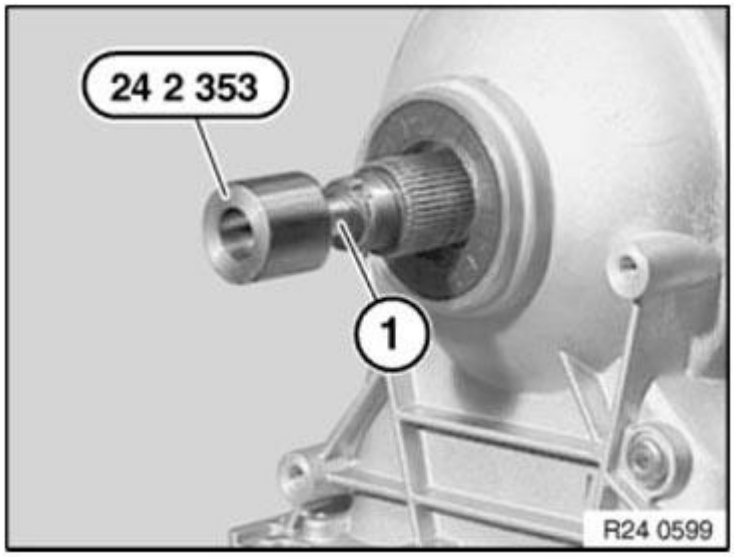


Fig. 39: Connecting Special Tool 24 2 353 To Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 2 351 until it is firmly connected with radial shaft seal.

Pull out radial shaft seal by screwing in special tool 24 2 352.

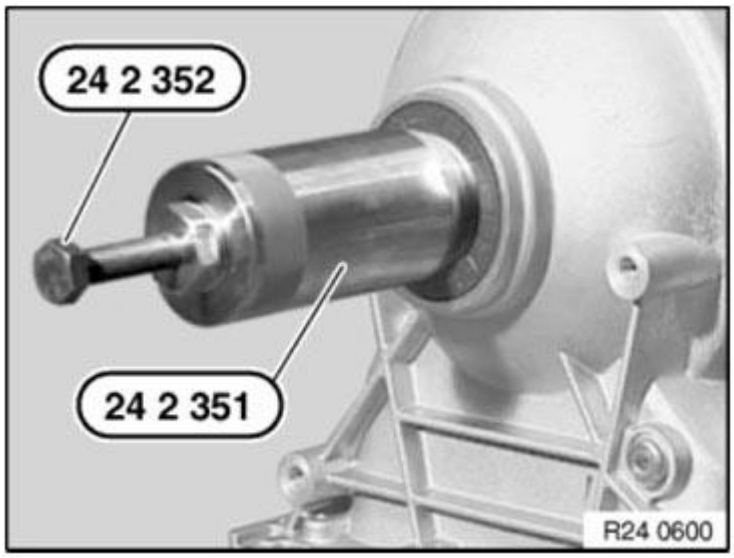


Fig. 40: Pulling Out Radial Shaft Seal Using Special Tool 24d 2 352
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip of radial shaft seal (1). Drive in radial shaft seal (1) as far as it will go using special tool **24 2 370** and adapter ring **24 2 410** .

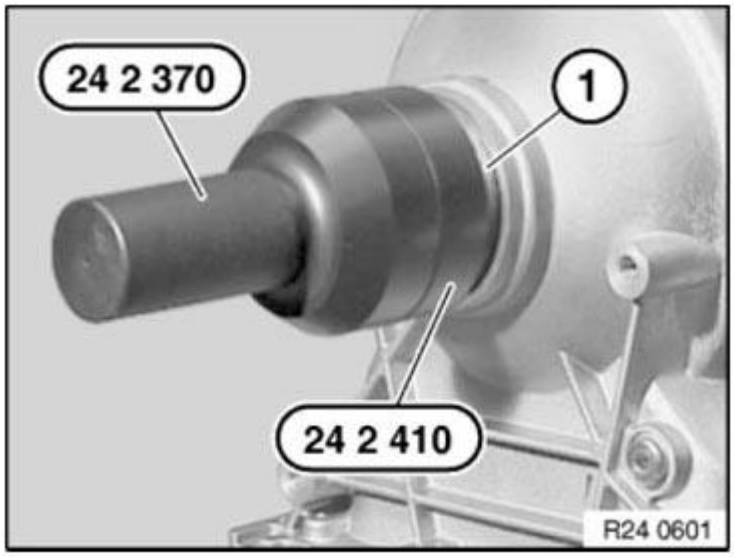


Fig. 41: Installing Radial Shaft Seal Using Special Tool 24 2 370
Courtesy of BMW OF NORTH AMERICA, INC.

2414 MECHANICAL ATTACHMENTS

2414001 REPLACING SELECTOR SHAFT SEAL (GA6HP26Z)

Notes

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only the approved TRANSMISSION FLUID .
Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks

- Remove rear **UNDERBODY PROTECTION**
- Remove left retaining plate

AWD - remove right retaining plate

IMPORTANT: Support transmission with workshop hoist.

Unfasten nut.

Remove cable (1).

Installation:

Adjusting cable:

- Release nut
- Adjust cable by means of holder (2)

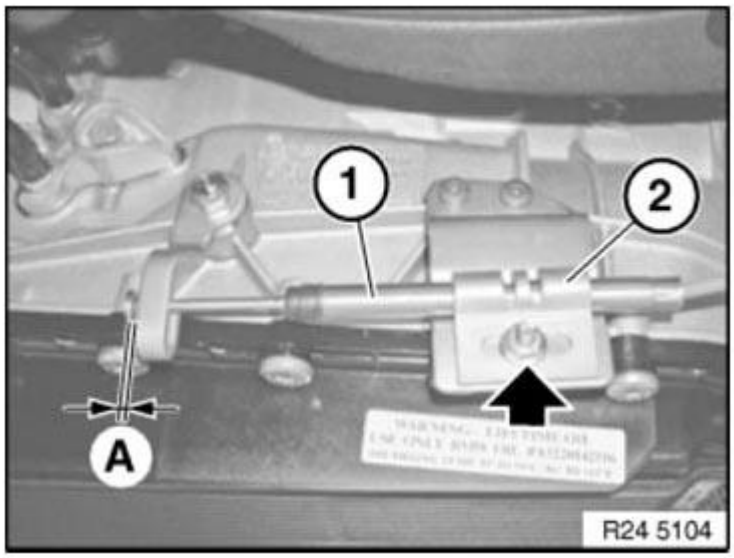


Fig. 42: Identifying Cable With Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Distance A = 1 mm.

Unfasten nut.

Take off holder (1).

Tightening torque **24 51 1AZ** .

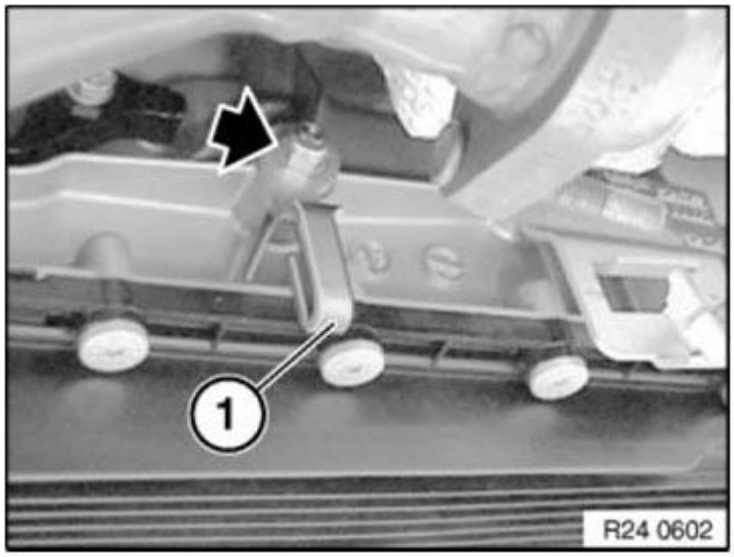


Fig. 43: Identifying Holder Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 5 361 until it is firmly connected with radial shaft seal.

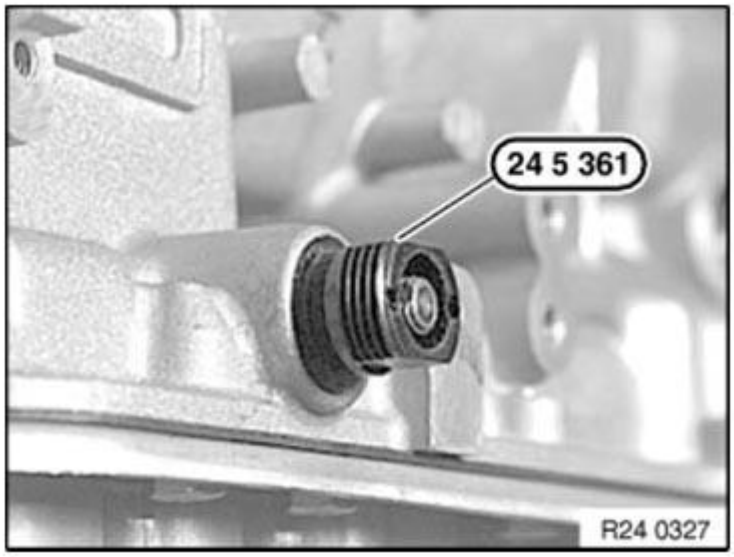


Fig. 44: Connecting Radial Shaft Seal Using Special Tool 24 5 361
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 24 5 362 onto special tool 24 5 361 and tighten down.

This pulls the shaft seal out of the transmission housing.

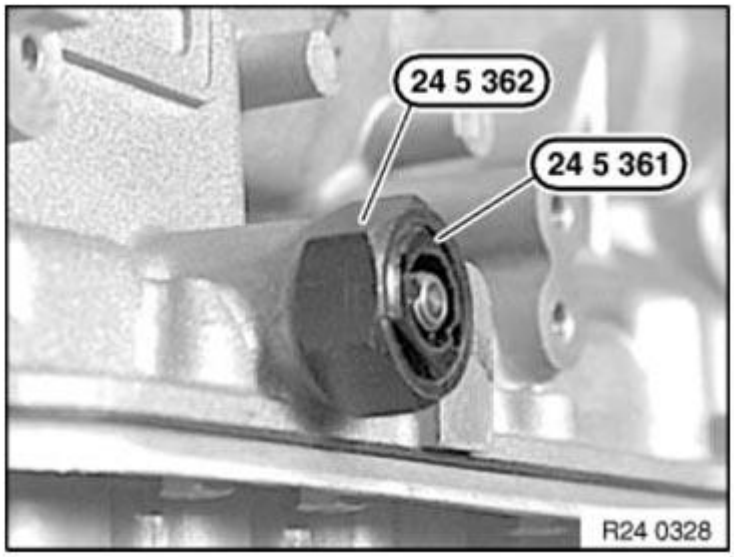


Fig. 45: Tightening Special Tool 24 5 362 Onto Special Tool 24 5 361
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip on shaft seal (1).

Screw in radial shaft seal (1) with special tools 24 5 366 and 24 5 364 as far as it will go.

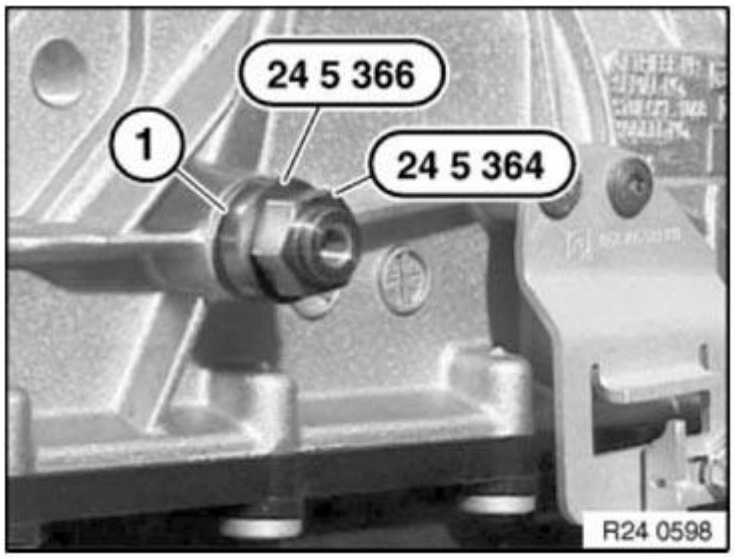


Fig. 46: Tightening Radial Shaft Seal Using Special Tools 24 5 366 And 24 5 364
Courtesy of BMW OF NORTH AMERICA, INC.

2430 HYDR/EL CONTROL COMPONENTS/ELEMENTS

24 30 100 REPLACING OIL ACCUMULATOR (GA8HP45Z)

- Do not let skin come in contact with transmission oil and do not inhale fuel vapors.
- Wear protective gloves.
- Ensure adequate ventilation.

IMPORTANT: Applies to vehicles from 08/2011

Remove transmission oil sump only after it has cooled down.

After completion of repair work, check TRANSMISSION OIL LEVEL.

Use only the approved TRANSMISSION OIL.

To set the correct level, it is mandatory that the service function "Transmission control unit: oil adjustment" is performed using the diagnosis system.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Installation note:

The transmission oil sump must be renewed **every** time it is removed.

Necessary preliminary tasks:

- Remove transmission oil sump.
- Remove retaining plates.

Recycling:

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.

Release screws (1) (M6x20).

Release screw (2) (M6x59).

Tightening torque **24 30 5AZ** .

Carefully unlock cable connector (3) with screwdriver.

Carefully pull out oil accumulator.

IMPORTANT: Mounting bolts of oil accumulator must be replaced after removal.

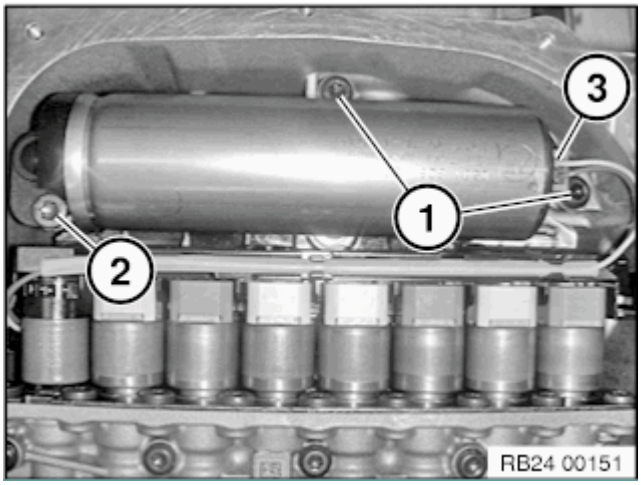


Fig. 47: Identifying Connector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

24 30 101 REPLACING OIL RESERVOIR (GA8HP70Z)

- Do not let skin come in contact with transmission oil and do not inhale fuel vapors.
- Wear protective gloves.
- Ensure adequate ventilation.

IMPORTANT: Applies to vehicles from 08/2011

After completion of repair work, check TRANSMISSION OIL LEVEL.

Use only the approved TRANSMISSION OIL.

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

- Remove transmission oil sump.

Release screws (1) (M6x20).

Release screw (2) (M6x59).

Tightening torque **24 30 5AZ** .

Carefully unlock cable connector (3) with screwdriver.

Carefully pull out oil accumulator.

IMPORTANT: Mounting bolts of oil accumulator must be replaced after removal.

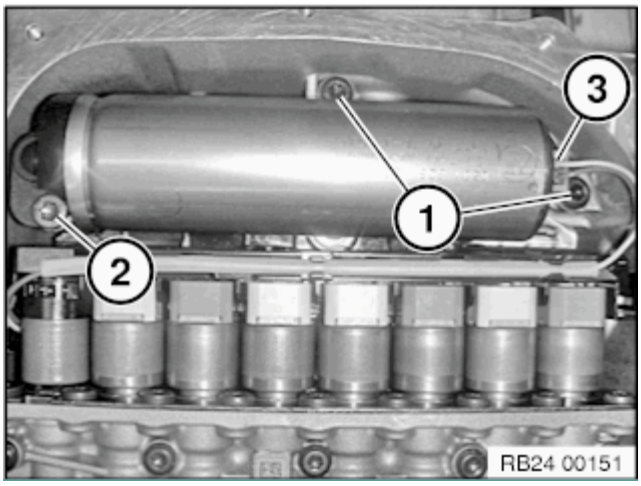


Fig. 48: Identifying Connector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

2431 OIL PUMP

2431575 REPLACING O-RING ON OIL PUMP (GA6HP19/GA6HP26Z

Notes

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved TRANSMISSION OIL .
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION**
- Secure transmission with **TRANSMISSION RETAINING BRIDGE** on assembly stand
- Remove **TORQUE CONVERTER**
- Remove **MECHATRONICS**

Remove adapter (1).

Installation

Note installation position.

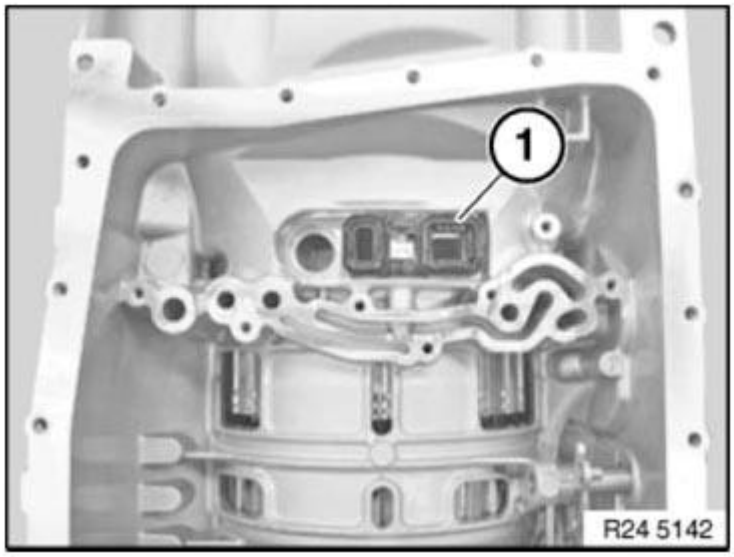


Fig. 49: Identifying Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 2AZ** .

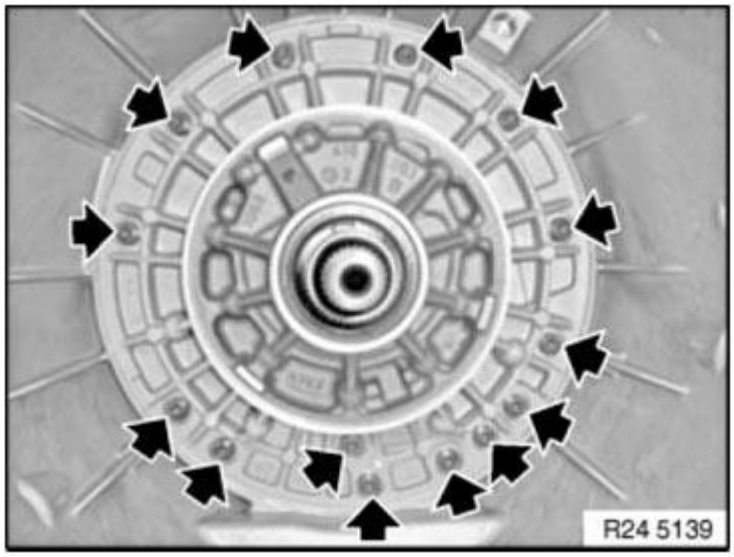


Fig. 50: Identifying Torque Converter Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slide special tool 24 1 184 completely into puller **24 1 180** .

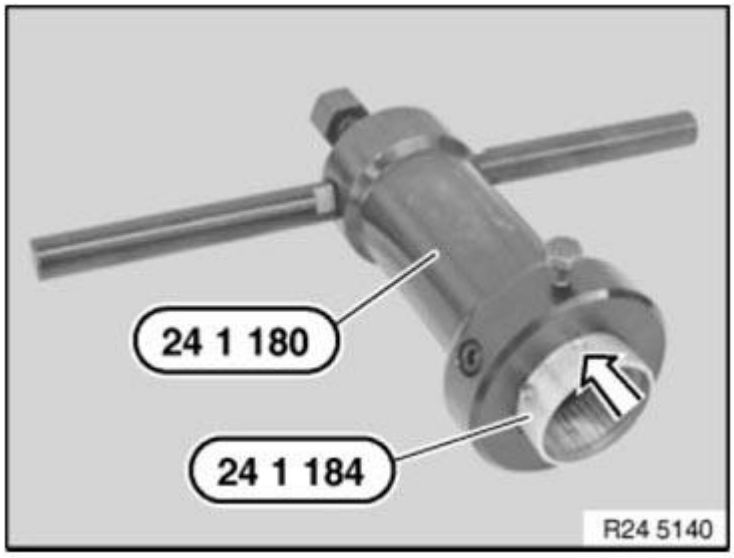


Fig. 51: Sliding Special Tool 24 1 184 Completely Into Puller 24 1 180
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool **24 1 180** and secure with screw (1).

Insert screw (2) and release oil supply unit from transmission housing.

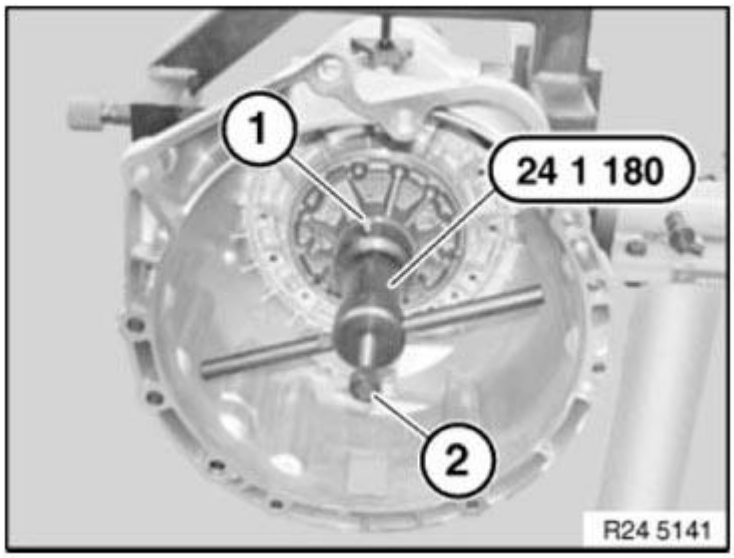


Fig. 52: Removing Oil Supply Unit From Transmission Housing Using Special Tool 24 1 180
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 1AZ** .

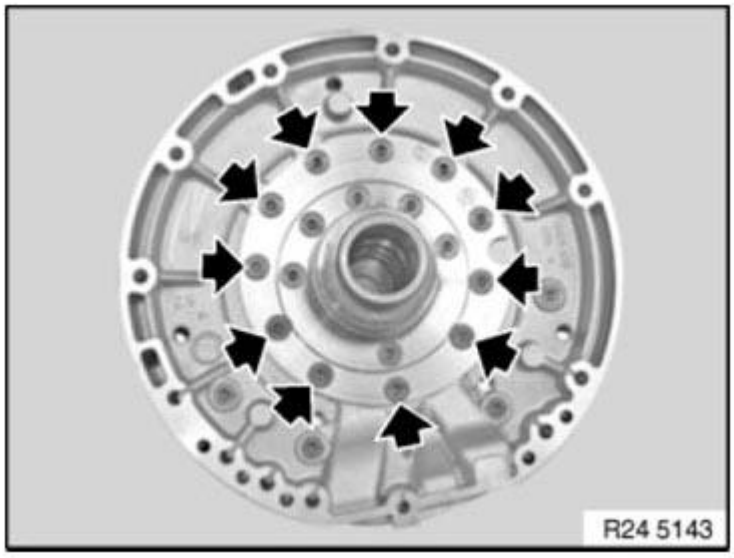


Fig. 53: Identifying Transmission Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach cover (1) from pump body (2).

Replace O-rings (3 + 4).

Installation

Pay attention to installation position of gears during disassembly.

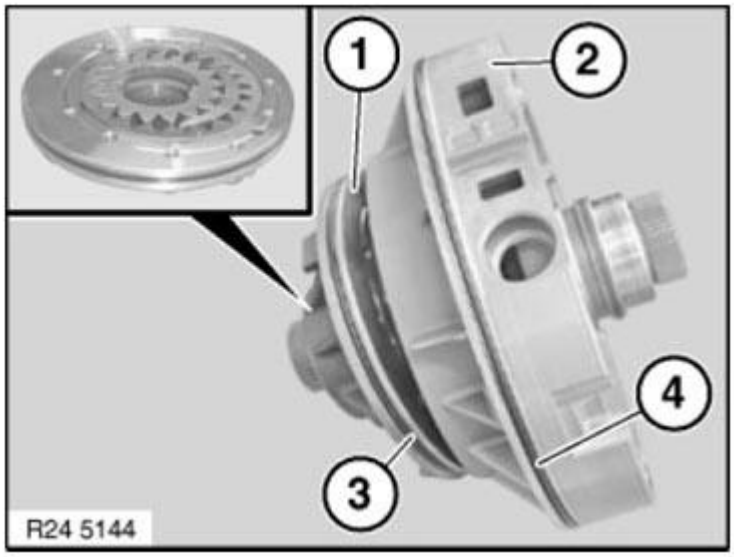


Fig. 54: Identifying Installation Position Of Gears
Courtesy of BMW OF NORTH AMERICA, INC.

2431010 REPLACING TORQUE CONVERTER SHAFT SEAL (GA6HP26Z)

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION**

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved TRANSMISSION OIL .
Failure to comply with this instruction will result in serious damage to the transmission.

Secure transmission with special tool **24 0 200** on assembly stand 00 1 450.

Remove **TORQUE CONVERTER** .

NOTE: Read and comply with note on installation of TRANSMISSION RETAINING BRIDGE .

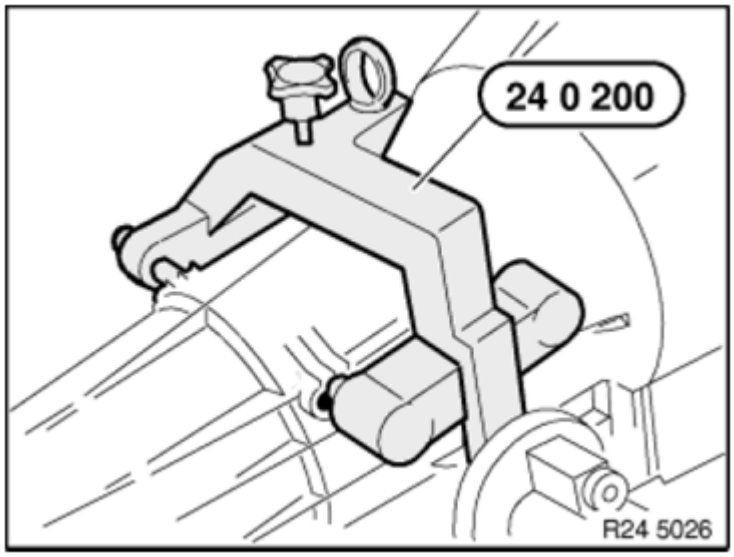


Fig. 55: Removing Torque Converter Using Special Tool 24 0 200
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 24 2 353 to input shaft (1).

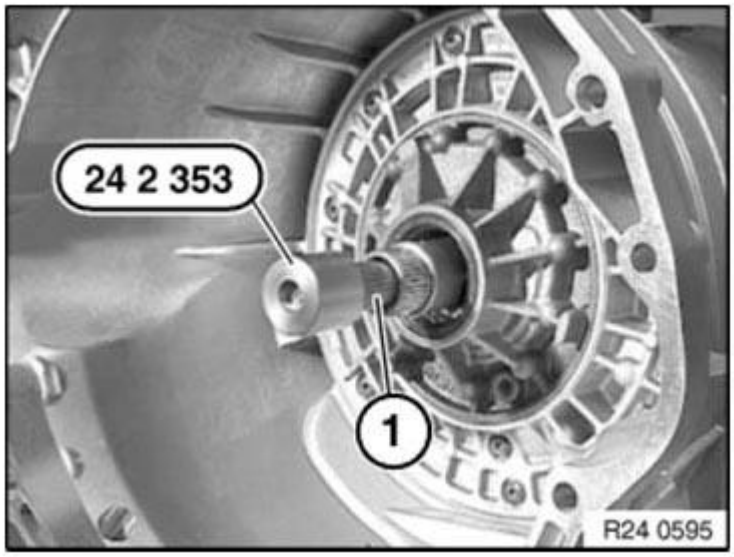


Fig. 56: Connecting Input Shaft Using Special Tool 24 2 353
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 2 351 until it is firmly connected with radial shaft seal.

Screw in special tool 24 2 352 to remove radial shaft seal.

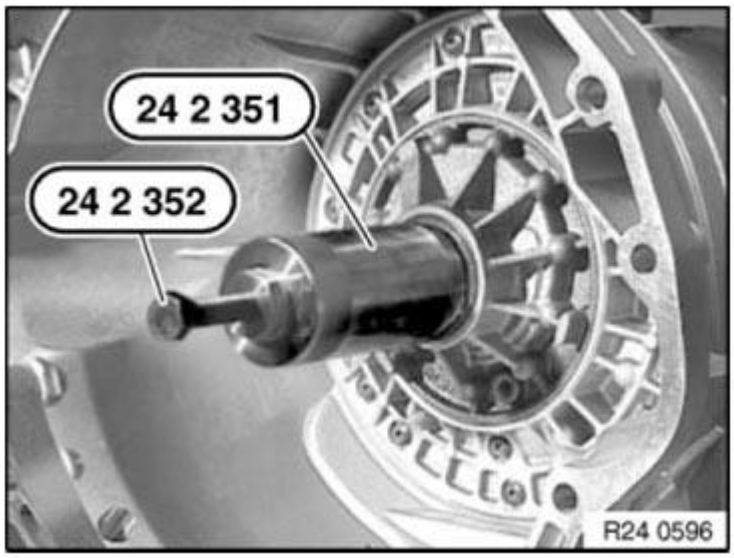


Fig. 57: Removing Radial Shaft Seal Using Special Tool 24 2 352
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip on shaft seal.

Drive in radial shaft seal (1) with special tool **24 2 400** as far as it will go.

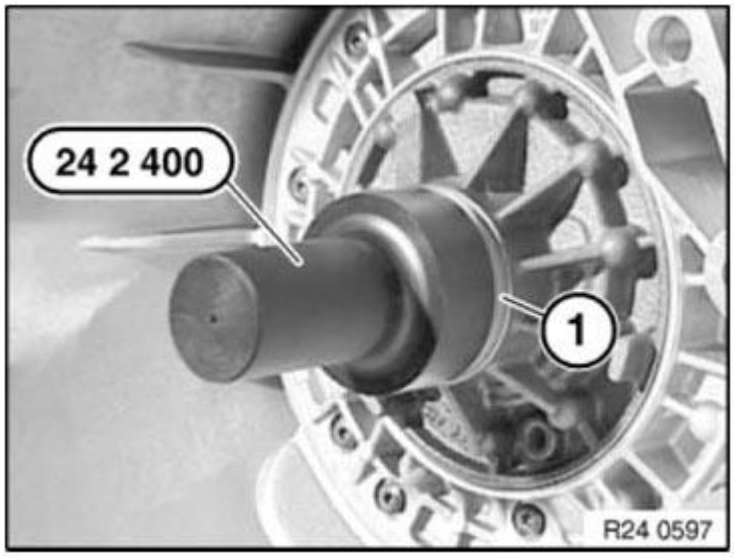


Fig. 58: Connecting Radial Shaft Seal Using Special Tool 24 2 400
Courtesy of BMW OF NORTH AMERICA, INC.

2432 CONTROLLER

2434... MANUAL EMERGENCY RELEASE OF TRANSMISSION LOCK

Manual emergency release of transmission lock from inside vehicle is not possible with GA6HP/GA8HP gearboxes from 03/2010

- From production date 04/2010 on, the transmission lock release cable is not fitted on:
- F01/F02/F03 GA6HP from production date 03/2010
- F01/F02/F03/F04 GA8HP from production date 09/2010
- F07 GA8HP from production date 03/2010
- F10 GA8HP from production date 06/2010

Releasing the transmission lock under the vehicle floor remains possible for towing purposes.

MANUALLY RELEASING TRANSMISSION LOCK

In the event of a power supply interruption, e.g. flat battery or electrical fault, the transmission lock must be manually released, otherwise the wheel will be locked and the vehicle cannot be moved.

IMPORTANT: Secure vehicle against rolling, e.g. with chocks.
Press the brake pedal when manually releasing the transmission lock, otherwise there is a risk that the vehicle will roll when the transmission lock is manually released.
If the parking brake has to be released as well, observe the following procedure:

1. **First, manually release the PARKING BRAKE .**
2. **Then manually release the automatic transmission lock.**

NOTE: Release tool is located in on-board tool kit.

Open lid of drinks holder (1).

Lift out drinks holder (1) and rubber mat (2) from drinks holder base.

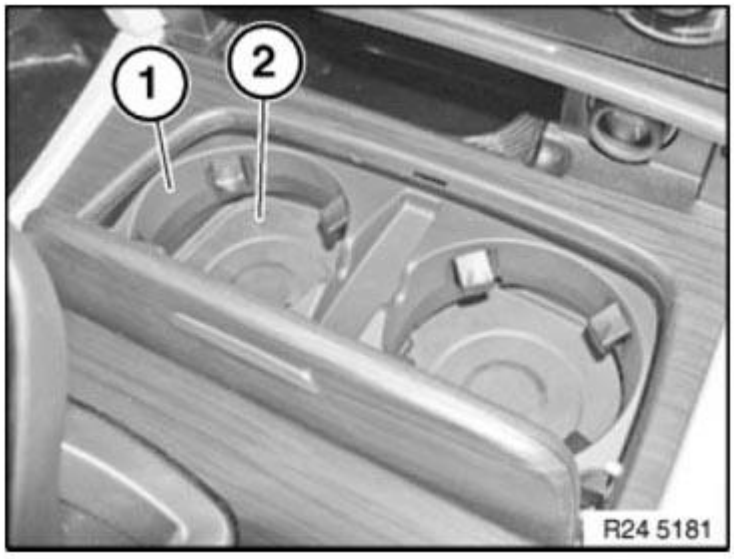


Fig. 59: Identifying Drinks Holder And Rubber Mat Of Drinks Holder Base
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover (1).

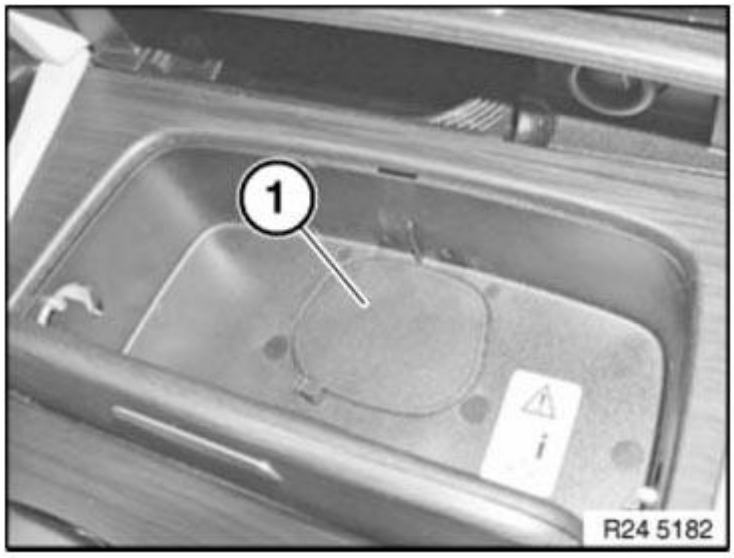


Fig. 60: Identifying Cover Of Drinks Holder Base
Courtesy of BMW OF NORTH AMERICA, INC.

Releasing transmission lock

Insert release tool (1) into opening.

Turn release tool clockwise up to stop and press down.

Transmission lock is released!

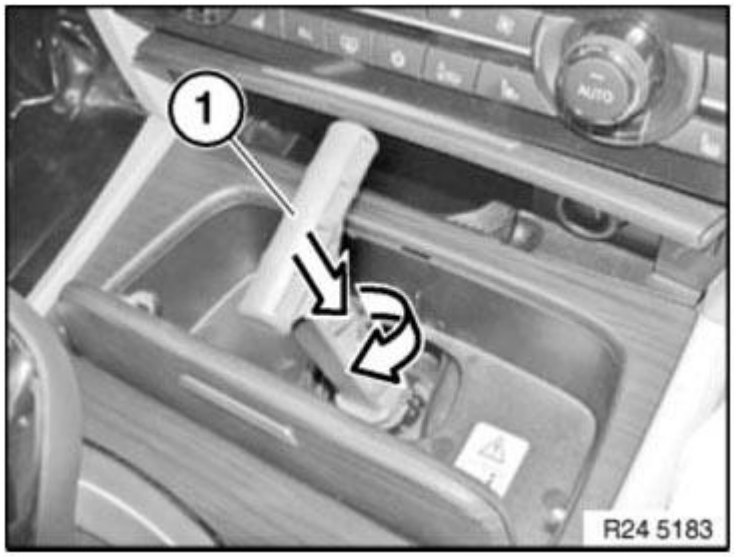


Fig. 61: Releasing Transmission Lock Using Release Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Locking transmission lock

Pull out release tool in direction of arrow.

Transmission lock is locked.

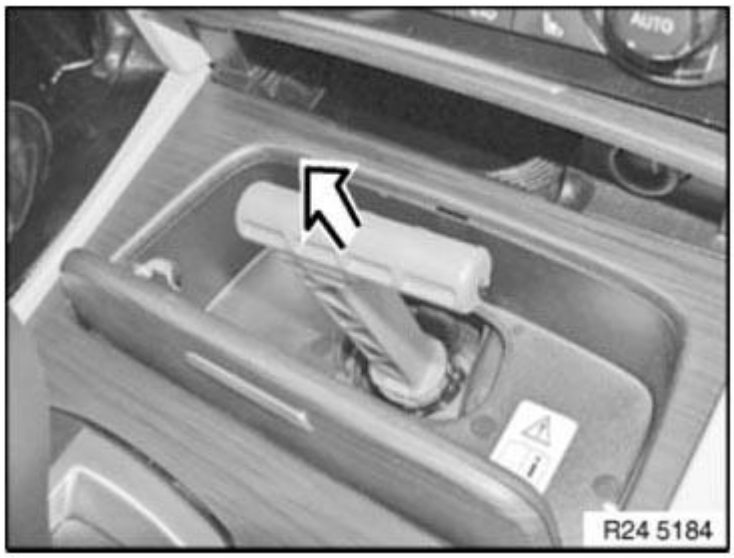


Fig. 62: Pulling Out Release Tool In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

2434 SHIFT VALVES, PARKING LOCK

2434... MANUAL EMERGENCY RELEASE OF TRANSMISSION LOCK

Manual emergency release of transmission lock from inside vehicle is not possible with GA6HP/GA8HP gearboxes from 03/2010

- From production date 04/2010 on, the transmission lock release cable is not fitted on:
- F01/F02/F03 GA6HP from production date 03/2010
- F01/F02/F03/F04 GA8HP from production date 09/2010
- F07 GA8HP from production date 03/2010
- F10 GA8HP from production date 06/2010

Releasing the transmission lock under the vehicle floor remains possible for towing purposes.

MANUALLY RELEASING TRANSMISSION LOCK

In the event of a power supply interruption, e.g. flat battery or electrical fault, the transmission lock must be manually released, otherwise the wheel will be locked and the vehicle cannot be moved.

IMPORTANT: Secure vehicle against rolling, e.g. with chocks.
Press the brake pedal when manually releasing the transmission lock, otherwise there is a risk that the vehicle will roll when the transmission lock is manually released.
If the parking brake has to be released as well, observe the following procedure:

1. **First, manually release the PARKING BRAKE .**
2. **Then manually release the automatic transmission lock.**

NOTE: Release tool is located in on-board tool kit.

Open lid of drinks holder (1).

Lift out drinks holder (1) and rubber mat (2) from drinks holder base.

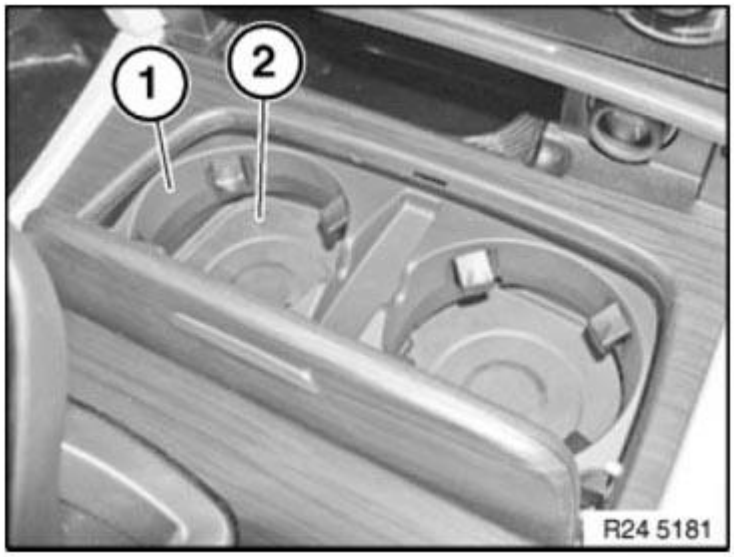


Fig. 63: Identifying Drinks Holder And Rubber Mat Of Drinks Holder Base
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover (1).

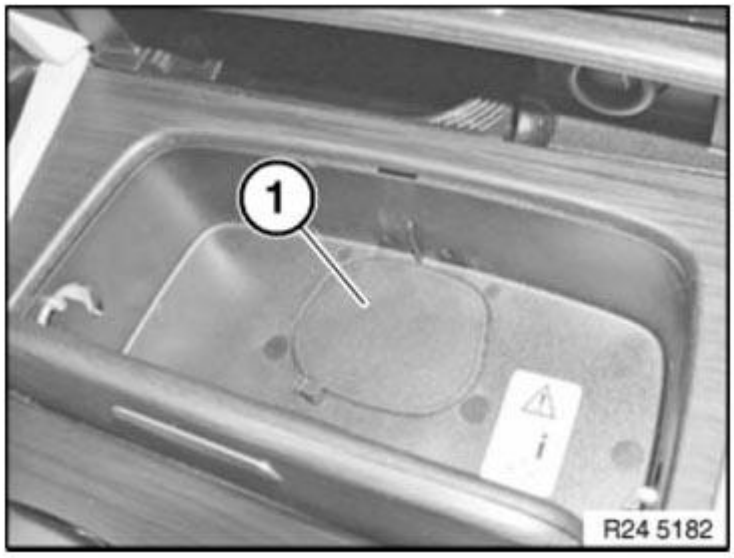


Fig. 64: Identifying Cover Of Drinks Holder Base
Courtesy of BMW OF NORTH AMERICA, INC.

Releasing transmission lock

Insert release tool (1) into opening.

Turn release tool clockwise up to stop and press down.

Transmission lock is released!

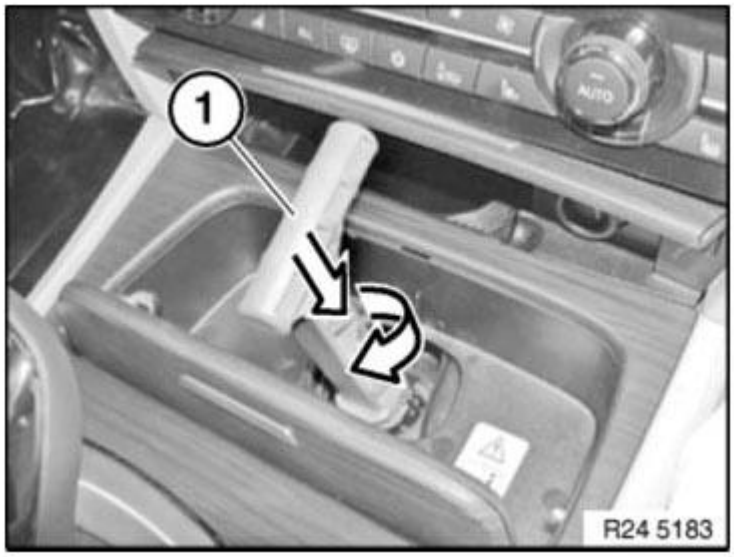


Fig. 65: Releasing Transmission Lock Using Release Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Locking transmission lock

Pull out release tool in direction of arrow.

Transmission lock is locked.

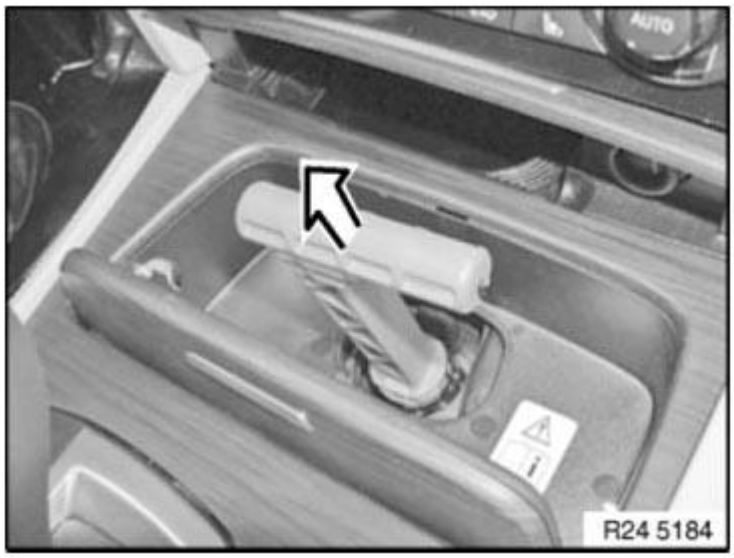


Fig. 66: Pulling Out Release Tool In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

2434... MANUALLY RELEASING PARKING LOCK (FROM UNDERNEATH VEHICLE) 6HP TRANSMISSION

For various tasks, it is necessary to unlock and lock the parking lock.

This can be done from inside the passenger compartment or underneath the vehicle.

Before unlocking the parking lock, secure the vehicle against rolling away.

In the event of a power supply interruption, e.g. flat battery or electrical fault, the parking lock must be manually released, otherwise the wheels will be locked and the vehicle cannot be moved.

Manual emergency release of parking lock from passenger compartment is not possible with GA6HP/GA8HP gearboxes from 03/2010

- From production date 04/2010, the Bowden cable is no longer required for transmission unlocking for:
- F01/F02/F03 GA6HP from production date 03/2010
- F01/F02/F03/F04 GA8HP from production date 09/2010
- F07 GA8HP from production date 03/2010
- F10 GA8HP from production date 06/2010

Before removing the underbody panel, always check inside the vehicle to be certain the parking lock emergency release is not fitted.

From the vehicle underbody:

Raise vehicle.

Manual emergency release of parking lock

Graphic shows: GA6HP gearbox.

- Remove **UNDERBODY PROTECTION**
- Screw in bolt (1) with hexagon socket (SW5) until parking lock is released by lever (2).

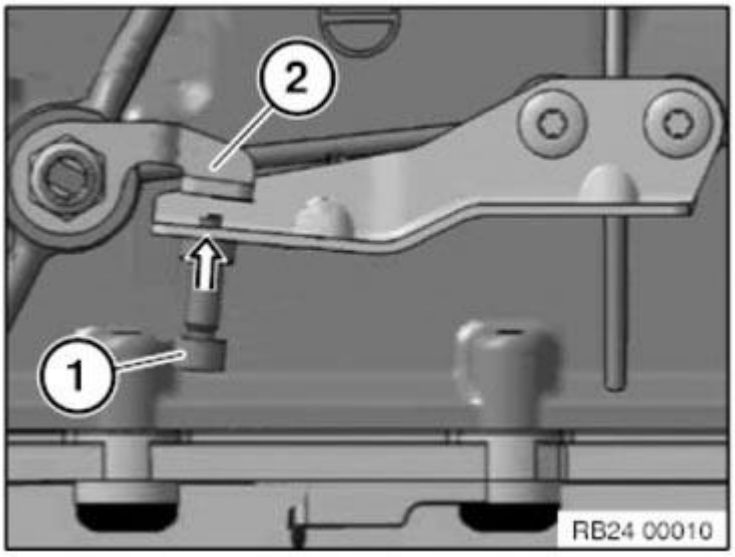


Fig. 67: Tightening Bolt With Hexagon Socket (Sw5)
Courtesy of BMW OF NORTH AMERICA, INC.

Then unscrew and remove screw (1).

Screw (1) should protrude 1.5 to 2.5 mm above thread lip (A).

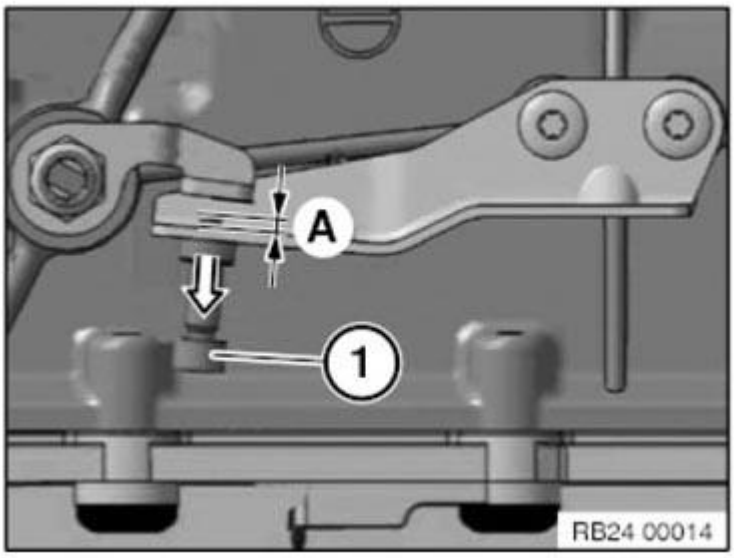


Fig. 68: Identifying Protrude Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

From the vehicle underbody:

Raise vehicle.

Manual emergency release of parking lock:

Illustration shows GA8HP transmission.

- Remove **UNDERBODY PROTECTION**
- Screw in bolt (1) with hexagon socket (SW5) until parking lock is released by lever (2).
- It is **imperative** that bolt is always replaced.
- Clean thread with screw tap size M6X1, 0.

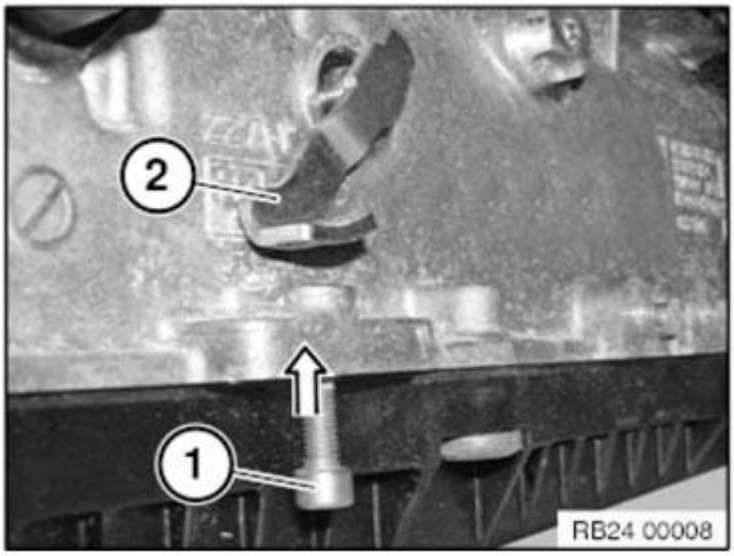


Fig. 69: Tightening Bolt With Hexagon Socket (Sw5)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw new micro-encapsulated screw (1) into thread.

IMPORTANT: Screwing in and adjusting of screw to 1.5 to 2.5 mm above thread lip (A) must occur within 3 minutes.
The screw may no longer be turned after 3 minutes (hardening of adhesive), otherwise it must be replaced.

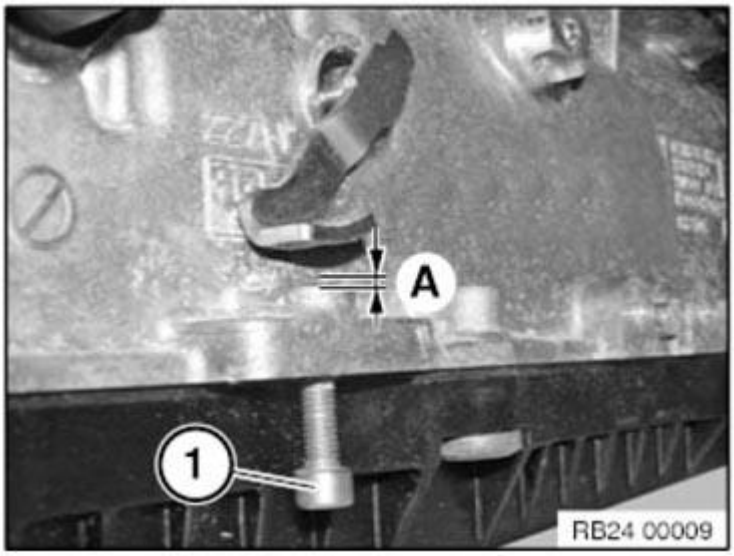


Fig. 70: Identifying Thread Lip Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

From passenger compartment

- Refer to **MANUAL EMERGENCY UNLOCKING OF PARKING LOCK**.

From underneath vehicle with Bowden cable

- Illustration shows GA6HP transmission.
- Remove rear **UNDERBODY PROTECTION** .
- Press lever (1) towards rear.

  Clamp lever firmly if permanently unlocking is desired.

Locking

- Release lever (1) or release clamping

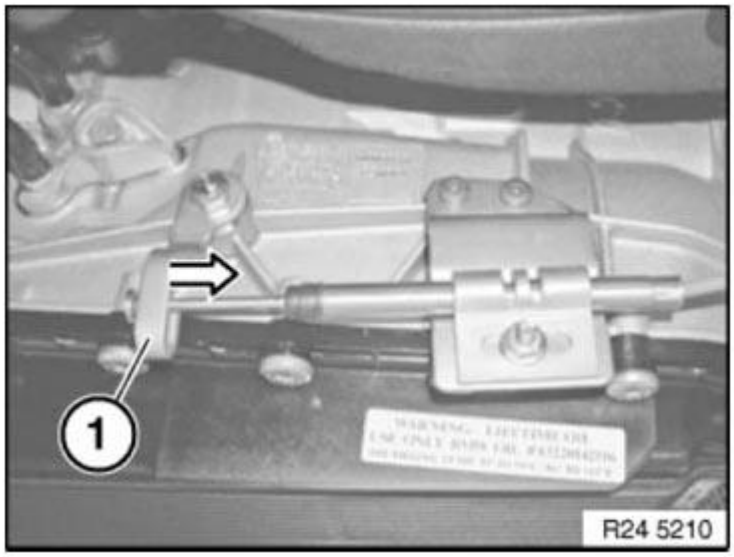


Fig. 71: Releasing Lever
Courtesy of BMW OF NORTH AMERICA, INC.

2434... NOTES ON MECHATRONICS (GA6HP19Z/GA6HP26/GA6HP32Z)

Notes

IMPORTANT: After completing work:

- **Load specific data version with DIS**
- **Check TRANSMISSION OIL LEVEL**

  Use only TRANSMISSION FLUID .

  Failure to comply with this requirement will result in serious damage to

the automatic transmission!

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Unscrew plug (1) and disconnect.

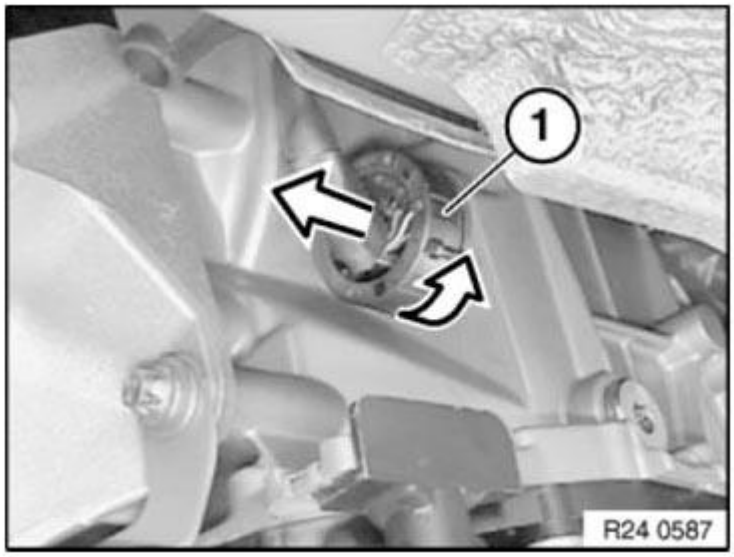


Fig. 72: Disconnecting Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **24 2 390** in sealing sleeve (1).

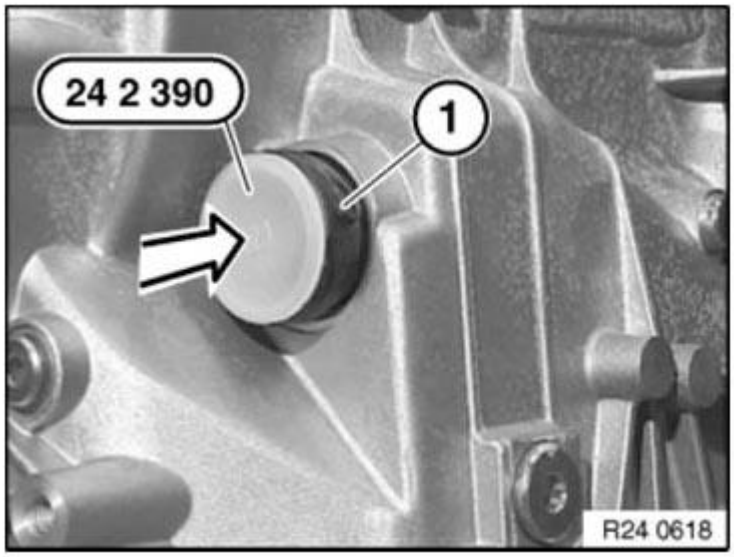


Fig. 73: Inserting Sealing Sleeve Using Special Tool 24 2 390

Courtesy of BMW OF NORTH AMERICA, INC.

2434... RELEASE TRANSMISSION LOCK ELECTRONICALLY

For various tasks, it is necessary to unlock and lock the parking lock.

Before unlocking the parking lock, secure the vehicle against rolling away.

- Emergency release is only possible if the engine does not start and the starter turns over.
- If an emergency release needs to be performed although the engine starts, pull out the fuse of the electrical fuel pump.
- Emergency release is active for 15 min.
- As soon as a wheel speed signal is recorded, this time increases by 15 min.
- After this period, the parking lock is engaged without a message.
- The time specification depends on the battery capacity.
- Only specially trained service personnel are permitted to operate both the mechanical as well as the electrical emergency transmission release system. See **MANUALLY RELEASING PARKING LOCK (FROM UNDERNEATH VEHICLE)** and **MANUAL EMERGENCY RELEASE OF TRANSMISSION LOCK**.
- The vehicle must be raised and the underbody panelling removed in order to operate the mechanical emergency transmission release. See **MANUAL EMERGENCY RELEASE OF TRANSMISSION LOCK**.

IMPORTANT: To operate the electronic emergency transmission release the vehicle must not be towed but rather only pushed.
In the case of misuse, a corresponding fault code is stored in the fault code memory.

Release transmission lock electronically

- Switch the ignition on.
- Press on brake pedal and keep depressed throughout the procedure.
- Press START-STOP button.
- As soon as the starter can be heard to operate (this may take several seconds on diesel engines or at low temperatures).
- Press and hold release button (1).



Fig. 74: Identifying Transmission Release Button
Courtesy of BMW OF NORTH AMERICA, INC.

1. The specified time must be adhere to!
2. Push gear selector switch (2) forward up to pressure point and hold for two seconds.
3. Release gear selector switch and move one step forward briefly.



Fig. 75: Identifying Gear Selector Switch
Courtesy of BMW OF NORTH AMERICA, INC.

- Gear position N is shown in the instrument cluster.
- The parking lock is now electronically unlocked.
- After the parking lock is successfully unlocked, release the brake pedal.

- Leave the ignition switched on in order to subsequently move the vehicle.
- The transmission automatically shifts into P when the ignition is turned off.



Fig. 76: Identifying Gear Position N
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: After the start-stop button is pressed again, the parking lock is activated without a message.
If the gearbox cannot be released, turn the ignition off and on again and repeat the previous steps.
Allow the starter to cool down for approx. 10 minutes after unsuccessful attempts.

2431575 REPLACING O-RING ON OIL PUMP (GA6HP19/GA6HP26Z

Notes

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved TRANSMISSION OIL .
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION**
- Secure transmission with **TRANSMISSION RETAINING BRIDGE** on assembly stand
- Remove **TORQUE CONVERTER**
- Remove **MECHATRONICS**

Remove adapter (1).

Installation:

Note installation position.

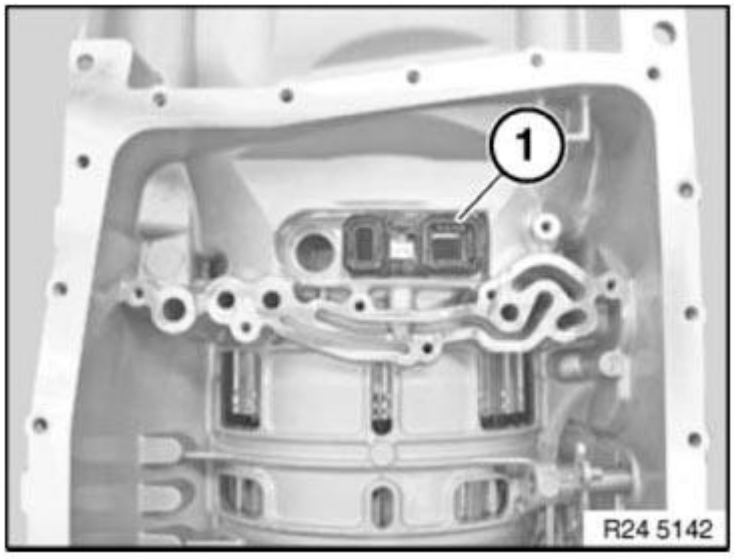


Fig. 77: Identifying Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 2AZ** .

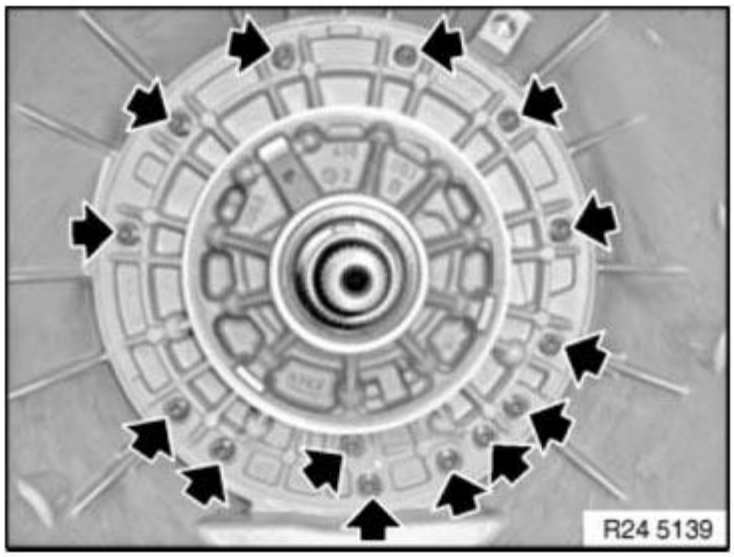


Fig. 78: Identifying Torque Converter Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Slide special tool 24 1 184 completely into puller **24 1 180** .

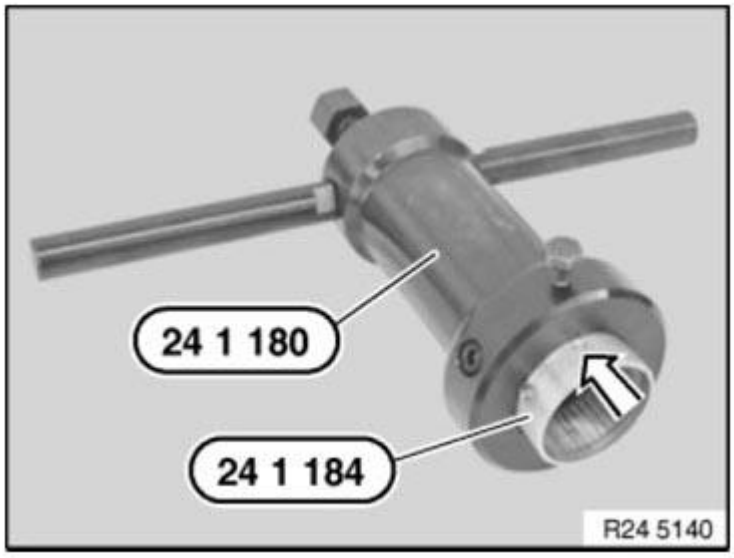


Fig. 79: Sliding Special Tool 24 1 184 Completely Into Puller 24 1 180
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool **24 1 180** and secure with screw (1).

Insert screw (2) and release oil supply unit from transmission housing.

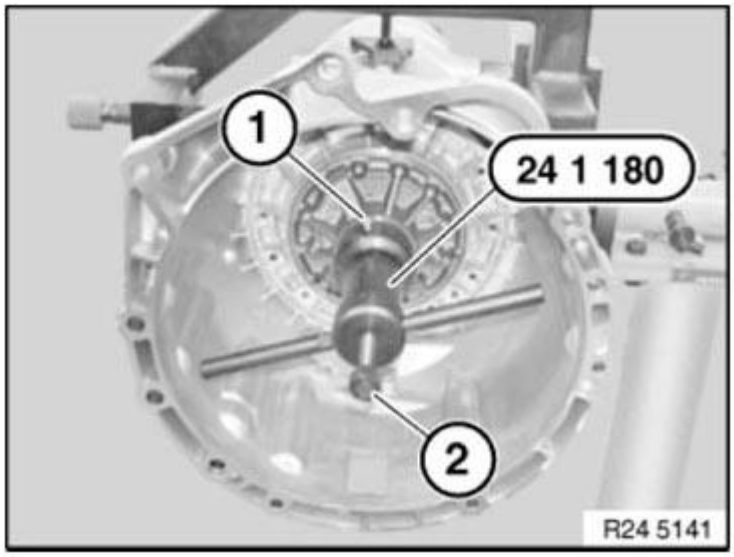


Fig. 80: Connecting Special Tool 24 1 180 With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 1AZ** .

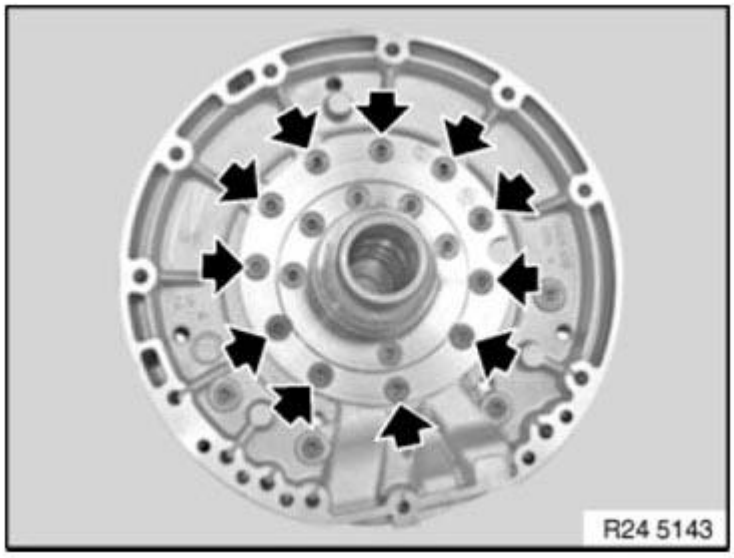


Fig. 81: Identifying Transmission Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach cover (1) from pump body (2).

Replace O-rings (3 + 4).

Installation:

Pay attention to installation position of gears during disassembly.

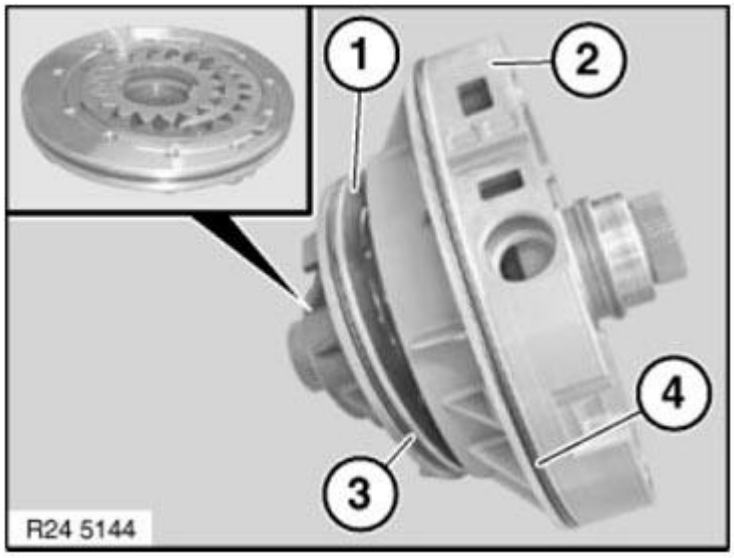


Fig. 82: Identifying Installation Position Of Gears
Courtesy of BMW OF NORTH AMERICA, INC.

2434561 REPLACING MECHATRONICS (GA6HP26Z TU)

Notes

NOTE: After completing work:

- **Load specific data version with DIS**

IMPORTANT: After completion of work, CHECK TRANSMISSION OIL LEVEL .
Use only TRANSMISSION FLUID .
Failure to comply with this requirement will result in serious damage to the automatic transmission!

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove underbody protection at front and rear. See **REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** and **REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION** .
- Remove exhaust system bracket

Remove plates (2).

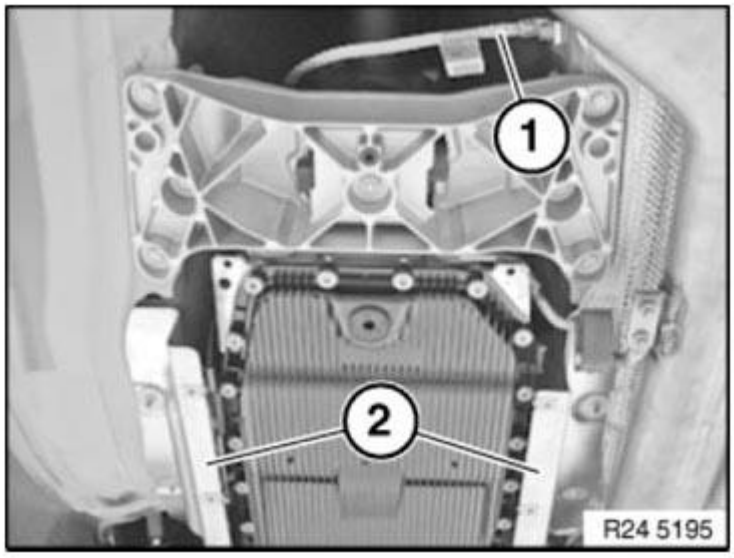


Fig. 83: Identifying Underbody Plates
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Disconnect cable (1).

Installation:

Adjusting cable:

- Release nut
- Adjust cable by means of holder (2) until spacing A = 1 mm is obtained.
- Tighten down nut

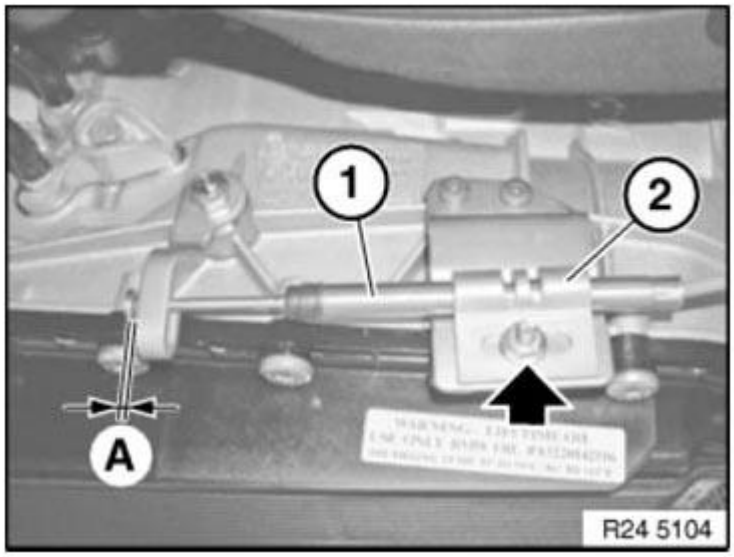


Fig. 84: Locating Cable Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Secure lever (1) with a cable tie (2) or wire in vertical position.

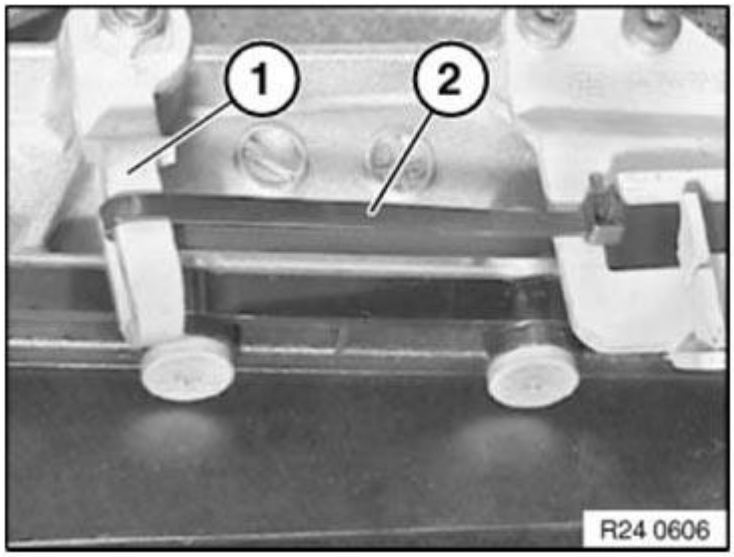


Fig. 85: Identifying Lever With Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mechatronics can be destroyed by static discharges. Therefore the contacts inside the plug must not be touched. Insert special tool immediately after work step.

Unscrew plug (1) and disconnect.

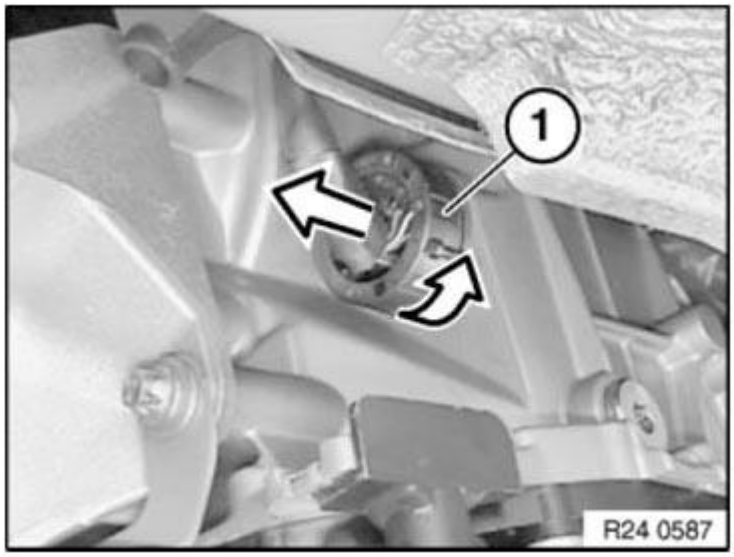


Fig. 86: Disconnecting Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **24 2 390** in sealing sleeve (1).

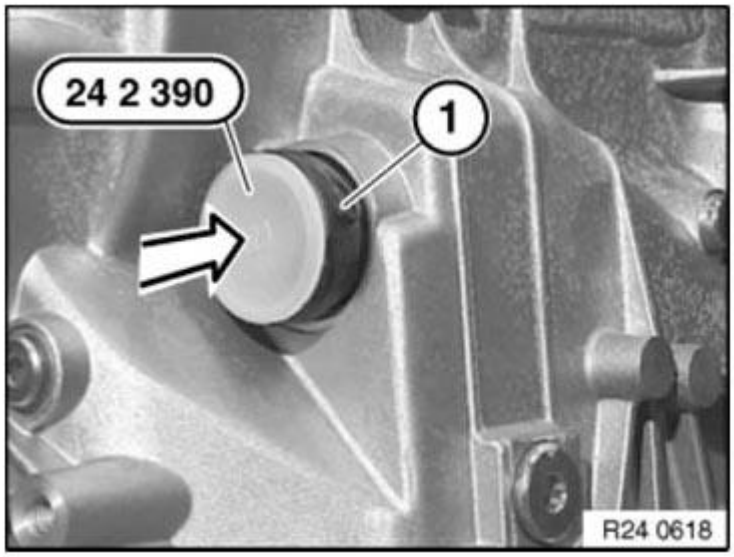


Fig. 87: Inserting Sealing Sleeve Using Special Tool 24 2 390
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TRANSMISSION OIL SUMP** .

Unlock sealing sleeve with slide (1).

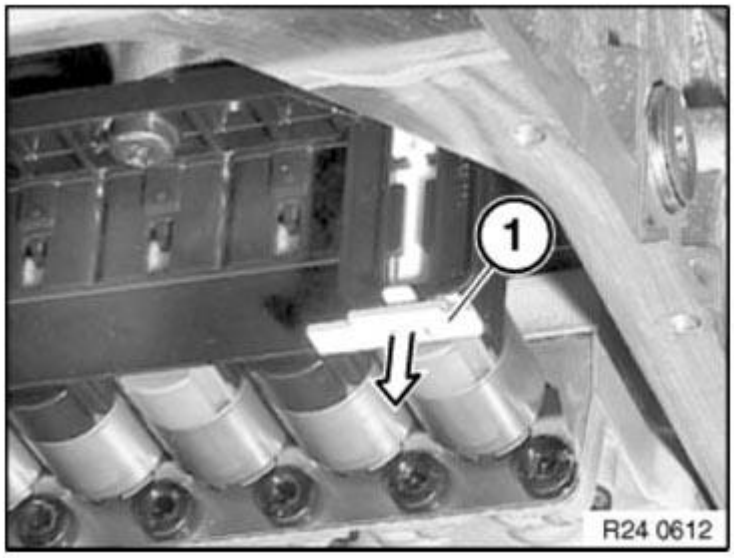


Fig. 88: Unlocking Sealing Sleeve With Slide
Courtesy of BMW OF NORTH AMERICA, INC.

Note position of sealing sleeve.

Pull out sealing sleeve (1).

Installation:

Screw in sealing sleeve partially (lug in upper area). Turn until lug engages in groove of transmission. Slide in sealing sleeve.

Lug on sealing sleeve must not be damaged!

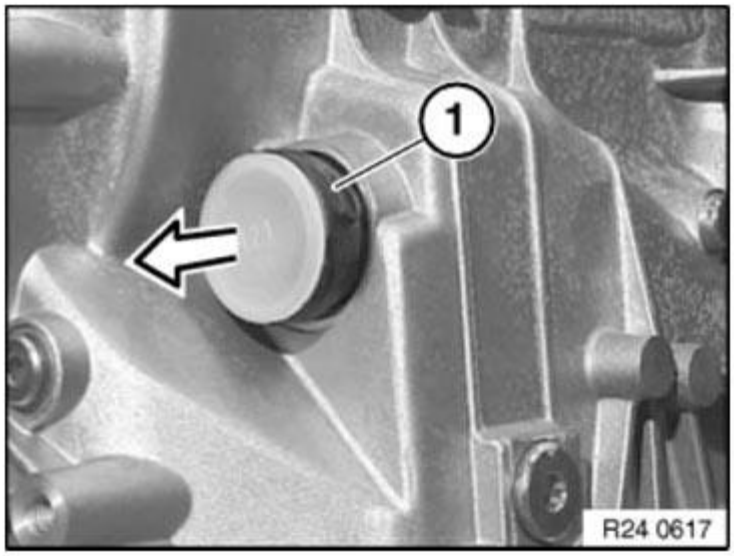


Fig. 89: Pulling Out Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: GA6HP26Z TU

Release all screws (1 and 2).

- 1 = M6 x 59 mm
- 2 = M6 x 20 mm

Remove mechatronics.

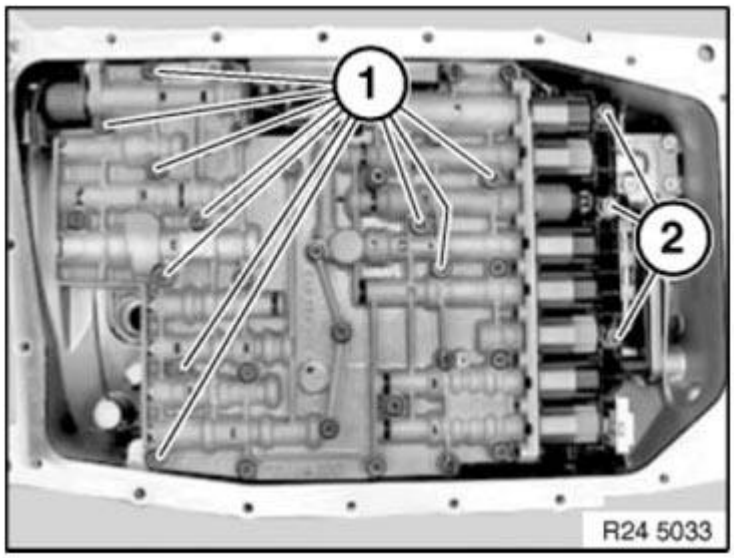


Fig. 90: Identifying Mechatronics Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check gaskets (1 and 2) for damage, replace gaskets if necessary.

Coat new seals with automatic transmission fluid and install.

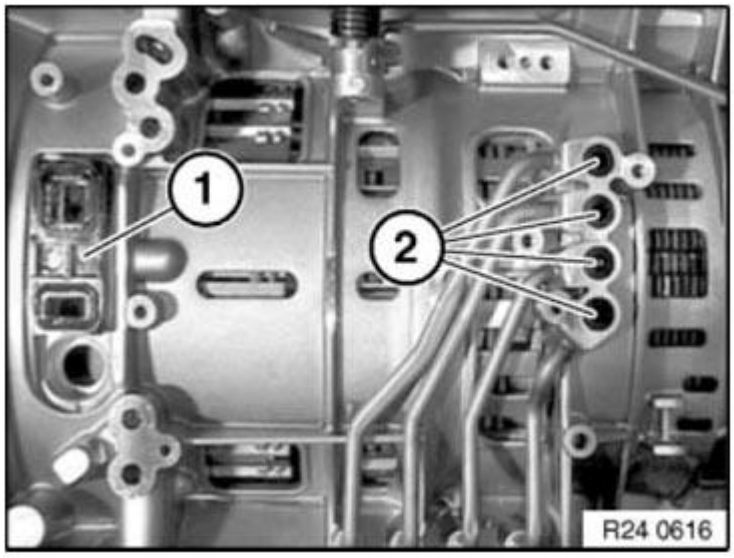


Fig. 91: Identifying Gaskets
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert screws (3) alternately until contact is made with each screw head.

Insert all further screws contact is made with each screw head.

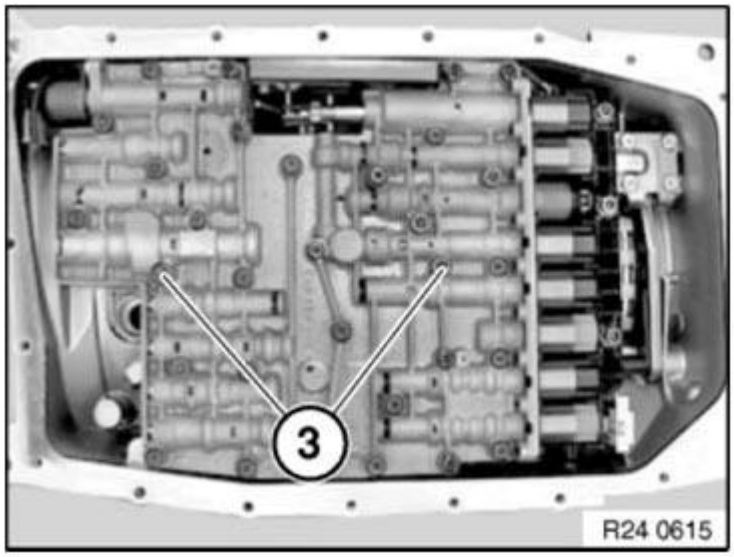


Fig. 92: Identifying Screw Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: GA6HP26Z TU

IMPORTANT: Tighten down screws in order 1...13.
Failure to comply with this requirement will result in serious damage to the automatic transmission!
Tightening torque 24 30 1AZ .

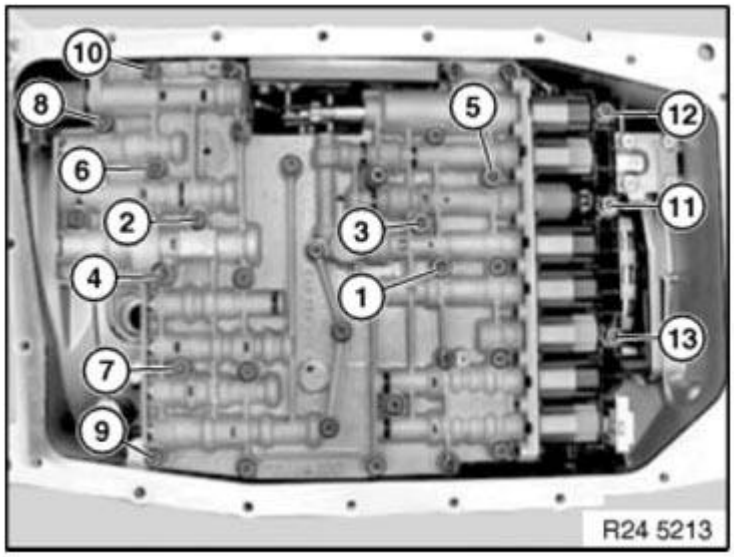


Fig. 93: Identifying Screw Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

24 30 100 REPLACING OIL ACCUMULATOR (GA8HP45Z)

See **REPLACING OIL ACCUMULATOR (GA8HP45Z)**.

24 30 101 REPLACING OIL RESERVOIR (GA8HP70Z)

See **REPLACING OIL RESERVOIR (GA8HP70Z)**.

2434020 REPLACING SEALING SLEEVE FOR TRANSMISSION HOUSING (GA6HP26Z)

Notes

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only TRANSMISSION FLUID .
Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks

- Remove rear **UNDERBODY PROTECTION**
- Remove **TRANSMISSION OIL SUMP**

- Remove **TRANSMISSION CROSSMEMBER** .

IMPORTANT: Support transmission with workshop hoist.

Unlock and disconnect plug (1) by turning.

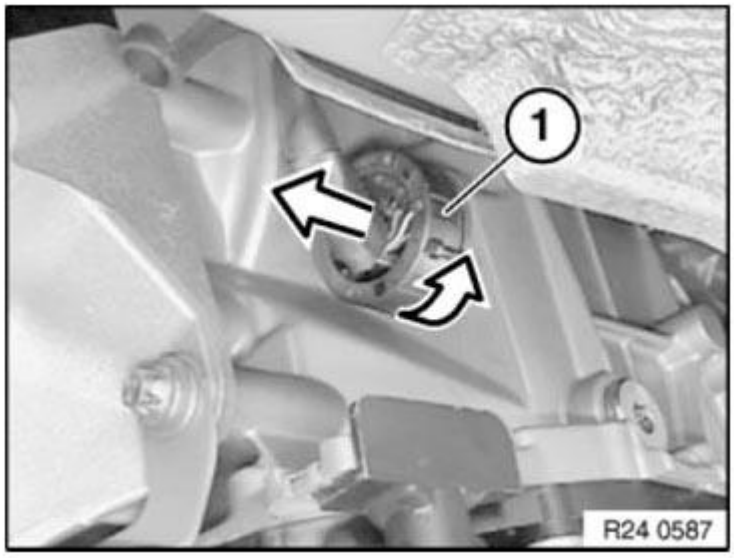


Fig. 94: Turning Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **24 2 390** in sealing sleeve (1).

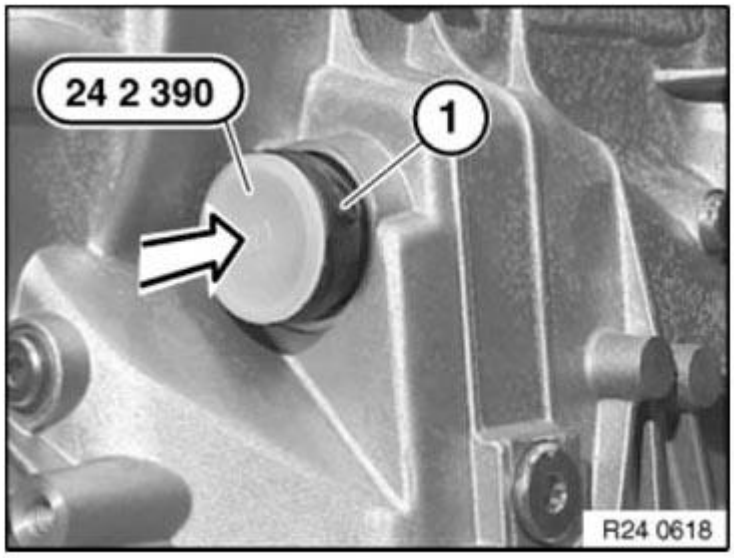


Fig. 95: Inserting Sealing Sleeve Using Special Tool 24 2 390
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock sealing sleeve with slide (1).

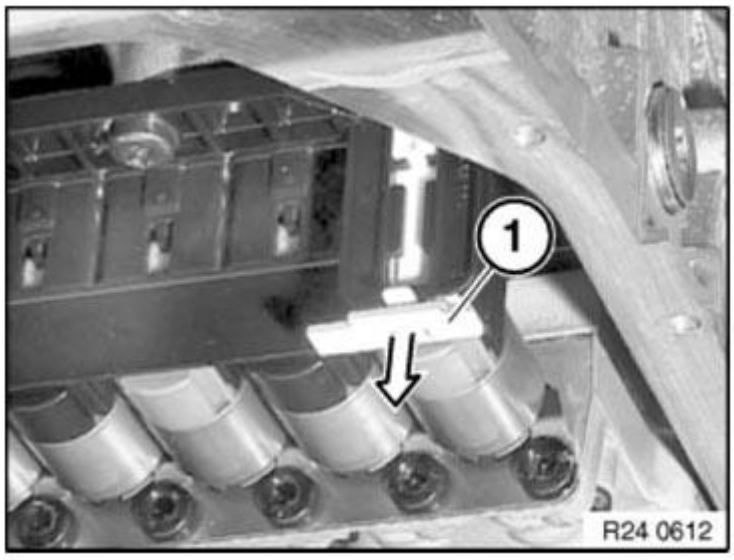


Fig. 96: Unlocking Sealing Sleeve With Slide
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Note position of sealing sleeve.

Pull out sealing sleeve (1).

Installation:

Screw in sealing sleeve partially (lug in upper area). Turn until lug engages in groove of transmission. Slide in sealing sleeve.

Lug on sealing sleeve must not be damaged!

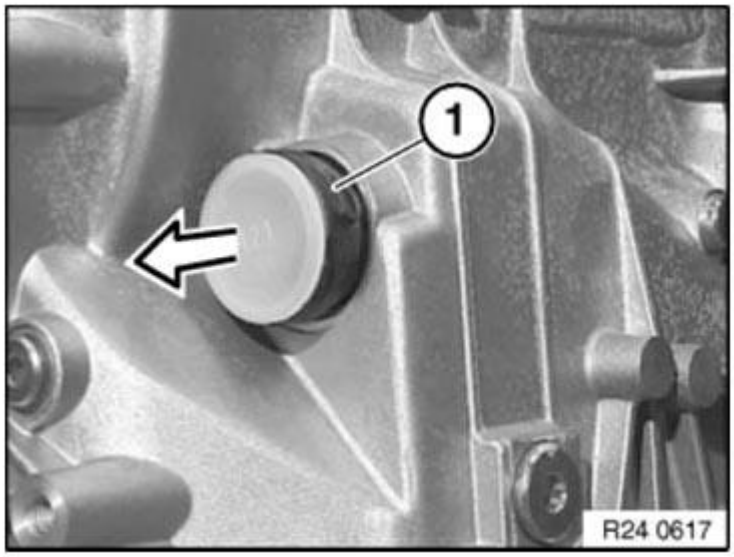


Fig. 97: Pulling Out Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

2440 TORQUE CONVERTER

2440010 REMOVING AND INSTALLING/REPLACING TORQUE CONVERTER (GA6HP26Z) (N63)

Notes

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved TRANSMISSION OIL .
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION**

Pull torque converter (1) by hand out of housing and set down vertically.

NOTE: When torque converter is removed, transmission oil flows out.

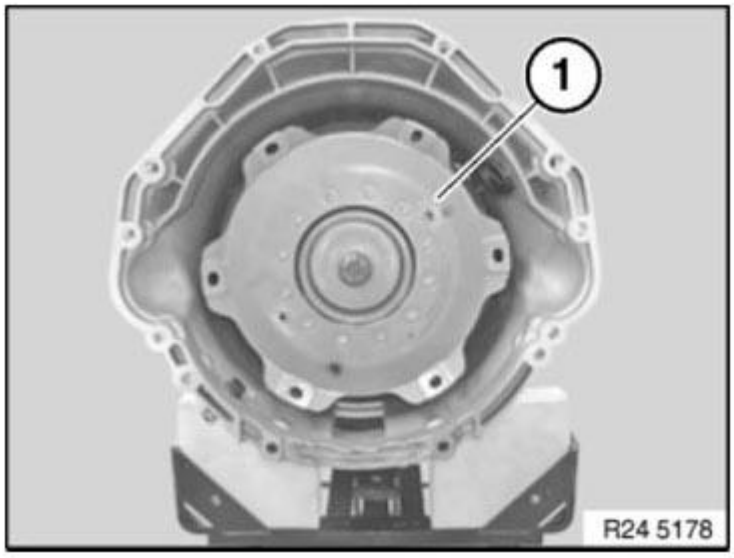


Fig. 98: Identifying Torque Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

When installing, do not damage shaft seal and bearing.

If the torque converter is not correctly installed, the driver of the pump impeller may be damaged when the transmission is flanged to the engine.

Installation

Push torque converter through shaft seal onto transmission shaft as far as it will go.

Press torque converter by hand into converter housing and turn in the process. Converter hub opening must snap into place in driver of pump impeller. Torque converter must be felt to slip inwards.

Calculate measurement between contact face and top edge of converter (1) with special tool **00 2 550** .

NOTE: Measured value must be min. 25 mm.

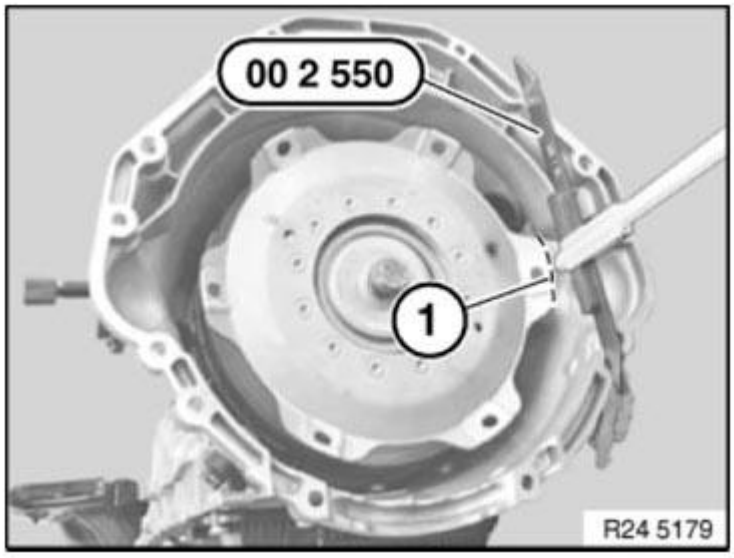


Fig. 99: Calculating Measurement Between Contact Face And Top Edge Of Converter Using Special Tool 00 2 550
Courtesy of BMW OF NORTH AMERICA, INC.

2431575 REPLACING O-RING ON OIL PUMP (GA6HP19/GA6HP26Z

Notes

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved TRANSMISSION OIL .
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION**
- Secure transmission with **TRANSMISSION RETAINING BRIDGE** on assembly stand
- Remove **TORQUE CONVERTER**
- Remove **MECHATRONICS**

Remove adapter (1).

Installation:

Note installation position.

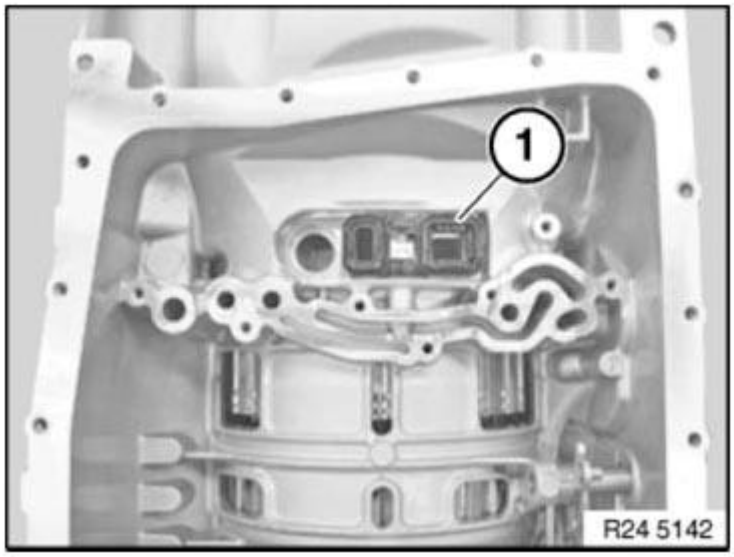


Fig. 100: Identifying Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 2AZ** .

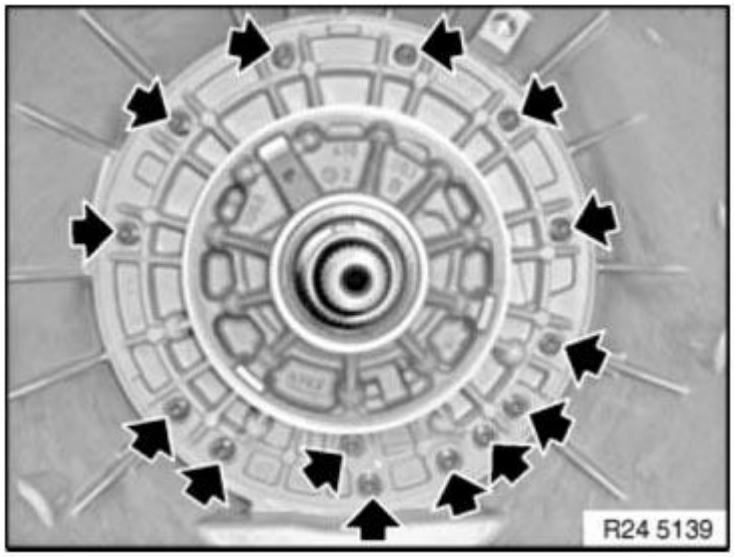


Fig. 101: Identifying Torque Converter Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slide special tool 24 1 184 completely into puller **24 1 180** .

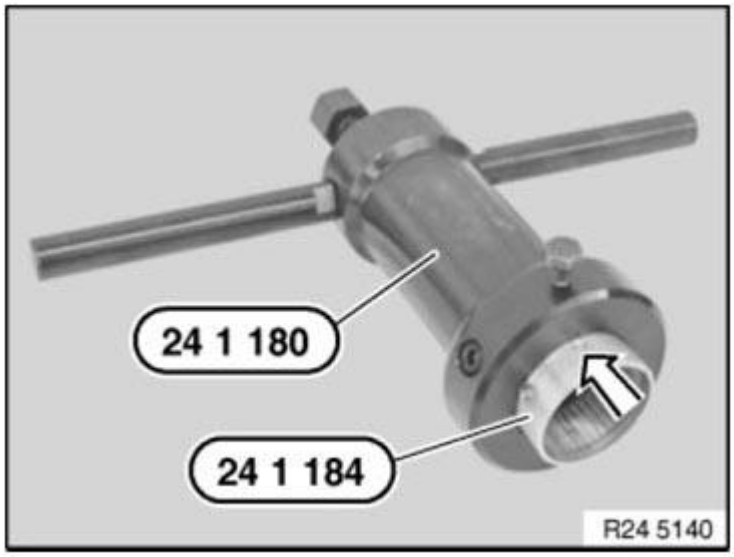


Fig. 102: Sliding Special Tool 24 1 184 Completely Into Puller 24 1 180
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool **24 1 180** and secure with screw (1).

Insert screw (2) and release oil supply unit from transmission housing.

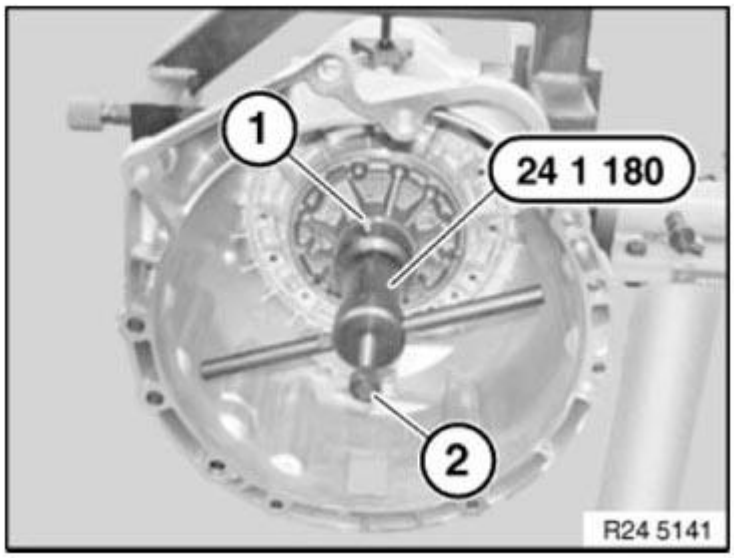


Fig. 103: Connecting Transmission Housing Screws Using Special Tool 24 1 180
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 31 1AZ** .

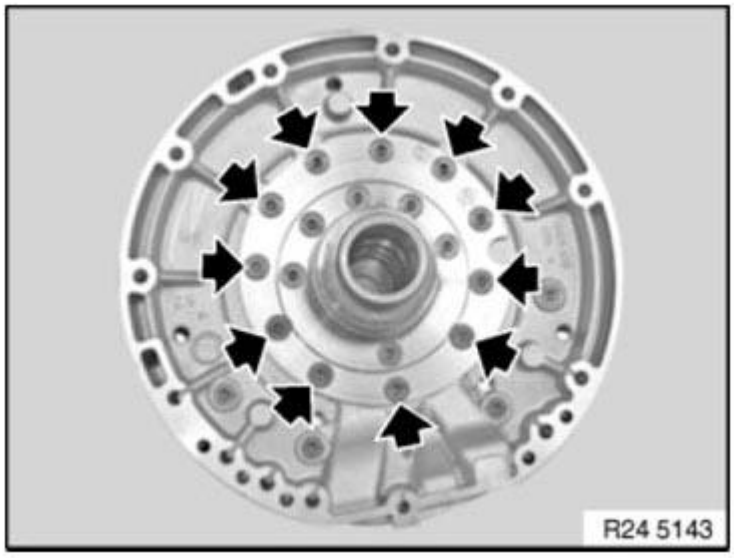


Fig. 104: Identifying Transmission Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach cover (1) from pump body (2).

Replace O-rings (3 + 4).

Installation:

Pay attention to installation position of gears during disassembly.

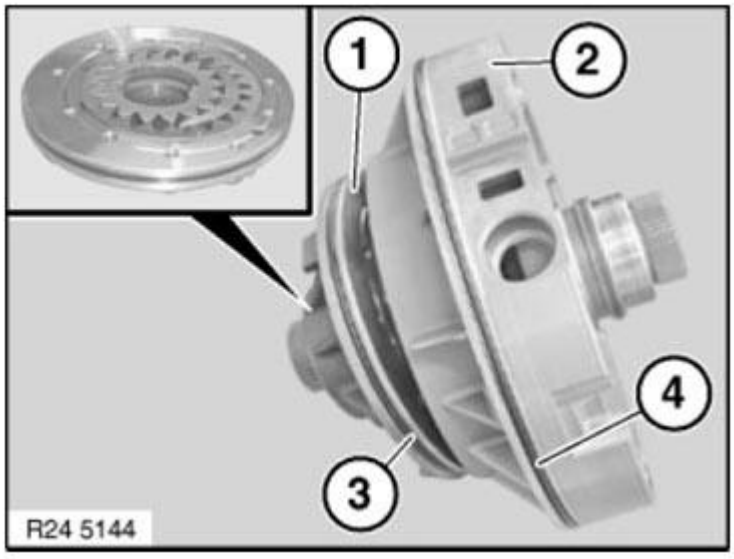


Fig. 105: Identifying Installation Position Of Gears
Courtesy of BMW OF NORTH AMERICA, INC.

2450 SHIFT FUNCTION

2450010 REPLACING EMERGENCY ACTUATOR

Necessary preliminary tasks

- Remove **CENTRE CONSOLE** .
- Remove rear **UNDERBODY PROTECTION**
- Remove left retaining plate from underbody protection
- Support transmission with lifter.
- Remove **TRANSMISSION CROSSMEMBER** .
- Remove transmission support bracket

Unfasten nut.

Remove cable (1).

Installation:

Adjust **GEARSHIFT LEVER** .

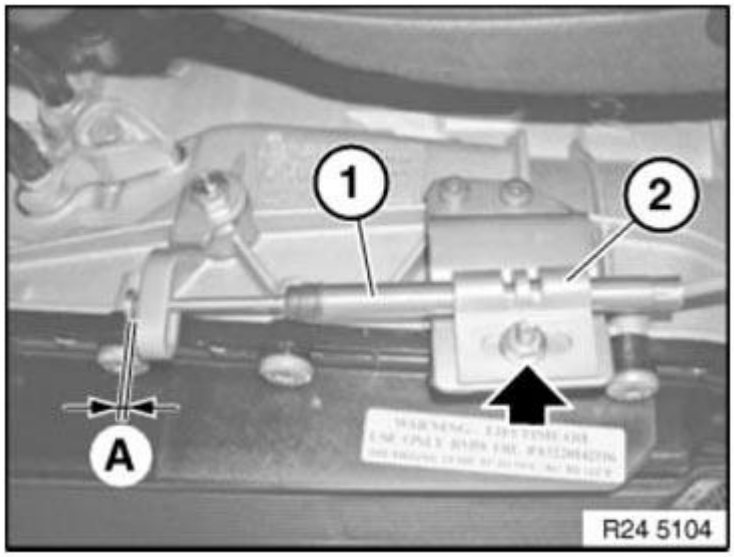


Fig. 106: Identifying Cable Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **24 51 2AZ** .

Release cable from pipe clamp (2).

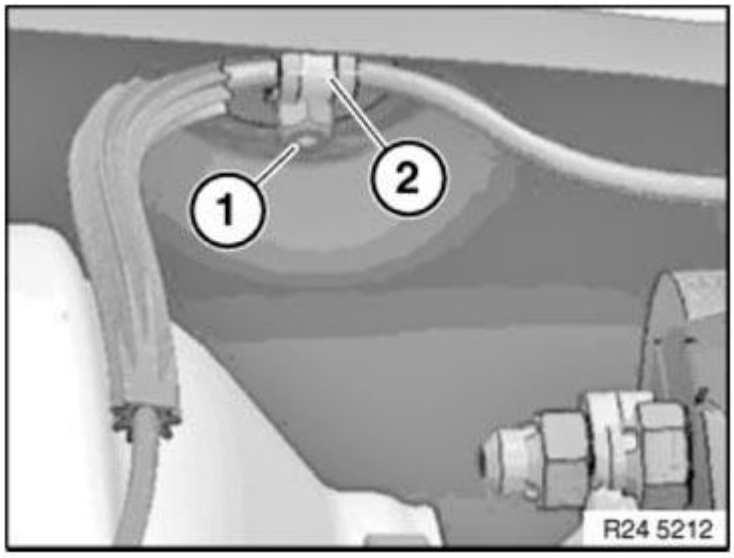


Fig. 107: Identifying Cable Of Pipe Clamp With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Reinstall transmission support bracket and transmission crossmember**
- **Lower vehicle**

Release nuts (1) and remove emergency actuator (2) in upward direction.

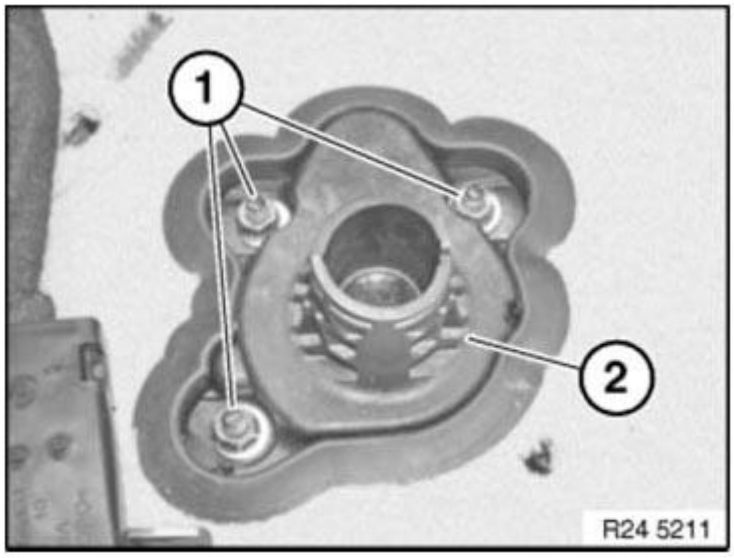


Fig. 108: Identifying Actuator With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

GENERAL INFORMATION

BMW Night Vision - Overview

BMW NIGHT VISION

Production: beginning March 2006

INTRODUCTION

The BMW Night Vision system provides the driver with a black-and-white image of the driving environment ahead of the vehicle in the central information display (CID).

BMW Night Vision is a 100% passive system without active infrared illumination. Objects situated ahead of the vehicle are shown in varying degrees of brightness depending on the temperature of these objects. This enables the driver to detect in good time heat-emitting objects such as people, animals, and other vehicles.

This thermal image is recorded with a Far Infrared camera (FIR) via a special imaging sensor which detects the infrared radiation in a specific wavelength range.

The BMW system is distinguished from infrared systems with active illumination by its resistance to dazzling, its long range, and its clearly structured image.



Fig. 1: Identifying CID Image
Courtesy of BMW OF NORTH AMERICA, INC.

The system offers the following advantages:

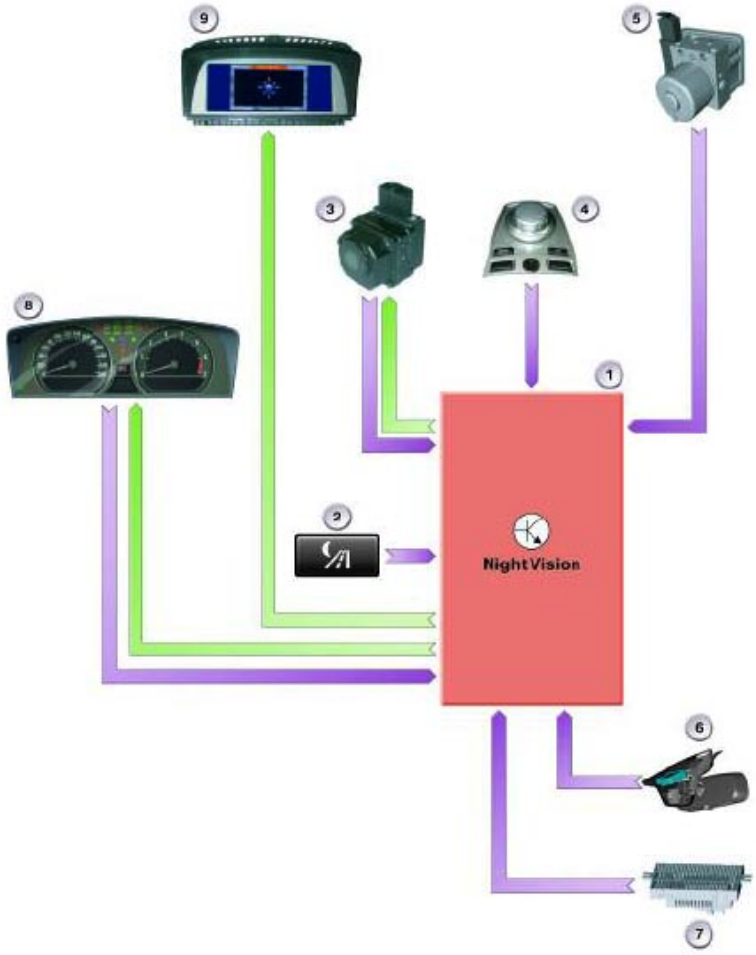
- Improved vision in conditions of dusk and darkness
- No dazzling by the headlights of oncoming vehicles
- Highlighting of unilluminated, heat-emitting objects such as pedestrians, cyclists vehicles and deer, etc.
- Better overview of the driving situation thanks to the depiction of the route of the road beyond the headlight cone

- Enlarged depiction thanks to the zoom function of objects in the far distance at high speeds
- Illumination of bends/curves thanks to the bend/curve mode (pivoting of image detail)
- Illumination of dark courtyard and garage entrances

NOTE: The driving speed must be adapted to the relevant visibility conditions in each case. BMW Night Vision is designed as a supporting system, which, with a modified driving style, affords the driver an early, better overview of the road conditions ahead of the vehicle.

SYSTEM OVERVIEW

IPO Diagram (E65/E66)



Index	Explanation
1	Night Vision control unit
2	Button in light switch center
3	Night Vision camera
4	Controller
5	Dynamic Stability Control
6	Rain/light sensor
7	Light module
8	Instrument cluster
9	Control display

Fig. 2: IPO Diagram (E65/E66)
Courtesy of BMW OF NORTH AMERICA, INC.

Connection of Control Units

Control Unit and Camera

The Night Vision control unit and the Night Vision camera are connected via the following cables:

- LIN bus; Diagnosis, programming and camera control
- Sym. Video; Video signal from the camera
- CAN_POW; Power supply from control unit to camera, heating of camera lens
- Ground; Common earth/ground of camera and control unit for suppressing interference

The video signal between the camera and the control unit is transmitted via two cables as a symmetrical, Analog video differential signal.

In the control unit the differential signal is converted into a CVBS signal and, depending on the equipment specification, transmitted to the navigation system or the video module.

The camera is powered under the following conditions:

- Switching on of BMW Night Vision by the button in the light switch center
- Rain/light sensor detects dusk/half-light (driving lights are switched on)

The BMW Night Vision control unit is powered by the front distribution box via term. 30B.

K-CAN

The K-CAN connection of the Night Vision control unit serves to transmit the diagnosis and programming data and to read out the information from the RLS (brightness), the LM (driving lights on) and DSC (yaw rate, speed and steering angle). The signals from DSC are placed on the K-CAN via the SGM. In addition, the control unit receives information on the terminal status via the K-CAN.

System Circuit Diagram (Front Equipment - E65/E66)

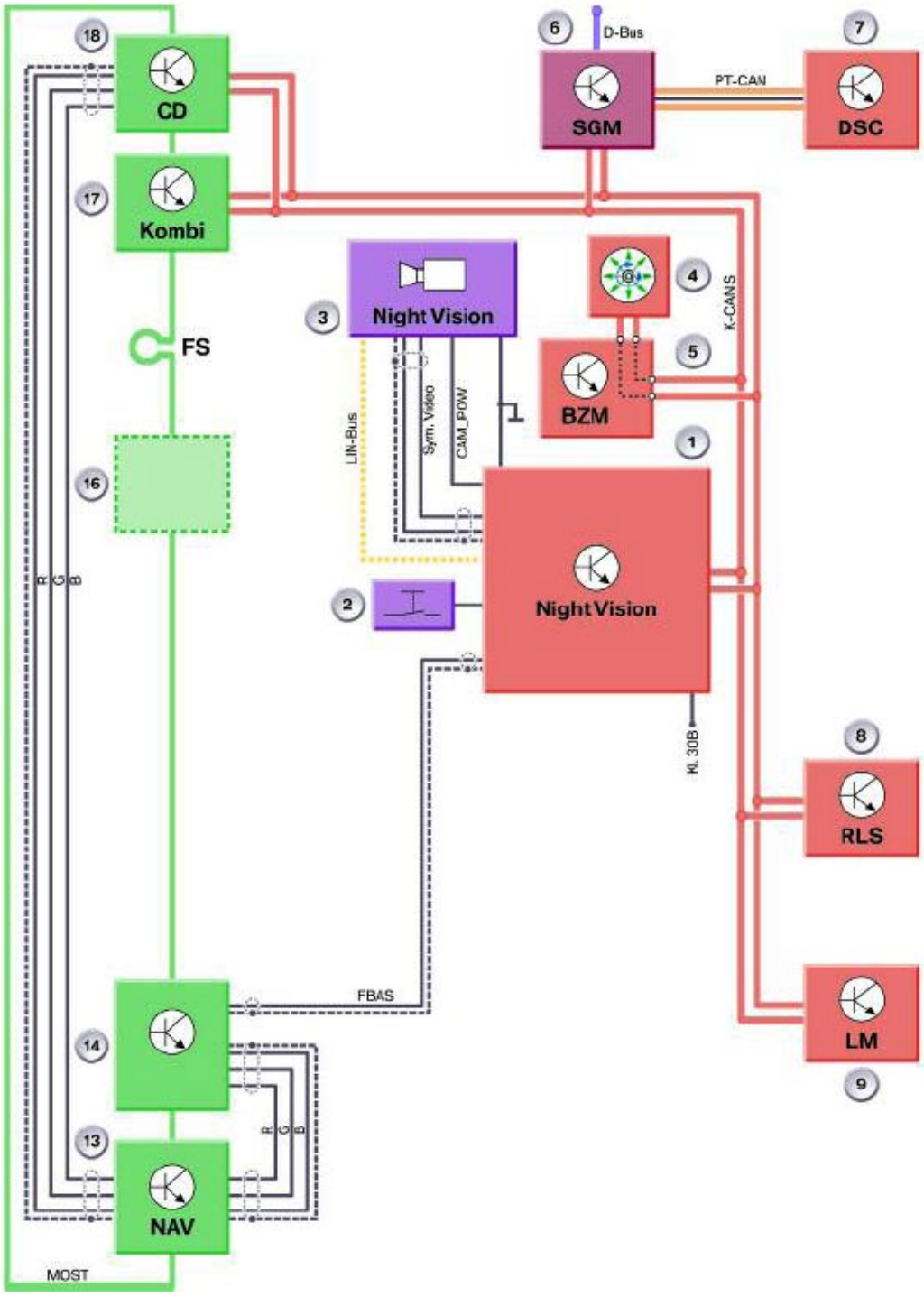


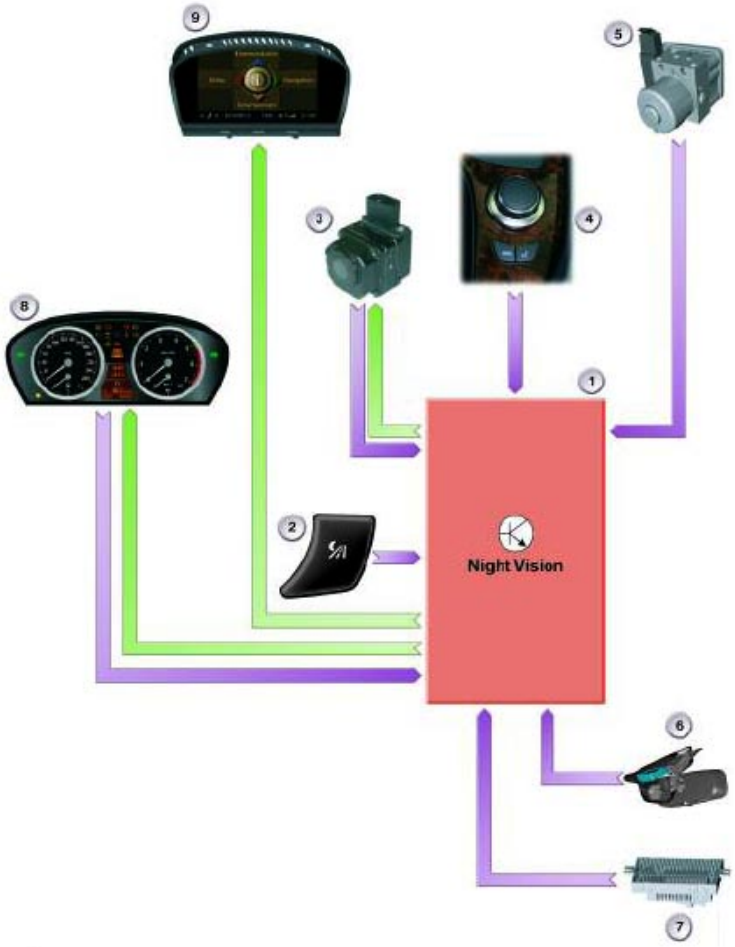
Fig. 3: System Circuit Diagram (Front Equipment - E65/E66)
Courtesy of BMW OF NORTH AMERICA, INC.

Legend for System Circuit Diagram

Index	Explanation	Index	Explanation
1	Night Vision ECU	18	Control Display
2	Button in Light Switch Center	D-Bus	Diagnosis Bus
3	Night Vision Camera	PT-CAN	Powertrain CAN
4	Controller	K-CAN	Body CAN
5	Center Console Switch Cluster	MOST	Media Oriented System Transport
6	Safety Gateway Module	LIN-Bus	Local Interconnect Network Bus
7	Dynamic Stability Control	Kl. 30B	Continuous Positive
8	Rain/light Sensor	Sym. Video	Symmetrical, Analog Video Differential Signal
9	Light Module	CAN_POW	Power Supply, Night Vision Camera
13	Navigation System	RGB	Red-Green-Blue Video Signal Cable
14	Video Switch, Drive	FBAS	Composite Video Burst Synchronization Signal
16	MOST Components (optional)	FS	MOST Direct Access
17	Instrument Cluster		

Fig. 4: Legends For System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

IPO Diagram (E60/E61/E63/E64)



Index	Explanation
1	Night Vision Control Unit
2	Night Vision Button on Light Switch
3	Night Vision Camera
4	Controller
5	Dynamic Stability Control
6	Rain/Light Sensor
7	Light Module
8	Instrument Cluster
9	Central Information Display

Fig. 5: IPO Diagram (E60/E61/E64)
Courtesy of BMW OF NORTH AMERICA, INC.

Connection of Control Units

Control Unit and Camera

The Night Vision control unit and the Night Vision camera are connected via the following cables:

- LIN bus; Diagnosis, programming and camera control
- Sym. Video; Video signal from the camera
- CAN_POW; Power supply from control unit to camera, heating of camera lens
- Ground; Common ground of camera and control unit for suppressing interference

The video signal between the camera and the control unit is transmitted via two cables as a symmetrical, Analog video differential signal.

In the control unit the differential signal is converted into a CVBS signal and, depending on the equipment specification, transmitted to the navigation system or the video module.

The camera is powered under the following conditions:

- Switching on of BMW Night Vision by the button in the light switch center
- Rain/light sensor detects dusk/half-light (driving lights are switched on)

The BMW Night Vision control unit is powered by the front distribution box via term. 30B.

K-CAN

The K-CAN connection of the Night Vision control unit serves to transmit the diagnosis and programming data and to read out the information from the RLS (brightness), the LM (driving lights on) and DSC (yaw rate, speed and steering angle). The signals from DSC are placed on the K-CAN via the KGM. In addition, the control unit receives information on the terminal status via the K-CAN.

System Circuit Diagram (E60/E61/E63/E64)

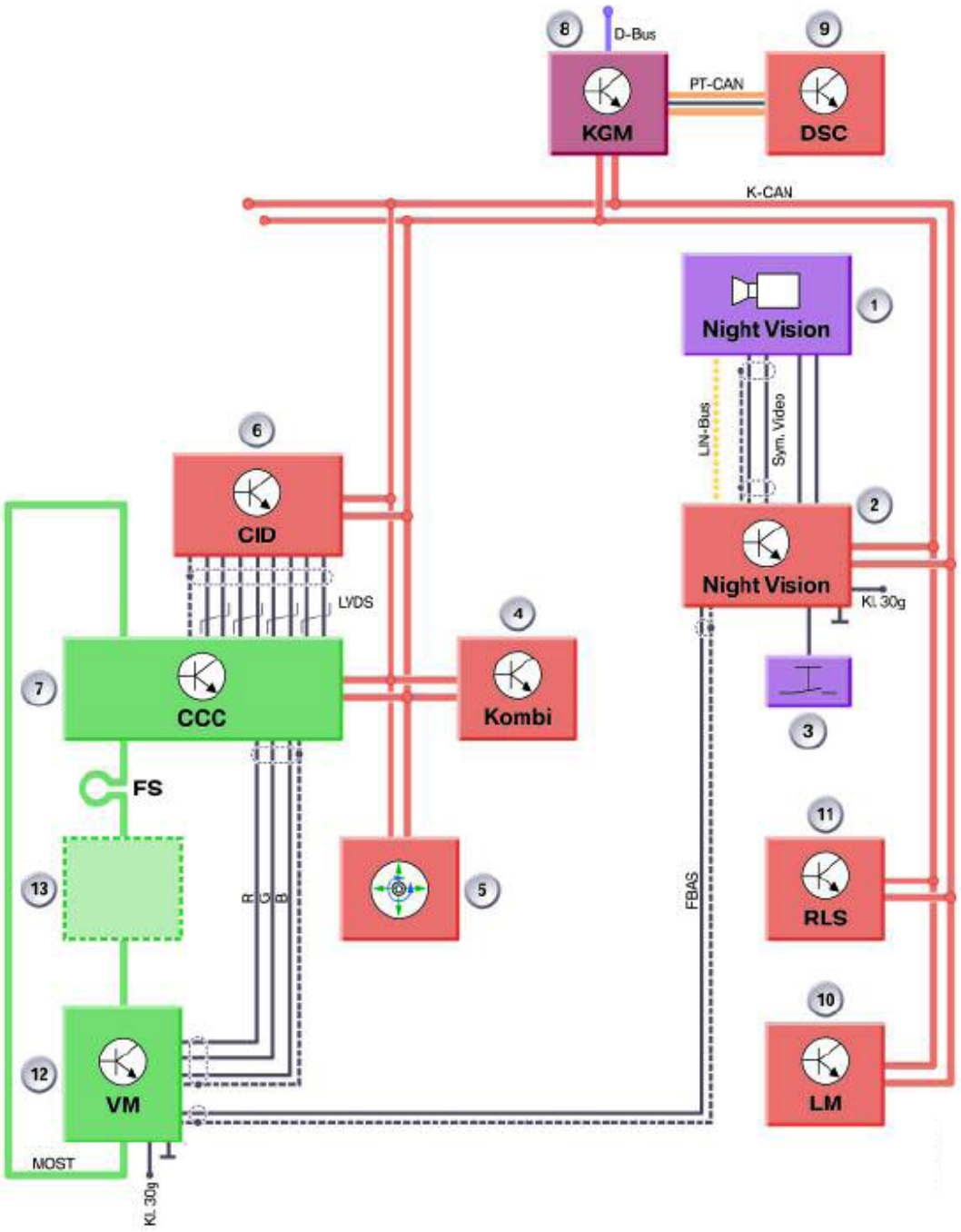


Fig. 6: System Circuit Diagram (E60/E61/E63/E64)
Courtesy of BMW OF NORTH AMERICA, INC.

Legend for System Circuit Diagram (E60/E61/E63/E64)

Index	Explanation	Index	Explanation
1	Night Vision Camera	13	MOST Components (optional)
2	Night Vision Control Unit	D-Bus	Diagnosis Bus
3	Button in Light Switch Center	PT-CAN	Powertrain CAN
4	Instrument Cluster	K-CAN	Body CAN
5	Controller	MOST	Media Oriented System Transport
6	Central Information Display	LIN-Bus	Local Interconnect Network Bus
7	Car Communication Computer	Sym. Video	Symmetrical, Analog Video Differential Signal
8	Body Gateway Module (KGM)	CAN_POW	Power Supply, Night Vision Camera
9	Dynamic Stability Control	RGB	Red-Green-Blue Video Signal Cable
10	Light Module	FBAS	Composite Video Burst Synchronization Signal
11	Rain/light Sensor	FS	MOST Direct Access
12	Video Switch, Drive		

Fig. 7: Legends For System Circuit Diagram (E60/E61/E63/E64)
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM COMPONENTS

Components

The BMW Night Vision system consists of the following components:

- Night Vision camera with camera bracket and camera washer jet
- Night Vision control unit
- Button in light switch center
- Sensor system



Night Vision installation Locations

Index	Explanation
1	Night Vision Control Unit
2	Control Display
3	Controller
4	Instrument Cluster
5	Button in Light Switch Center
6	Night Vision Camera

Fig. 8: Identifying BMW Night Vision System Components
Courtesy of BMW OF NORTH AMERICA, INC.

Night Vision Camera

The thermal imaging camera consists of a heated optical element and a thermal imaging sensor. The thermal imaging sensor is made up of a multitude of sensor elements.

Each display pixel is assigned one such sensor element. The sensor elements generate an electrical signal as a function of the impinging intensity of heat radiation.

The higher the temperature, the brighter the corresponding pixel will be displayed. The heat radiation is converted into electrical signals on the basis of the principle of a change in resistance.



Fig. 9: Identifying Camera With Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

The image can be replaced up to 60 times per second. In order to ensure an image of consistent quality, it is necessary for the camera to be calibrated roughly every 120 seconds. This calibration can take up to approx. 0.5 seconds. For this reason, the image may be seen to freeze in the display.

The Night Vision camera is mounted with a bracket directly behind the left ventilation grille on the bumper mounting bracket.

The camera is equipped with a sensor which detects heat-emitting objects in the Far Infrared range (wavelengths from 8 µm to 15 µm).

The camera resolution is 320 x 240 pixels. The maximum angle of view is 36°. The calculations for the "Bend/curve mode" functions are made in the camera. The camera operates in an ambient-temperature range of - 104°F to 185°F (40°C to +85°C). The camera and imaging sensor are thermally insulated to provide protection against heat influences from the camera surroundings.

The washer jet is screwed to the camera bracket and is situated directly above the camera's front lens. It is directly connected to the headlight washer system and therefore operates in conjunction with the latter.

A heater element is incorporated on the inside of the camera-housing cover to prevent the optical element from misting over or freezing up. The heater is activated when the rain/light sensor detects precipitation or at temperatures below 32°F (0°C).

Night Vision Control Unit

The control unit is accommodated in the front device holder behind the glovebox.

The control unit increases the image data from the camera from 320 x 240 pixels to 640 x 480 pixels. Only one detail is shown in the control display. 640 x 240 pixels are displayed when the "Full screen" function is activated while 400 x 240 pixels are displayed for the splitscreen function. The diagnosis, programming and coding data are transmitted to the camera via the control unit.



Fig. 10: Identifying 12-Pin Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

The camera and the front-lens heater are powered via the control unit. In addition, the control unit converts the symmetrical image data from the camera into a CVBS signal and, depending on the equipment specification, makes this signal available to either the navigation system or the video module.

The Night Vision control unit is accommodated in the front device holder behind the glovebox.

The camera-housing cover features a 12-pin plug connection.

Button in Light Switch Center

The button for switching BMW Night Vision on and off is integrated in the light switch center.



Fig. 11: Identifying Switch/Button On E65/E66
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 12: Identifying Switch/Button On E60/E61/E64
Courtesy of BMW OF NORTH AMERICA, INC.

PRINCIPLES OF OPERATION

The BMW Night Vision camera is a thermal imaging camera, which converts thermal radiation into electronic signals and then into images visible to the human eye.

The thermal image is converted first by the sensor into electrical signals and then with the aid of image-processing software into a visible image in the control display.

The sensor elements alter the resistance in proportion to the temperature. The higher the temperature, the higher the electrical signal and the whiter the pixel will be shown.

Thanks to increased dynamic sensitivity, the sensor can generate a new image up to 60 times per second. This results in a softer and clearer image.

Heat radiation is absorbed and dissipated by virtually every solid or liquid body. Heat radiation, however, is not visible to the human eye because it belongs in the long-wave infrared range. From a physical standpoint, this represents electromagnetic waves with a wavelength of 8 µm to 15 µm. This long-wave infrared radiation is known as Far Infrared (FIR).

The advantage of utilizing radiation in the Far Infrared range is the greater range compared with Near Infrared systems with a wavelength of 0.7 µm to 1.4 µm. These systems require illumination with just this wavelength.

Essentially, FIR systems consist of an optical element, a thermal imaging camera, an control unit and a display.

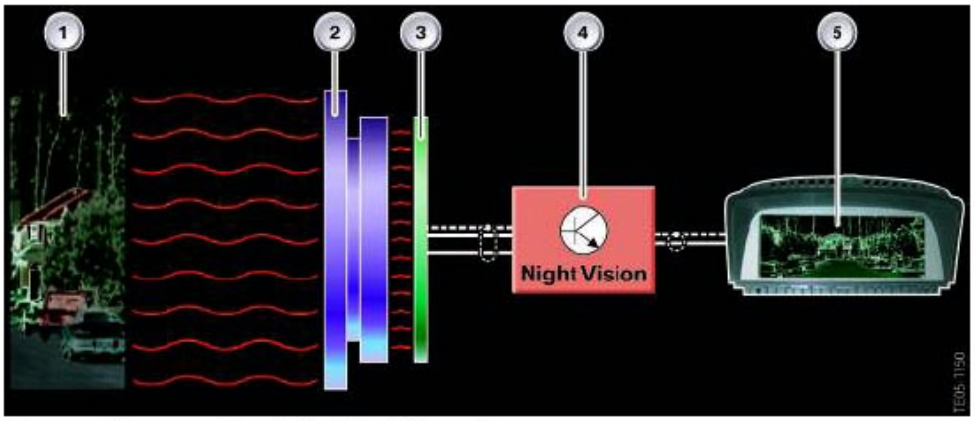


Diagram Representing Principle of Operation

Index	Explanation	Index	Explanation
1	Environment ahead of vehicle	4	BMW Night Vision control unit
2	Optical element	5	Central Information Display
3	Thermal Imaging Sensor		

Fig. 13: Operation Diagram Of Night Vision Camera
Courtesy of BMW OF NORTH AMERICA, INC.

Switch-On Conditions

BMW Night Vision is activated as soon as the button in the light switch center is pressed.

The following basic conditions can exist:

- The rain/light sensor detects sufficient ambient light and the driving lights are switched off; BMW Night Vision is ready for operation approx. 2 seconds after the button in the light switch center is pressed. A message is shown in the control display during this period of 2 seconds.



Switch/Button on E65/66

Fig. 14: Identifying Switch/Button On E65/E66
Courtesy of BMW OF NORTH AMERICA, INC.

- The rain/light sensor detects insufficient ambient light and the driving lights are switched on; BMW Night Vision is ready for operation immediately after the button is pressed.
- In conditions of darkness (underground car park), the driving lights are switched off and the driving speed is less than 5 km/h; BMW Night Vision is ready for operation after the button in the light switch center is pressed.



Fig. 15: Identifying Switch/Button On E60/E61/E63/E63
Courtesy of BMW OF NORTH AMERICA, INC.

BMW Night Vision cannot be activated when:

- the driving lights are switched off,
- the rain/light sensor detects insufficient ambient light, and
- the driving speed is greater than 5 km/h

Once BMW Night Vision has been activated, a message appears in the control display to the effect that the system cannot be used at night without driving lights.

Operation by iDrive

Calling up Settings

The individual functions and settings can be selected and activated via the iDrive.

The following settings can be called up:

- Night Vision off (not E65)
- Zoom
- Curve mode
- Full screen
- Contrast
- Brightness

A tick/check symbol indicates when zoom, bend/curve mode or full screen is activated.



Fig. 16: Display Of E65/E66 Settings Menu
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 17: Display Of E60/E61/E63/E64 Settings Menu
Courtesy of BMW OF NORTH AMERICA, INC.

Calling Up Menu

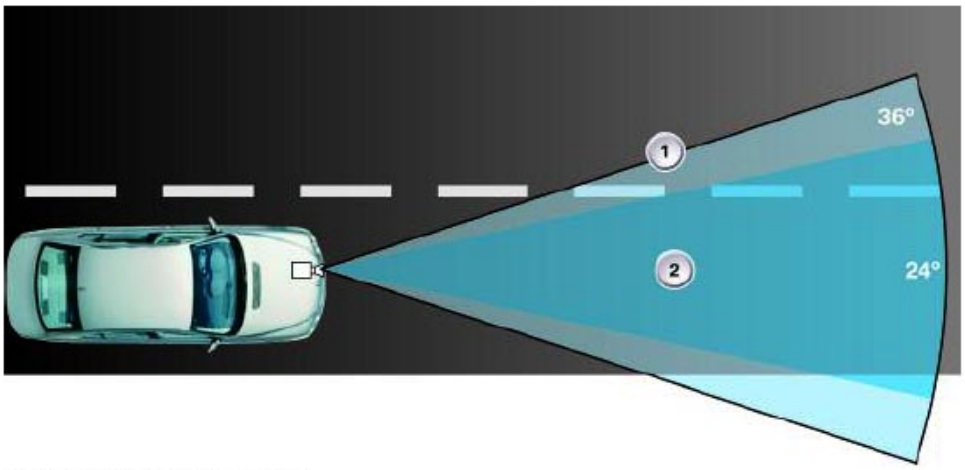
The BMW Night Vision menu can only be called up when the system is activated.

When the preconditions are in place, the menu can be called up for example from the Start menu as follows:

- Briefly press the controller. The "BMW Night Vision" menu appears in the control display
- Select the desired menu item, e.g. "Brightness", by turning the controller
- Press the controller to activate the function
- Set the desired value and confirm by pressing
- Select the menu item "Back" and quit the "BMW Night Vision" menu

Zoom - Angle of View of Camera

When the "Zoom" function is activated, BMW Night Vision automatically switches to a 1.5 times enlargement of the display at speeds in excess of 44 mph (70 km/h). The camera's angle of view is reduced to 24° here. Zoom is deactivated automatically again when the speed drops below 37 mph (60 km/h). The camera's angle of view reverts to 36°. Zoom is calculated by the camera.



Angle of View of Camera

Index	Explanation
1	Angle of view of 36° without zoom
2	Angle of view of 24° with zoom

Fig. 18: Identifying Zoom - Angle Of View Of Camera
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The "Zoom" function can only be selected when the "Full screen" function is deactivated.

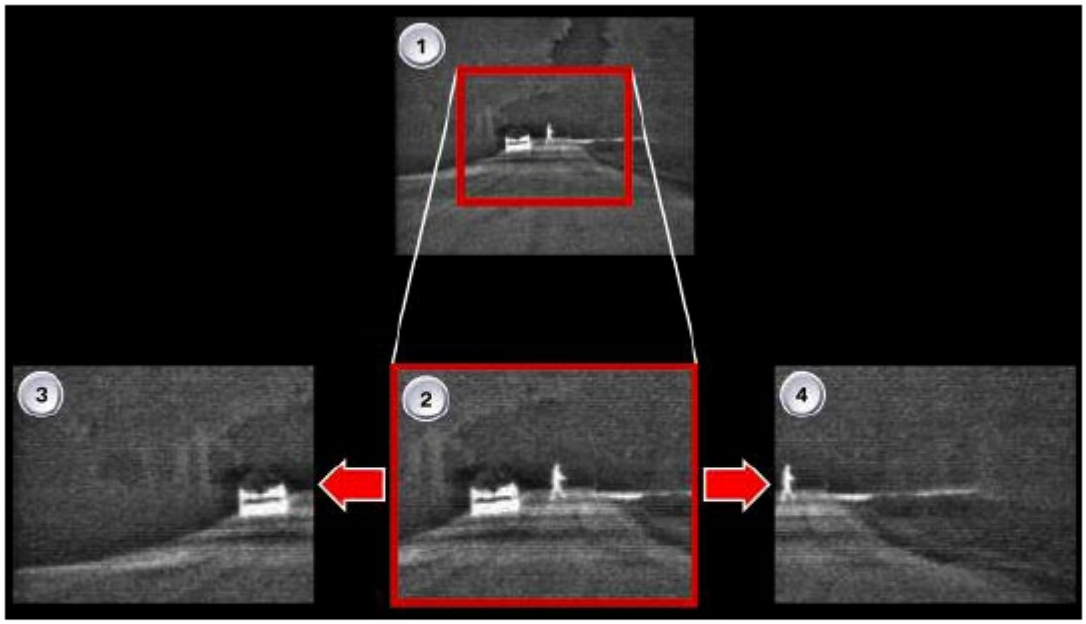
Bend/Curve Mode

Depending on the driving situation, the image detail follows the cornering path of the vehicle along the same lines as the directional headlights.

The image detail is calculated in the camera.

Bend/curve mode is only available when the "Zoom" function is activated.

For better understanding, the following graphic shows a driving situation in which the "Bend/curve mode" function is activated.



Index	Explanation
1	Driving situation without zoom
2	Driving situation with zoom, direction of travel
3	Cornering to the left, enlarged 1.5 x
4	Cornering to the right, enlarged 1.5 x

Fig. 19: Identifying Bend/Curve Mode Function
Courtesy of BMW OF NORTH AMERICA, INC.

Full Screen

In the case of the "Full screen" function, the Assist window is removed and the thermal image is shown over the entire width of the control display. 640 x 240 pixels (for full screen) and 400 x 240 pixels (for split screen) are used to display the BMW Night Vision image.



Fig. 20: Identifying Full Screen In Control Display
Courtesy of BMW OF NORTH AMERICA, INC.

Contrast and Brightness

Both values can be personalized and changed on a scale between -10 and 10.



Fig. 21: Display Of Contrast And Brightness
Courtesy of BMW OF NORTH AMERICA, INC.

Visibility

Normal driving-light illumination is approximately 328 ft (150 m).

The use of BMW Night Vision enables heat emitting objects to be detected up to a distance of approx. 984 ft (300 m).

This specified distance is dependent on weather factors.

For example, heavy fog or rain reduces visibility.

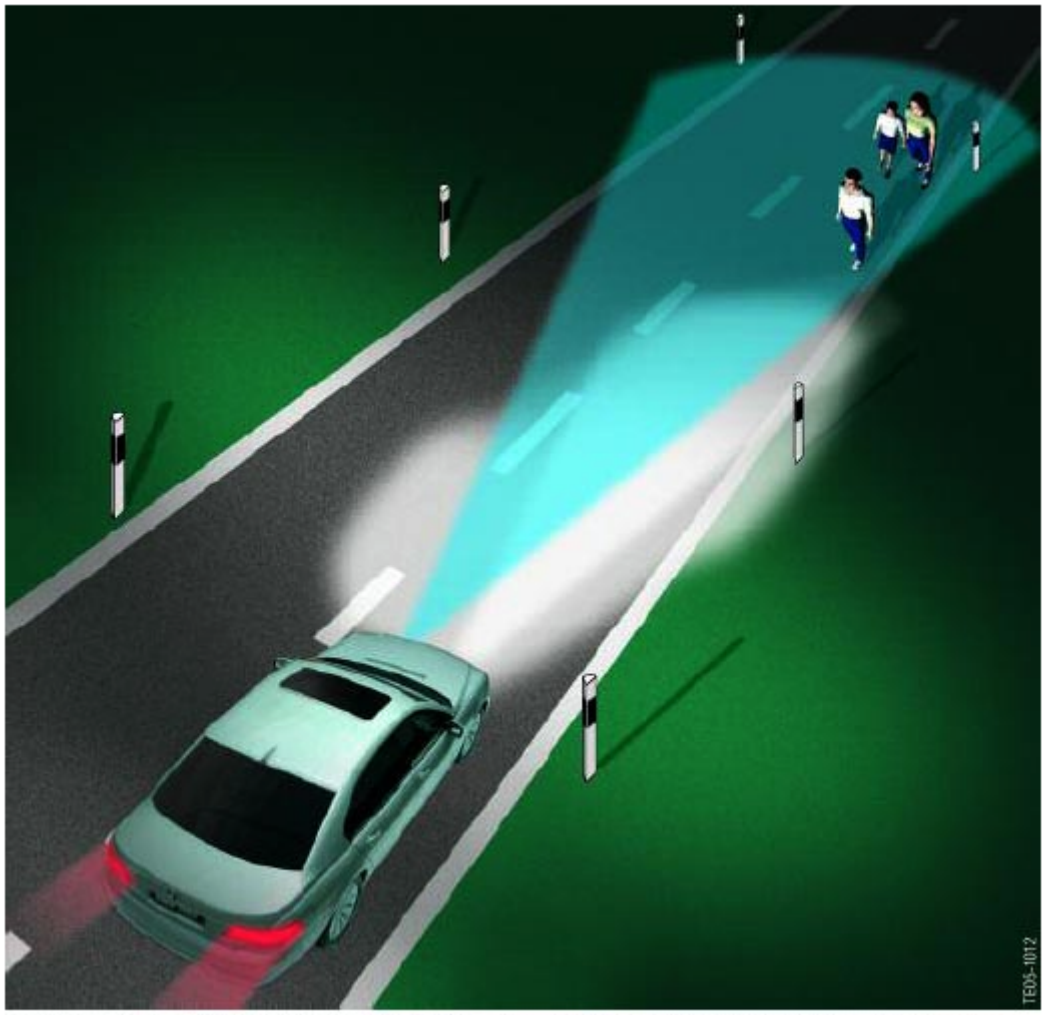


Fig. 22: Comparison Of BMW Night Vision Visibility With Different Vehicles Headlights
Courtesy of BMW OF NORTH AMERICA, INC.

The driving speed must be adapted to the relevant visibility conditions in each case. BMW Night Vision is designed as a supporting system, which, with a modified driving style, affords the driver an early, better overview of the road conditions ahead of the vehicle.

SERVICE INFORMATION

Axial Camera Adjustment

The camera can be axially readjusted by means of an adjusting screw on the housing.

The following procedure must be performed:

- Detach the left ventilation grille from the front spoiler
  Position the headlight aiming device in front of the vehicle

- Engage a Torx screwdriver and move the camera to the desired position
- Reassemble all parts that have been removed in reverse order

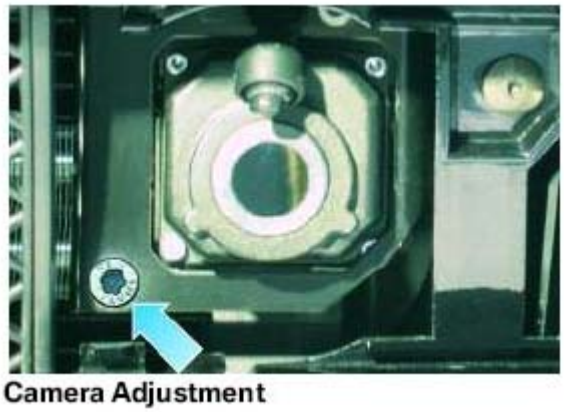


Fig. 23: Identifying Camera Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

Vertical Camera Adjustment

Vertical camera adjustment should be adjusted until the horizontal plane is centered on the CD/CID. This adjustment is only possible through a test plan in the BMW tester.

Replacing Camera Washer Jet

A washer jet with a direct connection to the headlight washer system for cleaning the lens is mounted on the camera.

Follow the procedure below to replace the washer jet:

- Detach the left ventilation grille from the front spoiler
- Release the two Torx screws (1)
- Release the hose clamp on the connecting hose to the headlight washer system and detach the washer jet towards the front
- Reinstall all parts that have been removed in reverse order

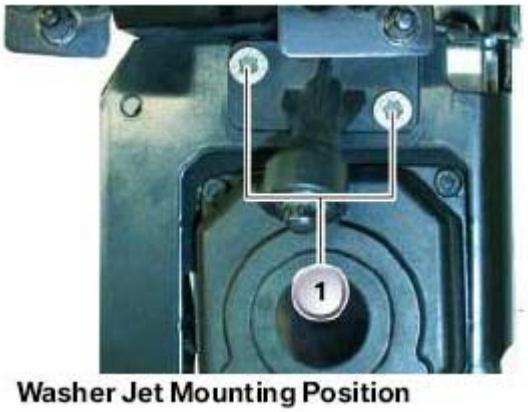


Fig. 24: Identifying Washer Jet Mounting Position
Courtesy of BMW OF NORTH AMERICA, INC.

Displays in Event of a Fault

The following warnings are displayed if the camera is faulty:

- Check control icon in the instrument cluster
- A symbol/description is also shown in CD or CID
- Check control message in the cluster under the tachometer (E65/E66 only)



Fig. 25: Displays In Event Of A Fault (E65/E66)
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 26: Displays In Event Of A Fault (E60/E61/E63/E64)
Courtesy of BMW OF NORTH AMERICA, INC.

Initialization

When replacing the camera, it is always necessary to initialize the software by entering a clearance code (FSC).

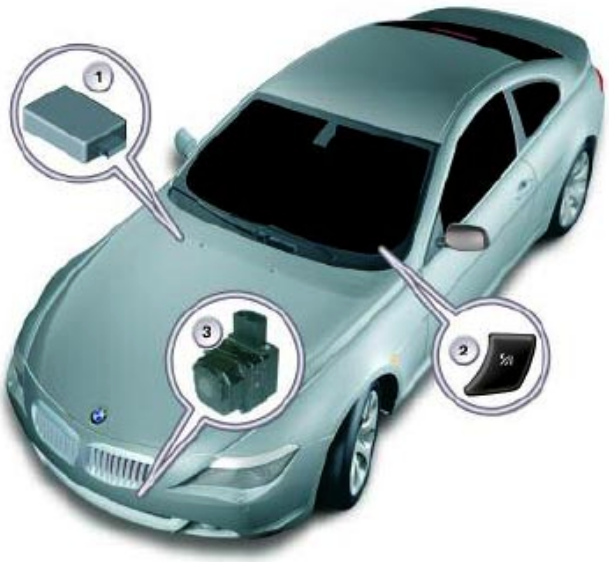
The camera is programmed by means of a control unit. The control unit receives the programming and coding data for the camera via the K-CAN. The control unit forwards these data to the camera via the LIN bus.

Component Location



Fig. 27: Identifying Component Location Of E65/E66
Courtesy of BMW OF NORTH AMERICA, INC.

E60/E61/E63/E64



Index	Explanation
1	Voltage regulator
2	Ignition output stage for belt force limiter
3	Igniter pellet for belt force limiter

Fig. 28: Identifying Component Location Of E60/E61/E63/E64
Courtesy of BMW OF NORTH AMERICA, INC.

GENERAL INFORMATION

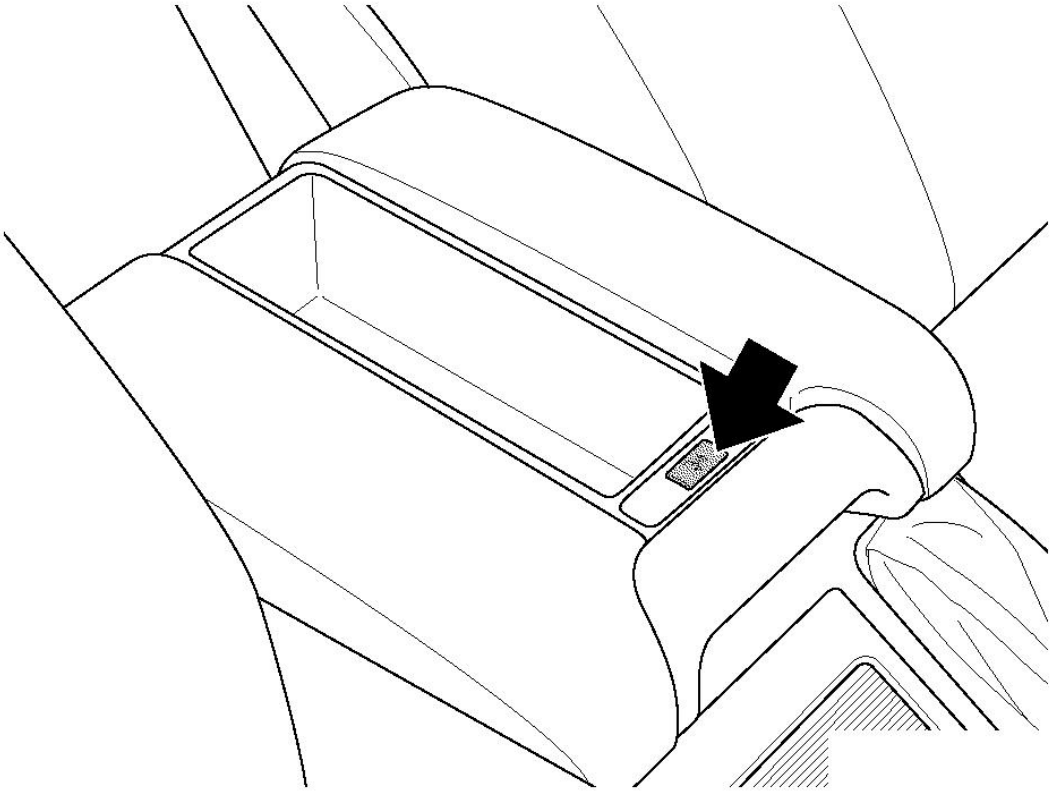
BMW Universal Bluetooth - Overview - All Models

BMW UNIVERSAL BLUETOOTH™

INTRODUCTION

The BMW Universal Bluetooth™ HandsFree System (ULF) utilizes Bluetooth™ wireless technology to enable a wireless connection to be established between a Bluetooth™ enabled mobile phone and the ULF Control Module installed in the vehicle. The combination of these components results in a new generation of in-vehicle phone system.

The ULF Control Module forms an interface that allows a mobile phone with the embedded Bluetooth™ wireless technology feature to be wirelessly integrated into the vehicle. For the first time BMW is introducing a new generation hands-free telephone system kit that provides the customer with the option of using various Bluetooth™ enabled mobile phones (a list of recommended phones is available from your BMW Center).



G03399806

Fig. 1: Identifying Oddment Tray Button

Courtesy of BMW OF NORTH AMERICA, INC.

WHAT IS BLUETOOTH™

The name Bluetooth™ is derived from the Danish King Harald Bluetooth who lived in the 10th century. He was well known for his ability to unify his kingdom and today lends his name to a wireless technology standard that can connect/unify various electronic devices that are Bluetooth™ enabled and located within a short range (approx. 10 m or 32.8 ft) of each other.

Bluetooth™ wireless technology is a short-range radio frequency technology standard that allows several devices to communicate with each other simultaneously. The standard indicates that up to seven simultaneous connections can be established and maintained at one time, as long as the connected devices are within a range of 10 m (32.8 ft).

NOTE: The ULF system will allow four phones to be paired to the system at a time and only allow one phone to be connected at a time.

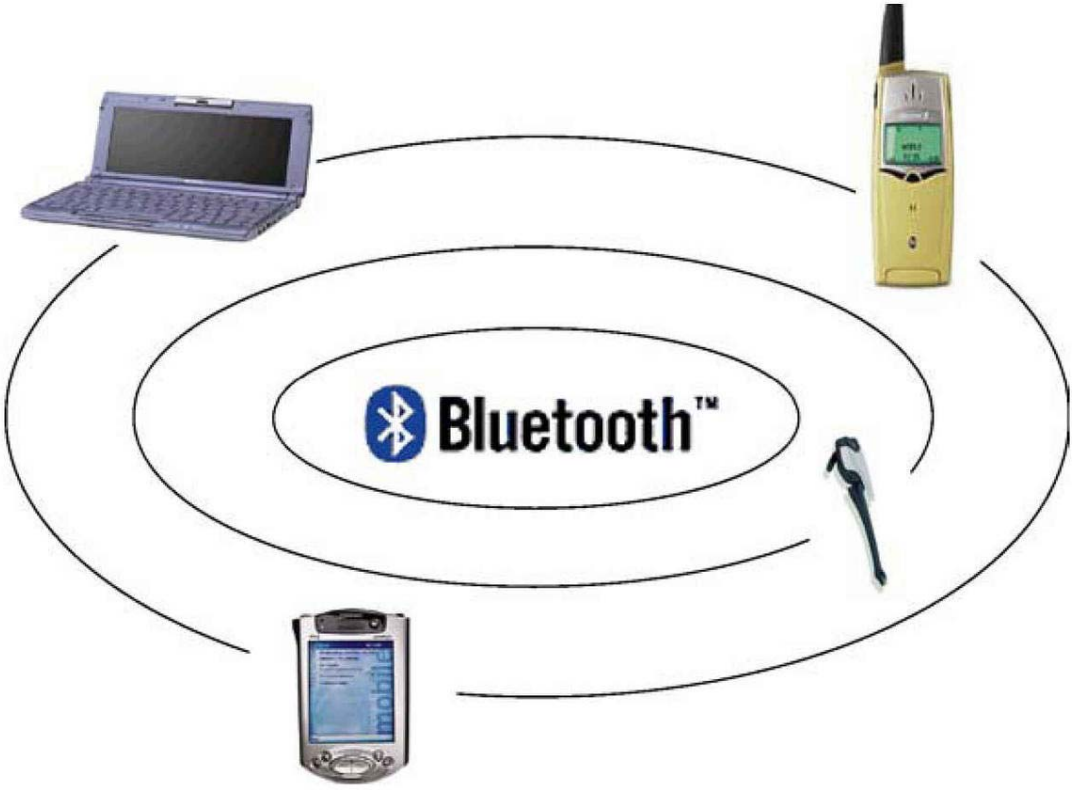


Fig. 2: Bluetooth Network Area Description
Courtesy of BMW OF NORTH AMERICA, INC.

Communication/Security

The system uses the license-free, global Industrial Scientific Medical band (ISM) at 2.45 GHz. This frequency range from 2.402 GHz to 2.480 GHz is subdivided into 79 channels with a 1 MHz bandwidth.

Signals transmitted through the airways can be scrambled and unscrambled to enhance communication security. With Bluetooth™ technology, communication frequencies are changed 1600 times per second to reduce the risk of interference or interception of the transmitted signal. The relatively small operating range of approx. 10 m (32.8 ft) also enhances the security of this technology, since tampering with the transmitted data is only possible when inside the 10 m (32.8 ft) wireless "network".

To further enhance the security of this short-range wireless network the ULF system requires a pairing procedure to be carried out for each device that will be introduced into the network. As part of this procedure a required passkey must be entered once (during the initial pairing procedure) to establish a secure connection between the phone and the ULF Control Module.

Data and Voice

Bluetooth™ was developed for the transmission of both voice as well as data. A bandwidth of approx. 1 MB/s is available for this purpose.

Bluetooth™ Enabled Phones

Ideally all phones that are Bluetooth™ enabled should work with the ULF system, however not all phones utilize the same profiles and therefore may not be recognized by the ULF System. A list of recommended Bluetooth™ enabled phones is available from your BMW Center.

ADVANTAGES OF THE ULF SYSTEM

- Once a phone is paired to the system it will be able to automatically connect to the Bluetooth™ wireless network of the vehicle, the next time it is introduced into the vehicle and the vehicle ignition is on.
- Up to four different Bluetooth™ phones can be paired to the system at one time, although only one phone can be wirelessly connected at any time.
- The phone does not need to be inserted into a phone specific cradle in order to be integrated into the vehicle.
- The phone can remain in a briefcase, purse, glove box, etc.; as long as it is turned on and located within the interior of the vehicle.
- The MFL buttons on the steering wheel can be utilized to place or receive a call, to scroll the phone book and select a number or activate voice recognition in order to dial a number via voice command.
- A voice recognition system is integrated into the ULF control module and can be activated by depressing the send/receive ™ button.
- The communications protocol of Bluetooth™ wireless technology is standardized irrespective of the manufacturer, this therefore allows various mobile telephones that utilize Bluetooth™ wireless technology and a recognized profile to be connected to the ULF System.

System Overview

A ULF system consists of a control module, microphone, Bluetooth™ antenna, a standalone pairing (send/receive) button, or eject box with a coin tray insert.

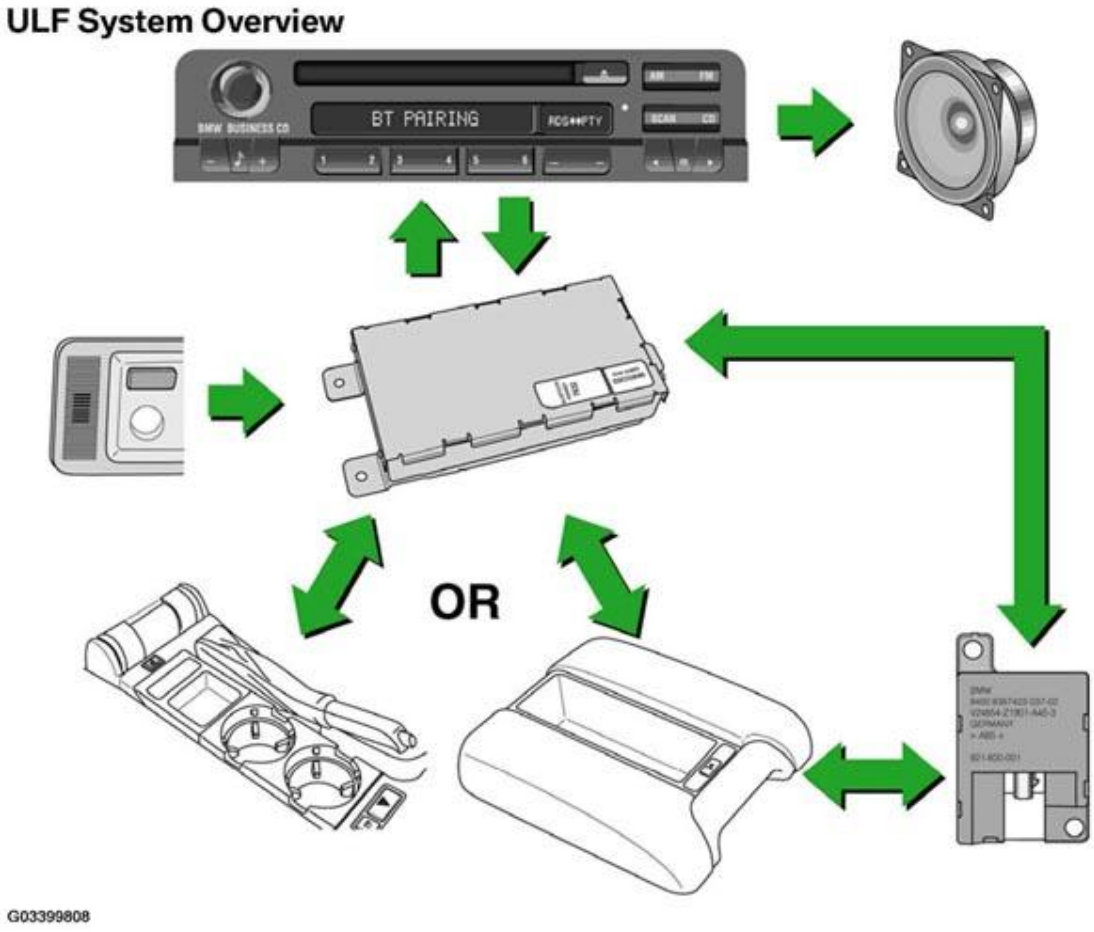


Fig. 3: ULF Control Module System Components
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Control Module

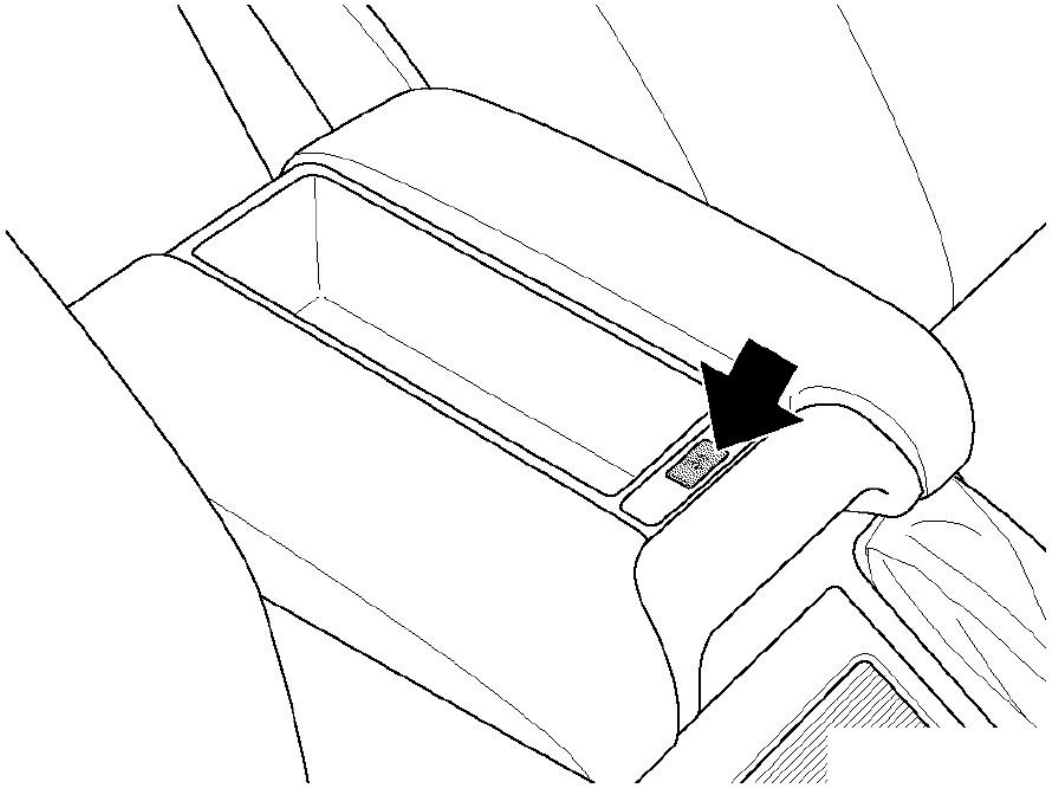
The ULF module forms the interface between the Bluetooth™ mobile phone and the electronic system in the vehicle. The mobile phone with the embedded Bluetooth™ wireless technology is the transceiver, this requires that the phone be activated, paired and present within the vehicle network in order to place or receive a call in the vehicle.

Oddment Tray

The oddment tray, which is connected to the ULF control module via the vehicles wiring harness, serves the purpose of:

Housing the send/receive ™ or pairing button, which must be depressed to activate the pairing procedure

between the phone and the control module.



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Fig. 4: Identifying Oddment Tray Button
Courtesy of BMW OF NORTH AMERICA, INC.

Pairing Button

A stand-alone send/receive ™ or pairing button is supplied for the 3 Series in order to retain the cup holders. The button provides the same function as the send/receive ™ button on the steering wheel, plus is the button that must be depressed to activate the pairing procedure between the phone and the control module.

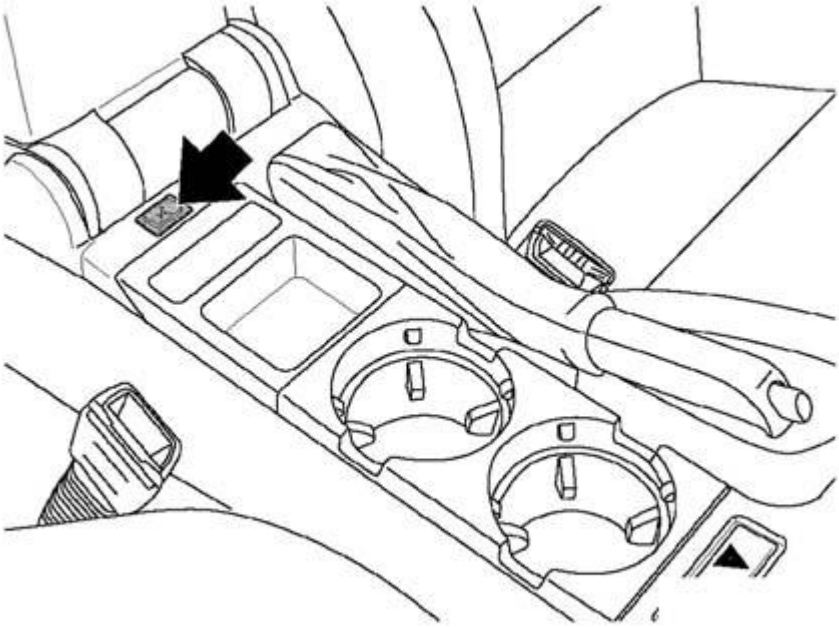


Fig. 5: Identifying Pairing Button
Courtesy of BMW OF NORTH AMERICA, INC.

Bluetooth™ Antenna

The Bluetooth™ antenna operates on a frequency of 2.45 GHZ and is installed in the interior compartment of the vehicle. This antenna provides the wireless interface between the Bluetooth™ enabled phone and the ULF Control Module.

SYSTEM OPERATION

Initial Operation

Prior to using the system for the first time, the Bluetooth™ mobile phone that is to be used must be paired with the ULF control module. This pairing procedure is necessary in order to assign the digital code of the mobile phone to the ULF control module installed in the vehicle. The pairing procedure is only required when a new phone is introduced to the ULF system for the very first time or the list of paired devices is cleared form the memory of the ULF module, it does not need to be performed every time the phone is used with the system.

After pairing, the mobile phone is recognized automatically by the ULF control module within 45 seconds after it is introduced into the vehicle and the ignition is turned on.

NOTE: Depending on the mobile phone manufacturer, particular care must be taken prior to initial operation to ensure that no headset is coupled with the mobile phone. Various devices may interpret the ULF control module as a headset and

request deactivation of the headset. Please refer to the operating instructions of the mobile phone for detailed information.

Pairing Procedure

The pairing procedure that must be initiated through the phone will differ corresponding to the different menu configurations of the various Bluetooth™ mobile phones on the market. The user's manual of the phone manufacturer should always be referenced for specific steps on how to activate the Bluetooth™ feature and to pair/link devices.

The following steps are generalized steps that should help in activating the Bluetooth™ function of most phones:

In Vehicle:

1. Depress the send /receive (pairing) button located in the center console, for at least 1 second prior to switching on the ignition and continue to hold the button down for approximately 2-3 seconds after the ignition is turned on.
2. Release the button.

NOTE: The send/receive (pairing) button in 5 Series and X5 SAV is located on the oddment tray assembly in the center console.

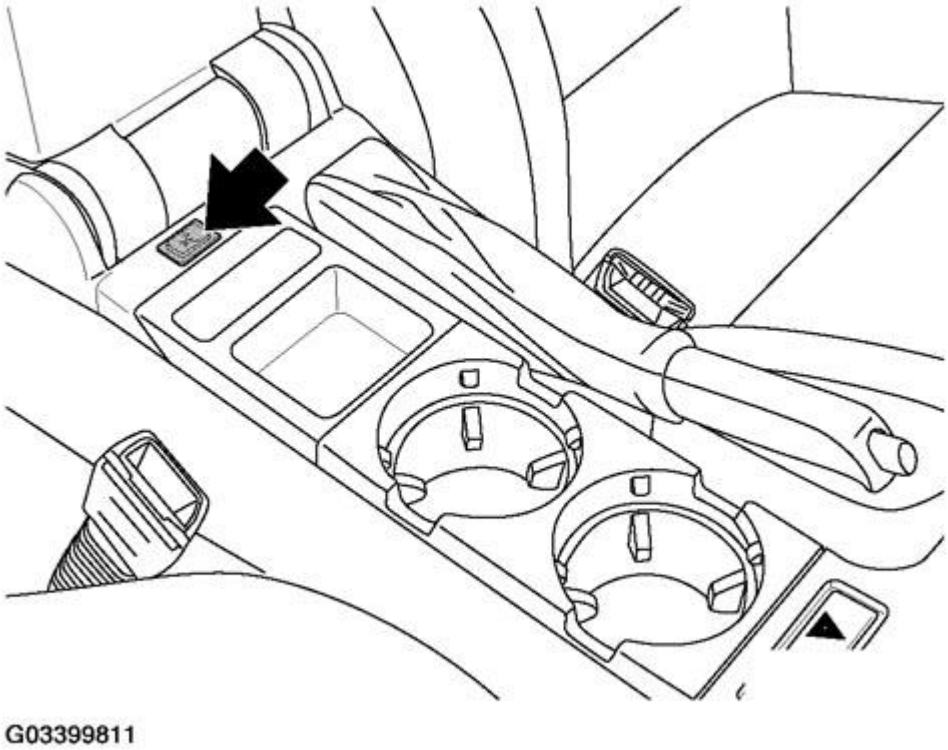


Fig. 6: Identifying Send /Receive (Pairing) Button Location (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

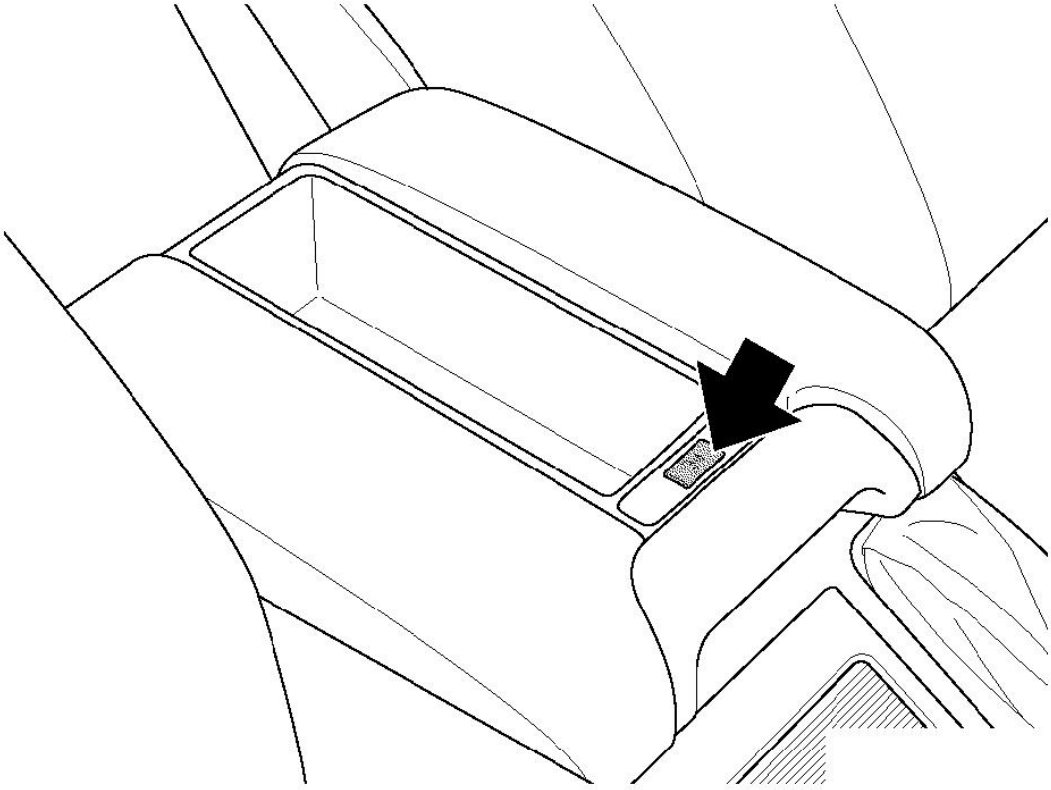
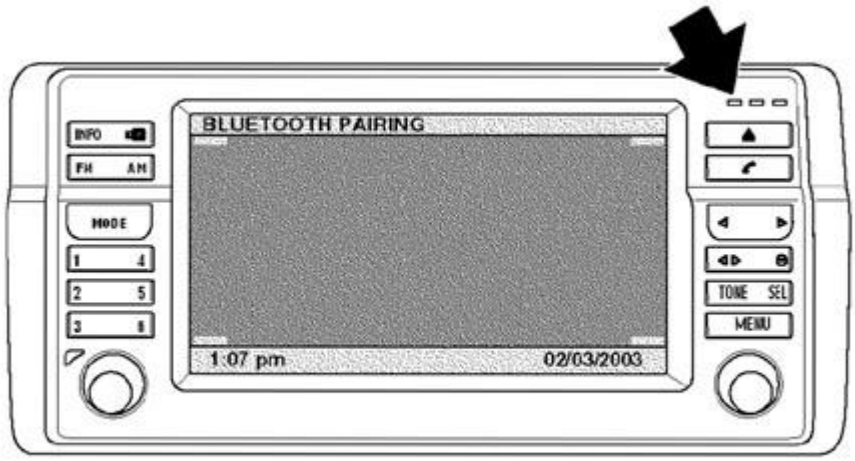


Fig. 7: Identifying Send /Receive (Pairing) Button Location (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

3. Shortly after releasing the button on the Radio or Display Screen, the following message should be displayed:
   a. Display Screen:

      "Bluetooth Pairing" displayed.

      Green, Yellow and Red LEDs on the right side of the unit are flashing which indicates that the ULF is waiting for a signal from the Bluetooth™ device to be paired.



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Fig. 8: Identifying Releasing Button On Radio
Courtesy of BMW OF NORTH AMERICA, INC.

b. Radio Display (5 Series and X5 SAV):

"Bluetooth Pairing" Display Which Indicates That The Ulf Is Searching For Available Bluetooth™ Devices. Green, Yellow And Red Leds On The Right Side Of The Unit Are Flashing Which Indicates That The Ulf Is Waiting For A Signal From The Bluetooth™ Device To Be Paired.

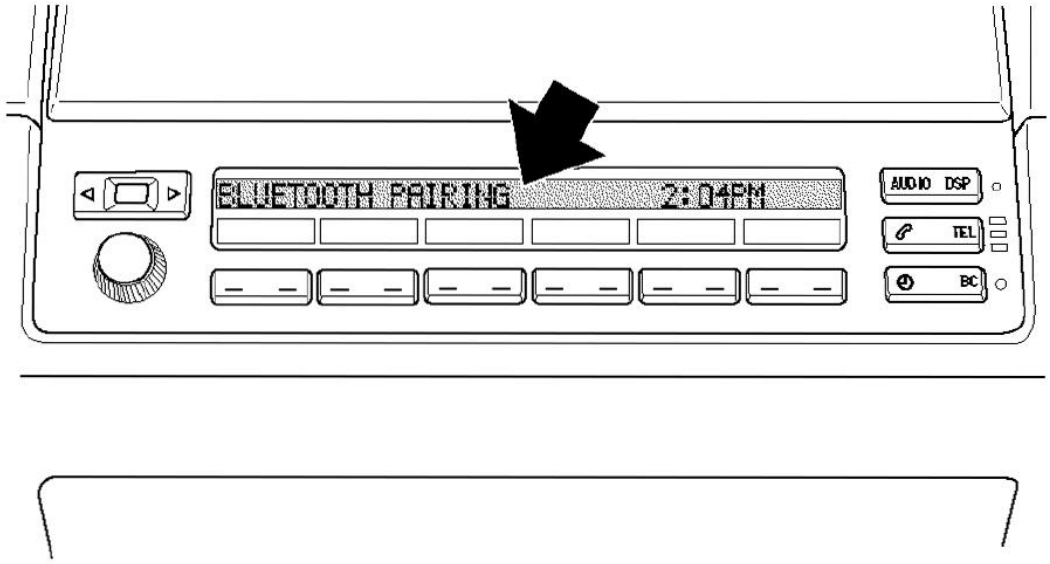
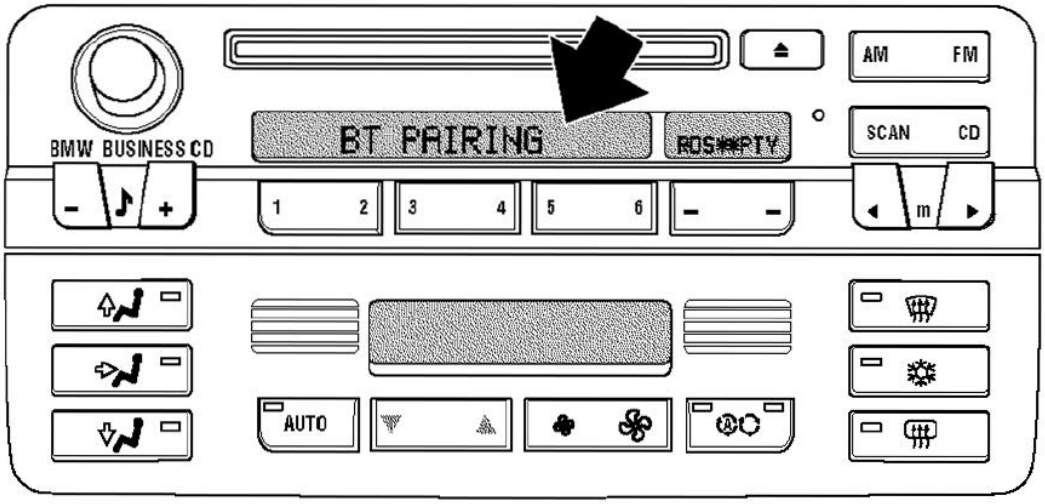


Fig. 9: Bluetooth Pairing Display
Courtesy of BMW OF NORTH AMERICA, INC.

c. Radio Display (3 Series with CD or Cassette):

"BT Pairing" display which indicates that the ULF is searching for available Bluetooth™ devices.



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Fig. 10: BT Pairing Display
Courtesy of BMW OF NORTH AMERICA, INC.

4. Activate the search function of the phone as indicated below.

ON PHONE:

1. Locate the connection/settings menu and select Bluetooth™.
2. Select the response that will activate the Bluetooth™ feature of the phone.
3. Next select a menu option that will allow you to "Discover" or "Search" for active Bluetooth™ devices.
4. If the phone identifies/finds a device (named "BMW" followed by 5 digits) select it and follow the indicated steps to complete the pairing process.
5. Once the phone is successfully paired to the device cycle the vehicle ignition switch off and back on and the devices should wirelessly connect within 30 seconds. When the connection is established the phone will display a connection symbol.

The following steps are an example of the pairing procedure that must be initiated to pair the Sony Ericsson T68i phone to the ULF Control Module.

1. Press the menu button.
2. Select "Connect".
3. Select option 3: "Bluetooth".
4. Select option 4: "Options".
5. Select option 1: "Operation mode" and set to "On" or "Automatic".

6. Go back one step by pressing the red phone button several times.
7. Select option 3: "Discover".
8. Mobile phone display shows 'Searching'
9. Select "BMW ....." in upcoming list.
10. Select option 1: "Add to paired".
11. Enter the password (= ULF passkey) located on ULF Control Module that is in the rear of the vehicle or on the Passkey Reference Card.
    - Mobile phone display shows 'BMW ..... Pairing'
    - Mobile phone display shows 'Pairing Successful'
    - Display screen shows 'Pairing succeeded' for 3 seconds
12. Enter device name or accept the name that is automatically displayed.
13. Mobile phone display shows "Added to paired devices".
14. Exit menu by pressing the red phone/NO button.
15. Once the phone is successfully paired to the device cycle the ignition switch off and back on.
16. The devices should wirelessly connect within 30 seconds. The connection is established when the phone displays the symbols indicated, on the right side of the screen.

NOTE: **Shortly after turning on the ignition and the Bluetooth™ connection is identified, the phone may display a message asking if the connection should be established/accepted. The connection authorization request will always occur unless the setting on the phone is modified to allow automatic connection every time, please refer to the user's manual of the phone to determine how to change this setting.**

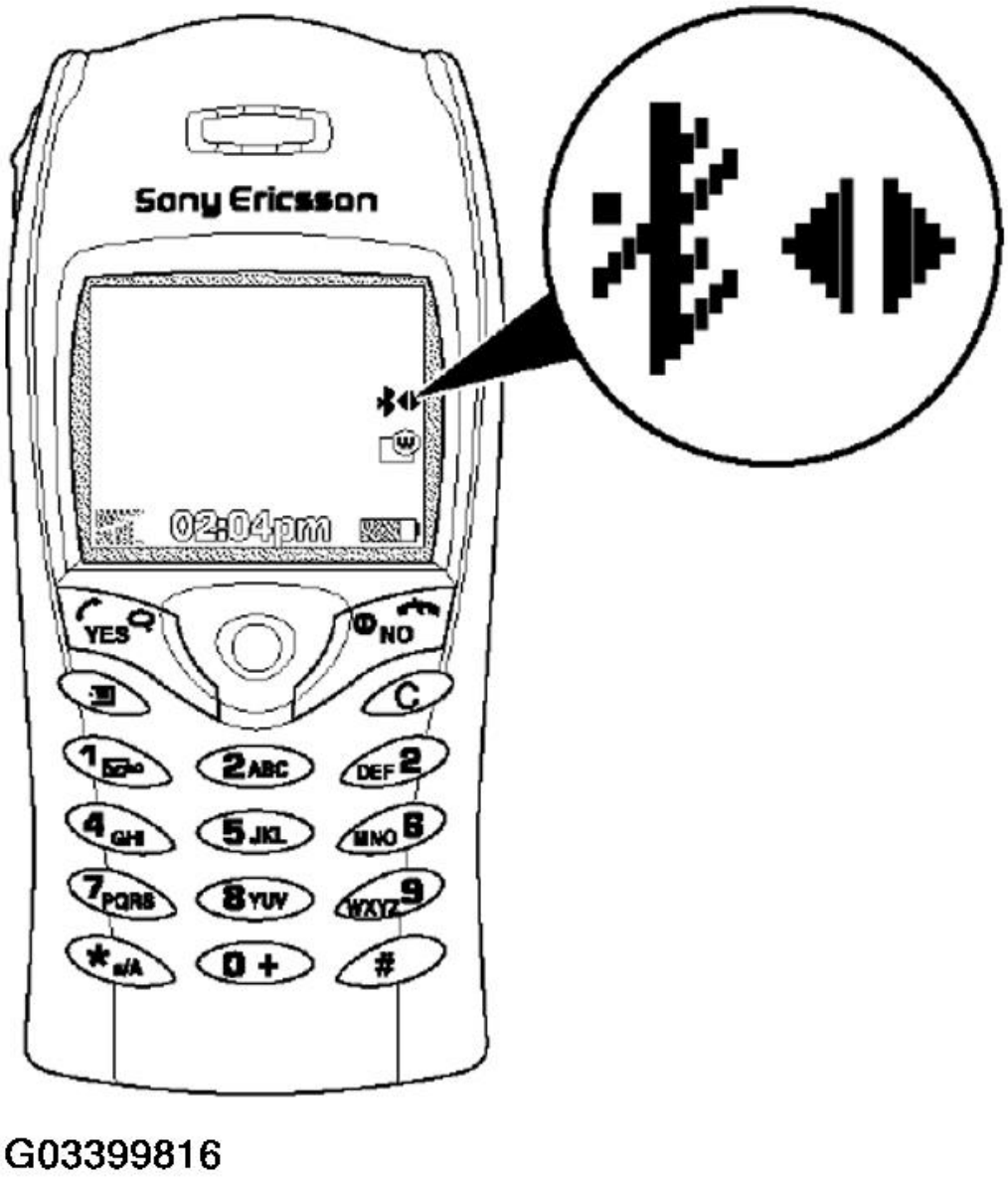


Fig. 11: Locating Connection/Settings Menu On Phone
Courtesy of BMW OF NORTH AMERICA, INC.

System Functions

The mobile phone must always be activated, paired and present within the Bluetooth™ network in order to place or receive a call through the vehicle.

Indicator Lamps

The indicator lamps show the following:

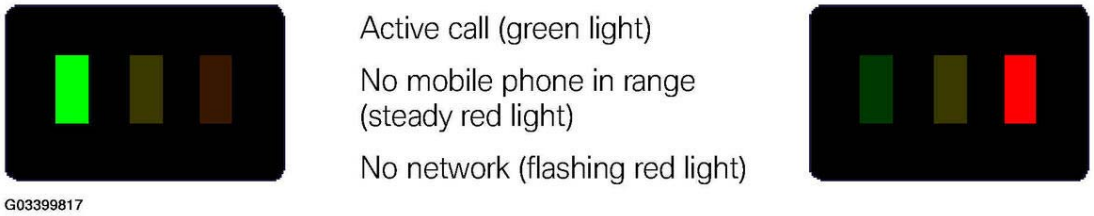


Fig. 12: Identifying Indicator Lamps
Courtesy of BMW OF NORTH AMERICA, INC.

Active call (green light).

No mobile phone in range (steady red light).

No network (flashing red light).

Adopting Telephone Book

Depending on the type of Bluetooth™ mobile phone, the telephone book is either transferred automatically (ex. Nokia 6310, Sony Ericsson T68i) or manually (depending on software version of phone) by the user to the ULF control module. The address book is stored temporarily for the purpose of accessing/displaying stored phonebook information using the steering wheel controls or telephone menu selections available on the display screen or some radio displays.

If a manual transfer of the address book must be made, the ULF must be in setup mode for manual transfer. The corresponding data can then be transferred. If phonebook data is modified while the phone is wirelessly connected to the vehicle the changes will not be displayed in the vehicle if the phonebook is scrolled via the steering wheel or display screen, changes will only be transferred the next time the ignition is cycled.

Placing a Call

A call can be placed in several different ways:

1. Using the keypad or address book of the mobile phone and depressing the send button on the phone.

   NOTE: Some phones may ask if the call is to remain within the phone. Refer to the users manual of the phone for specific instructions on disabling this feature.

2. Depressing the R/T button on the steering wheel, then scrolling (using the ™ or ™ buttons) through the address book of the phone that is linked to the ULF, until the desired number is displayed on the radio or

place the call.

3. Depressing the ™ button on the steering wheel until an audible "beep" is heard through the vehicle speakers, at this point a call can be placed by using the following voice commands:
   - "Dial number" or "Dial phone":
   - After the system asks for a number say the number.

     Example: "123 456 7890"; the system will repeat the number requested once you stop speaking momentarily, the number may also be displayed depending on the vehicle and equipment/accessories installed.

   - "Dial":

     NOTE: Once the dial command is given the number will be displayed on the dis play screen or radio; plus it will always be displayed on the mobile phone after a call is placed.

4. Briefly depressing the ™ button on the steering wheel will redial the last number dialed.

For more information on using voice commands refer to the " Owner's Manual for Voice Input System. The Convenient Alternative to Manual Control" (P/N 84 11 027 942)

Receiving/Accepting a Call

The call ringer in the Bluetooth™ mobile phone is audible when an incoming call signal is received. At the same time, the signal is sent via the Bluetooth™ interface in the mobile phone to the Bluetooth™ antenna in the vehicle. The ULF receives the incoming ring/call signal via the Bluetooth™ antenna and mutes the radio. The incoming ring/tone signal is then also transmitted to the vehicle speakers.

The following options are available for accepting a call:

3 Series without Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive ™ button in the center console.
- Press send/receive key on mobile phone.

5 Series and X5 SAV without Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive key on radio.
- Press send/receive ™ button on the oddment tray (Center Console).
- Press send/receive key on mobile phone.

Vehicles with Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive ™ button on the oddment tray (Center Console).
- Select the green phone symbol on the Display Screen.
- Press send/receive key on mobile phone.

Conducting a Call

If the call is accepted by pressing the send/receive key ™ on the Radio (5 series and X5 SAV), Display Screen, steering wheel or center console, it will be conducted via the hands free microphone and vehicle speakers.

If a call is accepted by pressing the send/receive key on the mobile phone, the reaction will depend on the type of handset. In the majority of cases, however, the question appears:

"Do you wish to use the mobile phone?"

Please refer to the operating instructions of the mobile phone for a detailed description of the operating procedure of the phone.

The hands-free function is activated after pressing the send/receive key. The incoming call is encoded (scrambled) via the Bluetooth™ interface in the mobile phone and sent to the Bluetooth™ antenna in the vehicle. The call is received by the ULF control module and output via the radio to the audio speakers.

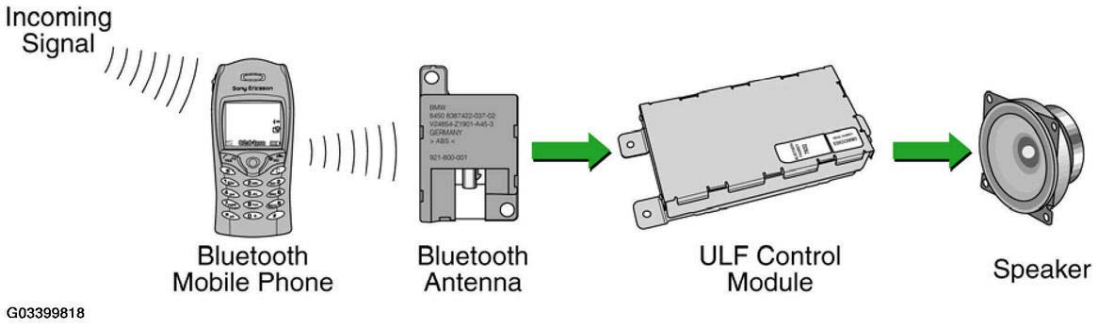


Fig. 13: Identifying Call Components (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Since the ULF system provides a digital full-duplex hands-free operation, it is possible to simultaneously speak and listen to calls. An echo cancellation function prevents feedback when speaking into the microphone. The microphone audio signal is sent via a hardwire connection to the ULF control module. In the ULF module the received audio signal is scrambled via the Bluetooth™ module and transferred via the Bluetooth™ antenna to the mobile phone. The mobile phone then transmits the call via the phone antenna.

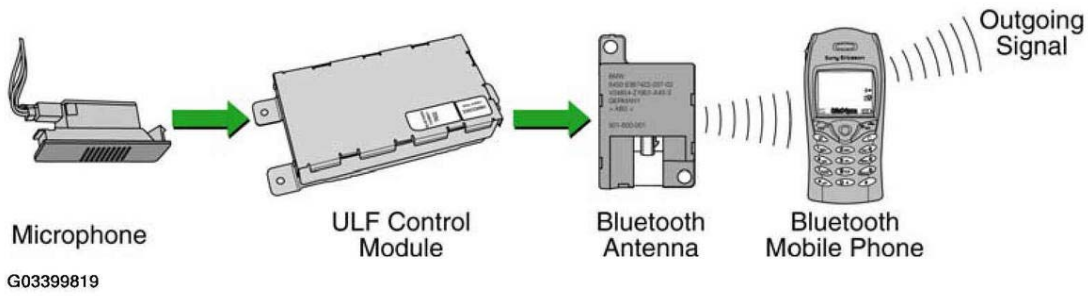


Fig. 14: Identifying Call Components (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Ending a Call

The following options are available for ending a call:

3 Series without Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive ™ button in the center console.
- Press send/receive key on mobile phone.

5 Series and X5 SAV without Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive key on radio.
- Press send/receive ™ button on the oddment tray (Center Console).
- Press send/receive key on mobile phone.

Vehicles with Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive ™ button on the oddment tray (Center Console).
- Select the green phone symbol on the Display Screen.
- Press send/receive key on mobile phone.

Transfer Active Call From Phone to ULF

If a call is received or placed via the handset, it can be transferred into the vehicle once the phone is within the active Bluetooth™ network of the vehicle.

Call transfer procedure:

1. Ignition must be on.
2. Bluetooth™ connection must be established.
3. Briefly depress the send/receive ™ button located in the center console.

NOTE: Some phones may automatically display a statement asking the user if the active call should be transferred to the ULF system shortly after the Bluetooth™ connection is established. If the request is acknowledged the call is automatically transferred into the vehicle/ULF system without having to depress the send/receive button.

Transfer Active Call from ULF to Phone

If you are currently in an active call and you need to leave the vehicle the call can be transferred into the handset in several ways.

1. Ignition is turned off and you walk away from the vehicle. Once outside the 10 m (32.8 ft) range a message may be displayed on the phone asking if the current call should be maintained or ended, by maintaining the call it will be transferred to the handset.
2. Depending on the model of phone being used the call can be transferred to the handset by manually disconnecting from the Bluetooth™ network via the connections menu or selecting a transfer function in the settings menu of the phone (refer to the user's manual of the phone for more information).

Linking Several Bluetooth™ Mobile Phones

Up to four Bluetooth™ mobile phones can be paired one after the other to the ULF control module. The pairing operation corresponds to the procedure described above.

The handset paired last has the highest priority. The telephone paired first will drop out of the list if a fifth Bluetooth™ mobile phone is paired.

NOTE: For incoming and outgoing calls, only the user connected first to the system can speak via the hands-free facility.

If two users enter the network or connection range simultaneously, only the user with the highest priority (the user last paired during the initial pairing procedure) will be able to use the hands-free function for incoming & outgoing calls. If the highest priority phone is turned off the phone with the next highest priority will be connected.

Deleting Devices

The paired Bluetooth™ mobile phones can only be deleted as a single group from the ULF control module.

The pairing procedure must first be activated, and then the send/receive ™ button on the installed eject-box or the pairing button located at the rear of the center console must again be depressed for an additional 10 seconds after the "Bluetooth Pairing" message is displayed on the radio in order to clear the list of paired devices from the control module and the message "paired devices deleted" is displayed.

TECHNICAL INFORMATION

Not only does the Universal Bluetooth™ Hands-Free System offer a means to wirelessly integrate a mobile phone into the vehicle, it also can be diagnosed using the DISplus or GT1.

The control module should always be coded to the specific vehicle that it is installed into to ensure optimum system performance. Coding of the module can be done using the DISplus or GT1 with CD33 or higher installed.

The ULF control module contains several controllers that provide the following functions:

1. Bluetooth™ Control Circuit:

   The Bluetooth™ control circuit is physically connected to the Bluetooth™ antenna. It establishes the connection between the Bluetooth™ mobile phone and the vehicle, de-scrambles the incoming call/signal from the phone, scrambles the outgoing signal from the microphone for transmission to the phone, plus controls all communication to paired Bluetooth™ devices.

2. Hands-free Control Circuit:

   The hands-free control circuit in the ULF controls the input/output of audio frequency signals in hands-free mode. The hands-free mode is designed for full-duplex transmission. This means the user can listen and speak simultaneously. Voice transmission takes place via a microphone located in the interior of the vehicle.

   Pressing and holding the send/receive ™ button until an audible beep is heard will activate the integrated voice recognition system and place the system into a hands-free mode.

3. Audio Output Control:

   The incoming signal from the Bluetooth™ phone is processed, sent through the radio and to the speakers.

4. Audio Input Control:

   The outgoing audio received from the vehicle microphone is processed and transmitted to the Bluetooth™ phone.

5. I/K-Bus Interface:

   The interface in the ULF control module for the I/K-bus controls the procedure for transmitting and receiving data telegrams via the I/K-bus in connection with other components on the bus.

6. Power Module:

   The power module in the ULF control module regulates the voltage supply and monitors system shutdown in the event of an under voltage situation in the vehicle.

SYSTEM OVERVIEW

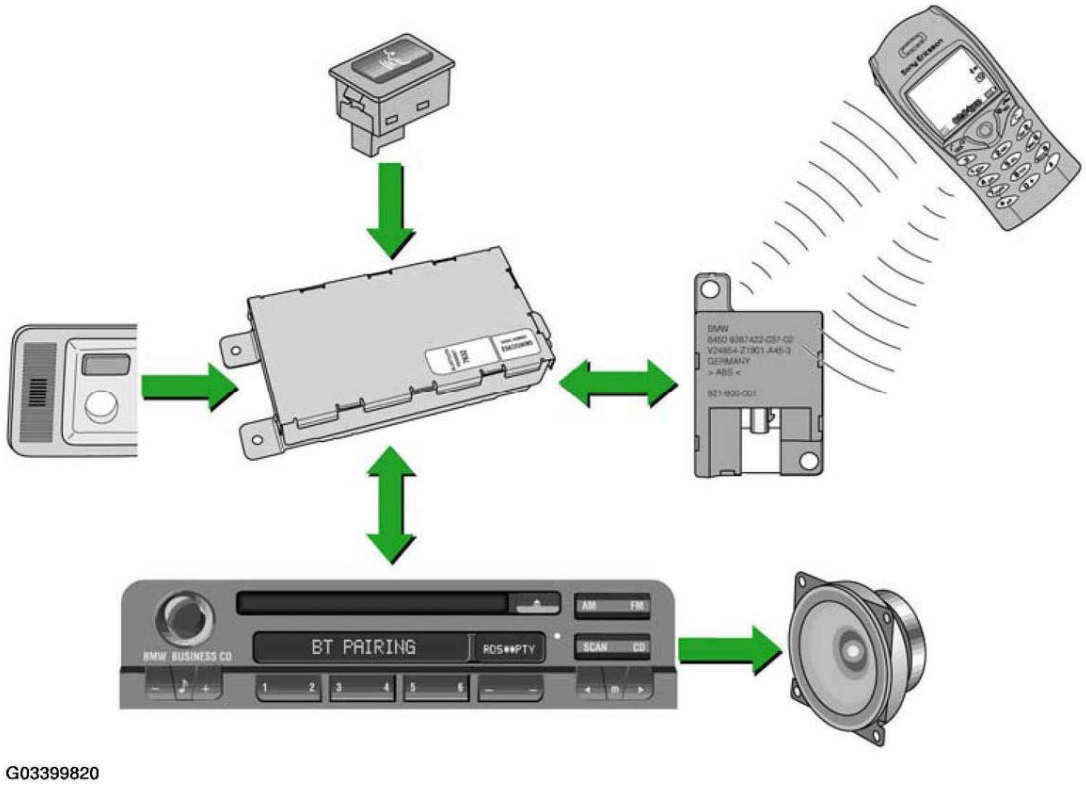


Fig. 15: Identifying Power Module System Components
Courtesy of BMW OF NORTH AMERICA, INC.

Voice Recognition

The voice recognition for the this system is integrated into the ULF Control Module and utilizes the same voice commands as those used with the TEMIC Voice Recognition Module used with the CPT8000 phone system. The "Owner's Manual for the Voice Input System" P/N 84 11 0 027 942 should be referenced for more detailed information regarding voice command features.

Coding ULF Control Module to Vehicle

After installing the ULF Kit, the vehicle should be re-coded with DISPlus/GT1 SW 33 or higher, using the "Retrofit" path to ensure that the system works properly with the systems currently installed in the vehicle. The recoding is done automatically when using the following "retrofit" procedure:

Example for coding E46 with ULF installed:

- Connect DIS or GT1 to vehicle (with SW 33 or higher installed).
- Turn on ignition.

- Select "Coding ZCS".
- Series: "E46 Series".
- Path: "2 Retrofit".
- System: "ULF Universal charging and Handsfree facility".
- Follow the on screen requests to activate the coding procedure.

Function Test

Upon completion of the recoding, verify that the BMW Universal Bluetooth™ HandsFree System is working correctly by going through the following action steps. After completing each step ensure that the desired result is obtained:

FUNCTION TEST

Action	Response
Pair phone to vehicle (refer to section for pairing instructions).	Phone and or Radio/MID/Board Computer should display statement indicating Pairing succeeded.
Turn on radio and initiate a call using voice recognition commands by depressing/holding the Voice recognition button on steering wheel until an audible beep is heard.	Radio should mute and an audible beep is heard through vehicle speakers.
Say "Dial number".	System states "Please speak the number".
Say phone number to be dialed ex"1234567890".	System states "1234567890".
If number is correct say "Dial"	Call is placed and number being dialed is displayed on phone as well as on Radio/MID/Board Computer.

TROUBLESHOOTING

TROUBLESHOOTING

Situation	Correction
No audio output through vehicle speakers.	Check SES module jumper plug.
Radio does not mute after placing a call.	Check connections at rear of radio for Tel On and Tel Mute signal. Verify that connectors and pins are properly seated.
Audio quality in vehicle may not sound very good.	Recode ULF Control Module.™ **NOTE:** **Audio quality in vehicle or at person being contacted, is dependent on the quality and signal strength of the wireless service provider in the area traveled.**
Customer complains that the person being contacted hears a "Buzzing" noise, at times during their conversation or on voice mail message that he/she	Intermittently a "Buzzing" noise is noticeable to the person being called from the vehicle. The "Buzzing" noise is a result of the GSM signal being feedback

has left.	through the microphone, this usually occurs if the GSM phone is located too close to the microphone. The customer should change the location of where the phone is placed/stored.
Driver is told that the person being contacted complains that there is an echo/reverberation in the audio; person can hear his/her voice back through the phone.	Audio volume in vehicle during a call may be a bit to loud, causing the other person to hear his/her voice coming back through the phone.
A second call is received while in a call, and call cannot be accepted using MFL controls.	Use handset to expect second call and place previous called on hold. Call waiting is functional only via the handset.
The radio audio does not come back immediately if the "other" person hangs up first.	It takes approximately 15 seconds for the ULF system to recognize that the call was terminated from outside the vehicle. If the call is terminated from outside the vehicle first, the driver can depress the button on the steering wheel to terminate the call from the vehicle and un-mute the radio quicker.
Customer is not able to pair phone to system, not able to locate ULF passkey/password reference card.	The "Bluetooth™ Passkey" is identified on the label of the ULF Control Module located in the rear of the vehicle.™ The "Bluetooth™ Passkey" for the installed control module can be obtained by connecting the DISPlus or GT1and accessing the diagnostics for the ULF system:- select "Diagnostic requests" - select "Bluetooth code".
Intermittently a popping noise is audible through the vehicles speaker and there is no Bluetooth™ wireless communication established between the ULF module and the phone.	Vehicle and /or ULF Control Module are not correctly coded.™ Recode module and vehicle (refer to **CODING ULF CONTROL MODULE TO VEHICLE**).
E46 Only: After installation of ULF system the speedometer and odometer do not work.	Remove pin 7 & 8 from the 54-pin connector going to the ULF Control Module. .

CONNECTOR PIN ASSIGNMENTS

The 54-pin connector of the ULF Control Module utilizes the following pins on X01185

PINS DESCRIPTION

PIN	Description
1	Microphone +
11	Cradle On/Enable
15	I-Bus
17	KL 30
19	Microphone -
21	Microphone Shield
22	Hook
27	Programming

28	Programming
32	Cradle Key +
33	Telephone On
34	Telephone On (pin 33)
35	KL R (Ignition)
36	KL 31 (Ground)
43	Programming
44	Programming
45	Programming
51	Telephone Mute
52	KL 58g (illumination)

The following pins on X4545 are utilized when the eject box is connected

PINS DESCRIPTION

PIN	Description
1	Cradle Key +
2	KL 31
3	58G
5	KL 30
13	Cradle On/Enable

NOTE: The pairing button used on the E46 only utilizes pin 1, 2 & 3 of X4545

ULF Wiring Schematic for the E53 with Boardmonitor

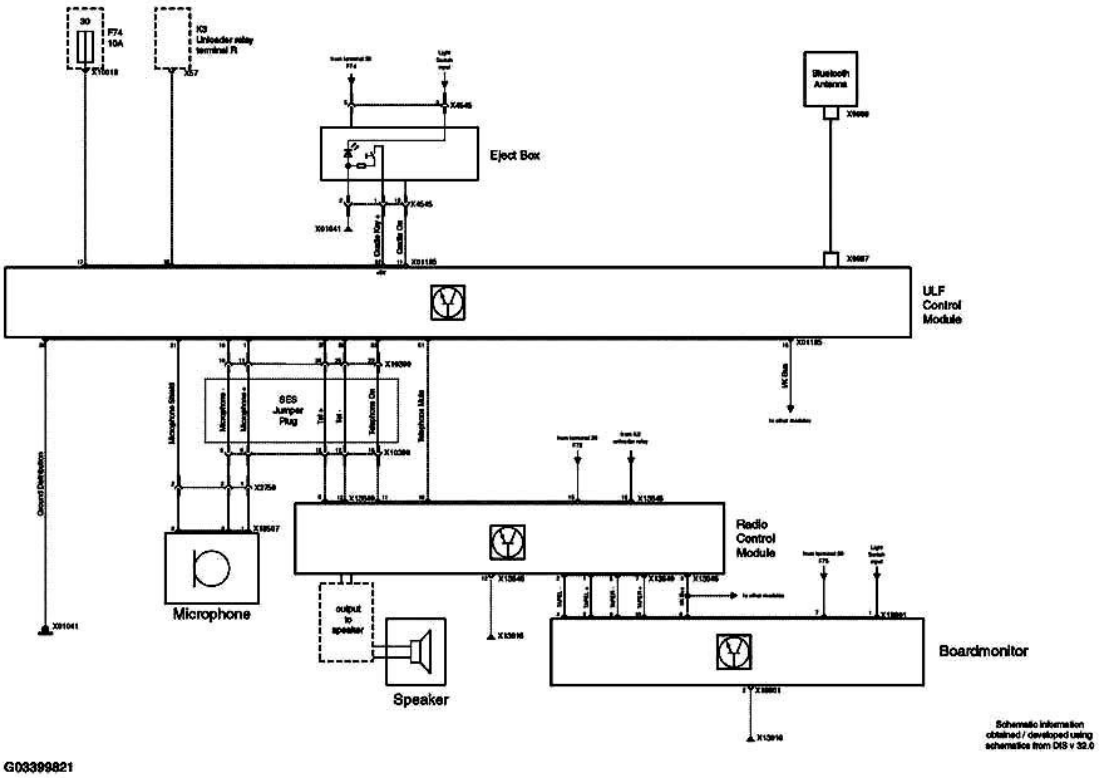


Fig. 16: ULF Wiring Schematic For E53 With Boardmonitor
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Wiring Schematic for the E53 with Multi Information Display

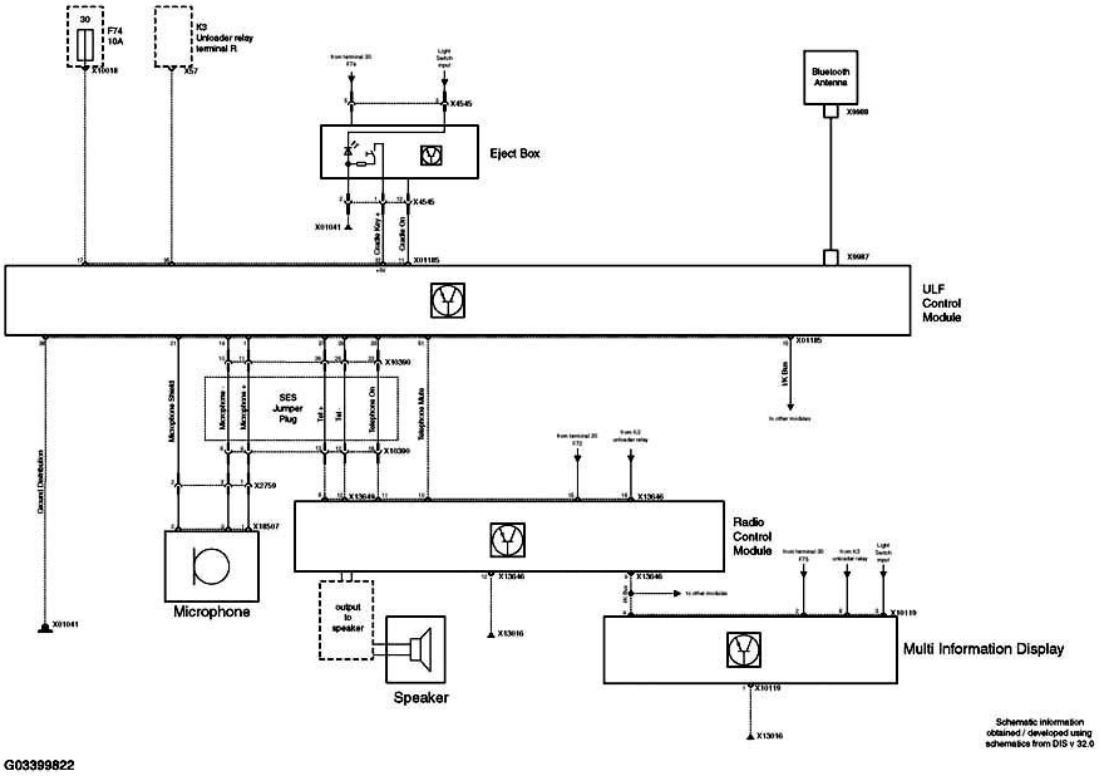


Fig. 17: ULF Wiring Schematic For E53 With MULTI Information Display
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Wiring Schematic for the E39 with Boardmonitor

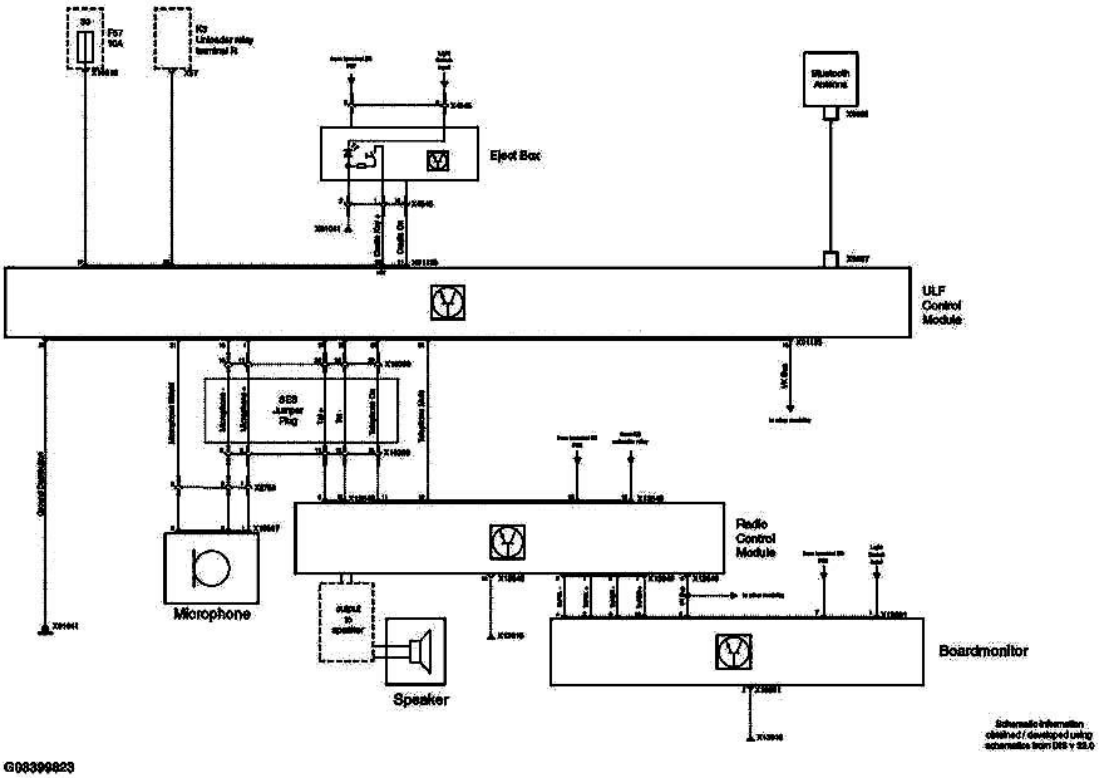


Fig. 18: ULF Wiring Schematic For E39 With Boardmonitor
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Wiring Schematic for the E39 with Multi Information Display

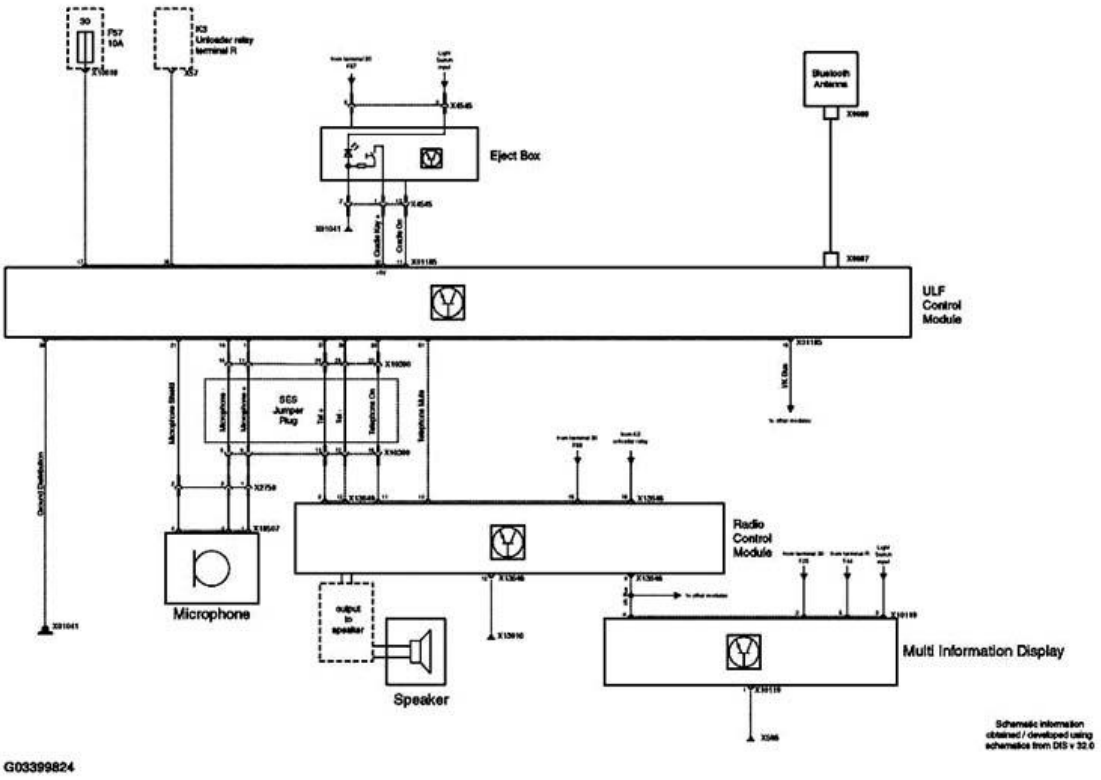


Fig. 19: ULF Wiring Schematic For E39 With Multi Information Display
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Wiring Schematic for the E46 with Boardmonitor

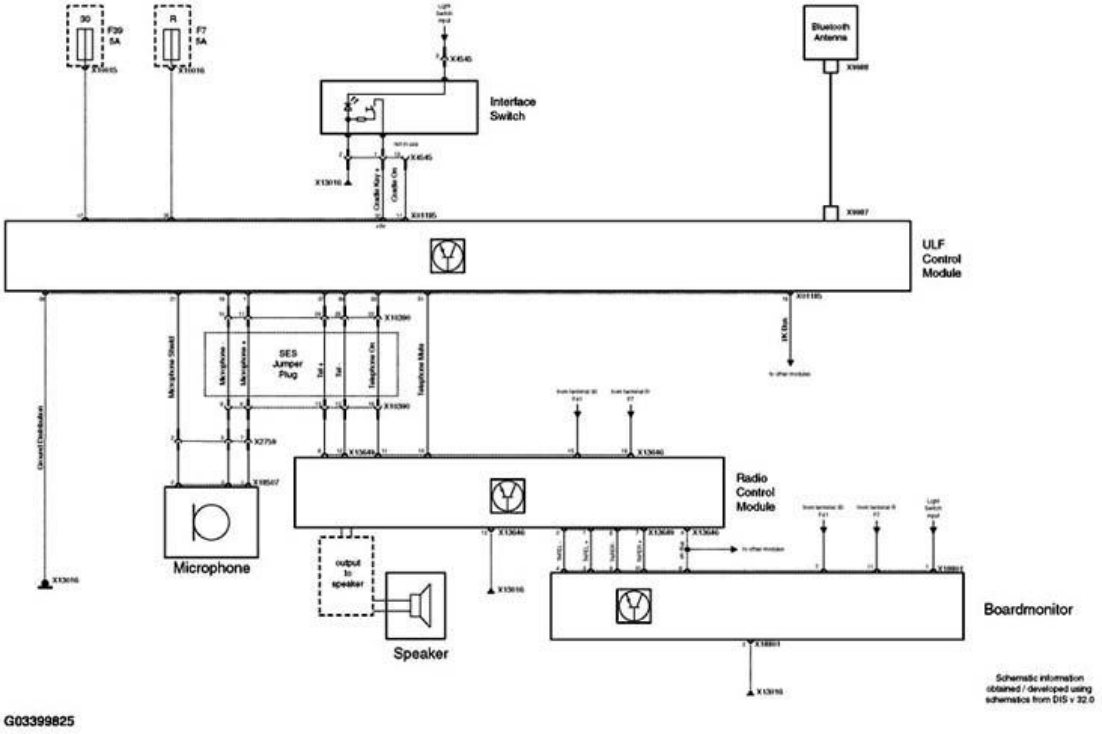


Fig. 20: ULF Wiring Schematic For E46 With Boardmonitor
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Wiring Schematic for the E46 without the Boardmonitor

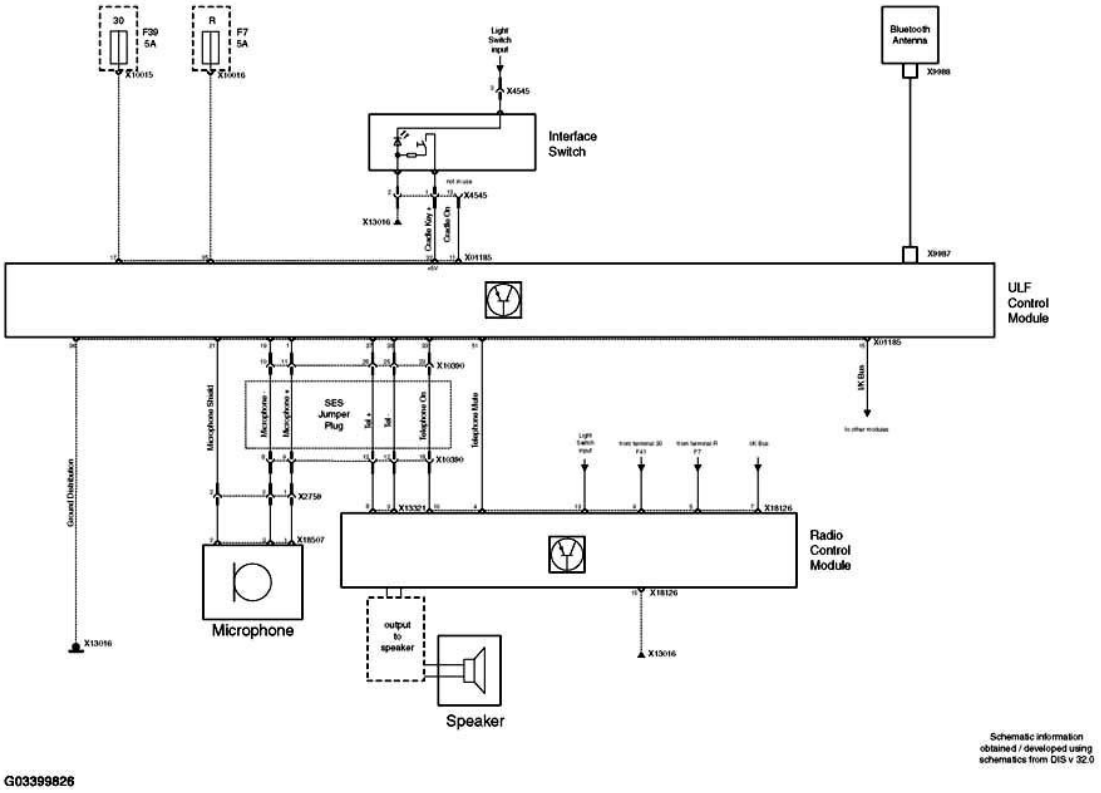


Fig. 21: ULF Wiring Schematic For E46 Without Boardmonitor
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Body - Repair

4100 BODY

41 0 0 CONTENTS OF BODY, GENERAL

General Information

- **QUALITY STANDARD**
- **WORKSHOP EQUIPMENT**

Safety regulations

- **SAFETY AT WORK**
- **INFORMATION ON HAZARDS**
- Information on **VEHICLE PROTECTION**

Materials

- **MATERIALS SCIENCE**
- **USE OF MATERIALS** in outer skin
- **EXPENDABLE MATERIALS**

Handling components after an accident

- **ELECTRICAL SYSTEM** , electronics and optical fibre
- **Passive safety** See **4100... HANDLING AIRBAGS AND RESTRAINT SYSTEMS** and **4100... AFGS (ACTIVE PEDESTRIAN PROTECTION) PROCEDURE AFTER ACCIDENT**
- Vehicles with Hybrid drive
- **CHASSIS, SUSPENSION AND STEERING**
- Folding roof

Body dimensions

- **FRAME DIMENSIONS**
- **GAP DIMENSIONS**

Cavity sealing

- **Installation of shaped parts** See **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (EXPANDED)**; **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (NOT EXPANDED)** or **4100... INSTALLING A CAVITY SEALING WITH 2-COMPONENT PU CAVITY FOAM**

- **Position of shaped parts** See **4100... POSITION OF SHAPED PARTS FOR CAVITY SEALING**

Vehicle identification number

- **VEHICLE IDENTIFICATION NUMBER, GENERAL**
- **Stamping vehicle identification number** See **4100... STAMPING VEHICLE IDENTIFICATION NUMBER (NEEDLE STAMPING UNIT)**

Repair techniques

- **REPAIR STAGE 1** All repairs that only provide for replacement of screwed/bolted components and planishing operations.
- **REPAIR STAGE 2** Repairs that are carried out by bonding and riveting without the use of a straightening bench.
- **REPAIR STAGE 3** Repairs that are carried out by bonding and riveting with the use of a straightening bench or welding.

Corrosion protection

- **GENERAL INFORMATION**

Paintwork

- **GENERAL INFORMATION**
- **INFORMATION/WARNING LABELS**
- **Sectional painting** See **9900... PAINTWORK (2 AND 3 COATS)** or **9900... MISCELLANEOUS PAINTING**

41 00... AFGS (ACTIVE PEDESTRIAN PROTECTION) PROCEDURE AFTER ACCIDENT

The AFGS system consists of the following components:

- *Satellites (control unit + sensor)*
  - Sensors, inside, bumper trim, left/middle/right
  - ACSM control unit (Crash Safety Module)
- *Cables and connectors*
- *Engine compartment lid hinges*
  - Actuator
  - Engine compartment lid hinge
- *Engine compartment lid catch*
  - Catch, engine compartment lid
  - Catch, upper section (striker)

In case of a frontal or side collision in the area of the engine compartment lid and/or the A-pillars, check the following components:

Satellites (control unit + sensor)

- Procedure
  - Read fault memory
  - Disconnect battery and observe waiting period
  - Rectify faults
  - Reconnect battery and observe waiting period
  - Delete fault memory
  - Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. interior lights, radio, etc.)
  - Switch on ignition.
  - Clear fault memory and if necessary rectify faults

Cables and connectors

- Procedure
  - Check cables and connectors for damage, replace if necessary.

Procedure if AFGS was activated

Engine compartment lid hinges

- Replace **ACTUATORS**
- **CHECK BOTH HINGES OF THE ENGINE COMPARTMENT LID AND REPLACE IF NECESSARY**

Engine compartment lid catch

- **Replace both engine compartment lid catches** See **5123101 REMOVING AND INSTALLING/REPLACING LEFT ACTIVE ENGINE COMPARTMENT LID LOCK** and **5123111 REMOVING AND INSTALLING/REPLACING RIGHT ACTIVE ENGINE COMPARTMENT LID LOCK**
- Check the top sections of the catch and replace if necessary.

Procedure if AFGS was not activated

Engine compartment lid hinges

- Check **BOTH HINGES OF THE ENGINE COMPARTMENT LID** and replace if necessary
- Only if the hinges are faulty, replace the **ACTUATOR** .

Engine compartment lid catch

- Check **BOTH ENGINE COMPARTMENT LID CATCHES** and replace if necessary.
- Check the top section of the catch and replace if necessary.

41 00... BLIND RIVETS

1.0 Recommended tools and equipment

- Blind riveting tongs
- Rivet head extension

Setting blind rivets

- Refer to repair instruction for rivet size.
- Position bore holes for blind rivets as specified in repair instruction. If necessary, carry over the positions of the rivets to the new component.
- Drill holes (0.2 mm bigger than the outside diameter of the rivet. Example 4.2 mm dia. for 4 mm rivet and 6.7 mm dia. for 6.5 mm rivet).
- Deburr holes.
- **APPLY ADHESIVE** .
- Insert blind rivet. If necessary, remove adhesive that has emerged.

  Position blind rivet tool vertically. Use rivet head extension if accessibility is poor.

- Rivet blind rivet with blind rivet tool. In the meantime clean rivet head if fouled with adhesive.

  Risk of damage to rivet head by penetrating adhesive.

- Seal blind rivets with **SEALANT D1** (risk of corrosion).
- Seal cavities after painting vehicle with **CAVITY SEALANT** (risk of corrosion).

41 00... BONDING ALUMINIUM ON STEEL

IMPORTANT: Conform with safety regulations See 4100... SAFETY AT WORK and 4100... INFORMATION ON HAZARDS!

Overview of topics

1. Equipment
2. Preparing the surface
3. Bonding coat
4. Hardening times
5. Subsequent treatment

1.0 Equipment

- Sandpaper
- **CLEANING AGENT R1**
- **4100... NOTES ON ADHESIVE K1**
- **CARTRIDGE GUN**

2.0 Preparation of surface

2.1 Steel surface

- Grind bonding surface with a metallic bright finish for better adhesion.
- Clean bonding surfaces with cleaning agent R1.
- Allow cleaned surfaces to dry for approx. 5 minutes.

  Bonding surfaces must be completely dry.

2.2 Aluminium surface

2.2.1 Procedure for new aluminium component

- **Do not grind/sand bonding surfaces.**

  Clean bonding surfaces with cleaning agent R1.

- Allow cleaned surfaces to dry for approx. 5 minutes.

  Bonding surfaces must be completely dry.

2.2.2 Procedure for previously bonded aluminium component

- Sand off adhesive residue and layers of paint.
- Clean bonding surfaces with cleaning agent R1.
- Allow cleaned surfaces to dry for approx. 5 minutes.

  Bonding surfaces must be completely dry.

- Flame spray the surface:
- Go over the bonding surfaces slowly with the flame.
- Avoid flaming with the blue part of the flame.
- Condensation water appears on the area that is still uncoated. The condensation water in the line of the flame must evaporate completely.
- Directly after flaming, coat the still hot bonding surfaces (approx. 50°C) with primer.
- Apply primer:

- Apply primer with a brush, cotton or similar item.
- Allow the coated surfaces to dry for approx. 5 minutes.

3.0 Adhesive application

- Processing temperature of glue cartridge 18°C - 30°C.
- Object temperature, vehicle and new parts, min. 15°C.
- Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.
- After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.
- Join components and secure in position.
- Remove excess adhesive. Do not use solvent cleaning agents.

3.1 Bonding in conjunction with repair elements (expanding elements)

- Repair elements are special shaped parts to connect new parts with the body. e.g. Partial replacement of engine support.
- The repair elements will spread when a special bolt is screwed in. The repair elements will thereby connect flush to the corresponding profile shape.
- Ensure there is a sufficient gap between the adhesive and the threads for the expander screws (approx. 10-15 mm).
- Spread adhesive over the repair element with a spatula up to the height of the ridges.

3.2 Bonding in conjunction with rivets

- Make sure that the blind rivet wrench comes in as little contact with the adhesive as possible.

  There is a risk of damaging the exchangeable head of the rivet wrench due to emerged adhesive.

- The standard punch rivets are always replaced by blind rivets in conjunction with bonding.
- The required strength of the connection is only achieved through a combination of bonding and riveting.

4.0 Hardening times

- Refer to **NOTES REGARDING ADHESIVE K1**

5.0 Subsequent treatment

- Protect the repair area with cavity sealant.

41 00... BONDING ON PAINTED SURFACES

IMPORTANT: Conform with safety regulations See 4100... SAFETY AT WORK and 4100... INFORMATION ON HAZARDS!

Overview of topics

1. Equipment
2. Expiry date of consumables
3. Preparation of surface
4. Bonding coat
5. Hardening times
6. Subsequent treatment
7. Disposing of adhesive

1.0 Equipment

- **CLEANER R1**
- Adhesive as specified in repair instructions
- **CARTRIDGE GUN**

2.0 Expiry date of consumables

- Glue cartridge is marked with a date.
- Do not use adhesive after this date.

3.0 Preparation of surface

3.1 Preparation of surface on vehicle

- Establish a level bonding surface (e.g. grinding). Do not remove primer entirely.
- **Do not grind/sand bonding surfaces.**
- If necessary, pre-clean bonding surfaces with cavity sealing wax remover.

  Clean bonding surfaces with cleaning agent R1.

- Allow cleaned surfaces to dry for approx. 5 minutes.

  Bonding surfaces must be completely dry.

3.2 Preparation of surface on new part

- Do not remove primer.
- **Do not grind/sand bonding surfaces.**
- Clean bonding surfaces with cleaning agent R1.

Bonding surfaces must be completely dry.

4.0 Adhesive application

- Processing temperature of glue cartridge 18°C - 30°C.
- Object temperature, vehicle and new parts, min. 15°C.
- Do not use any compressed-air-operated cartridge guns.
- Insert glue cartridge in cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube.
- Allow approx. 10 cm of mixed adhesive to emerge and then apply the mixed adhesive first on one side of the bonding surface.
- After applying the adhesive, check whether an adhesive component has emerged at the back of the cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.
- Potlife of mixed adhesive approx. 2 hours. A change of mixer is only necessary if over a period of 30 minutes no material has flowed through the mixer.
- Join components and secure in position.
- Remove excess adhesive.

5.0 Hardening times

- **Do not move the vehicle before the adhesive has hardened.**

  Check the degree of hardness of the adhesive with a fingernail.

  If the adhesive cannot be pressed in any further with a fingernail, the vehicle may be moved (without engine force) for further processing applications (e.g. painting).

- Vehicle **strength for driving applications** is achieved after:

  48 hours at min. 15°C object temperature (corresponding to approx. 18°C room temperature).

  or 1 hour in the spray booth (spray booth temperature 80°C/object temperature 60°C).

- When using radiant heaters, make sure that the object temperature does not exceed 85°C.

  Excessively high temperatures will destroy the adhesive.

- Remove contamination caused by adhesive residue immediately.

  Hardened adhesive can only be removed mechanically.

6.0 Subsequent treatment

- Reseal areas which are cavity-sealed as standard.

7.0 Disposing of adhesive

- Hardened adhesive is disposed of as normal waste.
- Empty glue cartridges are disposed of as normal waste.
- Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00... BONDING STEEL ON STEEL

IMPORTANT: Conform with safety regulations See 4100... SAFETY AT WORK and 4100... INFORMATION ON HAZARDS!

Overview of topics

1. Equipment
2. Preparing the surface
3. Bonding coat
4. Hardening times
5. Subsequent treatment

1.0 Equipment

- Sandpaper
- **CLEANING AGENT R1**
- **ADHESIVE K1**
- **CARTRIDGE GUN**

2.0 Surface preparation

- For better adhesion, remove oxide film and paint from the adhesive areas with a stainless steel wire brush or special sandpaper.
- Clean bonding surfaces with cleaning agent R1.
- Allow cleaned surfaces to dry for approx. 5 minutes.

  Bonding surfaces must be completely dry.

3.0 Adhesive application

- Processing temperature of glue cartridge 18°C - 30°C.
- Object temperature, vehicle and new parts, min. 15°C.

- After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.
- Join components and secure in position.
- Remove excess adhesive. Do not use solvent cleaning agents.

4.0 Hardening times

- Refer to **NOTES REGARDING ADHESIVE K1**

5.0 Subsequent treatment of bonding surfaces

- Protect the repair area with cavity sealant.

41 00... CARRYING OVER HOLE PATTERN

When replacing a body component, it is necessary to carry over the hole pattern from the existing body to the new component.

The following pictures are a schematic representation of carrying over the hole pattern on the example of the front wheel arch.

Necessary preliminary tasks

Adjust new part to fit with straightening attachment.

Insert paper stencil (1) between new component (2) and engine carrier and secure with adhesive tape (3).

Carry over contour (4) of new component to stencil.

Remove new component.

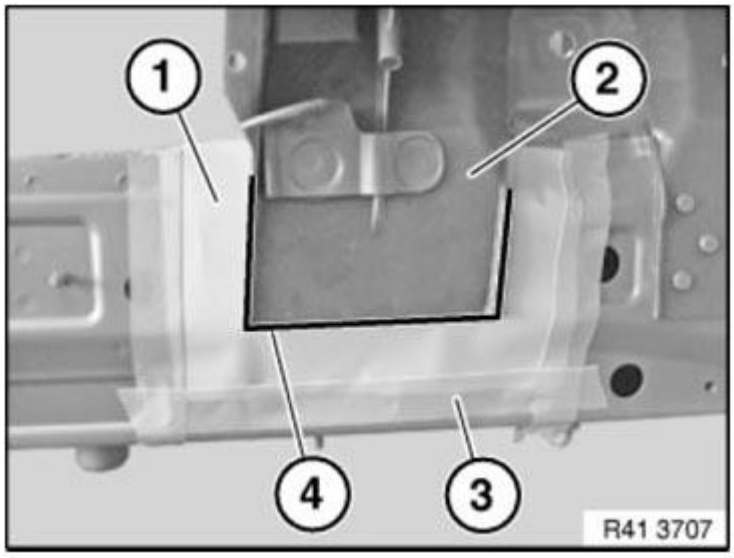


Fig. 1: Securing Paper Stencil Using Adhesive Tape
Courtesy of BMW OF NORTH AMERICA, INC.

(1) = contour of new component.

Carry over positions of holes (2) to stencil by pressing down with thumbs.

Remove stencil.

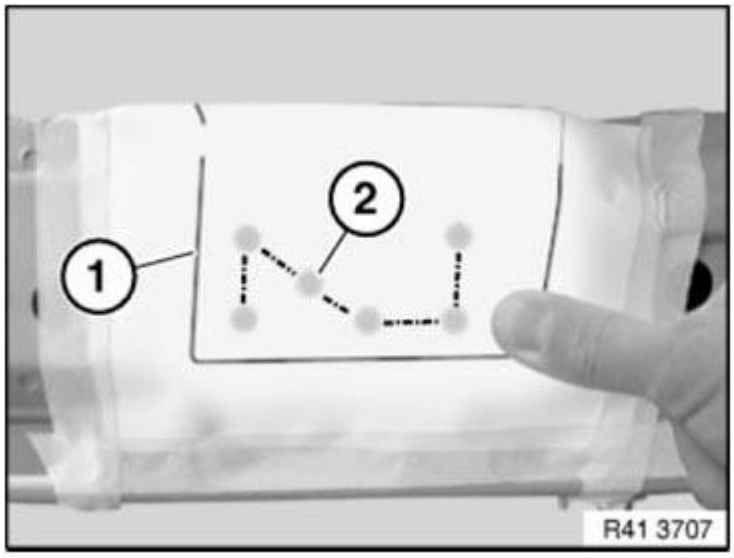


Fig. 2: Carrying Over Positions Of Holes To Stencil
Courtesy of BMW OF NORTH AMERICA, INC.

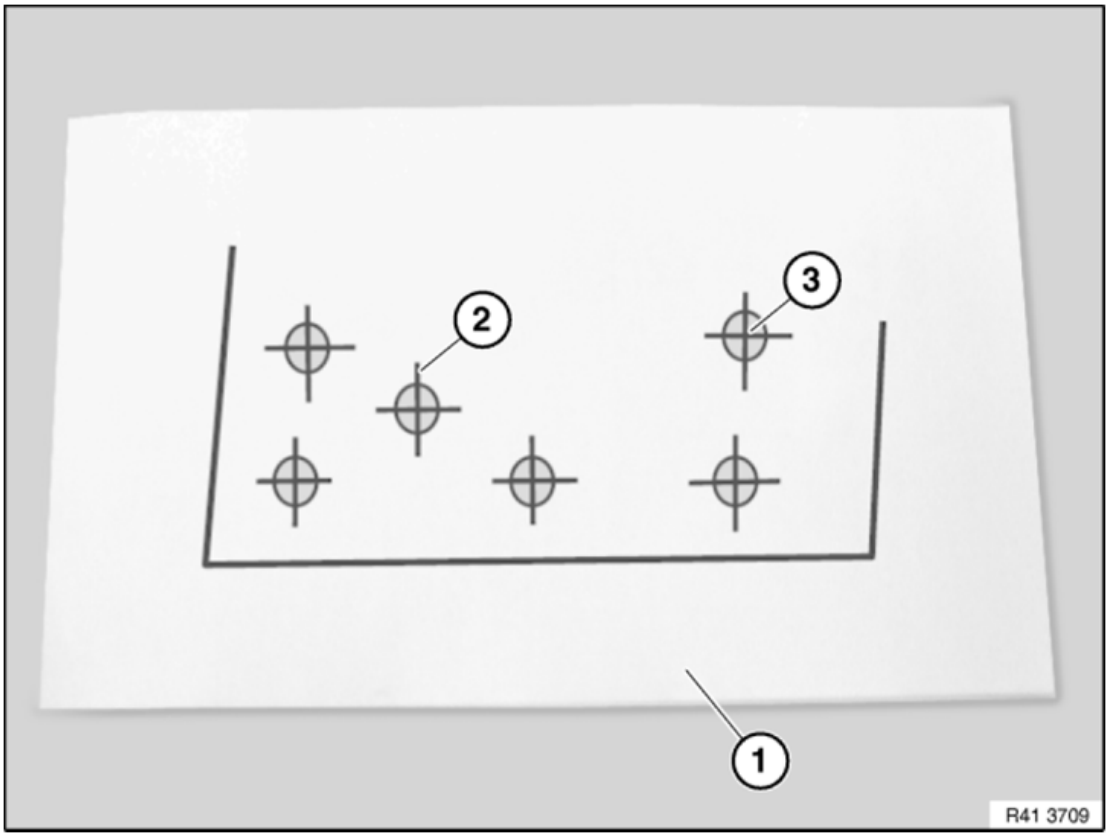


Fig. 3: Identifying Holes With Crosses And Stencil
Courtesy of BMW OF NORTH AMERICA, INC.

Lay stencil (1) on a flat surface.

Mark center points of holes with crosses (2).

Then pierce paper through center points (3) of holes with a pointed object.

Align stencil (1) according to contours (2) to inside of new component and secure with adhesive tape (3).

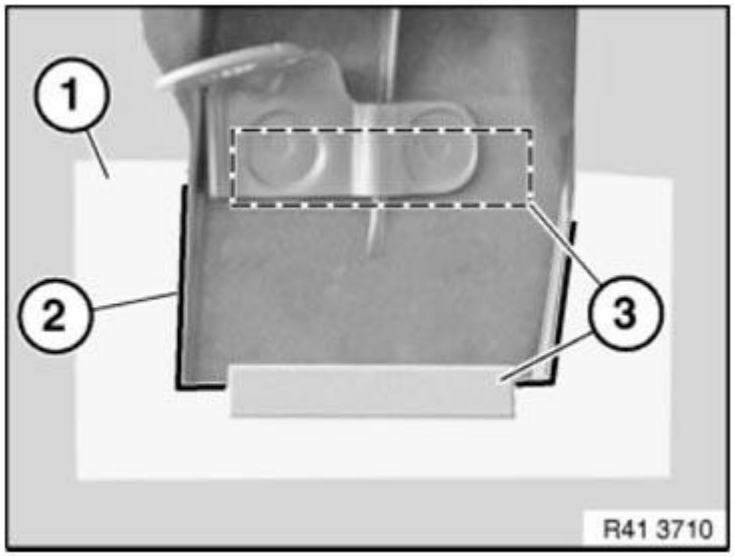


Fig. 4: Securing Stencil To Component Using Adhesive Tape
Courtesy of BMW OF NORTH AMERICA, INC.

Turn over new component.

IMPORTANT: Crosses must not be visible in this view!

Set punch marks at pierced center points (1).

Grip directly under punch marks for marking with punch.

Remove stencil (2).

Drill holes to approx. 3 - 4 mm dia. at punch marks (1).

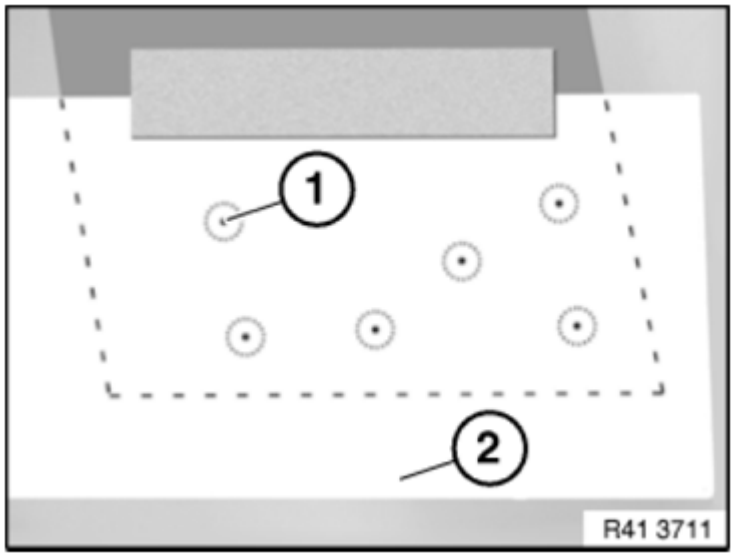


Fig. 5: Identifying Stencil And Punch Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Position new component (1) with straightening attachment on vehicle.

Drill out holes (2) to 6.7 mm dia.

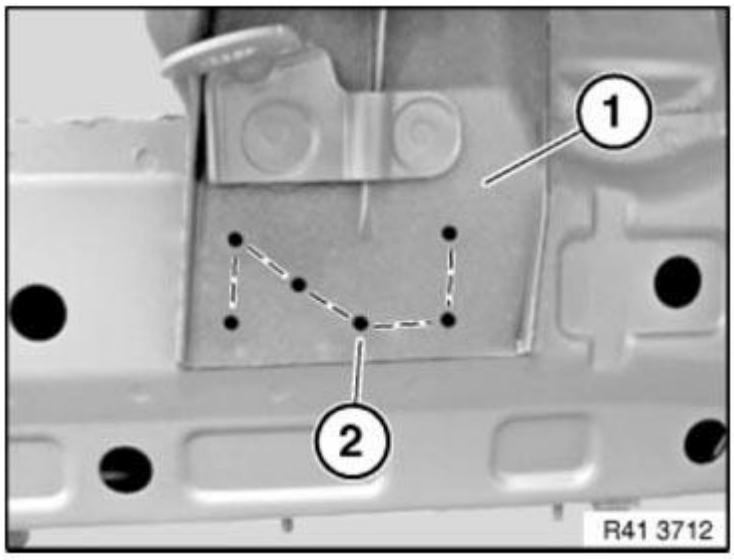


Fig. 6: Identifying Component Position And Drill Holes
Courtesy of BMW OF NORTH AMERICA, INC.

41 00... CORROSION PROTECTION

NOTE: Following repairs, the corrosion protection work already begins with the correct removal of the PVC undercoating, anti-drumming layer and seam seals.

The PRODUCTS RECOMMENDED by BMW are optimized with regard to corrosion protection.

1.0 Removing and applying sealing materials

1.1 Removing sealing materials

IMPORTANT:

- **Do not burn off PVC material (sealing compound) with a gas burner or similar or heat to temperatures above 180°C. This would generate highly corrosive hydrochloric acid and release harmful fumes.**
- **The new lining does not form a satisfactory bond with burnt PVC material which means that subsequent subsurface rust may set in.**

Remove PVC material with a rotating steel brush, or heat PVC to maximum 180°C with a hot air blower and scrape off with a spatula.

1.2 Applying sealing materials

All weld joints sealed off with body sealing compound in original state must be primed and sealed off again thoroughly after repairing. Replace damaged or removed anti-drumming layers.

NOTE: Spray gun required for body sealing compound (order no. 81 49 0 300 887).

2.0 Cavity preservation of sheet-metal parts

Carry out cavity preservation after all body repairs.

Concluding cavity preservation is the most important part of all corrosion protection measures.

Use the cavity protection spray only for smaller-scale straightening work where the parts in question are easily accessible. Use the Vaupel **PRESSURE CUP GUN** for all other repairs. Cavity protection agent is available in different container sizes.

Use the relevant probes with tubes for the different cavity areas.

Required tools can be found in the Aftersales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Shop Workshop Equipment or at www.bmwgroup-wep.com.

IMPORTANT: Incorrectly performed cavity protection can, especially in the case of steel/aluminium joints, give rise to a non-calculable product liability and safety risk.

The best repair is worth nothing if the subsequent cavity protection measures are not conscientiously carried out.

2.1 Cavity preservation of steel parts

New doors and lids must be sealed with cavity protection agent after being painted.

New sheet-metal parts or cavities, weld seams and folds formed by new sheet-metal parts must be sealed with cavity protection agent after being painted.

The cavities affected must be sealed with cavity protection agent after all straightening work.

2.2 Cavity preservation of aluminium parts

New doors, lids and side panels made of aluminium are not sealed with cavity protection agent.

After all straightening work on aluminium components, the cavities affected must be sealed with cavity protection agent after being painted.

After all welding work (E52 only) on aluminium components, the cavities affected must be sealed with cavity protection agent after being painted.

Cavities, seams and folds formed from new sheet-metal parts must be sealed with cavity protection agent after being painted.

41 00... EMC SCREWS

(EMC = Electro-Magnetic Compatibility)

1. Purpose

- **EMC SCREWS** are used in the Bonding/Riveting repair method to re-establish bonding transition.
- They assume the function of welded joints, which ensure transition to ground between the individual components.
- The punch or blind rivets used in the repair do not guarantee permanent bonding transition between the individual components!
- The EMC screws ensure the operational reliability and safety of the electrical/electronic components following repairs!

2. Procedure, aluminium front end

- Each welded joint which is opened must be replaced by at least 2 EMC screws.
- Position the 2 screws on the flange on which the weld seam has been separated. In the event of partial replacement, position the screws in the area of the component overlap.
- In the case of repairs using partial replacement, the number of EMC screws described in the repair instructions must be fitted.
- Drill holes to a diameter of 4.2 mm and insert screws.
- Seal EMC screws with PU sealing material (risk of corrosion).

3. Procedure, steel body

- Install the number of EMC screws described in the repair instructions.
- Drill holes to a diameter of 4.2 mm and insert screws.
- Seal EMC screws with PU sealing material (risk of corrosion).

41 14 021 FILLING BULKHEAD CROSS-MEMBER WITH FOAM

For acoustic insulation reasons insulating foam is applied to the finish-painted bodyshell in the bulkhead cross-member area.

A 2-component PU cavity foam is used.

Sourcing reference for cavity foam, refer to BMW Parts Department.

Observe **SAFETY AND APPLICATION INSTRUCTIONS** .

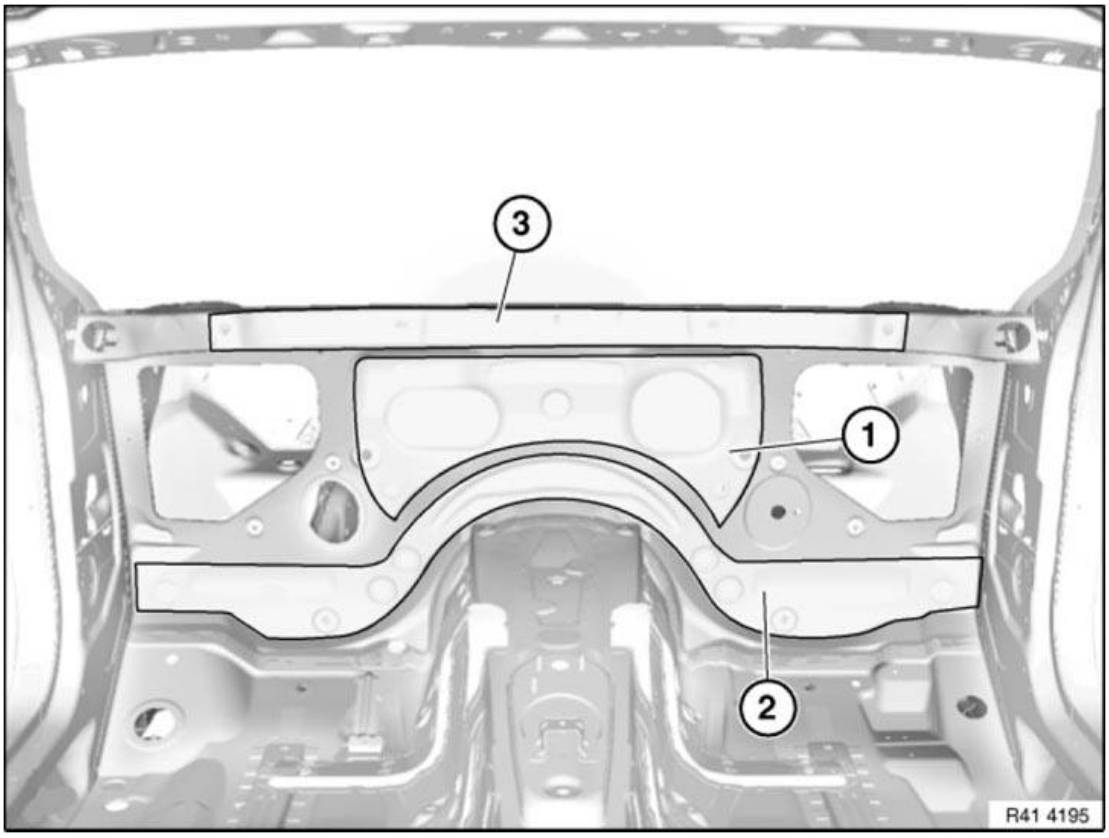


Fig. 7: Identifying Seal Plugs Of Cavities
Courtesy of BMW OF NORTH AMERICA, INC.

Remove seal plugs of cavities 1 to 3 and fill cavities with foam.

In so doing, insert spray pipe into bores and slowly pull out during the spraying operation.

To perform the operation, it may be necessary to lengthen the spray pipe.

IMPORTANT: Empty the can within 8 minutes.

Follow manufacturer's safety instructions.

41 00... FRAME ALIGNMENT CONTROL DIMENSIONS, BODY

Dimensions in mm.

Measurement tolerances:

- < or = 1000 mm ± 1.5 mm
- > or = 1000 mm ± 2.5 mm

The control points shown serve to check the body and the straightening attachment.

The specified dimensions/measurements always refer to the center point of the bore/screw.

Underbody view 1

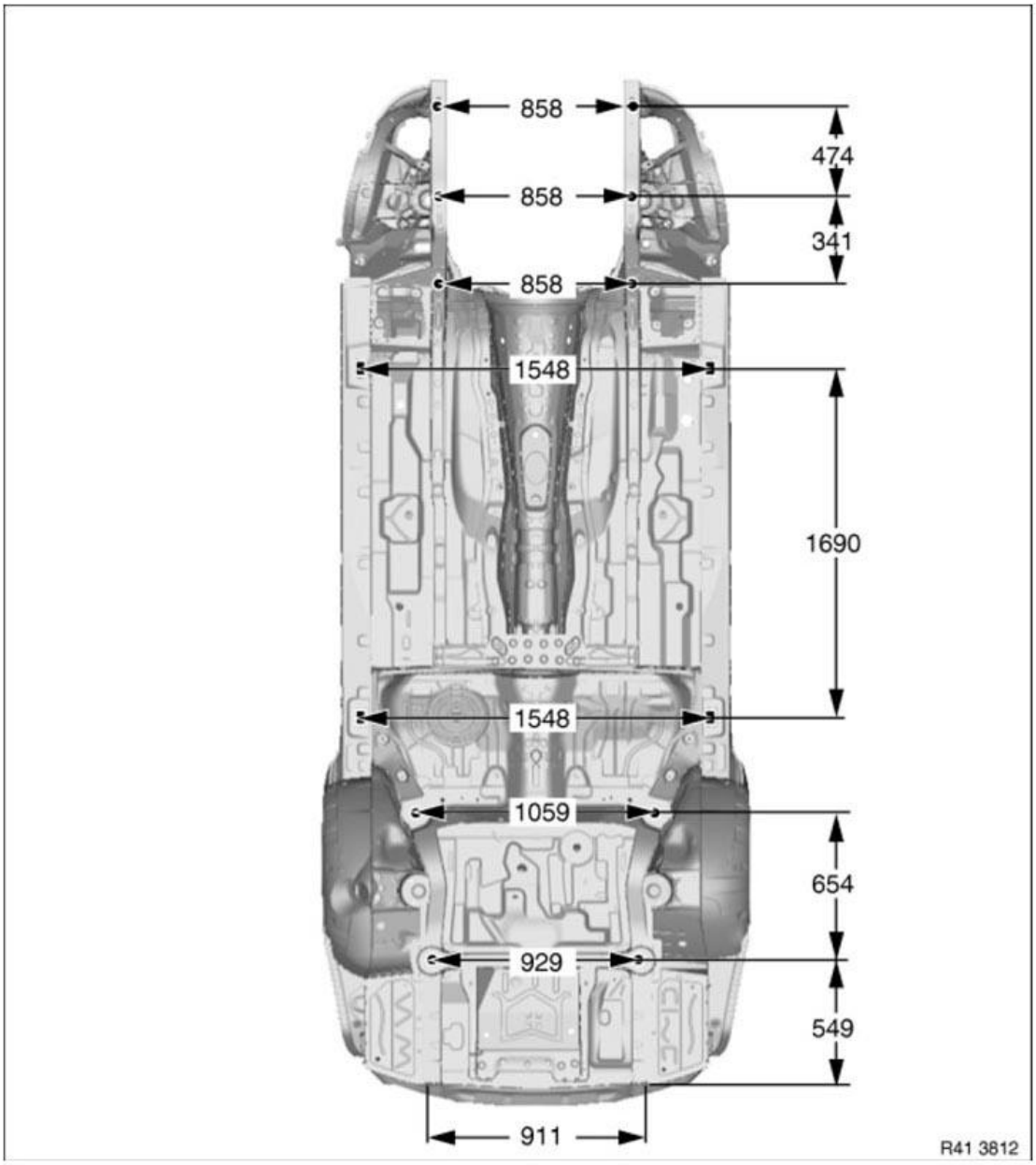


Fig. 8: Identifying Frame Alignment Control Dimensions, Body - Underbody View 1
Courtesy of BMW OF NORTH AMERICA, INC.

Underbody view 2

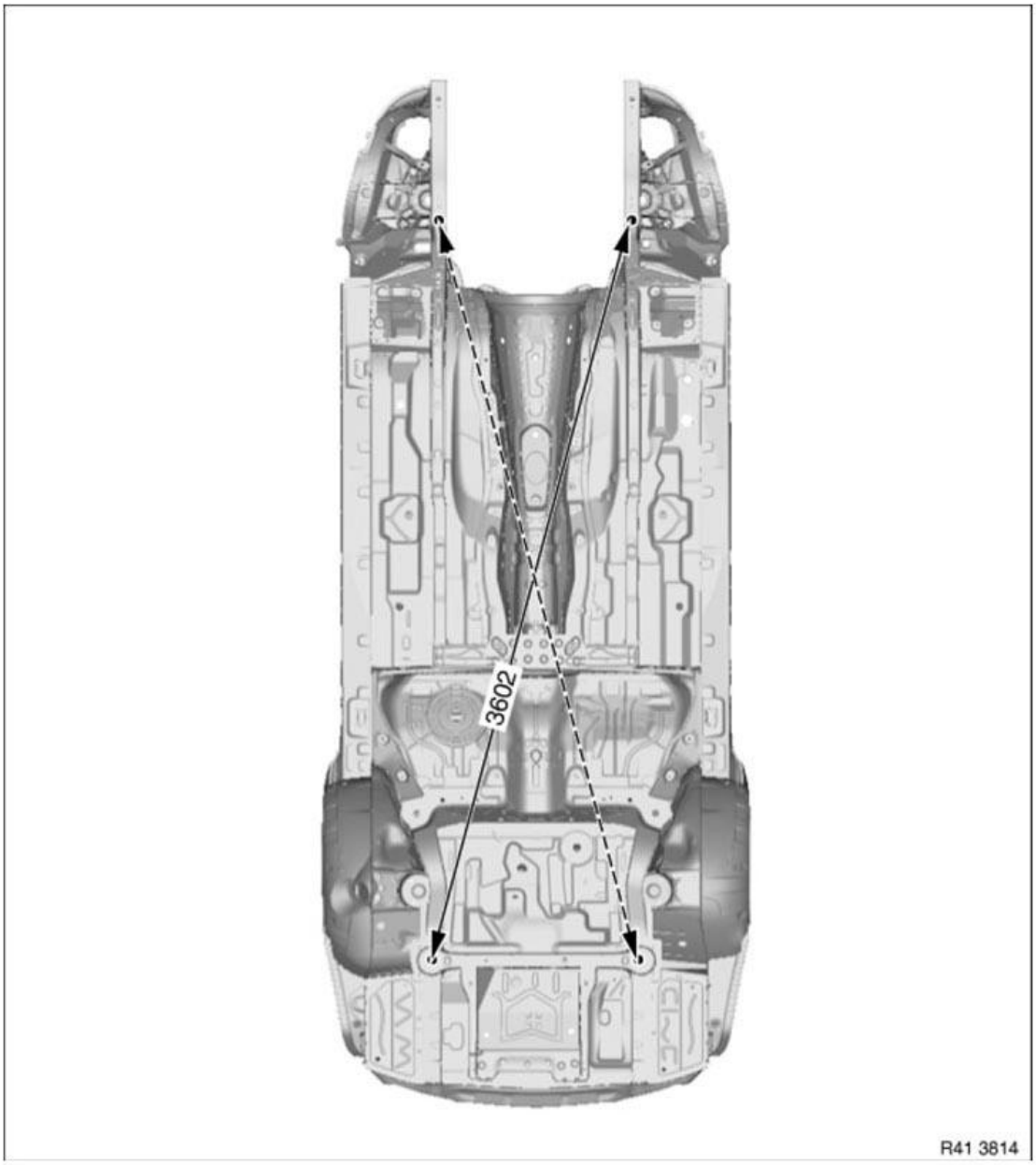


Fig. 9: Identifying Frame Alignment Control Dimensions, Body - Underbody View 2
Courtesy of BMW OF NORTH AMERICA, INC.

Top view, front end

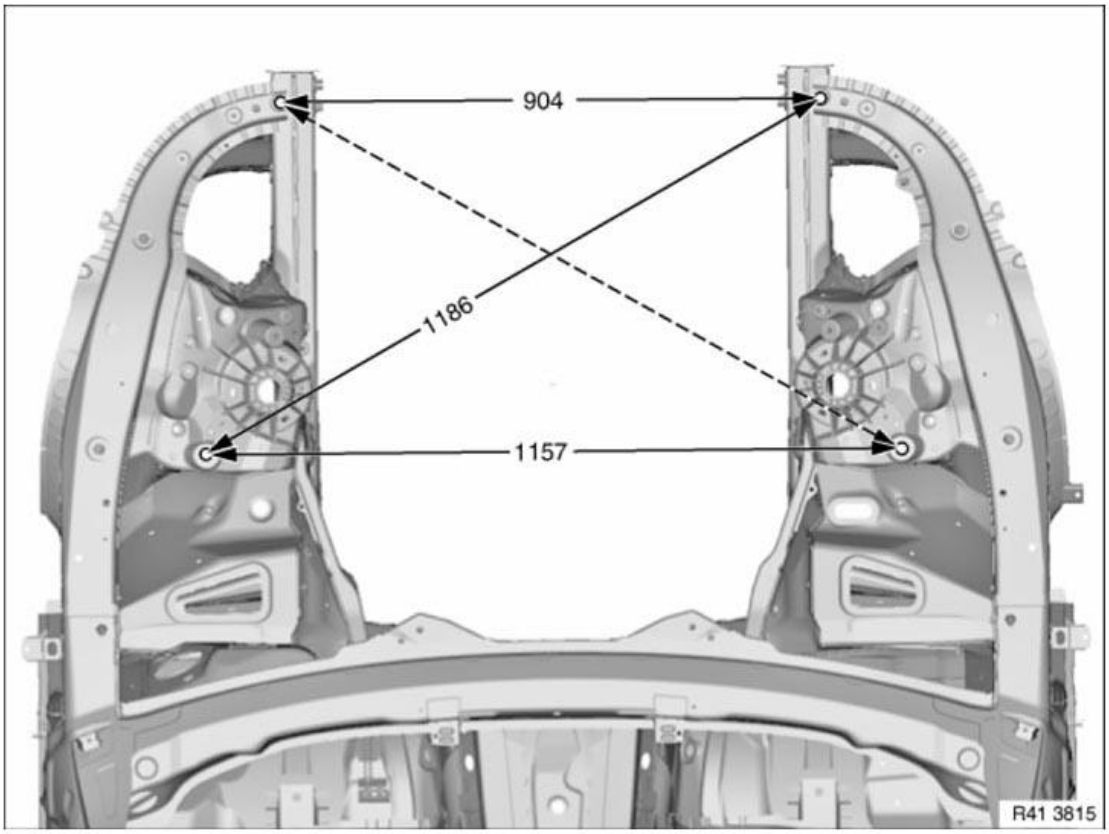


Fig. 10: Identifying Frame Alignment Control Dimensions, Body - Top View, Front End
Courtesy of BMW OF NORTH AMERICA, INC.

The specified dimensions refer to removed assemblies.

View, B-pillar

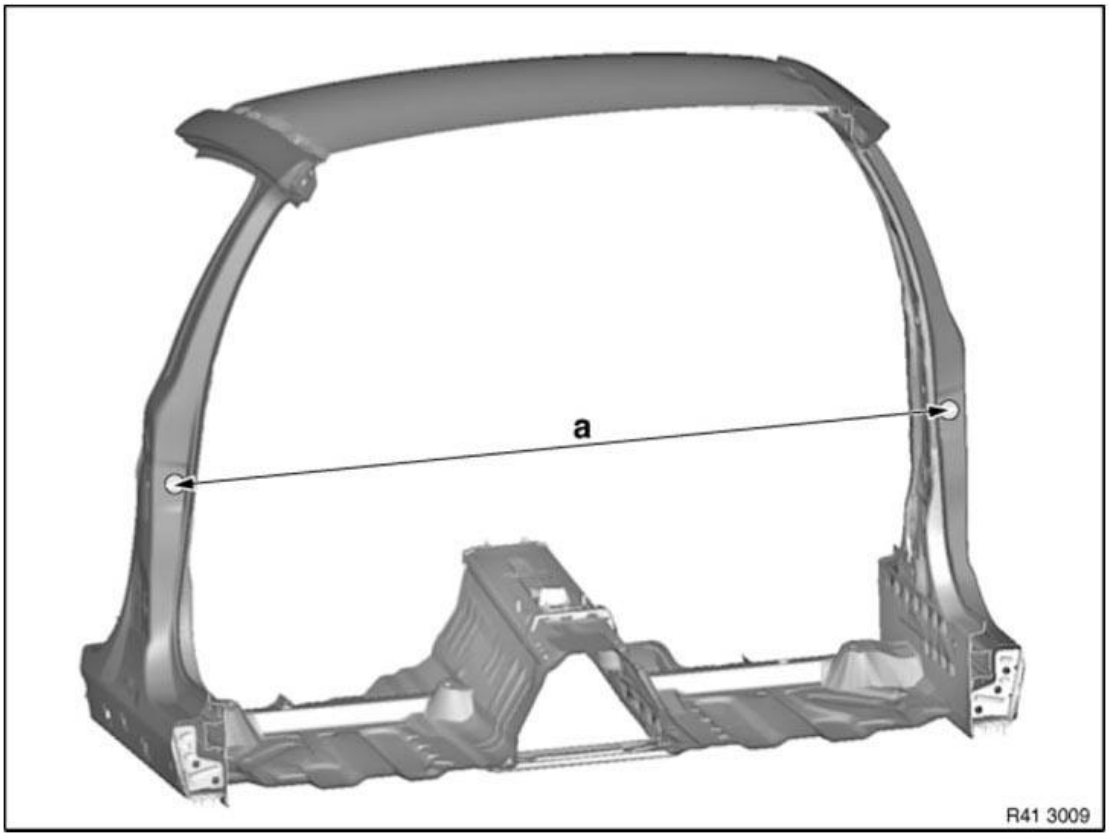


Fig. 11: Identifying Frame Alignment Control Dimensions, Body - B-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

Measurement a=1634 mm between screw-on points of door brakes.

41 00... GAP DIMENSIONS, BODY

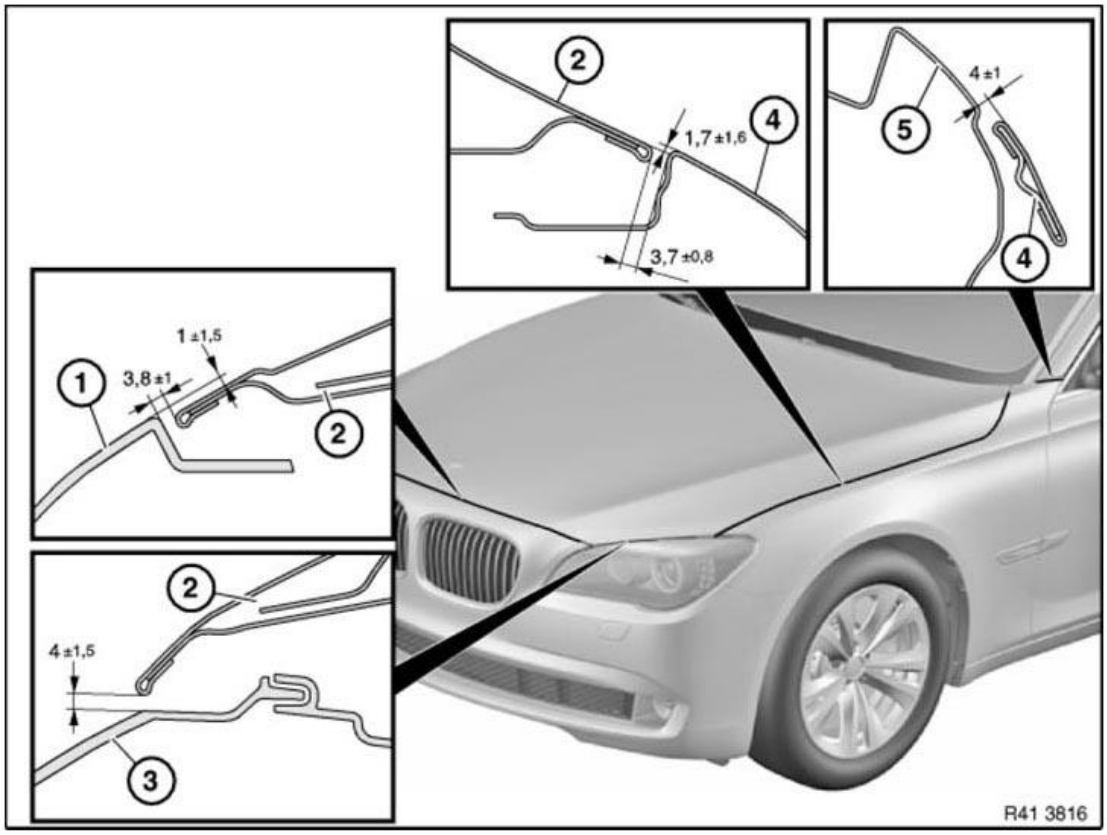
The dimensions specified in this document are applicable at an object temperature of 20°C. The aim of adjustment is to achieve a uniform gap.

Symmetry of the gaps between left and right sides of the vehicle has top priority.

The door gaps must not deviate between the front and rear gap by more than 1.0 mm.

No gap dimension are specified for components which cannot be adjusted.

Dimensions in mm



1. Panel, bumper, front
2. Front lid
3. Headlights
4. Side wall, front
5. A-pillar

Fig. 12: Identifying Body Gap Dimensions (1 Of 5)
Courtesy of BMW OF NORTH AMERICA, INC.

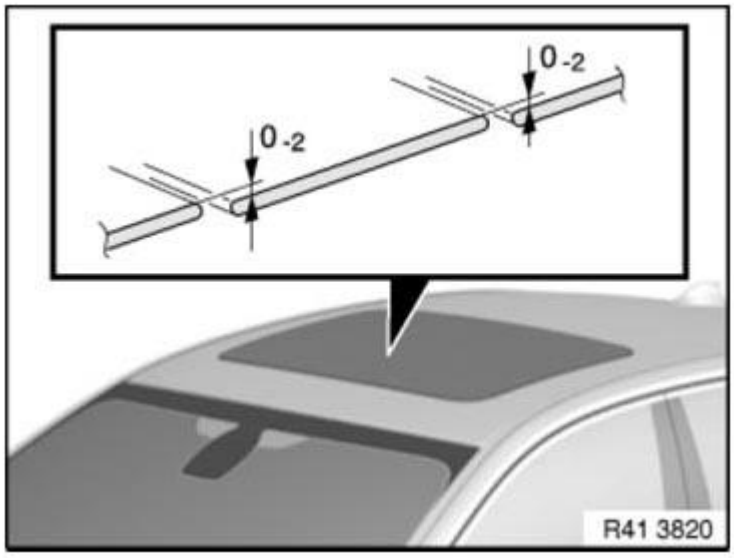
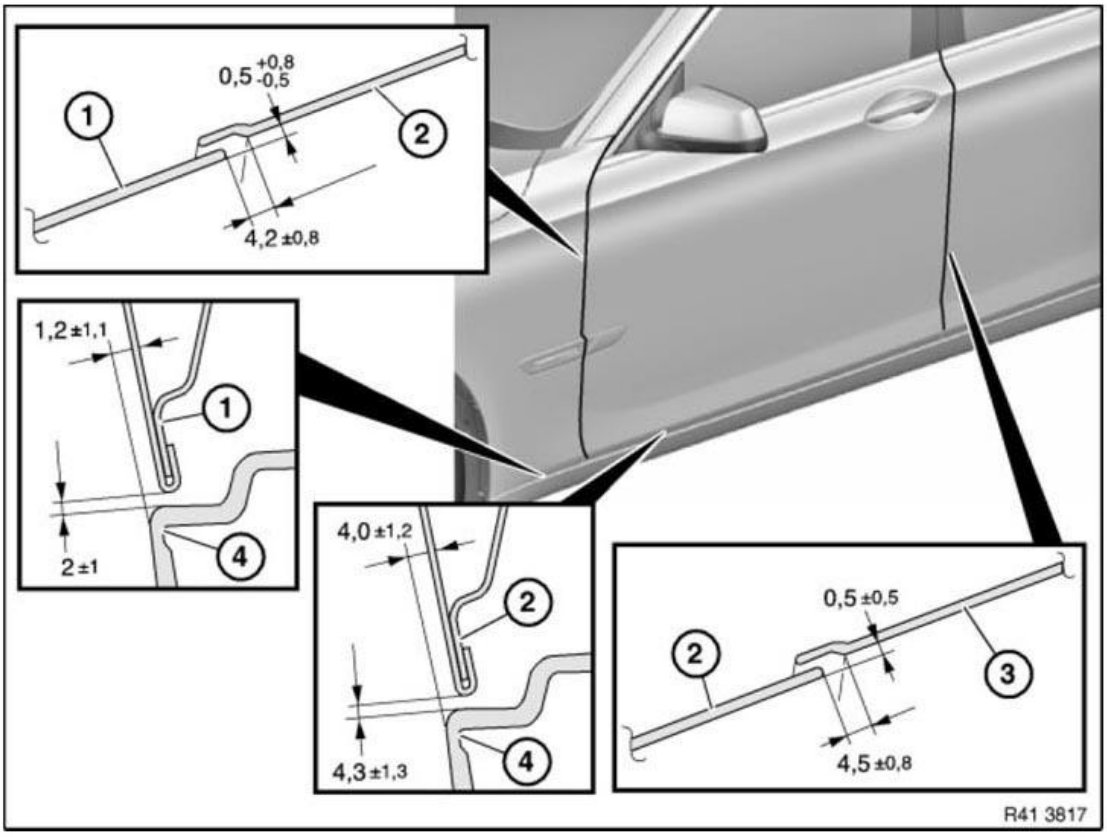
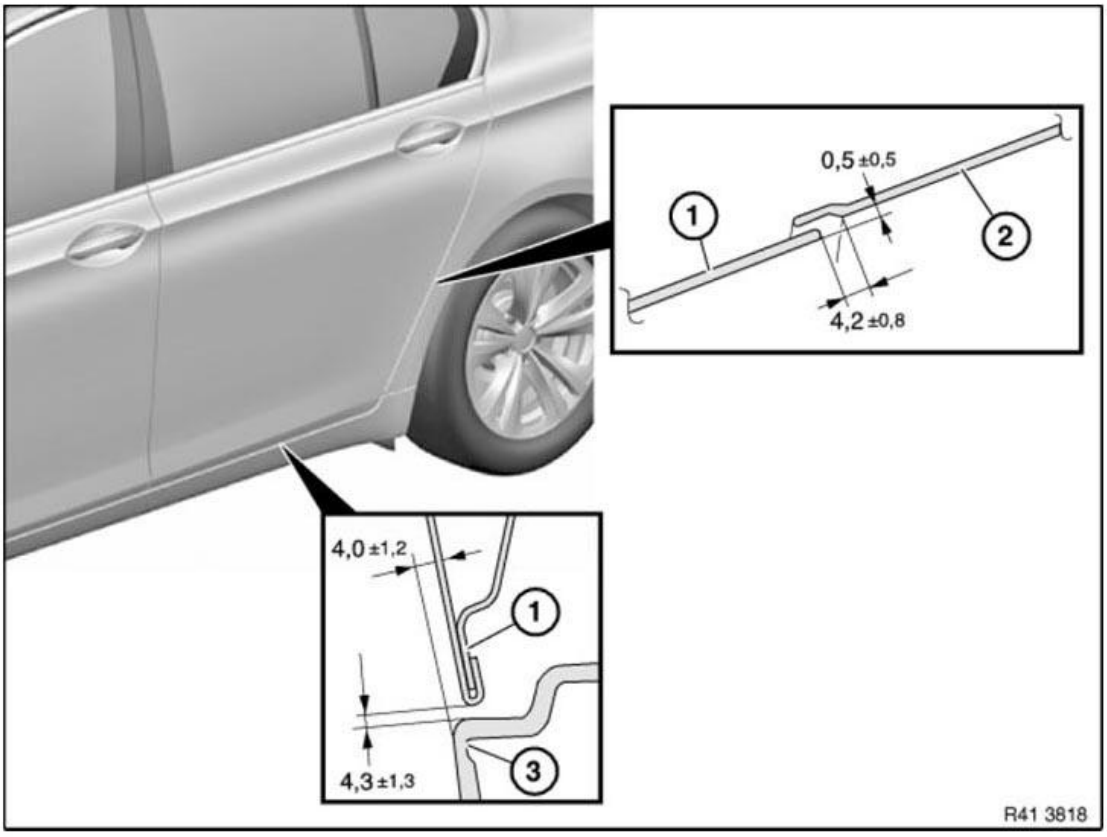


Fig. 13: Identifying Body Gap Dimensions (2 Of 5)
Courtesy of BMW OF NORTH AMERICA, INC.



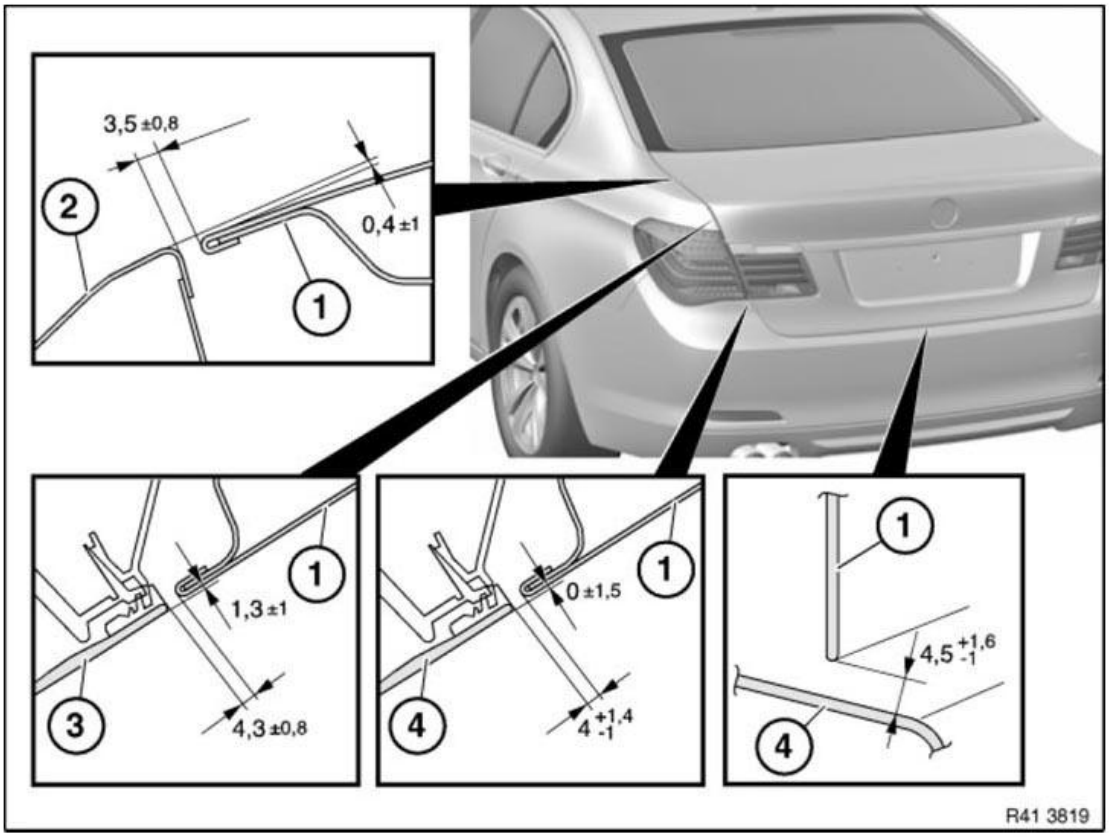
1. Side wall, front
2. Front door:
3. Rear door
4. Trim panel for entrance

Fig. 14: Identifying Body Gap Dimensions (3 Of 5)
Courtesy of BMW OF NORTH AMERICA, INC.



1. Rear door
2. Rear side panel
3. Trim panel for entrance

Fig. 15: Identifying Body Gap Dimensions (4 Of 5)
Courtesy of BMW OF NORTH AMERICA, INC.



1. Rear lid
2. Rear side panel
3. Tail light
4. Panel, bumper, rear

Fig. 16: Identifying Body Gap Dimensions (5 Of 5)
Courtesy of BMW OF NORTH AMERICA, INC.

99 00... GENERAL INSTRUCTIONS ON PAINTING

General instructions and classification of paint stages are described on the KSD-CD (notes-general information on flat rate unit data, passenger car explanation for FR specifications for painting).

For further information, please refer to BMW Painting Handbook.

The marked area serves as the starting point for painting. This area may differ from the illustration for technical painting reasons.

Touching-up areas are taken into account.

41 00... GRINDING ALUMINIUM PARTS

1.0 Recommended tools and equipment

Grinding on the outer shell:

- To carry out grinding work by hand or machine, you must use the recommended tools and equipment (refer to Service Information 5 03 03 975).

  The work area can be cleaned with conventional extractor systems (low dust concentration).

Grinding work on the structure (except Z8):

- To carry out grinding work by hand or machine, you must use the recommended tools and equipment (refer to Service Information 5 03 03 975).

  The work area can be cleaned with conventional extractor systems (low dust concentration).

Z 8 Spaceframe structure:

- To carry out machine grinding on the structure, you must use the recommended device with grinding dust extractor facility (refer to Service Information 5 01 00 532).

  The work area must be cleaned with the recommended explosion-proof extractor system (refer to Service Information 5 01 00 532).

  High dust concentration, **explosion hazard!**

2.0 Grinding outer shell and structure

Do not use any abrasives (grinding wheels, paper, etc.) which contain iron (risk of corrosion).

Always replace abrasives which have already been used to treat steel (risk of corrosion).

Use stainless steel wire brushes only (risk of corrosion).

Reduce speed of grinding machines. Excessive speeds cause a smearing effect.

Do not use coarse abrasive grains (only > or =. 80).

Do not grind notches into the material (risk of cracking).

Do not grind the material thin.

41 00... GRINDING STEEL PARTS

1.0 Recommended tools and equipment

- Tools are recommended for manual grinding work.
- Machines/equipment are recommended for machine grinding work.

2.0 Grinding outer shell and structure

Always replace abrasives which have already been used to treat aluminum (risk of corrosion).

Do not grind the material thin.

41 00... GUN FOR CAVITY SEALING

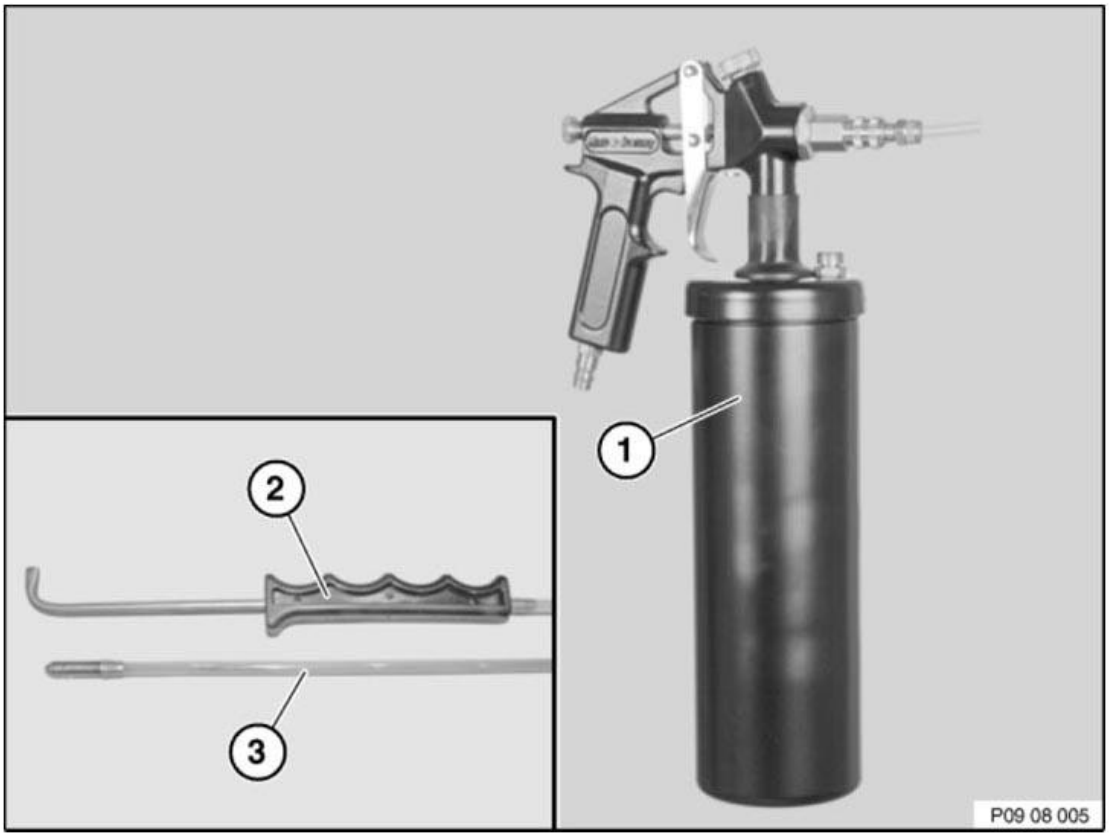


Fig. 17: Identifying Vessel Gun, Angle Nozzle And Round Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

1.0 Scope of delivery

- Owner's Handbook
- Pressure vessel gun (1) for cavity sealing
- Spray set, consisting of spray hoses: angle nozzle (2) and round spray nozzle (3)

IMPORTANT: Before start-up, read Owner's Handbook and safety instructions.

2.0 Start-up

- Open pressure vessel and introduce cavity sealant in form of a 1-litre can.

Close pressure vessel.

- Connect spray hose to quick-connect coupling.
- Connect apparatus to compressed air supply.

Working pressure 2-6 bar, max. 8 bar!

3.0 Mode of operation

NOTE: Unlike previous apparatus, it is possible here to alter the spray pattern with the air flow control screw (large knurled screw)!

- Twisting the air flow control screw in decreases the air flow and thus reduces the material spray mist.

This facilitates optimum working when preserving open components/surfaces.

- Twisting the air flow control screw out increases the air flow and thus the material spray mist (for closed cavities).
- The trigger lever has two stages.

Stage 1 - discharge of air only.

Stage 2 - discharge of air and material.

- After finishing work, press the first stage to clean the spray hose with compressed air.
- When storing, remember to twist the air flow control screw closed to prevent the material from drying out.
- Clean the gun prior to extended periods of non-use (approx. 2 weeks and upwards).
- To ensure that the spray hoses function properly, do not store the hoses coiled up e.g. in the frame side member area!

Store spray hoses stretched out.

4.0 Application examples

- Use the matching spray hoses for the different cavities or surfaces.
- Example - doors and lids:

Spray hose with angle nozzle. Reduce air flow to keep spray mist to a minimum.

- Example - frame side member:

Long spray hose with round spray nozzle. Depending on the type, increase the air flow slightly.

- Always keep the spray mist to a minimum so as to avoid fouling and bad smells.

5.0 Safety instructions

- Do not inhale spray mist.
- Use only in well ventilated rooms.
- Working pressure max. 8 bar.

41 00... HANDLING AIRBAGS AND RESTRAINT SYSTEMS

1.0 Airbags and restraint systems

- In the case of vehicles with airbags and restraint systems observe the relevant safety instructions.
- When straightening work is carried out on the body there is a risk of airbags being accidentally activated when the battery is connected.

  Because of this risk the battery negative lead must be disconnected prior to all repair work on the body.

41 00... HANDLING ELECTRICAL AND ELECTRONIC EQUIPMENT

1.0 Battery

- Explosion hazard in the vicinity of the battery during welding and grinding work. The battery must be removed.

2.0 Control units

- The following risks exist when the battery is connected:
  - Damage to control units resulting from welding work on the body or a line short circuit.
  - Accidental activation of airbags during straightening work on the body.

Because of these risks the battery negative lead must be disconnected prior to all repair work.

- Control units are designed for a temperature of 65°C. The temperatures in a spray booth do not pose any problems. If a vehicle is in the spray booth at a displayed temperature of 80°C, the actual temperature of the vehicle is = 60°C (object temperature).
- Protect control units against effects of heat >65°C (e.g. during welding and drying work with an infrared radiator or hot air blower).

3.0 Electrical wires and wiring harnesses

- Protect electrical wires and wiring harnesses against damage (e.g. during straightening and grinding work).
- Protect electrical wires and wiring harnesses against effects of heat >65°C (e.g. during welding and drying work with an infrared radiator or hot air blower).
- Do not kink electrical wires.

4.0 Optical fibres

- Follow instructions for handling optical fibres, see **ELECTRICAL SYSTEM**.

41 00... INFORMATION/WARNING LABELS

Missing or damaged information/warning labels (e.g. tire inflation pressure) must be replaced.

--> Overview of installation locations

41 00... INFORMATION ON HAZARDS

1.0 Aluminium

HAZARDS INFORMATION CHART

Hazards/effects	Measures/regulations
Repair stage 1: (replacement of bolted components, dent removal) Repair stage 2: (repairs with bonding and riveting)	- When a vehicle outer skin is ground, aluminium dust accumulates in small amounts. This dust can be removed with conventional exhaust extraction unit.
Repair stage 3: (repairs with welding) - Explosion hazard due to high concentration of fine aluminium dust. Arising e.g. during straight-through grinding of coated components in the base material and large-surface grinding of bright-finish components. - Explosion hazard due to swirling up of fine aluminium dust in cavities. Created by the necessary, thorough cleaning of machining surfaces and tools before and after machining aluminium.	- Avoid high concentration of fine aluminium dust by means of continuous extraction. - Use explosion-proof exhaust extraction unit - Do not use compressed air when cleaning the work bay. - Avoid swirling up dust when cleaning the work bay.
- Spontaneous combustion of fine aluminium dust when ignition and fire sources are drawn in. E.g.: hot debris, grinding sparks, cigarettes, etc.	- Do not operate ignition and fire sources in the intake area of exhaust extraction unit.

41 00... INFORMATION ON METAL FILLER

IMPORTANT: Note the following information before starting to apply metal filler!

- **Country-specific safety and industrial safety regulations**
- **Material safety data sheet of manufacturer**
- **Processing instructions on the packaging**

Storage

Dry at 15°C to 25°C.

Shelf life

The packaging is marked with a date.

Do not use the metal filler after this date.

Surface pre-treatment

Grind surface to a metallic bright-finish. The surface must be clean, dry and free from grease.

Clean the surface with a cleaning agent R1 and let it vent for 2-3 minutes.

Processing

The working temperature of the metal filler must be at least 18°C.

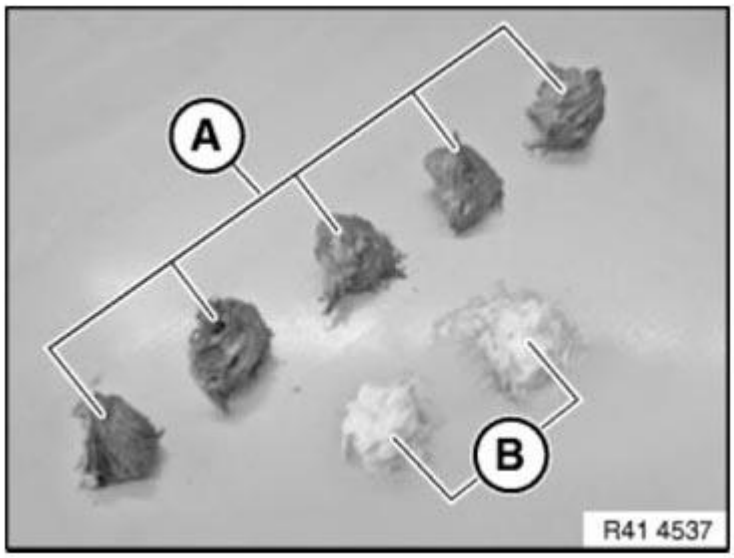


Fig. 18: Identifying Metal Filler And Hardener
Courtesy of BMW OF NORTH AMERICA, INC.

A = Metal filler

B = Hardener

NOTE: The mixture ratio refers to the volume.

Mix metal filler in mixture ratio of 5:2. Mix components thoroughly and free of pores.

IMPORTANT: Do not stir components. Danger of air pockets in metal filler!

Working life of the metal filler is approx. 45 minutes.

Applying filler

Apply pressure to apply a thin layer of metal filler. Carefully coat all edges in gaps with filler.

Then fill gap completely with filler. Apply filler with about 30% excess because the filler will significantly shrink during hardening. A second application of metal filler is not possible due to poor adhesion.

IMPORTANT: Use a narrow spatula to fill the gaps. Apply the filler in one draw if possible. Danger of formation of pores in gaps!

No restrictions related to the layer thickness.

Hardening time

The metal filler must be hardened using a short-wave infrared heater.

- 10 minutes at 50°C - pre-hardening (avoid formation of bubbles/blisters and pores)
- 10 minutes at 75°C - 1st stage hardening
- 10 minutes at 85°C - 2nd stage hardening (avoid material shrinkage)

IMPORTANT: In the first 10 minutes, the temperature of 50°C may not be exceeded. In contrast, a temperature that is too low may be equalized by extending the time.

NOTE: When the heater is used for the first time, the distances that match the temperature must be determined.

Switch the heater on and change the distance until the surface temperature of the metal filler no longer changes for a period of 2 minutes. Measure the temperature with a temperature gauge. When optical temperature gauges are used (Epsilon value 0.92-0.95), the heater must be switched off briefly during the measurement. Record the measurement

Post-processing

WARNING: When grinding, wear a fine dust mask with particulate filter P2-P3!

After cooling, the metal filler can be machined.

Pores and faulty spots that become visible after grinding the surface must be closed with polyester filler (BMW Color system).

Special procedure for pores:

Use a Ø4.2mm drill. Turn the drill by hand to expand the pores in v shape. by t

Fill cavities with polyester filler.

Paintwork

Perform paintwork according to the specifications in the painting handbook.

Metal filler disposal

Hardened metal filler is disposed of as normal waste.

Empty packaging is disposed of as normal waste.

Non-hardened metal filler and mixtures of metal filler with solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a**

month).

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

41 00... INFORMATION ON VEHICLE PROTECTION

- Vehicle parts located in the repair zone or threatened by heat, sparks or dust, must be removed or covered.

IMPORTANT: Do not use flammable or dirty material for covering.

41 00... INSTALLATION SOLUTION FOR STRAIGHT SHANK/HEXAGON RIVET NUT

Protection measures!

- Wear safety goggles
- Wear protective gloves

Hexagon/straight shank rivet nut (up to thread 8) with hand rivet gun ZS308

IMPORTANT: Risk of damage!
Failure to comply with these instructions may result in the drill bit slipping and causing significant paintwork damage.

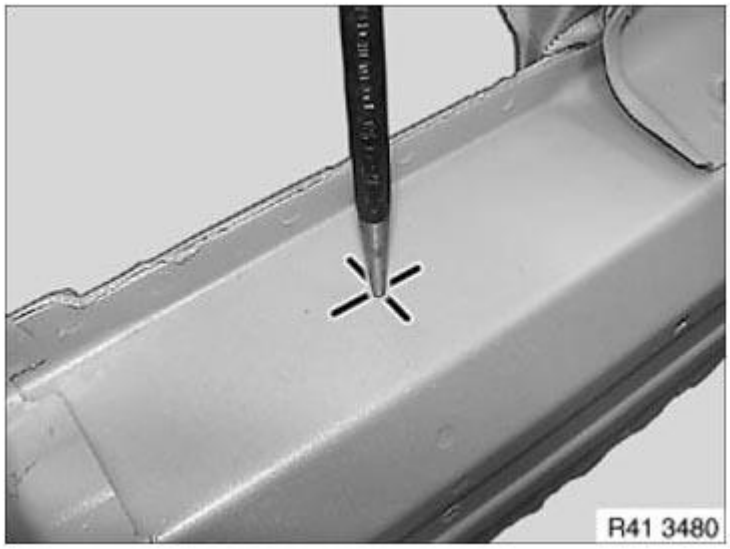


Fig. 19: Marking Position Of Bore
Courtesy of BMW OF NORTH AMERICA, INC.

1. Mark position of bore and then punch-mark component

IMPORTANT: If the determined drill bit diameter is not observed:

- the knurling on the straight shank rivet nut is rendered useless
- the component will be damaged when the straight shank rivet nut is inserted

Determining suitable drill bit:

Depending on the rivet nut shank diameter, the next drill bit diameter higher (5/10 step) can be used.

E.g. with a shank diameter of 10.1 mm, the 10.5 mm drill bit can be used. The 11.0 mm drill bit must not be used.

2. Drill bore with determined drill bit and deburr, pilot-drill with a smaller drill bit if necessary



Fig. 20: Drilling Bore
Courtesy of BMW OF NORTH AMERICA, INC.

3. Clean component, eliminate paintwork damage if necessary



Fig. 21: Identifying Component
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid corrosion, stop chips/debris by means of cavity sealing. Follow INSTRUCTIONS ON CORROSION PROTECTION .

4. Preserving cavity



Fig. 22: Preserving Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow manufacturer's operating instructions. Make sure straight shank rivet nut correctly contacts component.

5. Set rivet nut with hand rivet gun

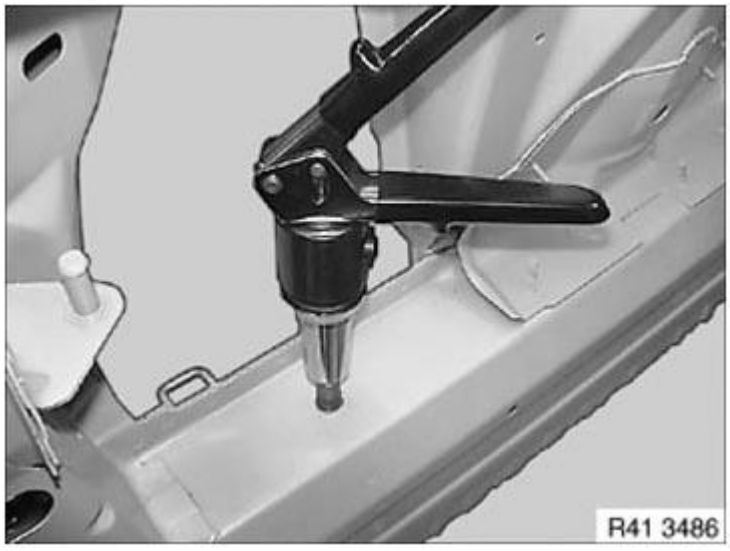


Fig. 23: Setting Rivet Nut With Hand Rivet Gun

Courtesy of BMW OF NORTH AMERICA, INC.

Hexagon/straight shank rivet nut (up to thread M12) with hand rivet gun MB512

IMPORTANT: Follow manufacturer's operating instructions.
Make sure hexagon rivet nut correctly contacts component.

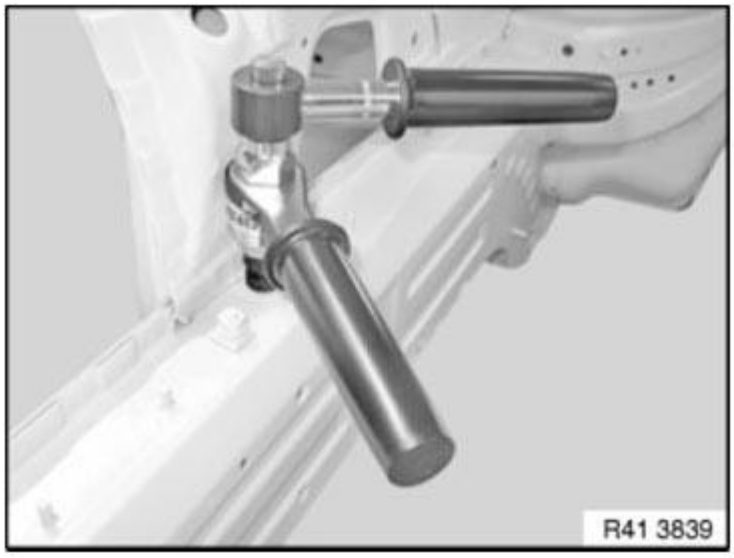


Fig. 24: Setting Rivet Nut With Hand Rivet Gun
Courtesy of BMW OF NORTH AMERICA, INC.

Set rivet nut with hand rivet gun

41 00... INSTALLING A CAVITY ACOUSTIC BAFFLE (EXPANDED)

NOTE: Carry over schematic representation to the relevant vehicle type.
The following repair represents the procedure for an already expanded cavity bulkhead.
The cavity bulkhead remains on the body in this instance.
Before these work steps, prepare the new part so that it is ready to install (adapting, cutting to size, applying welding primer etc.).

Clean contact surface (1) with cleaning agent R2.

Apply a bead (2) approx. 15 mm high of **SEALANT D1** to contact surface (1).

In order to avoid run off of the sealant when bonding to a vertical surface, a thin coat of sealant on both sides of the surface may be necessary.

Fit, secure and weld up new part.

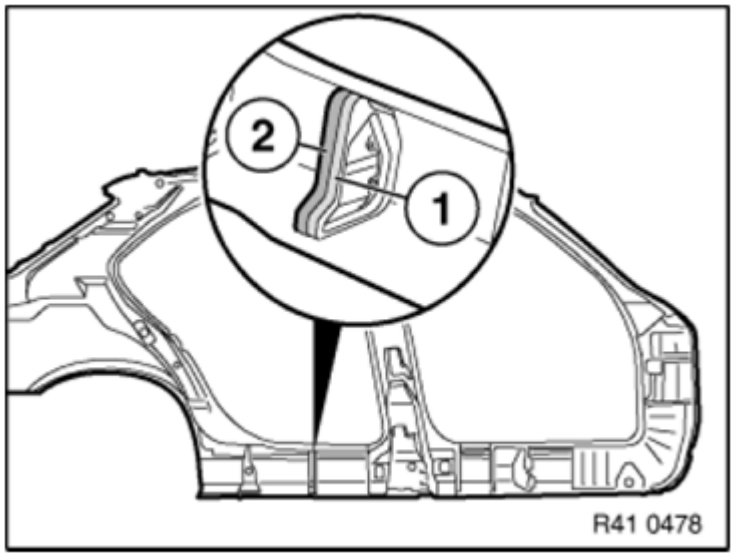


Fig. 25: Identifying Contact Surface Sealant Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Ensure adequate ventilation over entire processing period.

41 00... INSTALLING A CAVITY ACOUSTIC BAFFLE (NOT EXPANDED)

NOTE: Carry over schematic representation to the relevant vehicle type. The following repair represents replacement of a cavity bulkhead. Before these work steps, prepare the new part so that it is ready to install (adapting, cutting to size, applying welding primer etc.).

Sand contact surface of cavity acoustic baffle (1) with coarse-grained sandpaper (grain 50-100).

Clean contact surface (1) with cleaning agent R2.

Apply a bead approx. 15 mm high of **SEALANT D1** to contact surface (1).

If necessary apply sealant D1 somewhat thinner on each side, to prevent the sealant from running.

Attach cavity bulkhead in specified position (see old part).

Fit, secure and weld up new part.

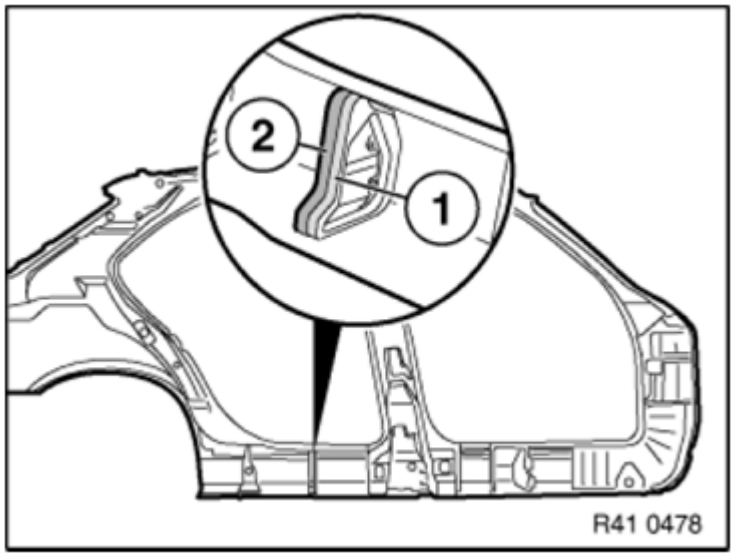


Fig. 26: Identifying Contact Surface Sealant Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Ensure adequate ventilation over entire processing period.

41 00... INSTALLING A CAVITY SEALING WITH 2-COMPONENT PU CAVITY FOAM

Sourcing reference for cavity foam (refer to BMW Parts Department).

IMPORTANT: The cavity foam may only be use for cavity sealing at the points at which cavity sealing is present as standard!

The following repair represents the replacement of a shaped part for the cavity sealing by the use of cavity foam.

This type of cavity sealing is used at points at which shaped parts cannot be used for repairs.

This is the case when large amounts of heat occur (e.g. due to welding, soldering or tin-plating) in the direct vicinity or at the point of the standard cavity sealing.

It is not possible here to install shaped parts for the cavity sealing because of the fire risk!

To replace shaped parts with cavity foam at further locations, adopt the procedure shown here and adapt it to the relevant ratios.

It must be ensured that the cavity is completely sealed off.

NOTE: Check the accessibility for the spraying pipe of the cavity foam to the affected

cavity after removing the defective parts.

Properties of cavity foam:

- 2-component PU foam, solvent-free.
- Excellent flow capacity, enabling complete sealing of cavities.
- Good strength, preventing slipping in cavities.
- Low water absorption, preventing corrosion.
- Ideal for use as insulating and sealing compound.

Information on dangers/hazards

- Avoid eye and skin contact.

  Wear eye protection, solvent-resistant protective gloves and protective clothing.

- Do not inhale.

  Apply in well ventilated rooms only.

  WARNING: Application time after mixing: within 8 minutes!

- Completely empty open can after use.
- Residual amounts which are not used can cause the can to explode on account of a chemical reaction (buildup of heat)!

  Alternatively, cool the can containing the non-removed residual amount for several hours in cold water.

- Do not eat, drink or smoke while working with these products.
- Keep heat and ignition sources well away.
- Read the manufacturer's information on hazards/dangers (printed on the can) prior to application.

Processing instructions

- Observe the expiry date on the cartridge.

  Do not use the spray can after the expiry date on the can has expired. After the Use by date the properties of the cavity foam will no longer meet the requirements of the BMW Group.

- Cavity sealing of repair area possible after an air drying time of 1 hour.
- Backing surface must be

  clean and free from

dust,

grease,

oil and stripping agent.

- Application temperature at least 15°C. Optimally 20°C.
- **IMPORTANT: Foam expands many times over as it sets (change in volume).**
- Before applying to the vehicle, fill a clearly visible cavity of corresponding size with foam on a used part.

  This enables an optimal dosage (i.e. spraying time) to be specified for filling the cavity on the vehicle with foam.

- Tape off open passages to visible areas with adhesive tape to prevent foam from escaping.
- Setting takes approx. 30 minutes. Mechanical processing (e.g. drilling, cutting, etc.) is then possible.
- Cavity sealing of repair area possible after an air drying time of 1 hour.
- Remove fresh, non-hardened PU foam with adhesive cleaner 208.

  Sourcing reference: BMW Parts Department.

  Hardened PU foam can only be removed by mechanical means (machine).

- Excess, hardened PU foam can be disposed of as residual waste.

  Cans which are not entirely empty and unused whose expiry date has expired are classed as hazardous waste.

  Observe country-specific waste disposal regulations.

- Observe the manufacturer's processing instructions (printed on the can).

41 00... MATERIALS SCIENCE

1. Aluminum

1.1 Chassis and suspension components

Read and observe the **NOTES ON CHASSIS AND SUSPENSION COMPONENTS** before handling aluminum.

1.2 Material influences

MATERIAL INFLUENCES CHART

Causes	Effects/remedies

A galvanic element is created under the effects of moisture by contact with materials such as copper, tin, nickel, iron and zinc.	This plating process causes aluminium to be removed from the joint. This results in surface corrosion or pitting. New parts and accessory parts which have been approved by the BMW Group for aluminum (screws, washers, nuts etc.) have undergone special surface treatment. Such parts must not be replaced by conventional parts. **NOTE:** **Damaged parts lose this protection and must be specially coated or replaced.** **Damage caused by contact corrosion is excluded from the warranty.**
Materials also used for work on steel components can implant steel particles in the softer surface of an aluminium component.	Surface corrosion or pitting occurs. A separate tool kit is available for processing/machining aluminum.
Surfaces are attacked when fluxing agents are used.	Soldering is not permitted for joining aluminum components. Risk of corrosion from chemical factors.
Aluminum/steel grinding dust from adjoining work areas.	This results in surface corrosion. Erection of protective barriers.

1.3 Machining properties

MACHINING PROPERTIES CHART

Properties of aluminum compared with steel	Effects
Aluminum parts are magnetically neutral.	Attachment with magnetic tools/working aids is not possible.
Elasticity is only 1/3 as high.	Convertibility is limited in comparison with steel.
Elongation failure is approx. 50% slighter.	Overstretching the material results in strain-hardening and an increased tendency of cracking.
Electrical conductivity is almost 4 times higher.	Electric welding procedures require different equipment (MIG welding).
Material expansion during heating is twice as high.	The material expands more markedly. Shorter heat treatment is necessary for removing dents.
Thermal conductivity is 3 times higher.	Heat is drained more quickly. Adjoining working areas are affected more heavily e.g. during welding.
Microstructural change between 200°C and 250°C.	Elongation characteristics and thus plasticity are improved. Strength is reduced. **IMPORTANT:** **No heat treatment when working on the vehicle structure! Temperature cannot be monitored to**

	sufficiently exact levels in garages.
Aluminum shows no annealing colors.	The melting point is 650°C. Once the melting temperature has been reached, the material begins to flow without any further indications. The temperature can only be estimated by means of the paint coloring and the surface warpage. **IMPORTANT:** **Do not use thermal applicators. Not suitable for garage use because the paint runs too quickly.**

1.4 Mounting

MOUNTING CHART

Characteristic features of aluminum	Special measures
Corrosion (ageing) in damp environments.	Store aluminum parts in a dry place.
Contact corrosion in event of contact e.g. with steel parts.	Always store aluminum parts separately or in isolation from steel parts.
Susceptibility to paint infiltration.	Do not damage protective surface layer since this would cause oxidation. Failure to comply with this requirement would result in more painting work.

41 00... NOTES ON ADHESIVE K1

IMPORTANT: Note the following information before starting to apply adhesive!

- **Country-specific safety and industrial safety regulations**
- **Material safety data sheet of manufacturer**
- **Processing instructions on glue cartridge**

Storage

Dry at 15°- 25°C.

Shelf life

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment

The **pre-treatment** See **4100... BONDING ALUMINIUM ON STEEL** depends on the material to be bonded and its coating.

Required cartridge gun

Overview of glue cartridge guns

Do not use any compressed-air-operated cartridge guns.

Preparing the glue cartridge

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

The working temperature of glue cartridge must be at least 20°C.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Approx. Allow approx. 10 cm of mixed adhesive to emerge and then apply the mixed adhesive first on one side of the bonding surface.

Pot life of mixed adhesive approx. 2 hours. A change of mixer is only necessary if over a period of 1 hour no material has flowed through the mixer.

Adhesive application

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.

Remove contamination caused by adhesive residue immediately.

Hardened adhesive can only be removed mechanically.

Hardening time

Do not move the vehicle before the adhesive has hardened.

Check the degree of hardness of the adhesive with a fingernail.

If the adhesive cannot be pressed in any further with a fingernail, the vehicle may be moved (without engine force) for further processing applications (e.g. painting).

Vehicle **strength for driving applications** is achieved after:

48 hours at min. 15°C object temperature (corresponding to approx. 18°C room temperature).

or 1 hour in the spray booth (spray booth temperature 80°C/object temperature 60°C).

When using radiant heaters, make sure that the object temperature does not exceed 85°C. Excessively high temperatures will destroy the adhesive.

Disposal of adhesive

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00... NOTES ON ADHESIVE K2

IMPORTANT: Note the following information before starting to apply adhesive!

- **Country-specific safety and industrial safety regulations**
- **Material safety data sheet of manufacturer**
- **Processing instructions on glue cartridge**

Storage

Dry at 15°-25°C.

Shelf life

The glue cartridge is marked with a date.

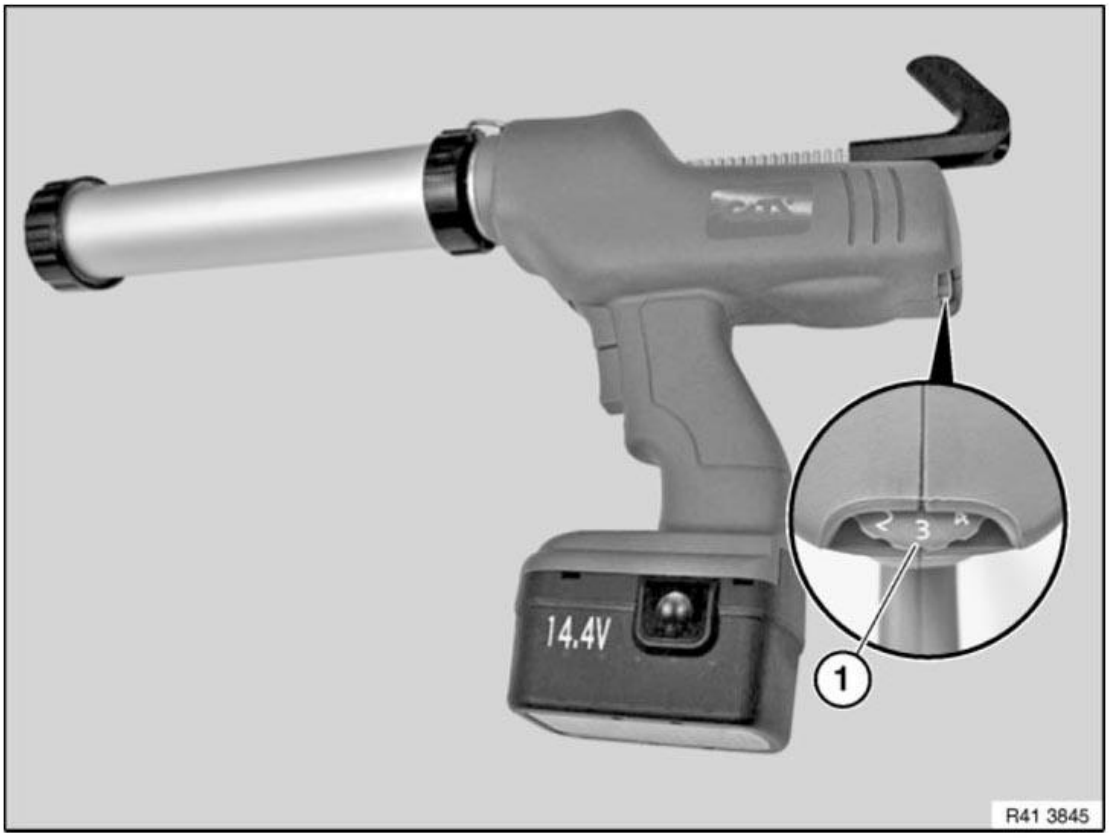
Do not use the adhesive after this date.

Surface pre-treatment

See vehicle-specific repair instructions

Required cartridge gun

CARTRIDGE GUN 81 43 2 159 881/883



1. Speed control

Fig. 27: Identifying Cartridge Gun Speed Control
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set speed control (1) to interval stage 3 to prevent overloading the cartridge gun.

Preparing the glue cartridge

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

The working temperature of glue cartridge must be at least 20°C.

Working life of adhesive is approx. 20 minutes.

IMPORTANT: At working temperatures above 30°C, the working life of the adhesive is reduced to 10 minutes!

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Approx. Allow approx. 10 cm of mixed adhesive to emerge and then apply the mixed adhesive first on one side of the bonding surface.

Adhesive application

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.

Remove contamination caused by adhesive residue immediately.

Hardened adhesive can only be removed mechanically.

Hardening time

See vehicle-specific repair instructions

Disposal of adhesive

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00... NOTES ON ADHESIVE K3

IMPORTANT: Note the following information before starting to apply adhesive!

- **Country-specific safety and industrial safety regulations**
- **Material safety data sheet of manufacturer**
- **Processing instructions on glue cartridge**

Storage

Dry at 15°- 25°C.

Shelf life

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment

See vehicle-specific repair instructions

Required cartridge gun

Overview of glue cartridge guns

Preparing the glue cartridge

Do not prepare the glue cartridge until just before applying the adhesive.

The working temperature of glue cartridge must be at least 18°C.

Pot life of adhesive is approx. 10 minutes at 25°C.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Before starting to apply adhesive, allow approx. 1 mixing tube length of mixed adhesive to emerge. Only then apply the mixed adhesive to one side of the bonding surface.

Opened cartridges may be used again before the expiry date as long as a new mixing tube is used.

2-component adhesive application

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

Hardening time

See vehicle-specific repair instructions

Adhesive disposal

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00... NOTES ON ADHESIVE K4

IMPORTANT: Note the following information before starting to apply adhesive!

- **Country-specific safety and industrial safety regulations**
- **Material safety data sheet of manufacturer**
- **Processing instructions on glue cartridge**

Storage

Dry at 15°- 25°C.

Shelf life

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment

See vehicle-specific repair instructions

Required cartridge gun

Overview of glue cartridge guns

Preparing the glue cartridge

Do not prepare the glue cartridge until just before applying the adhesive.

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

The working temperature of glue cartridge must be at least 18°C.

Working life of adhesive is approx. 10 minutes.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Before starting to apply adhesive, allow approx. one half mixing tube length of mixed adhesive to emerge. Only then apply the mixed adhesive to one side of the bonding surface.

2-component adhesive application

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

Hardening time

The bonded connection will be resistant after 30 minutes.

Disposal of adhesive

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00... NOTES ON ADHESIVE K5

IMPORTANT: Note the following information before starting to apply adhesive!

- **Country-specific safety and industrial safety regulations**
- **Material safety data sheet of manufacturer**
- **Processing instructions on glue cartridge**

Storage

Dry at 15°- 32°C.

Shelf life

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment

See vehicle-specific repair instructions

Required cartridge gun

Overview of glue cartridge guns

Preparing the glue cartridge

The working temperature of glue cartridge must be at least 20°C.

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Before starting to apply adhesive, allow approx. 1 mixing tube length of mixed adhesive to emerge. Only then apply the mixed adhesive to one side of the bonding surface.

Pot life of adhesive is approx. 60 minutes at 23°C.

Adhesive application

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.

Remove contamination caused by adhesive residue immediately.

Hardened adhesive can only be removed mechanically.

Hardening time

Do not move the vehicle before the adhesive has hardened.

Check the degree of hardness of the adhesive with a fingernail.

If the adhesive cannot be pressed in any further with a fingernail, the vehicle may be moved (without engine force) for further processing applications (e.g. painting).

The procedure may be accelerated by using a radiant heater. Let the adhesive harden for 30 minutes at 85°C. The component can then be processed in the joint areas.

Vehicle **strength for driving applications** is achieved after:

24 hours at a minimum object temperature of 23°C.

or 1 hour in the spray booth (spray booth temperature 80°C/object temperature 60°C).

When using radiant heaters, make sure that the object temperature does not exceed 85°C. Excessively high temperatures will destroy the adhesive.

Disposal of adhesive

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00... NOTES ON CLEANING AGENT R1

Use only cleaning agent R1, as other cleaning agents cab be emollient/moistening or may start to dissolve the cathodic dip paint primer.

41 00... OPENING ADHESIVE BONDS

1. Opening spot-weld bonds

OPEN WELD SPOTS .

WARNING: Extract vapors and gases.
Use personal protective clothing/equipment.

Heat connecting flange with a hot-air blower. Heat components to max. 250°C object temperature.

Release connection flange with chisel.

Remove adhesive residue from connecting flange.

2. Opening adhesive bonds

If necessary, open existing **PUNCH OR BLIND RIVETS** .

Roughly cut out damaged component.

WARNING: Extract vapors and gases.
Use personal protective clothing/equipment.

Heat adhesive flange with a hot-air blower. Heat components to max. 250°C object temperature.

The component can be peeled with the aid of pliers. Do not damage adjacent components.

Remove adhesive residue from connecting flange.

3. Opening adhesive bonds on aluminium roofs

Procedure is described in detailed in the relevant repair instructions.

4. Opening adhesive bonds on carbon-fibre-reinforced plastic parts

Procedure is described in detailed in the relevant repair instructions.

41 00... OPENING BRAZED JOINTS

The "Bonding and Riveting" repair method involves replacing the watertight brazed joint with adhesive.

This gives rise to a new procedure for opening brazed joints.

Grind brazed seam with a belt grinder. This keeps the influence of heat in the area around the brazed seam as small as possible.

IMPORTANT: Never use a gas flame.

All traces of brazing solder do not have to be removed.

Do not grind body panels thin.

41 00... OPENING RIVETED JOINTS

Different rivet types are used on BMW vehicles.

1. Opening blind rivets

1.1 Opening blind rivets (N1 and N2)

Grind off blind rivet head with a belt or angle grinder. Do not grind off base material. Remove rivet remnants with a drift punch.

1.2 Opening blind rivets (N3 and N6)

Drill out blind rivet head with a 5 mm dia. drill bit. Do not damage base material. Remove rivet remnants with a drift punch.

2. Opening punch rivets

2.1 Opening punch rivets by extraction

This procedure is used on the reduced-weight aluminium front end.

Recommended tools and equipment:

- Stud welding apparatus (refer to Service Information 5 03 03 975) with gas bottle containing inert gas (82 % argon, 18 % CO 2).
- Stainless steel stud (sourcing reference via BMW Parts Department picture board Aluminium and steel/bonding and welding)
- Universal riveting tool (refer to Service Information 5 03 03 975)

Grind off paint and dark grey coating of punch rivets.

Position bolt centrally on the rivet and weld on vertically. The area in which the bolts are welded on should be between the two grounding terminals. Position both terminals, if possible, on the top side of the metal plate on which the rivet is located.

Extract bolt with welded-on rivet using universal riveting tool. Use a large plastic nose piece if not otherwise specified in the repair instructions. Check plastic nose piece prior to use for wear.

Plastic nose piece must rest on sheet metal all round; if necessary, grind off plastic noise piece in collision area.

Do not push riveting tool forcefully onto special-steel bolts.

Do not use riveting tool to bend special-steel bolts.

Pay particular attention to central positioning of the bolt when using the small plastic mouthpiece.

Follow the equipment manufacturer's instructions for use.

2.2 Opening punch rivets by drilling out

Drill out rivets with a 6 mm dia. carbide drill bit.

Punch rivets can be drilled out on both sides. When drilling from the protruding rear side, spot-drill the rivet shank only and remove the rest with a rivet punch.

Use a drift punch to remove punch rivet remnants in the aluminium (risk of corrosion).

Clean vehicle to remove chips (risk of corrosion).

41 00... OPENING WELD JOINTS

1. Opening weld spots (resistance pressure spot welding)

Sheet steel panels made from high- and super-high-strength materials make great demands on the tools used.

Only with special carbide milling cutters can weld spots be drilled out on these sheet panels.

Procedure

If necessary, surface-grind existing unevenness with a belt or angle grinder in the area around the weld spot.

Set punch mark in center of weld spot. Set 8 mm dia. weld spot drill bit on punch mark and drill through top metal sheet.

NOTE: Because the weld spots may have surface-hardened, grind them if necessary with an angle grinder and paper grinding disk.

Use a chisel to separate the sheet metal flange and remove the component.

Follow the special procedure for **SPOT WELDS** .

2. Opening MAG weld seams and MIG brazing seams

Procedure

Grind off weld seams with a belt or angle grinder. Do not grind the base material thin.

Use a chisel to separate the sheet metal flange and remove the component.

3. Opening laser weld seams

Laser weld seams are used in the roof outer skin area.

Procedure

Roughly cut roof outer skin in the roof channel to improve accessibility.

Place angle grinder with grinding disc on laser weld seam and grind through top metal sheet. Be careful not to cut through and damage sheet metal underneath.

Remove sheet metal flange.

41 00... OVERVIEW OF ADHESIVE CARTRIDGE GUNS

Adhesive gun 83 19 2 149 522

Usable for adhesives K4, K5a.

Including insert 1:1 and 2:1.

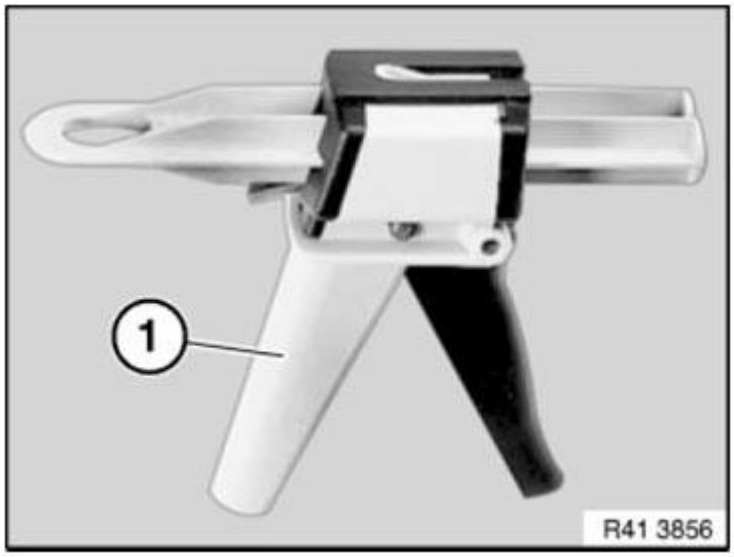


Fig. 28: Identifying Adhesive Gun (83 19 2 149 522)
Courtesy of BMW OF NORTH AMERICA, INC.

Adhesive gun 81 49 0 443 166

Usable for adhesive K3.

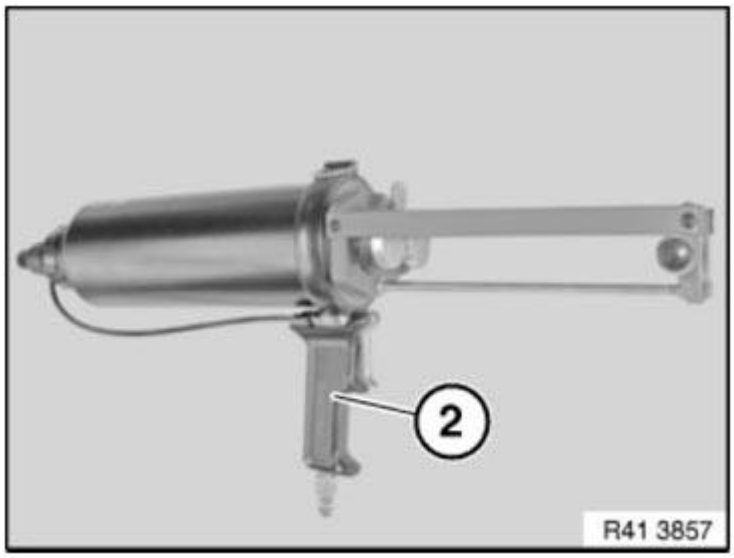


Fig. 29: Identifying Adhesive Gun (81 49 0 443 166)
Courtesy of BMW OF NORTH AMERICA, INC.

Adhesive cartridge gun 81 49 2 159 881/883

Usable for adhesives K1, K2, K5b, sealant D1 and window glass adhesive.

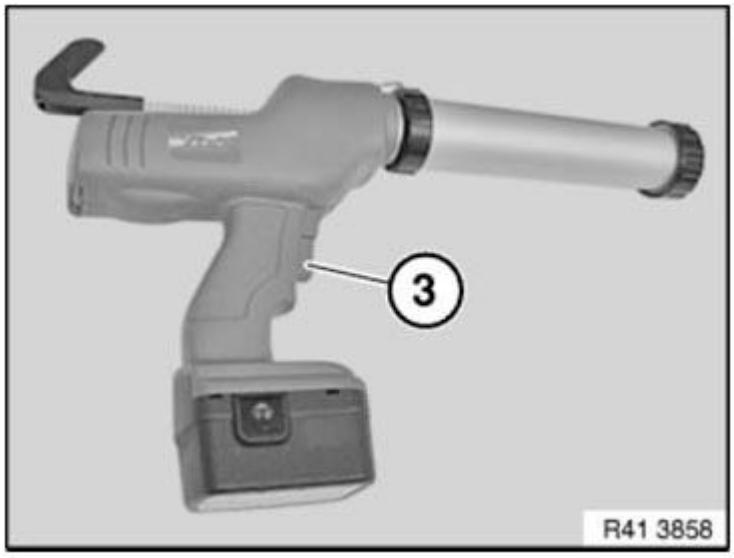


Fig. 30: Identifying Adhesive Cartridge Gun (81 49 2 159 881/883)
Courtesy of BMW OF NORTH AMERICA, INC.

Adhesive cartridge gun 83 30 0 494 836

Usable for structural foam HS2.

NOTE: Special tool number 41 3 010

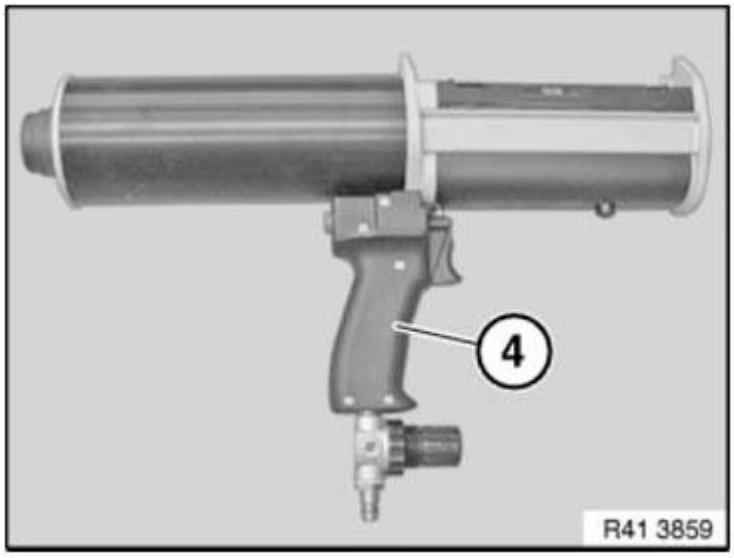


Fig. 31: Identifying Adhesive Cartridge Gun (83 30 0 494 836)
Courtesy of BMW OF NORTH AMERICA, INC.

41 00... OVERVIEW OF CONSUMABLES

1.0 Adhesives

ADHESIVES CHART

Designation, repair instructions	Designation, Electronic	Parts Catalogue Part number, Electronic Parts Catalogue	Remarks
Adhesive K1	Body adhesive K1	83 19 0 413 015	195 ml
Adhesive K2	Body adhesive K2	83 19 2 156 847	195 ml
Adhesive K3	Body adhesive K3	83 19 0 417 144	2 x 300 ml
Adhesive K4	Body adhesive K4	83 19 2 149 520	50 ml
Adhesive K5a	Body adhesive K5a	83 19 2 158 654	50 ml
Adhesive K5b	Body adhesive K5b	83 19 2 157 298	195 ml
Adhesives K5a and K5b are the same adhesive in different package sizes.			

1.1 Primer

PRIMER CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Primer P1	Primer P1	83 19 0 302 556	50 ml
Primer P2	Primer P2/Gas cartridge	83 19 0 302 555	50 ml

1.2 Cleaning agent

CLEANING AGENT CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Cleaning agent R1	Cleaning agent R1	83 19 2 157 286	125 ml
Cleaning agent R2	Cleaning agent R2	83 19 0 417 324	500 ml
Cavity sealing wax remover	Cavity sealing wax remover	83 12 0 390 086	500 ml

1.3 Fillers

FILLERS CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Metal filler	2C metal filler	83 19 2 154 175 US version: 83 19 2 163 602 Asian version:	

		83 19 2 163 603	

2.1 Rivets

RIVETS CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Blind rivet N1 Hemlock 813	Blind rivet N1	83 19 0 301 414	dia. 6.5 mm; clamping range 2.8-4.8 mm
Blind rivet N2 Hemlock 815	Blind rivet N2	83 19 0 301 419	dia. 6.5 mm; clamping range 4.8-6.8 mm
Blind rivet N3	Blind rivet N3	83 19 0 301 421	dia. 4 mm; clamping range 1-3 mm
Punch rivet N4	Punch rivet N4	83 19 2 158 080	dia. 3 mm; length 4 mm
Punch rivet N5	Punch rivet N5	83 19 2 158 079	dia. 5 mm; length 5 mm
Blind rivet N6	Blind rivet N6	83 19 2 158 655	dia. 4 mm; clamping range 3-5 mm

2.2 Plastic nuts

PLASTIC NUTS CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Cap nut	Plastic nut	51 16 1 943 122	Dia. 18 mm
Cap nut	Clip nut	07 14 7 139 081	Dia. 30 mm

3.0 Primer

PRIMER CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Primer	HS-AK multibase filler 2K spray	51 91 0 432 612	200 ml; pot life 5 hours
Primer	EP base filler 2K spray	51 91 0 432 615	200 ml; pot life 8 hours
Welding primer	INOX spray welding primer	83 40 0 409 992	500 ml

4.0 Sealant

SEALANT CHART

		Part number,	

Designation, repair instructions	Designation, Electronic Parts Catalogue	Electronic Parts Catalogue	Remarks
Sealant D1 Sprayable sealant	Seam sealing	83 42 0 428 349	310 ml

5.0 Cavity preservation

CAVITY PRESERVATION CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Cavity sealant	Cavity sealant spray	83 42 0 428 190	400 ml
Cavity sealant	Cavity preservation	83 42 0 428 348	1000 ml

6.0 Cavity foam

CAVITY FOAM CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Cavity foam HS1	Cavity foam	83 42 9 410 694	400 ml
Structural foam HS2	Structural foam	83 19 0 007 361	420 ml

7.0 EMC screw (electromagnetic compatibility)

EMC SCREW (ELECTROMAGNETIC COMPATIBILITY) CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
EMC screw	Screw	83 19 0 301 639	SF Plus M5x15

8.0 Twist drill

TWIST DRILL CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Drill bit	Twist drill	83 19 2 166 461	4.2 x 119 mm
Drill bit	Twist drill	83 19 2 166 462	6.8 x 156 mm
Drill bit	Twist drill	83 19 2 166 463	4.2 x 55 mm
Drill bit	Twist drill	83 19 2 166 464	6.8 x 74 mm

41 00... POSITION OF SHAPED PARTS FOR CAVITY SEALING

Cavity sealing is carried out in specific body areas in order to reduce interior noise and to reduce condensation. To do this, shaped parts are inserted in the cavities. These shaped parts adapt themselves optimally due to heating of the body to approx. 180°C by expansion to the shape of the cavities.

Because it is not possible to heat the body to this extent for a body repair, a **different procedure** has been specified for this situation. See **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (EXPANDED)**; **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (NOT EXPANDED)** or **4100... INSTALLING A CAVITY SEALING WITH 2-COMPONENT PU CAVITY FOAM**.

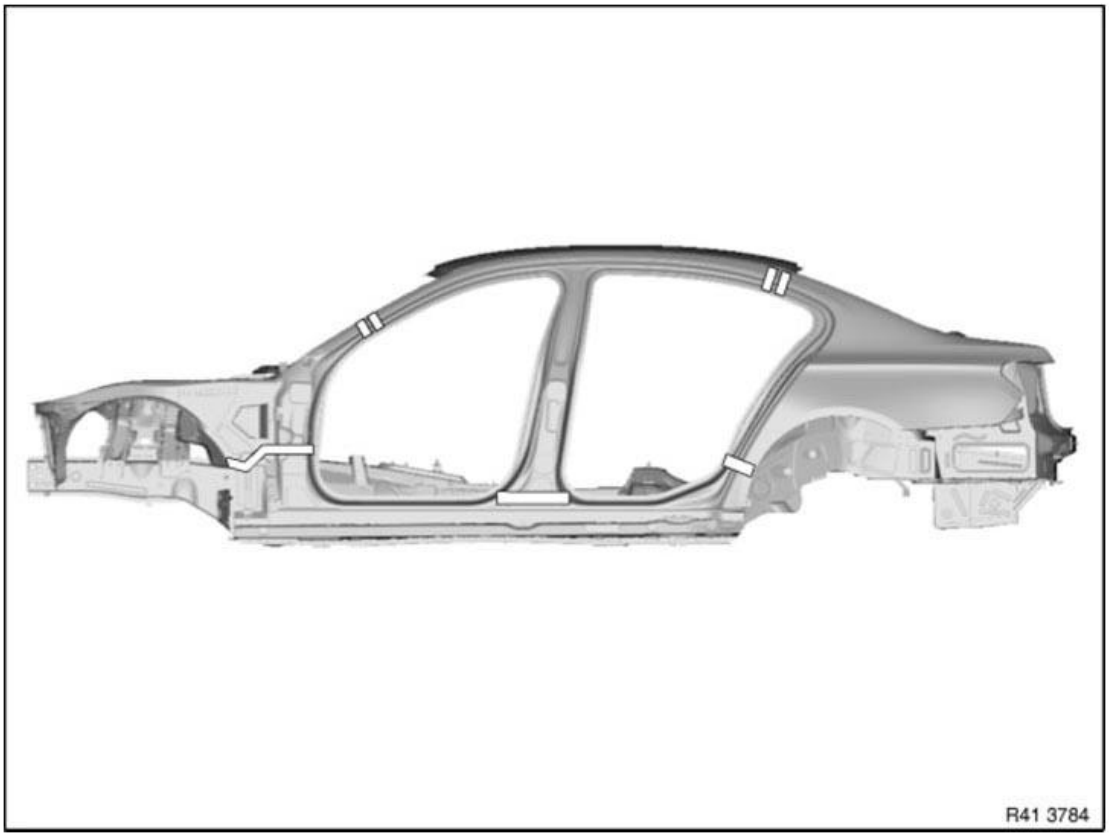


Fig. 32: Identifying Shaped Parts Position For Cavity Sealing
Courtesy of BMW OF NORTH AMERICA, INC.

41 00... PUNCH RIVETS

The "Bonding and Riveting" repair method involves the use for the first time of punch rivets in the repair. This requires new tools and procedures.

The punch rivets are matched in size to the material thickness and quality used at the respective connection point.

1.0 Recommended tools and equipment

- Punch rivet tool (see Service Information 05 03 09 (535))

Setting punch rivets

- Refer to the vehicle-specific repair instructions for the punch rivet size.
- Mark the positions of the rivets on the vehicle. Set punch rivets at roughly equal spacings.

  Punch rivets do not require a predrilled hole. They are pressed directly into the full material.

- Insert punch rivet in riveting die. Position punch rivet tool on sheet metal parts to be riveted.

  Riveting direction:

  Always from new part to used part.

  Deviations are specified in the vehicle-specific repair instructions.

- Rivet punch rivets with punch rivet tool. In the meantime clean riveting die and matrix if fouled with adhesive.
- Seal punch rivets in moist area (e.g. wheel arch or carrier support) on both sides with **SEALANTD1** (risk of corrosion).
- Seal cavities after painting vehicle with **CAVITY SEALANT** (risk of corrosion).

41 00... QUALITY STANDARD

- The overall requirements relating to a vehicle can only be implemented by including "all" components. This applies in particular to the body. With regard to an optimum crash result, it is necessary to maintain the structural measures.

  It is absolutely essential to observe the procedures set out in the repair instructions. Any deviation from these procedures will only be permitted after prior consultation with and approval by BMW. Should you have any questions, please contact the country-specific Hotline.

  The use of non-approved repair steps or tools may have serious consequences for the structure of the vehicle (e.g. in the event of a crash). In the end, this can result in safety and product liability risks which cannot be calculated.

  Corrosion protection measures during and after repairs are absolutely essential to maintain the value of the vehicle.

- Use only genuine BMW parts and approved auxiliary devices, materials and operating fluids when carrying out repairs.

41 00... REINFORCEMENT PLATE (BONDED)

In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A reinforcement plate is bonded in to ensure sufficient strength.

Observe notes on **REPAIR STAGE 2** .

NOTE: The following graphics serve as general illustrations of reinforcement plate repair work. They apply to sectional repairs to the structure.

Mark component in accordance with measurement a and cut.

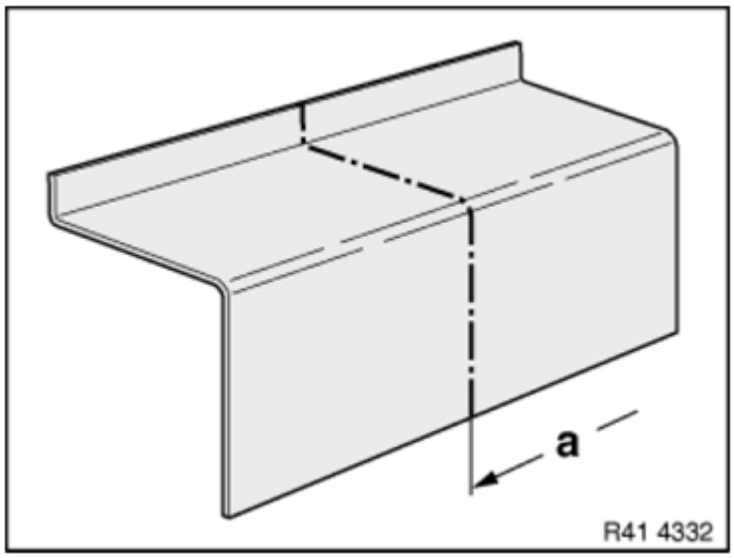


Fig. 33: Identifying Component Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Cut new part (1) in accordance with cut on vehicle and if necessary adjust to fit with straightening attachment or universal mount.

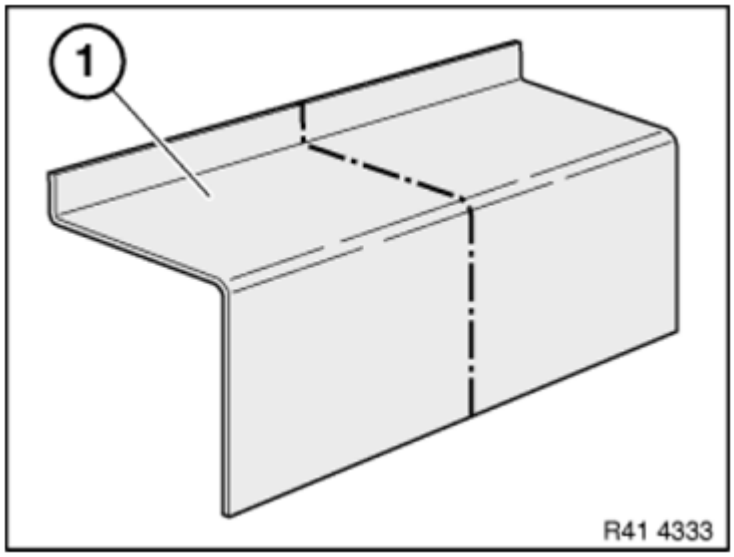


Fig. 34: Identifying Cut Position Of Part
Courtesy of BMW OF NORTH AMERICA, INC.

Make reinforcement plate (1) from trim of new part (2).

Length of reinforcement plate is 80 mm.

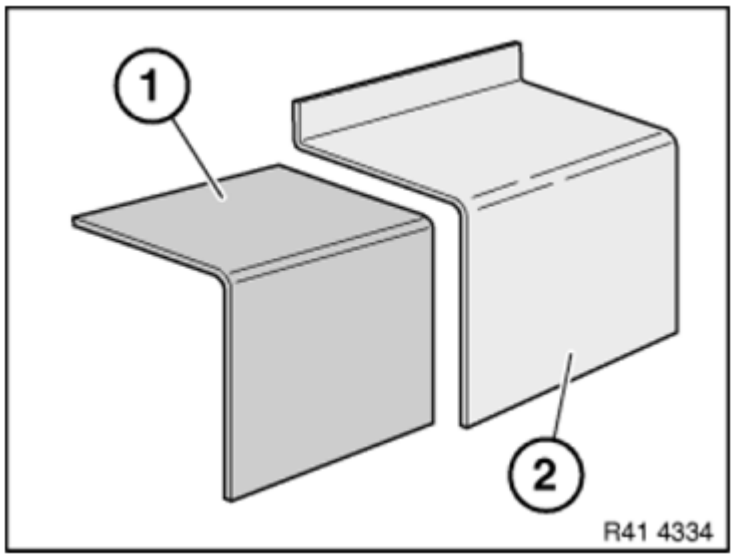


Fig. 35: Identifying Reinforcement Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Slide reinforcement plate (1) half-way into component on body and fasten with 2 self-tapping screws (2).

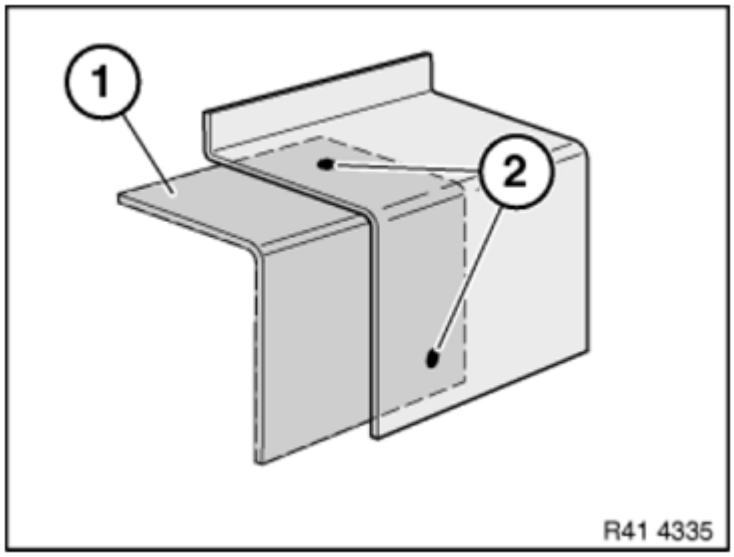


Fig. 36: Sliding Reinforcement Plate Half-Way Into Component On Body
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust new part (1) to fit and set 4.3 mm dia. bore holes (2).

Remove new part again.

Release self-tapping screws (3).

Remove reinforcement plate.

Drill out bore holes (3) for screws to 4.3 mm dia.

Deburr all bore holes.

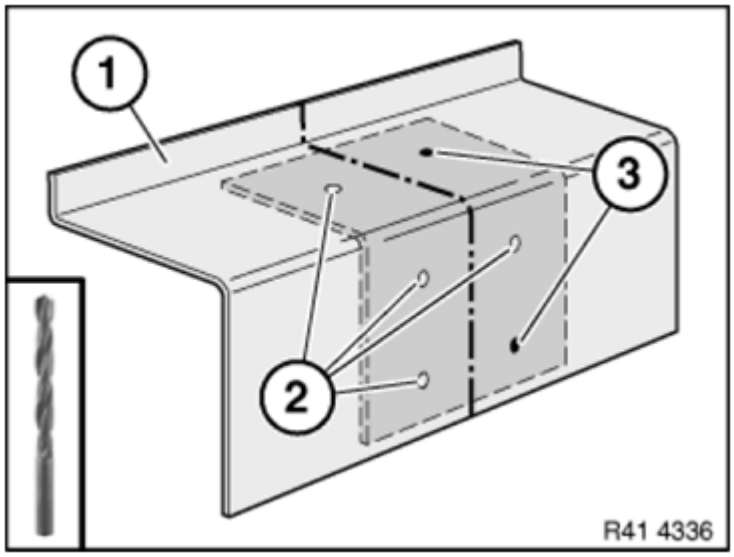


Fig. 37: Drilling Out Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Installing reinforcement plate

Clean **all** bonding surfaces with cleaning agent R1.

Apply adhesive (1) to reinforcement plate bonding surface.

Carefully slide reinforcement plate half-way into body component (2).

IMPORTANT: When joining reinforcement plate, make sure there is sufficient adhesive on bonding surfaces.

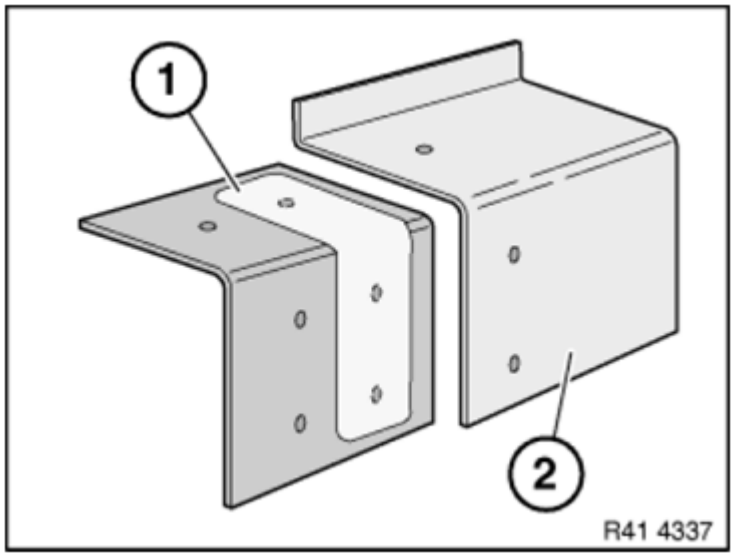


Fig. 38: Identifying Adhesive On Reinforcement Plate Bonding Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Rivet reinforcement plate (1) up to half-way with blind rivets N3 (2).

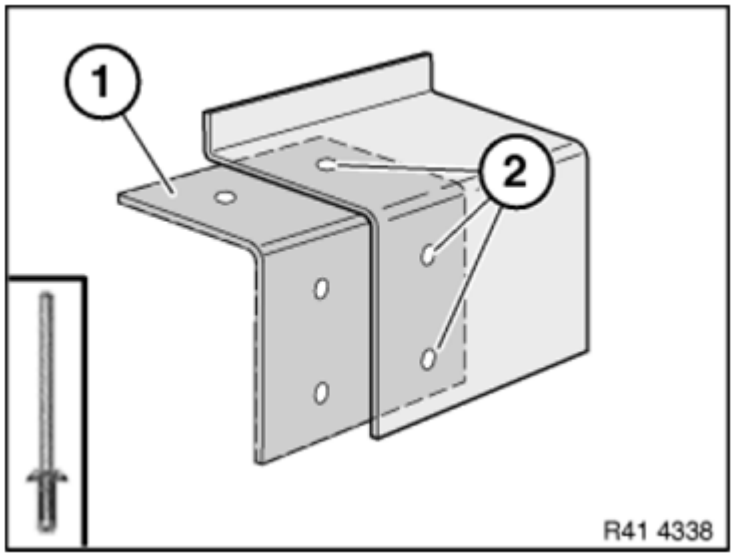


Fig. 39: Riveting Reinforcement Plate Up To Half-Way With Blind Rivets N3
Courtesy of BMW OF NORTH AMERICA, INC.

Apply adhesive (1) to reinforcement plate bonding surface.

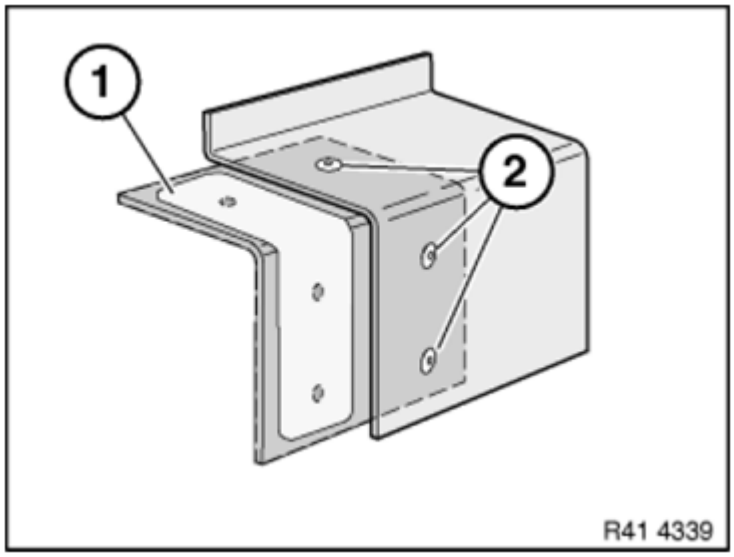


Fig. 40: Identifying Adhesive On Reinforcement Plate Bonding Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Install new part (1) with straightening attachment or universal mount and rivet with blind rivets N3 (2).

After adhesive has hardened, flatten adhesive area and seal blind rivets.

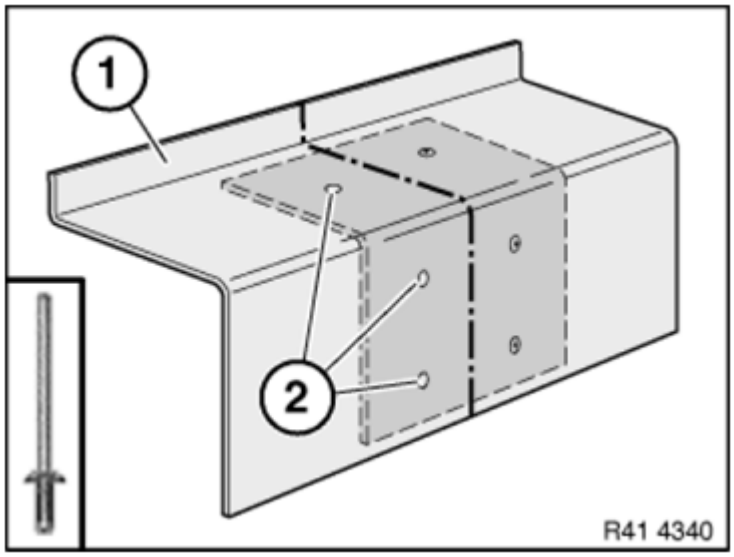


Fig. 41: Installing New Part Using Blind Rivets N3
Courtesy of BMW OF NORTH AMERICA, INC.

41 00... REINFORCEMENT PLATE WITH STUD BOLT (BONDED)

In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A reinforcement plate is bonded in to ensure sufficient strength.

Reinforcement plates are available as new parts and must also be used.

NOTE: The following graphics serve as general illustrations of reinforcement plate repair work. They are applicable to sectional repairs in the outer skin area.

Overview of reinforcement plates:

1. Reinforcement plate, sill
2. Reinforcement plate, C-pillar
3. Reinforcement plate, universal
4. Reinforcement plate, C- or D-pillar
5. Lock nuts (not pictured)
    - Plastic nut 18 mm, part number 1 943 122
    - Clip nut 30 mm, part number 7 139 081

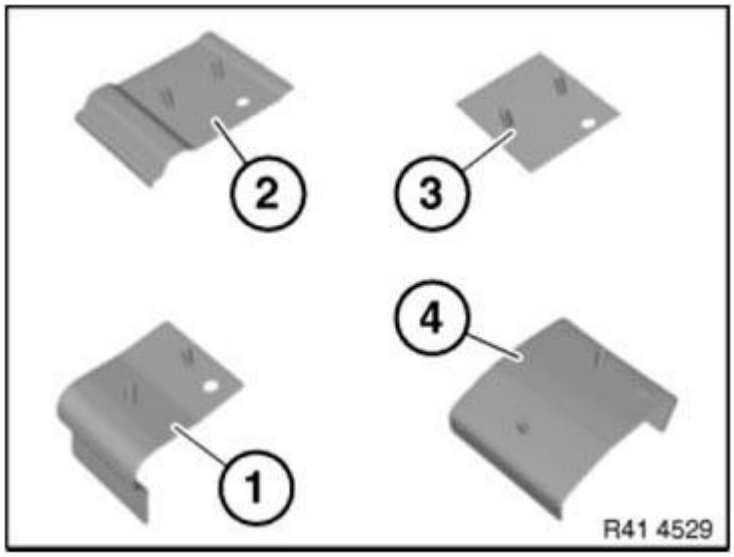


Fig. 42: Identifying Reinforcement Plate Sill, C-Pillar, Universal And C- Or D-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

Mark component in accordance with dimension a and cut.

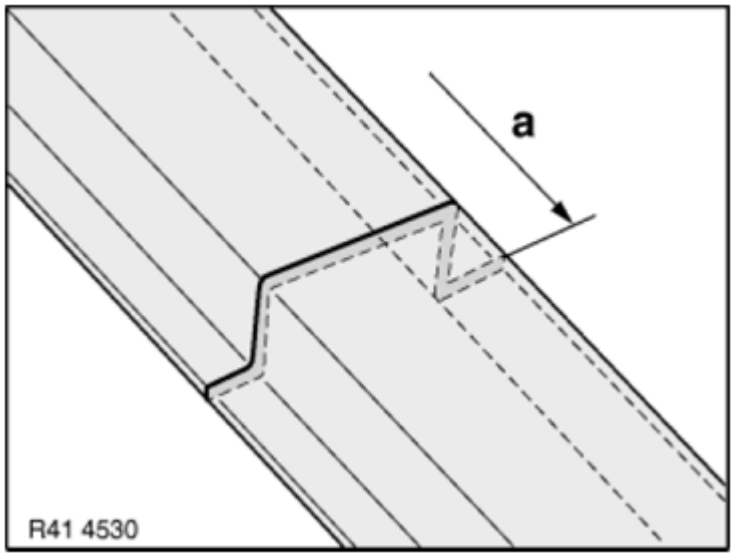


Fig. 43: Identifying Component Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

The reinforcement plates must if necessary be reworked and cut to size.

Adjust reinforcement plate (1) to fit in component (2) on vehicle.

Make recesses (3) for stud bolts (4) in a semicircular shape.

Diameter of recesses approx. 10 - 12 mm.

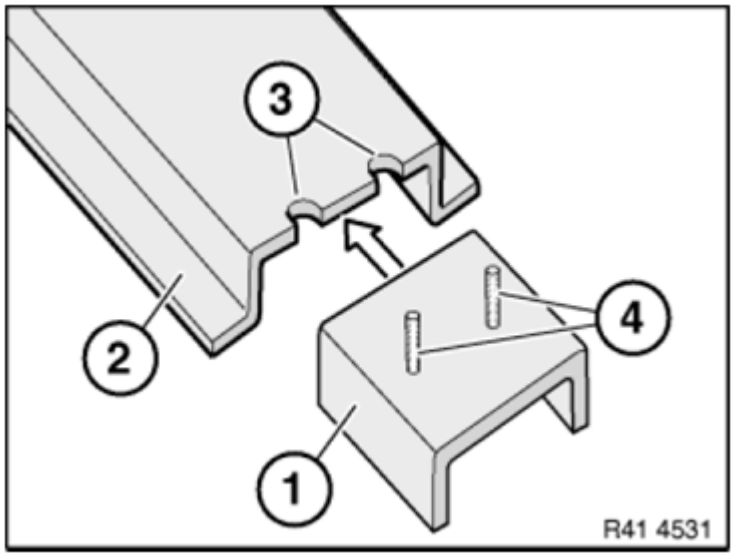


Fig. 44: Adjusting Reinforcement Plate

Courtesy of BMW OF NORTH AMERICA, INC.

Secure reinforcement plate by screwing on lock nuts (1).

Fit new part (2). Make recesses (3) in new part in a semicircular shape.

Diameter of recesses approx. 10 - 12 mm.

Remove reinforcement plate again.

NOTE: Width of joint between new part and component on vehicle approx. 3 - 8 mm (at least 30 mm flange width per side).

Plastic nuts should be screwed on once before applying adhesive (no thread in new plastic nut)!

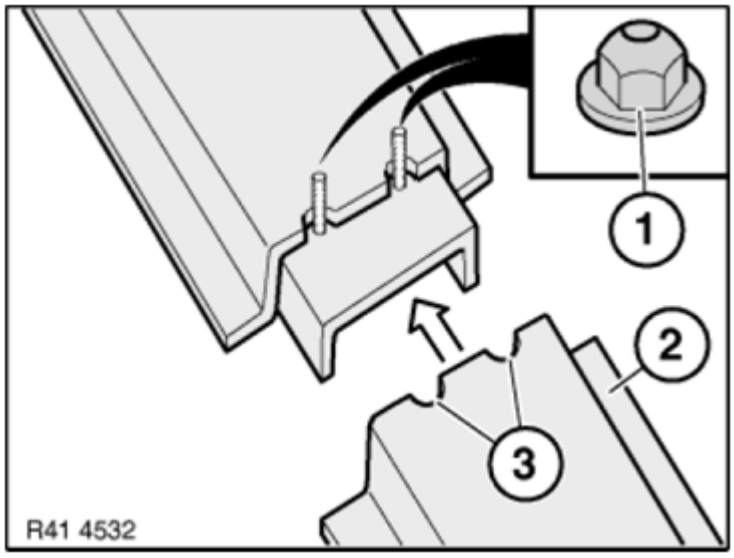


Fig. 45: Fitting New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Round off cutting edges (1) on joint by grinding.

(2) Component on vehicle

(3) New part

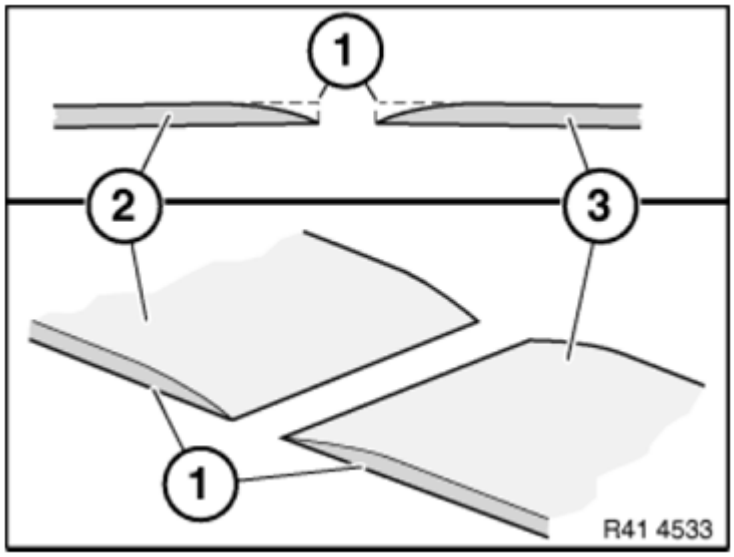


Fig. 46: Identifying Cutting Edges
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Procedure for using universal reinforcement plate

The universal reinforcement plate needs to be adapted. The plate must be divided if the distance between the pins is too great.

Dimension a is between 40 and 80 mm depending on the space available.

Secure plates with N4 punch rivets.

NOTE: Ensure the rivet is positioned correctly! Rivet head is on the adhesion side! Rivet the plate to the inside of the flange!

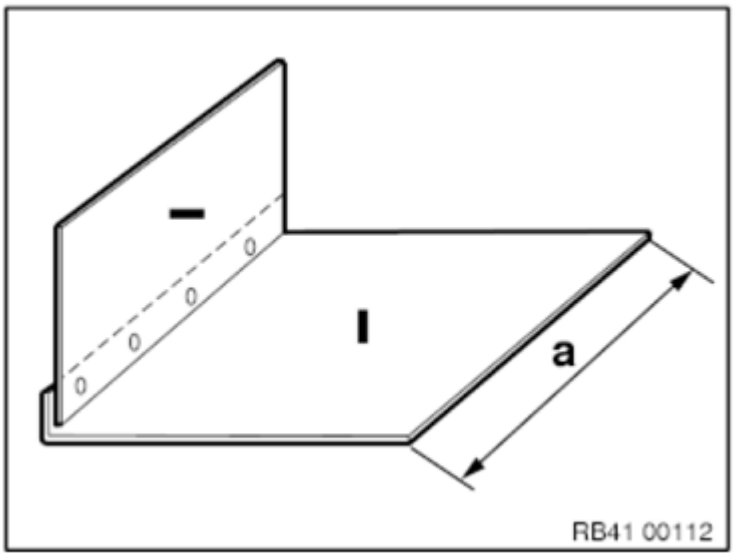


Fig. 47: Identifying Universal Reinforcement Plate Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Installing reinforcement plate

Clean **all** bonding surfaces.

Apply adhesive to reinforcement plate in area (1). Apply more adhesive in the radii to avoid air pockets.

Carefully slide reinforcement plate into component on vehicle and secure by screwing on nuts (2). Screw on nuts a few turns only.

IMPORTANT: When joining reinforcement plate, make sure there is sufficient adhesive on bonding surfaces.

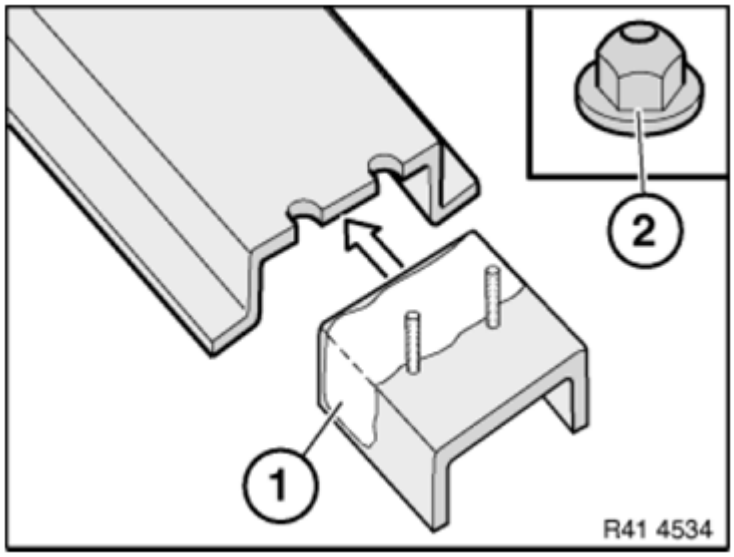


Fig. 48: Identifying Reinforcement Plate Adhesive Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Apply adhesive to reinforcement plate bonding surface (1). Apply more adhesive in the radii to avoid air pockets.

Fit new part (2).

Align new part to adjoining component and secure with gripping pliers.

Tighten nuts.

Tightening torque **41 14 1AZ** .

IMPORTANT: Check that the transition of the components is OK at the separation point. Corrections can only be made before the adhesive has hardened. Straightening at a later stage is not possible.

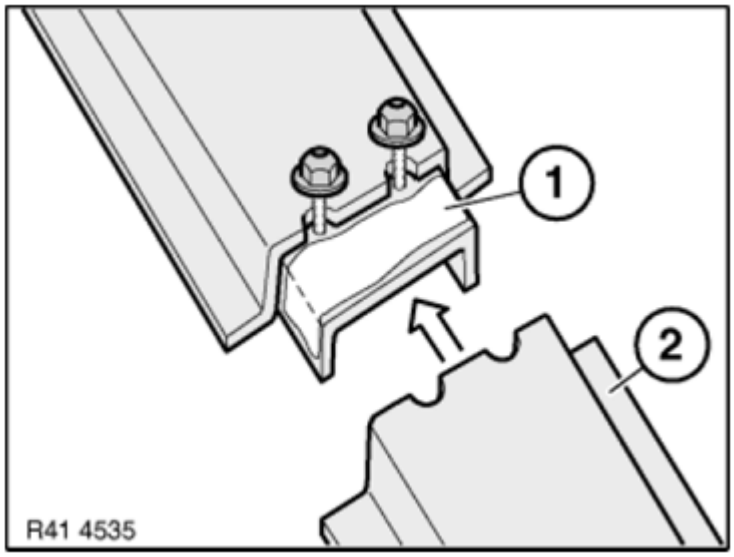


Fig. 49: Fitting New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Concluding tasks at separation point:

After adhesive has hardened:

In area visible to customer:

Cut off stud bolts with bodywork saw.

Completely remove adhesive residue in joint (1).

Round off sharp edges by grinding.

IMPORTANT: Avoid heating the separation point by excessive grinding. Reworking by pressing not permitted!

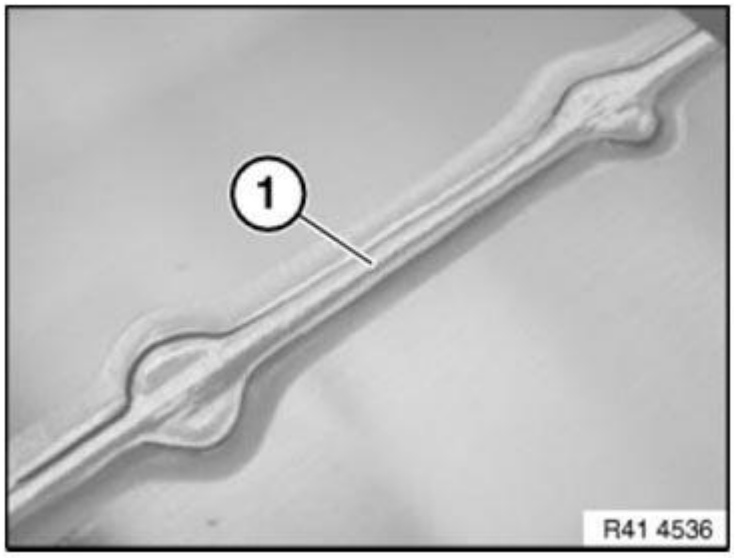


Fig. 50: Identifying Reinforcement Plate Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Only the BMW-approved **METAL FILLER** should be used on the joint.

METAL FILLER - INSTRUCTIONS FOR USE

Not in area visible to customer:

Examples: The joint is covered by sill trim panel, windows, seals, etc.

Grind off stud bolts and surplus adhesive flush. Do not use metal filler. Paint area as specified in BMW Painting Handbook.

NOTE: After painting, the joint becomes visible as the adhesive shrinks. This has no affect on the quality.

41 05 800 RELEASING BONDED FOLDED SEAM CONNECTIONS

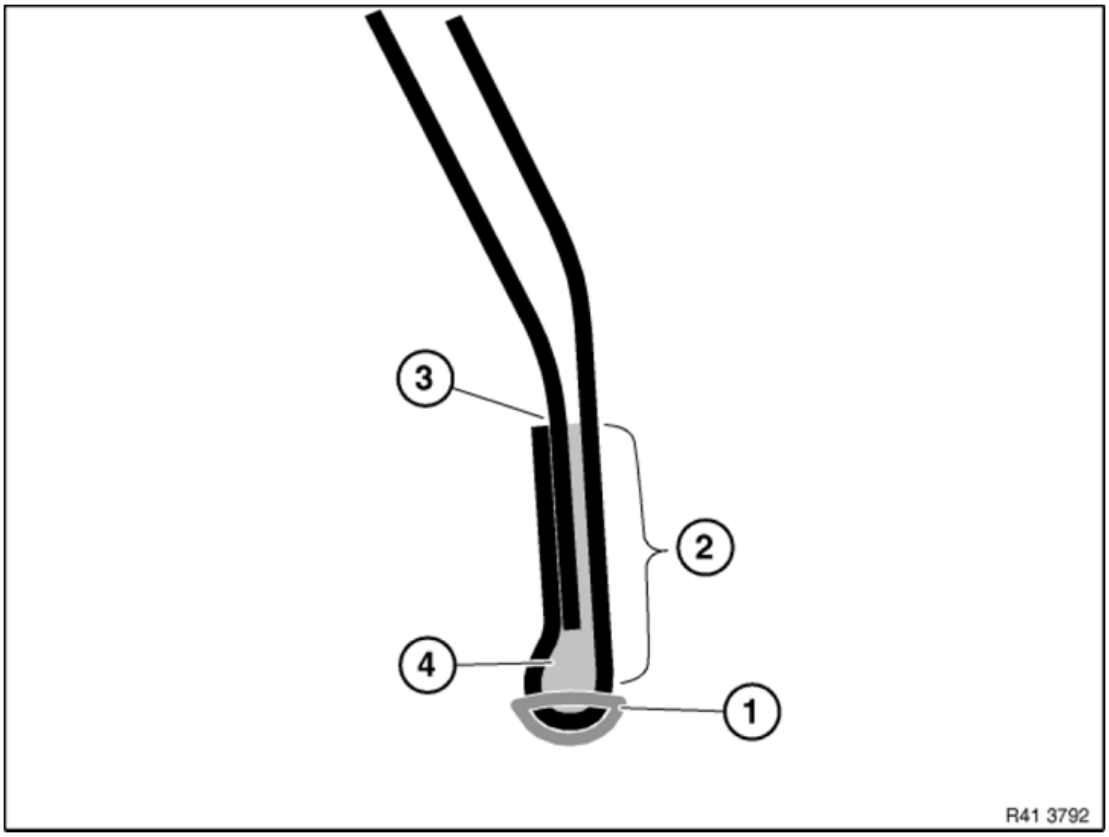


Fig. 51: Releasing Bonded Folded Seam Connections
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove area (1) of bead edge on wheel arch bend with a one-hand angle grinder and rough grinding wheel.
- Heat area (2) with hot air blower.

CAUTION: Extract vapors and gases.

- Release connection flange with chisel.
- Grind adhesive residue (4) off wheel arch connection flange.

CAUTION: Wear a grinding dust mask.

- Remove remnants of sealing material in area (3).

41 00... REPAIR SOLUTION FOR STRAIGHT SHANK/HEXAGON RIVET NUT

Protection measures!

- Wear safety goggles
- Wear protective gloves

IMPORTANT: To prevent the material from tapering, do not drill out the rivet head.

1. Carefully spot-drill rivet head with a larger drill bit/countersink

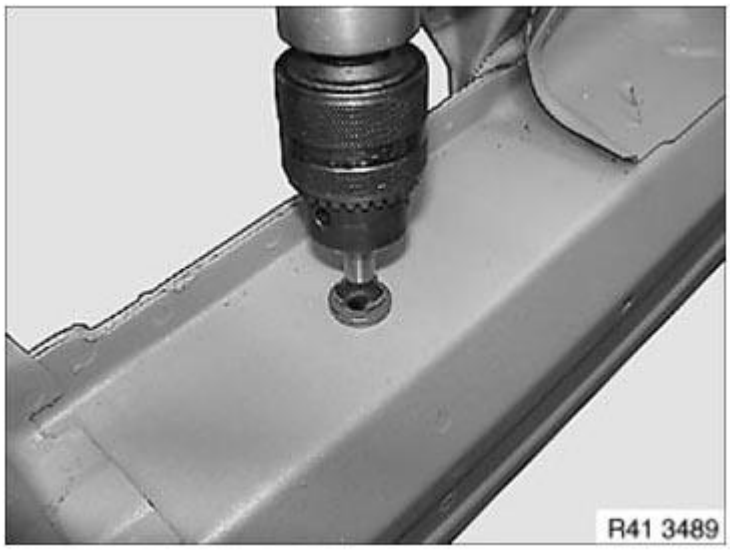


Fig. 52: Drilling Rivet Head Using Larger Drill Bit/Countersink
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid paintwork damage

2. Knock rivet head away with a chisel



Fig. 53: Knocking Rivet Head
Courtesy of BMW OF NORTH AMERICA, INC.

3. Drive through rivet shank into cavity, remove if necessary



Fig. 54: Identifying Rivet Shank
Courtesy of BMW OF NORTH AMERICA, INC.

4. Clean component, eliminate paintwork damage if necessary



Fig. 55: Identifying Component
Courtesy of BMW OF NORTH AMERICA, INC.

If the rivet shank can be removed:

IMPORTANT: To avoid corrosion, stop chips/debris by means of cavity sealing.

Follow **INSTRUCTIONS ON CORROSION PROTECTION** .

5. Preserving cavity



Fig. 56: Preserving Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

If the rivet shank cannot be removed:

WARNING: Risk of injury!
Observe NOTES ON CAVITY FOAM .

IMPORTANT: To avoid corrosion and rattling noises, stop chips/debris and rivet nut shank with cavity foam.
Remove foam remnants with isohexane (benzine).



Fig. 57: Preserving Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

5. Stop rivet shank by means of specific foaming
6. Set rivet nut with hand rivet gun

NOTE: Fit rivet nut as quickly as possibly, ideally before the cavity foam hardens.

Hexagon/straight shank rivet nut (up to thread M8) with hand rivet gun ZS308

IMPORTANT: Follow manufacturer's operating instructions.
Make sure rivet nut correctly contacts component.

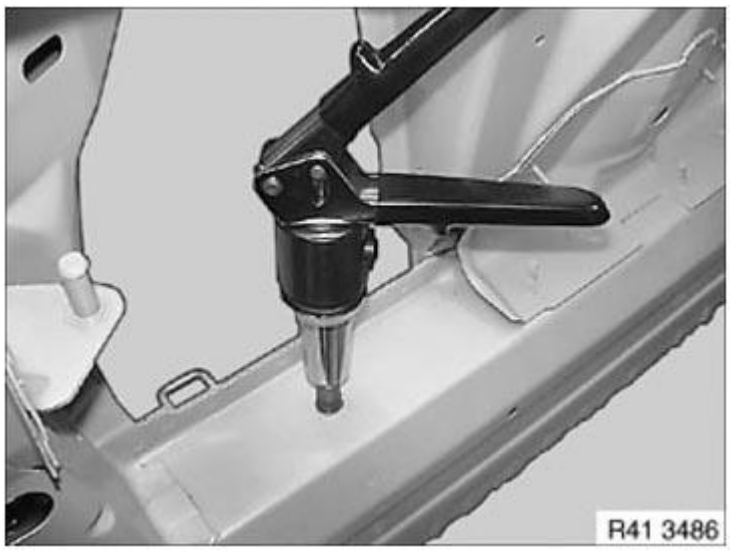


Fig. 58: Setting Rivet Nut With Hand Rivet Gun

Courtesy of BMW OF NORTH AMERICA, INC.

Hexagon/straight shank rivet nut (up to thread M12) with hand rivet gun MB512

IMPORTANT: Follow manufacturer's operating instructions.
Make sure rivet nut correctly contacts component.

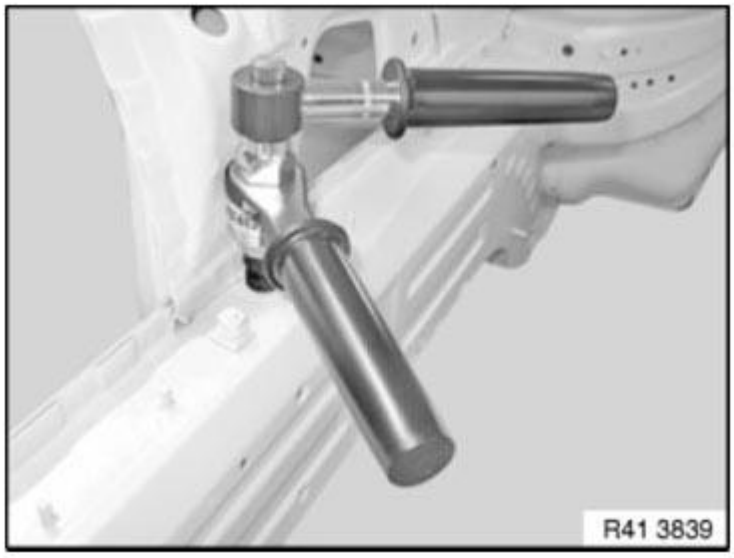


Fig. 59: Setting Rivet Nut With Hand Rivet Gun
Courtesy of BMW OF NORTH AMERICA, INC.

410 REPAIR TECHNIQUES, REPAIR STAGE 1

All work which provides only for replacement of screwed/bolted components and planishing operations.

Repair techniques

- Straightening outer skin
- **Straightening aluminium parts** See **4100... STRAIGHTENING ALUMINIUM PARTS ON OUTER SKIN**
- **Straightening steel parts** See **4100... STRAIGHTENING STEEL PARTS ON OUTER SKIN**
- **Information on metal filler** See **METAL FILLER**
- **Grinding** See **4100... GRINDING ALUMINIUM PARTS**
- **Grinding steel parts** See **4100... GRINDING STEEL PARTS**
- **Steel thread repairs** See **3100... NOTES ON REPAIRING THREADS**

410 REPAIR TECHNIQUES, REPAIR STAGE 2

Repairs that are carried out by bonding and riveting without the use of a straightening bench.

Repair techniques

- Removing used part
- **OPENING WELDED CONNECTIONS**
- **OPENING BRAZED CONNECTIONS**
- **OPENING RIVETED CONNECTION**
- **4100... OPENING ADHESIVE BONDS**
- **GRINDING ALUMINIUM COMPONENTS**
- **GRINDING STEEL COMPONENTS**
- **4100... REINFORCEMENT PLATE (BONDED)**
- **METAL FILLER**
- **4100... OVERVIEW OF CONSUMABLES**
- **Notes on adhesive:** See **4100... NOTES ON ADHESIVE K1**; **4100... NOTES ON ADHESIVE K2**; **4100... NOTES ON ADHESIVE K3**; **4100... NOTES ON ADHESIVE K4** and **4100... NOTES ON ADHESIVE K5**
- **BONDING ON PAINTED SURFACES**
- **BLIND RIVETS**
- **PUNCH RIVETS**
- **4100... INSTALLING A CAVITY SEALING WITH 2-COMPONENT PU CAVITY FOAM**
- **EMC SCREWS**
- **REPAIRING PLASTIC PARTS**
- **BONDING GLASS PANES**
- **BLIND RIVET NUTS AND BOLTS**

410 REPAIR TECHNIQUES, REPAIR STAGE 3

Repairs that are carried out by bonding and riveting with the use of a straightening bench or welding.

Repair techniques

- **STRAIGHTENING ALUMINIUM COMPONENTS ON THE STRUCTURE**
- **STRAIGHTENING STEEL COMPONENTS ON THE STRUCTURE**
- **OPENING WELD JOINTS**
- **OPENING BRAZED CONNECTIONS**
- **OPENING RIVETED CONNECTIONS**
- **OPENING BONDED CONNECTIONS**
- **GRINDING ALUMINIUM COMPONENTS**
- **GRINDING STEEL COMPONENTS**
- **WELDING IN REINFORCEMENT PLATE (STEEL PLATE)**
- **WELDING STEEL COMPONENTS**

- **SPOT-WELD BONDING STEEL COMPONENTS**
- **SOLDERING STEEL COMPONENTS**
- **4100... OVERVIEW OF CONSUMABLES**
- **NOTES ON ADHESIVE**
- **BONDING ALUMINIUM ON STEEL**
- **BONDING STEEL ON STEEL**
- **BLIND RIVETS**
- **PUNCH RIVETS**
- **4100... INSTALLING A CAVITY SEALING WITH 2-COMPONENT PU CAVITY FOAM**
- **EMC SCREWS**

41 00... REPAIRING CLIPS FOR ROOF STRIP

The following instructions describe the permanent repair gluing of clips which were originally secured with T-pins.

The repair gluing at the same time protects the area of the torn-off T-pin permanently against corrosion.

1.0 Information on dangers/hazards

- Read and comply with the manufacturer's information on dangers/hazards prior to application.
- Avoid eye and skin contact. Wear solvent-resistant protective gloves.
- Do not inhale adhesive fumes. Apply in well ventilated rooms only.

1.0 Equipment

- **ADHESIVE K4**
- Static mixing tube
- **ADHESIVE GUN**
- **CLEANING AGENT R1**
- Adhesive tape for fixing

2.0 Preparing the surface

- Surface temperature of bonding surface and room temperature at least 18°C.
- Cover area around bonding surface.
- Remove debris, flaked paint etc. from bonding surface with a brush. Use of compressed air prohibited!
- Clean bonding surface with cleaning agent R1.
- Let cleaned surface air dry for at least 2 minutes. Bonding surface must be completely dry.
- Do not contaminate bonding surfaces once they have been cleaned (sweat from hands, fingerprints, etc.).

3.0 Applying the adhesive

- Fill the hole (1) created by the torn-off T-pin with adhesive and spread over a length of approx. 4 cm (2) in the roof channel.

IMPORTANT: The hole must be completely filled or sealed with adhesive!

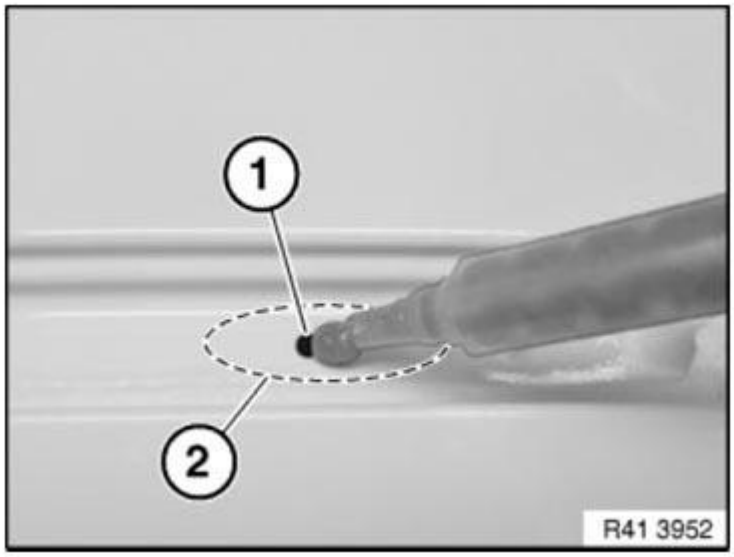


Fig. 60: Filling Roof Channel Hole Using Adhesive
Courtesy of BMW OF NORTH AMERICA, INC.

Apply adhesive bead (1) to the underside of the clip.

In so doing, fill channel of clip with adhesive.

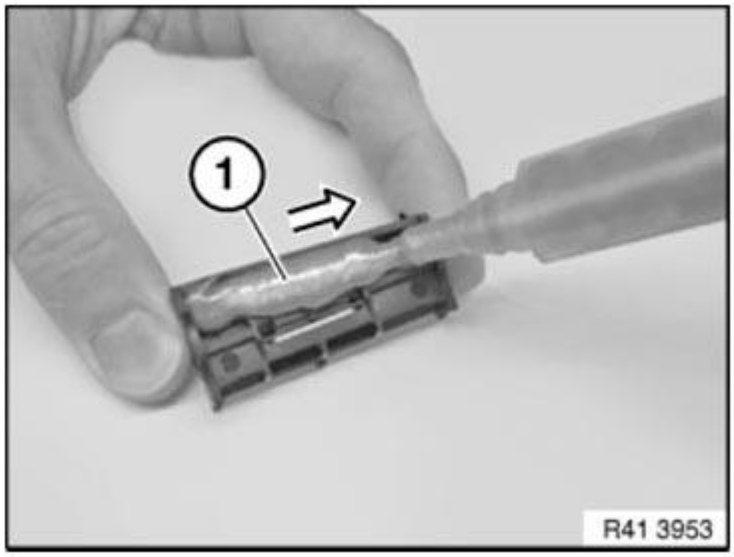


Fig. 61: Applying Adhesive Bead To Underside Of Clip

Move clip (1) into position and secure by hand.

If the adhesive is not already emerging evenly through the channel, apply additional adhesive from above.

Adhesive bead (2) must be below the clip height.

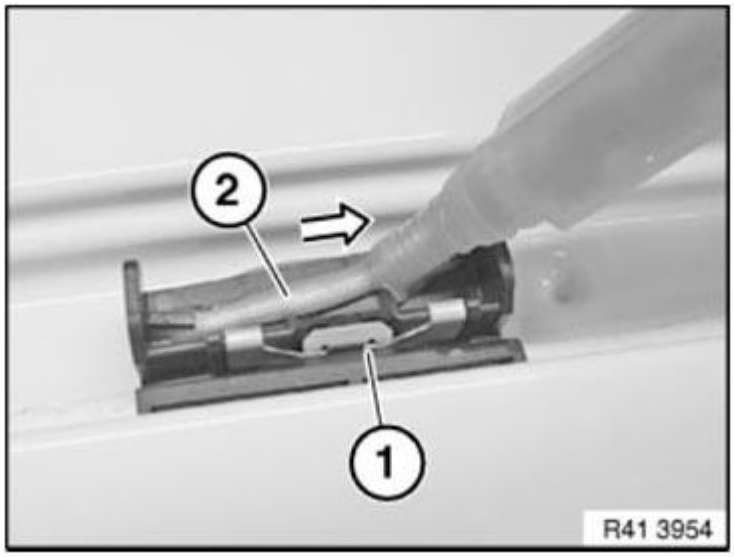


Fig. 62: Moving Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Secure clip with adhesive tape (1), approx. 150 mm long.

Apply adhesive tape in direction of travel.

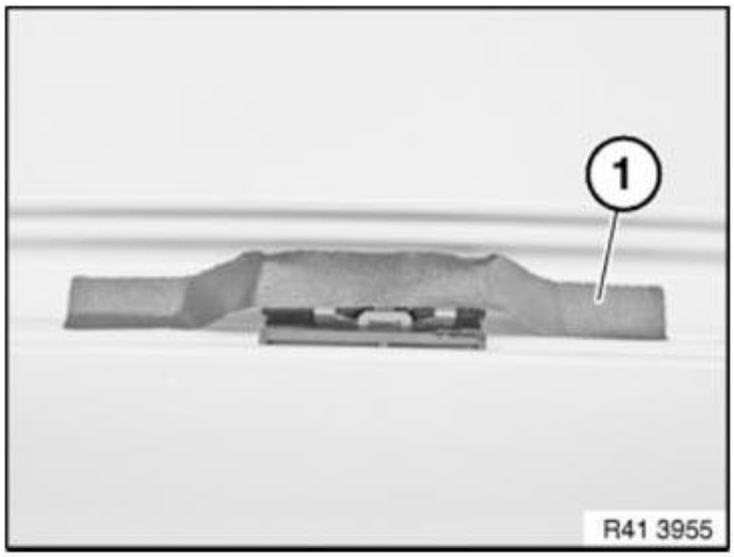


Fig. 63: Securing Clip With Adhesive Tape

Courtesy of BMW OF NORTH AMERICA, INC.

4.0 Hardening period

- Adhesive tape can be removed after approx. 10 mins.
- Earliest possible load capability, e.g. fitting of roof strip, after 30 minutes.

41 00... REPAIRING PLASTIC PARTS

1.0 General information

- Economic efficiency must always be checked prior to repair.
- Only the following painted components in the outer skin area are approved for repair:
  - Bumper trims (exception: E52)
  - Sill trims
  - Front side panels
  - Hardtop/roof
  - Convertible top compartment lid
  - Rear lid
- Prerequisite for professional repair:
  - Only minor deformations (without microcracks, usually visible in the paint)
  - Only minor damage, e.g. abrasions, cracks and holes up to 2.5 cm long
  - No damage (cracks) to the edge of the component!

CAUTION: The following are not approved for repair:

- **Fuel tanks, reservoirs for liquids/fluids (e.g. windscreen washer unit, brake fluid, coolant expansion tank, etc.)**
- **Headlight mountings (pedestrian protection)**

2.0 Shaping plastic parts

- Plastic parts can be reshaped using a hot-air blower.
- Microcracks can occur in the plastic if plastic parts are deformed. After the component is reshaped and then painted, the cracks may become visible again on the surface after a period of time.
- The component must be replaced if microcracks can be identified in the area of deformation.

3.0 Bonding plastic parts

IMPORTANT: Conform with safety precautions See 4100... SAFETY AT WORK and 4100... INFORMATION ON HAZARDS!

- A plastics repair box (sourcing reference: BMW Parts Service) is offered for cost-effective and time-

value-compatible repairs.

- The plastics repair box contains the step-by-step instructions for repairing plastic parts.

41 00... SAFETY AT WORK

1.1 Working with aluminium dust

- Wear a fine dust mask.
- E52 only: Use an explosion-proof extractor system (refer to Service Information 5 01 00 532).
- Note national regulations.

1.2 Removing sealant

- Hydrochloric acid is created when PVC sealing material is heated to temperatures in excess of 180°C.
- Remove PVC sealant with a rotating wire brush only or heat material with a hot air blower to max. 180°C and remove with a spatula.
- Ensure that all enclosed areas are well ventilated or are provided with direct extractor facilities.

1.3 Arc welding and brazing

IMPORTANT: The extremely bright arc during welding may cause serious injury to the eyes if appropriate protective measures are not taken.

- Use a special welding screen* for the relevant welding method (MAG or MIG).
- Partition off the work bays with beam protection screens*.
- Use a welding-emissions extractor facility*.
- The welder must wear protective clothing* and gloves* which are suitable for welding (i.e. flame-proof).
- A fire extinguisher must be located within reach of the welding area.
- Do not carry out any welding work in the proximity of a fuel tank e.g. when it is installed.
- Note national regulations.

1.4 Working with chemical products (adhesive, cleaning agents, fillers, etc.)

Heed the manufacturer's material safety data sheets.

IMPORTANT: Handling chemical products may result in allergic skin and breathing reactions.

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with eyes and skin.
- Wear safety goggles, protective gloves and if necessary an apron.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Use a breathing apparatus with a suitable filter type when ventilation is insufficient.

- Wear impermeable protective clothing.
- Immediately change contaminated work clothing.
- After finishing work, wash your hands thoroughly and apply protective skin cream.
- Always keep an eye douche on hand, change the water regularly (once a month).
- Store bonding products in a secure cabinet only.
- Keep bonding products away from naked flames and other ignition sources.
- Protect bonding products against strong heat sources and direct sunlight.
- Note national regulations.

First Aid

If product comes in contact with eyes, immediately flush with running water for about 10 -15 minutes. Seek the advice of eye specialist.

In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. If necessary, consult a doctor.

If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.

After inhaling adhesive vapors ensure ample supply of fresh air. Stay calm. Keep air passages open. Consult a doctor.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

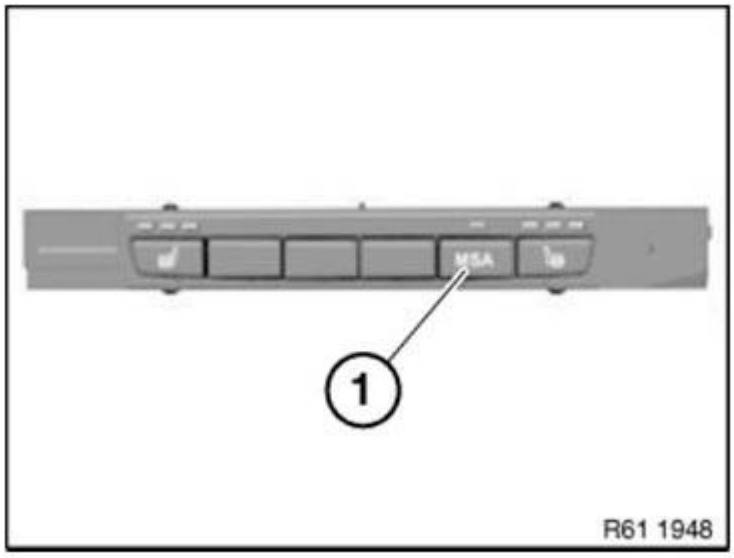


Fig. 64: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

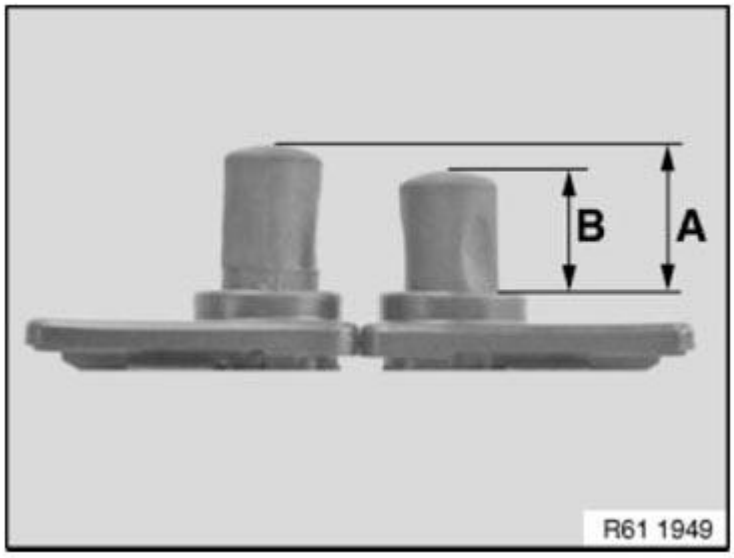


Fig. 65: Identifying Engine Hood/Bonnet Basic Setting
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

41 00... SEPARATING CUT DETERMINATION WITH A TEMPLATE

In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A template may be used for the exact position determination for the separating cut.

The template is made from the reinforcement plate and can be reused.

Carry over schematic diagram at the separation cut C-pillar to the relevant vehicle type.

Remove stud bolts (1).

Set bore holes Ø 4 mm at the positions of the removed stud bolts.

If applicable, place additional bore holes in the area of the edges.

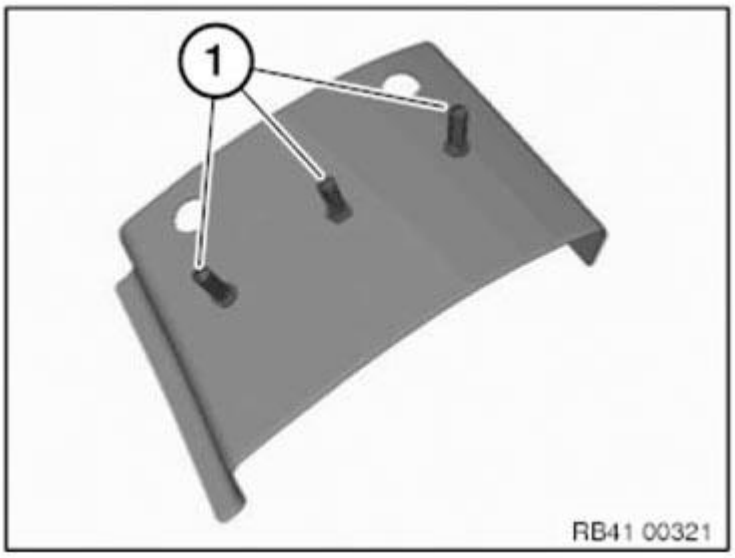


Fig. 66: Identifying Stud Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert the template (1) into the new part (in direction of arrow) until it is flush (without gap).

Carry over the positions of the holes (2) to the new part.

Remove reinforcement plate again.

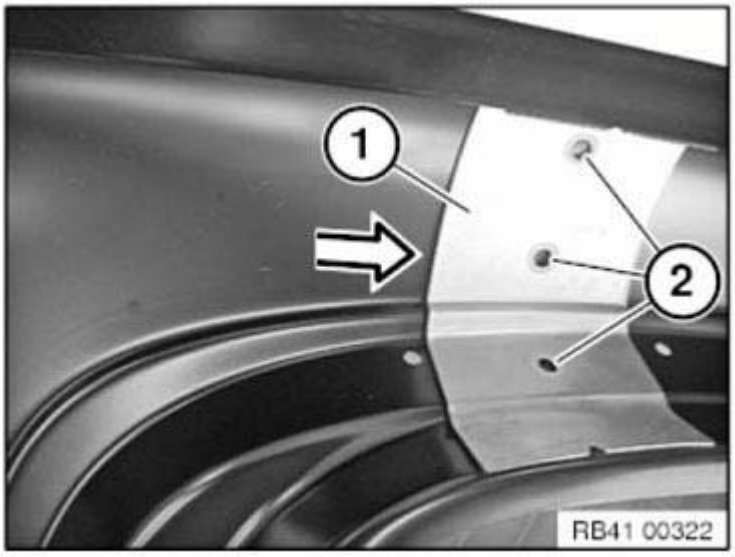


Fig. 67: Inserting Template Into New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Connect marks (positions of holes) to the separating cut line (1).

Carry out the separating cut.

Tear and separate the separating cut on the vehicle according to the new part.

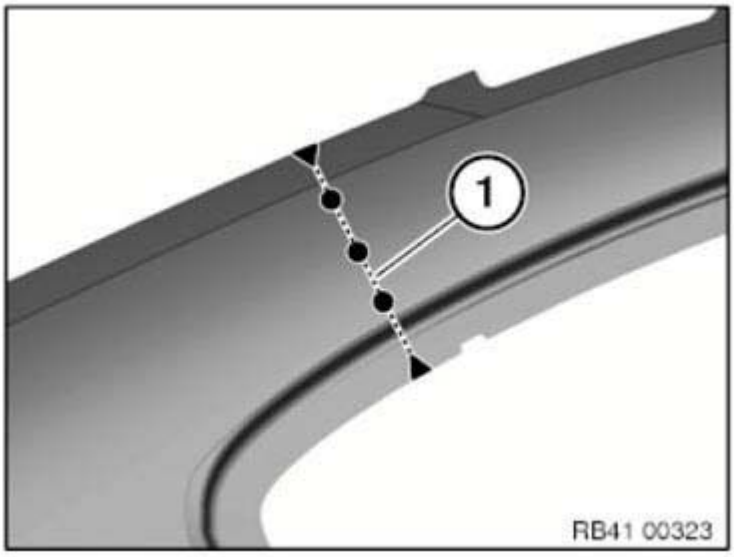


Fig. 68: Identifying Separating Cut On Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

41 00... SETTING BLIND RIVET NUTS AND BOLTS

- Studs welded as standard are always replaced by blind rivet bolts.
- Drill holes (0.2 mm larger than the outside diameter of the blind rivet nuts or blind rivet bolts).
- Blind rivet nuts and studs must have a special coating for anti-corrosion purposes (sourcing reference: BMW Parts Department).

  Use the blind rivet nuts and bolts supplied in the case of the manual riveting tool for steel only!

- It will no longer be possible to set a blind rivet nut if the drilled hole is too big. In this event, set a clip nut (sourcing reference: BMW Parts Department). This nut tightens itself automatically when screwed to the component.
- Insert blind rivet nuts or bolts and **TIGHTEN DOWN WITH RIVET TOOL** .
- Seal blind rivet nuts and blind rivet bolts with **SEALANT D1** (risk of corrosion).

41 00... SOLDERING STEEL COMPONENTS

IMPORTANT: Comply with the following topics from "Body, General":
Safety regulations See 4100... SAFETY AT WORK and 4100... INFORMATION ON HAZARDS.
Handling electrical/electronic equipment, airbags and restraint systems See 4100... HANDLING AIRBAGS AND RESTRAINT SYSTEMS and 4100...

HANDLING ELECTRICAL AND ELECTRONIC EQUIPMENT.

1. General information

- For repair cases the following method will implemented:
  - Gas brazing
- *The MIG soldering procedure is not used in repairs for strength reasons. MIG soldered/brazed seams used in series production are replaced in repairs by MAG weld seams.*
- Brazed areas from vehicle production are bonded with the same method.

2. Work materials

- Tube pack and torch (gas torch)
- Brazing solder
- Gas bottles (oxygen and acetylene)
- Welding goggles

3. Preparation

- Remove the paint and zinc coating in an area of approx. 30 mm around the seam to be soldered.

4. Implementation

- Execute brazed seam without overheating the solder and with low heat dissipation. If necessary, use heat protecting paste.

5. Subsequent treatment of brazed joints

- Remove burnt residual zinc completely. Align and grind visible connection faces.
- Remove burnt paint with a stainless steel wire brush.

6. Notes on melting/tinning

Only applicable within the European Union!

European used-car regulations prohibit the use of tin containing lead in motor vehicles introduced after 01.07.2003!

Even out unevenness smaller than 2 mm with filler according to painting handbook

If an exceptional unevenness is larger than 2 mm, use **METAL FILLER** .

Only perform in visible areas of the outer skin and on the carrier support.

All areas which have covers on the vehicle are not to be processed.

41 00... SPOT-WELD BONDING STEEL PARTS

IMPORTANT: Comply with the following topics from "Body, General":
Safety regulations See 4100... SAFETY AT WORK and 4100... INFORMATION ON HAZARDS.
Handling electrical/electronic equipment, airbags and restraint systems See 4100... HANDLING AIRBAGS AND RESTRAINT SYSTEMS and 4100... HANDLING ELECTRICAL AND ELECTRONIC EQUIPMENT.

Welding steel parts

- The spot-weld bonding process is used starting from the E65 to increase vehicle rigidity. In partial bodywork areas, a 1-component adhesive is applied to the spot flanges and this is followed by resistance pressure spot welding. The adhesive is hardened only after the paint drying process (at approx. 180°C).
- In the case of repairs, adhesive is not applied to the spot flanges. The number of welding spots is doubled as a substitute for the omitted adhesive.
- The following processes are used as a substitute for spot-weld bonding:
  - MAG welding (**M** etal **A** ctive **G** as welding)
  - Resistance pressure spot welding (referred to in the following and in the repair instructions as spot welding).
- Adhesive is not applied between the spot flanges on new parts in the case of 2- or multi-sheet joints. Areas which cannot be reached by the spot-welding tongs can be joined by MAG spot welding. The number of welding spots is doubled as a substitute for the omitted adhesive.

  Exceptions (e.g. E65) are described in the relevant repair instructions. Apply welding spots to existing welding spots on new part. This is necessary because the adhesive between the spot flanges of the new part acts as an insulator.

  CAUTION: Extract smoke and fumes during welding work.

-

41 00... STAMPING VEHICLE IDENTIFICATION NUMBER (NEEDLE STAMPING UNIT)

Read and comply with **GENERAL INFORMATION** .

The needle stamping system 360 - VRM - BMW is required to stamp the vehicle identification number.

Order number: 81 43 2 155 736

- Sourcing reference:

  BMW Workshop Equipment Catalogue.

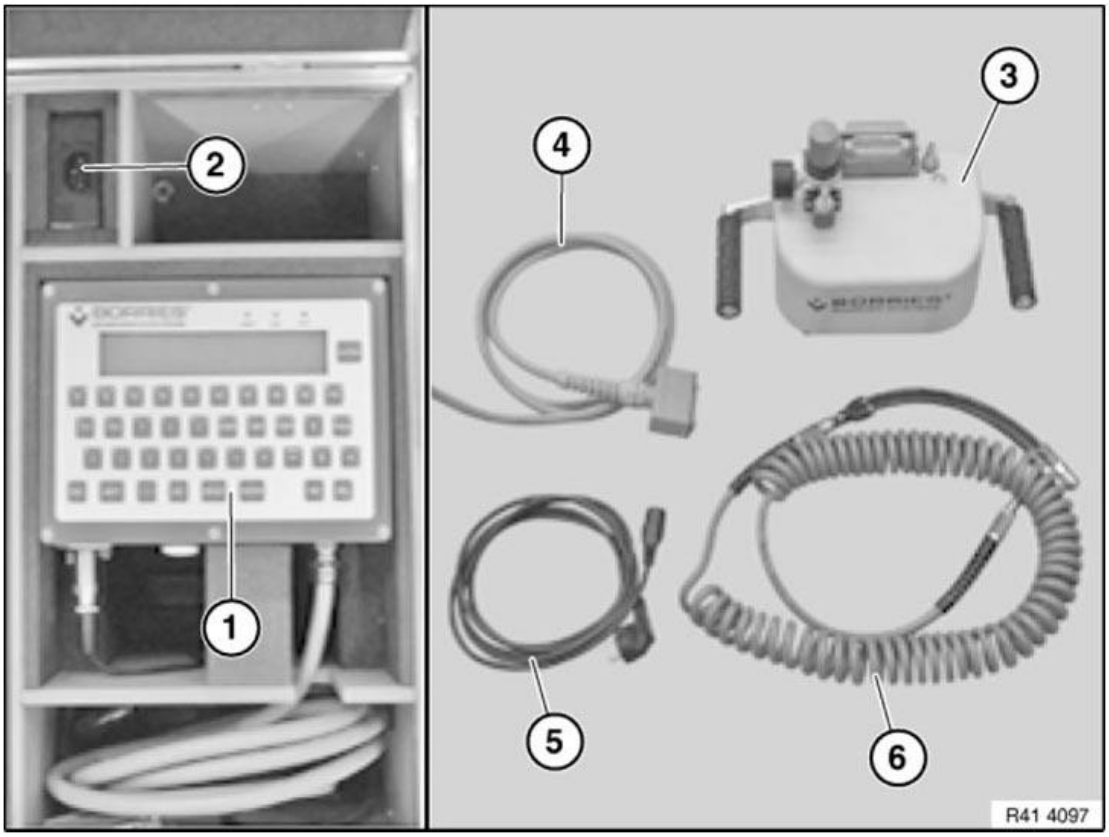


Fig. 69: Identifying Display, Mains Adapter, Needle Stamping Unit, Connecting Cable And Power Cable
Courtesy of BMW OF NORTH AMERICA, INC.

The needle stamping system 360 tool set comprises:

- (1) Display
- (2) Mains adapter
- (3) Needle stamping unit
- (4) Connecting cable
- (5) Power cable
- (6) Compressed-air hose

NOTE: A compressed-air connection is also required.

- **Operating pressure approx. 4 bar**
- **Use only dried, oil-free air**

Procedure for additional vehicle identification number

- Cross through original vehicle identification number.

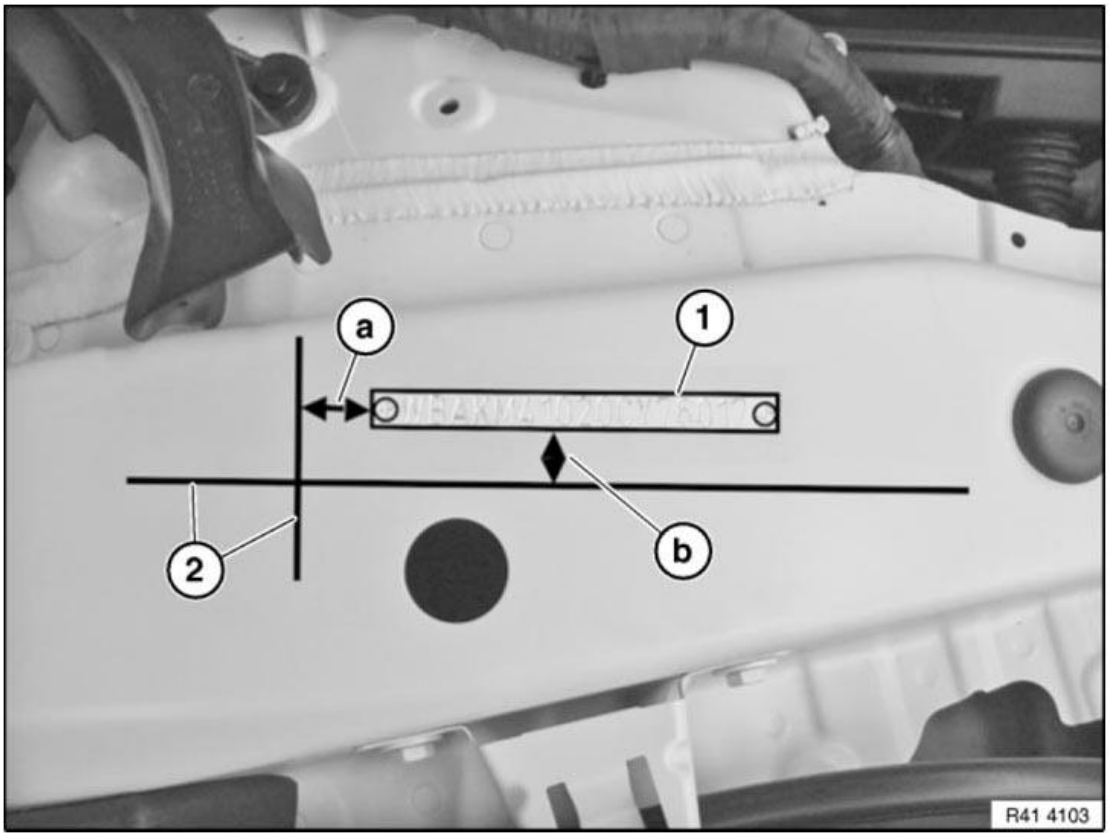


Fig. 70: Identifying Vehicle Identification Number Position
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **ENGINE COMPARTMENT LID SEAL LOCATOR**

(1) = Original vehicle identification number (line 1).

Mark position lines (2) in accordance with specified dimensions/measurements.

Measurement a = 12 mm

Measurement b = 10 mm

Display input:

- Select Layout 5 with arrow button.
- Enter vehicle identification number with F10.
- Press "ENTER" button.

NOTE: With Layout 5 the vehicle identification number (line 1) is crossed through.



Fig. 71: Identifying Display
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Perform stamping operation with position lines in advance on a test sheet.

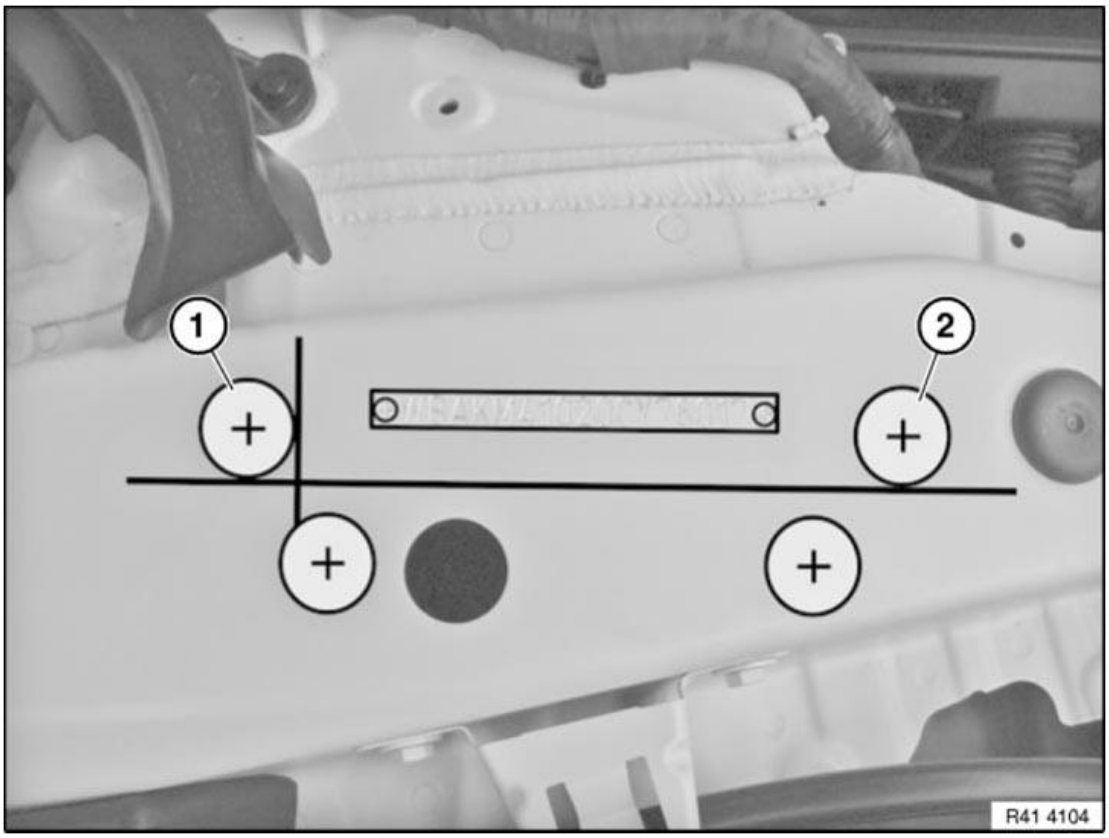


Fig. 72: Identifying Suction Feet Of Needle Stamping Unit Moving Position

Courtesy of BMW OF NORTH AMERICA, INC.

Move suction feet of needle stamping unit to positions (1) and (2) shown.

- First adjust position (1)
- Then adjust position (2)

NOTE: Make sure the unit is resting securely in position. If necessary, adjust the height and position of the suction feet.

Press pushbutton (1) for vacuum pressure.

Then start stamping operation with pushbutton (2).

IMPORTANT: After completing the stamping operation, do not alter the position of the unit. Do not switch off vacuum pressure.

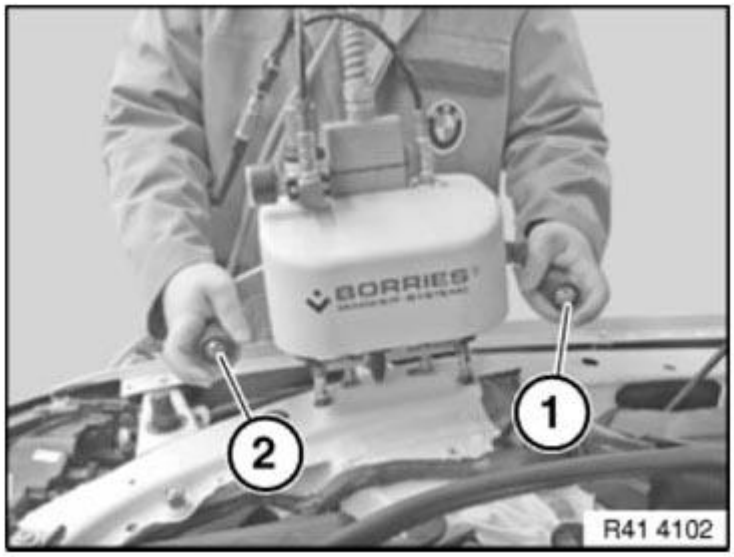


Fig. 73: Stamping Vehicle Identification Number
Courtesy of BMW OF NORTH AMERICA, INC.

Stamping second vehicle identification number

Display input:

- Select Layout 2 with arrow button.
- Press "ENTER" button.

NOTE: With Layout 2 the already entered vehicle identification number is stamped in line 2.



Fig. 74: Identifying Display
Courtesy of BMW OF NORTH AMERICA, INC.

Start stamping operation with pushbutton (2).

After the stamping operation, if necessary adapt **ENGINE COMPARTMENT LID SEAL LOCATOR** of second vehicle identification number.

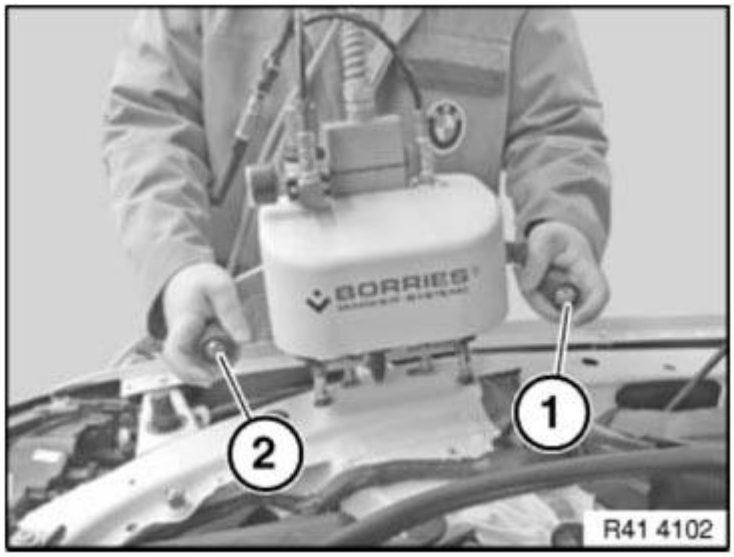


Fig. 75: Stamping Vehicle Identification Number
Courtesy of BMW OF NORTH AMERICA, INC.

Following layout functions are available:

VEHICLE IDENTIFICATION NUMBER CHART

Layout selection	Vehicle identification number
Layout 1	In line 1
Layout 2	In line 2
Layout 3	Turned through 180° in line 1
Layout 4	Turned through 180° in line 2
Layout 5	Cross through in line 1
Layout 6	Cross through in line 2

41 00... STRAIGHTENING ALUMINIUM COMPONENTS IN STRUCTURE

- **Reshaping or heating extruded sections and cast parts is not permitted!**

  Failure to comply with this requirement would have the following results:

  In the case of reshaping, weld seams (E52) or glued connections (E60, E61, E63, E64) tear in the surrounding area.

  In the case of reshaping, the material loses up to 40 % of its original strength.

  In the case of heating, the material loses up to 40 % of its original strength.

  The adhesive is destroyed at temperatures =120°C (E60, E61, E63, E64).

  Extruded sections and cast parts which show visible or measurable signs of deformation must be replaced.

  Perform the check for deformation with the aid of the straightening system.

  For optical testing, strip adjoining components in cases of doubt.

  Extruded sections are used in the E52 as engine supports, door pillars, side members, etc.

  Extruded sections are used in the E60, E61, E63, E64 as engine supports.

  Cast parts are used in the E60, E61, E63, E64, E70, E71 as spring supports.

- Reshaping of extruded sections and cast parts may only be used to achieve optimum joining of connecting faces (e.g. when bulkhead is damaged). Reshaped parts must be replaced.
- Repairs which affect the mounting points of mechanical assemblies and chassis components must be carried out on the straightening bench. Use the vehicle-specific straightening attachment set or vehicle-specific data sheet.

  Straightening attachment supports and data sheets are also available for the top section, e.g.: door pillars, convertible top mounts, cowl, rear lid hinges, etc.

- Check windshield and rear window apertures for curvature by inserting the original glass.

- Take the gap dimensions for doors, engine hood and rear lid from the vehicle-specific gap dimension diagram.
- Exceptions on the E60, E61, E63, E64:

  Carrier support and bulkhead may be straightened if they do not have any cracks, sharp-edged damage or holes. After repair work, check parts again for cracks.

  Examine adjoining adhesive flanges for peeling off. If necessary, seal and preserve with **SEALING COMPOUND** .

  Observe the frame alignment control dimensions for the carrier support.

  Any repairs to the bulkhead if cracked outside the approved repair scopes are only permitted after consultation with and approval by BMW. Should you have any questions, please contact the country-specific Hotline.

41 00... STRAIGHTENING ALUMINIUM PARTS ON OUTER SKIN

1.0 Recommended tools

- Use only those tools specially intended for aluminium repairs (refer to Service Information 5 03 03 975).
- Do not use any tools that have already been used for steel repairs (contact corrosion).
- Do not use any sharp-edged tools (notch effect).

2.0 Straightening outer shell

- "Cold" straightening: Press dents out from their center and smooth in an outwards direction with gentle taps.

  In the case of small, soft dents (hail and parking damage), this is also possible without damaging the paintwork. This work requires a special tool (refer to Service Information 5 04 98 328) and a trained worker.

- "Hot" straightening: Heat dents in their central point only with a gas flame or hot air blower. Then quench the material with a wet cloth. Heating can only be detected by warpage of the material. The color of the paint does not change.
- In the case of damaged areas which are only accessible from one side, stud welding can be used (refer to Service Information 5 01 00 532). The aluminium stud welded on in the center of the damaged area is beaten out with a hammer until the dent is eliminated. The stud is then ground off.
- Avoid notching and cracking.
- Avoid hardening and overstretching.
- Avoid heating and overheating the outer shell over large areas.

41 00... STRAIGHTENING STEEL COMPONENTS IN THE STRUCTURE

- High-strength and super-high-strength steel plates as a rule cannot be reshaped. Reshaping only serves as a preparatory measure to replacing the component in order to achieve optimal joining of the connection points.
- Bearing body components such as e.g. engine supports, door pillars, side members etc. with deformations which can no longer be returned to their original shape by "cold straightening" must be replaced.

  Heating bearing body components for better reshaping is not permitted!

  Failure to comply with this requirement would result in a loss of original strength of up to 40 %.

- **The body must be anchored as follows for reshaping:**

  If using vehicle-specific/universal straightening attachment sets (Carbench/Celette/Car-O-Liner), it is necessary to secure the body **additionally** with 4 retaining clips to the spot flange of the entrance or to the 4 jacking points. The spot flange (if available) is to be preferred.

  If using universal electronic or mechanical straightening systems (Car-O-liner/Celette), it is necessary to secure the body with 4 retaining clips to the spot flange of the entrance or to the 4 jacking points. The spot flange (if available) is to be preferred. **In addition** anchor at least 2 points with the securing set.

  Failure to comply with these instructions will result in damage to the body during reshaping in non-damaged areas. Vehicle-specific straightening attachments and universal mounts may be damaged.

- Repairs affecting the mounting points of assemblies and chassis/suspension components must be carried out on the straightening bench with the matching straightening attachment set or specification sheet for the vehicle.

  Straightening attachments and specification sheets are also available for the top section, e.g.: door pillars, convertible top mounts, cowl, rear lid hinges, etc.

- Check windshield and rear window apertures for curvature by inserting the original glass.
- Take the gap dimensions for doors, engine hood and rear lid from the vehicle-specific gap dimension diagram.

41 00... STRAIGHTENING STEEL PARTS ON OUTER SKIN

1.0 Recommended tools

Only use those tools designed for steel repairs.

2.0 Straightening outer shell

- "Cold" straightening: Press dents out from their center and smooth in an inwards direction with gentle taps.

  In the case of small, soft dents (hail and parking damage), this is also possible without damaging the

paintwork. This work requires a special tool (refer to Service Information 5 04 98 328) and a trained worker.

- "Hot" straightening: Heat dents in their central point only with a gas flame until bright red hot. Then quench the material with a wet cloth.
- Stud welding can be used in the case of damage where access is only possible from one side. Weld on the stud in the middle of the damaged area. The steel pin or shim is driven out using a hammer until the depression is removed. The stud, pin or shim is then ground or twisted off.
- Avoid cracking.
- Avoid hardening and overstretching.
- Avoid heating and overheating the outer shell over large areas.
- If, after steel parts have been straightened, the surface shows no dents larger than 2 mm, these dents may be touched up with knifing filler.

  Dents larger than 2 mm must be treated with filling solder.

  NOTE: Only applicable within the European Union!
  European used-car regulations prohibit the use of tin containing lead in motor vehicles introduced after 01.07.2003!

- For safety vehicles, follow the special notes and information in the repair instructions.

41 00... USE OF MATERIALS IN OUTER SKIN

The following illustration is a schematic representation of all the body variants.

Apply this illustration to the relevant vehicle.

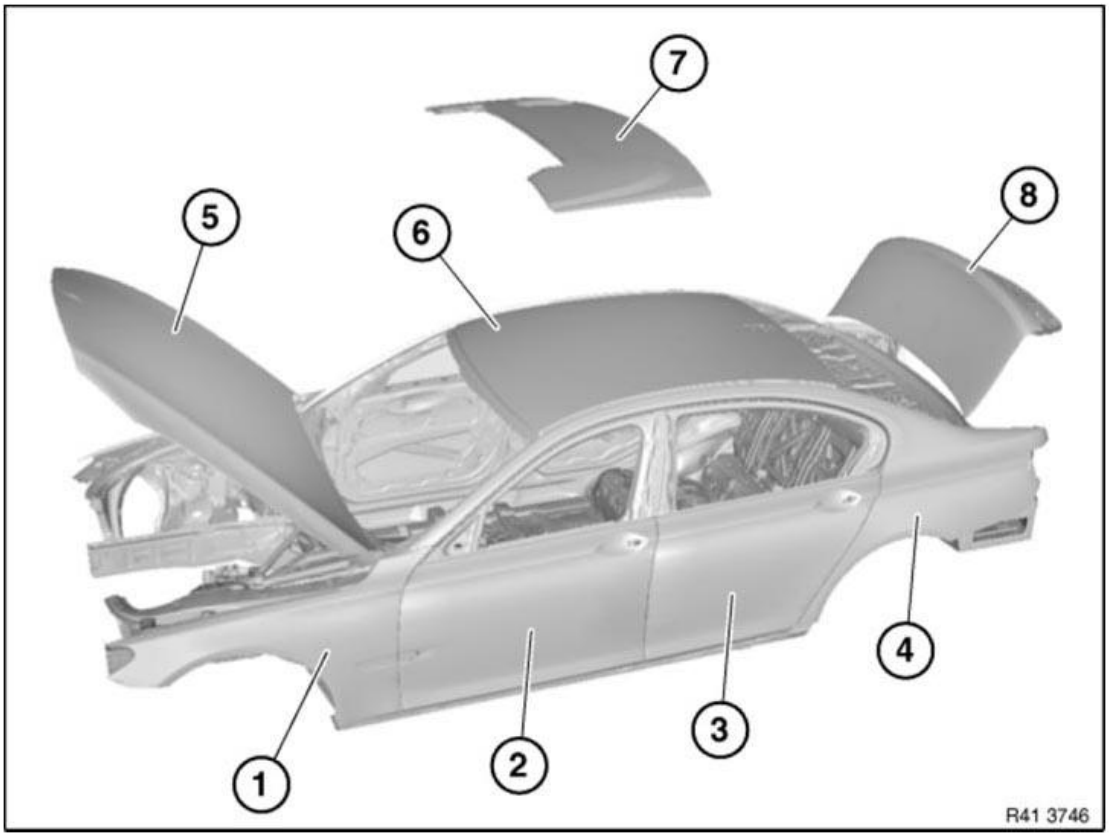


Fig. 76: Identifying Vehicle Components
Courtesy of BMW OF NORTH AMERICA, INC.

All components not listed in the table below are composed of established sheet steel qualities.

MATERIAL CHART

Component	Vehicle	Material
(1) Side panel, front	F01	Aluminium
	F02	Aluminium
	F10	Aluminium
(2) Front door	F01	Aluminium
	F02	Aluminium
	F07	Aluminium
	F10	Aluminium
(3) Rear door	F01	Aluminium
	F02	Aluminium
	F07	Aluminium
	F10	Aluminium
(5) Engine compartment lid	F01	Aluminium
	F02	Aluminium
	F07	Aluminium

	F10	Aluminium
(6) Hardtop/roof	F01	Aluminium
	F02	Aluminium
(8) Rear lid	F07	Aluminium

41 00... VEHICLE IDENTIFICATION NUMBER, GENERAL

In the event of repair 2 procedures are used, depending on the vehicle. Refer to the vehicle-specific repair instructions for the correct procedure.

1. General notes for stamped vehicle identification numbers

The vehicle identification number is stamped with a special tool. There are different special tool numbers and stamping procedures for the various vehicles. Refer to the relevant repair instructions.

In repair work, the vehicle identification number is always stamped into a replacement vehicle identification number surface. The replacement surface is usually situated under the original VIN surface.

The IGEF number (bodyshell number) is omitted when the wheel arch is replaced.

In the event of component or body replacement by the BMW garages/workshops, clearly delimit the vehicle identification number at front and rear by stamping a + in place of the BMW badge.

If a VIN is stamped into the replacement surface in addition to the original VIN (e.g. if the original VIN has been tampered with), the following applies: The original VIN must be crossed out. To do so, stamp the letter I from the punch digits lengthways through the original VIN.

IMPORTANT: Do not use an angle grinder in conjunction with a cutting disk!

The protective film used as standard is omitted after the VIN has been manually stamped in. Paint area in accordance with BMW Painting Handbook. Ensure that layer thicknesses are small.

Observe national/country-specific regulations.

2. General notes for embossed vehicle identification numbers

This procedure is used on all newly launching model series from model year 09/2008 (exception X1).

For the repair new parts with an embossed vehicle identification number can as a rule be ordered from the BMW Parts Department. If this is not possible, observe country-specific regulations.

The IGEF number (bodyshell number) is omitted when the wheel arch is replaced.

If a VIN is embossed into the replacement surface in addition to the original VIN (e.g. if the original VIN has been tampered with), the following applies: The vehicle-specific repair instructions describe the procedure.

The protective film used as standard is omitted after the VIN has been embossed. Paint area in accordance with BMW Painting Handbook. Ensure that layer thicknesses are small.

Observe national/country-specific regulations.

41 00... WELDING IN REINFORCEMENT PLATE (STEEL PLATE)

In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A reinforcement plate is welded in to ensure sufficient strength.

Follow notes for welding steel parts.

NOTE: The following illustrations serve as general illustrations of reinforcement plate repair work. They are applicable to all cutting repairs.

Mark component in accordance with distance A and cut.

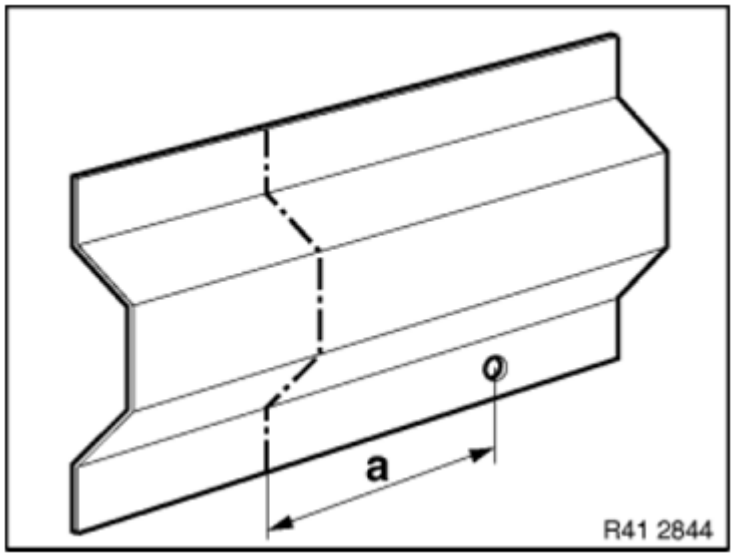


Fig. 77: Identifying Component Cutting Distance
Courtesy of BMW OF NORTH AMERICA, INC.

Cut new part (1) in accordance with cut and if necessary adjust to fit with straightening attachment or universal mount.

Installation:

Adhere to a gap at severance cut of approx. one to max. two material thicknesses in order to ensure welding with the reinforcement plate and to facilitate a more tolerant fit.

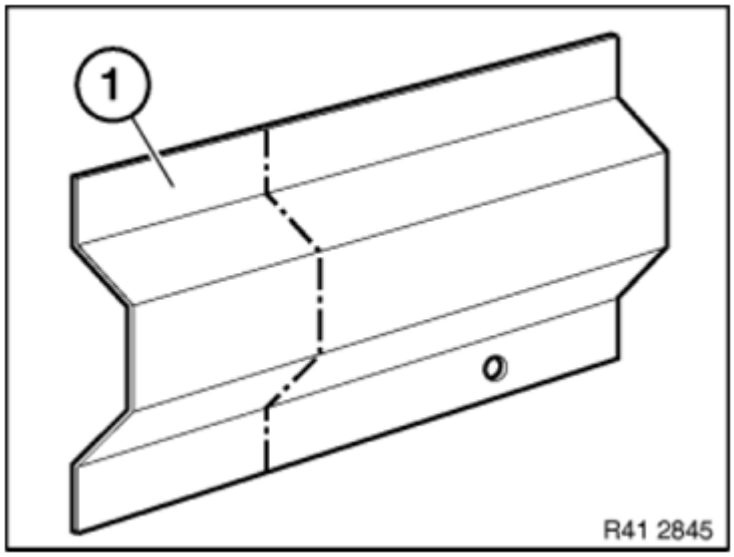


Fig. 78: Identifying Cut Position Of Part
Courtesy of BMW OF NORTH AMERICA, INC.

Clean inner and outer sides of connecting areas (1) on new part and (2) on body.

Coat inner sides with welding primer.

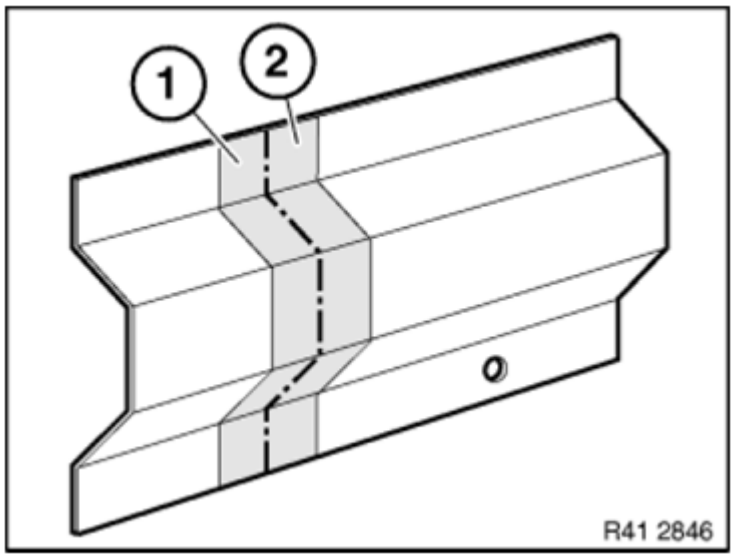


Fig. 79: Identifying Inner And Outer Sides Of Connecting Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Drill holes (1) and (2) at distance of 25 mm to each other.

Hole diameter approx. 8 mm.

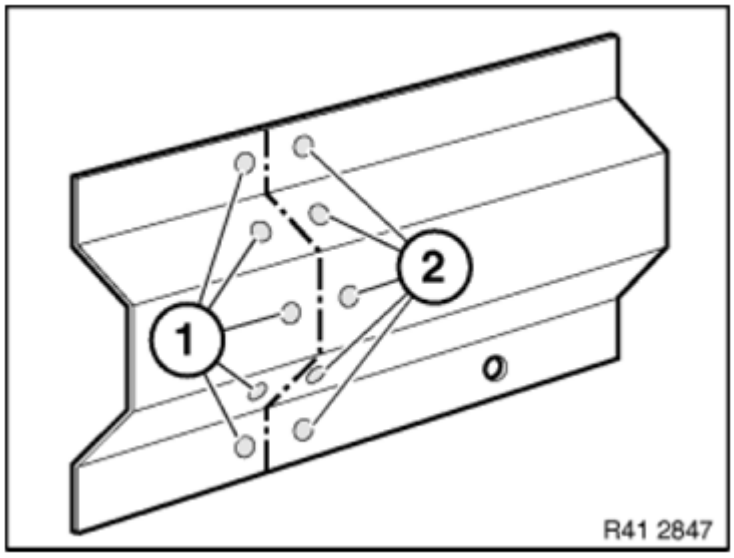


Fig. 80: Identifying Drill Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Make reinforcement plate (1) from trim of new part.

If necessary, make further reinforcement plates.

Length of reinforcement plates is min. 40 mm.

Coat reinforcement plates (1) and (2) on both sides with welding primer.

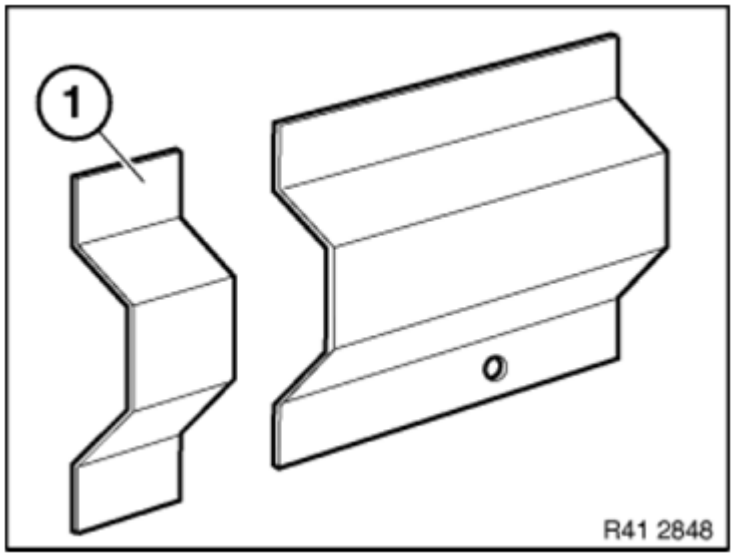


Fig. 81: Identifying Reinforcement Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Push reinforcement plate (1) into component on body up to half way and plug-weld (3).

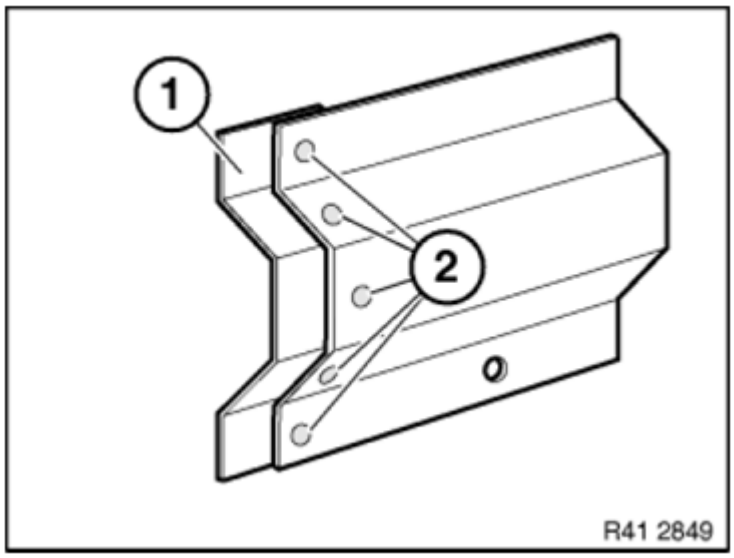


Fig. 82: Pushing Reinforcement Plate Into Component On Body Up To Half Way And Plug-Weld
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, adjust new part (1) to fit with straightening attachment or universal mount and plug-weld (2).

MAG weld joint (3).

Grind and clean weld seam and plug weld spots.

Only visible areas of the outer skin and worn areas on the support carrier must be tinned.

All areas which have covers on the vehicle are not to be tinned.

NOTE: Only applicable within the European Union!
European used-car regulations prohibit the use of tin containing lead in motor vehicles introduced after 01.07.2003!

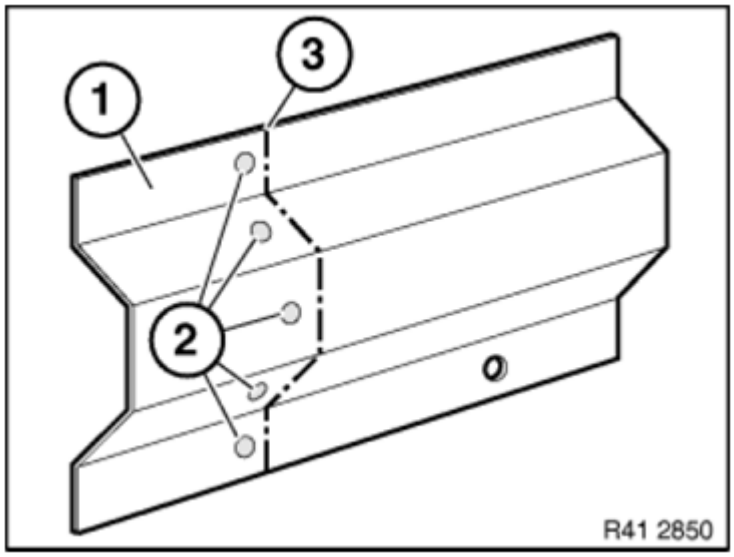


Fig. 83: Identifying Plug-Weld And MAG Weld Joint
Courtesy of BMW OF NORTH AMERICA, INC.

41 00... WELDING STEEL COMPONENTS

IMPORTANT: Comply with the following topics from "Body, General":
Safety regulations See 4100... SAFETY AT WORK and 4100... INFORMATION ON HAZARDS.
Handling electrical/electronic equipment, airbags and restraint systems See 4100... HANDLING AIRBAGS AND RESTRAINT SYSTEMS and 4100... HANDLING ELECTRICAL AND ELECTRONIC EQUIPMENT.

1. General information

- The following procedures are used for repairs:
  - MAG welding (**M** etal **Ac** tive **G** as welding)
  - Resistance pressure spot welding (referred to in the following and in the repair instructions as spot welding).
- Take the number and location of weld spots and MAG weld seams from the separated part. Replace areas inaccessible to spot-welding tongs with MAG plug/spot welds at the same distance. Diameter of bores for plug/spot welds 8 mm.
- In the case of emissions extraction, observe a minimum distance of 30 cm for MAG welding during the welding process. Otherwise the inert gas would be drawn off.
- Follow the equipment manufacturer's instructions for use.

2. Work materials

- MAG welding:
  - Steel welding apparatus (see **WORKSHOP EQUIPMENT**).

- Steel welding wire - G3SI1 (SG2) or alternatively G4SI1 (SG3)
- Welding mask
- Gas bottle containing inert gas (82 % argon, 18 % CO 2)

- Resistance pressure spot welding:
  - Spot-welding apparatus (see **WORKSHOP EQUIPMENT**).
  - Protective goggles

3. Preparations for MAG and spot-welding

- Remove the paint coating in an area of approx. 30 mm around the weld seam or spot.
  - The zinc coating underneath must be removed during the MAG welding operation.
  - It is not necessary to remove the zinc coating underneath during spot-welding.
- Remove the paint coating on the reverse side of the weld seam or spot.
  - Contaminants will otherwise enter the weld pool via the root of the weld seam.
  - An insufficient electron flow prevents an optimum spot-weld joint.
- Coat all metal overlaps and weld spot flanges with welding primer.
- To determine the optimum electrode contact force for spot-welding, carry out spot-weld shear tests on sample metal sheets.
- In order to keep the electron flow short during MAG welding on the body, you must if possible attach the ground terminal directly to the component to be welded.

4. Welding

- During MAG welding, the weld gap must be kept as small as possible. The larger the weld gap, the lower will be the strength of the joint.
- During spot-welding, the metal flanges to be joined must be placed as close together as possible without gaps.

  The larger the gap, the lower will be the strength of the joint.

  Minimum gap between welding spots 25 mm.

5. Subsequent treatment of weld joints

- When grinding a weld seam, do not grind thin the base material next to the seam.
- After joining, clean all weld seams and spots with a stainless steel wire brush.
- Remove burnt paint with a stainless steel wire brush.
- All weld joints sealed off with body sealing compound in original state must be primed and sealed off again thoroughly after repairing. Replace damaged or removed anti-drumming layers.

41 00... WORKING WITH 2-COMPONENT PU CAVITY FOAM

Sourcing reference for cavity foam, refer to BMW Parts Service.

Properties of cavity foam:

- 2-component PU foam, solvent-free.
- Excellent flow capacity, enabling complete sealing of cavities.
- Good strength, preventing slipping in cavities.
- Low water absorption, preventing corrosion.
- Ideal for use as insulating and sealing compound

Information on dangers/hazards

- Avoid eye and skin contact.

  Wear protective goggles, solvent-resistant protective gloves and protective clothing.

- Do not inhale.

  Apply in well ventilated rooms only.

  WARNING: Application time after mixing: within 8 minutes!

- Completely empty open can after use.
- Remaining amounts which are not used can cause the **can to explode** on account of a chemical reaction (buildup of heat)!

  Alternatively, cool the can containing the non-removed remaining amount for several hours in cold water.

- Do not eat, drink or smoke during this operation.
- Keep heat and ignition sources well away.
- Read the manufacturer's information on hazards/dangers (printed on the can) prior to application.

Application instructions

- Use by date on can.

  Do not use the spray can after the Use by date on the can has expired. After the Use by date the properties of the cavity foam will no longer meet the requirements of the BMW Group.

- Cavity sealing of repair area possible after an air drying time of 1 hour.
- Backing surface must be

  clean and free from

dust,

grease,

oil and stripping agent.

- Application temperature at least 15°C. Optimally 20°C.
- Remove fresh, non-hardened PU foam with adhesive cleaner 208.

  Sourcing reference: BMW Parts Service.

  Hardened PU foam can only be removed by mechanical means (machine).

- Excess, hardened PU foam can be disposed of as residual waste.

  Cans which are not entirely empty and unused whose Use by date has expired are classed as hazardous waste.

  Observe country-specific waste-disposal regulations.

- Observe the manufacturer's application instructions (printed on the can).
- **IMPORTANT: Foam expands many times over as it sets (change in volume).**
- Setting takes approx. 30 minutes. Mechanical processing (e.g. drilling, cutting, etc.) is then possible.

41 00... WORKSHOP EQUIPMENT

Minimum workshop equipment requirements in order to ensure the correct and expert performance of body repairs:

The tools listed below **must be used.**

All repair stages:

TOOL SPECIFICATION

	Steel		Aluminium	
Tool(1)	**Structure**	**Outer skin**	**Structure**	**Outer skin**
Vaupel pressure cup spray gun for cavity preservation	x	x	x	x
(1) Sourcing reference BMW Workshop Equipment Catalogue.				

Repair stage 1:

TOOL SPECIFICATION

	Steel		Aluminium	
Tool(1)	**Structure**	**Outer skin**	**Structure**	**Outer skin**
Body tool trolley	x	x		x
Aluminium bodywork tool assortment			x	x
(1) Sourcing reference BMW Workshop Equipment Catalogue.				

Repair stage 2:

TOOL SPECIFICATION

	Steel		Aluminium	
Tool(1)	**Structure**	**Outer skin**	**Structure**	**Outer skin**
Body tool trolley	x	x		
Bodywork saw	x	x		
Belt sander	x	x	x	x
Single-handed grinder	x	x	x	x
Welding spot remover	x	x		
Universal riveting tool	x	x	x	
Punch riveting tool	x	x	x	
CARTRIDGE GUN for adhesives	x	x		x
(1) Sourcing reference BMW Workshop Equipment Catalogue.				

Repair stage 3:

TOOL SPECIFICATION

	Steel		Aluminium	
Tool(1)	**Structure**	**Outer skin**	**Structure**	**Outer skin**
Body tool trolley	x	x		
Aluminium bodywork tool assortment			x	x
Bodywork saw	x	x		
Belt sander	x	x	x	x
Single-handed grinder	x	x	x	x

Welding spot remover	x	x		
Drill	x		x	
MAG welding apparatus	x	x		
MIG welding apparatus			x (E52 only)	
Spot welding apparatus	x	x		
Gas welder		x		
Straightening system	x		x	
Stud welding apparatus	x		x	
Flame coating set			x	
Universal riveting tool			x	
CARTRIDGE GUN for adhesives	x	x	x	
(1) Sourcing reference BMW Workshop Equipment Catalogue.				

IMPORTANT: In vehicles from model year 2001, higher-tensile and high-tensile steels are used in certain areas.
It is essential to check whether the spot-welding apparatus used conforms to the technical requirements of the currently recommended welding sets. Should you have any questions, please contact the country-specific Hotline.
The use of technically obsolete equipment may have serious consequences for the structure of the vehicle (e.g. in the event of a crash). In the end, this can result in safety and product liability risks which can not be calculated.

Use and restrictions:

Definition of recommendation:

All currently recommended spot welding sets comply according to the latest information with the requirements relating to reliable welding of today's and future BMW Group vehicles. A spot welding unit will loose its recommendation as soon as tests with materials and material combinations designated for future use in BMW Group vehicles return negative results (see Table Group 1). All previous application before the withdrawal of the recommendation shall remain unaffected.

DEVICE DESIGNATION CHART

	Device designation	**Manufacturer**
Group 1 Devices currently no longer recommended	CR500	Car-O-Liner
	Spot9000	Tecna

	ATL 400V	Wielander&Schill
Group 2 Devices currently *recommended*	MIDIspot QSVM9000	Celette)(1)
	MIDIspot QSVM9000	Elmatech)(1)
	CR600 QSM	Car-O-Liner) (1)
	MIDIspot QSVM12000T	Car-O-Liner
	MIDIspot QSVM12000T	Elmatech
(1) no longer produced		

Application options and restrictions of above devices.

VEHICLE CHART

Vehicle	**Group 1**	**Group 2**
All convertibles from E64	x Except A-pillar, B-pillar, sill	x
All model series from E70	x Except B-pillar	x

NOTE: Status October 2009

All vehicles not mentioned can be repaired with the equipment of Group 1 and Group 2.

4111 SUPPORT MEMBERS

41 11 150 COVER FOR FRAME SIDE MEMBER (PART REPLACEMENT BETWEEN A AND B PILLAR)

Observe procedure for **REPAIR STAGE 3** .

Read contents of **BODY, GENERAL** .

Following new body parts are required:

- (1) B-pillar with entrance

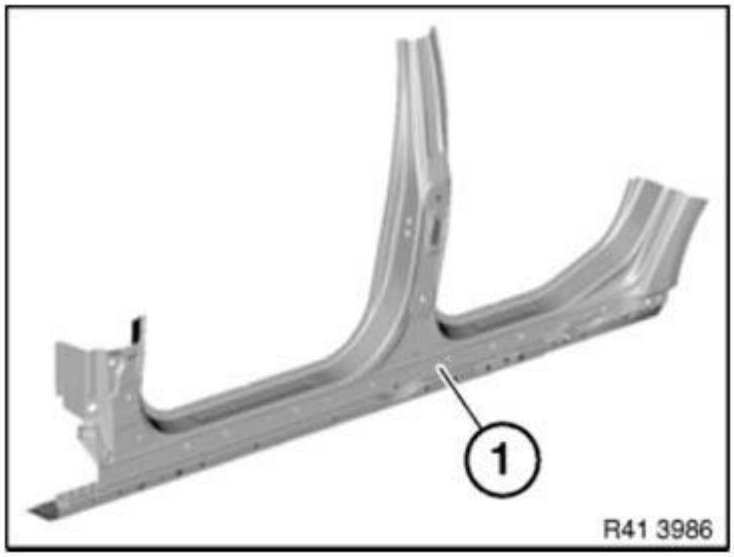


Fig. 84: Identifying B-Pillar With Entrance
Courtesy of BMW OF NORTH AMERICA, INC.

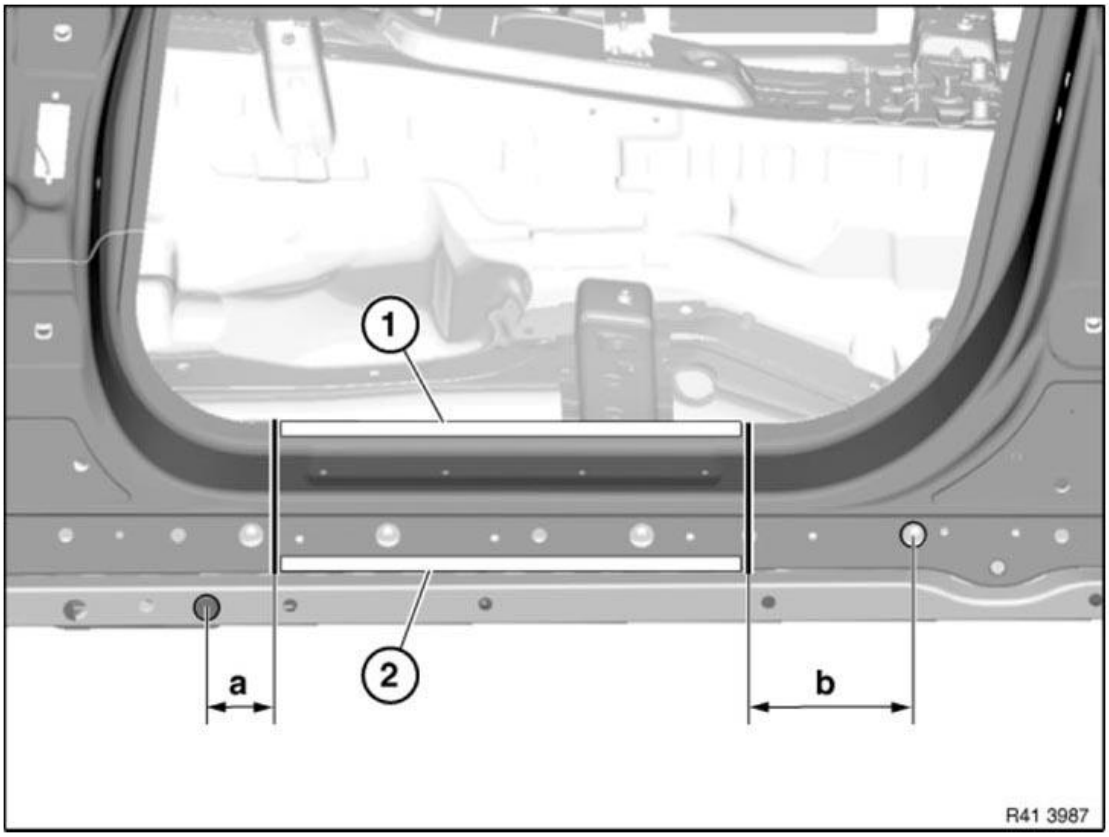


Fig. 85: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cuts in accordance with specified measurements and cut.

IMPORTANT: Cut outer panel only for following severance cuts.

Measurement a = approx. 70 mm behind hole dia. 25 mm.

Dimension b = approx. 180 mm in front of 25 mm hole.

Open welded connections in areas (1) and (2).

Installation note:

Mark new part in accordance with severance cuts on vehicle and cut.

Open welded connections of new part to suit the vehicle.

Weld in **REINFORCEMENT PLATES** at all severance cuts.

Set repair welding spots in area (1) on existing welding spots on vehicle. This is necessary because the adhesive between the spot flanges acts as an insulator.

41 11 542 COVER FOR SIDE MEMBER AT REAR (REAR SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Use only approved **SPOT-WELDING APPARATUS** for repairs.

The following new bodywork parts are required:

- Cover, side member, rear

  (component is included on new side panel part)

Removal

Open weld joints in area (1).

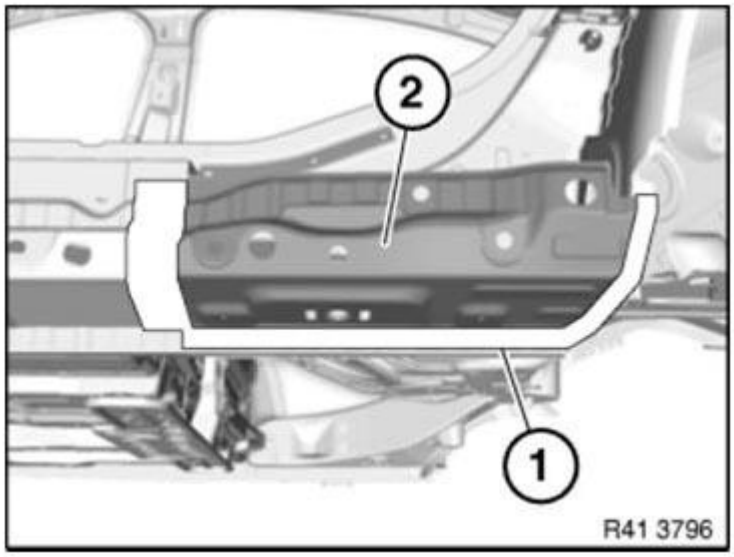


Fig. 86: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

View from below:

Open weld joint (1).

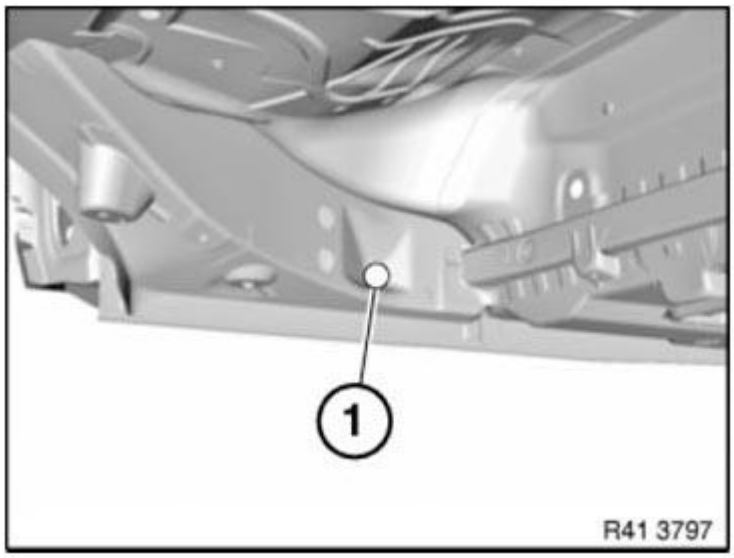


Fig. 87: Identifying Weld Joint
Courtesy of BMW OF NORTH AMERICA, INC.

View from inside:

Open weld joint (1).

Remove side member cover.

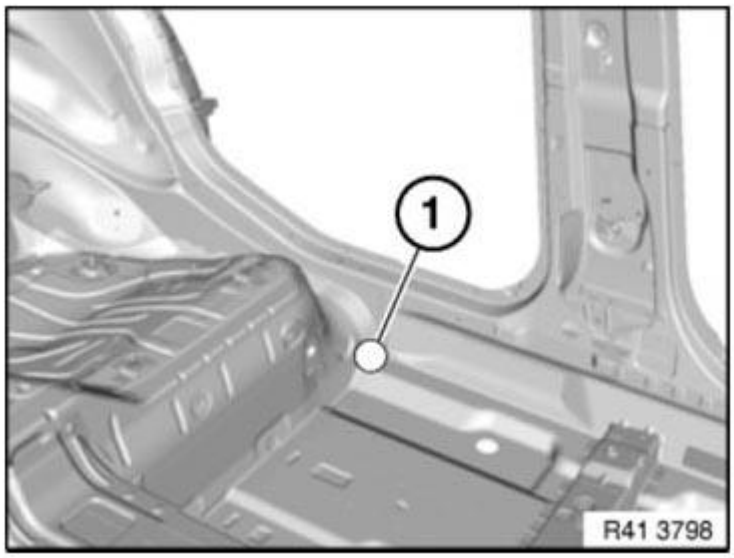


Fig. 88: Identifying Weld Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Detach side wall.

Open welded connections in area (1) and remove side member cover (2).

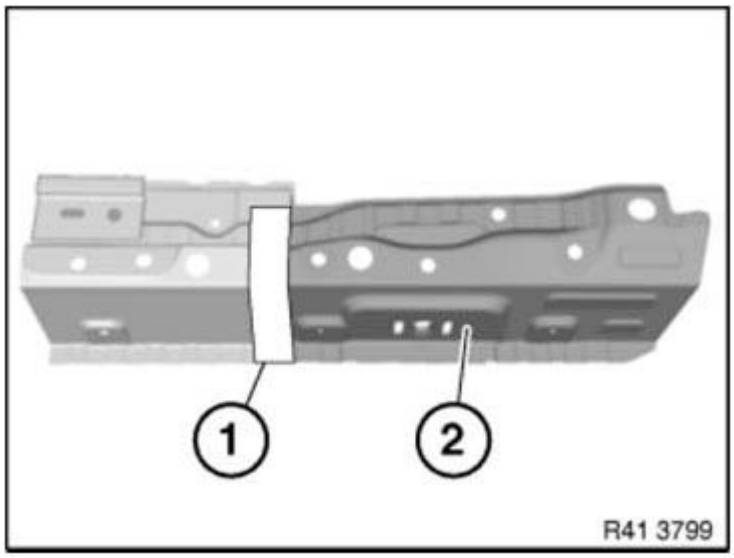


Fig. 89: Identifying Welded Connections Area And Side Member Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Install new part and weld.

NOTE: Apply repair welding spots in area of sill bottom edge to existing welding spots on new component/car. This is necessary because the adhesive between the spot flanges acts as an insulator.

41 14 021 Filling bulkhead cross-member with foam

For acoustic insulation reasons insulating foam is applied to the finish-painted bodyshell in the bulkhead cross-member area.

A 2-component PU cavity foam is used.

Sourcing reference for cavity foam, refer to BMW Parts Department.

Observe **SAFETY AND APPLICATION INSTRUCTIONS** .

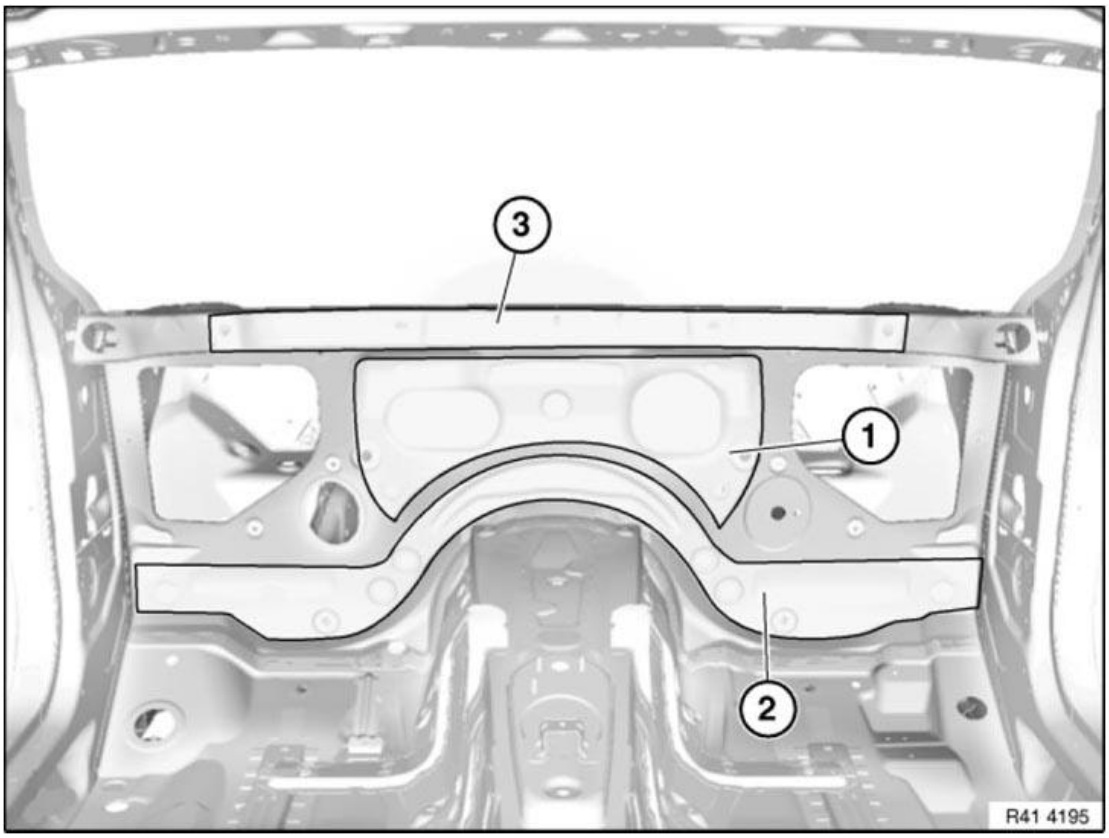


Fig. 90: Identifying Seal Plugs Of Cavities
Courtesy of BMW OF NORTH AMERICA, INC.

Remove seal plugs of cavities 1 to 3 and fill cavities with foam.

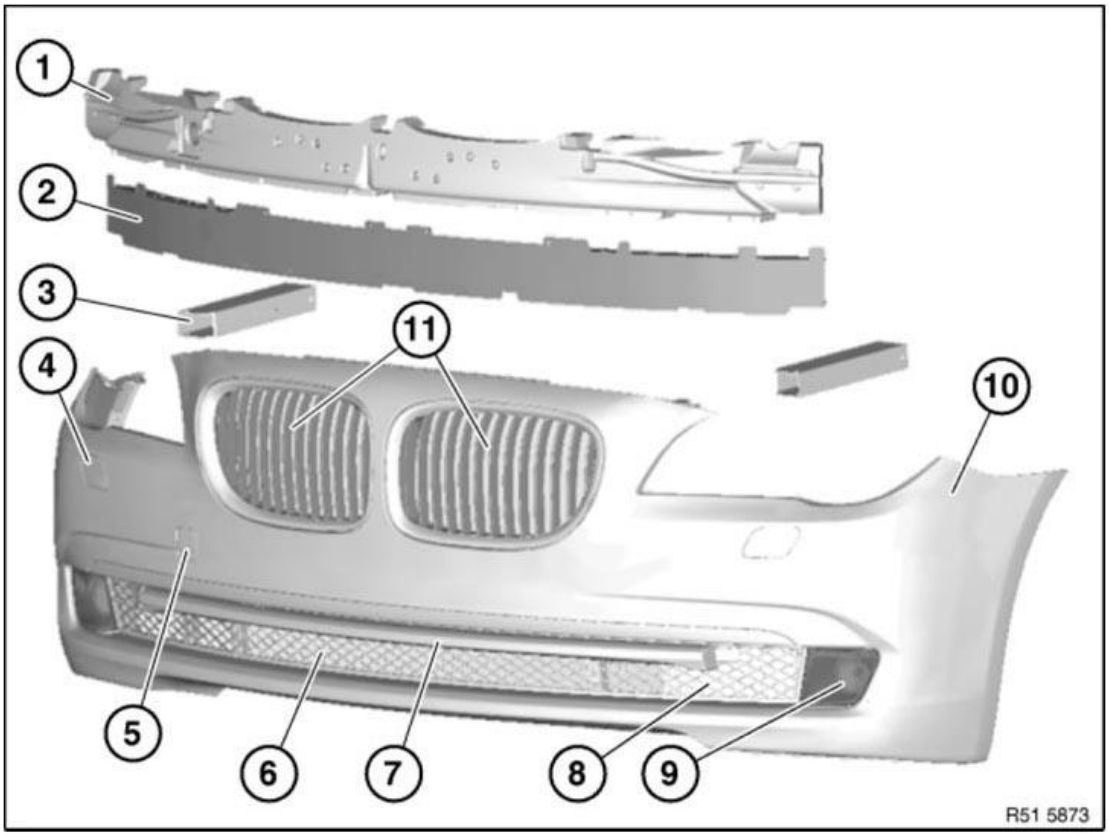
In so doing, insert spray pipe into bores and slowly pull out during the spraying operation.

To perform the operation, it may be necessary to lengthen the spray pipe.

IMPORTANT: Empty the can within 8 minutes.

Follow manufacturer's safety instructions.

51 11... OVERVIEW OF FRONT BUMPER



1	Impact absorber, top	6	Ornamental grille, bumper trim, middle
2	Front support	7	Trim strip, front
3	Deformation element, front lower	8	Ornamental grille, bumper trim, side
4	Cover cap, headlight washer	9	Front fog light
5	Towing eye	10	Bumper trim
		11	Middle ornamental grille

Fig. 91: Identifying Front Bumper Components
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 091 REPLACING ENGINE SUPPORT IN FRONT OF BULKHEAD, LEFT

Observe procedure of **REPAIR STAGE 3**.

Read **CONTENTS OF BODY, GENERAL**.

Steel-aluminium composite construction is used on the vehicle.

Observe specific procedures for **OPENING ADHESIVE BONDS**, **BONDING ALUMINIUM ON STEEL**, and **OPENING RIVETED JOINTS**.

Use only approved spot-welding apparatus for repairs. See **WORKSHOP EQUIPMENT**.

Place vehicle on straightening bench.

The following new body parts are required (see BMW Electronic Parts Catalogue):

- (1) Engine support
- (2) Engine support, rear

The following consumables are required:

Material	Quantity
Adhesive K1	1
Blind rivets N2	19
Cleaning agent R1	1
Cavity sealing wax remover	1
Sealant D1	

Removal of engine support

Open welded connections in area (1).

Drill out rivet connections in areas (1) and (2).

Important!

Do not damage aluminium spring strut dome!

Drill diameter max. 6.8 mm.

Mark severance cut (1) in accordance with dimension a and cut engine support.

Dimension a=140 mm

Roughly mark severance cuts (1) and cut.

Important!

Do not damage aluminium spring strut dome (2)!

Heat **ADHESIVE AREAS** with hot air blower and release sheet sections (1) from spring strut dome.

Important!

Do not damage aluminium spring strut dome (2)!

Open welded connections in area (1) and remove engine support section (2).

New part preparation

Mark severance cuts on new parts in accordance with severance cuts on vehicle and cut.

Prepare **REINFORCEMENT PLATES** at severance cuts.

NOTE: The following graphics serve as general illustrations of reinforcement plate repair work. They are applicable to all sectional repairs.

Mark component in accordance with dimension A and cut.

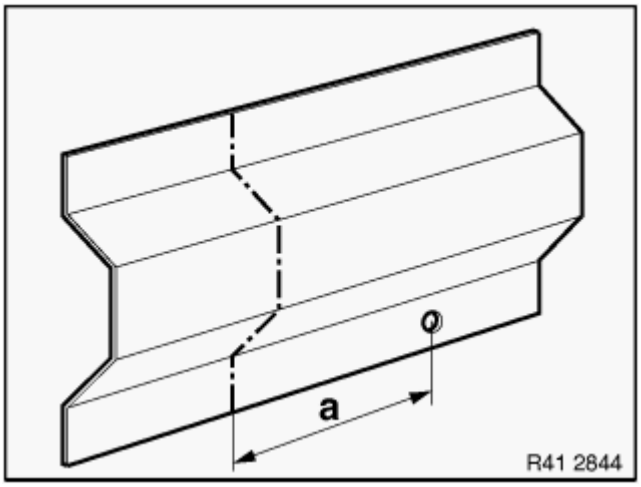


Fig. 92: Marking Component
Courtesy of BMW OF NORTH AMERICA, INC.

Cut new part (1) in accordance with cut and if necessary adjust to fit with alignment bracket or universal mount.

Installation note:

Maintain a distance of approximately one to no more than two material thicknesses at the severance cut to ensure welding with the reinforcement metal and enable more tolerant adjustment.

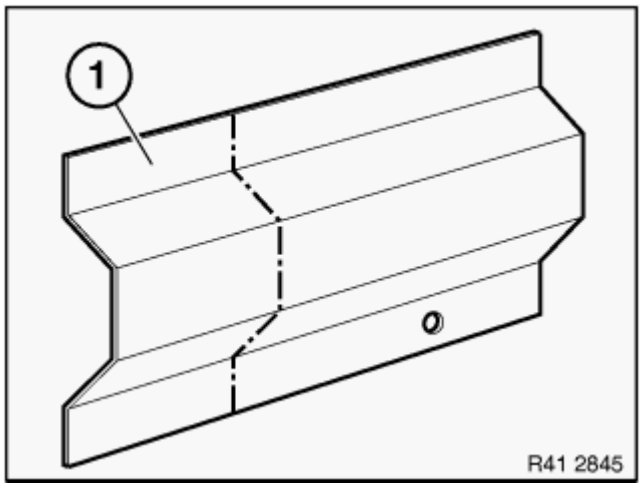


Fig. 93: Cutting New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Clean inner and outer sides of connection faces (1) on new part and (2) on body.

Coat insides with welding primer.

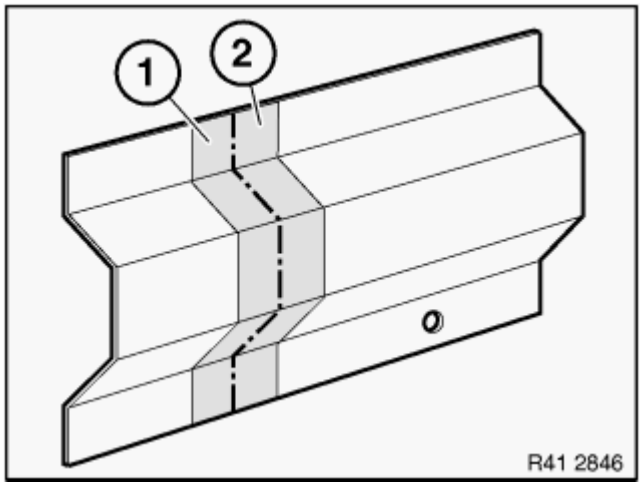


Fig. 94: Identifying Cleaning Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Drill bore holes (1) and (2) at distance of 25 mm to each other.

Hole diameter approx. 8 mm.

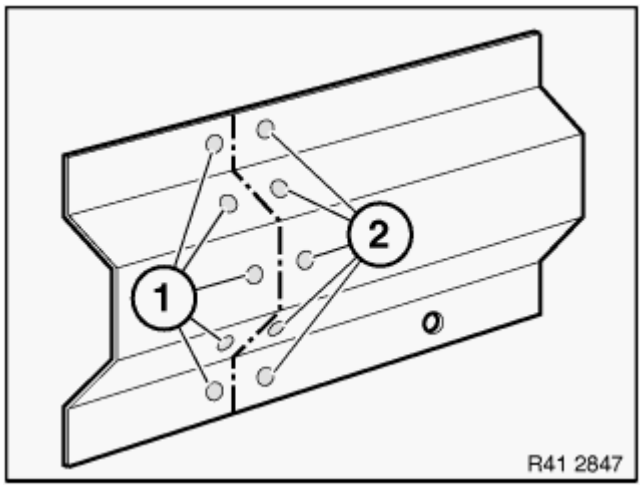


Fig. 95: Identifying Areas For Drilling Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Make reinforcement plate (1) from trim of new part.

If applicable, produce more reinforcement plates.

Length of reinforcement plates is min. 40 mm.

Coat reinforcement plates on both sides with welding primer.

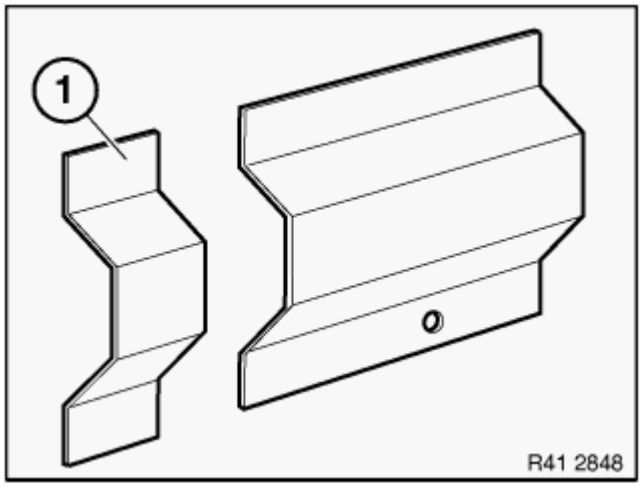


Fig. 96: Identifying Reinforcement Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Push reinforcement plate (1) into component on body up to half way and plug-weld (3).

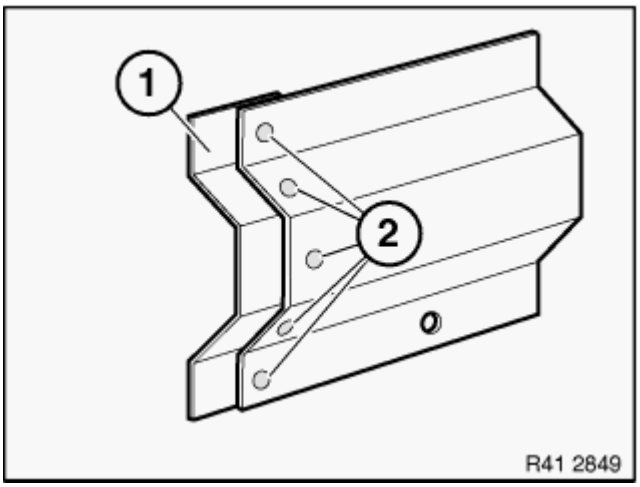


Fig. 97: Positioning Reinforcement Plate
Courtesy of BMW OF NORTH AMERICA, INC.

If applicable, adjust the new part (1) with the alignment bracket or universal tool and plug-weld (2).

MAG weld the joint (3).

Grind and clean weld seam and plug weld spots.

Only visible areas of the outer skin and on the carrier support must be tinned.

All areas which have covers on the vehicle are not to be tinned.

NOTE: Only applicable within the European Union: European used-vehicle regulations prohibit the use of tin containing lead in motor vehicles introduced after 01.07.2003!

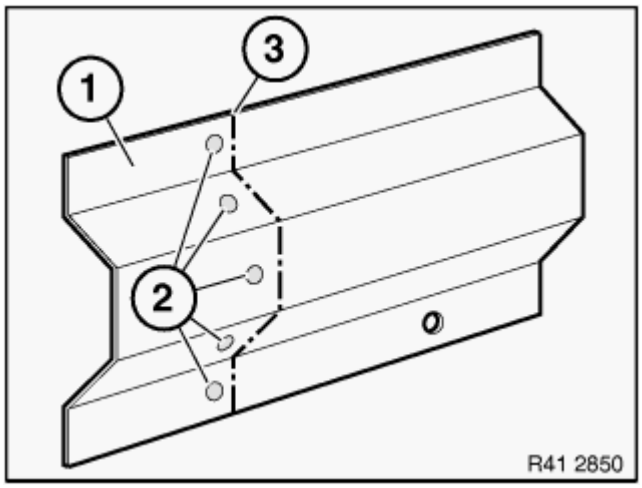


Fig. 98: MAG Welding Joint
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 095 REPLACING ENGINE SUPPORT IN FRONT OF WHEEL ARCH, LEFT

Observe procedure of **REPAIR STAGE 3**.

Read **CONTENTS OF BODY, GENERAL**.

Steel-aluminium composite construction is used on the vehicle.

Observe specific procedures for **OPENING ADHESIVE BONDS**, **BONDING ALUMINIUM ON STEEL**, and **OPENING RIVETED JOINTS**.

Use only approved spot-welding apparatus for repairs. See **WORKSHOP EQUIPMENT**.

Place vehicle on straightening bench.

Necessary preliminary work:

Remove **CARRIER SUPPORT**

Following new body parts are required (refer to BMW Electronic Parts Catalogue):

- (1) Engine support, front

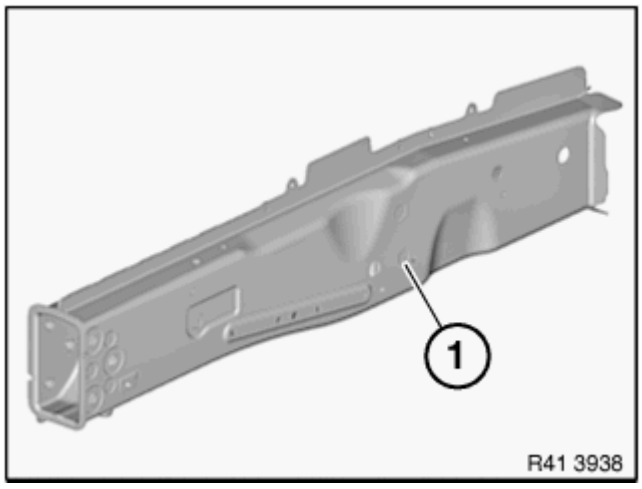


Fig. 99: Identifying Front Engine Support
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut in accordance with Dimension a and cut.

Dimension a=40 mm before wheel arch edge.

Remove section of engine support.

Installation note:

Mark severance cut on new part in accordance with vehicle and cut.

Adjust new part to fit with alignment bracket or universal mount.

Weld in **REINFORCEMENT PLATE** at severance cut.

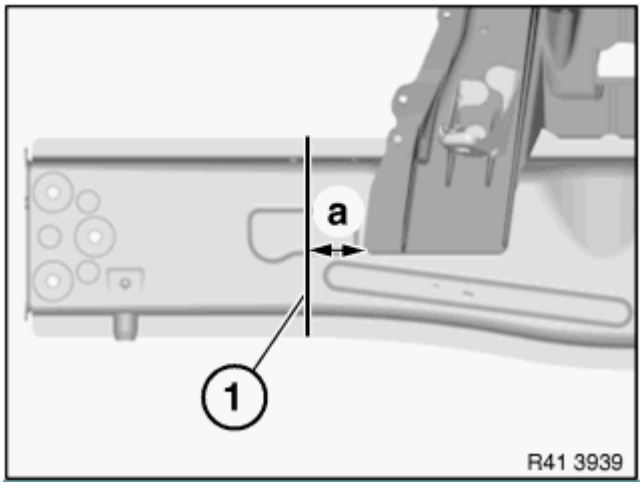


Fig. 100: Identifying Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 015 REPLACING ENGINE SUPPORT WITH WHEEL ARCH, LEFT

Procedure **OBSERVE** repair stage 3!

Read contents of **BODY, GENERAL** .

Steel-aluminium composite construction is used on the vehicle. Observe specific **procedure** See **4100... BONDING ALUMINIUM ON STEEL**.

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE** .

Place vehicle on straightening bench.

Following new body parts are required:

- (1) Engine support
- (2) Engine support, rear
- (3) Wheel arch, front
- (4) Connection, wheel arch/entrance
- (5) Connection, side frame, rear
- (6) Shaped parts, carrier support, wheel arch, front (not shown)

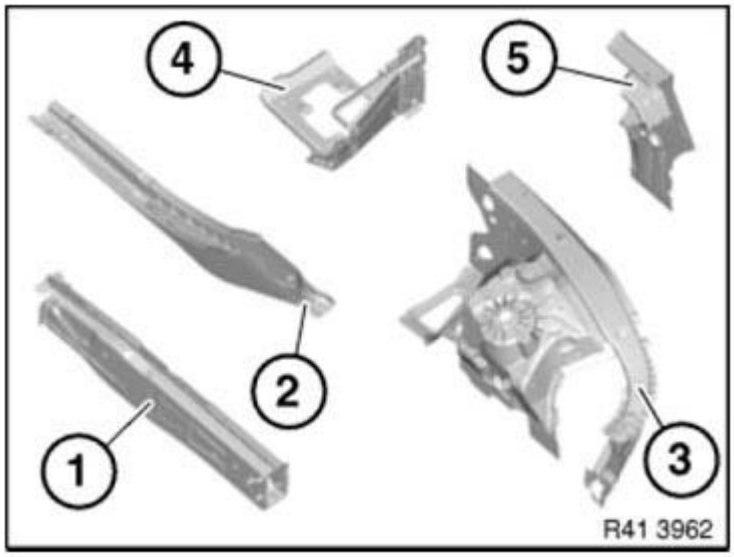


Fig. 101: Identifying Engine Support, Rear Side Frame Connection And Wheel Arch/Entrance Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

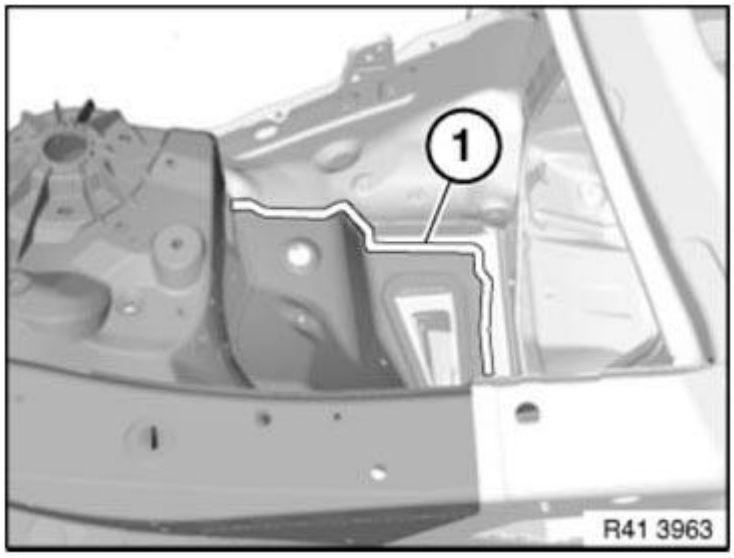


Fig. 102: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

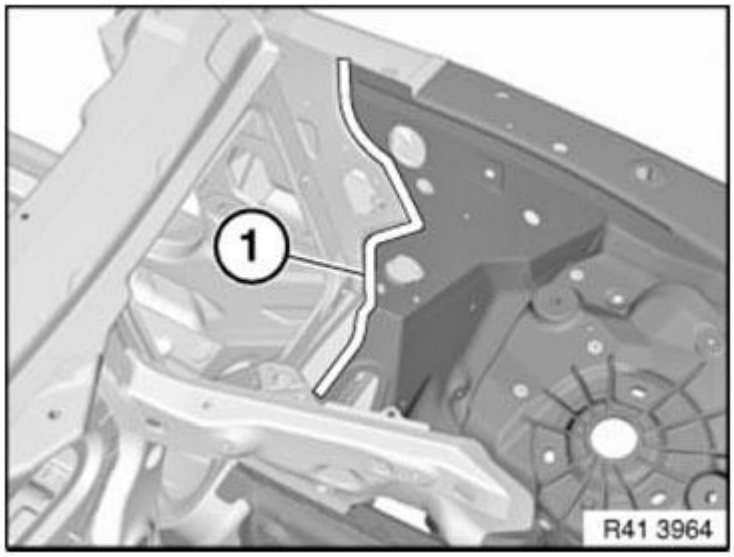


Fig. 103: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

LOOSEN spot-welded adhesive joints in area (1).

Open welded connections in area (2).

Roughly cut side frame connection (3) along lines (4).

Remove side frame connection (3).

Installation note:

MAG weld new part in areas (4).

To do so, apply 10 mm long fillet welds at spacing of 15 mm.

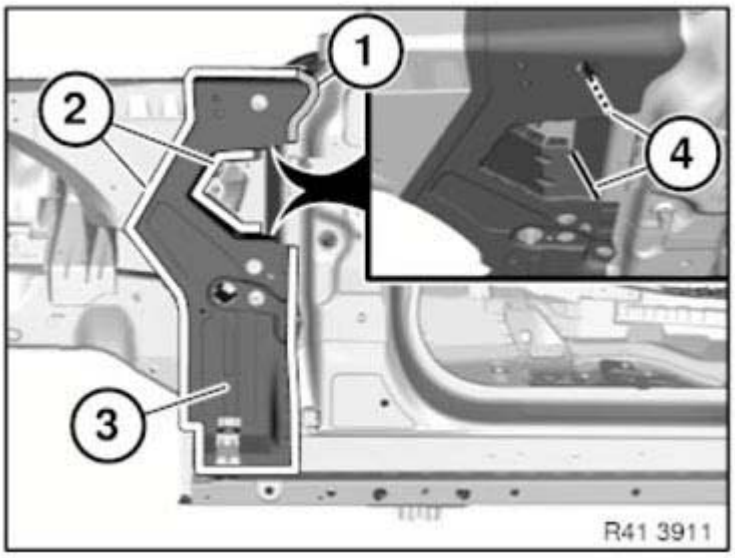


Fig. 104: Identifying Side Frame Connection And Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

Installation note:

Replace **CAVITY SEALING (2)** .

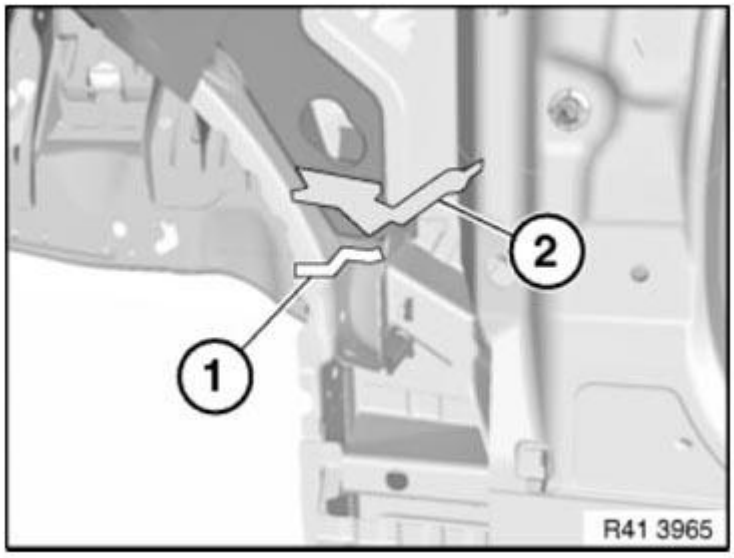


Fig. 105: Identifying Welded Connections Area And Cavity Sealing
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with dimension a and cut engine support.

Dimension a = 140 mm

Installation note:

Weld in **REINFORCEMENT PLATE** at severance cut.

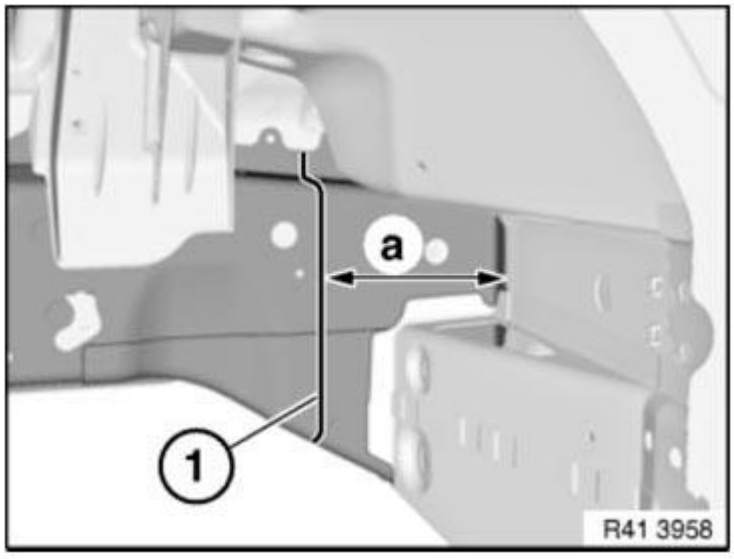


Fig. 106: Identifying Reinforcement Plate Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Drill out rivet connections in area (1).

Open **BONDED CONNECTIONS** in area (1).

Remove wheel arch (2) with engine support.

Installation note:

Use 6 **N2 RIVETS** in area (1).

Glue new part with **ADHESIVE K1** .

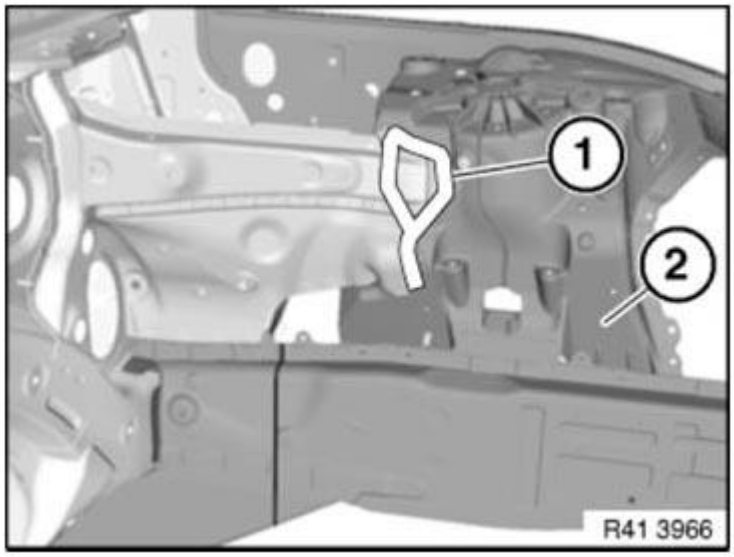


Fig. 107: Identifying Bonded Connections Area And Wheel Arch
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

Remove metal section (2).

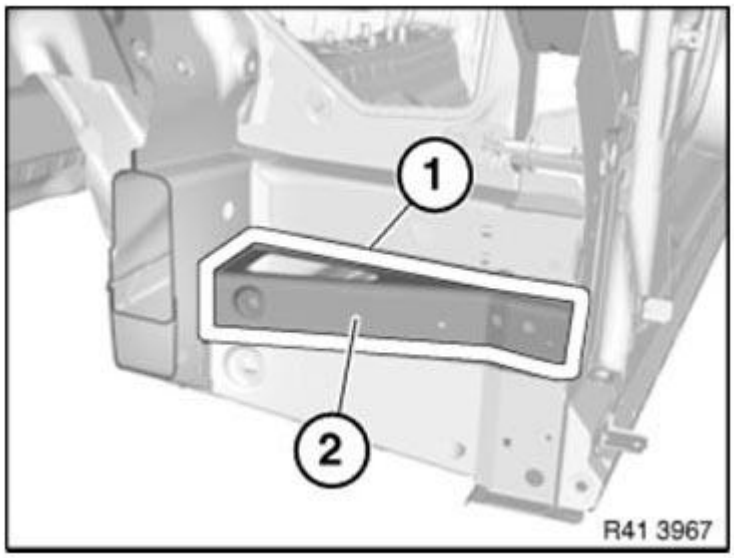


Fig. 108: Identifying Welded Connections Area And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) and cut.

IMPORTANT: Cut outer panel only.

Open welded connections in area (2).

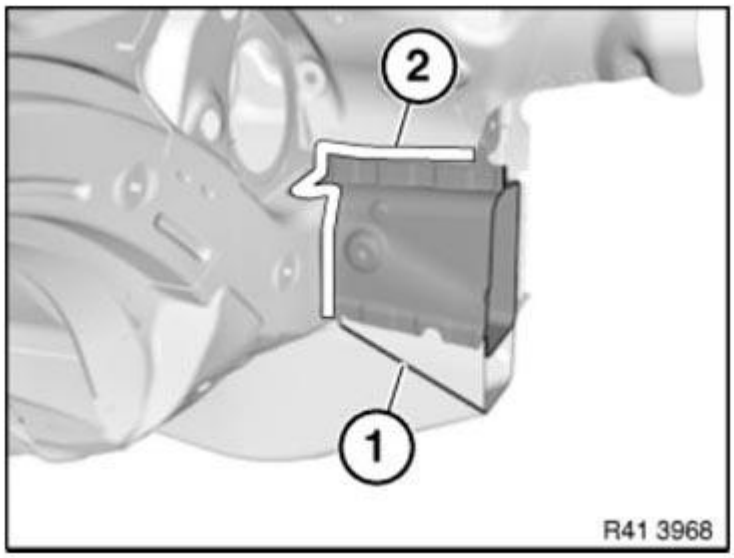


Fig. 109: Identifying Outer Panel Severance Cut And Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

View of engine support from front.

Open welded connections in area (1).

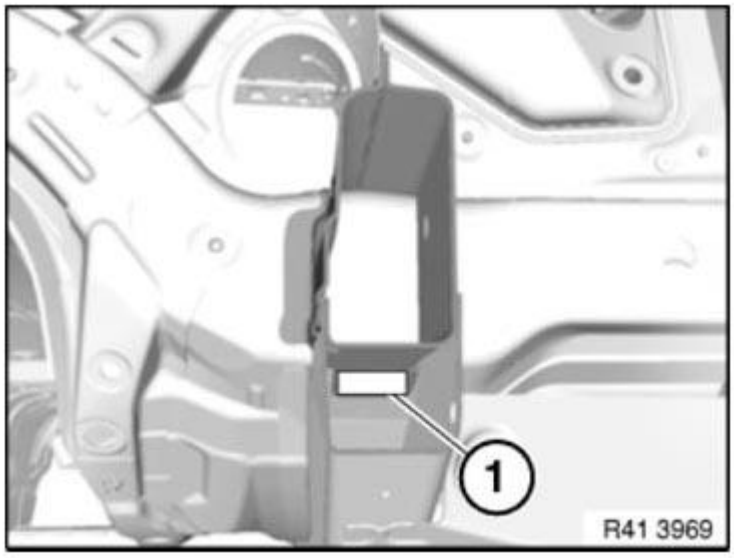


Fig. 110: Identifying Front Engine Support Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

Remove metal section (2).

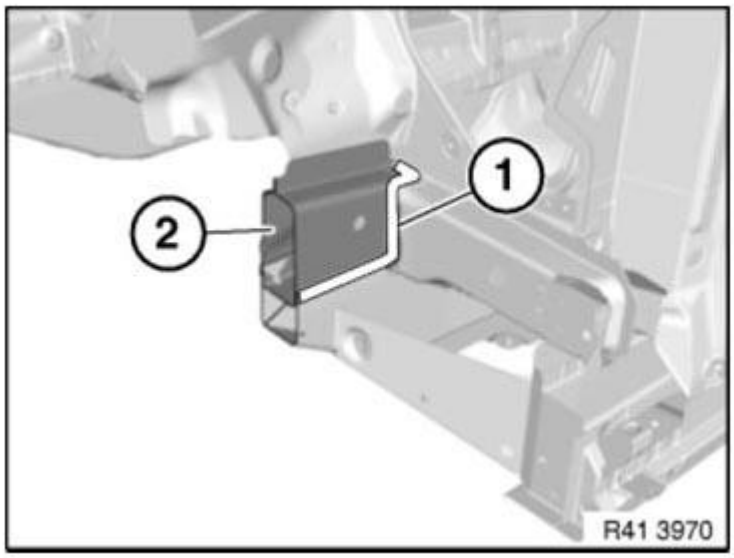


Fig. 111: Identifying Welded Connections Area And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Open welded connections in areas (1). Remove metal section (2).

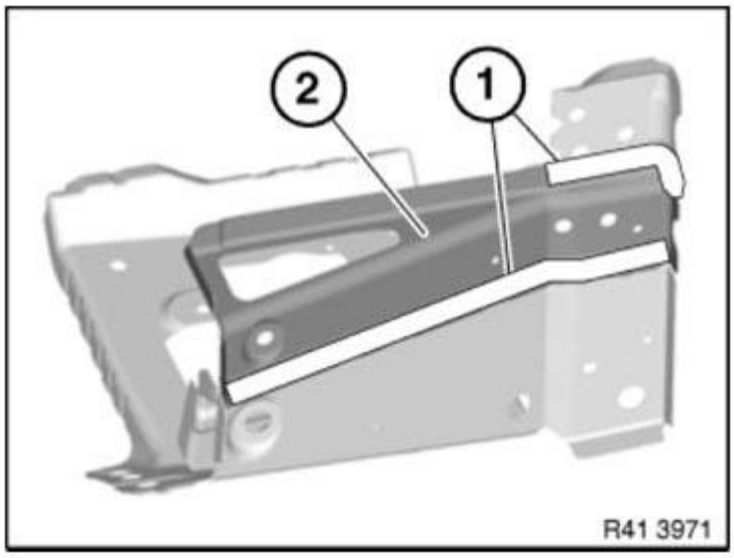


Fig. 112: Identifying Welded Connections Areas And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark severance cut (1) in accordance with dimension a and cut.

Dimension a = 20 mm

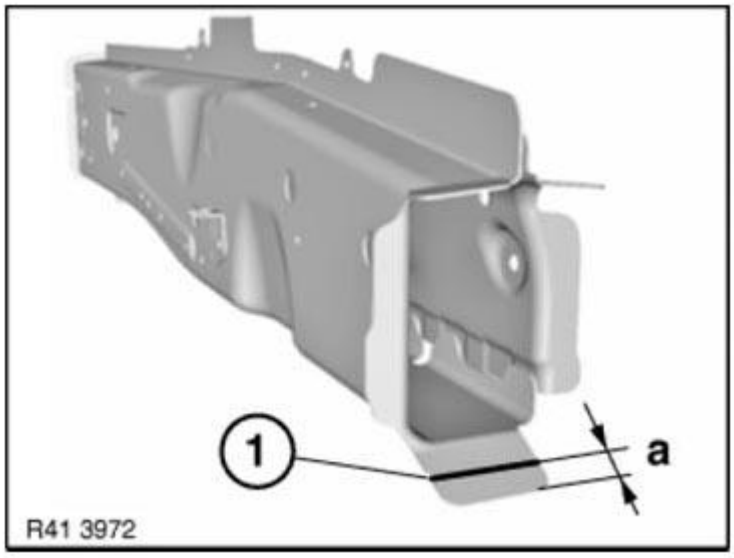


Fig. 113: Identifying Part Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark rear engine support in accordance with severance cut on vehicle and cut (1).

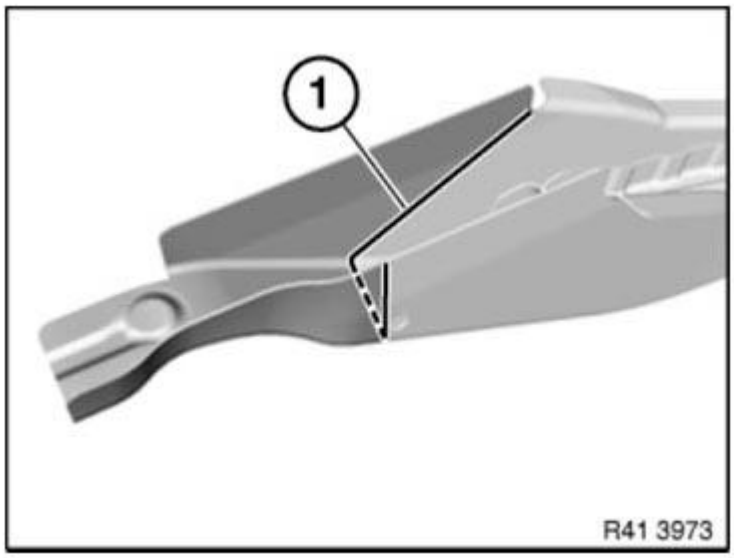


Fig. 114: Identifying Rear Engine Support Cutting Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Mark severance cut (1) in accordance with dimension a and cut.

Dimension a = 15 mm

Remove metal section (2).

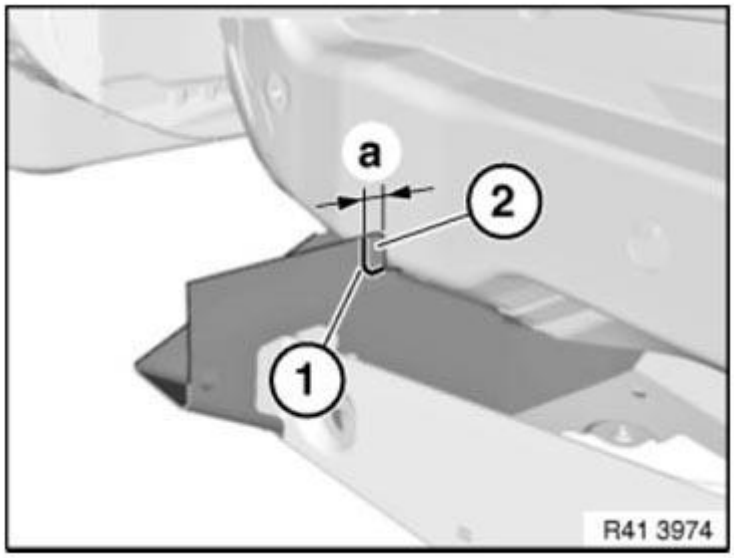


Fig. 115: Identifying Metal Section Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid contact corrosion, do not grind the new wheel arch part in the area of the BONDING SURFACES .

Grind bonding surfaces on body blank.

Clean bonding surfaces with cleaning agent R1.

Installation note:

Adjust new parts to fit with alignment bracket or universal mounting.

Drill new rivet holes in areas (1) and (2).

Deburr bore holes.

Use 19 N2 rivets.

Glue new part with adhesive K1.

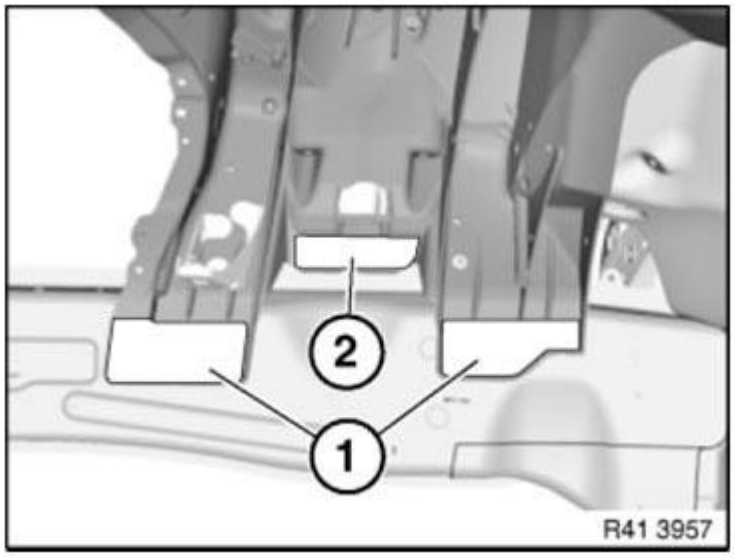


Fig. 116: Identifying Rivet Holes Drill Areas
Courtesy of BMW OF NORTH AMERICA, INC.

View from below.

Installation note:

Weld new components in area (1) additionally.

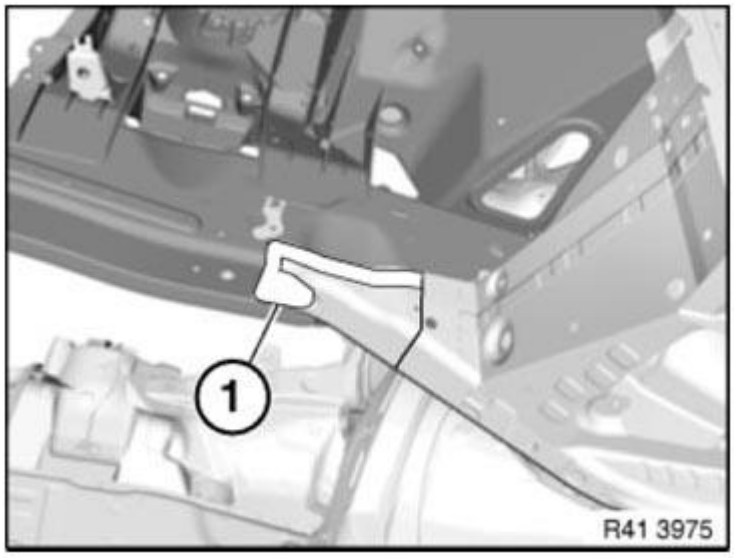


Fig. 117: Identifying New Components Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Weld new components in area (1) additionally.

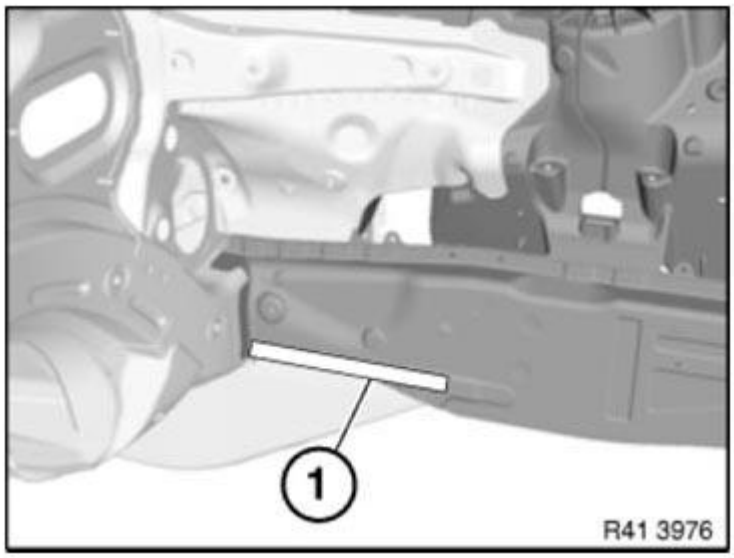


Fig. 118: Identifying New Components Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Weld new component in area (1) additionally.

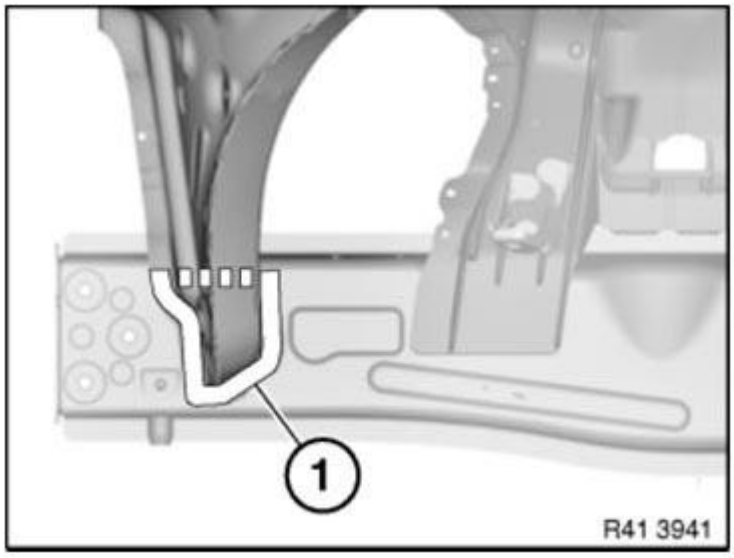


Fig. 119: Identifying New Components Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

MAG-weld new component in area (1) additionally.

To do so, apply 2 fillet welds at distance of approx. 20 mm. Length of fillet welds approx. 10 mm.

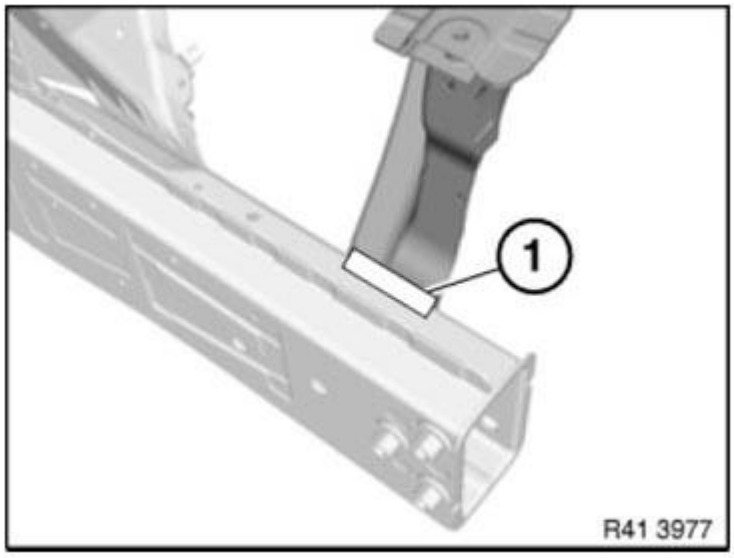


Fig. 120: Identifying New Component MAG-Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 14 531 REPLACING ENGINE SUPPORT/FRONT LEFT SIDE FRAME CONNECTION (FRONT LEFT WHEEL ARCH REMOVED)

Observe procedure for **REPAIR STAGE 3** .

Read contents of **BODY, GENERAL** .

To remove engine support side frame connection

Following new body parts are required:

- (1) Connection, wheel arch/entrance

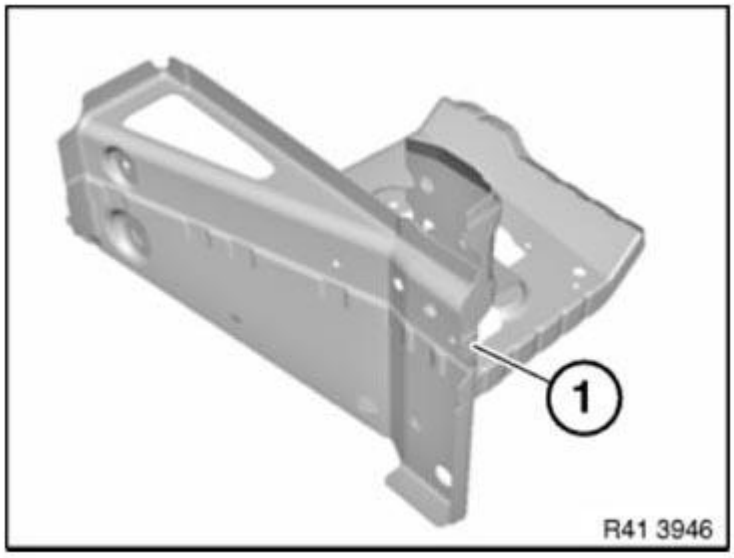


Fig. 121: Identifying Connection, Wheel Arch/Entrance
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in areas (1).

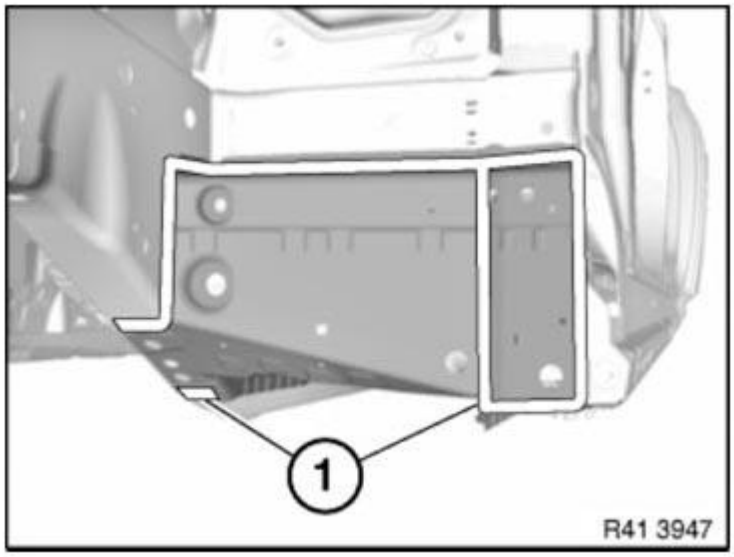


Fig. 122: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

View from below:

Open welded connections in areas (1).

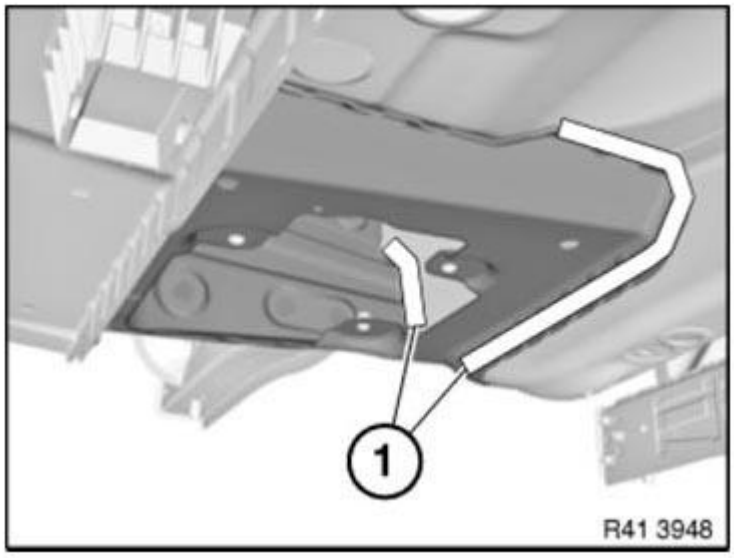


Fig. 123: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

View from below:

Open welded connections in areas (1).

Remove wheel arch/entrance connection.

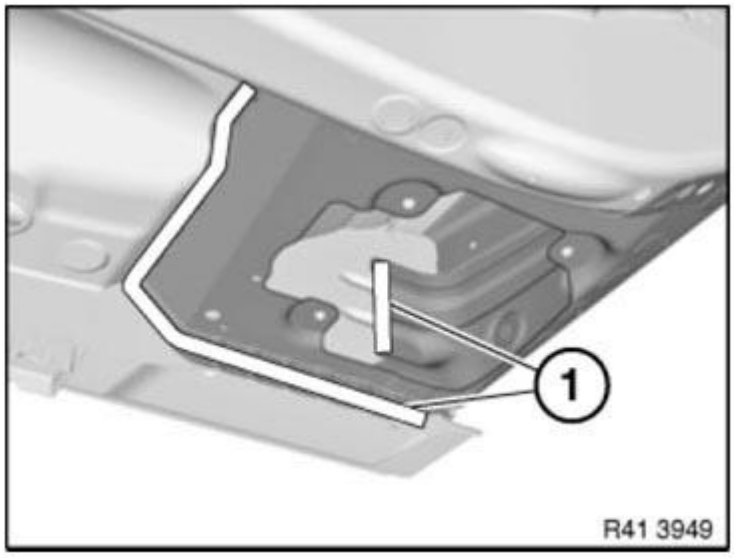


Fig. 124: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Open welded connections in area (1).

Remove metal section (2).

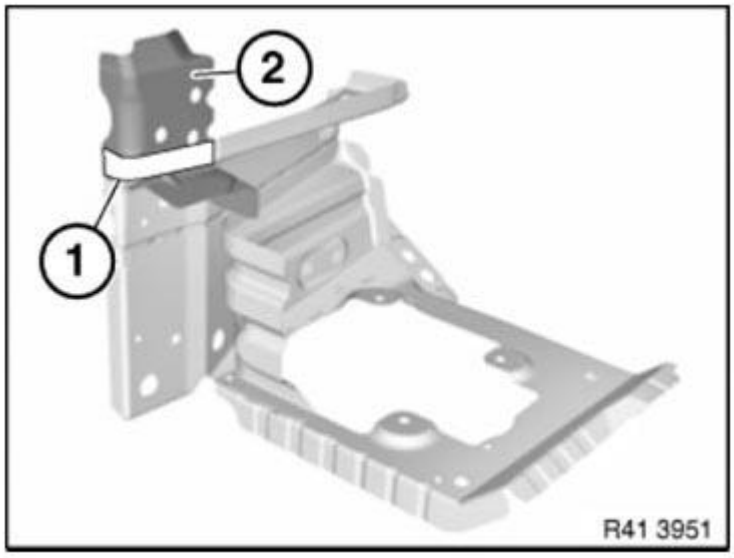


Fig. 125: Identifying Welded Connections Area And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

To install engine support side frame connection

Install and weld new parts.

41 11 043 REPLACING FRONT SECTION OF LEFT ENGINE SUPPORT

Observe procedure of **REPAIR STAGE 3** .

Read contents of **BODY, GENERAL** .

Steel-aluminium composite construction is used on the vehicle.

Observe specific **procedure** See **4100... BONDING ALUMINIUM ON STEEL**.

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Place vehicle on straightening bench.

Following new body parts are required:

- (1) Engine support
- (2) Engine support, rear

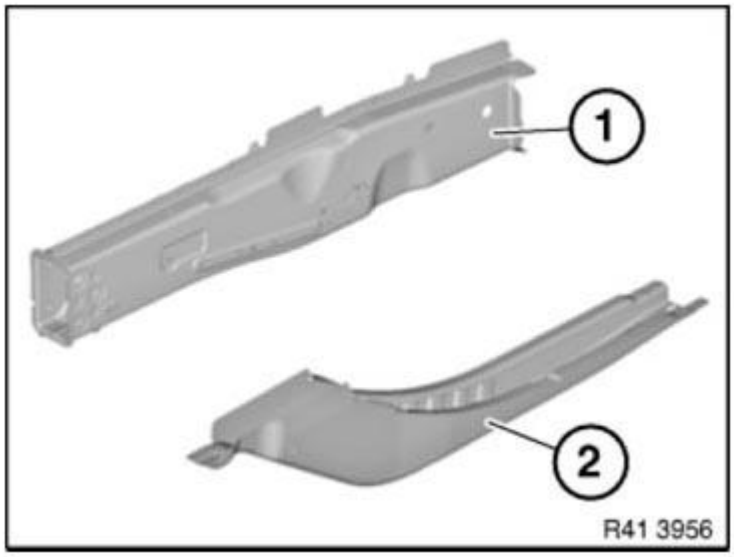


Fig. 126: Identifying Engine Support And Engine Support, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

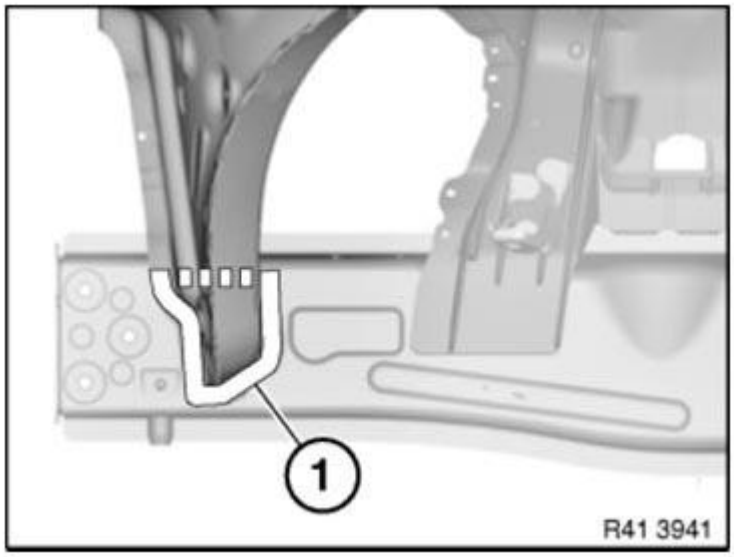


Fig. 127: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Drill out riveted connections in areas (1) and (2).

Installation note:

Use 19 **N2 RIVETS** in areas (1) and (2).

Glue new component with **ADHESIVE K1** .

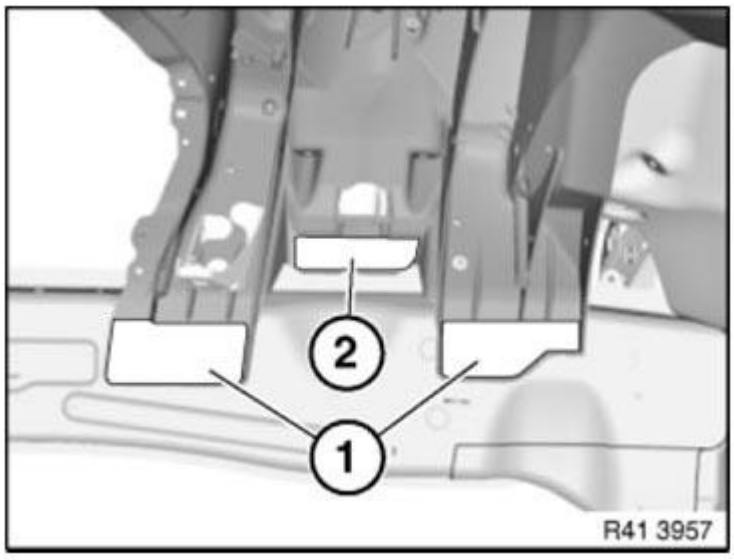


Fig. 128: Identifying Rivet Holes Drill Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with dimension a and cut engine support.

Measurement a=140 mm

Installation note:

Weld in **REINFORCEMENT PLATES** at severance cut.

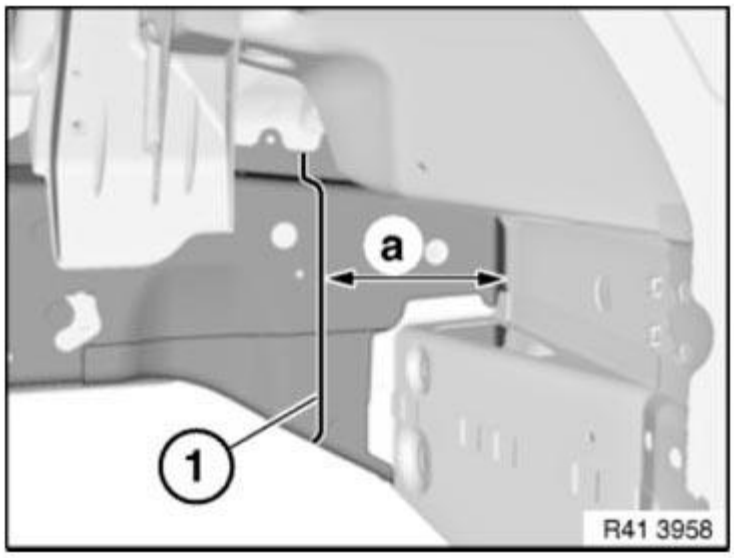


Fig. 129: Identifying Reinforcement Plate Severance Cut

Courtesy of BMW OF NORTH AMERICA, INC.

Roughly mark severance cuts (1) and cut.

IMPORTANT: Do not damage spring strut dome (2).

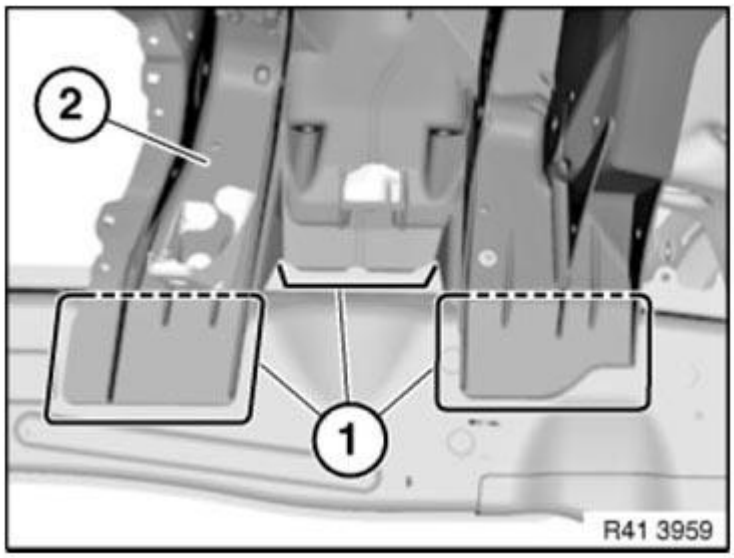


Fig. 130: Identifying Spring Strut Dome And Severance Cuts
Courtesy of BMW OF NORTH AMERICA, INC.

Heat **ADHESIVE AREAS** with hot air blower and release sheet sections (1) from spring strut dome.

IMPORTANT: Do not damage spring strut dome (2).

Installation note:

Remove adhesive residue from spring strut dome.

Then **FLAME-COAT** bonding surfaces of spring strut dome.

Grind bonding surfaces on engine support blank.

Clean bonding surfaces with **CLEANING AGENT R1** !

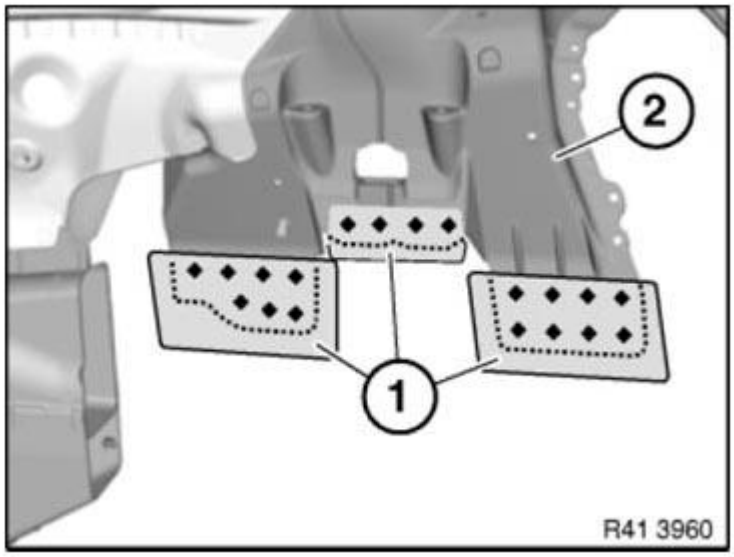


Fig. 131: Identifying Sheet Sections And Spring Strut Dome
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1) and remove engine support section (2).

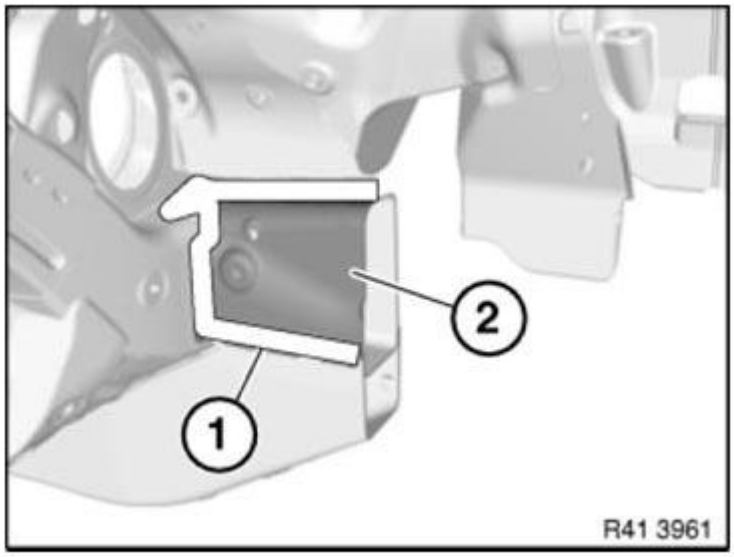


Fig. 132: Identifying Welded Connections Area And Engine Support Section
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

MAG-weld new part in area (1).

To do so, apply 2 fillet welds at spacing of 15 mm.

Length of fillet welds approx. 10 mm.

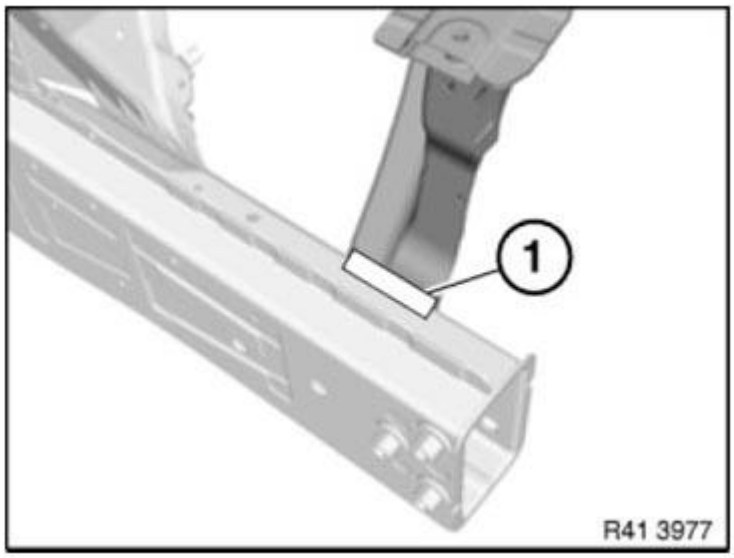


Fig. 133: Identifying New Component MAG-Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark new parts in accordance with severance cuts on vehicle and cut.

Installation note:

Adjust new parts to fit with alignment bracket or universal mounting.

41 11 300 REPLACING ENTRANCE WITH DOOR POST, LEFT AND RIGHT (PARTIAL REPLACEMENT, B-PILLAR)

Observe procedure of **REPAIR STAGE 3**.

Read **CONTENTS OF BODY, GENERAL**.

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE**.

Use only approved spot-welding apparatus for repairs. See **WORKSHOP EQUIPMENT**.

Place vehicle on straightening bench.

The following new body parts are required (see BMW Electronic Parts Catalogue):

- (1) B-pillar with entrance
- (2) **ADHESIVE K1**

- (3) Blind rivets N1 (3 pieces)

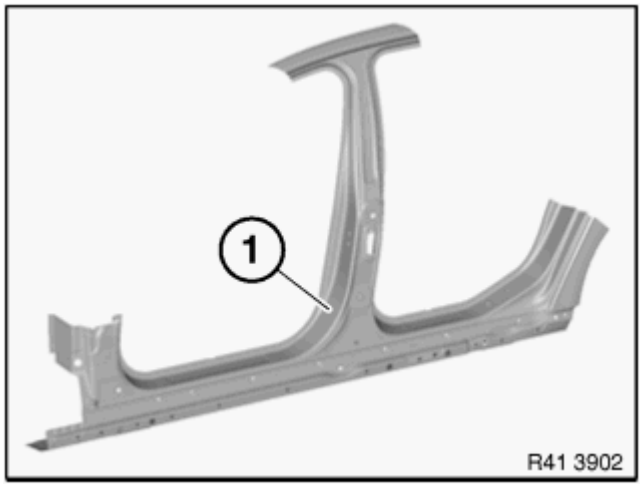


Fig. 134: Identifying B-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

Removing entrance cover with door post

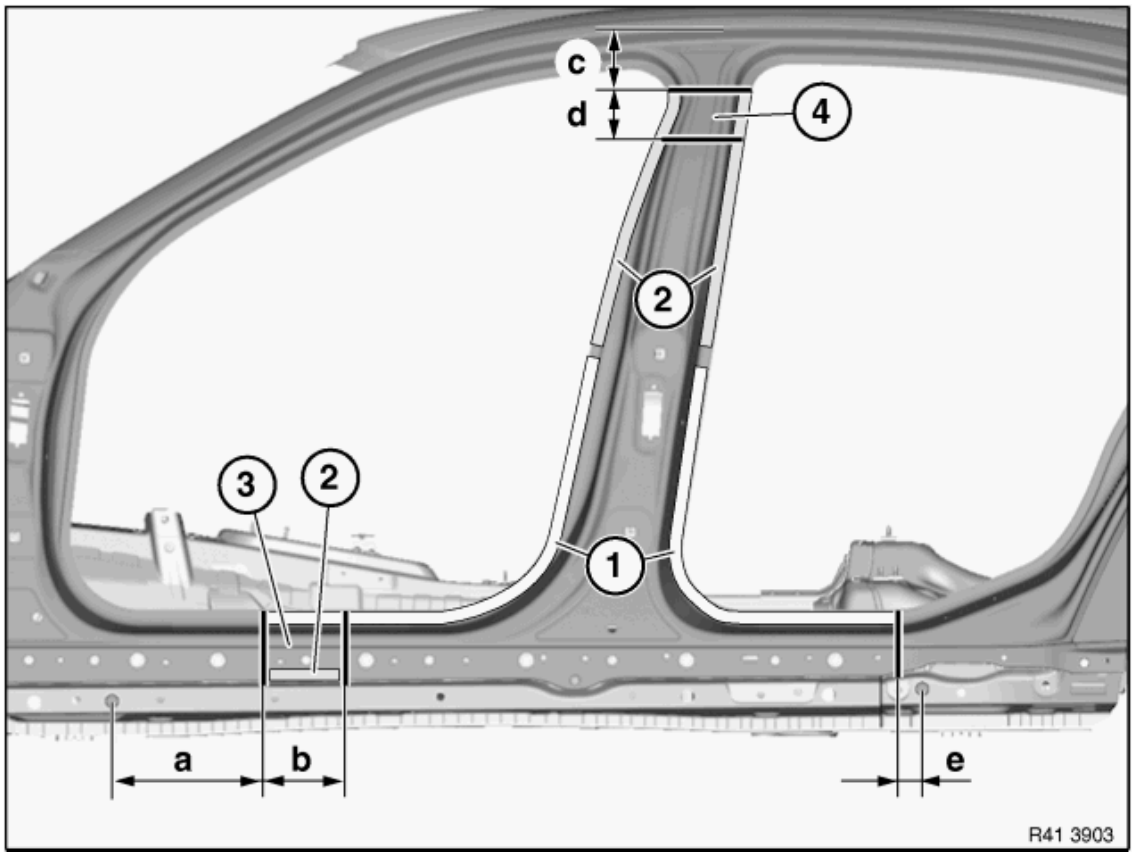


Fig. 135: Removing Entrance Cover With Door Post
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cuts in accordance with specified dimensions and cut.

IMPORTANT: Cut outer panel only for following severance cuts.

Measurement a = approx. 270 mm from center point of 25 mm dia. hole.

Dimension b = approx. 140 mm after cut a.

Measurement c = approx. 100 mm from roof edge.

Measurement d = approx. 80 mm below cut c.

Measurement e = approx. 40 mm from center point of 25 mm dia. hole.

OPEN spot-welded adhesive joints in areas (1). Open welded connections in areas (2).

Mark severance cut in accordance with specified dimension and cut.

IMPORTANT: Cut outer metal plate only for following severance cut.

Measurement a = approx. 340 mm from center point of 25 mm dia. hole.

Open welded connections in area (1).

Installation note:

Apply repair welding spots in area (1) to existing welding spots on new part / vehicle.

This is necessary because the adhesive between the spot flanges acts as an insulator.

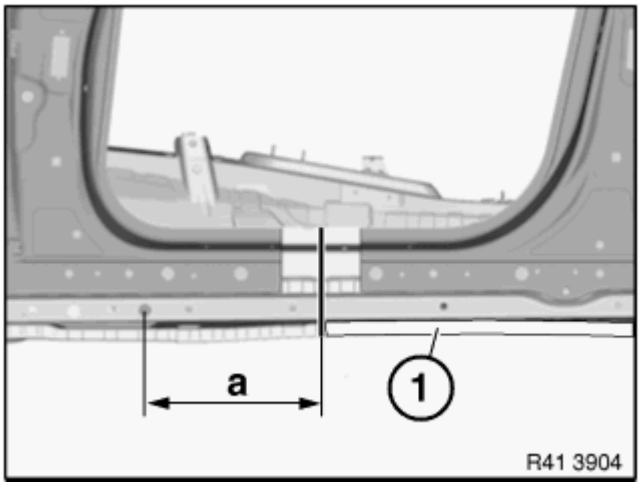


Fig. 136: Identifying Area For Repair Welding (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in areas (1).

Perform severance cut (2) according to illustration.

Tilt metal section (3) forwards to gain access to the 4 weld joints underneath.

Open the 4 weld joints.

Installation note:

Apply repair welding spots in area (1) to existing welding spots on new part / vehicle.

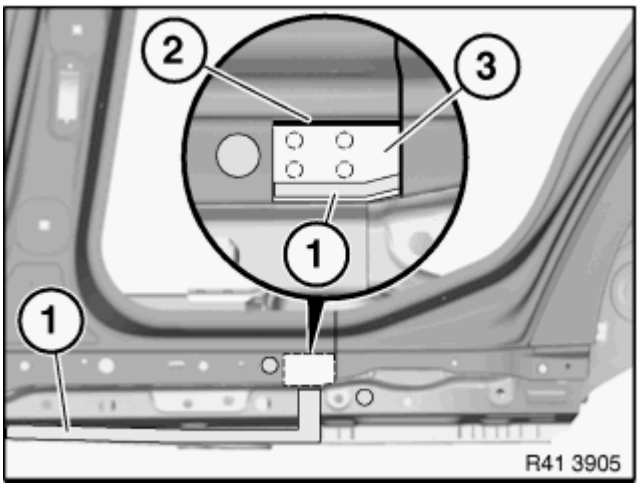


Fig. 137: Identifying Area For Repair Welding (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Open spot-welded adhesive joints in area (1) Open welding spots from outside. Do not damage inside panel!

Open bonded connection in area (2).

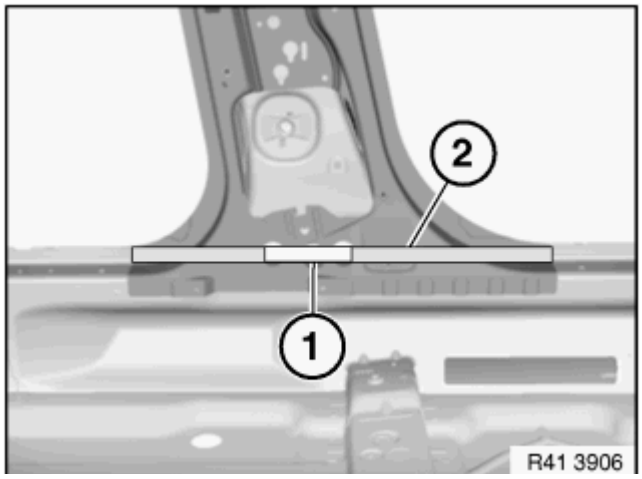


Fig. 138: Identifying Spot-Welded And Bonded Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut in accordance with specified dimension and cut.

IMPORTANT: Cut outer metal plate only for following severance cut.

Dimension a =140 mm from the edge of roof frame.

Open weld joint (1).

Remove cover for side member with B-pillar.

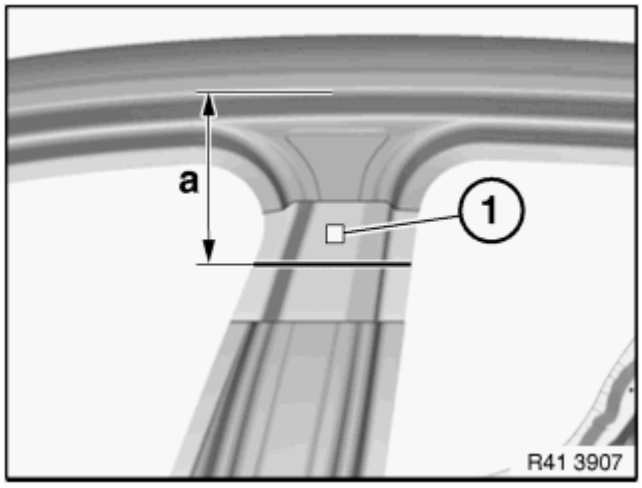


Fig. 139: Identifying Welding Area At Joint
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Mark severance cuts on B-pillar in accordance with severance cuts on the vehicle and cut.

IMPORTANT: Do not cut through support (3) for B-pillar reinforcement.

(2) B-pillar reinforcement outer skin

(1) B-pillar outer skin

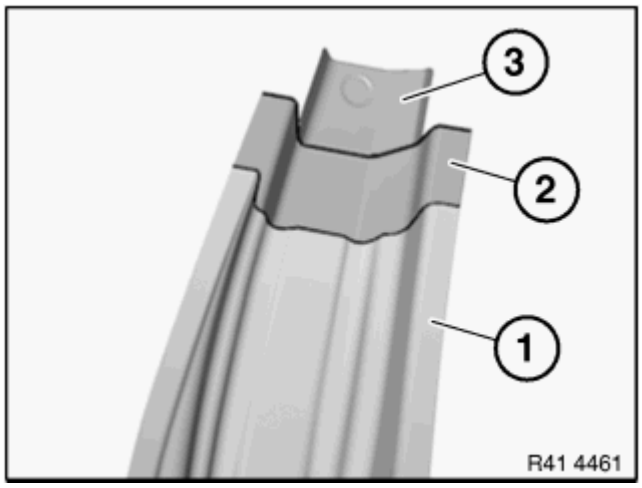


Fig. 140: Identifying Outer Skins And Support For B-Pillar Reinforcement
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) and other severance cuts according to the severance cuts on the vehicle and cut.

Partially release metal section (2) as described in removal and tilt forwards.

Open weld joints in area (3) and remove cover for side member (4).

Prepare **REINFORCEMENT PLATES** at severance cuts.

NOTE: After welding in new part, tilt metal section (2) closed again and weld up.

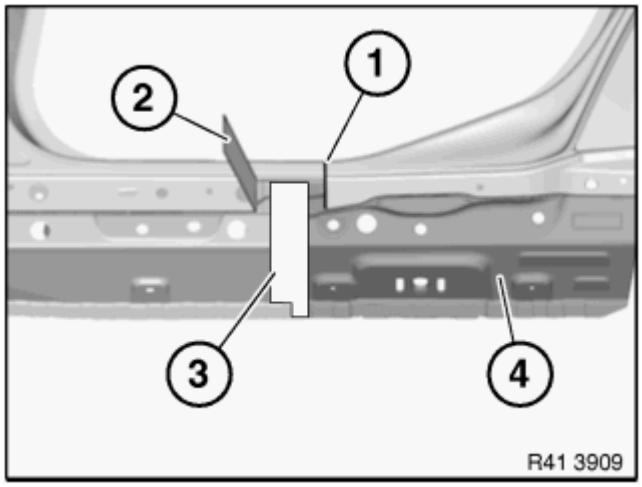


Fig. 141: Welding In New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Set 3 6.8 mm Ø bore holes for blind rivets in area (1). Drill from passenger compartment.

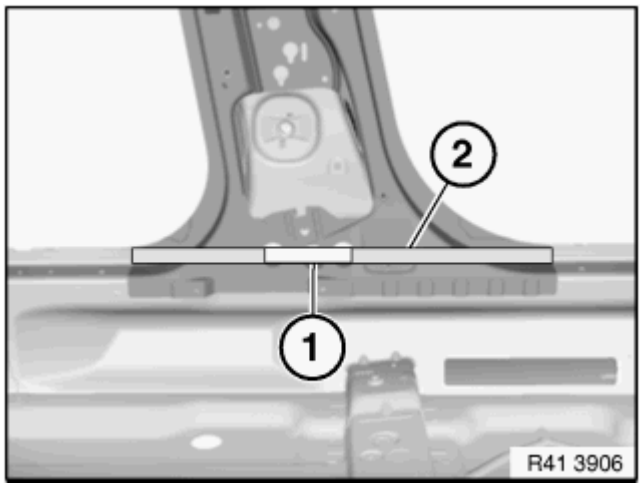


Fig. 142: Identifying Area For Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Structure bonding!

Observe preparation of bonding surfaces (1).

Adjust new part to fit with set of attachments or universal mount.

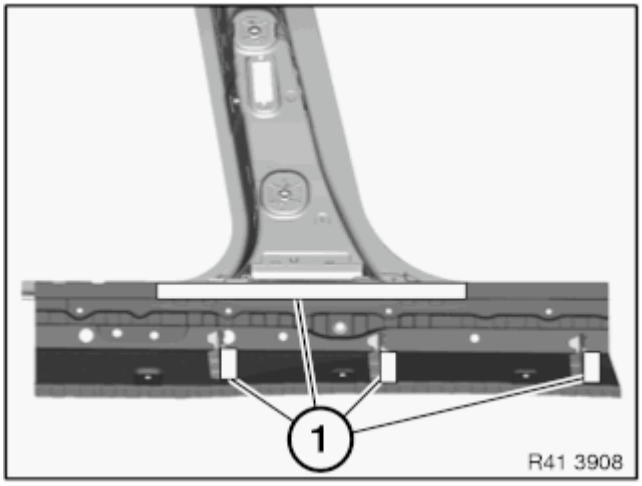


Fig. 143: Identifying Bonding Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Installing entrance cover with door post

Clean bonding surfaces with cleaning agent R1.

Apply adhesive K1 to bonding surfaces.

Install new parts and reinforcement plates with alignment bracket or universal mount and weld.

Set 3 blind rivets N1.

41 14 500 REPLACING OUTER SECTION OF LEFT OR RIGHT REAR WHEEL HOUSING (SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **procedure** See **4100... SPOT-WELD BONDING STEEL PARTS**.

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Necessary preliminary tasks

Remove **COVER FOR REAR SIDE MEMBER**

Following new body parts are required:

- (1) Outer wheel arch section, rear
- (2) C-pillar reinforcement
- (3) Shaped parts, entrance (not pictured)

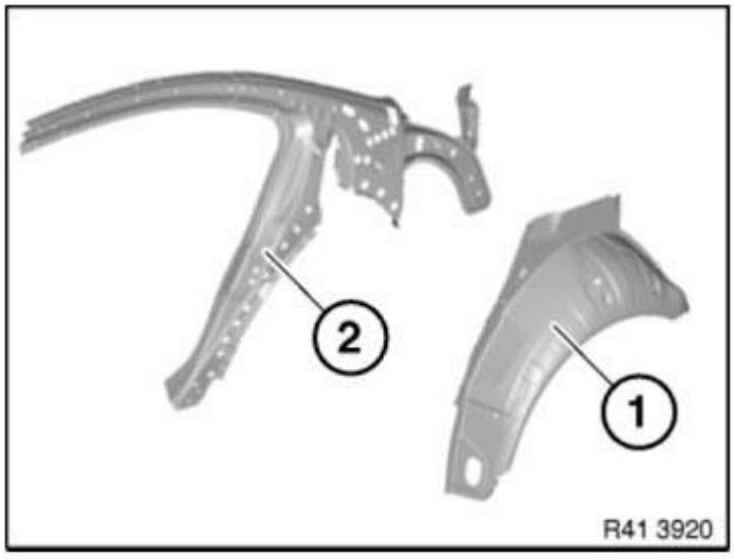


Fig. 144: Identifying C-Pillar Reinforcement And Outer Wheel Arch Section, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of outer wheel arch section

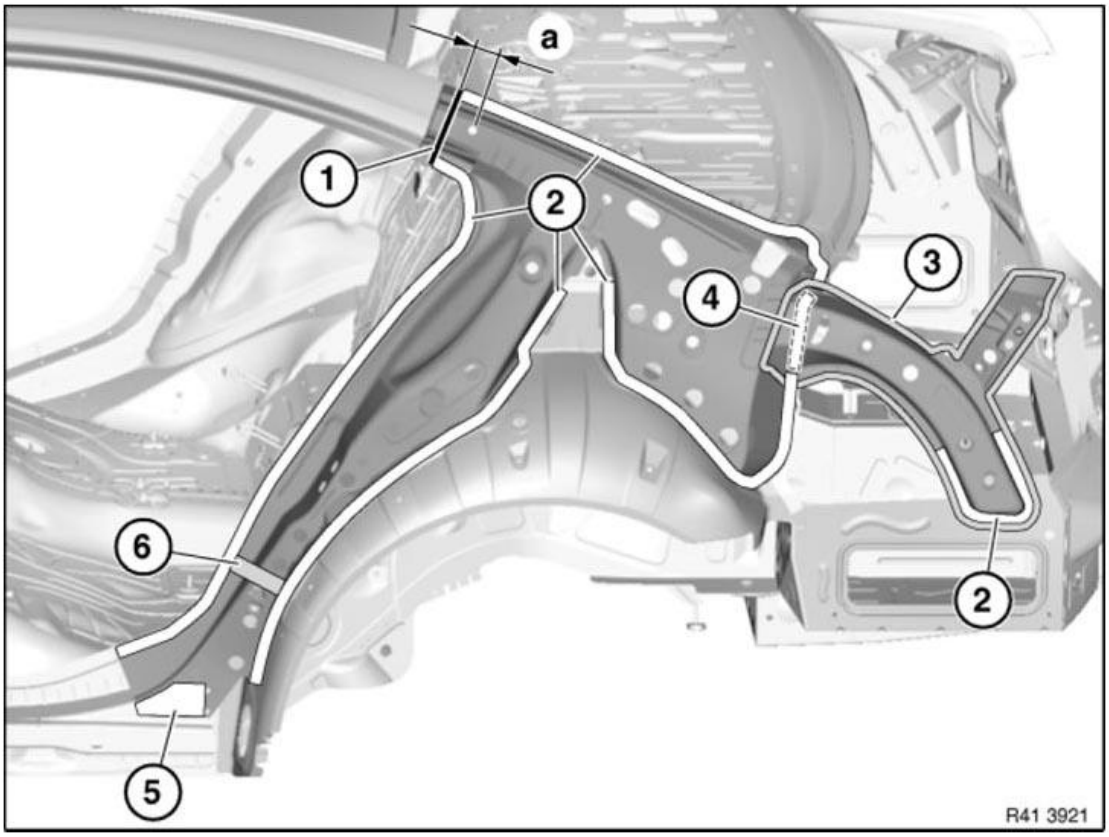


Fig. 145: Identifying Rivet Joints Area, Welded Connections Areas And Sheet Section
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with measurement and cut.

IMPORTANT: Cut outer panel only.
Measurement a = approx. 30 mm from center point of 14 mm dia. hole.
Open welded connections in areas (2).
Fold sheet section (3) forwards and open weld joints in area (4).
Open rivet joints in area (5).
Remove sheet section.

Installation note:

Weld in **REINFORCEMENT PLATE** at severance cut.

Replace both **CAVITY ACOUSTIC BAFFLES** (6).

No rivet connection in area (5). Weld new part.

Open spot-weld bonded joints in area (1)

Open welded connections in area (2)

Remove outer section of wheel arch.

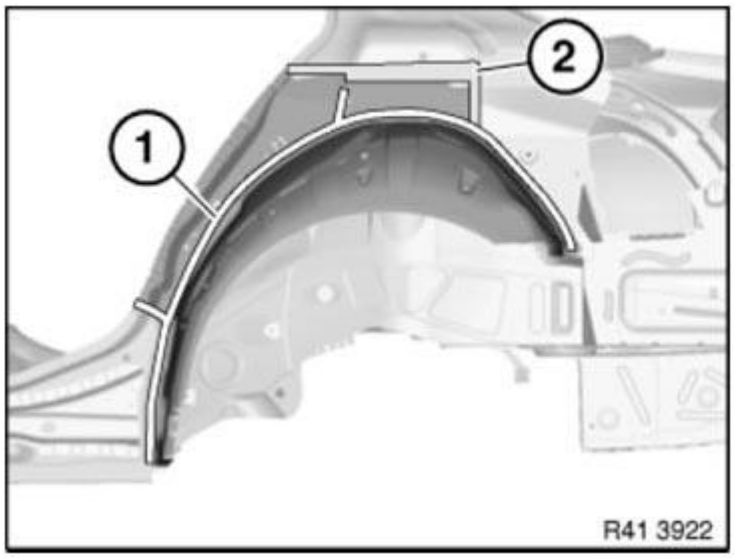


Fig. 146: Identifying Spot-Weld Bonded Joints Area And Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark severance cut on C-pillar reinforcement and cut.

Adjust new parts in conjunction with side panel to fit.

Installation of outer wheel arch section

Install and weld new parts.

41 11 201 REPLACING THE CARRIER SUPPORT BEFORE THE WHEEL ARCH ON THE LEFT

Follow procedure for **REPAIR STAGE 3** .

Read contents of **BODY, GENERAL** .

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only **APPROVED SPOT-WELDING APPARATUS** for repairs.

Place vehicle on straightening bench.

Following new body parts are required:

- (1) Carrier support/basis

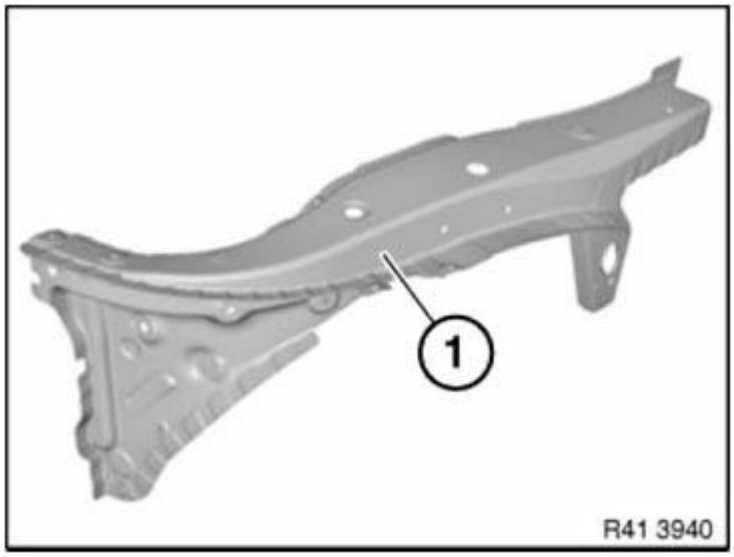


Fig. 147: Identifying Carrier Support/Basis
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

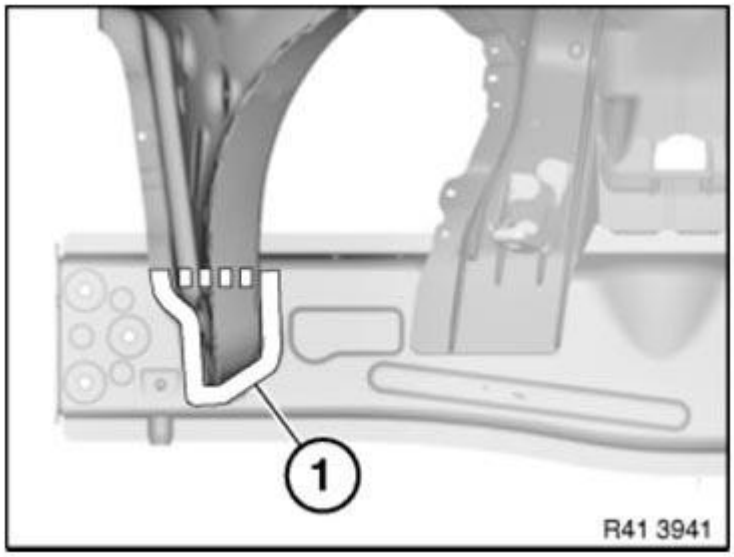


Fig. 148: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) as pictured and cut.

IMPORTANT: Cut outer panel only.

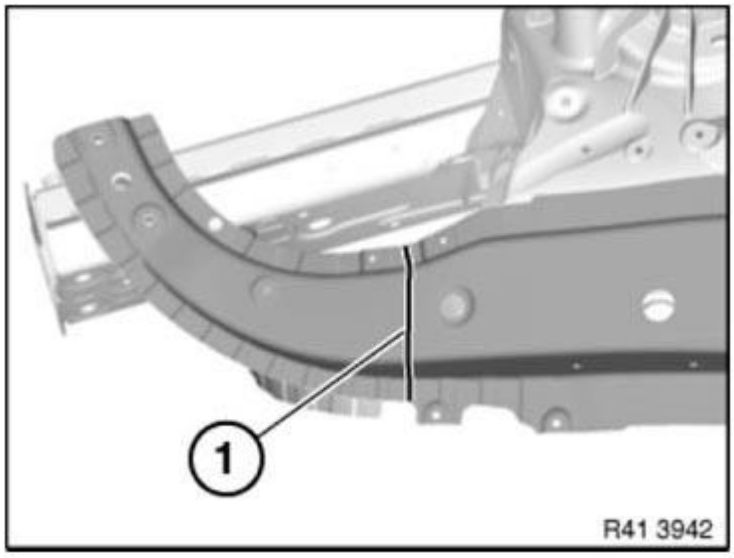


Fig. 149: Identifying Outer Panel Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage to spring strut dome!

Open welded connections in area (1).

Mark severance cut (2) as pictured and cut.

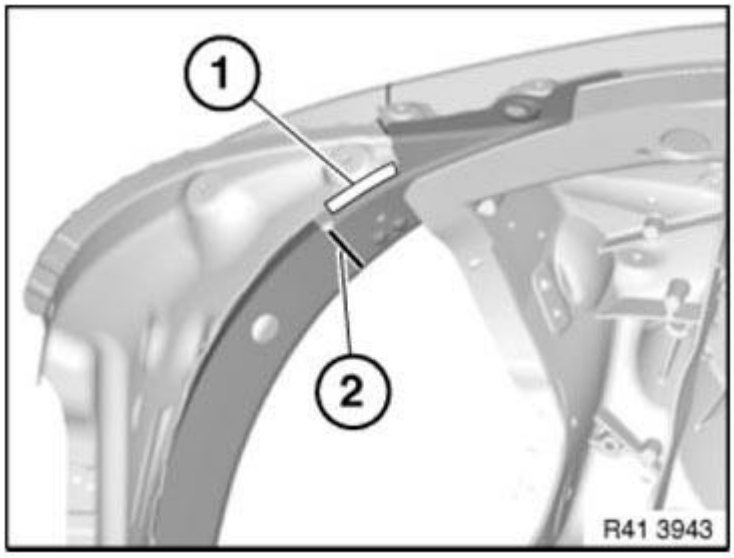


Fig. 150: Identifying Welded Connections Area And Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) as pictured and cut.

Remove carrier support section.

Installation note:

Mark new part in accordance with body and cut.

Adjust new part to fit with alignment bracket or universal mount.

Weld in **REINFORCEMENT PLATES** at all severance cuts.

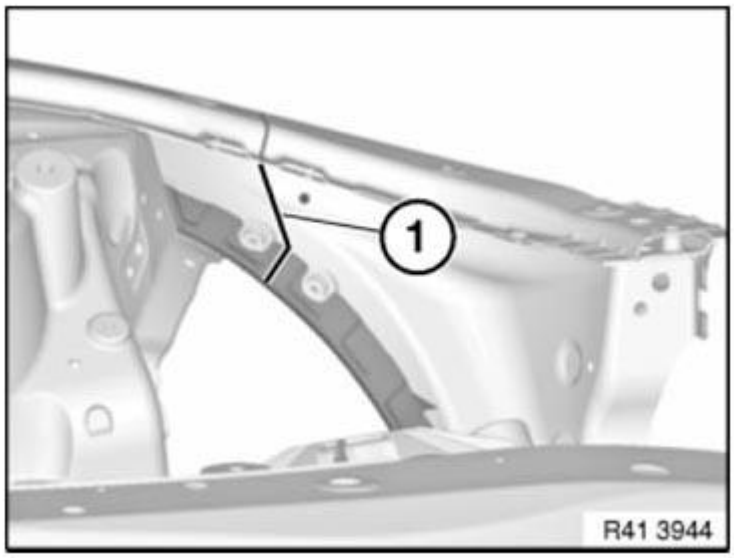


Fig. 151: Identifying Carrier Support Section Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

MAG-weld new part in area (1).

To do so, apply 2 fillet welds at distance of approx. 20 mm. Length of fillet welds approx. 10 mm.

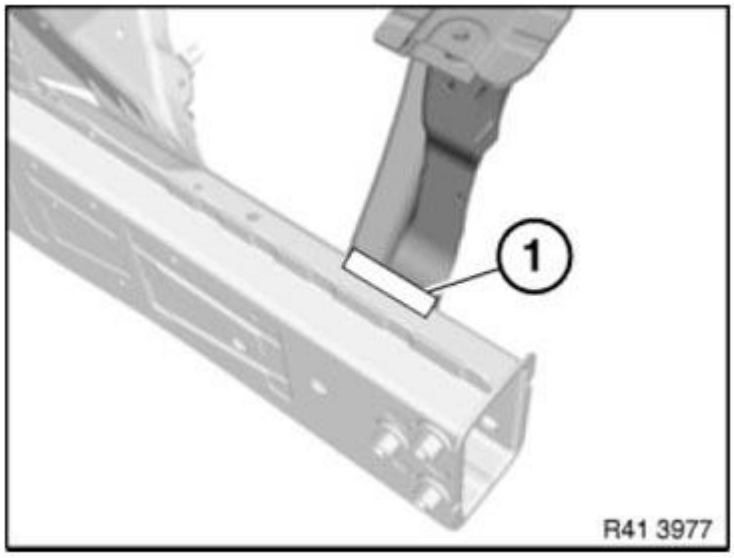


Fig. 152: Identifying New Component MAG-Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 14 021 STRIPPING OPERATIONS - REPLACING FRONT LEFT WHEEL ARCH

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence. Refer to the appropriate service information for each item.

- Disconnect negative battery cable
- Remove bumper trim
- Remove bumper support
- Remove headlight
- Remove radiator
- Remove A/C system condenser
- Remove and install charge air cooler
- Remove hydraulic steering cooling coil
- Remove intake silencer housing
- Remove coolant expansion tank
- Remove wheel arch cover (front section)
- Remove wheel arch cover (rear section)
- Front axle complete with engine and transmission
- Engine compartment lid seal locator
- Remove engine compartment lid

- Remove engine compartment lid hinge
- Remove left side wall
- Remove top left wishbone
- Remove left suspension brace
- Remove bulkhead sound insulation
- Remove brake booster
- Remove/detach hydraulic lines for power steering pump
- Detach coolant hoses
- Detach fuel lines
- Release left wiring harness
- Partially release/remove thermal protection

4112 LUGGAGE COMPARTMENT FLOOR

41 12 535 REPLACE LUGGAGE COMPARTMENT FLOOR AND BOTH SIDE MEMBERS (TAIL PANEL TRIM REMOVED)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE

Place vehicle on straightening bench.

These repair instructions comprise the procedures for **REPAIR STAGE 3** .

Following new body parts are required:

- (1) Luggage compartment floor, rear
- (2) Side member, left and right
- (3) Extension, side member, left and right
- (4) Luggage compartment floor, left and right
- (5) Fixture, bumper, left and right

Following consumables are required:

MATERIAL CHART

Material	Quantity
Adhesive K5a	2
Blind rivets N3	87
EMC screws	4
Cleaning agent R1	1
Sealant D1	

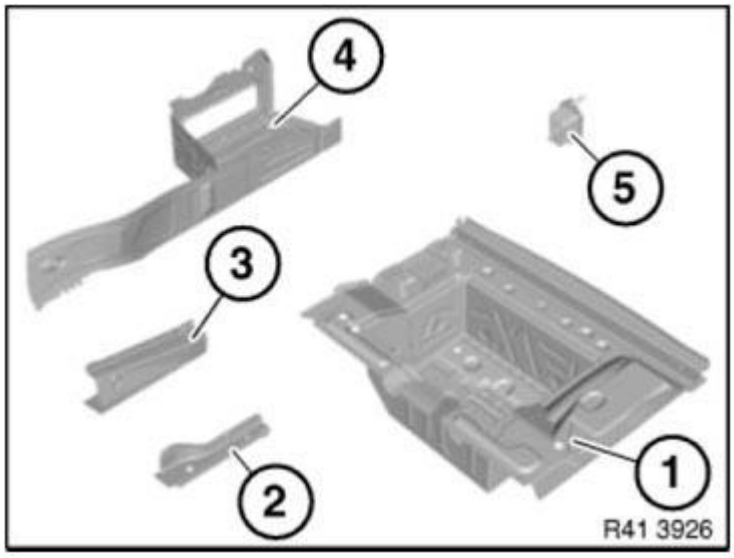


Fig. 153: Identifying, Rear Luggage Compartment Floor And Side Member, Left And Right
Courtesy of BMW OF NORTH AMERICA, INC.

Removing side members and luggage compartment floor

Operation is partially described on the left side. Right side identical.

Open weld joints in area (1).

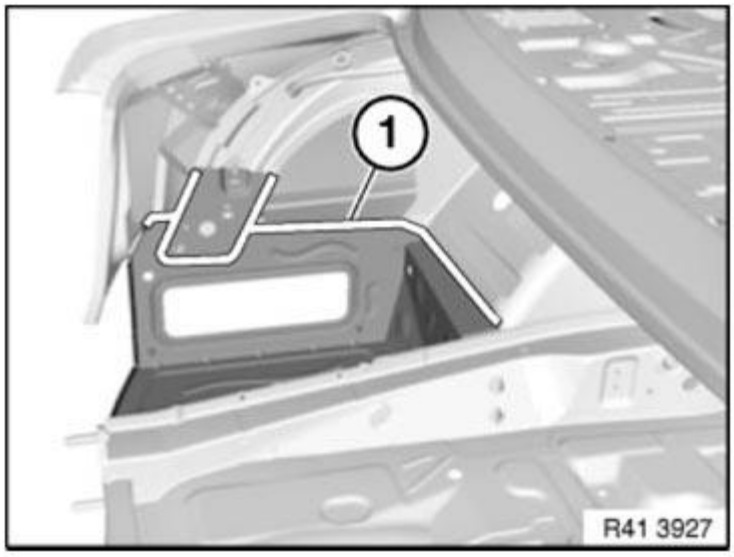


Fig. 154: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in area (1).

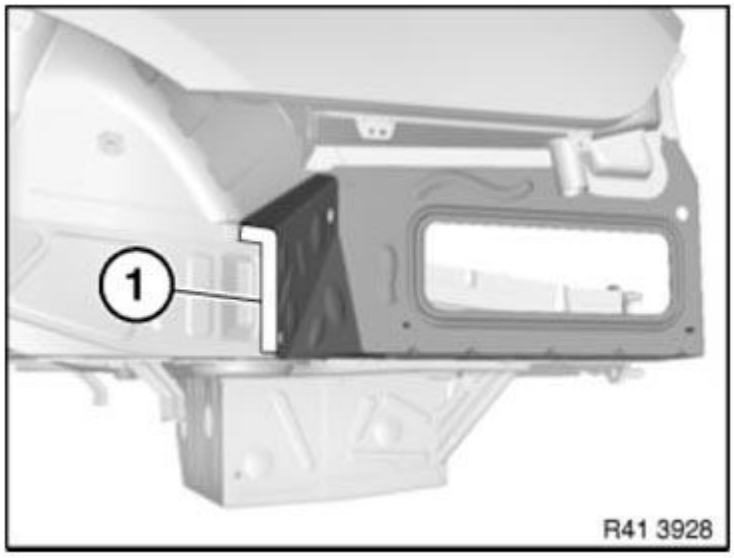


Fig. 155: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Roughly mark severance cut (1) and cut.

Open weld joints in area (2).

Remove luggage compartment floor (3).

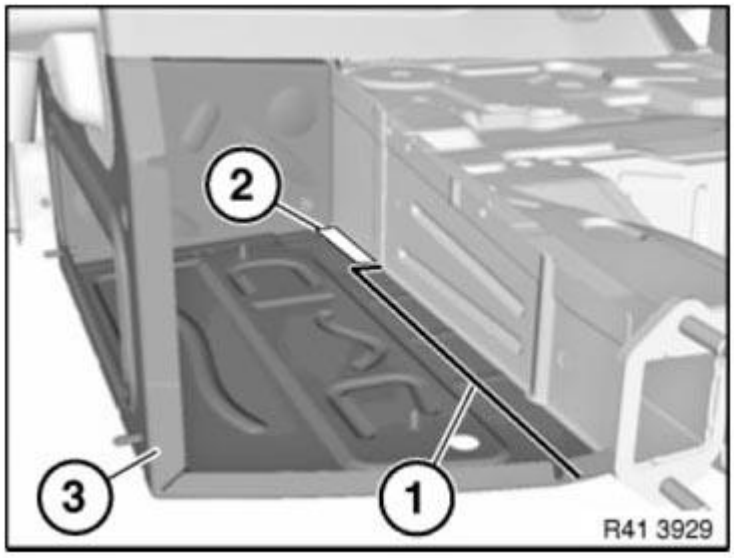


Fig. 156: Identifying Luggage Compartment Floor And Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

View from below.

Open weld joints in area (1).

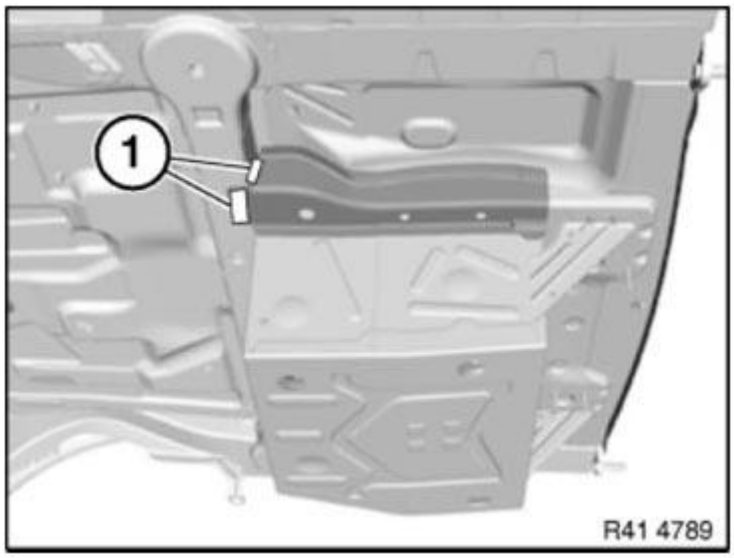


Fig. 157: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

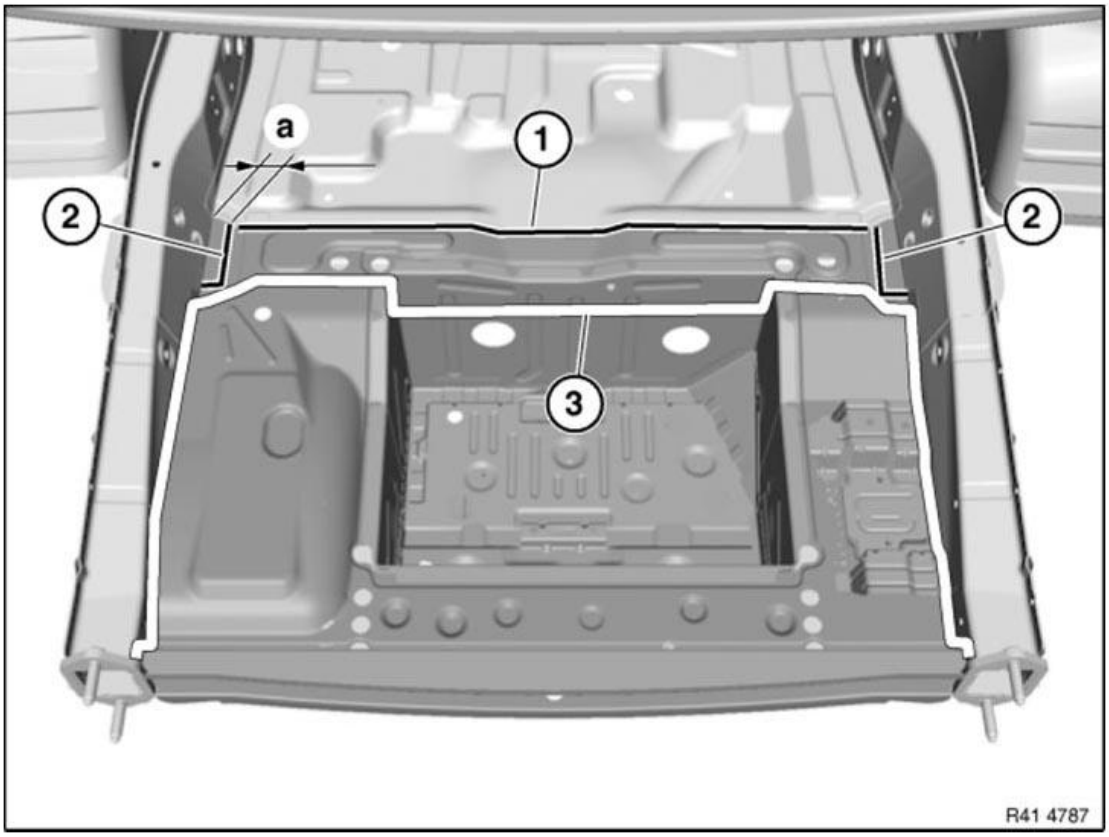


Fig. 158: Identifying Weld Joints Area And Severance Cuts
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) approx. 6 mm from edge of component and disconnect.

Mark severance cuts (2) in accordance with measurement and cut.

IMPORTANT: Cut outer metal sheet only.
Measurement a = 25 mm
Open weld joints in area (3).
Remove the luggage compartment floor.

Installation note:

Changed joining sequence: Place new component in the areas (1) and (2) from above and install so that it overlaps them.

Mark severance cut (1) flush with side member and cut.

After cutting side member extension (2), open weld joints in area (3).

Installation note:

Additionally weld new parts in area (4).

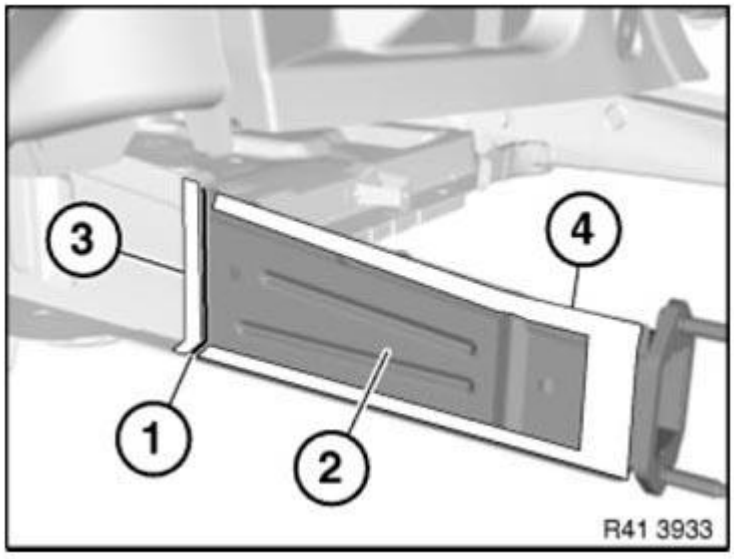


Fig. 159: Identifying Side Member Extension And Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) flush with side member and cut.

Remove side member extension (2).

Open weld joints in area (3).

Installation note:

Additionally weld new parts in area (4) all round.

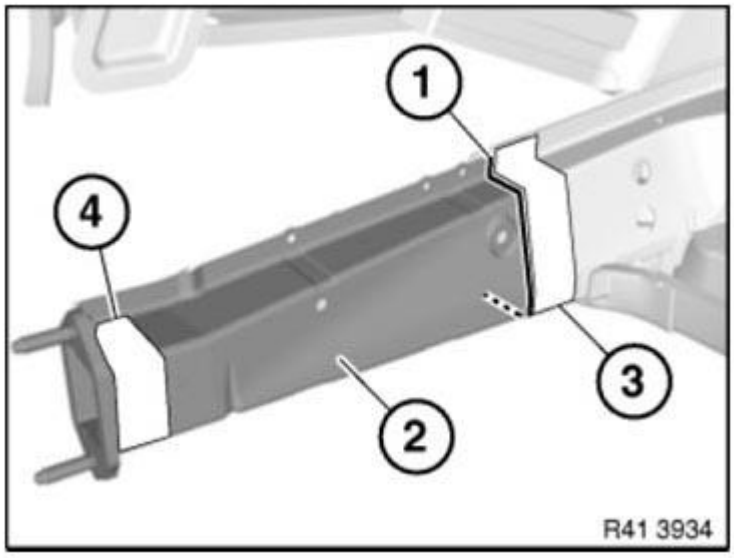


Fig. 160: Identifying Side Member Extension And Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Operation is partially described on the left side. Right side identical.

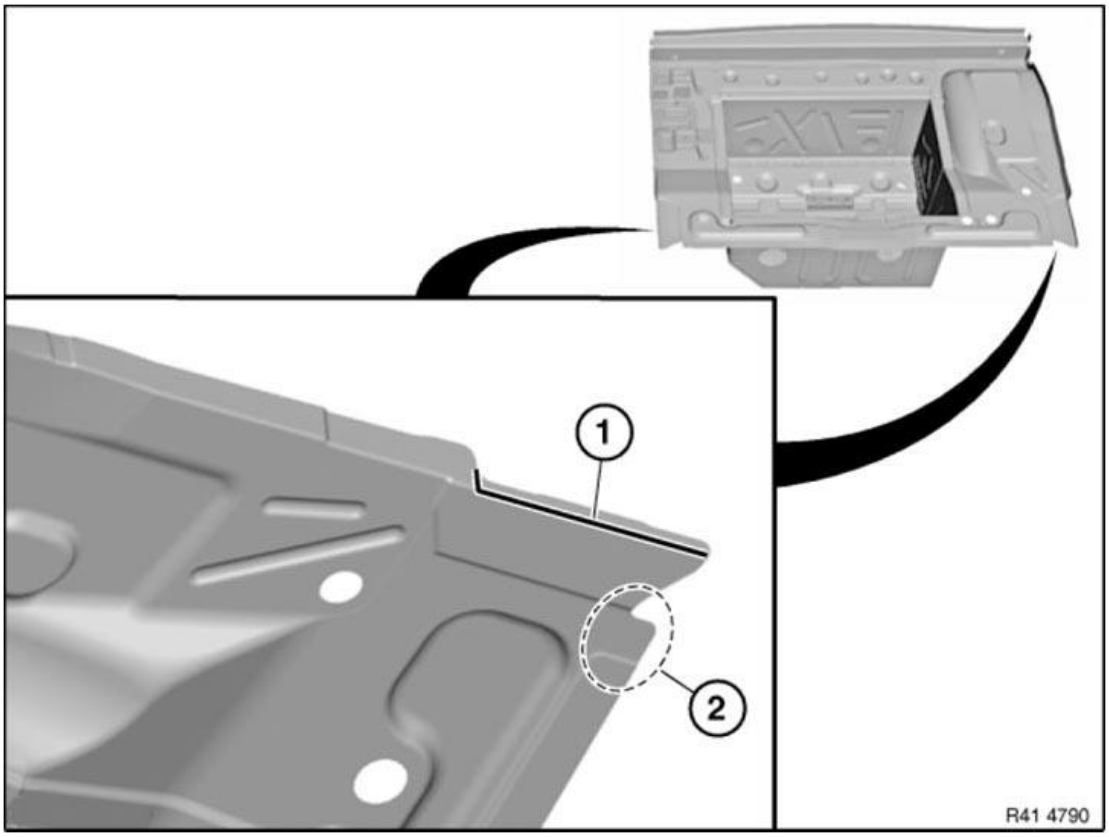


Fig. 161: Identifying Severance Cut And Stampings Fitting Area
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in radius and cut.

Fit stampings in area (2) on the vehicle.

Open weld joints in area (1).

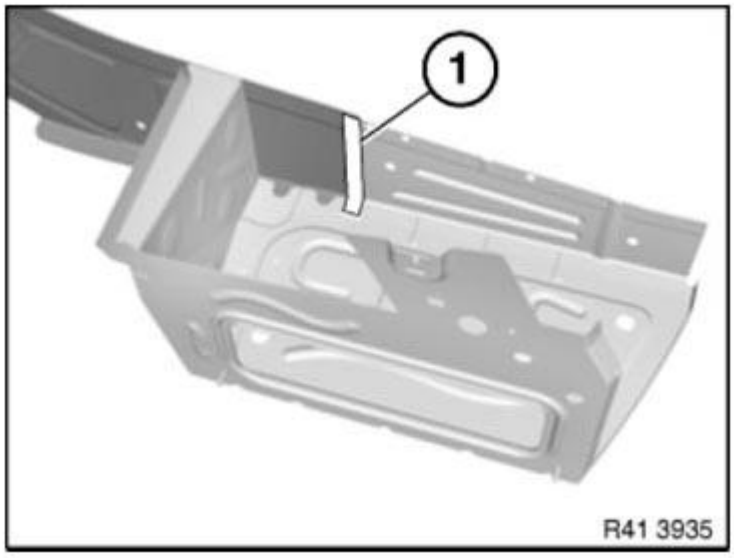


Fig. 162: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in area (1).

Remove metal section (2).

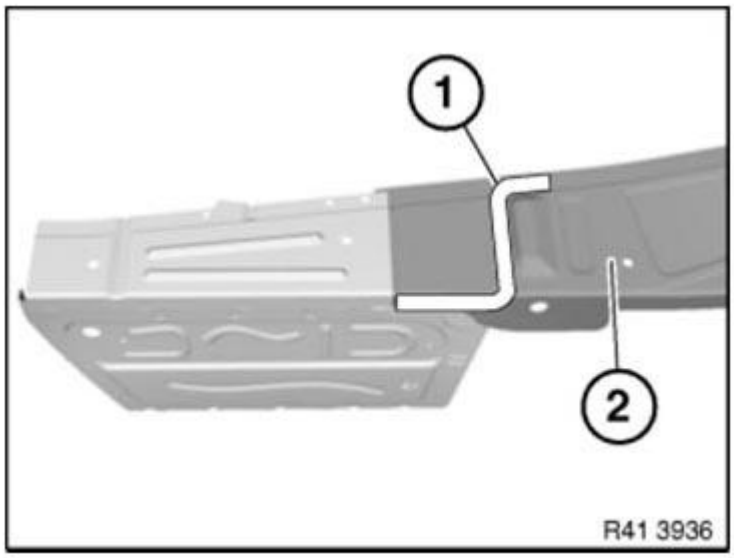


Fig. 163: Identifying Metal Section And Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To adjust new parts to fit, bend side member end panel (1) outwards slightly.

Adjust new parts, side members to fit with alignment bracket or universal mount.

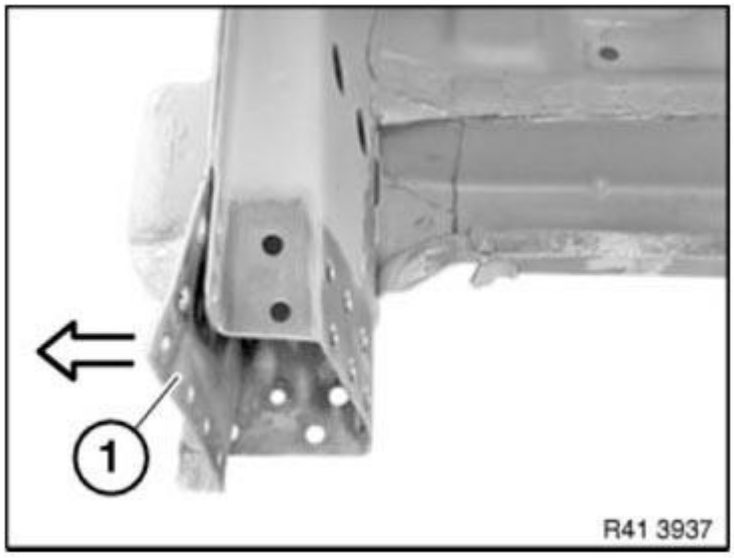


Fig. 164: Bending Side Member End Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Set down luggage compartment well (1) from above and adjust in combination with cross member (2) and tail panel to fit and secure.

In areas (1) to (4), set 4.2 mm dia. holes for blind rivets.

BLIND RIVETS HOLES AREA CHART

Area	Number
1	5
2	9
3	8
4	5

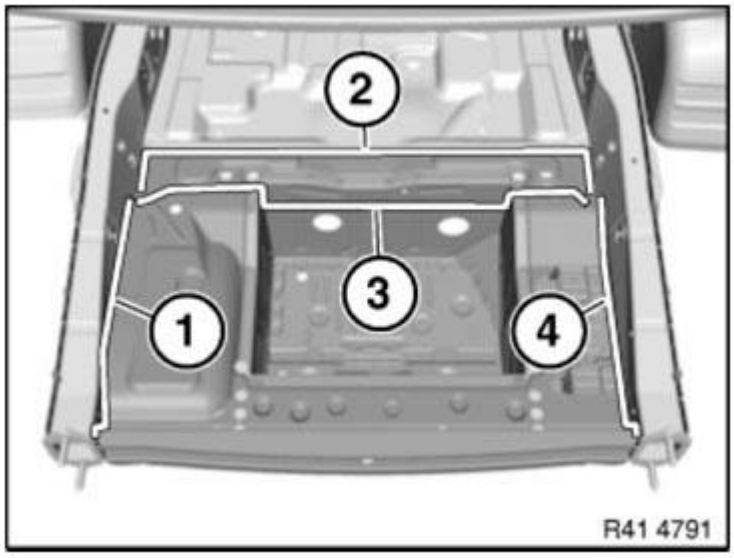


Fig. 165: Identifying Luggage Compartment Well And Cross Member Blind Rivets Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

After adhesive has hardened install 2 **EMC SCREWS** each in areas (1) and (4).

Adjust side member to fit and secure.

In areas (1) to (4), set 4.2 mm dia. holes for blind rivets.

BLIND RIVETS HOLES AREA CHART

Area	Number
1	1
2	4
3	4
4	2

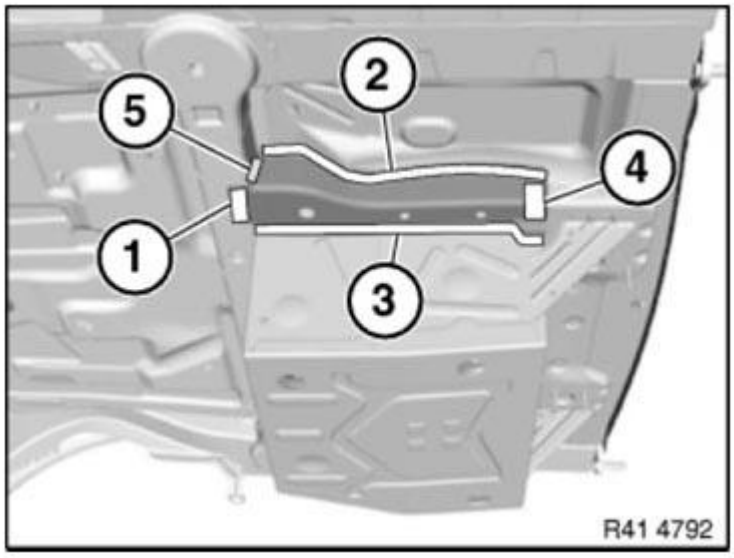


Fig. 166: Identifying Side Member Blind Rivets Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

New parts are later welded in the area (5).

IMPORTANT: Risk of damage to adjoining adhesive areas! Avoid excessive application of heat.

Adjust boot floor laterally (1) to fit and secure.

Set 5 4.2 mm dia. bore holes in area (2).

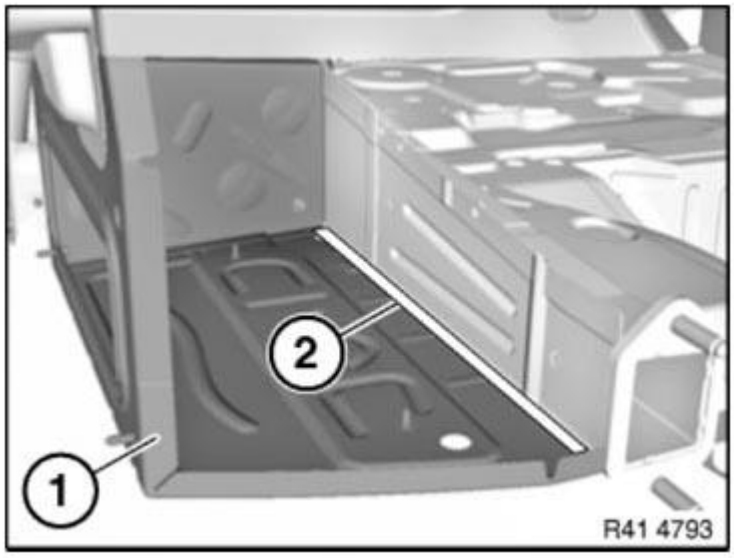


Fig. 167: Identifying Boot Floor Laterally And Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set 3 4.2 mm dia. bore holes in area (1).

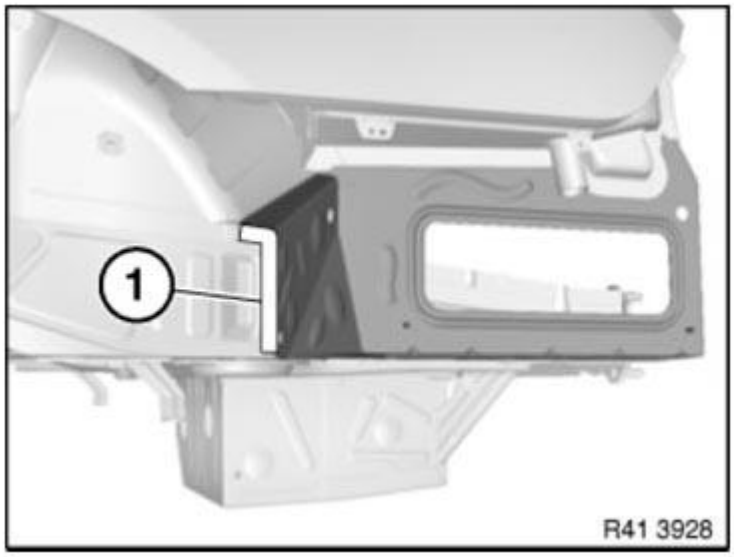


Fig. 168: Identifying Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set 11 4.2 mm dia. bore holes in area (1).

Remove new parts and deburr bore holes.

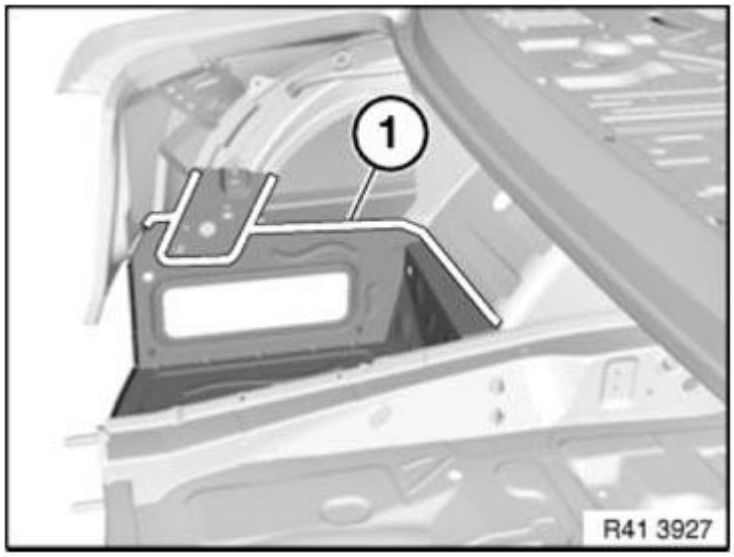


Fig. 169: Identifying Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Installation of side member

Adjust new parts to fit with straightening attachment or universal mount and weld.

- Extension, side member
- Extension, end plate side member
- Mounting, bumper

Installation of luggage compartment floor

Clean **all** bonding surfaces with cleaning agent R1.

Apply adhesive to bonding surfaces.

Install new parts and rivet with blind rivets.

41 12 651 REPLACING LUGGAGE COMPARTMENT FLOOR, LEFT SECTION (TAIL PANEL OR SIDE WALL REMOVED)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Luggage compartment floor, left Following **CONSUMABLES** are required:

MATERIAL CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N3	25
Cleaning agent R1	1
Sealant D1	

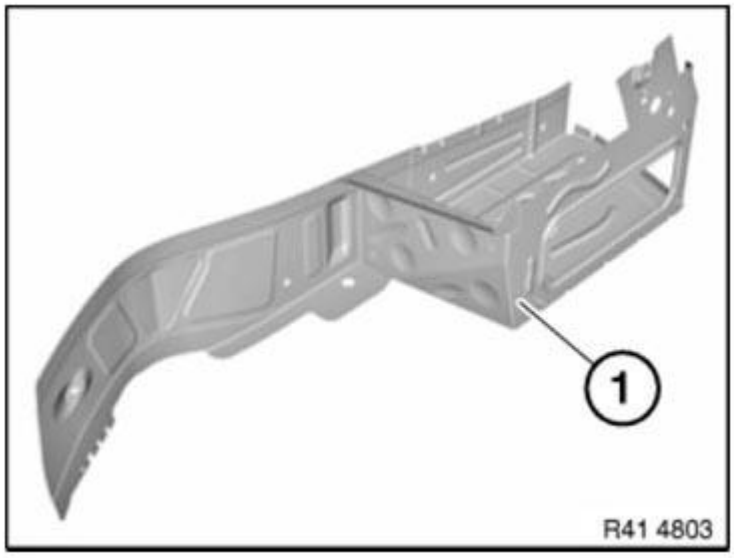


Fig. 170: Identifying Left Luggage Compartment Floor
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of luggage compartment floor

For purposes of clarity, graphic shows most of the tail panel removed.

Open welded connections in area (1).

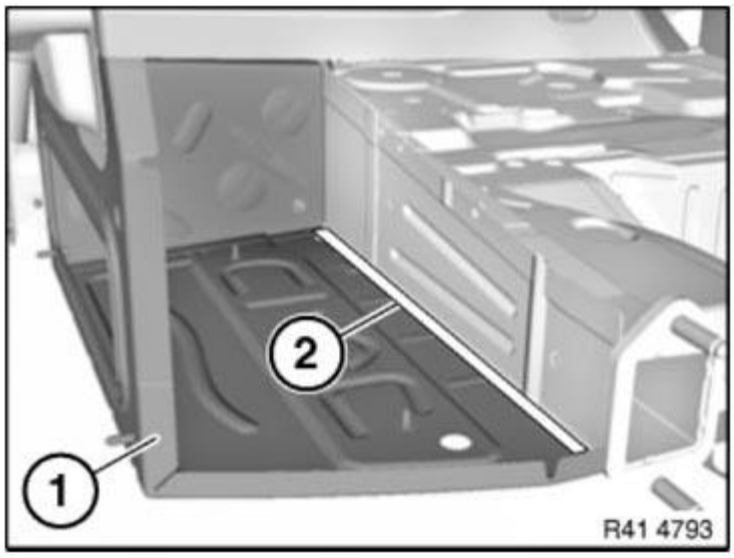


Fig. 171: Identifying Welded Connections Area And Luggage Compartment Floor
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

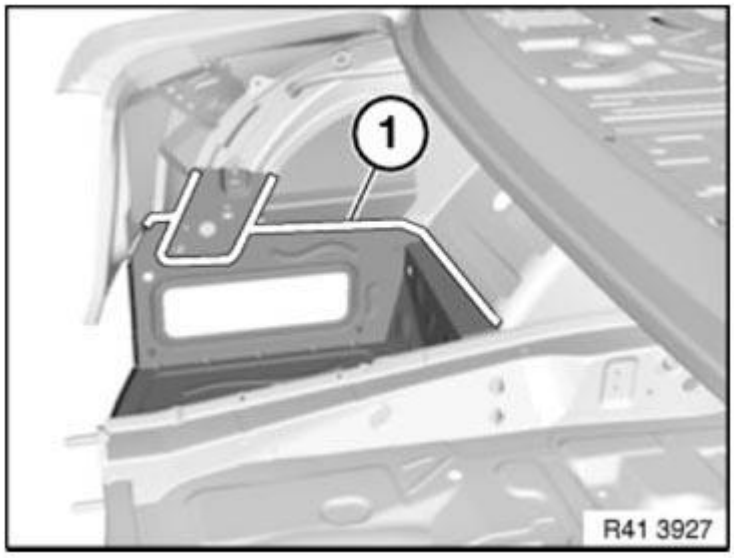


Fig. 172: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

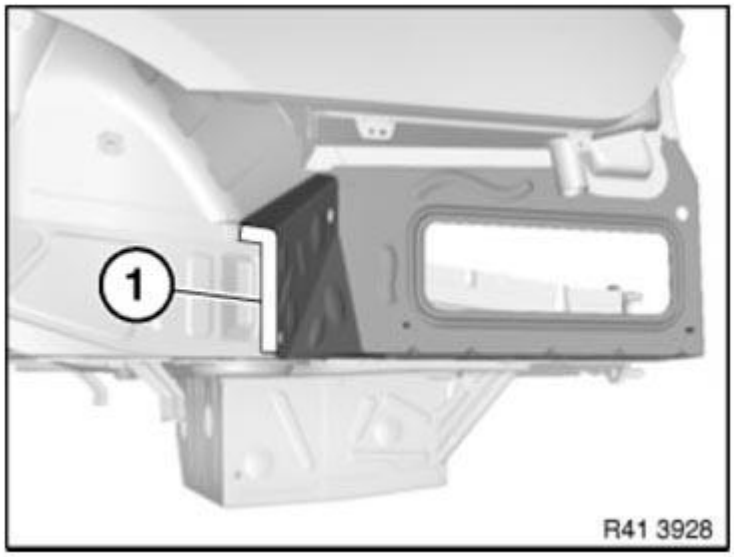


Fig. 173: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Separate welded connections in area (1) from inside.

Remove the luggage compartment floor.

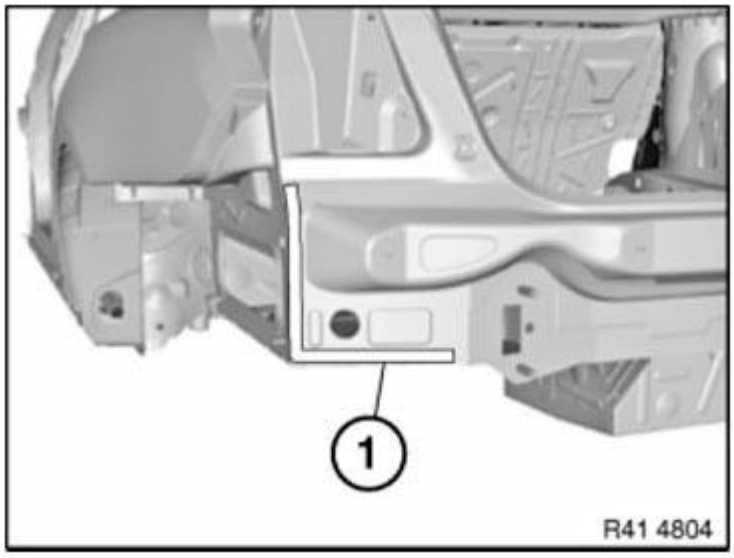


Fig. 174: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Open welded connections in area (1).

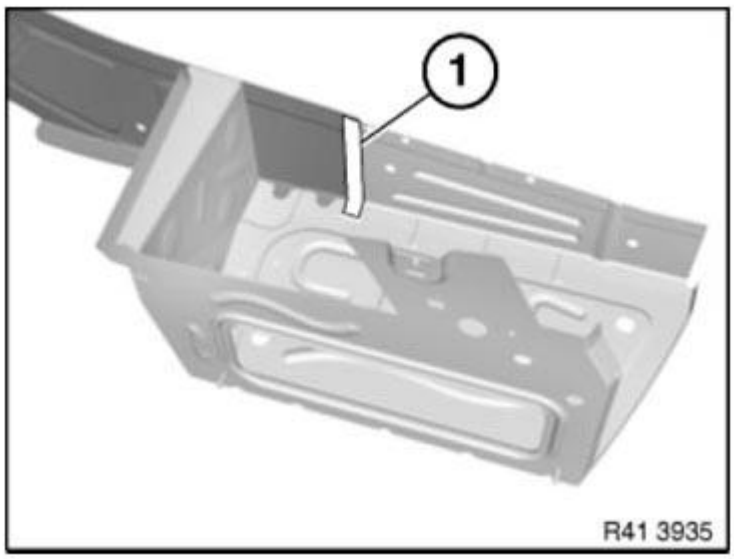


Fig. 175: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

Remove metal section (2).

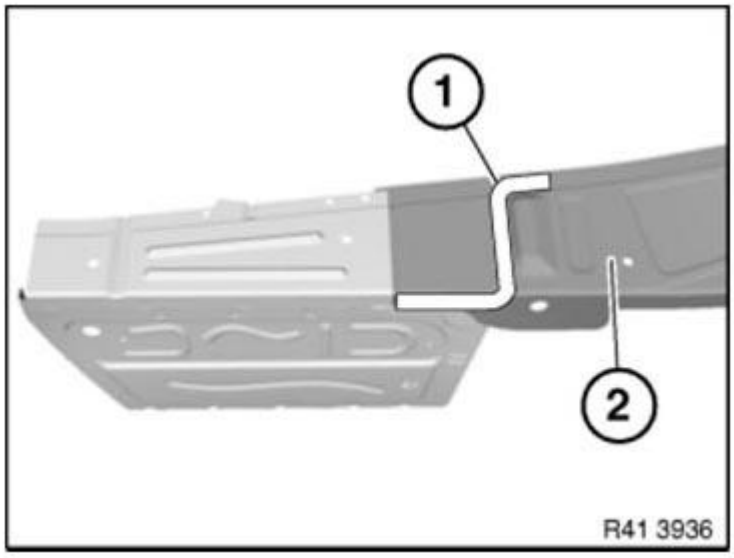


Fig. 176: Identifying Welded Connections Area And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust and secure the luggage compartment floor (1).

Set 5 4.2 mm dia. bore holes in area (2).

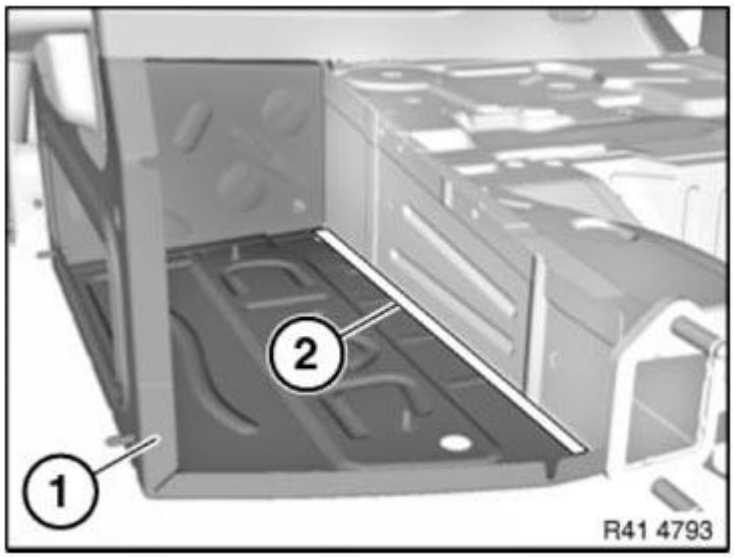


Fig. 177: Identifying Luggage Compartment Floor And Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set 3 4.2 mm dia. bore holes in area (1).

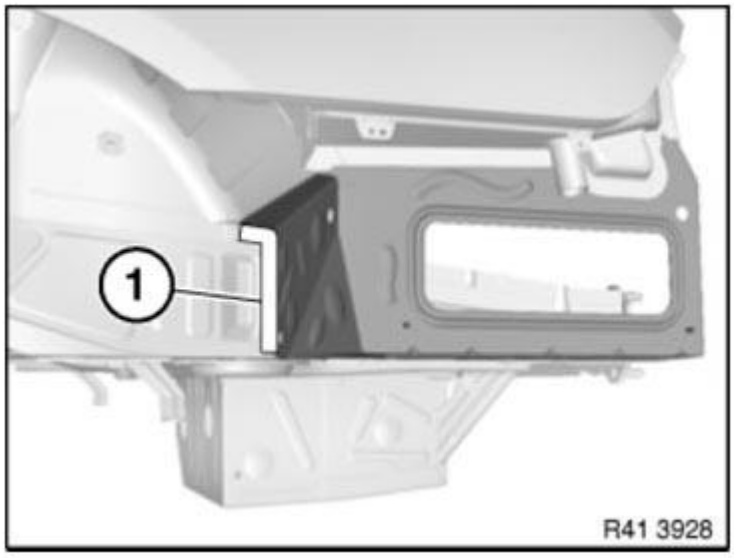


Fig. 178: Identifying Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set 11 4.2 mm dia. bore holes in area (1).

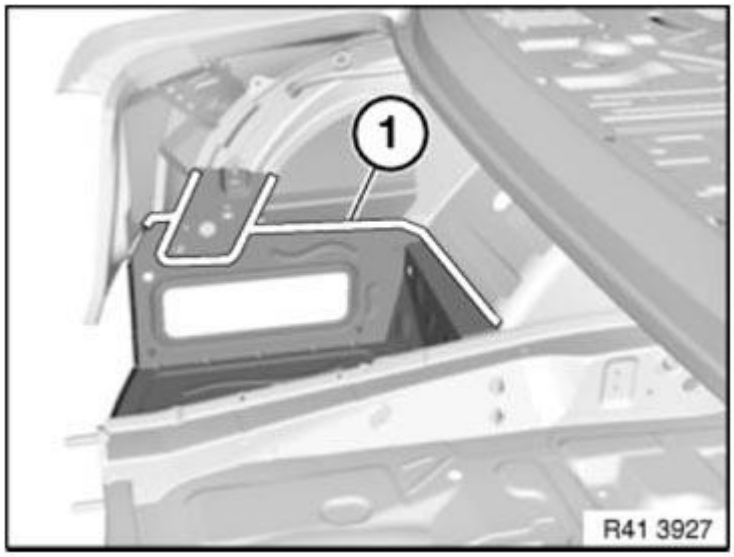


Fig. 179: Identifying Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set six 4.2 mm dia. bore holes in area (1).

Remove new parts and deburr bore holes.

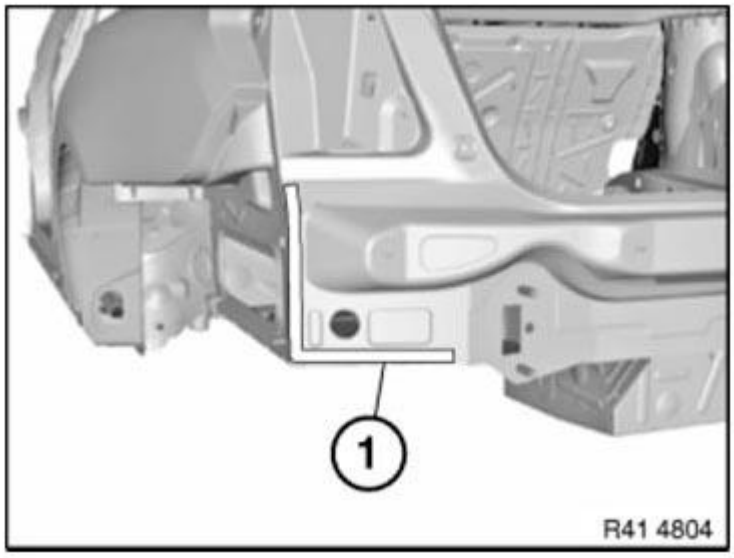


Fig. 180: Identifying Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Installation of luggage compartment floor

Clean **all** bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive on all bonding and riveting surfaces.

Install new part and rivet with blind rivets.

When installing the new part, make sure that all bonding surfaces have sufficient adhesive.

41 12 548 REPLACING REAR CROSS MEMBER ON LUGGAGE COMPARTMENT FLOOR (TAIL PANEL REMOVED)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE

Observe new procedure for bonding and riveting **(REPAIR STAGE 2)** .

Following new body parts are required:

- (1) End of luggage compartment floor Following **CONSUMABLES** are required:

MATERIAL CHART

Material	Quantity

Adhesive K5a	1
Blind rivets N3	12
EMC screws	2
Cleaning agent R1	1
Cavity wax remover	
Sealant D1	

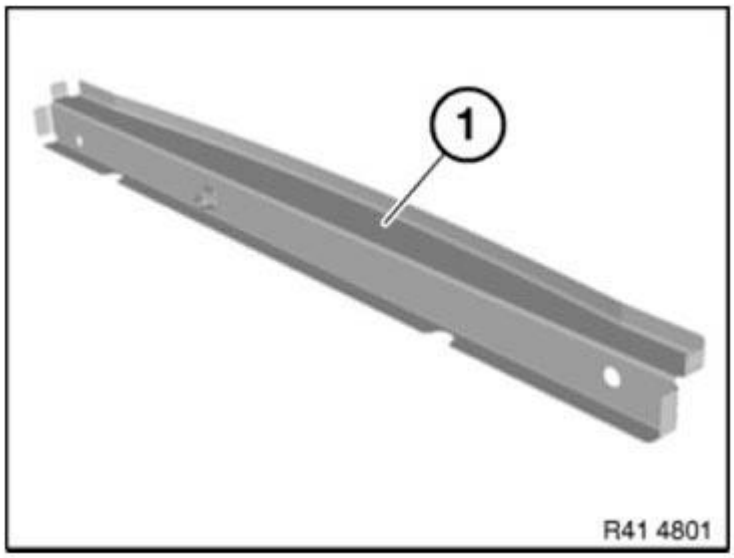


Fig. 181: Identifying End Of Luggage Compartment Floor
Courtesy of BMW OF NORTH AMERICA, INC.

Removing cross member

Open welded connections in area (1) and remove cross member (2).

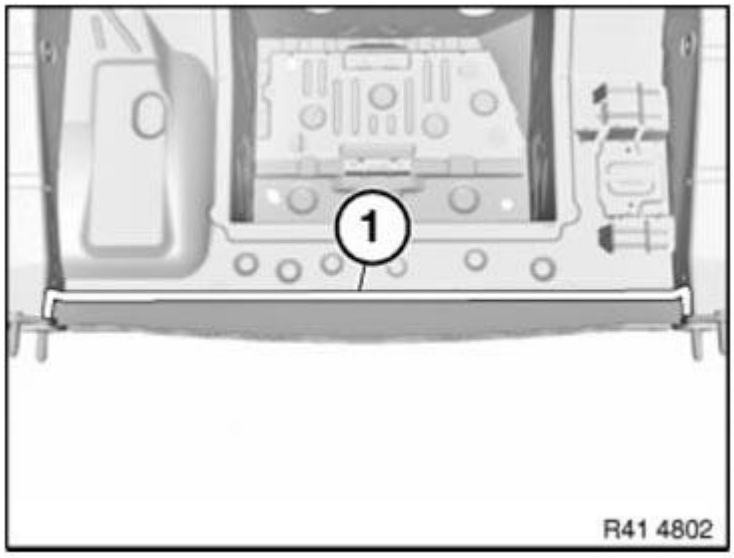


Fig. 182: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Adjust cross-member in combination with tail panel to fit and secure.

Drill 12 dia. 4.2 mm holes for blind rivets in area (1).

Remove new part again and deburr bore holes.

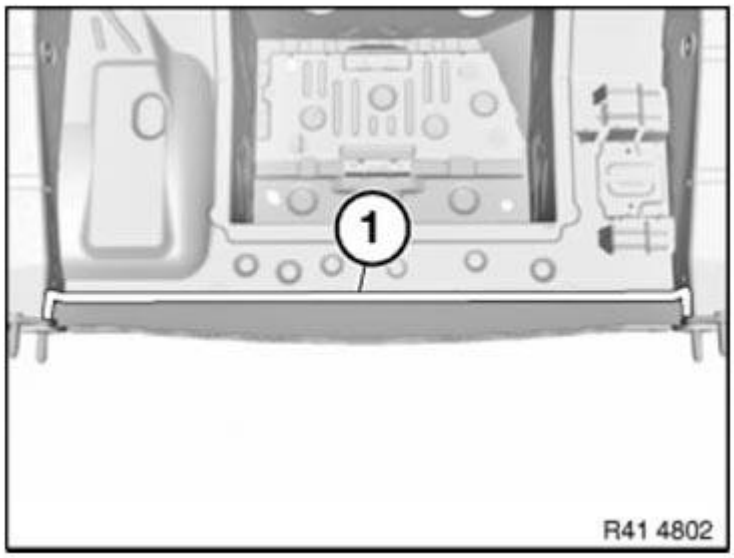


Fig. 183: Identifying Blind Rivets Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installing cross member

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Clean **all** bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive to bonding surfaces.

Install cross member and secure with blind rivets

After adhesive has hardened: In the connection area of cross member to side member, fit 2 **EMC SCREWS** .

41 12 651 STRIPPING OPERATIONS - REPLACING LEFT LUGGAGE COMPARTMENT FLOOR (TAIL PANEL OR SIDE PANEL REMOVED)

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.
The following list basically represents the removal sequence.

- Disconnect battery negative lead (FR number: 61 20 600)
- Remove rear left wheel well cover (FR number: 51 71 041)
- Remove exhaust system (job number: gasoline engine 18 00 020, diesel engine 18 00 018)
- Remove heat shield
- Remove left luggage compartment floor trim panel (job number: 51 47 101)
- Remove left luggage compartment wheel arch panel (job number: 51 47 151)

Release holder (1) for wiring harness and lay to one side.

Release holder for control units (2).

Disconnect plug connections and remove control units (2).

Remove tank venting valve (3).

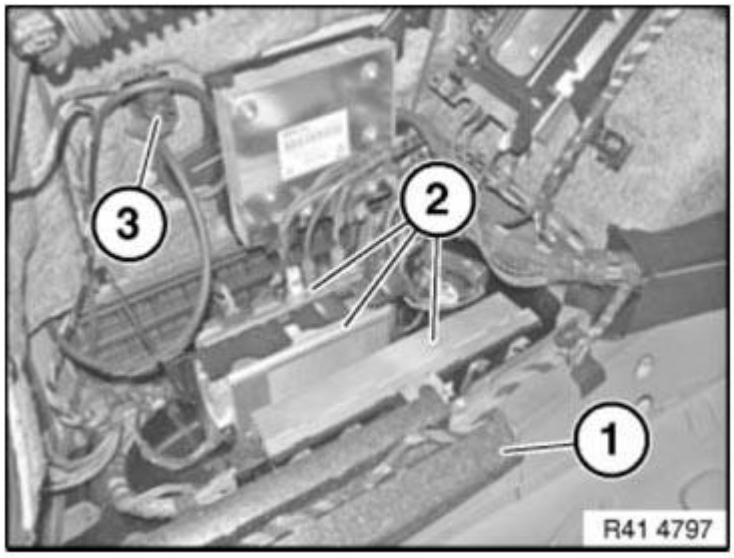


Fig. 184: Identifying Holder, Control Units And Tank Venting Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder for control units (1).

Disconnect plug connections and remove control units (2).

Release cable channel (2) and wiring harness (3) and place to one side.

Release latch mechanisms and remove ventilation (4).

Remove soundproofing (5).

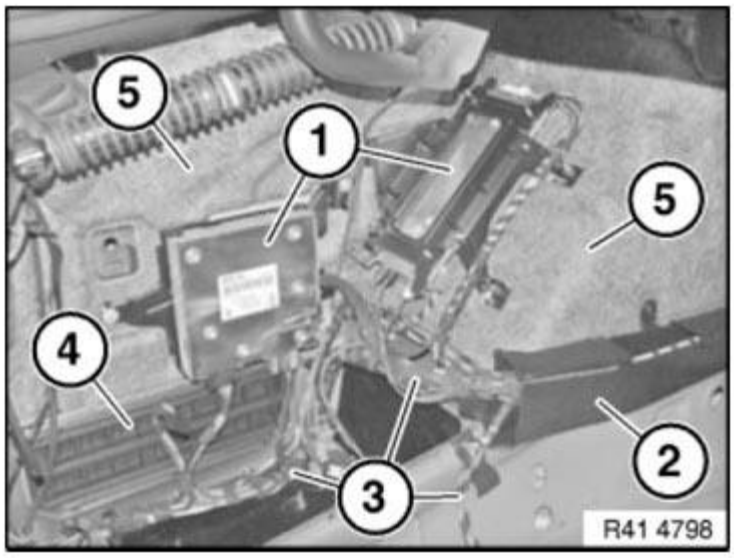


Fig. 185: Identifying Cable Channel, Wiring Harness And Control Units

Courtesy of BMW OF NORTH AMERICA, INC.

41 12 535 STRIPPING OPERATIONS - REPLACING LUGGAGE COMPARTMENT FLOOR AND BOTH SIDE MEMBERS (TAIL PANEL REMOVED)

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.
The following list basically represents the removal sequence.

- Remove left and right rear wheel arch covers (job number: 51 71 041)
- Remove exhaust system (job number: gasoline engine 18 00 020, diesel engine 18 00 018)
- Remove heat shield

Release holder (1) for wiring harness and lay to one side.

Release holder for control units (2).

Disconnect plug connections and remove control units (2).

Remove tank venting valve (3).

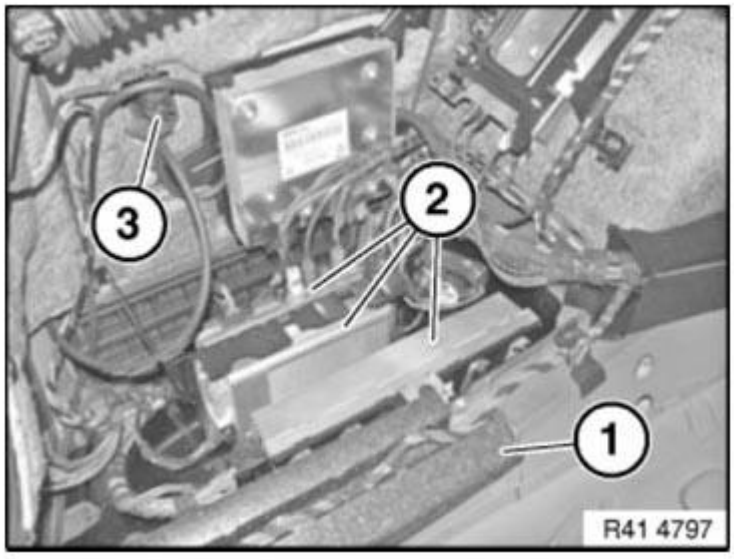


Fig. 186: Identifying Holder, Control Units And Tank Venting Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder for control units (1).

Disconnect plug connections and remove control units (1).

Release cable channel (2) and wiring harness (3) and place to one side.

Release latch mechanisms and remove ventilation (4).

Remove sound insulation (5).

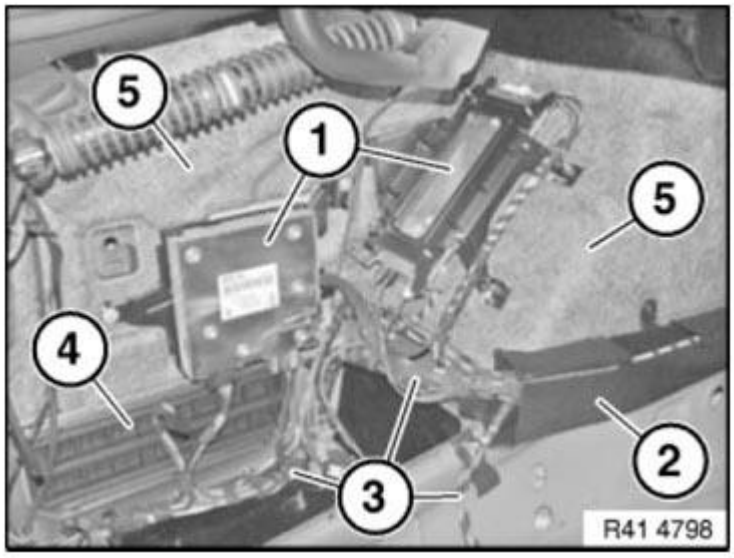


Fig. 187: Identifying Cable Channel, Wiring Harness And Control Units
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable channel cover (1) and place to one side.

Remove storage compartment (2).

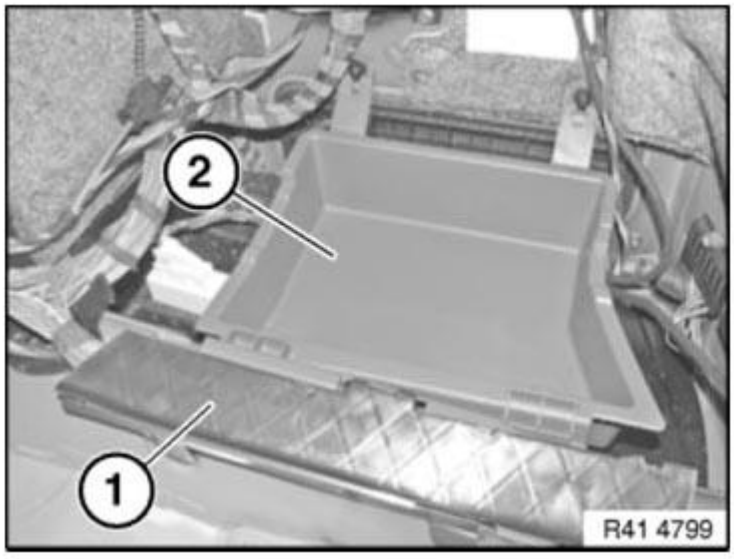


Fig. 188: Identifying Cable Channel Cover And Storage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

Remove power distribution box in passenger compartment (1). See **61 13 050 REMOVING AND INSTALLING/REPLACING POWER DISTRIBUTION BOX IN PASSENGER COMPARTMENT** .

Disconnect plug connections and **CONTROL UNITS** (2) with holder.

Release wiring harness (3) and place to one side.

Release latch mechanisms and remove ventilation (4).

Remove sound insulation (5).

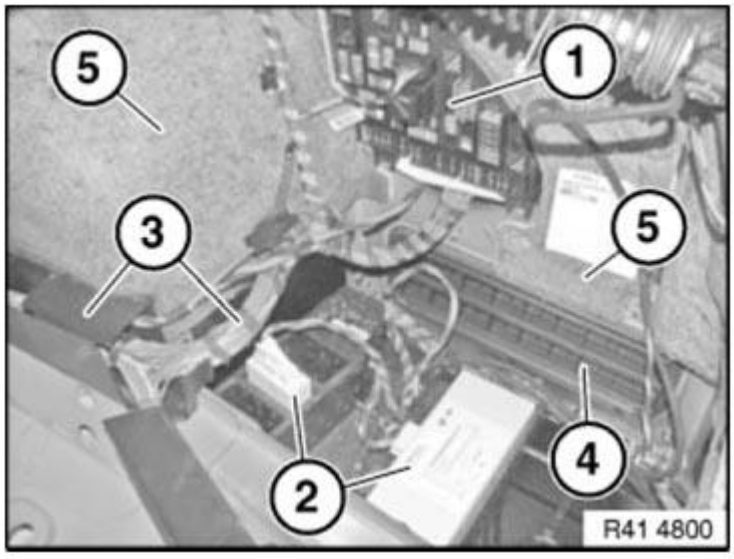


Fig. 189: Identifying Passenger Compartment, Wiring Harness And Ventilation
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **BATTERY** .

Remove **NEGATIVE TERMINAL BATTERY CABLE** (1).

Release nut (2) and remove ground connection.

Tightening torque **41 34 2AZ** .

Disconnect plug connections and remove control units (3).

Release wiring harness (4) and place to one side.

Release positive battery cables (5) and lay to one side.

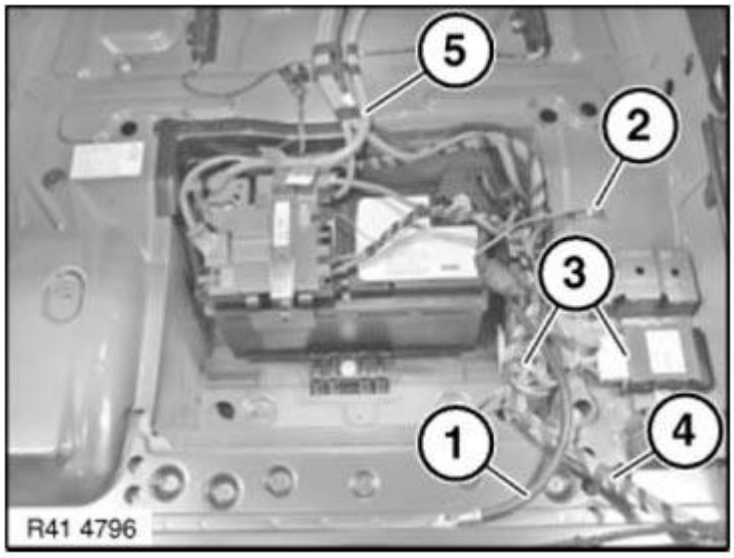


Fig. 190: Identifying Control Units, Wiring Harness And Positive Battery Cables
Courtesy of BMW OF NORTH AMERICA, INC.

41 12 557 STRIPPING OPERATIONS - REPLACING LUGGAGE COMPARTMENT FLOOR, MIDDLE (TAIL PANEL REMOVED)

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.
The following list basically represents the removal sequence.

- Remove exhaust system (job number: 18 00 020)
- Remove heat shield
- Remove spare wheel well trim panel at front and rear.

Remove **BATTERY** .

Remove **BATTERY NEGATIVE LEAD** (1).

Release nut (2) and remove earth connection.

Tightening torque **41 34 2AZ** .

Disconnect plug connections and remove control units (3).

Release wiring harness (4) and place to one side.

Release positive battery leads (5) and lay to one side.

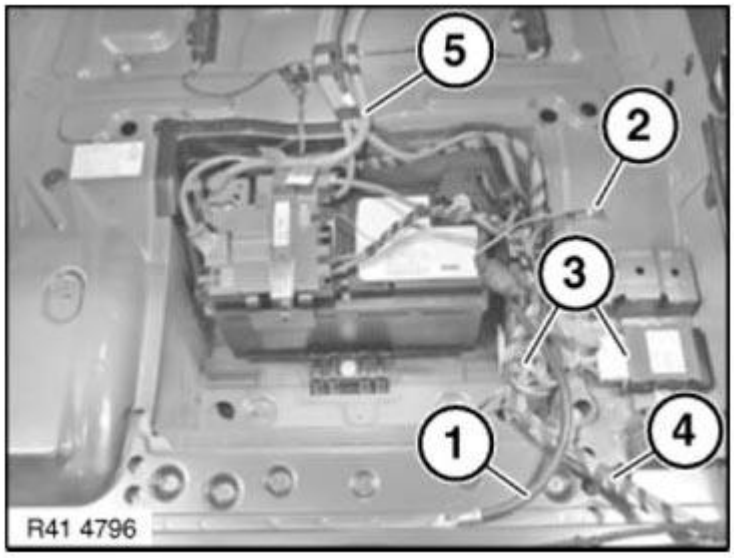


Fig. 191: Identifying Control Units, Wiring Harness And Positive Battery Cables
Courtesy of BMW OF NORTH AMERICA, INC.

41 12 548 STRIPPING OPERATIONS - REPLACING REAR CROSS-MEMBER ON LUGGAGE COMPARTMENT FLOOR (TAIL PANEL REMOVED)

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.
The following list basically represents the removal sequence.

- Remove negative battery cable (job number: 61 12 013)
- Remove exhaust system (job number: 18 00 020)
- Remove heat shield

4114 WHEEL WELLS

41 00... CARRYING OVER HOLE PATTERN

When replacing a body component, it is necessary to carry over the hole pattern from the existing body to the new component.

The following pictures are a schematic representation of carrying over the hole pattern on the example of the front wheel arch.

Necessary preliminary tasks

Adjust new part to fit with straightening attachment.

Insert paper stencil (1) between new component (2) and engine carrier and secure with adhesive tape (3).

Carry over contour (4) of new component to stencil.

Remove new component.

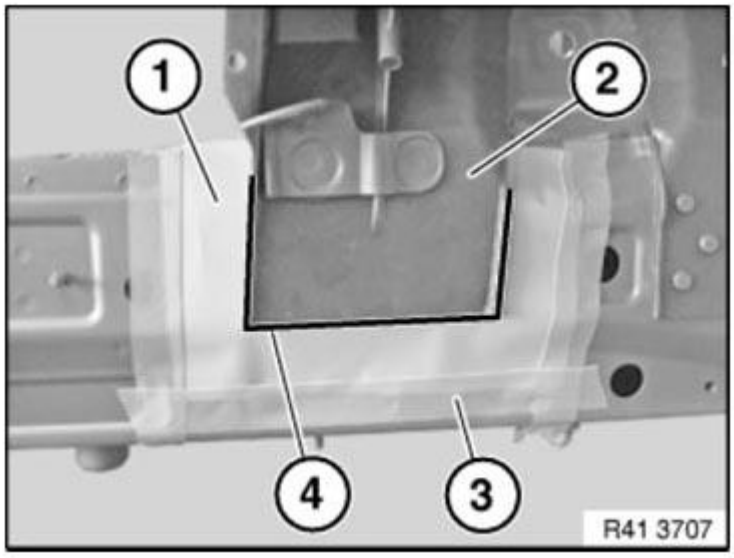


Fig. 192: Securing Paper Stencil Using Adhesive Tape
Courtesy of BMW OF NORTH AMERICA, INC.

1. = contour of new component.

Carry over positions of holes (2) to stencil by pressing down with thumbs.

Remove stencil.

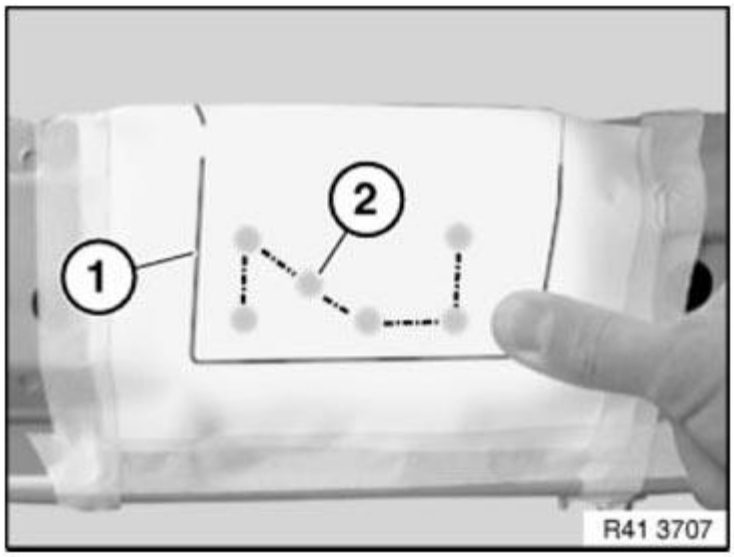


Fig. 193: Carrying Over Positions Of Holes To Stencil

Courtesy of BMW OF NORTH AMERICA, INC.

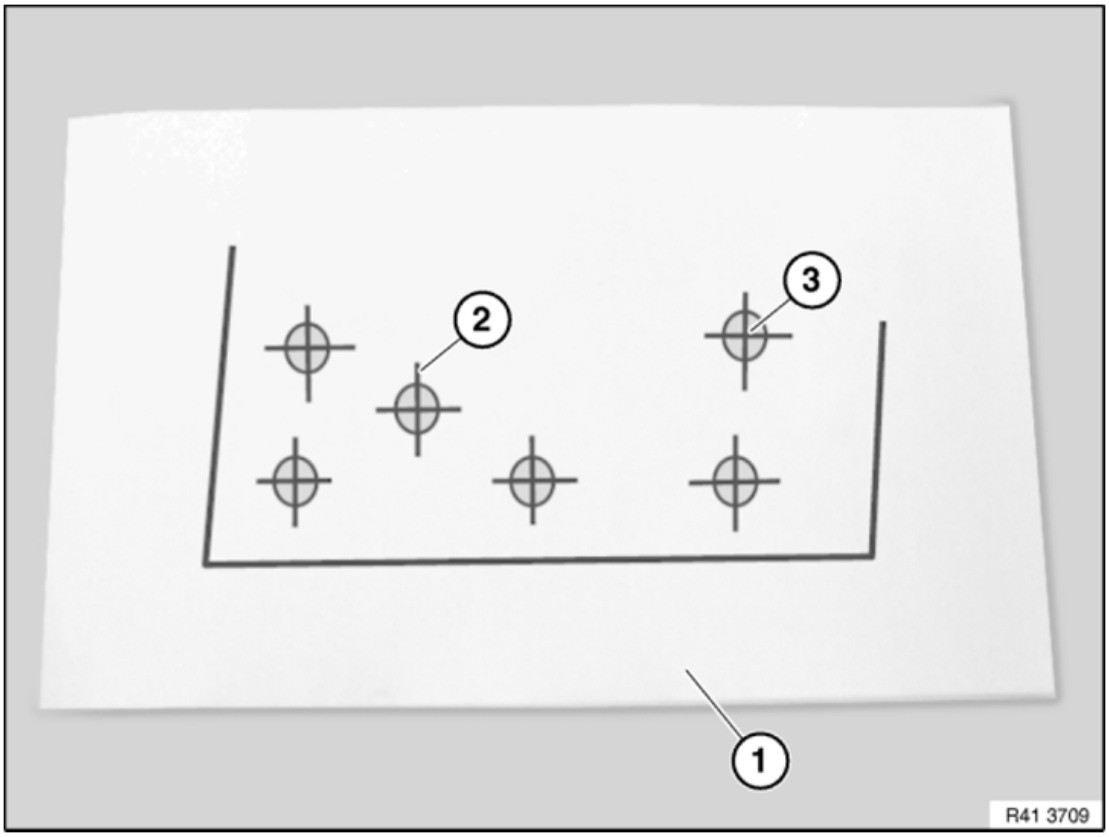


Fig. 194: Identifying Holes With Crosses And Stencil
Courtesy of BMW OF NORTH AMERICA, INC.

Lay stencil (1) on a flat surface.

Mark center points of holes with crosses (2).

Then pierce paper through center points (3) of holes with a pointed object.

Align stencil (1) according to contours (2) to inside of new component and secure with adhesive tape (3).

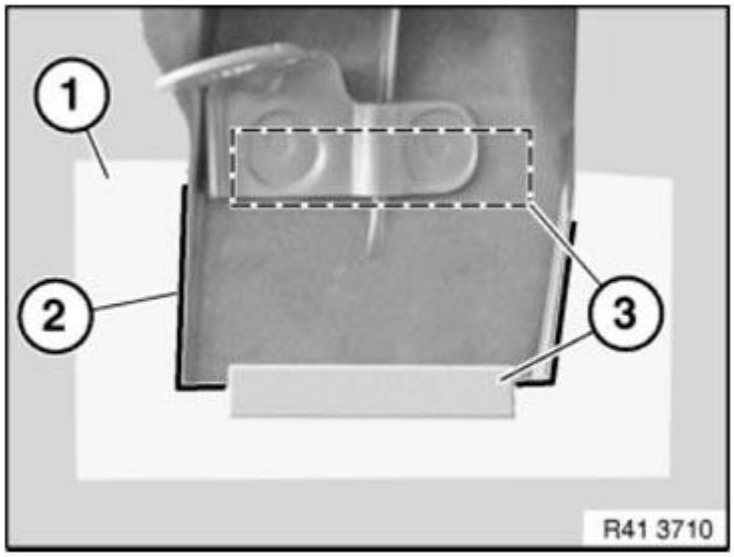


Fig. 195: Securing Stencil To Component Using Adhesive Tape
Courtesy of BMW OF NORTH AMERICA, INC.

Turn over new component.

IMPORTANT: Crosses must not be visible in this view!

Set punch marks at pierced center points (1).

Grip directly under punch marks for marking with punch.

Remove stencil (2).

Drill holes to approx. 3 - 4 mm dia. at punch marks (1).

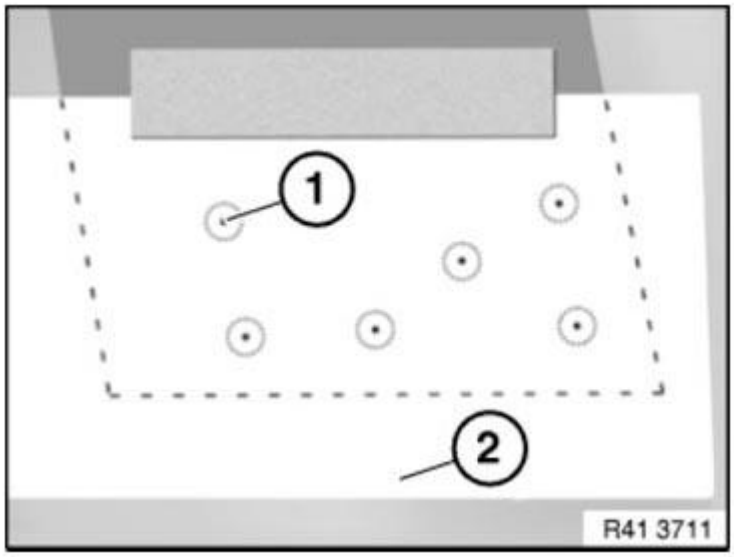


Fig. 196: Identifying Stencil And Punch Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Position new component (1) with straightening attachment on vehicle.

Drill out holes (2) to 6.7 mm dia.

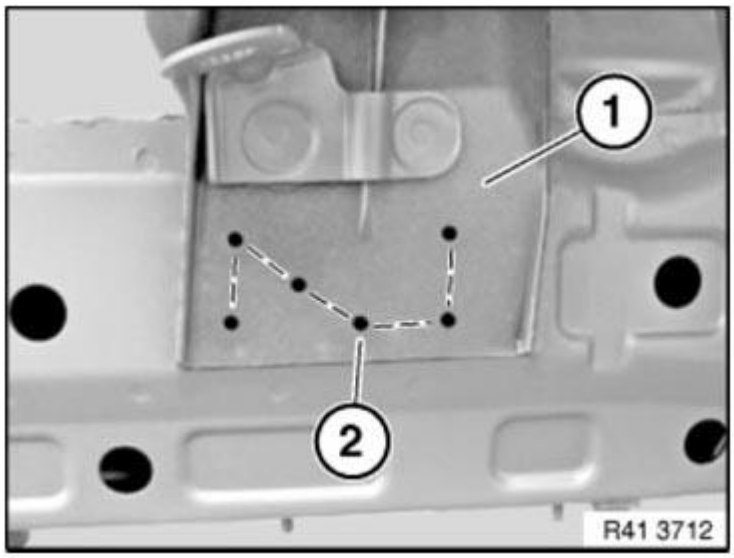


Fig. 197: Identifying Component Position And Drill Holes
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 015 REPLACING ENGINE SUPPORT WITH WHEEL ARCH, LEFT

Procedure **OBSERVE** repair stage 3!

Read contents of **BODY, GENERAL** .

Steel-aluminium composite construction is used on the vehicle. Observe specific **procedure** See **4100... BONDING ALUMINIUM ON STEEL**.

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE** .

Place vehicle on straightening bench.

Following new body parts are required:

- (1) Engine support
- (2) Engine support, rear
- (3) Wheel arch, front
- (4) Connection, wheel arch/entrance
- (5) Connection, side frame, rear
- (6) Shaped parts, carrier support, wheel arch, front (not shown)

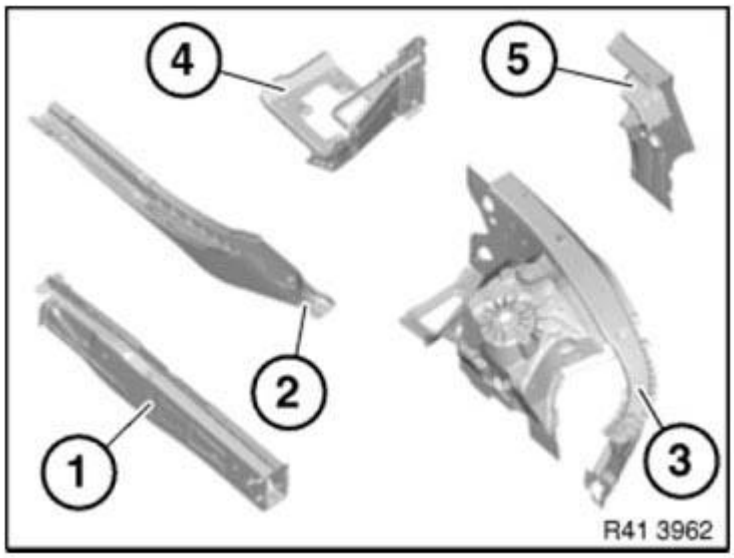


Fig. 198: Identifying Engine Support, Rear Side Frame Connection And Wheel Arch/Entrance Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

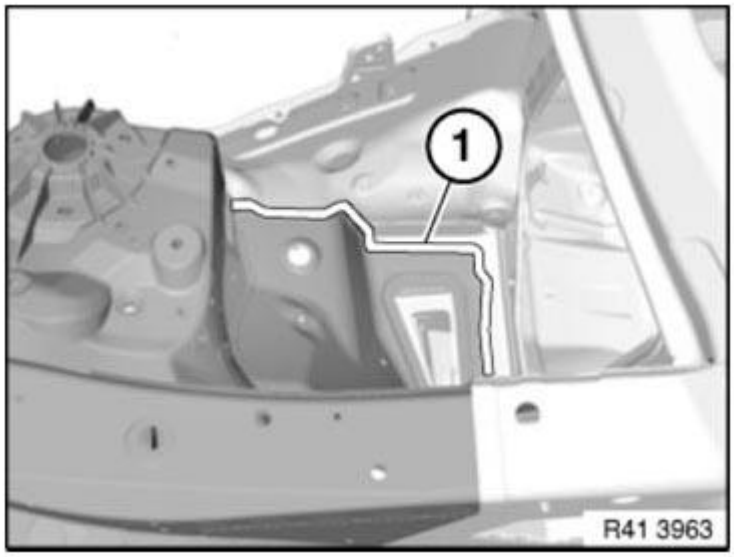


Fig. 199: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

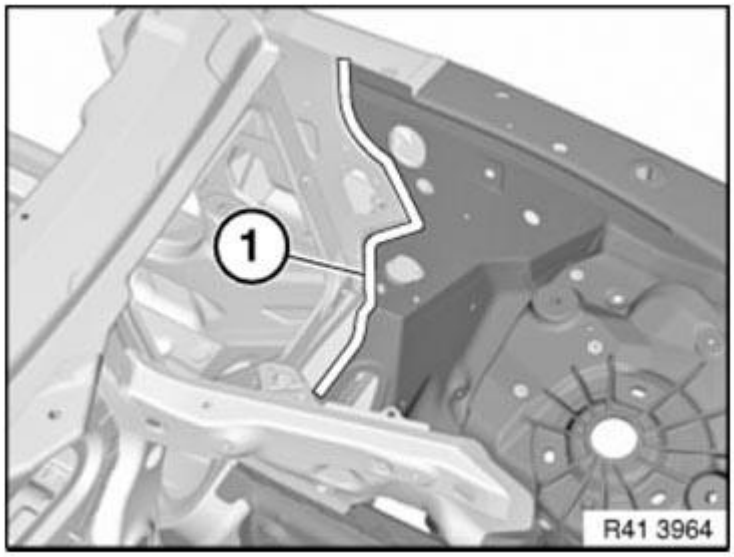


Fig. 200: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

LOOSEN spot-welded adhesive joints in area (1).

Open welded connections in area (2).

Roughly cut side frame connection (3) along lines (4).

Remove side frame connection (3).

Installation note:

MAG weld new part in areas (4).

To do so, apply 10 mm long fillet welds at spacing of 15 mm.

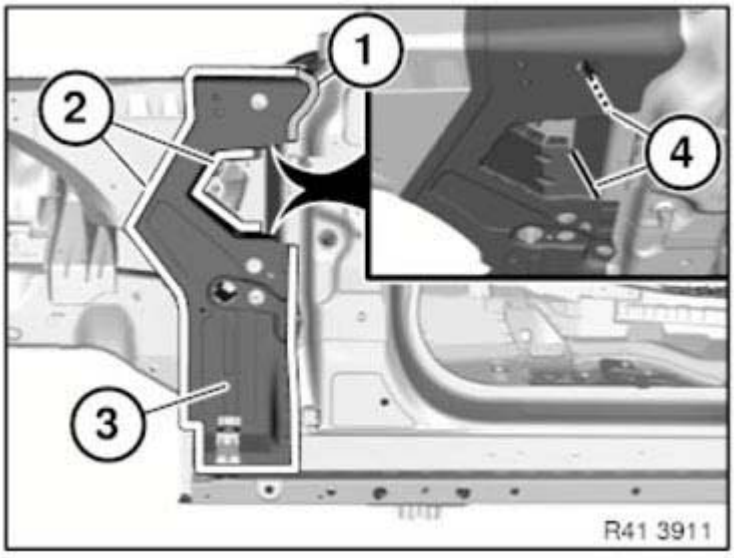


Fig. 201: Identifying Spot-Welded Adhesive Joints Area And Side Frame Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

Installation note:

Replace **CAVITY SEALING (2)** .

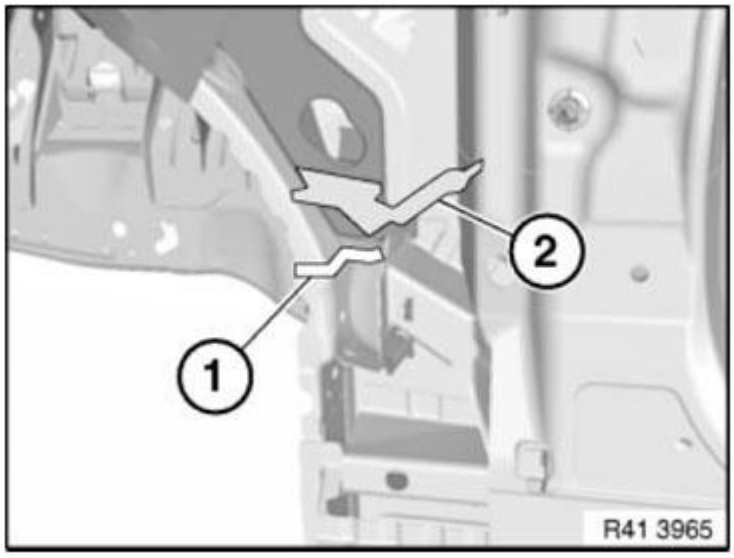


Fig. 202: Identifying Welded Connections Area And Cavity Sealing
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with dimension a and cut engine support.

Dimension a = 140 mm

Installation note:

Weld in **REINFORCEMENT PLATE** at severance cut.

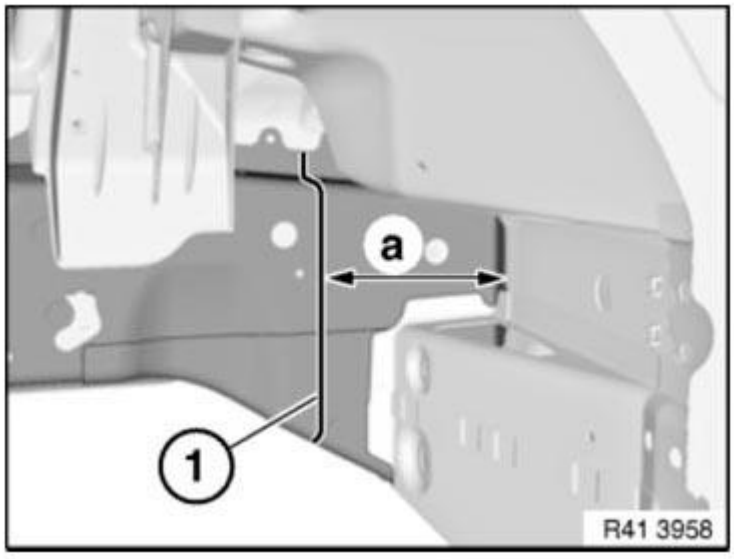


Fig. 203: Identifying Reinforcement Plate Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Drill out rivet connections in area (1).

Open **BONDED CONNECTIONS** in area (1).

Remove wheel arch (2) with engine support.

Installation note:

Use 6 **N2 RIVETS** in area (1).

Glue new part with **ADHESIVE K1** .

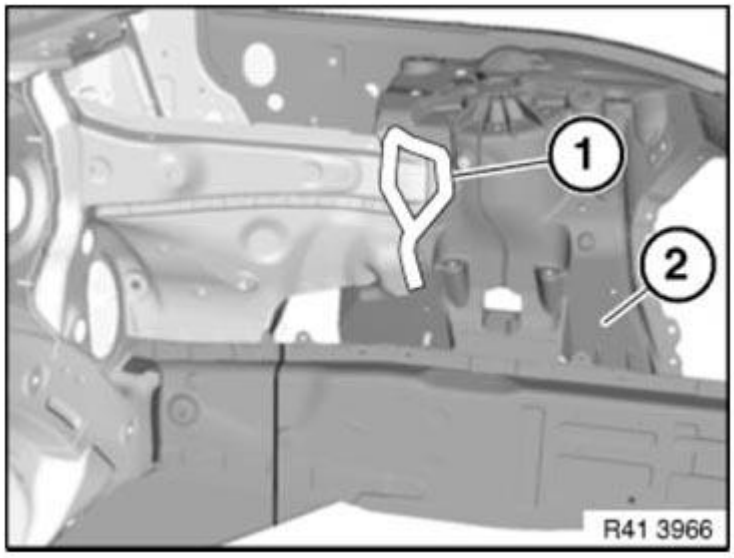


Fig. 204: Identifying Bonded Connections Area And Wheel Arch
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

Remove metal section (2).

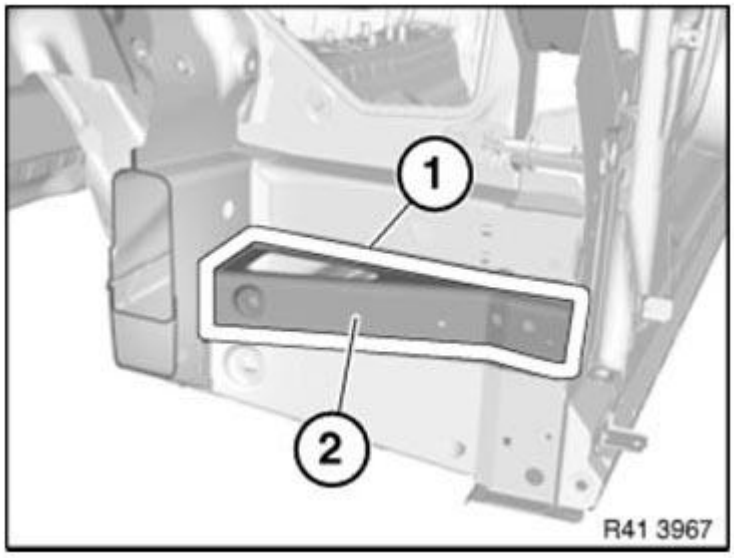


Fig. 205: Identifying Welded Connections Area And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) and cut.

IMPORTANT: Cut outer panel only.

Open welded connections in area (2).

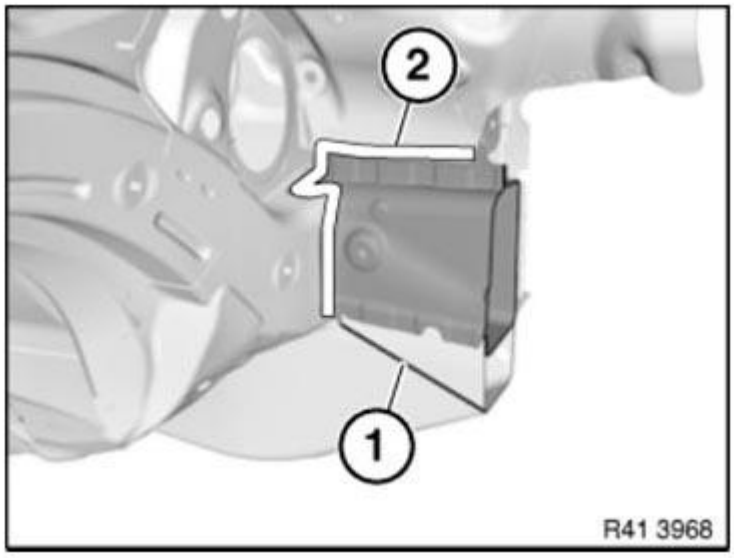


Fig. 206: Identifying Outer Panel Severance Cut And Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

View of engine support from front.

Open welded connections in area (1).

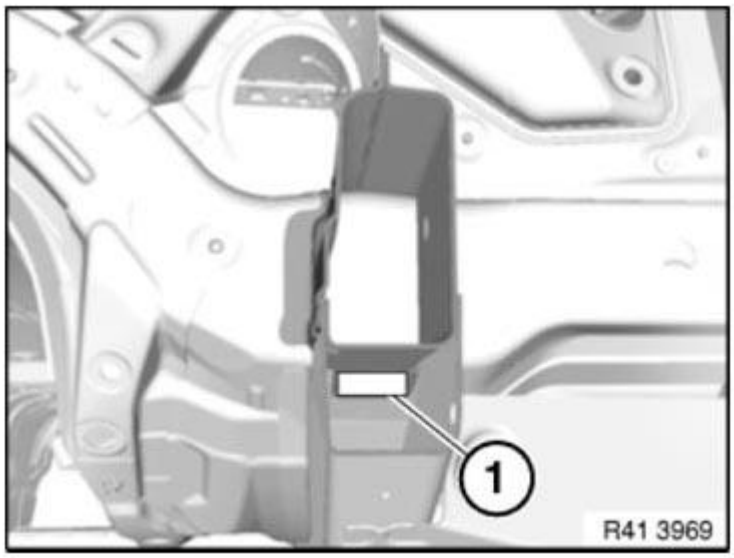


Fig. 207: Identifying Front Engine Support Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

Remove metal section (2).

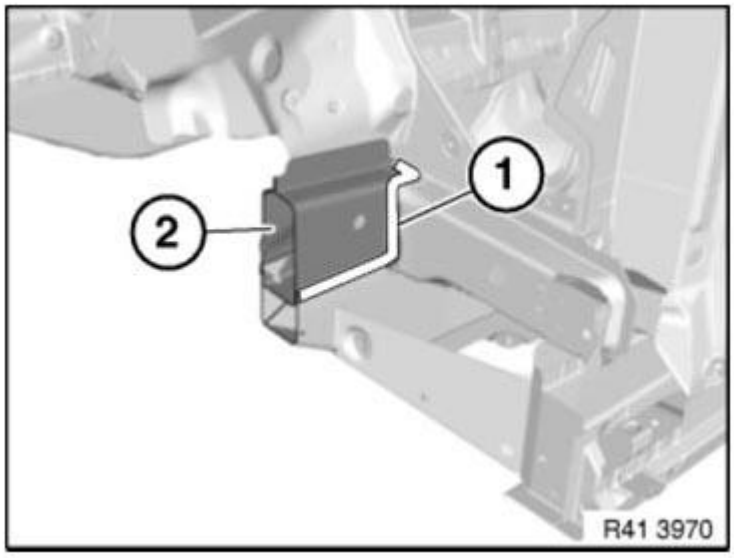


Fig. 208: Identifying Welded Connections Area And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Open welded connections in areas (1). Remove metal section (2).

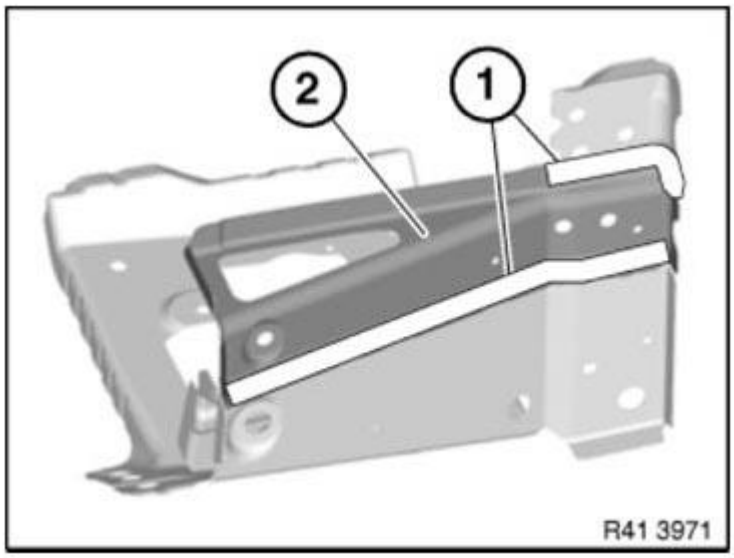


Fig. 209: Identifying Welded Connections Areas And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark severance cut (1) in accordance with dimension a and cut.

Dimension a = 20 mm

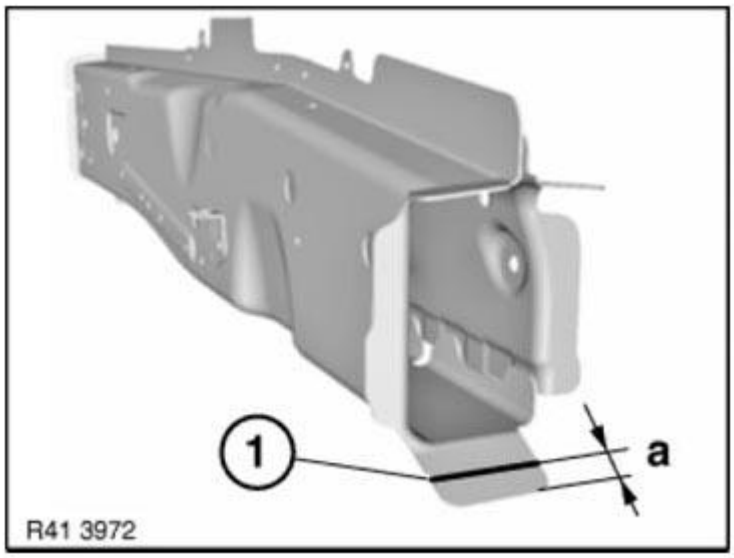


Fig. 210: Identifying Part Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark rear engine support in accordance with severance cut on vehicle and cut (1).

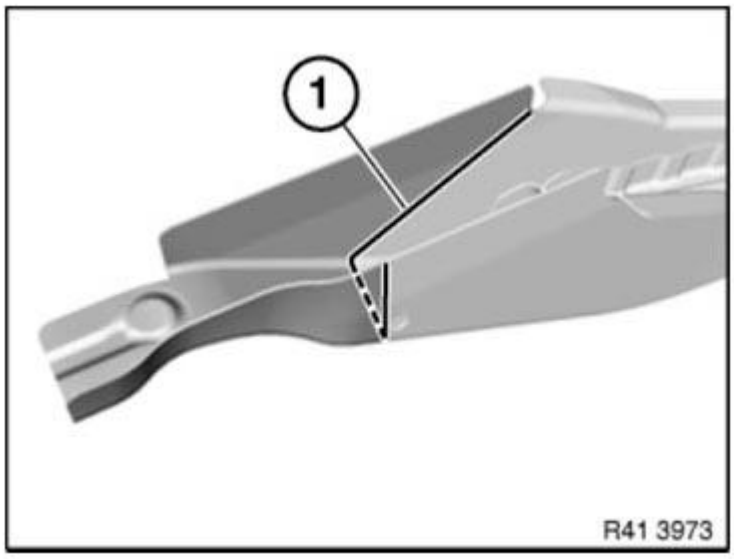


Fig. 211: Identifying Rear Engine Support Cutting Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Mark severance cut (1) in accordance with dimension a and cut.

Dimension a = 15 mm

Remove metal section (2).

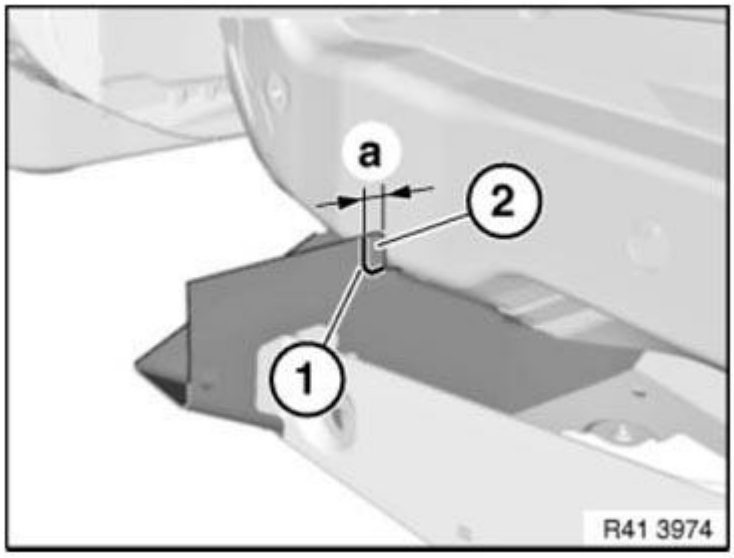


Fig. 212: Identifying Metal Section Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid contact corrosion, do not grind the new wheel arch part in the area of the BONDING SURFACES .

Grind bonding surfaces on body blank.

Clean bonding surfaces with cleaning agent R1.

Installation note:

Adjust new parts to fit with alignment bracket or universal mounting.

Drill new rivet holes in areas (1) and (2).

Deburr bore holes.

Use 19 N2 rivets.

Glue new part with adhesive K1.

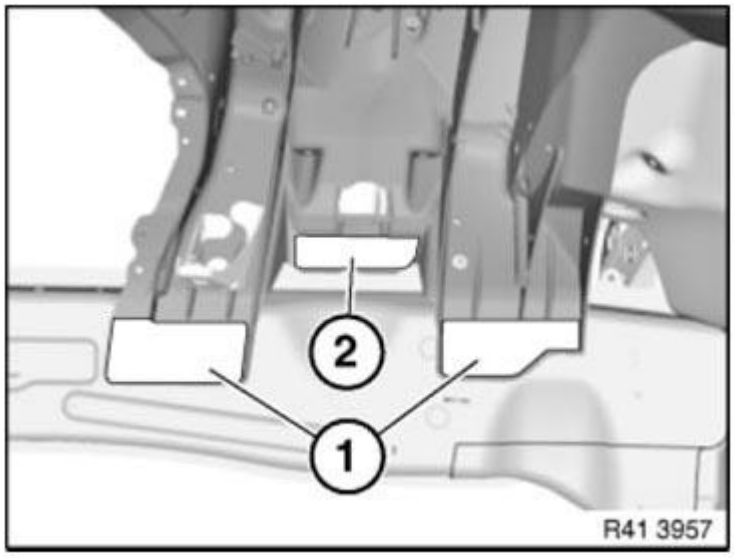


Fig. 213: Identifying Rivet Holes Drill Areas
Courtesy of BMW OF NORTH AMERICA, INC.

View from below.

Installation note:

Weld new components in area (1) additionally.

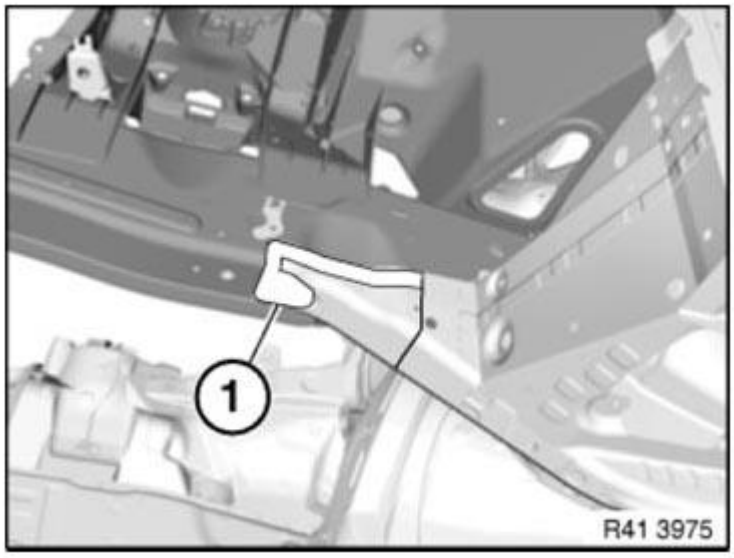


Fig. 214: Identifying New Components Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Weld new components in area (1) additionally.

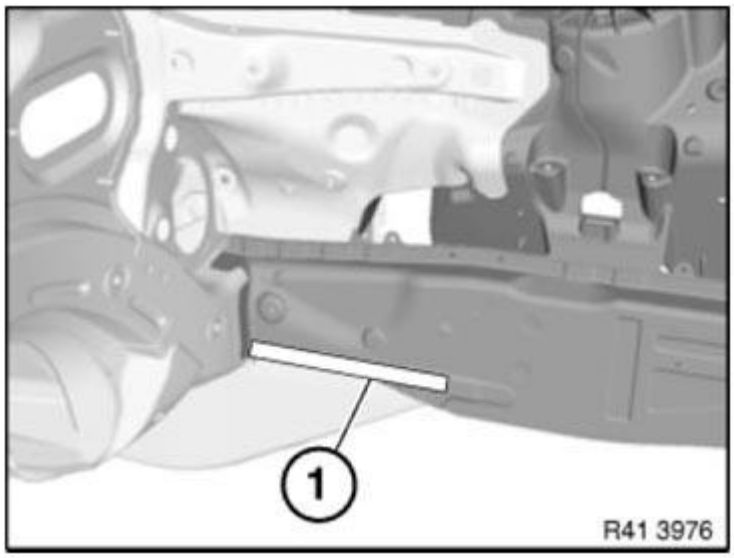


Fig. 215: Identifying New Components Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Weld new component in area (1) additionally.

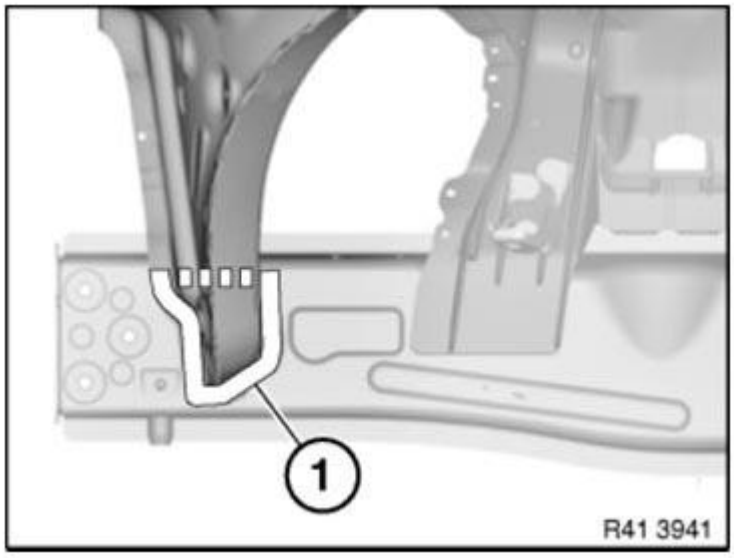


Fig. 216: Identifying New Components Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

MAG-weld new component in area (1) additionally.

To do so, apply 2 fillet welds at distance of approx.

20 mm. Length of fillet welds approx. 10 mm.

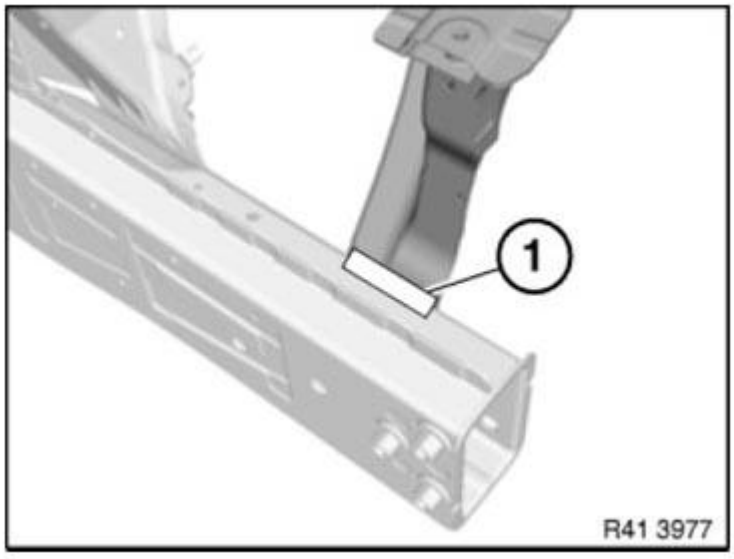


Fig. 217: Identifying New Component MAG-Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 14 531 REPLACING ENGINE SUPPORT/FRONT LEFT SIDE FRAME CONNECTION (FRONT LEFT WHEEL ARCH REMOVED)

Observe procedure for **REPAIR STAGE 3** .

Read contents of **BODY, GENERAL** .

To remove engine support side frame connection

Following new body parts are required:

- (1) Connection, wheel arch/entrance

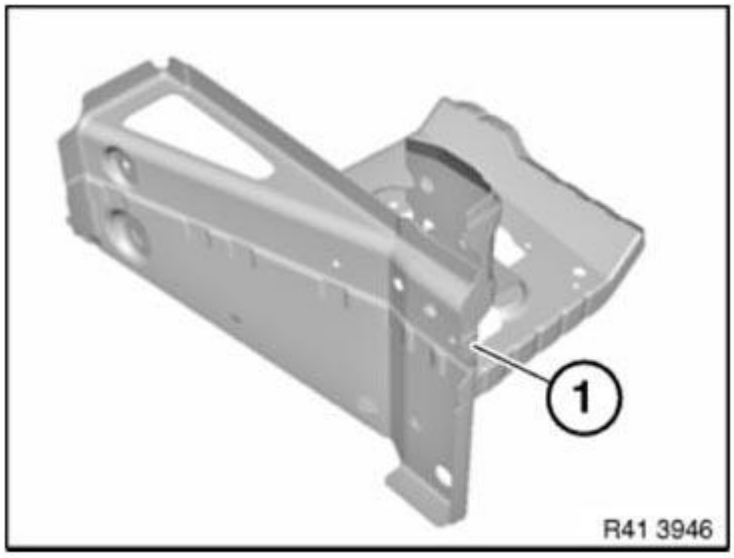


Fig. 218: Identifying Connection, Wheel Arch/Entrance
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in areas (1).

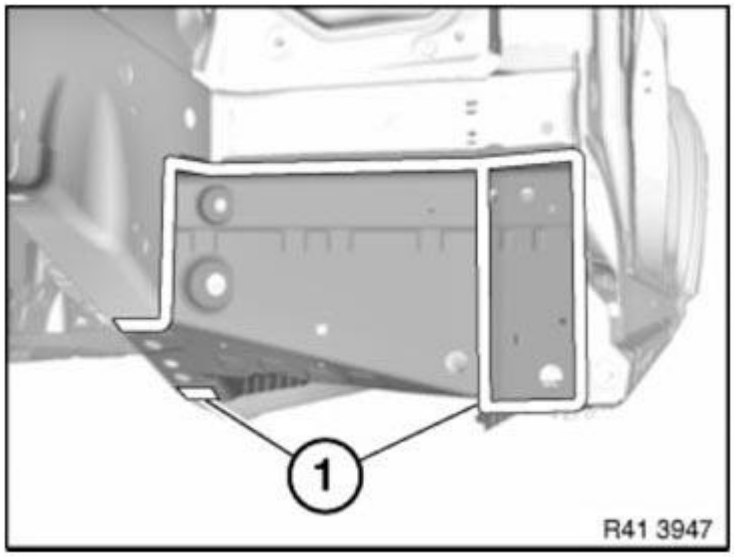


Fig. 219: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

View from below:

Open welded connections in areas (1).

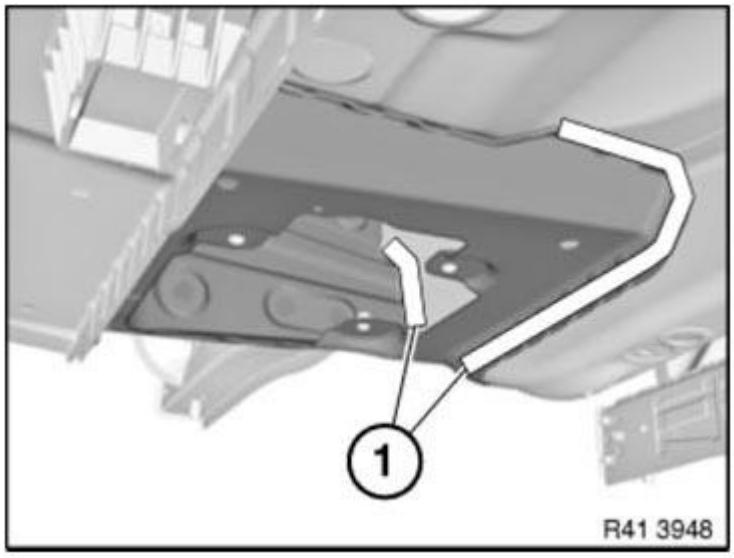


Fig. 220: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

View from below:

Open welded connections in areas (1).

Remove wheel arch/entrance connection.

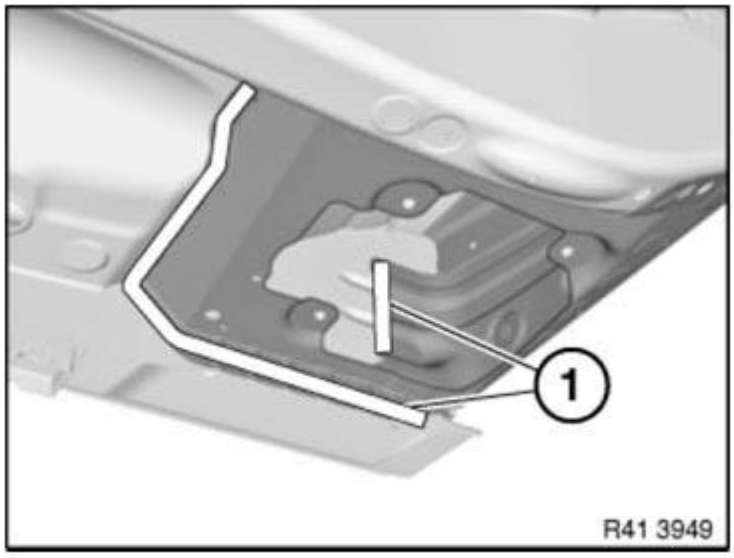


Fig. 221: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Open welded connections in area (1).

Remove metal section (2).

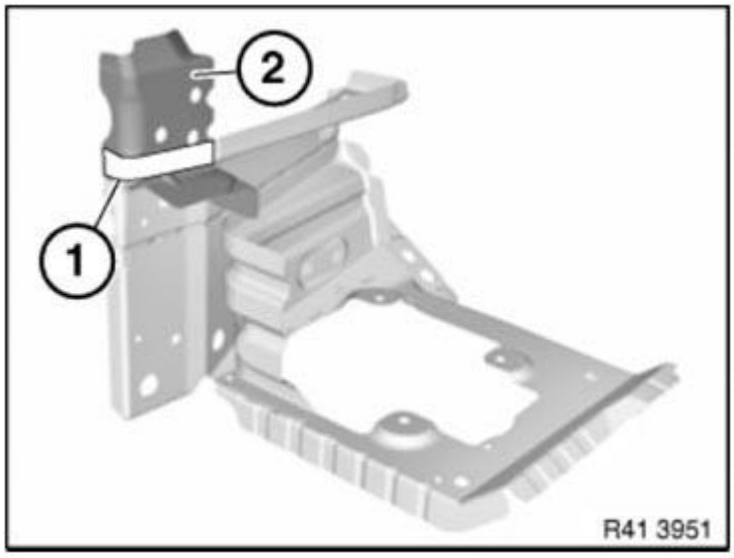


Fig. 222: Identifying Welded Connections Area And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

To install engine support side frame connection

Install and weld new parts.

41 14 020 REPLACING FRONT LEFT WHEEL ARCH

Note the special vehicle identification number procedure when replacing the front right wheel arch (order the new body part with the vehicle identification number, if necessary)!

These instructions are only applicable the first time the wheel arch is replaced! Repeated replacement is only permitted after consultation with and release by BMW. Should you have any questions, please contact the country-specific Hotline.

If the wheel arch has not yet been replaced, this can be recognized from the punch rivets (1) fitted at the factory.

If replacing the wheel arch, replace the punch rivets with blind rivets (2).

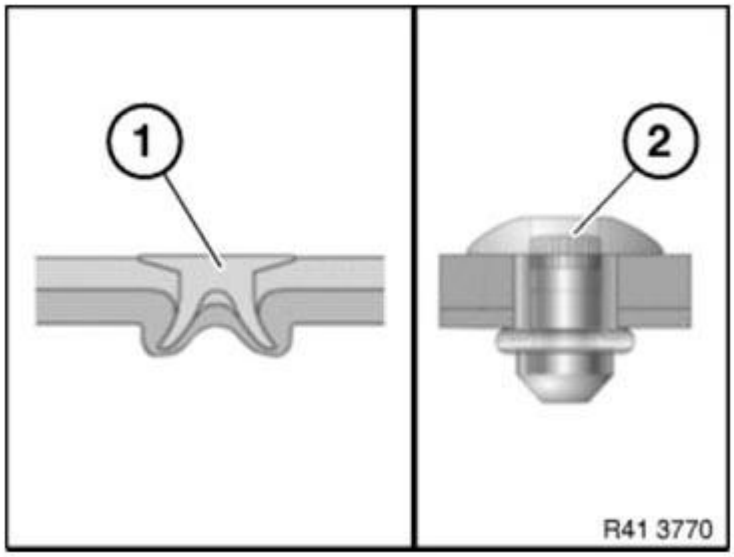


Fig. 223: Identifying Punch And Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Observe procedure of **REPAIR STAGE 3** .

Read contents of **BODY, GENERAL** .

Strip down See **4111021 STRIPPING OPERATIONS - REPLACING FRONT LEFT WHEEL ARCH** and **4111031 STRIPPING OPERATIONS - REPLACING FRONT RIGHT WHEEL ARCH** vehicle.

Steel-aluminium composite construction is used on the vehicle. Observe specific **procedure** See **4100... BONDING ALUMINIUM ON STEEL**.

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE** .

Use only approved **SPOT-WELDING EQUIPMENT** for repairs!

Place vehicle on straightening bench.

Following new body parts are required:

- (1) Wheel arch, front
- (2) Connection, side frame, rear

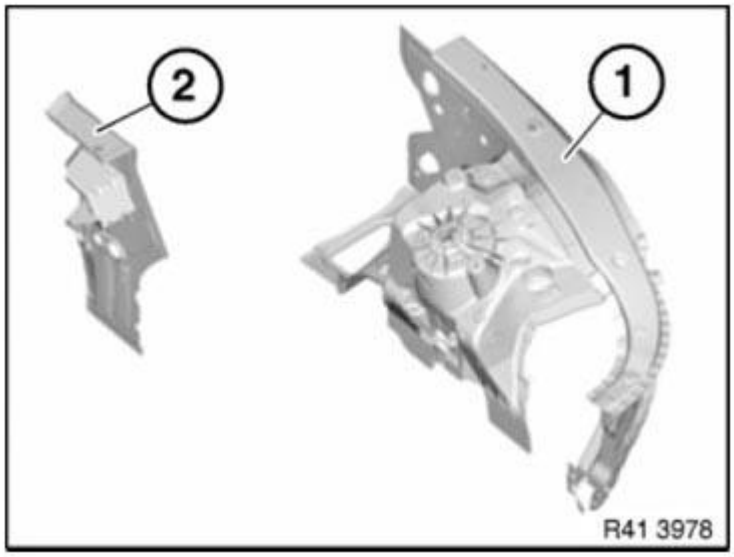


Fig. 224: Identifying Connection, Side Frame, Rear And Wheel Arch, Front
Courtesy of BMW OF NORTH AMERICA, INC.

Open spot-weld bonded joints in area (1)

OPEN WELDED CONNECTIONS IN AREAS (2).

ROUGHLY CUT SIDE FRAME CONNECTION (3) ALONG LINES (4).

REMOVE SIDE FRAME CONNECTION (3).

REPLACE CAVITY SEALING .

Installation note:

MAG weld new part in areas (4).

To do so, apply 10 mm long fillet welds at spacing of 15 mm.

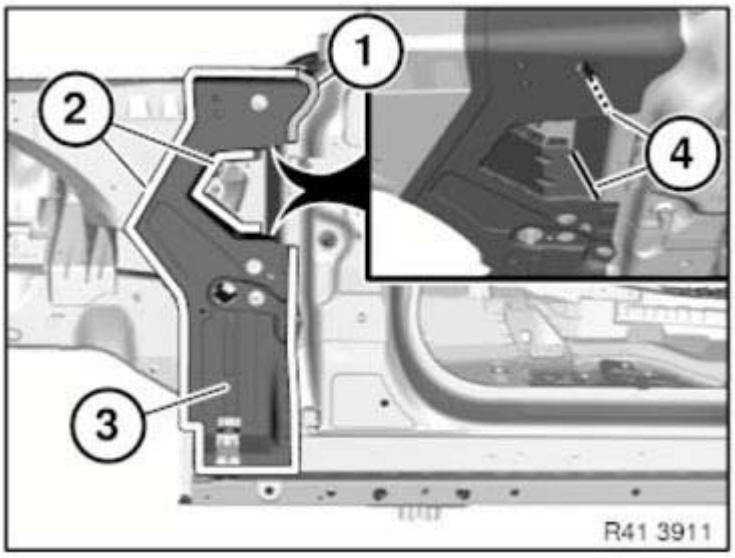


Fig. 225: Identifying Spot-Welded Adhesive Joints Area And Side Frame Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Drill out rivet connections in area (1).

Open **BONDED CONNECTION** in area (1).

Installation note:

Use 6 **N2 RIVETS** in area (1).

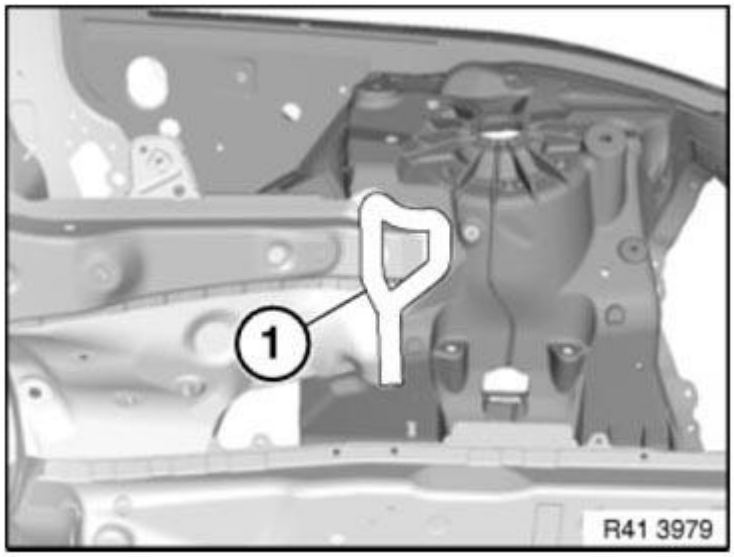


Fig. 226: Identifying Rivets Area
Courtesy of BMW OF NORTH AMERICA, INC.

View from above:

Open welded connections in areas (1) to (3).

NOTE: Cut out component roughly and open welded connections from inside.

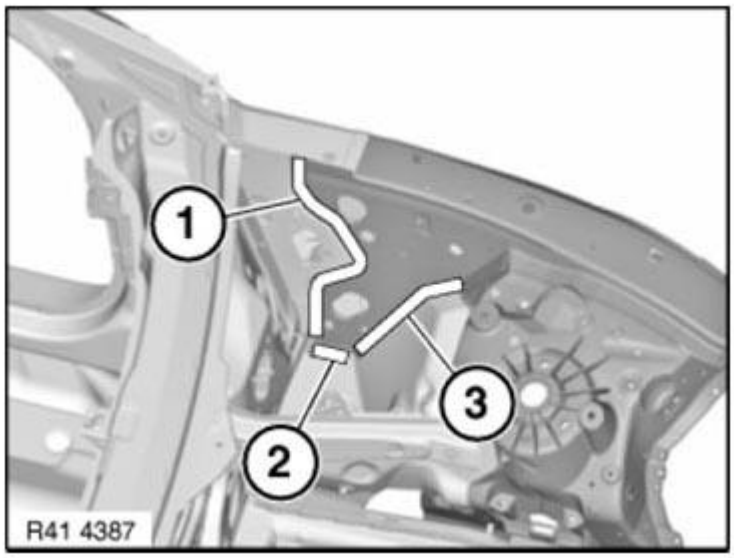


Fig. 227: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

View from below:

Open welded connections in area (1).

Drill out rivet connections in area (2).

Open bonded connection in area (2).

Installation note:

Use 10 rivets N2 in area (2).

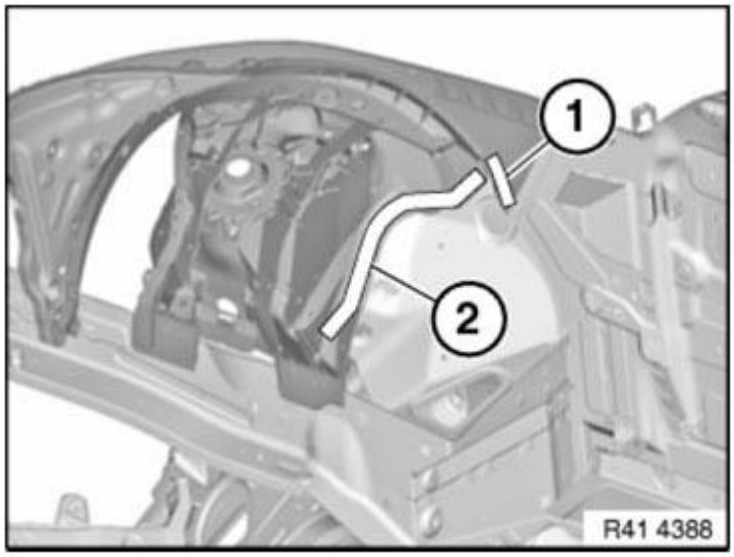


Fig. 228: Identifying Rivet Connections And Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

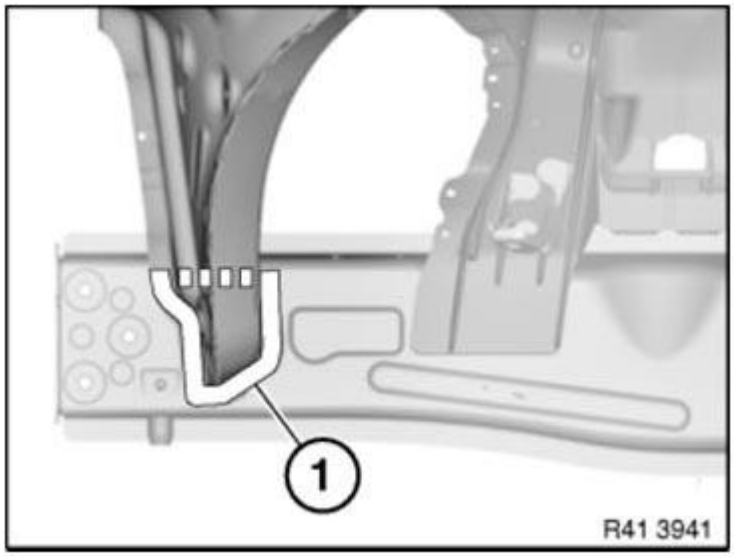


Fig. 229: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Drill out rivet connections in areas (1) and (2).

Open bonded connections in areas (1) and (2).

Installation note:

Adjust new part to fit with alignment bracket or universal mount.

CARRY OVER HOLE PATTERN from engine support to new part in areas (1).

Carry over new rivet holes from engine support to wheel arch in area (2).

Use 4 N2 rivets in area (2).

Glue new part with **ADHESIVE K1** .

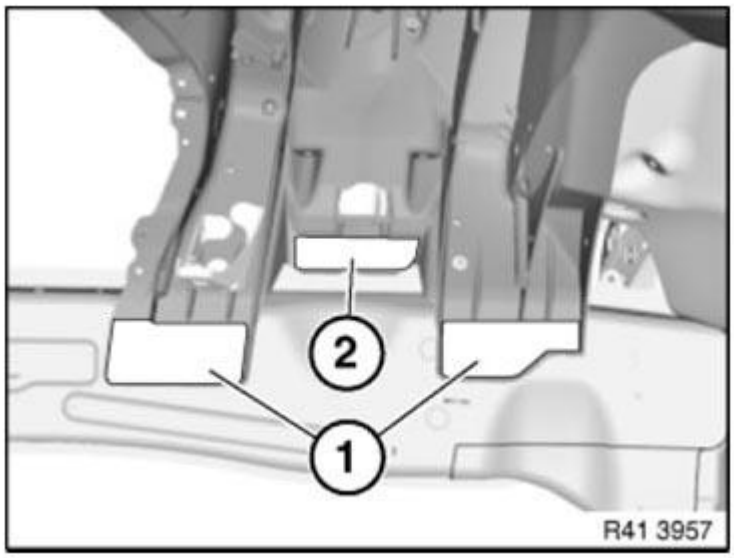


Fig. 230: Identifying Rivet Holes Drill Areas
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid contact corrosion, do not grind the new wheel arch part in the area of the BONDING SURFACES .
Grind bonding surfaces on engine support blank.

Clean bonding surfaces with **CLEANING AGENT R1** !

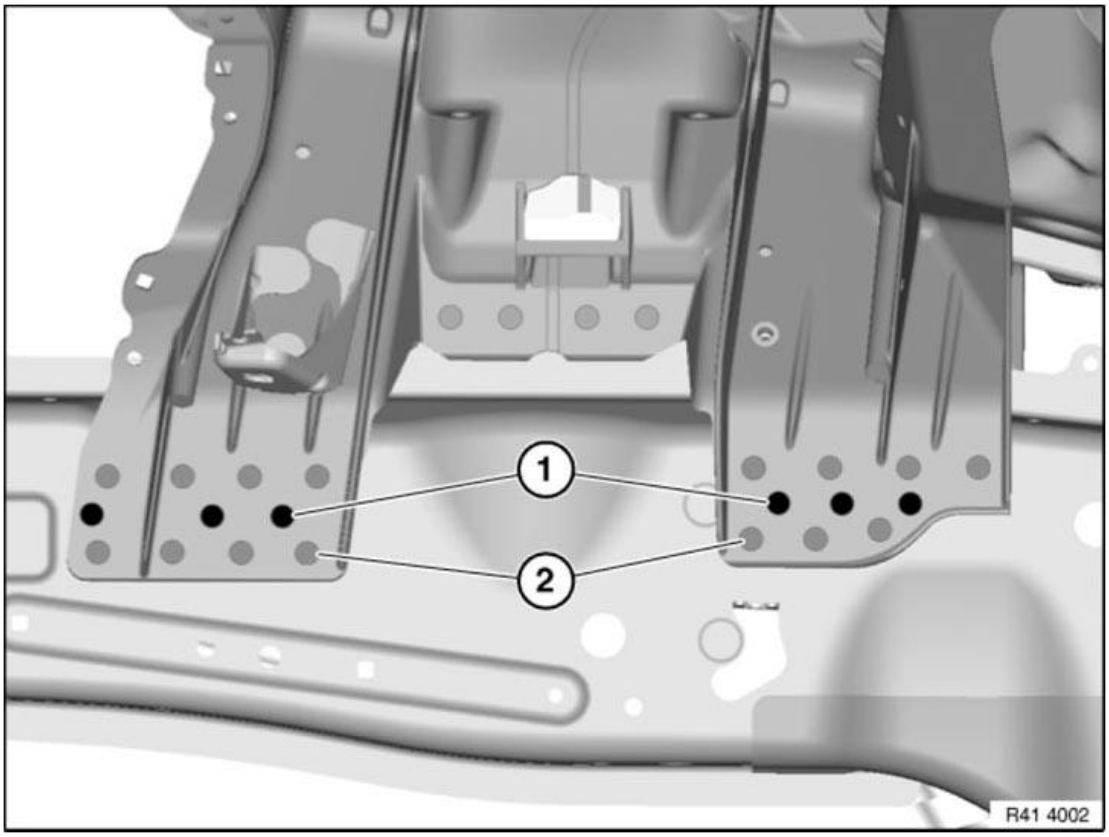


Fig. 231: Identifying Rivet Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Additional rivet positions are required for strength reasons.

1. = Additional rivet positions (black, number 6)
2. = Previous rivet positions (grey, number 15)

Drill additional rivet holes as shown in picture.

Use 21 N 2 rivets.

Glue new part with adhesive K1.

Installation note:

MAG-weld new part in area (1).

To do so, apply 2 fillet welds at distance of approx. 20 mm. Length of fillet welds approx. 10 mm.

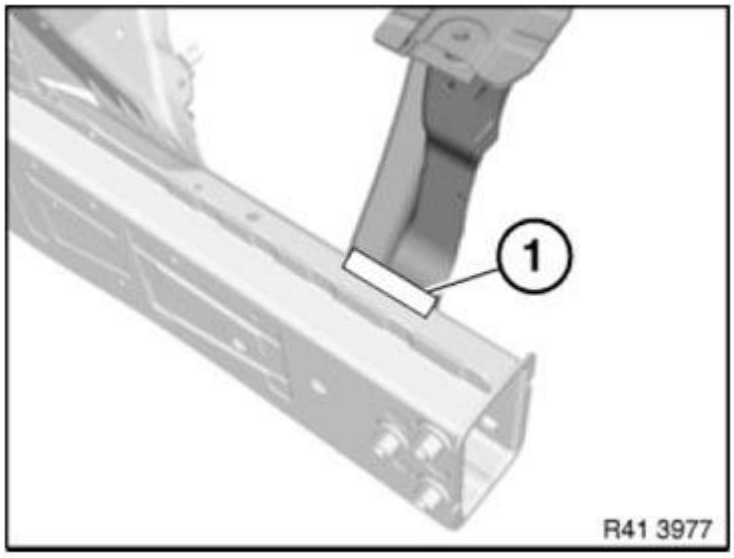


Fig. 232: Identifying New Component MAG-Welding Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 14 500 REPLACING OUTER SECTION OF LEFT OR RIGHT REAR WHEEL HOUSING (SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **procedure** See **4100... SPOT-WELD BONDING STEEL PARTS**.

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Necessary preliminary tasks

Remove **COVER FOR REAR SIDE MEMBER**

Following new body parts are required:

- (1) Outer wheel arch section, rear
- (2) C-pillar reinforcement
- (3) Shaped parts, entrance (not pictured)

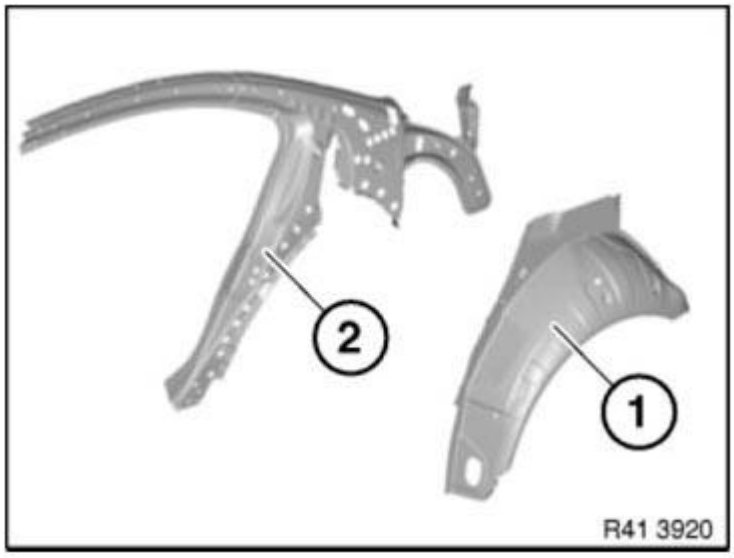


Fig. 233: Identifying C-Pillar Reinforcement And Outer Wheel Arch Section, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of outer wheel arch section

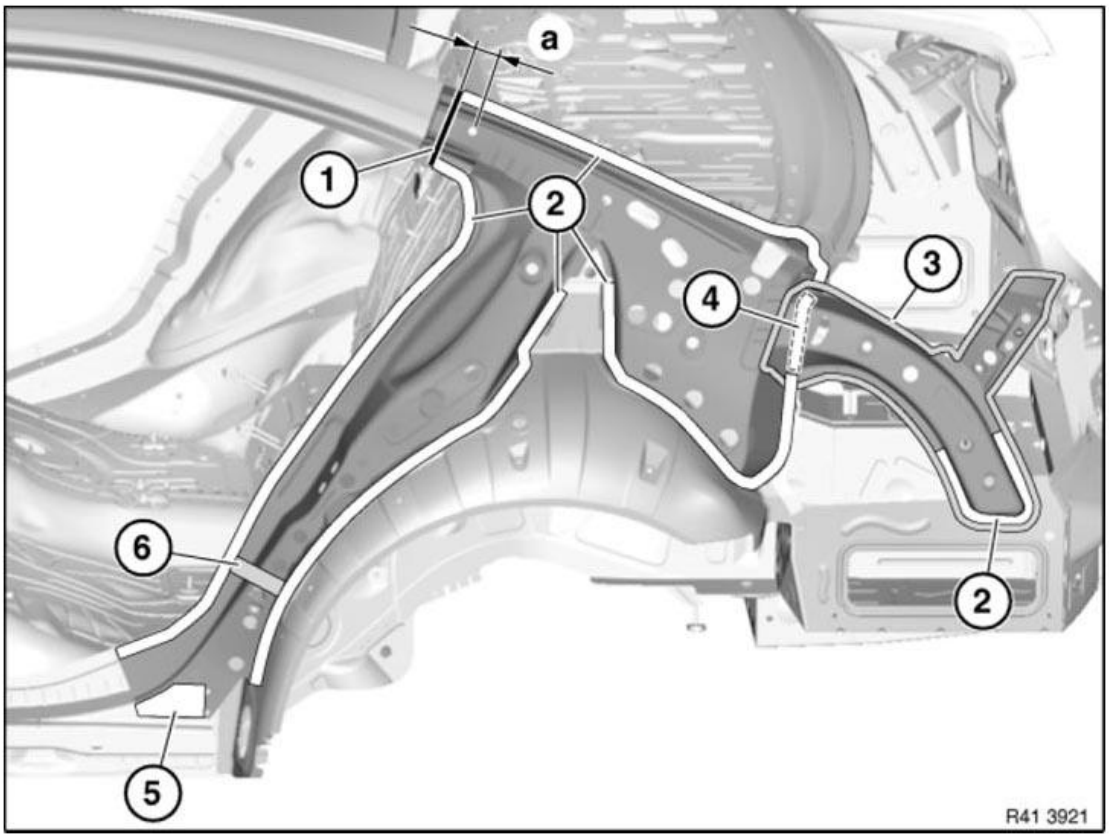


Fig. 234: Identifying Rivet Joints Area, Sheet Section And Spot-Weld Bonded Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with measurement and cut.

IMPORTANT: Cut outer panel only.
Measurement a = approx. 30 mm from center point of 14 mm dia. hole.
Open welded connections in areas (2).
Fold sheet section (3) forwards and open weld joints in area (4).
Open rivet joints in area (5).
Remove sheet section.

Installation note:

Weld in **REINFORCEMENT PLATE** at severance cut.

Replace both **CAVITY ACOUSTIC BAFFLES** (6).

No rivet connection in area (5). Weld new part.

Open spot-weld bonded joints in area (1)

Open welded connections in area (2).

Remove outer section of wheel arch.

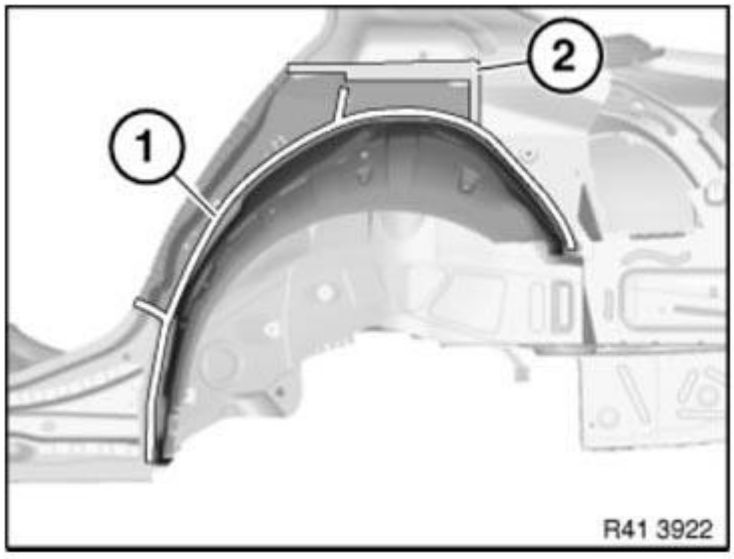


Fig. 235: Identifying Spot-Weld Bonded Joints Area And Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark severance cut on C-pillar reinforcement and cut.

Adjust new parts in conjunction with side panel to fit.

Installation of outer wheel arch section

Install and weld new parts.

41 14 505 REPLACING REAR LEFT OUTER WHEEL ARCH SECTION (REAR SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Following new body parts are required:

- (1) Outer wheel arch section, rear
- (4) Shaped part, entrance, outer (not shown)

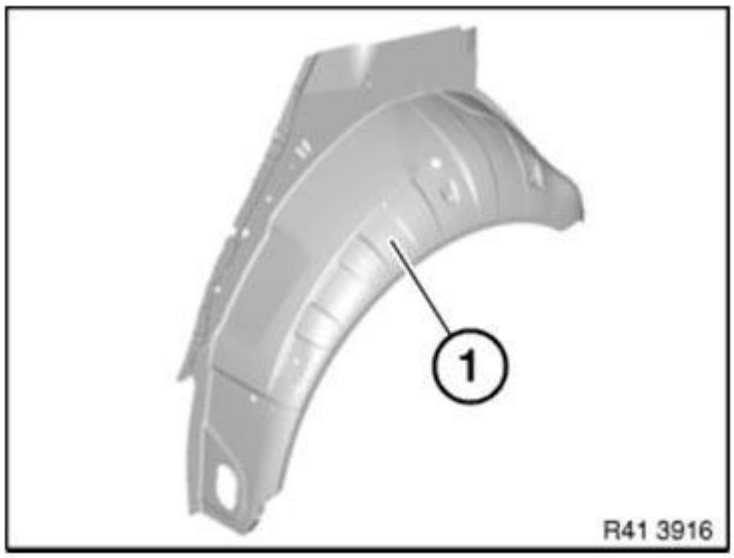


Fig. 236: Identifying Outer Wheel Arch Section, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of outer wheel arch section

Cut wheel arch along line (1).

REPLACE CAVITY SEALING (2).

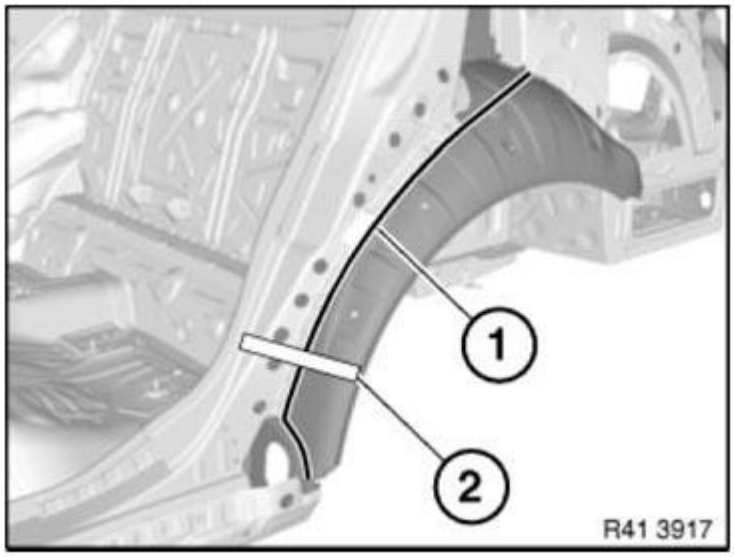


Fig. 237: Identifying Cavity Sealing And Wheel Arch Along Line
Courtesy of BMW OF NORTH AMERICA, INC.

Cut wheel arch along line (1).

Remove section for outer wheel arch section.

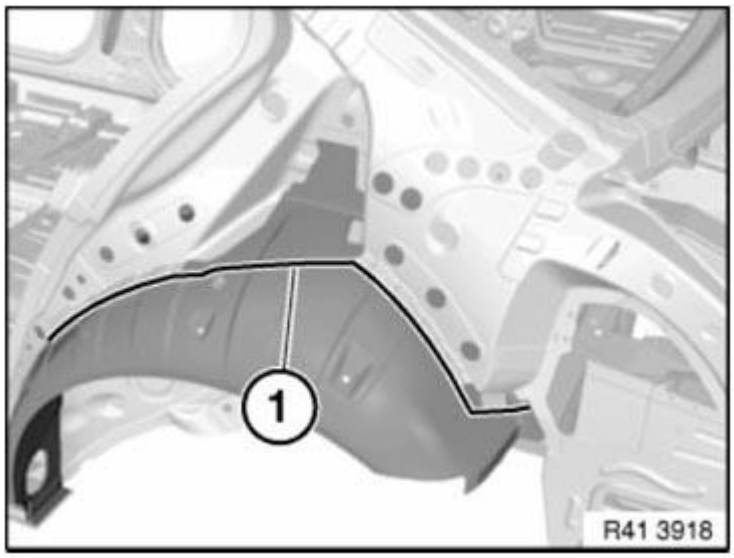


Fig. 238: Identifying Wheel Arch Along Line
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Fit new part from below and weld in area (1) to overlap.

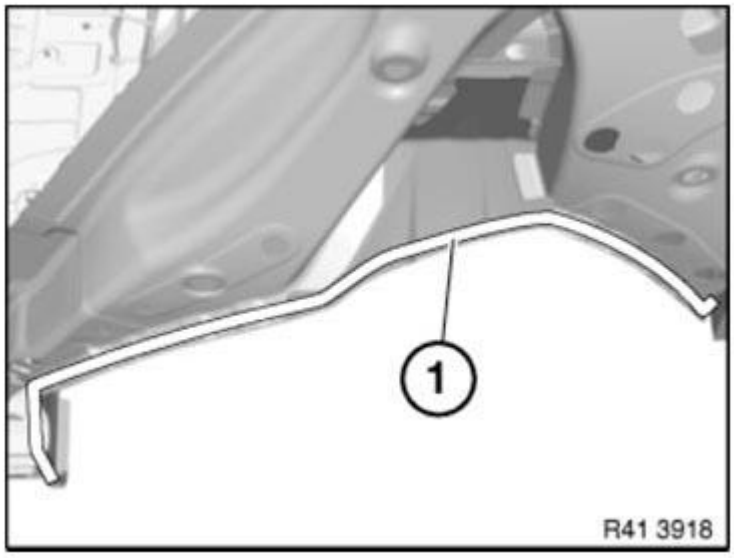


Fig. 239: Identifying New Part Weld Area
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark new part in accordance with severance cut on vehicle + 20 mm extra material and cut.

Adjust new part in conjunction with side wall to fit.

Installation of outer wheel arch section

Install new part and weld.

41 14 504 REPLACING REAR RIGHT OUTER WHEEL ARCH SECTION (REAR SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE** .

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Following new body parts are required:

- (1) Outer wheel arch section, rear
- (4) Shaped part, entrance, outer (not shown)

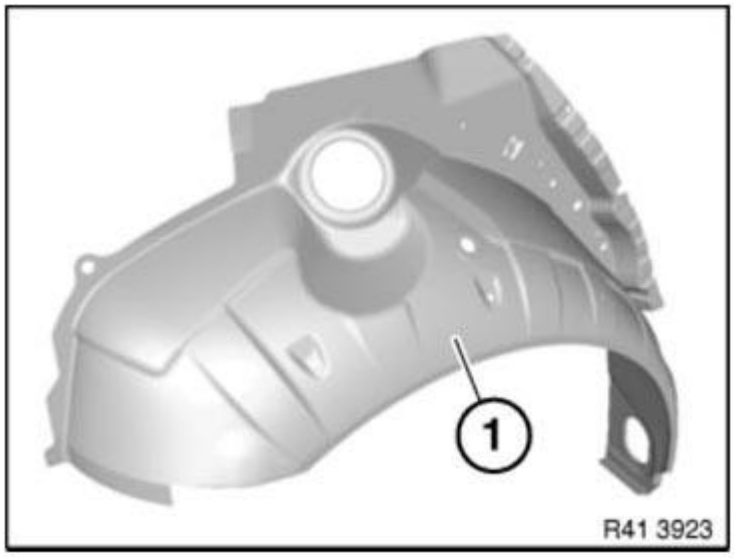


Fig. 240: Identifying Outer Wheel Arch Section, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of outer wheel arch section

Cut wheel arch along line (1).

REPLACE CAVITY SEALING (2).

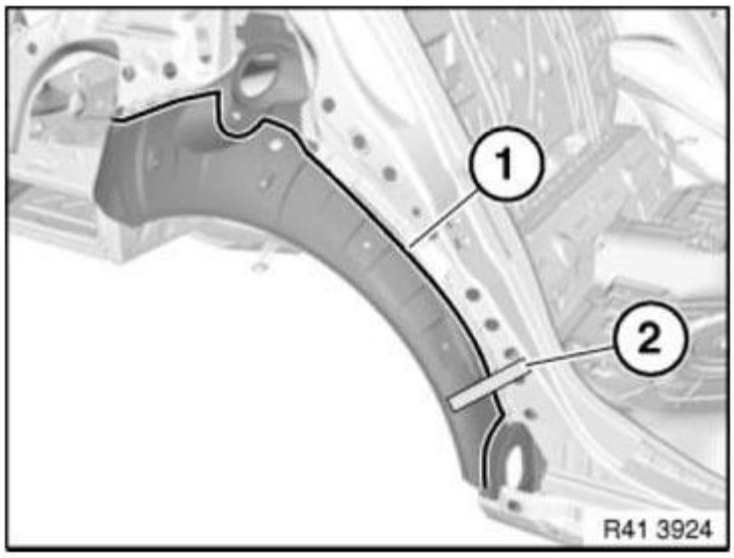


Fig. 241: Identifying Cavity Sealing And Wheel Arch Along Line
Courtesy of BMW OF NORTH AMERICA, INC.

Cut wheel arch along line (1).

OPEN spot-welded adhesive joints in area (2).

IMPORTANT: Severance cut in area (3) not permitted!

Remove section for outer wheel arch section.

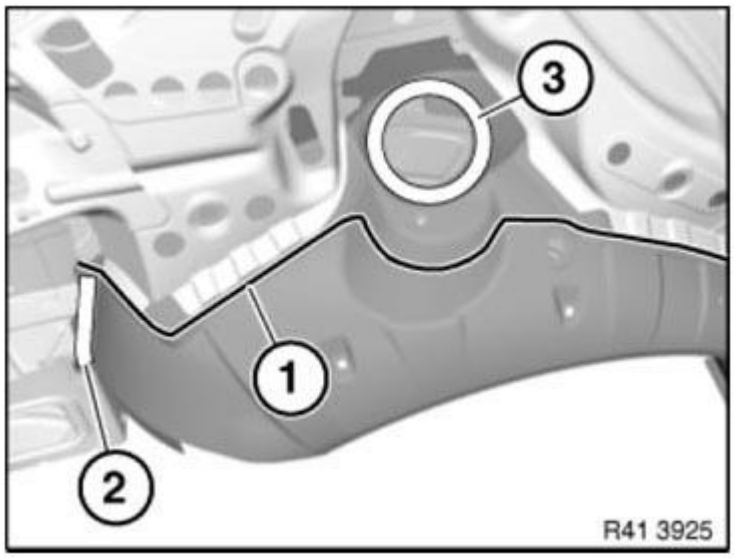


Fig. 242: Identifying Wheel Arch Along Line And Spot-Welded Adhesive Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark new part in accordance with severance cut on vehicle + 20 mm extra material and cut.

Installation of outer wheel arch section

Fit new part from below and adjust to fit in conjunction with side wall.

Weld new part.

41 00... STAMPING VEHICLE IDENTIFICATION NUMBER (NEEDLE STAMPING UNIT)

Read and comply with **GENERAL INFORMATION** .

The needle stamping system 360 - VRM - BMW is required to stamp the vehicle identification number.

Order number: 81 43 2 155 736

- Sourcing reference:

  BMW Workshop Equipment Catalogue.

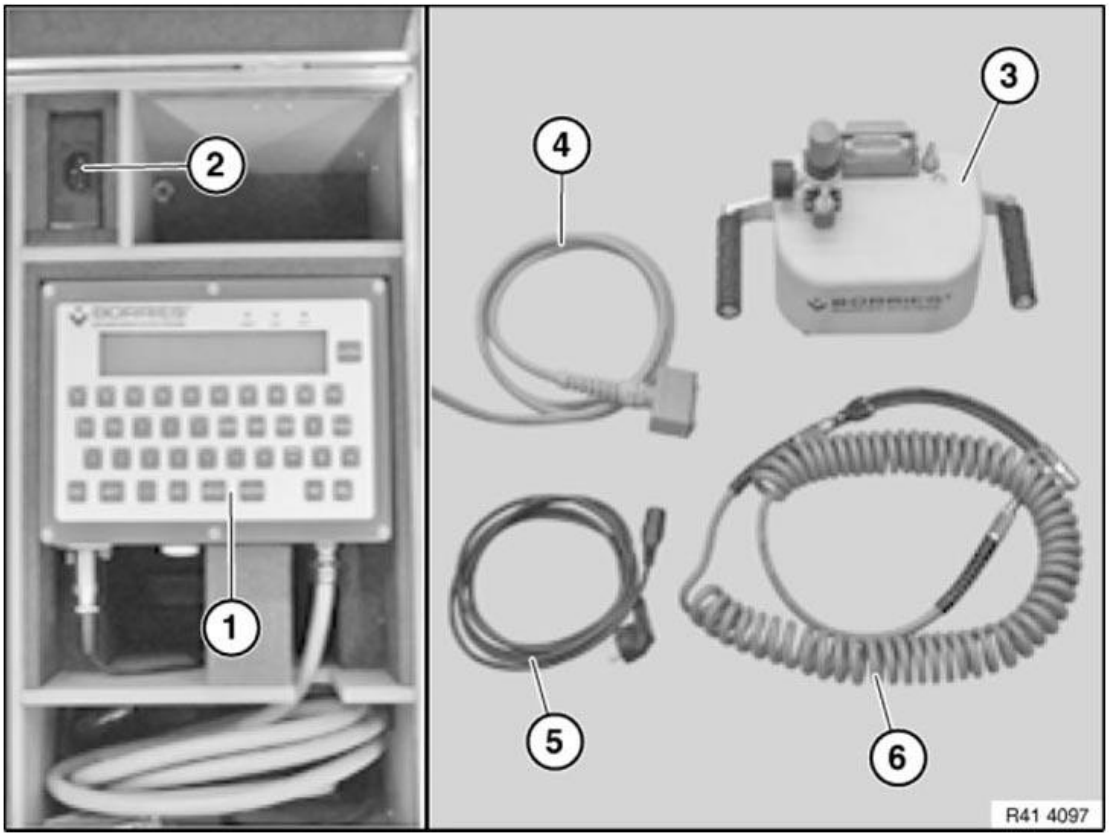


Fig. 243: Identifying Display, Mains Adapter, Needle Stamping Unit, Connecting Cable And Power Cable
Courtesy of BMW OF NORTH AMERICA, INC.

The needle stamping system 360 tool set comprises:

- (1) Display
- (2) Mains adapter
- (3) Needle stamping unit
- (4) Connecting cable
- (5) Power cable
- (6) Compressed-air hose

NOTE: A compressed-air connection is also required.

- **Operating pressure approx. 4 bar**
- **Use only dried, oil-free air**

Procedure for additional vehicle identification number

- Cross through original vehicle identification number.

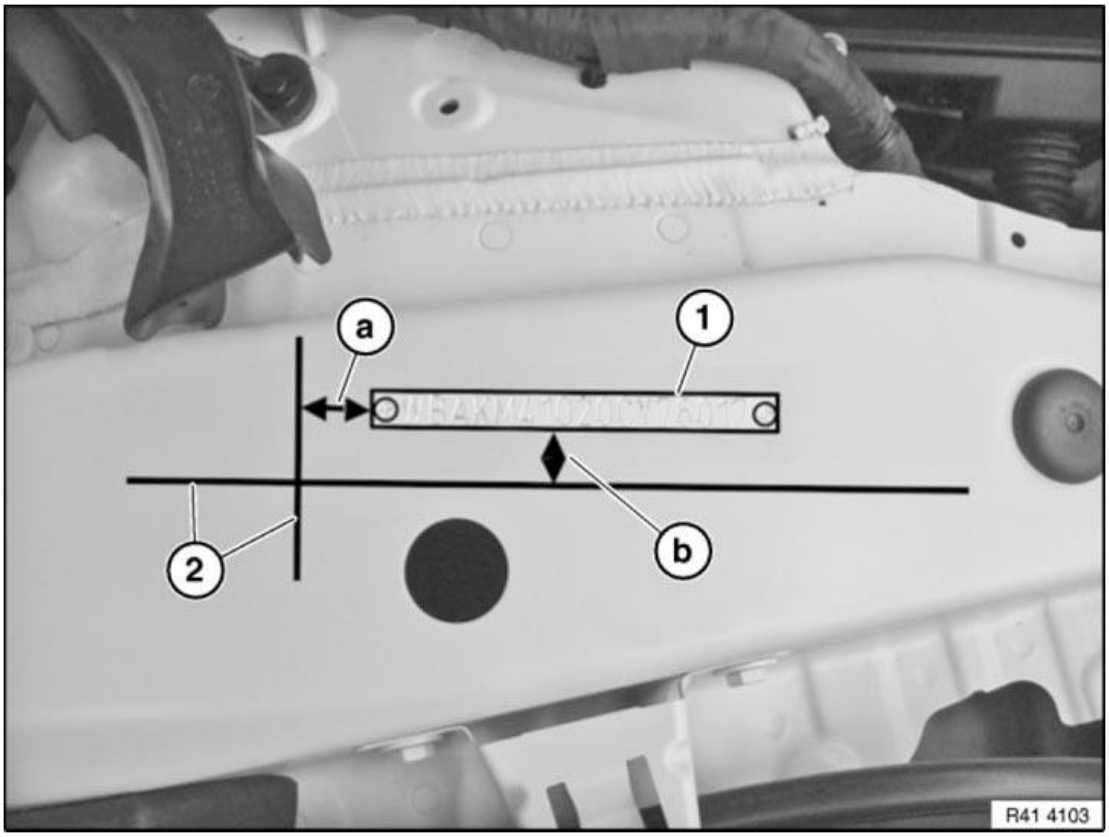


Fig. 244: Identifying Vehicle Identification Number Position
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **ENGINE COMPARTMENT LID SEAL LOCATOR**

1. = Original vehicle identification number (line 1).

Mark position lines (2) in accordance with specified dimensions/measurements.

Measurement a = 12 mm

Measurement b = 10 mm

Display input:

- Select Layout 5 with arrow button.
- Enter vehicle identification number with F10.
- Press "ENTER" button.

NOTE: With Layout 5 the vehicle identification number (line 1) is crossed through.



Fig. 245: Identifying Display
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Perform stamping operation with position lines in advance on a test sheet.

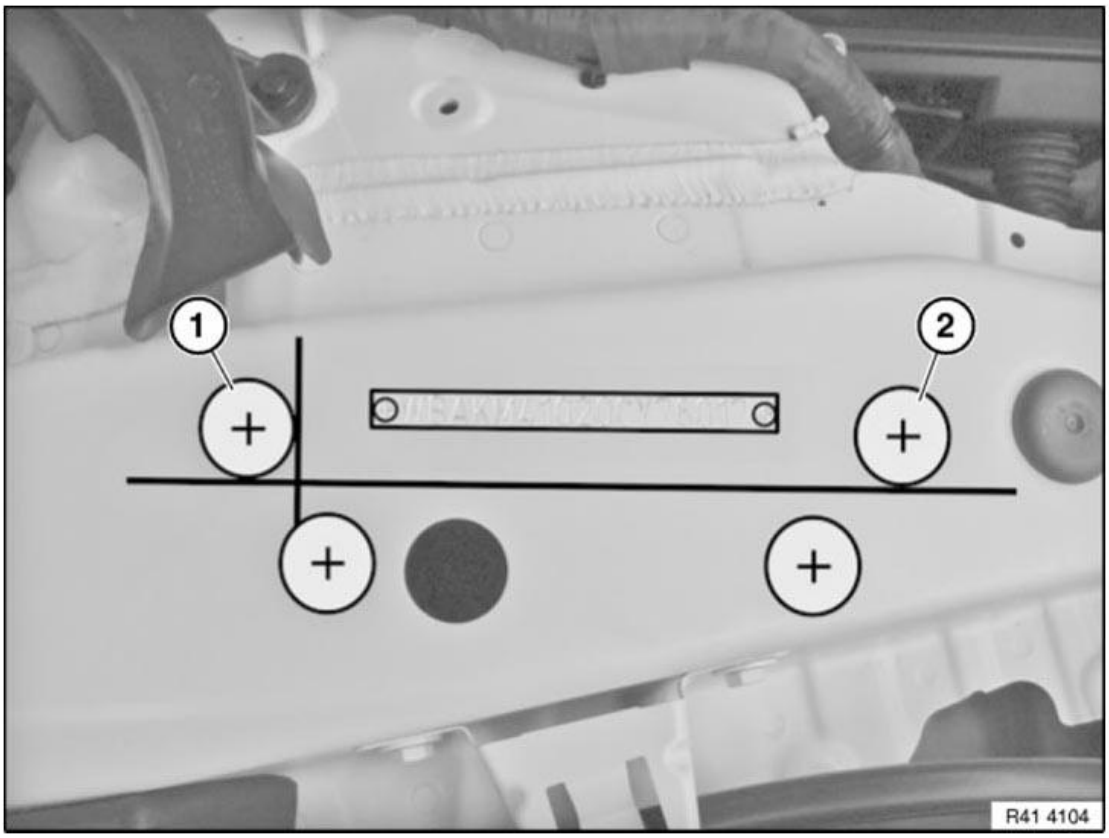


Fig. 246: Identifying Suction Feet Of Needle Stamping Unit Moving Position

Courtesy of BMW OF NORTH AMERICA, INC.

Move suction feet of needle stamping unit to positions (1) and (2) shown.

- First adjust position (1)
- Then adjust position (2)

NOTE: Make sure the unit is resting securely in position. If necessary, adjust the height and position of the suction feet.

Press pushbutton (1) for vacuum pressure.

Then start stamping operation with pushbutton (2).

IMPORTANT: After completing the stamping operation, do not alter the position of the unit. Do not switch off vacuum pressure.

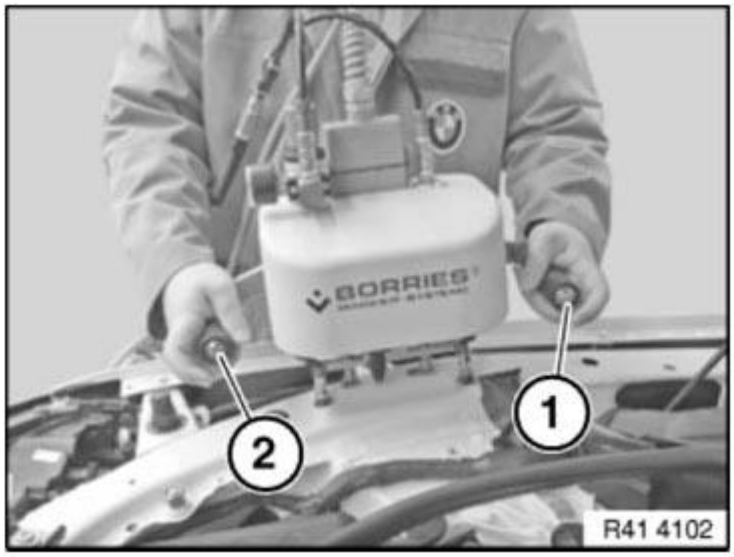


Fig. 247: Stamping Vehicle Identification Number
Courtesy of BMW OF NORTH AMERICA, INC.

Stamping second vehicle identification number

Display input:

- Select Layout 2 with arrow button.
- Press "ENTER" button.

NOTE: With Layout 2 the already entered vehicle identification number is stamped in line 2.



Fig. 248: Identifying Display
Courtesy of BMW OF NORTH AMERICA, INC.

Start stamping operation with pushbutton (2).

After the stamping operation, if necessary adapt **ENGINE COMPARTMENT LID SEAL LOCATOR** of second vehicle identification number.

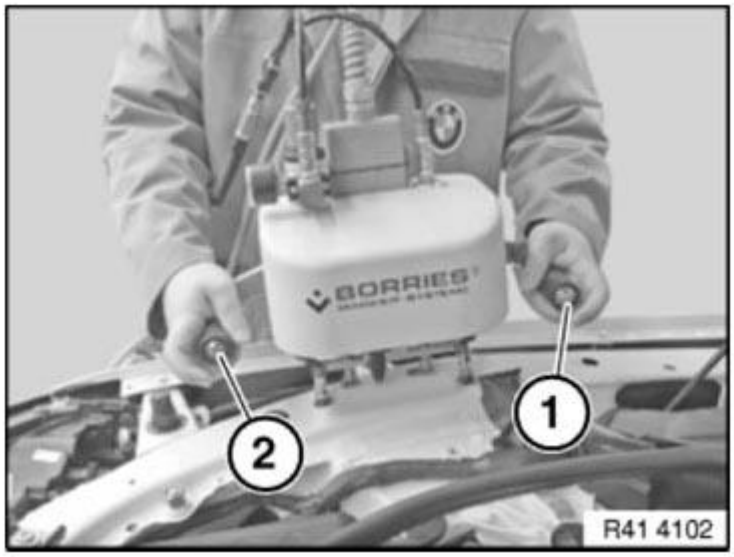


Fig. 249: Stamping Vehicle Identification Number
Courtesy of BMW OF NORTH AMERICA, INC.

Following layout functions are available:

VEHICLE IDENTIFICATION NUMBER CHART

Layout selection	Vehicle identification number
Layout 1	In line 1
Layout 2	In line 2
Layout 3	Turned through 180° in line 1
Layout 4	Turned through 180° in line 2
Layout 5	Cross through in line 1
Layout 6	Cross through in line 2

41 11 021 STRIPPING OPERATIONS - REPLACING FRONT LEFT WHEEL ARCH

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Disconnect battery earth lead (job number: 61 20 900)
- Remove bumper trim (job number: 51 11 156
- Remove bumper support (job number: 51 11 050)
- Remove headlight (job number: 63 12 010)
- Remove radiator (job number: 17 11 000)
- Remove A/C system condenser (job number: 64 53 550)
- Remove and install charge air cooler (job number: 17 51 000)
- Remove hydraulic steering cooling coil (job number: 17 11 370)
- Remove intake silencer housing (job number: 41 35 111)
- Remove coolant expansion tank (job number: 17 11 100)
- Remove wheel arch cover (front section) (job number: 51 71 038)
- Remove wheel arch cover (rear section) (job number: 51 71 039)
- Front axle complete with engine and transmission (job number: 31 10 001)
- Engine compartment lid seal locator (job number 51 76 035).
- Remove engine compartment lid (job number 41 61 000)
- Remove engine compartment lid hinge (job number: 41 61 050)
- Remove left side wall (job number: 41 35 050)
- Remove top left wishbone (job number: 31 12 002)
- Remove left suspension brace (job number: 51 71 345)
- Remove bulkhead sound insulation
- Remove brake booster (job number: 34 33 000)
- Remove/detach hydraulic lines for power steering pump.
- Detach coolant hoses
- Detach fuel lines

- Release left wiring harness
- Partially release/remove thermal protection

41 11 031 STRIPPING OPERATIONS - REPLACING FRONT RIGHT WHEEL ARCH

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Disconnect battery earth lead (job number: 61 20 900)
- Remove bumper trim (job number: 51 11 156
- Remove bumper support (job number: 51 11 050)
- Remove headlight (job number: 63 12 010)
- Remove radiator (job number: 17 11 000)
- Remove A/C system condenser (job number: 64 53 550)
- Remove and install charge air cooler (job number: 17 51 000)
- Remove hydraulic steering cooling coil (job number: 17 11 370)
- Remove intake silencer housing (job number: 41 35 111)
- Remove coolant expansion tank (job number: 17 11 100)
- Remove wheel arch cover (front section) (job number: 51 71 038)
- Remove wheel arch cover (rear section) (job number: 51 71 039)
- Front axle complete with engine and transmission (job number: 31 10 001)
- Remove engine compartment lid seal mounting (job number: 51 76 035)
- Remove engine compartment lid (job number 41 61 000)
- Remove engine compartment lid hinge on right (job number: 41 61050)
- Remove right side wall (job number: 41 35 055)
- Remove top right wishbone (job number: 31 12 003)
- Remove right suspension cross-brace (job number: 51 71 346)
- Remove bulkhead sound insulation
- Remove heating A/C system blower (job number: 64 11 213
- Remove air conditioning refrigerant lines.
- Release right wiring harness
- Partially release/remove thermal protection

Release grommet (1) from fan housing and lay wiring harness (2) to one side.

Installation note:

The sealant between grommet (1) and fan housing must be replaced!

Make sure rubber grommet (1) is correctly seated. (watertightness).

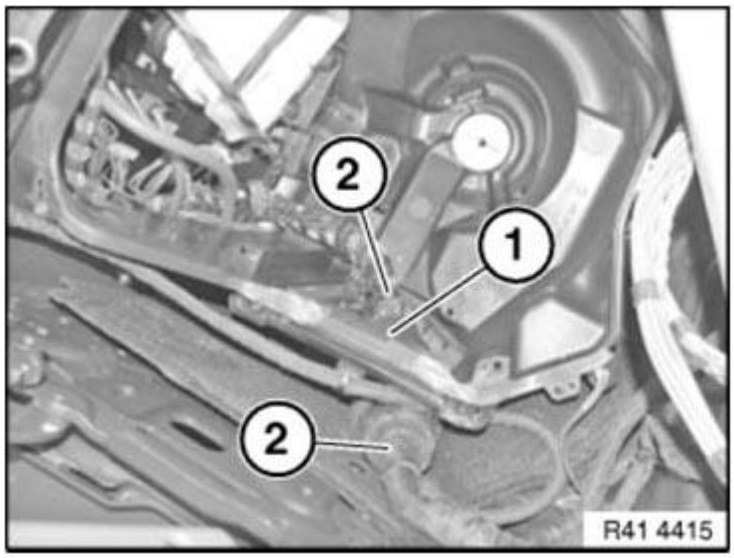


Fig. 250: Identifying Wiring Harness And Rubber Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

41 00... VEHICLE IDENTIFICATION NUMBER, GENERAL

In the event of repair 2 procedures are used, depending on the vehicle. Refer to the vehicle-specific repair instructions for the correct procedure.

1. General notes for stamped vehicle identification numbers

The vehicle identification number is stamped with a special tool. There are different special tool numbers and stamping procedures for the various vehicles. Refer to the relevant repair instructions.

In repair work, the vehicle identification number is always stamped into a replacement vehicle identification number surface. The replacement surface is usually situated under the original VIN surface.

The IGEF number (bodyshell number) is omitted when the wheel arch is replaced.

In the event of component or body replacement by the BMW garages/workshops, clearly delimit the vehicle identification number at front and rear by stamping a + in place of the BMW badge.

If a VIN is stamped into the replacement surface in addition to the original VIN (e.g. if the original VIN has been tampered with), the following applies: The original VIN must be crossed out. To do so, stamp the letter I from the punch digits lengthways through the original VIN.

IMPORTANT: Do not use an angle grinder in conjunction with a cutting disk!

The protective film used as standard is omitted after the VIN has been manually stamped in. Paint area in

accordance with BMW Painting Handbook. Ensure that layer thicknesses are small.

Observe national/country-specific regulations.

2. General notes for embossed vehicle identification numbers

This procedure is used on all newly launching model series from model year 09/2008 (exception X1).

For the repair new parts with an embossed vehicle identification number can as a rule be ordered from the BMW Parts Department. If this is not possible, observe country-specific regulations.

The IGEF number (bodyshell number) is omitted when the wheel arch is replaced.

If a VIN is embossed into the replacement surface in addition to the original VIN (e.g. if the original VIN has been tampered with), the following applies: The vehicle-specific repair instructions describe the procedure.

The protective film used as standard is omitted after the VIN has been embossed. Paint area in accordance with BMW Painting Handbook. Ensure that layer thicknesses are small.

Observe national/country-specific regulations.

4121 SIDE FRAME AND DOOR PILLARS

41 11 150 COVER FOR FRAME SIDE MEMBER (PART REPLACEMENT BETWEEN A AND B PILLAR)

Observe procedure for **REPAIR STAGE 3** .

Read contents of **BODY, GENERAL** .

Following new body parts are required:

- (1) B-pillar with entrance

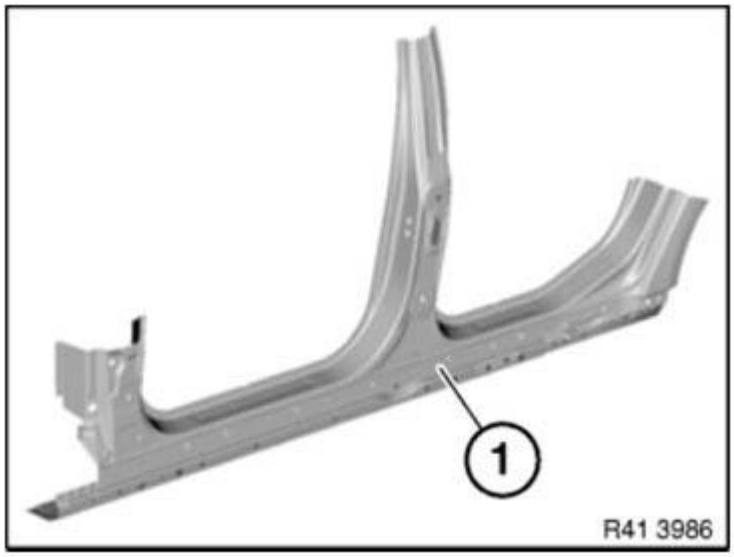


Fig. 251: Identifying B-Pillar With Entrance
Courtesy of BMW OF NORTH AMERICA, INC.

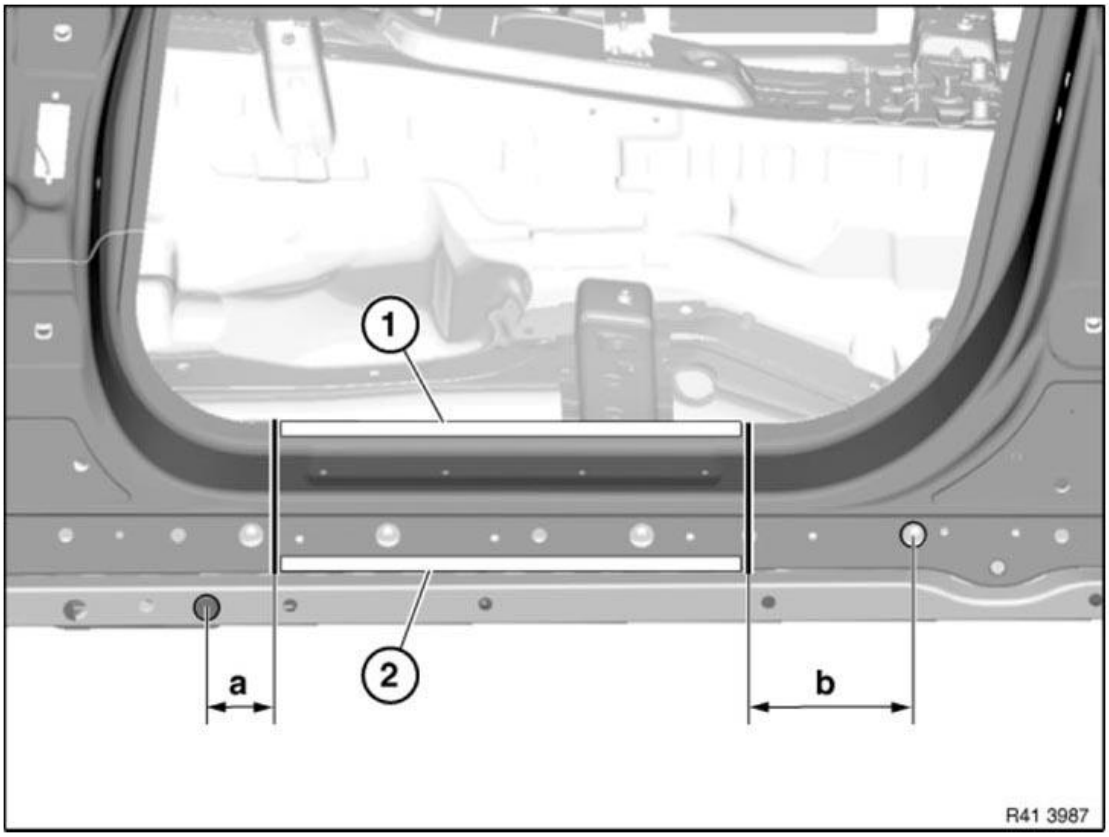


Fig. 252: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cuts in accordance with specified measurements and cut.

IMPORTANT: Cut outer panel only for following severance cuts.
Measurement a = approx. 70 mm behind hole dia. 25 mm.
Dimension b = approx. 180 mm in front of 25 mm hole.
Open welded connections in areas (1) and (2).

Installation note:

Mark new part in accordance with severance cuts on vehicle and cut.

Open welded connections of new part to suit the vehicle.

Weld in **REINFORCEMENT PLATES** at all severance cuts.

Set repair welding spots in area (1) on existing welding spots on vehicle. This is necessary because the adhesive between the spot flanges acts as an insulator.

41 14 531 REPLACING ENGINE SUPPORT/FRONT LEFT SIDE FRAME CONNECTION (FRONT LEFT WHEEL ARCH REMOVED)

Observe procedure for **REPAIR STAGE 3** .

Read contents of **BODY, GENERAL** .

To remove engine support side frame connection

Following new body parts are required:

- (1) Connection, wheel arch/entrance

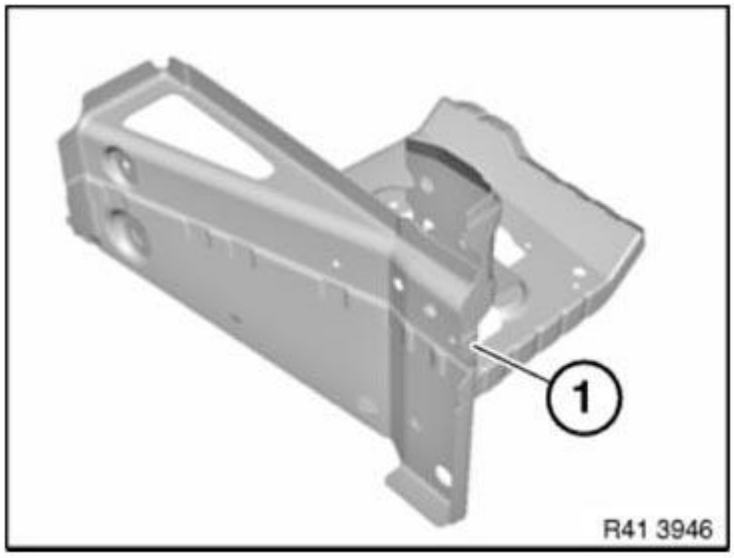


Fig. 253: Identifying Connection, Wheel Arch/Entrance

Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in areas (1).

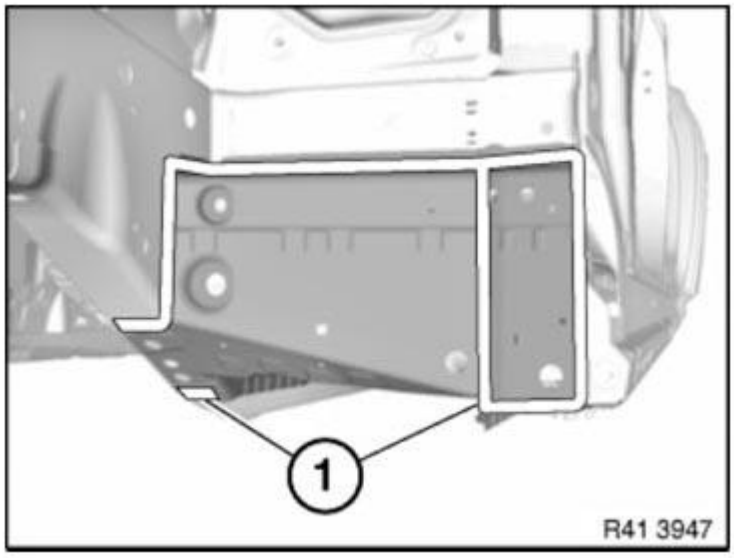


Fig. 254: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

View from below:

Open welded connections in areas (1).

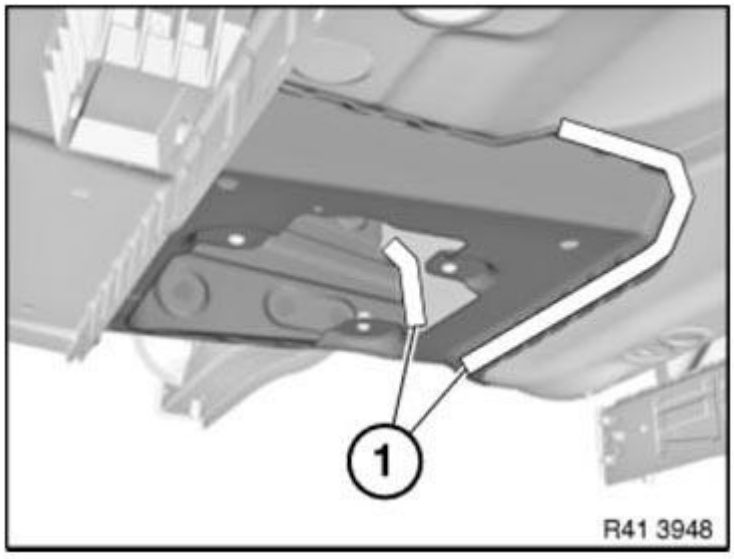


Fig. 255: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

View from below:

Open welded connections in areas (1).

Remove wheel arch/entrance connection.

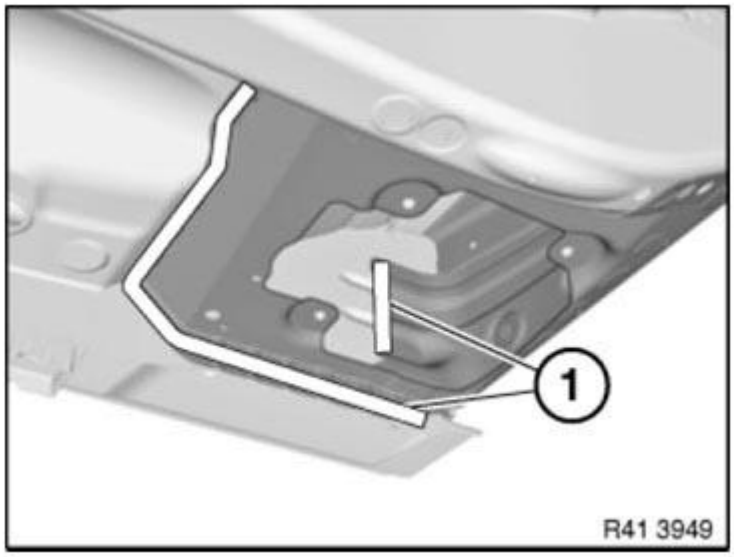


Fig. 256: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Open welded connections in area (1).

Remove metal section (2).

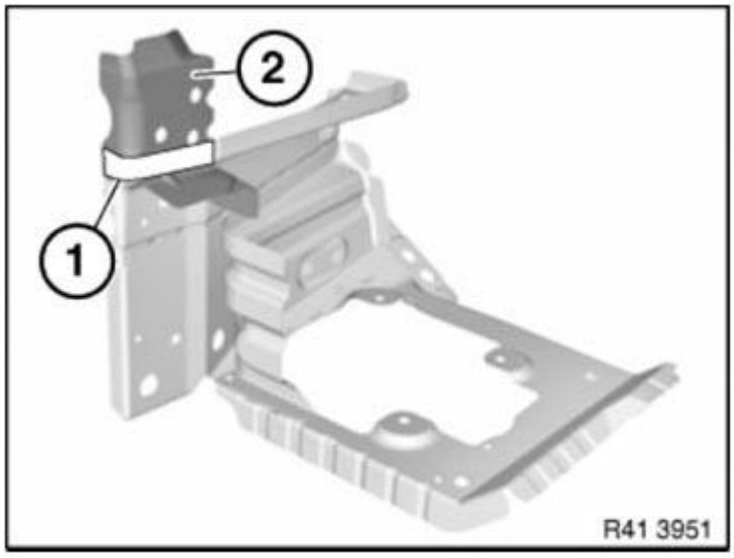


Fig. 257: Identifying Welded Connections Area And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

To install engine support side frame connection

Install and weld new parts.

41 21 510 REPLACING FRONT LEFT DOOR POST (FRONT SIDE PANEL REMOVED)

Procedure **OBSERVE** repair stage 3!

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **procedure** See **4100... SPOT-WELD BONDING STEEL PARTS**.

Place vehicle on straightening bench.

Following new body parts are required:

- (1) A-pillar, outer
- (2) Connection, side frame
- (3) Shaped part, carrier support, wheel arch, front (not shown)
- (4) Shaped part, carrier support, wheel arch (not shown)

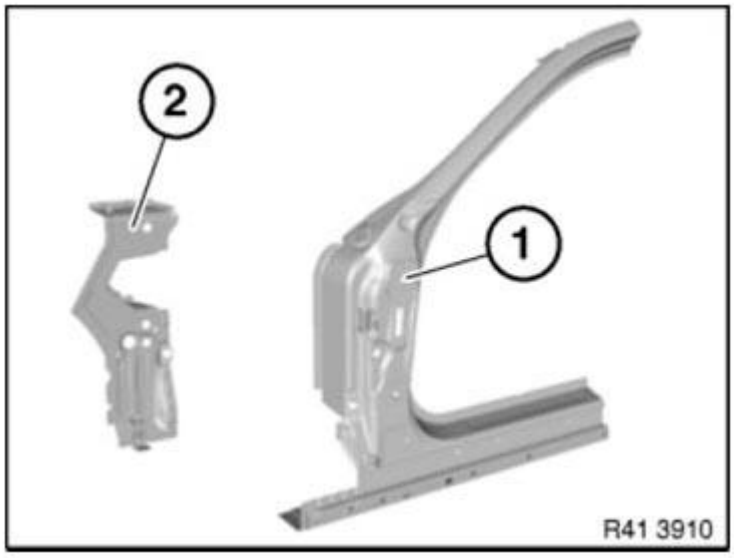


Fig. 258: Identifying Connection, Side Frame And A-Pillar, Outer
Courtesy of BMW OF NORTH AMERICA, INC.

Open spot-welded adhesive joint in area (1).

Open welded connections in areas (2).

Roughly cut side frame connection along lines (4).

Remove side frame connection (3).

Installation note:

MAG-weld new part in areas (4).

To do so, apply 10 mm long fillet welds at spacing of 15 mm.

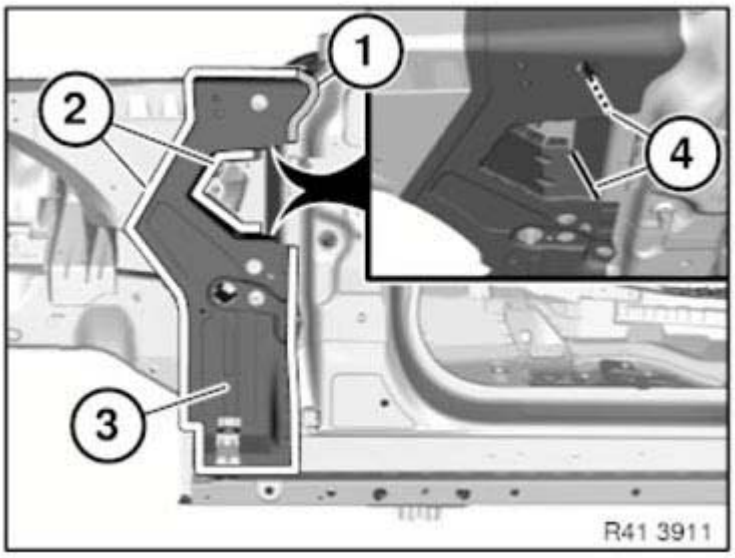


Fig. 259: Identifying Spot-Welded Adhesive Joints Area And Side Frame Connection
Courtesy of BMW OF NORTH AMERICA, INC.

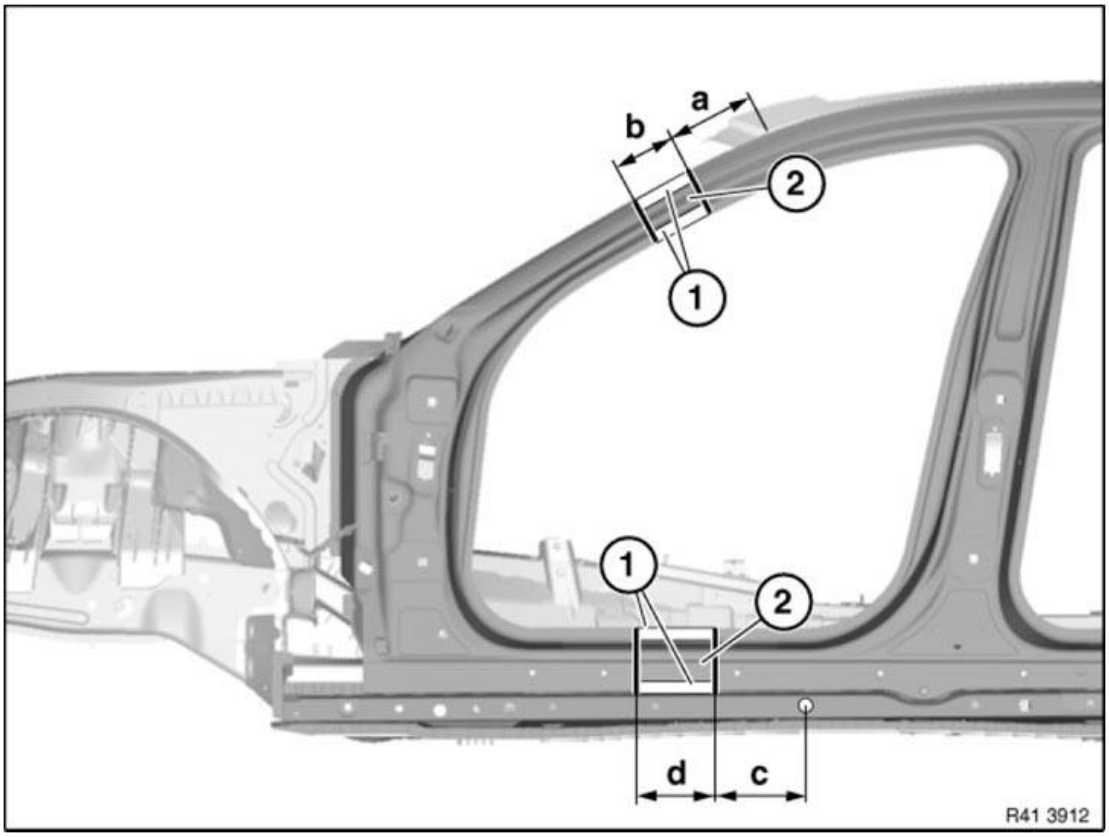


Fig. 260: Identifying Welded Connections Areas And Sheet Sections
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cuts in accordance with specified dimensions and cut

IMPORTANT: Cut outer panel only for following severance cuts.
Dimension a = 200 mm from roof edge.
Dimension b = 100 mm below severance cut a.
Dimension c = approx. 165 mm before center of hole diameter 15 mm.
Dimension d = 140 mm before severance cut c.
Open welded connections in areas (1).
Remove sheet sections (2).

Installation note:

Cut-out metal sections (2) are required again for sealing.

Weld in **REINFORCEMENT PLATES** at all severance cuts.

IMPORTANT: For following severance cut, do not damage slide/tilt sunroof water drain hose.
Cut outer panel only.

Mark severance cut (1) in accordance with specified dimension and cut.

Dimension a = approx. 250 mm from roof edge.

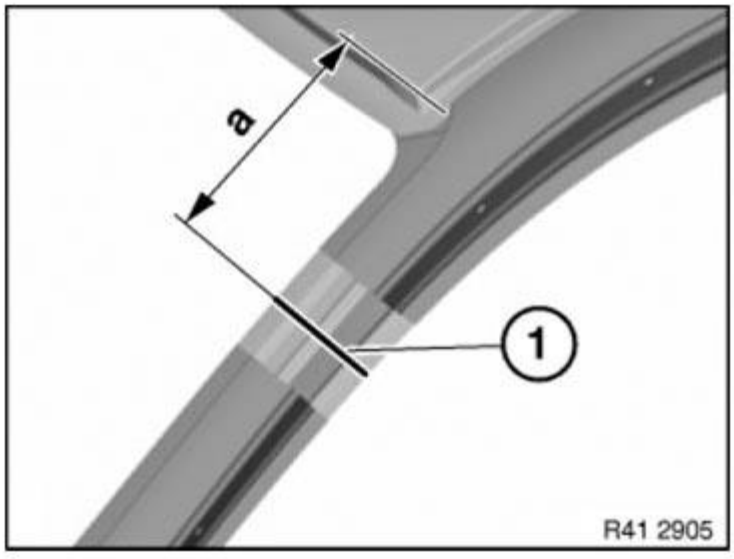


Fig. 261: Identifying Roof Edge Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with specified dimension and cut.

IMPORTANT: Cut outer panel only.

Dimension a = approx. 235 mm before center of 15 mm dia. hole.

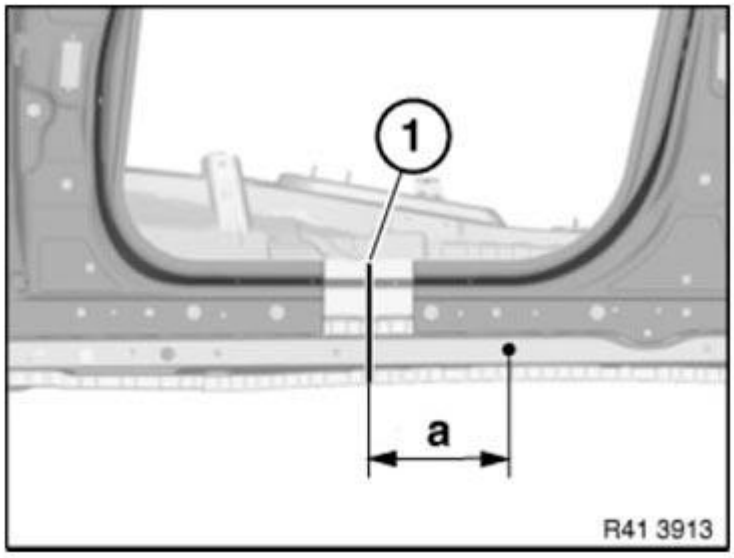


Fig. 262: Identifying Outer Panel Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

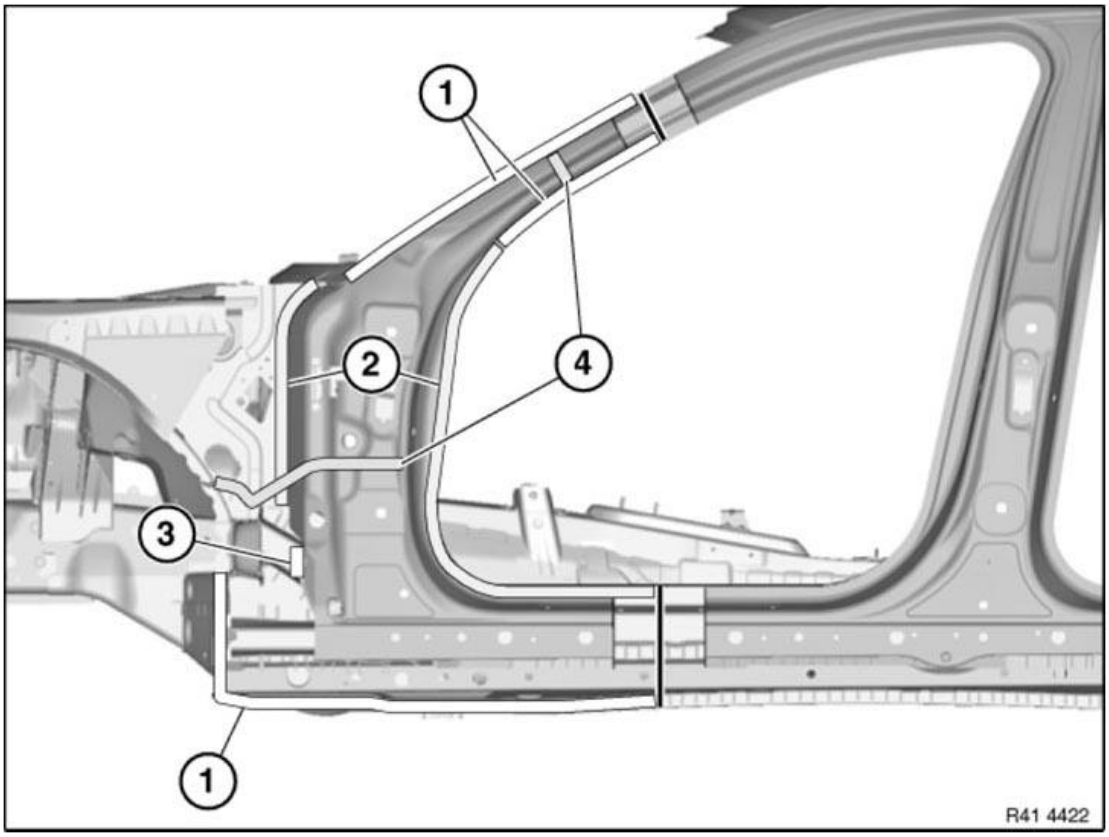


Fig. 263: Identifying Bonded Connection Area, Cavity Sealing And Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in areas (1).

Open spot-welded adhesive joints in areas (2).

Open bonded connection in area (3).

Installation note:

Replace bonded connection in area (3) with MAG weld seam.

Apply sealant to **cavity sealing** See **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (EXPANDED)** or **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (NOT EXPANDED)**(4).

View from below.

Open welded connection (1).

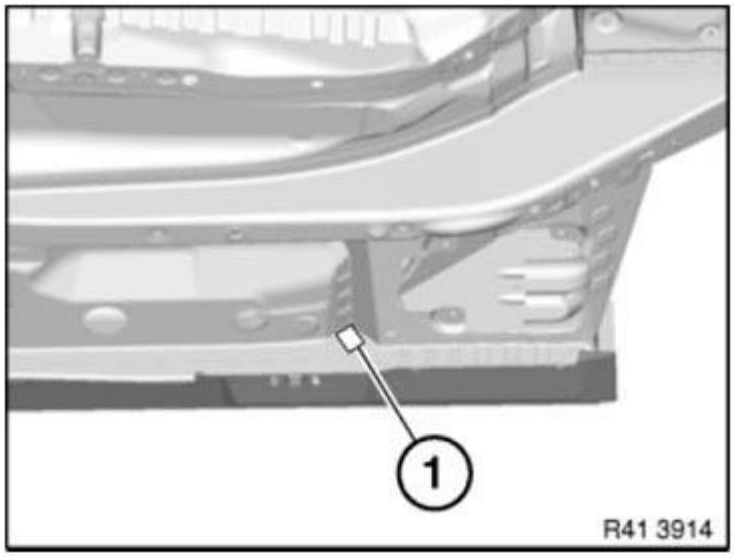


Fig. 264: Identifying Welded Connection
Courtesy of BMW OF NORTH AMERICA, INC.

View from inside.

Open spot-welded adhesive joint (1 welding spot in each case) in areas (1).

Open welded connection (2).

Feed out sliding sunroof water drain hose (3) and door post.

Installation note:

Prepare body in areas (1) for plug welding.

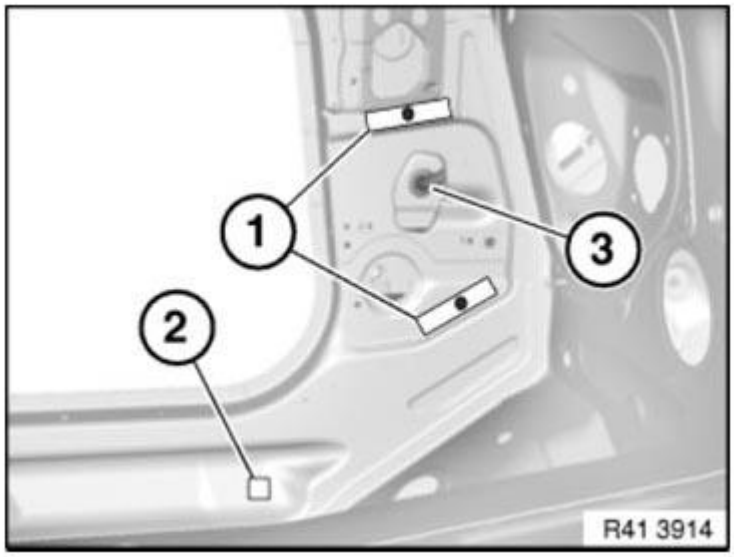


Fig. 265: Identifying Sunroof Water Drain Hose, Spot-Welded Adhesive Joint Areas And Welded Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Apply repair welding spots in area (1) to existing welding spots on new part/vehicle. This is necessary because the adhesive between the spot flanges acts as an insulator.

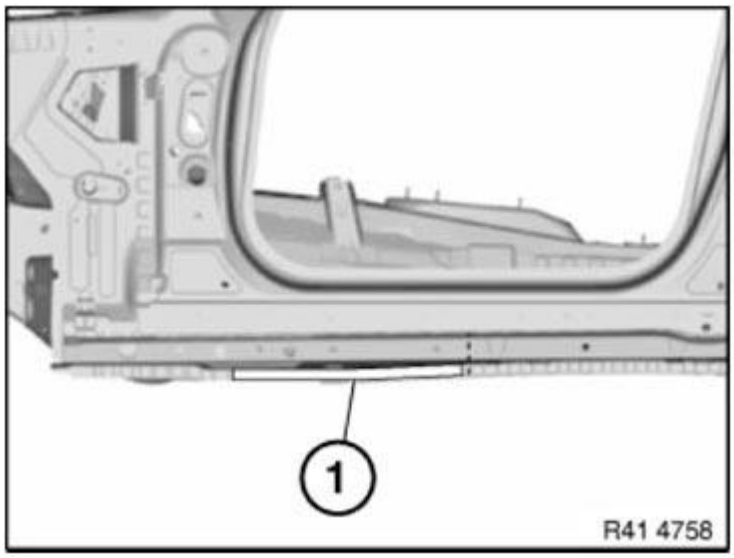


Fig. 266: Identifying Welding Spots Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Mark new part in accordance with severance cuts above and cut.

Adjust new part to fit with alignment bracket or universal mount.

Make sure water drain hose is correctly fitted.

4131 ROOF OUTER SKIN

41 00... REPAIRING CLIPS FOR ROOF STRIP

The following instructions describe the permanent repair gluing of clips which were originally secured with T-pins.

The repair gluing at the same time protects the area of the torn-off T-pin permanently against corrosion.

1.0 Information on dangers/hazards

- Read and comply with the manufacturer's information on dangers/hazards prior to application.
- Avoid eye and skin contact. Wear solvent-resistant protective gloves.
- Do not inhale adhesive fumes. Apply in well ventilated rooms only.

1.0 Equipment

- **ADHESIVE K4**
- Static mixing tube
- **ADHESIVE GUN**
- Cleaning agent R1
- Adhesive tape for fixing

2.0 Preparing the surface

- Surface temperature of bonding surface and room temperature at least 18°C.
- Cover area around bonding surface.
- Remove debris, flaked paint etc. from bonding surface with a brush. Use of compressed air prohibited!
- Clean bonding surface with cleaning agent R1.
- Let cleaned surface air dry for at least 2 minutes. Bonding surface must be completely dry.
- Do not contaminate bonding surfaces once they have been cleaned (sweat from hands, fingerprints, etc.).

3.0 Applying the adhesive

- Fill the hole (1) created by the torn-off T - pin with adhesive and spread over a length of approx. 4 cm (2) in the roof channel.

IMPORTANT: The hole must be completely filled or sealed with adhesive!

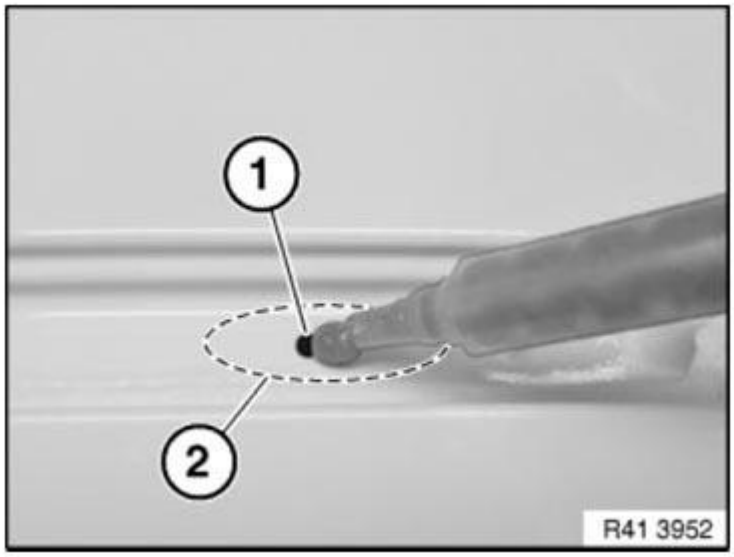


Fig. 267: Filling Roof Channel Hole Using Adhesive
Courtesy of BMW OF NORTH AMERICA, INC.

Apply adhesive bead (1) to the underside of the clip.

In so doing, fill channel of clip with adhesive.

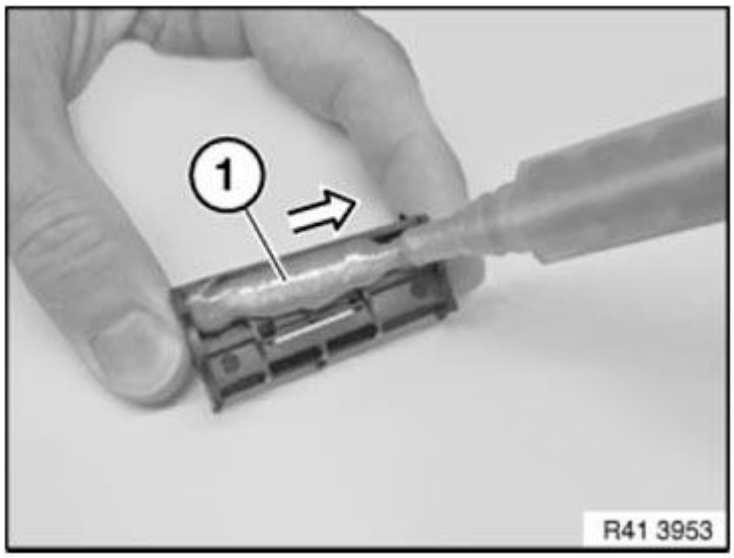


Fig. 268: Applying Adhesive Bead To Underside Of Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Move clip (1) into position and secure by hand.

If the adhesive is not already emerging evenly through the channel, apply additional adhesive from above.

Adhesive bead (2) must be below the clip height.

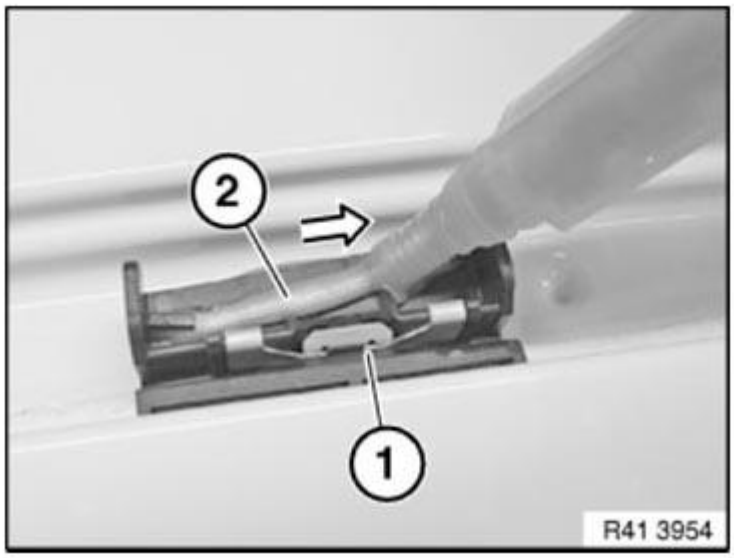


Fig. 269: Moving Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Secure clip with adhesive tape (1), approx. 150 mm long.

Apply adhesive tape in direction of travel.

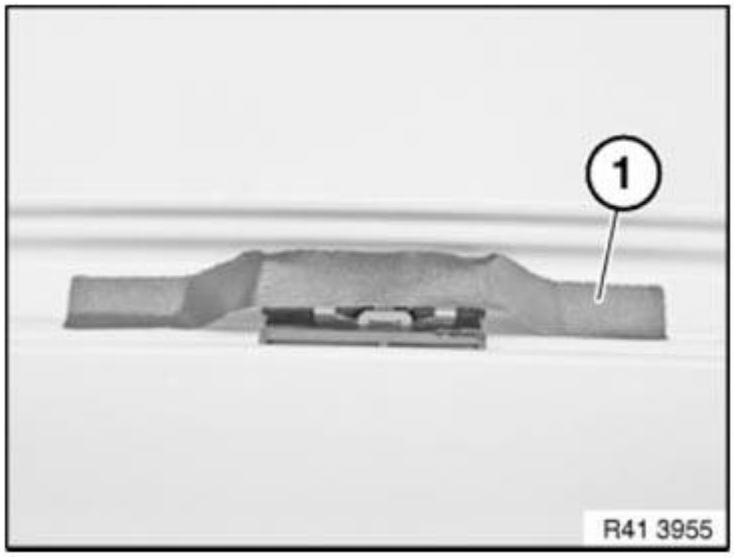


Fig. 270: Securing Clip With Adhesive Tape
Courtesy of BMW OF NORTH AMERICA, INC.

4.0 Hardening period

- Adhesive tape can be removed after approx. 10 mins.
- Earliest possible load capability, e.g. fitting of roof strip, after 30 minutes.

41 31 000 REPLACE ROOF OUTER SKIN

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following parts are required:

- Roof outer skin

Additional required parts (not pictured):

SOUND INSULATION CHART

Description	Part number	Quantity
Sound insulation	07 14 6 949 300	3
Blind rivets for holder	51 41 7 068 752	4
Blind rivets for earth strap	07 14 7 216 857	8

Following consumables are required:

MATERIAL CHART

Material	Quantity
Adhesive K2	2
Cleaning agent R1	1
Sealant D1	



Fig. 271: Identifying Roof Outer Skin
Courtesy of BMW OF NORTH AMERICA, INC.

Tools also required:

- Roof pliers set, order number: 81 43 2 158 707

  Sourcing reference:

  BMW Workshop Equipment Catalogue.

NOTE: Store adhesive at room temperature.
Adhere to adhesive processing temperature of 15 - 28°C without fail.
Prior to installation, store roof outer skin and vehicle for at least 12 hours at room temperature (17°C to 35°C).

Removing roof outer skin

View of passenger compartment above driver's seat.

Operation is described on the left side. Right side identical.

Release screw (1).

Release rivets (2) and remove holder (3).

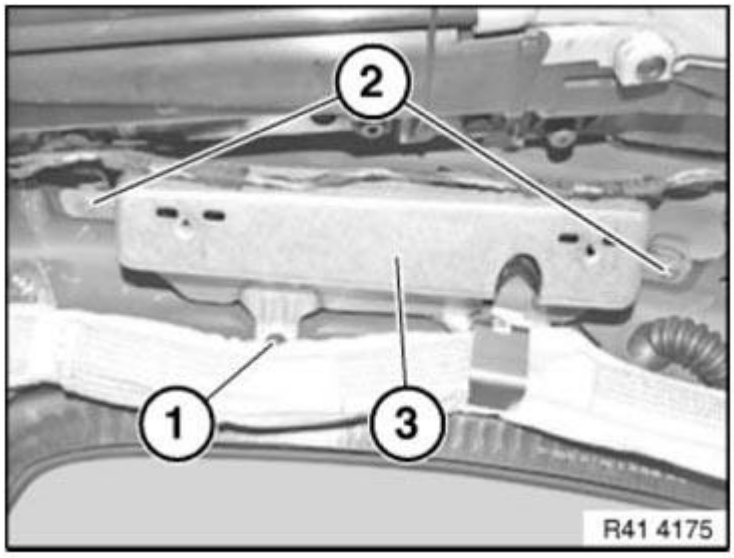


Fig. 272: Identifying Rivets, Screw And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release rivets (1) and remove earth strap (2).

NOTE: Do not damage earth strap.
Replace if necessary, part number 61 12 7 213 377
Also release earth straps on left and right above rear seat.

IMPORTANT: Only the special rivets may be used to fit the earth straps!

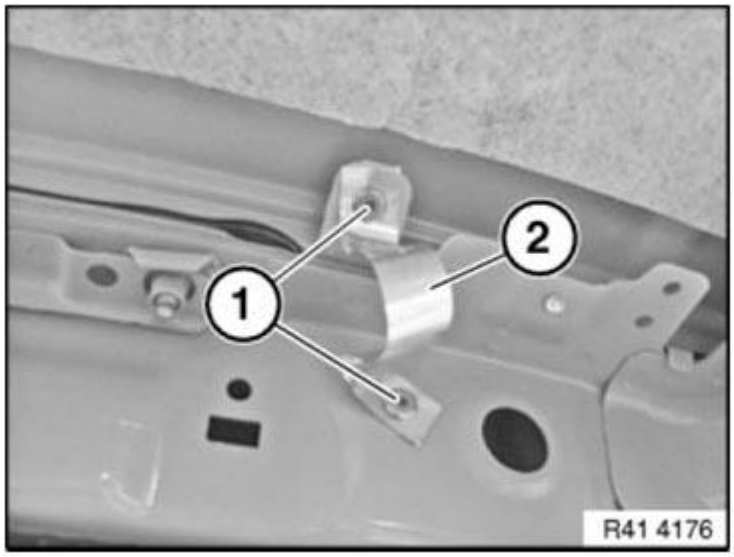


Fig. 273: Identifying Rivets And Earth Strap
Courtesy of BMW OF NORTH AMERICA, INC.

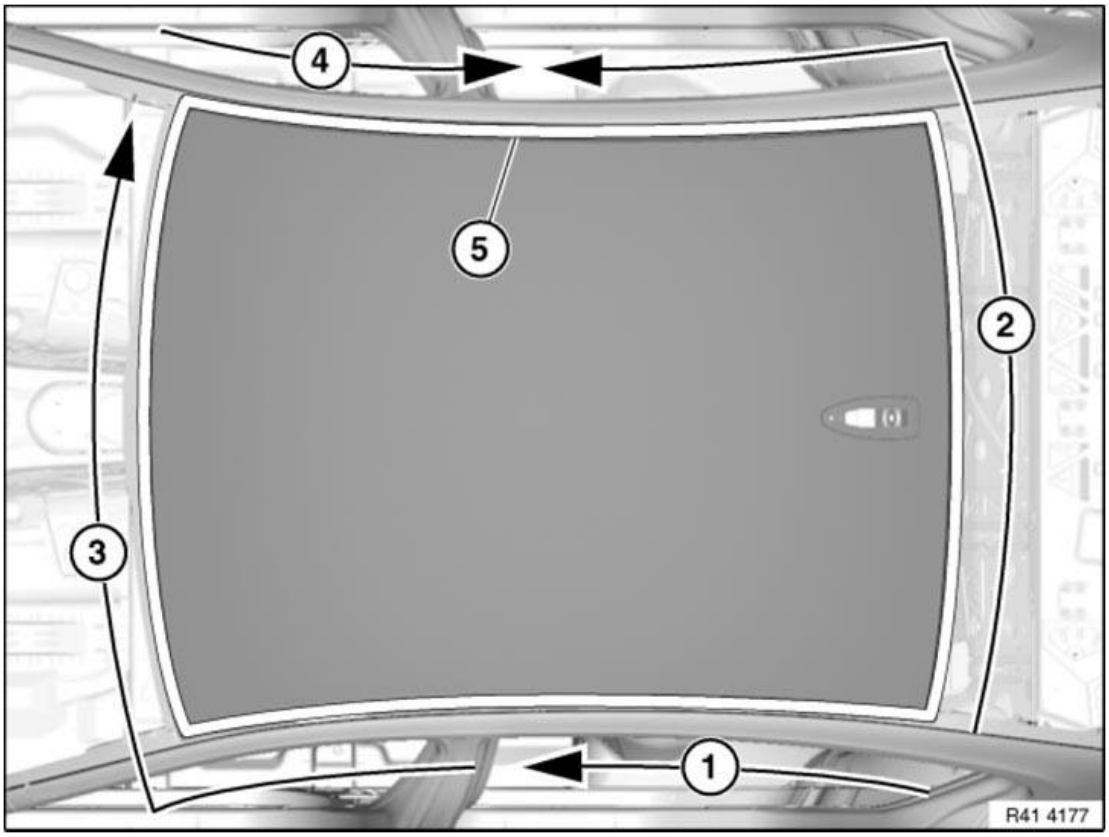


Fig. 274: Identifying Bonded Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Heat bonded connection (5) with hot-air blower until adhesive is loosened and release.

In so doing, proceed in sections (1 to 4), starting at rear left.

IMPORTANT: Extract vapors and gases.
Primed surface must not be damaged.
Do not use any metallic tools.

Carefully drive in plastic or wooden wedge at heated section. The wedge creates tension between roof outer skin and body.

IMPORTANT: Do not exert force to drive in wedge. If the wedge cannot be driven in, continue heating roof outer skin on adhesive flange over a large area (max. 180°C). Carry out operation with a 2nd person helping.

Heat next section until roof outer skin has detached from body. Reapply plastic wedge. Repeat procedure until roof outer skin is completely detached.

Take off roof outer skin.

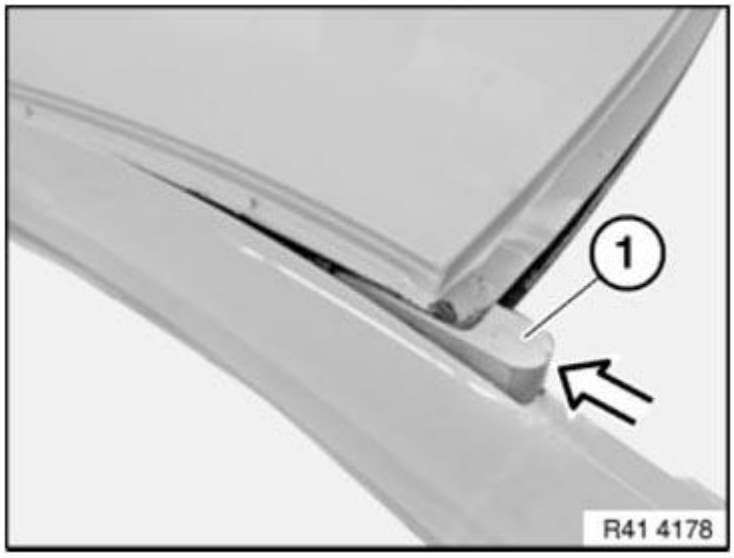


Fig. 275: Taking Off Roof Outer Skin
Courtesy of BMW OF NORTH AMERICA, INC.

Installing roof outer skin

Remove adhesive residues (1) to 0.5 mm.

Primed surface must not be damaged.

Smaller damage to 5 mm or scratch marks can be ignored.

In the event of larger damage to primer (greater than 5 mm), proceed as follows:

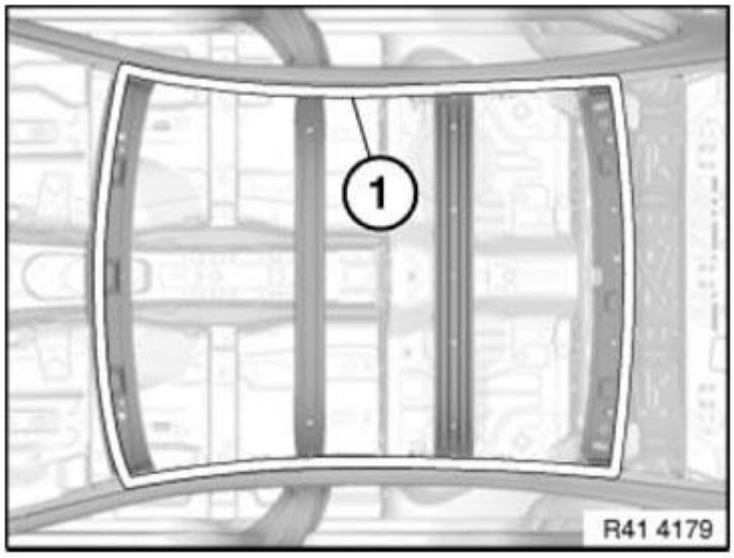


Fig. 276: Identifying Roof Outer Skin Adhesive Residues

Courtesy of BMW OF NORTH AMERICA, INC.

In the event of larger damage to primer, the following procedure applies:

Clean damaged area with cleaning agent R1.

Apply adhesive K5a to the bare areas with a spatula or a brush. Apply a uniformly thin layer (max. 0.5 mm). The roof outer skin can be bonded after a curing period of 24 hours.

The adhesive flange area must not be painted over when the roof frame is being repaired or replaced.

Fit new sound insulation in areas (1).

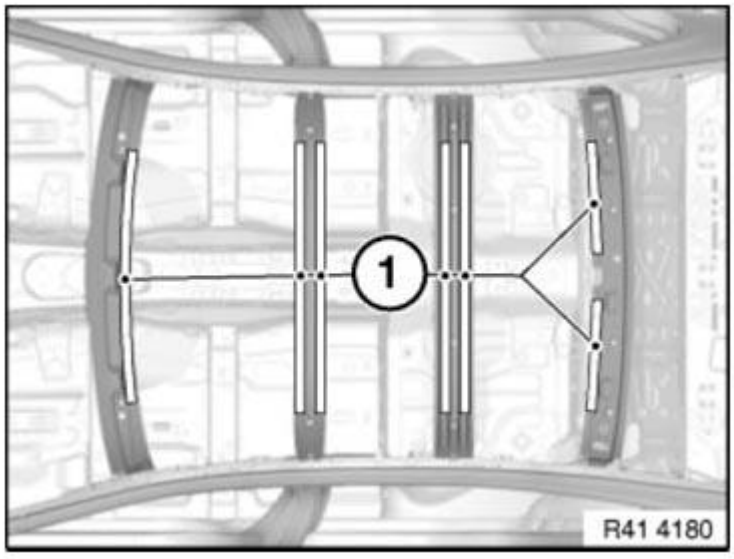


Fig. 277: Identifying Sound Insulation Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Clean bonding surface (1) on body and on new part with cleaning agent R1. Observe an air drying time of 2 minutes.

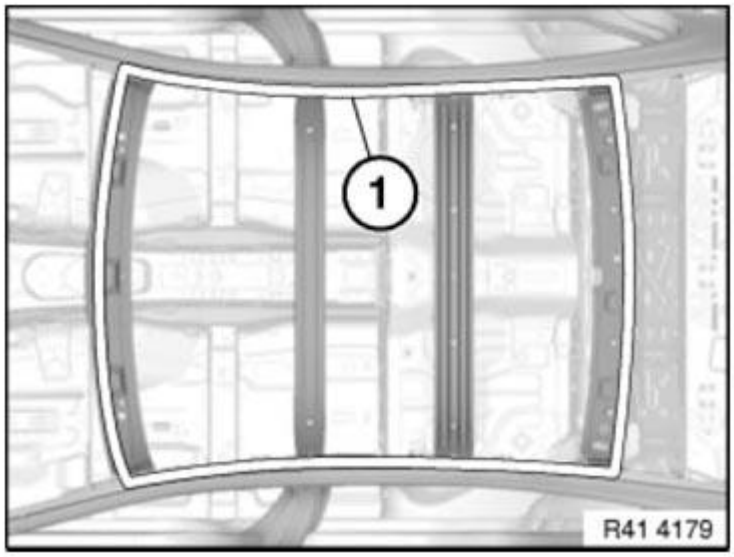


Fig. 278: Identifying Bonding Surface On Body
Courtesy of BMW OF NORTH AMERICA, INC.

Lay out following parts ready:

- Adhesive in adhesive gun and 2nd glue cartridge
- Rear window
- Roof trim strips
- Preset roof pliers with tensioning straps
- 3 large fixing pliers (windscreen area)
- 3 small fixing pliers (rear window area)

Steps 1 to 3 described below must be completed within **15 minutes!**

1. Applying adhesive
2. Joining and fixing roof outer skin
3. Applying adhesive to nodes on A- and C-pillars. Removing excess adhesive.

NOTE: To ensure that the processing time of 15 mins. is observed, make sure that the clamping tools are pre-adjusted. To do so, lay on roof outer skin without adhesive.
Then mount and adjust all clamping tools. In so doing, position roof pliers close to roof frame. (Arrangement, see Fig. 283)

IMPORTANT: Position roof pliers only in areas of stiffening impressions.

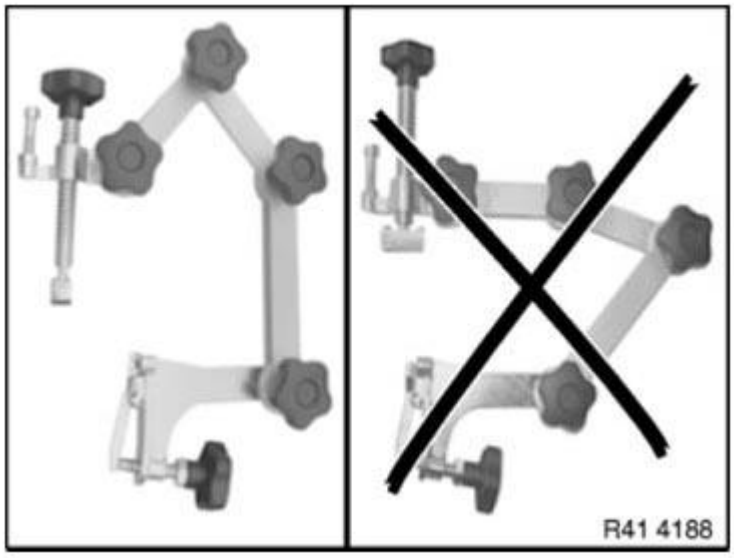


Fig. 279: Identifying Correct Position Of Roof Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

1. Applying adhesive

Apply adhesive K2 in area (1).

Guide nozzle at an angle of max. 60° along adhesive flange.

Cross-section of adhesive bead approx. 4 - 5 x 10 mm.

Apply a short reference bead at an appropriate point for later checking.

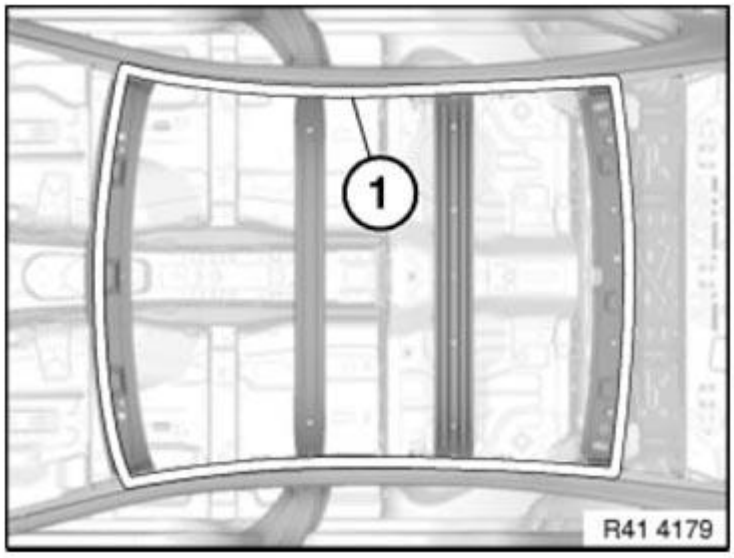


Fig. 280: Identifying Adhesive K2 Area

Courtesy of BMW OF NORTH AMERICA, INC.

Apply a little more adhesive K2 to nodes (1) of A and C-pillars.

NOTE: Excess material is later used for spreading to side frame.

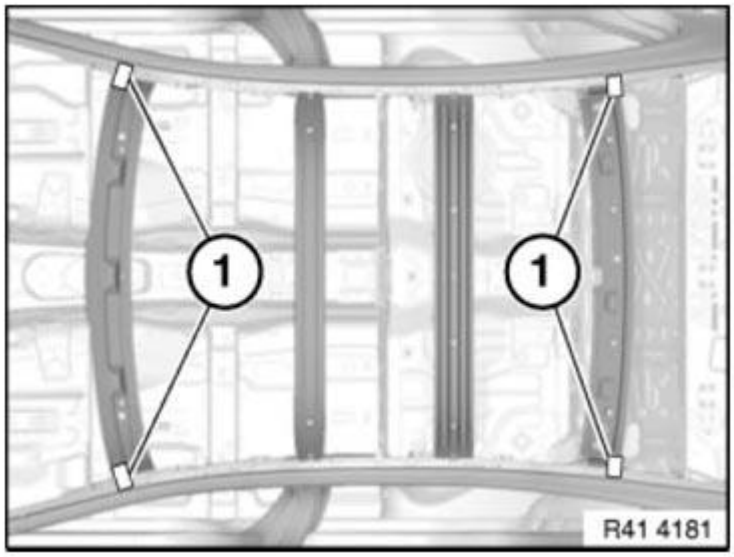


Fig. 281: Identifying A And C-Pillars Adhesive K2 Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a little less adhesive (2) in area of holders (1).

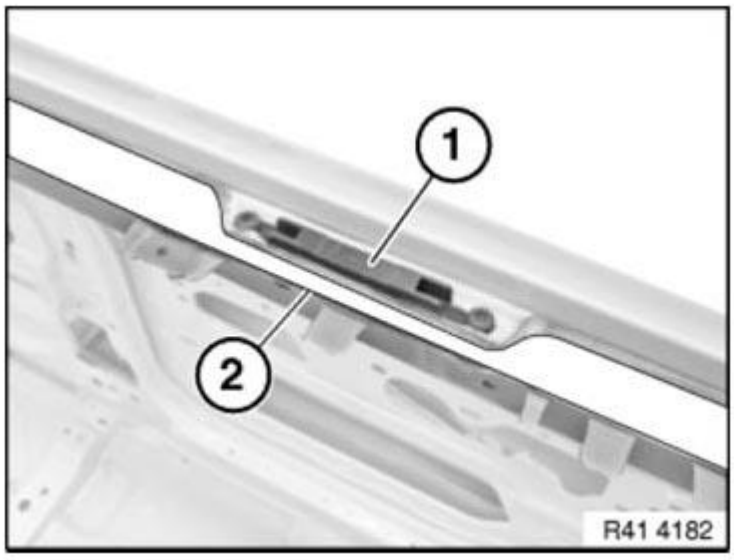


Fig. 282: Identifying Adhesive Area And Holders
Courtesy of BMW OF NORTH AMERICA, INC.

2. Joining and fixing roof outer skin

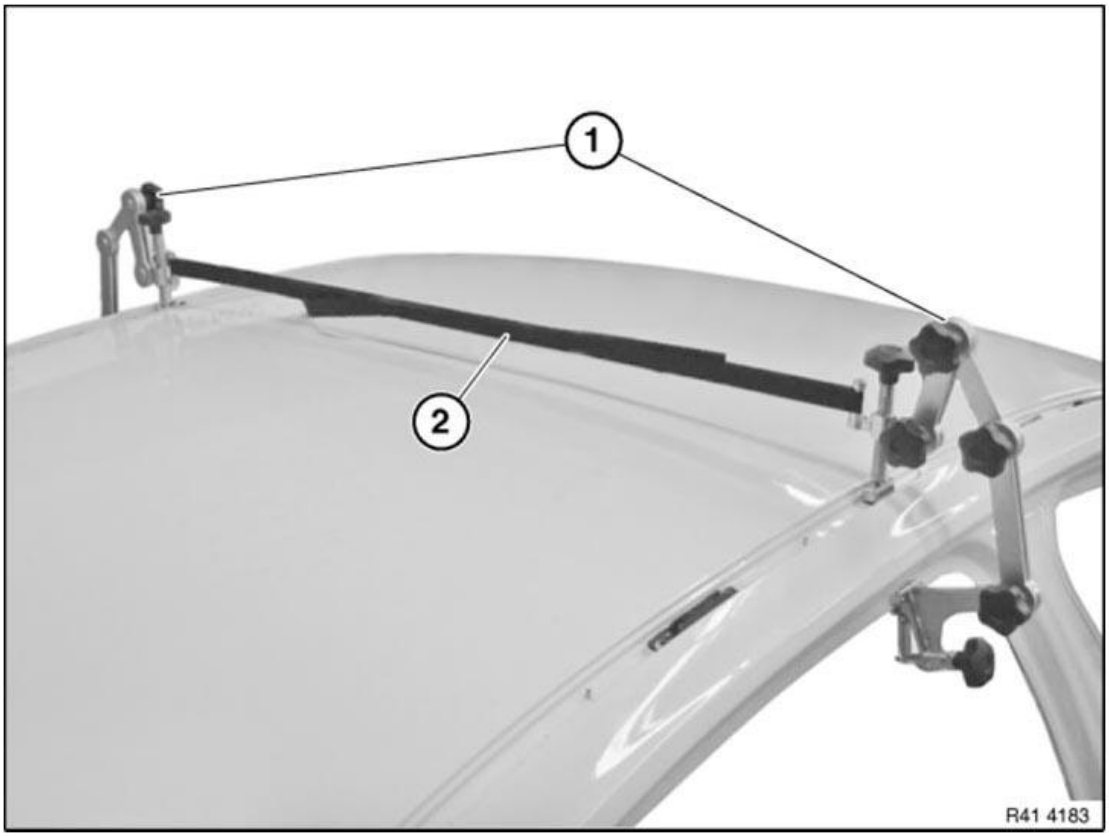


Fig. 283: Securing Roof Pliers With Tensioning Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Place roof outer skin with 3 helpers evenly and centrally on vehicle.

Fit rear window and roof trim strips to check correct position of roof outer skin.

Mount roof pliers (1) and secure with tensioning strap (2).

IMPORTANT: Position clamping tools only on stiffening impressions (1) in adhesive flange area of roof outer skin.
This ensures that correct distance and thus the correct amount of adhesive between the roof outer skin and the roof frame.

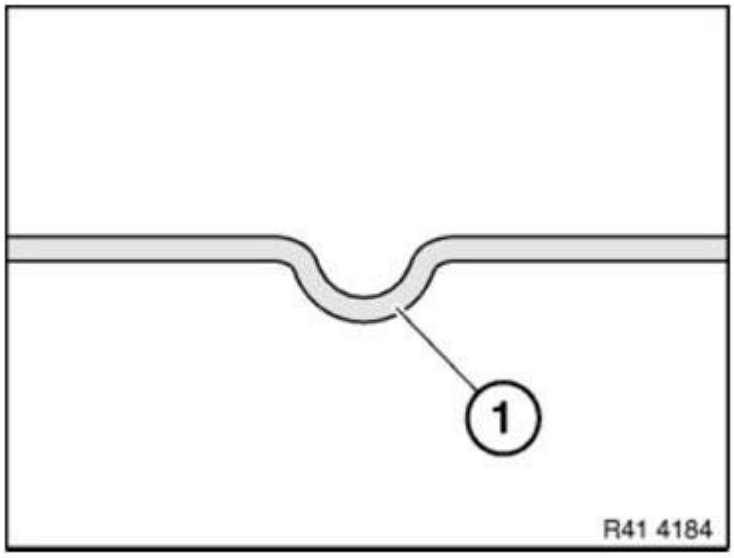


Fig. 284: Identifying Roof Outer Skin Adhesive Flange Area
Courtesy of BMW OF NORTH AMERICA, INC.

Secure roof outer skin at 3 areas with roof pliers and tensioning straps.

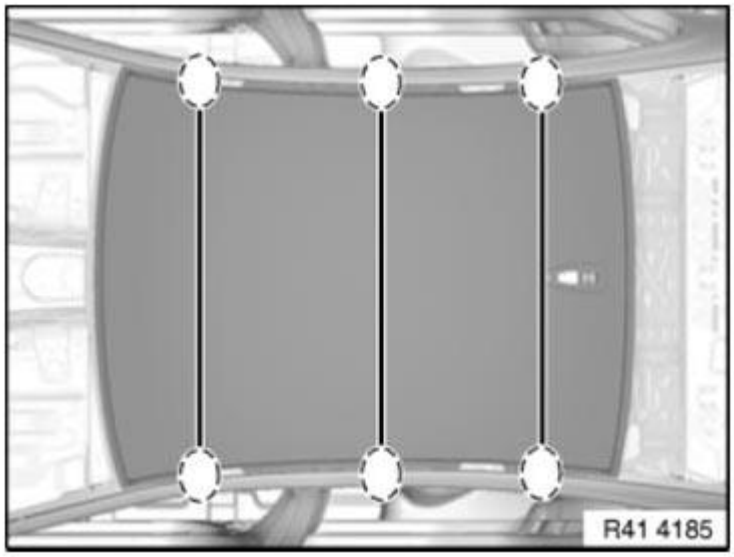


Fig. 285: Identifying Roof Outer Skin Securing Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Secure roof outer skin in windscreen area 3 times with large fixing pliers (1).

In rear window area use small fixing pliers (2) 3 times.

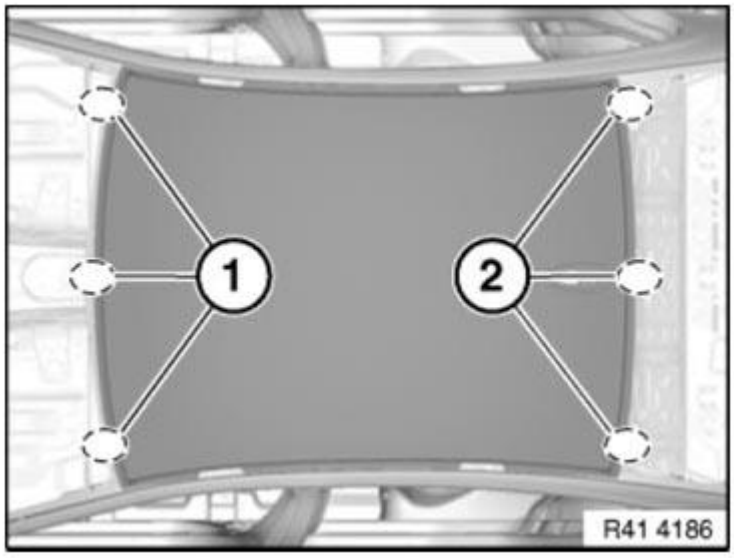


Fig. 286: Identifying Roof Outer Skin Securing Area In Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Use a suitable support (1) (approx. 50 x 50 mm) in windscreen area, as otherwise roof pillar (2) may be pressed in when the fixing pliers are secured.
(3) Roof outer skin

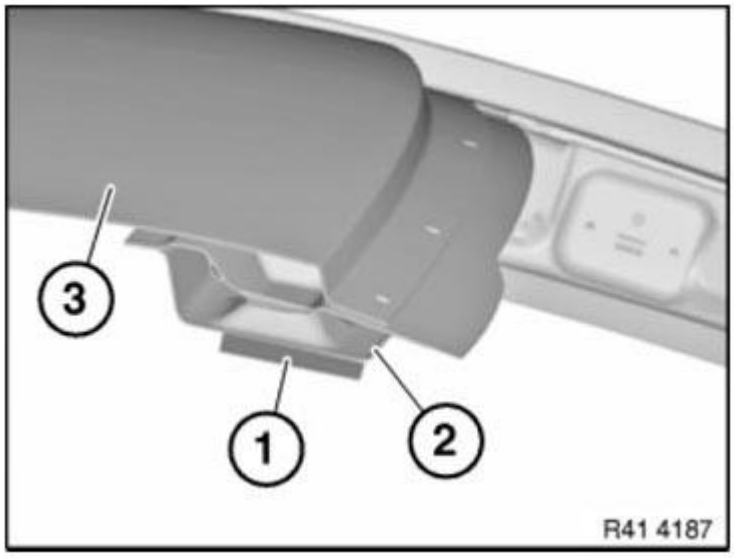


Fig. 287: Identifying Support, Roof Pillar And Roof Outer Skins
Courtesy of BMW OF NORTH AMERICA, INC.

3. Applying adhesive to nodes on A- and C-pillars. Removing excess adhesive

Adjust stage (1) between roof outer skin (2) and A-pillar or roof outer skin (2) and C-pillar with emerged

adhesive. Remove excess adhesive.

IMPORTANT: Do not use any cleaning agents containing solvents.

Do not leave any traces of sharp edges as this could compromise the tightness of the subsequent bond.

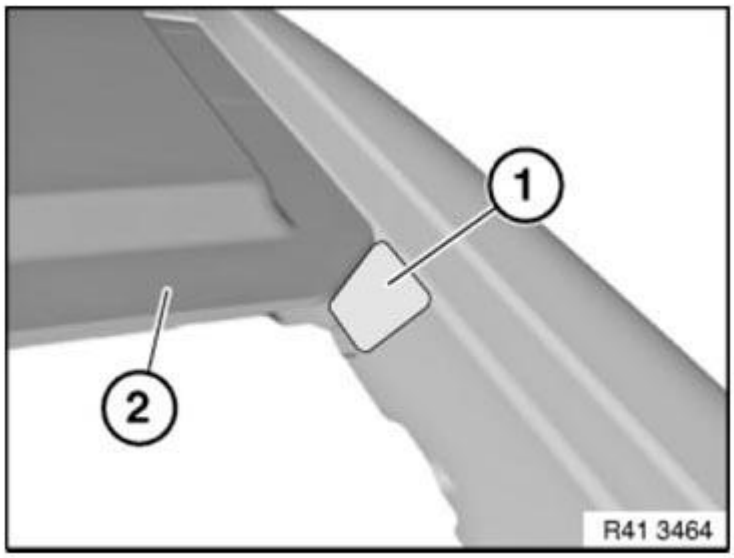


Fig. 288: Identifying Stage And Roof Outer Skin
Courtesy of BMW OF NORTH AMERICA, INC.

Spread excess adhesive in roof trim strip channel. Mounting surfaces of clips for roof trim strips must not be moistened with adhesive.

Clamping tools must remain on the vehicle for at least 1 hour. Do not move the vehicle during this period. Only then is it permitted to proceed with subsequent installation work.

Check whether reference bead has hardened after 2 hours hardening time (15-38°C).

After bonding, the vehicle must remain parked for at least 12 hours at room temperature (15-38°C).

The vehicle is then ready for operation.

41 31 010 REPLACING ROOF OUTER SKIN (VERSION WITH SLIDE/TILT SUNROOF)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following parts are required:

- Roof outer skin

Additional required parts (not pictured):

PART SPECIFICATION

Description	Part number	Quantity
Sound insulation	07 14 6 949 300	1
Blind rivets for holder	51 41 7 068 752	4
Blind rivets for earth strap	07 14 7 216 857	8

Following consumables are required:

MATERIAL CHART

Material	Quantity
Adhesive K2	3
Adhesive K5a	1
Cleaning agent R1	1
Sealant D1	

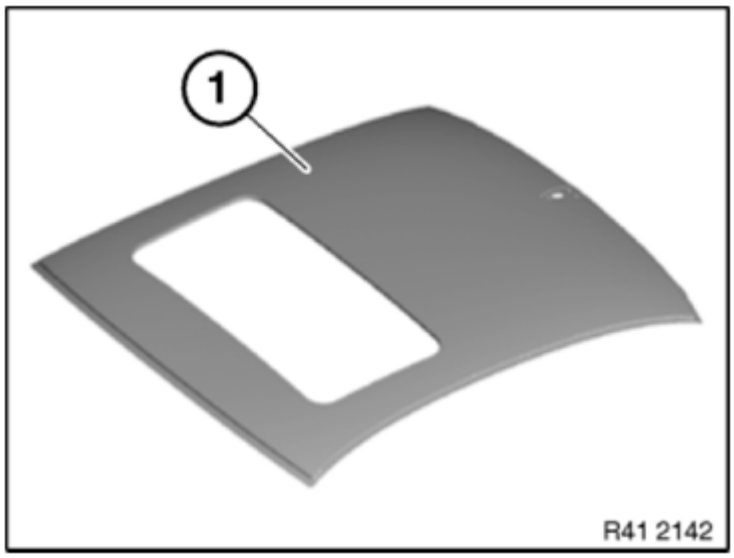


Fig. 289: Identifying Roof Outer Skin
Courtesy of BMW OF NORTH AMERICA, INC.

Tools also required:

- Roof pliers set, order number: 81 43 2 158 707

NOTE: Store adhesive at room temperature.
Adhere to adhesive processing temperature of 15 - 28°C without fail.

Prior to installation, store roof outer skin and vehicle for at least 12 hours at room temperature (17°C to 35°C).

Removing roof outer skin

View of passenger compartment above driver's seat.

Operation is described on the left side. Right side identical.

Release screw (1).

Release rivets (2) and remove holder (3).

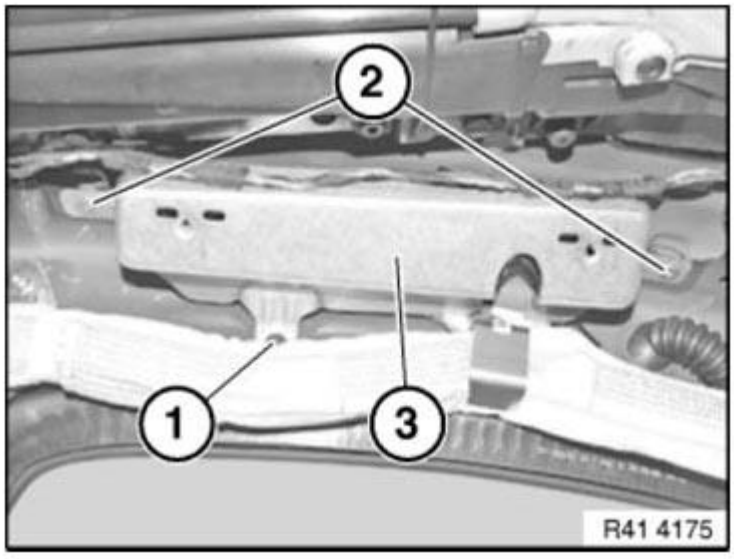


Fig. 290: Identifying Rivets, Screw And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release rivets (2) and remove earth strap (2).

NOTE: Do not damage earth strap.
Replace if necessary, part number 61 12 7 213 377
Also release earth straps on left and right above rear seat.

IMPORTANT: Only the special rivets may be used to fit the earth straps!

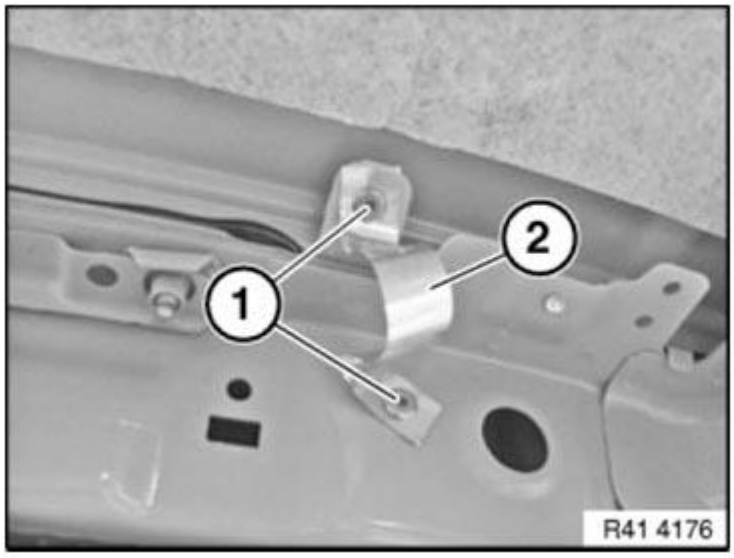


Fig. 291: Identifying Rivets And Earth Strap
Courtesy of BMW OF NORTH AMERICA, INC.

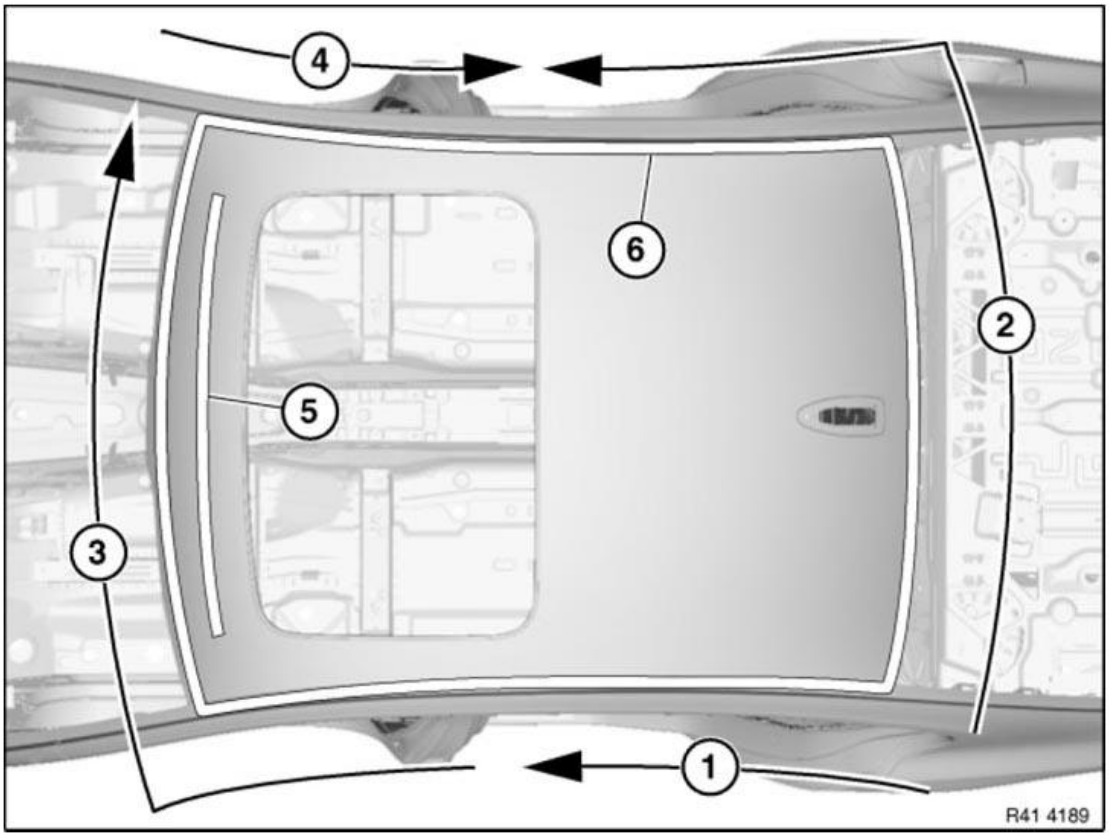


Fig. 292: Identifying Bonded Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Heat bonded connection (6) with hot air blower until adhesive is loosened, then release.

In so doing, proceed in sections (1 to 4), starting at rear left.

Heat bonded connection (5) from passenger compartment and release.

IMPORTANT: Extract vapors and gases.
Primed surface must not be damaged.
Do not use any metallic tools.

Carefully drive in plastic or wooden wedge (1) at heated section. The wedge creates tension between roof outer skin and body.

IMPORTANT: Do not exert force to drive in wedge. If the wedge cannot be driven in, continue heating roof outer skin on adhesive flange over a large area (max. 180°C). Carry out operation with a 2nd person helping.

Heat next section until roof outer skin has detached from body. Reapply plastic wedge. Repeat procedure until roof outer skin is completely detached.

Take off roof outer skin.

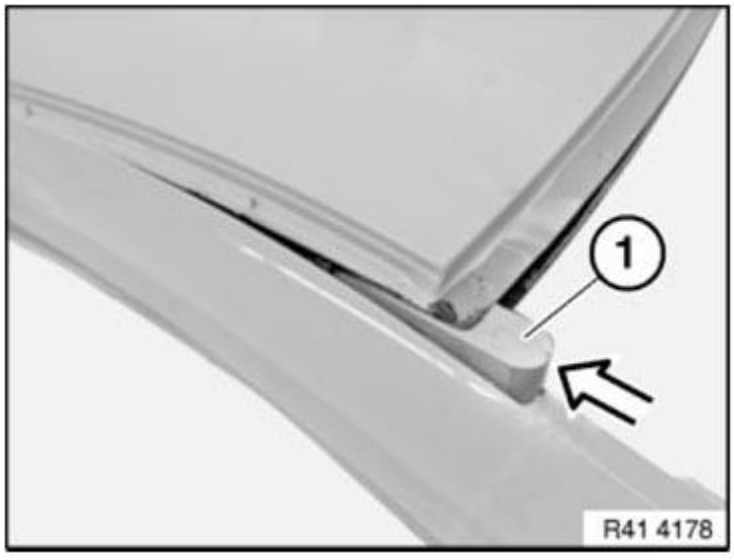


Fig. 293: Taking Off Roof Outer Skin
Courtesy of BMW OF NORTH AMERICA, INC.

Installing roof outer skin

Remove adhesive residues (1) to 0.5 mm.

Primed surface must not be damaged.

Smaller damage to 5 mm or scratch marks can be ignored.

In the event of larger damage to primer (greater than 5 mm), proceed as follows:

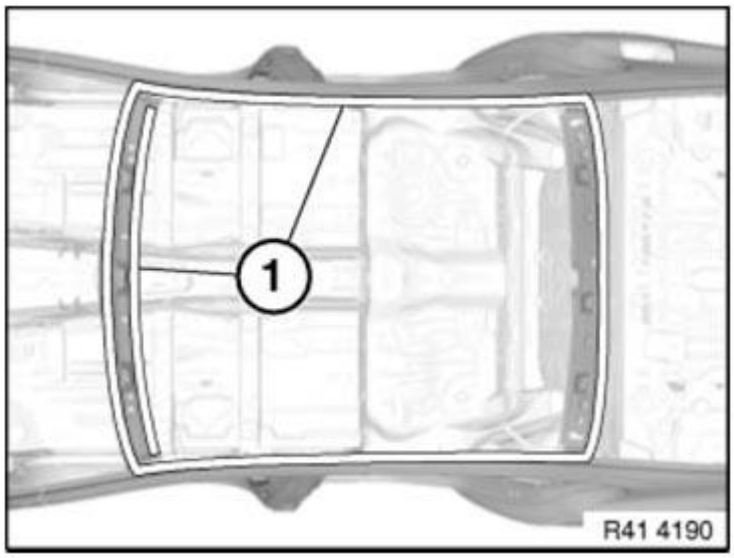


Fig. 294: Identifying Roof Outer Skin Adhesive Residues
Courtesy of BMW OF NORTH AMERICA, INC.

In the event of larger damage to primer, the following procedure applies:

Clean damaged area with cleaning agent R1.

Apply adhesive K5a to the bare areas with a spatula or a brush. Apply a uniformly thin layer (max. 0.5 mm). The roof outer skin can be bonded after a curing period of 24 hours.

The adhesive flange area must not be painted over when the roof frame is being repaired or replaced.

Fit new sound insulation in areas (1).

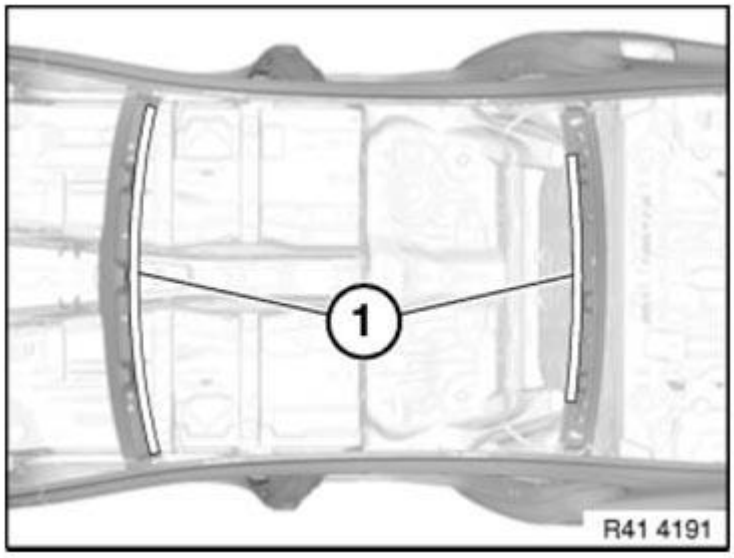


Fig. 295: Identifying Sound Insulation Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Clean bonding surfaces (1) on body and on new part with cleaning agent R1. Observe an air drying time of 2 minutes.

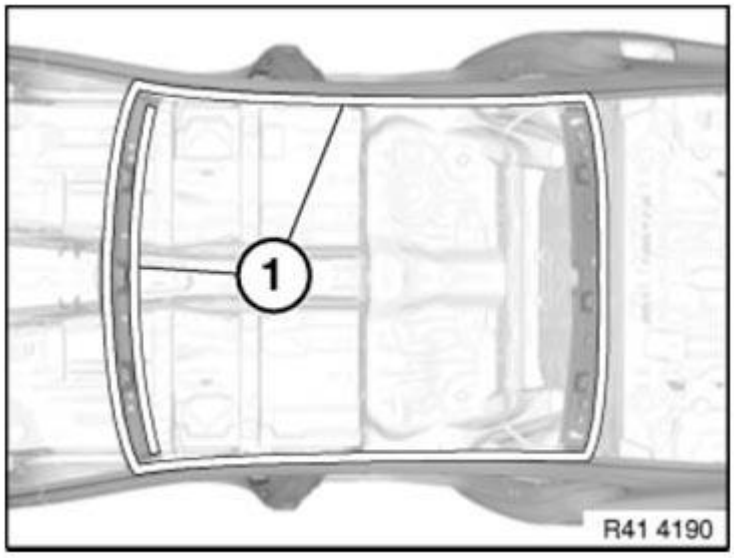


Fig. 296: Identifying Bonding Surfaces On Body
Courtesy of BMW OF NORTH AMERICA, INC.

Lay out following parts ready:

- Adhesive in adhesive gun and two further glue cartridges.
- Rear window
- Roof trim strips

- Preset roof pliers with tensioning straps
- 3 large fixing pliers (windscreen area)
- 3 small fixing pliers (rear window area)

Steps 1 to 3 described below must be completed within **15 minutes!**

1. Applying adhesive
2. Joining and fixing roof outer skin
3. Applying adhesive to nodes on A- and C-pillars. Removing excess adhesive.

NOTE: To ensure that the processing time of 15 mins. is observed, make sure that the clamping tools are pre-adjusted. To do so, lay on roof outer skin without adhesive.
Then mount and adjust all clamping tools. In so doing, position roof pliers close to roof frame. (For arrangement see Fig. 283)

IMPORTANT: Position roof pliers only in areas of stiffening impressions.

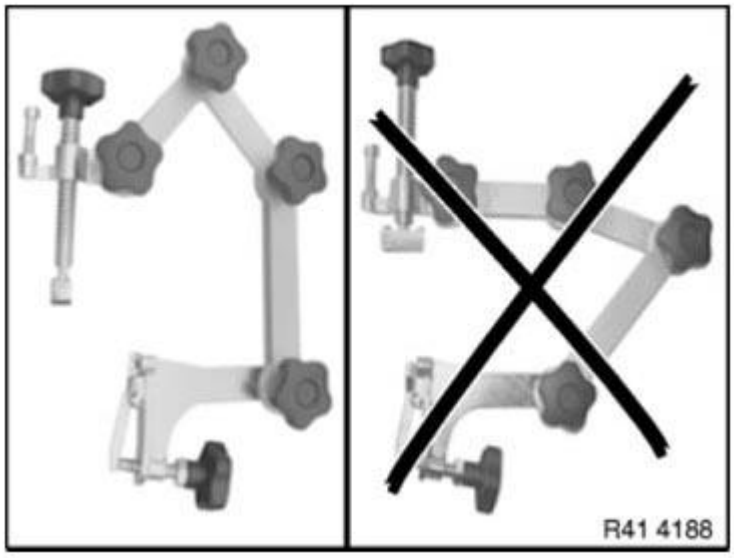


Fig. 297: Identifying Correct Position Of Roof Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

1. Applying adhesive

Apply K2 adhesive in areas (1).

Guide nozzle at an angle of max. 60° along adhesive flange.

Cross-section of adhesive bead approx. 4 - 5 x 10 mm.

Apply a short reference bead at an appropriate point for later checking.

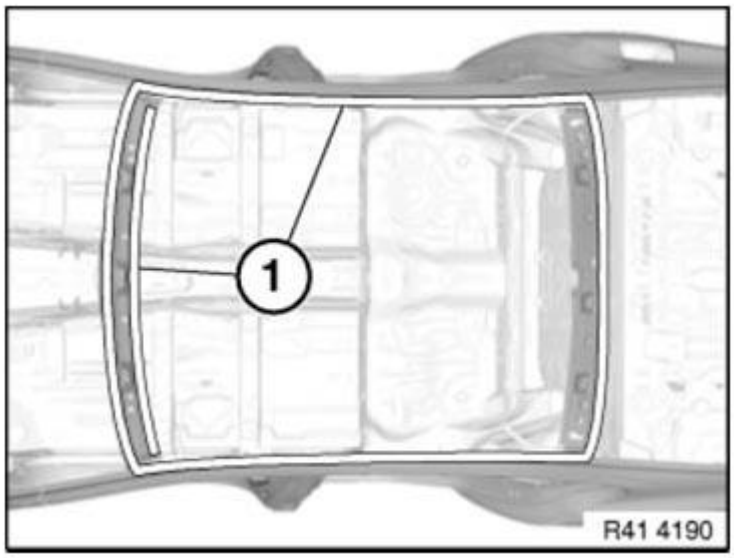


Fig. 298: Identifying K2 Adhesive Area
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a little more adhesive K2 to nodes (1) of A-and C-pillars.

NOTE: Excess material is later used for spreading to side frame.

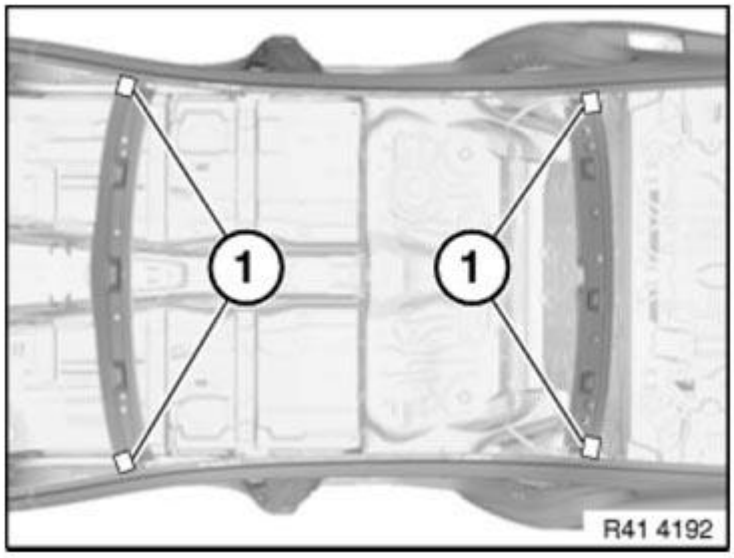


Fig. 299: Identifying A And C-Pillars Adhesive K2 Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a little less adhesive (1) in area of holders (1).

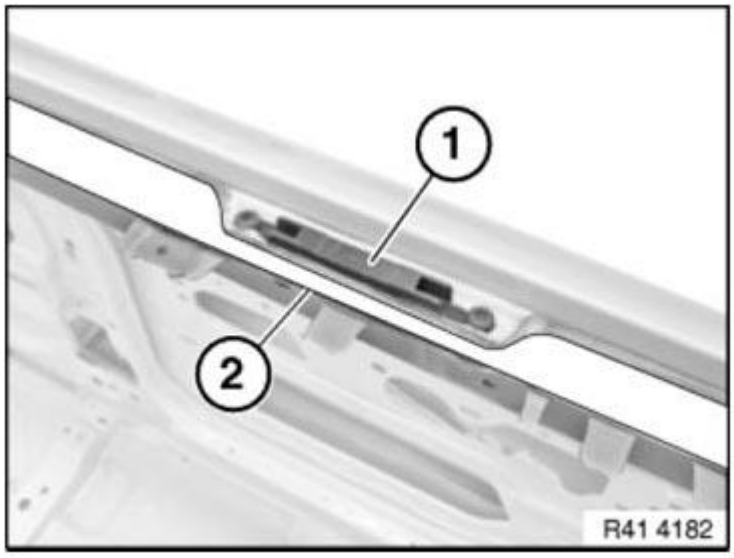


Fig. 300: Identifying Adhesive Area And Holders
Courtesy of BMW OF NORTH AMERICA, INC.

2. Joining and fixing roof outer skin

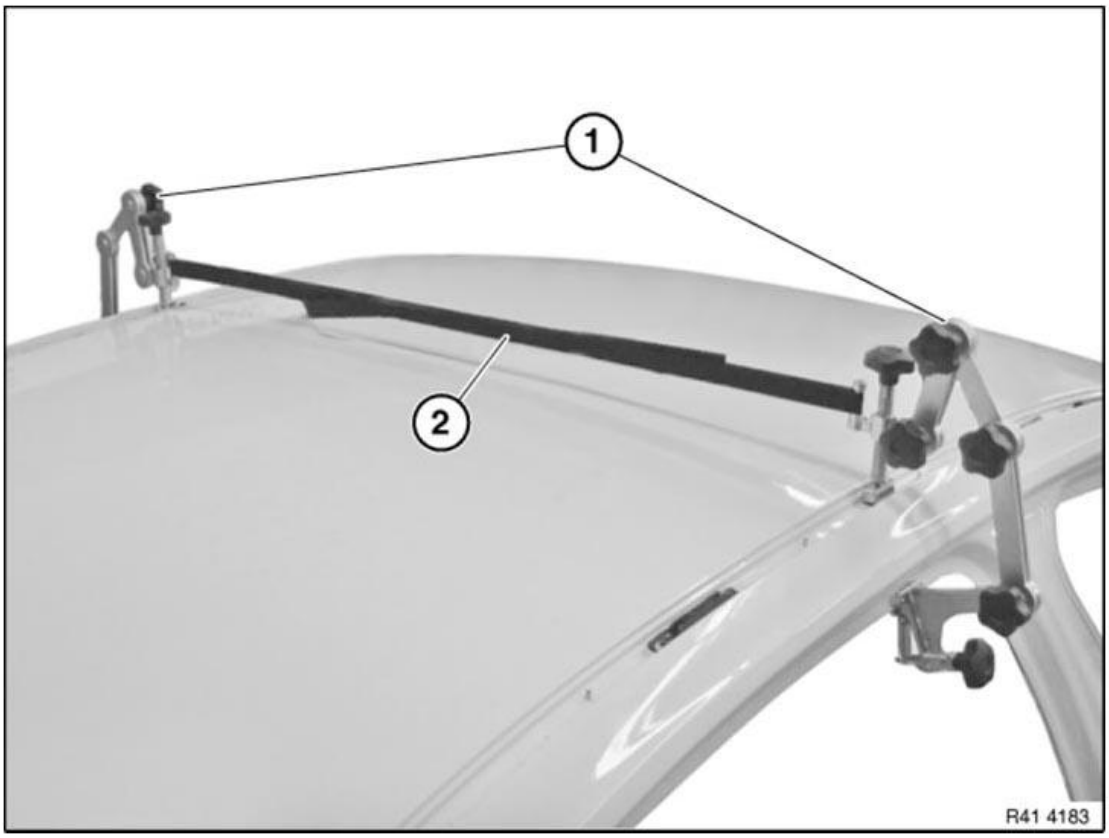


Fig. 301: Securing Roof Pliers With Tensioning Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Place roof outer skin with 3 helpers evenly and centrally on vehicle.

Fit rear window and roof trim strips to check correct position of roof outer skin.

Mount roof pliers (1) and secure with tensioning strap (2).

IMPORTANT: Position clamping tools only on stiffening impressions (1) in adhesive flange area of roof outer skin.
This ensures that correct distance and thus the correct amount of adhesive between the roof outer skin and the roof frame.

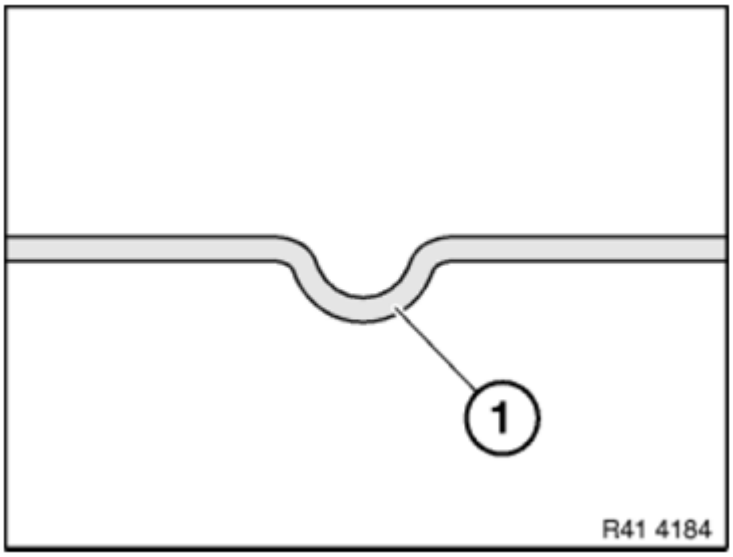


Fig. 302: Identifying Roof Outer Skin Adhesive Flange Area
Courtesy of BMW OF NORTH AMERICA, INC.

Secure roof outer skin at 3 areas with roof pliers and tensioning straps.

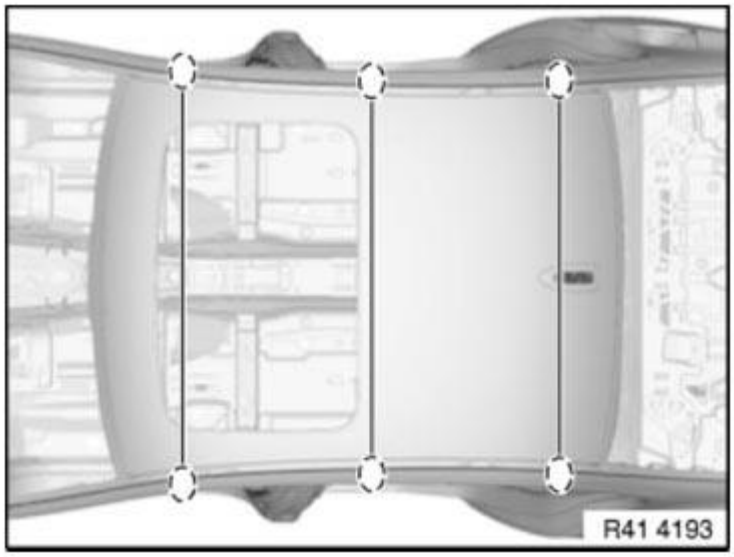


Fig. 303: Identifying Roof Outer Skin Securing Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Secure roof outer skin in windscreen area 3 times with large fixing pliers (1).

In rear window area use small fixing pliers (2) 3 times.

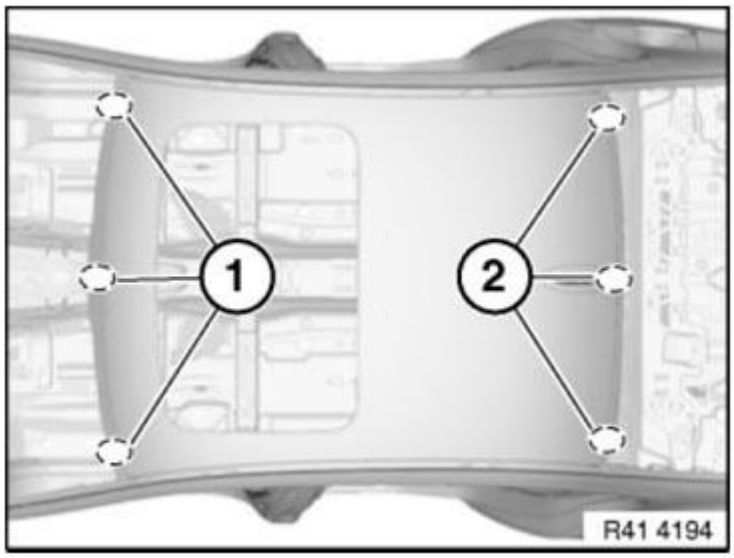


Fig. 304: Identifying Roof Outer Skin Securing Area In Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Use a suitable support (1) (approx. 50 x 50 mm) in windscreen area, as otherwise roof pillar (2) may be pressed in.
(3) Roof outer skin

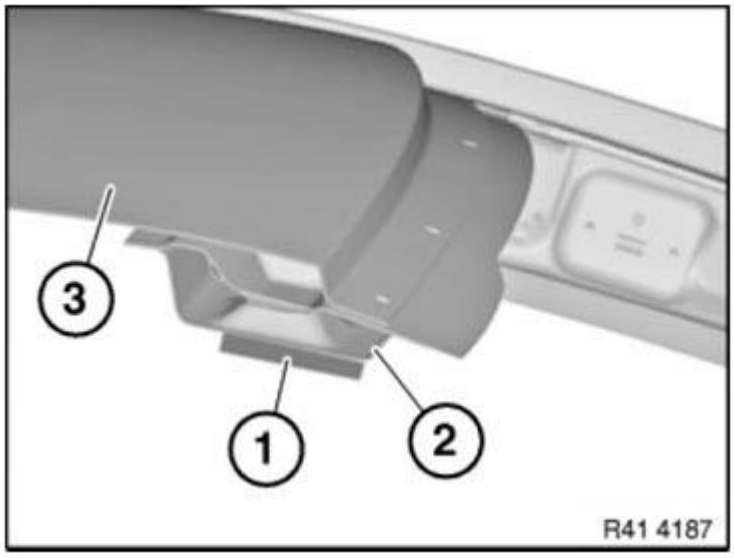


Fig. 305: Identifying Support, Roof Pillar And Roof Outer Skin
Courtesy of BMW OF NORTH AMERICA, INC.

3. Applying adhesive to nodes on A- and C-pillars. Removing excess adhesive

Adjust stage (1) between roof outer skin (2) and A-pillar or roof outer skin (2) and C-pillar with emerged adhesive. Remove excess adhesive.

IMPORTANT: Never use cleaning agents!

Do not leave any traces of sharp edges as this could compromise the tightness of the subsequent bond.

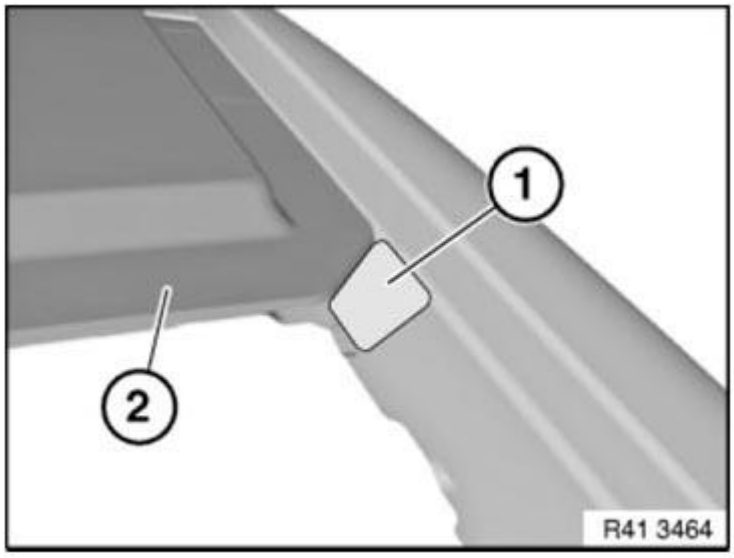


Fig. 306: Identifying Stage And Roof Outer Skin
Courtesy of BMW OF NORTH AMERICA, INC.

Spread excess adhesive in roof trim strip channel. Mounting surfaces of clips for roof trim strips must not be moistened with adhesive.

Clamping tools must remain on the vehicle for at least 1 hour. Do not move the vehicle during this period. Only then is it permitted to proceed with subsequent installation work.

Check whether reference bead has hardened after 2 hours hardening time (15-38°C).

After bonding, the vehicle must remain parked for at least 12 hours at room temperature (15-38°C).

The vehicle is then ready for operation.

41 31 010 STRIPPING OPERATIONS - REPLACING ROOF OUTER SKIN (VERSION WITH SLIDE/TILT SUNROOF)

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove left roof trim strip (job number: 51 13 280)
- Remove right roof trim strip (job number: 51 13 280)
- Remove cowl panel cover (job number: 51 13 116)
- Remove both door post trim panels (job number: 51 43 148)
- Remove both rear roof pillar trim panels (job number: 51 43 251)
- Remove both front roof pillar trim panels (job number: 51 43 201)
- Remove headlining (job number: 51 44 011)
- Remove slide/tilt sunroof (FR number: 54 12 211)
- Remove front windscreen (job number: 51 31 000)
- Remove rear window (job number: 51 31 200)
- Remove roof aerial (job number: 65 20 035)
- Partially detach edge protector
- Remove both head restraints

41 31 000 STRIPPING OPERATIONS - REPLACING ROOF OUTER SKIN (VERSION WITHOUT SLIDE/TILT SUNROOF)

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove left roof trim strip (FR number: 51 13 280)

- Remove right roof trim strip (FR number: 51 13 280)
- Remove cowl panel cover (FR number: 51 13 116)
- Remove both covers for door posts (FR number: 51 43 148)
- Remove both covers for roof pillars, rear (FR number: 51 43 251)
- Remove both covers for roof pillars, front (FR number: 51 43 201)
- Remove headlining (job number: 51 44 001)
- Remove front windscreen (FR number: 51 31 000)
- Remove rear window (FR number: 51 31 200)
- Remove roof aerial (FR number: 65 20 035)
- Partially disengage edge protection
- Remove both head restraints

4132 DASH COWL

41 32 031 REPLACE THE A-PILLAR ON THE OUTSIDE LEFT IN THE AREA OF THE WINDSCREEN

Read contents of **BODY, GENERAL** .

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved **SPOT-WELDING APPARATUS** for repairs.

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.
Improper, unauthorized operations may result in serious dangers.
Unauthorized persons are strictly prohibited from performing any operations on this system.

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling can activate airbag and cause injury.

A damaged head airbag must be replaced.

A damaged head airbag exhibits an impaired protective function and in extreme cases loses its protective function altogether.

Necessary preliminary work

Disconnect **BATTERY NEGATIVE LEAD**

Remove **PANEL FOR ROOF PILLAR**

Following new body parts are required:

- (1) A-pillar, outer

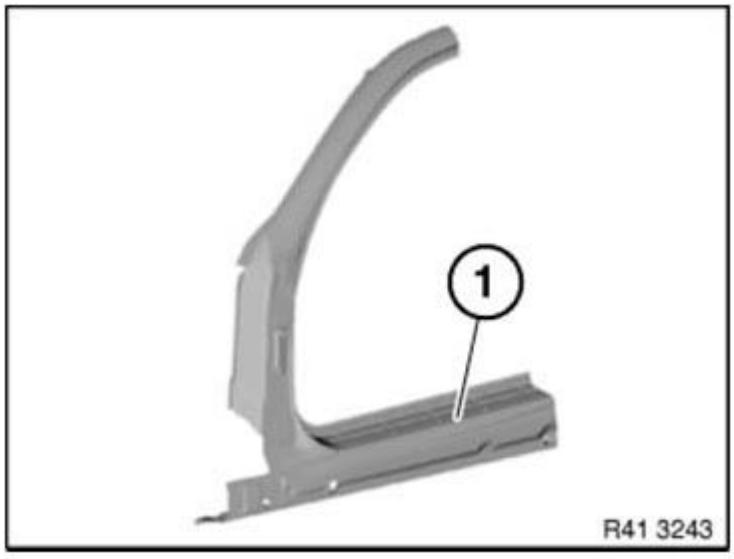


Fig. 307: Identifying A-Pillar, Outer
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip wiring harness in area (1).

Release screws (2) for airbag.

IMPORTANT: Risk of damage!
Airbag (3) must not be kinked or bent!

Installation note:

Tightening torque **72 12 02AZ** .

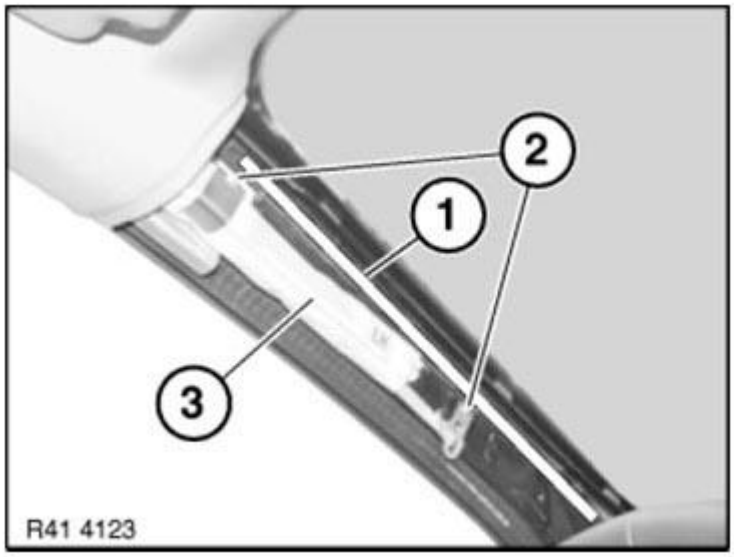


Fig. 308: Identifying Wiring Harness Area, Screws And Airbag
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Use protective sleeve (1) to protect the airbag. Check protective sleeve for damage prior to use. A damaged protective sleeve must not be used!

(2) Velcro fastener

(3) Loop

- Order number, protective sleeve: 81 47 2 159 578

  Sourcing reference:

  BMW Workshop Equipment Catalogue.

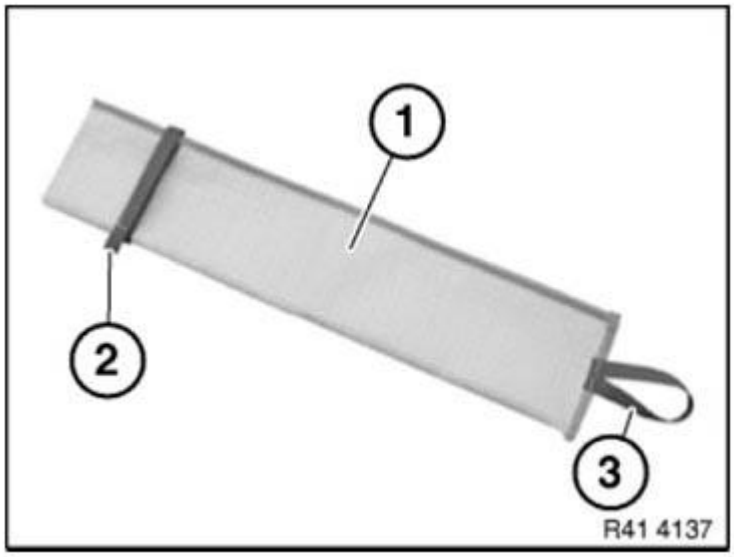


Fig. 309: Identifying Protective Sleeve, Velcro Fastener And Loop
Courtesy of BMW OF NORTH AMERICA, INC.

Slide protective sleeve (1) onto airbag under roofliner so that airbag is completely covered.

Fasten protective sleeve with Velcro fastener (2).

Secure protective sleeve with airbag against kinking.

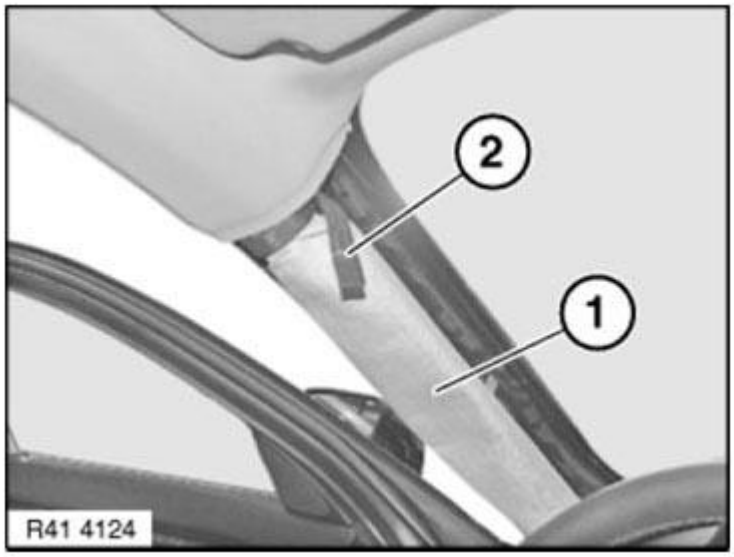


Fig. 310: Identifying Protective Sleeve And Velcro Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

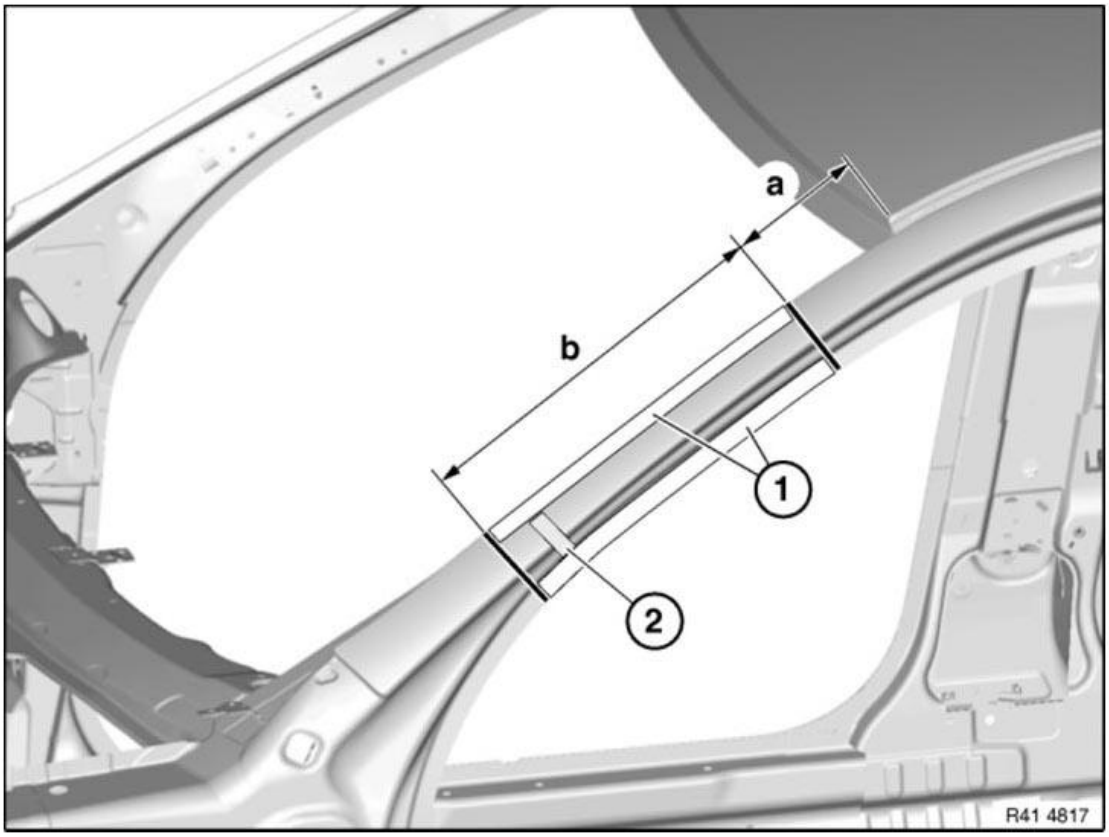


Fig. 311: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cuts in accordance with specified dimensions and cut.

IMPORTANT: Cut outer panel only for following severance cuts.
Measurement a = approx. 150 mm from roof edge.
Measurement b = approx. 380 mm below severance cut a.
Open welded connections in areas (1).

Installation note:

Weld in **REINFORCEMENT PLATE** at all severance cuts.

Apply window glass adhesive to **CAVITY ACOUSTIC BAFFLE** (2).

After completing welding work:

Check airbag in area of protective sleeve for damage, replace if necessary. See **7212060 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT HEAD AIRBAG** or **7212061 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HEAD AIRBAG (VERSION WITH SLIDE/TILT SUNROOF)** .

41 21 510 REPLACING FRONT LEFT DOOR POST (FRONT SIDE PANEL REMOVED)

Procedure **OBSERVE** repair stage 3!

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **procedure** See **4100... SPOT-WELD BONDING STEEL PARTS**.

Place vehicle on straightening bench.

Following new body parts are required:

- (1) A-pillar, outer
- (2) Connection, side frame
- (3) Shaped part, carrier support, wheel arch, front (not shown)
- (4) Shaped part, carrier support, wheel arch (not shown)

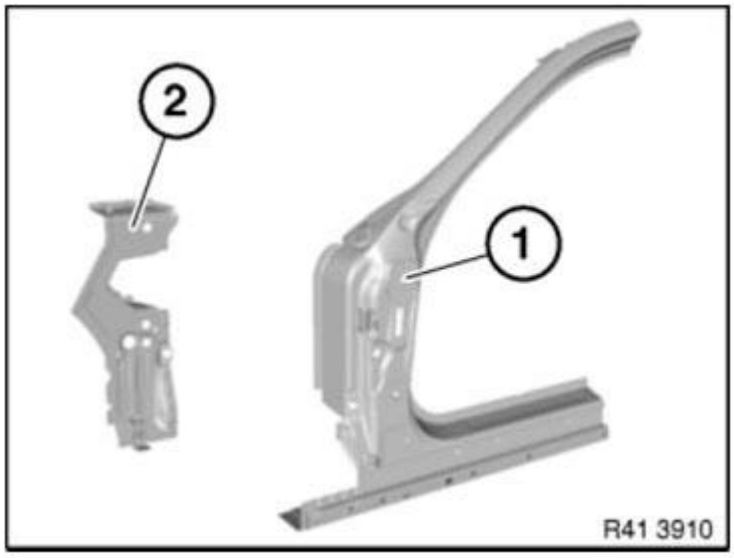


Fig. 312: Identifying Connection, Side Frame And A-Pillar, Outer
Courtesy of BMW OF NORTH AMERICA, INC.

Open spot-welded adhesive joint in area (1).

Open welded connections in areas (2).

Roughly cut side frame connection along lines (4).

Remove side frame connection (3).

Installation note:

MAG-weld new part in areas (4).

To do so, apply 10 mm long fillet welds at spacing of 15 mm.

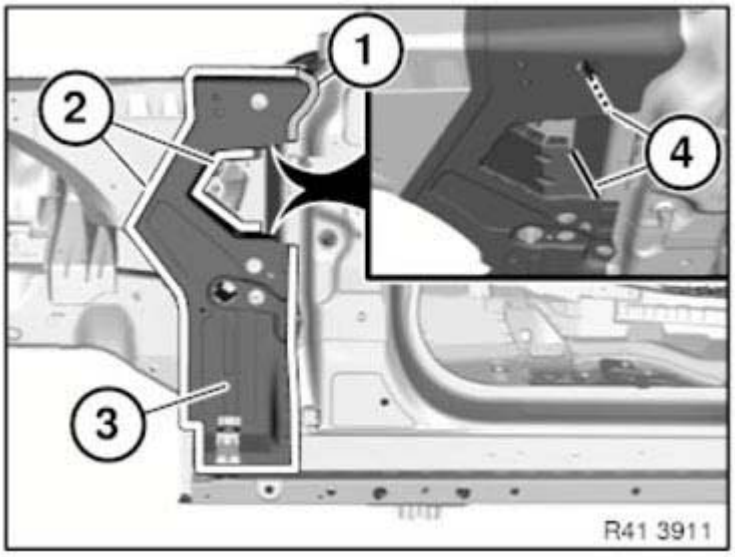


Fig. 313: Identifying Spot-Welded Adhesive Joints Area And Side Frame Connection
Courtesy of BMW OF NORTH AMERICA, INC.

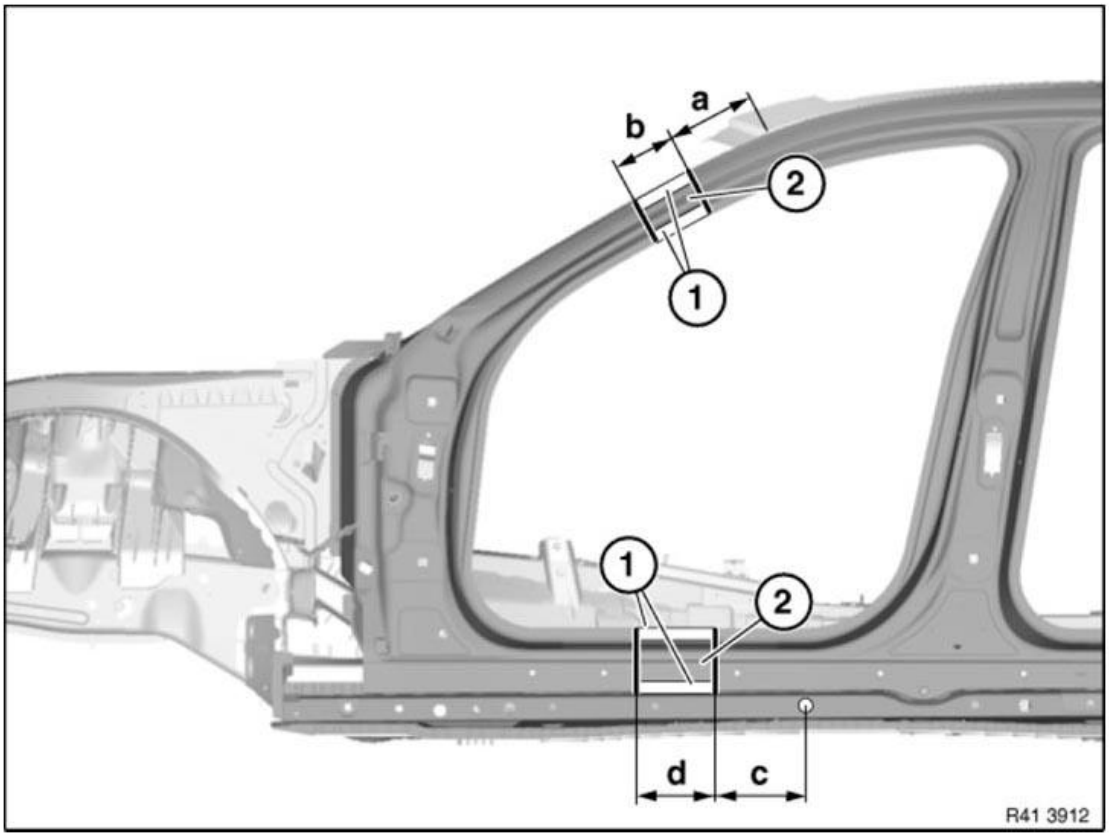


Fig. 314: Identifying Welded Connections Areas And Sheet Sections
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cuts in accordance with specified dimensions and cut.

IMPORTANT: Cut outer panel only for following severance cuts.
Dimension a = 200 mm from roof edge.
Dimension b = 100 mm below severance cut a.
Dimension c = approx. 165 mm before center of hole diameter 15 mm.
Dimension d = 140 mm before severance cut c.
Open welded connections in areas (1).
Remove sheet sections (2).

Installation note:

Cut-out metal sections (2) are required again for sealing.

Weld in **REINFORCEMENT PLATES** at all severance cuts.

IMPORTANT: For following severance cut, do not damage slide/tilt sunroof water drain hose.
Cut outer panel only.

Mark severance cut (1) in accordance with specified dimension and cut.

Dimension a = approx. 250 mm from roof edge.

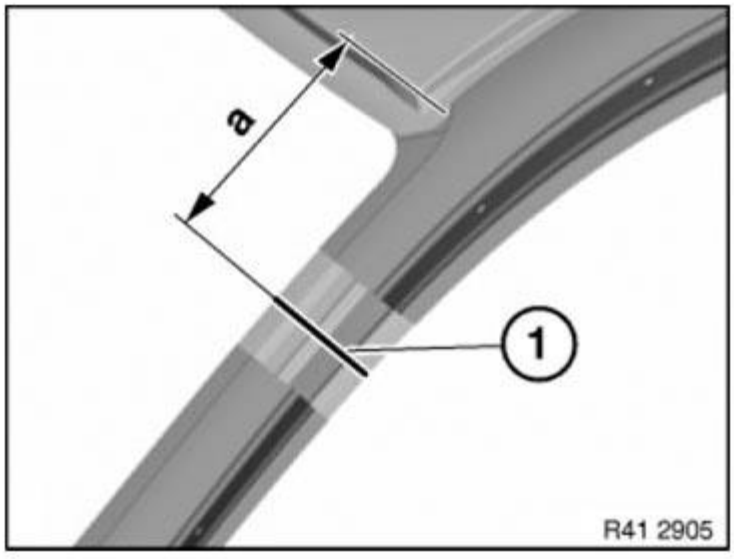


Fig. 315: Identifying Roof Edge Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with specified dimension and cut.

IMPORTANT: Cut outer panel only.

Dimension a = approx. 235 mm before center of 15 mm dia. hole.

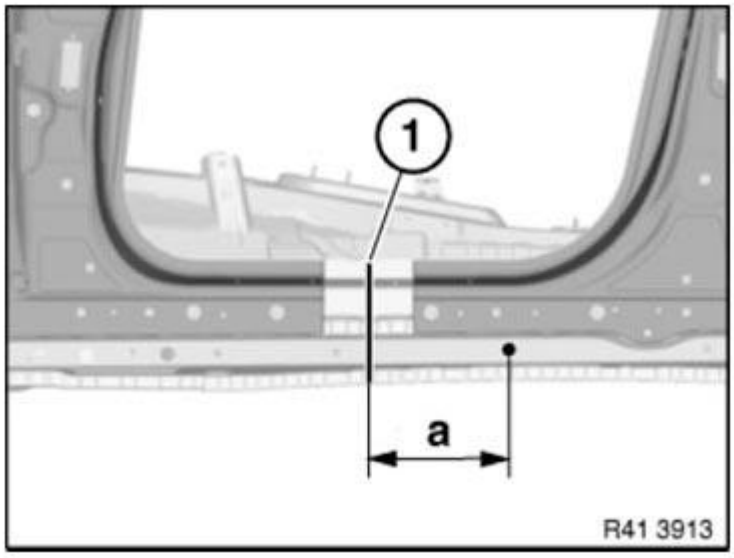


Fig. 316: Identifying Outer Panel Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

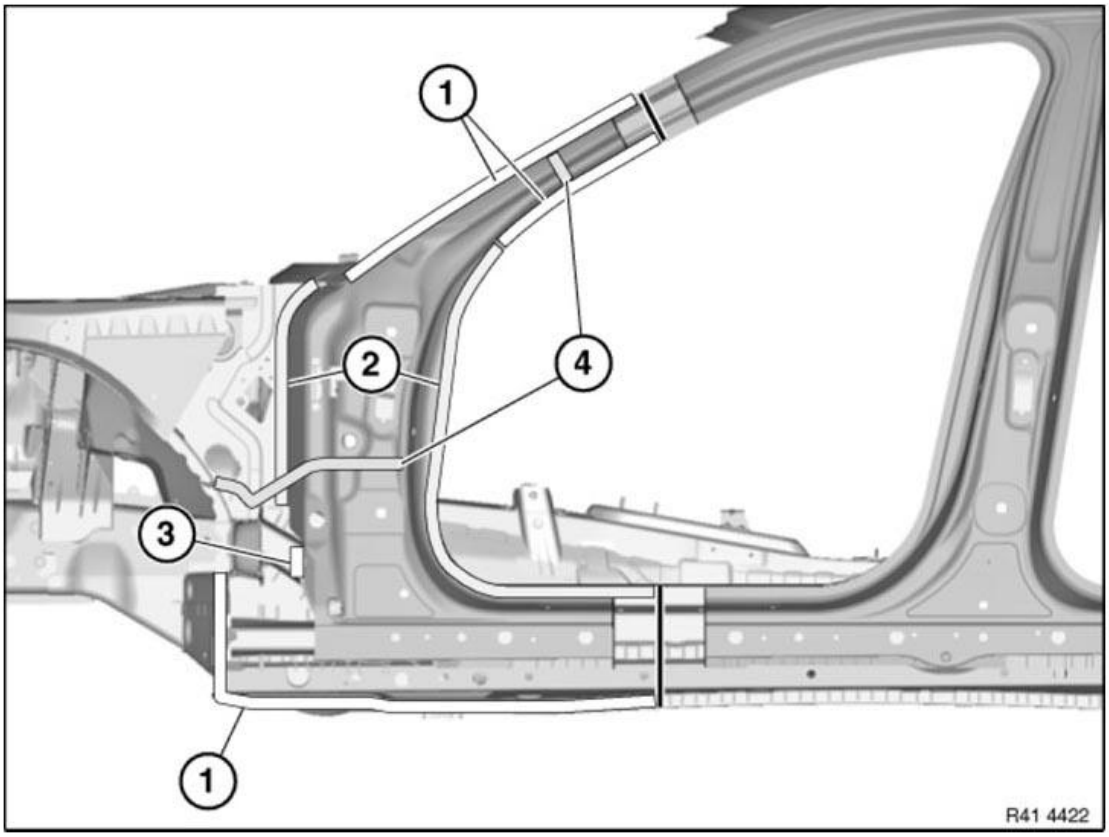


Fig. 317: Identifying Bonded Connection Area, Cavity Sealing And Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in areas (1).

Open spot-welded adhesive joints in areas (2).

Open bonded connection in area (3).

Installation note:

Replace bonded connection in area (3) with MAG weld seam.

Apply sealant to **cavity sealing** See **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (EXPANDED)** or **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (NOT EXPANDED)**(4).

View from below.

Open welded connection (1).

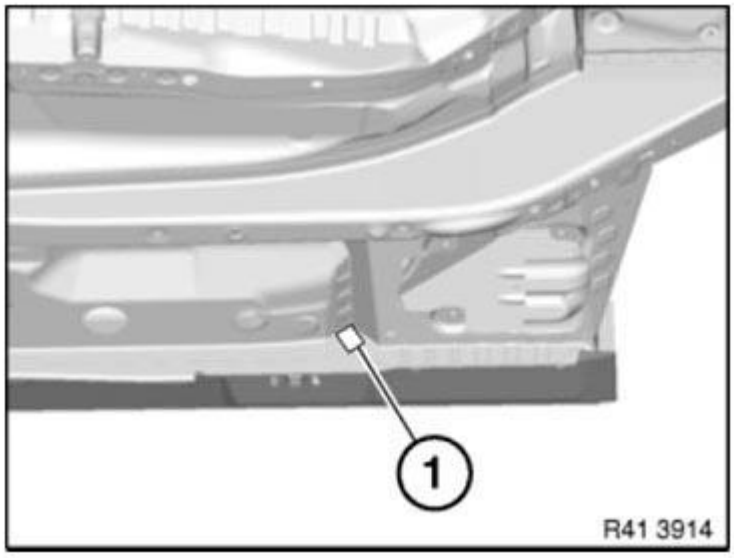


Fig. 318: Identifying Welded Connection
Courtesy of BMW OF NORTH AMERICA, INC.

View from inside.

Open spot-welded adhesive joint (1 welding spot in each case) in areas (1).

Open welded connection (2).

Feed out sliding sunroof water drain hose (3) and door post.

Installation note:

Prepare body in areas (1) for plug welding.

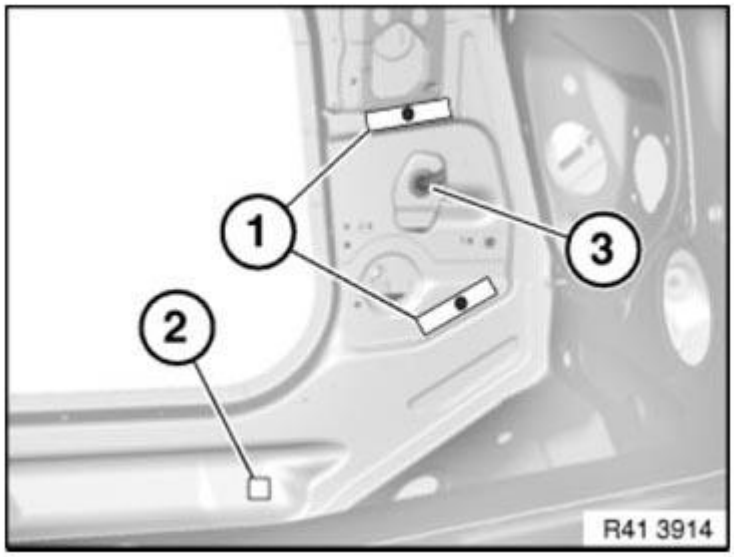


Fig. 319: Identifying Sunroof Water Drain Hose, Spot-Welded Adhesive Joint Areas And Welded Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Apply repair welding spots in area (1) to existing welding spots on new part/vehicle. This is necessary because the adhesive between the spot flanges acts as an insulator.

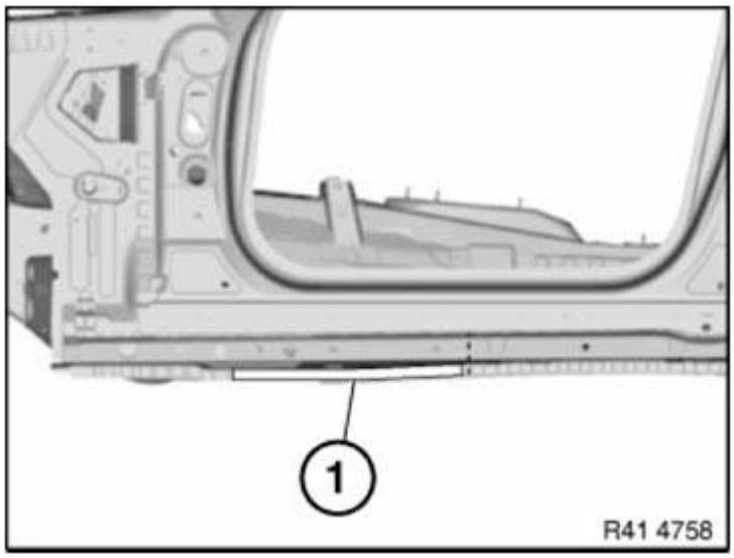


Fig. 320: Identifying Welding Spots Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Mark new part in accordance with severance cuts above and cut.

Adjust new part to fit with alignment bracket or universal mount.

Make sure water drain hose is correctly fitted.

4133 FRONT TRIM PANEL

41 33 040 REPLACING FRONT LEFT OR RIGHT SIDE WALL HOLDER

NOTE: Read CONTENTS OF BODY, GENERAL.

Side wall removed.

Transfer the systematic diagram onto the respective holder version.

NOTE: Observe REPAIR STAGE 2.

The following new body parts are required (refer to BMW Electronic Parts Catalogue):

- (1) Holder, side wall, front (variant 1)
- (2) Holder, side wall, front (variant 2)

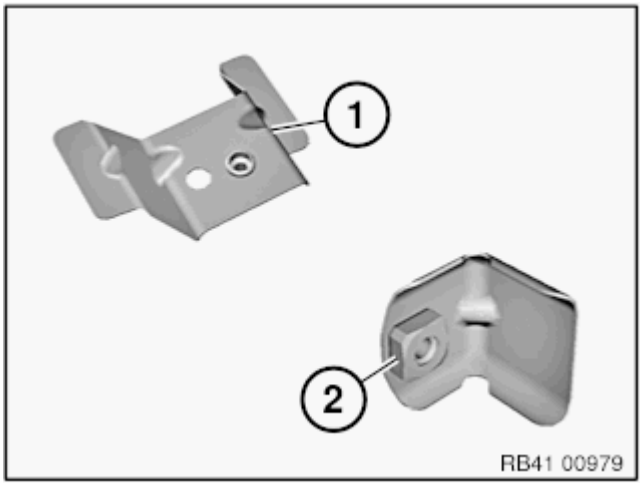


Fig. 321: Identifying Holder Variants
Courtesy of BMW OF NORTH AMERICA, INC.

The following **CONSUMABLES** are required:

Material	Quantity
Adhesive K5a	1
Blind rivets N3	2

Cleaning agent R1	1

Removal of side wall holder (variant 1):

Release welded connections in areas (1) and remove holder (2).

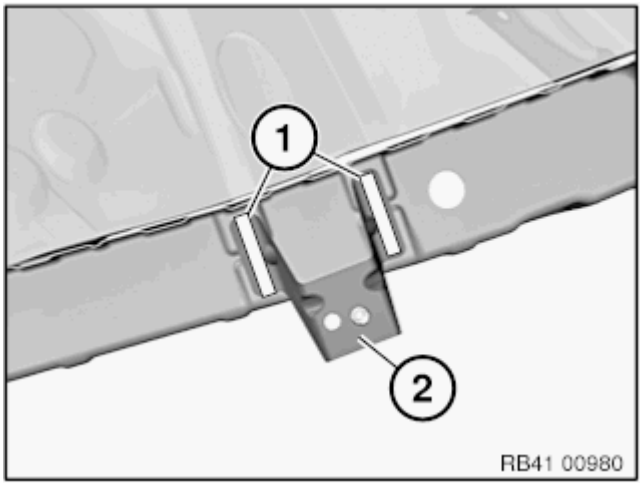


Fig. 322: Removing Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part:

Adjust new part in conjunction with side panel in front to fit.

In area of bonding surfaces (1), set 2 4.2 mm dia. bore holes (2) for blind rivetsN3.

Remove new part and deburr holes.

IMPORTANT: Do not grind bonding surfaces down or off.

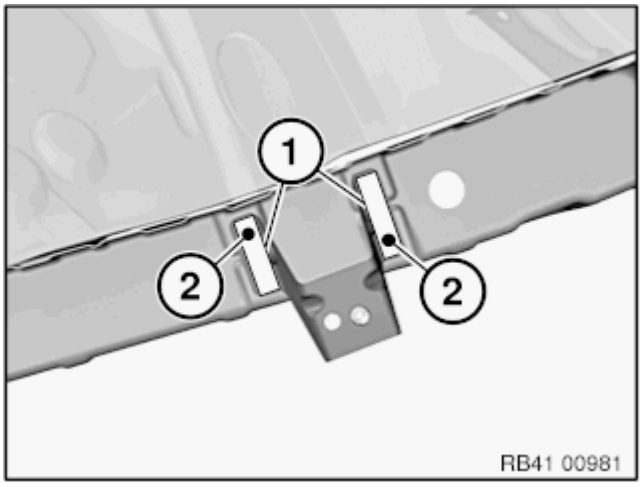


Fig. 323: Identifying Locations For Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Installation of side wall holder:

Clean all bonding surfaces with cleaning agent R1.

Apply adhesive to bonding surfaces.

Install new part and rivet with blind rivets.

Removal of side wall holder (variant 2):

Release welded connection in area (1) and remove holder (2).

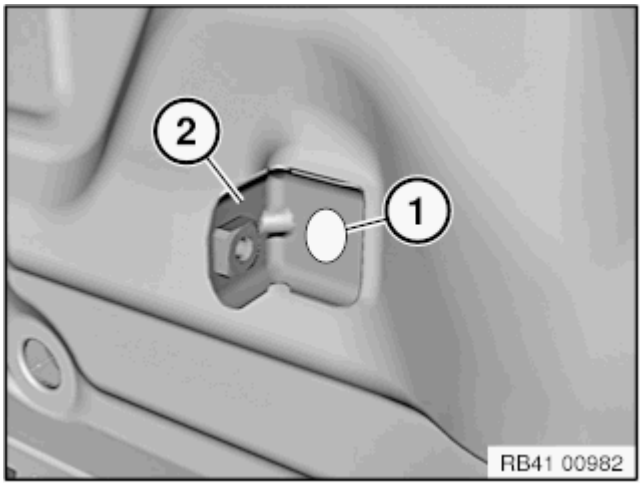


Fig. 324: Removing Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part:

Fit in new part.

In area of adhesive surface (1), drill a 4.2 mm dia. bore hole (2) for blind rivet N3.

Remove new part and deburr holes.

IMPORTANT: Do not grind bonding surfaces down or off.

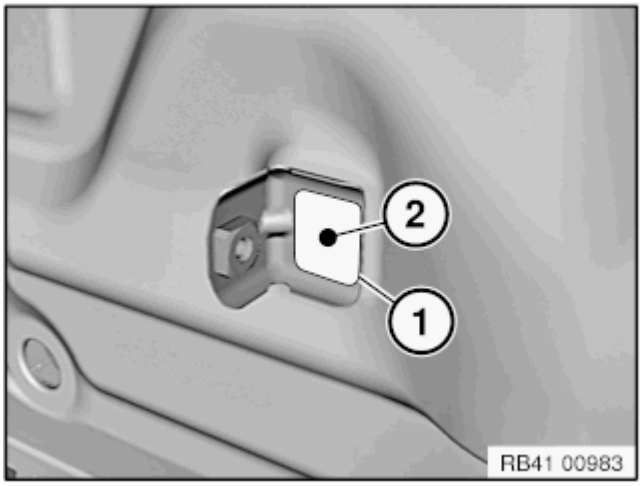


Fig. 325: Identifying Location For Bore Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Installation of side wall holder:

Clean all bonding surfaces with cleaning agent R1.

Apply adhesive to bonding surface.

Install new part and rivet with blind rivet.

4134 REAR TRIM PANEL

41 34 041 REPLACING COMPLETE TAIL PANEL

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE .

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2). Operation is partially described on the left side. Right side identical.

Following new body parts are required (refer to Electronic Parts Catalogue - EPC):

- (1) Rear panel

Following consumables are required:

MATERIAL CHART

Material	Quantity
Adhesive K5b	1
Blind rivets N3	40

Punch rivets N4	8
EMC screws	2
Cavity sealing wax remover	
CleanerR1	1
Sealant D1	

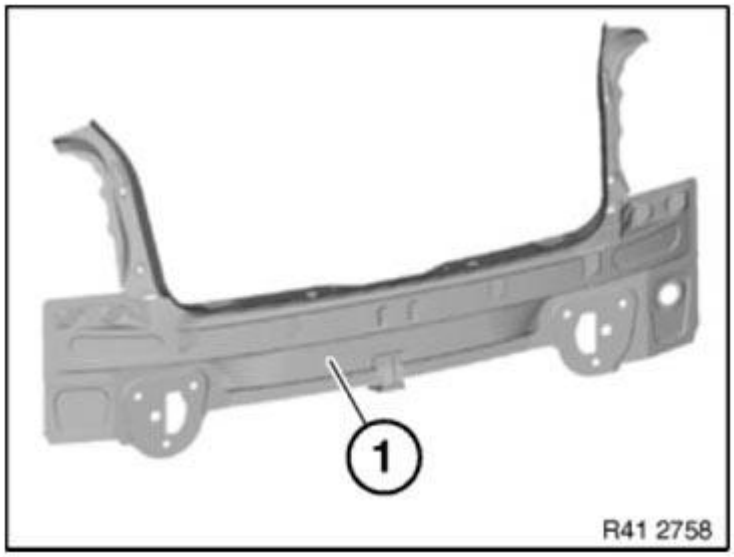


Fig. 326: Identifying Rear Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Removing rear trim panel

Release screws (1) and remove support (2).

Tightening torque **41 34 1AZ** .

Version with automatic tailgate actuation:

Shut down automatic read lid actuation. See **6135196 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR AUTOMATIC OPERATION OF TAILGATE SYSTEM** .

IMPORTANT: Risk of damage to spindle drive: only move tailgate slowly by hand. If necessary, remove spindle drive See 5124350 REMOVING AND INSTALLING/REPLACING LEFT SPINDLE DRIVE or 5124351 REMOVING AND INSTALLING/REPLACING RIGHT SPINDLE DRIVE .

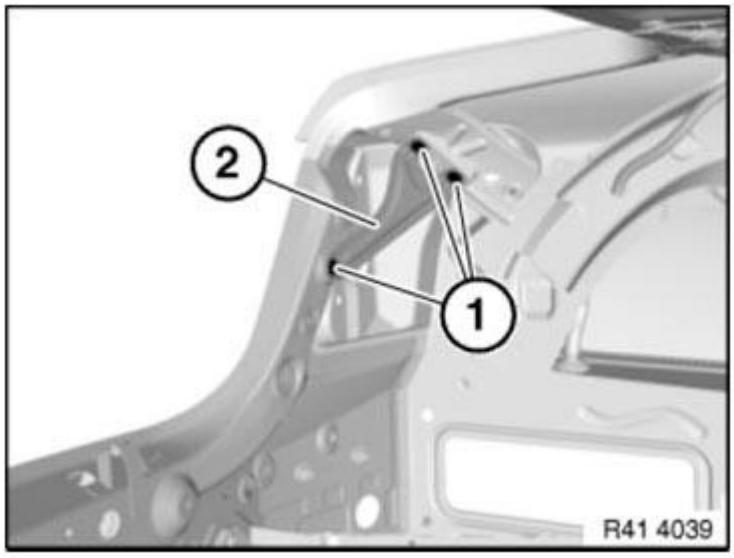


Fig. 327: Identifying Screws And Support
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in areas (1).

Open welded connections in areas (2) from inside.

Remove rear trim.

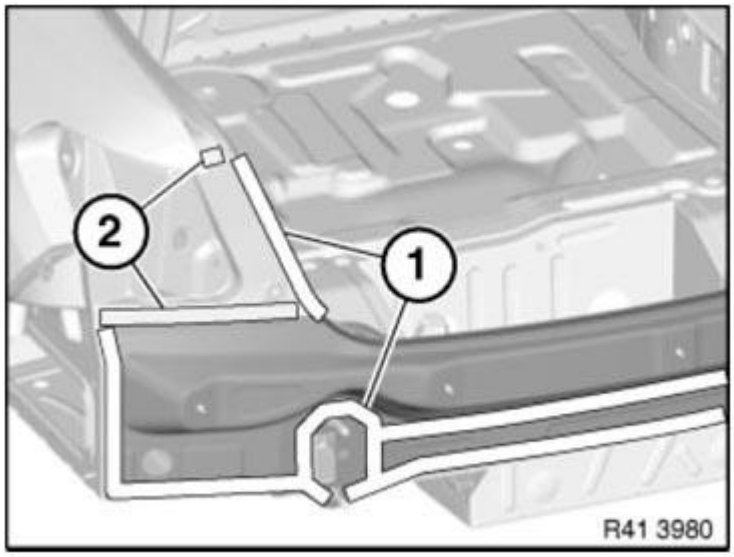


Fig. 328: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Slide in rear panel (1) from below in upward direction and adjust to fit and secure in conjunction with tailgate and rear lights.

NOTE: On vehicles with a sensor for lane change warning , also check the bumper guide for correct seating. See 5112825 REMOVING AND INSTALLING/REPLACING GUIDE FOR REAR CENTRE BUMPER and 6632020 REMOVING AND INSTALLING/REPLACING SENSOR FOR LANE CHANGE WARNING (HC2 SENSOR) ON LEFT OR RIGHT .

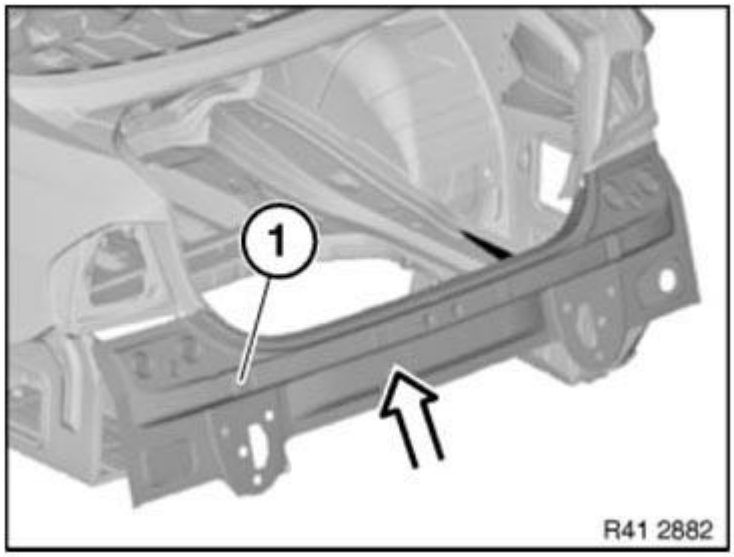


Fig. 329: Sliding Rear Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fixing screws must not be used in area (1)

In areas (2 to 5) set 4.2 mm dia. holes for blind rivets: N3

BLIND RIVETS HOLES AREA CHART

Area	Number
2	1
3	4
4	4
5	3

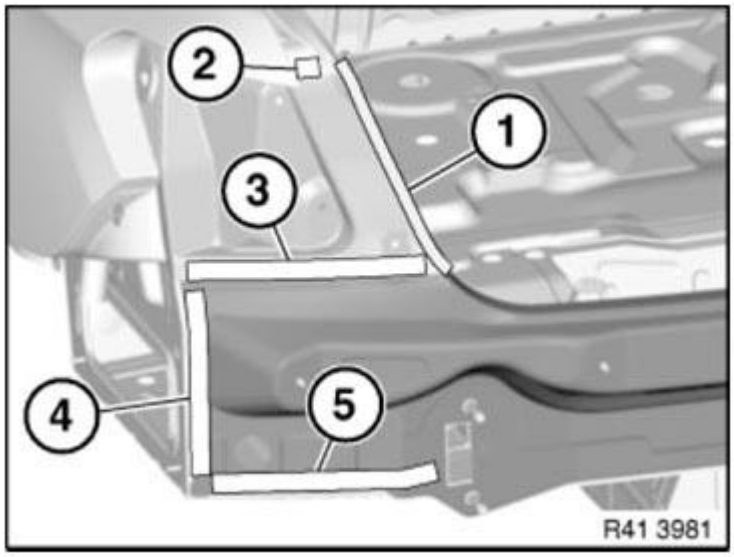


Fig. 330: Identifying Blind Rivet Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

In area (1) set 8 holes for blind rivets N3. In so doing, drill the two outer holes from the inside outwards.

Then connect the outer holes on the outside with a line. Drill the remaining holes on the line from the outside.

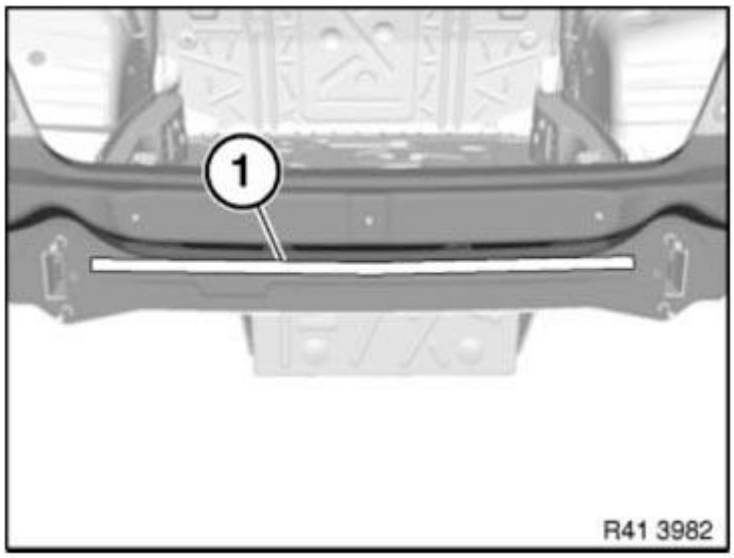


Fig. 331: Identifying Blind Rivet Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

In area (1) set seven 4.2 mm holes for N3 blind rivets.

IMPORTANT: No blind rivets may be used in areas (2)!
Dimension A = 10 cm

Remove new part again and deburr holes.

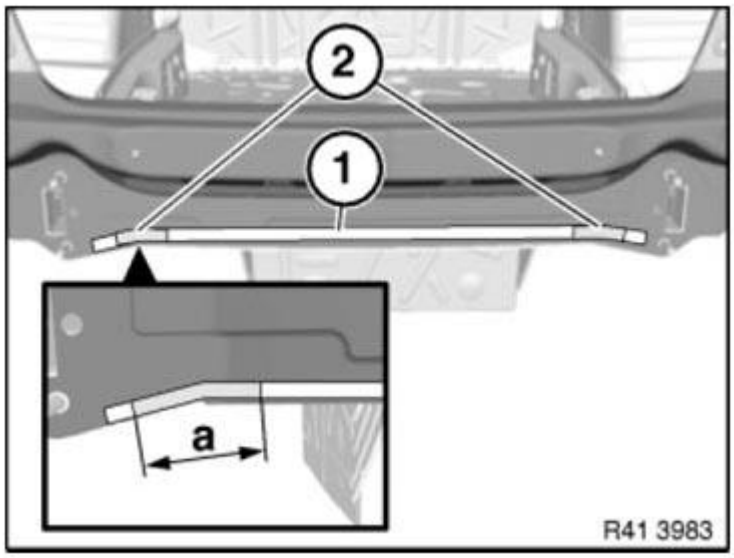


Fig. 332: Identifying Blind Rivet Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind/sand new part in area of bonding surfaces.

Installing rear trim panel

Clean **all** bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive K5b to bonding surfaces.

Make sure adhesive application is closed in area (1)! (watertightness).

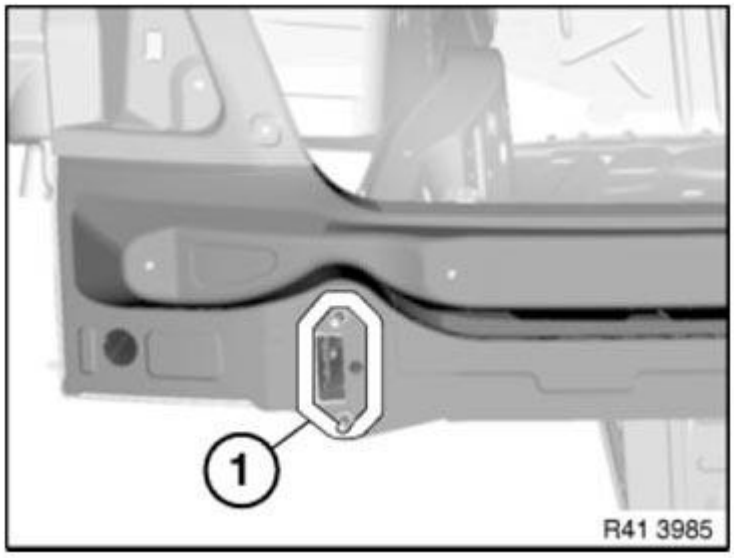


Fig. 333: Identifying Rear Panel Adhesive Application Area
Courtesy of BMW OF NORTH AMERICA, INC.

Slide in rear trim panel (1) from bottom upwards.

Rivet rear panel.

NOTE: When sliding in rear trim panel, make sure there is sufficient adhesive on bonding surfaces.

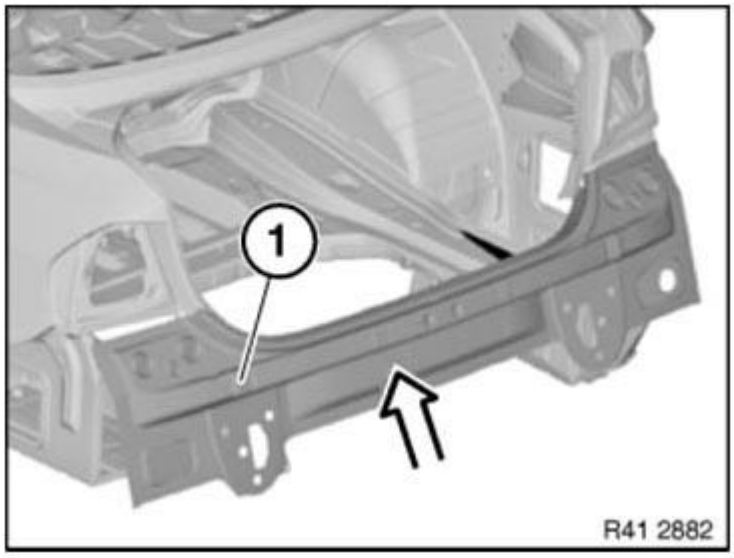


Fig. 334: Sliding Rear Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

In area (1), rivet tail panel with 4 punch rivets N4.

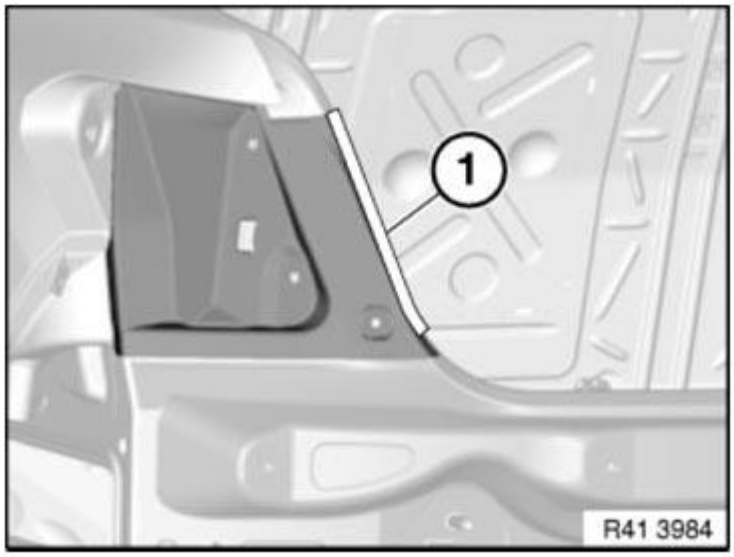


Fig. 335: Identifying Tail Panel Punch Rivets Area
Courtesy of BMW OF NORTH AMERICA, INC.

Press rear panel in area (1) and remove emerging adhesive.

Before the adhesive has hardened, install the support for the bumper trim.

IMPORTANT: Prevent emerging adhesive from coming into contact with support.

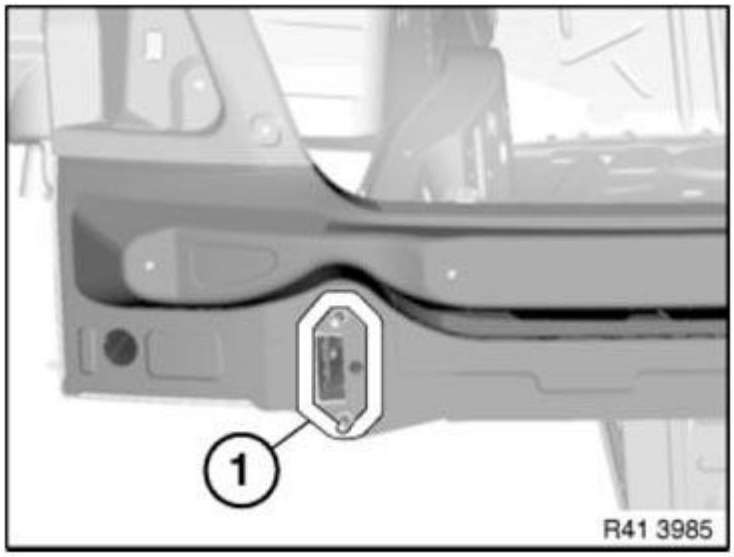


Fig. 336: Identifying Rear Panel Adhesive Application Area
Courtesy of BMW OF NORTH AMERICA, INC.

After adhesive has hardened:

In areas (2), use **2 EMC SCREWS** .

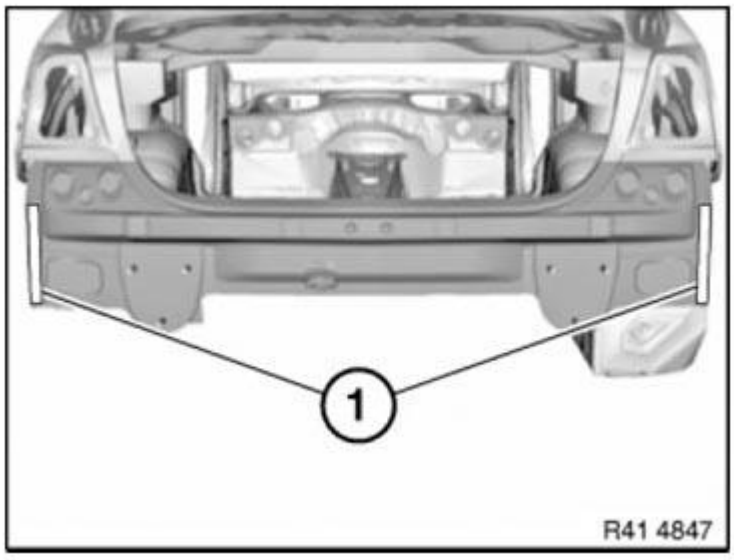


Fig. 337: Identifying Adhesive Areas
Courtesy of BMW OF NORTH AMERICA, INC.

41 12 651 REPLACING LUGGAGE COMPARTMENT FLOOR, LEFT SECTION (TAIL PANEL OR SIDE WALL REMOVED)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required (refer to Electronic Parts Catalogue - EPC):

- (1) Luggage compartment floor, left Following consumables are required:

MATERIAL CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N3	25
Cleaning agent R1	1
Sealant D1	

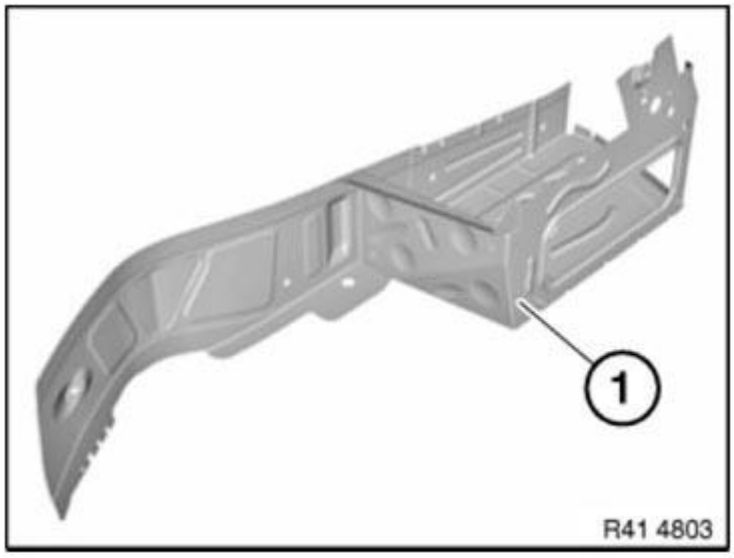


Fig. 338: Identifying Luggage Compartment Floor, Left
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of luggage compartment floor

For purposes of clarity, graphic shows most of the tail panel removed.

Open welded connections in area (1).

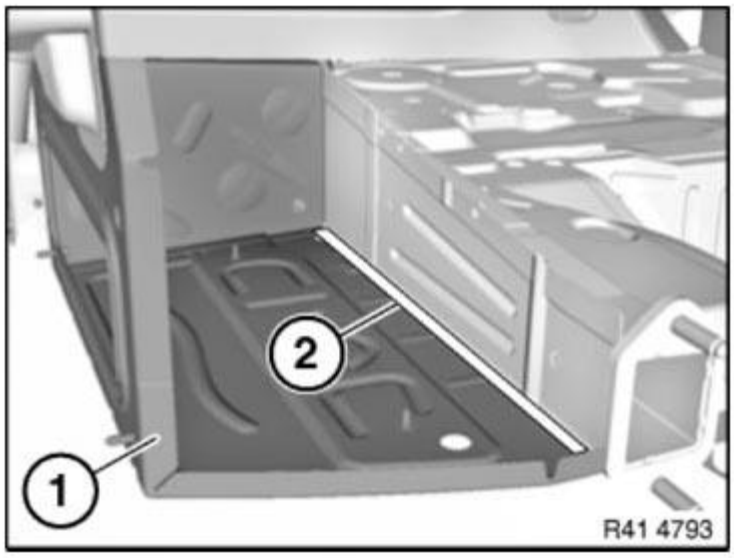


Fig. 339: Identifying Welded Connections Area And Luggage Compartment Floor
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

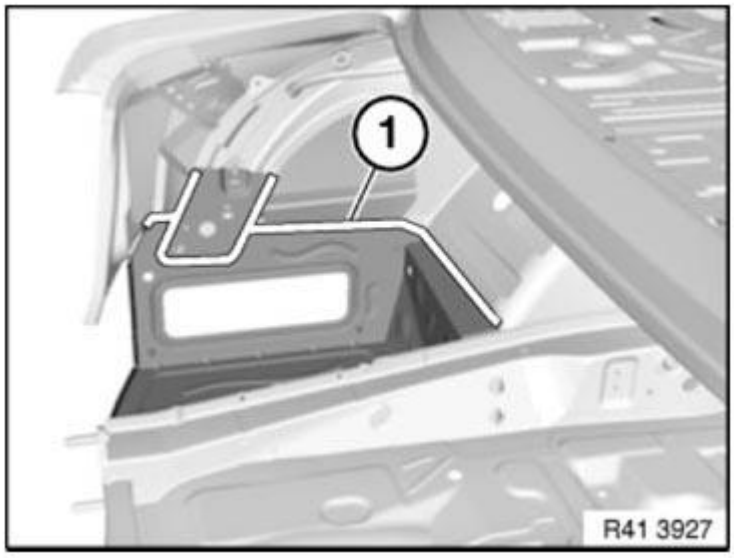


Fig. 340: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

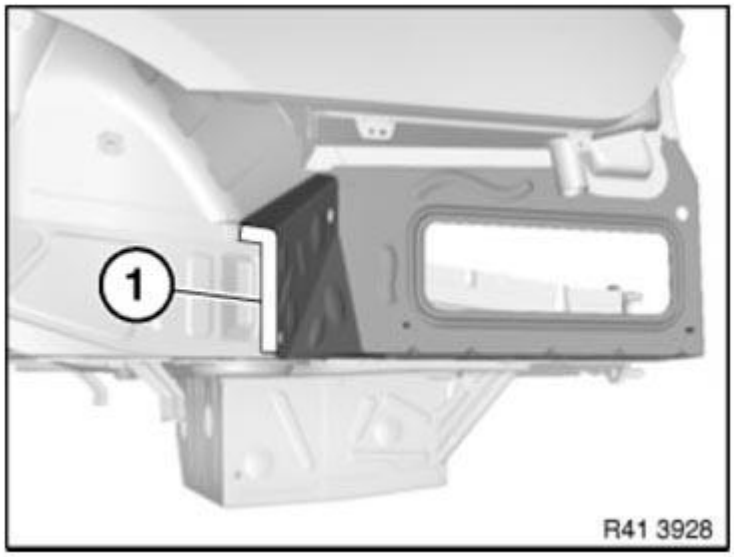


Fig. 341: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Separate welded connections in area (1) from inside.

Remove the luggage compartment floor.

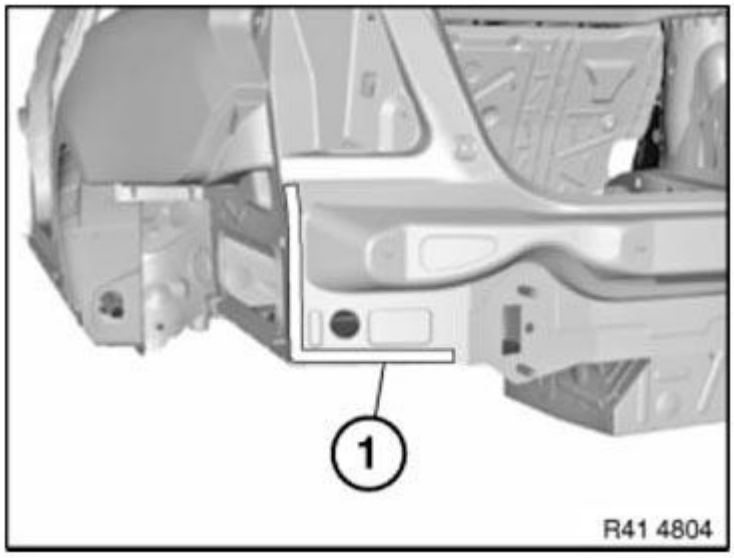


Fig. 342: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Open welded connections in area (1).

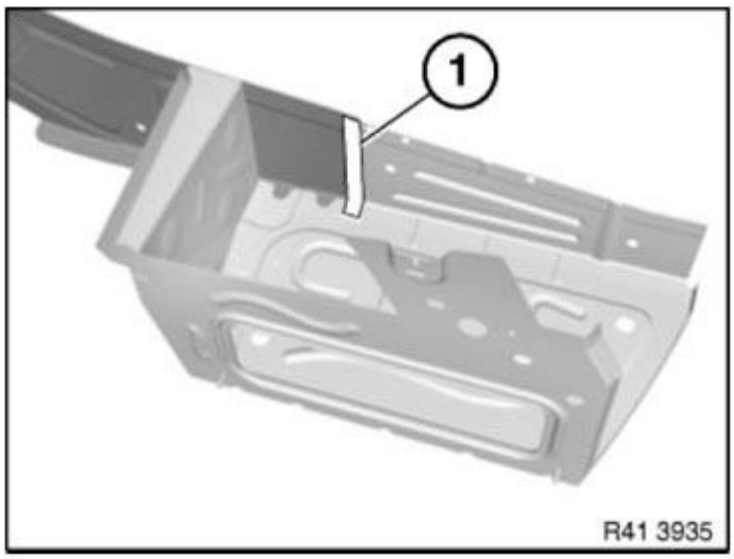


Fig. 343: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

Remove metal section (2).

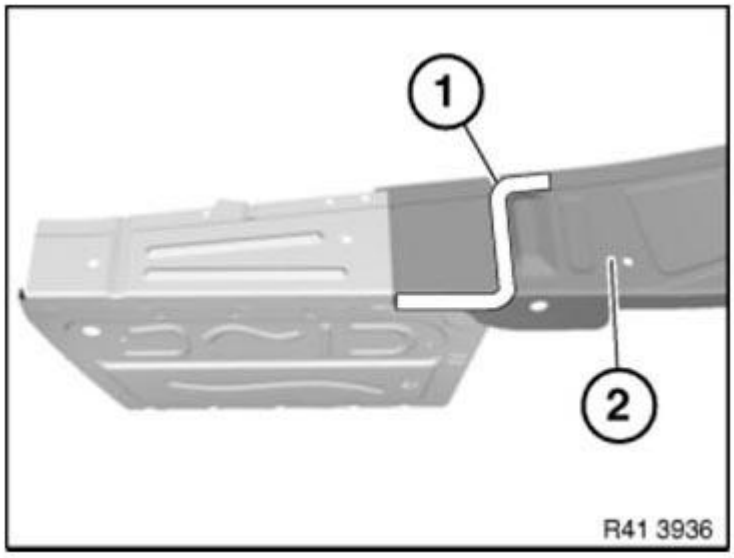


Fig. 344: Identifying Welded Connections Area And Metal Section
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust and secure the luggage compartment floor (1).

Set 5 4.2 mm dia. bore holes in area (2).

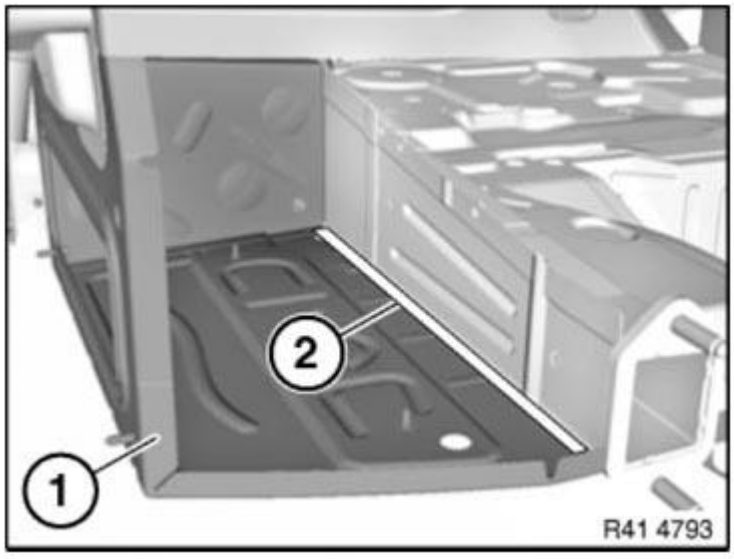


Fig. 345: Identifying Luggage Compartment Floor And Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set 3 4.2 mm dia. bore holes in area (1).

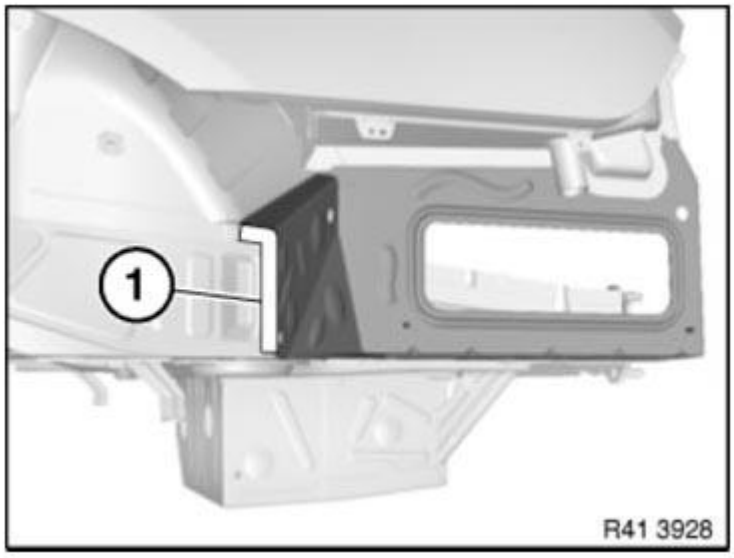


Fig. 346: Identifying Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set 11 4.2 mm dia. bore holes in area (1).

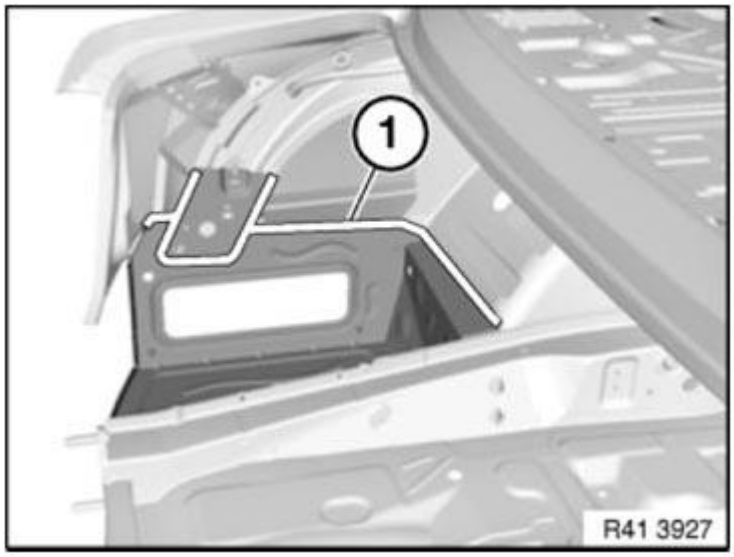


Fig. 347: Identifying Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set six 4.2 mm dia. bore holes in area (1).

Remove new parts and deburr bore holes.

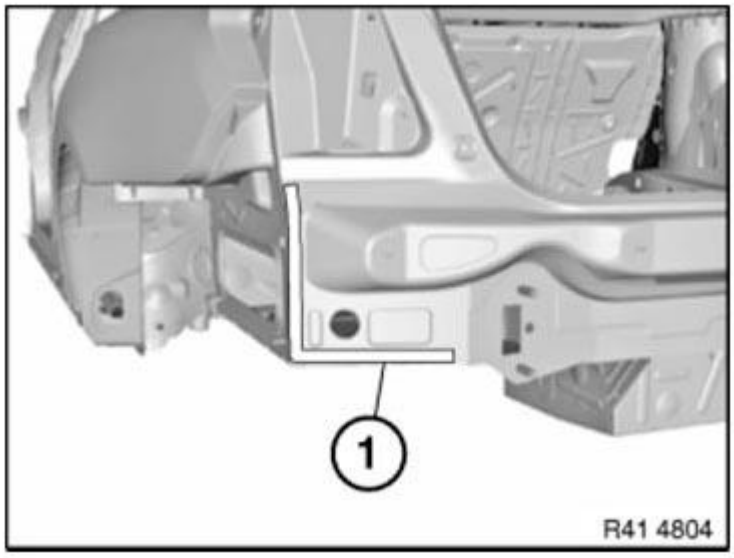


Fig. 348: Identifying Bore Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Installation of luggage compartment floor

Clean **all** bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive on all bonding and riveting surfaces.

Install new part and rivet with blind rivets.

When installing the new part, make sure that all bonding surfaces have sufficient adhesive.

41 12 548 REPLACING REAR CROSS MEMBER ON LUGGAGE COMPARTMENT FLOOR (TAIL PANEL REMOVED)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE

Observe new procedure for bonding and riveting **(REPAIR STAGE 2)** .

Following new body parts are required:

- (1) End of luggage compartment floor

Following consumables are required:

MATERIAL CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N3	12
EMC screws	2
Cleaning agent R1	1
Cavity wax remover	
Sealant D1	

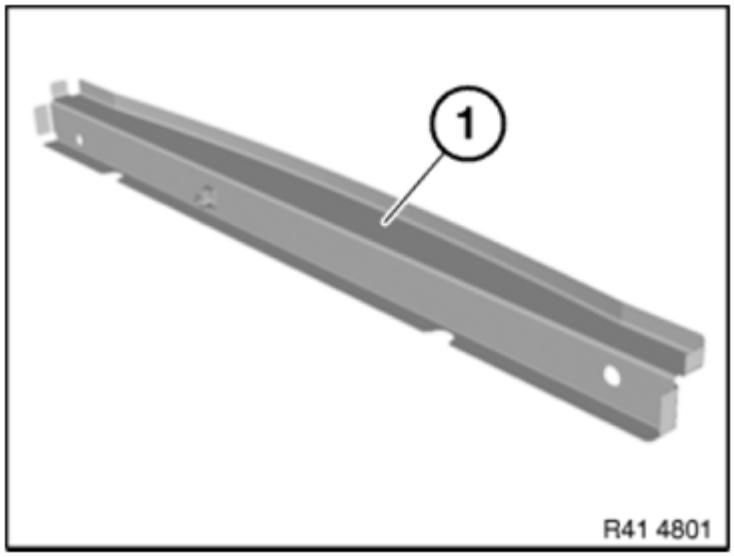


Fig. 349: Identifying End Of Luggage Compartment Floor
Courtesy of BMW OF NORTH AMERICA, INC.

Removing cross member

Open welded connections in area (1) and remove cross member (2).

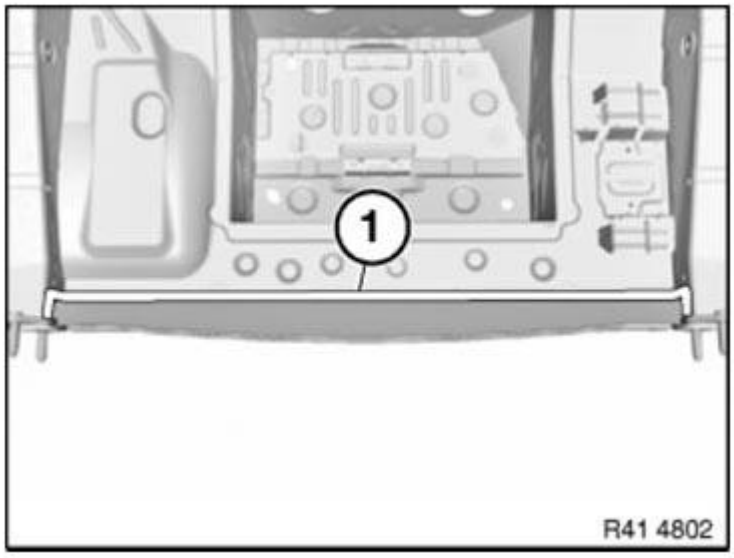


Fig. 350: Identifying Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Adjust cross-member in combination with tail panel to fit and secure.

Drill 12 dia. 4.2 mm holes for blind rivets in area (1).

Remove new part again and deburr bore holes.

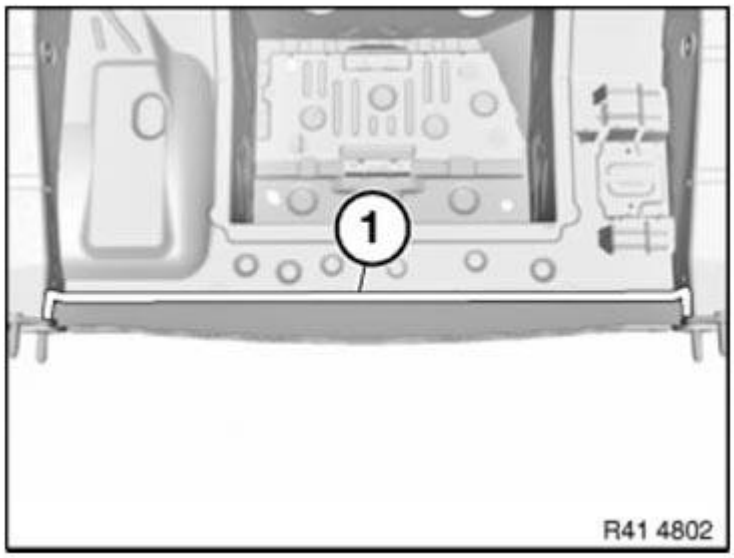


Fig. 351: Identifying Blind Rivets Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installing cross member

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Clean **all** bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive to bonding surfaces.

Install cross member and secure with blind rivets

After adhesive has hardened: In the connection area of cross member to side member, fit 2 **EMC SCREWS** .

41 35 101 STRIPPING OPERATIONS - REPLACING REAR LEFT SIDE PANEL

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Clamp off battery negative lead (job number: 6120 900)
- Remove bumper trim (job number: 5112156)
- Remove bumper support (job number: 5112050)
- Remove center bumper guide (job number: 5112825)
- Remove left bumper guide (job number: 5112828)
- Remove luggage compartment floor trim panel (FR number: 5147101)
- Remove tail panel trim at top (FR number: 5146050)
- Remove left luggage compartment wheel arch panel (FR number: 5147151)
- Partially detach rear lid seal
- Remove left rear lid (FR number: 6321180)
- Remove trim panel for left roof pillar (FR number: 5143 251)
- Remove rear lid (FR number: 41 62 000)
- Remove left lock striker (FR number: 5121003)
- Remove rear left door sill cover strip (FR number: 51 47 030)
- Remove rear left rocker panel trim (FR number: 51 47 072)
- Remove left backrest side section (FR number: 52 26 008)
- Remove trim on C-pillar at bottom left (FR number: 51 43 230)
- Remove rear left door mucket (FR number: 5172010)
- Remove rear window (FR number: 51 31 200)
- Remove rear left wheel arch cover (FR number: 51 71 041)
- Remove panel for cover on left side member (FR number: 5171447)
- Remove rear left door

- Remove trim strip on left roof frame (FR number: 5113280)
- Remove holder for gas pressure spring on left
- Partially release wiring harness

41 34 041 STRIPPING-DOWN OPERATIONS - REPLACING COMPLETE TAIL PANEL

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove bumper trim (FR flat rate number: 5112156)
- Remove bumper carrier (FR number: 5112050)
- Remove center guide (FR number: 5112825)
- Remove guide for bumper on left and right (FR number: 5112828)
- Remove luggage compartment floor trim panel (FR number: 5147101)
- Remove luggage compartment storage compartment (FR number: 5147...)
- Upper tail panel trim (FR number: 5146050)
- Remove left luggage compartment wheel arch panel (FR number: 5147151)
- Remove right luggage compartment wheel arch panel (FR number: 5147161)
- Remove striker for rear lid (FR number: 5124130)
- Remove rear lights (FR number: 6321180)
- Partially detach rear lid seal

NOTE: Operation is described on the left side. Right side identical.

Lift out clip (1) and remove drip molding trim (2).

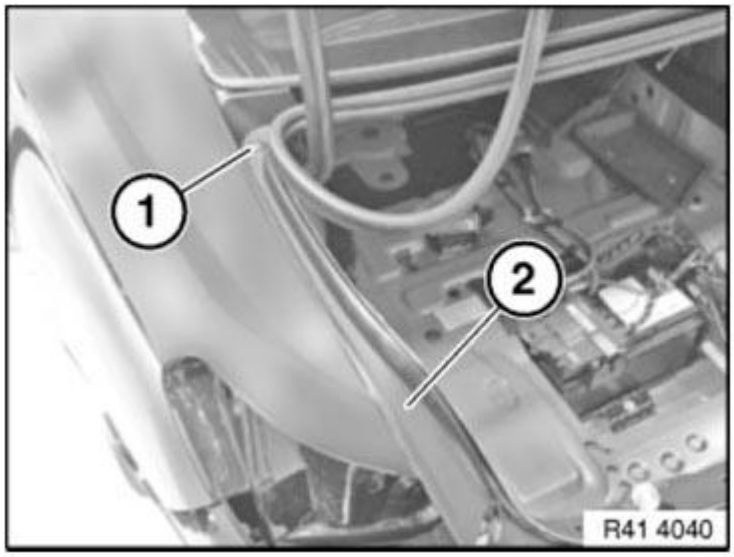


Fig. 352: Identifying Clip And Drip Molding Trim
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Operation is described on the left side. Right side identical.

Lever out expander rivets (1) and fold sound insulation (2) to one side.

Release nuts and remove ground/earth points (3).

Tightening torque **41 34 2AZ** .

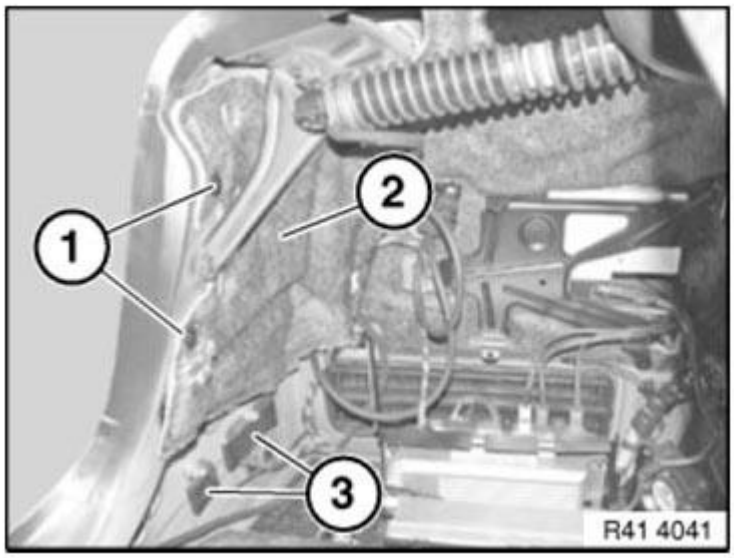


Fig. 353: Identifying Expander Rivets, Ground/Earth Points And Sound Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable duct covers (1) and lay towards front.

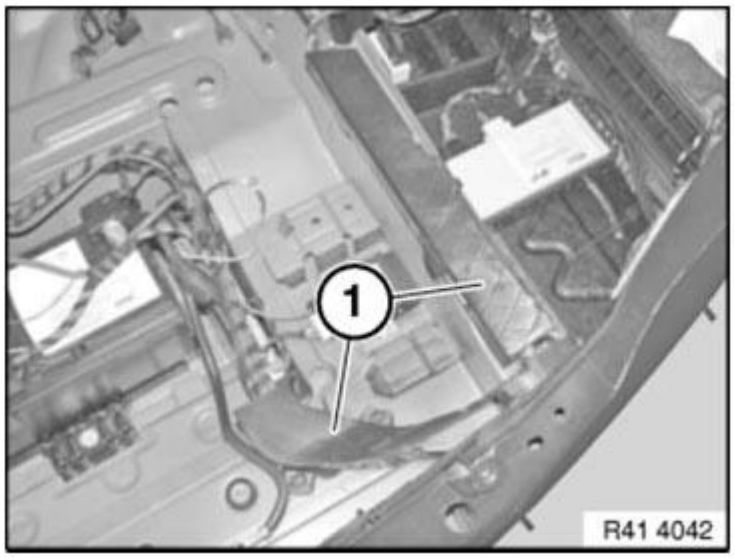


Fig. 354: Identifying Cable Duct Covers
Courtesy of BMW OF NORTH AMERICA, INC.

Release wiring harnesses (1) from rear trim panel and lay towards front.

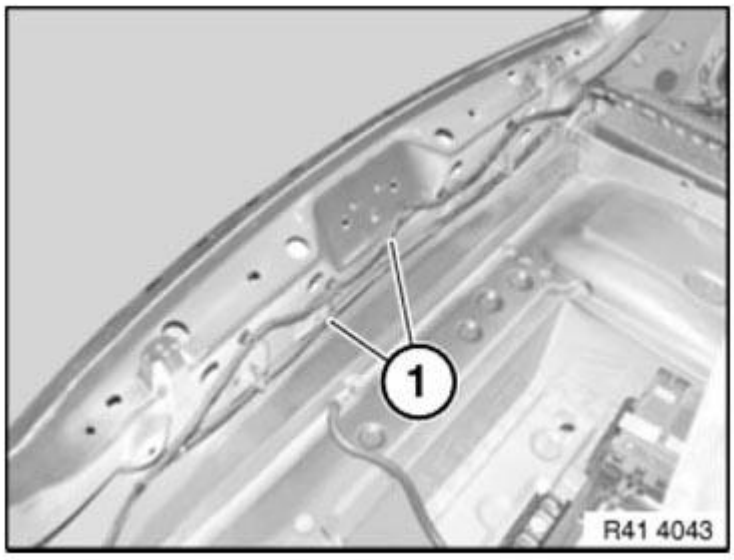


Fig. 355: Identifying Wiring Harnesses
Courtesy of BMW OF NORTH AMERICA, INC.

View from below.

Release nuts (1) and remove cover (1).

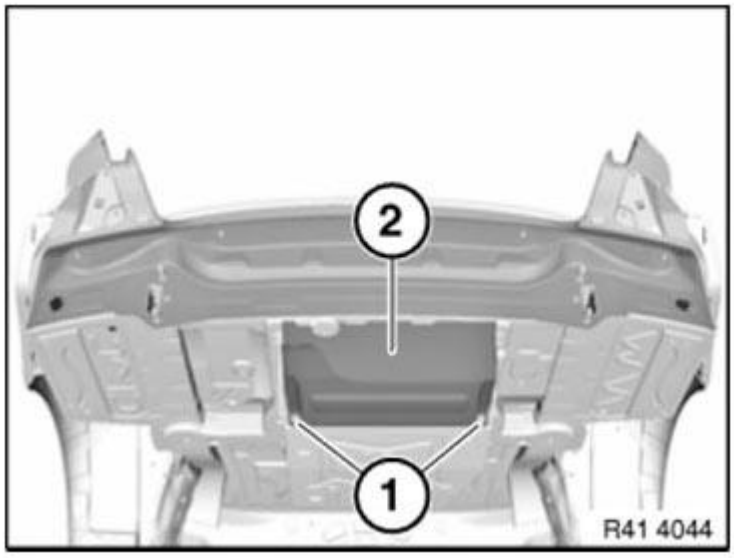


Fig. 356: Identifying Nuts And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

4135 SIDE PANELS

41 11 542 COVER FOR SIDE MEMBER AT REAR (REAR SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Use only approved **SPOT-WELDING APPARATUS** for repairs.

The following new bodywork parts are required:

- Cover, side member, rear (component is included on new side panel part)

Removal

Open weld joints in area (1).

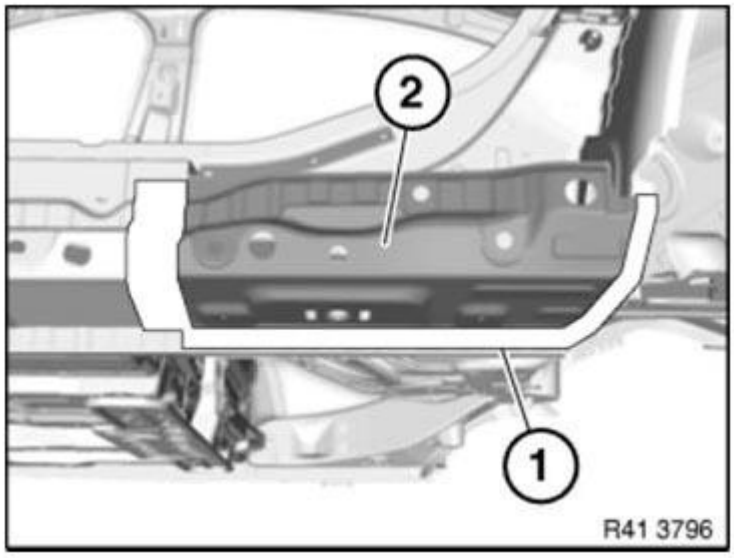


Fig. 357: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

View from below:

Open weld joint (1).

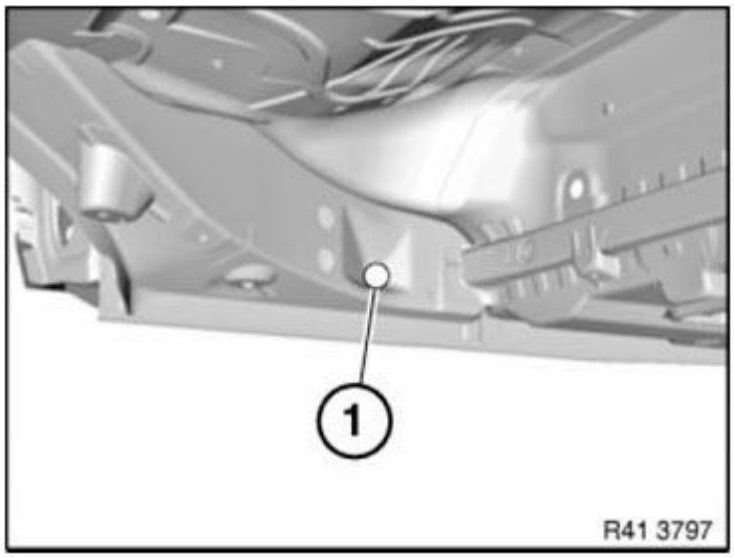


Fig. 358: Identifying Weld Joint
Courtesy of BMW OF NORTH AMERICA, INC.

View from inside:

Open weld joint (1).

Remove side member cover.

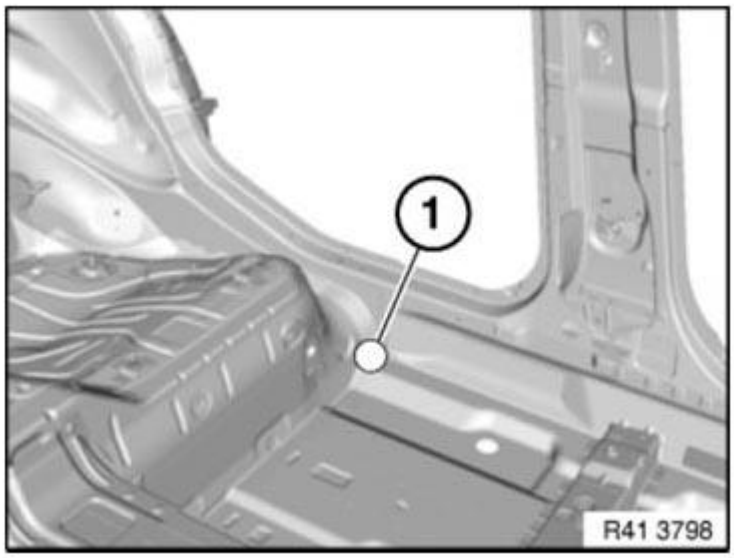


Fig. 359: Identifying Weld Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Detach side wall.

Open welded connections in area (1) and remove side member cover (2).

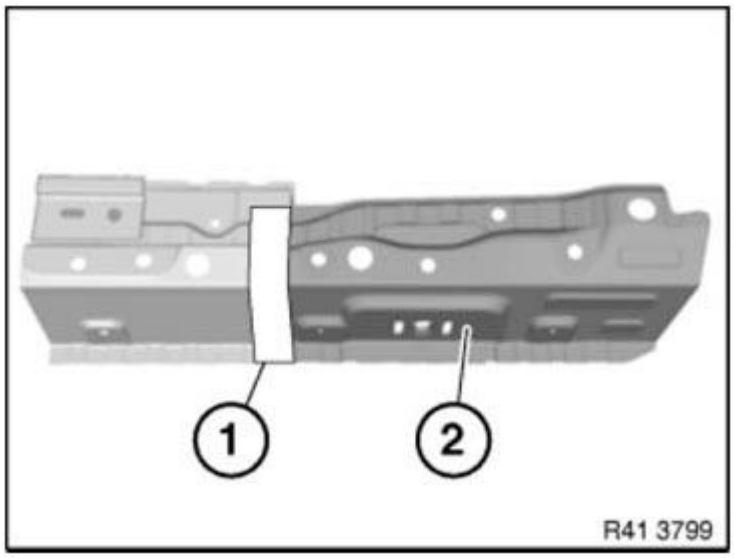


Fig. 360: Identifying Welded Connections Area And Side Member Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Install new part and weld.

NOTE: Apply repair welding spots in area of sill bottom edge to existing welding spots on new component/car. This is necessary because the adhesive between the spot flanges acts as an insulator.

41 00... REINFORCEMENT PLATE WITH STUD BOLT (BONDED)

In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A reinforcement plate is bonded in to ensure sufficient strength.

Reinforcement plates are available as new parts and must also be used (refer to Electronic Parts Catalogue).

NOTE: The following graphics serve as general illustrations of reinforcement plate repair work. They are applicable to sectional repairs in the outer skin area.

Overview of reinforcement plates:

1. Reinforcement plate, sill
2. Reinforcement plate, C-pillar
3. Reinforcement plate, universal
4. Reinforcement plate, C- or D-pillar
5. Lock nuts (not pictured)
    - Plastic nut 18 mm, part number 1 943 122
    - Clip nut 30 mm, part number 7 139 081

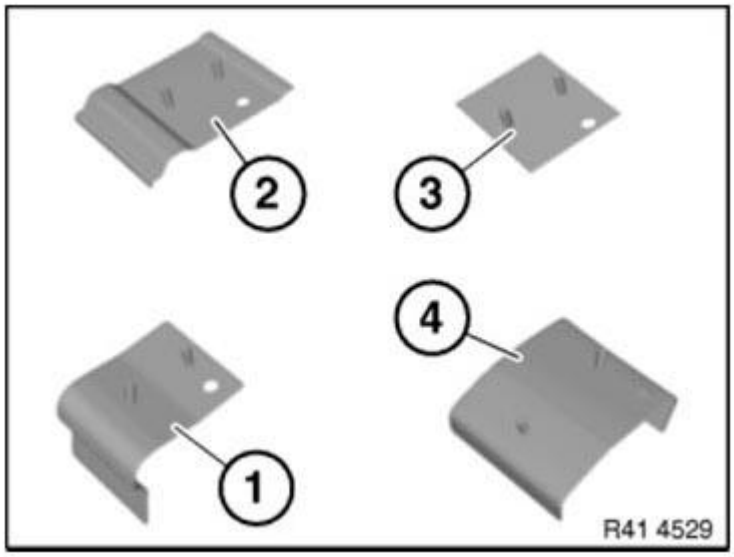


Fig. 361: Identifying Reinforcement Plate Sill, C-Pillar, Universal And C- Or D-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

Mark component in accordance with dimension a and cut.

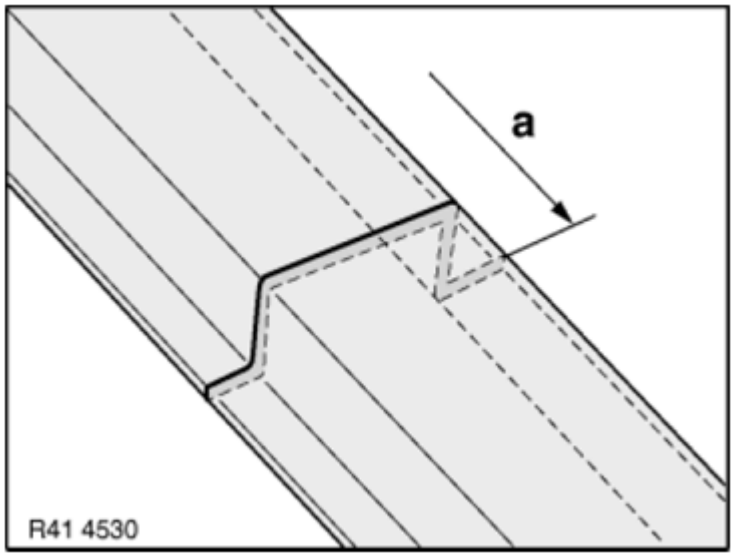


Fig. 362: Identifying Component Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

The reinforcement plates must if necessary be reworked and cut to size.

Adjust reinforcement plate (1) to fit in component (2) on vehicle.

Make recesses (3) for stud bolts (4) in a semicircular shape.

Diameter of recesses approx. 10 - 12 mm.

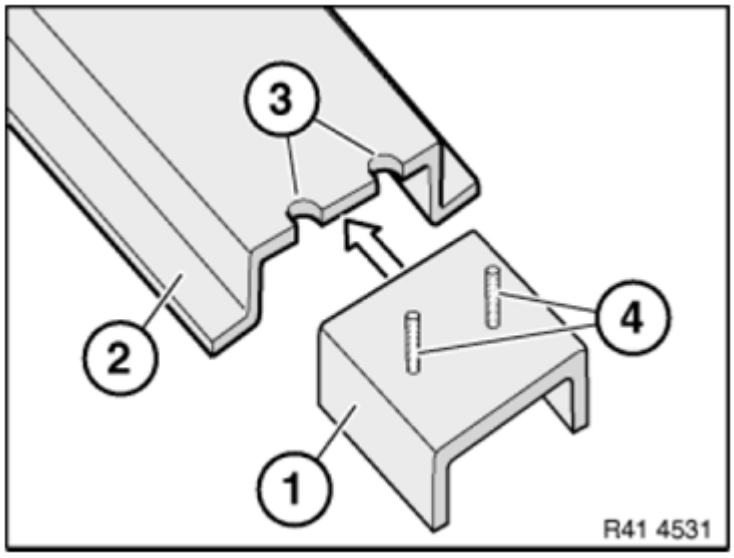


Fig. 363: Adjusting Reinforcement Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Secure reinforcement plate by screwing on lock nuts (1).

Fit new part (2). Make recesses (3) in new part in a semicircular shape.

Diameter of recesses approx. 10 - 12 mm.

Remove reinforcement plate again.

NOTE: Width of joint between new part and component on vehicle approx. 3 - 8 mm (at least 30 mm flange width per side).
Plastic nuts should be screwed on once before applying adhesive (no thread in new plastic nut)!

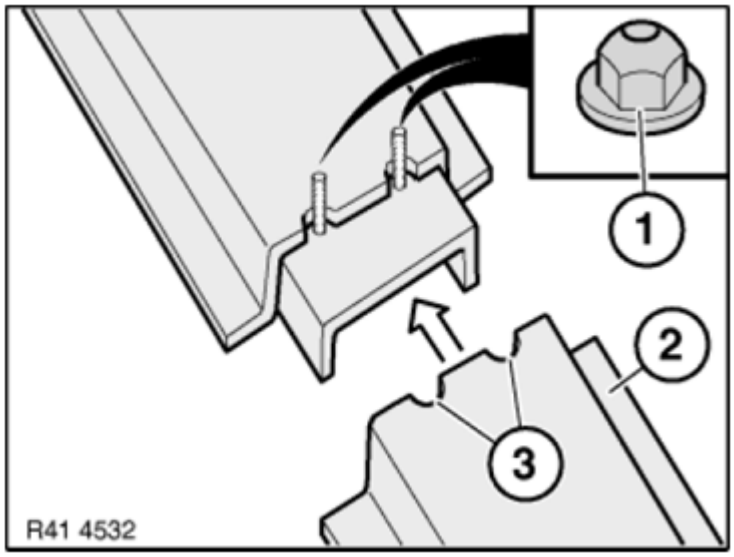


Fig. 364: Fitting New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Round off cutting edges (1) on joint by grinding.

(2) Component on vehicle

(3) New part

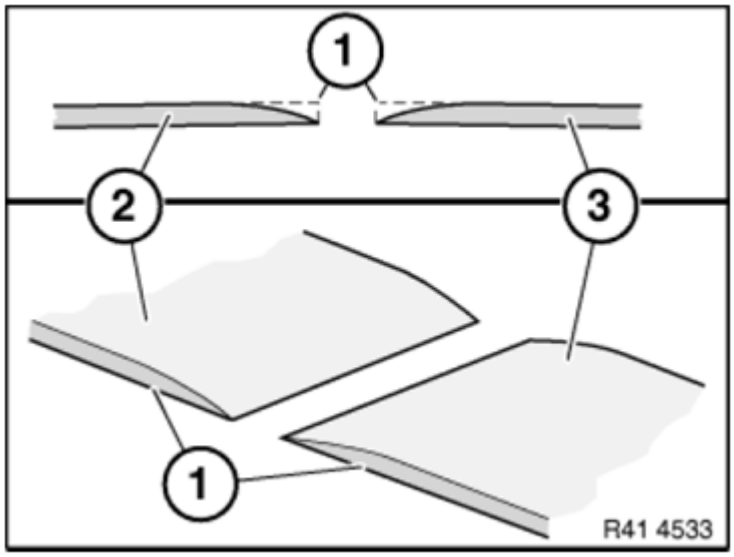


Fig. 365: Identifying Cutting Edges
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Procedure for using universal reinforcement plate

The universal reinforcement plate needs to be adapted. The plate must be divided if the distance between the pins is too great.

Dimension a is between 40 and 80 mm depending on the space available.

Secure plates with N4 punch rivets.

NOTE: Ensure the rivet is positioned correctly! Rivet head is on the adhesion side! Rivet the plate to the inside of the flange!

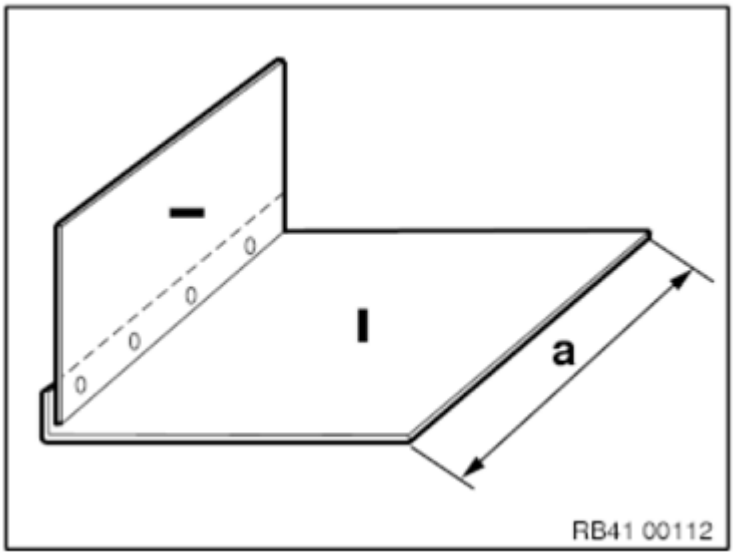


Fig. 366: Identifying Universal Reinforcement Plate Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Installing reinforcement plate

Clean **all** bonding surfaces.

Apply adhesive to reinforcement plate in area (1).

Apply more adhesive in the radii to avoid air pockets.

Carefully slide reinforcement plate into component on vehicle and secure by screwing on nuts (2).

Screw on nuts a few turns only.

IMPORTANT: When joining reinforcement plate, make sure there is sufficient adhesive on bonding surfaces.

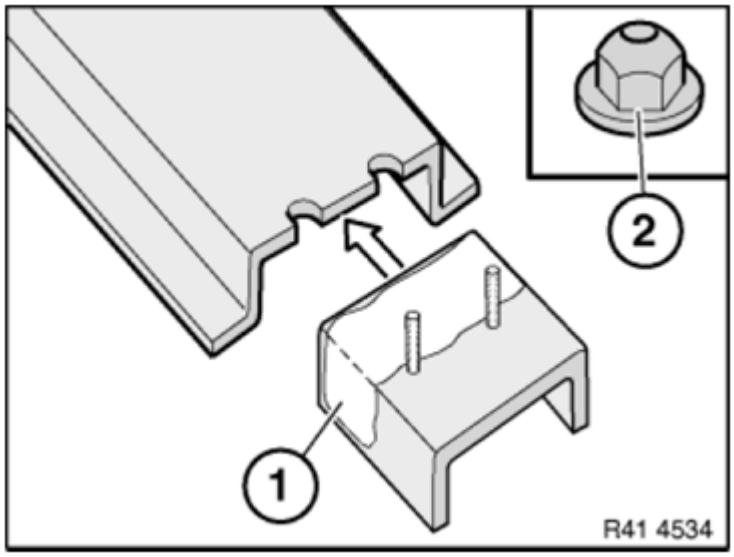


Fig. 367: Identifying Reinforcement Plate Adhesive Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Apply adhesive to reinforcement plate bonding surface (1). Apply more adhesive in the radii to avoid air pockets.

Fit new part (2).

Align new part to adjoining component and secure with gripping pliers.

Tighten nuts.

Tightening torque **41 14 1AZ** .

IMPORTANT: Check that the transition of the components is OK at the separation point. Corrections can only be made before the adhesive has hardened. Straightening at a later stage is not possible.

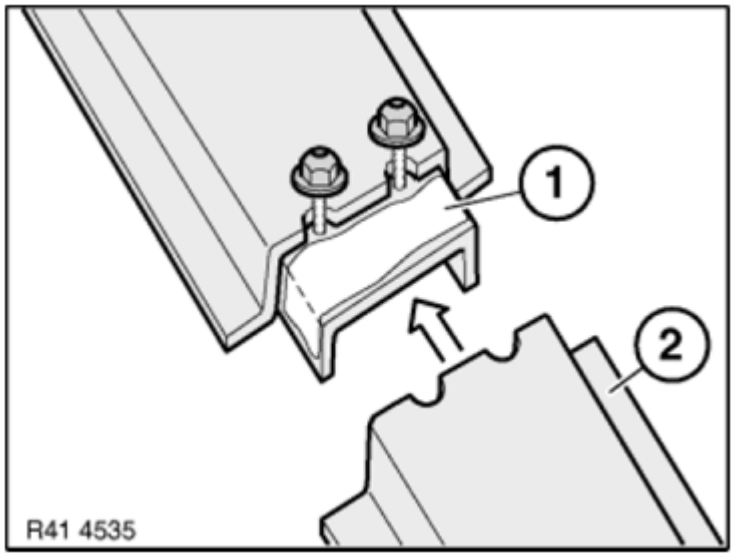


Fig. 368: Fitting New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Concluding tasks at separation point:

After adhesive has hardened:

In area visible to customer:

Cut off stud bolts with bodywork saw.

Completely remove adhesive residue in joint (1).

Round off sharp edges by grinding.

IMPORTANT: Avoid heating the separation point by excessive grinding. Reworking by pressing not permitted!

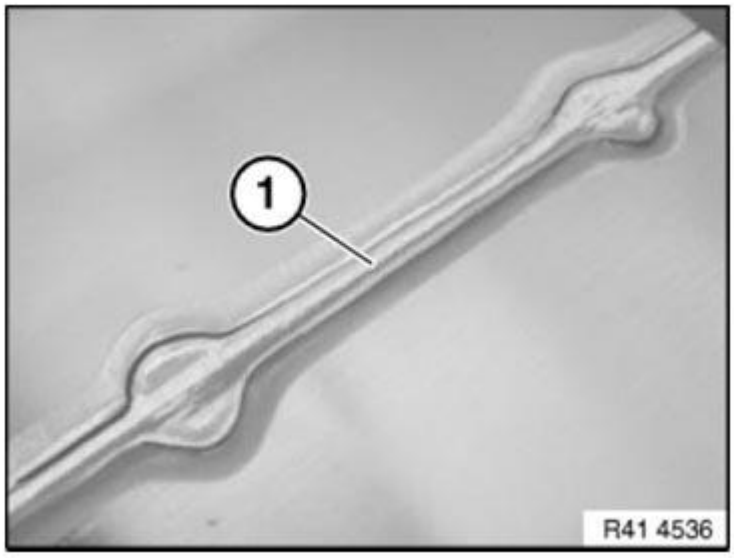


Fig. 369: Identifying Reinforcement Plate Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Only the BMW-approved **METAL FILLER** should be used on the joint.

METAL FILLER - INSTRUCTIONS FOR USE

Not in area visible to customer:

Examples: The joint is covered by sill trim panel, windows, seals, etc.

Grind off stud bolts and surplus adhesive flush. Do not use metal filler. Paint area as specified in BMW Painting Handbook.

NOTE: After painting, the joint becomes visible as the adhesive shrinks. This has no affect on the quality.

41 35 081 REMOVING AND INSTALLING FRONT SIDE WALL ON LEFT

Observe **GAP DIMENSIONS** .

IMPORTANT: Do not damage adjoining body components.

Necessary preliminary work

- Remove **SIDE REPEATER**
- Remove **wheel arch covers** See **5171038 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (FRONT SECTION)** and **5171039 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (REAR SECTION)**

- Remove **TRIM PANEL FOR COVER ON SIDE MEMBER**
- Partially loosen **BUMPER TRIM** on the side
- Remove **SEAL MOUNTING** for engine compartment lid

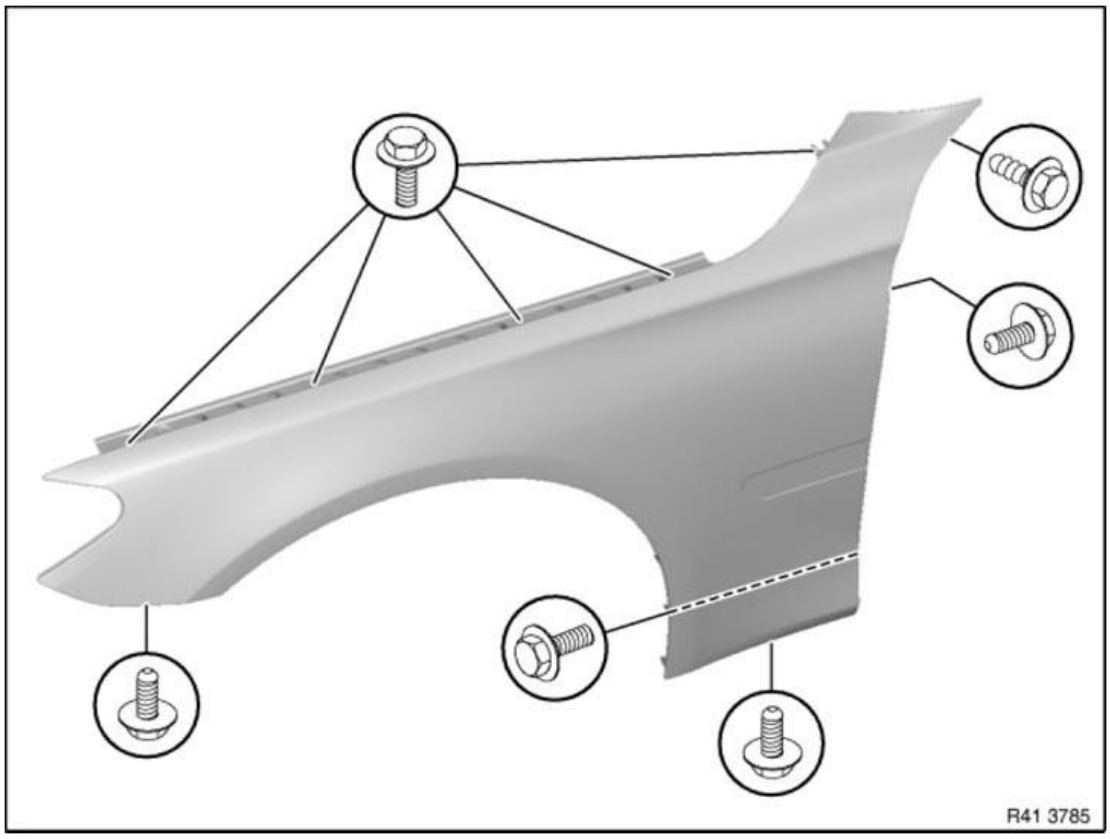


Fig. 370: Identifying Trim Panel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **41 35 1AZ** .

Tightening torque **41 35 2AZ** .

Replacement

Apply additional sealant to inside of front panel in area (1). Apply to area (1) based on shape of side wall to be replaced.

Material: **SEALANT D1** (sourcing reference via BMW Parts Department).

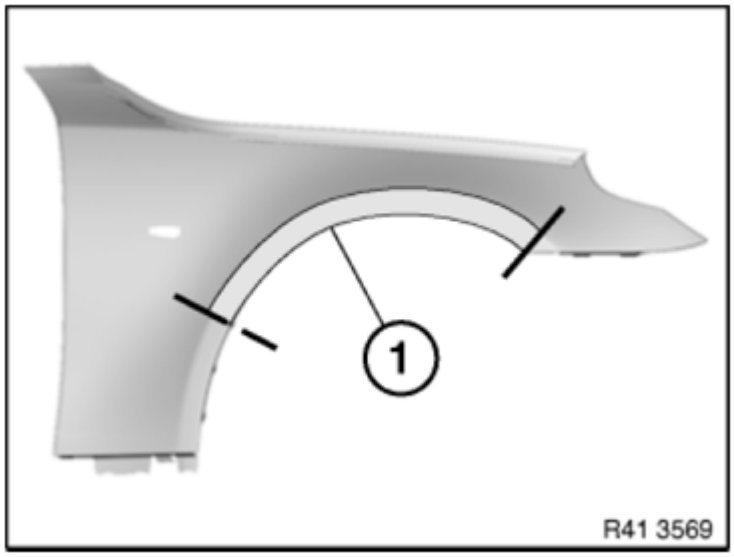


Fig. 371: Identifying Front Panel Sealant Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 35 101 REPLACING LEFT REAR SIDE WALL

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE

Observe new procedure for bonding and riveting **(REPAIR STAGE 2)** .

Following new body parts are required:

- (1) Side frame, rear
- (2) Reinforcement plate, C-pillar (not shown)
- (3) Reinforcement plates (not pictured)
- (4) Lock nuts (not pictured)

Following consumables are required:

MATERIAL CHART

Material	Quantity
Adhesive K5b	1
Adhesive K5a	1
Blind rivets N3	14
Punch rivets N4	23
Punch rivets N5	4
EMC screws	1

Cleaning agent R1	1
Cavity sealing wax remover	1
Sealant D1	

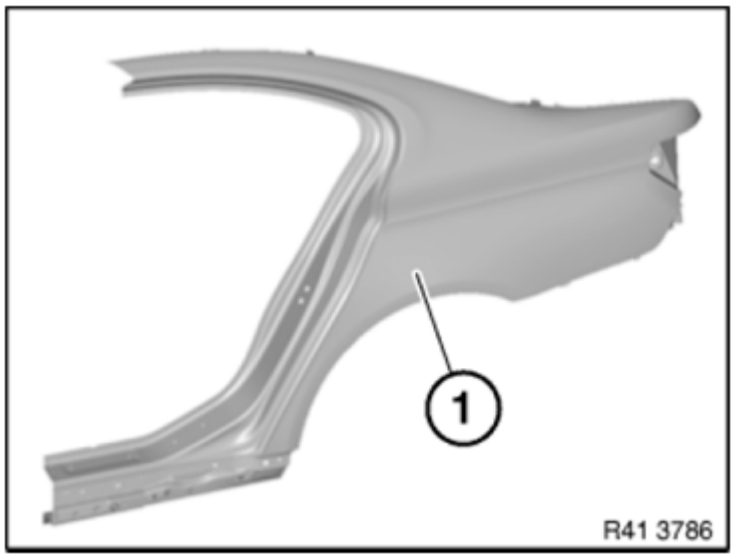


Fig. 372: Identifying Side Frame, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Removing side wall

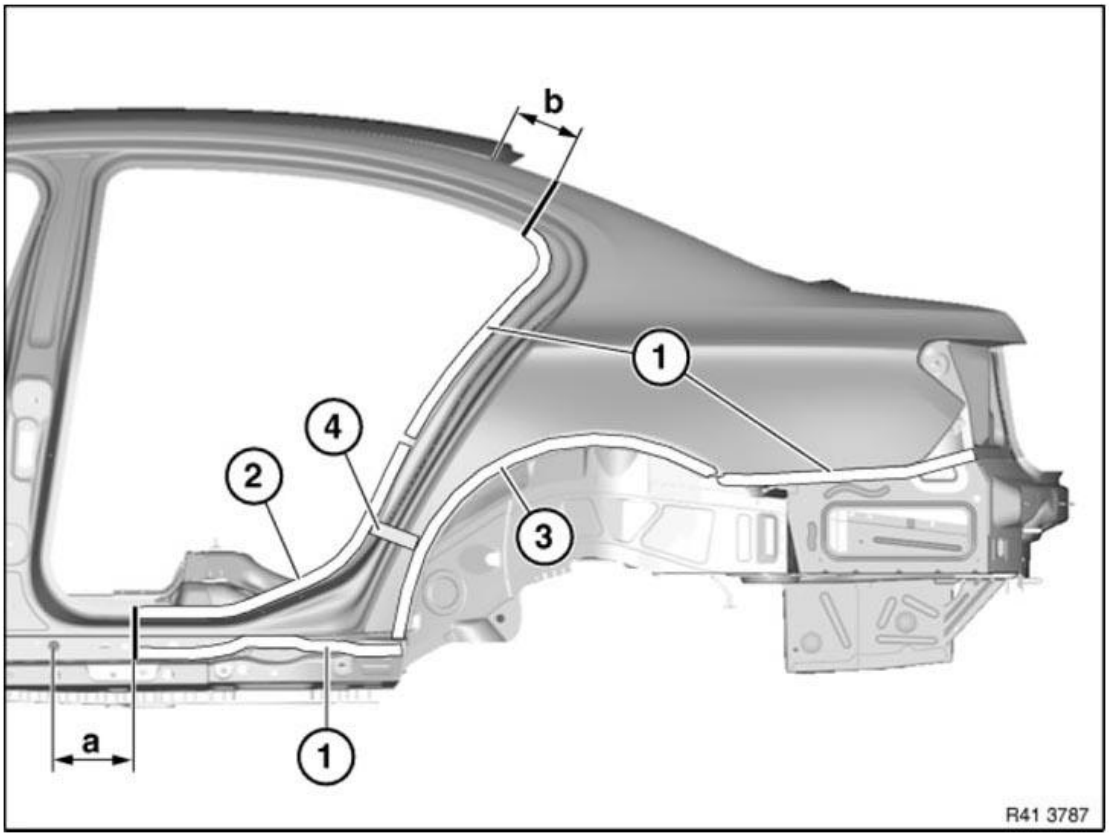


Fig. 373: Identifying Cavity Sealing, Welded Connections Areas And Spot-Welded Adhesive Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cuts in accordance with specified dimensions and cut.

IMPORTANT: Cut outer panel only.
Compare position of severance cuts with REINFORCEMENT PLATES .
Dimension a = approx. 200 mm from center point of 25 mm dia. hole
Dimension b = approx. 115 mm from roof edge.
Open welded connections in areas (1).
Open spot-welded adhesive joints in area (2)
Open FOLDED BONDED CONNECTION in area (3).
Loosen side wall of cavity sealing (4).

NOTE: In addition to the dimensions, a TEMPLATE (1) may be used to determine the position of the separating cut.

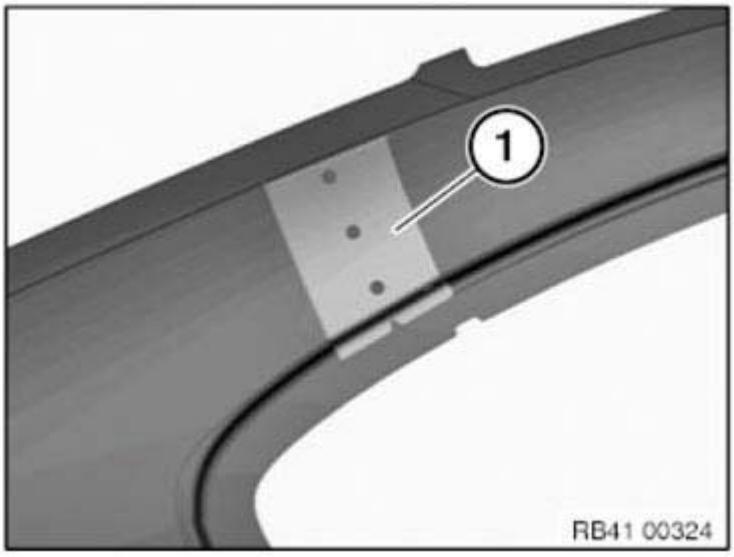


Fig. 374: Identifying Template
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in areas (1) and (2).

IMPORTANT: In areas (2), the welding spots must be released from the side wall.

Take off side wall.

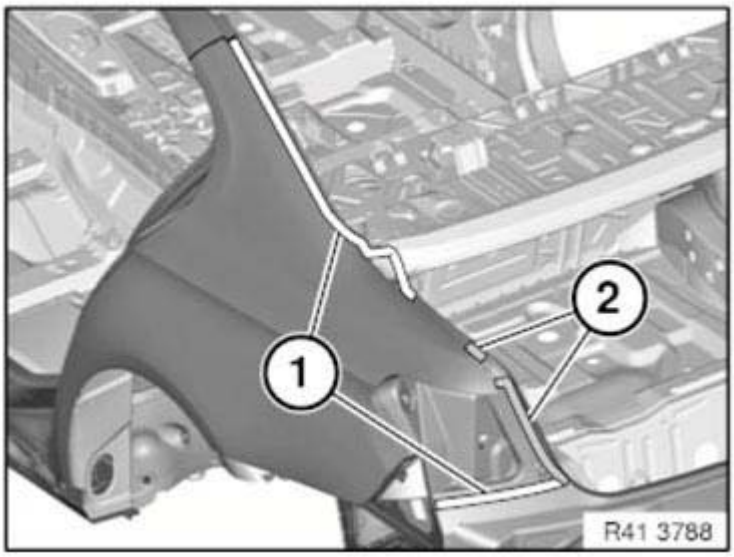


Fig. 375: Identifying Welded Connections Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

Release bonded joint (2).

Remove lock striker reinforcement.

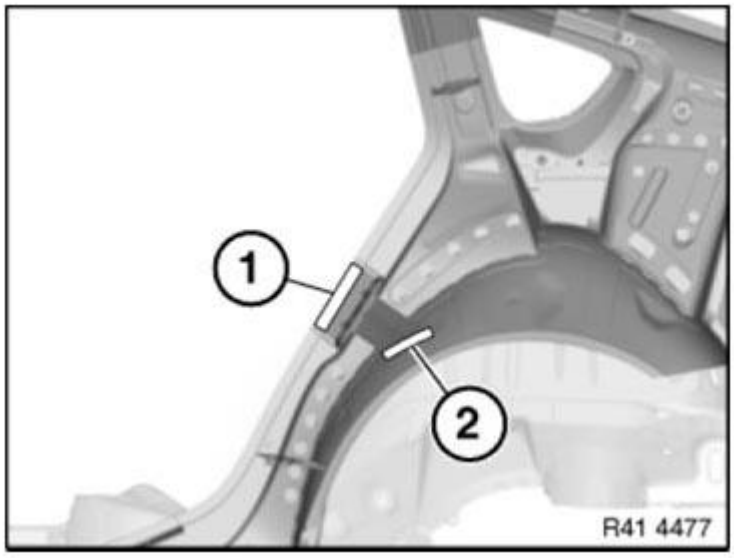


Fig. 376: Identifying Welded Connections Areas And Bonded Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark severance cuts on the new part according to vehicle and cut.

Prepare **REINFORCEMENT PLATES** (bonded) at all severance cuts.

Separate weld joints in area (1) from inside.

Remove sill section (2).

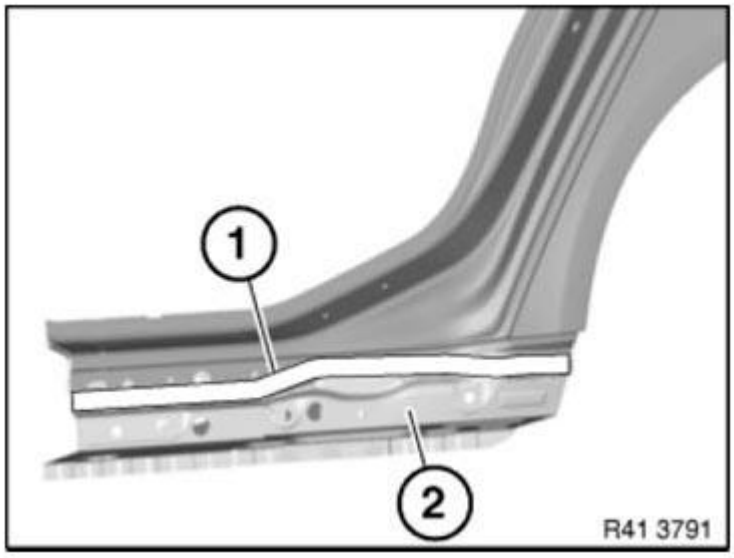


Fig. 377: Identifying Weld Joints Area And Sill Section
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust new part to fit and secure.

In areas (1) and (2) set 4.2 mm dia. holes for blind rivets:

Area (1): 5 bore holes

Area (2): 4 bore holes

F02 only:

In area (1) 6 holes

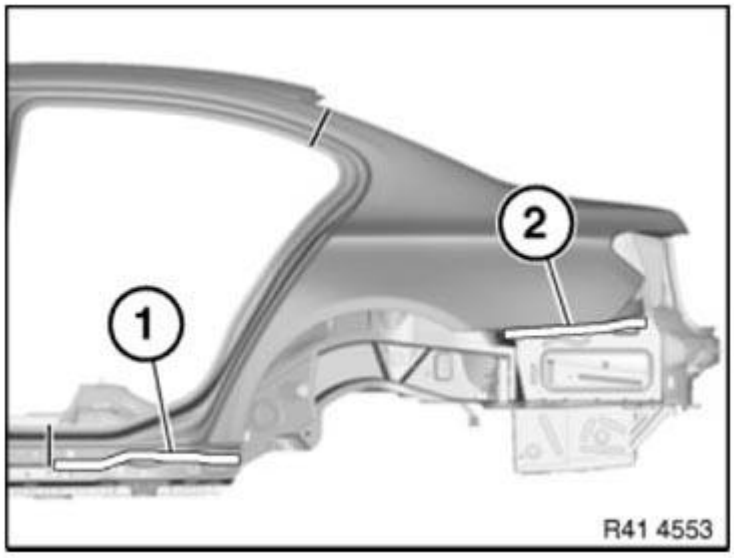


Fig. 378: Identifying Blind Rivets Holes Areas
Courtesy of BMW OF NORTH AMERICA, INC.

In areas (1) and (2) set 4.2 mm dia. holes for blind rivets:

Area (1): 3 bore holes

Area (2): 1 bore holes

Remove new part again and deburr bore holes.

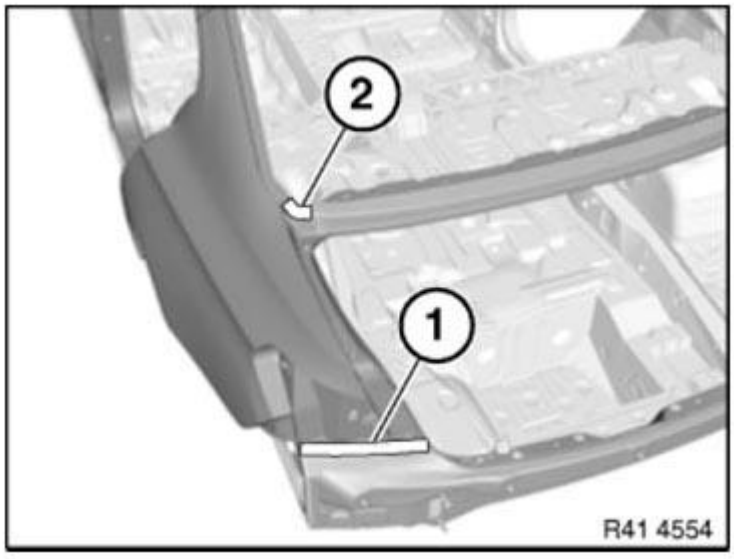


Fig. 379: Identifying Blind Rivets Holes Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind/sand new part in area of bonding surfaces.

Installing side wall

Clean all bonding surfaces on vehicle, on the new part and on the reinforcement plates with cleaning agent R1.

Apply adhesive to reinforcement plates. Install reinforcement plates.

Apply adhesive in areas (1).

Apply sealing compound to **CAVITY SEALING** at area 2.

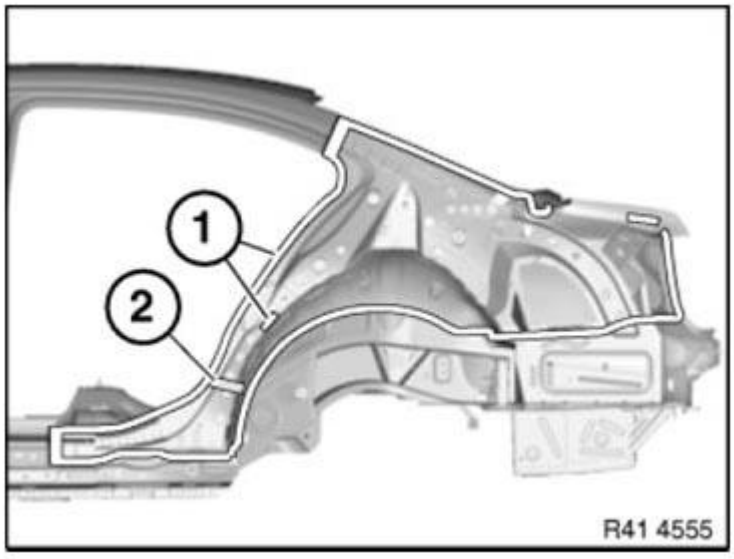


Fig. 380: Identifying Adhesive Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Apply adhesive in area (1) of lock striker reinforcement.

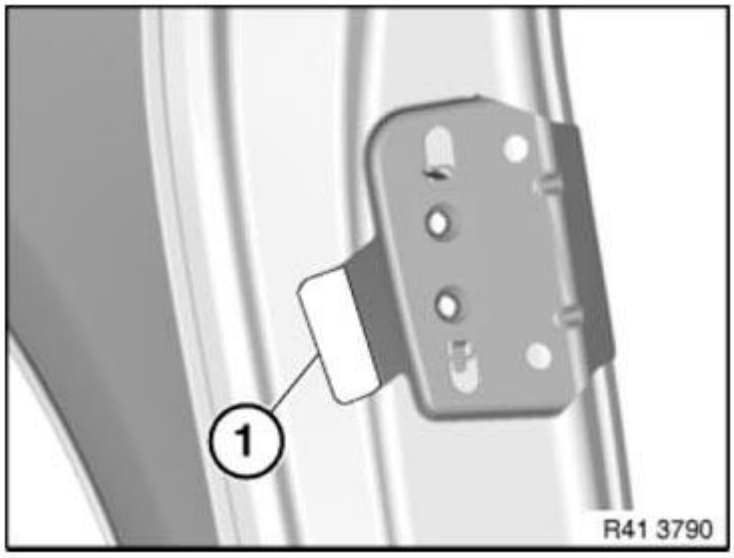


Fig. 381: Identifying Lock Striker Reinforcement Adhesive Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Apply adhesive (1) to inside of side wall at distance a.

Dimension a = approx. 5 mm.

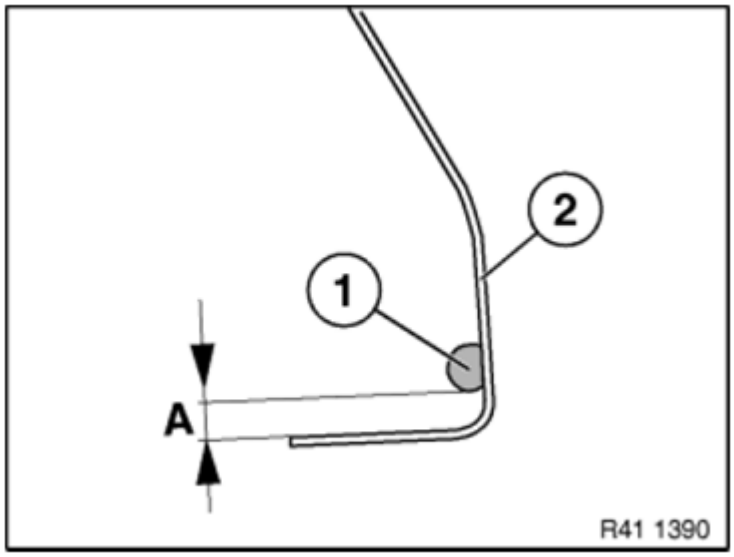


Fig. 382: Identifying Side Wall Adhesive Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

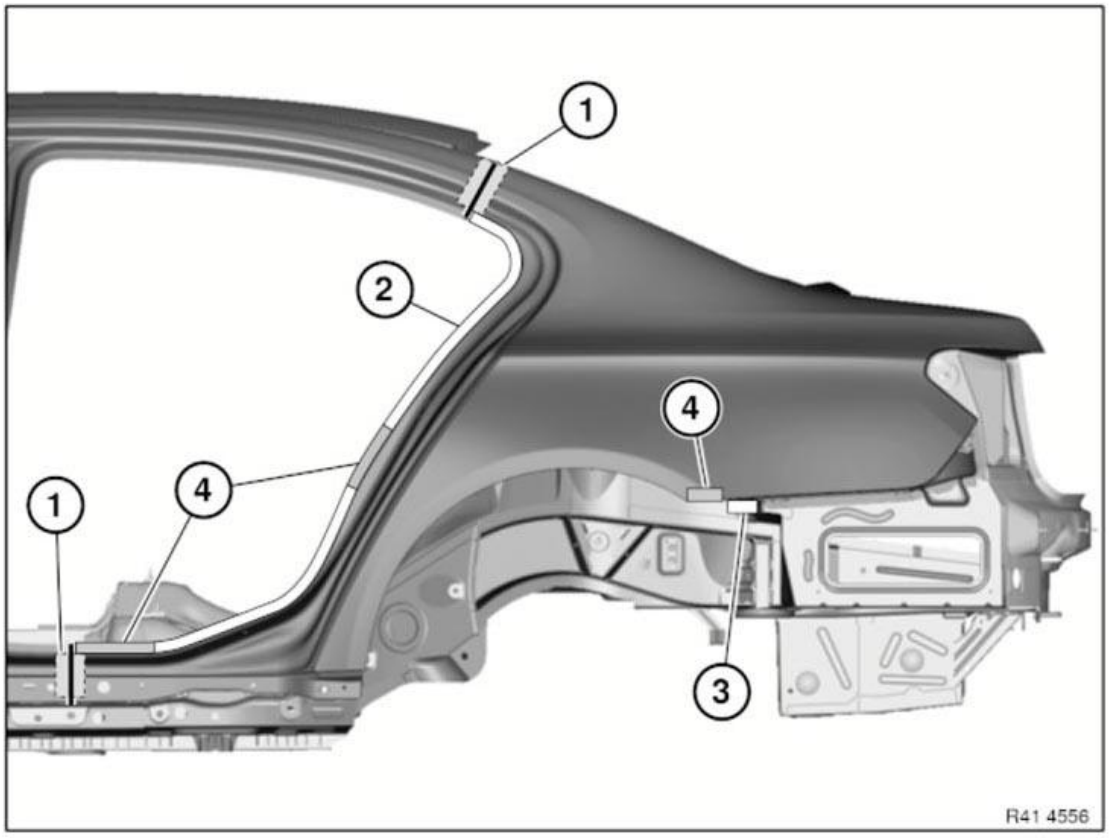


Fig. 383: Identifying Reinforcement Plates And Punch Rivets Area
Courtesy of BMW OF NORTH AMERICA, INC.

Install side wall with a second person helping.

NOTE: When installing side wall, make sure there is sufficient adhesive on bonding surfaces.
After adjusting side wall to fit, tighten nuts of reinforcement plates (1).
Secure side wall in area of reinforcement plates with gripping pliers.
Rivet side wall with blind rivets N3.
Use 11 punch rivets N4 in area (2).
Use 2 punch rivets N4 in area (3).
In areas (4), fix the side wall using gripping pliers until the adhesive hardens.

Use N4 punch rivets in areas (1) to (3).

Use punch rivets N5 in areas (4) and (5).

IMPORTANT: In area (4), the punch rivets must be set from the side wall.

PUNCH RIVETS AREAS CHART

Area	Number

1	5
2	2
3	3
4	3
5	1

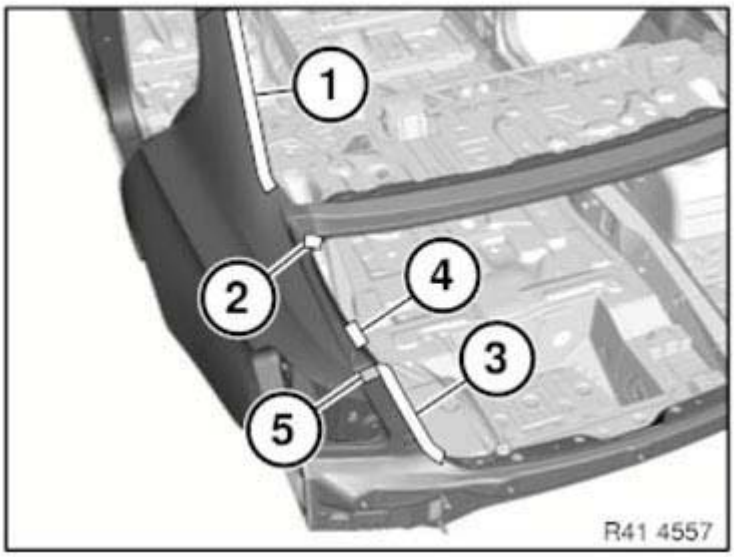


Fig. 384: Identifying Punch Rivets Area
Courtesy of BMW OF NORTH AMERICA, INC.

Also apply adhesive (2) to outer wheel arch section (3).

1. Rear side wall.

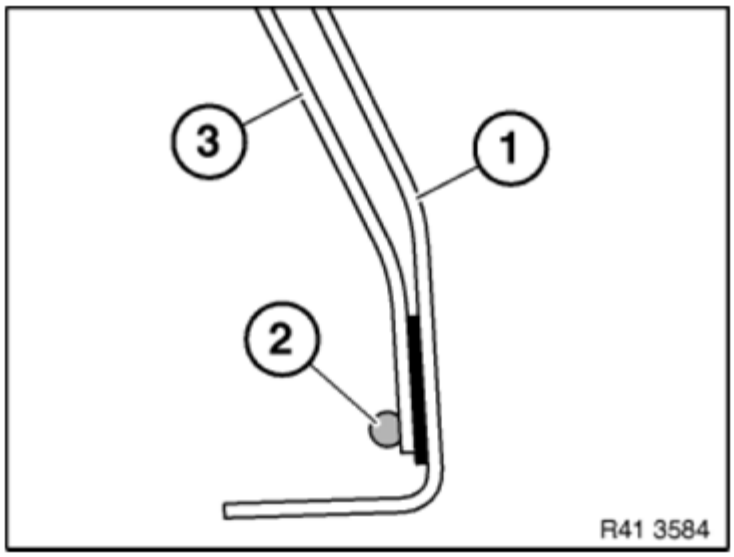


Fig. 385: Identifying Outer Wheel Arch Section Adhesive Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Flange edge of wheel arch (3) of side wall flush to outer wheel arch section.

Do not create sharp edges when flanging as otherwise the flange edge may begin to tear.

Dimension (A) = 5 mm.

1. Adhesive
2. Rear side wall

Also seal in area (3) according to standard.

IMPORTANT: Flange edge must be completely filled with adhesive!

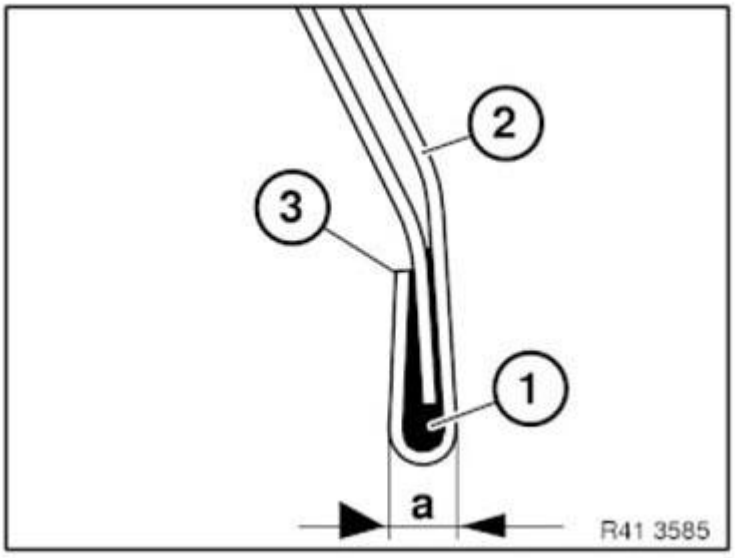


Fig. 386: Identifying Rear Side Wall Adhesive Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

After adhesive has hardened in sill area, install an **EMC SCREW** .

41 14 500 REPLACING OUTER SECTION OF LEFT OR RIGHT REAR WHEEL HOUSING (SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **procedure** See **4100... SPOT-WELD BONDING STEEL PARTS**.

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Necessary preliminary tasks

Remove **COVER FOR REAR SIDE MEMBER**

Following new body parts are required:

- (1) Outer wheel arch section, rear
- (2) C-pillar reinforcement
- (3) Shaped parts, entrance (not pictured)

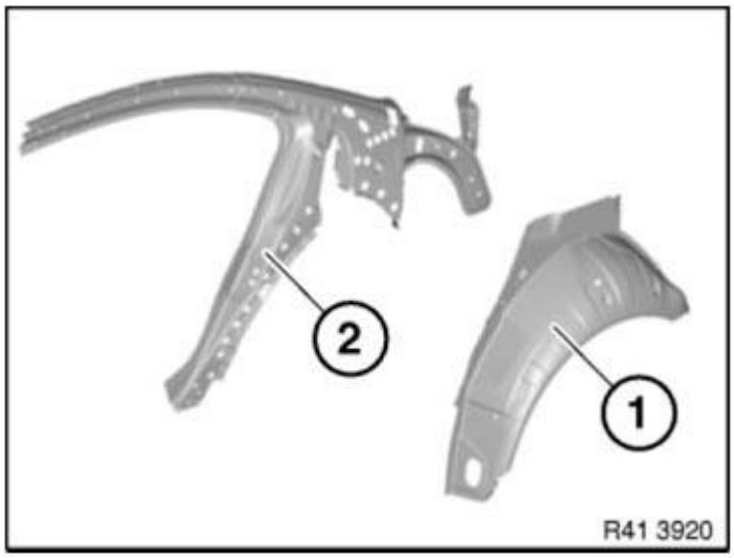


Fig. 387: Identifying C-Pillar Reinforcement And Outer Wheel Arch Section, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of outer wheel arch section

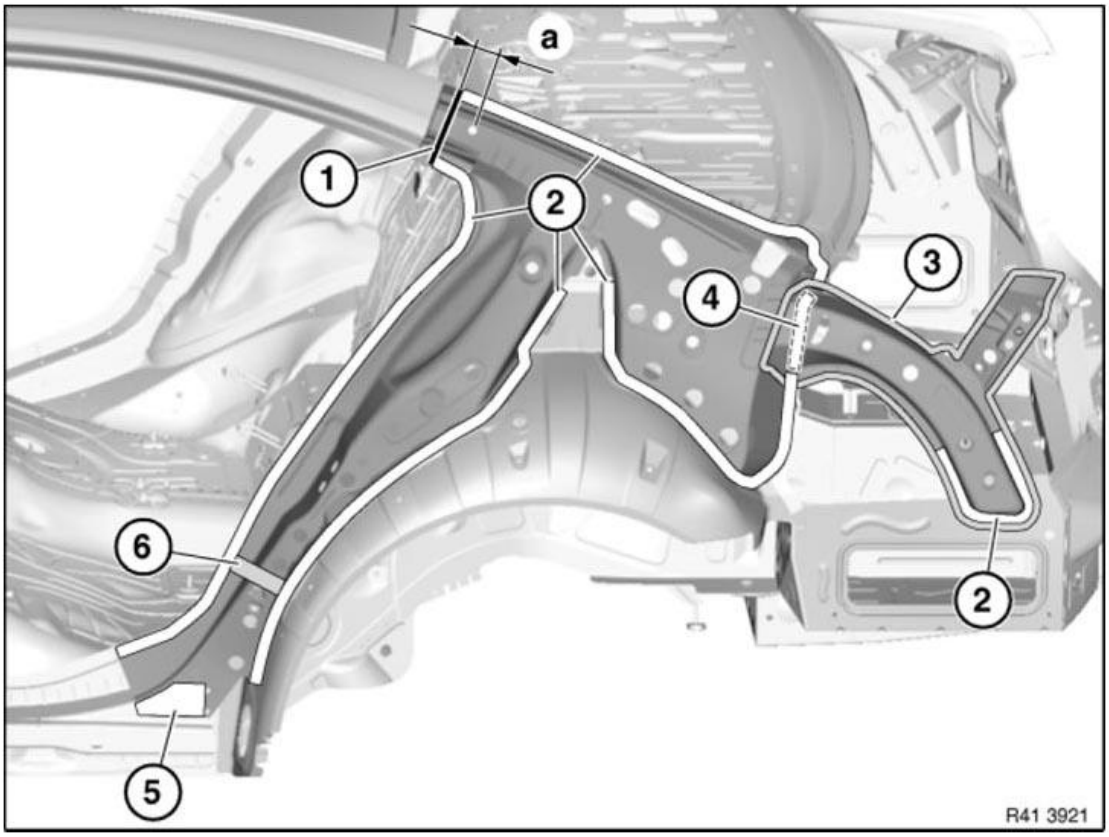


Fig. 388: Identifying Rivet Joints Area, Welded Connections Areas And Sheet Section
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with measurement and cut.

IMPORTANT: Cut outer panel only.
Measurement a = approx. 30 mm from center point of 14 mm dia. hole.
Open welded connections in areas (2).
Fold sheet section (3) forwards and open weld joints in area (4).
Open rivet joints in area (5).
Remove sheet section.

Installation note:

Weld in **REINFORCEMENT PLATE** at severance cut.

Replace both **CAVITY ACOUSTIC BAFFLES** (6).

No rivet connection in area (5). Weld new part.

Open spot-weld bonded joints in area (1)

Open welded connections in area (2)

Remove outer section of wheel arch.

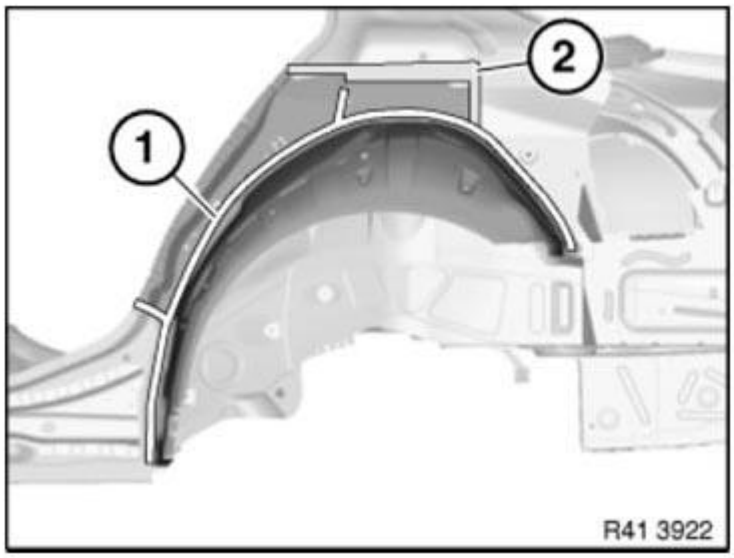


Fig. 389: Identifying Spot-Weld Bonded Joints Area And Welded Connections Area
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Mark severance cut on C-pillar reinforcement and cut.

Adjust new parts in conjunction with side panel to fit.

Installation of outer wheel arch section

Install and weld new parts.

41 35 101 STRIPPING OPERATIONS - REPLACING REAR LEFT SIDE PANEL

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Clamp off battery negative lead (job number: 6120 900)
- Remove bumper trim (job number: 5112156)
- Remove bumper support (job number: 5112050)
- Remove center bumper guide (job number: 5112825)
- Remove left bumper guide (job number: 5112828)
- Remove luggage compartment floor trim panel (FR number: 5147101)
- Remove tail panel trim at top (FR number: 5146050)

- Remove left luggage compartment wheel arch panel (FR number: 5147151)
- Partially detach rear lid seal
- Remove left rear lid (FR number: 6321180)
- Remove trim panel for left roof pillar (FR number: 5143 251)
- Remove rear lid (FR number: 41 62 000)
- Remove left lock striker (FR number: 5121003)
- Remove rear left door sill cover strip (FR number: 51 47 030)
- Remove rear left rocker panel trim (FR number: 51 47 072)
- Remove left backrest side section (FR number: 52 26 008)
- Remove trim on C-pillar at bottom left (FR number: 51 43 230)
- Remove rear left door mucket (FR number: 5172010)
- Remove rear window (FR number: 51 31 200)
- Remove rear left wheel arch cover (FR number: 51 71 041)
- Remove panel for cover on left side member (FR number: 5171447)
- Remove rear left door
- Remove trim strip on left roof frame (FR number: 5113280)
- Remove holder for gas pressure spring on left
- Partially release wiring harness

4151 FRONT SIDE DOORS

41 5.... ADJUST DOOR

IMPORTANT: Do not damage adjoining body components.
Minor corrections (realignment work) are permitted if the existing adjustment options are not sufficient.

NOTE: Observe GAP DIMENSIONS .
The door must be provided with all add-on parts for correct adjustment.
Adjust screwed body components from rear to front.
The following illustrations are schematic representations and are to be applied to the relevant vehicle type.

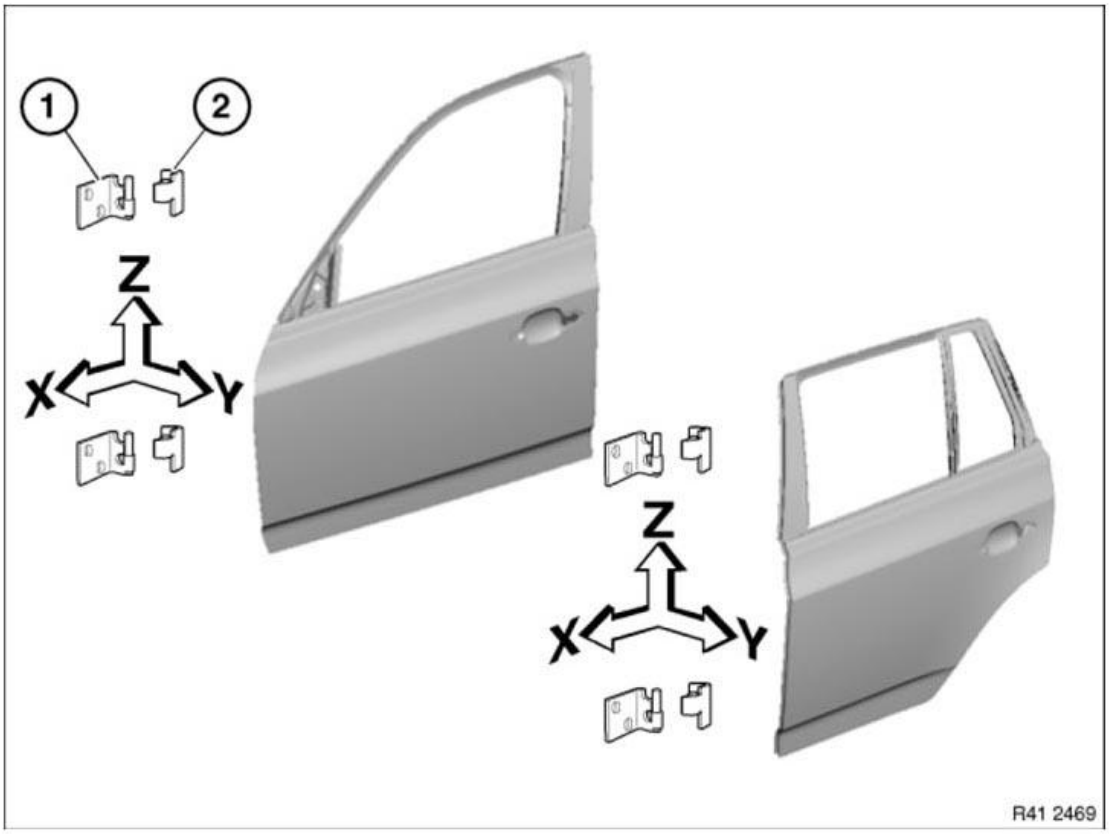


Fig. 390: Adjusting Door
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken lock striker, remove if necessary.

Slacken screws for hinge (2) on door until door can still just be moved.

Front door: Tightening torque **41 51 2AZ** .

Rear door: Tightening torque **41 52 2AZ** .

If adjustment range is not sufficient, slacken screws for hinges (1) on body.

NOTE: Screw connections only accessible from inside.
Front door: Tightening torque 41 51 3AZ .
Rear door: Tightening torque 41 52 3AZ .

Check that adjoining body components are flush in terms of height and correct if necessary.

NOTE: Height adjustment of door must not be influenced by lock striker.
When the door is closed, the lock striker must not touch or scrape against the door lock.

Look out for scratch marks.

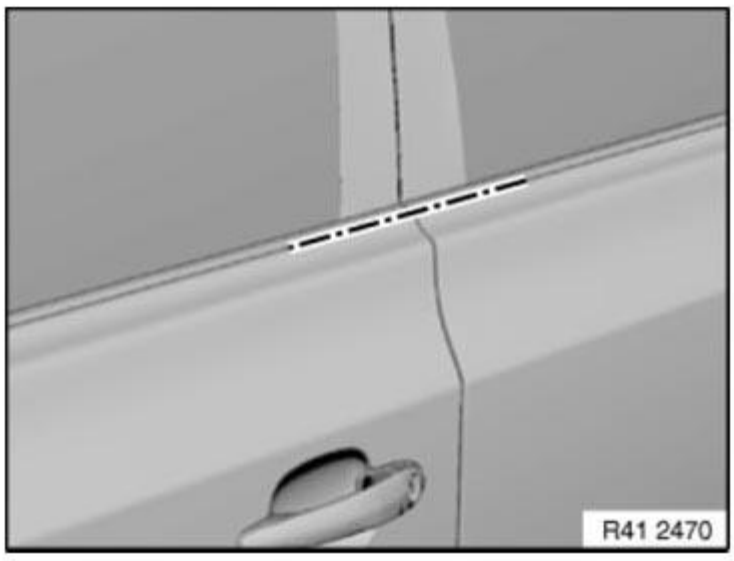


Fig. 391: Identifying Door Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screws (1) until lock striker can still just be moved.

Move lock striker sideways in order to adjust transition between door and adjoining bodywork parts.

Tightening torque **51 22 2AZ** .

NOTE: **When the door is closed, the lock striker must not touch or scrape against the door lock.**
Look out for scratch marks.

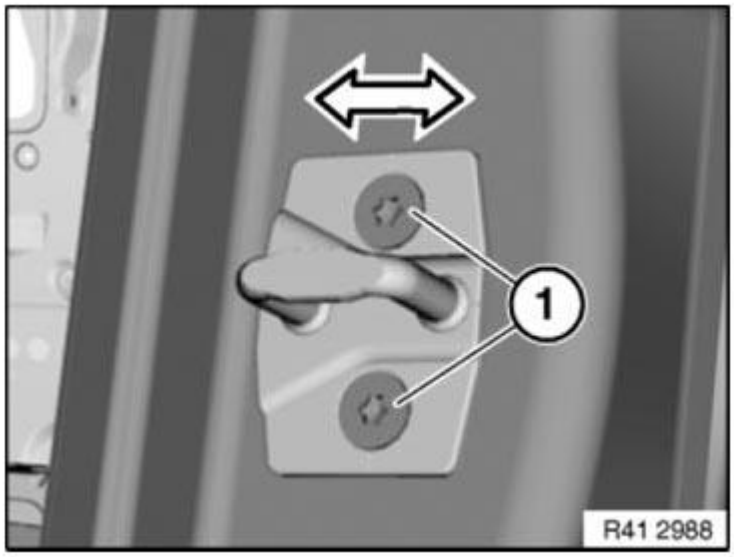


Fig. 392: Moving Lock Striker
Courtesy of BMW OF NORTH AMERICA, INC.

After setting

If the hinge is slackened on the body side, the area of the hinge must be sealed in a u-shape with sealant (1).

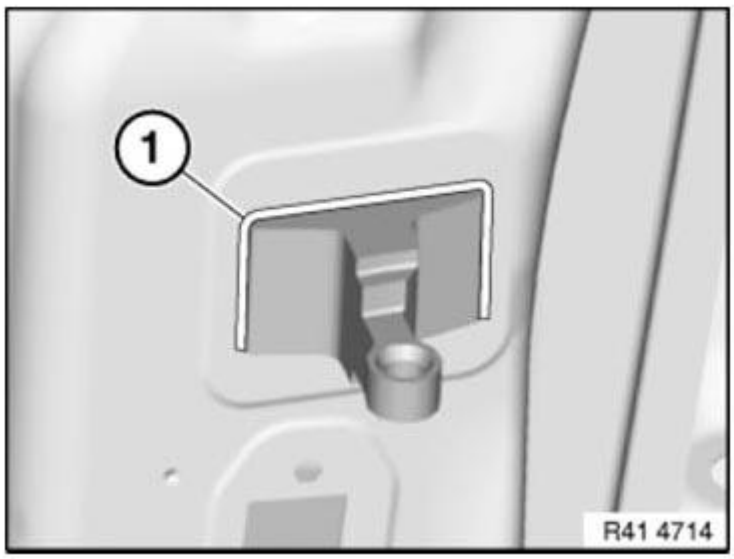


Fig. 393: Identifying Hinge Sealant Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

- Tighten all screws to specified torque.
- Touch up unpainted surfaces in the appropriate color.
- If necessary, adjust front door.

41 5.... REMOVING AND INSTALLING DOOR

IMPORTANT: Do not damage adjoining body parts.

The illustrations are schematic representations and are to be applied to the relevant vehicle type.

Open door.

Release screw on connector frame.

Front door:

Tightening torque **41 51 4AZ** .

Rear door:

Tightening torque **41 52 4AZ** .

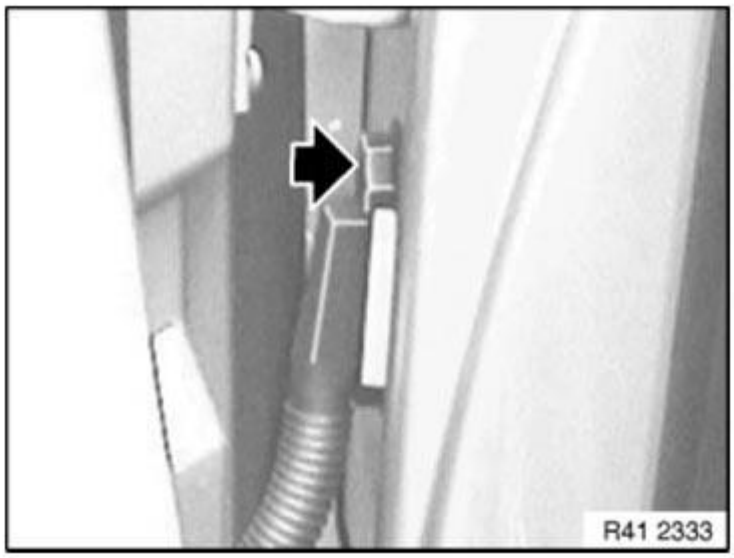


Fig. 394: Locating Screw On Connector Frame
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Secure door against closing.

Release screw (1) on door retainer.

Front door:

Tightening torque **51 21 3AZ** .

Rear door:

Tightening torque **51 22 3AZ** .

Open door up to stop.

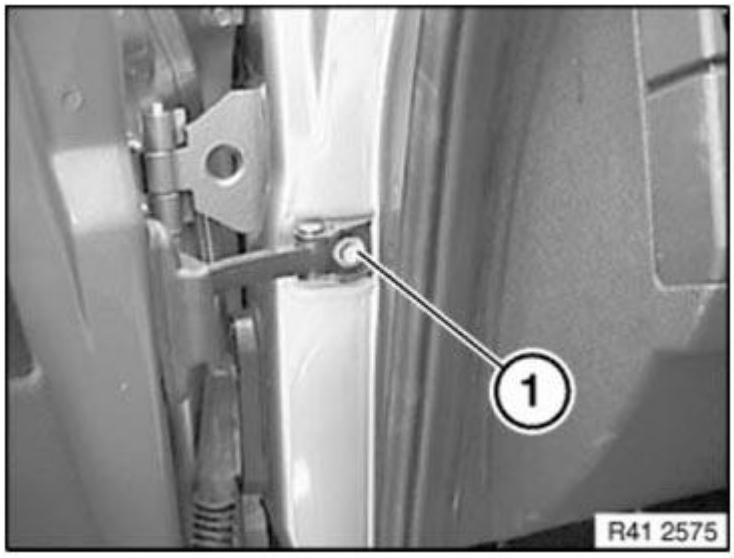


Fig. 395: Identifying Screw On Door Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws between both hinge elements at top and bottom.

Front door:

Tightening torque **41 51 1AZ** .

Rear door:

Tightening torque **41 52 1AZ** .

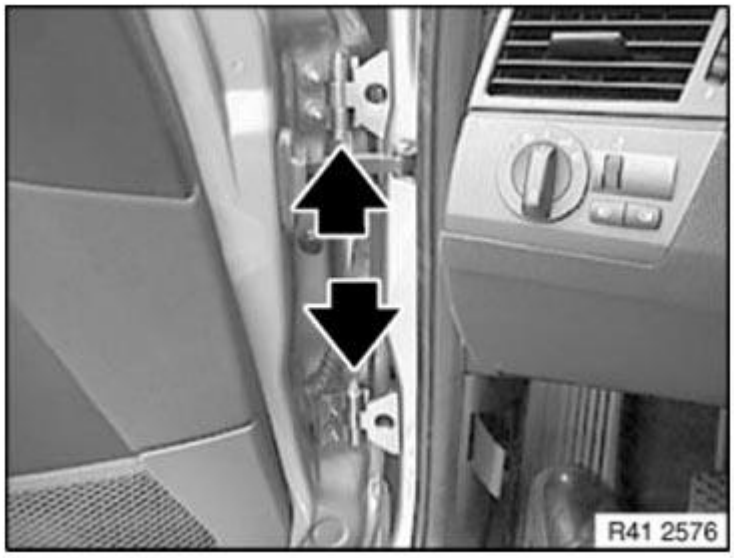


Fig. 396: Locating Hinge Elements
Courtesy of BMW OF NORTH AMERICA, INC.

Pull plug connection from door pillar, unlock by pulling out bar and detach.

Unhinge door by moving upwards and placing it on a suitable surface.

Installation:

If necessary, adjust **DOOR** .

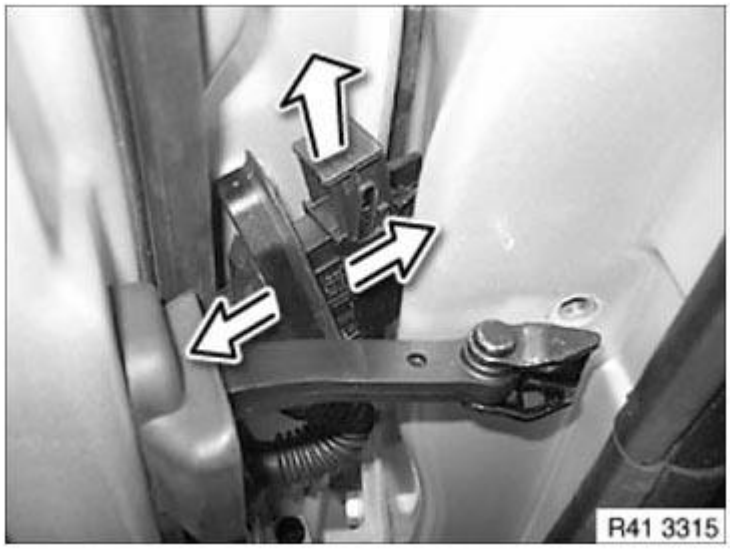


Fig. 397: Pulling Plug Connection From Door Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

4152 REAR SIDE DOORS

41 5.... ADJUST DOOR

IMPORTANT: Do not damage adjoining body components.
Minor corrections (realignment work) are permitted if the existing adjustment options are not sufficient.

NOTE: Observe GAP DIMENSIONS .
The door must be provided with all add-on parts for correct adjustment.
Adjust screwed body components from rear to front.
The following illustrations are schematic representations and are to be applied to the relevant vehicle type.

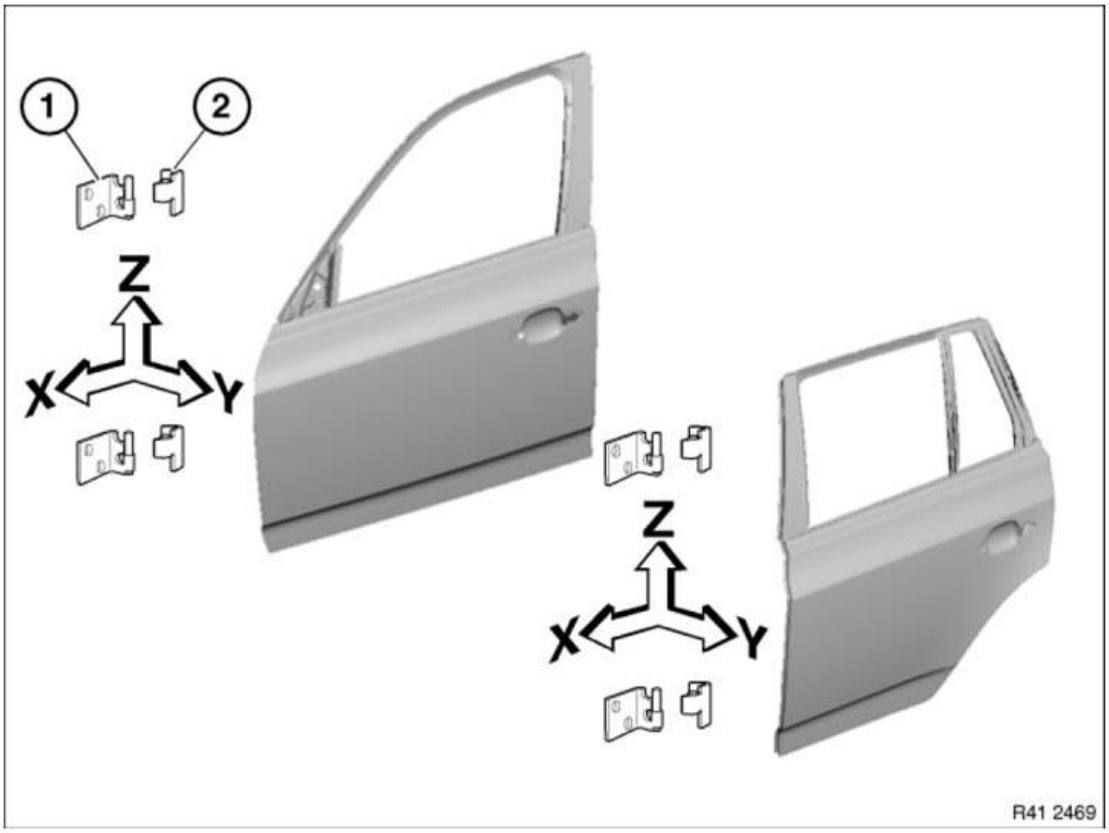


Fig. 398: Adjusting Door
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken lock striker, remove if necessary.

Slacken screws for hinge (2) on door until door can still just be moved.

Front door: Tightening torque **41 51 2AZ** .

Rear door: Tightening torque **41 52 2AZ** .

If adjustment range is not sufficient, slacken screws for hinges (1) on body.

NOTE: Screw connections only accessible from inside.
Front door: Tightening torque 41 51 3AZ .
Rear door: Tightening torque 41 52 3AZ .

Check that adjoining body components are flush in terms of height and correct if necessary.

NOTE: Height adjustment of door must not be influenced by lock striker.
When the door is closed, the lock striker must not touch or scrape against the door lock. Look out for scratch marks.

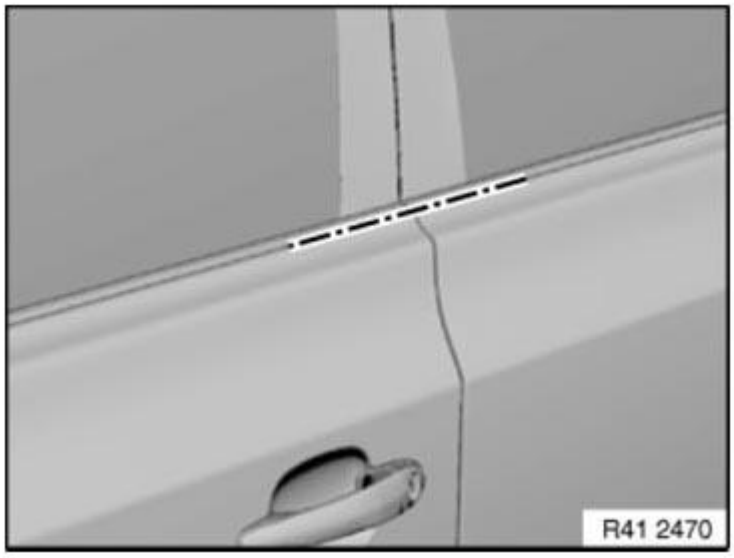


Fig. 399: Identifying Door Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screws (1) until lock striker can still just be moved.

Move lock striker sideways in order to adjust transition between door and adjoining bodywork parts.

Tightening torque **51 22 2AZ** .

NOTE: When the door is closed, the lock striker must not touch or scrape against the door lock.
Look out for scratch marks.

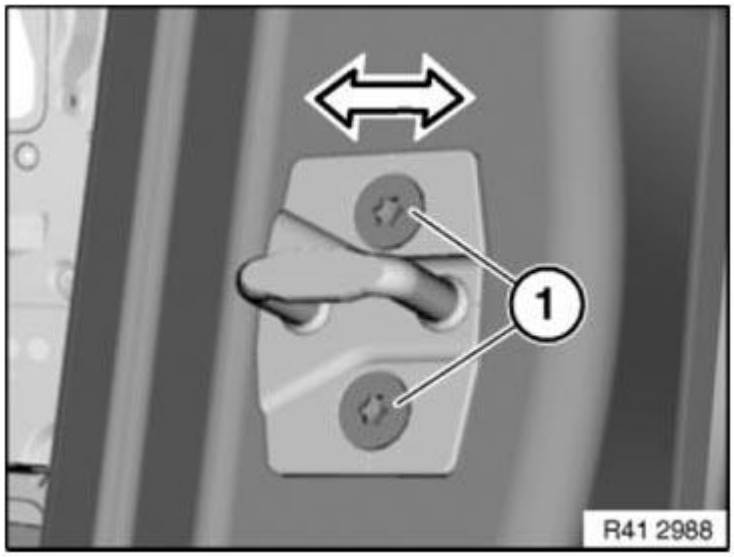


Fig. 400: Moving Lock Striker
Courtesy of BMW OF NORTH AMERICA, INC.

After setting

If the hinge is slackened on the body side, the area of the hinge must be sealed in a u-shape with sealant (1).

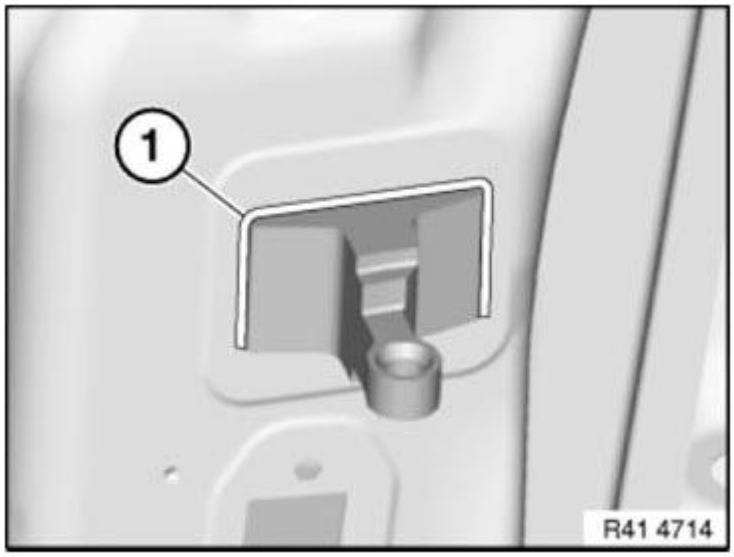


Fig. 401: Identifying Hinge Sealant Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

- Tighten all screws to specified torque.
- Touch up unpainted surfaces in the appropriate color.
- If necessary, adjust front door.

41 5.... REMOVING AND INSTALLING DOOR

IMPORTANT: Do not damage adjoining body parts.

The illustrations are schematic representations and are to be applied to the relevant vehicle type.

Open door.

Release screw on connector frame.

Front door:

Tightening torque **41 51 4AZ** .

Rear door:

Tightening torque **41 52 4AZ** .

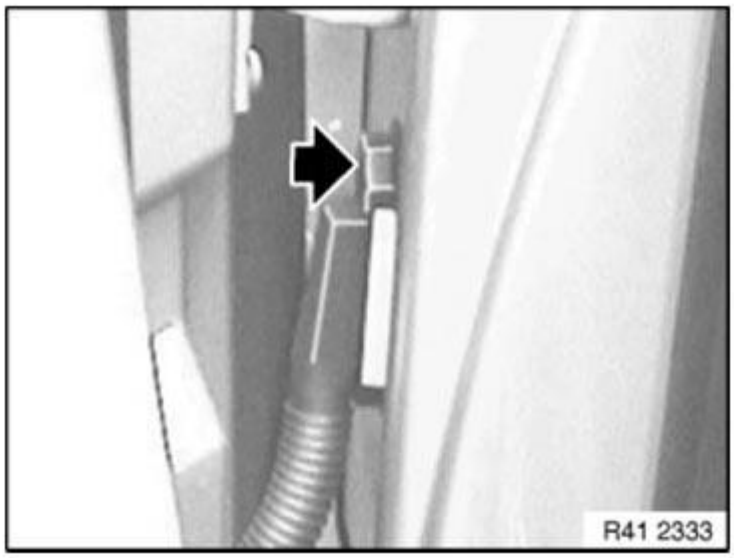


Fig. 402: Locating Screw On Connector Frame
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Secure door against closing.

Release screw (1) on door retainer.

Front door:

Tightening torque **51 21 3AZ** .

Rear door:

Tightening torque **51 22 3AZ** .

Open door up to stop.

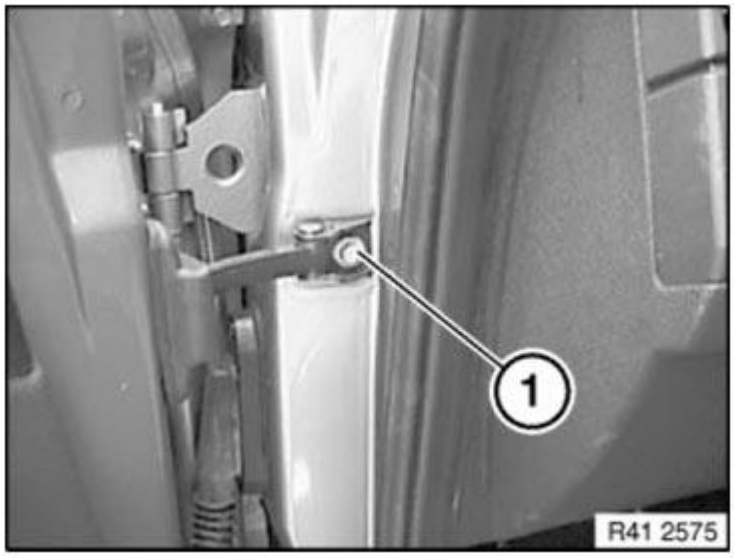


Fig. 403: Identifying Screw On Door Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws between both hinge elements at top and bottom.

Front door:

Tightening torque **41 51 1AZ** .

Rear door:

Tightening torque **41 52 1AZ** .

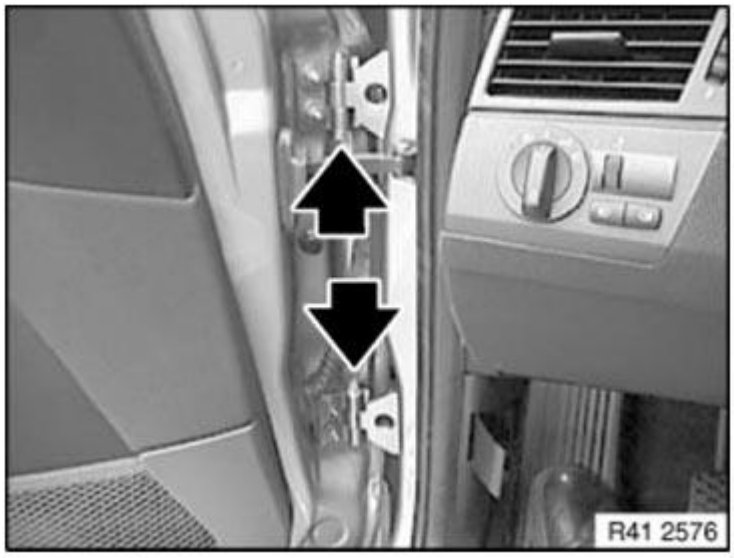


Fig. 404: Locating Hinge Elements
Courtesy of BMW OF NORTH AMERICA, INC.

Pull plug connection from door pillar, unlock by pulling out bar and detach.

Unhinge door by moving upwards and placing it on a suitable surface.

Installation:

If necessary, adjust **DOOR** .

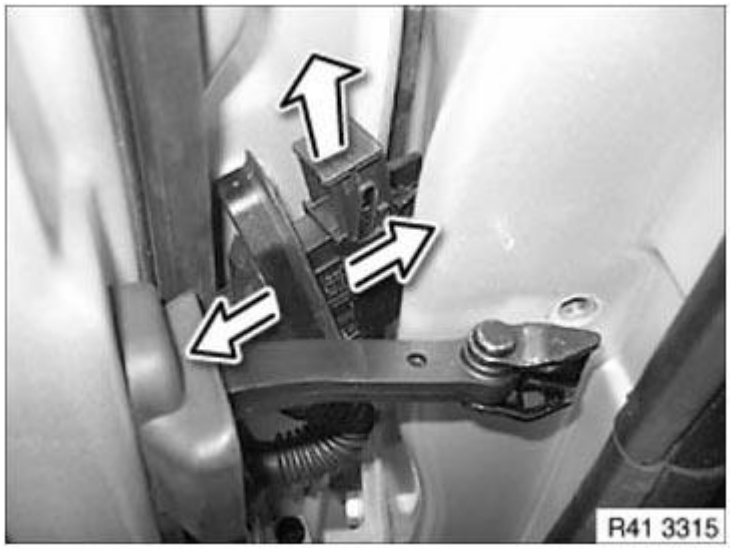


Fig. 405: Pulling Plug Connection From Door Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

4161 FRONT LID

41 00... AFGS (ACTIVE PEDESTRIAN PROTECTION) PROCEDURE AFTER ACCIDENT

The AFGS system consists of the following components:

- *Satellites (control unit + sensor)*
  - Sensors, inside, bumper trim, left/middle/right
  - ACSM control unit (Crash Safety Module)
- *Cables and connectors*
- *Engine compartment lid hinges*
  - Actuator
  - Engine compartment lid hinge
- *Engine compartment lid catch*
  - Catch, engine compartment lid
  - Catch, upper section (striker)

In case of a frontal or side collision in the area of the engine compartment lid and/or the A-pillars, check the following components:

Satellites (control unit + sensor)

- Procedure
  - Read fault memory
  - Disconnect battery and observe waiting period
  - Rectify faults
  - Reconnect battery and observe waiting period
  - Delete fault memory
  - Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. interior lights, radio, etc.)
  - Switch on ignition.
  - Clear fault memory and if necessary rectify faults

Cables and connectors

- Procedure
  - Check cables and connectors for damage, replace if necessary.

Procedure if AFGS was activated

Engine compartment lid hinges

- Replace **ACTUATORS**
- **CHECK BOTH HINGES OF THE ENGINE COMPARTMENT LID AND REPLACE IF NECESSARY**

Engine compartment lid catch

- **Replace both engine compartment lid catches** See **5123101 REMOVING AND INSTALLING/REPLACING LEFT ACTIVE ENGINE COMPARTMENT LID LOCK** and **5123111 REMOVING AND INSTALLING/REPLACING RIGHT ACTIVE ENGINE COMPARTMENT LID LOCK**
- Check the top sections of the catch and replace if necessary.

Procedure if AFGS was not activated

Engine compartment lid hinges

- Check **BOTH HINGES OF THE ENGINE COMPARTMENT LID** and replace if necessary
- Only if the hinges are faulty, replace the **ACTUATOR** .

Engine compartment lid catch

- Check **BOTH ENGINE COMPARTMENT LID CATCHES** and replace if necessary.
- Check the top section of the catch and replace if necessary.

41 61 014 ADJUSTING ENGINE COMPARTMENT LID

IMPORTANT: The BATTERY NEGATIVE LEAD must be clamped off on vehicles with AFGS active pedestrian protection!
Do not damage adjoining body components!
Minor corrections (realignment work) are permitted if the existing adjustment options are not sufficient.

Carry over schematic representation to the relevant vehicle type.

NOTE: Observe GAP DIMENSIONS .

NOTE: Stop screw must not be damaged or missing. If necessary, replace hood/boot hinge.
The stop screw is preset and must not be used to adjust the hood/bonnet!

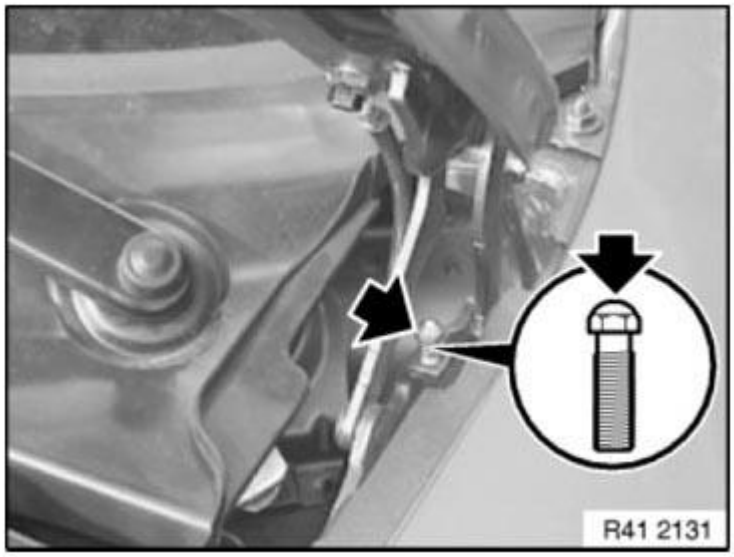


Fig. 406: Locating Stop Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nuts (1) of hinges on left and right.

Hood lid must be able to be moved.

Tightening torque **41 61 1AZ** .

NOTE: If adjustment range is not sufficient, slacken screws on body and slide hinge. (Refer to operation: Height adjustment at hinge)

Tightening torque **41 61 3AZ** .

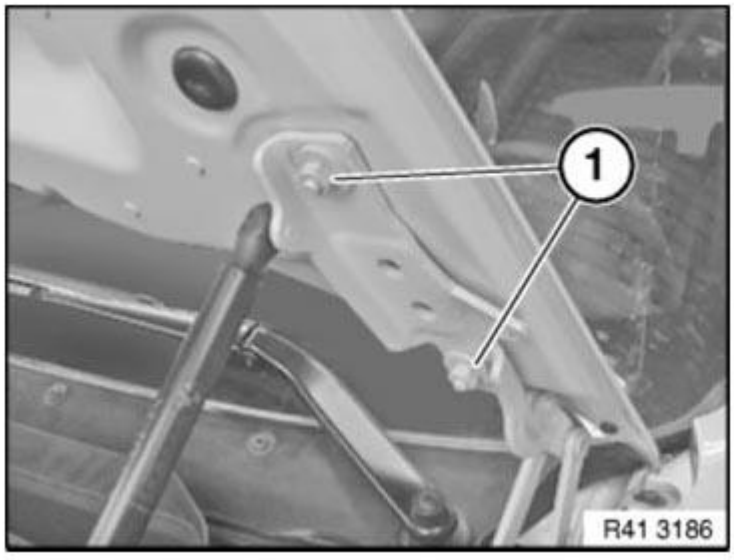


Fig. 407: Identifying Hinges Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust engine hood/bonnet sideways and lengthways.

Retaining hooks must snap into place in locks.

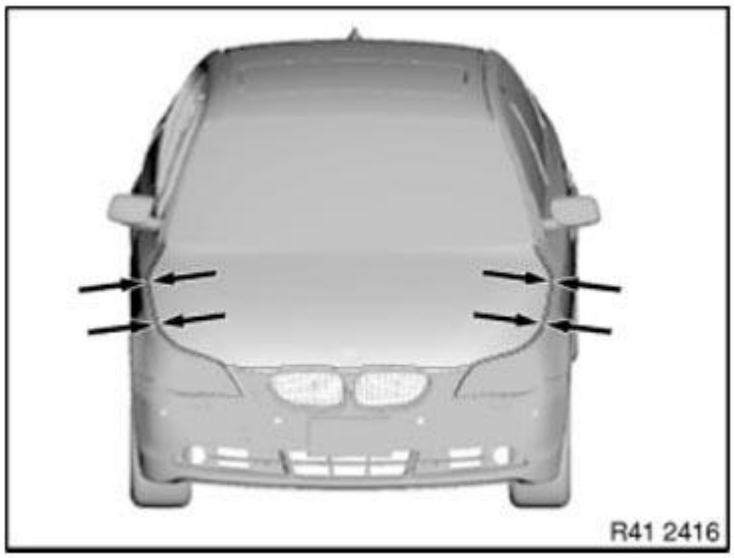


Fig. 408: Locating Engine Hood/Bonnet Adjustment Area
Courtesy of BMW OF NORTH AMERICA, INC.

Height adjustment at hinge

Slacken screws (1) and adjust engine hood/bonnet.

Tightening torque **41 61 3AZ** .

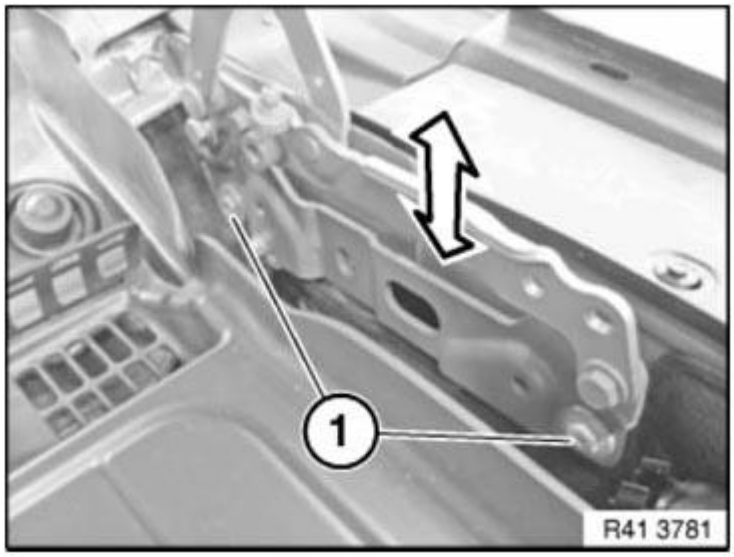


Fig. 409: Adjusting Hinge
Courtesy of BMW OF NORTH AMERICA, INC.

Height adjustment at retaining hooks

Adjust height by turning nut (1).

Height adjustment of engine hood/bonnet to side panel by means of **STOP BUFFERS** .

NOTE: The engine hood/bonnet is correctly adjusted in the front area by a combination of pulling the arrester hooks and pressing the stop buffers. Incorrect adjustment results in either wobbling of the engine hood/bonnet or sluggish unlocking.

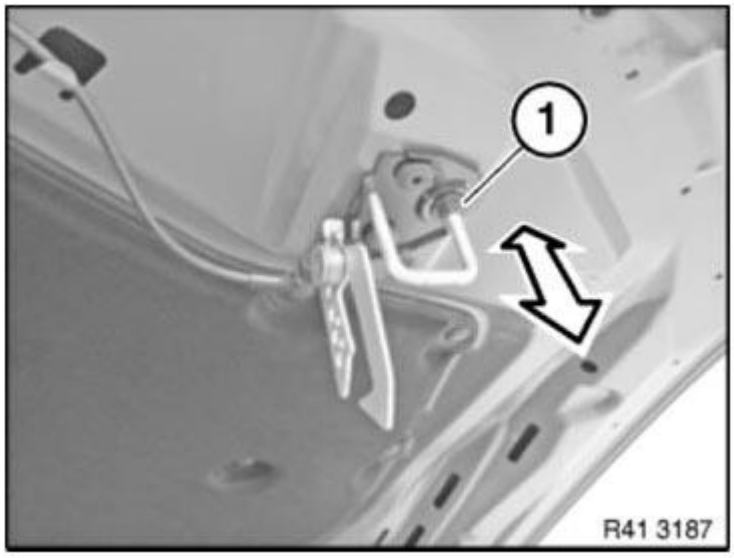


Fig. 410: Adjusting Height Using Turning Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check function of arrester hook.

After installation

- Tighten all screws and nuts to specified torque.
- Touch up unpainted surfaces in the appropriate color.
- If necessary, adjust front side panels.

51 23... CHECK ACTUATOR

Necessary preliminary tasks

- **REMOVE ACTUATOR**

Check actuator for damage.

ACTUATOR CHART

Test result	Solution
Housing (1) damaged	Replace actuator
Actuator top section (2) can not be moved by hand	Replace actuator

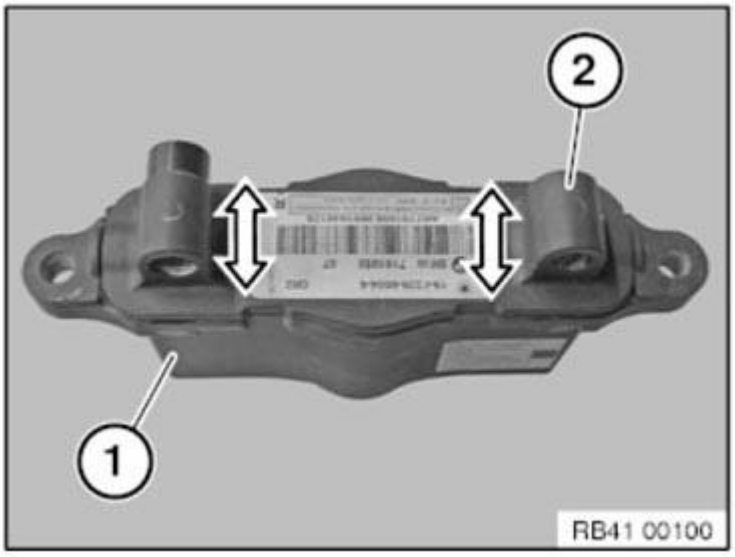


Fig. 411: Checking Actuator
Courtesy of BMW OF NORTH AMERICA, INC.

41 61... CHECK HINGE FOR ENGINE COMPARTMENT LID

Necessary preliminary tasks

- **REMOVE HINGE FOR ENGINE COMPARTMENT LID**

Open and close hinge (1).

Place hinge (1) on a level surface. Check holes (2) for parallelism with surface.

HINGE CHART

Test result	Solution
Hinge is stiff	Replace hinge
Lack of parallelism	Replace hinge

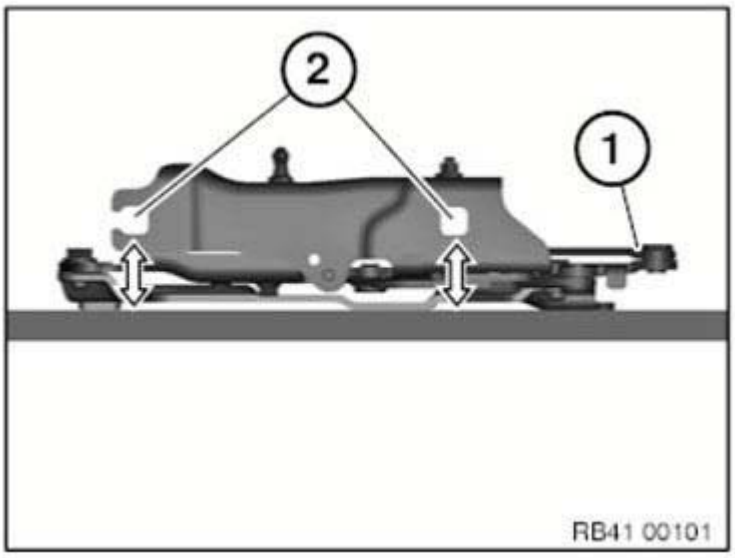


Fig. 412: Checking Hinge Holes For Parallelism With Surface
Courtesy of BMW OF NORTH AMERICA, INC.

51 23... CHECKING HOOD/BONNET LOCKS

Necessary preliminary tasks

- **Remove hood/bonnet locks** See **5123101 REMOVING AND INSTALLING/REPLACING LEFT ACTIVE ENGINE COMPARTMENT LID LOCK** and **5123111 REMOVING AND INSTALLING/REPLACING RIGHT ACTIVE ENGINE COMPARTMENT LID LOCK**

Check hood/bonnet locks for damage; replace if necessary.

HOOD/BONNET LOCKS CHART

Test result	Solution
Retaining tabs (1) bent	Replace hood/bonnet lock

Spring (2) scratched or damaged	Replace hood/bonnet lock
Movable parts stiff	Replace hood/bonnet lock

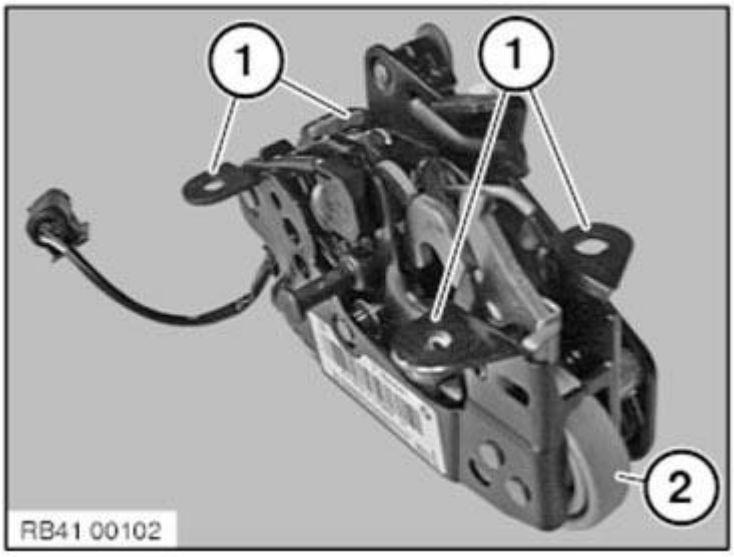


Fig. 413: Identifying Hood/Bonnet Lock Retaining Tabs And Spring
Courtesy of BMW OF NORTH AMERICA, INC.

41 61 000 REMOVING AND INSTALLING ENGINE COMPARTMENT LID

WARNING: Danger of injury!
Support engine compartment lid in fully opened position with suitable apparatus.

IMPORTANT: These instructions only apply to vehicles without active pedestrian protection ! Removal of the engine compartment lid must be carried out with the assistance of a second person.

Unscrew nuts (1).

Remove engine compartment lid.

Installation note:

Install engine compartment lid at screw locations to on hinge.

Tightening torque **41 61 1AZ** .

If necessary, adjust **ENGINE COMPARTMENT LID** .

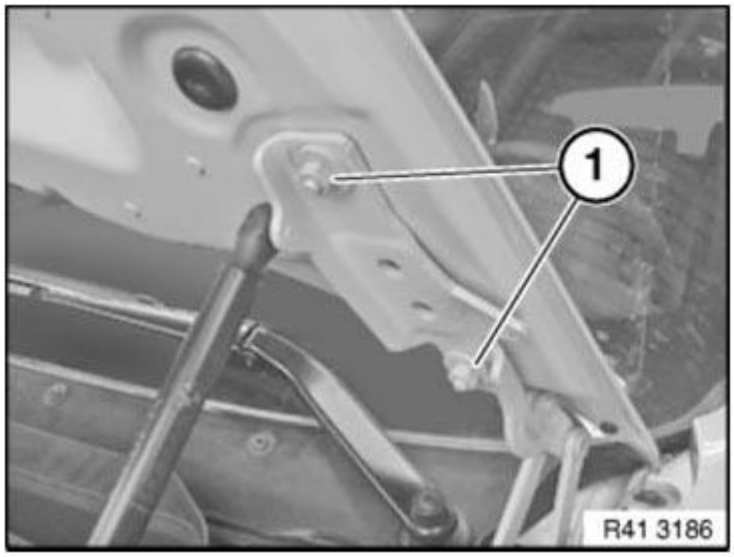


Fig. 414: Identifying Engine Compartment Lid Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

41 61 010 REMOVING AND INSTALLING ENGINE COMPARTMENT LID (ACTIVE PEDESTRIAN PROTECTION AFGS)

WARNING: Danger of injury!
The BATTERY NEGATIVE LEAD must be clamped off on vehicles with AFGS active pedestrian protection!
Adhere to the following SAFETY INFORMATION so as to avoid a danger of injury by the actuator.

IMPORTANT: Support engine compartment lid in fully opened position with suitable apparatus.
Removal of the engine compartment lid must be carried out with the assistance of a second person.

Follow instructions on **ACTIVE PEDESTRIAN PROTECTION** system.

Necessary preliminary work

Vehicles **with** active pedestrian protection only:

- Disconnect **BATTERY EARTH LEAD**

Unscrew nuts (1).

Remove engine compartment lid.

Installation note:

Install engine compartment lid at screw locations to on hinge.

Tightening torque **41 61 1AZ** .

If necessary, adjust **ENGINE COMPARTMENT LID** .

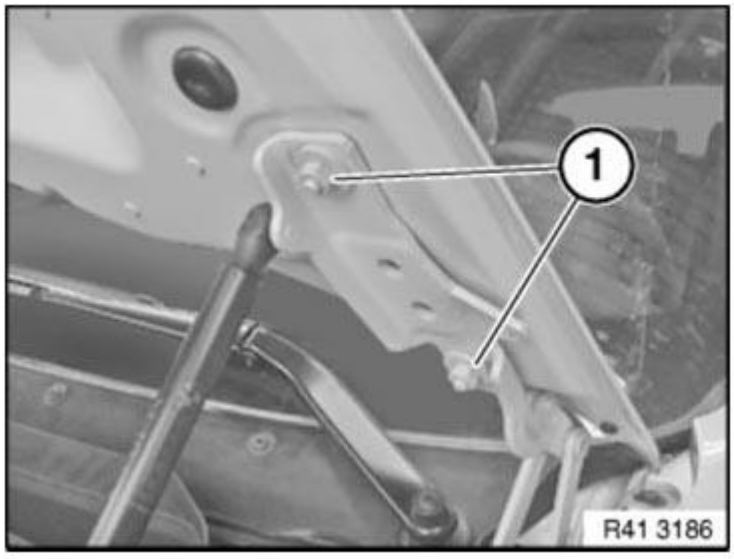


Fig. 415: Identifying Engine Compartment Lid Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

41 61 071 REMOVING AND INSTALLING/REPLACING LEFT HINGE FOR ENGINE COMPARTMENT LID (ACTIVE PEDESTRIAN PROTECTION), UP TO 09/ 2011

WARNING: Adhere to the following SAFETY INFORMATION so as to avoid a danger of injury by the actuator.
The BATTERY EARTH LEAD must be clamped off prior to work on the hinge or engine compartment lid!

IMPORTANT: When replacing the hinge, it is absolutely essential after installing to remove the retaining screws (1) fitted on the new hinge!
If the retaining screws are not removed after installation, active pedestrian protection will not function.

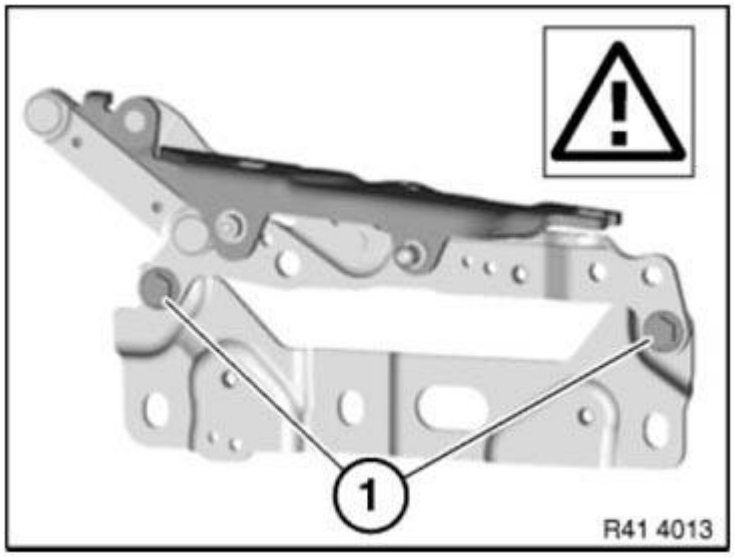


Fig. 416: Identifying Retaining Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary work

Disconnect **BATTERY EARTH LEAD**

Remove **ENGINE COMPARTMENT LID**

Remove **ACTUATOR**

NOTE: For purposes of clarity, graphic shows holder for actuator and gas pressure spring removed.

Release screws (1) and remove hinge.

Installation note:

Tightening torque **41 61 3AZ** .

ADJUST hinge together with engine compartment lid.

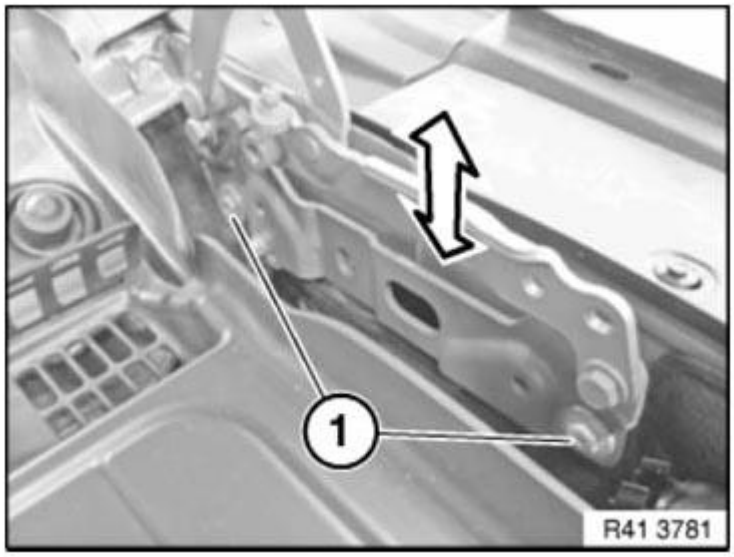


Fig. 417: Adjusting Hinge
Courtesy of BMW OF NORTH AMERICA, INC.

41 61 071 REMOVING AND INSTALLING/REPLACING HINGE FOR ENGINE COMPARTMENT LID (ACTIVE PEDESTRIAN PROTECTION), FROM 09/ 2011

WARNING: Adhere to the following SAFETY INFORMATION so as to avoid a danger of injury by the actuator.
The BATTERY EARTH LEAD must be clamped off prior to work on the hinge or engine compartment lid!

Support engine compartment lid in fully opened position with suitable apparatus. Risk of injury.

Necessary preliminary work

Disconnect **BATTERY EARTH LEAD**

Remove **GAS PROP FOR ENGINE COMPARTMENT LID**

Remove **ACTUATOR**

Position suitable cloth under engine compartment lid without gaps.

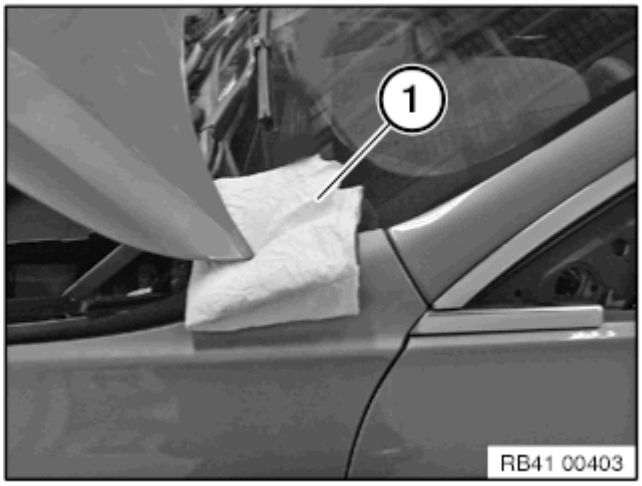


Fig. 418: Positioning Suitable Cloth Under Engine Compartment Lid
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: After screws have been slackened no lateral forces must be exerted on the engine compartment lid! Secure engine compartment lid with a second person.

Release screws (1).

Tightening torque **41 61 1AZ** .

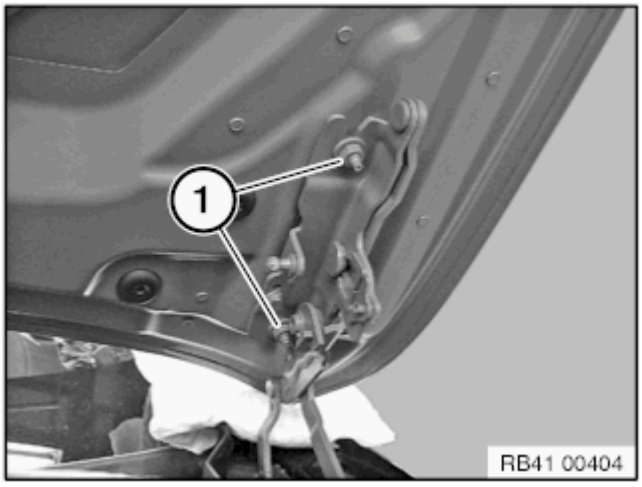


Fig. 419: Identifying Screws (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove hinge.

Tightening torque **41 61 3AZ** .

Installation note:

ADJUST hinge together with engine compartment lid.

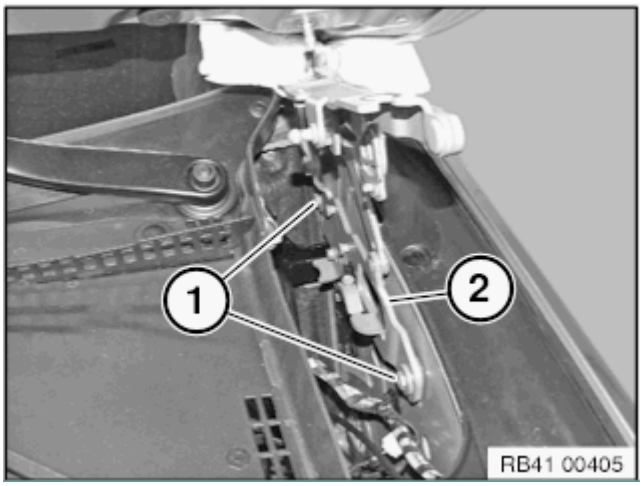


Fig. 420: Identifying Screws (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

41 61 060 REMOVING AND INSTALLING/REPLACING LEFT HINGE FOR ENGINE COMPARTMENT LID (UP TO 09/ 2011)

WARNING: Support engine compartment lid in fully opened position with suitable apparatus. Risk of injury.

IMPORTANT: Observe separate procedure for vehicles with ACTIVE PEDESTRIAN PROTECTION.

Necessary preliminary work

IMPORTANT: After screws have been slackened no lateral forces must be exerted on the engine compartment lid! Secure engine compartment lid with a second person.

Unscrew nuts (1).

Tightening torque **41 61 1AZ** .

Remove **GAS PRESSURE SPRING** .

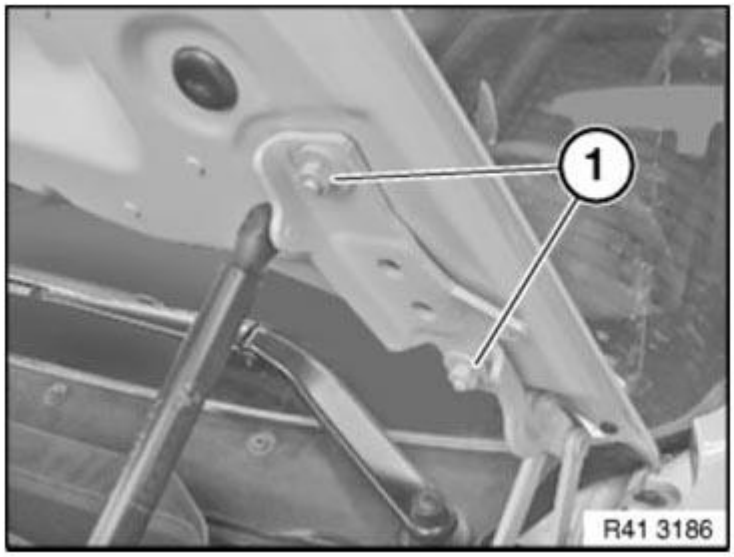


Fig. 421: Identifying Engine Compartment Lid Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove hinge.

Installation note:

Tightening torque **41 61 3AZ** .

ADJUST hinge together with engine compartment lid.

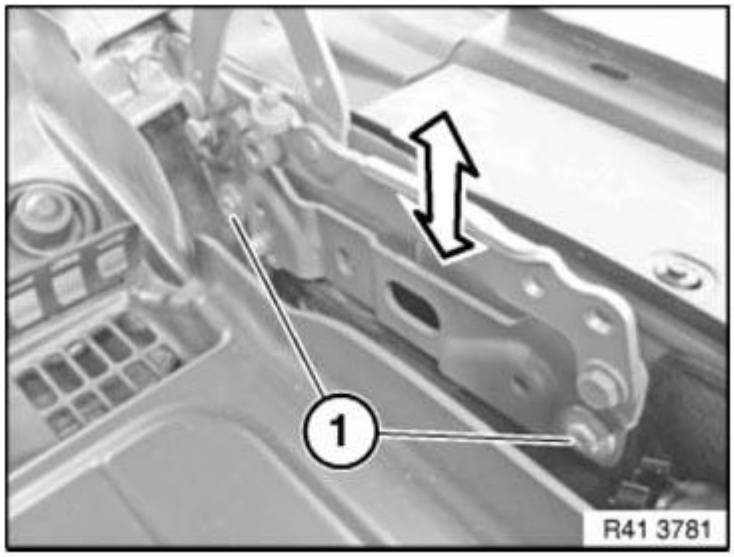


Fig. 422: Adjusting Hinge
Courtesy of BMW OF NORTH AMERICA, INC.

41 61 060 REMOVING AND INSTALLING/REPLACING LEFT HINGE FOR ENGINE COMPARTMENT LID (FROM 09/ 2011)

WARNING: Support engine compartment lid in fully opened position with suitable apparatus. Risk of injury.

IMPORTANT: Observe separate procedure for vehicles with ACTIVE PEDESTRIAN PROTECTION.

Necessary preliminary work

Remove **GAS PROP FOR ENGINE COMPARTMENT LID**

Position suitable cloth under engine compartment lid without gaps.

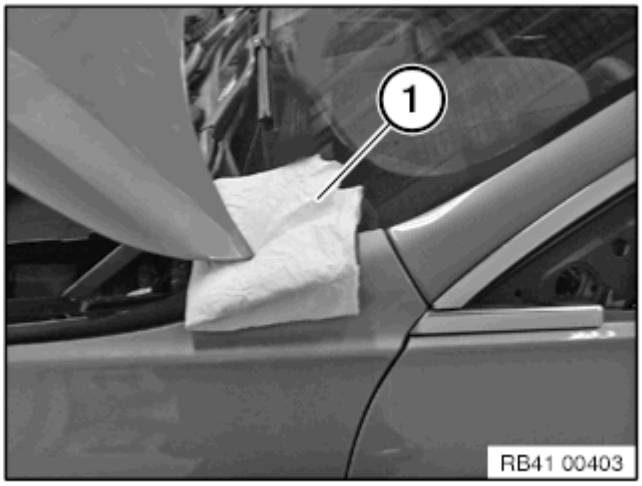


Fig. 423: Positioning Suitable Cloth Under Engine Compartment Lid
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: After screws have been slackened no lateral forces must be exerted on the engine compartment lid! Secure engine compartment lid with a second person.

Release screws (1).

Tightening torque **41 61 1AZ** .

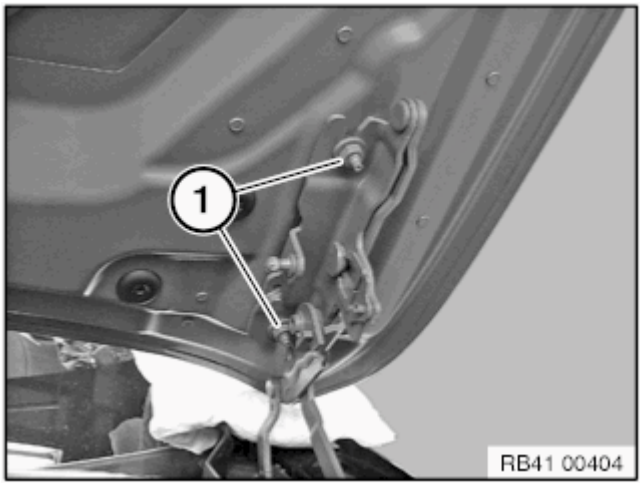


Fig. 424: Identifying Screws (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove hinge.

Tightening torque **41 61 3AZ** .

Installation note:

ADJUST hinge together with engine compartment lid.

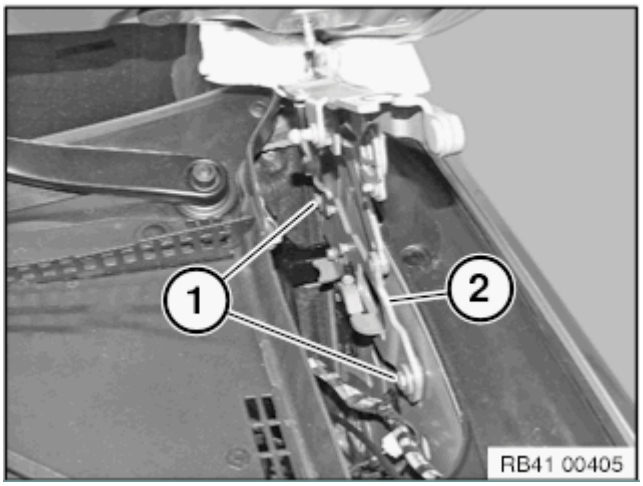


Fig. 425: Identifying Screws (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 400 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ACTUATOR (ACTIVE PEDESTRIAN PROTECTION), UP TO 09/ 2011

WARNING: Adhere to the following SAFETY INSTRUCTIONS so as to avoid a risk of injury by the actuator.

The BATTERY NEGATIVE LEAD must be clamped off prior to work on the actuator or engine compartment lid!
Do not exert any force on the actuator.
Incorrect handling may result in triggering of the actuator and thereby cause serious injury.

IMPORTANT: After the actuator has been installed, retaining screws (1) must be removed!
The retaining screws are required as aids to fitting the actuator.
If the retaining screws are not removed after the actuator has been installed, active pedestrian protection will not function.

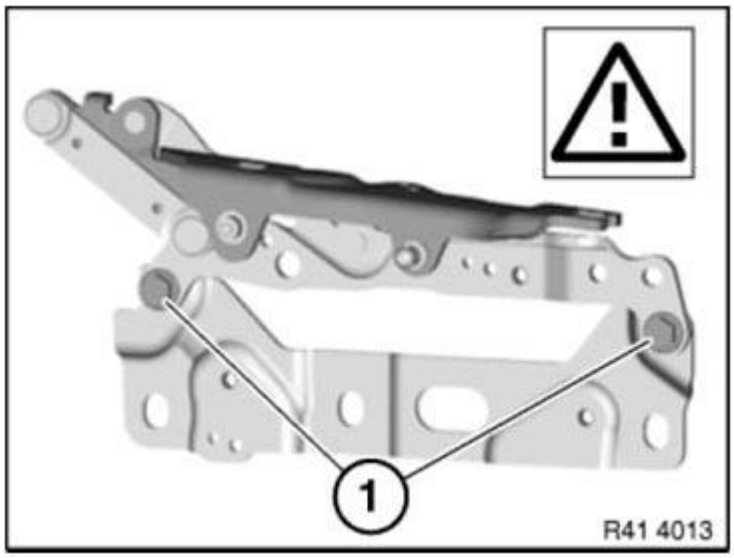


Fig. 426: Identifying Retaining Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure after actuator triggering

Necessary preliminary tasks

Disconnect **BATTERY NEGATIVE LEAD**

Remove **ENGINE COMPARTMENT LID**

Remove **GAS PRESSURE SPRING** .

Removing actuator

Remove resetter (1).

Release screws (2) and slowly raise actuator until plug on underside of actuator is accessible.

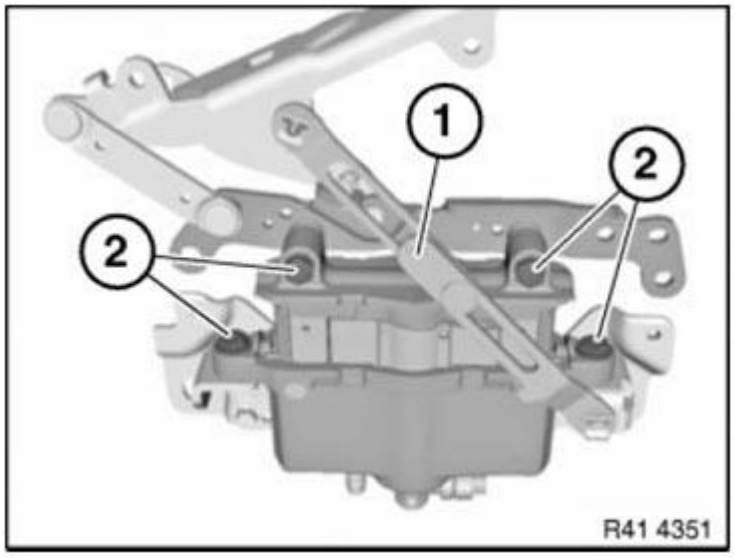


Fig. 427: Identifying Resetter And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull lock (1) in direction of arrow.

Then press together plug locks on both sides and detach plug (2).

Installation:

PROCEDURE after actuator triggering.

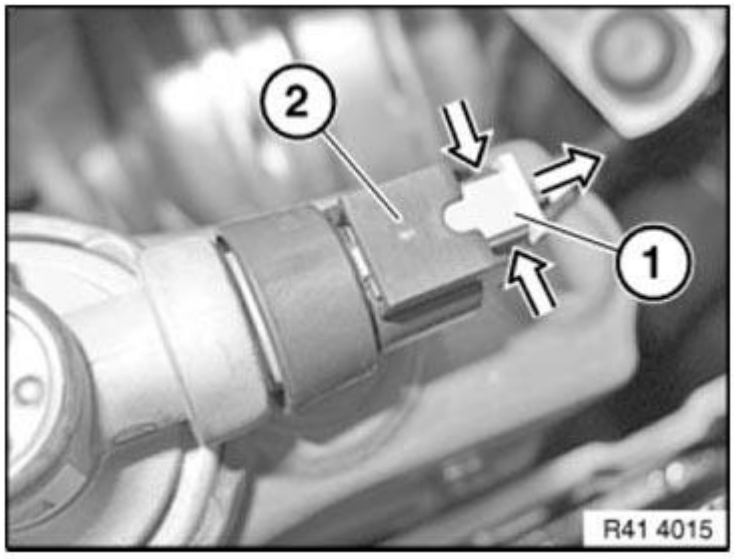


Fig. 428: Pulling Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Installing actuator

Screw hinge upper section to hinge lower section.

To do so, insert M 8 retaining screws (1) and tighten down.

IMPORTANT: After the actuator has been installed, retaining screws (1) must be removed again!

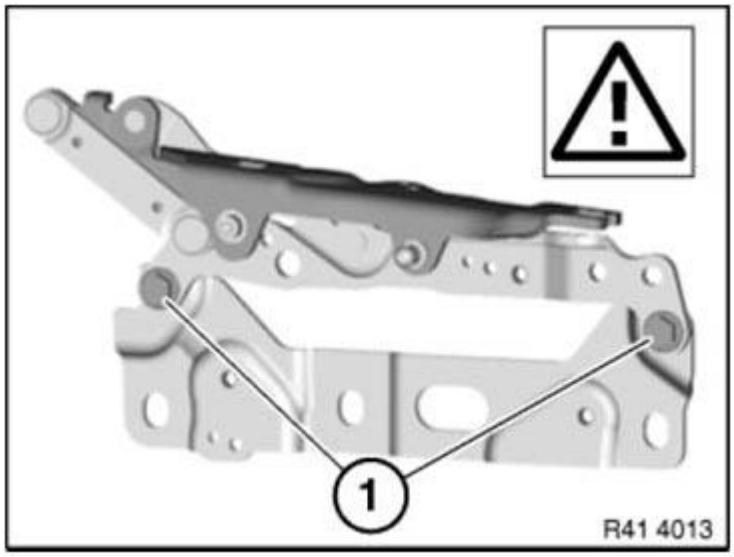


Fig. 429: Identifying Retaining Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Connect plug (1) to actuator.

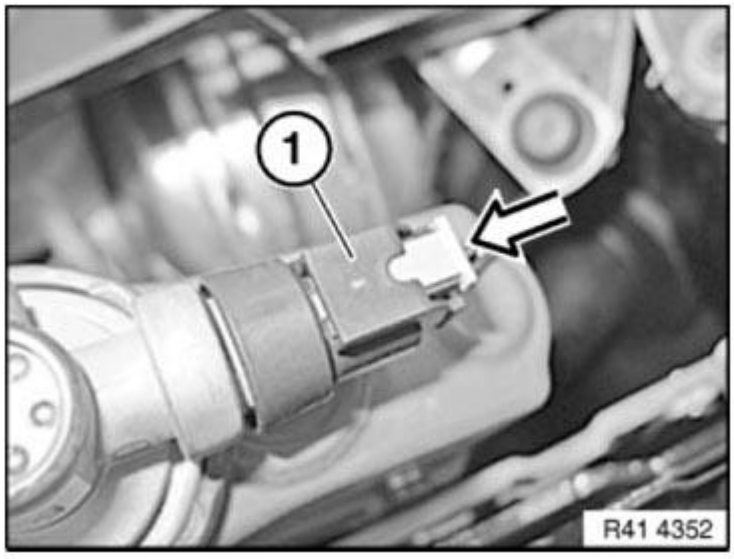


Fig. 430: Connecting Plug To Actuator
Courtesy of BMW OF NORTH AMERICA, INC.

Secure actuator screws (1).

Tighten screws hand-tight only.

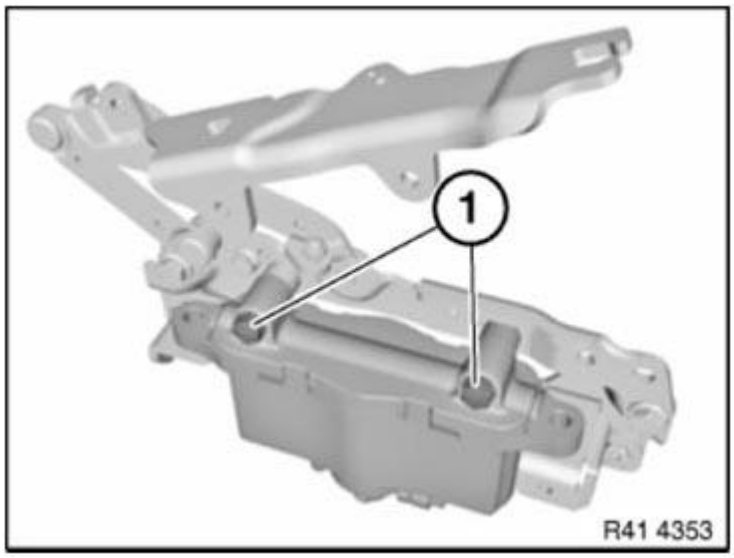


Fig. 431: Identifying Actuator Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (1) and tighten down

Tightening torque **41 61 5AZ** .

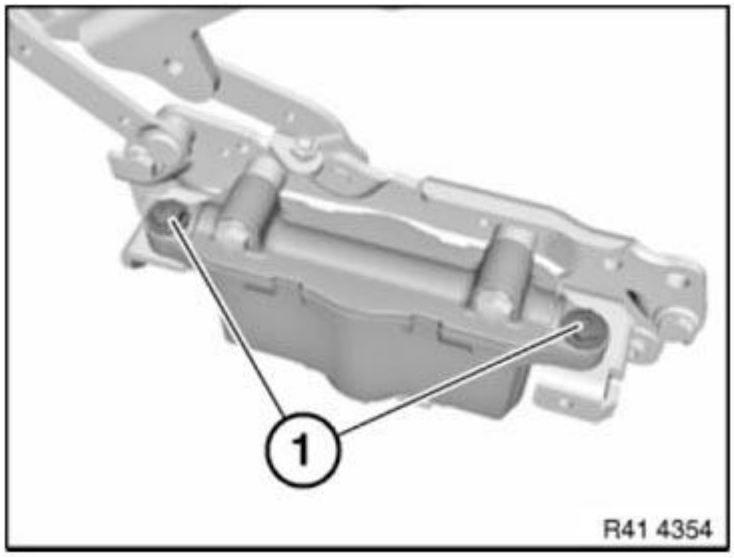


Fig. 432: Identifying Actuator Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screws (1).

Tightening torque **41 61 4AZ** .

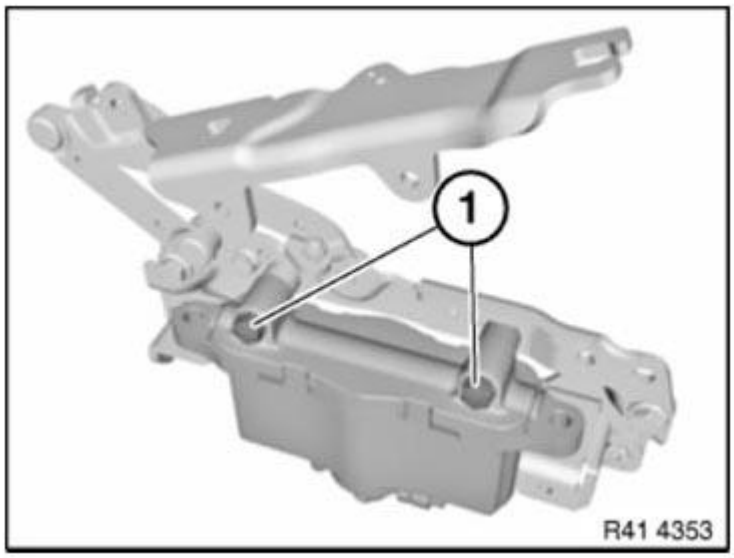


Fig. 433: Identifying Actuator Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Fit resetter (2).

Remove retaining screws (1).

IMPORTANT: After the actuator has been installed, retaining screws (1) must be removed again!
If the retaining screws are not removed after the actuator has been installed, active pedestrian protection will not function.

Seal holes of retaining screws with protective caps.

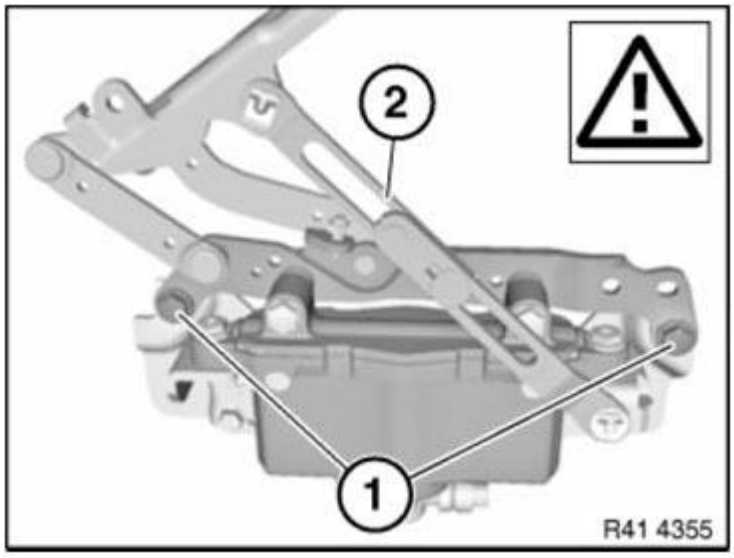


Fig. 434: Identifying Retaining Screws And Resetter
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 400 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ACTUATOR (ACTIVE PEDESTRIAN PROTECTION), FROM 09/ 2011

WARNING: Adhere to the following SAFETY INSTRUCTIONS so as to avoid a risk of injury by the actuator.
The BATTERY NEGATIVE LEAD must be clamped off prior to work on the actuator or engine compartment lid!
Do not exert any force on the actuator.
Incorrect handling may result in triggering of the actuator and thereby cause serious injury.

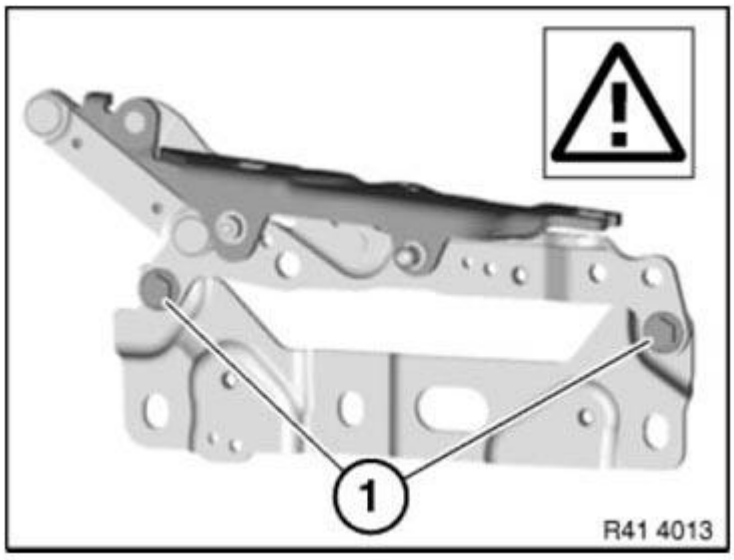


Fig. 435: Identifying Retaining Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary work:

Disconnect **BATTERY NEGATIVE LEAD**

Unlock plug connection (1) and disconnect.

Release bolt (2) and remove actuator (3).

Tightening torque **41 61 8AZ** .

Comply with notes regarding handling **ACTIVE PEDESTRIAN PROTECTION**.

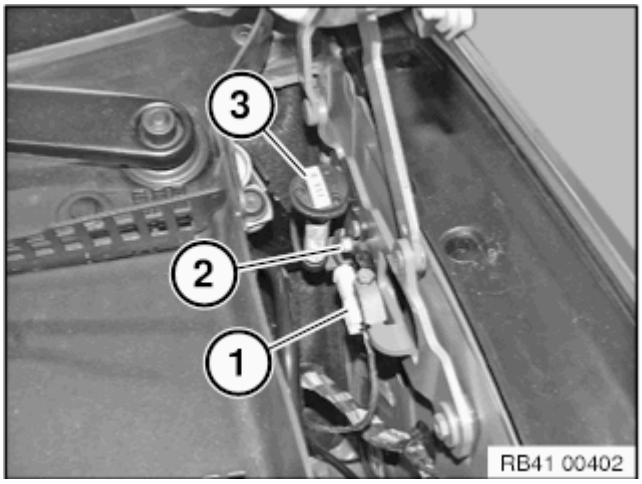


Fig. 436: Removing Actuator
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 400 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ACTUATOR (ACTIVE PEDESTRIAN PROTECTION, NOT DEPLOYED), UP TO 09/ 2011

WARNING: Adhere to the following SAFETY INSTRUCTIONS so as to avoid a risk of injury by the actuator.
The BATTERY NEGATIVE LEAD must be clamped off prior to work on the actuator or engine compartment lid!
Do not exert any force on the actuator.
Incorrect handling may result in triggering of the actuator and thereby cause serious injury.

IMPORTANT: After the actuator has been installed, retaining screws (1) must be removed!
The retaining screws are required as aids to fitting the actuator.
If the retaining screws are not removed after the actuator has been installed, active pedestrian protection will not function.

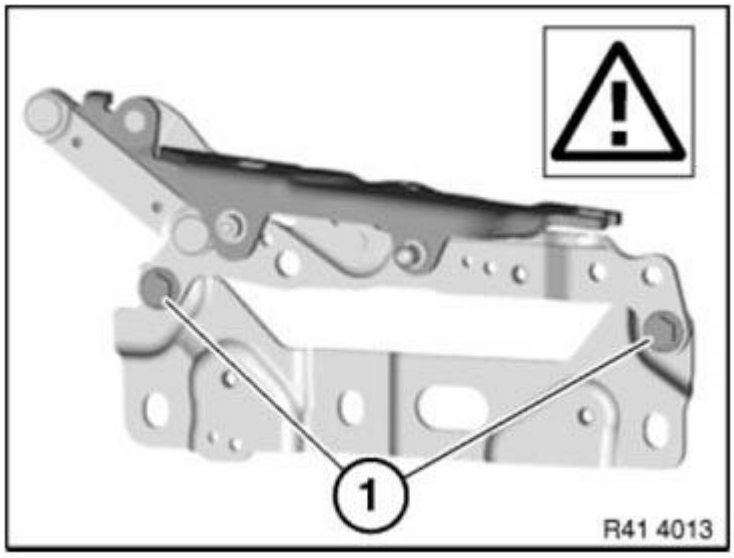


Fig. 437: Identifying Retaining Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Actuator procedure not activated:

Necessary preliminary work:

Disconnect **BATTERY NEGATIVE LEAD**

NOTE: When the actuators have not activated, the front flap and gas pressure springs do not have to be removed.

Removing actuator

Remove protective caps and screw in and tighten retaining screws M8 (1).

Remove resetter (2).

NOTE: The retaining screws are required as aids to fitting the actuator. After the actuator has been installed, retaining screws must be removed again!

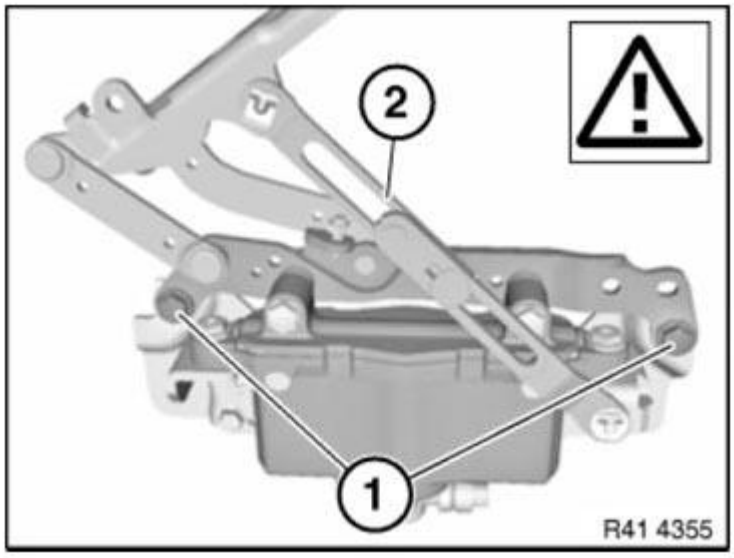


Fig. 438: Identifying Retaining Screws And Resetter
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and slowly raise actuator (2) until connector on underside of actuator is accessible.

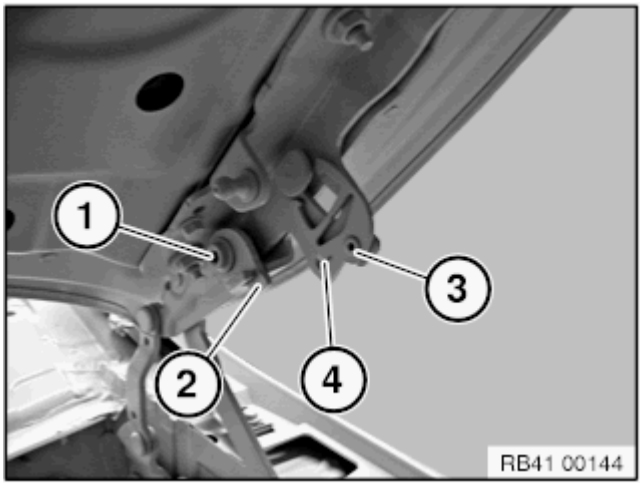


Fig. 439: Identifying Actuator And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull lock (1) in direction of arrow.

Then press together connector fastener on both sides and detach connector (2).

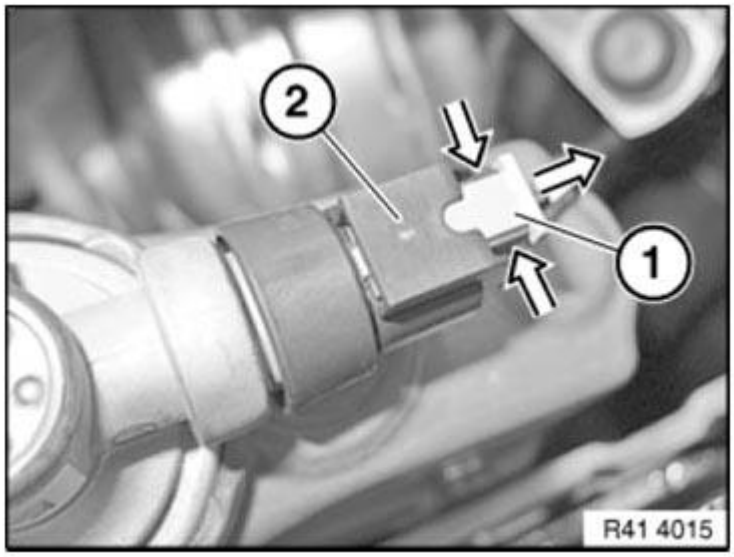


Fig. 440: Pulling Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Installing actuator

Connect plug (1) to actuator.

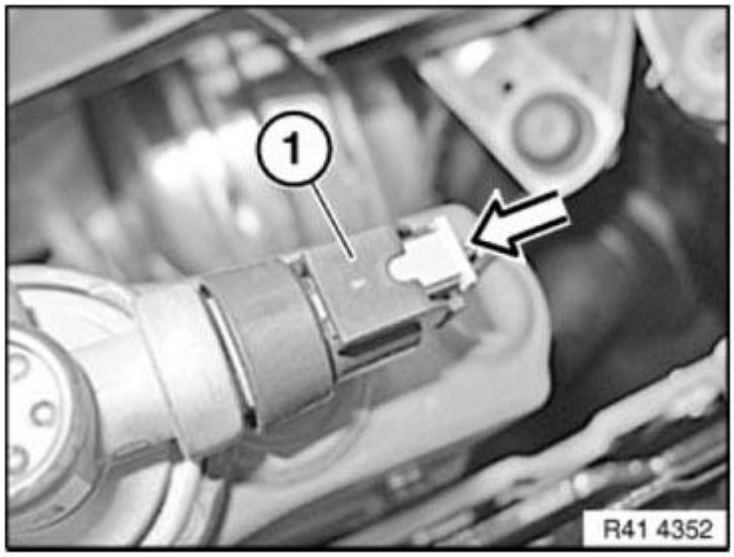


Fig. 441: Connecting Plug To Actuator
Courtesy of BMW OF NORTH AMERICA, INC.

Secure actuator screws (1).

Tighten screws hand-tight only .

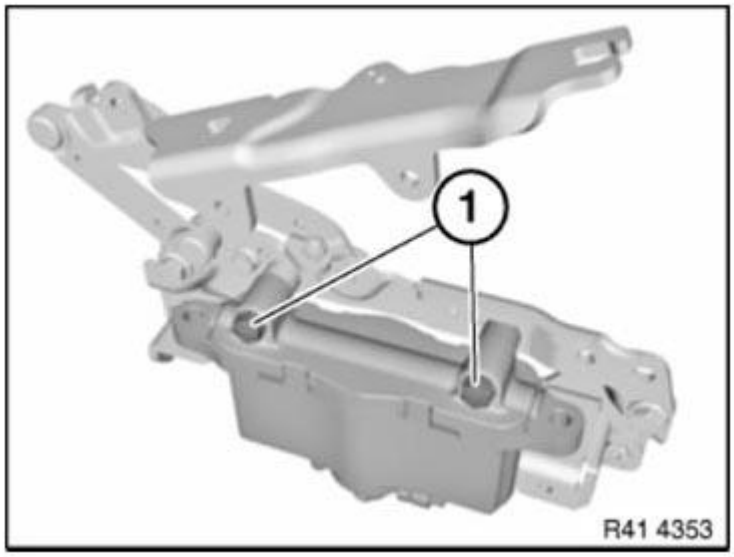


Fig. 442: Identifying Actuator Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (1) and tighten down

Tightening torque **41 61 5AZ** .

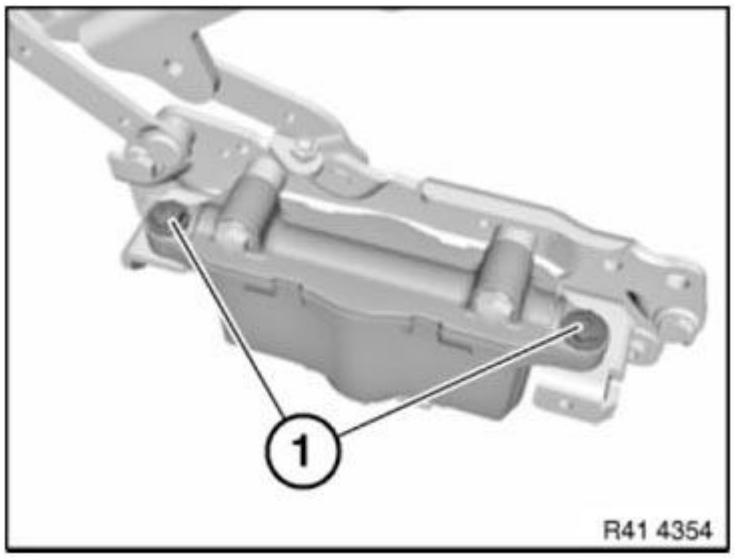


Fig. 443: Identifying Actuator Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screws (1).

Tightening torque **41 61 4AZ** .

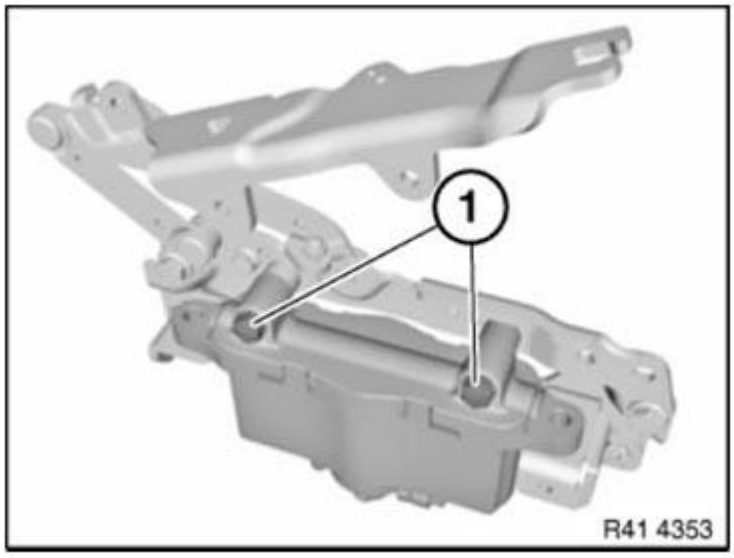


Fig. 444: Identifying Actuator Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Fit resetter (2).

Remove retaining screws (1).

IMPORTANT: After the actuator has been installed, retaining screws (1) must be removed again!
If the retaining screws are not removed after the actuator has been installed, active pedestrian protection will not function.

Seal holes of retaining screws with protective caps.

Comply with notes regarding handling **ACTIVE PEDESTRIAN PROTECTION**.

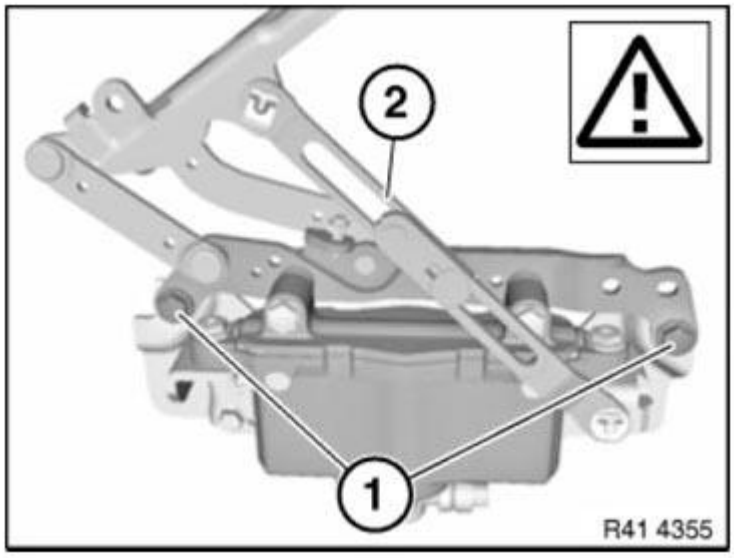


Fig. 445: Identifying Retaining Screws And Resetter
Courtesy of BMW OF NORTH AMERICA, INC.

41 61 543 REPAIRING BOTH HINGES FOR ENGINE COMPARTMENT LID (FROM 09/11)

WARNING: Adhere to the following SAFETY INSTRUCTIONS so as to avoid a risk of injury by the actuator.
The BATTERY NEGATIVE LEAD must be clamped off prior to work on the actuator or engine compartment lid!
Use suitable tool to support bonnet in the fully opened position. Risk of injury.

Necessary preliminary work:

Disconnect **BATTERY NEGATIVE LEAD**

The following new body parts are required (refer to BMW Electronic Parts Catalogue):

- Repair kit for engine compartment lid hinge

Raise engine compartment lid.

Release screw (1) and remove lever (2).

Drill out blind rivets (3) on both sides of vehicle and remove damping elements.

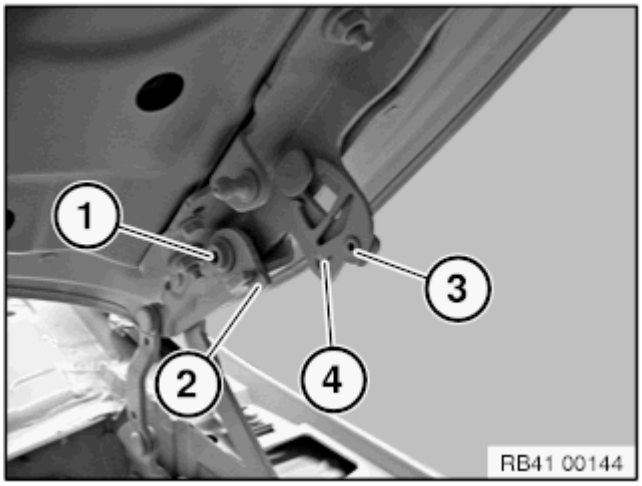


Fig. 446: Identifying Screw, Lever, And Blind Rivet
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Left-hand thread!

Release screw (1) and remove lever (2).

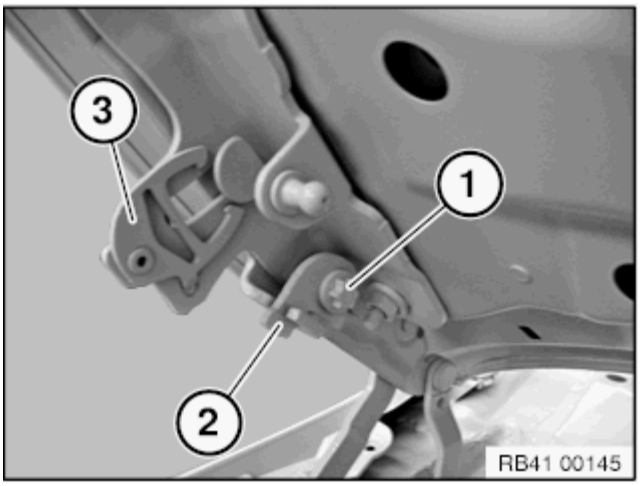


Fig. 447: Identifying Screw And Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Press back engine compartment lid to initial position. Support the engine compartment lid in the completely open position.

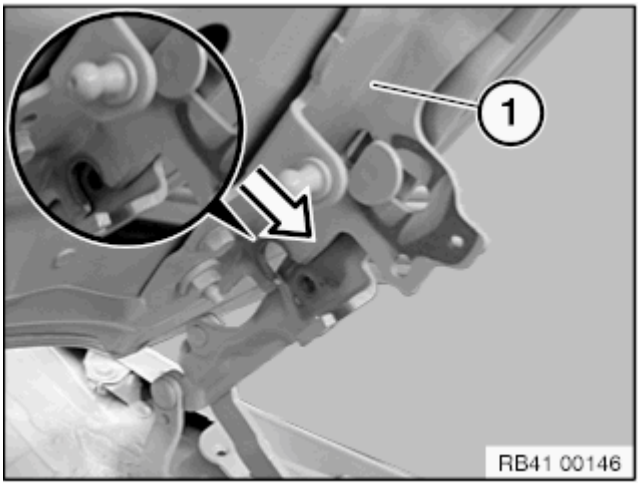


Fig. 448: Pressing Back Engine Compartment Lid To Initial Position
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Position lever (2) in recess on engine compartment lid hinge and tighten screw (1).

Tightening torque **41 61 9AZ** .

Repeat procedure on right side of vehicle.

Tightening torque **41 61 10AZ** .

Position damping elements (4). Anti-twist lock must engage in recess on hinge.

Mount blind rivet (3).

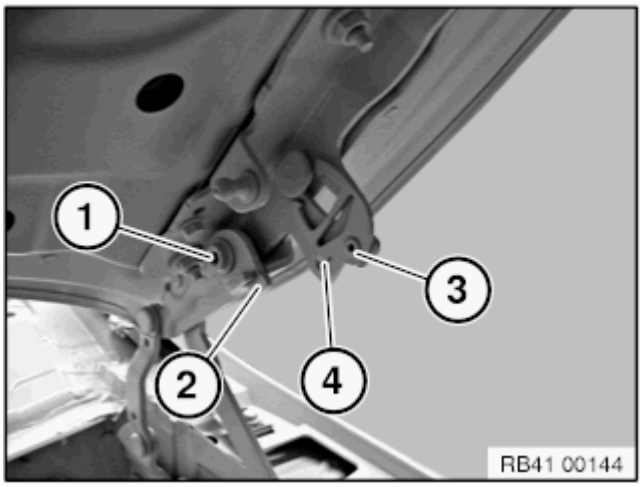


Fig. 449: Identifying Screw, Lever, Blind Rivet, And Damping Elements
Courtesy of BMW OF NORTH AMERICA, INC.

4162 REAR LID

41 62 014 ADJUSTING TAILGATE

IMPORTANT: Do not damage adjoining body parts.
Minor corrections (realignment work) are permitted if the existing adjustment options are not sufficient.

Read contents of **BODY, GENERAL** .

Observe **GAP DIMENSIONS** .

The rear lid must be provided with all attachment parts for correct adjustment.

Version with automatic rear lid actuation:

Shut down **AUTOMATIC REAR LID ACTUATION** .

IMPORTANT: Risk of damage to spindle drive: only move rear lid slowly by hand.
If necessary, REMOVE SPINDLE DRIVE

Necessary preliminary tasks:

- Remove **PANEL FOR REAR LID**

Slacken nuts (1) and (2) until such stage that the rear lid can still be moved.

Adjust rear lid laterally and longitudinally.

Tightening torque **41 62 1AZ** .

When the rear lid is closed, the striker must not touch or scrape against the rear lid lock. If necessary, remove striker.

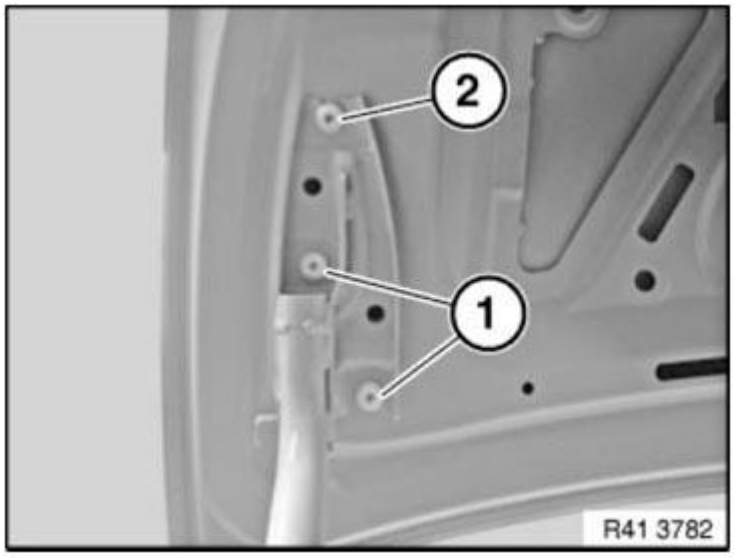


Fig. 450: Identifying Rear Lid Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting height of rear lid in relation to side panel:

- **REMOVE TENSION SPRING**
- Remove cap from opening (1).

WARNING: Risk of injury!
Secure rear lid against dropping down.

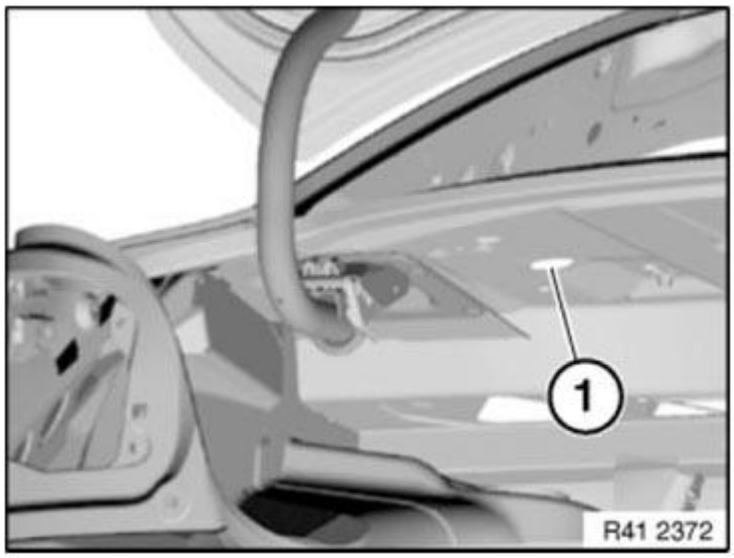


Fig. 451: Identifying Opening
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Parcel shelf is shown removed for purposes of clarity.

Slacken nut (1) with a suitable tool (SW13) until hinge can be moved.

Adjust height of rear lid.

Tightening torque **41 62 3AZ** .

Adjust **REAR LID LOCK** .

Adjust **BUMP STOPS** .

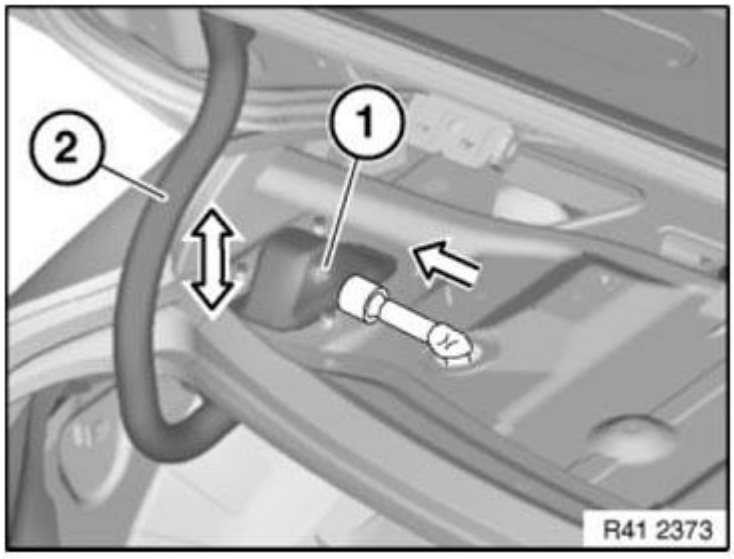


Fig. 452: Adjusting Bump Stops
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Tighten all screws and nuts to specified torque.
- Touch up unpainted surfaces in the appropriate color.
- **If reversing camera optional equipment installed:**

  Calibrate **REVERSING CAMERA** .

41 62 000 REMOVING AND INSTALLING REAR LID (TAILGATE)

Read contents of **BODY, GENERAL** .

Necessary preliminary tasks

- Remove **PANEL FOR REAR LID** .

- Disconnect all cable plug connections and pull wiring harness out of rear lid.

Carry over the work step shown symmetrically to the other side of the vehicle.

Release screws (1).

Slacken screw (2) and remove rear lid with a second person.

Tightening torque **41 62 1AZ** .

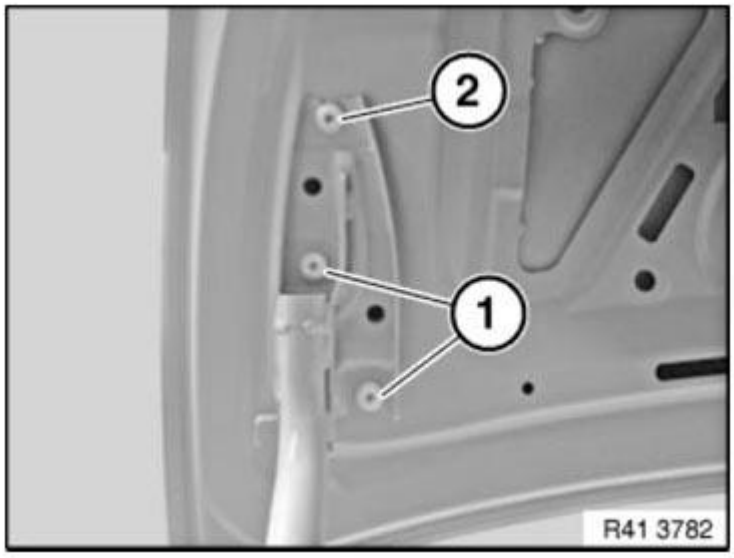


Fig. 453: Identifying Rear Lid Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install rear lid at screw locations on hinge.

If necessary, **ADJUST TRUNK LID** .

If reversing camera optional equipment installed:

Calibrate reversing camera.

41 62 043 REMOVING AND INSTALLING/REPLACING LEFT HINGE FOR TAILGATE

Read contents of **BODY, GENERAL**

Carry over schematic diagram to the relevant vehicle type.

Necessary preliminary work:

- Remove **TAILGATE**
- Remove **tension spring/spindle drive** See **5124350 REMOVING AND INSTALLING/REPLACING LEFT SPINDLE DRIVE**
- Remove **PANEL FOR STORAGE SHELF**
- Remove **luggage compartment wheel arch panel** See **5147151 REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH PANEL** .

Open screw connections (1) on vehicle.

Remove hinge.

Installation note:

Tightening torque **41 62 2AZ** .

ADJUST hinge together with tailgate.

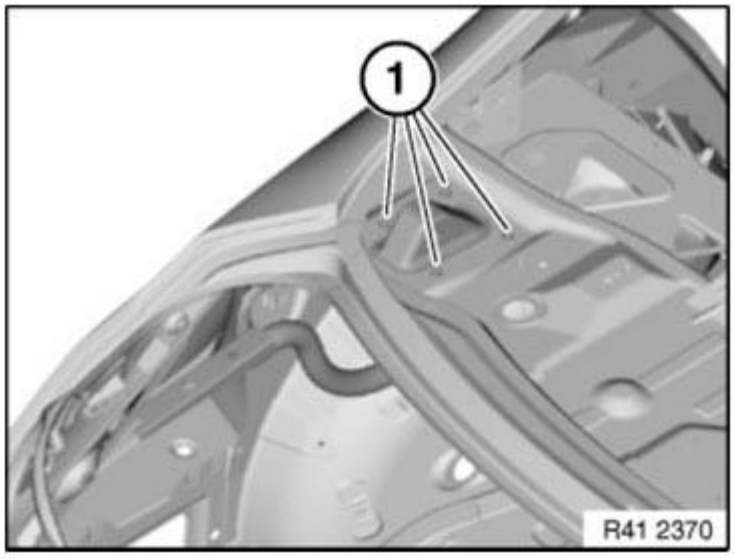


Fig. 454: Identifying Vehicle Screw Connections
Courtesy of BMW OF NORTH AMERICA, INC.

51 24 325 REMOVING AND INSTALLING/REPLACING LEFT TENSION SPRING FOR REAR LID (TAILGATE)

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT WHEEL ARCH PANEL** on left

WARNING: Support tailgate in fully opened position with suitable apparatus. Danger of injury!

Press retainer (1) together.

Ball socket (2) jumps out of ball stud.

WARNING: The tailgate will drop down if it is not supported.

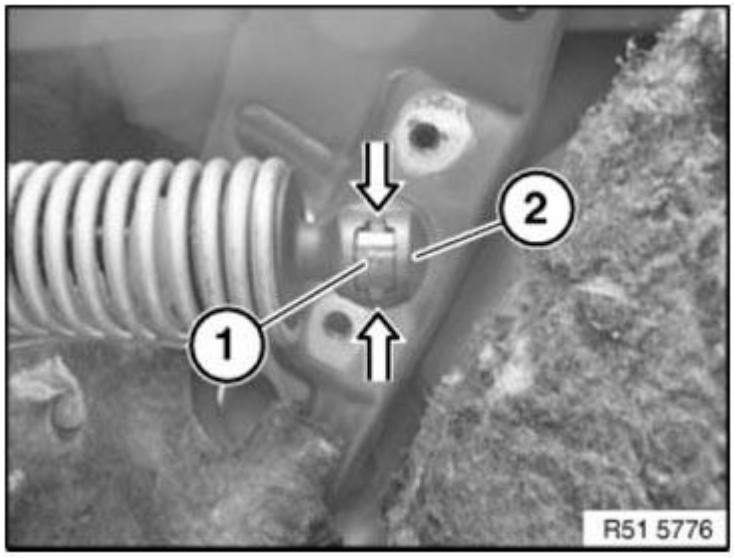


Fig. 455: Pressing Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook tension spring with damper (1) from tailgate hinge (2).

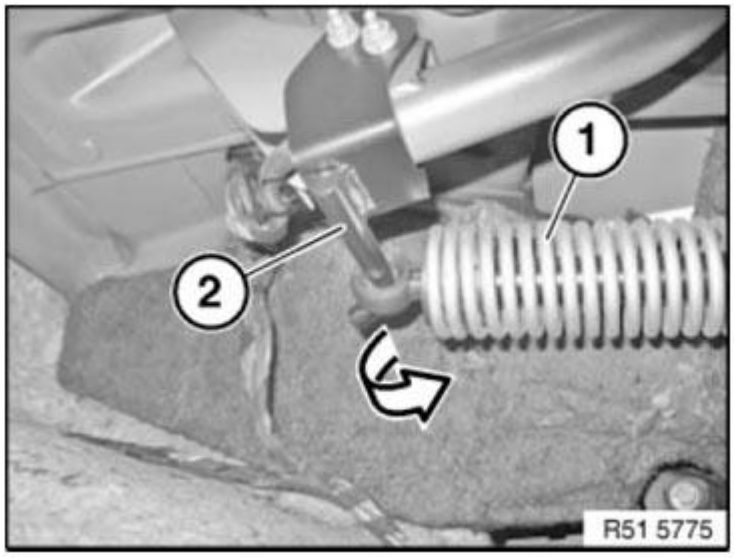


Fig. 456: Unhooking Tension Spring With Damper

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If the removed tension spring (1) is going to be installed again, the tension spring (1) may need to be bent into its original condition by hand.

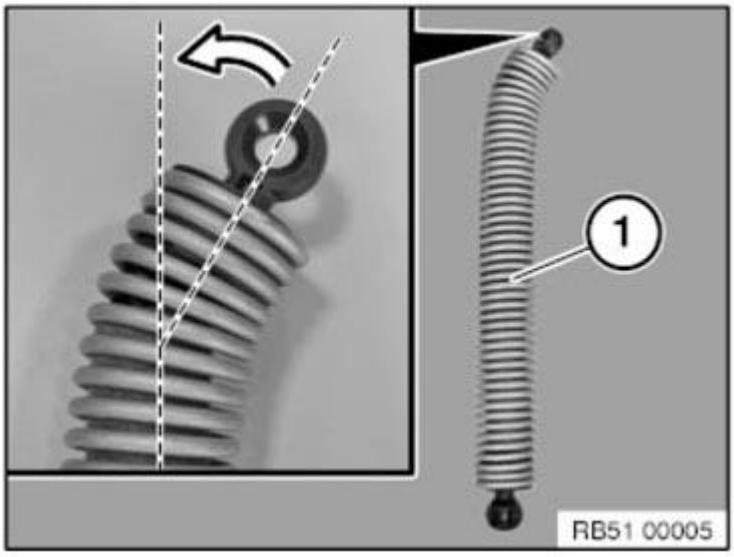


Fig. 457: Moving Tension Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows tension spring (1) in original condition.

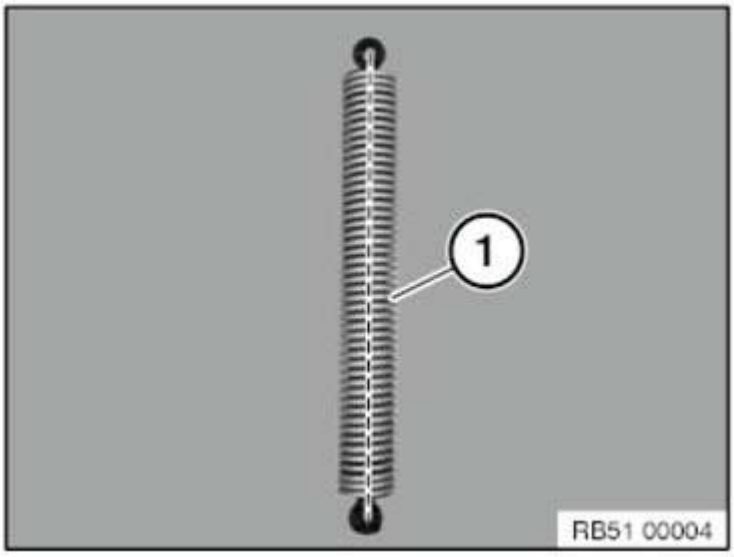


Fig. 458: Identifying Tension Spring Correct Condition
Courtesy of BMW OF NORTH AMERICA, INC.

51 24 326 REMOVING AND INSTALLING/REPLACING RIGHT TENSION SPRING WITH DAMPER FOR TAILGATE

Necessary preliminary work

- Remove right **LUGGAGE COMPARTMENT WHEEL ARCH PANEL** .

WARNING: Support tailgate in fully opened position with suitable apparatus. Danger of injury!

Press retainer (1) together.

Ball socket (2) jumps out of ball stud.

WARNING: The tailgate will drop down if it is not supported.

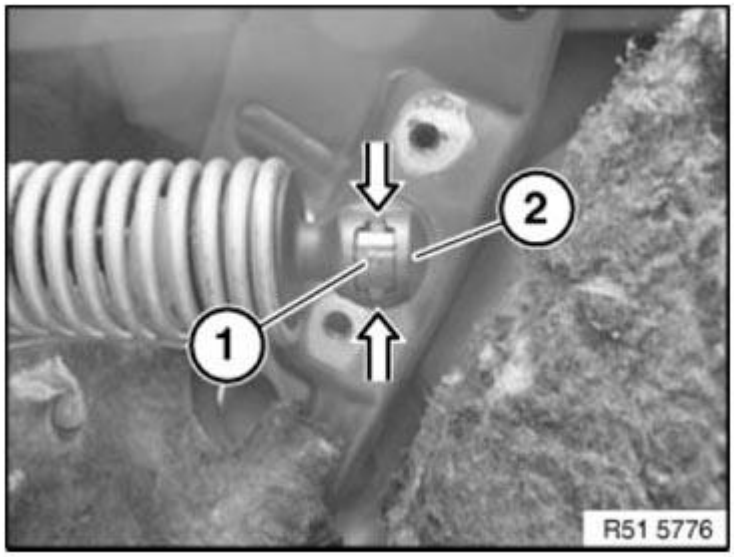


Fig. 459: Pressing Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook tension spring with damper (1) from tailgate hinge (2).

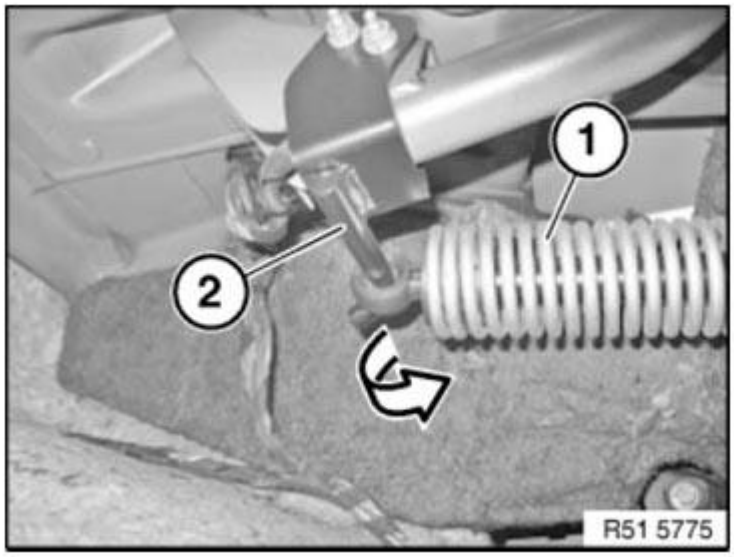


Fig. 460: Unhooking Tension Spring With Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

On refitting the tension springs (1), these have to be bent to the original condition by hand.

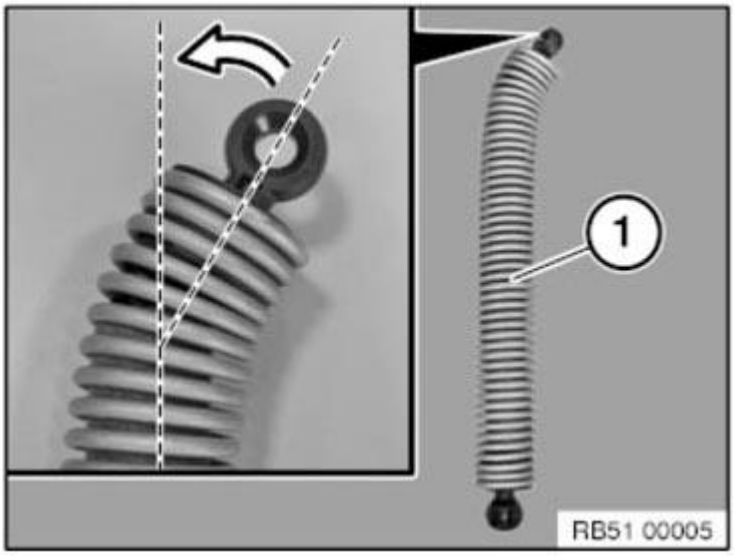


Fig. 461: Moving Tension Spring
Courtesy of BMW OF NORTH AMERICA, INC.

The graphic shows the tension springs (1) in original condition.

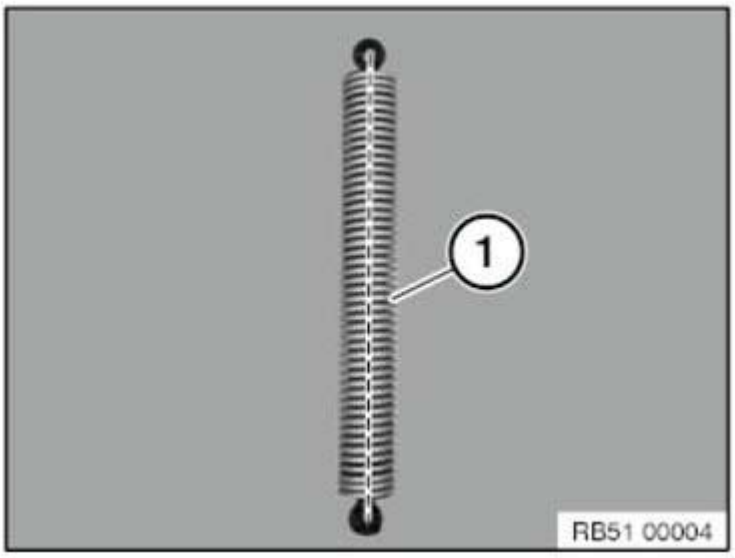


Fig. 462: Identifying Tension Spring Correct Condition
Courtesy of BMW OF NORTH AMERICA, INC.

4163 OTHER FLAPS

41 63 000 REMOVING AND INSTALLING FLAP FOR FUEL FILLER NECK

NOTE: The illustration is a schematic representation and is to be applied to the relevant vehicle type.

Open fuel filler flap.

Lever out lock (2) and detach fuel filler flap (1) in direction of arrow.

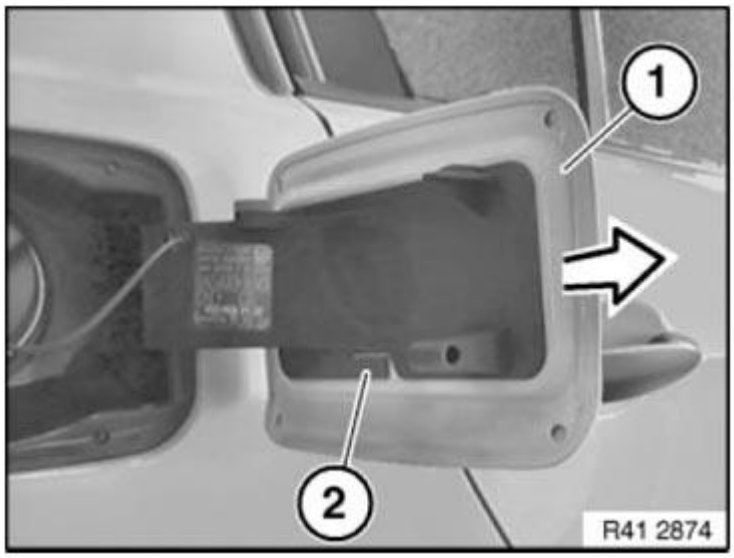


Fig. 463: Detaching Fuel Filler Flap
Courtesy of BMW OF NORTH AMERICA, INC.

41 63 003 REPLACING COVER BOWL

Necessary preliminary tasks

- Remove **FLAP FOR FUEL FILLER NECK**

NOTE: Carry over schematic representation to the relevant vehicle type.

IMPORTANT: Deformation of the sheet metal flanges in the side panel and the wheel arch results in permanent vehicle leakage. Carry out removal/installation with great care.

Following new body parts are required (refer to Electronic Parts Catalogue ETK):

- (1) Filler bowl

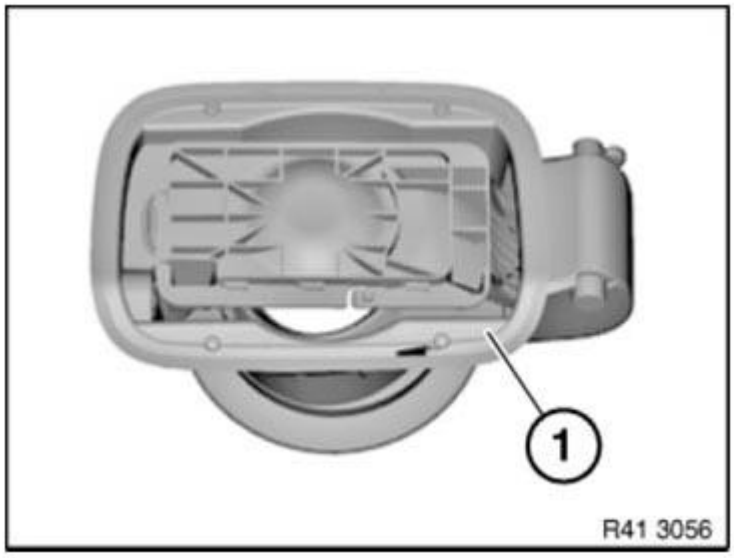


Fig. 464: Identifying Filler Bowl
Courtesy of BMW OF NORTH AMERICA, INC.

Release rubber collar (1) from cover bowl (2) by pressing inward.

NOTE: Rubber collar (1) remains attached to vehicle.

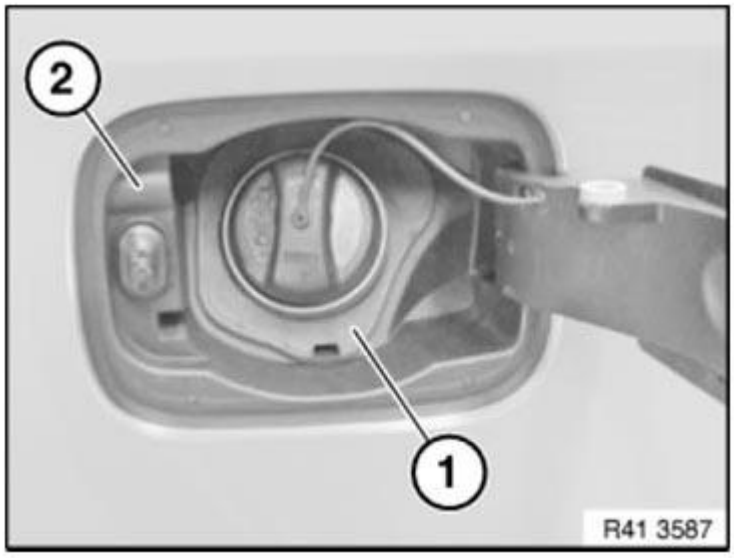


Fig. 465: Identifying Rubber Collar And Cover Bowl
Courtesy of BMW OF NORTH AMERICA, INC.

Press retaining strap (1) inwards and remove.

Remove grommets (2).

NOTE: Grommets (2) are replaced with new cover bowl.

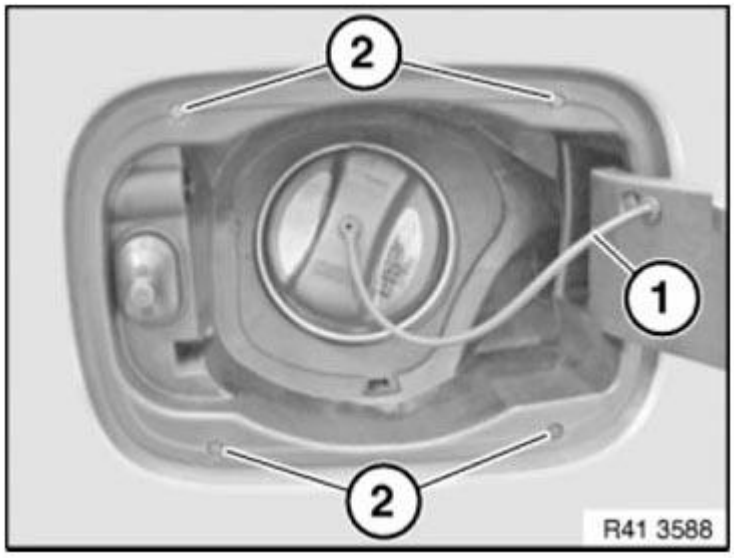


Fig. 466: Identifying Retaining Strap And Grommets
Courtesy of BMW OF NORTH AMERICA, INC.

Turn sleeve (1) through approx. 45° and pull out in direction of arrow.

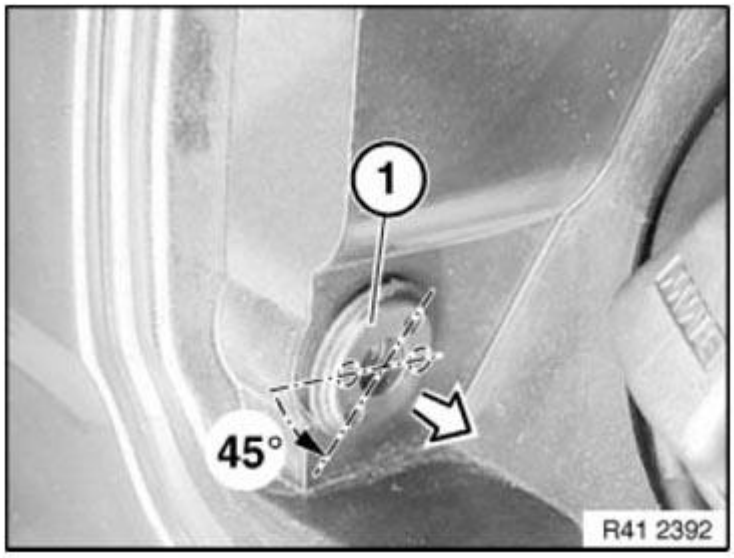


Fig. 467: Turning Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Locks (1) on left/right of cover (2) must not be damaged.

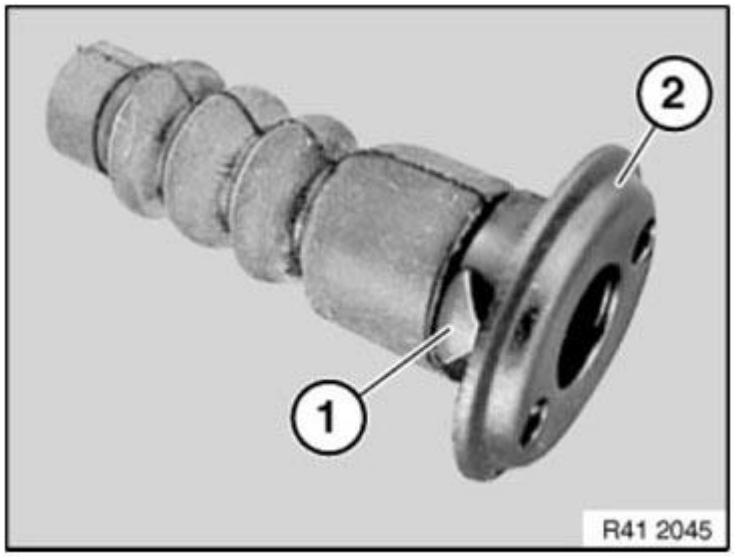


Fig. 468: Identifying Locks On Left/Right Of Cover
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, picture shows cover bowl removed.

Insert screwdriver to specified measurement a and unlock cover bowl catch.

Measurement a = approx. 10 mm

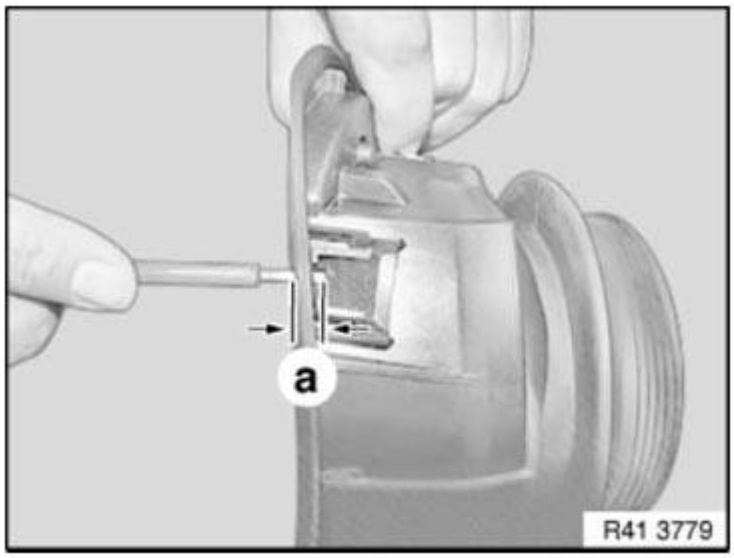


Fig. 469: Identifying Cover Bowl Catch Unlocking Measurement
Courtesy of BMW OF NORTH AMERICA, INC.

Keep cover bowl tensioned with pliers (1).

Unlock catches individually with screwdriver (2).

Unlock catches in following order:

1. Top left
2. Bottom left
3. Top right
4. Bottom right

Move screwdriver in opposite direction at both lower catches.

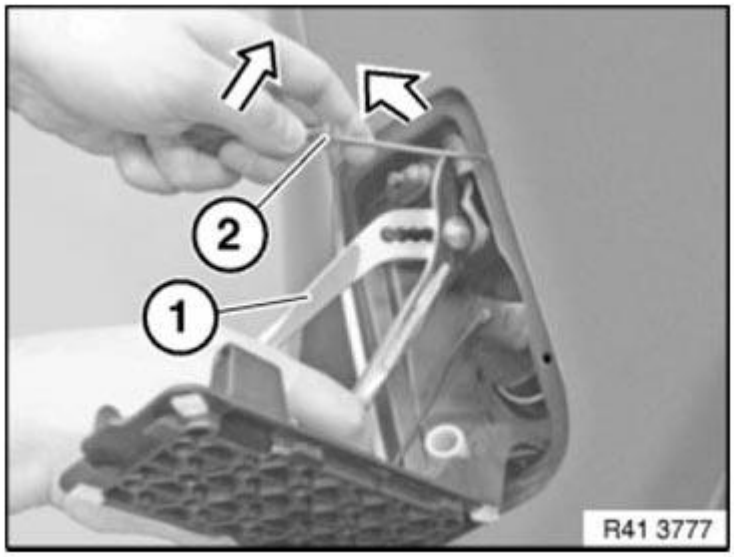


Fig. 470: Unlocking Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Close hinge arm (1).

IMPORTANT: Do not damage sheet metal flange of side panel.

Carefully twist out cover bowl (2) at first at rear in direction of arrow from side panel and remove.

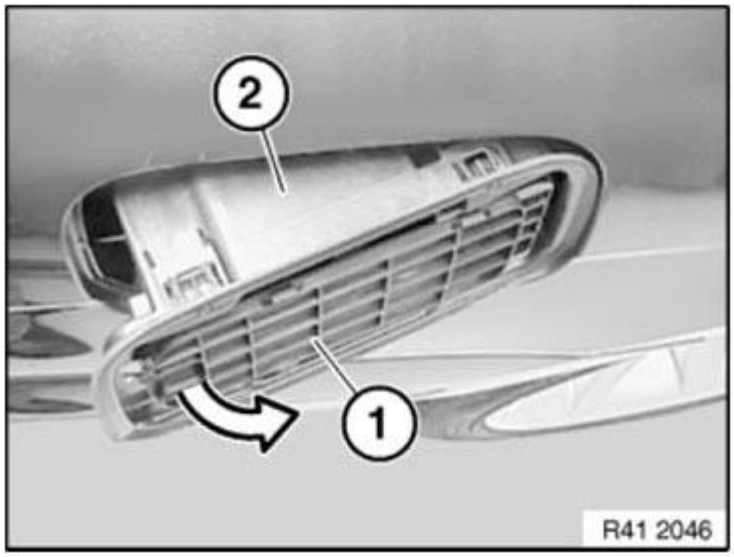


Fig. 471: Removing Cover Bowl
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Remove rubber collar (1) from new part.

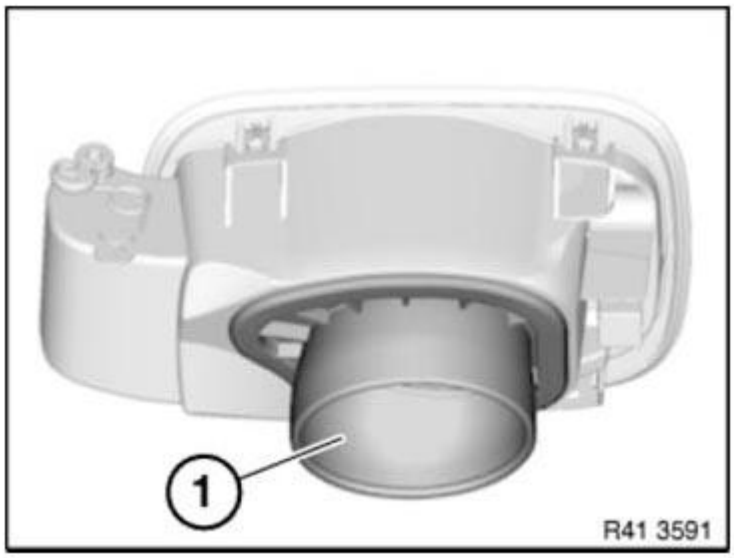


Fig. 472: Identifying Rubber Collar
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit approx. 0.5 m long cable (1) in groove on rubber collar (2).

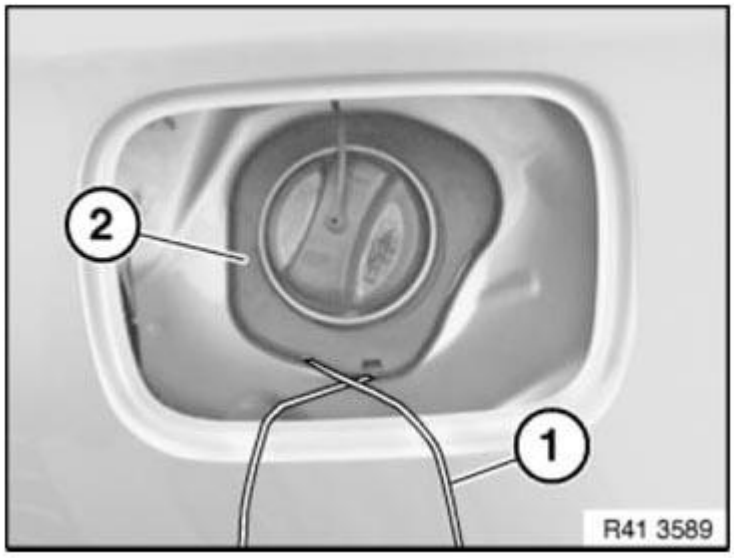


Fig. 473: Identifying Cable And Rubber Collar
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install cover bowl (1).

Thread ends of cable (2) outwards.

Align bottom rubber collar (3) with recess (see arrow).

Pull rubber collar (3) over the cover bowl by pulling the ends of cables (2).

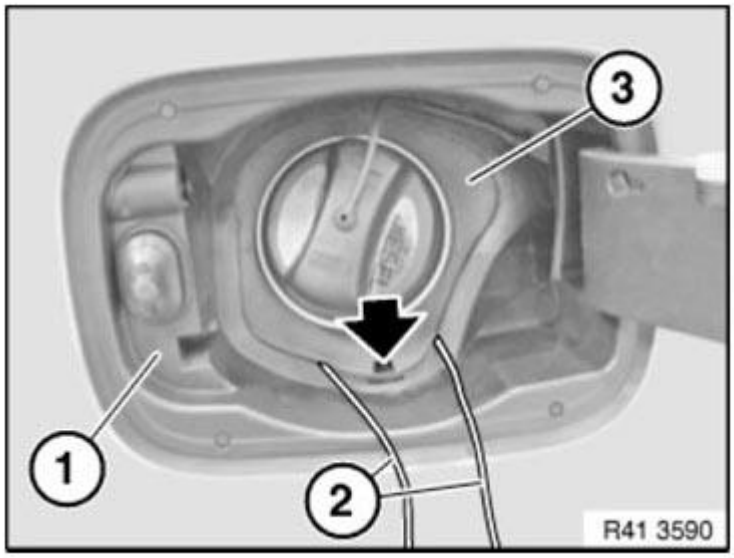


Fig. 474: Aligning Bottom Rubber Collar With Recess
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Slowly pull out cable ends (2).

Press rubber collar (1) into groove with special tool **00 9 321** .

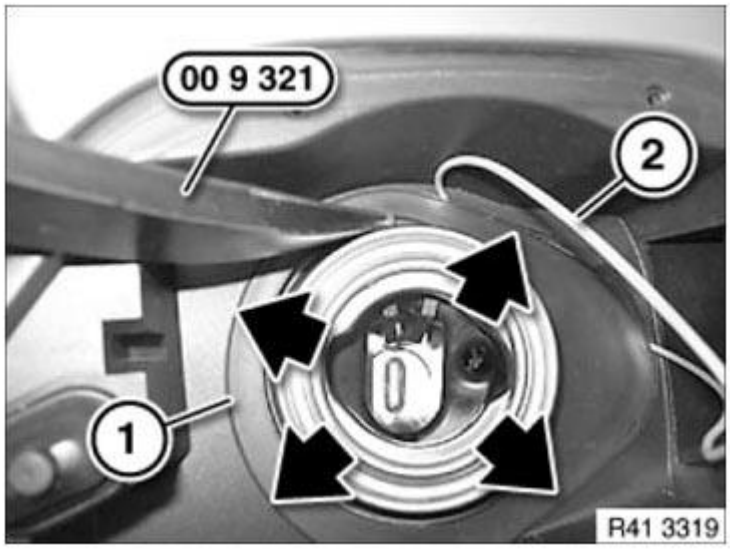


Fig. 475: Pressing Rubber Collar Into Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Cover bowl (2) must snap into place 4 times.

After installing, carefully check cover bowl at clips for secure fit.

There must be no discernible gap between the sealing lip of the cover bowl and the side panel in the area.

Make sure rubber collar (1) is correctly seated (watertightness).

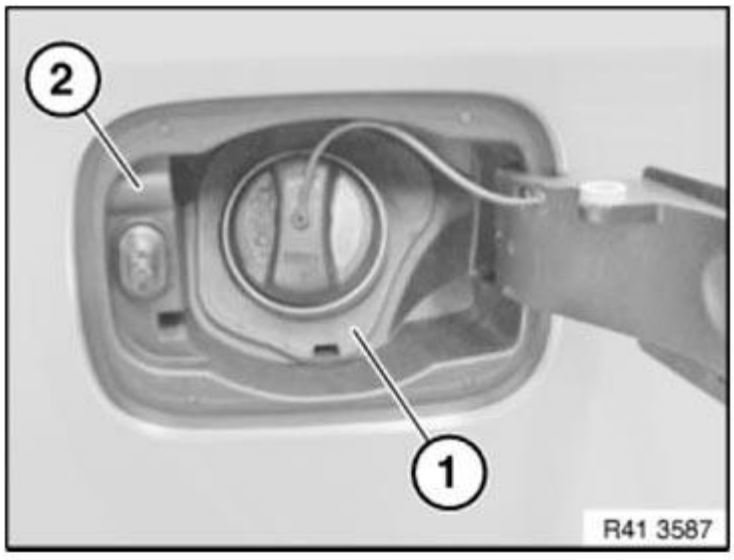


Fig. 476: Identifying Rubber Collar And Cover Bowl

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) on ejector (2) must not be damaged.

Check protective cap (3) for correct seating.

(Watertightness!)

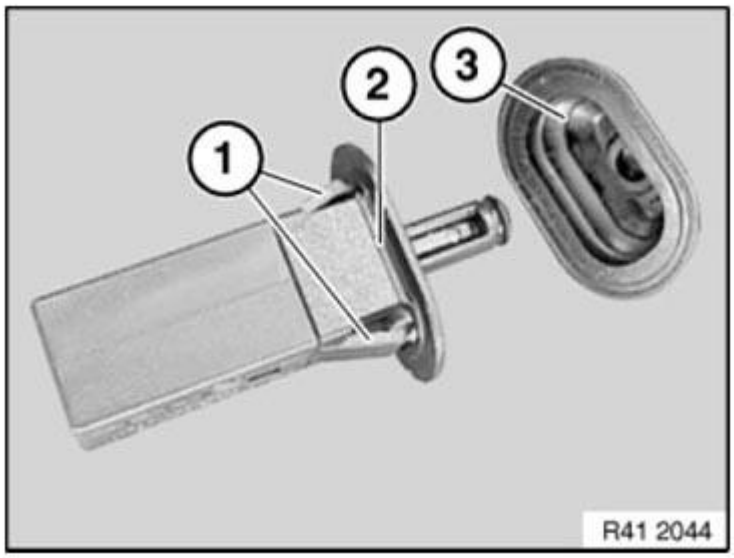


Fig. 477: Identifying Protective Cap, Ejector And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Body - Special Tools

41 BODY

413000 DEVICE

0494717 413000 Device MW

Note: (Bonding device set) For bonding the CFK roof

Consisting of:

1 = 0494718 Device

NOTE: (Bonding device)

2 = 0494719 Cartridge gun

NOTE: (Adhesive gun)

3 = 0494720 Cartridge

NOTE: (Adhesive cartridge (3 x))

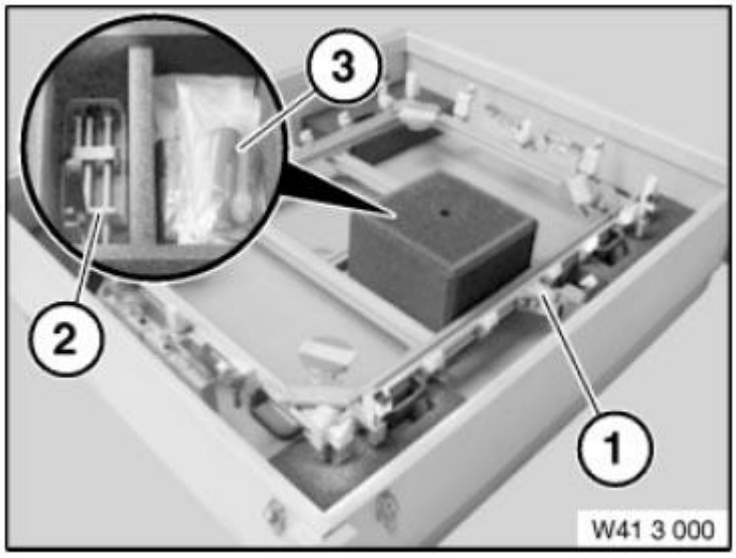


Fig. 1: Identifying Device (413000)
Courtesy of BMW OF NORTH AMERICA, INC.

410000 PUNCH ELEMENT

0495628 410000 MW Punch element

Note: (Punch numbers/letters/special characters) For punching device 41 1 000 (41 1 002)

Consisting of:

1 = 0495629 Punch element

NOTE: (Punch number 1)

2 = 0495630 Punch element

NOTE: (Punch number 2)

3 = 0495631 Punch element

NOTE: (Punch number 3)

4 = 0495632 Punch element

NOTE: (Punch number 4)

5 = 0495633 Punch element

NOTE: (Punch number 5)

6 = 0495634 Punch element

NOTE: (Punch number 6)

7 = 0495635 Punch element

NOTE: (Punch number 7)

8 = 0495636 Punch element

NOTE: (Punch number 8)

9 = 0495637 Punch element

NOTE: (Punch number 9)

10 = 0495639 Punch element

NOTE: (Punch number 0)

11 = 0495640 Punch element

NOTE: (Punch letter A)

12 = 0495641 Punch element

NOTE: (Punch letter B)

13 = 0495642 Punch element

NOTE: (Punch letter C)

14 = 0495643 Punch element

NOTE: (Punch letter D)

15 = 0495644 Punch element

NOTE: (Punch letter E)

16 = 0495645 Punch element

NOTE: (Punch letter F)

17 = 0495646 Punch element

NOTE: (Punch letter G)

18 = 0495647 Punch element

NOTE: (Punch letter H)

19 = 0495649 Punch element

NOTE: (Punch letter I)

20 = 0495650 Punch element

NOTE: (Punch letter J)

21 = 0495651 Punch element

NOTE: (Punch letter K)

22 = 0495652 Punch element

NOTE: (Punch letter L)

23 = 0495653 Punch element

NOTE: (Punch letter M)

24 = 0495654 Punch element

NOTE: (Punch letter N)

25 = 0495655 Punch element

NOTE: (Punch letter P)

26 = 0495656 Punch element

NOTE: (Punch letter R)

27 = 0495657 Punch element

NOTE: (Punch letter S)

28 = 0495659 Punch element

NOTE: (Punch letter T)

29 = 0495660 Punch element

NOTE: (Punch letter U)

30 = 0495661 Punch element

NOTE: (Punch letter V)

31 = 0495662 Punch element

NOTE: (Punch letter W)

32 = 0495663 Punch element

NOTE: (Punch letter X)

33 = 0495664 Punch element

NOTE: (Punch letter Y)

34 = 0495665 Punch element

NOTE: (Punch letter Z)

35 = 0495666 Punch element

NOTE: (Punch special character +)

ACCESSORIES AND BODY, CAB

Body - Tightening Torques

ENGINE COMPARTMENT LID

41 61 ENGINE COMPARTMENT LID

TIGHTENING TORQUE SPECIFICATION - ENGINE COMPARTMENT LID

		Type	Thread	Tightening specifications	Dimension
1AZ	Engine compartment lid to hinge	F01/F02/F03/F04/F07/F10/F11	M8		20 Nm
2AZ	Hinge upper section to hinge lower section	F01/F02/F03/F04/F07/F10/F11	M8		18.5 Nm
3AZ	Hinge lower section to body to 09/2010	F01/F02/F03/F04/F07/F10/F11	M8		20 Nm
3AZ	Hinge lower section to body, rear screw connection, from 10/2010	F01/F02/F03/F04/F07/F10/F11	M8, Stability class 10.9		28 Nm
	Front flap with active pedestrian Safety:	F01/F02/F10/F11			
4AZ	Actuator to hinge upper section	F01/F02/F10/F11	M8 x 45		17 Nm
5AZ	Actuator to holder	F01/F02/F10/F11	M8 x 24		17 Nm
6AZ	Holder to hinge lower section	F01/F02/F10/F11	M8 x 14		18.5 Nm
7AZ	Holder, damper to hinge upper section	F01/F02/F10/F11	M8 x 14		18.5 Nm

FRONT DOORS

41 51 FRONT DOORS

TIGHTENING TORQUE SPECIFICATION - FRONT DOORS

		Type	Thread	Tightening specifications	Dimension
1AZ	Hinge bolt	F01/F02/F04	M10 x 56		25 Nm
1AZ	Screw for hinge halves	F07/F10/F11	M8 x 20		28 Nm
2AZ	Door hinge to door	F01/F02/F04/F07/F10/F11	Countersunk screw, M8 x 28		20 Nm
2AZ	Door hinge to door	F03	Countersunk screw, M8 x 28		35 Nm

3AZ	Door hinge to body	F01/F02/F04/F07/F10/F11	Hexagon screw with taper, M12 x 36		66 Nm
4AZ	Door plug connection to body	F01/F02/F04/F07/F10/F11/F12/F13	M5 x 16		3 Nm

REAR DOORS

41 52 REAR DOORS

TIGHTENING TORQUE SPECIFICATION - REAR DOORS

	Type	Thread	Tightening specifications	Dimension
1AZ	Hinge bolt	F01/F02/F04	M10 x 56		25 Nm
1AZ	Screw for hinge halves	F07/F10/F11	M8 x 20		28 Nm
2AZ	Door hinge to door	F01/F02/F04/F07/F10/F11	Countersunk screw, M8 x 28		20 Nm
2AZ	Door hinge to door	F03	Countersunk screw, M8 x 28		35 Nm
3AZ	Door hinge to body	F01/F02/F04/F07/F10/F11	Hexagon screw with taper, M12 x 36		66 Nm
4AZ	Door plug connection to body	F01/F02/F04/F07/F10/F11	M5 x 16		3 Nm

REAR TRIM PANEL

41 34 REAR TRIM PANEL

TIGHTENING TORQUE SPECIFICATION - REAR TRIM PANEL

	Type	Thread	Tightening specifications	Dimension
1AZ	Support to body	F01/F02/F03/F04	M6		6 Nm
2AZ	Earth support point to body	F01/F02/F03/F04/F07/F10/F11	M6		8 Nm

REINFORCEMENT PLATE (BONDED)

41 14 REINFORCEMENT PLATE (BONDED)

TIGHTENING TORQUE SPECIFICATION - REINFORCEMENT PLATE (BONDED)

	Type	Thread	Tightening specifications	Dimension

1AZ	Cap nut to reinforcement plate	All	M5		3 Nm

SIDE WALLS

41 35 SIDE WALLS

TIGHTENING TORQUE SPECIFICATION - SIDE WALLS

		Type	Thread	Tightening specifications	Dimension
1AZ	Front side panel to body	F01/F02/F03/F04/F07/F10/F11/F12/F13/F25	M6x12		7.6 Nm
2AZ	Front side panel to body	F01/F02/F03/F04/F07/F10/F11/F12/F13	Hexagon head tapping screw ST6.3x13		7.6 Nm
			Sheet metal nut ST 6.3		7.6 Nm

TAILGATE

41 62 TAILGATE

TIGHTENING TORQUE SPECIFICATION - TAILGATE

		Type	Thread	Tightening specifications	Dimension
1AZ	Tailgate to tailgate hinge	F01/F02/F03/F04/F10	M8x19.5 8.8		18.5 Nm
		F11	ISA M8x22		18.5 Nm
		F07	M8 countersunk screw		18.5 Nm
		F07	M10 x 34		36 Nm
2AZ	Tailgate hinge to body	F01/F02/F03/F04/F10	M8 nut		18.5 Nm
		F11	ISA M8x22		27 Nm
		F11	ISA M6x12		10 Nm
		F07	M8 x 20		18.5 Nm
3AZ	Hinge bolt	F01/F02/F03/F04/F10	M8 nut		18.5 Nm
4AZ	Tailgate, lower section to hinge	F07	M8 x 17		18.5 Nm
5AZ	Hinge, tailgate, lower section to tailgate	F07	M8 nut		18.5 Nm
6AZ	Limit position, tailgate to body	F07	M6 x 21		6 Nm
		F07	M6 nut		6 Nm
		F07	M12x1.5		16 Nm

7AZ	Ball pin for gas pressure spring to body	F07	M10		36 Nm

ACCESSORIES & EQUIPMENT

Body Equipment - Operating Fluids

1.0 ADHESIVES/SEALANTS FOR GLASS

Sikaflex 255 Adhesive is a single component polyurethane with a minimum curing time of 4 hours at 72°F/22° C and 38% relative humidity.

The windshield or rear window must be installed within 10 minutes of applying the adhesive or a skin will form on the adhesive's surface and reduce the adhesive effectiveness.

Sikaflex 255, BMW Part No. 81 22 9 407 497 Cold Kit, or

Sika Ultrafast, BMW Part No. 83 19 9 407 714 in conjunction with Heater, BMW Part No. 83 19 9 407 820.

2.0 OTHER FLUIDS

Cleaning E53 black glossy exterior ornamental trim please use Meguiar's Mirror Glaze Number 9 Professional Swirl Remover 2.0

Glass treatment, all models: Aquapel® Glass Treatment, BMW Part No. 83 19 9 408 523.

3.0 CONTACT CEMENT

A powerful adhesive for leather and leatherette, rubber moldings, felt linings, insulating materials, convertible top adhesive, etc.

(former BMW Part No. 81 22 9 407 524)

3M 1357High Performance Contact Adhesive

4.0 INSTANT ADHESIVE FOR RUBBER, METAL AND PLASTIC SURFACES.

Applications: Rubber profiles on windows, doors, bumpers (soft and hard rubber), seals, inner covers, buttons and controls (plastic/plastic, plastic/steel), circuit elements (electronics), rear lights, turn indicators, ornamental strips and moldings.

(former BMW Part No. 81 22 9 407 143)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8155
Loctite	Part No. 49450

5.0 LOCTITE 380

Black cyanacrylate adhesive for joining metals, but also rubber, PVC etc.

Particularly recommended for attaching rubber door seals on the BMW 5 Series (E34). (former BMW Part No. 81 22 9 407 394)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8155
Wurth	Part No. 893 4103
Loctite	Part No. 38050

6.0 GLASS ADHESIVE

BMW Part No. 81 22 9 407 497.

7.0 PREMIUM LEATHER CARE KIT

BMW Part No. 81 11 024 455.

ACCESSORIES AND BODY, CAB

Body Equipment - Special Tools

51 BODY EQUIPMENT

512190 ADJUSTER

0494325 512190 Minimum set: Mechanical tools Adjuster MW

Note: (Door lock tensioner) For pre-tensioning front and rear door locks when installing. Change to tool through use of noise-optimized locks from 02/2004. Illustration items: 1 = knurled nut 51 2 191 2 = support 51 2 192 3 = protection 51 2 196 4 = mandrel 51 2 197

Storage Location

B44

C44

SI number

01 06 02 (864)

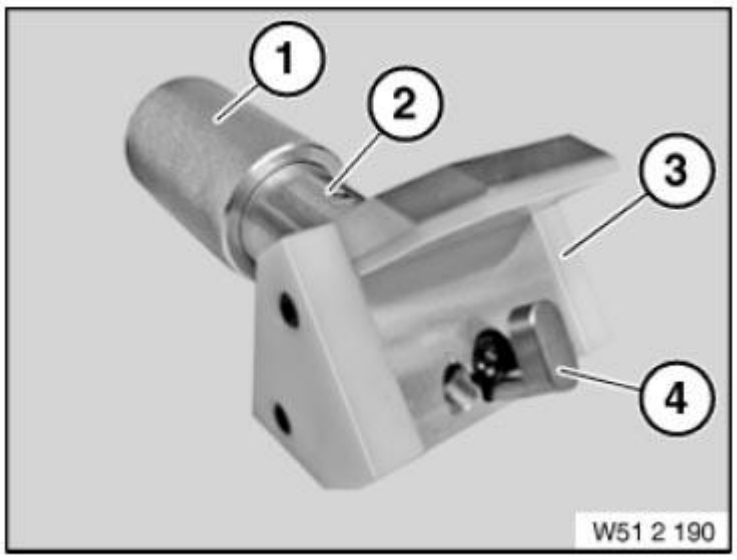


Fig. 1: Identifying Adjuster (512190)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

2 = 0494472 Guard

NOTE: Is replaced by 51 2 196 with the use of noise-optimized locks from 02/2004 Replaced by 51 2 196 (0 494 906)

2 = 0494473 Mandrel

NOTE: Is replaced by 51 2 197 with the use of noise-optimized locks from 02/2004 Replaced by 51 2 197 (0 494 907)

4 = 0494907 Mandrel

NOTE: Replaces mandrel 51 2 194

1 = 0494470 Nut

NOTE: (Knurled nut)

2 = 0494471 Support

2 = 0494474 Shaped element

NOTE: E85 (discontinued)

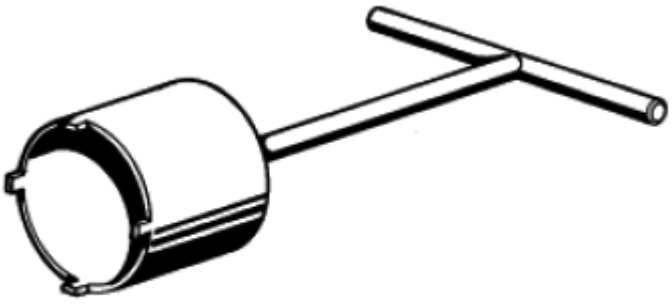
3 = 0494906 Guard

NOTE: Replaces guard 51 2 193

512040 BOX WRENCH

0492594 512040 Box Wrench MW

Note: For lock barrel screw connection (threaded ring) of tailgate E93 impact plate, tailgate



W51 2 040

Fig. 2: Identifying Box Wrench (512040)
Courtesy of BMW OF NORTH AMERICA, INC.

51 0 103 BRIDGE

51 0 103 Bridge

Note: Gantry crane

SI number

6 04 03 (046)

51 2 197 DRIFT

51 2 197 Drift

Note: Replaces drift 51 2 194

513320 FITTING AID

0496529 513320 Minimum set: Mechanical tools Fitting aid MW

Note: For correct installation of upper rubber seal on windscreen.

Storage Location

A26

SI number

01 18 08 (482)



Fig. 3: Identifying Fitting Aid (513320)
Courtesy of BMW OF NORTH AMERICA, INC.

510000 GAUGE

0496710 510000 Minimum set: Mechanical tools Gauge MW

Note: For measurement of retraction depth of window glass (replaces special tool 51 3 080 as of 10/2009).

SI number

01 22 09 (587)



Fig. 4: Identifying Gauge (510000)
Courtesy of BMW OF NORTH AMERICA, INC.

510010 GAUGE

0495259 510010 Minimum set: Mechanical tools Gauge MW

Note: (test gauge for installing windscreen and rear window) (replaces special tool 51 3 210 from 06/2005)

Storage Location

B2

SI number

01 10 05 (189)

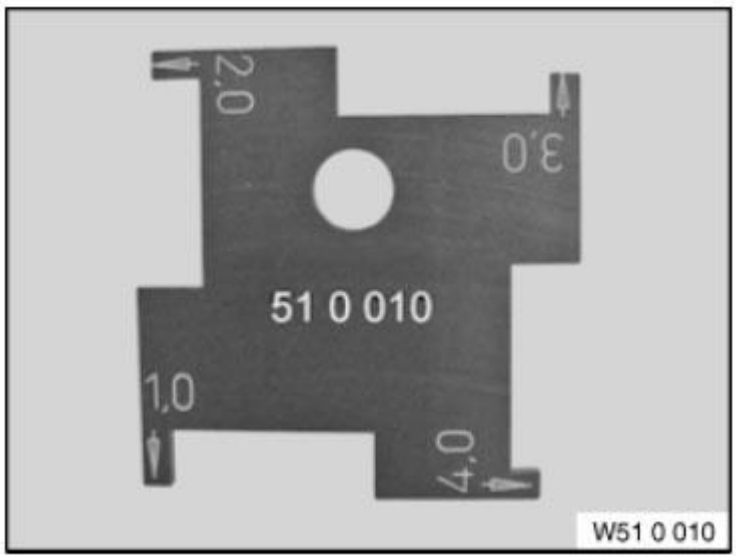


Fig. 5: Identifying Gauge (510010)
Courtesy of BMW OF NORTH AMERICA, INC.

513270 HANDLE

0494633 513270 Handle MW

Note: (pull handles) Cutting wire pull handles fore removing rear, quarterlight and side windows

SI number

01 13 03 (001)

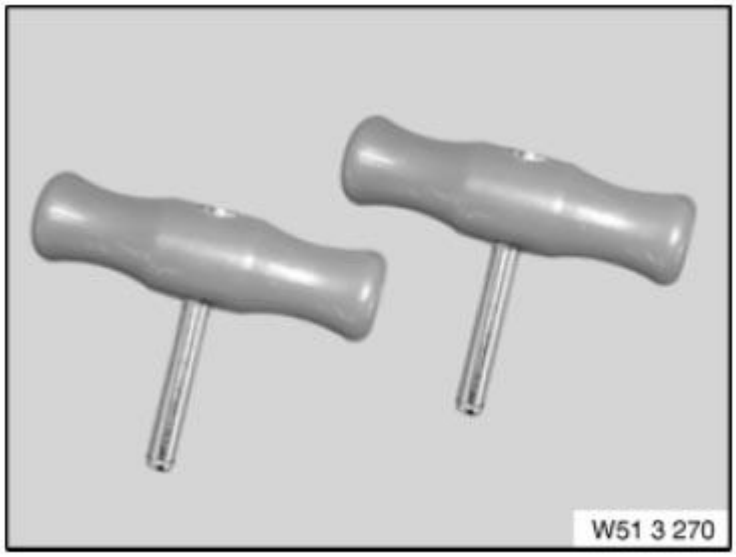


Fig. 6: Identifying Handle (513270)
Courtesy of BMW OF NORTH AMERICA, INC.

51 0 107 HOISTING WINCH

51 0 107 Hoisting winch

Note: for windscreen/rear window locating fixture on gantry crane

SI number

6 04 03 (046)

51 0 108 HOISTING WINCH

51 0 108 Hoisting winch

Note: for side window locating fixture on gantry crane

SI number

6 04 03 (046)

513000 HOLDER

0492608 513000 Holder MW

Note: (Window glass holder) For holding the front and rear window glass when mounting the window glass/replaced by 51 3 010. (0 492 609)

0496532 513330 Lever MW

Note: (Lever (2 x)) Lever for unlocking the jacking points.

Storage Location

C26

SI number

01 24 08 (501)



Fig. 7: Identifying Lever (513330)
Courtesy of BMW OF NORTH AMERICA, INC.

51 2 196 PROTECTION

51 2 196 Protection

Note: Replaces protection 51 2 193

510300 ROLLER

0495505 510300 Roller MW

Note: (Contact roller) For pressing sound insulation into doors; various rubber seals and covers

Storage Location

B19

SI number

01 07 06 (271)

Consisting of:

1 = 0495843 Handle

2 = 0495844 Roller

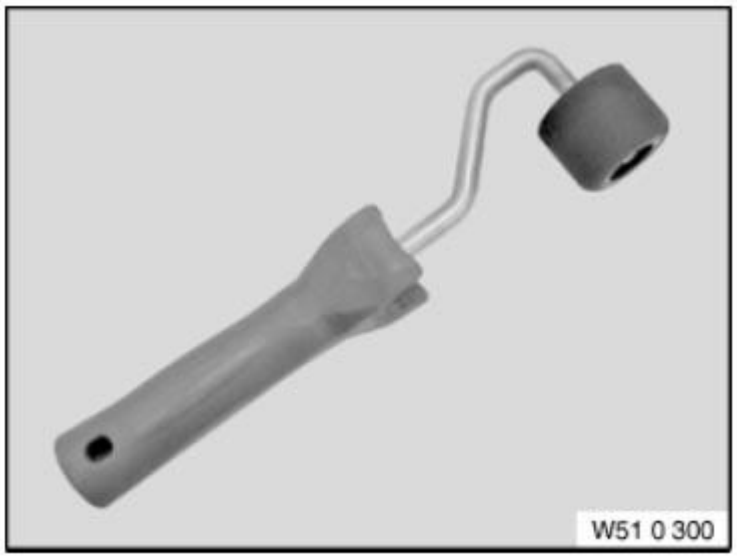


Fig. 8: Identifying Roller (510300)
Courtesy of BMW OF NORTH AMERICA, INC.

51 0 105 SIDE WINDOW LOCATING FIXTURE

51 0 105 Side window locating fixture

Note: for gantry crane

SI number

6 04 03 (046)

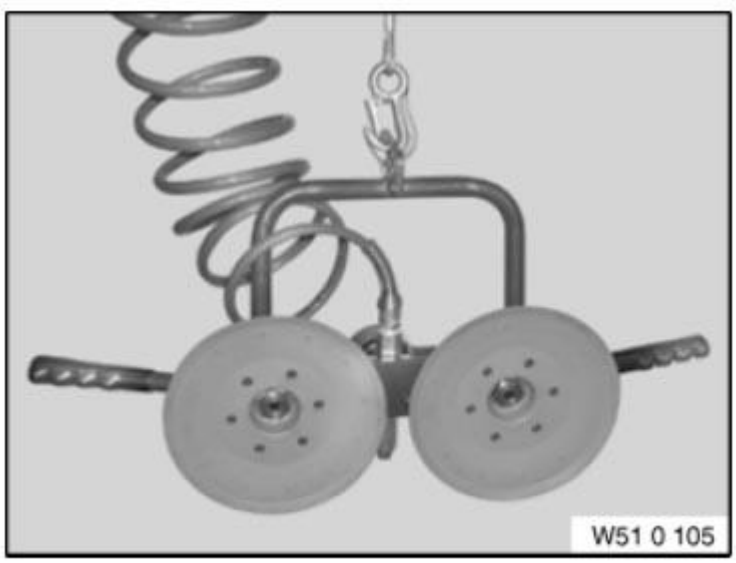


Fig. 9: Identifying Side Window Locating Fixture (51 0 105)
Courtesy of BMW OF NORTH AMERICA, INC.

513010 SIPHON

0492609 513010 Siphon MW

Note: (Siphon (2 pieces)) For removal and installation of the window glass. Is replaced by 81 64 2 184 377, see Service Information (bulletin) 08 01 10 (635).

SI number

01 05 86 (604)

Consisting of:

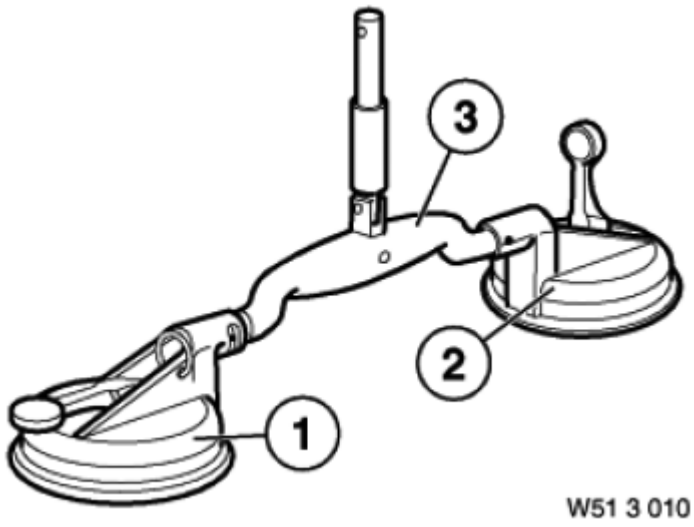


Fig. 10: Identifying Siphon (513010)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0493119 Suction cup

NOTE: With elongated hole, suspension can be moved around all axles. Is replaced by 81 64 2 184 377, see Service Information (bulletin) 08 01 10 (635)

2 = 0493120 Suction cup

NOTE: With bore hole, suspension can only be moved in longitudinal direction. Is replaced by 81 64 2 184 377, see Service Information (bulletin) 08 01 10 (635).

3 = 0493121 Handle

NOTE: (Grab handle): Is replaced by 81 64 2 184 377, see Service Information (bulletin) 08 01 10 (635).

2 = 0493267 Plate

NOTE: (rubber plate without joint)

2 = 0493268 Joint

NOTE: (joint without rubber plate)

51 0 109 SUCTION CUP

51 0 109 Suction cup

Note: Gantry crane

SI number

6 04 03 (046)

512240 SUPPORT

0495830 512240 Minimum set: Mechanical tools Support MW

Note: (Bonnet support (2 x)) For retaining engine compartment lid in working position

Storage Location

B22

C22

SI number

01 22 06 (307)

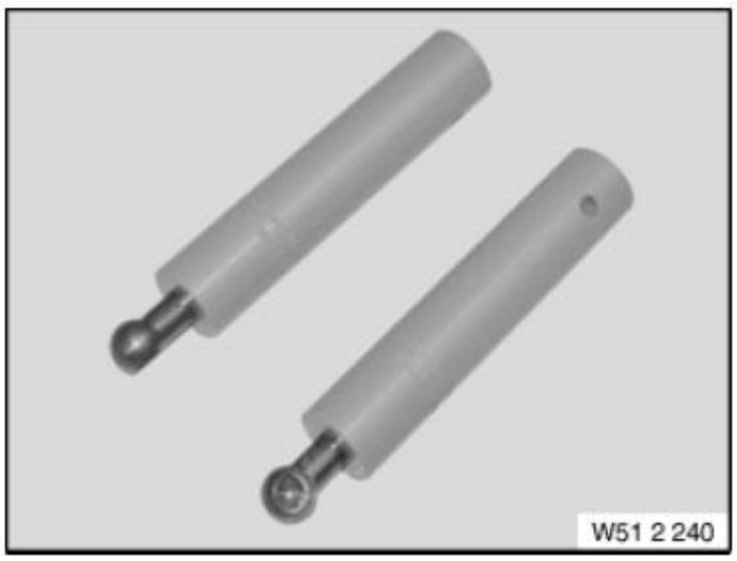


Fig. 11: Identifying Support (512240)
Courtesy of BMW OF NORTH AMERICA, INC.

512110 SUPPORT

0492600 512110 Support MW

Note: For the engine compartment lid when removing the engine/Replaced by 51 2 140.(0 492 603)



W51 2 110

Fig. 12: Identifying Support (512110)
Courtesy of BMW OF NORTH AMERICA, INC.

51 0 102 SUPPORT, LEFT

51 0 102 Support, left

Note: Gantry crane

SI number

6 04 03 (046)

51 0 101 SUPPORT, RIGHT

51 0 101 Support, right

Note: Gantry crane

SI number

6 04 03 (046)

513080 TOOL

0492634 513080 Tool MW

Replaced by: 0496710

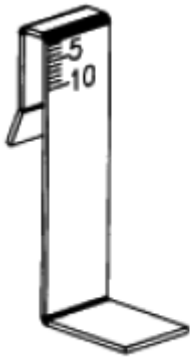
Note: For checking retraction depth when installing side window. From 10/2009 Replaced by 51 0 000.(0 496 710)

Storage Location

B6

SI number

01 05 90 (207)



W51 3 080

Fig. 13: Identifying Tool (513080)
Courtesy of BMW OF NORTH AMERICA, INC.

514100 TOOL

0496530 514100 Tool MW

Note: (Punching tool) For punching the recess for the seat memory switch when replacing the front and rear door trim Supplied complete in plastic case.

SI number

01 23 09 (589)

Consisting of:

12 = 0496636 Nut

NOTE: as an alternative for 51 4 106 with tight packaging space

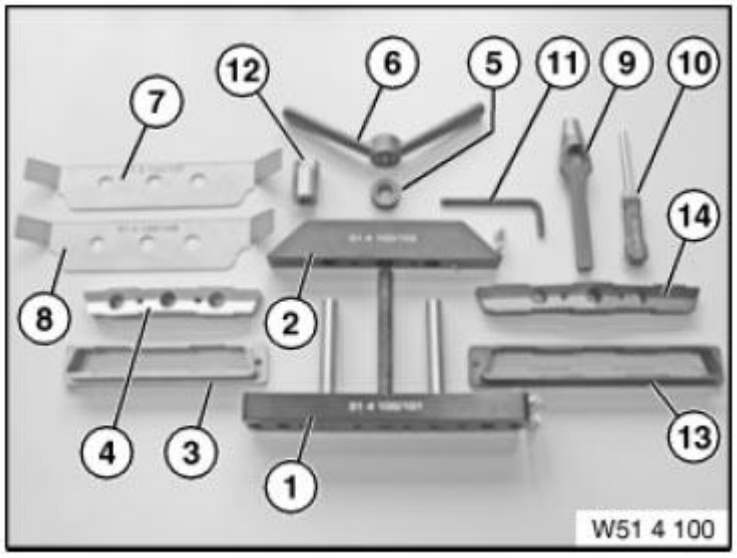


Fig. 14: Identifying Tool (514100)
Courtesy of BMW OF NORTH AMERICA, INC.

13 = 0496783 Matrix

14 = 0496784 Tool

NOTE: Cutting punch for front door seat memory switch

1 = 0496540 Tool

NOTE: (Lower yoke)

2 = 0496541 Tool

NOTE: (Upper yoke)

3 = 0496542 Matrix

NOTE: (Cutting matrix) bottom for F01/F02

4 = 0496543 Tool

NOTE: (Cutting punch) top for F01/F02

5 = 0496544 Washer

NOTE: (Thrust washer)

6 = 0496545 Nut

NOTE: (Wing nut) M12

7 = 0496546 Template

NOTE: For rear door trim F01

8 = 0496547 Template

NOTE: For rear door trim F02

9 = 0496548 Tool

NOTE: (Wad punch) Size 12 mm

10 = 0496549 Pressing-out tool

NOTE: (Ejector) For removing residual punched portions from cutting matrix.

11 = 0496550 Hexagon socket

NOTE: (Hexagon socket wrench) 6 mm

51 0 106 VACUUM PUMP

51 0 106 Vacuum pump

Note: for gantry crane

SI number

6 04 03 (046)

51 0 104 WINDSCREEN/REAR WINDOW LOCATING FIXTURE

51 0 104 Windscreen/rear window locating fixture

Note: Gantry crane

SI number

6 04 03 (046)

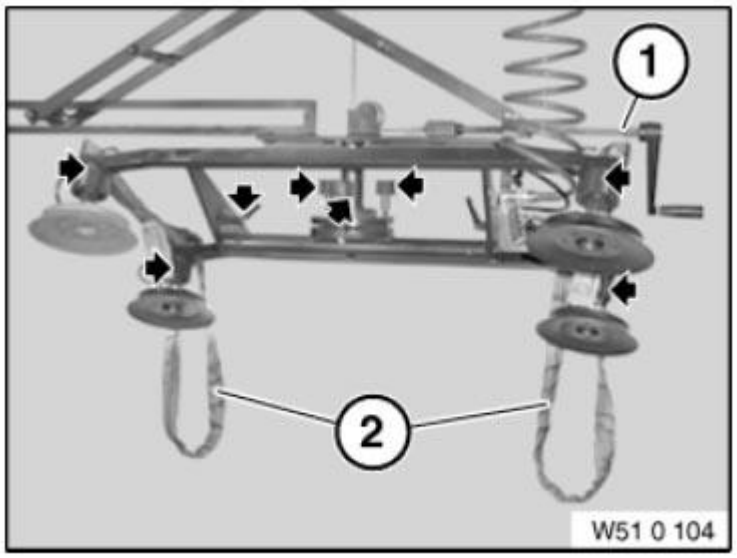


Fig. 15: Identifying Windscreen/Rear Window Locating Fixture (51 0 104)
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Body Equipment - Tightening Torques

DOOR LOCKS, REAR

51 22 DOOR LOCKS, REAR

TIGHTENING TORQUE SPECIFICATION - DOOR LOCKS, REAR

		Type	Thread	Tightening specifications	Dimension
1AZ	Door lock to rear door	F01/F02/F03/F04/F07/F10/F11/F18/F25			9.4 Nm
2AZ	Lock striker to body	F01/F02/F03/F04/F07/F10/F11/F18/F25			21 Nm
3AZ	Door stop to pillar	F01/F02/F03/F04/F07/F10/F11/F18/F25			22 Nm
4AZ	Door stop to door	F01/F02/F04			18.5 Nm
5AZ	Door stop to inner door panel	F07/F10/F11/F18/F25			10 Nm
6AZ	Support, Soft Close, to inner door panel	F07			8 Nm
7AZ	Automatic soft close system motor to inner door panel	F01/F02/F04/F10/F11/F18			5 Nm

DOOR TRIM PANEL TO REAR DOOR WITH ARMRESTS

51 42 DOOR TRIM PANEL TO REAR DOOR WITH ARMRESTS

TIGHTENING TORQUE SPECIFICATION - DOOR TRIM PANEL TO REAR DOOR WITH ARMRESTS

		Type	Thread	Tightening specifications	Dimension
1AZ	Door trim panel to rear door	F01/F02/F03/F04/F07/F10/F11/F18/F25			3.0 Nm
2AZ	Mid-range speaker to door trim panel	F07			1.5 Nm
3AZ	Armrest to door trim panel (repair solution)	F25			1.2 Nm

ELECTRICAL WINDOW SYSTEMS OPERATION FRONT

51 33 ELECTRICAL WINDOW SYSTEMS OPERATION FRONT

TIGHTENING TORQUE SPECIFICATION - ELECTRICAL WINDOW SYSTEMS OPERATION FRONT

		Type	Thread	Tightening specifications	Value
1AZ	Flat motor to power window regulator	F01/F02/F04/F10/F11/F18			5 Nm
2AZ	Power window regulator to door	F01/F02/F03/F04/F10/F11/F18		Replace bolts	11.8 Nm
		F25			9.5 Nm
3AZ	Holder to inner door panel	F01/F02/F04/F10/F11/F18			5.5 Nm
4AZ	Power window regulator to holder	F03		Hexagon screw	18.5 Nm

ELECTRICAL WINDOW SYSTEMS OPERATION, REAR

51 35 ELECTRICAL WINDOW SYSTEMS OPERATION, REAR

TIGHTENING TORQUE SPECIFICATION - ELECTRICAL WINDOW SYSTEMS OPERATION, REAR

		Type	Thread	Tightening specifications	Value
1AZ	Flat motor to power window regulator	F01/F02/F04/F10/F11/F18		Oval-head screw for thermoplastic	5.5 Nm
2AZ	Power window regulator to door	F01/F02/F04/F10/F11/F18		Oval-head screw, self-locking	11.8 Nm
		F25			9.5 Nm
3AZ	Side window, rear, non-opening (bottom)	F01/F02/F04/F10/F11/F18			7.6 Nm
4AZ	Cover, window frame, B-pillar	F01/F02/F04/F10/F11/F18			2.5 Nm
5AZ	Cover, window guide web - Side window, rear	F01/F02/F04/F10/F11/F18			3 Nm
6AZ	Roller sunblind	F01/F02/F04			9 Nm
7AZ	Cover, window frame (B-pillar) to SBL, rear	F01/F02/F04	M5x30	Oval-head screw	2.5 Nm
		F01/F02/F04	ST4.8x19	Sheet metal screw	2 Nm
8AZ	Guide rail to end plate	F01/F02/F04		Oval-head screw for thermoplastic	3 Nm
		F01/F02/F04	ST4.8x19	Sheet metal screw	2 Nm
9AZ	Roller shell	F01/F02/F04		Oval-head screw for thermoplastic	3 Nm
		F01/F02/F04		Flat-head screw	8 Nm
10AZ	Window guide rail rear, to window partition web	F01/F02/F04			8 Nm

11AZ	Holder to inner door panel	F01/F02/F04/F10/F11/F18			5.5 Nm
12AZ	Power window regulator to door	F03		Hexagon screw	18.5 Nm
13AZ	Side window, rear, non-opening (top)	F10/F11/F18			2.5 Nm
14AZ	Cover, window frame (C-pillar)	F11			1.5 Nm

ENGINE COMPARTMENT LID CATCH/LOCKS

51 23 ENGINE COMPARTMENT LID CATCH/LOCKS

TIGHTENING TORQUE SPECIFICATION - ENGINE COMPARTMENT LID CATCH/LOCKS

		Type	Thread	Tightening specifications	Dimension
1AZ	Upper lock section (striker) to engine compartment lid	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25			11.8 Nm
2AZ	Engine compartment lid lock to lock carrier	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25			11.8 Nm

FRONT BUMPER

51 11 FRONT BUMPER

TIGHTENING TORQUE SPECIFICATION - FRONT BUMPER

		Type	Thread	Tightening specifications	Dimension
1AZ	Bumper to air duct, top	F01/F02/F03/F04/F07/F10/F11/F18			4 Nm
2AZ	Deformation element, top or bottom, to vertical connection	F01/F02/F03/F04/F07/F10/F11/F18			11.8 Nm
3AZ	Deformation element to engine support	F01/F02/F03/F04/F07/F10/F11/F18/F25	M12	Replace bolts Jointing torque Angle of rotation	80 Nm 270 °

4AZ	Support to deformation element	F01/F02/F03/F04/F07/F10/F11/F18		Replace screws and nuts	27 Nm
		F25	M8		20 Nm
5AZ	Support to deformation element, bottom	F01/F02/F03/F04/F07/F10/F11/F18			11 Nm
6AZ	Deformation element, bottom, to adapter plate, front axle support	F01/F02/F03/F04/F07/F10/F11/F18			19 Nm
7AZ	V - support to deformation element, top	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18			19 Nm
8AZ	Number plate to bumper	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18			1 Nm
9AZ	Number plate to bumper (thread repair)	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M5		4.5 Nm
10AZ	Support, bottom, to deformation element, bottom	F01/F02/F03/F04/F07/F10/F11/F18			11 Nm
11AZ	Bumper to side wall	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18			3 Nm

FRONT DOOR LOCKS

51 21 FRONT DOOR LOCKS

TIGHTENING TORQUE SPECIFICATION - FRONT DOOR LOCKS

	Type	Thread	Tightening specifications	Value
1AZ Door lock to front door	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25			9.5 Nm
2AZ Lock striker to body	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25			21 Nm
3AZ Door stop to pillar	F01/F02/F04/F10/F11/F18/F25			22 Nm
	F12/F13			27 Nm
4AZ Door stop to inner door panel	F01/F02/F04	M8		18.5 Nm
5AZ Door stop to inner door panel	F07/F10/F11/F12/F13/F18/F25			10 Nm
Automatic soft				

6AZ	close system motor to inner door panel	F01/F02/F04/F10/F11/F18			4.6 Nm

FRONT DOOR TRIM PANEL WITH ARMRESTS

51 41 FRONT DOOR TRIM PANEL WITH ARMRESTS

TIGHTENING TORQUE SPECIFICATION - FRONT DOOR TRIM PANEL WITH ARMRESTS

	Type	Thread	Tightening specifications	Dimension
1AZ	Door trim panel to front door	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25			3.0 Nm
2AZ	Power window regulator switch to door trim panel	F07			1.5 Nm
3AZ	Mid-range speaker to door trim panel	F07/F10/F11/F18			1.5 Nm
4AZ	Bolt to repair clip	F10/F11/F18			0.5 Nm
5AZ	Armrest to door trim panel (repair solution)	F25			1.2 Nm

GASKETS AND LOOSE BODY COMPONENTS

51 71 GASKETS AND LOOSE BODY COMPONENTS

TIGHTENING TORQUE SPECIFICATION - GASKETS AND LOOSE BODY COMPONENTS

	Type	Thread	Tightening specifications	Dimension
1AZ	Rear spoiler	F01/F02/F04/F07		Screw Nut	2 Nm 8 Nm
		F11	M8		8 Nm
2AZ	Gasket to tailgate	F11			1.5 Nm
3AZ	Bulkhead top	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18		Replace bolts (Oval-head	5 Nm

				screw)	
4AZ	Trim panel for cover on side member	F12/F13			10 Nm

HEADLINING

51 44 HEADLINING

TIGHTENING TORQUE SPECIFICATION - HEADLINING

		Type	Thread	Tightening specification	Measure
1AZ	Holder, roofliner, to roof	F02/F04		Replace screws	4 Nm

MIRRORS, COVERS, ASHTRAYS, STORAGE COMPARTMENTS

51 16 MIRRORS, COVERS, ASHTRAYS, STORAGE COMPARTMENTS

TIGHTENING TORQUE SPECIFICATION - MIRRORS, COVERS, ASHTRAYS, STORAGE COMPARTMENTS

		Type	Thread	Tightening specifications	Dimension
1AZ	Exterior mirror to front door	F01/F02/F03/F04/F07/F10/F11/F18	Sheet metal screw	new rear view mirror, initial screw connection	6 Nm 8 Nm
		F25	thread cutting	new rear view mirror, initial screw connection	9 Nm 11 Nm
		F12/F13	thread cutting		8 Nm
2AZ	Sun visor to body	F01/F02/F03/F04/F07/F10/F11/F18/F25			2.5 Nm
3AZ	Grab handle, front/rear	F01/F02/F03/F04/F07/F10/F11/F18			3 Nm
4AZ	Support, center console	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25			4.5 Nm
5AZ	Floor trim panel to support	F01/F02/F03/F04			2.5 Nm
6AZ	Decorative trim to center	F01/F02/F03/F04/F12/F13			1.2 Nm

	console/support				
7AZ	Holder, center console, front, middle, to tunnel	F01/F02/F03/F04			4.5 Nm
8AZ	Centre console to dashboard	F01/F02/F03/F04			2.5 Nm
9AZ	Decorative trim to center console	F01/F02/F03/F04	Dia. 5 mm	Oval-head screw for light alloy	4 Nm
		F01/F02/F03/F04	TS5 x 12	Plastic screw	2.8 Nm
10AZ	Centre console/support to dashboard	F01/F02/F03/F04			2.5 Nm
		F12/F13			1.2 Nm
11AZ	Cover, rear, with rear compartment nozzle	F01/F02/F03/F04			2.5 Nm
12AZ	Rear console to body shell holder	F01/F02/F03/F04			6 Nm
13AZ	Oddments tray, center armrest, to support, center console	F01/F02/F03/F04/F07			1.5 Nm
		F12/F13			1.2 Nm
14AZ	Handle to inner part, lid, glove box	F01/F02/F03/F04/F25			1.5 Nm
15AZ	Lid, glove box/end cover to housing	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18			1.5 Nm
16AZ	Glove box/storage compartment to dashboard	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25			1.8 Nm
17AZ	Guide rail, roller sunblind, B-pillar	F01/F02/F03/F04		Sheet metal screw, black	2 Nm
		F03		Replace bolts	2.5 Nm
18AZ	Roller sunblind module	F01/F02/F04		Oval flange head screw (ISA)	3 Nm
		F03			8 Nm
		F07/F10/F11/F18			1.5 Nm
		F25			0.7 Nm

19AZ	Engine to function carrier	F01/F02/F04		Flat-head screw	4.4 Nm
		F03			8 Nm
20AZ	Engine to function carrier, top	F01/F02/F04		Oval-head screw	2 Nm
		F03			3 Nm
21AZ	Vent window guide rail - window bar connection	F03			4.6 Nm
22AZ	Centre console to support	F07			1.8 Nm
23AZ	Bracket, handle, to bodyshell	F01/F02/F04			3 Nm
24AZ	Support to holder, support part	F12/F13			2.5 Nm
25AZ	Side bracket to support	F12/F13			1.2 Nm

PANEL, REAR PARCEL SHELF, ROLLER SUN BLIND

51 46 PANEL, REAR PARCEL SHELF, ROLLER SUN BLIND

TIGHTENING TORQUE SPECIFICATION - PANEL, REAR PARCEL SHELF, ROLLER SUN BLIND

		Type	Thread	Tightening specifications	Measure
1AZ	Rear parcel shelf to body	F01/F02/F03/F04/F10/F18			2.5 Nm
2AZ	Roller sun blind with rear parcel shelf to body	F01/F02/F03/F04/F10/F18			4 Nm

REAR BUMPER

51 12 REAR BUMPER

TIGHTENING TORQUE SPECIFICATION - REAR BUMPER

		Type	Thread	Tightening specifications	Dimension
1AZ	Support to body	F01/F02/F03/F04/F12/F13	M12	Replace nuts	66 Nm
		F07/F10/F11/F18	M12		108 Nm
		F25			68 Nm
		F01/F02/F03/F04/F07/F10/F11/F12/F13/F18		Replace nuts	4 Nm

2AZ	Guide, middle rear	F25		Replace nuts	4.5 Nm
3AZ	Guide, side, to body	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18, F25		Replace nuts Screw	4.5 Nm 3 Nm
4AZ	Trailer tow hitch on support of bumper				
5AZ	Bumper trim panel to side mounting	F07/F10/F11/F18			2 Nm
6AZ	Bumper trim panel to rear light housing	F07/F25			4.5 Nm
		F10/F11/F18			2 Nm
		F12/F13			2.8 Nm
7AZ	Bumper trim panel to bottom center mounting	F07/F10/F11/F18			4.5 Nm
8AZ	Nut, rear silencer holder	F07/F10/F11/F12/F13/F18			21 Nm

REAR LID LOCK, LOCKS

51 24 REAR LID LOCK, LOCKS

TIGHTENING TORQUE SPECIFICATION - REAR LID LOCK, LOCKS

		Type	Thread	Tightening specifications	Dimension
1AZ	Rear lid/tailgate lock	F01/F02/F03/F04/F07/F10/F11/F18/F25			18.5 Nm
2AZ	Lock (lock barrel) to tailgate	F01/F02/F03/F04			4.5 Nm
3AZ	Striker rear trim panel	F01/F02/F03/F04			10 Nm
		F10/F18			7.6 Nm
4AZ	Automatic Soft Close system to retaining plate	F01/F02/F03/F04			1.2 Nm
5AZ	Spring hook, hinge	F01/F02/F03/F04			10 ±1 Nm
6AZ	Gas pressure spring to tailgate	F07	M6		8 Nm
7AZ	Automatic Soft Close system to retaining plate	F07			1.4 Nm
8AZ	Striker to tailgate	F07	M8		17.5 Nm
		F11/F25			18.5 Nm
	Automatic Soft				

9AZ	Close system to tailgate	F10/F18			2.6 Nm
10AZ	Retaining bracket/gas-filled shock absorber to body	F11			27 Nm
11AZ	Fixture, load area net to body	F11			9 Nm
		F25	M6		7.6 Nm
12AZ	Limit position, tailgate	F11	M6		3.3 Nm
13AZ	Limit position, tailgate to rear side panel	F11	M6		7.6 Nm

REINFORCEMENT, BODY

51 61 REINFORCEMENT, BODY

TIGHTENING TORQUE SPECIFICATION - REINFORCEMENT, BODY

		Type	Thread	Tightening specifications	Dimension
1AZ	Suspension cross-brace, rear	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M10x47	Replace bolts	
				Jointing torque	30 Nm
				Angle of rotation	45 °
		F25	M10x25	Replace bolts	
				Jointing torque	56 Nm
				Angle of rotation	90 °
2AZ	Suspension cross-brace, front	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M10x47		56 Nm
		F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M10x25	Replace bolts Jointing torque Angle of rotation	30 Nm 90 °
3AZ	Connection, rear, to carrier support	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18			28 Nm
4AZ	Connection, front, to connection,	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18			19 Nm

	rear				
5AZ	Engine compartment lid catch	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M8x20		11.8 Nm
6AZ	V-support to connection, front	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18			19 Nm
7AZ	Air duct, lower, to vertical strut	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18			19 Nm
8AZ	Air duct, lower, to support	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M8		8 Nm
9AZ	Air duct, upper, to lock support	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M8		8 Nm
10AZ	Torsion strut to side member	F07/F11/F12/F13	M12x1.5x70	Replace screws Jointing torque Angle of rotation	100 Nm 90 °
11AZ	Torsion strut to compression strut, front (rear axle)	F07/F11/F12/F13	M8		19 Nm
12AZ	Torsion strut to cross reinforcement (support, rear end)	F07/F11/F12/F13	M12x1.5x53	Replace screws Jointing torque Angle of rotation	100 Nm 90 °
13AZ	Cross reinforcement (support, rear end) to rear end	F07/F11/F12/F13	M10x22		38 Nm
14AZ	Cross reinforcement (support, rear end) to cross member	F07/F11/F12/F13	M10		38 Nm

SIDE TRIM PANEL WITH ARMRESTS

51 43 SIDE TRIM PANEL WITH ARMRESTS

TIGHTENING TORQUE SPECIFICATION - SIDE TRIM PANEL WITH ARMRESTS

		Type	Thread	Tightening specifications	Dimension
1AZ	Trim panel, front roof pillar (A-pillar) on body	F01/F02/F03/F04/F07/F10/F11/F18			2.5 Nm
2AZ	Trim panel, rear roof pillar (C-pillar) on body	F01/F02/F03/F04/F07/F10/F11/F18/F25			2.5 Nm
3AZ	Screw connection, convenient opening	F11			8.5 Nm

TRIM PARTS, COVERS, HANDLE TRIM

51 13 TRIM PARTS, COVERS, HANDLE TRIM

TIGHTENING TORQUE SPECIFICATION - TRIM PARTS, COVERS, HANDLE TRIM

		Type	Thread	Tightening specification	Measure
1AZ	Centre trim to rear lid	F01/F02/F03/F04 /F07			3 Nm
2AZ	Handle strip to rear lid, exterior	F07		Screw	3 Nm
3AZ	Handle strip to rear lid, interior	F07		Nut	3 Nm

TRIM PANEL, DASHBOARD

51-1 45 TRIM PANEL, DASHBOARD

TIGHTENING TORQUE SPECIFICATION - TRIM PANEL, DASHBOARD

		Type	Thread	Tightening specifications	Dimension
1AZ	Dashboard support to console for steering column support, screw	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25	M8		21.5 Nm
2AZ	Support for dashboard to A pillar	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25	M8		21.5 Nm
3AZ	Dashboard support to tunnel, screw	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25	M8		21.5 Nm
	Trim panel,				

4AZ	pedal mechanism, to dashboard support, screw	F01/F02/F04/F07/F10/F11/F12/F13/F18/F25		Replace bolts	8 Nm
5AZ	Dashboard to support	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18			1.8 Nm
		F25			8 Nm
6AZ	Fold-down compartment (driver's side) to dashboard	F01/F02/F03/F04/F07			2.4 Nm
7AZ	Handle recess to fold-down compartment (driver's side)	F01/F02/F03/F04			1.5 Nm
8AZ	Support for dashboard to bulkhead	F25			21.5 Nm

UNDERBODY PANELLING

51 75 UNDERBODY PANELLING

TIGHTENING TORQUE SPECIFICATION - UNDERBODY PANELLING

	Type	Thread	Tightening specifications	Dimension
1AZ	Underbody panelling on body	F01/F02/F03/F04/F06/F07/F10/F11/F12/F13	Screw		3 Nm

ACCESSORIES & EQUIPMENT

Body - Operating Fluids

1.0 SEALING COMPOUNDS

Seam Sealer, Sikaflex 221 may be used to seal adjoining sheet metal parts which create creaking noises due to interactive contact. High-adhesion, polyurethane-based, black-colored.

Sikaflex 221 Sealer

BMW Part No. 81 22 9 407 533

Other sealants for body panels are found in Group 97 (Body Cavity Sealings and Undercoatings).

2.0 LUBRICANTS

BMW offers several lubricants which are formulated for specific components. Some of these lubricants also appear in the "Universal Lubricants" group.

3.0 DOOR HINGES AND PIVOTS

Moly spray for quieting squeaks and similar noises. (former BMW Part No. 81 22 9 400 720)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8876
Loctite	Part No. 24378

4.0 DOOR BRAKES

Grease for any sliding contact area, especially door brake mechanisms. (former BMW Part No. 81 22 9 407 629)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8878
Loctite	Part No. 20029

5.0 DOOR LOCKS

Lock cylinder lubricant prevents locks from jamming in sub-freezing temperatures. Insert tip of spray can directly into keyslot.

(former BMW Part No. 81 22 9 407 421)

3M	Part No. 8878
Wurth	Part No. 893051
Loctite	Part No. 20029

6.0 (HKL) AUTOMATIC TRUNK LID LIFT HYDRAULIC FLUID

E65/E66 Automatic Trunk Lid Lift Hydraulic Fluid

BMW Part No. 51 24 7 066 901

ACCESSORIES & EQUIPMENT

Body Cavity Sealing and Undercoating - Operating Fluids

1.0 GENERAL INFORMATION ON PRESERVATION MEASURES

The classic quality of BMW automobiles is based on the long-term comprehensive research and testing, the design, the applied materials and the manufacturing procedures in modern production plants.

BMW recommends cleaning the engine, engine compartment, vehicle underside, axles and engine/transmission at least twice annually, and then waxing the car or repairing the wax coating. This should be performed before or after the period of salt usage on streets.

New cars parked outdoors should be waxed at BMW centers before delivery to customers. This is to avoid deposits damaging to the paint finish, such as air-born rust particles, chemical dust, oil saturated soot, sulfur dioxide (acid) rain, etc. settling on the horizontal surfaces. Bird and insect droppings as well as tree resin could mar the paint finish, forming spots, swelling and pitting in the paint coat.

Wax films on the engine, engine compartment and A pillars (hinge areas) are intentional and prevent corrosion. Such wax film should not be removed.

Unwaxed cars should be washed at least once each week. Parked cars must never be protected with plastic or other nonporous material covers. This will damage the paint finish due to condensed water in conjunction with plastic softener diffusion and scratching.

2.0 BODY CAVITY SEALING

It is only necessary to rewax or seal the affected area after repairing the body.

Only BMW approved products may be used to comply with the six year warranty against rust perforation. These products protect cavities effectively and permanently against corrosion. Their excellent coating and waterproofing properties let them flow into all inaccessible corners and folds for unsurpassed overall protection.

Underbody and Body Cavity Sealing Compound

For sealing of body cavities, such as doors, A-pillars, front, side and cross members, etc.

(Former BMW Part No. 81 22 9 407 479)

3M Part No. 8891

Wurth Part No. 892080

Also: Wurth "Brushable Seam Sealer", Part No. 8901021.

3.0 BODY CORROSION PROTECTION

To comply with the six year warranty against rust, specially selected waxes and additives produce an elastic, temperature-proof, corrosion inhibiting protectant. The corrosion protection thickness should measure a maximum of 30 microns, but can be varied as desired by repeating the spraying procedures accordingly.

Procedure:

Clean underside of car to remove grease, oil and dirt. Cover rotating parts and parts not undercoated, such as driveshaft, brake discs, brake hoses, springs, exhaust pipes, etc.

After completion of body repairs, the affected areas must have corrosion protection reapplied. This applies, also, if the BMW Annual Check shows that the corrosion protection has to be repaired.

UNDERBODY SEALING

Quick-drying, rubber-based, paintable. Compatible with PVC-based undercoat, front apron and door sill coatings. (Former BMW Part Nos. 81 22 9 407 001, 81 22 9 407 521/522)

3M Part No. 8883

Wurth Part No. 892072

Loctite Part No. 81833 (or PX135EA)

CRC Part No. Siloo 28A

Also: Wurth "Body Seal, beige", Part No. 0892091 U.

BODY SEALANT, LIGHT

Sealing compound for all joints and seams, can be painted over. Good adhesion, free of shrinkage, resistant to heat and cold temperatures, permanently elastic.

(Former BMW Part Nos. 81 22 9 400 013 and 81 22 9 407 313)

3M Part No. 8361

Wurth Part No. 893430

SEAM SEALER, WHITE

Elasto-plastic sealing compound based on polyacrylate.

Applications: Protection of door and hood panel seams.

(Former BMW Part No. 81 22 9 407 675)

3M Part No. 8361

Wurth Part No. 890100025

Also: Wurth "Gray Seam Sealer", Part No. 089228 U.

TRANSPARENT WAX

Prevents corrosion on painted and non-painted metal surfaces. Serves mainly for treating edges and folded-over seams. (Former BMW Part No. 81 22 9 400 711)

3M Part No. 8892

Wurth Part No. 893082

ANTI-CHIP COMPOUND

Sprayable coating compound for outside and inside. For sealing, noise-insulation and as protection against flying stones.

Quick-drying can be painted over, permanently elastic, heat and cold-resistant.

(Former BMW Part Nos. 81 22 9 407 001 and 81 22 9 407 416)

3M Part No. 8964

Wurth Part No. 893075

Loctite Part No. 81833/PX135EA

4.0 OTHER FLUIDS

ADHESIVE REMOVER

(Former BMW Part No. 81 22 9 407 388)

3M Part No. 8984

RUST REMOVER

(Former BMW Part No. 81 22 9 407 121)

Wurth Part No. 89091801

BRAKES

Brakes - Operating Fluids

1.0 GENERAL INFORMATION

Brake fluid, (glycol-based) as used in BMW brake systems, must conform with the following requirements:

- High boiling point
- Good low temperature resistance
- Low compressibility
- Corrosion inhibition for all metal parts inside of brake system
- Compatibility with all rubber parts used in brake system

These requirements are fulfilled by reputable brand name DOT 4 brake fluids.

Silicone-based brake fluid has better compressibility, but because it cannot absorb moisture, is subject to vapor lock at temperatures above 212°F/ 100°C. At lower temperatures, it may even ice-up. **Silicone-based brake fluid is not approved by BMW.**

Glycol-based brake fluid absorbs moisture from the atmosphere (hygroscopicity) through the brake fluid reservoir, brake hoses, etc. This absorption of water lowers the original boiling point of brake fluid and active safety of the entire system. If there is extended use of the brakes while driving downhill at high speeds, the thermal loads could cause vapor bubbles in the brake fluid. This situation could lead to reduced braking effectiveness.

The original boiling point of factory-approved brake fluids is approximately 500°F/260°C. Due to the hygroscopic behavior of brake fluid, 2% of water within one year is permissible. The boiling point of brake fluid will drop by 100°C with 3% water absorption. It is essential to conform with brake fluid changing intervals in order to guarantee the safety and maximum effectiveness of a brake system.

It would not be sufficient simply to replace the brake fluid in the reservoir. Experience has shown that vapor bubbles will occur first on areas of the brake caliper. This area is subjected to high thermal loads and also exposed to heat transmission.

When replacing the brake fluid, the brake fluid used as the working fluid in the hydraulic clutch should also be replaced. This is done by draining the clutch operation system or bleeding with the help of the clutch slave cylinder.

The brake fluid should be replaced by filling the brake fluid reservoir. Make sure that each bleeder valve of all wheel cylinders or brake calipers is kept open until the escaping brake fluid is clear and without air bubbles. Never use brake fluid that has been drained from the system.

Storage of brake fluids also deserves your special attention. The aging process begins with the initial contact between the brake fluid and the atmosphere. This means immediately after a new container is opened.

To keep the boiling point of stored brake fluids as high as possible, we recommend conforming with the following points:

- Close all containers tightly.
- Select small size containers, which can be used up quickly.
- Avoid pouring contents of one container into a different container.

2.0 HANDLING BRAKE FLUIDS

Brake fluids could be mixed up accidentally with mineral oil products so it is important to leave them in their original containers and not pour them into a different container.

CAUTION: If brake fluid accidentally comes into contact with your skin, wash it off with soap and water immediately. Eyes should be thoroughly flushed with cold water if contacted by brake fluid. Vomiting should be induced if brake fluid is internally consumed and a physician should be consulted.

If brake fluid is spilled or drips on a painted surface, wash it off with water immediately to prevent damage to the paint finish. Never rub it off. Brake fluids should not have contact with grease or oil. Wash hands to remove grease and oil before working with brake fluids. Also make sure that grease cannot enter the brake system.

Drained brake fluid must never be discarded in the garbage, oil disposal tanks or water drains.

Read instructions on container label prior to use.

3.0 BMW TESTED AND APPROVED BRAKE FLUIDS

BMW Tested and Approved DOT 4 ESL Brake Fluid is available as follows:

BMW PARTS SPECIFICATION

12 fl. oz. bottle	BMW Part No. 81 22 0 142 156
1 gallon container	BMW Part No. 81 22 0 142 155

4.0 BRAKE FLUID CHANGE INTERVALS

All Models Brake fluid change interval every 2 years.

5.0 OTHER OPERATING FLUIDS

ANTI-SQUEAK/CORROSION PASTE

Bostik NEVER-SEEZ® to prevent disc brake squeaking. It is applied on cleaned recesses, pressure surfaces of piston crowns, brake pad backplates and possibly transfer plates-but not on friction liners.

To prevent corrosion between the ABS impulse sensor and the hole in the wheel suspension component, apply a thin coat of Bostik NEVER-SEEZ® to cleaned sensor and hole before assembly.

BMW PARTS SPECIFICATION

Bostik NEVER-SEEZ®	Part No. NSBT-16

BRAKE CLEANER SPRAY

Non-CFC spray (former BMW Part No. 81 22 9 407 704) for cleaning brakes, brake pads, brake shoes, drums, disks and other brake components. Also suitable for clutch pressure plates.

BMW PARTS SPECIFICATION

3M	Part No. 8895
Loctite	Part No. 82220
CRC	Part No. 08088

BRAKES

Brakes - Repair

3400 BRAKE TESTING AND BLEEDING

34 00 050 BLEEDING BRAKE SYSTEM WITH DSC

Necessary preliminary work

- Remove left sensor opening
- Read and comply with **GENERAL INFORMATION** .

IMPORTANT: When replacing or repairing, observe the filling and bleeding instructions for the following parts:

- **Tandem brake master cylinder**
- **Hydraulic unit**
- **Components and lines which are fitted between these assemblies.**

Connect bleeder unit with max. 2 bar filling pressure.
A second person is needed to help carry out this work.
Only use brake fluids that have been approved by BMW, see BRAKE SYSTEM - OPERATING FLUIDS .

Connect DIS (BMW scan tool).

Select path: Service functions - Chassis and Suspension - Traction control system - Bleeding procedure.

IMPORTANT: Check relevant equipment manufacturer's operating instructions for each device.
Charging pressure should not exceed 2 bar.

Connect bleeder unit to expansion tank and switch on.

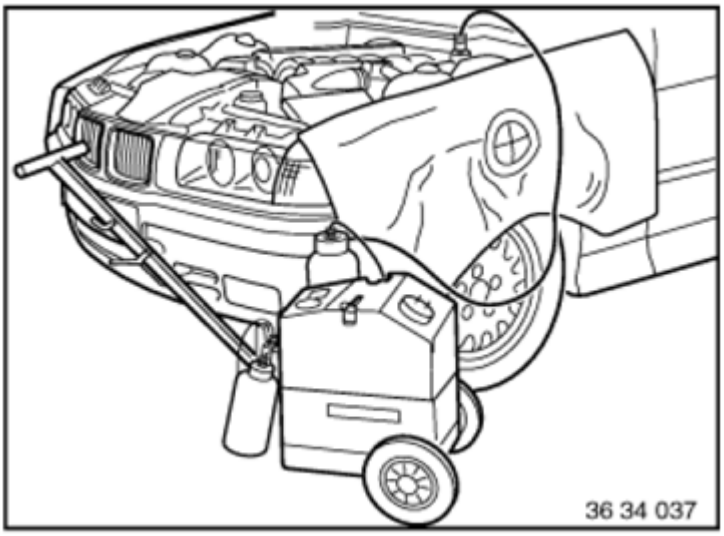


Fig. 1: Connecting Bleeder Unit To Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Fully rinse the brake system

Connect vent hose with collecting vessel to vent valve on rear right brake caliper.

Open vent valve and purge until clear, bubble-free brake fluid emerges.

Close vent valve.

Follow same procedure on rear left, front right and front left wheel brake.

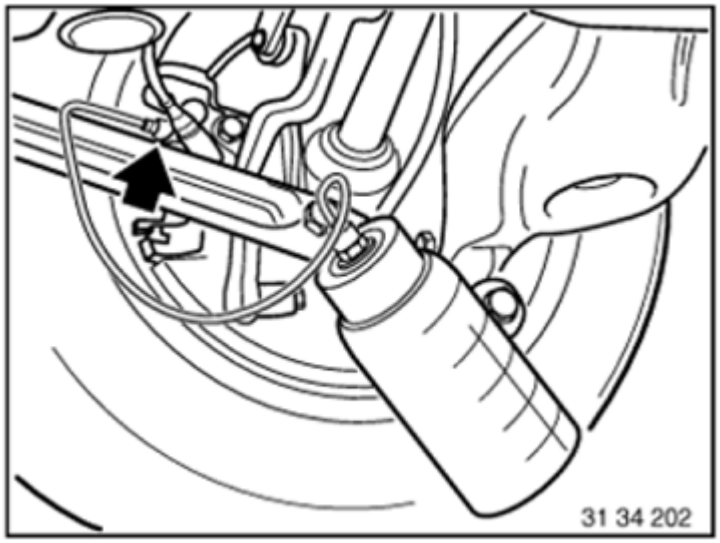


Fig. 2: Locating Vent Valve On Rear Right Brake Caliper (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding rear axle brake circuit

Connect vent hose with collecting vessel to vent valve on rear right brake caliper.

Open vent valve.

Run bleeding procedure with DIS with vent valve open.

After completing routine, press brake pedal 5 times to floor; clear and bubble-free brake fluid must flow out.

Close vent valve.

Repeat procedure at rear left.

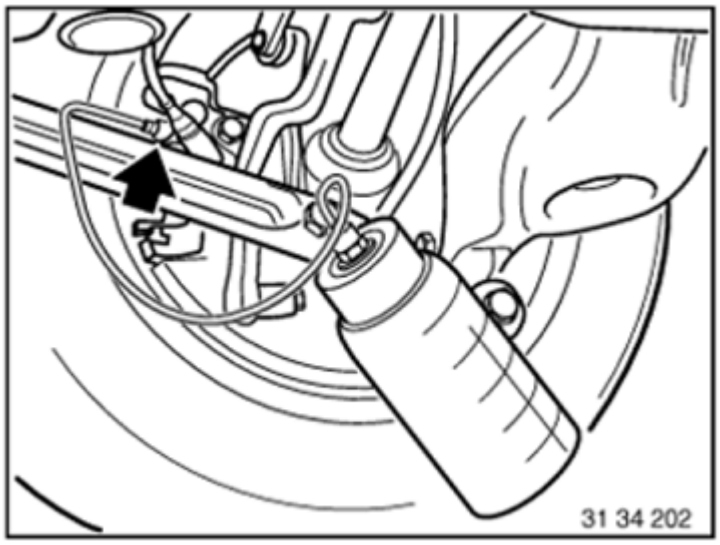


Fig. 3: Locating Vent Valve On Rear Right Brake Caliper (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding front axle brake circuit

Connect vent hose with collecting vessel to vent valve on front right brake caliper.

Open vent valve.

Run bleeding procedure with DIS with vent valve open.

After completing routine, press brake pedal 5 times to floor, clear and bubble-free brake fluid must flow out.

Close vent valve.

Repeat procedure at front left.

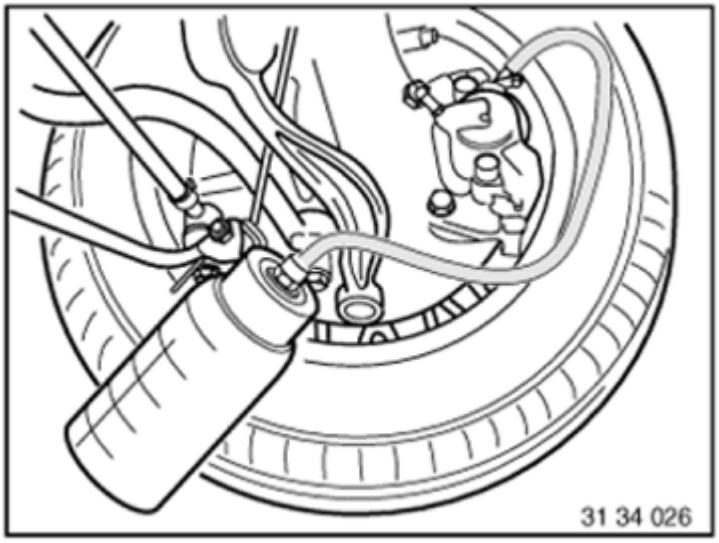


Fig. 4: Connecting Vent Hose With Collecting Vessel To Vent Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Switch off bleeder unit and remove from expansion tank.

Check brake fluid level. If necessary, top up/draw off to "MAX" level.

Close expansion tank.

NOTE: Pay attention to gasket (1) in sealing cap.

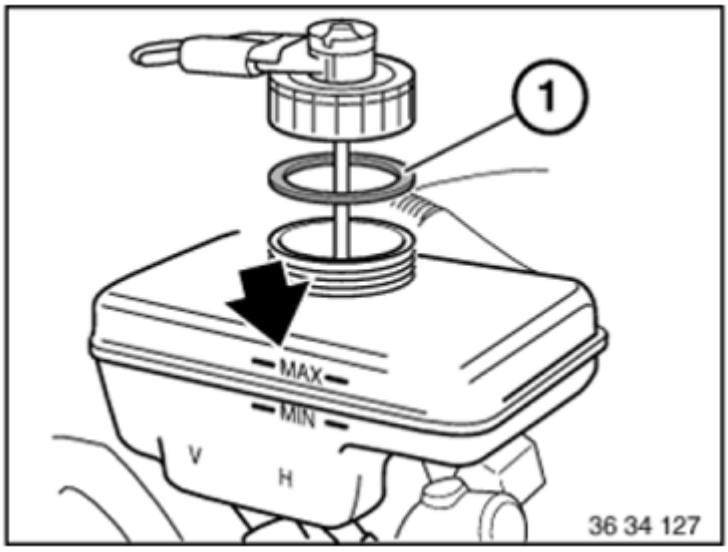


Fig. 5: Identifying Gasket And Brake Fluid Level
Courtesy of BMW OF NORTH AMERICA, INC.

34 00... CHECKING BRAKE DISCS

Necessary preliminary tasks

- Remove **WHEELS** .

Checking thickness difference:

- Measure thickness difference within brake surfaces at 8 point (spread over the circumference) with a micrometer gauge
- Compare measurement result with **setpoint value** . See **FRONT BRAKE** or **REAR BRAKE**

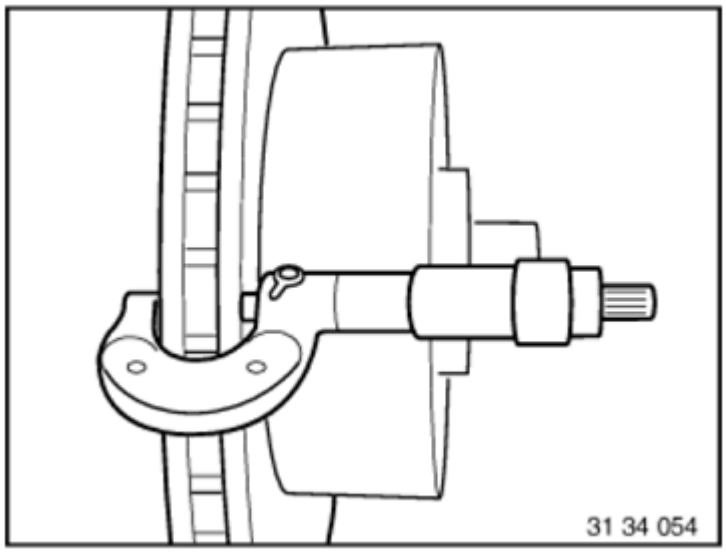


Fig. 6: Measuring Thickness Difference Within Brake Surfaces Using Micrometer Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- Position special tool **34 1 280** at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with **setpoint value** . See **FRONT BRAKE** or **REAR BRAKE**

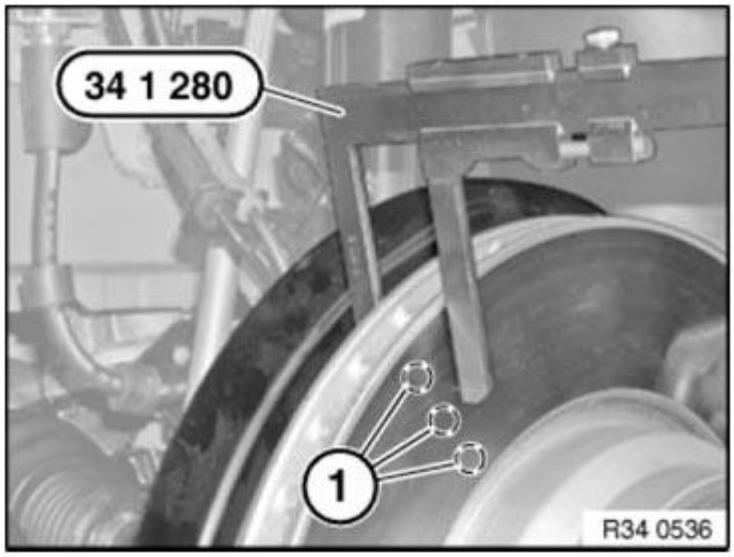


Fig. 7: Checking Brake Disc Thickness
Courtesy of BMW OF NORTH AMERICA, INC.

34 00 010 CHECKING THICKNESS OF BRAKE PAD

Notes

NOTE: The thickness of the outer brake pads can be determined without removing the wheels.

If necessary, move car until opening for brake pad wear indicator (brake pad) can be seen through rim styling.

Insert special tool **34 1 260** rim into opening for brake pad wear indicator.

Press special tool onto brake pad. Slide ring (1) in direction of arrow up to stop and read off measured value.

NOTE:

A. Brake disc
B. Brake pad with backplate

Safe limit for lining wear, front brake.

Safe limit for lining wear, rear brake.

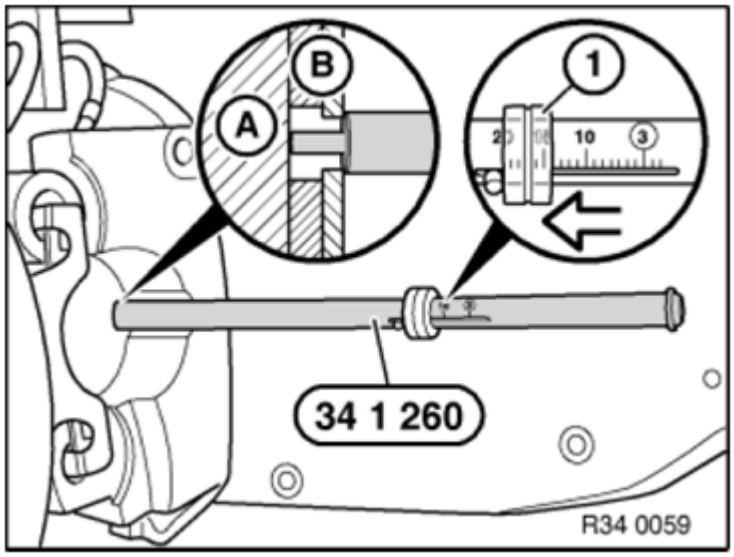


Fig. 8: Inserting Special Tool (34 1 260) Rim Into Opening For Brake Pad Wear Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

34 00... GENERAL INFORMATION

The brake system is one of the most important safety systems on any vehicle. It is therefore essential to act with utmost care when performing repair work on the brake system and to follow the instructions below.

General

- Ensure cleanliness and use only fluff-free cleaning cloths.
- Wash away or vacuum up brake dust, do not clear it away using compressed air. This dust is a health hazard.
- Do not under any circumstances allow any oil or grease to get into the brake system. This would result in a complete malfunction of the brake system.
- When cleaning brake components with brake cleaner, make sure that no brake cleaner gets into the brake system.
- Even the most minute traces of brake cleaner must be avoided.

Brake fluid

- Replace brake fluid at least every two years.
- Important: Never reuse drained off brake fluid.
- Use only BMW-approved brake fluid. See **BRAKE SYSTEM - OPERATING FLUIDS** .
- Dispose of brake fluid in approved appliances only, refer to BMW Service Workshop Equipment Planning documentation.
- Do not allow brake fluid to drain into drain pipes, into the outside environment or into unsuitable facilities. This would create the risk of groundwater contamination since brake fluid is classed as a fluid that is hazardous to water.

- Do not allow brake fluid to come into contact with paintwork as this will destroy the paint.
- Brake fluid must not be allowed to remain on bare skin too long in order to avoid skin problems. Wash skin coated with brake fluid with water and soap.
- If brake fluid makes contact with eyes, immediately flush with large quantity of clean water and visit eye doctor.

Wheel brakes

- Brake pads:

  Brake pads must be replaced when the **remaining brake pad thickness** See **FRONT BRAKE** or **REAR BRAKE** is reached.

  Brake pads must always be replaced on both sides of any axle.

  The friction surfaces of the brake pads must not come into contact with oil or grease. The brake pads must be replaced if they are dirt contamination by such substances.

  In the case of rotation-dependent brake pads, make sure the arrow marking points in the direction of rotation of the brake disc for when the vehicle is moving forward. Brake pads with left/right markings must be fitted on the relevant side of the vehicle.

  One-sided angled areas on the brake pads must be located on the disc contact side of the brake caliper for when the vehicle is moving forward.

- Brake discs:

  Brake discs must not be scored or cracked. Furthermore, **minimum brake disc thickness** See **FRONT BRAKE** or **REAR BRAKE** , disc runout, parallelism and surface roughness of the friction surfaces must not exceed or drop below the permitted values.

  Always strip preservative off new parts before installation. With the rear brake discs, also strip preservative off brake drum on parking brake.

- Always strip preservative off new parts before installation.
- Brake calipers:

  Only approved glycol-based assembly pastes may be used for repairs on brake calipers.

  All moving components on the brake caliper must move freely: note grease specifications.

  Use only BMW-approved lubricants to grease the brake caliper guides.

Brake lines, brake hoses

- Brake lines and brake hoses must be correctly routed and must not abut with body or components in a

way which would cause chafing.

- To prevent damage, release and tighten brake line couplings with a special brake line wrench only.
- The system must be bled each time any brake lines have been detached.
- All connection points must be checked for leaks.
- Only tighten down brake hoses on the front axle when wheels are in straight-ahead position.
- Close off open connections of brake lines and individual components to prevent dirt from getting into the brake system.
- Observe tightening torque when tightening down brake line couplings. See **34 32 BRAKE LINES** .

Traction control system

The traction control system is basically maintenance-free. However, be sure to adhere to the following:

- When carrying out welding work with electric welding equipment, be sure to disconnect the plug from the electronic control unit (ignition turned off).
- During painting work, the control unit may be subjected for brief periods to max. 95°C and for long periods (approx. 2 hours) to max. 85°C.
- Terminals must be completely tight on end poles of battery.
- The brake lines on the hydraulic unit must not be mixed up; if necessary, mark them prior to disassembly.
- On completion of repair work, carry out mix-up test with the DIS diagnosis system.

34 00... GENERAL INFORMATION ON BRAKING IN NEW BRAKE DISCS/BRAKE PADS

IMPORTANT: After completing work:

- **Carry out function check on brake test stand to ensure that the brakes complies with legal requirements.**
- **Carry out test braking while driving at low speed; the effectiveness of the brakes may be reduced during the initial braking operations.**
- **Exaggerated drastic and continuous braking operations for faster braking in are not permitted.**
- **Advise the customer not to perform any wilful drastic braking in the first 200 km after brake replacement.**
- **Attach mirror tag to interior rearview mirror.**

34 00 012 PARKING BRAKE FUNCTION CHECK

- Connect BMW diagnosis system.
- Carry out vehicle test
- Call up "Workshop braking-in" service function.
- Start braking-in program.
- (Parking brake indicator lamp in instrument cluster flashes at low frequency)

- Drive vehicle onto brake analyzer and pull parking brake button once.
- Parking brake is applied at approx. 15 km/h with reduced force.
- (Parking brake indicator lamp in instrument cluster flashes at high frequency)
- Braking-in procedure takes 3 minutes.
- Braking-in procedure can be terminated by pressing the parking brake button.
- Delete fault memory.

34 00 027 REPLACING FLUID IN BRAKE SYSTEM

Necessary preliminary work

- Remove left sensor opening
- Read and comply with **GENERAL INFORMATION** .

IMPORTANT: When carrying out repairs to the brake system, follow the procedure set out in BLEEDING BRAKE SYSTEM WITH DSC .
Use only BMW-approved brake fluids, see BRAKE SYSTEM - OPERATING FLUIDS .

Connect bleeder unit to expansion tank and switch on.

NOTE: Follow the applicable machine manufacturer's operating instructions.

Charging pressure should not exceed 2 bar.

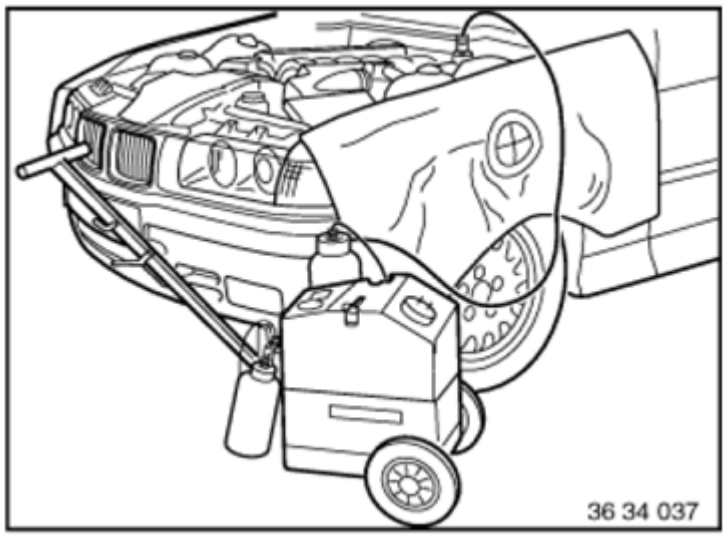


Fig. 9: Connecting Bleeder Unit To Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Fully rinse the brake system

Connect vent hose with collecting vessel to vent valve on rear right brake caliper.

Open vent valve and purge until clear, bubble-free brake fluid emerges.

Close vent valve.

Follow same procedure on rear left, front right and front left wheel brake.

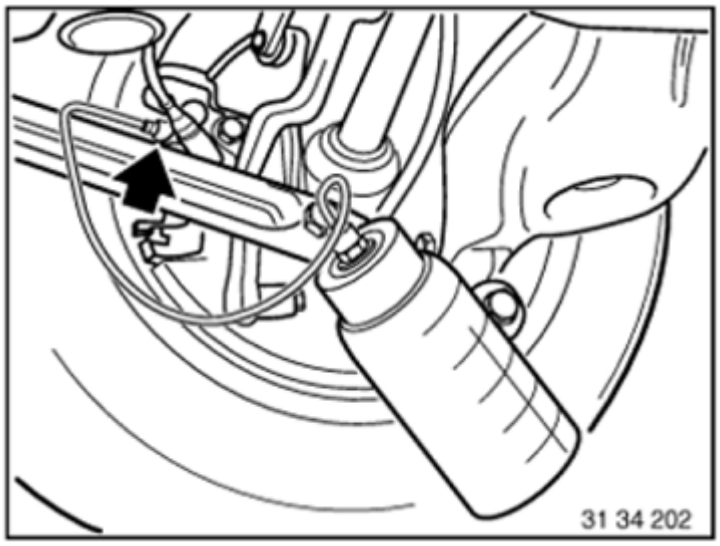


Fig. 10: Locating Vent Valve On Rear Right Brake Caliper
Courtesy of BMW OF NORTH AMERICA, INC.

Switch off bleeder unit and remove from expansion tank.

Check brake fluid level. If necessary, top up/draw off to "MAX" level.

Close expansion tank.

NOTE: Pay attention to gasket (1) in sealing cap.

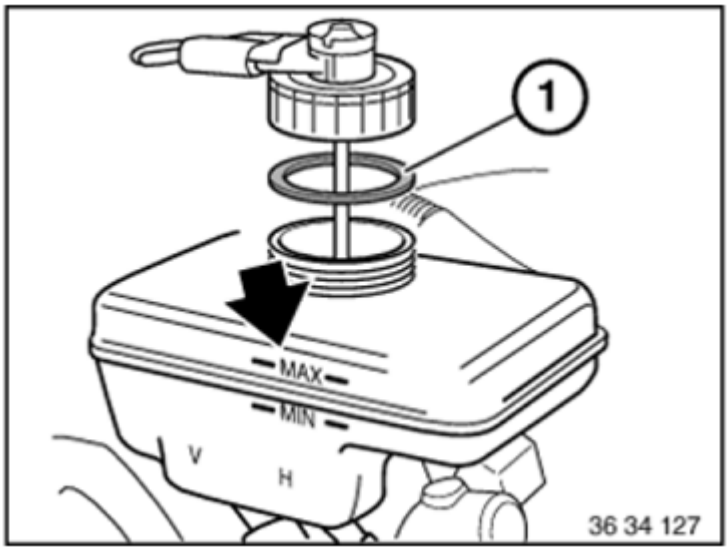


Fig. 11: Identifying Gasket And Brake Fluid Level
Courtesy of BMW OF NORTH AMERICA, INC.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

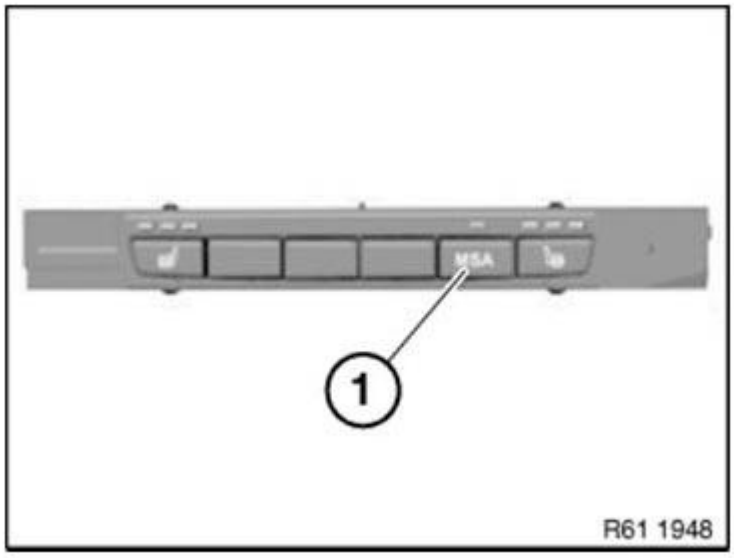


Fig. 12: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

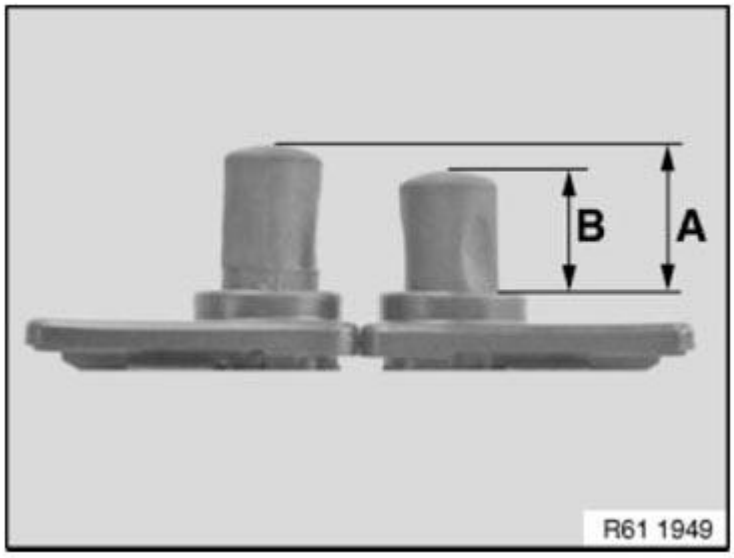


Fig. 13: Identifying Engine Hood/Bonnet Contact Distance (Workshop Mode And Basic Setting)
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

3411 FRONT BRAKES

34 00... CHECKING BRAKE DISCS

Necessary preliminary tasks

- Remove **WHEELS** .

Checking thickness difference:

- Measure thickness difference within brake surfaces at 8 point (spread over the circumference) with a micrometer gauge
- Compare measurement result with **setpoint value** . See **FRONT BRAKE** or **REAR BRAKE**

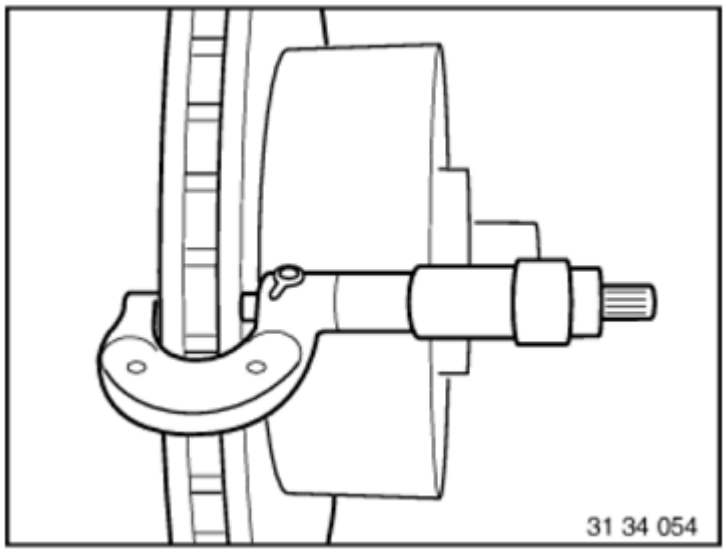


Fig. 14: Measuring Thickness Difference Within Brake Surfaces Using Micrometer Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- Position special tool **34 1 280** at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with **setpoint value** . See **FRONT BRAKE** or **REAR BRAKE**

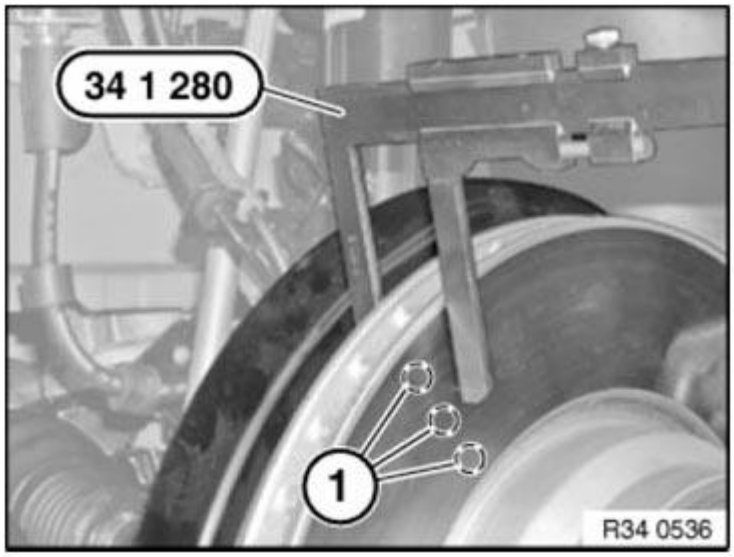


Fig. 15: Inserting Special Tool (34 1 260) Rim Into Opening For Brake Pad Wear Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 552 OVERHAULING LEFT OR RIGHT FRONT BRAKE CALIPER (BRAKE CALIPER REMOVED)

Notes

**WARNING: In the following operation, large forces occur at the brake caliper piston (up to more than 2800 N).
Danger of injury!**

NOTE: Use repair kit.

Check guide sleeves (1). If necessary, fit repair kit guide sleeve.

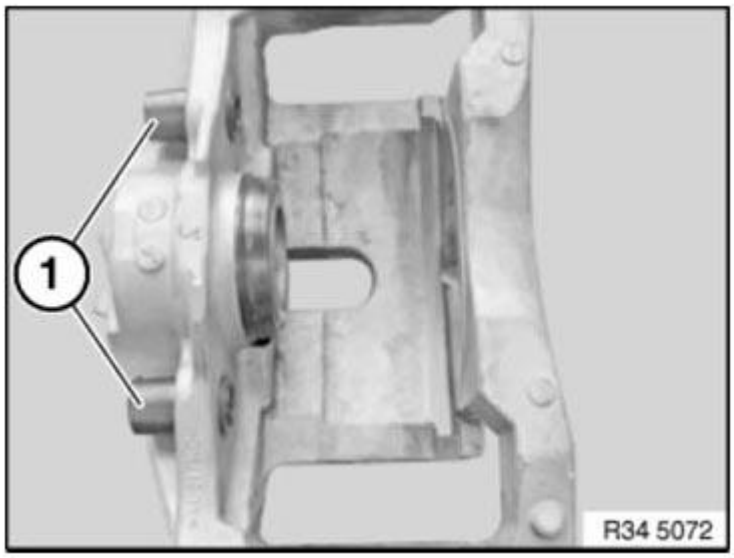


Fig. 16: Identifying Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully force piston out through connecting bore (1) with compressed air.

To protect piston, place a protective plate (2) (e.g. hard wood or hardened felt) in caliper recess.

Do not grip piston with fingers - pinch hazard!

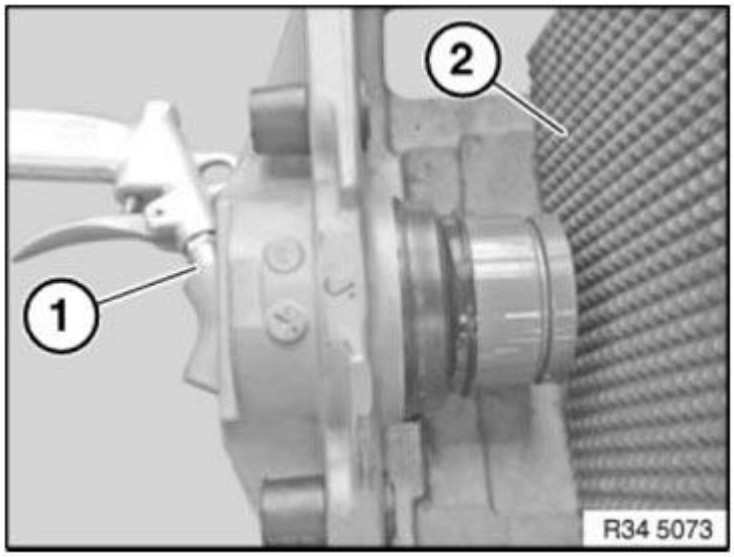


Fig. 17: Identifying Connecting Bore And Protective Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Press off dust boot (1).

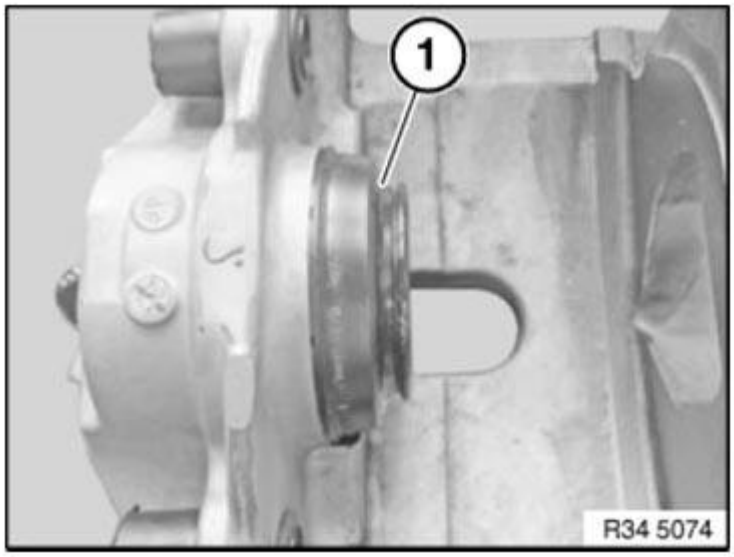


Fig. 18: Identifying Dust Boot
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove sealing ring (1) special tool **00 9 316** .

Clean cylinder bores and parts with spirits and dry with compressed air.

Thoroughly inspect cylinder bore, piston and flange surfaces for damage. Machining of cylinders and pistons is not permitted.

Install new sealing ring.

Installation note:

Apply a light coat of **ANTI-SQUEAK/CORROSION PASTE** to cylinder bore, piston and sealing ring.

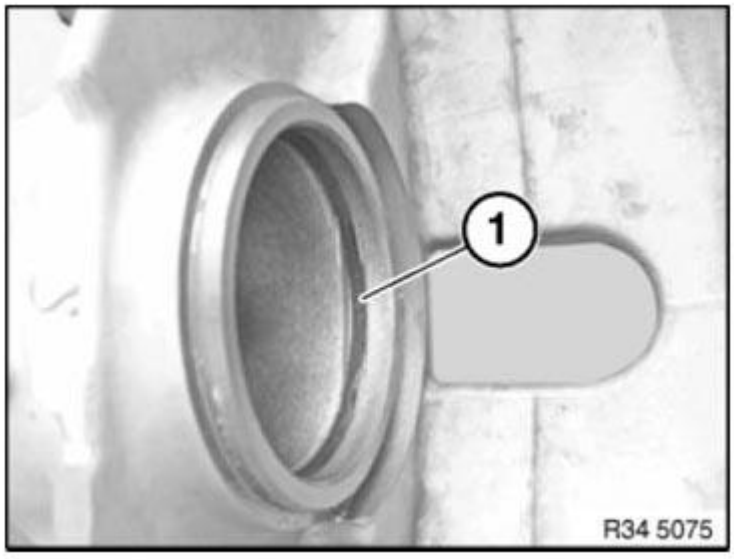


Fig. 19: Removing Sealing Ring Using Special Tool (00 9 316)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit dust boot (1) in annular groove of piston (2).

IMPORTANT: Do not twist brake piston.

Press piston into cylinder bore.

Evenly press dust boot (1) onto brake caliper housing (3) to the limit position.

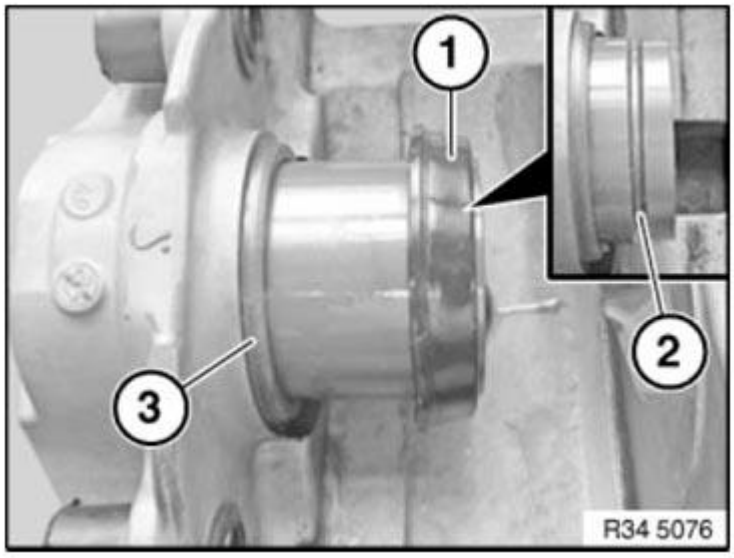


Fig. 20: Identifying Dust Boot, Piston And Brake Caliper Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The area between the dust boot and the brake caliper housing (3) must be kept dry. It must not come into contact with brake cylinder paste or brake fluid so as to ensure that the dust boot is perfectly fitted.

34 21 812 OVERHAULING LEFT OR RIGHT REAR BRAKE CALIPER (BRAKE CALIPER REMOVED)

Notes

WARNING: In the following work step, large forces occur at the brake caliper piston (up to more than 2800 N).
Risk of injury!

NOTE: Use repair kit.

Check guide sleeves (5). If necessary, fit repair kit guide sleeve.

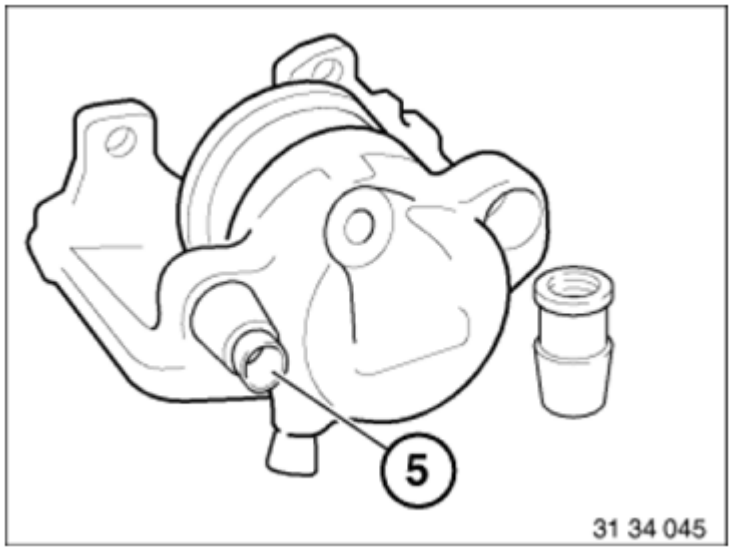


Fig. 21: Identifying Guide Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully force piston out through connection bore with compressed air.

To protect piston, place a protective plate (e.g. hard wood or hard felt) in caliper recess.

Do not grip piston with fingers - risk of trapping!

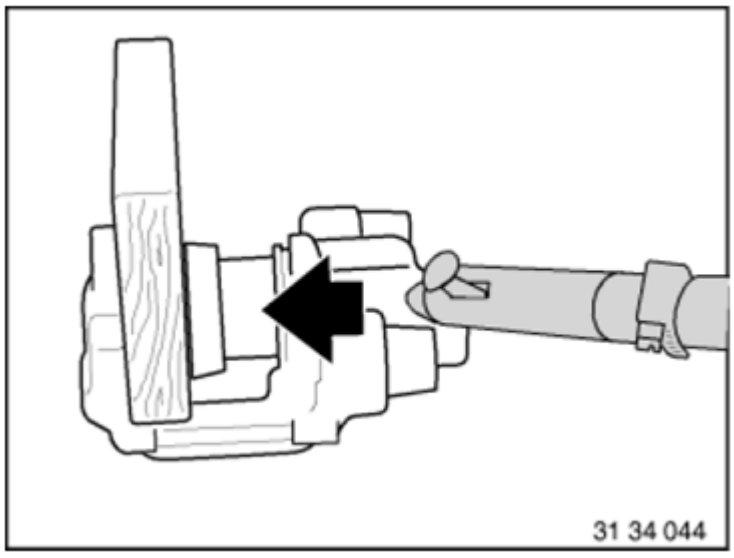


Fig. 22: Forcing Piston Out Through Connection Bore With Compressed Air
Courtesy of BMW OF NORTH AMERICA, INC.

Press off dust sleeve (1).

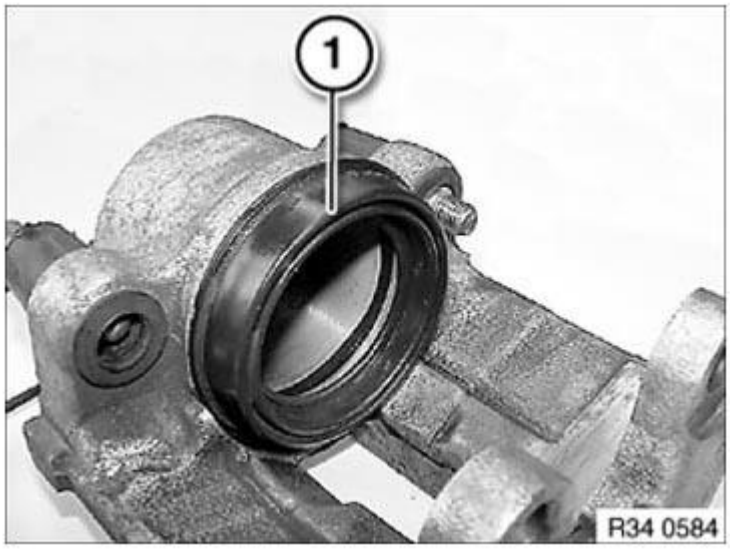


Fig. 23: Identifying Dust Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove sealing ring (1) special tool **00 9 316** .

Clean cylinder bores and parts with alcohol and dry with compressed air.

Thoroughly inspect cylinder bore, piston and flange surfaces. Machining of cylinders and pistons is not permitted.

Install new sealing ring (1).

Installation:

Apply a light coat of **ANTI-SQUEAK/CORROSION PASTE** to cylinder bore, piston and seal.

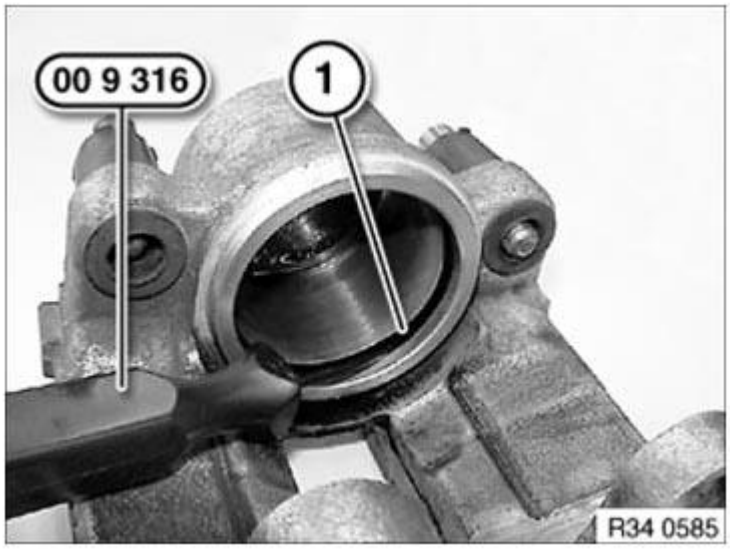


Fig. 24: Removing Sealing Ring Using Special Tool (00 9 316)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit dust sleeve (1) in annular groove of piston (2).

Press piston into cylinder bore.

IMPORTANT: Do not twist brake piston.

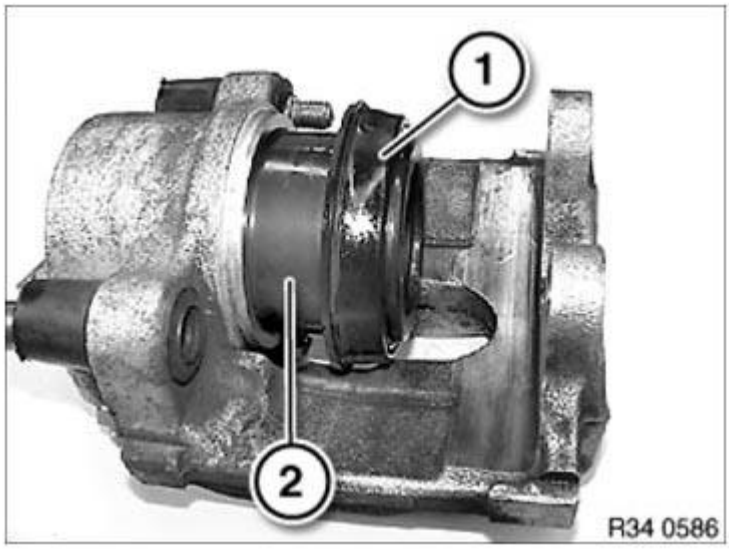


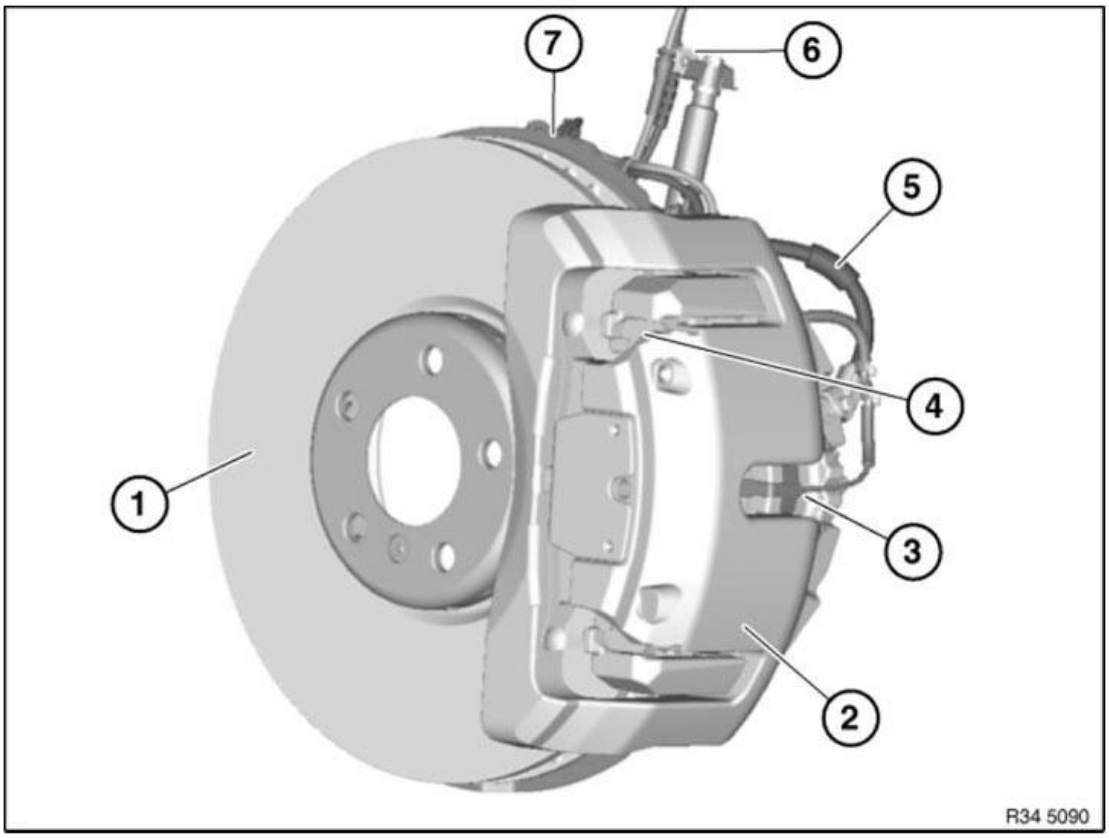
Fig. 25: Identifying Dust Sleeve And Piston
Courtesy of BMW OF NORTH AMERICA, INC.

Evenly press dust sleeve (1) onto brake caliper housing as far as it will go.

Installation:

The area between the dust sleeve and the brake caliper housing must be kept dry. It must not come into contact with brake cylinder paste or brake fluid so as to ensure that the dust sleeve is perfectly seated.

34 11... OVERVIEW OF FRONT BRAKES



1 Brake disc
2 Brake calliper
3 Brake pad wear sensor
4 Brake pads
5 Brake hose
6 Pulse generator
7 Brake guard plate

Fig. 26: Overview Of Front Brakes
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 667 PRECISION-TURNING BOTH FRONT BRAKE DISCS ON BOTH SIDES

IMPORTANT: Always precision-turn both sides of both brake discs on one axle. Observe max. machining dimension on each friction ring side and minimum brake disc thickness (MIN TH). See BRAKES - TECHNICAL DATA -- 750LI . Brake discs of M models (Compound brake discs) must not be machined! Only one brake pad set may be used up on brake discs which have been lathe-turned to minimum thickness (MIN TH).

Stationary brake disc lathe

IMPORTANT: Only BMW-approved brake disc lathes may be used!

In the case of stationary brake disc lathes, the **BRAKE DISC** must be removed.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

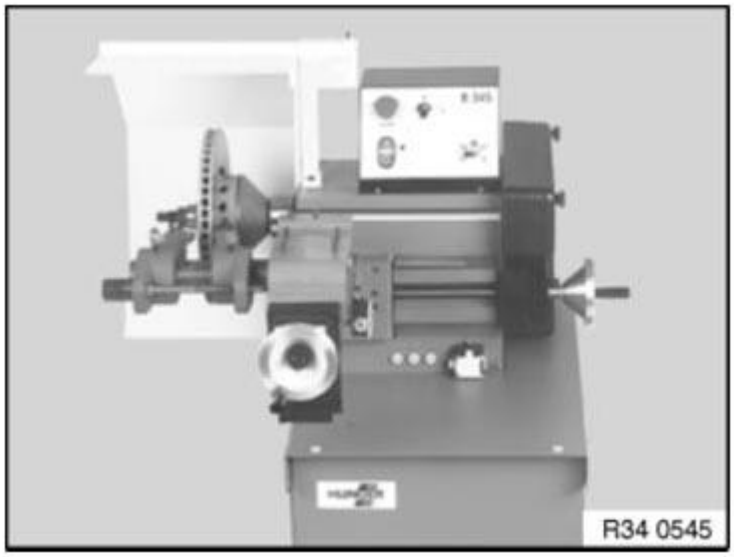


Fig. 27: Stationary Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

Mobile brake disc lathe

IMPORTANT: Only BMW-approved brake disc lathes may be used!

In the case of mobile brake disc lathes, the brake calipers and brake anchor plates must be removed.

The brake discs remain on the car.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.



Fig. 28: Mobile Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

After fine-grinding the brake discs, measure the thickness difference inside the braking surfaces at 8 points with an external micrometer. See **BRAKES - TECHNICAL DATA -- 750LI** .

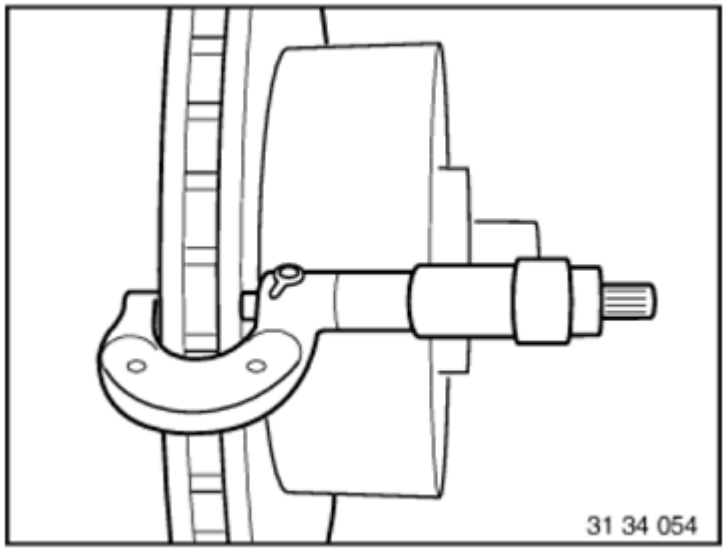


Fig. 29: Measuring Braking Surface Thickness Using External Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 000 REMOVING AND INSTALLING/RENEWING BRAKE PADS ON BOTH FRONT DISC BRAKES

Notes

IMPORTANT:

- **Brake pad wear sensor: after removal it must be replaced (brake pad wear sensor loses its retention capability in the break pad).**
- **Retaining spring: for vehicles older than 48 months it is recommended to replace the retaining spring!**

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket. Instead, clean with brake cleaner BMW part no. 83 19 2 154 780 and apply a thin coating of brake pad paste BMW part no. 83 19 2 158 851.

Necessary preliminary work

- Remove **FRONT WHEELS** .
- Remove **BRAKE PAD WEAR SENSOR** .
- For F03: Remove brake caliper cover.

NOTE: After completing repair work:

- **Fully depress brake pedal several times so that brake pads contact brake discs.**
- **When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.**
- **Read and comply with notes on BRAKING IN new brake discs/brake pads.**
- **When replacing pads, reset CBS display in accordance with factory specification.**

Lever out retaining spring (1) in direction of arrow towards rear.

Installation note:

Place retaining spring (1) first at top and bottom of brake caliper and then allow to engage in recess (2) of brake caliper housing.

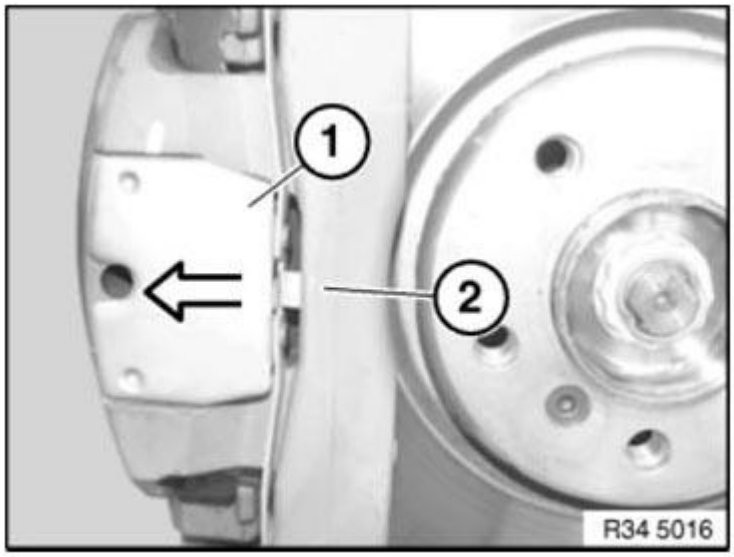


Fig. 30: Identifying Retaining Spring And Recess
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plastic plugs (1).

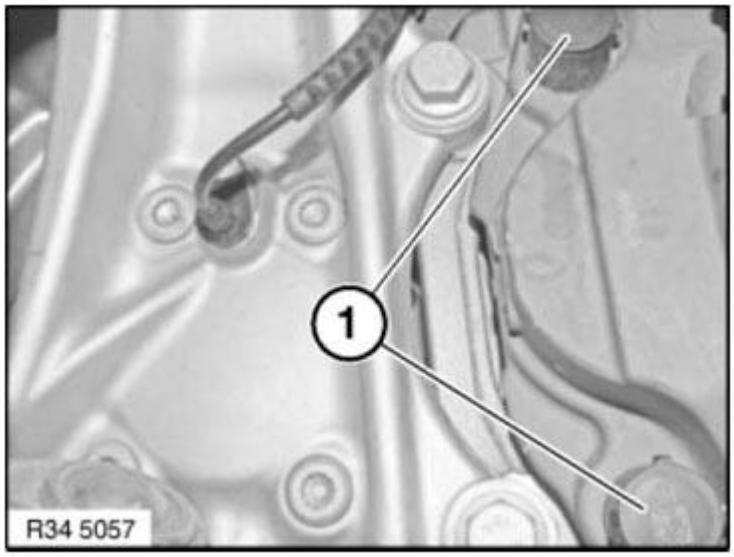


Fig. 31: Identifying Plastic Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew guide bolts (1).

IMPORTANT: Tie brake caliper back and do not allow to hang from brake hose.

Withdraw brake caliper backwards.

Installation note:

Only clean guide bolts; do not grease.

Check threads.

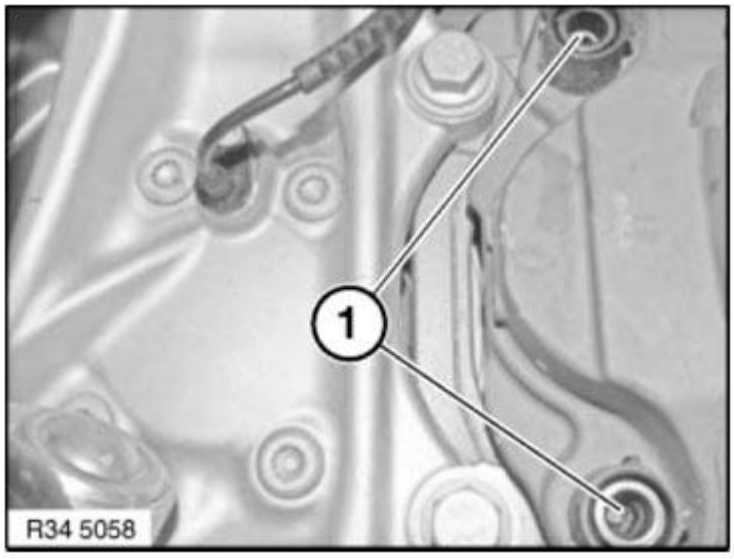


Fig. 32: Identifying Guide Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Replace all guide bolts which are not in perfect condition.

Tightening torque, see **34 11 FRONT BRAKE** .

IMPORTANT: Mark any worn brake pads.

Remove brake pads in direction of arrow.

In the event of one-sided brake pad wear, do not change brake pads round.

Observe minimum thickness of brake pads. See **BRAKES - TECHNICAL DATA -- 750LI** .

Clean brake pads.

Do not apply grease to brake lining backplate.

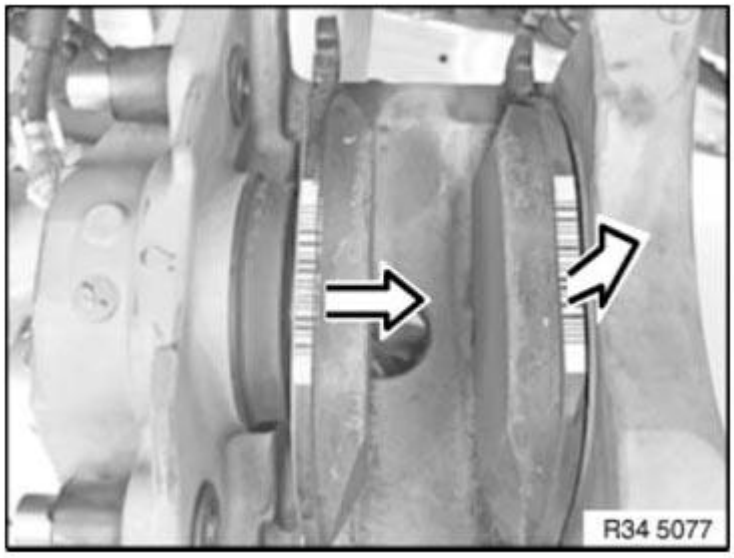


Fig. 33: Removing Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mark any worn brake pads.

Equipment specification, high-speed brake system.

Remove brake pads in direction of arrow.

In the event of one-sided brake pad wear, do not change brake pads round.

Observe minimum thickness of brake pads. See **BRAKES - TECHNICAL DATA -- 750LI** .

Clean brake pads.

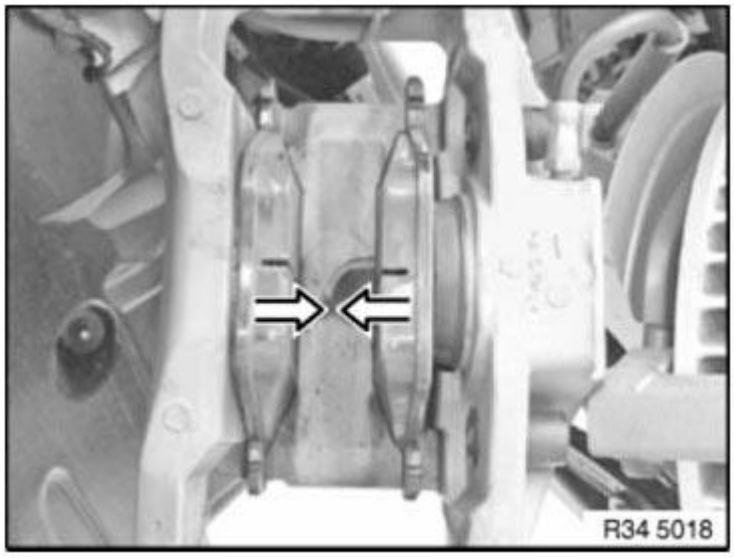


Fig. 34: Removing Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

Do not apply grease to brake lining backplate.

IMPORTANT: When forcing piston back:

- **Pay attention to brake fluid level in expansion tank; brake fluid that spills over will damage paintwork.**

Press back brake pads and piston with special tool **34 1 050** .

Check minimum brake disc thickness:

- Position special tool **34 1 280** at three measuring points in area (1) and measure.
- Compare measuring result and lowest value with setpoint value. See **BRAKES - TECHNICAL DATA - - 750LI** .

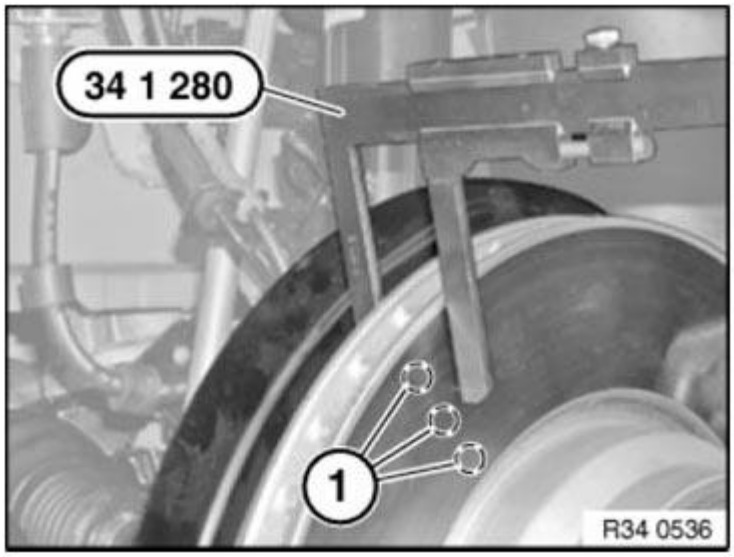


Fig. 35: Pressing Back Brake Pads And Piston Using Special Tool (34 1 050)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be fitted if the brake disk thickness is greater than the minimum brake disc thickness (MIN TH). See BRAKES - TECHNICAL DATA -- 750LI .

Check dust boot (1) for damage and replace if necessary.

IMPORTANT: Dust boot must not come into contact with brake pad paste as this may cause the dust boot to swell.

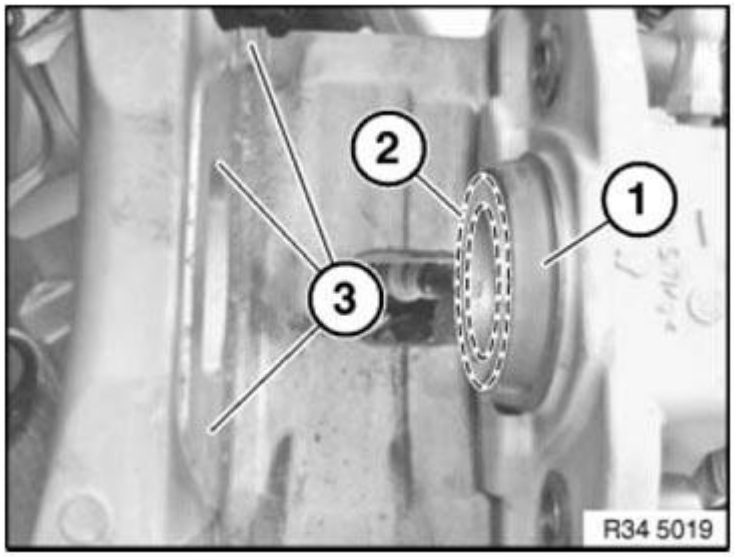


Fig. 36: Identifying Dust Boot, Brake Piston And Brake Pads Surface

Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact surface (2) of brake piston and brake pads (3) with brake cleaner and apply a thin coat of brake pad paste.

NOTE: Grease contact surfaces on brake caliper at top and bottom.

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket. Instead, clean with brake cleaner and apply a thin coating of Never Seez Compound brake pad paste.

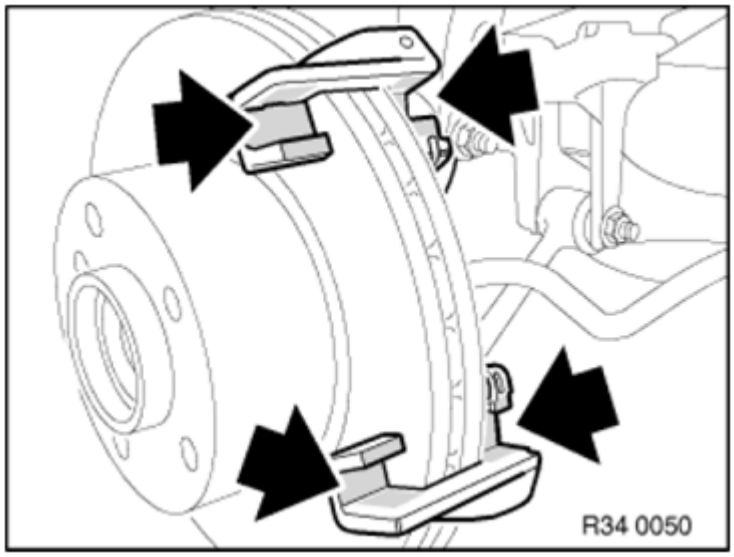


Fig. 37: Identifying Brake Pads Guide Surfaces On Brake Caliper Mounting Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

So as not to damage the surface coating, if possible do not mechanically clean pad guides (1). Instead, clean with brake cleaner and apply a thin coating of Never Seez Compound brake pad paste.

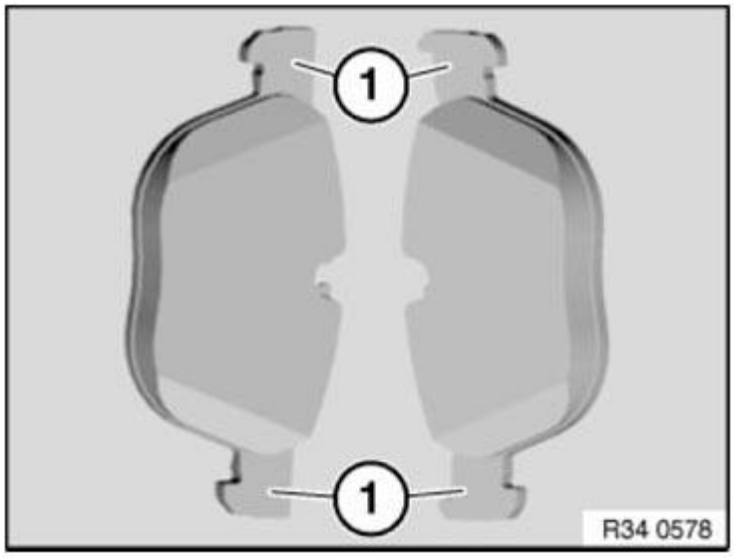


Fig. 38: Identifying Brake Pad Guides
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 220 REMOVING AND INSTALLING/REPLACING BOTH FRONT BRAKE DISCS

Necessary preliminary work

- Remove **FRONT WHEELS**
- Remove and clean **BRAKE PADS**

NOTE: After completing work, read and comply with notes on BRAKING IN NEW BRAKE DISCS/BRAKE PADS .

Check minimum brake disc thickness:

- Position special tool **34 1 280** at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with setpoint value. See **BRAKES - TECHNICAL DATA -- 750LI** .

NOTE: If the brake discs are replaced, you must also fit new brake pads.

Brake discs may only be replaced in pairs (on each axle).

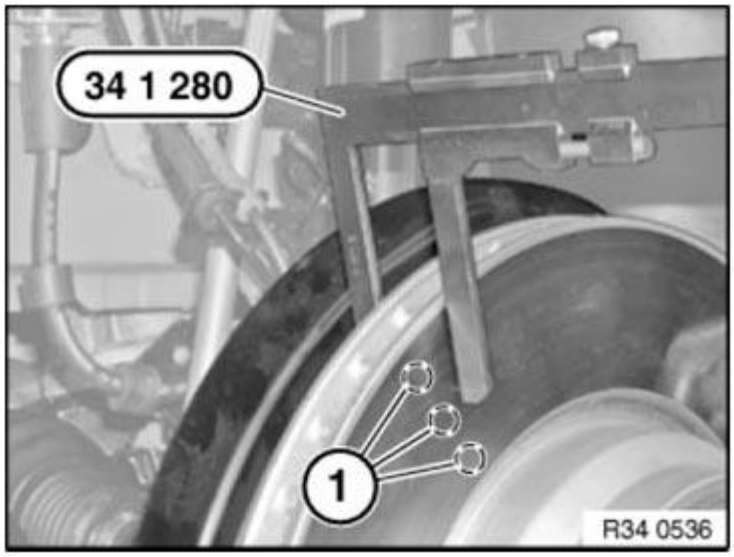


Fig. 39: Checking Brake Disc Thickness Using Special Tool (34 1 280)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH). See BRAKES - TECHNICAL DATA -- 750LI .

Release screws (1). Remove brake caliper mounting bracket.

Installation note:

Tightening torque **34 11 2AZ** .

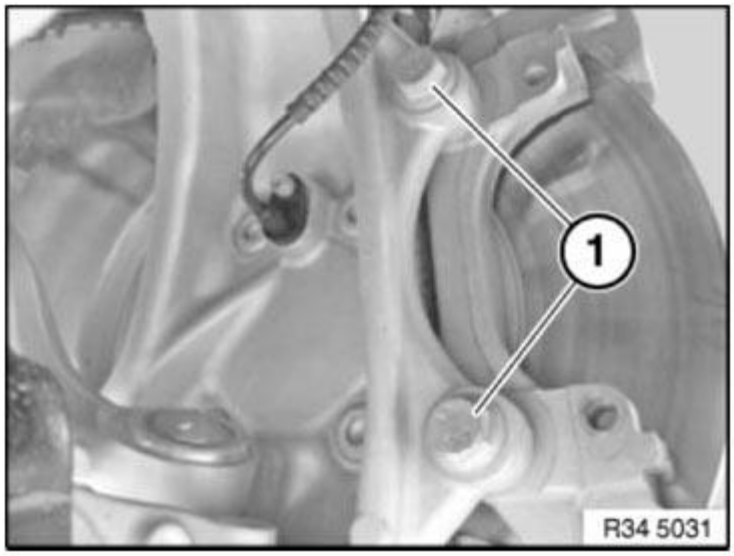


Fig. 40: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To release brake disc: Do not under any circumstances strike friction ring with a hammer or similar!

If necessary, carefully tap on base of brake disc chamber with a rubber mallet.

Clean contact surface of brake disc at wheel hub thoroughly and remove traces of corrosion.

Unevenness on contact surface may result in distortion of brake disc!

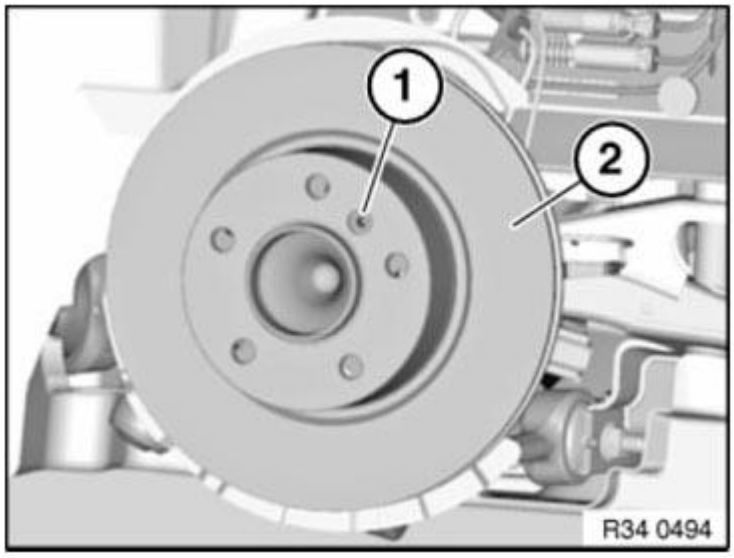


Fig. 41: Identifying Screws And Brake Disc
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove brake disc (2).

Installation note:

Replace screw.

Tightening torque **34 11 1AZ** .

34 11 519 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT BRAKE CALIPER

Necessary preliminary work

- **REMOVE WHEEL**
- Read and comply with **GENERAL INFORMATION** .

After completing work: replace fluid in brake system. See **REPLACING FLUID IN BRAKE SYSTEM**.

Press brake pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

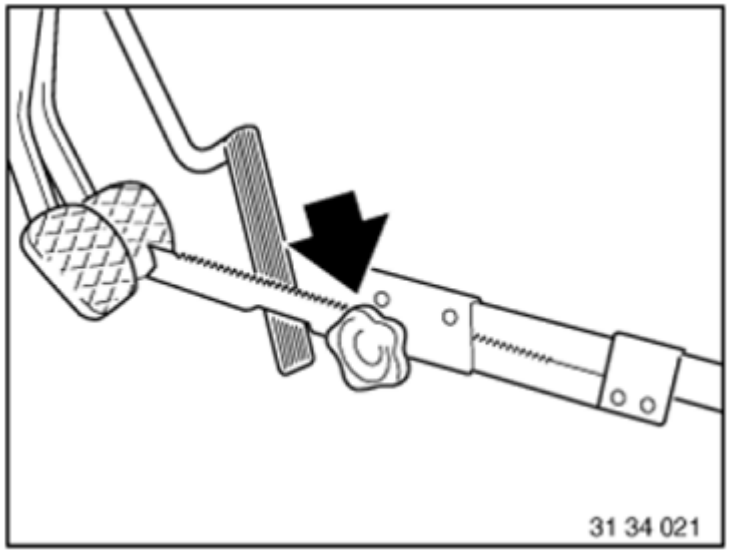


Fig. 42: Pressing Brake Pedal Down
Courtesy of BMW OF NORTH AMERICA, INC.

Release union screw (1).

Installation note:

Tightening torque **34 32 2AZ** .

If necessary, grip at knurling (2).

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

If necessary, remove **BRAKE PAD WEAR SENSOR** .

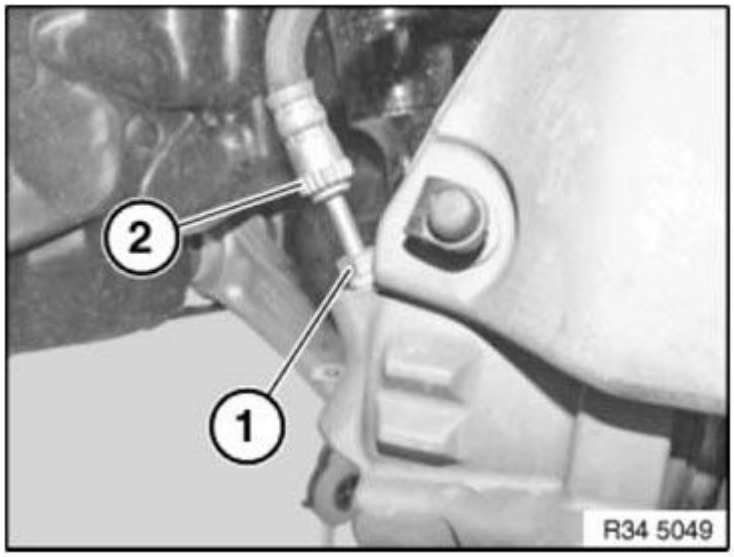


Fig. 43: Identifying Union Screw And Knurling
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out retaining spring (1) in direction of arrow towards rear.

Installation note:

Place retaining spring (1) first at top and bottom of brake caliper and then allow to engage in recess (2) of brake caliper housing.

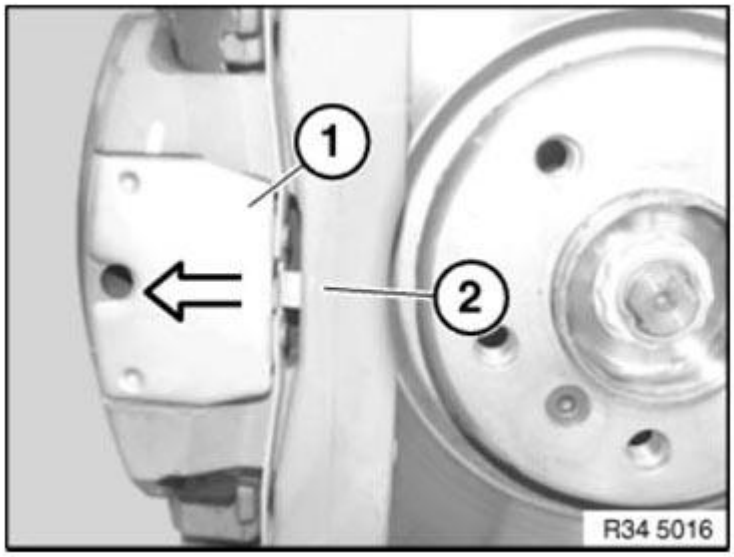


Fig. 44: Identifying Retaining Spring And Recess
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plastic plugs (1).

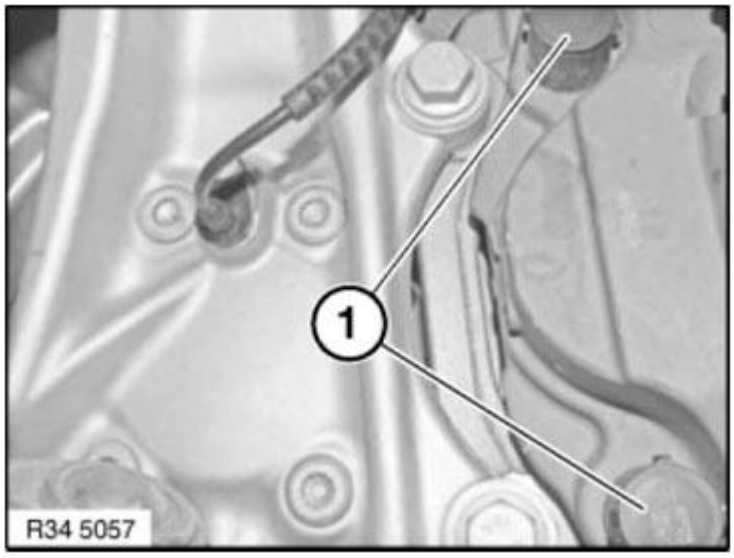


Fig. 45: Identifying Plastic Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew guide bolts (1).

Withdraw brake caliper backwards.

Installation note:

Only clean guide bolts; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.

Tightening torque **34 11 4AZ** .

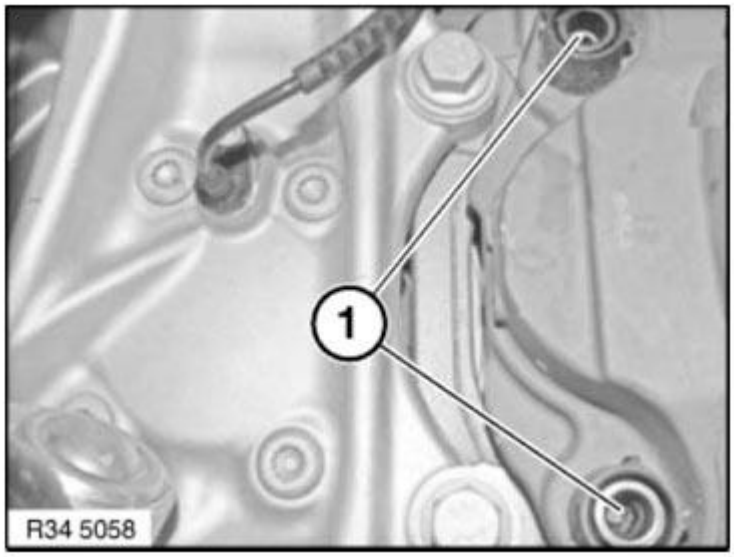


Fig. 46: Identifying Guide Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mark any worn brake pads.

Remove brake pads in direction of arrow.

In the event of one-sided brake pad wear, do not change brake pads round.

If necessary, clean **BRAKE CALIPER AND PADS** .

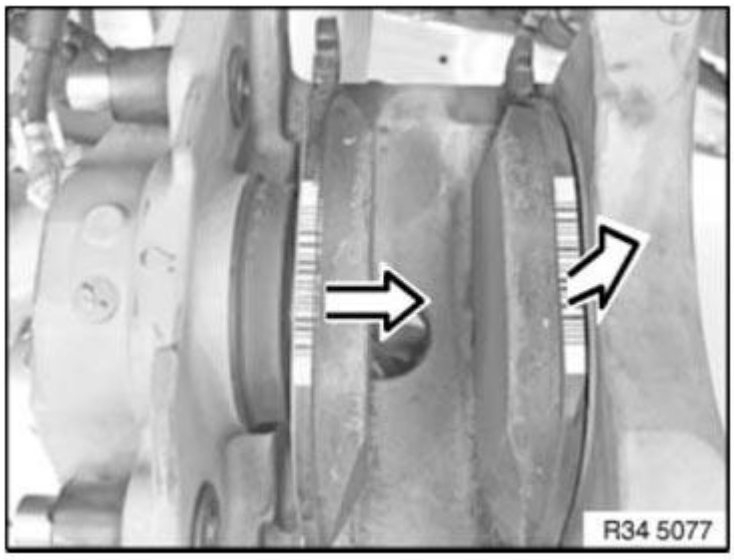


Fig. 47: Removing Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

Equipment specification, high-speed brake system.

IMPORTANT: Mark any worn brake pads.

Remove brake pads in direction of arrow.

In the event of one-sided brake pad wear, do not change brake pads round.

If necessary, clean **BRAKE CALIPER AND PADS** .

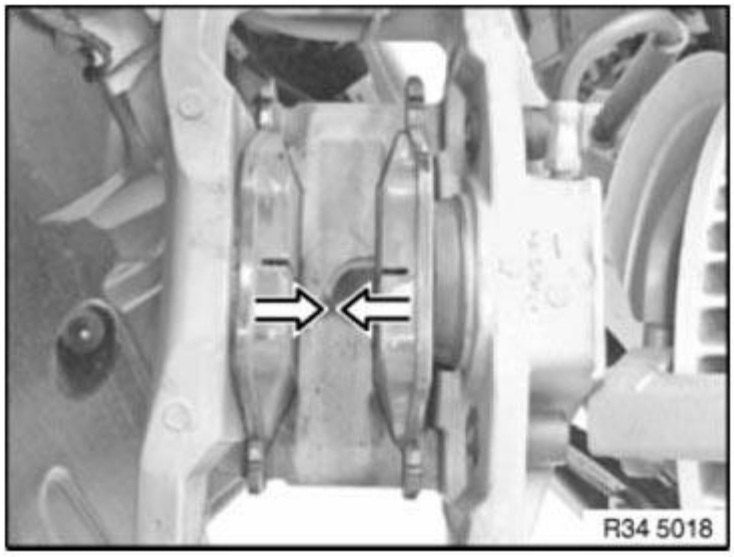


Fig. 48: Removing Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 519 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT BRAKE CALIPER

Necessary preliminary tasks

- **REMOVE WHEEL**
- Read and comply with **GENERAL INFORMATION** .

After completing work: replace fluid in brake system. See **REPLACING FLUID IN BRAKE SYSTEM**.

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

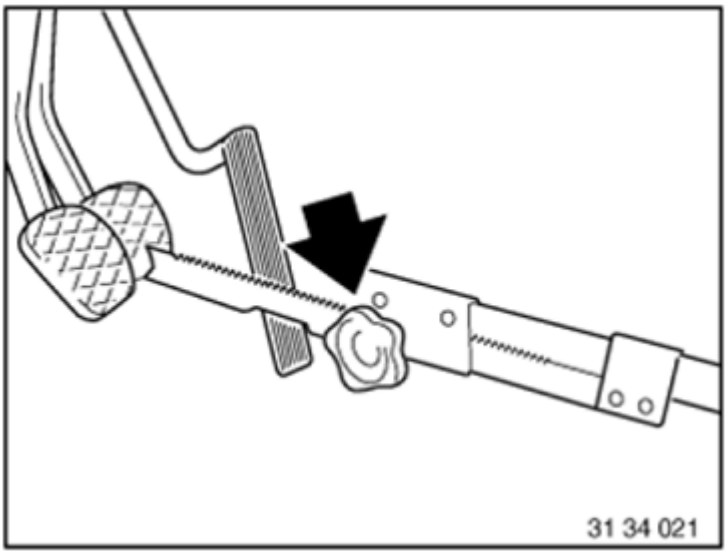


Fig. 49: Pressing Clutch Pedal Down
Courtesy of BMW OF NORTH AMERICA, INC.

Release union screw (1).

Installation:

Tightening torque **34 32 2AZ** .

If necessary, grip at knurling (2).

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

If necessary, remove **BRAKE PAD WEAR SENSOR** .

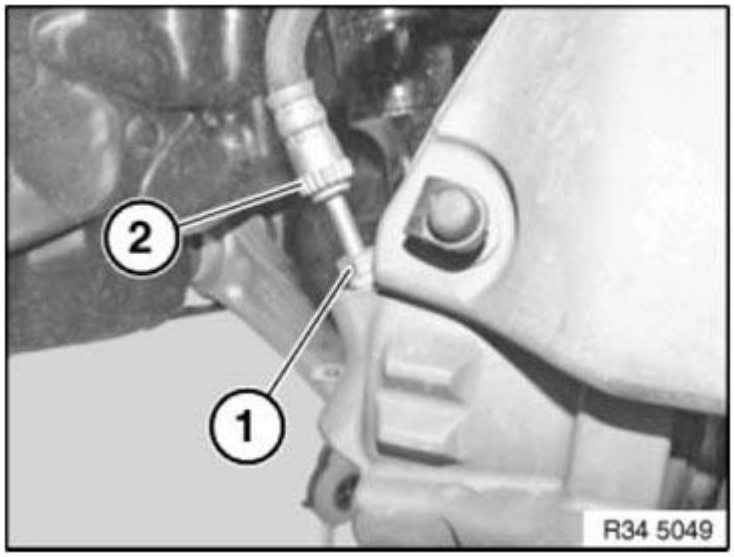


Fig. 50: Identifying Union Screw And Knurling
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out retaining spring (1) in direction of arrow towards rear.

Installation:

Place retaining spring (1) first at top and bottom of brake caliper and then allow to engage in recess (2) of brake caliper housing.

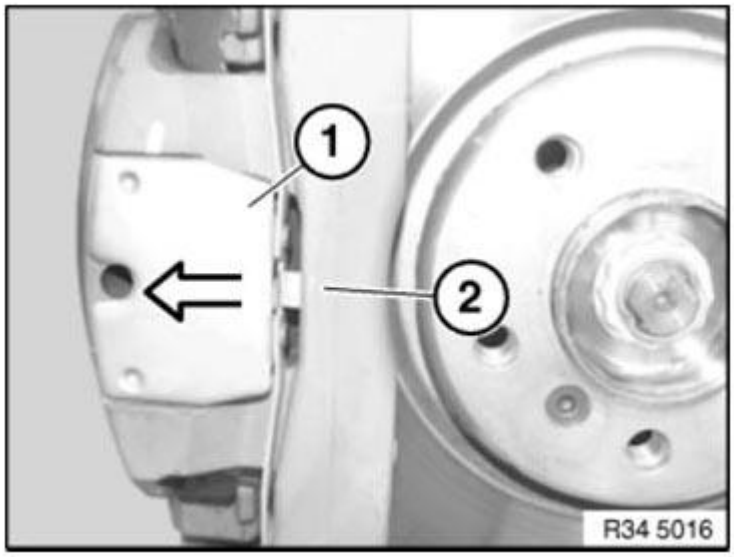


Fig. 51: Identifying Retaining Spring And Recess
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plastic plugs (1).

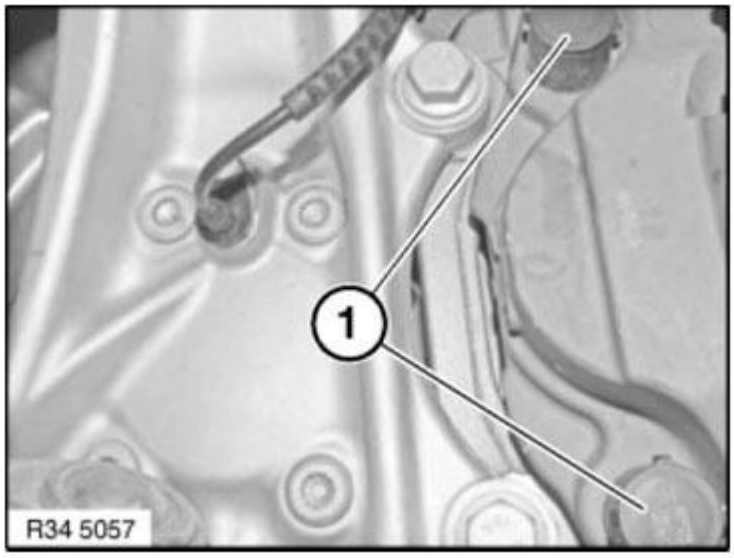


Fig. 52: Identifying Plastic Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew guide bolts (1).

Withdraw brake caliper backwards.

Installation:

Only clean guide bolts; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.

Tightening torque **34 11 4AZ** .

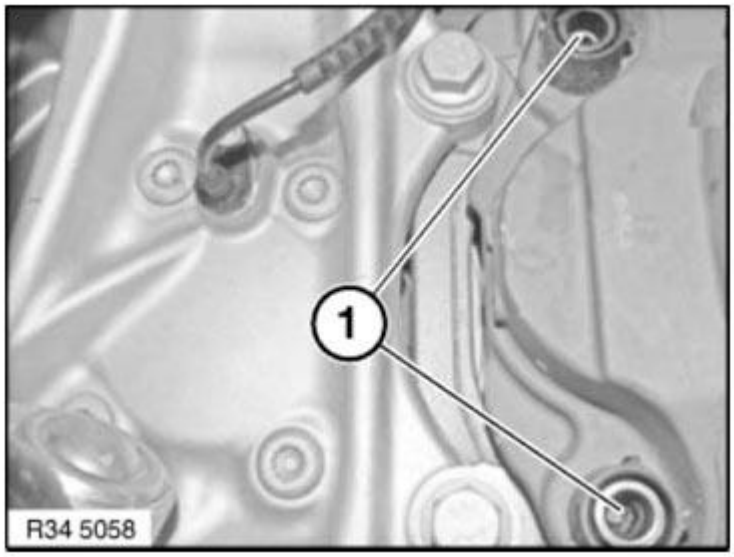


Fig. 53: Identifying Guide Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mark any worn brake pads.

Remove brake pads in direction of arrow.

In the event of one-sided brake pad wear, do not change brake pads round.

If necessary, clean **BRAKE CALIPER AND PADS** .

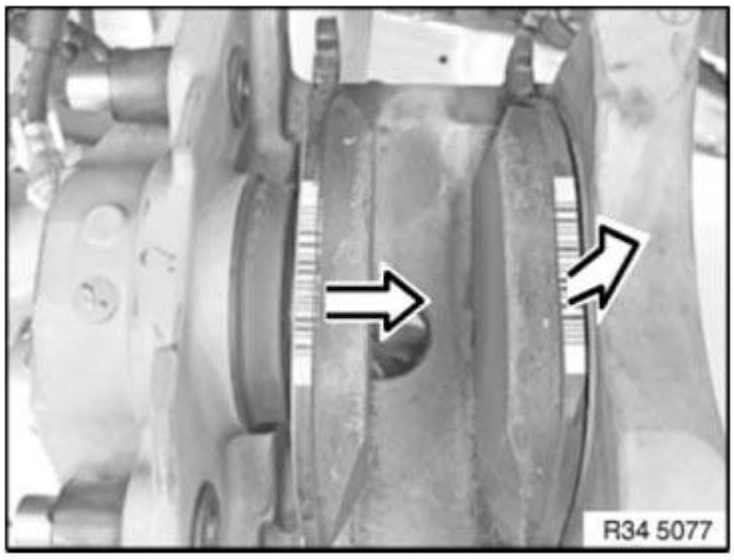


Fig. 54: Removing Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

Equipment specification, high-speed brake system.

IMPORTANT: Mark any worn brake pads.

Remove brake pads in direction of arrow.

In the event of one-sided brake pad wear, do not change brake pads round.

If necessary, clean **BRAKE CALIPER AND PADS** .

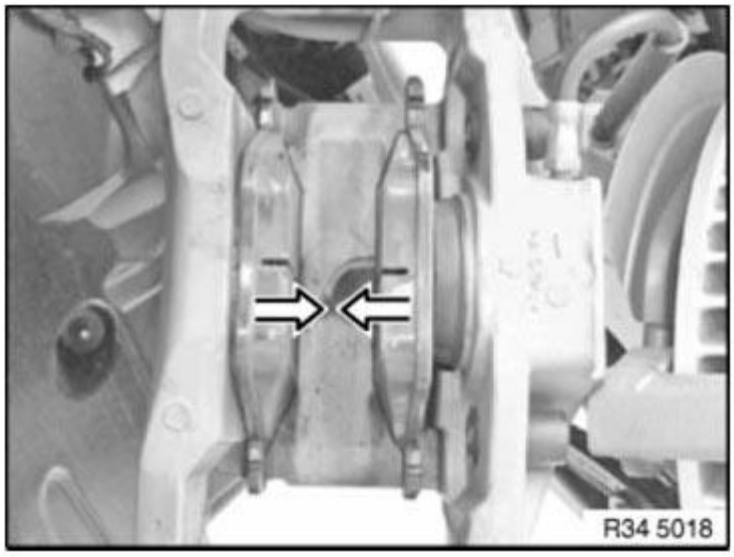


Fig. 55: Removing Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 250 REPLACING FRONT LEFT OR RIGHT BRAKE ANCHOR PLATE/GUARD PLATE

Necessary preliminary tasks

- Remove front **BRAKE DISC**

Release screws (1) and remove brake guard plate (2).

Installation note:

Tightening torque **34 11 3AZ** .

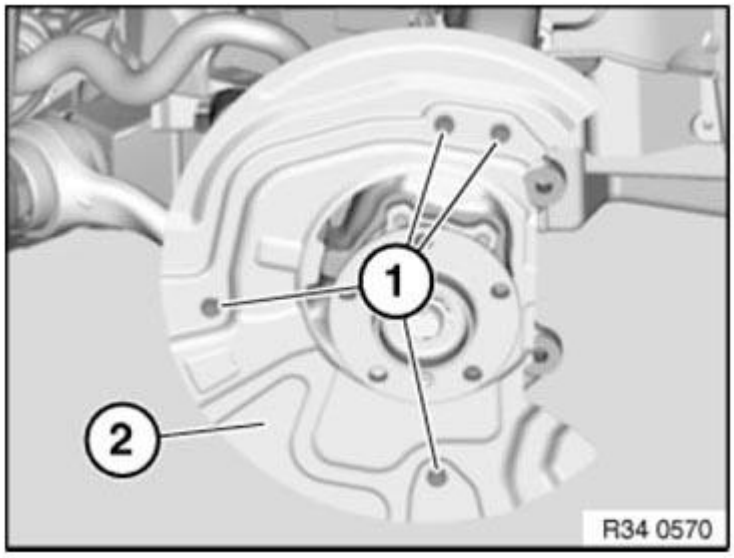


Fig. 56: Identifying Screws And Brake Guard Plate
Courtesy of BMW OF NORTH AMERICA, INC.

3421 REAR BRAKES

34 00... CHECKING BRAKE DISCS

Necessary preliminary tasks

- Remove **WHEELS** .

Checking thickness difference:

- Measure thickness difference within brake surfaces at 8 point (spread over the circumference) with a micrometer gauge
- Compare measurement result with **setpoint value** . See **FRONT BRAKE** or **REAR BRAKE**

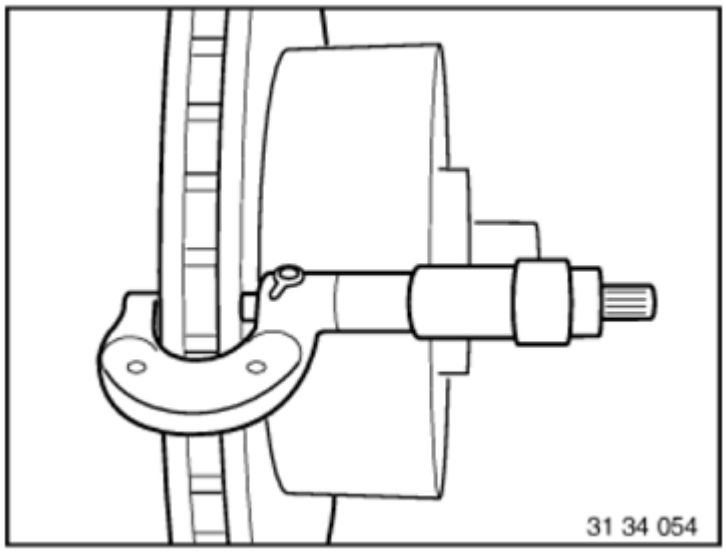


Fig. 57: Checking Brake Surface Thickness Using Micrometer Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- Position special tool **34 1 280** at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with **setpoint value** . See **FRONT BRAKE** or **REAR BRAKE**

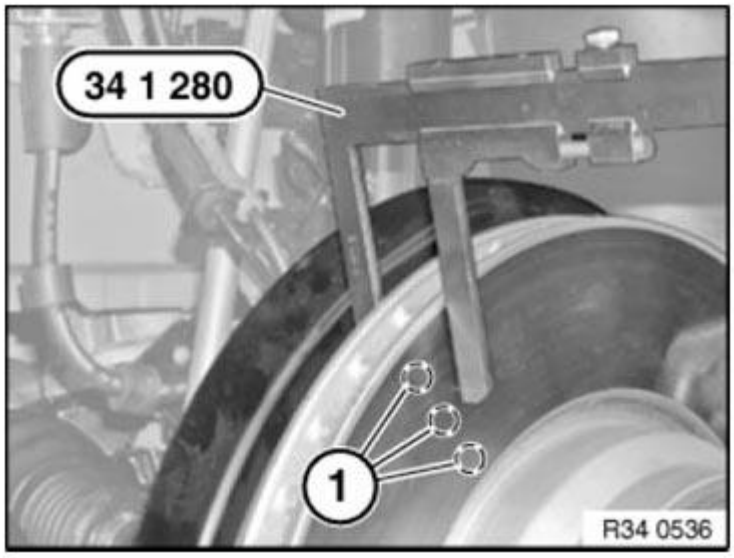


Fig. 58: Checking Brake Disc Thickness Using (34 1 280)
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 812 OVERHAULING LEFT OR RIGHT REAR BRAKE CALIPER (BRAKE CALIPER REMOVED)

Notes

**WARNING: In the following work step, large forces occur at the brake caliper piston (up to more than 2800 N).
Risk of injury!**

NOTE: Use repair kit.

Check guide sleeves (5). If necessary, fit repair kit guide sleeve.

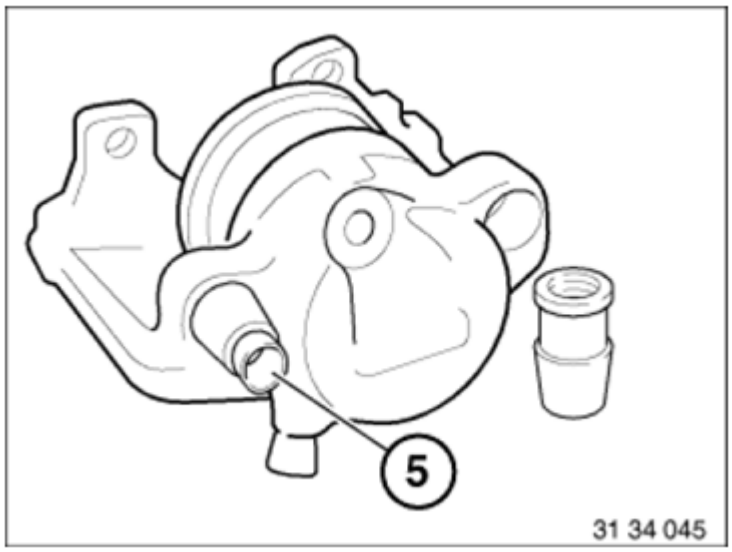


Fig. 59: Identifying Guide Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully force piston out through connection bore with compressed air.

To protect piston, place a protective plate (e.g. hard wood or hard felt) in caliper recess.

Do not grip piston with fingers - risk of trapping!

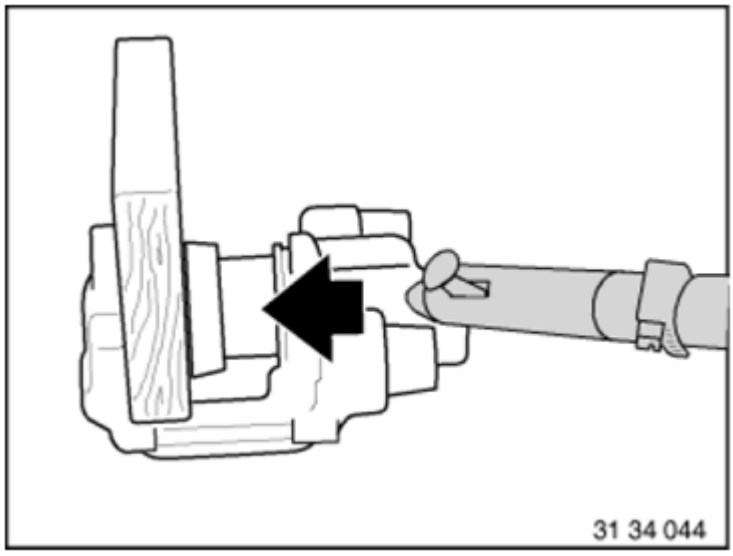


Fig. 60: Forcing Piston Out Through Connection Bore With Compressed Air
Courtesy of BMW OF NORTH AMERICA, INC.

Press off dust sleeve (1).

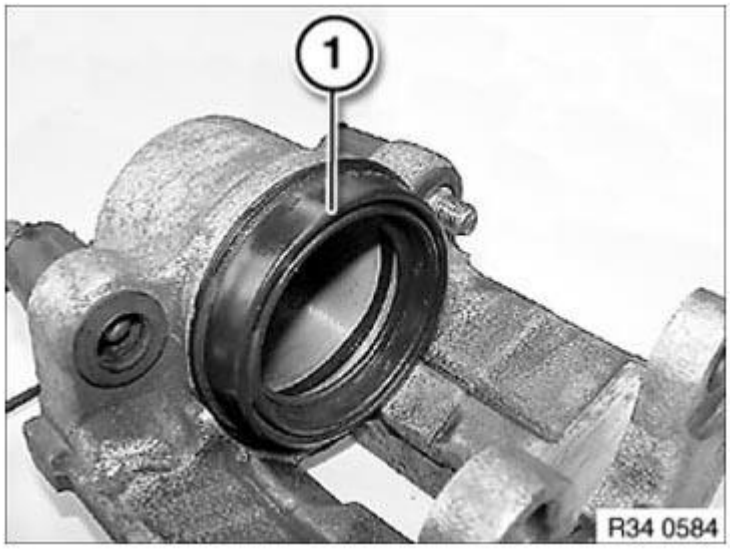


Fig. 61: Identifying Dust Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove sealing ring (1) special tool **00 9 316** .

Clean cylinder bores and parts with alcohol and dry with compressed air.

Thoroughly inspect cylinder bore, piston and flange surfaces. Machining of cylinders and pistons is not permitted.

Install new sealing ring (1).

Installation:

Apply a light coat of **ANTI-SQUEAK/CORROSION PASTE** to cylinder bore, piston and seal.

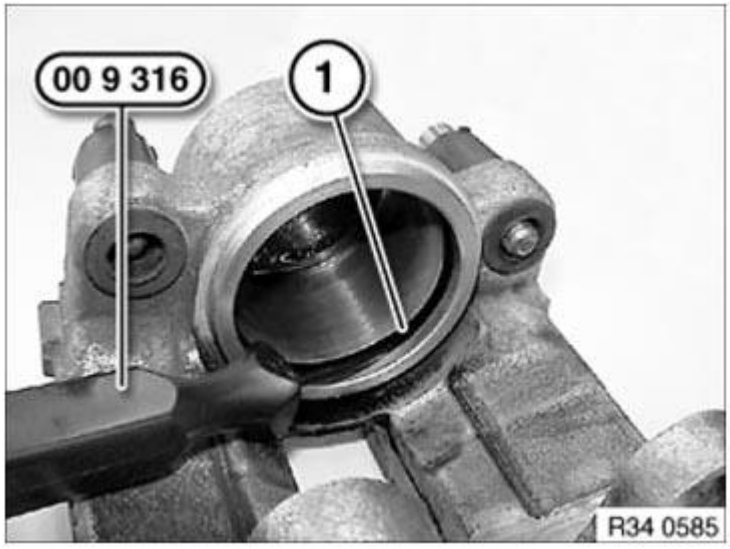


Fig. 62: Removing Sealing Ring Using Special Tool (00 9 316)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit dust sleeve (1) in annular groove of piston (2).

Press piston into cylinder bore.

IMPORTANT: Do not twist brake piston.

Evenly press dust sleeve (1) onto brake caliper housing as far as it will go.

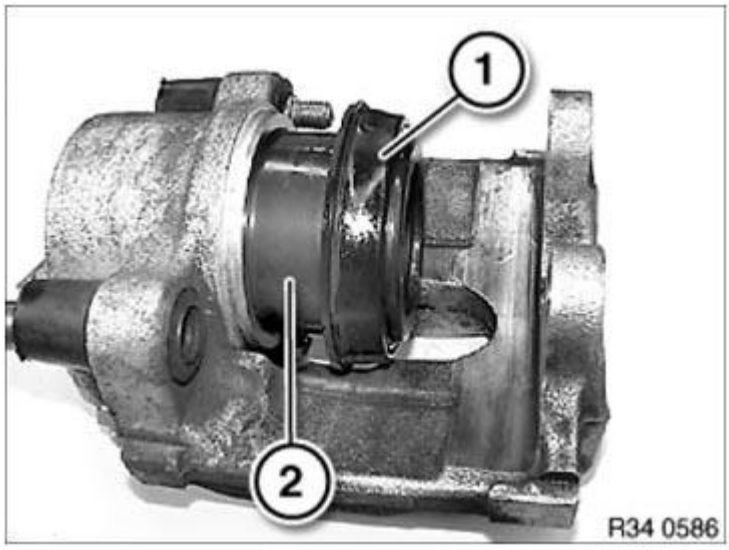
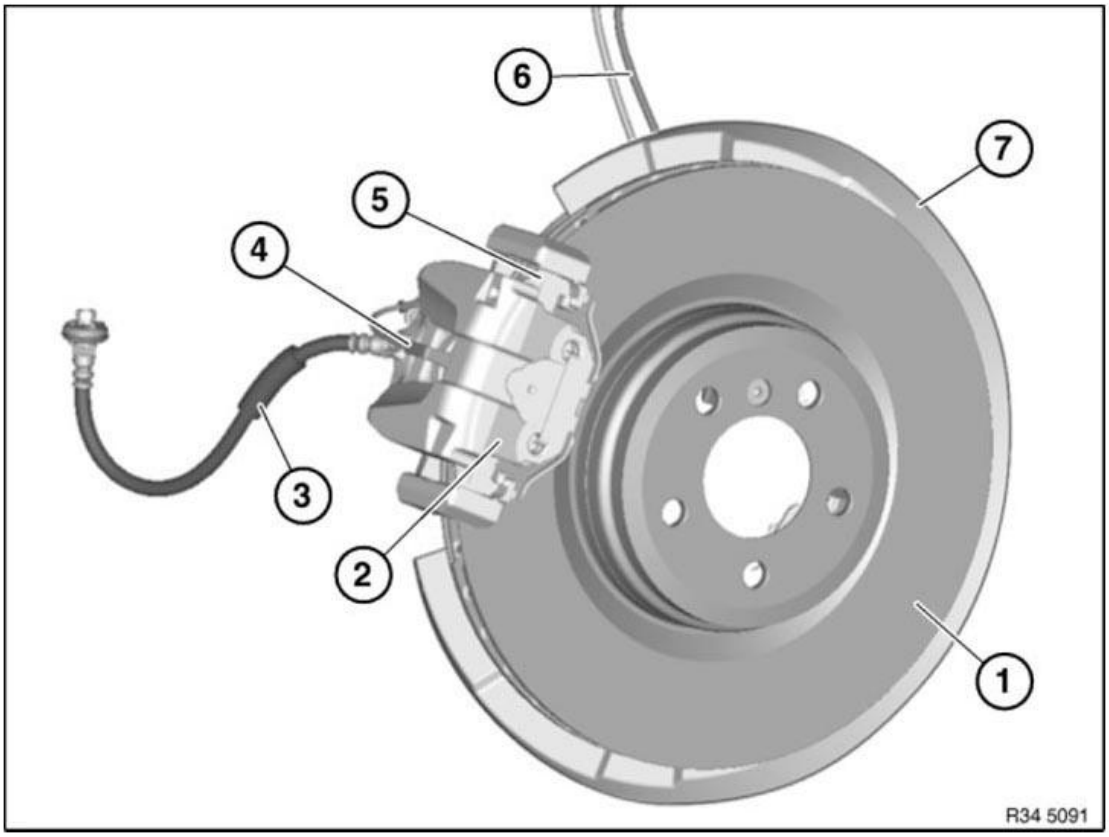


Fig. 63: Identifying Dust Sleeve And Piston
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The area between the dust sleeve and the brake caliper housing must be kept dry. It must not come into contact with brake cylinder paste or brake fluid so as to ensure that the dust sleeve is perfectly seated.

34 21... OVERVIEW OF REAR BRAKE



1 Brake disc
2 Brake calliper
3 Brake hose
4 Brake pad wear sensor
5 Brake pads
6 Pulse generator
7 Brake guard plate

Fig. 64: Overview Of Rear Brake
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 947 PRECISION-TURNING BOTH REAR BRAKE DISCS ON BOTH SIDES

IMPORTANT: Always precision-turn both sides of both brake discs on one axle.
Observe max. machining dimension on each friction ring side and minimum brake disc thickness (MIN TH). See BRAKES - TECHNICAL DATA -- 750LI .
Observe minimum brake disc thickness (MIN TH).
Brake discs of M models (Compound brake discs) must not be machined!
Only one brake pad set may be used up on brake discs which have been lathe-turned to minimum thickness (MIN TH).

Stationary brake disc lathe

IMPORTANT: Only BMW-approved brake disc lathes may be used!

In the case of stationary brake disc lathes, the rear brake discs must be removed. See **34 21 320 REMOVING AND INSTALLING OR REPLACING BOTH REAR BRAKE DISCS**.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

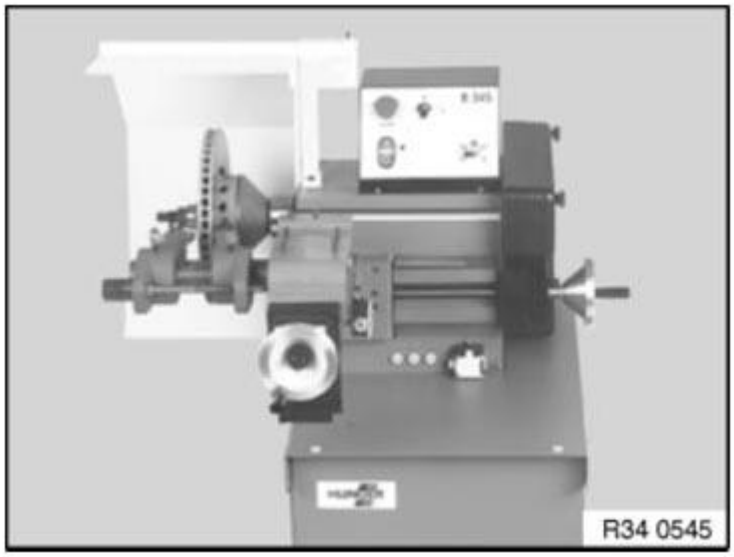


Fig. 65: Stationary Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

Mobile brake disc lathe

IMPORTANT: Only BMW-approved brake disc lathes may be used!

In the case of mobile brake disc lathes, the brake calipers and brake anchor plates must be removed.

The brake discs remain on the car.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.



Fig. 66: Mobile Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

After fine-grinding the brake discs, measure the thickness difference inside the braking surfaces at 8 points with an external micrometer. See **BRAKES - TECHNICAL DATA -- 750LI** .

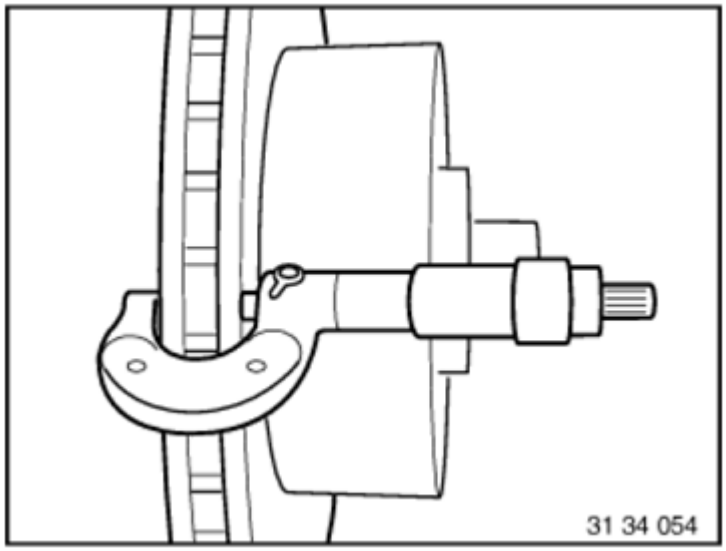


Fig. 67: Measuring Brake Surfaces Thickness Using Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 320 REMOVING AND INSTALLING OR REPLACING BOTH REAR BRAKE DISCS

Necessary preliminary work

- Remove **WHEELS** .

- Remove and clean **BRAKE PADS**

After completing repair work:

- Adjust **PARKING BRAKE** (not F10F11F18F25)
- Read and comply with notes on **BRAKING IN NEW BRAKE DISCS/BRAKE PADS** .

Check minimum brake disc thickness:

- Position special tool **34 1 280** at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with setpoint value. See **BRAKES - TECHNICAL DATA -- 750LI** ..

NOTE: If the brake discs are replaced, you must also fit new brake pads.

Always replace brake discs in pairs.

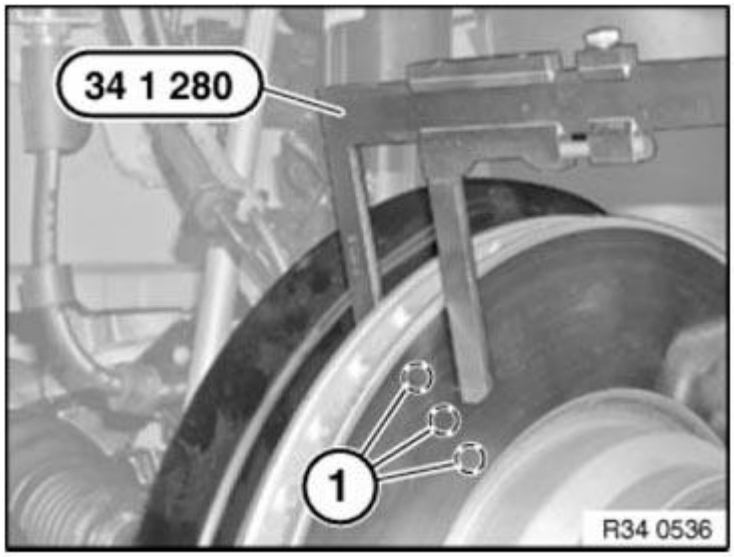


Fig. 68: Checking Brake Disc Thickness
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH). See BRAKES - TECHNICAL DATA -- 750LI .

Release screws (1). Detach brake caliper mounting bracket.

Installation note:

Tightening torque **34 21 2AZ** .

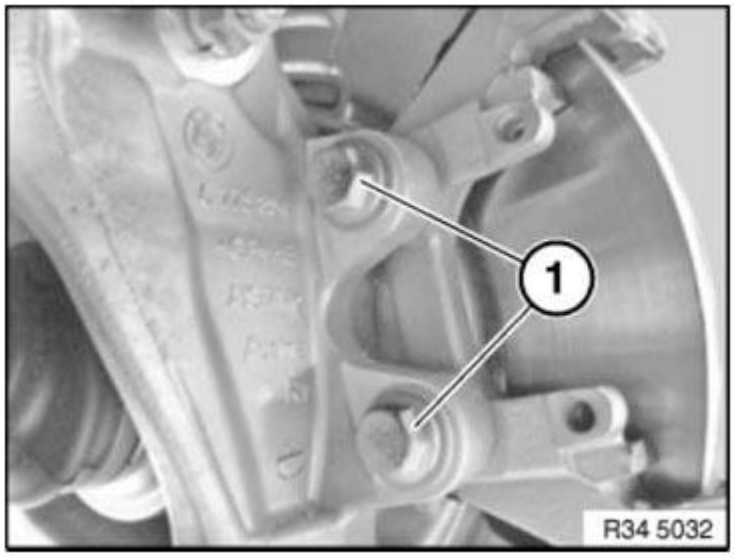


Fig. 69: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To release brake disc: Do not under any circumstances strike friction ring with a hammer or similar!
If necessary, carefully tap on base of brake disc chamber with a rubber mallet.
Clean contact surface of brake disc at wheel hub thoroughly and remove traces of corrosion.
Unevenness on contact surface may result in distortion of brake disc!

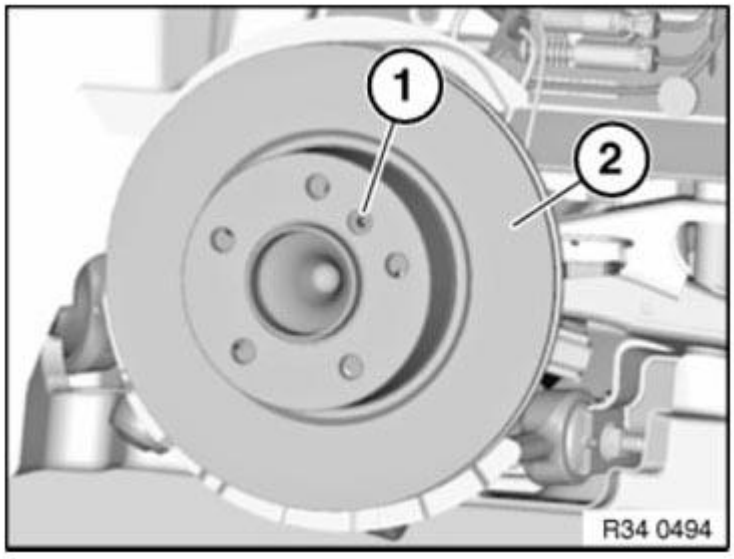


Fig. 70: Identifying Screw And Brake Disc
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove brake disc (2).

Installation note:

Replace screw.

Tightening torque **34 21 1AZ** .

34 21 169 REMOVING AND INSTALLING/RENEWING A BRAKE ANCHOR PLATE/BRAKE GUARD PLATE AT REAR

Necessary preliminary tasks

- Remove **PARKING BRAKE SHOES**

NOTE: Picture shows wheel hub removed. Wheel hub does not have to be removed.

Release screws (1).

Installation note:

Replace screws.

Tightening torque **34 21 3AZ** .

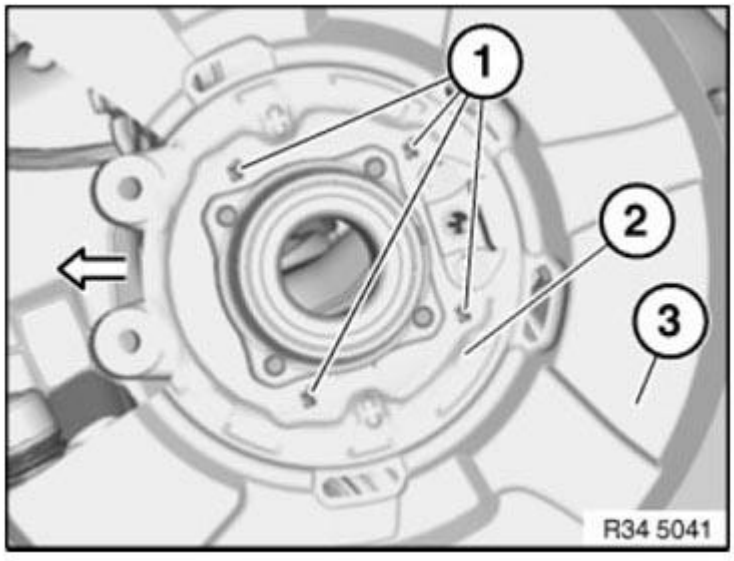


Fig. 71: Identifying Screws, Retaining Plate And Brake Guard Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Remove retaining plate (2) in direction of arrow.

Feed out brake guard plate (3) over wheel hub.

34 21 200 REMOVING AND INSTALLING/REPLACING BOTH REAR DISC BRAKES

Notes

IMPORTANT:

- **Brake pad wear sensor: after removal it must be replaced (brake pad wear sensor loses its retention capability in the break pad).**
- **Retaining spring: for vehicles older than 48 months it is recommended to replace the retaining spring!**

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket. Instead, clean with brake cleaner BMW part no. 83 19 2 154 780 and apply a thin coating of brake pad paste BMW part no. 83 19 2 158 851.

Necessary preliminary work

- Remove **WHEELS** .
- Remove **BRAKE PAD WEAR SENSOR**

NOTE: **After completing work:**

- **Fully depress brake pedal several times so that brake pads contact brake discs.**
- **When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.**
- **Read and comply with notes on BRAKING IN NEW BRAKE DISCS/BRAKE PADS .**
- **If necessary, when replacing pads, reset CBS display in accordance with factory specification.**

Lift out retaining spring (1).

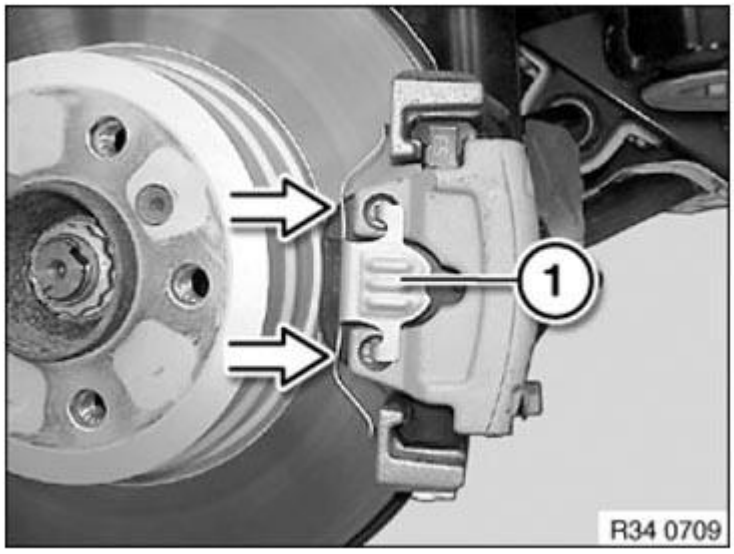


Fig. 72: Identifying Retaining Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover plug (1).

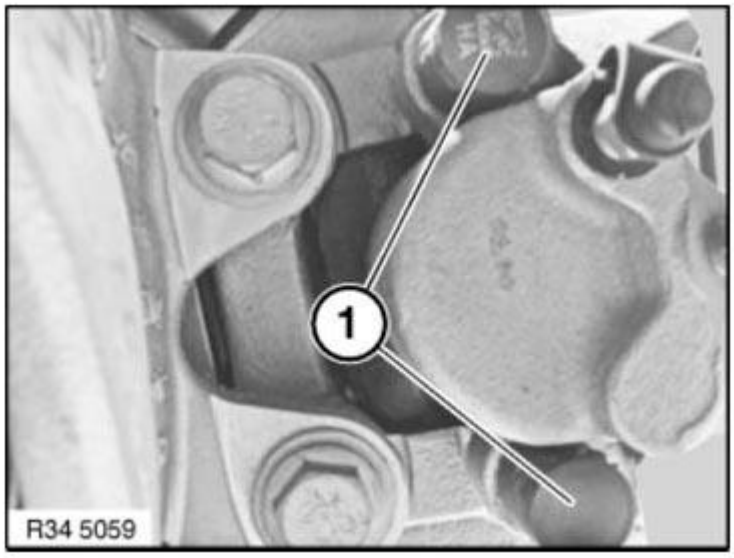


Fig. 73: Identifying Cover Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew guide bolts (1).

Withdraw brake caliper backwards.

IMPORTANT: Tie brake caliper back and do not allow to hang from brake hose.

Installation note:

Tightening torque **34 21 4AZ** .

Clean guide screws only; do not grease.

Check threads.

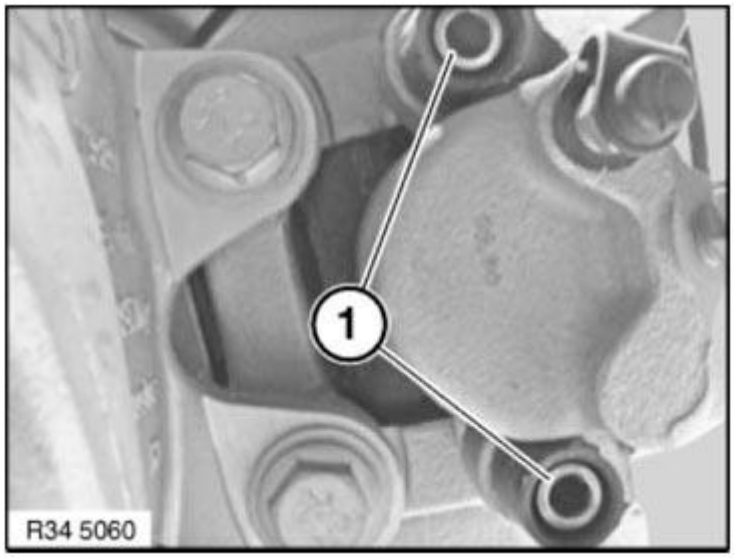


Fig. 74: Identifying Guide Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Replace all guide bolts which are not in perfect condition.

IMPORTANT: When pressing down piston, note brake fluid level in expansion tank. Overflowing brake fluid will damage the paintwork.

Turn piston back fully with special tool **34 1 050** .

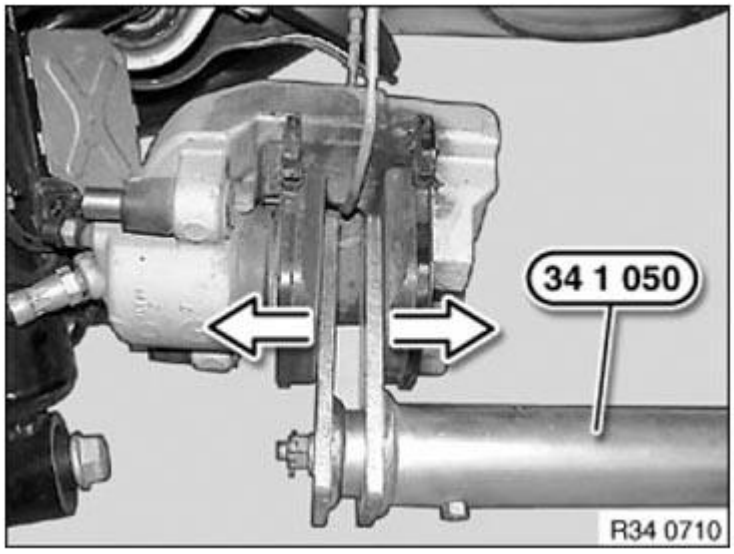


Fig. 75: Turning Piston Back Fully Using Special Tool (34 1 050)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mark any worn brake pads.

In the event of one-sided brake pad wear, do not change brake pads round.

Remove outer brake pad.

Inner brake pad is located with its spring in the piston.

Clean brake pads.

Do not grease backs of brake pads sleeve.

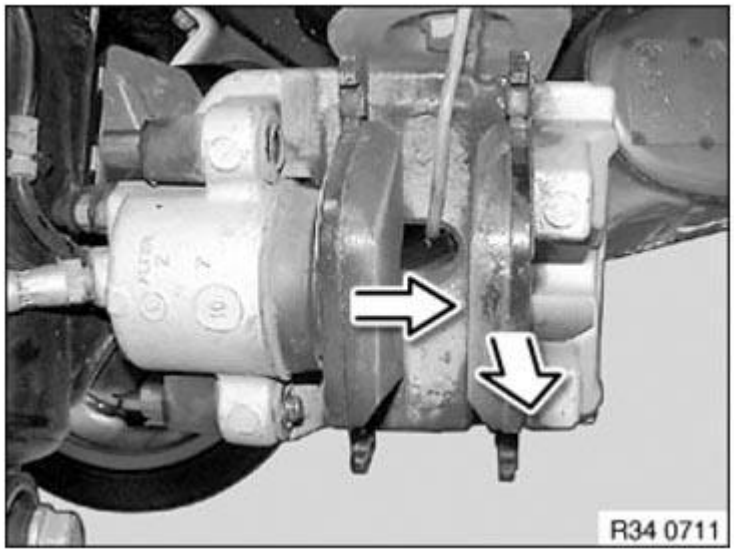


Fig. 76: Removing Outer Brake Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- Position special tool **34 1 280** at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with setpoint value. See **BRAKES - TECHNICAL DATA -- 750LI** .

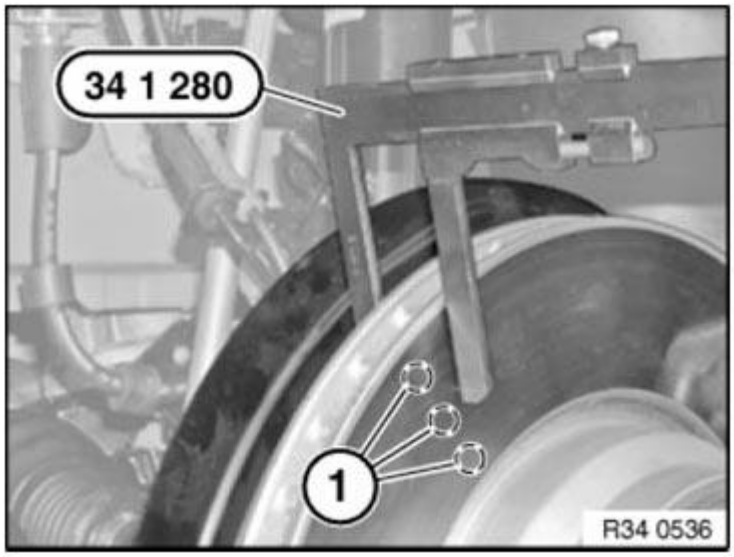


Fig. 77: Checking Brake Disc Thickness Using Special Tool (34 1 280)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).

Check dust boot (1) for damage and replace if necessary.

IMPORTANT: Dust boot must not come into contact with brake pad paste as this may cause the dust boot to swell.

Clean contact surface (2) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

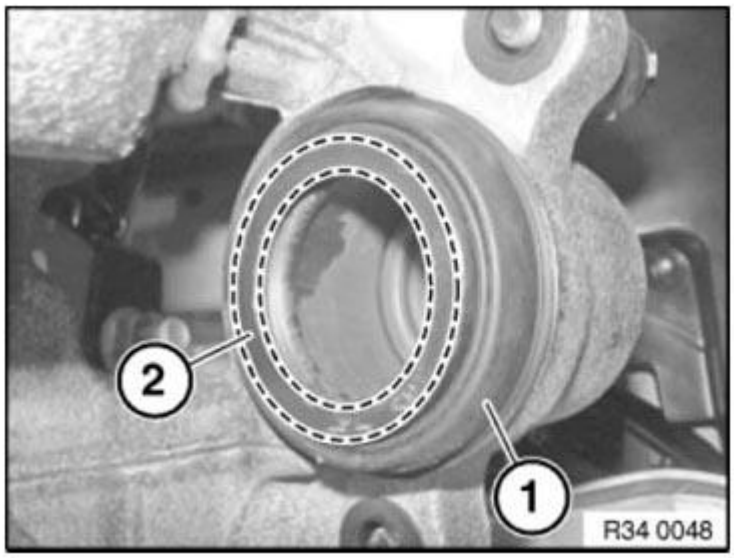


Fig. 78: Identifying Dust Boot, Brake Piston And Brake Cleaner Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact surfaces (1...2) of brake pad tee heads/brake caliper housing with brake cleaner and apply a thin coating of brake pad paste.

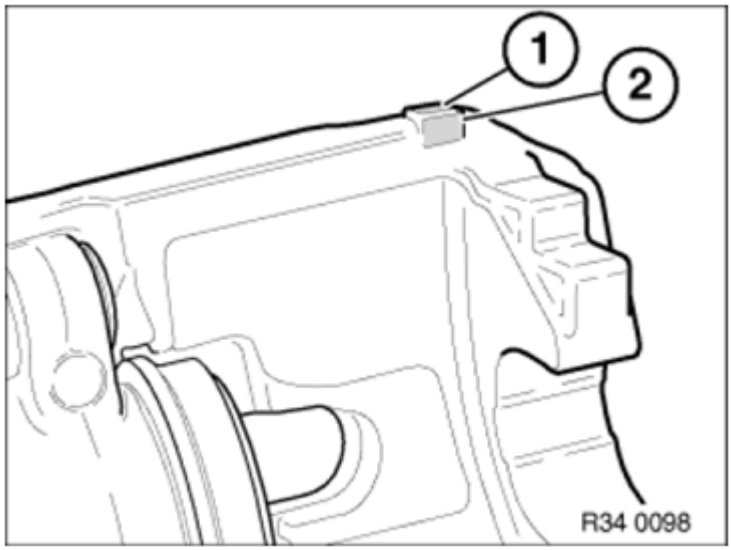


Fig. 79: Identifying Brake Caliper Housing Contact Surface

Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact surface (3) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.

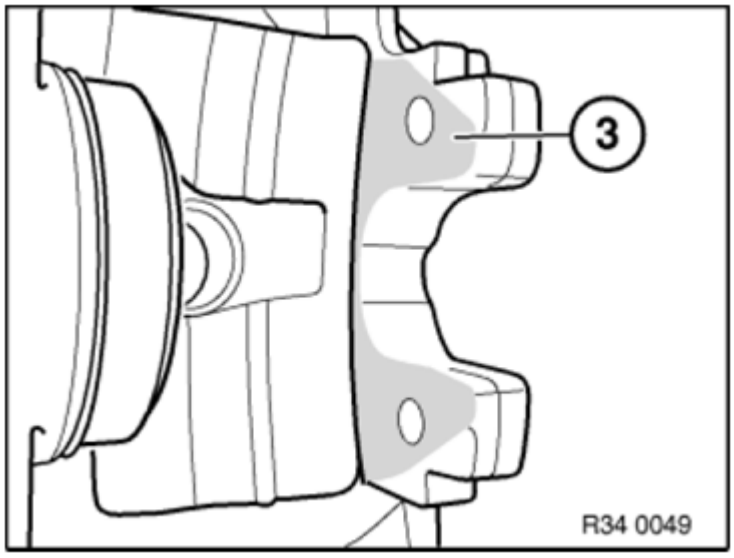


Fig. 80: Identifying Brake Caliper Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket. Instead, clean with brake cleaner and apply a thin coating of brake pad paste.

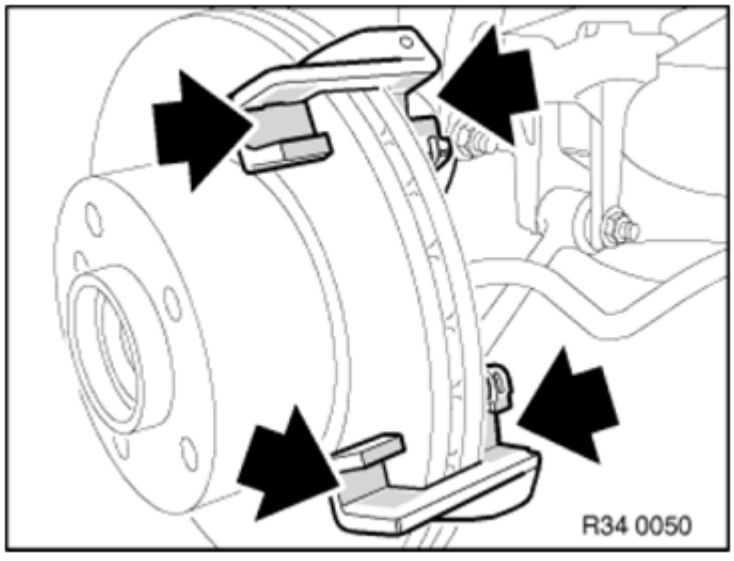


Fig. 81: Identifying Brake Pads Guide Surfaces On Brake Caliper Mounting Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 745 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR BRAKE CALIPER

Necessary preliminary tasks

- Remove **WHEEL**
- Read and comply with **GENERAL INFORMATION** .

After completing work: replace fluid in brake system. See **REPLACING FLUID IN BRAKE SYSTEM**.

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

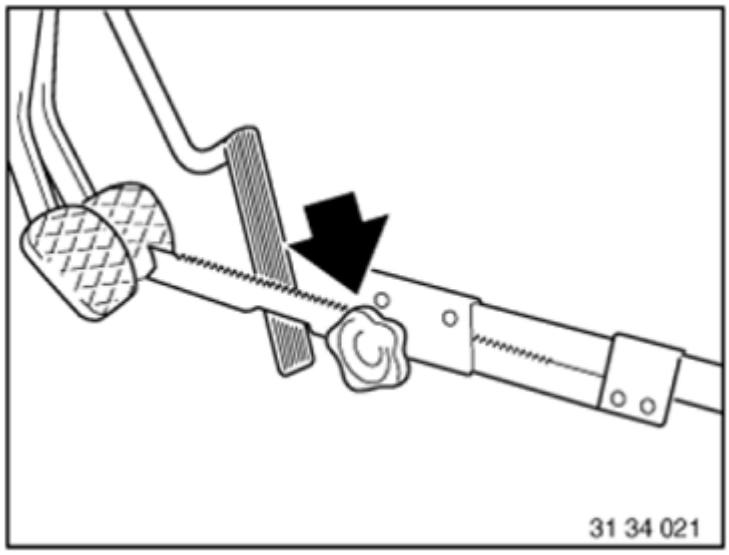


Fig. 82: Pressing Clutch Pedal Down
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Grip brake hose at square head (2) so that connecting piece cannot rotate in retaining bracket.

Disconnect brake hose from brake line (1).

Installation:

Tightening torque **34 32 1AZ** .

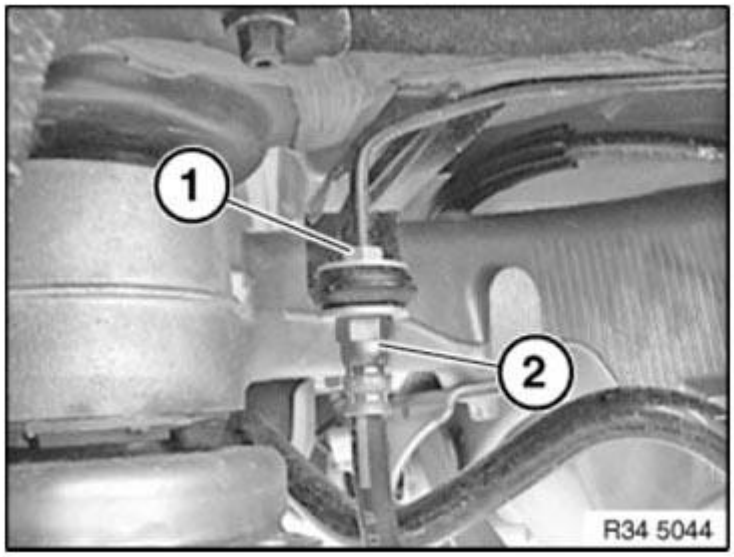


Fig. 83: Identifying Brake Hose And Brake Line
Courtesy of BMW OF NORTH AMERICA, INC.

Detach brake hose (1) from brake caliper.

Installation:

Tightening torque **34 32 3AZ** .

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

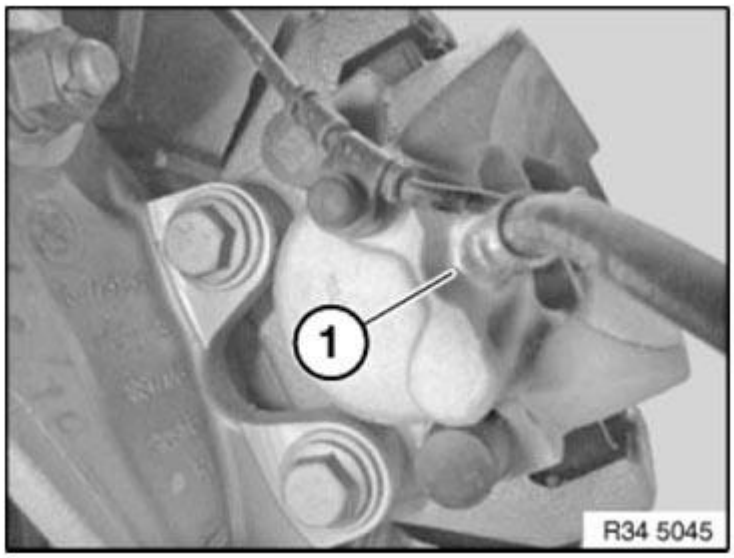


Fig. 84: Identifying Brake Hose
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: First tighten brake hose on brake caliper.

If necessary, remove **BRAKE PAD WEAR SENSOR** .

Lift out retaining spring (1).

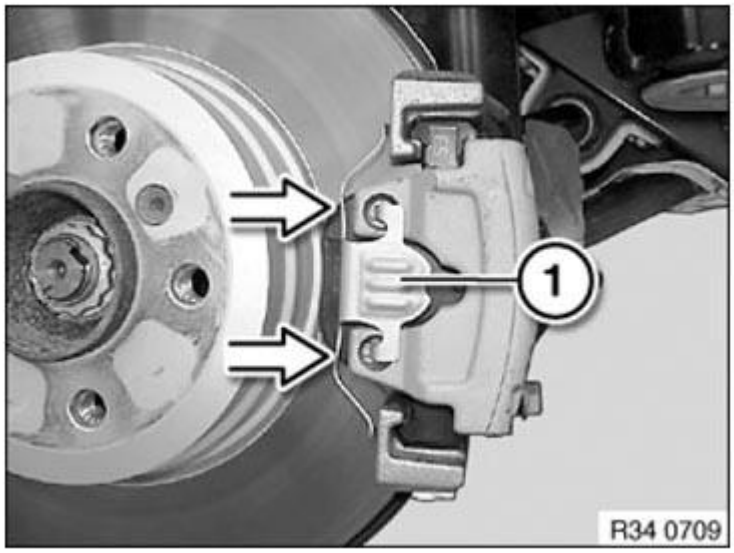


Fig. 85: Identifying Retaining Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover plug (1).

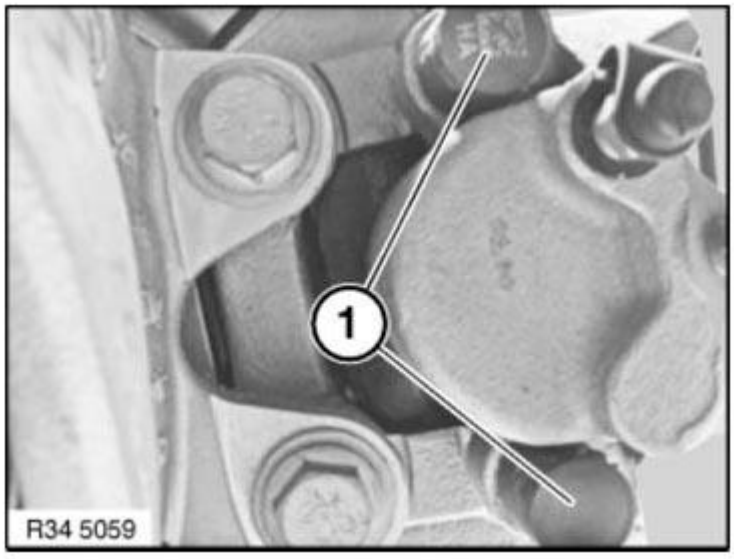


Fig. 86: Identifying Cover Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew guide bolts (1).

Withdraw brake caliper backwards.

Installation:

Tightening torque **34 21 4AZ** .

Clean guide screws only; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.

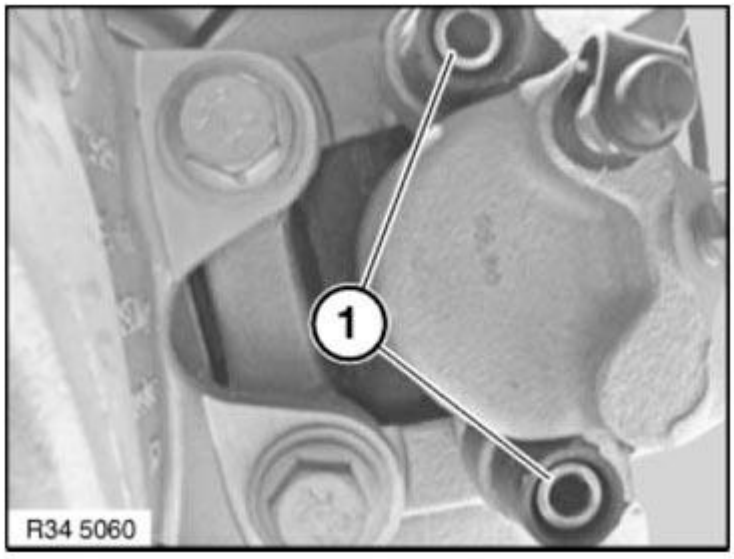


Fig. 87: Identifying Guide Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mark any worn brake pads.

In the event of one-sided brake pad wear, do not change brake pads round.

Remove brake pads in direction of arrow.

If necessary, clean **BRAKE CALIPER AND PADS** .

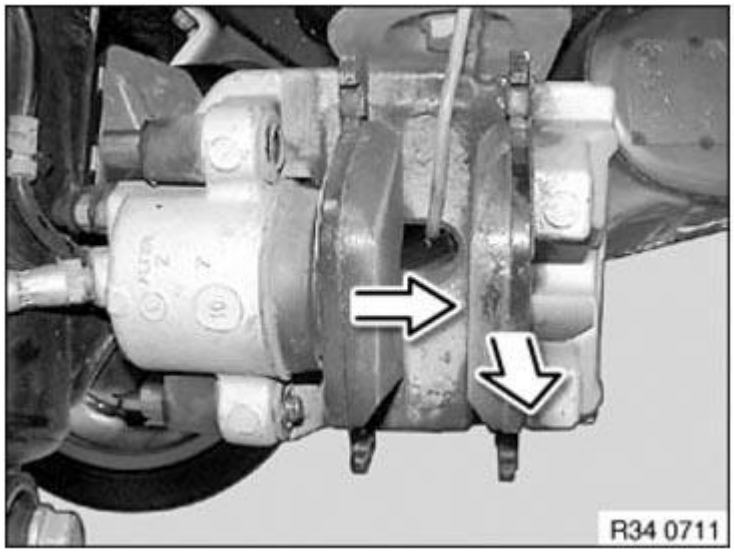
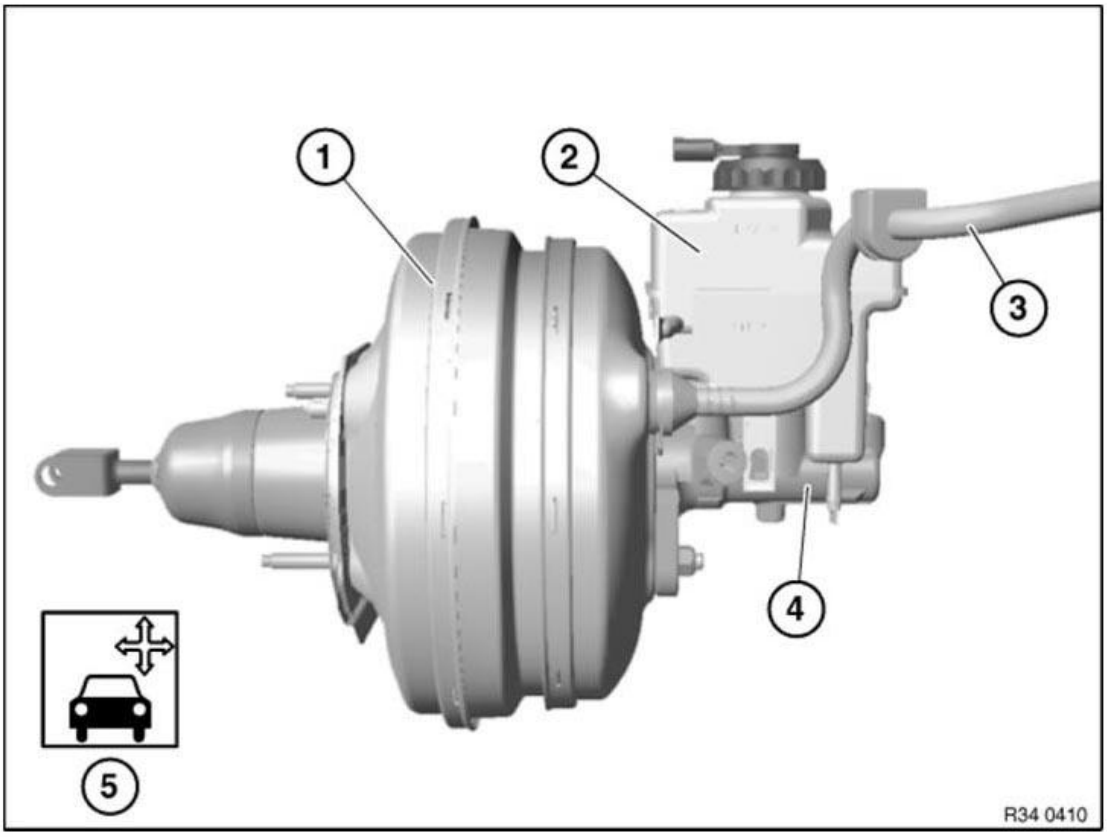


Fig. 88: Removing Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

3431 MASTER BRAKE CYLINDER

34 31... OVERVIEW OF BRAKE MASTER CYLINDER/BRAKE BOOSTER



1 Brake booster
2 Expansion tank
3 Vacuum hose
4 Brake master cylinder
5 Bleed braking system

Fig. 89: Overview Of Brake Master Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

34 31 181 REMOVING AND INSTALLING/REPLACING EXPANSION TANK FOR HYDRAULIC BRAKE CONTROL

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION** .
- Remove **COVER FOR COWL PANEL** on left

NOTE: Extract brake fluid out of expansion tank. Use a suction bottle used exclusively for drawing off brake fluid.

Do not reuse drawn out brake fluid.

Disconnect plug connection (1).

Pull out locking pin (2) and lift out expansion tank in vertical direction.

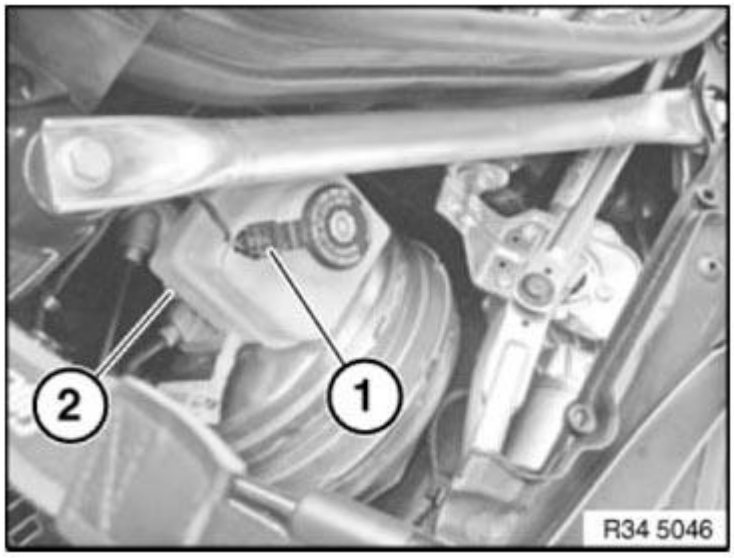


Fig. 90: Identifying Plug Connection And Locking Pin
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check rubber plugs (1) in brake master cylinder for damage and replace if necessary.

Push the expansion tank vertically onto the master brake cylinder.

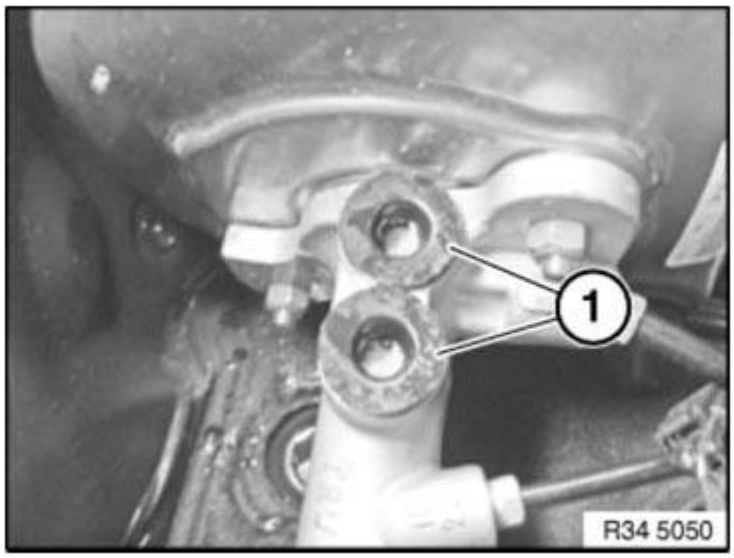


Fig. 91: Identifying Rubber Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

34 31 505 REMOVING AND INSTALLING/REPLACING MASTER BRAKE CYLINDER FOR DSC

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION** .
- Remove **EXPANSION TANK** .
- Remove **BRAKE BOOSTER**

After completing repair work, bleed **BRAKE SYSTEM WITH DSC** .

Set brake booster down on a suitable surface.

Release nuts (1) and withdraw brake master cylinder (2) from brake booster (3).

Installation note:

Replace self-locking nuts.

Tightening torque **34 31 1AZ** .

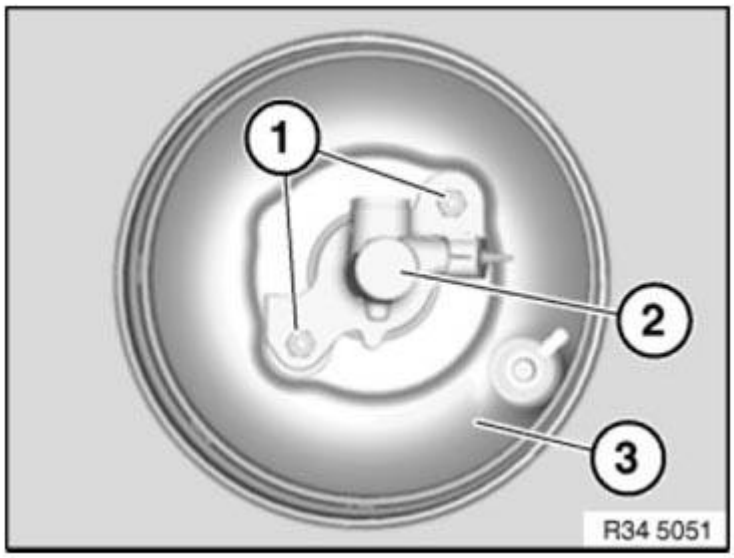


Fig. 92: Identifying Nuts, Brake Booster And Brake Master Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing ring (1).

When inserting the brake master cylinder into the brake servo, make sure the pushrod of the brake servo and the brake master cylinder are in perfect alignment.

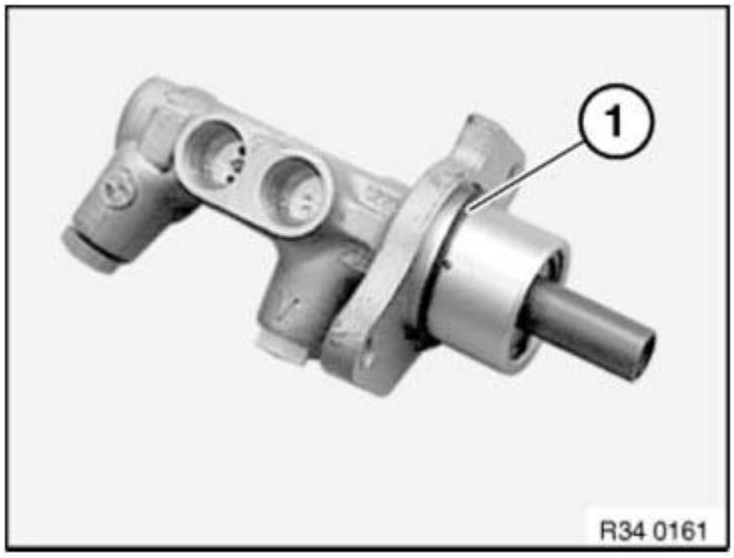


Fig. 93: Identifying Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

F04 only

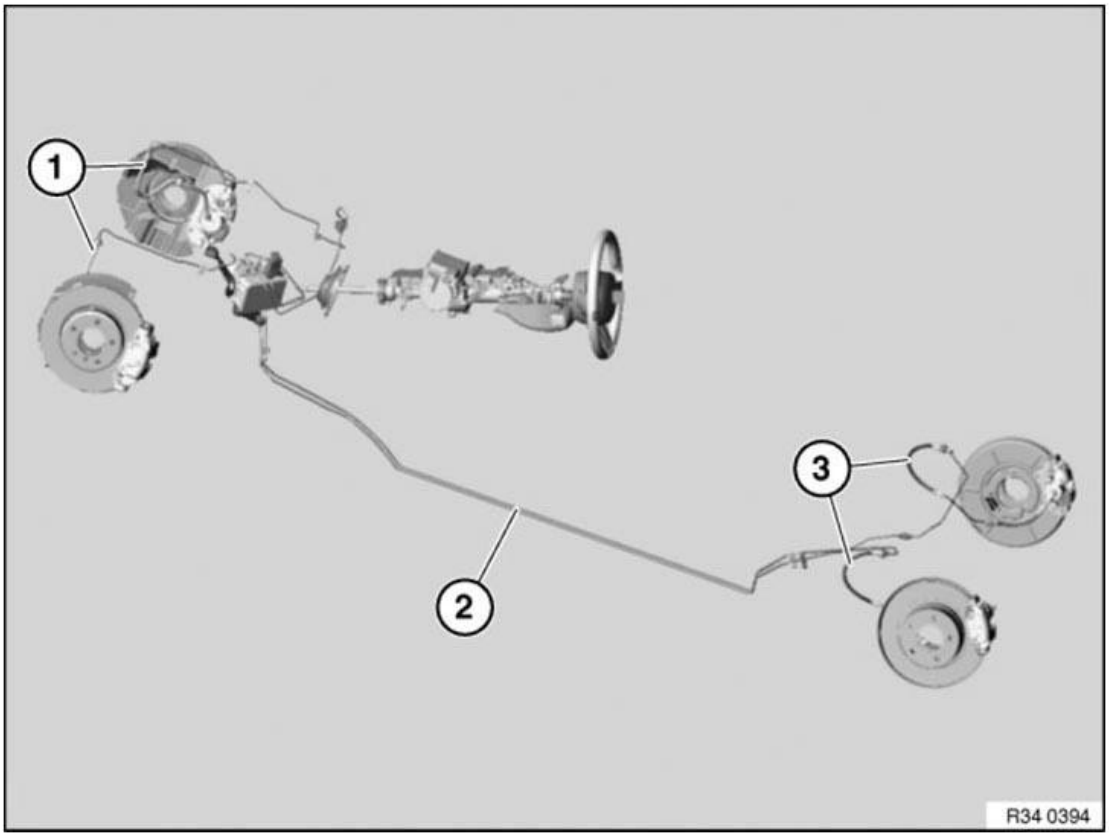
The brake pedal travel sensor has to be transferred when the brake master cylinder is replaced.

The following service function must be performed after completion of the repair work:

- Brake pedal travel sensor adjustment.

3432 BRAKE LINES

34 32... OVERVIEW OF BRAKE LINES



1 Brake hose, front 2 Brake tubes
3 Brake hose, rear

Fig. 94: Overview Of Brake Lines
Courtesy of BMW OF NORTH AMERICA, INC.

34 32 861 REPLACING ALL BRAKE PIPES

Notes

NOTE: **The brake lines are only supplied in the straight version and correct length with connecting nipple.**
Read and comply with GENERAL INFORMATION .
After completing tasks, BLEED BRAKE SYSTEM .

The new brake lines are bent into shape with bending tool **34 5 100** .

Removed brake pipes can be used as templates for bending.

IMPORTANT:

- **Protective coating of brake line must not be damaged during bending.**
- **Do not kink or bend back brake lines.**
- **Watch distances to rigid and movable vehicle parts. Brake lines may not**

make contact or rub.

- **Tighten down brake line couplings with torque wrench.**



Fig. 95: Removing Brake Pipes Using Bending Tool (34 5 100)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tightening torque **34 32 1AZ** .

34 32 881 REPLACING FRONT LEFT OR RIGHT BRAKE HOSE

Necessary preliminary tasks

- Remove **WHEEL**
- Read and comply with **GENERAL INFORMATION** .

After completing work: replace fluid in brake system. See **REPLACING FLUID IN BRAKE SYSTEM**.

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

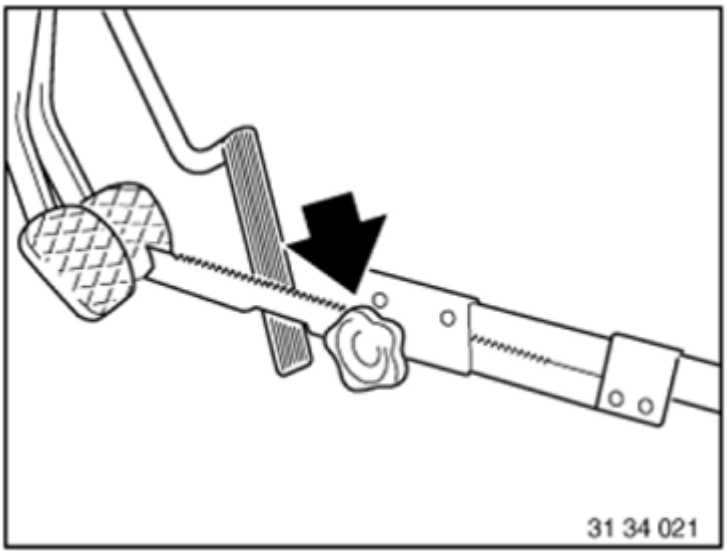


Fig. 96: Pressing Clutch Pedal Down
Courtesy of BMW OF NORTH AMERICA, INC.

Detach brake hose (1) from brake caliper.

If necessary, grip at knurling (2).

Installation:

Tightening torque **34 32 2AZ** .

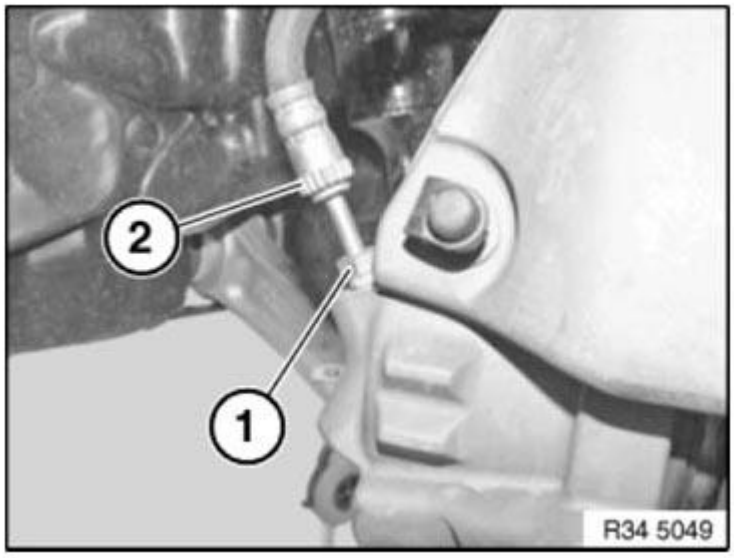


Fig. 97: Identifying Brake Hose And Knurling
Courtesy of BMW OF NORTH AMERICA, INC.

Release union screw (1). If necessary, grip at square head.

Installation:

Position guides (3) correctly in holder (4).

Tightening torque **34 32 1AZ** .

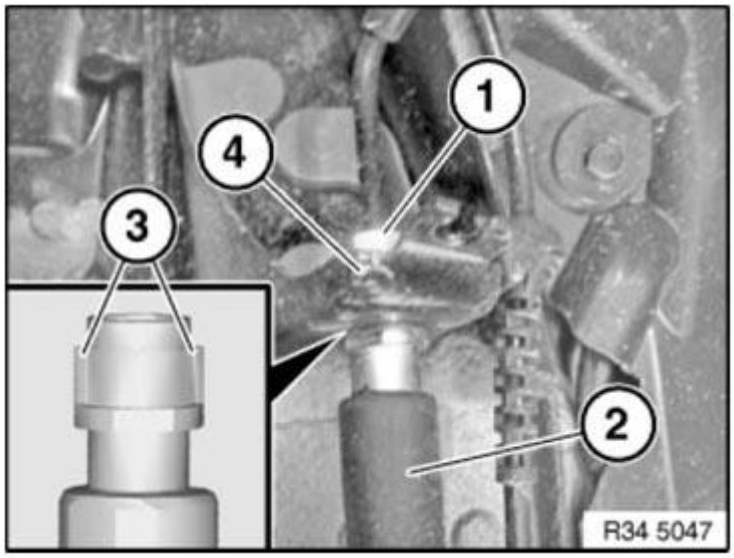


Fig. 98: Identifying Union Screws, Guides And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release brake hose from holders (1).

IMPORTANT: Observe installation sequence:

1. **Fasten brake hose in holders (1).**
2. **Move wheels into straight-ahead position.**
3. **Fasten brake hose at pipe/brake hose connection.**
4. **Fasten brake hose at brake caliper.**

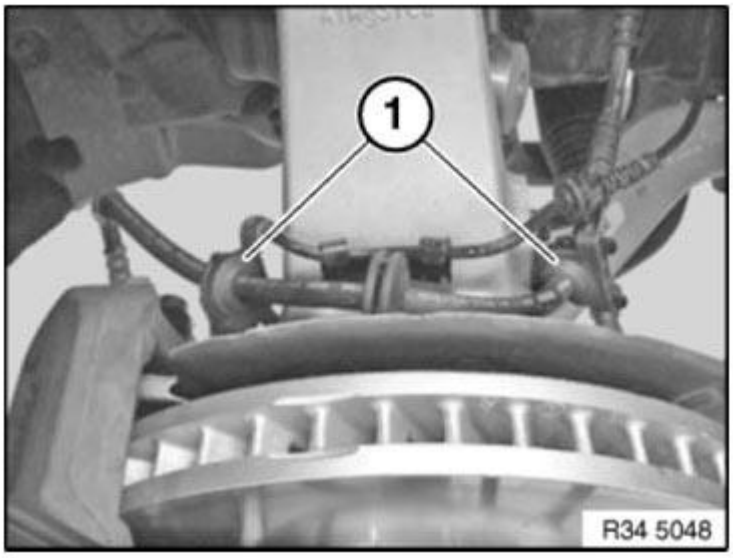


Fig. 99: Identifying Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

34 32 980 REPLACING REAR LEFT OR RIGHT BRAKE HOSE

NOTE: Read and comply with GENERAL INFORMATION .
After completing work: replace fluid in brake system. See REPLACING FLUID IN BRAKE SYSTEM.

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

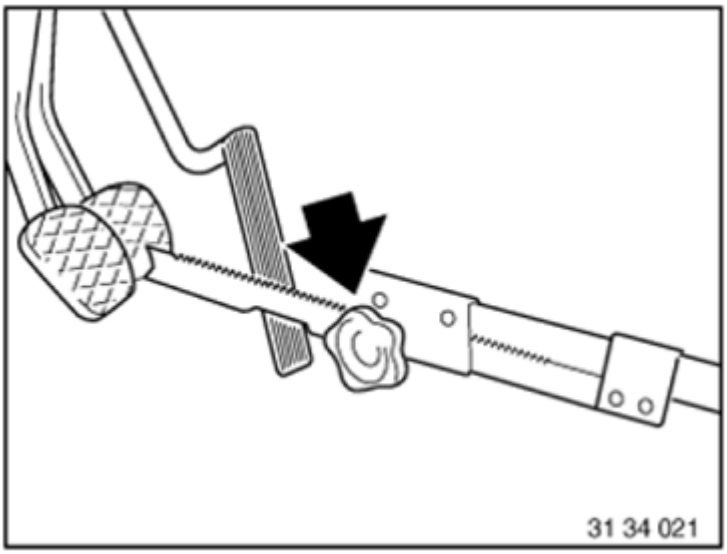


Fig. 100: Pressing Clutch Pedal Down
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Grip brake hose at square head (2) so that connecting piece can not rotate in retaining bracket.

Disconnect brake hose from brake line (1).

Installation:

Tightening torque **34 32 1AZ** .

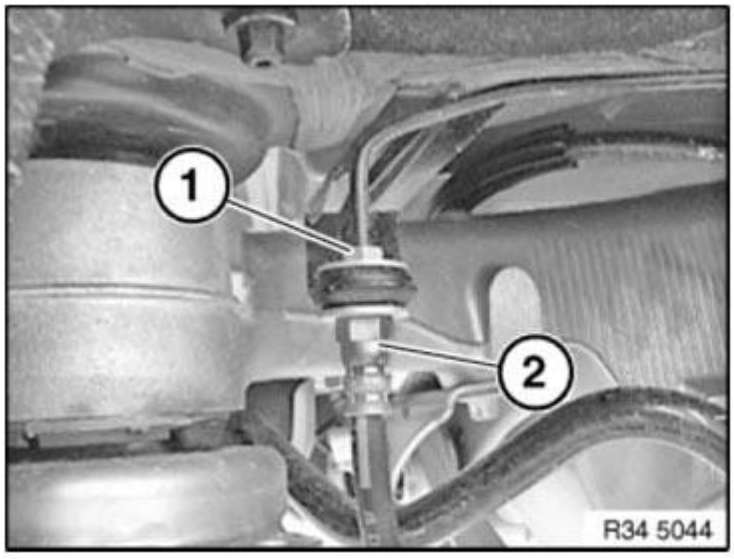


Fig. 101: Identifying Brake Hose And Brake Line
Courtesy of BMW OF NORTH AMERICA, INC.

Detach brake hose from brake caliper (1).

Installation:

First tighten brake hose on brake caliper.

Tightening torque **34 32 3AZ** .

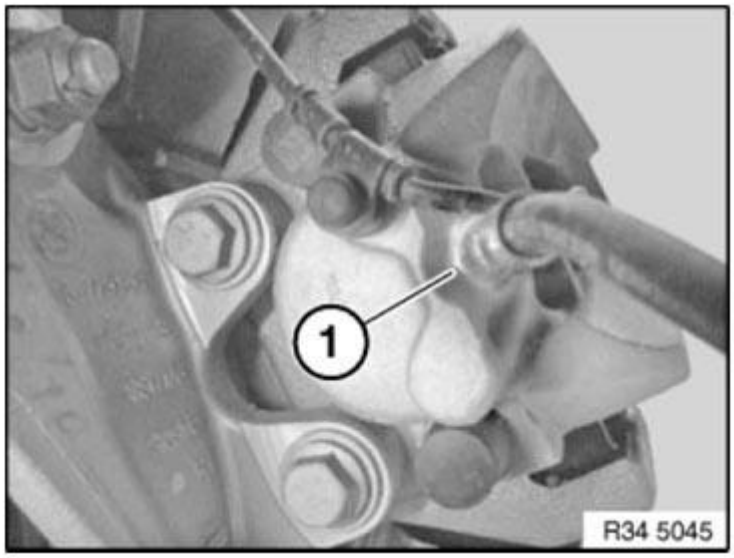


Fig. 102: Identifying Brake Caliper
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

3433 BRAKE BOOSTER

34 33 505 REMOVING AND INSTALLING OR REPLACING BRAKE BOOSTER

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION** .
- Remove rear left **DOME CROSS-BRACE**
- Remove left **footwell trim** See **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (ECE ONLY)** or **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (US ONLY)**
- On vehicles with coolant expansion tank in side panel, front left: Remove coolant filler neck

After completing tasks, bleed **BRAKE SYSTEM WITH DSC** .

Extract brake fluid out of expansion tank.

Unfasten brake lines (1).

Installation note:

Tightening torque **34 32 1AZ** .

Disconnect vacuum line (2).

Installation note:

Check seal (3), replace if necessary.

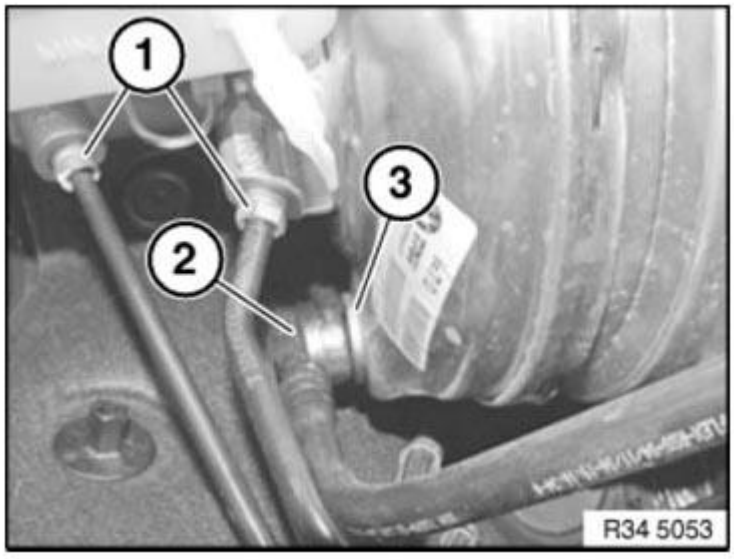


Fig. 103: Identifying Brake Lines, Vacuum Line And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Detach retaining clip (1) on brake pedal.

Pull out locking pin.

Unscrew nuts (2).

Installation note:

Replace self-locking nuts.

Tightening torque **35 11 1AZ** .

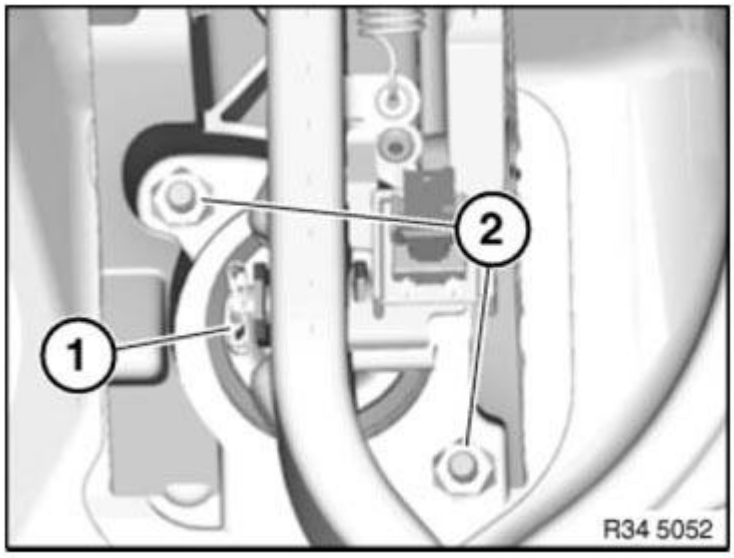


Fig. 104: Identifying Retaining Clip And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not use any force when removing and installing the brake unit; the brake unit can be damaged under certain circumstances.

Brake lines must not be bent.

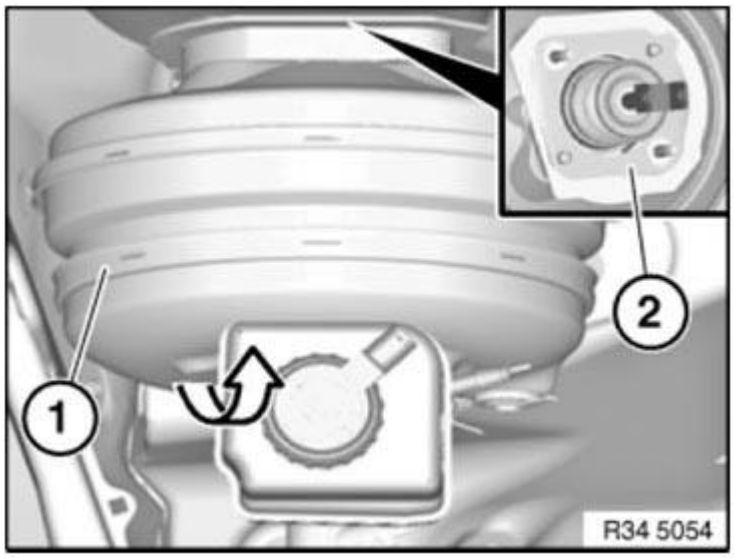


Fig. 105: Identifying Brake Booster And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully pull brake booster (1) out of bulkhead and tilt out.

Installation note:

Make sure seal (2) is present and correctly seated.

Replacement

Modify **TANDEM BRAKE MASTER CYLINDER** .

F04 only

When the repair work is complete, the following service function must be performed:

- Brake pedal travel sensor adjustment.

34 33 071 REPLACING VACUUM HOSE FOR BRAKE BOOSTER

IMPORTANT: Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake booster. This makes it easier to remove the vacuum hose.
Vacuum hose and non-return valve are welded together and are replaced together as a single unit.

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION** .
- Remove **MOUNTING BRACKET FOR WINDSCREEN WIPER SYSTEM**
- Remove **RIGHT SUSPENSION CROSS-BRACE** .

IMPORTANT: Do not kink vacuum line.
Vacuum line and brake lines must not touch each other in area of brake booster!
Contact with surrounding components is only permitted at the designated toothed rings!
Check vacuum line for ease of movement after reinstalling mounting bracket for windscreen wiper system.

Detach vacuum line (1) from brake booster (2).

Installation:

Check seal (3), replace if necessary.

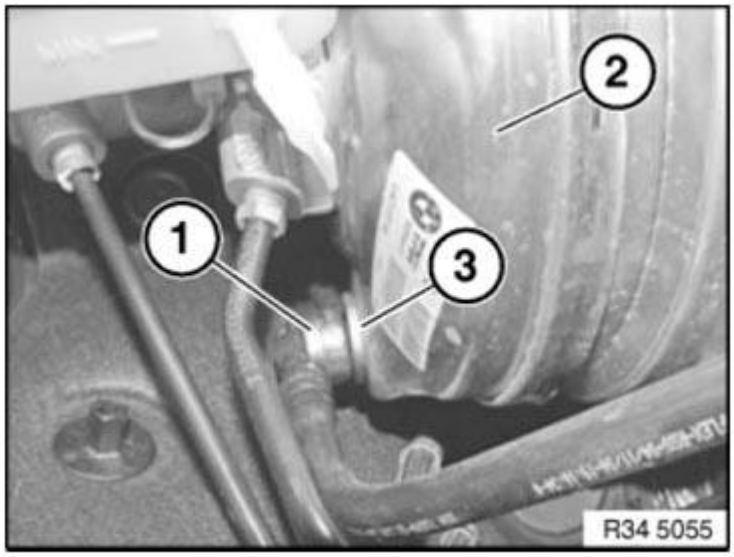


Fig. 106: Identifying Vacuum Line, Brake Booster And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Remove seal (1).

Release screws (2) and remove bulkhead upper section (3).

Release screws (4).

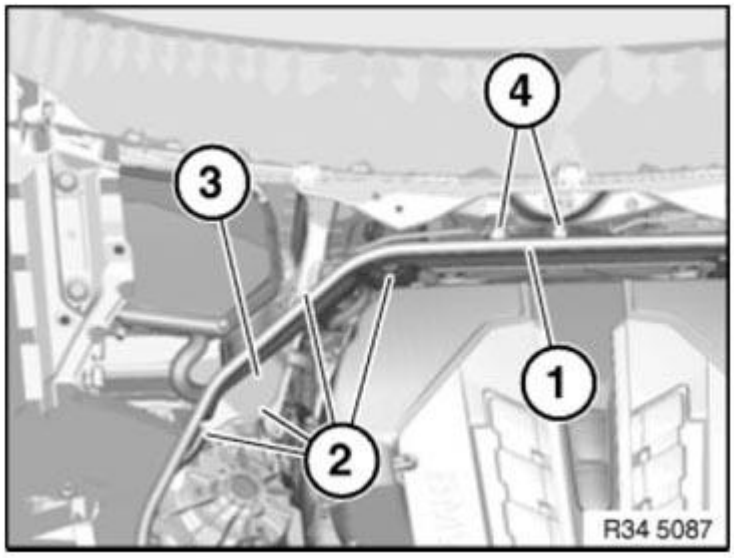


Fig. 107: Identifying Seal, Screws And Bulkhead Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Gently pull bulkhead upper section middle (1) upwards and

Feed out line penetration (2) towards top.

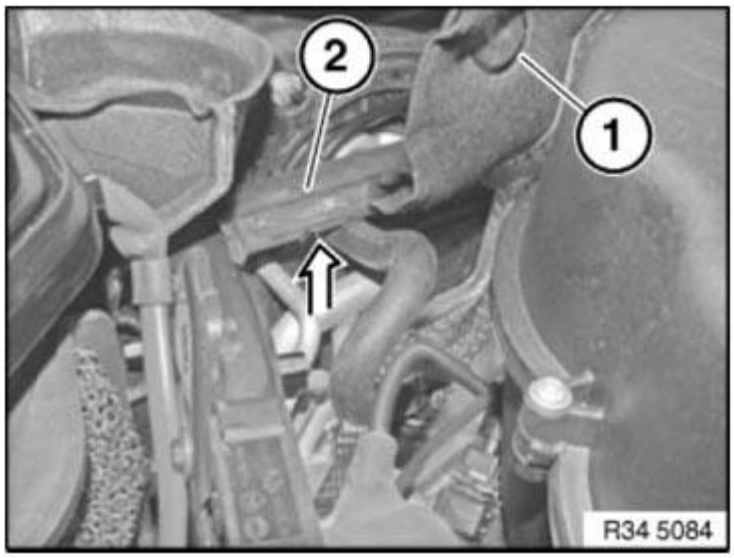


Fig. 108: Identifying Bulkhead Upper Section And Line Penetration
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect vacuum line (1) from vacuum pump (2).

Unclip vacuum line (1) in water box from holders and remove.

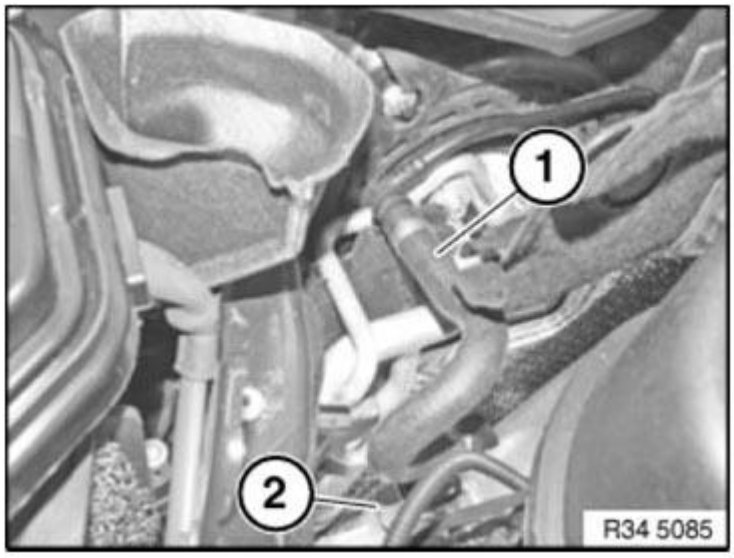


Fig. 109: Identifying Vacuum Line And Pump
Courtesy of BMW OF NORTH AMERICA, INC.

34 33 071 REPLACING VACUUM HOSE FOR BRAKE BOOSTER (N63)

IMPORTANT: Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake booster. This makes it easier to remove the vacuum hose.
Vacuum hose and non-return valve are welded together and are replaced together as a single unit.

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION**.
- Remove partition wall, units compartment.

Pull off partition wall seal upper part (1) in direction of arrow.

Remove non-return valve (2) from brake servo.

Installation note:

Check gasket for non-return valve and replace if necessary.

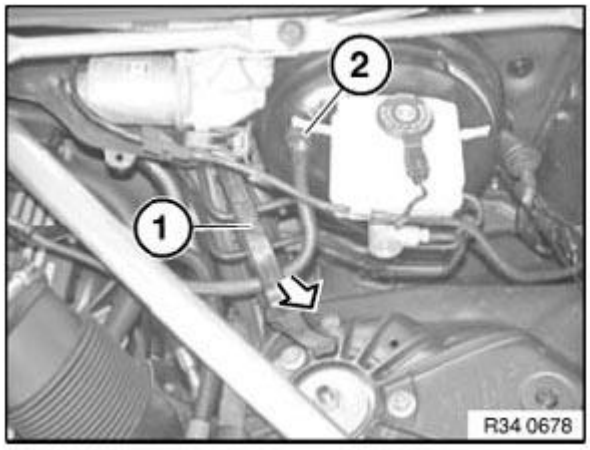


Fig. 110: Removing Non-Return Valve From Brake Booster
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip vacuum line (1) from line clip (2).

Unlock snap fastener (3) and detach vacuum line.

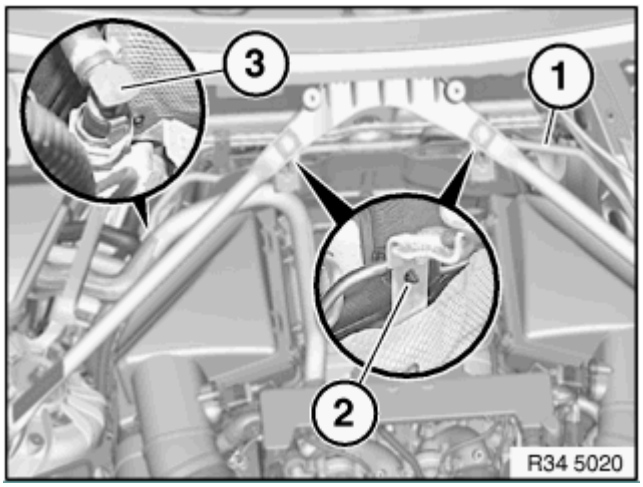


Fig. 111: Identifying Vacuum Line, Clip, And Snap Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

3435 ELECTRICAL COMPONENTS WEAR INDICATOR

34 35 001 REPLACING A BRAKE PAD SENSOR (FRONT)

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).
If an already ground brake pad wear sensor has to be replaced although the minimum brake pad thickness has not yet been reached, it is necessary to file down the new sliding contact with a file to the same length as the ground sliding contact. See BRAKES - TECHNICAL DATA -- 750LI .

Necessary preliminary tasks

- Remove front left **WHEEL**

Open housing cover.

Disconnect plug connection (1).

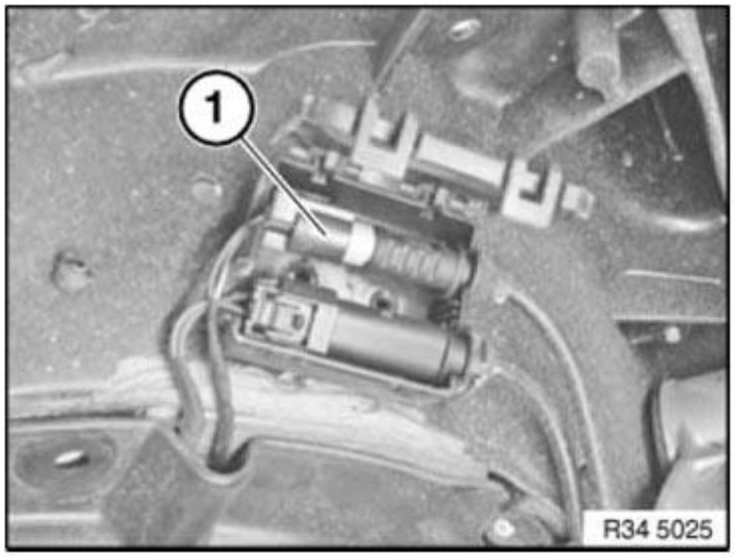


Fig. 112: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1) along line.

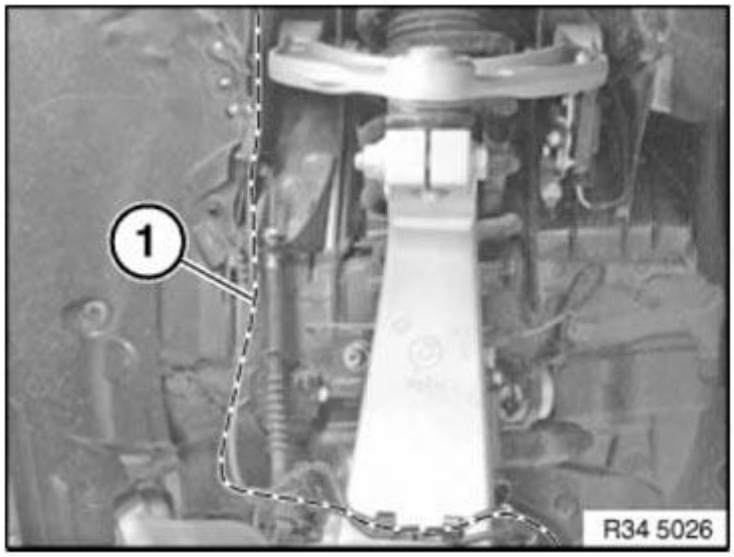


Fig. 113: Identifying Unclip Line
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage line from brake pad wear sensor from holder (1).

Pull brake pad wear sensor (2) in direction of arrow out of brake pad.

Installation:

Make sure brake pad wear sensor (2) is correctly seated in brake pad and holder (1).

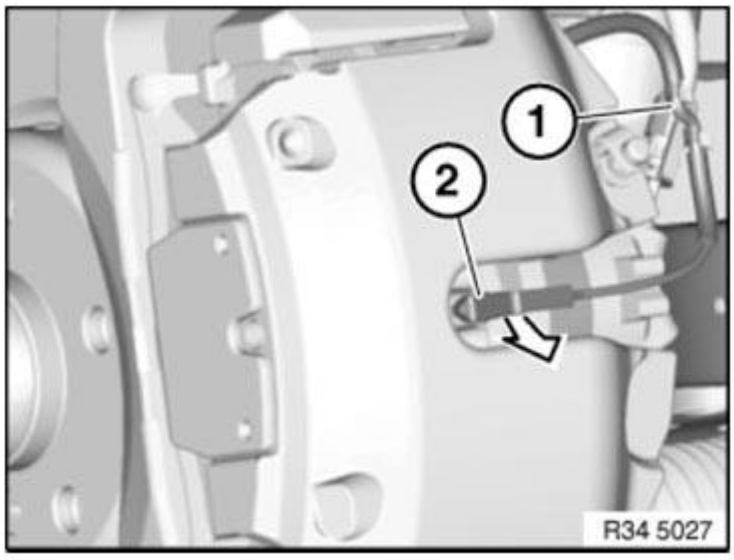


Fig. 114: Identifying Brake Pad Wear Sensor And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

34 35 001 REPLACING A BRAKE PAD SENSOR (REAR)

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).
If an already ground brake pad wear sensor has to be replaced although the minimum brake pad thickness has not yet been reached, it is necessary to file down the new sliding contact with a file to the same length as the ground sliding contact. See BRAKES - TECHNICAL DATA -- 750LI .

Necessary preliminary tasks

- Remove rear right **WHEEL**

Open housing cover.

Disconnect plug connection (1).

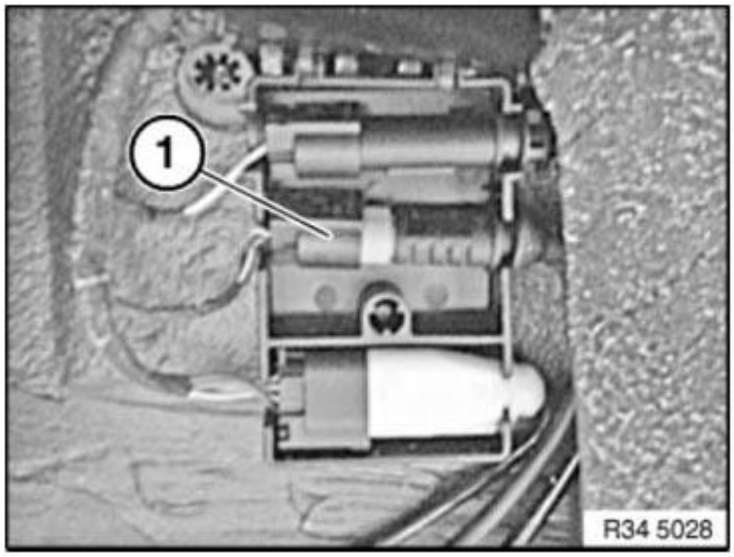


Fig. 115: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1) along line.

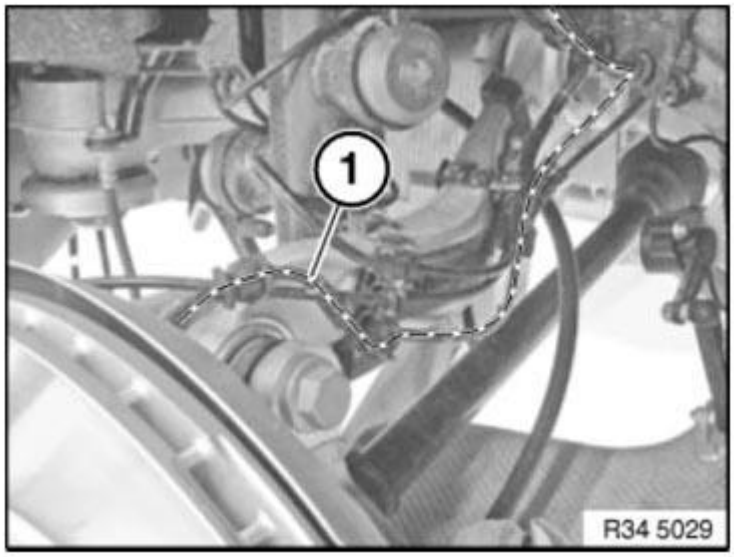


Fig. 116: Identifying Unclip Line
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage line from brake pad wear sensor from holder (1).

Pull brake pad wear sensor (2) in direction of arrow out of brake pad.

Installation:

Make sure brake pad wear sensor (2) is correctly seated in brake pad and holder (1).

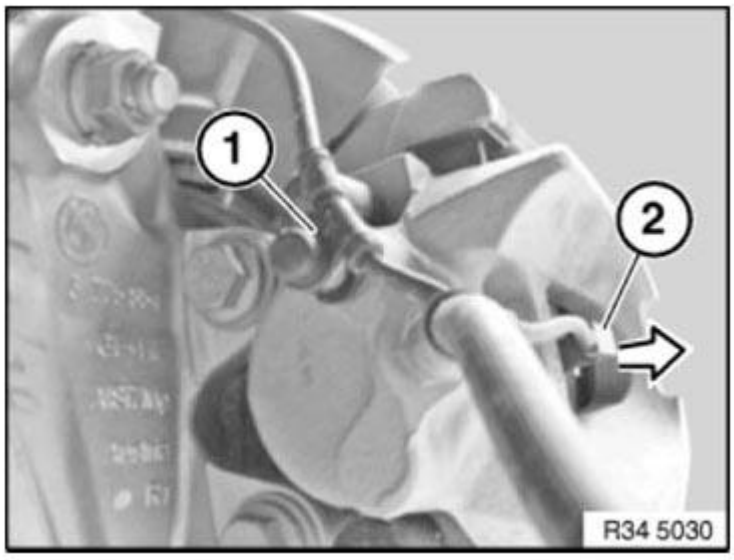


Fig. 117: Identifying Brake Pad Wear Sensor And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

3441 PARKING BRAKE

34 41 006 ADJUSTING PARKING BRAKE

The parking brake test must be carried out on the dynamic brake analyzer as follows.

Release position:

- Wheel circumferential force right/left < or = 300 N.

Press parking brake button:

- Car must be pulled uniformly out of brake roller or drive of brake roller is deactivated on both sides.

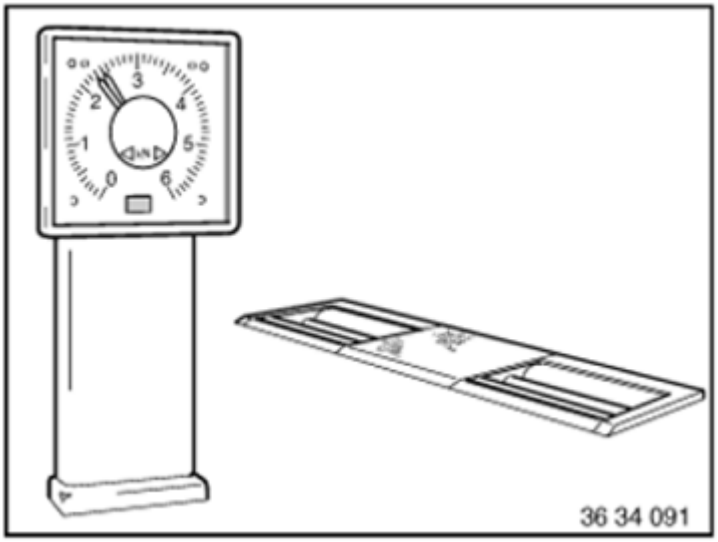


Fig. 118: Checking Parking Brakes On Test Stand
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Accurate adjustment of the parking brake is only possible if the parking brake Bowden cables and all moving parts on the parking brake move easily and function correctly.

Basic setting of the parking brake is required:

- After replacing brake shoes
- Brake discs are replaced

1. Adjustment specification for brake shoes

   Release parking brake (switch on center console).

   Approach installation position using BMW diagnosis system.

   Completely unscrew one wheel stud on each rear wheel.

   Installation:

   Install and tighten wheel bolt.

   Tightening torque, **36 10 1AZ** .



Fig. 119: Locating Wheel Stud
Courtesy of BMW OF NORTH AMERICA, INC.

Turn adjusting screw with a screwdriver until it is no longer possible to turn the wheel.

Then unfasten the adjusting screw 10 notches.

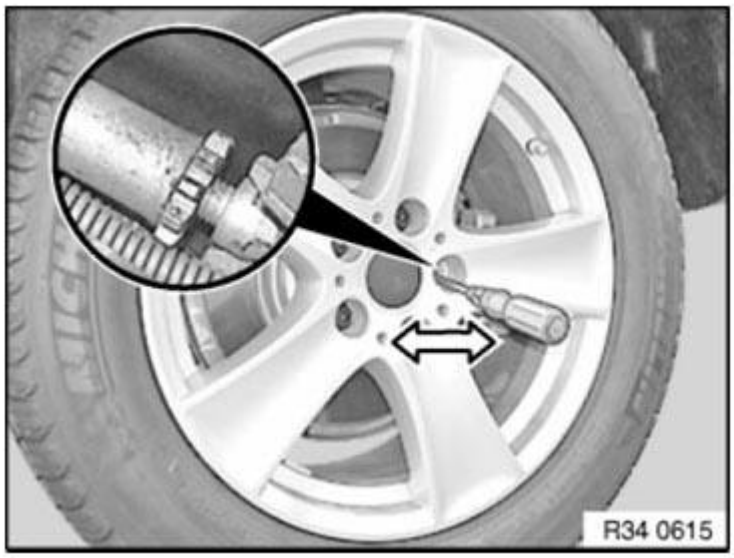


Fig. 120: Turning Adjusting Screw Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

2. Braking in duo-servo parking brake

***2.1 On brake dynamometer:**

2.1.1 Call up braking-in program via diagnosis interface using DIS diagnosis system.

(Parking brake indicator lamp in instrument cluster flashes at low frequency)



Fig. 121: Display - Brake Dynamometer
Courtesy of BMW OF NORTH AMERICA, INC.

2.1.2 Drive vehicle onto brake analyzer and pull parking brake button once.
2.1.3 Parking brake is applied at approx. 15 km/h with reduced force.

(Parking brake indicator lamp in instrument cluster flashes at high frequency)

2.1.4 Braking-in procedure takes 3 minutes.
2.1.5 Braking-in procedure can be terminated by pressing the parking brake button.
2.1.6 Delete fault memory.

2.2 **When road-testing** (if possible on company property or an unused road):

2.2.1 Call up braking-in program via diagnosis interface using DIS diagnosis system.

(Parking brake indicator lamp in instrument cluster flashes at low frequency)

2.2.2 Pull parking brake button once.

Increase driving speed to 15 km/h, braking-in distance is 400 meters.

2.2.3 Parking brake is applied with reduced force.

(Parking brake indicator lamp in instrument cluster flashes at high frequency)

2.2.4 Braking-in procedure can be terminated by pressing the parking brake button.
2.1.6 Delete fault memory.

34 41... ELECTROMECHANICAL PARKING BRAKE - EMERGENCY RELEASE

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

IMPORTANT: Secure vehicle against rolling, e.g. with chocks.

Attach release tool (1) at release point (2).

Forcefully pull release tool against mechanical resistance upwards in direction of arrow until a clear increase in force can be felt and the parking brake can be clearly heard to release.

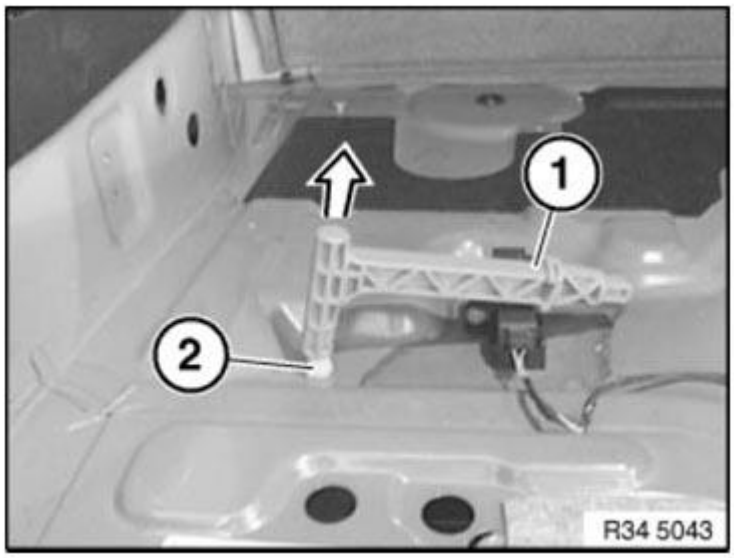


Fig. 122: Identifying Release Tool And Release Point
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Startup after emergency release:

1. **Switch on ignition.**
2. **Press brake button with brake pedal depressed.**
3. **The indicator lamp in the instrument cluster goes out as soon as the parking brake is released.**

34 00... GENERAL INFORMATION ON BRAKING IN NEW BRAKE DISCS/BRAKE PADS

IMPORTANT: After completing work:

- **Carry out function check on brake test stand to ensure that the brakes complies with legal requirements.**

- **Carry out test braking while driving at low speed; the effectiveness of the brakes may be reduced during the initial braking operations.**
- **Exaggerated drastic and continuous braking operations for faster braking in are not permitted.**
- **Advise the customer not to perform any wilful drastic braking in the first 200 km after brake replacement.**
- **Attach mirror tag to interior rearview mirror.**

34 41 682 INITIALIZING PARKING BRAKE (AFTER MANUAL UNLOCKING OF ACTUATOR UNIT)

IMPORTANT: The instrument cluster indicates when the parking brake is emergency-released. The parking brake telltale lamp is activated in the color yellow. Vehicle condition before initialization:

- **Rectify fault**
- **Vehicle stationary**
- **Ignition turned on**

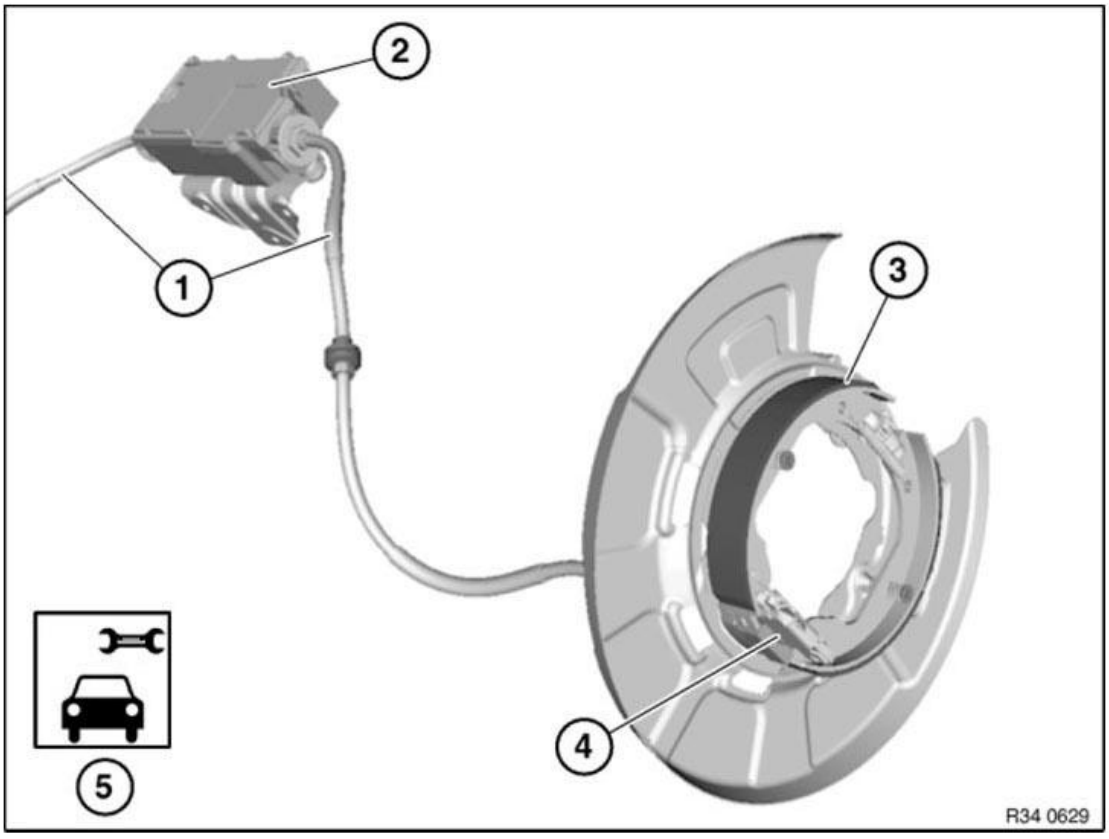
Press parking brake button with brake activated.

NOTE: The indicator lamp in the instrument cluster goes out as soon as the parking brake is ready for operation again.

It is normal for noises to be heard.

Startup can take several seconds.

34 41... OVERVIEW OF PARKING BRAKE



1 Handbrake Bowden cables
2 Actuator unit with control unit
3 Handbrake shoes
4 Brake shoe expander
5 Adjust parking brake / emergency release

Fig. 123: Overview Of Parking Brake
Courtesy of BMW OF NORTH AMERICA, INC.

34 41 280 REMOVING AND INSTALLING ACTUATOR UNIT WITH CONTROL UNIT FOR PARKING BRAKE (EMF)

Necessary preliminary work

- Remove **BOTH REAR WHEELS** .

IMPORTANT: The following work must only be carried of ISID diagnosis system with software version 02.21 or later.

Delete fault memory.

Check function of actuator unit.

If actuator unit is defective, set BMW diagnosis workshop mode.

- **Operating procedure:**
  - Perform vehicle **identification**
  - Carry out **vehicle test.**
  - Open menu item **Actions.**
    - Open **Service Function**
      - Level 1:

        Select menu item:

        02 Chassis and Suspension

      - Level 2:

        Select menu item:

        Parking Brake

      - Level 3:

        Select menu item:

        Workshop Mode

        - List of matches:

          Activate **"AS 3440_L6_EMF" workshop mode** file

        - Procedure/Option:

          Select menu item:

          1 Set Workshop Mode

        - Procedure:

          The message **Workshop mode has been set** is displayed

Open tailgate.

Fold back luggage compartment floor trim panel (1) as pictured.

Release plastic nuts (2).

Remove luggage compartment floor trim panel (1) in direction of arrow.

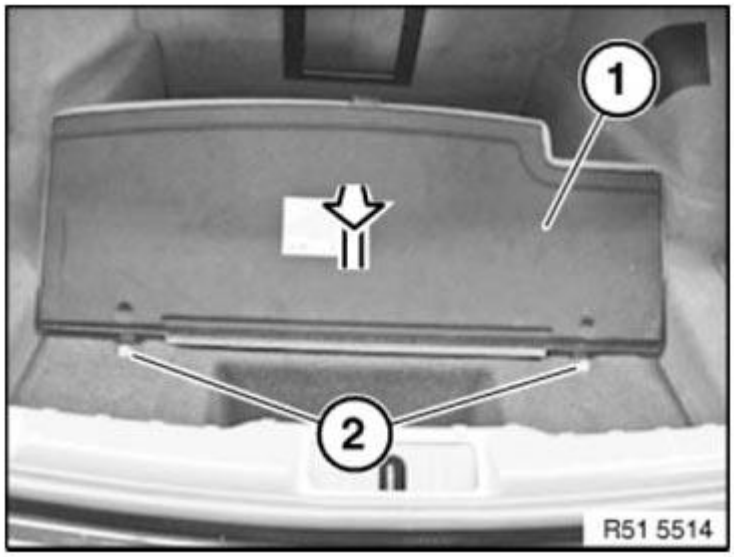


Fig. 124: Identifying Luggage Compartment Floor Trim Panel And Plastic Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Cable for emergency release (1) must be removed with actuator unit.

Press both retaining lugs together and press cable for emergency release (1) downwards.

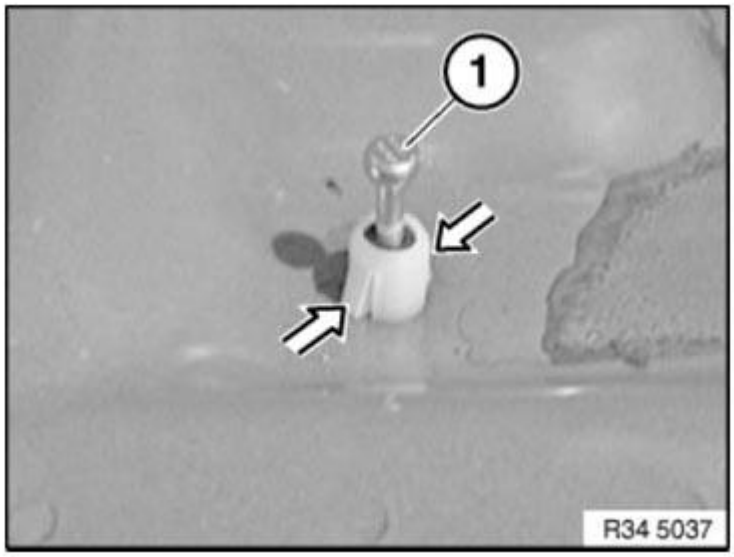


Fig. 125: Identifying Cable For Emergency Release
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove spring clip (2) on left and right.

Installation note:

Tightening torque **34 41 1AZ** .

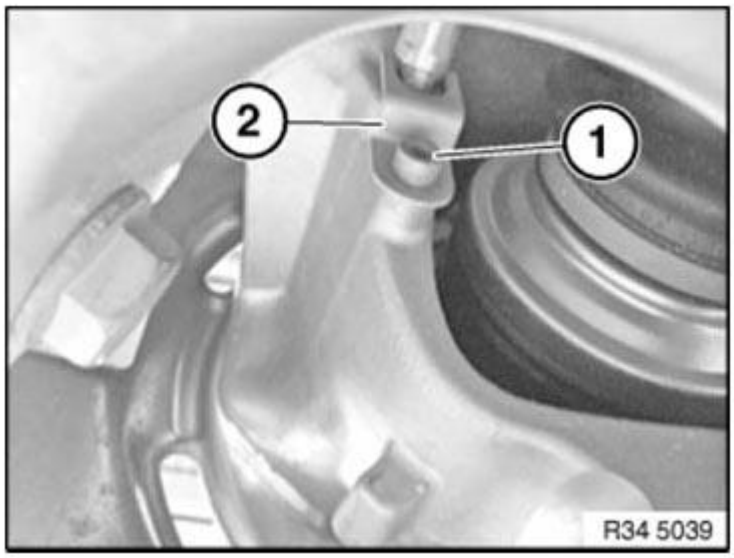


Fig. 126: Identifying Screw And Spring Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage parking brake Bowden cable (1) from holder (2) on right and left.

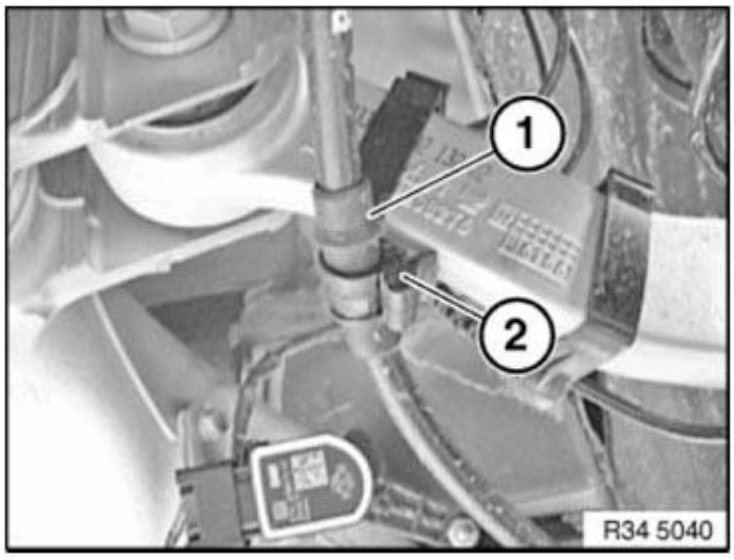


Fig. 127: Identifying Parking Brake Bowden Cable And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

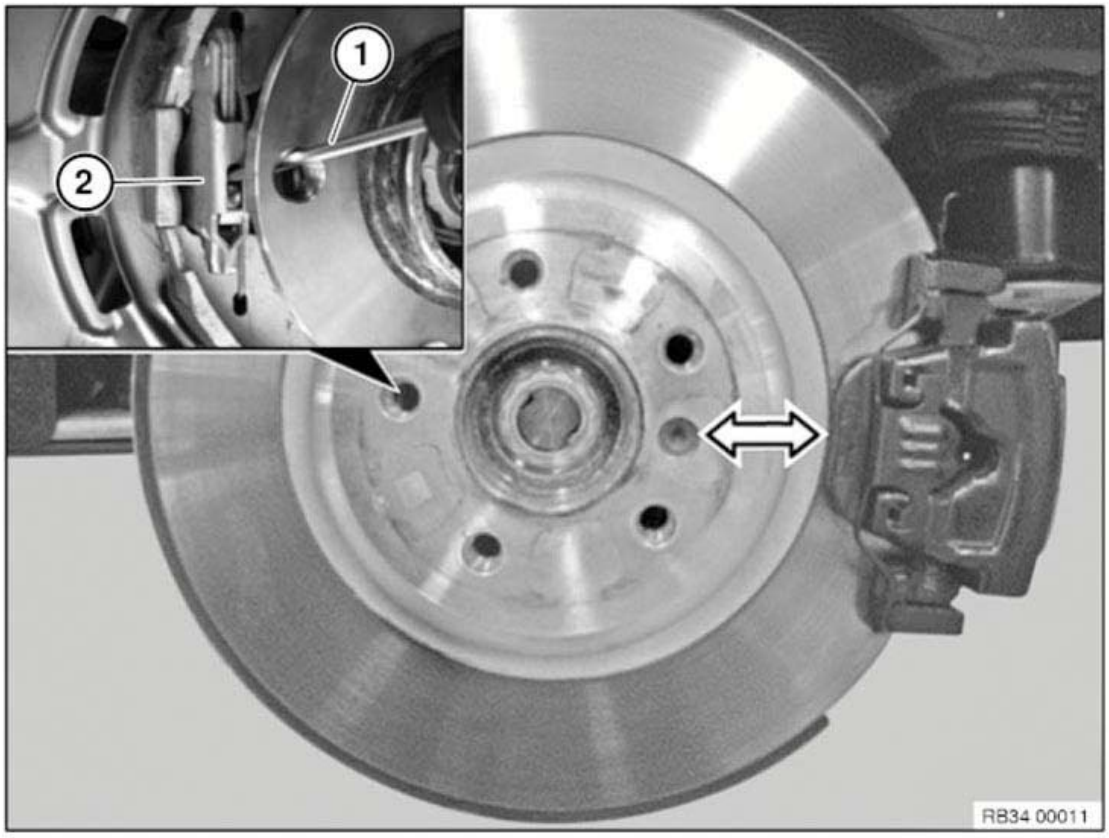


Fig. 128: Identifying Screwdriver And Brake Shoe Expander
Courtesy of BMW OF NORTH AMERICA, INC.

F01/F02/F03/F04 only

Turn brake disc into position as illustrated (arrow).

Position screwdriver (1) on brake shoe expander (2) as illustrated.

NOTE: For greater clarity, illustration does not show brake disc.

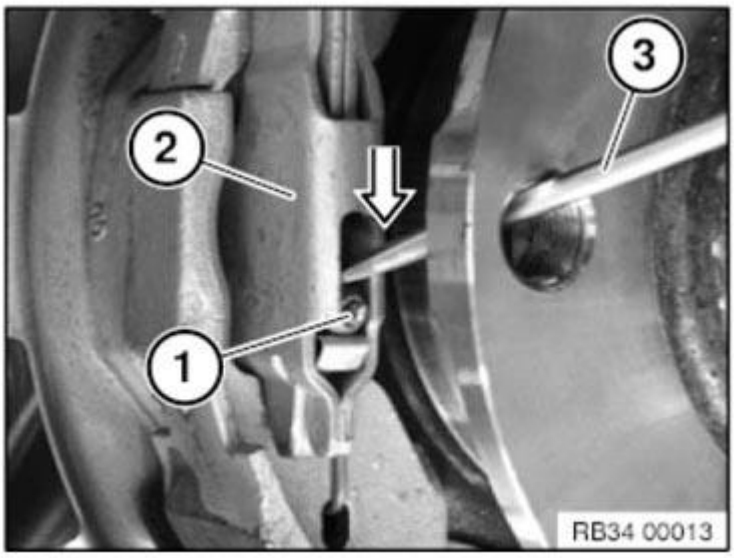


Fig. 129: Identifying Nipple, Screwdriver And Brake Shoe Expander
Courtesy of BMW OF NORTH AMERICA, INC.

Pull up parking brake Bowden cable behind wheel carrier towards brake shoe expander (2) as far as it will go and hold in position.

At the same time, use a standard screwdriver (3) to press nipple (1) in brake shoe expander (2) downwards as far as possible.

Screwdriver: shank length 40 mm, blade width 4 mm

Pull parking brake Bowden cable out of wheel carrier.

NOTE: Bowden cable must not be pulled out before the nipple (1) is pushed down.

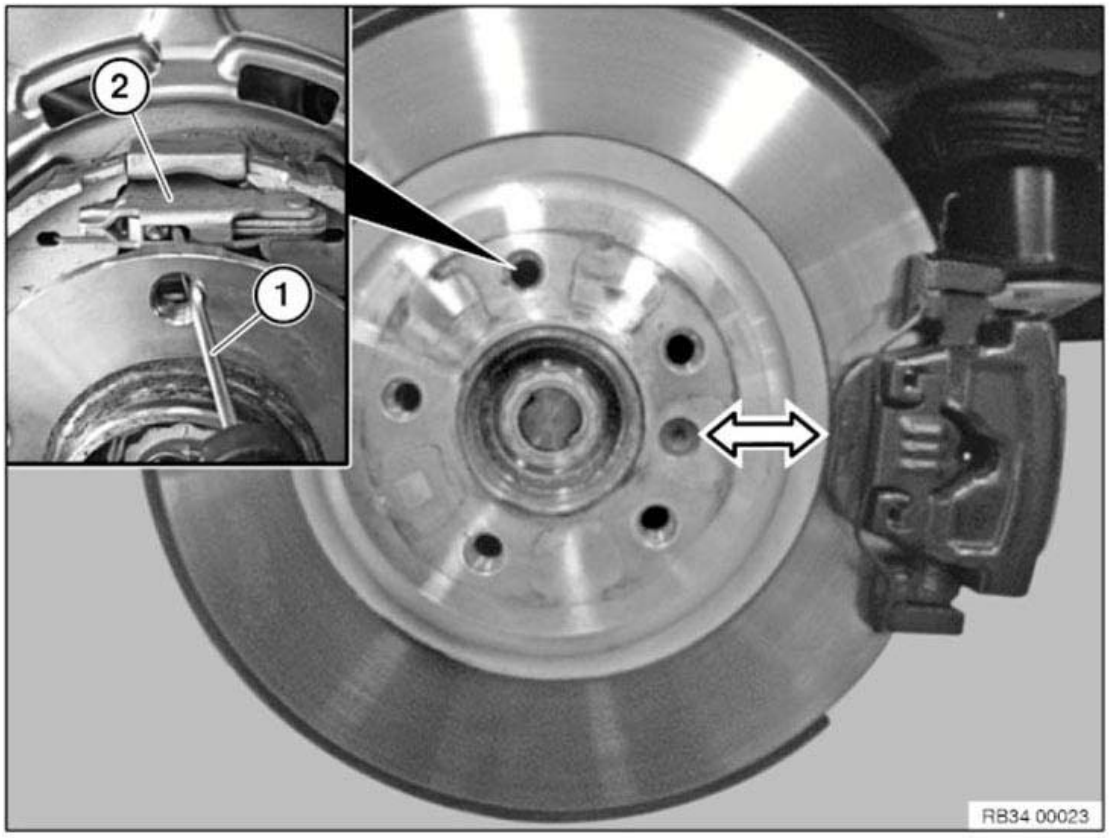


Fig. 130: Identifying Screwdriver And Brake Shoe Expander
Courtesy of BMW OF NORTH AMERICA, INC.

F07 only

Turn brake disc into position as illustrated (arrow).

Position screwdriver (1) on brake shoe expander (2) as illustrated.

NOTE: For greater clarity, illustration does not show brake disc.

Pull up parking brake Bowden cable behind wheel carrier towards brake shoe expander (2) as far as it will go and hold in position.

At the same time, use a standard screwdriver (3) to press nipple (1) in brake shoe expander (2) to the left as far as possible.

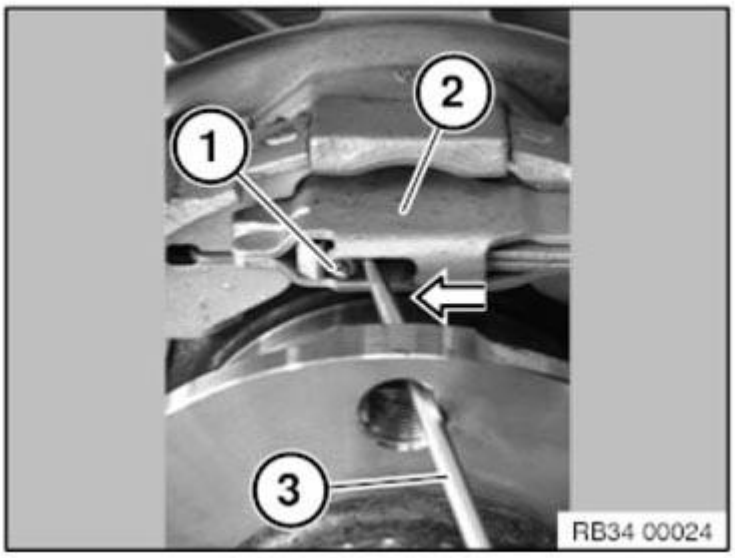


Fig. 131: Identifying Nipple, Screwdriver And Brake Shoe Expander
Courtesy of BMW OF NORTH AMERICA, INC.

Screwdriver: shank length 40 mm, blade width 4 mm

Pull parking brake Bowden cable out of wheel carrier.

NOTE: Bowden cable must not be pulled out before the nipple (1) is pushed away.

Installation note:

Grease nipple of parking brake Bowden cable with assembly paste (part number 81 22 9 407 171).

Obtainable from BMW Parts Department.

Feed parking brake Bowden cable **horizontally** into brake anchor plate/brake guard plate. Sleeve must be inserted up to stop.

Nipple of parking brake Bowden cable must audibly snap into place in brake shoe expander.

Disconnect plug connection (1).

Release screw (2).

Installation note:

Tightening torque **34 41 3AZ** .

Disengage actuator unit (3) in direction of arrow and remove.

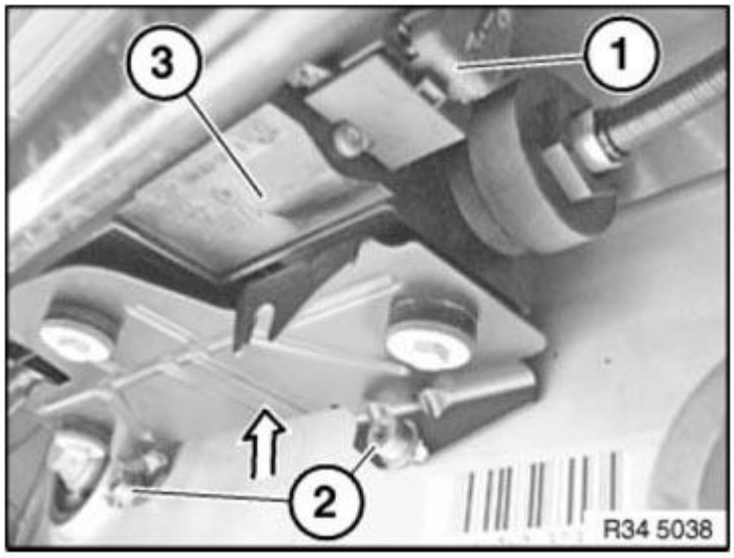


Fig. 132: Identifying Plug Connection, Actuator Unit And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Vehicles with HSR and Dynamic Drive:

RELEASE DYNAMIC DRIVE STABILIZER on rear axle support (removal not necessary).

Slide holder with parking brake actuator unit (2) to the point where screws (1) can be released.

Installation note:

Tightening torque **34 41 4AZ** .

Detach actuator unit from holder (2).

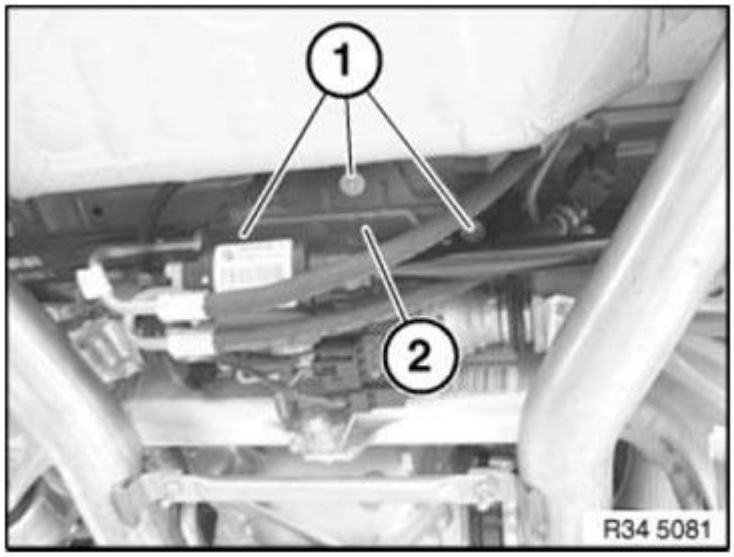


Fig. 133: Identifying Screws And Parking Brake Actuator Unit
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not kink parking Bowden cable.

Feed through left parking Bowden cable (1) between left rear silencer and rear axle support.

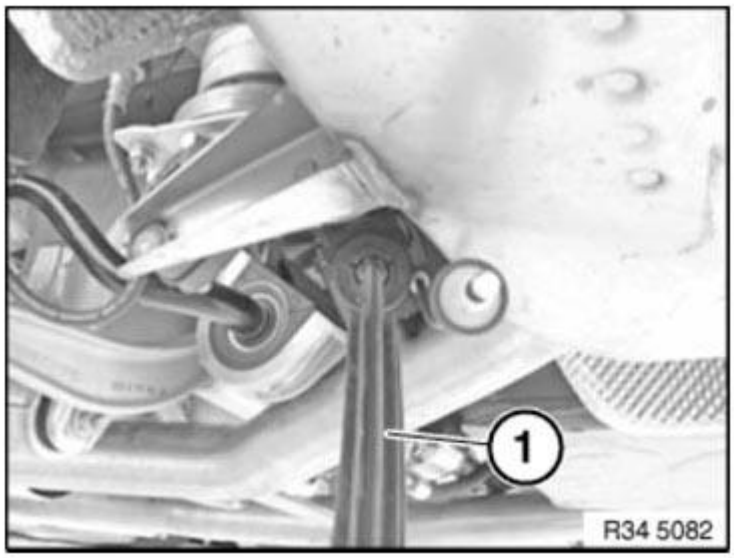


Fig. 134: Identifying Parking Bowden Cable
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, release bracket from left rear silencer and gently pull rear silencer downwards.

Feed out parking brake actuator unit (1) between left rear silencer and rear axle support.

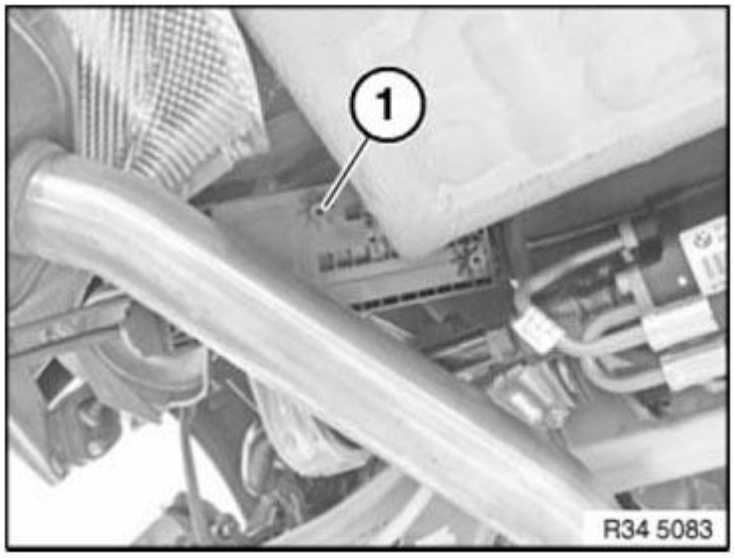


Fig. 135: Identifying Parking Brake Actuator Unit
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out initial operation/functional check in BMW diagnosis system.
  - Path
    - Activities
    - Service functions
    - Chassis and suspension
    - Parking brake
    - Initial operation/functional check

Replacement

- Carry out programming/coding of control units
- Carry out parking brake initial operation/functional check

34 41 220 REMOVING AND INSTALLING/RENEWING ALL PARKING BRAKE SHOES

Installation

- Remove rear brake discs, see **34 21 320 REMOVING AND INSTALLING OR REPLACING BOTH REAR BRAKE DISCS**
- Release electromechanical parking brake (EMF)

After completing tasks, adjust **PARKING BRAKE** .

Disconnect return springs (1) with brake spring pliers.

Installation:

Return springs (1) must not be over-elongated.

Check return springs (1) and replace if necessary.

Return springs (1) must not be mixed up.

Pay attention to installation position of adjusting screw (2).

Apply a thin coat of grease to bush and screw threads,

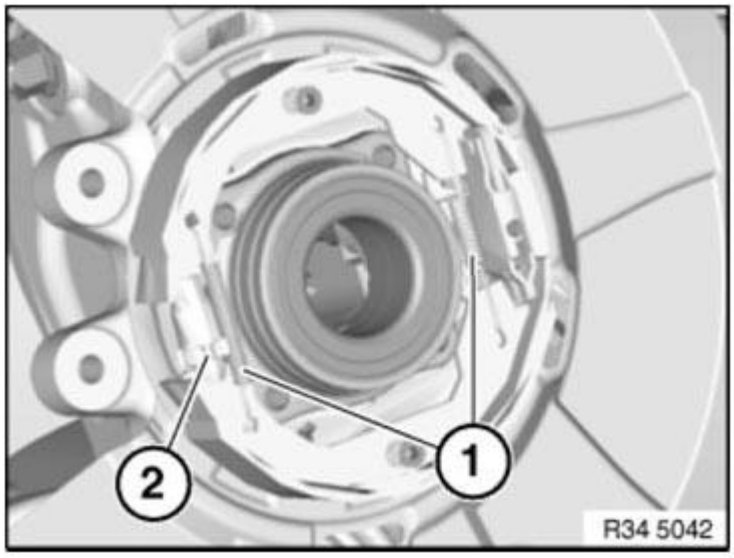


Fig. 136: Identifying Return Springs And Adjusting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration does not show wheel hub.

Twist roll pins (1) 90° with special tool **34 4 000** and detach.

Remove brake pads (2).

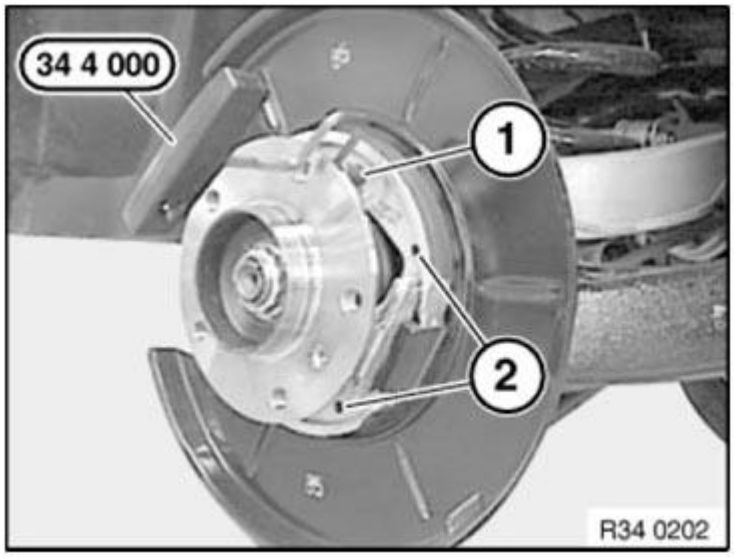


Fig. 137: Identifying Roll Pins And Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

34 41 250 REMOVING AND INSTALLING/REPLACING EXPANDER FOR PARKING BRAKE SHOES

Necessary preliminary tasks

- Remove **PARKING BRAKE SHOES**

After completing tasks, adjust **PARKING BRAKE** .

Pull brake shoe expander (1) forward, disconnect parking brake Bowden cable (2) and remove brake shoe expander.

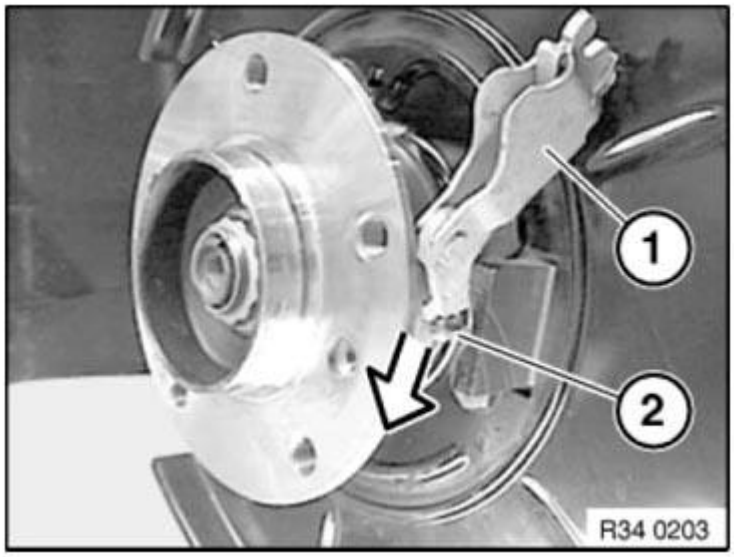


Fig. 138: Identifying Brake Shoe Expander And Parking Brake Bowden Cable
Courtesy of BMW OF NORTH AMERICA, INC.

34 41 135 REPLACING BOTH BOWDEN CABLES FOR PARKING BRAKE

IMPORTANT: Read and comply with GENERAL INFORMATION .
Bowden cables may only be replaced in pairs.

Necessary preliminary tasks

- Remove **ACTUATOR UNIT** with control unit for parking brake

Bowden cable, left

Release union nut (1).

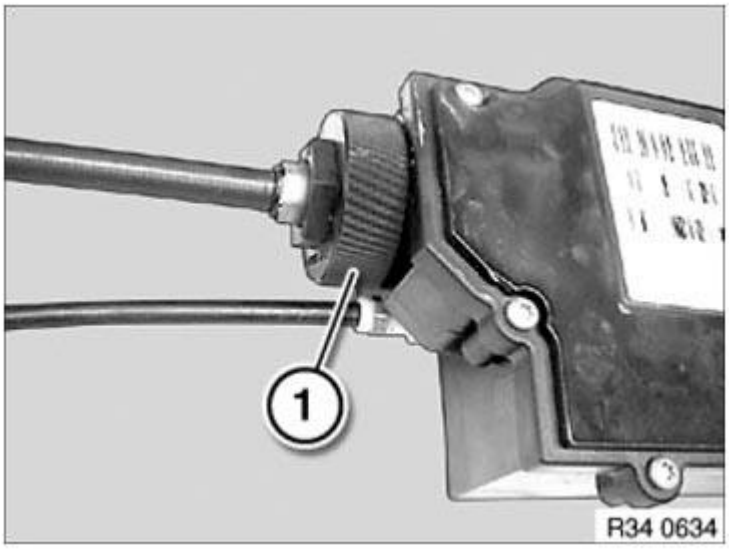


Fig. 139: Identifying Union Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Tightening torque **34 41 5AZ** .

Pull Bowden cable (1) out of actuator unit (2).

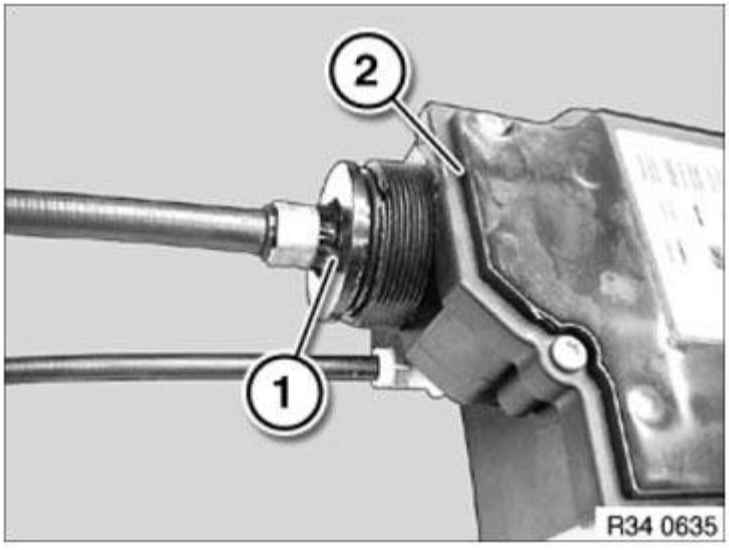


Fig. 140: Identifying Bowden Cable And Actuator Unit
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure all parts are absolutely clean.

Turn spindle (1) out of actuator unit (2) and remove Bowden cable.

Installation:

Lubricate new spindle with grease provided.

Insert spindle (1) 3 turns into inner spline shaft of actuator unit (2).

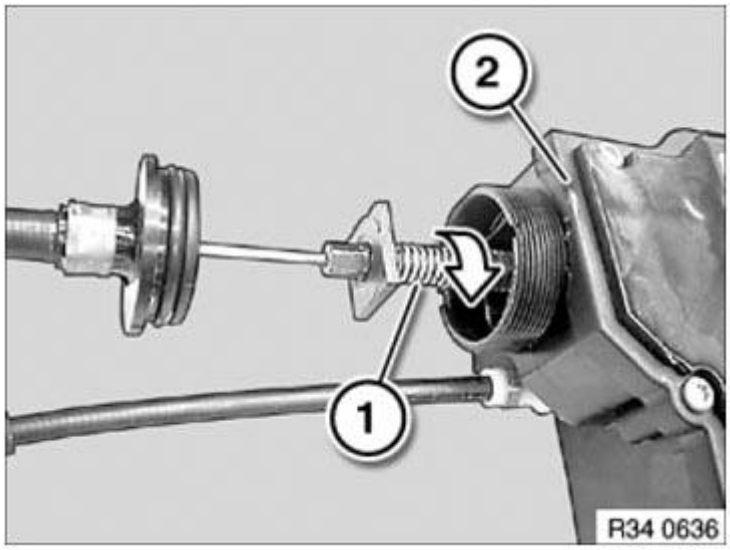


Fig. 141: Identifying Spindle And Actuator Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Bowden cable, right

Release union nut (1).

Installation:

Tightening torque **34 41 5AZ** .

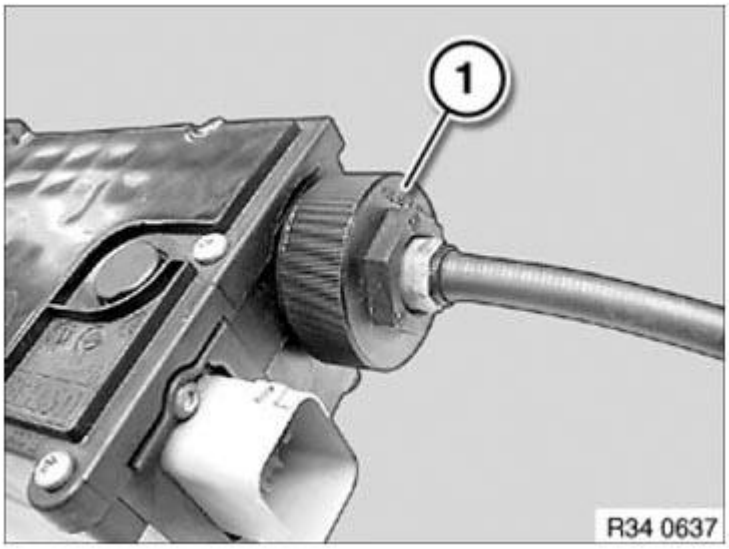


Fig. 142: Identifying Union Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Pull Bowden cable (1) out of actuator unit (2).

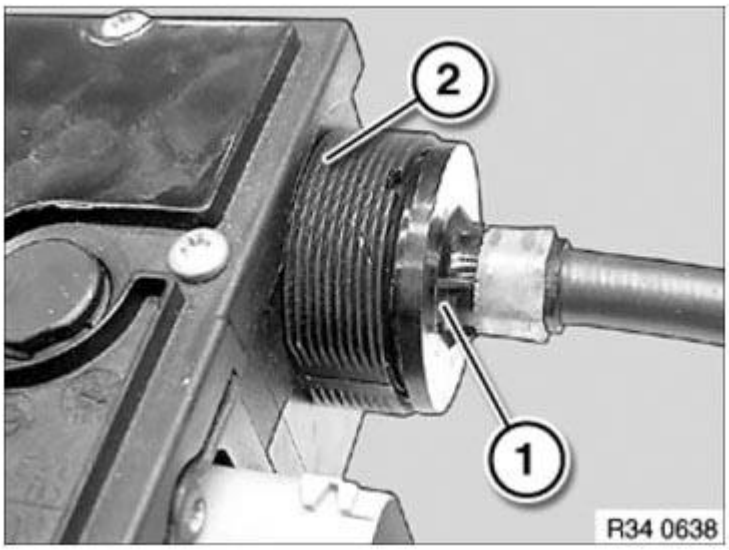


Fig. 143: Identifying Bowden Cable And Actuator Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock locking sleeve (1) and pull out of housing a little.

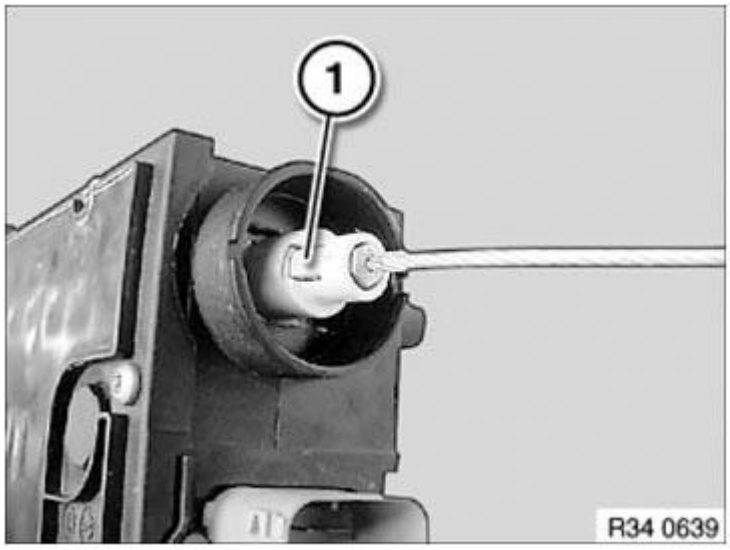


Fig. 144: Identifying Locking Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Snap out coupling (1) in direction of arrow.

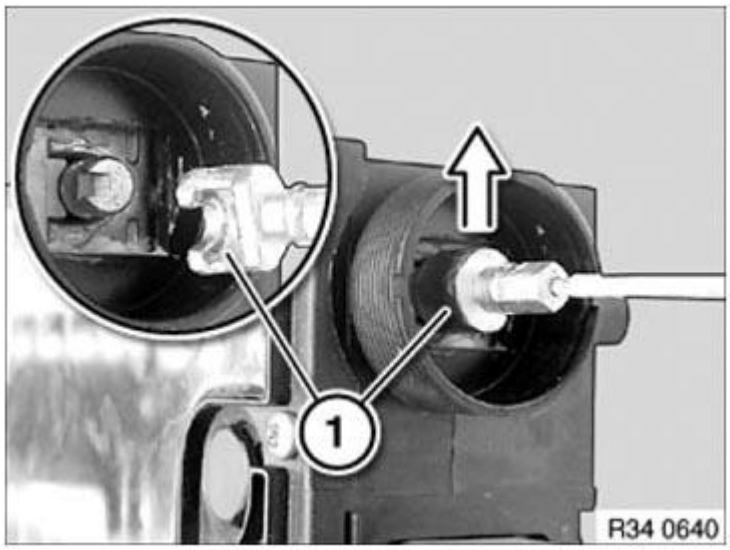


Fig. 145: Identifying Snap Out Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out initial operation/function test in BMW diagnosis system.
  - Path
    - Function selection
    - Service functions

- Chassis
- Parking brake
- Initial operation/function test

3451 MECHANICAL/HYDRAULIC COMPONENTS

34 51 527 REMOVING AND INSTALLING/REPLACING DSC HYDRAULIC UNIT

Necessary preliminary work

- Read and comply with **GENERAL INFORMATION** .
- Remove front left rear **WHEEL ARCH PANEL**
- Remove left **UNDERBODY PANELLING**

After completing work:

- **BLEED BRAKE SYSTEM**

IMPORTANT: Do not mix up brake lines.
If necessary, mark before removal.
Brake lines must not be bent.
Close off connecting bores with seal plugs.

Press brake pedal down to floor and secure with pedal support.

NOTE: The brake pedal may only be released when the brake lines are reconnected. This prevents brake fluid from emerging from the expansion tank when the brake lines are opened.

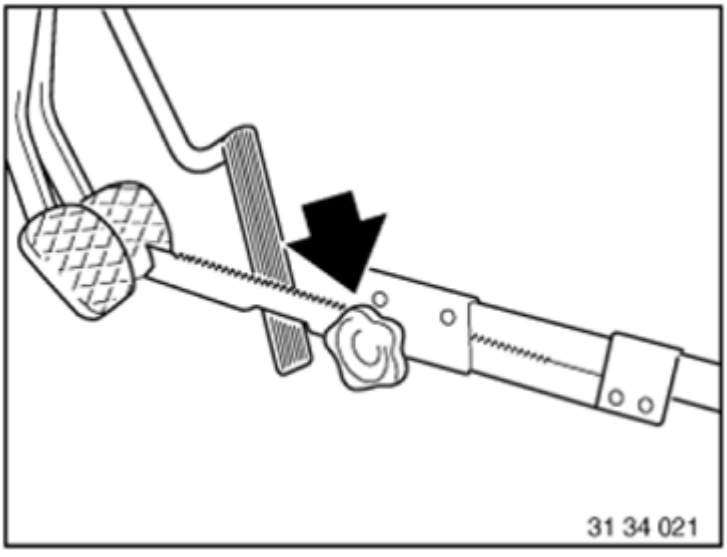


Fig. 146: Pressing Brake Pedal Down
Courtesy of BMW OF NORTH AMERICA, INC.

Cut open cable strap (1).

Replace cable straps.

Remove foam block (2).

Lever out penetration (3) and pull out towards front.

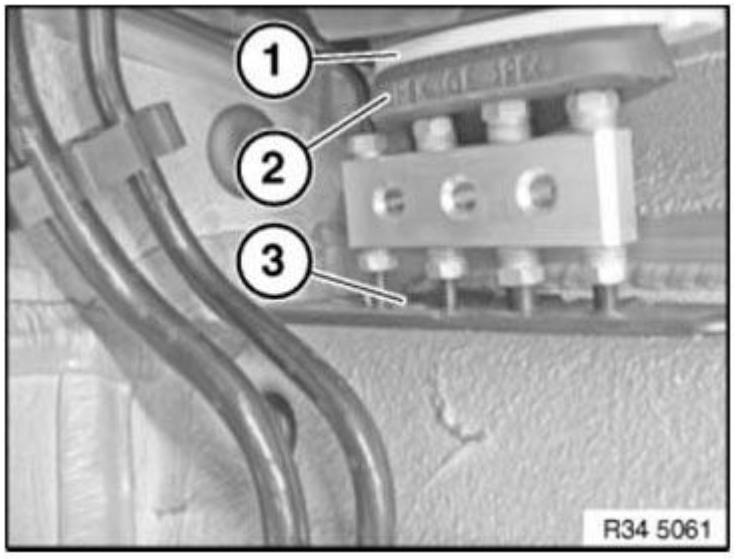


Fig. 147: Identifying Foam Block, Open Cable Straps And Cable Straps
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not bend brake lines.

Grip at square head (1) and release brake lines (2).

Tightening torque **34 32 1AZ** .

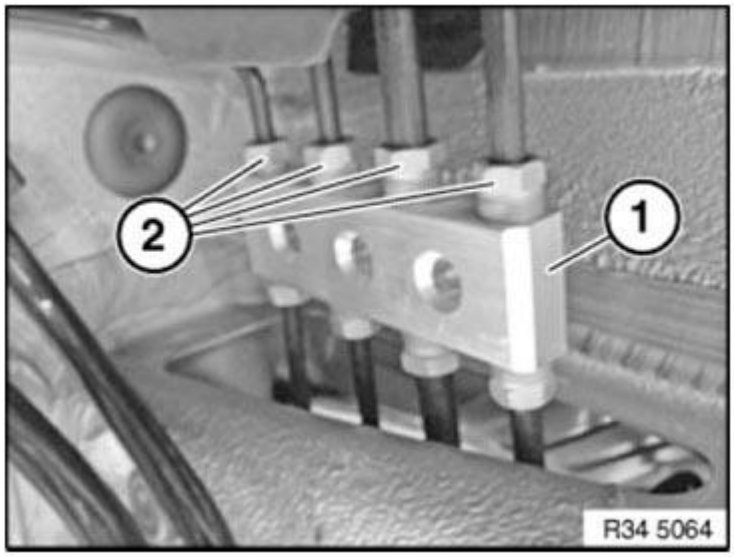


Fig. 148: Identifying Square Head And Brake Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten brake lines (1).

Installation note:

Tightening torque **34 32 1AZ** .

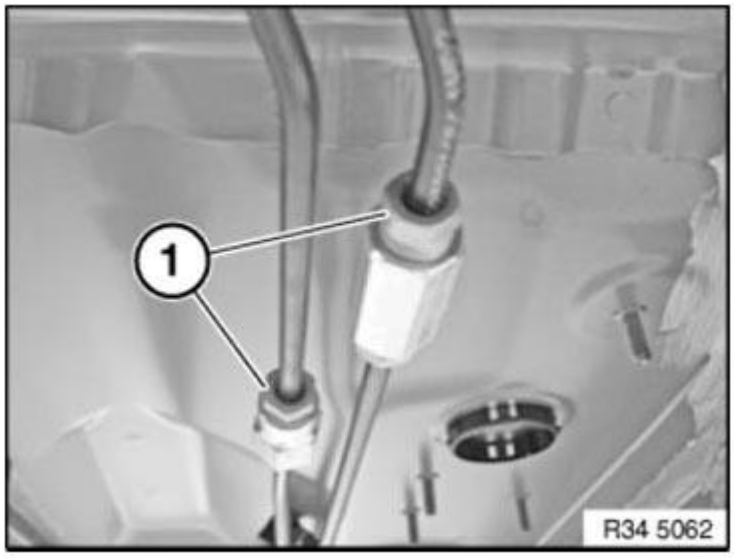


Fig. 149: Identifying Brake Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unfasten screws (2).

Installation note:

Tightening torque **34 51 5AZ** .

Remove hydraulic unit (3) towards bottom.

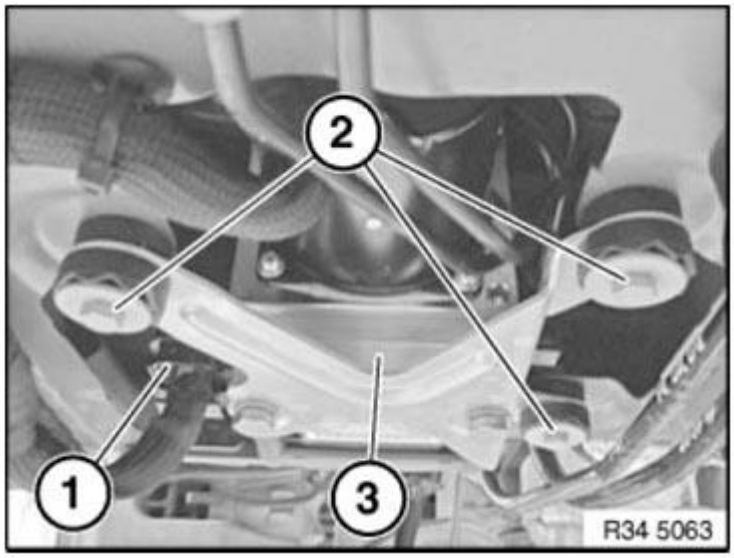


Fig. 150: Identifying Plug Connection, Screws And Hydraulic Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Unclip brake lines (1) from holder (2).

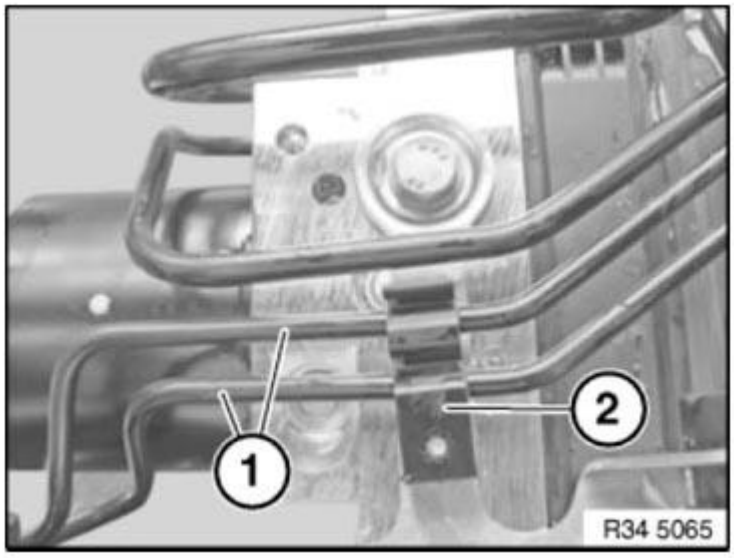


Fig. 151: Identifying Brake Lines And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten brake lines (1).

Installation note:

Tightening torque **34 32 1AZ** .

Unfasten screws (2). Take off holder (3).

Installation note:

Tightening torque **34 51 4AZ** .

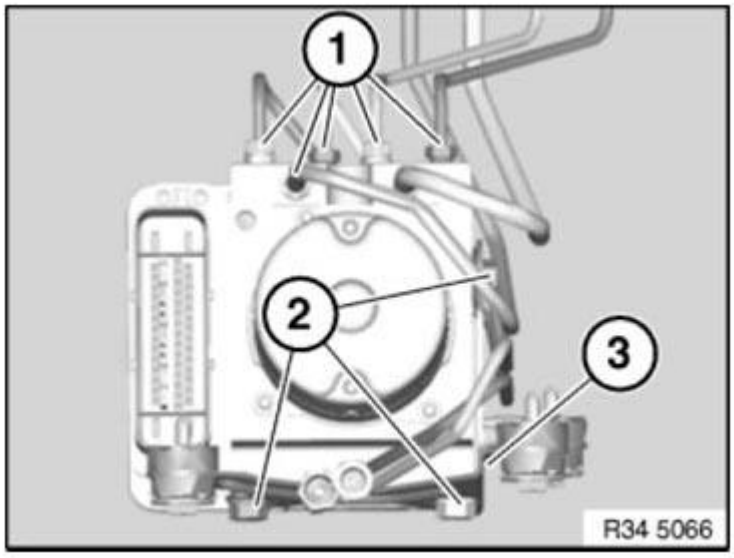


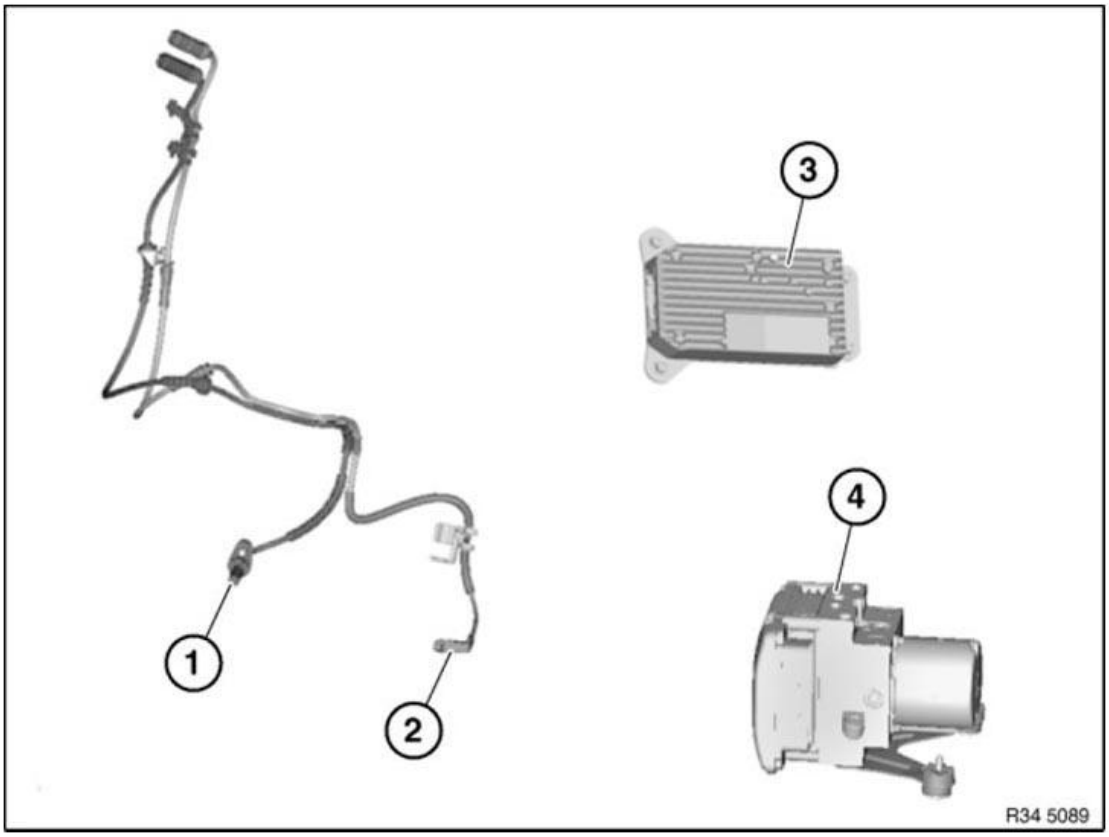
Fig. 152: Identifying Brake Lines, Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing control unit

- Carry out programming/encoding

3452 ELECTRONIC COMPONENTS

34 52... OVERVIEW OF ELECTRONIC COMPONENTS



1 Pulse generator 2 Brake pad wear sensor
3 ICM control unit 4 DSC control unit

Fig. 153: Overview Of Electronic Components
Courtesy of BMW OF NORTH AMERICA, INC.

34 52 121 REMOVING AND INSTALLING/RENEWING ICM CONTROL UNIT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection).

Necessary preliminary tasks

- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **SIDE TRIM PANEL** on center console on left and right
- Remove **CENTRE ARMREST STORAGE COMPARTMENT**
- Remove **REAR CENTRE CONSOLE TRIM**

Open ashtray cover (1).

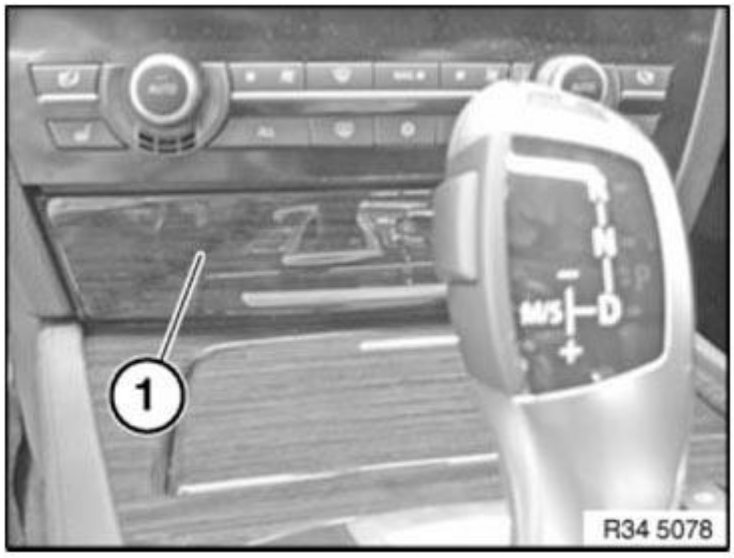


Fig. 154: Identifying Ashtray Cover
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage in area (1) of center console on left and right!

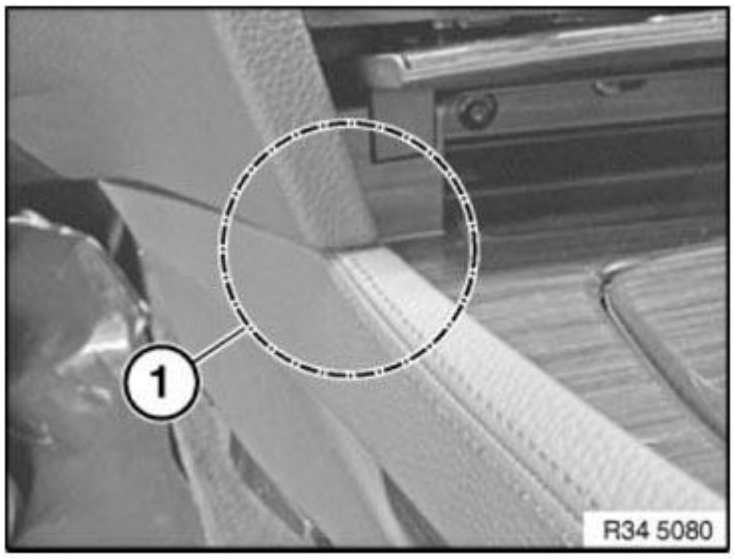


Fig. 155: Identifying Damage Area
Courtesy of BMW OF NORTH AMERICA, INC.

Release left and right screws (1).

Installation:

Tightening torque **51 16 7AZ** .

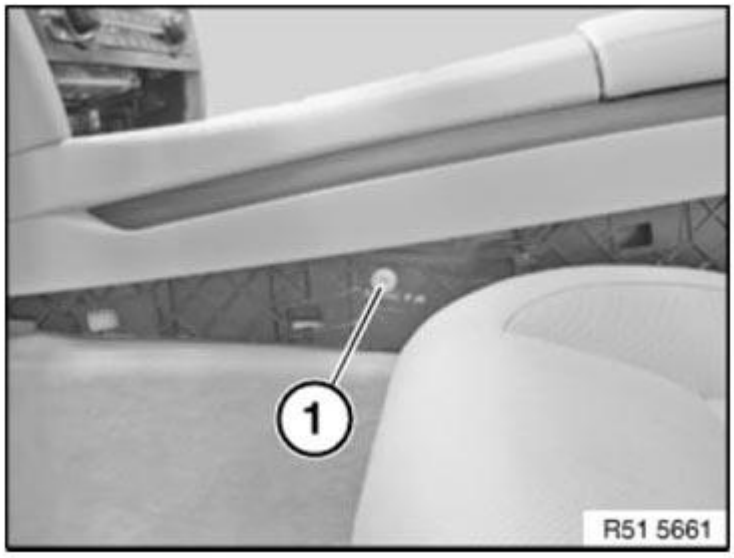


Fig. 156: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on center console carrier.

Installation:

Tightening torque **51 16 4AZ** .

IMPORTANT: Risk of damage to center console (2)!
Observe the following instruction exactly.

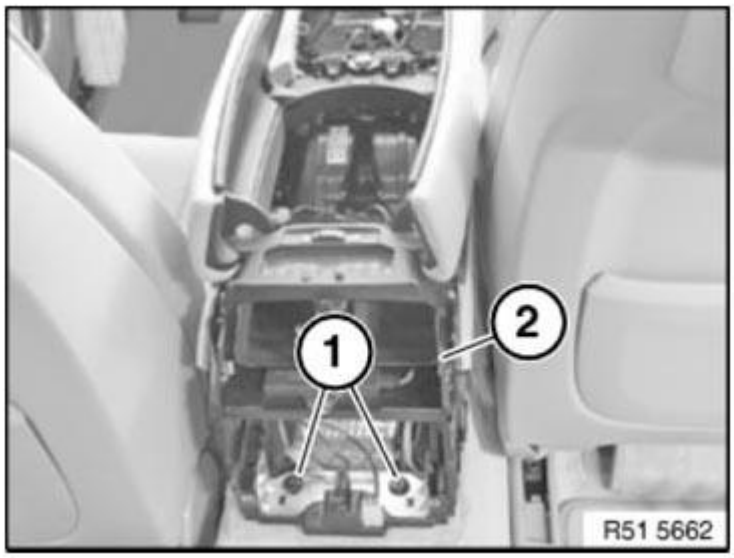


Fig. 157: Identifying Screws And Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

Raise center console (1) at rear (A) 7 cm.

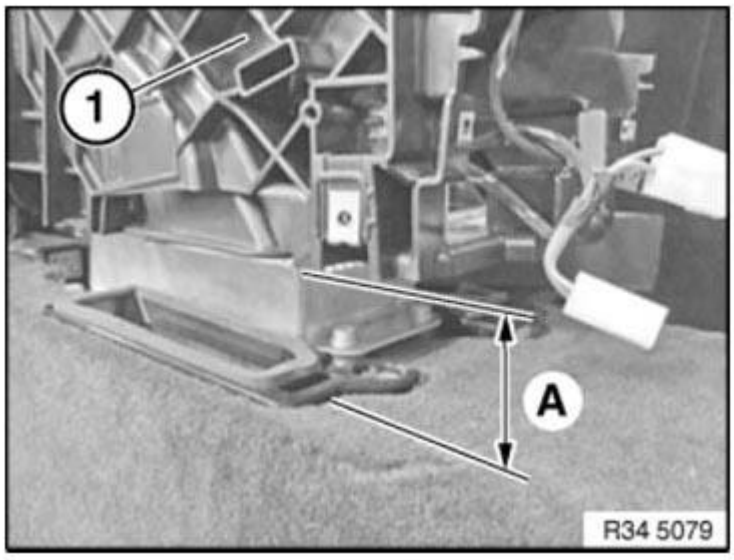


Fig. 158: Raising Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows center console removed.

Unfasten screws (2).

Installation:

Replace screws.

Tightening torque **34 51 2AZ** .

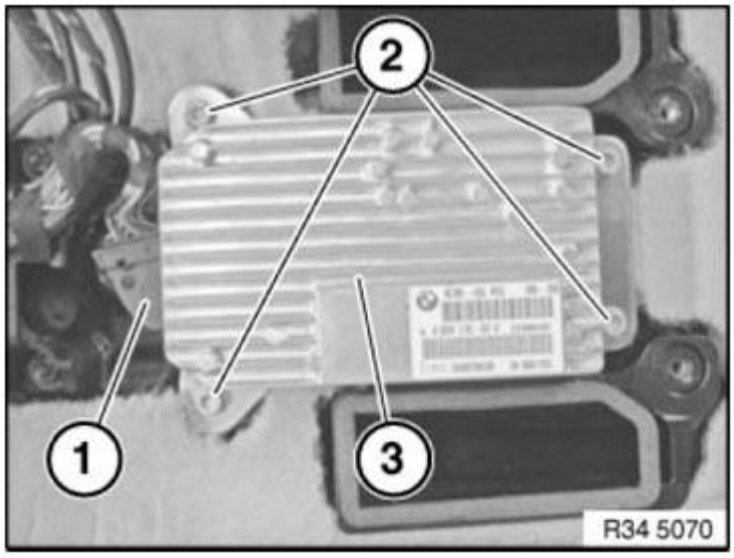


Fig. 159: Identifying Plug Connection, Screws And ICM Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Swing out ICM control unit (3).

Disconnect plug connection (1).

IMPORTANT: Do not trap any electrical leads when installing ICM control unit!

After removing and installing ICM control unit

After completing tasks, use BMW Diagnosis and Information System to

- Carry out **ADJUSTMENT/STARTUP OF ICM CONTROL UNIT**

Replacement

After completing tasks, use BMW Diagnosis and Information System to

- Carry out programming/encoding
- Carry out **RIDE-HEIGHT CALIBRATION**
- Carry out **ADJUSTMENT/STARTUP OF ICM CONTROL UNIT**
- Active front steering only: carry out **ADJUSTMENT/INITIAL OPERATION** of active front steering

34 52 516 REMOVING AND INSTALLING/REPLACING DSC CONTROL UNIT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection).

Necessary preliminary work

- Remove the **HYDRAULIC UNIT**

IMPORTANT: Maintain conditions of absolute cleanliness.

Unclip brake lines (1) from bracket (2).

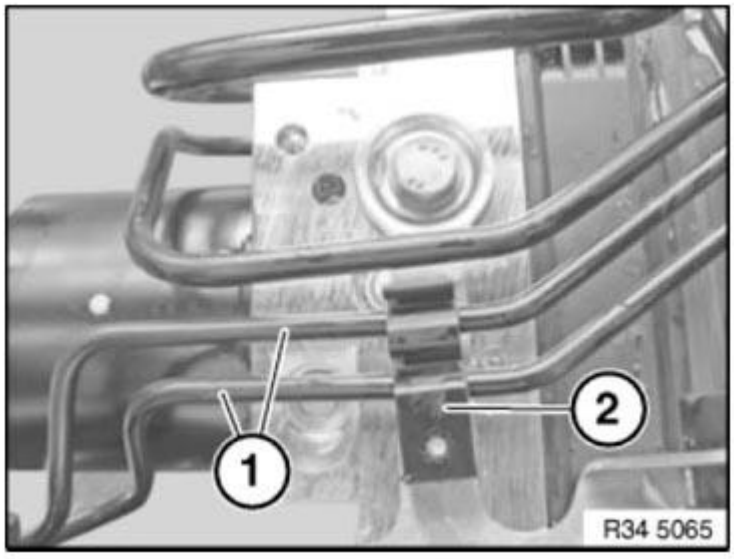


Fig. 160: Identifying Brake Lines And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten brake lines (1).

Installation note:

Tightening torque **34 32 1AZ** .

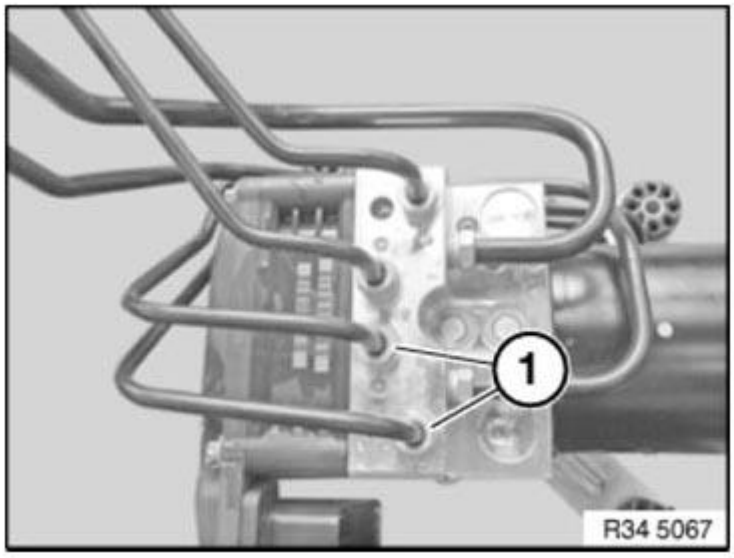


Fig. 161: Identifying Brake Lines
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage to the contacts when removing and installing the hydraulic unit.

Release screws (1) and carefully detach DSC control unit (2) towards top.

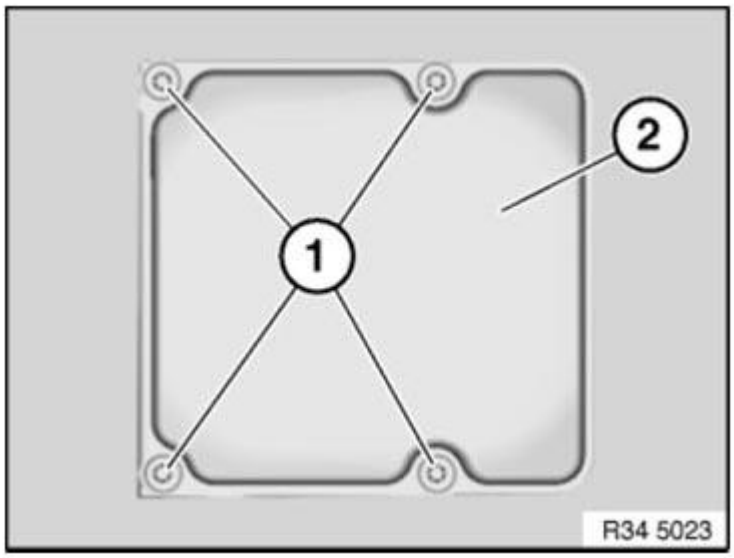


Fig. 162: Identifying Screws And DSC Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Cleaning with compressed air, chemical solvents and sharp-edged objects is not permitted.

Do not touch pressure sensor contacts (2) with your fingers or clean the contacts.

If necessary, clean sealing surface (1) with a plastic scraper or a fluff-free cloth.

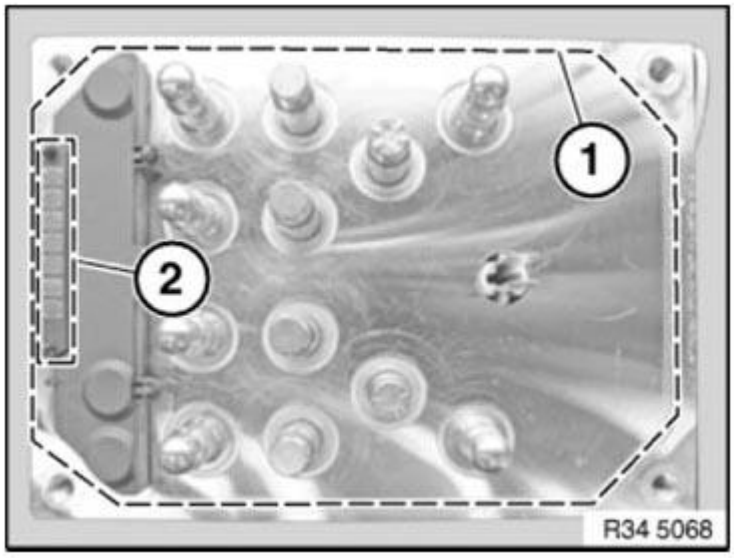


Fig. 163: Identifying Pressure Sensor Contacts And Sealing Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not touch valve coils (1) and pressure sensor contact springs (2) with your fingers, do not clean or readjust these components either.

Check gasket (3) for damage. If damaged, replace DSC control unit (4).

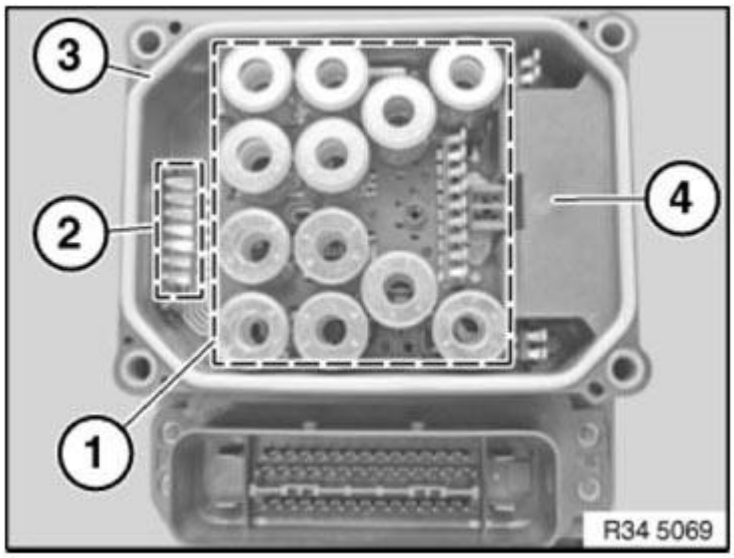


Fig. 164: Identifying Valve Coils, Pressure Sensor Contact Springs, Gasket And DSC Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure screws are inserted evenly and DSC control unit rests on hydraulic unit.

Replace screws.

Observe tightening sequence (1-4).

Tightening torque **34 51 1AZ** .

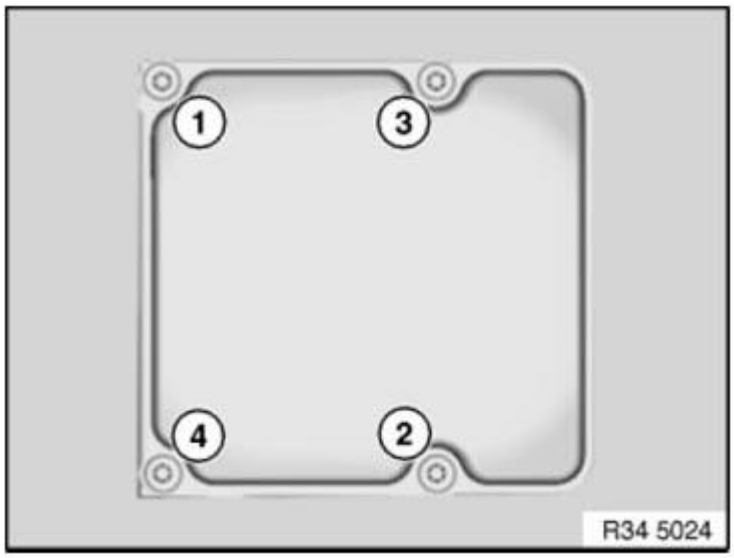


Fig. 165: Screw Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out programming/encoding
- Brake line mix-up test:
- Function check of hydraulic unit

F04 only

- Carry out brake pedal travel sensor adjustment.

34 35 001 REPLACING A BRAKE PAD SENSOR (FRONT)

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).
If an already ground brake pad wear sensor has to be replaced although the minimum brake pad thickness has not yet been reached, it is necessary to file down the new sliding contact with a file to the same length as the ground

sliding contact. See BRAKES - TECHNICAL DATA -- 750LI .

Necessary preliminary tasks

- Remove front left **WHEEL**

Open housing cover.

Disconnect plug connection (1).

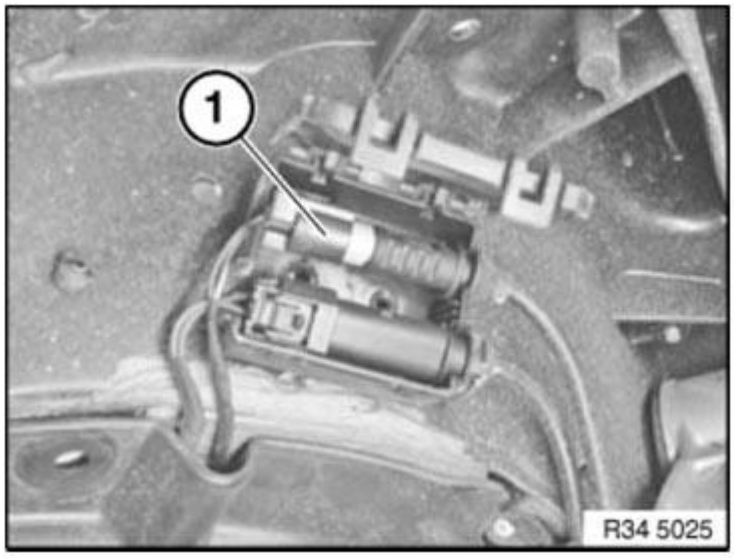


Fig. 166: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1) along line.

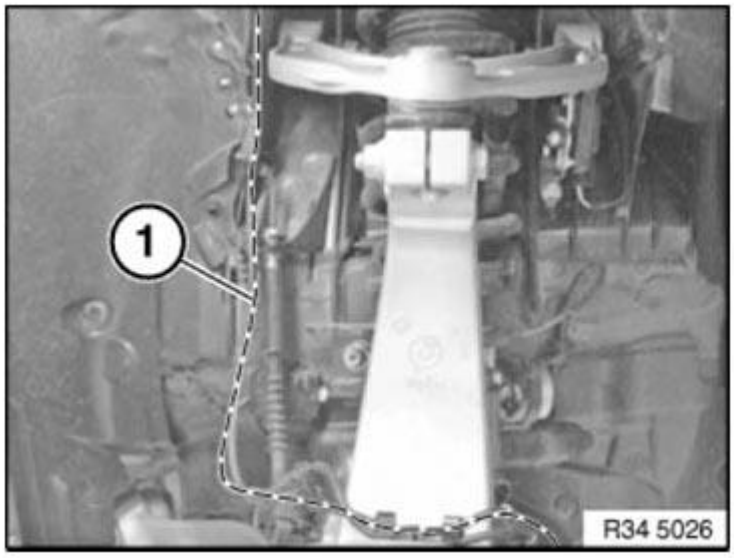


Fig. 167: Identifying Unclip Line
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage line from brake pad wear sensor from holder (1).

Pull brake pad wear sensor (2) in direction of arrow out of brake pad.

Installation:

Make sure brake pad wear sensor (2) is correctly seated in brake pad and holder (1).

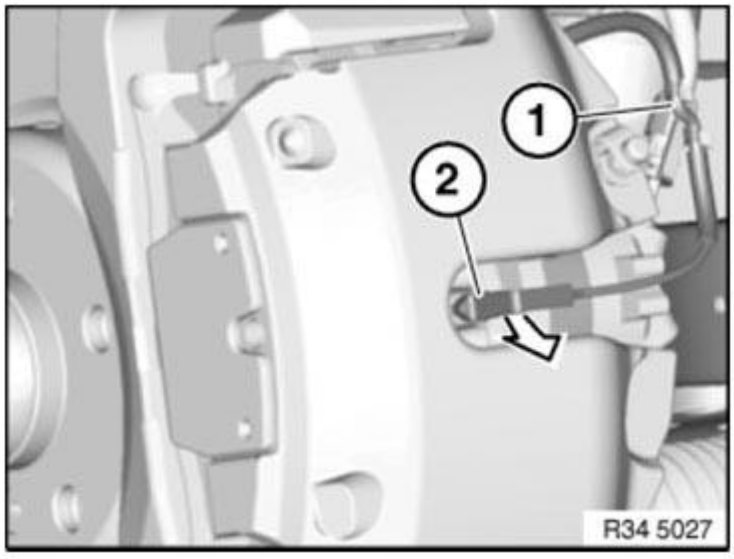


Fig. 168: Identifying Brake Pad Wear Sensor And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

34 35 001 REPLACING A BRAKE PAD SENSOR (REAR)

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).
If an already ground brake pad wear sensor has to be replaced although the minimum brake pad thickness has not yet been reached, it is necessary to file down the new sliding contact with a file to the same length as the ground sliding contact. See BRAKES - TECHNICAL DATA -- 750LI .

Necessary preliminary tasks

- Remove rear right **WHEEL**

Open housing cover.

Disconnect plug connection (1).

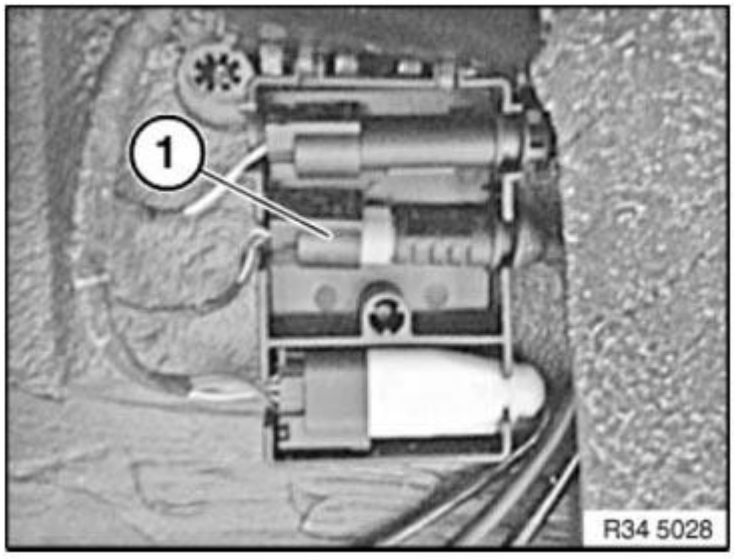


Fig. 169: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1) along line.

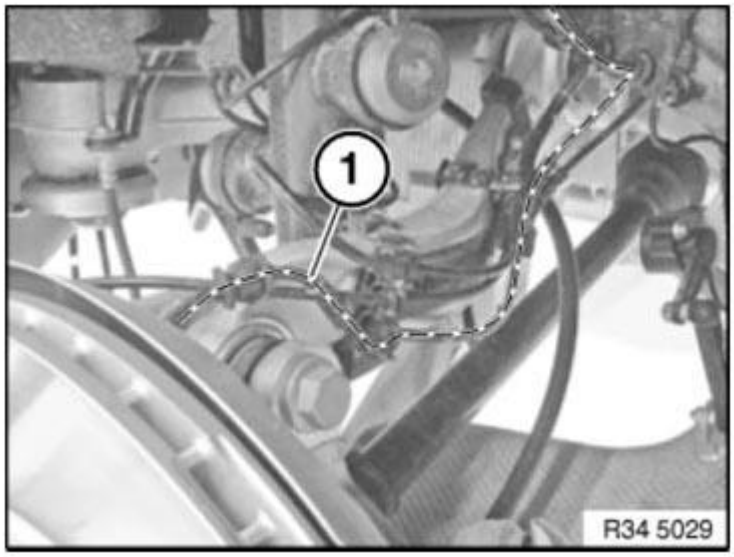


Fig. 170: Identifying Unclip Line
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage line from brake pad wear sensor from holder (1).

Pull brake pad wear sensor (2) in direction of arrow out of brake pad.

Installation:

Make sure brake pad wear sensor (2) is correctly seated in brake pad and holder (1).

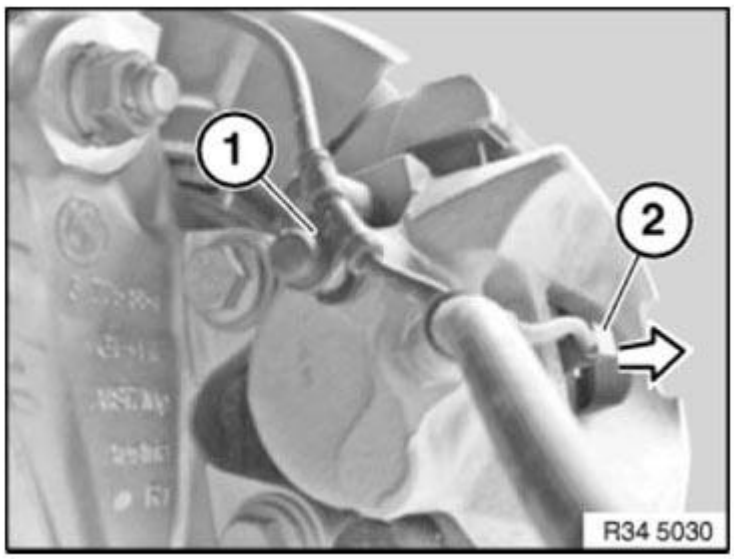


Fig. 171: Identifying Brake Pad Wear Sensor And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

34 52 535 REPLACING A REAR PULSE SENSOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection).

Necessary preliminary tasks

- Remove rear **WHEEL**
- Read and comply with **GENERAL INFORMATION** .

Open housing cover.

Disconnect plug connection (1).

Installation:

Ensure proper locking of plug connector and proper seating of rubber grommets.

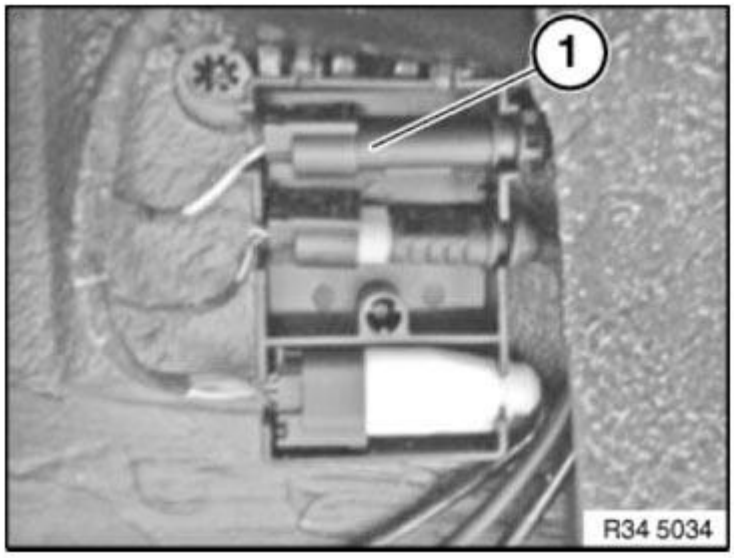


Fig. 172: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage line (1) along marked lines from holders.

Installation:

Ensure proper locking of the holders and proper seating of the line in the holders.

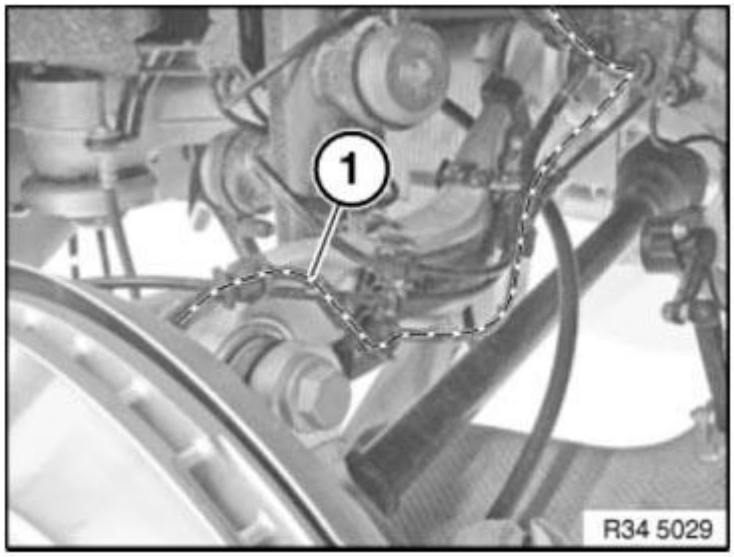


Fig. 173: Identifying Disengage Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Withdraw wheel speed sensor (2) from bore hole.

Installation:

Tightening torque **34 51 3AZ** .

Clean bore for pulse generator and lubricate with Staburags NBU 12/K lubricating grease.

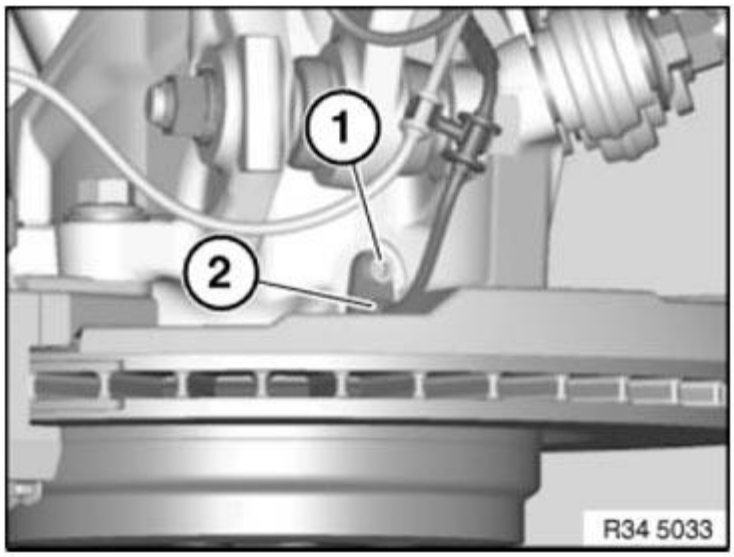


Fig. 174: Identifying Wheel Speed Sensor And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Prior to installation, check sensor head for damage and replace if necessary.

34 52 525 REPLACING ONE FRONT PULSE SENSOR

IMPORTANT: Read and comply with PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection).

Necessary preliminary tasks

- Remove front **WHEEL**
- Read and comply with **GENERAL INFORMATION** .

Open housing cover.

Disconnect plug connection (1).

Installation:

Ensure proper locking of plug connector and proper seating of rubber grommets.

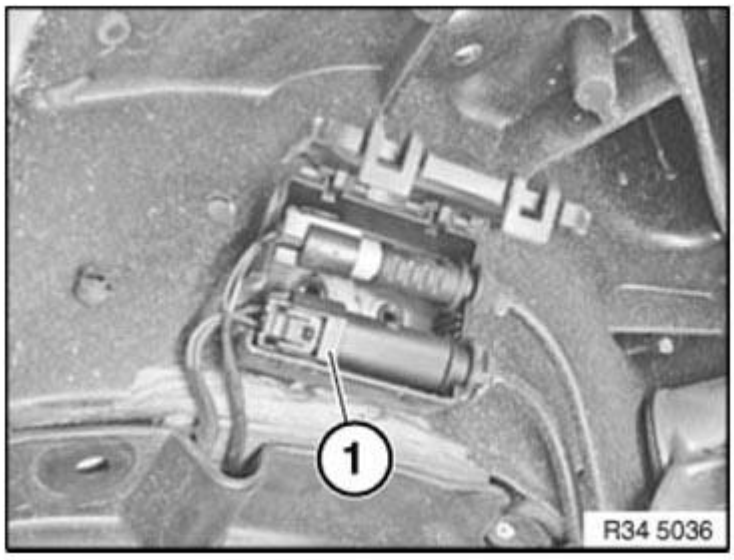


Fig. 175: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage line (1) along marked lines from holders.

Installation:

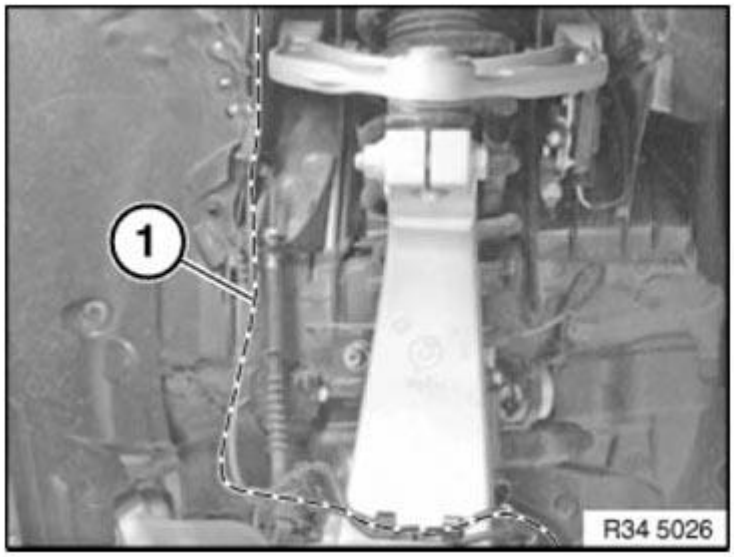


Fig. 176: Identifying Disengage Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and withdraw pulse generator (2) from bore.

Installation:

Tightening torque **34 51 3AZ** .

Clean bore for pulse generator and lubricate with Staburags NBU 12/K lubricating grease.

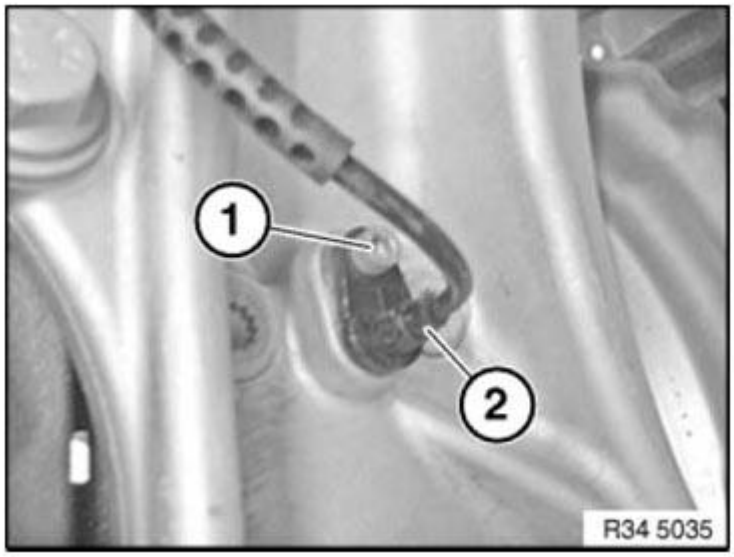


Fig. 177: Identifying Screw And Pulse Generator
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Prior to installation, check sensor head for damage and replace if necessary.

34 52.. STARTUP OF ICM CONTROL UNIT

NOTE: Startup of ICM control unit must be carried out:

- **After replacement or removal and installation of ICM control unit**

Connect vehicle to BMW diagnosis system.

Select and carry out startup of ICM control unit under Service functions.

BRAKES

Brakes - Special Tools

34 BRAKES

345100 DEVICE

0492498 345100 Device MW

Note: (Bending device) For brake lines

Storage Location

A3



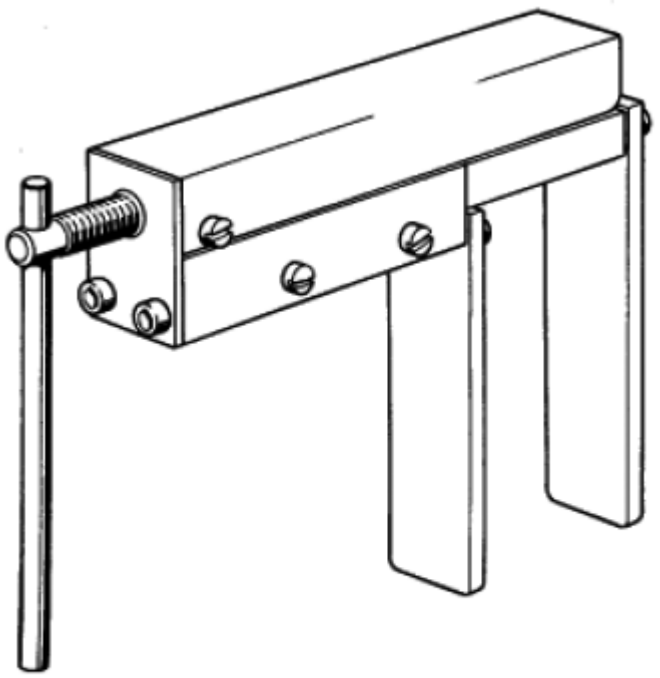
W34 5 100

Fig. 1: Identifying Device (345100)
Courtesy of BMW OF NORTH AMERICA, INC.

341050 DEVICE

0492455 341050 Device MW

Note: For turning back brake piston when fitting new brake pads, disc brakes front and rear



W34 1 050

Fig. 2: Identifying Device (341050)
Courtesy of BMW OF NORTH AMERICA, INC.

341260 GAUGE

0492467 341260 Minimum set: Mechanical tools Gauge MW

Note: (Brake pad measuring gauge) For measuring brake pad thickness without dismantling wheels.

SI number

01 12 95 (992)

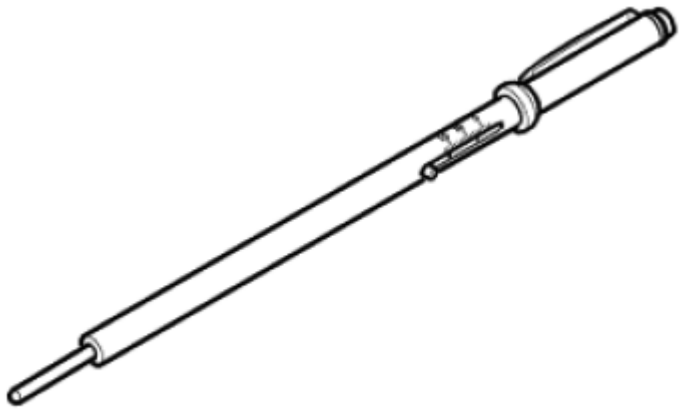


Fig. 3: Identifying Gauge (341260)
Courtesy of BMW OF NORTH AMERICA, INC.

341280 GAUGE

0495451 341280 Gauge MW

Note: (Slide gauge) For measuring brake disk thickness.

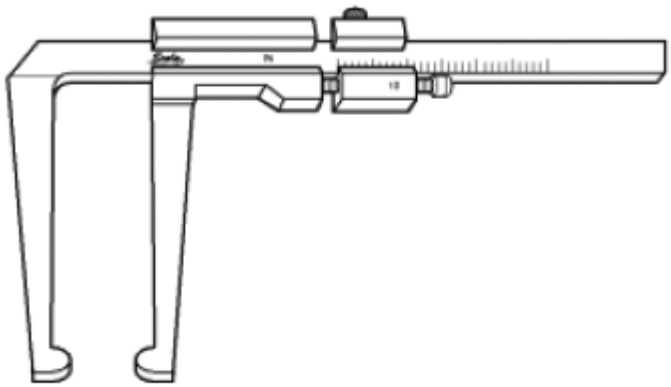


Fig. 4: Identifying Gauge (341280)
Courtesy of BMW OF NORTH AMERICA, INC.

344000 HEXAGON SOCKET

0492488 344000 Hexagon socket MW

Note: (Allen key) For removing and fitting the handbrake shoe mounting spring and the ABS impulse sensor

Storage Location

B10

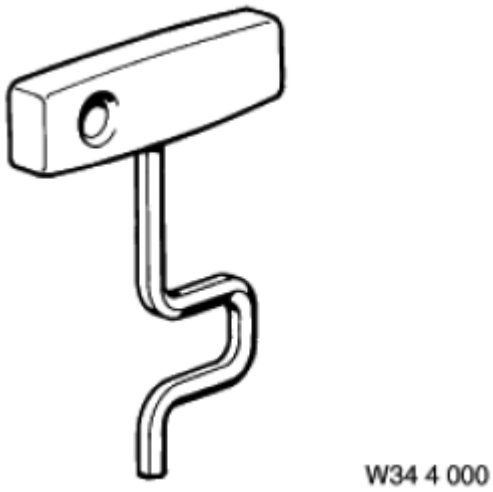


Fig. 5: Identifying Hexagon Socket (344000)
Courtesy of BMW OF NORTH AMERICA, INC.

BRAKES

Brakes - Technical Data

FRONT BRAKE

34 11 FRONT BRAKE F01/F02/F07

FRONT BRAKE SPECIFICATION

IMPORTANT: **New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH). Minimum brake disc thickness during general inspection (GI): Nominal size thickness minus 2.4 mm** **(Not applicable to perforated brake discs and M vehicles)** **M vehicles and perforated brake discs:** **Nominal size thickness minus 1.6 mm** **Depending on:** ○ **Engine type** ○ **Transmission version** ○ **Equipment specification (e.g. maximum load increase, chassis official-use, national version, etc.)** **different brake discs can be fitted The brake discs must always be assigned by way of the relevant vehicle identification number and the Electronic Parts Catalogue!**		
Different thicknesses on brake linings	Max. mm	0.01
Max. machining limit per friction ring side (M vehicles and perforated brake discs must not be machined). Brake disc minimum thickness (MIN TH) must not be undershot.	mm	0.8
Nominal size (diameter x thickness)	mm	324x30
Nominal size (diameter x thickness)	mm	374x36

Nominal size (diameter x thickness)	mm	348x36
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	34.4
Wear warning from residual lining thickness	mm	3.7

REAR BRAKE

34 21 REAR BRAKE DISCS F01/F02/F07

REAR BRAKE DISCS SPECIFICATION

IMPORTANT: **New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).** **Minimum brake disc thickness during general inspection (GI):** **Nominal size thickness minus 2.4 mm** **(Not applicable to perforated brake discs and M vehicles)** **M vehicles and perforated brake discs:** **Nominal size thickness minus 1.6 mm** **Depending on:** ○ **Engine type** ○ **Transmission version** ○ **Equipment specification (e.g. maximum load increase, chassis official-use, national version, etc.)** **different brake discs can be fitted** **The brake discs must always be assigned by way of the relevant vehicle identification number and the Electronic Parts Catalogue!**		
Different thicknesses on brake linings	Max. mm	0.01
Max. machining limit per friction ring side (M vehicles and perforated brake discs must not be machined). Brake disc minimum thickness	mm	0.8

(MIN TH) must not be undershot.		
Nominal size (diameter x thickness)	mm	324x20
Nominal size (diameter x thickness)	mm	370x24
Nominal size (diameter x thickness)	mm	345x24
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	22.4
Wear warning from residual lining thickness	mm	3.7

PARKING BRAKE F01, F02

34 41 PARKING BRAKE F01/F02

PARKING BRAKE SPECIFICATION

Handbrake drum diameter	mm	185
Minimum lining thickness	mm	1.5

BRAKES

Brakes - Tightening Torques

3400-F01 TESTING AND BLEEDING BRAKES

34 00 TESTING AND BLEEDING BRAKES

TIGHTENING TORQUE SPECIFICATION - TESTING AND BLEEDING BRAKES

		Type	Thread	Tightening specifications	Dimension
1AZ	Vent valve	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	WAF 11		12-18 Nm
		F10, F11, F12, F18, F25	wrench size 9 mm		9-11 Nm

3411-F01 FRONT BRAKE

34 11 FRONT BRAKE

TIGHTENING TORQUE SPECIFICATION - FRONT BRAKE

		Type	Thread	Tightening specifications	Value
1AZ	Brake disc to wheel hub	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M8	Replace screws.	16 Nm
2AZ	Brake anchor plate to swivel bearing	F01, F02, F04, F07, F10, F11, F12, F18	M12x1.5		110 Nm
		F03	M14x1.5	Replace screws. **IMPORTANT: Observe 4 phase tightening!** Jointing torque Release Jointing torque Angle of rotation	 150 Nm min.90 ° 150 Nm 180°± 15°
		F25	M12x1.5	Replace screws. Jointing torque Angle of rotation	 75 Nm 45°10°
3AZ	Protective plate to swivel bearing	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M6	Replace screws.	12 Nm
	Guide bolt (brake caliper to	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	SW9		55 Nm

4AZ	brake anchor plate)	F10, F11, F12, F18, F25	SW7		30-5 Nm

3421-F01 REAR BRAKE

34 21 REAR BRAKE

TIGHTENING TORQUE SPECIFICATION - REAR BRAKE

		Type	Thread	Tightening specifications	Dimension
1AZ	Brake disc to wheel hub	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M8	Replace screw	16 Nm
2AZ	Brake anchor plate to wheel carrier	F01, F02, F04, F07, F10, F11, F12, F18	M12x1.5		110 Nm
		F03	M14x1.5	Replace screws. **IMPORTANT: Observe 4 phase tightening!** Jointing torque Release Jointing torque Angle of rotation	 150 Nm min.90 ° 150 Nm 180°± 15°
		F25	M12x1.5	Replace screws. Jointing torque Angle of rotation	 75 Nm 45°10°
3AZ	Protective plate to wheel carrier	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M6	Replace bolts	12 Nm
4AZ	Guide bolt (brake caliper to brake anchor plate)	F01, F02, F03, F04, F07	WAF 7		30-5 Nm
5AZ	Guide bolt (brake caliper to brake anchor plate)	F10, F11, F12, F18, F25	WAF 13	Replace bolts	35 Nm

3431-F01 BRAKE MASTER CYLINDER

34 31 BRAKE MASTER CYLINDER

TIGHTENING TORQUE SPECIFICATION - BRAKE MASTER CYLINDER

		Type	Thread	Tightening specifications	Dimension
1AZ	Brake master cylinder to brake servo (vacuum)	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M8	Replace self-locking nuts.	23 ± 2 Nm
2AZ	Distance sensor to brake master	F04	M4	Replace screws.	3.5 Nm

	cylinder				
3AZ	Retaining screw, expansion tank to brake master cylinder	F25			8 Nm

3432-F01 BRAKE LINES

34 32 BRAKE LINES

TIGHTENING TORQUE SPECIFICATION - BRAKE LINES

		Type	Thread	Tightening specifications	Value
1AZ	Brake line screw connection/retaining screws	F01, F02, F03, F04, F07, F10, F11, F12, F18	M12 x 1		14 Nm
		F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M12 x 1	Blue retaining screw connection in steel e.g. brake hose	16 Nm
		F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M12 x 1	Blue retaining screw connection in aluminium e.g. hydraulic unit	17 Nm
		F01, F02, F03, F04, F07, F10, F11, F12, F18	M10 x 1		14 Nm
		F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M10 x 1	Blue retaining screw connection in steel e.g. brake hose	16 Nm
		F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M10 x 1	Blue retaining screw connection in aluminium e.g. hydraulic unit	17 Nm
2AZ	Brake hose to brake caliper, front	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25		Retaining screw	17 Nm
3AZ	Brake hose to brake caliper, rear	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25			24 Nm

3433-F01 BRAKE SERVO

34 33 BRAKE SERVO

TIGHTENING TORQUE SPECIFICATION - BRAKE SERVO

		Type	Thread	Tightening specifications	Dimension
1AZ	Brake booster to pedal bracket	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M8	Replace self-locking nut Retighten on brake booster after 10 min.	24 Nm

3441-F01 PARKING BRAKE

34 41 PARKING BRAKE

TIGHTENING TORQUE SPECIFICATION - PARKING BRAKE

		Type	Thread	Tightening specifications	Value
1AZ	Spring clip to wheel carrier	F01, F02, F03, F04, F07	M6		8 Nm
2AZ	Support Duo-Servo to wheel carrier, rear	F01, F02	M10		60 Nm
		F03, F04, F07	M8		28 Nm
3AZ	Bracket, parking brake, to rear axle support	F01, F02, F03, F04, F07	M8		19 Nm
4AZ	Parking brake actuator unit to bracket	F01, F02, F03, F04, F07		Sheet metal screw	4 Nm
5AZ	Union nut, parking brake Bowden cables, to actuator unit	F01, F02, F03, F04, F07		WAF 27	6 Nm
6AZ	EMF actuator to brake caliper	F10, F11, F12, F18, F25		Replace bolts	11 ± 1 Nm
7AZ	Parking brake control unit to body	F10, F11, F12, F18		Replace plastic nuts	2.5 Nm

3451-F01 TRACTION CONTROL SYSTEM (DSC)

34 51 TRACTION CONTROL SYSTEM (DSC)

TIGHTENING TORQUE SPECIFICATION - TRACTION CONTROL SYSTEM (DSC)

		Type	Thread	Tightening specifications	Value
1AZ	Control unit to hydraulic unit	F01, F02, F03, F04, F07, F10, F11, F12, F18		Initial torque Final torque	2 ± 0.5 Nm 4.3 + 0.5 Nm
2AZ	ICM control unit to body	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25		Replace screws.	8 Nm
3AZ	Pulse sensor to swivel bearing/wheel carrier	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M6x16		8 Nm
	Pulse at the front trunnion-wheel vehicles	F01, F02, F04, F07, F10, F11, F12	M6x16	Hex bolt SW 10 replace screw	12 Nm
4AZ	Hydraulic unit to holder	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M8		8 Nm
5AZ	Holder, hydraulic unit, to body	F01, F02, F03, F04, F07, F10, F12, F11, F18			19 Nm
		F25	M6		8 Nm

6AZ	Pulse sensor adapter to swivel bearing	F03	M6		8 Nm

CABIN AIR FILTER

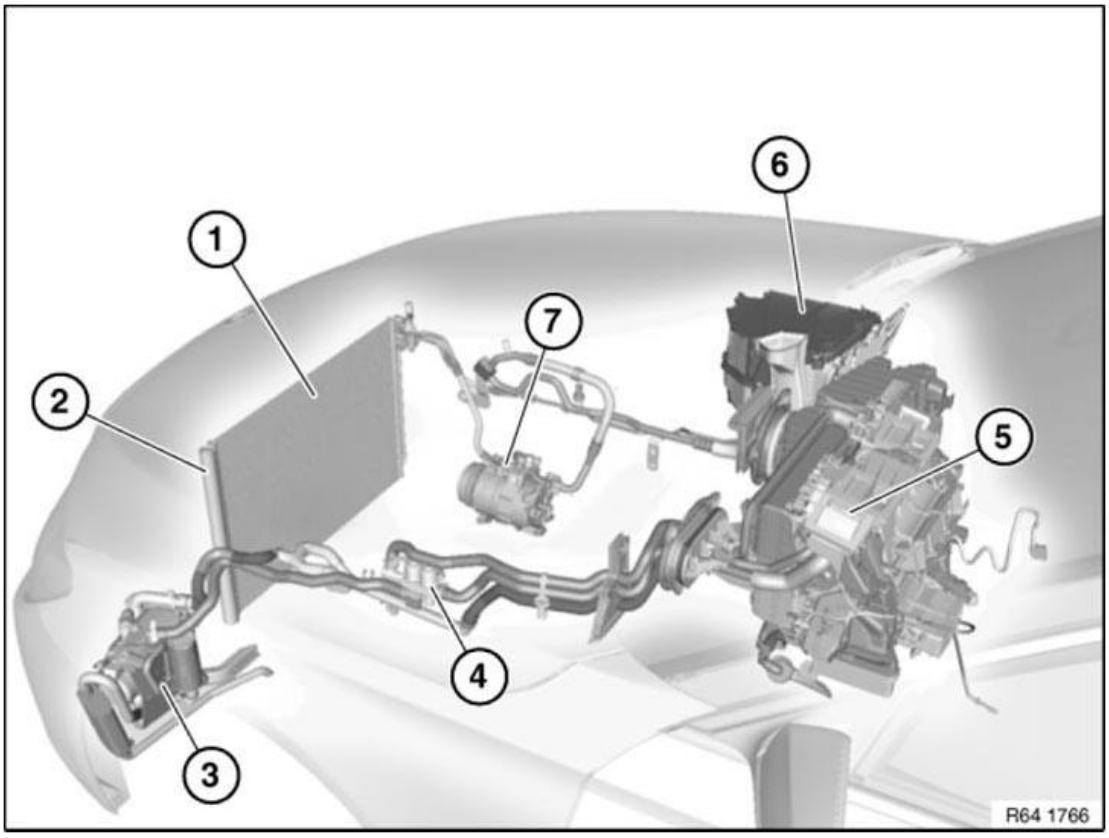
BMW - 750i &750Li

CABIN AIR FILTER

NOTE: Manufacturer's terminology for this filter is Microfilter.

REMOVAL & INSTALLATION

64 00.. Overview of heater - A/C system components



1 Condenser for air conditioner
2 Drier insert for air conditioner
3 Independent heater and attachment parts
4 Water valve
5 Heater - A/C system and attachment parts
6 Fan and attachment parts
7 Compressor

Fig. 1: Overview Of Heater And A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 31 010 Replacing microfilter for interior ventilation

IMPORTANT: Risk of damage!

A/C system must not be operated without the prescribed filter element.

Note on cleaning

Spray microfilter housing from inside with BMW pollen filter housing cleaner* (observe instructions for use).

Comply WITH NOTES AND INSTRUCTIONS ON HANDLING CLEANING AGENTS. !

Wipe away excess liquid.

This kills off germs, bacteria and fungi that cause smells.

The smell that results on the plastic parts of the microfilter housing is eliminated.

*BMW part number: 0 447 913

Necessary preliminary work

- Remove lower instrument panel trim. See **5145195 REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT TRIM FOR INSTRUMENT PANEL (US VERSION ONLY)** .

Release screws (1) on filter housing (2).

Remove microfilter cover (3) in direction of arrow.

Installation note:

Microfilter cover (3) must be correctly engaged in guides on filter housing (2).

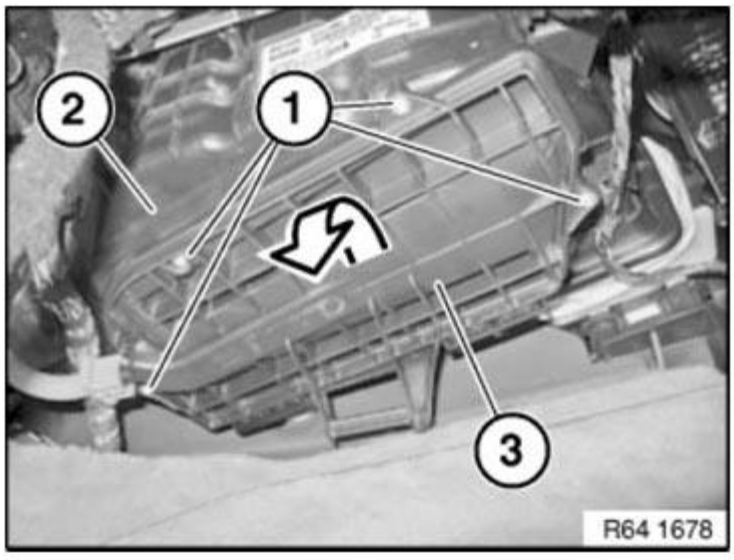


Fig. 2: Removing Microfilter Cover On Filter Housing

Courtesy of BMW OF NORTH AMERICA, INC.

Remove microfilter (1) at tabs in direction of arrow from filter housing (2).

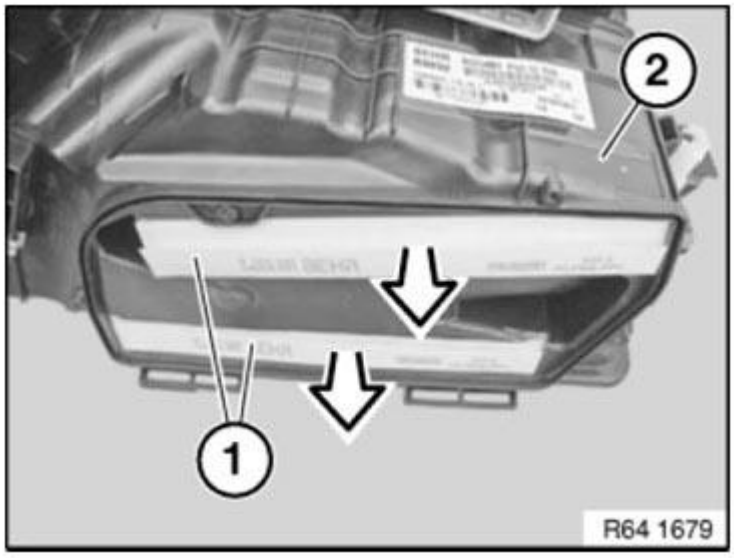


Fig. 3: Removing Microfilter From Filter Housing
Courtesy of BMW OF NORTH AMERICA, INC.

64 31 020 Replacing rear A/C system microfilter

IMPORTANT: Risk of damage!

Air conditioning must not be operated without the prescribed filter element.

Follow manufacturer's instructions.

Necessary preliminary work

- from 11/2010, **only** remove luggage compartment partition wall
- **Otherwise** remove **ALL LUGGAGE COMPARTMENT TRIM PANELS**

Remove side cover (1) in direction of arrow.

Remove microfilter (2).

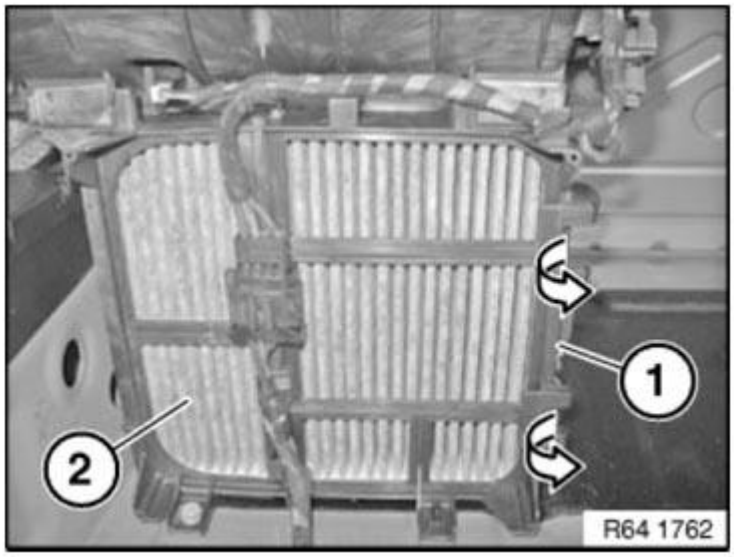


Fig. 4: Removing Microfilter To Side Cover
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Car Information Computer - 128i

INTRODUCTION

The Car Information Computer (CIC) is incorporates many innovations and new features. The system has been introduced to the US market on the 1 Series and the 3 Series from September of 2008 production. The 7 Series (F01/F02) will soon follow.

The CIC replaces the Car Communication Computer (CCC) and will be offered as part of the navigation system option.



Fig. 1: Identifying iDrive System With CIC On An E90 Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

NEW FEATURES

The Car Information Computer (CIC) continues the path laid out by the earlier CCC system and takes it to the next level of development. The main noticeable feature of this iDrive system is the newly designed controller

that is now equipped with seven direct access buttons. These buttons provide shortcuts to the menus in the redesigned layout of the user interface.

Compared to the CCC system, the number of CD/DVD drives in the CIC has been reduced to one optical drive.

The CIC overall screen dimensions have remained the same. However, the number of pixels have doubled from 640x240 (CCC) to 1280x480. This provides improved visual quality by generating a sharper graphic display.

The navigation system display has been enhanced with the following functions:

- Full screen mode
- Night view
- 3D models in the perspective map view

The use of an integrated HDD (hard disk drive) now allows navigation map data to be saved on the CIC hard disk. Previously, this map data had to be loaded from a navigation DVD for each destination entry. Maps can also be displayed much faster due to the increased processing power of the CIC.

The hard disk drive in the CIC also makes it possible to compile and store a personalized music collection. An 8GB section of the total 80GB hard disk is dedicated to store music files.

These files can be transferred from audio CDs, MP3 players or USB sticks. Along with the music data files, the music track database (Gracenote®) is also stored to be used for the music search function.

An address database has been included in the "Contacts" menu, which can also be accessed from the Telephone and Navigation menus. This feature offers a single "location" for accessing contact information. The information contained is more comprehensive than before.

Many external receiver hardware devices such as IBOC and GPS are integrated in the CIC. This adds flexibility and expands the system's functions.

The voice recognition system has been further developed to now enable even simpler and more fluid voice command inputs.

The communication service BMW Assist has been adapted to the new layout of the user interface and expanded with additional services.

Additional services available in BMW Assist effective September of 2008:

- My info
- BMW Search with Google Map database access

WMA FILE

A Windows Media Audio file (WMA) is an audio data compression technology.

With WMA technology, audio signals that are deemed to be imperceptible to the hum an ear (heating limit) are deleted. Compared to MP3 at low data transmission rates of 128 kbit/s, this technology offers a rich and detailed sound quality.

Despite its very compact size (1 MB per song minute), a WMA file of 128 kbit/s is comparable in terms of sound quality, to an MP3 file of approximate 160 kbit/s.

This compression technology was developed by Microsoft® and because of its DRM (Digital Rights Management) capabilities, it is the preferred platform for the majority of the online music industry.

HARD DISK DRIVE (HDD)

The HDD is a ferromagnetic storage medium, which uses a write/read head to write binary data on to the surface of a rotating disk. This device is comparable to the hard drive on a home computer or laptop.

MUSIC TRACK DATABASE (GRACENOTE®)

This is a music track identification technology created by the company Gracenote®. It makes available the data associated with the music tracks (metadata). Gracenote® is the industry standard in the field of music identification technology that provides associated content.

The metadata contains the following information:

- Artist
- Track title
- Album
- Release year
- Genre classification

NOTE: These metadata are managed and distributed by Gracenote® (www.gracenote.com/music). Non-commercial users have free access.

ID3-TAG

The ID3-Tag is the identification byte of an MP3 file.

A format for additional information (metadata) that can be contained in reserved parts of the storage space of an MP3 file. This metadata is used exclusively for displaying track title, artist, genre etc., in the display of MP3 players or vehicles.

SYSTEM OVERVIEW

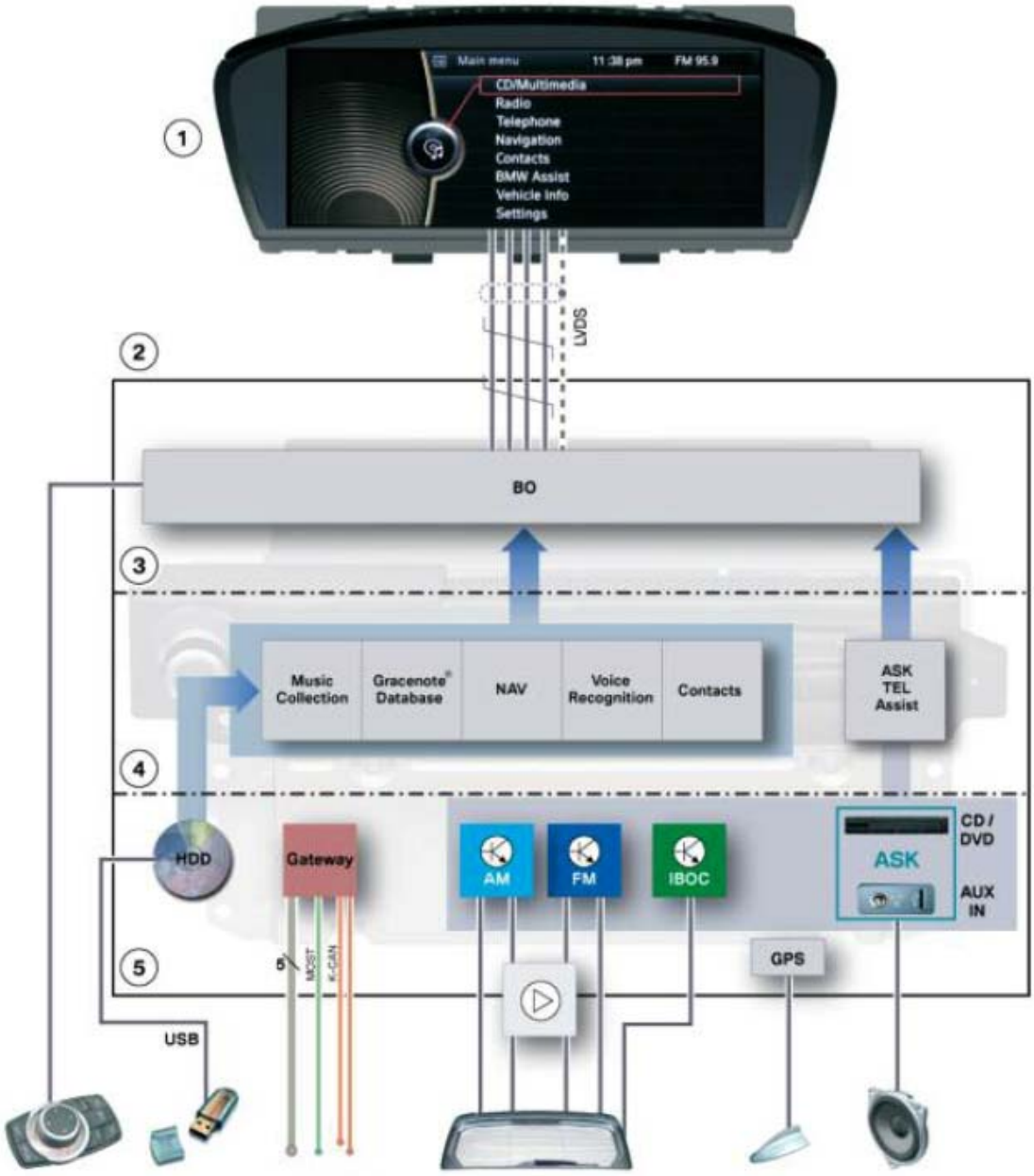


Fig. 2: CIC System Block Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

CIC SYSTEM EXPLANATION CHART

Index	Explanation
1	Central information display (CID)
2	Car Information Computer (CIC)
3	User interface (BO)
4	Application software
5	Hardware

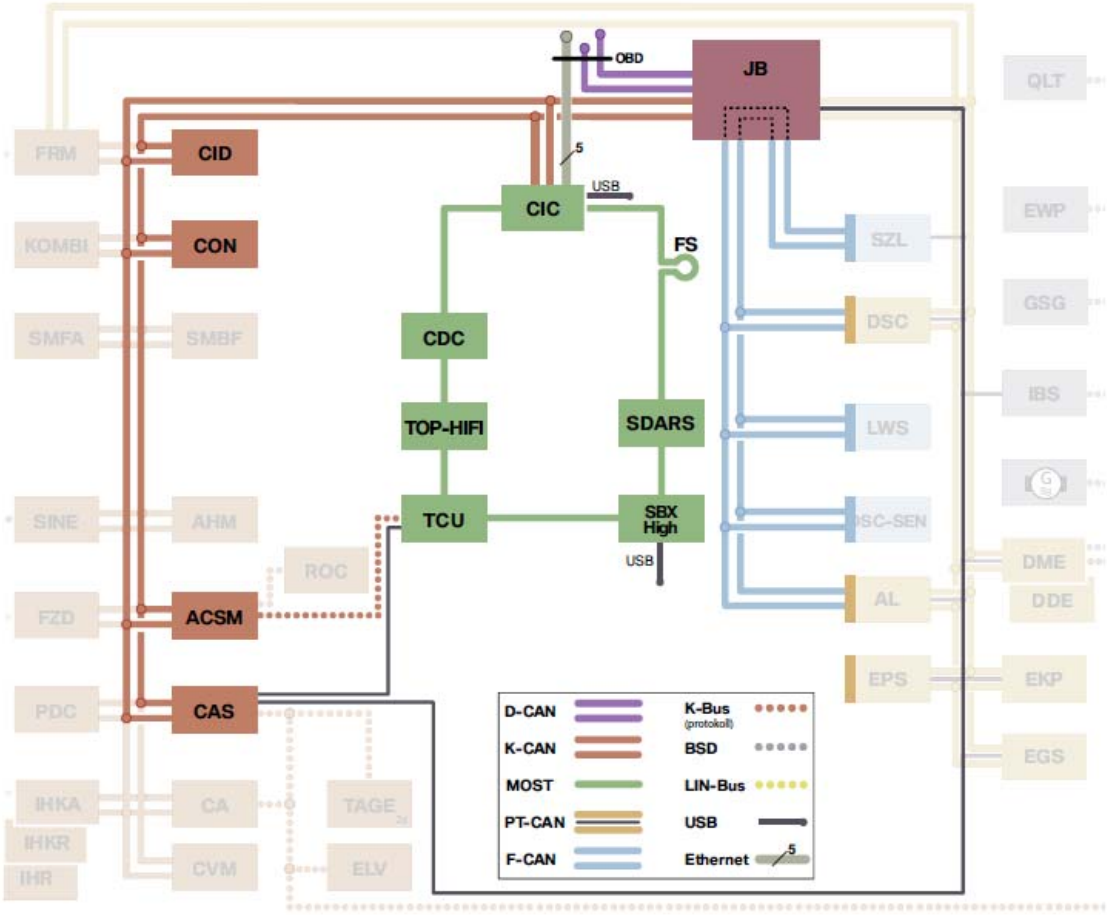


Fig. 3: Bus Overview E9x And E8x (Not Including E83, E85, E86) Model Series, CIC
Courtesy of BMW OF NORTH AMERICA, INC.

BUS EXPLANATION CHART

Index	Explanation
ACSM	Advanced crash and safety management
CAS	Car access system
CDC	CD changer
CID	Central information display
CIC	Car Information Computer
CON	Controller
FS	MOST direct access
JB	Junction box
SDARS	Satellite radio tuner
TCU	Telematics Control Unit
TOP-HiFI	Top-HiFi amplifier
SBX-High	USB interface box High

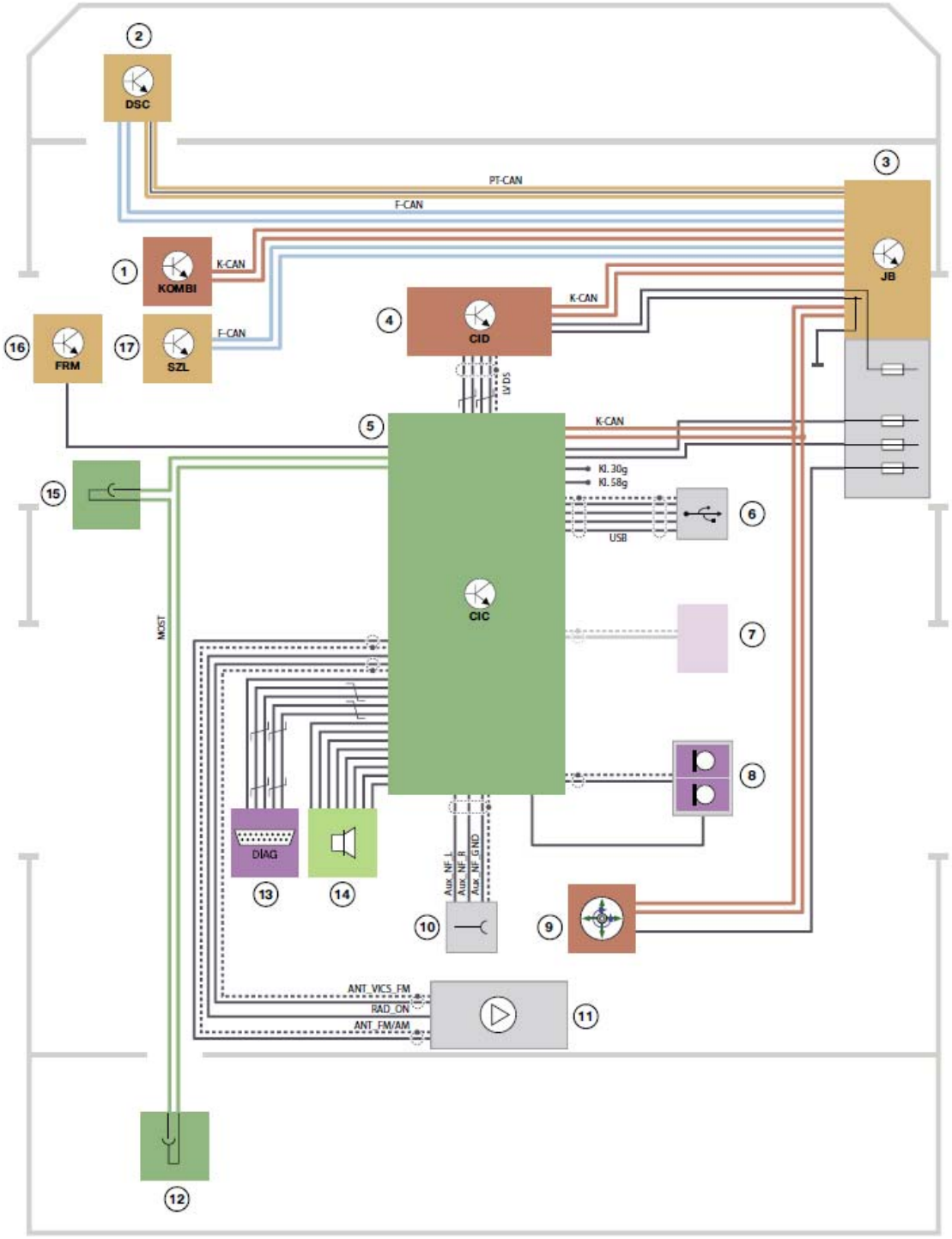


Fig. 4: CIC System Circuit Diagram, In E9x And E8x Model Series (Not Including E83, E85, E86)
Courtesy of BMW OF NORTH AMERICA, INC.

CIC SYSTEM EXPLANATION CHART

Index	Explanation
1	Instrument cluster

2	Dynamic stability control
3	Junction box
4	Central information display
5	Car Information Computer
6	USB Import/Export jack, glove compartment
7	Future antenna expansion
8	Microphone for hands-free facility
9	Controller
10	AF output for audio jack (standard equipment) if no USB Audio interface is installed
11	Antenna diversity module with antenna amplifier
12	MOST distributor in rear area
13	OBD interface (including Ethernet connection to CIC)
14	AF signals to speakers
15	MOST direct access
16	Footwell module
17	Steering column switch cluster

SYSTEM COMPONENTS

CAR INFORMATION COMPUTER



Fig. 5: Front View Of CIC
Courtesy of BMW OF NORTH AMERICA, INC.

The design principle of the CIC is similar to a personal computer, the Car Information Computer contains a processor, RAM (memory) modules and other peripheral components.

The following CIC applications are stored on the integrated hard disk drive:

- Music collection
- Music track database (Gracenote®)
- Navigation software (application)
- Navigation (map material)
- iSpeech (voice recognition system)
- Contacts (database with address data)
- System operating software

The CIC is the central control unit for the listed applications. It is linked to the central information display (CID) for the purpose of transmitting and displaying information.

The Car Information Computer is also connected to the controller. The controller serves as a selection and input device for the user interface.

The CIC is based on a modular design. The most important systems of the communication network are integrated in the CIC in the form of modules.

The CIC combines the following control units in one enclosure:

- Navigation computer, HIP module and yaw rate sensor
- Tuner (FM)
- Tuner (AM)
- Tuner (FM-TMC)
- IBOC decoder
- Audio system controller, and music search database
- MOST-CAN gateway
- Interface to control display (LVDS)

The upper half of the CIC consists of the optical drive player where CDs and DVDs of digital audio media can be played. The player also has ability to playback video DVDs on the front CID. The video signal is only displayed when the vehicle is stationary with the Parking Brake on.

For the navigation system, the optical drive can be used for updating the map material stored on the hard disk.

The processors for the main board and application board are located in the lower half of the CIC. This section also contains the main memory, the individual modules as well as the hard disk drive. The CIC together with the controller and CID, make up the iDrive system.

Advantages of the Car Information Computer

Combining several modules in one enclosure provides the following advantages:

- The combination of several systems enhances the functionality
- Outstanding software expansion options through suitable software interfaces
- Fewer plug connections increases reliability
- Less overall package space required for control units

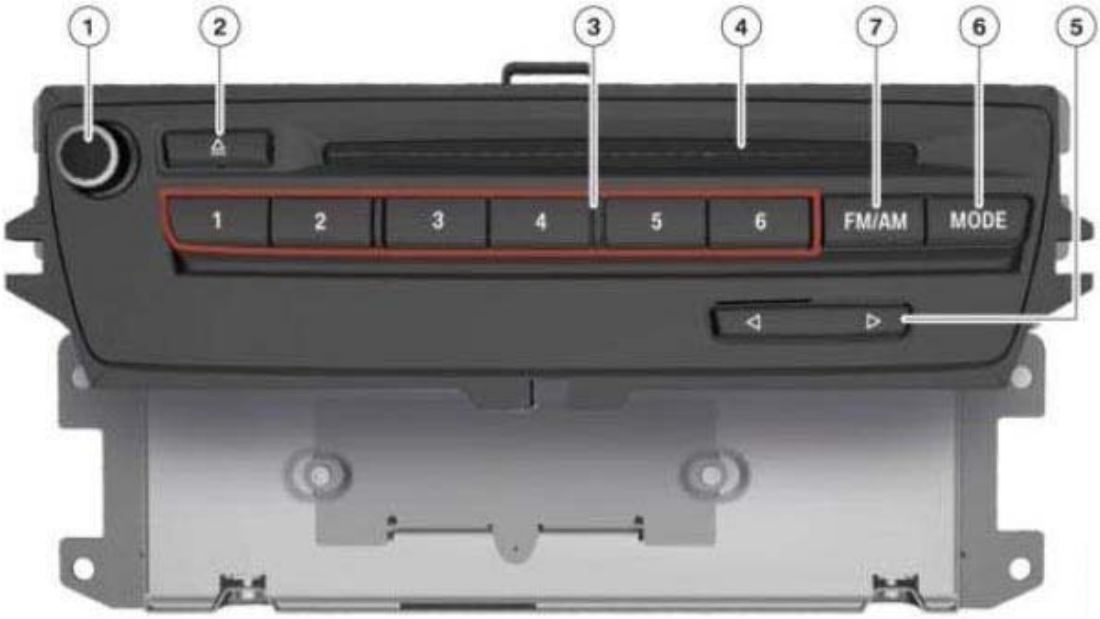


Fig. 6: Front View Of CIC On E9x And E8x (Not Including E83, E85, E86)
Courtesy of BMW OF NORTH AMERICA, INC.

CIC FRONT VIEW EXPLANATION CHART

Index	Explanation
1	Rotary/push button for (ON/OFF) and controlling the volume of audio system
2	Eject button for DVD/CD player
3	Favorite buttons 1-6
4	Slot for DVD/CD player
5	Station/track "forward-back" search button
6	MODE button (Radio, CD/DVD)
7	FM/AM button selects between the two frequency bands

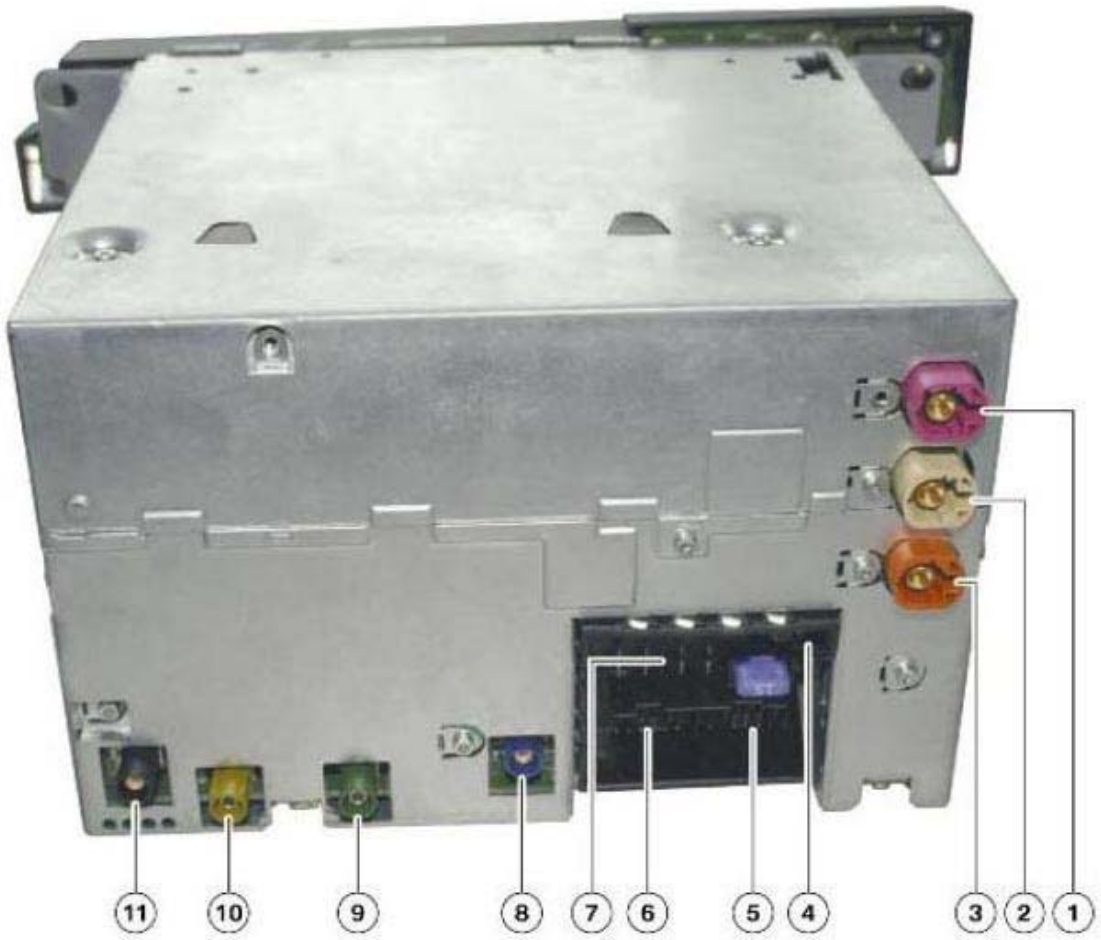


Fig. 7: Rear View Of Car Information Computer
Courtesy of BMW OF NORTH AMERICA, INC.

CIC REAR VIEW EXPLANATION CHART

Index	Explanation
1	LVDS signal for CID Connector color code: violet
2	Front View of the CIC on the E9x and E8x (not including E83, E85, E86)connection for glove compartment connector color code: beige
3	Ethernet connection Future expansions connector color code: pastel orange
4	MOST connector
5	12-pin connector; right-hand chamber (Ethernet, TEL_AF, AUX_In)
6	12-pin connector; left-hand chamber (video input signals - CSCC)
7	16-pin connector (K-CAN, audio output AF; power supply, Rad-on signal)
8	GPS antenna signal Connector color code: blue
9	(Not for US)
10	(Not for US)
11	AM/FM tuner signal Connector color code: black

The transmission of picture data from the CCC to the CID was performed by means of an 8-wire LVDS line. With the introduction of the Car Information Computer, the video signal is now transmitted through a 2-wire LVDS line.

The change in picture data transmission in the vehicle reflect the changes made in PC technology. While the printer was formerly connected to the PC via a parallel cable, data transmission now takes place using serial USB technology.

In the following graphics, 8-wire LVDS technology is compared to the new 2-wire LVDS technology:

8-wire LVDS

Transmission of video signals via 8-wire LVDS technology with CCC and CID.

(LVDS+ and LVDS- for each of the four signal lines and an additional synchronization line)

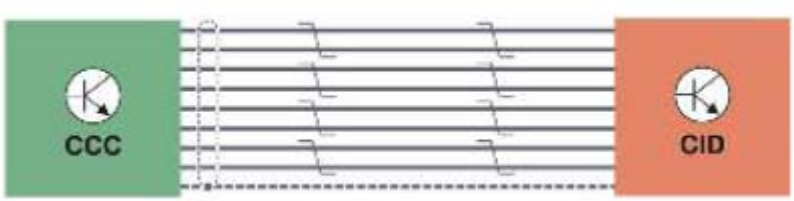


Fig. 8: 8-Wire LVDS Technology With CCC And CID
Courtesy of BMW OF NORTH AMERICA, INC.

2-wire LVDS

Transmission of video signals via 2-wire LVDS technology with CIC and CID.

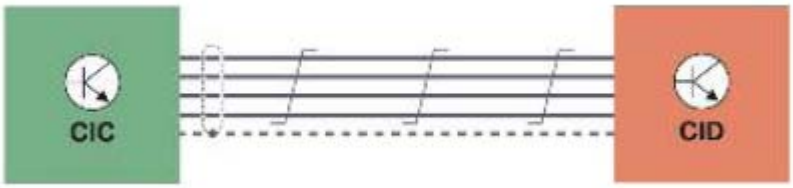


Fig. 9: 2-Wire LVDS Technology With CIC And CID
Courtesy of BMW OF NORTH AMERICA, INC.

Signal transmission through this 2-wire LVDS line offers four distinct advantages:

- Higher data transfer rate
- Simplified wiring
- Runtime differences between the individual lines are avoided
- Serial 2-wire LVDS data transmission is now much more cost-effective than 8-wire LVDS technology

The main advantage of using serial 2-wire LVDS is the resulting high picture resolution.

A 4-core, shielded cable is used for the 2-wire LVDS technology. The cable consists of the four cores, LVDS+, LVDS-, 2x ground and shielding.

For Electromagnetic compatibility (EMC) reasons, the unused wire is also connected to ground.

In the illustration to the right, the advantages of both cores connected to ground are shown with the aid of field lines.

The capacitive interference of the signals is deflected to ground. The wires connected to ground form a defined potential and cannot act as antennas.

This ensures that additional interference is avoided.

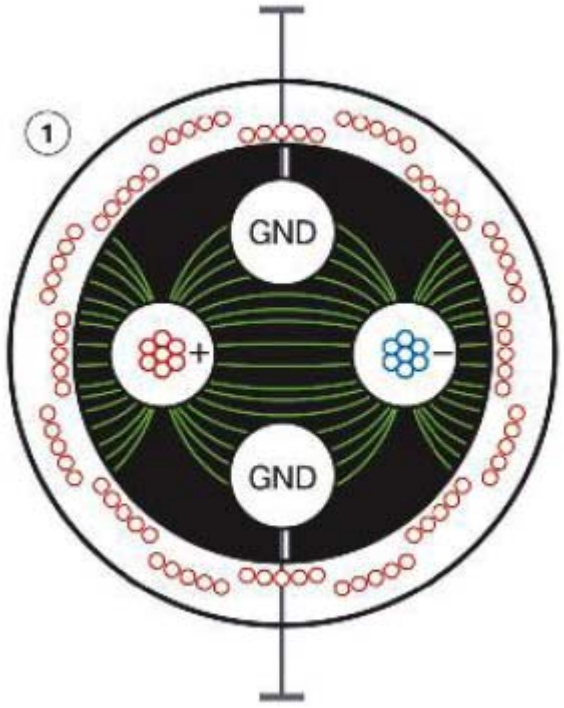


Fig. 10: EMC Protection Using 2-Wire LVDS Technology
Courtesy of BMW OF NORTH AMERICA, INC.

2-WIRE LVDS EXPLANATION CHART

Index	Explanation
1	Two signal-carrying cores, two cores connected to ground

MODULAR DESIGN OF CIC COMPONENTS



Fig. 11: Individual Replaceable Components Of Car Information Computer
Courtesy of BMW OF NORTH AMERICA, INC.

CIC COMPONENTS EXPLANATION CHART

Index	Explanation
1	Replaceable device CIC
2	DVD/CD player including CIC housing cover
3	Front panel
4	Hard disk drive

The components listed above are defined as separate or modular. These components are attached to the main/complete head unit.

Of these components, only the faceplate remains a serviceable and replaceable component. Failure of any other internal component will necessitate the replacement of the entire CIC unit once proper authorization has been obtained through PuMA.

The functions of the individual components are briefly described in the following pages.

The installation and removal instructions for the individual components and the complete CIC control unit are available in TIS (Technical Information System) or the workshop system ISTA.

It is essential to follow ESD (Electrostatic Discharge) guidelines when replacing individual components in order to avoid damage to internal components of the CIC. These requirements also apply when storing or sending back components.

Special packaging (ESD bags, ESD boxes with film or foam material cladding) is available for this purpose and should be used instead of conventional packaging materials.

The following picture illustrates the effects of electrostatic discharge (ESD) on electronic components.

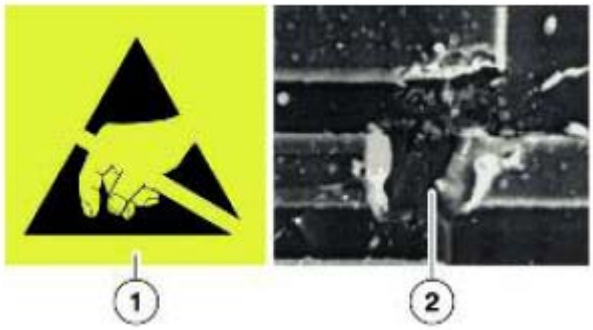


Fig. 12: Effects Of ESD (Electrostatic Discharge) On Electronic Components
Courtesy of BMW OF NORTH AMERICA, INC.

ELECTROSTATIC DISCHARGE EXPLANATION CHART

Index	Explanation
1	ESD symbol (protection measures necessary)
2	ESD damage to a conductor (magnified 5000 times)

Working on Electronic Components

The following requirements must be observed when working on electronic components on the Car Information Computer.

- The work must be performed on a conductive and grounded workbench (special tool 12 7 192 is used for this purpose).
- The grounding cable must be connected to a secure grounding point (water pipe, heating pipe, electric socket ground).
- The person carrying out the work must first put on the grounding cuff in order to ground himself before removing the components from the packaging.
- The electronic components are placed on the anti-static mat which is also connected to a grounding cable.

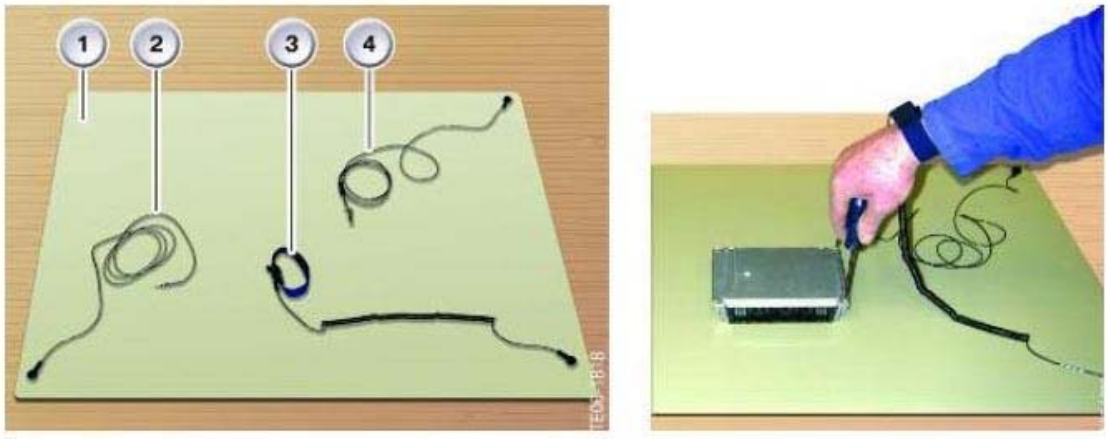


Fig. 13: Identifying Anti-Static Mat Special Tool 12 7 192
Courtesy of BMW OF NORTH AMERICA, INC.

CAR INFORMATION COMPUTER ELECTRONIC COMPONENTS EXPLANATION CHART

Index	Explanation
1	Anti-static mat
2	Grounding cable for the mat
3	Anti-static cuff
4	Grounding cable for the component

Optical Drive (CD/DVD Player)

The Car Information Computer is equipped with a DVD-ROM player.

The optical drive is used for playing audio and video media.

This drive makes it possible to play the following media file formats:

- Audio CDs (CD Digital Audio)
- Audio CD-ROM with MP3, WMA or AAC files
- DVD Audio (only stereo track if contained on the data medium)
- Audio DVD-ROM with MP3, WMA or AAC files
- Video DVD

Playing video on the (front) CID display is only possible when the vehicle is stationary and in the "Park" position. When the vehicle is moving or the Parking Brake is **not** on, only the audio track of the video will be played.

Although the CD/DVD drive is no longer used for the navigation system (as in CCC), it may be used to update navigation map data from a navigation DVD.

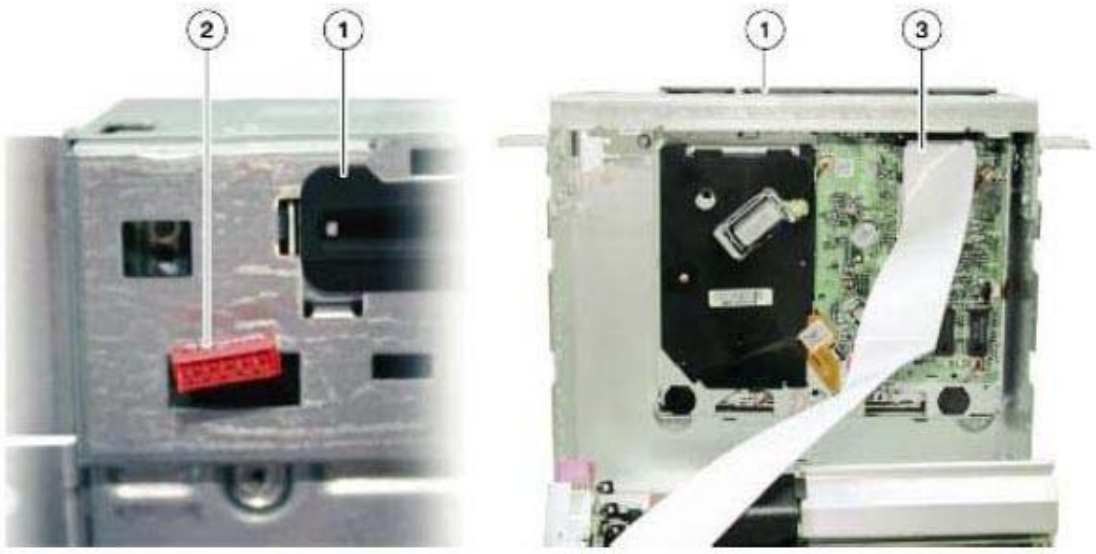


Fig. 14: Identifying Key Components Of DVD Player Used In CIC System
Courtesy of BMW OF NORTH AMERICA, INC.

DVD PLAYER EXPLANATION CHART

Index	Explanation
1	DVD player
2	Front panel connection
3	Ribbon cable connection, DVD player to CIC head unit

Hard Disk Drive

With the development CIC, a hard disk for storing applications (programs) and data is used in a head unit of a BMW vehicle for the first time.

A 2.5" hard disk drive with a storage a capacity of 80 GB is installed.

This makes it possible to display complex graphics like 3D models in the perspective view of the navigation system.

This system provides the option of converting, storing and playing music tracks.

The hard disk makes it possible to maintain a music collection with a music track database (Gracenote®).

The HDD (hard disk drive) also provides a data storage option for the three languages of the voice recognition system.

The hard disk drive is a replaceable component of the CIC. Proper repair instructions and ESD guidelines must be followed when replacing the unit.

The Music collection backup should only be performed by the customer and not the service technician. For

more information refer to "**MUSIC COLLECTION BACKUP**" in the Principles of Operation section of this training material.

The following illustrations show the hard disk location and the individual partitions.

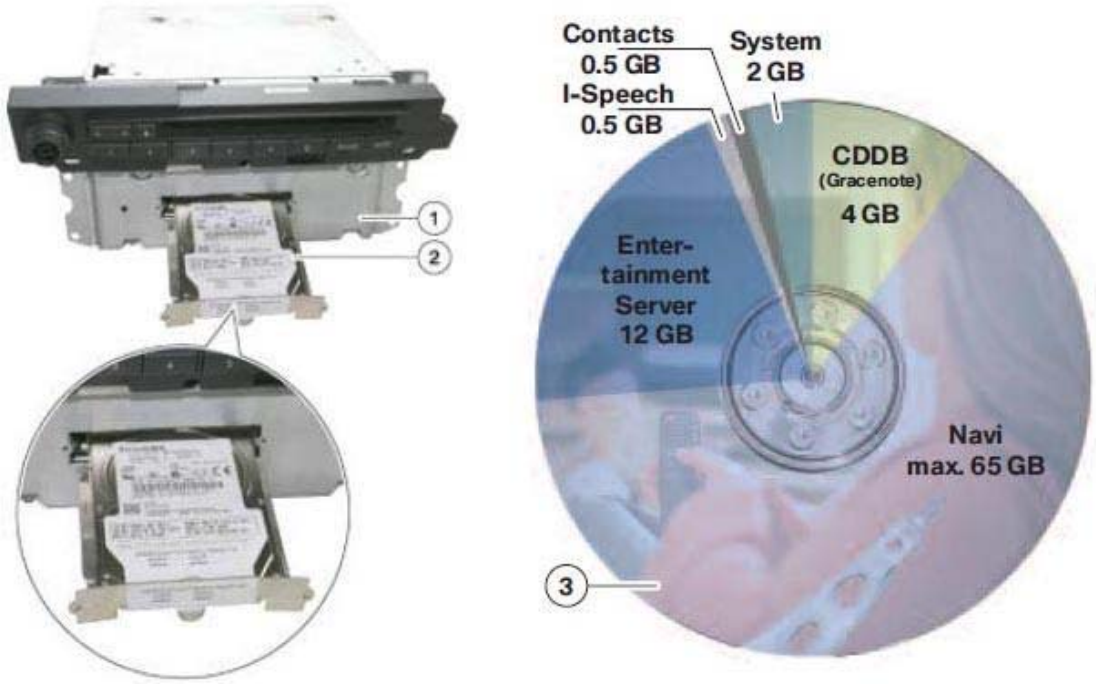


Fig. 15: Identifying Hard Disk Location And Individual Partitions
Courtesy of BMW OF NORTH AMERICA, INC.

HARD DISK EXPLANATION CHART

Index	Explanation
1	Car Information Computer
2	Hard disk (slide-in tray)
3	Pie diagram with individual storage units on the hard disc (partition)

Front Panel

The front panel of the CIC can be replaced separately.

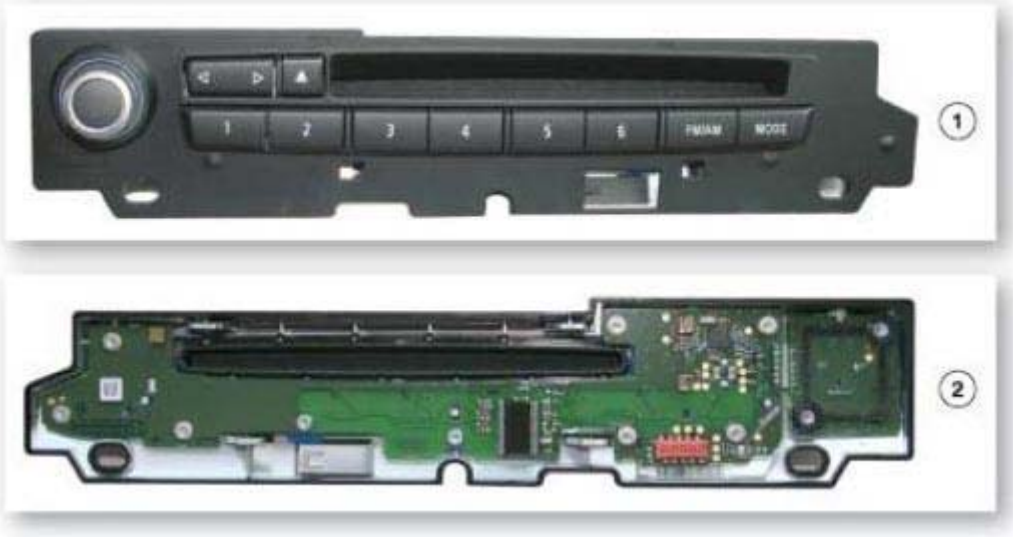


Fig. 16: Front And Rear View Of CIC System Front Panel E6x Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

CIC SYSTEM FRONT PANEL EXPLANATION CHART

Index	Explanation
1	Front panel - front view
2	Front panel - rear view

NOTE: Currently only the faceplate is a serviceable and replaceable component.

Failure of any other internal component will necessitate the replacement of the entire CIC unit once proper authorization has been obtained through PuMA.

FIXED COMPONENTS

Some of the components that were modular in the Car Communication Computer are now integrated into the CIC as solid state components.

In the event of defects to some of the components, it may be necessary to replace the entire head unit after submitting a PuMA case.

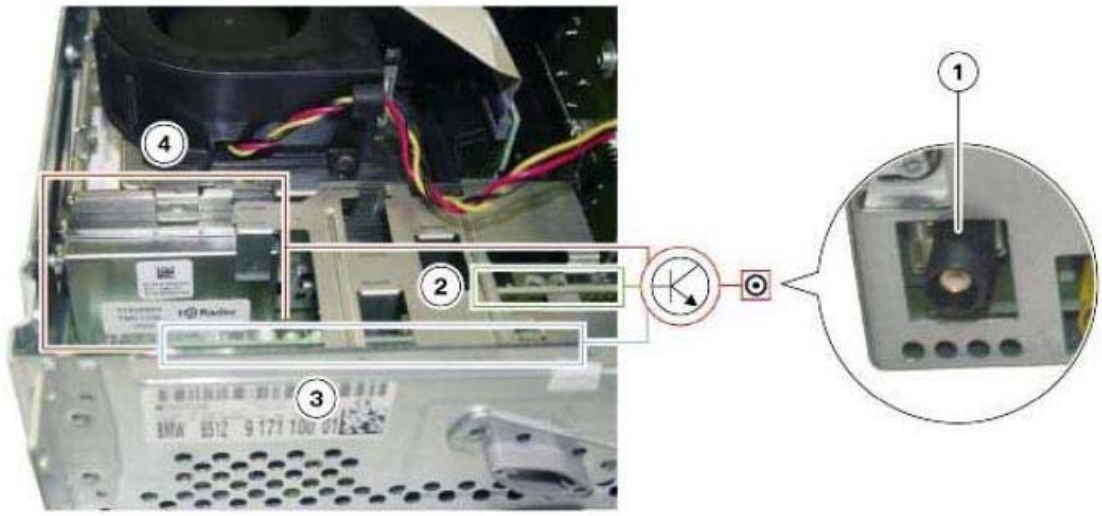


Fig. 17: Bottom Open View Of CIC Components
Courtesy of BMW OF NORTH AMERICA, INC.

CIC COMPONENTS EXPLANATION CHART

Index	Explanation
1	FM/AM aerial connection
2	FM - TMC module
3	FM/AM double tuner module
4	IBOC decoder

Fan

Unlike with CCC, it is not possible to replace the fan of the Car Information Computer separately as part of a service procedure.

The fan provides cooling for the entire hardware assembly, including the hard disk drive and the gateway processor (located directly below it). The exhaust air cools the cooling fins of the HiFi output stage in the power board as it is routed through a cooling channel out of the unit.

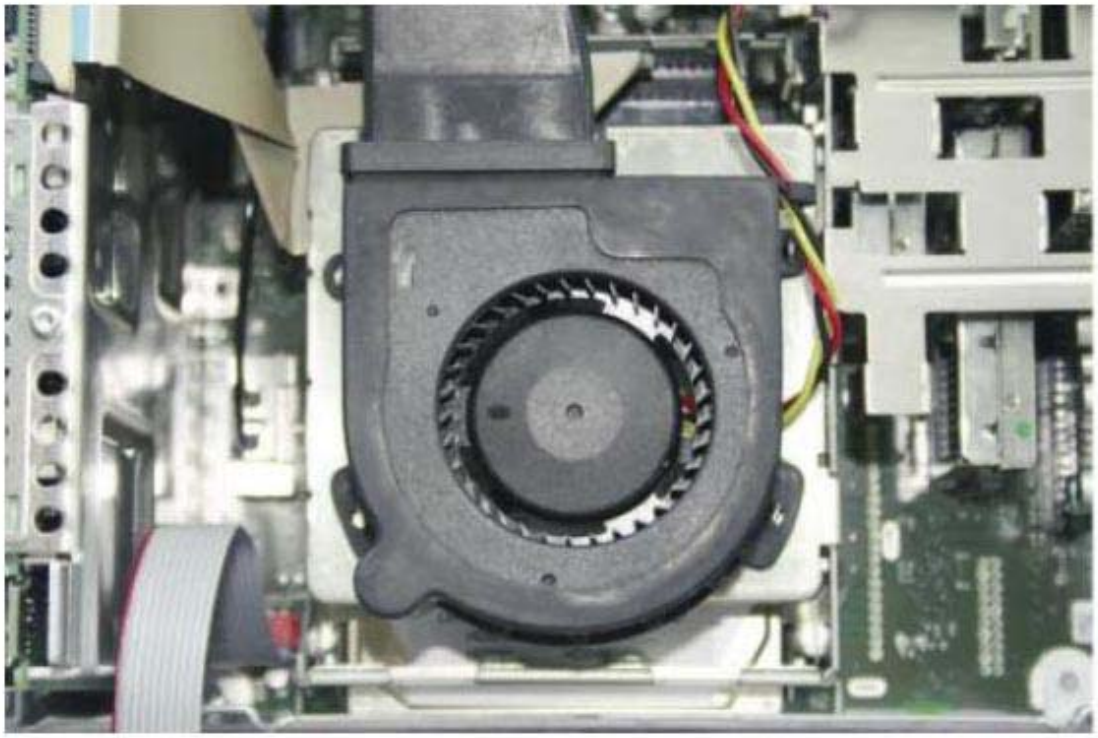


Fig. 18: Identifying CIC System's Cooling Fan Location
Courtesy of BMW OF NORTH AMERICA, INC.

Gateway Processor

The gateway processor converts all relevant data of the K-CAN system into MOST-bus telegrams and vice versa.

The electronic module is soldered into the board directly under the hard disk drive and cannot be replaced separately.

The gateway processor has its own control unit address in the BMW diagnosis system.

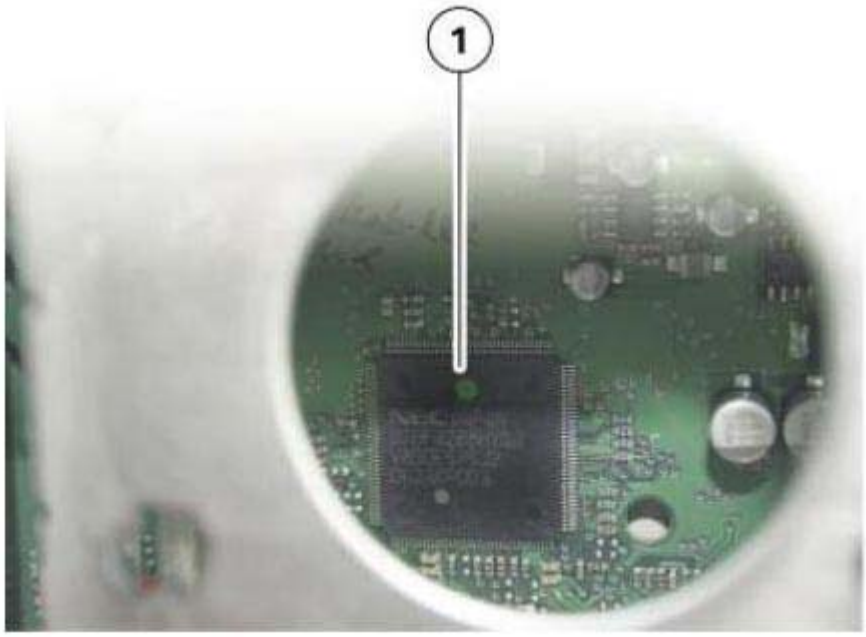


Fig. 19: Identifying CIC System's Gateway Processor Location
Courtesy of BMW OF NORTH AMERICA, INC.

GPS Receiver Module

The GPS receiver module is also known as the HIP module (Host Independence Positioning).

Location and route of the vehicle are calculated in the navigation system with the data from the GPS receiver module.

This module was already integrated in the head unit with the CCC system. It has the task of converting the signals received from the GPS antenna together with the data from the DSC control unit and yaw rate sensor.

The following information is calculated in the GPS receiver module:

- Longitude
- Latitude
- Altitude above sea level
- Direction (bearing)
- Speed

This information is known as Almanac data and it is transferred to the navigation system for further processing. The Almanac data must be permanently stored for future reference. One of the reasons for this is that it takes a long time for data to be received again from satellites after switching to terminal 15 from terminal status ignition "OFF".

This Almanac data ensures the position of the vehicle is recognized immediately after starting the vehicle.

Therefore the navigation system can also be used immediately.

Compared to the GPS receiver module of the Car Communication Computer the GPS receiver module in the CIC has been greatly reduced in size while maintaining the same functionality.

The graphic shows the size of the GPS receiver module compared to the main connection plug of the head unit.

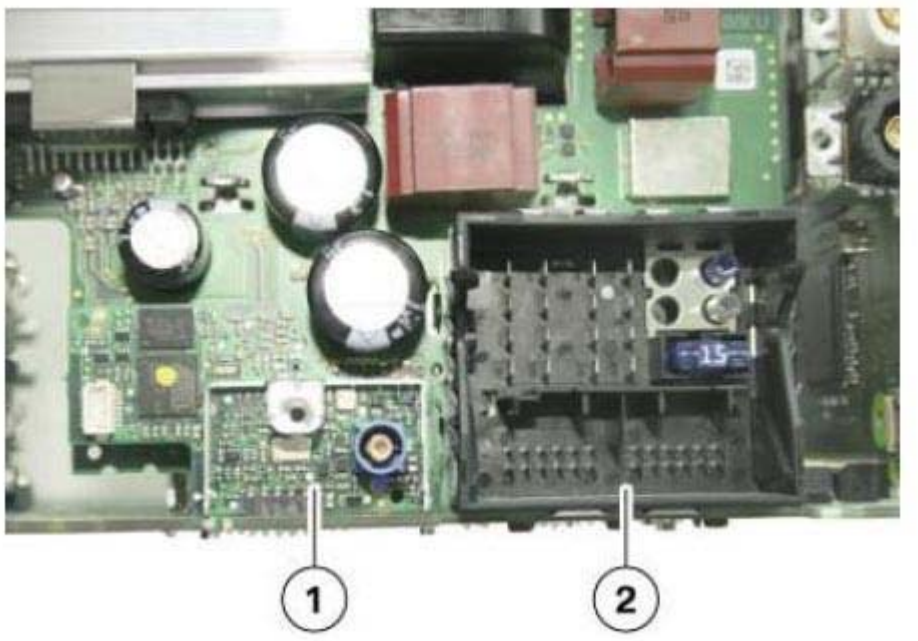


Fig. 20: CIC System's GPS Receiver Size Compared To Main Connector
Courtesy of BMW OF NORTH AMERICA, INC.

CIC SYSTEM GPS RECEIVER EXPLANATION CHART

Index	Explanation
1	GPS receiver module
2	CIC main connection plug

Yaw Rate Sensor

The Car Information Computer features a yaw rate sensor. It supplies the data relating to changes in driving direction for the navigation system.

This data is required for the purpose of determining the exact position as satellite signals cannot be received everywhere (tunnels, underground parking lot etc.).

The yaw rate sensor is a separate module soldered on the main board. It has been greatly reduced in size compared to the yaw rate sensor in the Car Communication Computer.

Unlike with CCC, it is no longer possible to replace the yaw rate sensor separately from the entire unit.

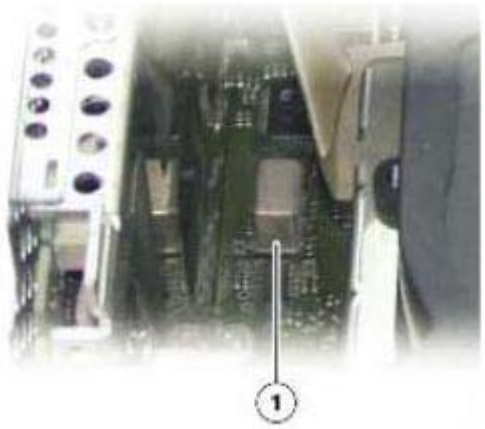


Fig. 21: Location Of Yaw Rate Sensor Soldered To CIC Main Board
Courtesy of BMW OF NORTH AMERICA, INC.

Analog Tuner Modules

The tuner modules in the Car Information Computer have enhanced functions compared to the tuners used in the CCC system. The FM/AM and the traffic information (RTTI) range have been expanded.

FM and AM Station List

A double tuner module (see item 1) is installed in the CIC for the FM/AM range.

While one tuner in the network receives the required station and outputs the music signal, the other tuner works in the background searching the station landscape for additional signals and shows them on the display. ("All stations" menu item).

This function in the FM range is already known from the CCC and is now available in the AM range.

The third module in the tuner network enables expansion of the FM-TMC (Traffic Message Channel) functions. The FM/AM double tuner module and the FM-TMC module combine to form the triple tuner.

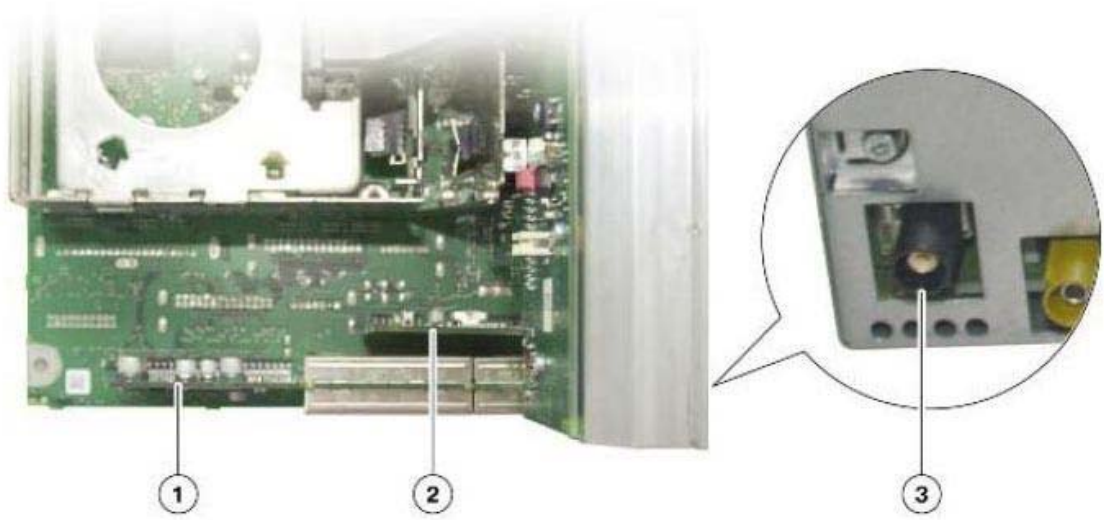


Fig. 22: Identifying FM Tuner Module Component Location In CIC
Courtesy of BMW OF NORTH AMERICA, INC.

FM TUNER MODULE COMPONENT EXPLANATION CHART

Index	Explanation
1	FM/AM double tuner module
2	FM-TMC module
3	Black FAKRA connector below the CIC heat sink

IBOC System/HD Radio

The IBOC (In-Band- On-Channel) system is offered as the digital radio. With the introduction of the CIC, the control unit of the IBOC system has been integrated in the head unit as the IBOC decoder.

The IBOC system was developed by the company Ibiquity and, with the aid of a decoder, enables the reception of HD (High Definition) radio through the FM/AM double tuner.

This system simultaneously broadcasts an analog and digital signal.

A special oscilloscope (spectrum analyzer) would show the digital components at both sides of the analog wave of the FM frequency (step shape).

The IBOC system receives the signals with the aid of the FM double tuner module.

These signals are then routed to the IBOC decoder which adds the digital data stream to the audible music signals.

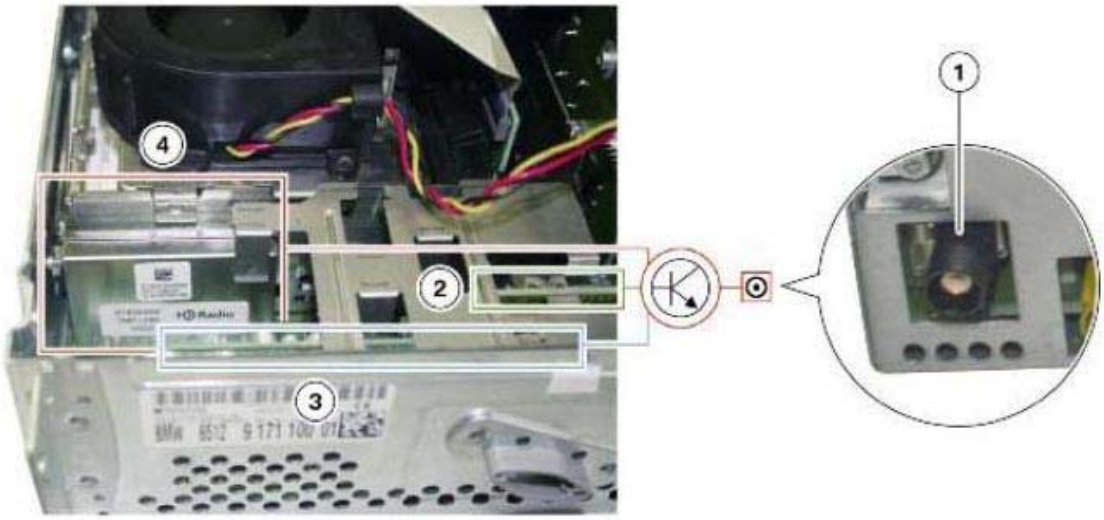


Fig. 23: Location Of IBOC Decoder In CIC
Courtesy of BMW OF NORTH AMERICA, INC.

IBOC DECODER EXPLANATION CHART

Index	Explanation
1	FM/AM antenna connection
2	FM-TMC module
4	FM/AM double tuner module
5	IBOC decoder



Fig. 24: IBOC Station List Menu
Courtesy of BMW OF NORTH AMERICA, INC.

There are two types of broadcast services:

- MPS = Main Program Service
- SPS = Secondary Program Service

Both services differ to the effect that the signal previously broadcast analog in the MPS is now used in digital form.

The decoder delays digital reception for several seconds until it is synchronous again with the analog signal previously heard.

SPS offers additional radio stations that are only broadcast in digital form. Using the multicast method, it is possible to accommodate up to seven digital stations in the submenu of the SPS main station. Normally, however, a maximum of 3 sub-menu are offered in the SPS.



Fig. 25: Sub-Menu Of IBOC Main Station
Courtesy of BMW OF NORTH AMERICA, INC.

The system automatically switches over to analog FM reception if the digital signal is no longer available.

HD radio is also available in the AM frequency range. In this case, the digital signals are transmitted on directly adjacent frequencies of the analog station. Multicast is not supported on AM. The content of the digitally broadcast station is the same as that of the analog station.

HD radio plays AM radio stations in near-FM quality and FM radio stations in near-CD quality.

CIC Application Board with Processors

The application board accommodates the main processor (CPU = Central Processing Unit) and the main memory modules (RAM = Random Access Memory) for the CIC. These components are soldered into the board and cannot be replaced.

CPU AND MAIN MEMORY EXPLANATION CHART

Index	Explanation
1	CPU - Central processing unit
2	Main memory (RAM) of the CIC

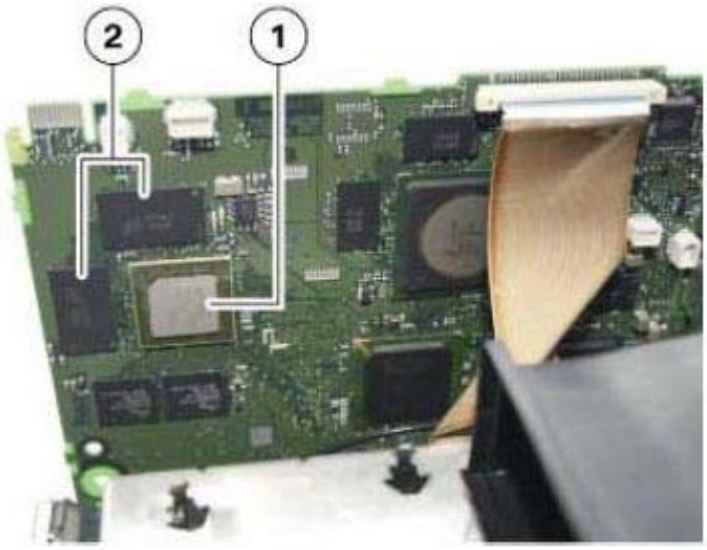


Fig. 26: Identifying CPU And Main Memory Location
Courtesy of BMW OF NORTH AMERICA, INC.

Power Board

The power board is located beneath the CIC heat sink and on the left next to the CIC main connector. It contains both the audio output stages for the speakers of the stereo system as well as the power supply unit for the CIC.

The heat sinks and CIC fan cool the system by dissipating the heat from the power supply unit and amplifier.

The unit interfaces with the vehicle's electrical system (power supply, MOST link, etc.) through the main connector.

CIC MAIN BOARD AND HEAT SINK EXPLANATION CHART

Index	Explanation
1	Heat sink
2	Power board
3	Main connector of the CIC

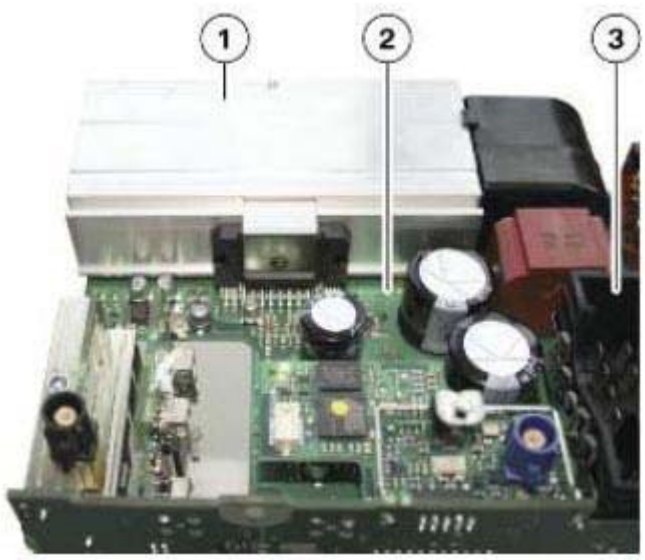


Fig. 27: Identifying CIC Main Board And Heat Sink Location
Courtesy of BMW OF NORTH AMERICA, INC.

PRINCIPLES OF OPERATION

CENTRAL INFORMATION DISPLAY (CID)

The display used on the CIC system in known as CID (central information display) and is similar to the one used for the CCC. The diagonal measurement for the CID on the 1 Series and 3 Series remains the same as on the CCC equipped vehicle at 8.8 inches.

The number of pixels of the CID has doubled from 640x240 in CCC to 1280x480 pixels in CIC. This improves picture quality by enhancing the display resolution.

In addition to the display enhancements the graphic layout of the CIC user interface has also been totally redesigned.



Fig. 28: Graphic User Interface On CID With CIC Equipped Vehicle

Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 29: Graphic User Interface On CID With CCC Equipped Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For detailed description of how the individual functions of the CIC operate, refer to the respective .

CONTROLLER

The new controller has been completely redesigned. The most noticeable feature of the new CIC controller is the seven direct access buttons.

It is now possible to access the following menus directly:

- Main menu
- CD/Multimedia
- Radio
- Navigation
- Telephone

The following menus can still only be selected from the main menu, with no direct access:

- Contacts
- BMW Services
- Vehicle information
- Settings

The "Back" button is pressed to go back to the last display view. Up to 30 "back" steps are possible with this button.

The "Option" button makes it possible to make fine adjustments or carry out special functions in the previously

selected sub-menu.

The direct access buttons replace the CCC "long push" function.

NOTE: With the "Long Push" function is was possible to change from a sub-menu directly to another sub-menu in the CCC by pushing the controller in the corresponding direction for at least two seconds.

The respective sub-menus are now selected directly by pressing the CD/multimedia, radio, navigation or telephone buttons twice.



Fig. 30: Identifying CIC Controller With Sub-Menu Buttons
Courtesy of BMW OF NORTH AMERICA, INC.

CIC CONTROLLER WITH SUB-MENU BUTTONS EXPLANATION CHART

Index	Explanation
1	Direct access button for Main menu
2	Direct access button for CD/Multimedia
3	Direct access button for Radio
4	Direct access button to go Back
5	Direct access button for Options sub-menu
6	Direct access button for Navigation
7	Direct access button for Telephone

The star-shaped operating concept of "Turn-Press-Push" of the CCC has been redesigned for CIC. The sub-

menus in the main menu now have been arranged in lists.

One of the listed sub-menus can now be marked with the "turn" function in the start window menu. The selected sub-menu is accessed with the subsequent "press" function.

Several sub-menus can now also be selected by means of the direct access buttons on the controller. The "push" function is now used to further navigate in the selected sub-menu. The windows of the selected sub-menu are arranged horizontally one above the other.

The following table shows a comparison between the previous menu items of the CCC and the menu items structure of the CIC.

CCC AND CIC MAIN MENU EXPLANATION CHART

CCC main menu	CIC main menu
	
Communication	**Telephone**
Telephone	Telephone
A-Z	Telephone/Phonebook
Telephone => Phonebook Navigation => Address Book	**Contacts** (imported/self-entered contacts)
Communication	**BMW Services**
Assist services	BMW Services
Navigation	**Navigation**
Navigation, onboard information, BC	**Vehicle information** , onboard computer
Air conditioning (climate control)	**Settings (limited)**
Entertainment	**CD/Multimedia**
CD, DVD, CDC	CD/DVD
Radio (FM, AM, IBOC)	**Radio** (FM, AM, IBOC)
	Music collection
Settings (5th menu)	Settings
Audio	Sound
Display screen	Central screen
Time/Date	Time/Date
Language	Language/Units
Vehicle/Tires	**Vehicle information** /Vehicle status
Service	**Vehicle information** /Vehicle status

CD/MULTIMEDIA OVERVIEW

The CD/DVD, external devices and sound sub-menus are listed under CD/Multimedia in a similar configuration to the iDrive "Entertainment" menu of the CCC.

This Product Information mainly deals with the Music collection sub-menu.

An innovative feature of this system is that video DVD can be played in the front CID. This function is only available with the vehicle stationary (Parking Brake on) and is enabled in the corresponding vehicle order. It provides the control option with which the video function is activated.

Music Collection

For the first time in a BMW vehicle, a music collection can be saved on an internal hard disk drive and accessed through its own sub-menu. The music collection feature is found under the CD/Multimedia menu of the CIC.

A music search function has been implemented, which searches for information (metadata) on the individual music tracks (artist, album, etc.). A hard drive-based track database (Gracenote®) provides further information to the music track (metadata).

NOTE: Metadata storage is a separate function to the conversion process from Digital Audio CD to a WMA file format which allows the system to perform a music search.



Fig. 31: CD/Multimedia Sub-Menu With "Music Collection" Checked
Courtesy of BMW OF NORTH AMERICA, INC.

Storing Music Data on the HDD

The music collection is stored in a partition on the internal hard disk drive (HDD) of the CIC. This device makes it possible to store a large selection of music data in the vehicle, while allowing the option to retrieve it when necessary.

Up to 12 GB of the total 80 GB hard drive is set aside for the music collection.

The following three options can be used to store music data on the hard disk:

- Rip function from Compact Disc Audio format
- Copying data via the CD/DVD drive
- Copying data from the USB

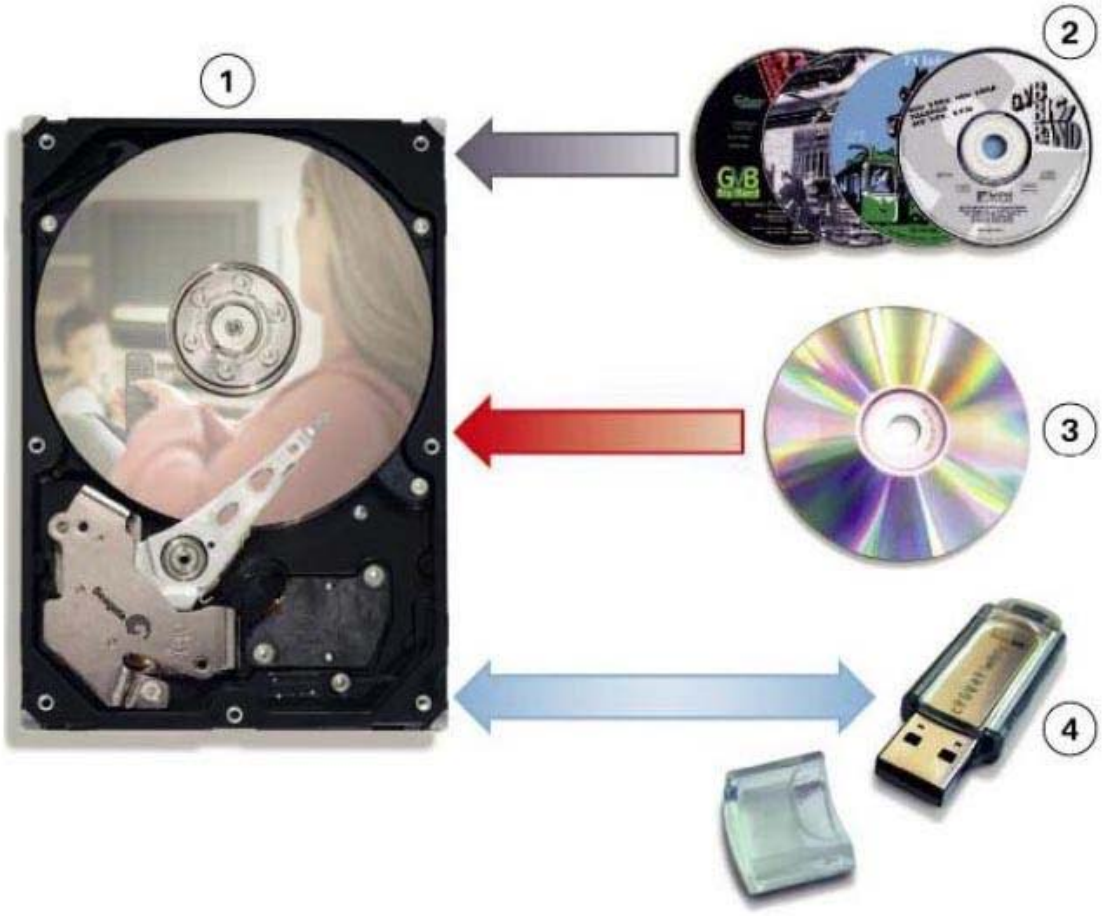


Fig. 32: Storing Music Data On HDD
Courtesy of BMW OF NORTH AMERICA, INC.

HDD EXPLANATION CHART

Index	Explanation
1	Hard disk (HDD)
2	Commercially available audio CDs (Compact Disk Digital Audio CDA)
3	DVD/CD ROM with compressed audio data (WMA, CDA, MP3, AAC)
4	USB stick

Rip Function

This function rips commercially available audio CDs (marked with the Compact Disk Digital Audio logo) and

converts them to compressed music files.

COMPACT disc **DIGITAL AUDIO**

This function can be performed when the vehicle is stationary or while driving.

The music on the CD can also be played back during the conversion and storage process of the rip function.

The music data is converted at a speed between 3 and 12 times the playback speed. Following the conversion the music data is stored on the hard disk in WMA file format.

The data is then displayed in the form of file folders in the music collection menu. These folders are identified with the corresponding title and with a round CD icon.

After the conversion process the files will be displayed and can now be selected individually by using the music search function.



Fig. 33: Start Of Rip Function For Loaded Digital Audio CD
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 34: Music Data (WMA) Of Digital Audio CD Stored In Music Collection

Courtesy of BMW OF NORTH AMERICA, INC.

Copying Data via the CD/DVD Drive

Self-recorded CD/DVD ROMs with audio files in MP3, WMA or AAC (M4A) format can be read, copied and stored using the DVD player (drive).

All CD/DVD formats (from CD-R to DVD Double Layer) are supported, except for CD-RAM and DVD-RAM.

The audio data is then stored in the form of file folders in the music collection together with the title of the respective CD/DVD ROM.

If the CD/DVD ROMs are untitled, they will be stored as "Audio-CD 1", "Audio-CD 2", etc. To facilitate identification, a folder icon is shown next to the file folder.



Fig. 35: Copying Music File From CD-ROM
Courtesy of BMW OF NORTH AMERICA, INC.

Copying Data from the USB

Data contained on a USB stick (music files in MP3, WMA or AAC format) can be imported via the import/export USB port located in the glove compartment.



Fig. 36: Copying USB Music File Using Import/Export Music Feature
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 37: Import/Export USB Port In Glove Compartment
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 38: Type A USB/Symbol For USB 2.0
Courtesy of BMW OF NORTH AMERICA, INC.

Copying music data from audio devices such as an MP3 players or iPods using the USB connection is possible although not advisable. The folders and file structure of the MP3 player are also copied when copying music files from these devices.

In this case, the copied folder names are represented by means of cryptic characters instead of an album title. This makes it virtually impossible to search for a music file.

NOTE: It is not possible to import music data via the USB-audio interface (SBX High) in the center console. The USB audio interface is intended only for the playback of external audio sources.

The imported USB music data is stored in file folders with USB 1, USB 2 etc. in the music collection. These folders are also shown together with a folder icon as the files copied through the DVD drive.



Fig. 39: Copied USB1 Folder Stored In Music Collection Menu
Courtesy of BMW OF NORTH AMERICA, INC.

Compatible USB sticks must be FAT formatted and must support the Mass Storage Class USB protocol. The format can be easily checked on any PC running the Windows operating system.

USB hard drives, USB hubs and USB memory card readers with several slots cannot be read when connected to the USB jack in the glove compartment and therefore can not be used.

The USB interface powers the USB stick with maximum 500 mA.

The file system (FAT 16, FAT 32 or NTFS) is shown under properties of the USB stick in the Windows Explorer. The protocol which is used is shown by clicking the hardware icon in the windows information area.

When using a USB stick device with several partitions, the music data files must be located in the first partition in order to be recognized and processed.

NOTE: Simultaneously connecting a device to the USB import/export jack and a second interface to the (12 V socket, USB audio auxiliary interface) can cause damage to both the external devices and the connected control units.

File System

The folders of the converted or copied music files can subsequently be renamed in the Options menu.

For this purpose, the corresponding album entry must be marked in the music collection and then the "Options" menu selected.

It is important to note the following when coping music files with Digital Rights Management (DRM) protection to the music collection:

- AAC music data in the M4P format (P = Protected) cannot be copied to the hard disk.
- Only music data in WMA format with copy protection can be copied.

This data will be shown in the music collection and in the music search. However, these protected tracks **cannot** be played. The track will be "skipped" or ignored and a different non-protected music track will be played.

The reason for this is that it is not possible to provide purchaser authentication in the CIC because a link to the online provider cannot be established. It is suggested that the customer import the audio files using a self recorded Digital Audio CD.

All music download portals allow the creation of a Digital Audio CD for the downloaded music track. However, the number of copies that can be created is limited by licensing legislation.

Data Saving (Backup)

The customer has the option of saving his/her complete music collection under the "Options" sub-menu. This is achieved by copying it back to a USB stick installed in the glove box port. It is necessary to ensure that the USB stick has sufficient storage capacity. A maximum storage capacity of 12 GB is required for saving the music



Fig. 40: Import/Export Submenu Screen Shot Showing How To Back Up Music Files
Courtesy of BMW OF NORTH AMERICA, INC.

The process is similar to the data saving procedure on a PC. This function makes it possible to import data when changing vehicles or when replacing a head unit or hard disk.

Data saving will only be possible if the hard disk of the CIC has not been damaged and the interfaces to the CIC are still fully operational.

Data back up should be done prior to programming the vehicle after replacing control units. Without data saving (backup), all of the music data could be lost. However, this can only be done by the customer prior to bringing the vehicle in for service. Detailed instructions on how and where the data backup can be performed are provided in the Vehicle Owner's Manual.

WARNING: For copyright reasons, the service personnel are not permitted to perform the data backup for the customer. The service personnel, can, however, instruct the customer on how to perform the backup procedure.

Music Search

The "Music search" sub-menu is provided in the music collection for the purpose of managing a large quantity of music files.

The music search takes place in accordance with a special filtering process. The search can be started at any menu item in the music search. For example, if the menu item "Genre" is selected as the starting point, all albums of all artists together with all the tracks in this music direction will be made available for selection.

In the next step, only the artist is selected and all his/her albums are displayed.

The search is now filtered further with each step until at the end, only the required entry remains.

The information for the music search is stored in the form of a metafile, similar to the ID3 tags of an MP3 file.

An example of how these metafile or meta information could appear is shown below:

MUSIC SEARCH REFERENCE CHART

Music search	Search for:	Example
1	Genre	Rock
2	Artist	Queen
3	Album	Greatest Hits II
4	Track	A Kind Of Magic



Fig. 41: Music Collection Menu With Stored Album Selected
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 42: "Genre" Selected In Music Search Sub Menu
Courtesy of BMW OF NORTH AMERICA, INC.

Data management is achieved with the aid of a music track database.

The music track database information is stored on the hard disk of the CIC for the purpose of managing the music file's metadata. A 4 GB partition is allocated to the music search function.

The CIC is equipped with special software provided by Gracenote® for the purpose of identifying the complete albums of ripped Digital Audio CDs. It provides additional information about the music track on the respective

This music track database (Gracenote®) uses TOC (Table of Content) as the identification pattern. This means, complete albums on Digital Audio CDs are identified based on the number of tracks and the track length.

The corresponding data (track, artist, etc.) is then accordingly assigned to the music files in the music search database.

On conclusion of the conversion procedure to WMA files, the new metadata is automatically added to the directory structure in the music search. It is not possible to rename or edit this metadata after it is in the hard disk.

NOTE: Albums with newly released metadata at the time of vehicle delivery will no longer be identified. The music track database would require a permanent link with the server in order to keep this data up to date and this is not possible.

Unrecognized metadata of Digital Audio CDs is stored in the music collection as "Audio-CD 1", "Audio- CD 2", etc., together with the CD icon.

The metadata for the music track database from copied CD/DVD-ROMs or USB sticks is adopted identically in the music search function. This metadata does not stem from the music track database but rather from the user/customer himself.

The metadata, copied from a USB stick or CD/DVD ROM, cannot be renamed in the CIC.

In order to correct the faulty metadata on a track or file, the file must first be deleted from the hard disk in the CIC.

The user can then rename or add to these metadata files corresponding to the music track database structure (genre, artist, album and track) by using software on a personal computer.

When the file is imported back into the CIC hard disk, the correct metafiles will be displayed. This procedure also ensures that the music search will also find the copied music data with the music track, artist, etc.

Updating unknown music tracks is only possible with WMA files from ripped Digital Audio CD. If the user/customer does not follow this procedure, in time the music search will become unusable.

A "current" version of the music track database is stored in the vehicle on delivery. The information about music CDs (Digital Audio CDs) released after the vehicle delivery will not be found in the vehicle's music track database.

NOTE: If the metadata is not found because the Gracenote database in the CIC is outdated, the tracks will not be recognized.

Updating the Music Track Database (Gracenote®)

To keep the entire contents of the music track database (Gracenote®) up to date, BMW Service is equipped with the latest CD of the music track database (Gracenote®).

This update takes place in connection with the media package, which also contains the Gracenote Update CD.

The CD can be loaded directly in the CIC drive and updated via the Service menu of the CIC (See **SERVICE INFORMATION**).

The update of the music track database (Gracenote®) will become effective in the WMA music files only after subsequent conversions (rip function) of Digital Audio CD.

Metadata will no longer be added to files that were ripped before the update of the music track database (Gracenote®).

The reason for this is that the music track database is only accessed when a Digital Audio CD is loaded and subsequently ripped.



Fig. 43: Gracenote Update CD
Courtesy of BMW OF NORTH AMERICA, INC.

RADIO

FM Stations

The layout of the "FM stations" in the Radio menu has been adapted to the new operating concept.

The former layout of the "All stations" list in the form displayed by the CCC has been replaced in the CIC by a list layout.



Fig. 44: FM Menu "All Stations" In CCC
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 45: FM Menu "All Stations" In CIC As List
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 46: Manual Station Search In CIC System
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 47: Manual Station Search In CCC System
Courtesy of BMW OF NORTH AMERICA, INC.

AM Stations

A double tuner has now made it possible to receive the "All stations" list in the AM range. However, no station information can be displayed because the RDS data is not transmitted for AM.

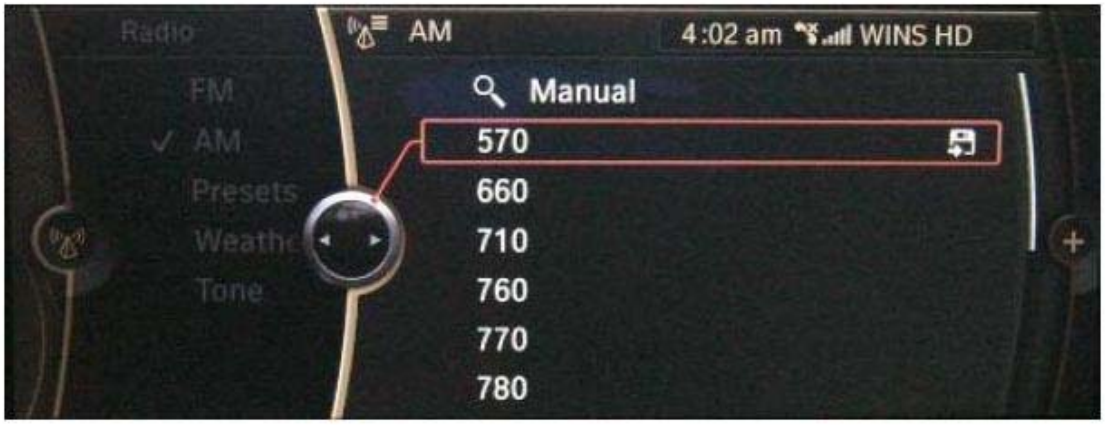


Fig. 48: AM Stations List
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 49: AM Stations Manual Setting
Courtesy of BMW OF NORTH AMERICA, INC.

IBOC

The IBOC functions in connection with the IBOC decoder which is now installed inside the CIC. IBOC makes it possible to receive digital radio signals. The IBOC components are described in detail in the "System Components" section of this training material.

SDARS

The Satellite radio service is available with a subscription to Sirius satellite radio. An example of how a station list would look like in the CIC with channels that have not yet been subscribed to is shown in the illustration below.



Fig. 50: Station List With SDARS Channels Still Disabled
Courtesy of BMW OF NORTH AMERICA, INC.

Stored Stations

Under the menu item "Stored stations", the required stations from all frequency ranges can be stored in a common menu and then selected at a later time.

The following frequency bands are available for storage:

- FM
- AM (SW, MW, LW)
- IBOC



Fig. 51: Stored Stations
Courtesy of BMW OF NORTH AMERICA, INC.

TELEPHONE

The pairing assistant for the Bluetooth® connection can be found under "Bluetooth" in the Telephone menu.

Up to four mobile phones can be paired. One of the mobile phones already paired must be removed from the displayed list in order to pair a fifth mobile phone.



Fig. 52: Bluetooth In Telephone Menu
Courtesy of BMW OF NORTH AMERICA, INC.

Follow the steps below to pair a Bluetooth telephone:

- After selecting "Add new phone" the identification number of the vehicle is shown in the display.
- The pairing assistant now receives the message that it is necessary to proceed with the mobile phone.
- A search for new Bluetooth devices should now be conducted on the mobile phone.



Fig. 53: Add New Phone Display
Courtesy of BMW OF NORTH AMERICA, INC.

- If the search was successful, the identification number of the vehicle will be shown in the mobile phone display.



Fig. 54: Identification Number Of Vehicle - Mobile Phone Display
Courtesy of BMW OF NORTH AMERICA, INC.

- A free random PIN-CODE must now be entered in the mobile phone which must then be repeated in the vehicle.



Fig. 55: Identifying Free Random PIN-CODE
Courtesy of BMW OF NORTH AMERICA, INC.

Following successful pairing, the data of the paired mobile phone device is now displayed in the phonebook or contact. This procedure can take from several seconds up to several minutes to complete depending on the amount of entries stored.



Fig. 56: Mobile Phone Device Connected Displayed
Courtesy of BMW OF NORTH AMERICA, INC.

NAVIGATION



Fig. 57: View Of Navigation System's "Speller" For Entering Destinations
Courtesy of BMW OF NORTH AMERICA, INC.

NAVIGATION EXPLANATION CHART

Index	Explanation
1	Speller
2	Fast access
3	Selection menu

To simplify the destination entry procedure, the speller entry interface has been developed for the navigation system of the CIC.

The menu located at the top right, next to the speller, shows the last three place names entered, which can also be selected at any time.

Navigation destinations can also be entered based on their ZIP code using the speller symbol 1@+.

After entering several letters, a preview map will be shown in the assistant window. This makes it easier to select the desired destination. This function is particularly useful for identifying place names that share the same name and/or appear several times in one town, city or country.

The map shown in the assistance window is independent of the main map. Both the scale as perspective can be adjusted separately from each other. This setting is made under the Options menu.

Compared to the CCC, entering the destination using the voice recognition system has been made considerably easier. Many new commands are now possible using the voice recognition system.



Fig. 58: Assistance Window With Different Zoom Factor Compared To Main Window
Courtesy of BMW OF NORTH AMERICA, INC.

Interactive Map

The interactive map is another option for entering destinations.

In addition to horizontal and vertical navigation there is also the option of diagonal navigation. Since the CIC does not directly have a diagonal sliding option, the following solution was found.

The auxiliary line for entering the destination can also be moved diagonally by pushing, pressing and turning the controller.

Various diagonal graduations can now be selected to facilitate destination selection.

A destination location appears in the crosshairs, it is shown highlighted and now it can be selected as the destination.

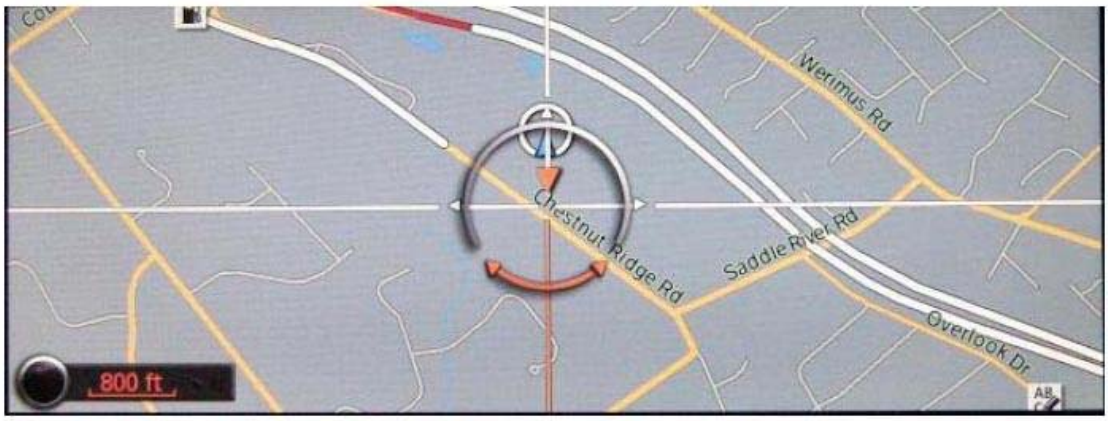


Fig. 59: Interactive Map View
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The interactive map is an excellent tool for checking the controller functions. Since the controller can be moved in all directions, it is possible to detect if there are any defects in the controller or CIC head unit.

Map Data

The navigation Map material data is already pre-installed and enabled in all US vehicles.

The maps data can be updated in two different ways:

- **Updating the BMW programming system**

  In this case, the map data in the CIC is updated through the Ethernet connection in the diagnostic connector. The data is enabled by means of an enable code that needs to be downloaded and entered into the BMW programming system.

- **Using a complete DVD set**

  The DVD is loaded directly into the head unit. The enable code can then be entered directly into the iDrive system by the customer or service technician using the "speller". The customer can still continue navigating with the old map material after loading the CD and starting the update procedure. A reset is triggered in the CIC immediately on completion of the update procedure and the customer continues to navigate with the new map material. The navigation destination, last destination and contact data are retained. The update can be interrupted at any time and continued when ever the trip is resumed.

Map Views

Separate map views are possible in the main window and assistance window. The scale for each of the two maps can be selected individually. The map view can be selected in the icon bar on the left half of the screen.

The following maps can be selected:

- North-up
- Perspective
- Direction-up
- Arrow view

Full screen mode can be activated by pressing the "Scale" icon twice or via Options while in the Navigation menu.

The assistance window can be activated under the "Options" menu.

The various map views for the main window and further display options are available in this assistance window.

The increased display resolution of the CIC display (1280 x 480) is particularly noticeable in full screen mode.



Fig. 60: Full Screen Mode
Courtesy of BMW OF NORTH AMERICA, INC.

Night View

A night view for map presentation can be activated under Options - Map Options. This view uses colors that are easy on the eye in darker conditions.



Fig. 61: Night View Of Navigation Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Points of Interest (POI)

Addresses of navigation destinations as well as service stations, service areas, cinemas etc. can be selected via the "Special destinations" (Points of Interest) menu or by using the icon bar in the map view.

The Points of Interest pictograms can be selected under the "Options" menu item.

A POI search is possible while displaying the traveled route with the system in full screen mode.

Route Planner

Up to 30 stages can be entered when selecting a destination with the route planner. The trip or route planner is located in the Options menu of the navigation system. The entry "Trip with several stages" must be selected to activate this function.



Fig. 62: Trip/Route Planner In Options Menu Of Navigation System
Courtesy of BMW OF NORTH AMERICA, INC.

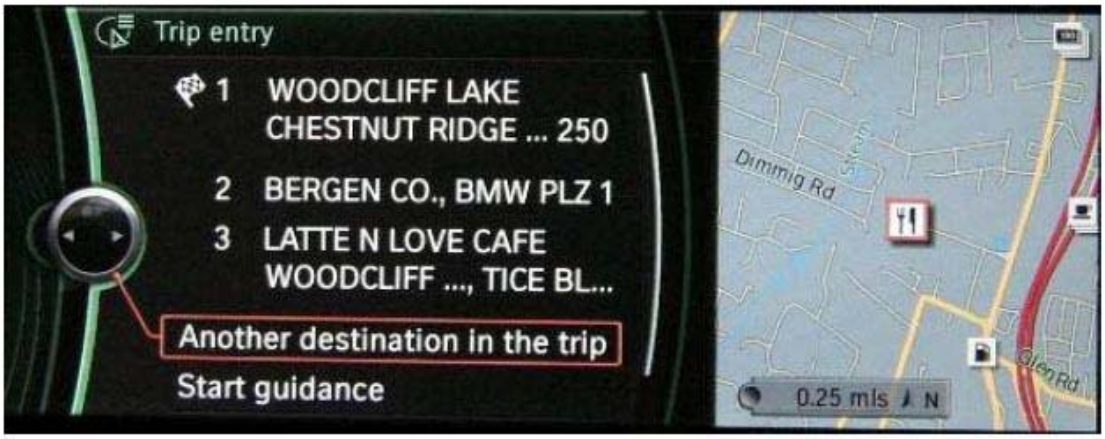


Fig. 63: Trip/Route Planner In Options Menu Of Navigation System
Courtesy of BMW OF NORTH AMERICA, INC.

The individual stages are then marked with their own flag in the map views.

These on-route destinations can be rearranged at any time.

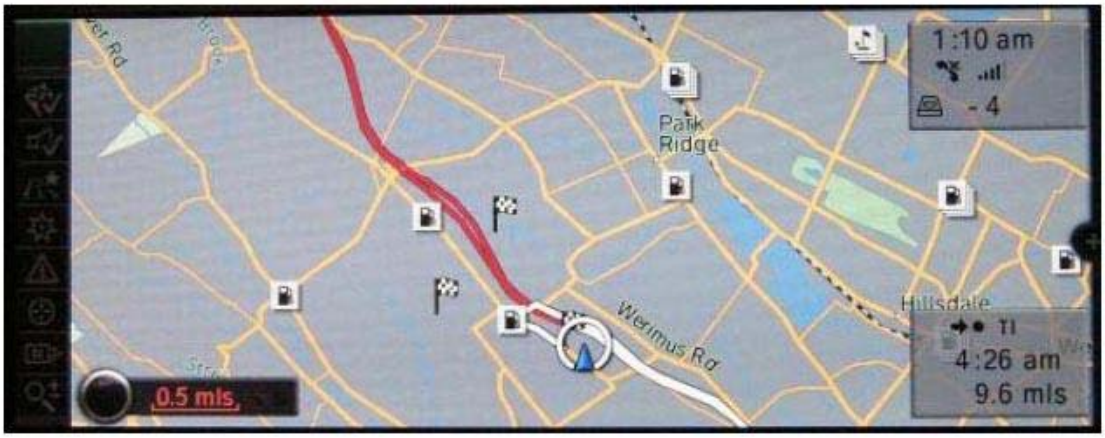


Fig. 64: Trip/Route Planner Screen
Courtesy of BMW OF NORTH AMERICA, INC.

CONTACTS

The Contacts menu is a database for managing names, addresses and telephone numbers.

Data that is displayed both in the phonebook as well as in the navigation system is stored in this central address database.

The phonebook data is transferred through the currently paired mobile phone using a PBAP protocol (Phonebook Access Profile).



Fig. 65: New Contact Menu Option Selection
Courtesy of BMW OF NORTH AMERICA, INC.

The imported entries from a paired bluetooth phone are identified by the Bluetooth icon next to the telephone entry.

An option for exporting all contact data back into the mobile phone is not provided.

Entries made under "New contact" are retained even after uncoupling the telephone and can be edited at any time. Initially, these contacts are shown without a symbol. A navigation symbol is added at the end of the entry when an address has been added.

BMW ASSIST

With the introduction of the CIC several innovations have been implemented in the vehicle regarding the BMW Assist.

The system has been changed to a push services, where an incoming message is shown in the display immediately.

These push services make it possible to immediately view receipt of the following data packages:

- BMW Search
- Destination addresses from Google Maps
- Destination addresses sent from the BMW Assist information service and their immediate display



Fig. 66: Destination Addresses From Google Maps
Courtesy of BMW OF NORTH AMERICA, INC.

Under the Assist menu, the Service status option lists the services that are available.



Fig. 67: Service Status Sub-Menu In BMW Assist Menu
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 68: Available Services Availability
Courtesy of BMW OF NORTH AMERICA, INC.

VEHICLE INFORMATION

There are three sub-groups that can be selected in the "Vehicle info" menu:

- Onboard computer
- Trip computer
- Vehicle status

Onboard Computer

The onboard computer takes the place of the trip computer previously known from the CCC.

The information available:

- Range
- Distance to destination
- Arrival time
- Average fuel consumption
- Average speed



Fig. 69: Onboard Computer Information - Range
Courtesy of BMW OF NORTH AMERICA, INC.

Trip Computer

The onboard computer 2 takes the place of the trip computer previously known from the CCC.

The information available:

- Departure time
- Time remaining
- Distance remaining
- Average fuel consumption
- Average speed



Fig. 70: Trip Computer Information - Departure Time
Courtesy of BMW OF NORTH AMERICA, INC.

Vehicle Status

The functions found under Vehicle Status are:

- TPMS (tire failure indicator)



Fig. 71: Vehicle Status - TPMS (Tire Failure Indicator)
Courtesy of BMW OF NORTH AMERICA, INC.

- TPMS initialization

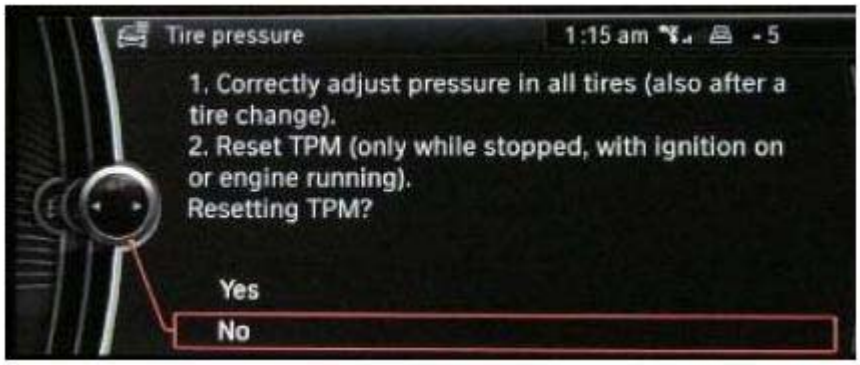


Fig. 72: Vehicle Status - TPMS Initialization
Courtesy of BMW OF NORTH AMERICA, INC.

- Service Required



Fig. 73: Vehicle Status - Service Required
Courtesy of BMW OF NORTH AMERICA, INC.

- Vehicle Information - Check Control Messages



Fig. 74: Vehicle Information - Check Control Messages
Courtesy of BMW OF NORTH AMERICA, INC.

Settings

The following settings can be edited under the Settings sub-menu:

COMPONENT SETTINGS REFERENCE CHART

Component	Setting
Head-up display	Brightness
Central screen	Brightness
Time/Date	Time, date, format
Language/Units	Languages
	Voice dialog: Standard/Short
	Fuel consumption: l/km, km/l, mpg
	Distance: km, mls
	Temperature: °C, F
Sound	Treble, bass, etc.
	Volume adjustment: Speed Volume
	Volume adjustment: Navigation
	Volume adjustment: PDC
	Volume adjustment: Gong
Limit	Setting limit, acceptance limit
Air conditioning (climate control)	Parked Car Ventilation
Lights	Home lights
	One-touch indicators
	Daytime driving light
	Welcome light
	High beam assistant
Door locking	Remote control key, lock automatically etc.
Trunk lid/Tail gate	Adjust opening angle

Language/Units

There are three different languages that can be selected:

- English US
- French
- Spanish

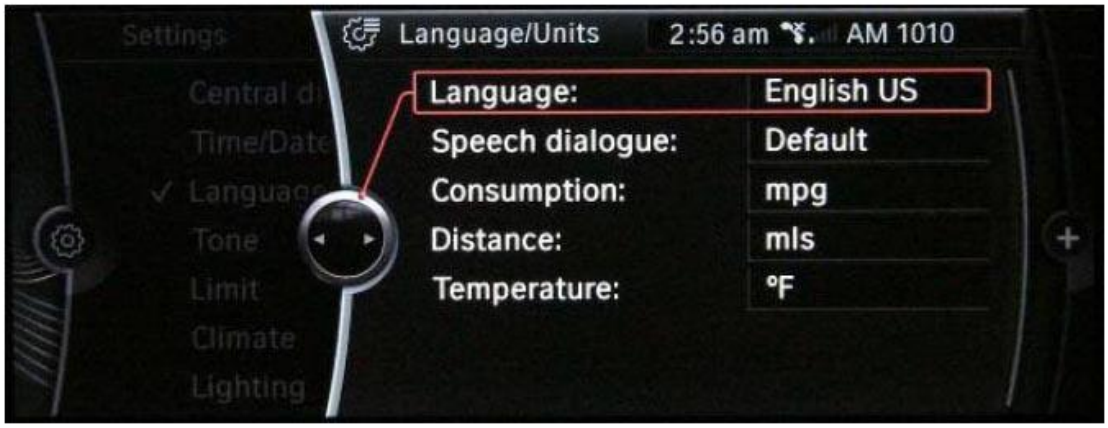


Fig. 75: Language Options In Settings Menu
Courtesy of BMW OF NORTH AMERICA, INC.

Voice Recognition

The CCC command "Options" in the voice recognition system has been renamed to "Language options". The reason for this is that the newly created "Options menu" is accessed with the "Options" command.

In addition to the display language, the input and output language used in the voice recognition system can also be selected. Beeps are no longer heard between the individual dialog steps and it is possible to choose between "Default" and "Short" voice dialog commands.

Default dialog:

SYSTEM: "Please name the town"

USER: "Munich" - shown on display

SYSTEM: "Name the number of the correct entry and say new entry"

USER: "Entry one"

Short dialog:

SYSTEM: "Town"

USER: "Munich" - shown on display

SYSTEM: "Which entry"?

USER: "One"

Favorite Buttons

There are six favorite buttons available in the CIC.

The favorite buttons have the following operating modes:

- Short press, activates the button's assigned function
- Long press, storage of functions currently displayed and selected in the CID

The Long press function is capable of storing the following selections:

- Radio stations
- CD, DVD player
- DVD changer access
- Phone numbers
- Navigation destinations (these must already be stored under "Contacts" or entered from "Last destinations")

A new feature in this system is the option of assigning any of the sub-menus such as "Navigation" or "Vehicle info" to the favorite buttons.



Fig. 76: Demonstration Of Long Press Favorite Button Function
Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INFORMATION

UNLOCKING THE SERVICE MENU OPTION

Several important functions can be checked directly at the CIC with the aid of the Service menu. This menu can be used to select and adjust settings that are not visible for the customer.

The procedure for starting the Service menu with the "safe grip" has changed compared to the CCC system:

- Call up Start menu
- Push controller in up direction for at least 10 s
- Controller 3 notches to the right
- Controller 3 notches to the left
- Controller 1 notch to the right
- Controller 1 notch to the left
- Controller 1 notch to the right
- Press controller once
- The Service menu is now added as the last submenu to "Settings"

Four selection menus are available in the Service menu of the CIC:

- Navigation
- Telephone and BMW Service
- TV (Not for US)
- Gracenote



Fig. 77: Service Menu Hidden
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 78: Service Menu "Unlocked"
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Although it appears in the Service menu, TV is not available on US vehicles.

Navigation



Fig. 79: CIC Service Menu With Navigation Item Selected
Courtesy of BMW OF NORTH AMERICA, INC.

NAVIGATION EXPLANATION CHART

Navigation	Screen content (example)	Explanation
GPS		
GPS	Status Latitude: 12°34'56" N	GPS position data
GPS	Tracking 01: 03 14,3, 02 xx, yy, z	GPS satellites
GPS	Version Receiver SW Version/Date	Software version and date of manufacture of GPS receiver
Sensor test	Wheel sensors, GPS satellites, Gyro	Check of input signals
Map version	Map Database: 1.067	Map version number Database: 1.067
Location entry	Location Entry: Entry	loop same as destination entry
Voice output test		

NOTE: Although it appears in the Service menu, TV is not available on US vehicles.

Telephone and BMW Service



Fig. 80: CIC Service Menu With Telephone And BMW Service Selected
Courtesy of BMW OF NORTH AMERICA, INC.

TELEPHONE AND BMW SERVICE EXPLANATION CHART

Telephone	Screen content (example)	Explanation
BT Name	BMW 57502	Bluetooth name of BMW vehicle for pairing
NAD	51 dBm	GSM signal level of built-in telephone module
MCC/MNC	262 01	Mobile Country Code + Mobile Network Code; unique code for country and network provider with which the phone is currently registered.
ICC ID	89490200000537151529	Integrated Circuit identifier = Identifier of SIM card
IMEI	351231004373763	International Mobile Equipment Identity (IMEI) is a unique 15-digit serial number of the telephone transceiver
Registration status	Registered	Registered = SIM card enabled and logged into network; Not registered = SIM card enabled but currently no
Reception		
Signal strength	20/100	Relative signal strength of the built-in telephone module in percent (max 100 %)
GPS T/D	14:41:57 27.05.2008	Assist cannot be enabled if time and date are incorrect

NOTE: Although it appears in the Service menu, TV is not available on US vehicles.

TV



Fig. 81: Screen Shot Of TV Sub-Menu In Service Menu
Courtesy of BMW OF NORTH AMERICA, INC.

There are five sub-menus which can be selected under the TV sub-menu:

- Ch = channel currently tuned in
- Frequency in MHz
- Channel information (transmission standard, bandwidth and program name)
- DVB-T parameter (modulation type, analog, digital TV distinction)
- Antenna information (field strength in **dBµV** (Decibel micro Volt)

NOTE: Although it appears in the Service menu, TV is not available on US vehicles.

Gracenote®



Fig. 82: Sub-Menu For Gracenote Under Service Menu
Courtesy of BMW OF NORTH AMERICA, INC.

The music track database can be updated under the menu item Gracenote.

Once the update CD has been loaded in the CIC drive, it is possible to compare the currently installed data status with the data status of the CD in the Service menu selection (See illustration below).

If the CD corresponds to the current status, the latest version of the Gracenote® music track database is downloaded after selecting "Start installation". The previous version is overwritten.



Fig. 83: Identifying Gracenote Database CD
Courtesy of BMW OF NORTH AMERICA, INC.

No data is added to unrecognized music tracks. The update only serves the purpose of identifying music tracks in connection with future music data storage converted with the aid of the rip function.



Fig. 84: Sub-Menu For Gracenote/Start Installation Under Service Menu
Courtesy of BMW OF NORTH AMERICA, INC.

RESETTING THE CIC

The Car Information Computer can be reset by pressing the rotary push button (ON button) for 25 seconds. After 25 seconds, the control display becomes blank as a confirmation that the CIC is being restarted.



Fig. 85: CIC Start Screen After Successful Reset
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When resetting the MOST control unit, the MOST gateway is muted for 2 seconds.

PROGRAMMING

Programming the CIC is done with the use of the respective optical testing and programming interface modules.

The interface modules OP(P)S or ICOM (A+B) are simultaneously connected to the OBD interface and to the MOST interface of the vehicle.

GENERAL INFORMATION

Telephone Diagnostics - Overview - All Models

TELEMATICS

FREQUENTLY ASKED QUESTIONS

1. **What is telematics?**

   Telematics combines wireless voice and data to provide location-specific security, information, productivity, and in-vehicle entertainment services to drivers and their passengers.

2. **How does a telematics system work?**

   The heart of a telematics system within the car is a telematics Communications Unit (TCU) that is connected (wirelessly) to a central service center. The TCU serves as the central platform of a telematics system, where all telematics-related technologies are deeply integrated. It communicates location-specific information to a central service center and in turn the center helps deliver telematics services to a driver via the cellular phone.

   These services can include dispatching ambulance services to a driver in an emergency situation, or sending roadside assistance to a driver whose car has broken down. Other services include the ability of a central server to deliver navigation assistance and real-time traffic information, among others. What's more, the TCU is also connected to the engine control unit (or the onboard computer) which enables enhanced services such as remote engine diagnostics and automatic airbag notification.(01)

3. **What is the difference between telematics and navigation systems?**

   A telematics system provides numerous services to drivers, and navigation is simply one of the services offered. Navigation systems that are starting to appear in high-end cars today are referred to as autonomous navigation systems. Here, the navigation database resides in the car on a CD. These systems are relatively expensive. telematics systems provide navigation assistance "off-board". This means that the database resides outside the car, making the service far more affordable to a wider number of people.

4. **Where does the word "telematics" come from?**

   The term originated in Europe and remains widely used in the European automotive industry to describe automotive communications technologies.

5. **Can you explain a telematics system in technological detail? What are its components?**

   The main component in a telematics system is the telematics Communications Unit (TCU). In North America, a TCU contains a Motorola GPS receiver, cellular transceiver, and modem/transceiver control board. In Europe, a TCU contains a Motorola GPS receiver and GSM transceiver. Motorola's European telematics systems do not require a modem due to the already existing digital data transfer services, such as SMS (short message service) available with GSM.

Every telematics system developed by Motorola contains Motorola's automotive grade telematics software, which is uniquely programmed to deeply integrate the components of a TCU, enabling simplified delivery of telematics services from one centralized area.

6. **What services does a telematics system offer today?**

   Today, telematics systems offer drivers emergency and roadside assistance, air bag deployment notification, navigation, remote door unlock, vehicle security notification and stolen vehicle tracking services.(01) (02)

7. **What services will telematics offer in the future?**

   Just as today's telematics safety and security features are a direct result of initial consumer demand, future telematics services will also be a direct result of what drivers want in their cars. These systems may provide customized services such as travel information (traffic updates, parking availability, airline status), messaging (voice mail and email retrieval), information (sports, weather, stock market updates and Internet access) and entertainment (audio games, books, magazines and newspapers). These are only a few of the applications which will evolve with telematics to keep drivers and their passengers in touch.

   Eventually, telematics will even reach outside the car and communicate with the office and home, extending far beyond voice conversations. Drivers will be able to turn on home lights, start and stop the sprinkler system, set their office security system - all via their telematics systems.

8. **How does a driver interact with a telematics system?**

   Drivers activate telematics systems via buttons located on the dashboard or the overhead console of the car. Motorola works with each automaker to help develop a purpose-built system for the projected ergonomic desires of drivers. The BMW Mayday telematics system has an emergency and roadside assistance button located on a cellular handset. The Mercedes TeleAid system has an S.O.S. button located behind the rear view mirror and "Information" and "Roadside Assistance" buttons located in the armrest.

9. **Can a Global Positioning System (GPS) phone handle telematics services?**

   We have several concerns about integrating GPS functionality into a phone handset, instead of the vehicle itself.

   Our first issue is the ability of a GPS phone to operate inside of the automobile without an external GPS or cellular antenna. GPS antennas must have an unrestricted view of the sky to track satellites. So the decision must be made whether it's more cost-effective to have the GPS in the phone or in the car.

   Furthermore, integrating telematics into a portable phone may be very attractive from a cost and convenience perspective, but does not support the stolen vehicle alarm, door lock/unlock, and other features that require the device to remain in the car when the occupants have left.

   Finally, GPS is only one part of the locating solution. In addition, cellular infrastructure positioning, such as cell tower triangulation, can help. Given current technology, GPS does not operate as effectively inside

multiple story, concrete or metal buildings, where many emergency calls originate.

All of these issues, and many others, are taken into account when designing telematics systems and service.

10. **How does the airbag deployment notification feature work?**

The TCU is constantly "listening" or on the lookout for any sign of emergency. Because the TCU is connected to the engine control unit, when the airbag sensor sends a message to the engine controller to deploy the airbag, the controller alerts the TCU as well. Automotive-grade software that enables these functions and assures their reliability.

Once the TCU is alerted, it automatically makes a cellular call to the response center. The call gets priority call status and jumps ahead of other telematics calls, and the operator is alerted that a call has been received from an airbag deployment. That way, emergency crews can be sent immediately to the scene. (01)

11. **What services do consumers really want in their cars?**

Initially, autonomous navigation-only systems caught the fancy of drivers in Europe and Japan, while in North America, consumers were more interested in emergency response or emergency call systems. Increasingly, consumers are attracted to the broader spectrum of telematics services, such as the delivery of personalized information and entertainment.

12. **Do Motorola's systems use digital cellular technology?**

Yes. In Europe, Motorola's telematics systems use the European digital standard, GSM.

In North America, however, only AMPS offers the broad geographic coverage essential for reliable emergency response services. That's why it's the system being utilized in North American telematics right now.

13. **What do telematics systems cost?**

While each automotive company determines its own pricing, system prices currently range from $500 to $2000 in Europe and North America. Some GM vehicles include the OnStar system at no additional equipment charge, and require only a low monthly service fee. Monthly service costs vary, depending on the services offered. Like other new technologies, we anticipate that consumer demand will ultimately drive these costs down.

14. **Do European and North American drivers expect different features?**

It's clear that Europeans and Americans are all interested in navigation, safety and security services. But the degree to which they prioritize these services varies.

In Europe, there is a greater emphasis on navigation. At the same time, frequent cross-border travel creates language barriers, making familiar navigation and security services even more welcome. In the

United States and Canada, safety and security are the most desired services. North Americans are also interested in navigation, but the need for it is not as great. All drivers are interested in getting real-time traffic information.

15. **When will North American telematics make the shift to digital?**

In North America, the growth of telematics depends on digital cellular standards providing service over a larger geographic area, especially in cities. Unlike the European-wide GSM standard, North America has multiple standards including AMPS, TDMA, CDMA, GSM and iDEN®.

Today, only AMPS offers wide enough geographic cellular coverage for emergency response services. That's why it is utilized in the Motorola telematics systems Motorola currently installed in North America. For data transmission on analog AMPS, modems can be added to the telematics hardware and central service center. In the future, systems will be based on digital wireless, to allow a richer array of features in metropolitan areas.

In addition, as the industry endeavors to deliver comprehensive data services such as Internet access and customized entertainment services, the migration to digital communications technology will be even more essential.

Companies such as Motorola, Nokia, Ericsson and Unwired Planet are addressing these issues for a wide variety of wireless devices. Through the Wireless Applications Protocol (WAP) consortium, we are working together to ensure a reliable and standard method of transferring data over wireless networks worldwide.

16. **What new technologies will help deliver greater telematics services?**

An important, ongoing initiative that will help drive telematics growth is the ITS Data Bus, or IDB. IDB is based on an open protocol for networking car audio, video, communication and computing devices. Lead by the Society of Automotive Engineers (SAE) and supported by several corporations (including Motorola), IDB will allow seamless integration of multiple technologies inside the car.

IDB will allow simple plug-and-play use of any consumer electronics, regardless of the manufacturer. In addition, a firewall contained in the IDB will allow all electronics in the car to operate independently of each other, eliminating signal interference.

17. **How will IDB specifically impact telematics?**

Many companies are expected to integrate IDB into their telematics components and other electronics systems. Motorola, for example, plans to integrate IDBs into our telematics Communications Units, enabling the system to act as the central hub for all electronics interacting within the car. This will allow consumers to simply plug and play various electronics via their TCU, and take advantage of additional telematics services, without requiring multiple wires and cables overlapping in different areas of their vehicle. Not only will IDB allow easier installations, but it enable drivers to add new services without being concerned about propriety systems and wiring. With IDB, consumers will have greater choice, resulting in greater market growth.

Automatic airbag deployment notification, information services and other telamatics services must be supported by your carrier's network, depend on service availability and coverage, and require a subscription. These services are not available in all areas. Check with your service provider for availability. All location based services are subject to the availability of GPS signal or alternative location tracking means. GPS coverage is not available in all areas.

The use of wireless devices and their accessories may be prohibited or restricted in certain areas. Always obey the laws and regulations on the use of these products. All navigation systems select routes based on several criteria: geographic distance, type of route, and in some cases dynamic traffic information. While these systems usually opt for the shortest travel time to your destination, it is important that you take into account factors including road and driving conditions, terrain and local environments, some of which may contain hazards to you or your vehicle. Always use your best judgment when deciding on a route. As the driver of your vehicle, you are always the final decision-maker, and despite the many advantages of using any Telematics system, you are ultimately responsible for ensuring your safety.

GLOSSARY

AMPS Advanced Mobile Phone System

The first-generation analog cellular phone system that originated in the United States.

APCO

Association of Public Communications Officials

CDMA Code Division Multiple Access

An advanced digital cellular and PCS platform that converts audio signals into a stream of digital information (made up of 1s and 0s). This "digital speech packet" is transmitted via a wide-band channel consisting of several radio frequencies. CDMA differs from the other popular digital cellular platform, TDMA, in that it uses several frequencies instead of just one. These digital platforms ensure greater call clarity and security, prevent cloning fraud and allow a greater number of calls to be handled by a tower or response center at one time.

CDPD Cellular Digital Packet Data

Using the existing AMPS system to carry digital data, by transmitting dense packets of information across vacant analog channels.

CTIA

Cellular Telephone Industry Association

Data Bus

The central collection of wires that carry instructions to electronic components throughout the vehicle.

DCS-1800

The low-power variant of GSM (the European digital standard). Uses a 1.8 GHz carrier. Example: Mercury One-2-One.

DCS-1900

The proposed use of GSM (the European digital standard) with a 1.9 GHz carrier for PCS applications.

DCTU Digital Cordless Telephone U.S.

A standard based on a micro-cellular radio system that provides low-power cordless access between a subscriber and a base station up to a few hundred meters away. DCTU is a version of its European counterpart, DECT.

DECT Digital European Cordless Telephone

A standard based on a micro-cellular radio system that provides low-power cordless access between a subscriber and a base station up to a few hundred meters away.

ETACS Enhanced TACS (Total Access Communication System)

European analog cellular.

ETSI European Telecommunications Standards Institute

The standards body responsible for GSM.

FDMA Frequency Division Multiple Access

Used for AMPS and TACS, the two key analog systems and their variants, this system gives each conversation its own unique radio channel.

FLEX® Protocol

Created by Motorola, FLEX is the global de facto standard for high-speed, one-way alphanumeric paging. With its ability to handle more robust code transport messages effectively, Motorola's FLEX protocol is laying the foundation for graceful growth from 1600 to 6400 bits per second (bps) transmission rates.

Gateway

A device that allows consumer products to interface with the communication system in vehicles, while protecting the vehicle's system from defective devices or inappropriate messages.

GPS Global Positioning System

Also refers to Global Positioning Satellite. A system using satellites, receivers and software to allow users to determine their exact geographic position.

GSM Global System for Mobiles

A European digital standard.

Half-Rate

A variant of GSM, Half-Rate doubles system capacity by more efficient speech coding.

IDB ITS Data Bus

A medium-speed multiplexed bus intended for command and control of devices in vehicles. It has been proposed by Motorola and the Society of Automotive Engineers (SAE) as an industry standard. Should this happen, IDB will allow device manufacturers to create products that will be compatible with all vehicles - versus today's data bus systems which differ by automobile manufacturer. The IDB would interface with an existing vehicle bus through a gateway.

iDEN® Integrated Digital Enhanced Network

A new generation of digital wireless technology developed by Motorola to enable multiple services to be delivered from a single, integrated wireless communications system. iDEN is the backbone of the Nextel all-digital cellular service.

InFLEXion®

A Motorola protocol which enables transmission and storage of voice messages and offers enhanced privacy, channel efficiency and ease of use. What's more, InFLEXion allows greater detail and expression to come through.

IS-41

The protocol for "roaming" within the U.S., describing how services should "hand over" between operators.

IS-54

The TDMA standard for U.S. digital cellular.

IS-95

The CDMA standard for U.S. digital cellular.

ISO 9000

The International Organization for Standardization (ISO) published the ISO 9000 series of quality management and quality assurance standards in 1987 as a means to rationalize the many various national approaches to the subject of product quality. The ISO 9000 series has been widely recognized as an aid in developing manufacturing and service organizations' quality management as an additional assurance to product purchasers that the products and services they buy will consistently meet quality objectives.

ISO 9001

This standard is used when conformance with specific requirements is to be assured by the supplier during several product stages including design and development, production, testing, inspection and servicing.

ITS IntelligentTransportation Systems

A broad range of diverse technologies, including information processing, communications, control and electronics, which, when applied to our transportation system, can save time, money and lives.

ITS America IntelligentTransportation Systems of America

An organization mandated by the U.S. Congress in 1991 to foster public and private partnerships to increase the safety and efficiency of surface transportation through the application of advanced ITS technologies.

JDC Japanese Digital Cellular

Now renamed PDC.

JTAC Japanese Total Access Communication

Like the European TACS, JTAC is the Japanese analog cellular system.

LMR Land Mobile Radio

Wireless communication for specialized applications, such as taxis and emergency services.

MMI Man/Machine Interface

Also known as User Interface. The means by which the user interacts with a machine or device. In the past, knobs, dials and displays manipulated by a user's hand were common interfaces on technical devices. Today, MMI includes more advanced functions such as Voice Dialing, speech synthesis and touch screens.

NAMPS

Narrowband AMPS.

PCS Personal Communications Service

Service that bundles voice communications, numeric and text messaging, voice mail and other features into one device, service or bill.

PCS-1900

Like DCS-1900, this refers to the proposed use of a 1.9 GHz carrier for PCS applications.

PDC Personal Digital Cellular

The Japanese cellular standard.

PHS Personal Handy System

The Japanese cordless phone standard.

Protocol

A standard set of rules that governs how computers or other electronics communicate with one another. Protocols define a message's format as well as how they are exchanged. Agreeing to a standard protocol allows different types of computer systems to communicate with one another in spite of their differences.

PSAP Public Safety Answering Point

PSTN Public Switched Telephone Network

QS 9000

The quality system standard established by Chrysler, Ford, General Motors, truck manufacturers and other subscribing companies. This standard includes the ISO 9000 requirements, plus additional requirements for all aspects of the business. QS 9000 includes a detailed Advanced Product Quality Planning, Control Plan, Continuous Improvement, Production Part Approval Process, Manufacturing Capabilities methodologies and more.

ReFLEX®

The world's first two-way alphanumeric paging protocol, created by Motorola. ReFLEX enables pagers to confirm receipt, respond to and initiate messages.

SAE Society of Automotive Engineers

A one-stop resource for technical information and expertise used in designing, building, maintaining and operating self-propelled vehicles for use on land or sea, in air or space.

SIM Subscriber Identification Module

A card used in GSM to personalize a handset.

TACS Total Access Communication System

European analog cellular.

TCU Telematics Control Unit

The embedded vehicle control unit that communicates with the automobile controls, GPS satellite and customer service center to provide Telematics features to a driver.

TDMA Time Division Multiple Access

An advanced digital cellular platform that converts audio signals into a stream of digital information (made up

of 1s and 0s) and divides it into "digital speech packets" according to time. The packets are then transmitted one a single radio frequency. TDMA differs from the other popular digital cellular platform, CDMA, in that it uses one channel instead of many. These digital platforms ensure greater call clarity and security, prevent cloning fraud and allow a greater number of calls to be handled by a tower or response center at one time.

TETRA TErrestrial Trunked RAdio

European digital cellular land mobile radio system.

TIA Telecommunications Industry Association

The United States' telecommunications standards making body.

User Interface

Also known as Man/Machine Interface (MMI). The means by which the user interacts with a machine or device. In the past, knobs, dials and displays manipulated by a user's hand were common interfaces on technical devices. Today, User Interfaces include more advanced functions such as Voice Dialing, speech synthesis and touch screens.

VR Virtual Reality

Used in a variety of Motorola products and services, it is a type of computer-generated environment in which the user interacts with the environment in three dimensions that provide sensory information to make an individual feel that they are in a different place.

WAP Wireless Application Protocol

A standard that aims to align industry efforts to bring advanced applications and Internet content to digital cellular phones.

SUSPENSION

Chassis Dynamics - F01/F02

F01 CHASSIS AND SUSPENSION

NEW CHASSIS SYSTEMS FOR F01/02

Through intelligent design layout and optimum package space utilization on the new F01/F02, the basis has been created for distinctly increasing the driving dynamics while improving comfort and vehicle handling.

At virtually identical wheel loads, a greater track width and a larger wheelbase have been realized compared to the predecessor, the E65.

The development of the new generation chassis and suspension systems in the new F01/F02 focused on revolution instead of evolution. The aim was to set a new bench-mark.

The lightweight construction philosophy was consistently pursued in the design of the chassis and suspension systems. This is reflected in the widespread use of aluminum, representing an important contribution to increasing comfort and reducing CO2 emissions.

For the first time, a BMW Sedan is fitted with a double wishbone front axle made of aluminum, a steerable integral-V rear axle, BMW integral active steering (IAL) and the innovative damper system, the 2nd generation vertical dynamics control (VDC 2).

The integrated chassis management (ICM) intelligently links all chassis and suspension control systems, thus achieving a new level of functional quality. Further highlights include "Dynamic Drive" (ARS) and a fully variable power steering pump to improve fuel economy.

CHASSIS SYSTEM COMPONENTS DIMENSION DESCRIPTION CHART

Explanation	E65	F01	E66	F02
Overall length	5039 mm	**5072 mm**	5179 mm	**5212 mm**
Wheelbase	2990 mm	**3070 mm**	3130 mm	**3210 mm**
Overhang, front	914 mm	864 mm	914 mm	864 mm
Overhang, rear	1135 mm	**1138 mm**	1135 mm	**1138 mm**
Vehicle Width	1902 mm	1902 mm	1902 mm	1902 mm
Front track width (basic wheel)	1578 mm	**1612 mm**	1578 mm	**1612 mm**
Rear track width (basic wheel)	1596 mm	**1646 mm**	1596 mm	**1646 mm**

Chassis and Suspension Comparison

CHASSIS AND SUSPENSION COMPARISON CHART

Comparison	E65/E66	F01/F02

Front Axle	Double pivot spring strut front axle	Double wishbone front axle
Suspension/damping, front	Steel spring/EDC	Steel spring/VDC 2
Stabilizer bar, front	Passive or Active (ARS)	Passive or Active (ARS)
Rear axle	Integral IV	Integral V
Suspension/damping, rear	Steel spring or Air spring/EDC	Steel spring or Air spring (VDC2)
Stabilizer bar, rear	Passive or Active (ARS)	Passive or Active (ARS)
Brake, front	Disc brake with rotor diameter of 348mm	Disc brake with rotor diameter of 373mm
Brake, rear	Disc brake with rotor diameter of 345mm	Disc brake with rotor diameter of 368mm
Parking brake	Drum brake with EMF	Drum brake with EMF
Wheels/tires	Standard tires	Runflat tires (as standard)
Steering	Power steering (w/Servotronic)	Power steering with Servotronic (optional IAL)

Track Width

The size of the track width at the front and rear has a decisive influence on the cornering characteristics of the vehicle and its tendency to roll.

- The track width should be as large as possible, however, it cannot exceed a defined value in relationship to the width of the vehicle.
- The fully deflected (spring compressed) wheel turned at full lock on the front axle must not scrape or snag in the wheel arch cutout.
- A certain degree of clearance for fitting snow chains is required on the drive axle (irrespective of whether this is the front, rear or both axles).
- The wheels must not make contact with any chassis or body parts when the suspension springs fully compress and rebound.

Wheelbase

The wheelbase -measured from the center of the front axle to the center of the rear axle has a decisive influence on the vehicle handling properties.

A large wheelbase compared to the length of the vehicle permits favorable accommodation of the vehicle occupants between the axles and reduces the influence of the vehicle load on the overall load distribution. Short body overhang at the front and rear reduces the pitching tendency.

A short wheelbase, on the other hand, provides favorable cornering characteristics, i. e. a smaller turning circle at the same steering lock angle.

The outstandingly balanced values on the E65 result in safe, superior and agile vehicle handling characteristics that represent the standard in the luxury class segment also for the future. These technical data are the prerequisite for achieving the top position in its class. In terms of driving dynamics, the F01/F02 will assume a

leading position without forfeiting driving and rolling comfort compared to the competition (with comparable equipment).

SYSTEM OVERVIEW

Front Axle

A double wishbone front axle as known from the E70 and E71 is now also fitted in the F01/F02.

In comparison with the double pivot spring strut front axle on the E65, this front axle design offers the following advantages:

- Higher transverse acceleration is reflected in greater vehicle agility.
- Improved cornering/steering and transition characteristics which are particularly favorable in terms of rolling motion.
- Reduced interference means greater comfort.
- Shock absorbers that are subjected to virtually no transverse forces provide greater comfort.
- The design layout of the double wishbone front axle facilitates vertical dynamics control (VDC) and all-wheel drive (as on the E70/E71) without the need to adjust height and no spring travel loss.
- Double wishbone front axles improve directional stability.

The outstanding driving dynamics, the excellent driving comfort as well as the exceptional directional stability are factors of this double wishbone front axle design solution that contribute to a high degree of driving pleasure and safety while making the vehicle ideal for every day use and providing the most relaxing drive on long journeys.

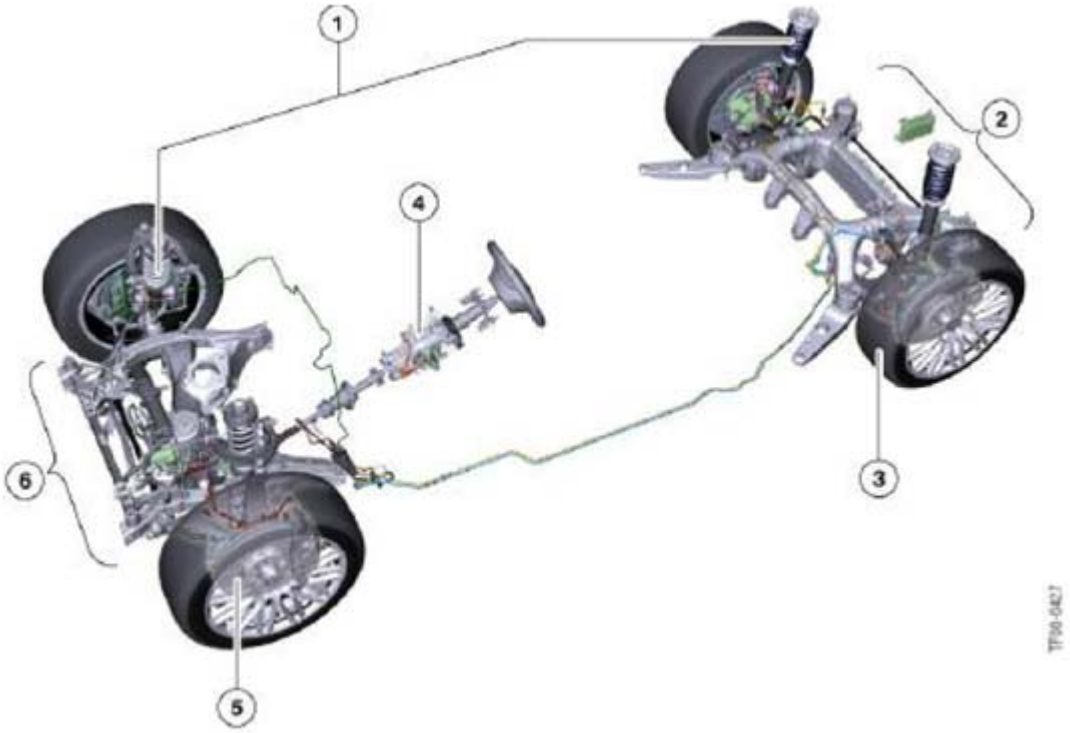


Fig. 1: Identifying F01/F02 Chassis And Suspension Components
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENT REFERENCE CHART

Index	Explanation
1	Spring/damper
2	Rear axle
3	Wheels/tires
4	Steering
5	Brakes
6	Front axle

Rear Axle

Compared to the integral IV rear axle, the further-developed integral-V rear axle in the F01/F02 is characterized by further improved driving dynamics without compromising comfort and driving safety.

Furthermore, a "distributed" integral-V rear axle was required in order to realize HSR (rear axle slip angle control) that is a fundamental part of the integral active steering system.

Dampers/suspension

In the F01/F02, the range of spring/damper units extends from the steel spring with standard vertical dynamics control (VDC) through to the electronically controlled dampers that can also be combined with the single axle air spring on the rear axle.

Brakes

The brake system on the F01/F02 is a further developed high performance brake system with newly adapted dimensions for the F01/F02 and is dependent on the national market specification. The service brake is based on the conventional design, however, the parking brake features an electromechanical parking brake system (EMF).

Steering

The F01/F02 is available with two steering system variants:

- Hydraulic servotronic
- Integral active steering (IAL).

Both steering systems are adapted to the varied application options of the F01/F02. The integral active steering is a new BMW development.

Wheels and Tires

In contrast to its predecessor the E65/E66, the F01/F02 is now equipped as standard with a runflat safety package.

SYSTEM COMPONENTS

General

The chassis and suspension is subdivided into the main components that are described in more detail in the following:

- Front axle
- Rear axle
- Damping/suspension
- Brakes
- Steering
- Wheels/tires.

Front Axle

Design Layout

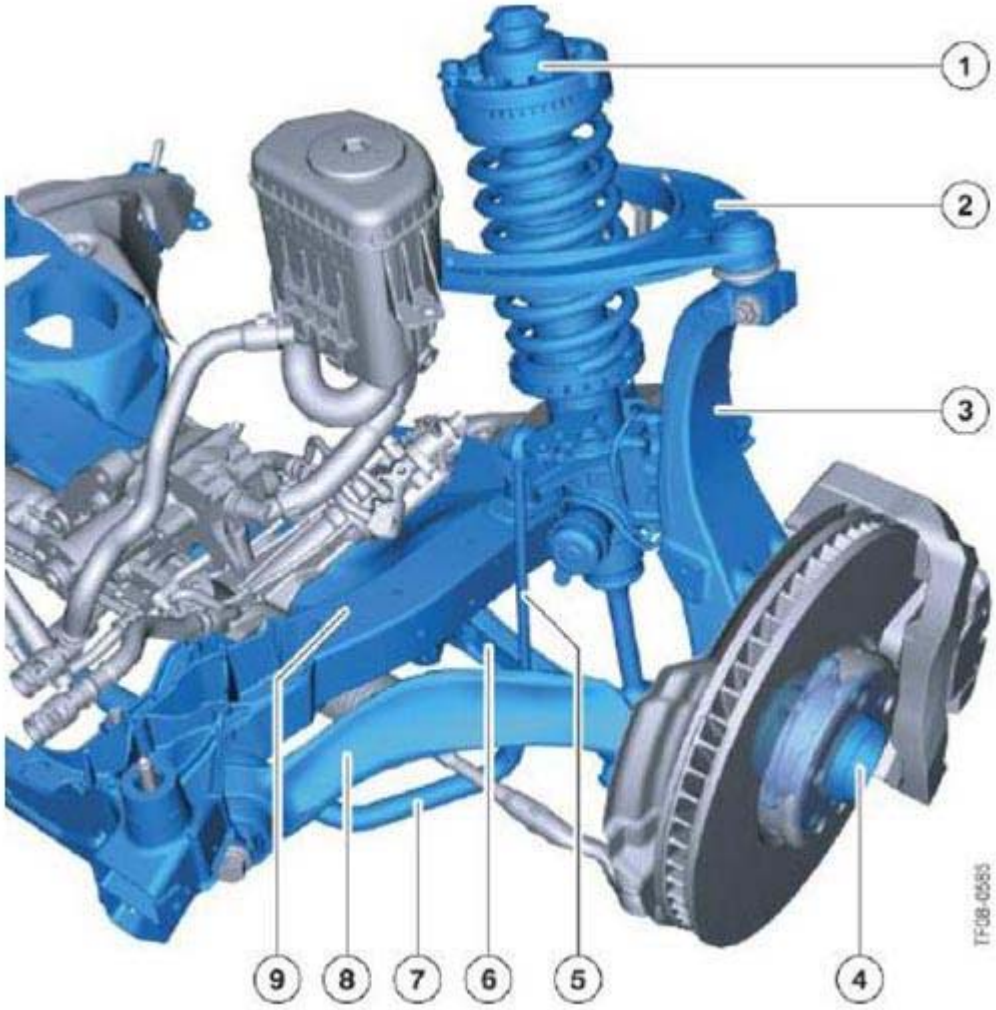


Fig. 2: Identifying F01/F02 Front Axle Components
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENT REFERENCE CHART

Index	Explanation
1	Spring strut
2	Transverse control arm, top
3	Swivel bearing
4	Wheel bearing
5	Stabilizer link
6	Transverse control arm, bottom
7	Stabilizer bar
8	Tension strut with hydraulic mount
9	Front suspension subframe

The introduction of a second control arm level for wheel control, which is arranged above the wheel, results in

additional degrees of freedom for the kinematics of the front axle as well as for the suspension/damping compared to other designs such as a spring strut front axle.

Components with special materials:

- The forged aluminum swivel bearing (3) with the 3rd generation wheel bearing (4).

NOTE: The arms and links are bolted by means of ball/disc connections to the swivel bearing and, similar to the track rod heads, no longer have tapered screw fittings.

- The transverse control arm at the top (2) is made from forged aluminum and the cylindrical joint pin is clamped in the swivel bearing (3).
- Tension strut with hydraulic mount (8) and lower transverse control arm (6) are forged aluminum components while the lower control arm bears the spring strut (1) by means of a forged steel mount.
- The new front axle subframe (9) is a welded aluminum structure which, as the standard axle, does not require the familiar aluminum thrust panel with service openings for increasing stiffness. This is made possible by the solid transverse section in the front axle subframe.

NOTE: The design layout of the front axle subframe makes it possible to lower the complete steering gear for service purposes.

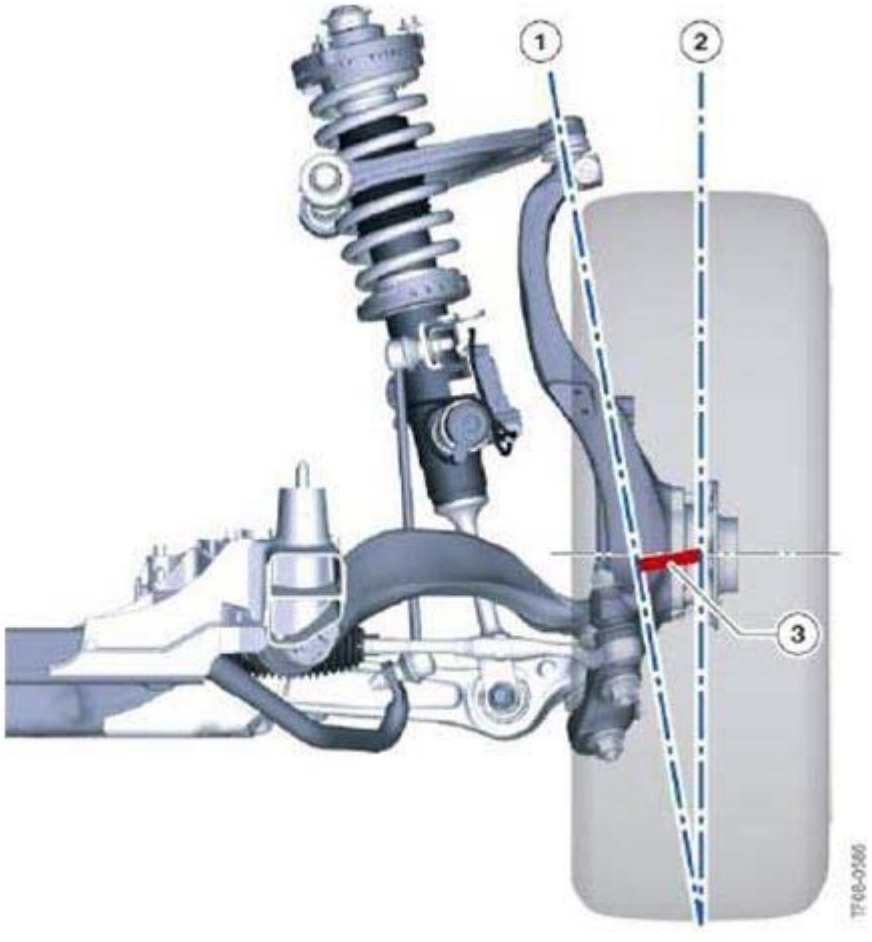


Fig. 3: Identifying Kingpin Offset At Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Kingpin offset at hub

INDEX REFERENCE CHART

Index	Explanation
1	Steering pivot axis
2	Wheel center plane
3	Kingpin offset at hub

The steering pivot axis of the wheel suspension is now formed by a joint at the top A-arm and the virtual pivot point of the lower arm level as known from the spring strut or McPherson front axle.

The steering pivot axis is therefore freely selectable and can be positioned such as to produce a small kingpin offset at hub with sufficient weight recoil.

This kingpin offset at hub is decisive for transmitting the irregularities on the road surface to the steering wheel. The lower and upper arm levels now move simultaneously in response to wheel deflection. As a result, as the

spring compresses, the wheel pivots in such a way that the negative camber to the road does not decrease as much as is the case with a spring strut front axle.

Since the two control arm levels undertake the wheel control, the damper is virtually no longer subjected to transverse forces and rotational motion.

This makes it possible to do without a roller bearing assembly (conventional strut mount) on the spring strut support. Instead of this conventional roller bearing a damping and support unit is installed that takes up all three load paths. The load paths are the damper piston rod, the inner auxiliary spring and the bearing spring. This damping and support unit is still referred to as the "strut mount".

Due to the lack of transverse forces, the piston rod can be made thinner, resulting in a similar displacement volume in the push and pull direction of the damper. This serves to improve the design layout of the damper and is the prerequisite for the innovative damper control system - vertical dynamics control (VDC).

Due to the substantially lower friction at the circumference of the piston rod, the damper can respond more sensitively.

By connecting the stabilizer bar via the stabilizer link to the spring strut, the torsion in response to body roll motion is equivalent to the total wheel lift from the inside to the outside of the curve (in other suspension setups, the stabilizer bars are connected to a transverse control arm and therefore achieve only a fraction of the torsion angle). Despite being highly effective, this high degree of torsion allows for the stabilizer bar to be made relatively thin which has a favorable effect on driving comfort and dynamics as well as saving weight.

Comparison of front axle technical data

FRONT AXLE TECHNICAL DATA COMPARISON CHART

Description (Front axle data)	**E65/E66**	**F01/F02**
Kingpin offset at hub (mm)	**88.1**	**56.3**
Track width (mm)	1578	1611
Camber	-0° 20' ±20'	-0° 12' ±15'
Camber difference	0° ±30'	0° ±30'
Total toe-in	10' ±8'	16' ± 6'
Turning circle (**m** /ft)	**11.92** /39.10	**12.15** /39.86
Kingpin offset (mm)	0	0.5
Toe angle difference (toe out on turns)	1° 27' ±30'	12° 20'
Caster angle	7° 27' ± 30'	7° 0'

Cast aluminum spring support (body side)

On the E70, a cast aluminum spring support was used for the first time on the front end of the X Series. This assembly is now also used on the F01/F02. It offers the following advantages:

- Reduced weight through intelligent lightweight construction

- Improved driving dynamics thanks to higher degree of stiffness
- Less components therefore reduced manufacturing expenditure.

The cast aluminum spring support takes up the forces from the chassis and suspension and directs them into the car body. Both the spring strut as well as the upper transverse control arm are secured to the cast spring support. The component must exhibit a high degree of stiffness for this purpose. This is achieved by optimum material distribution by ensuring material is only accumulated where necessary. The spring support therefore represents an important contribution to controlling driving characteristics as it takes up both static and dynamic wheel forces. Since, with the cast construction, it is possible to integrate many individual functions and components in one single component, compared to the conventional shell construction, this setup is distinctly more compact while making a significant contribution to reducing weight.

- The cast aluminum lightweight construction reduces the weight by approx. 50 % compared to the conventional sheet steel construction
- More useful package space compared to conventional sheet steel construction -80 mm shorter front end
- Function-compliant design with specific local stiffening points adding to lightweight construction
- Integration of various brackets for mounting units etc. in the cast aluminum spring support with add-on parts.

The cast aluminum spring support is connected to the neighboring steel components (e. g. engine support) by means of a rivet-adhesion structure. The structure is of lower weight while making it possible to reduce the number of parts (no additional sheet metal brackets). Nevertheless, the vehicle body is more stable and torsionally rigid while increasing local stiffness. This design arrangement has a positive effect on improved driving dynamics.

Service

NOTE: The camber can also not be adjusted on the double wishbone front axle. As for the E70/E71, two replacement upper transverse control arms are available for the F01/F02 should the camber need to be changed (e. g. after an accident). These replacement upper transverse control arms enable positive (+5 mm) and negative (-5 mm) correction.

Front axle wheel alignment is required during service when:

FRONT AXLE WHEEL ALIGNMENT REFERENCE CHART - SCREW CONNECTION REPLACED

Component/screw Connection is Replaced		
Front axle subframe	YES	
Steering gear	YES	
Transverse control arm, bottom	YES	
Rubber mount for lower transverse control arm	YES	
Tension strut		NO
Rubber mount for tension strut		NO

Transverse control arm, top		NO
Rubber mount for upper transverse control arm		NO
Track rod	YES	
Swivel bearing	YES	
Wheel bearing		NO
Spring strut		NO
Coil spring		NO
Mount		NO

FRONT AXLE WHEEL ALIGNMENT REFERENCE CHART - SCREW CONNECTION RELEASED

Screw Connections are Released		
Front axle subframe to body (lowering)		NO
Steering gear unit to front axle subframe	YES	
Lower transverse control arm to front axle subframe	YES	
Lower transverse control arm to swivel bearing		NO
Tension strut to front axle subframe		NO
Tension strut to swivel bearing		NO
Upper transverse control arm to body		NO
Upper transverse control arm to swivel bearing		NO
Track rod to steering gear		NO
Track rod head to track rod	YES	
Track rod head to swivel bearing		NO
Spring strut to lower transverse control arm		NO
Strut mount to body		NO
Lower steering shaft to steering gear		NO
Steering column to lower steering shaft		NO

Rear Axle

Highlight in F01/F02

The integral-V rear axle is a revolutionary further development of the integral IV rear axle now installed in

many BMW models.

The integral IV rear axle fulfils the primary function of the running gear and wheel control in a unique way while making a significant contribution to driving dynamics characteristic of a BMW.

Safety functions are defined by the superior vehicle control characteristics. Effective decoupling of the road and drive train guarantees outstanding levels of acoustic and vibration comfort.

The further developed integral-V rear axle in the F01/F02 also provides these properties. In addition, the new rear axle has been specifically tuned to the new requirements of the F01/F02:

- Larger vehicle dimensions
- Greater total weight
- Greater drive output
- Higher drive torque
- Runflat tires.

In addition, the demanding objectives relating to driving dynamics and comfort have been correspondingly adapted while the new system integrates driving dynamics systems required for this purpose.

The integral-V rear axle primarily fulfils the driving dynamics functions of the mechanical chassis and suspension, i. e. define elastokinematic wheel control in all relevant driving situations.

The particularly innovative BMW development of the integral active steering (IAL), however, makes specific demands in terms of the **elastokinematics** of the integral-V rear axle: To a certain extent, the wheels on the rear axle must be able to execute steering movements.

Kinematics and elastokinematics

The spatial arrangement of the pivot points or pivot axes of the arms and links is known as kinematics. This term applies to components that are assumed to be non-deformable.

Elastokinematics takes into account the flexibility at least of the rubber-metal mounts, often of the ball joints and rarely of the components.

Various arms define the horizontal plane of the rear axle wheel suspension at the axle carrier and the wheel carrier. These arms are mounted such that they can rotate about an approximately horizontal axis of rotation and therefore allow vertical movement of the wheel carrier.

Kinematics is primarily of significance in terms of vehicle handling. The kinematics is arranged such that defined camber and toe-in angles are achieved between the wheel and road surface in response to the suspension and steering.

Kinematics is superimposed by elastokinematic effects. These elastokinematic effects occur as the movement points and movement axes are spatially displaced by the effect of the forces at the wheel.

New challenge for the integral rear axle

In terms of the F01/F02, the new integral active steering (IAL) as a BMW driving dynamics innovation, posed a completely new challenge to the engineers and the tried and tested integral IV rear axle. The integral active steering is made up of the active steering and the rear axle slip angle control (HSR).

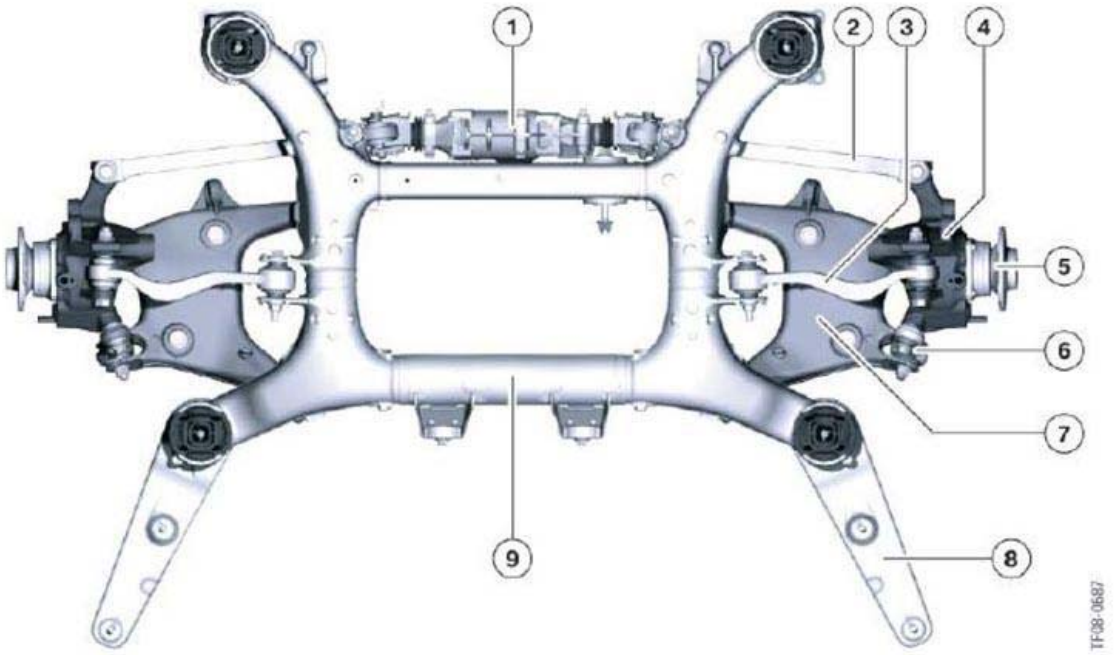


Fig. 4: Identifying Integral V Rear Axle Components With Integral Active Steering
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENT REFERENCE CHART

Index	Explanation
1	Actuator, rear axle slip angle control (HSR)
2	Track rod, left
3	Transverse control arm, top
4	Wheel carrier
5	Wheel bearing
6	Integral link
7	A-arm (swinging arm)
8	Thrust strut
9	Rear axle carrier

The principle of the integral-V rear axle makes it possible to resolve the conflict between driving dynamics and comfort. The dynamic and drive forces applied through the wheel contact point into the wheel suspension are taken up by the wheel carrier, rear axle carrier, three links and an A-arm (swinging arm).

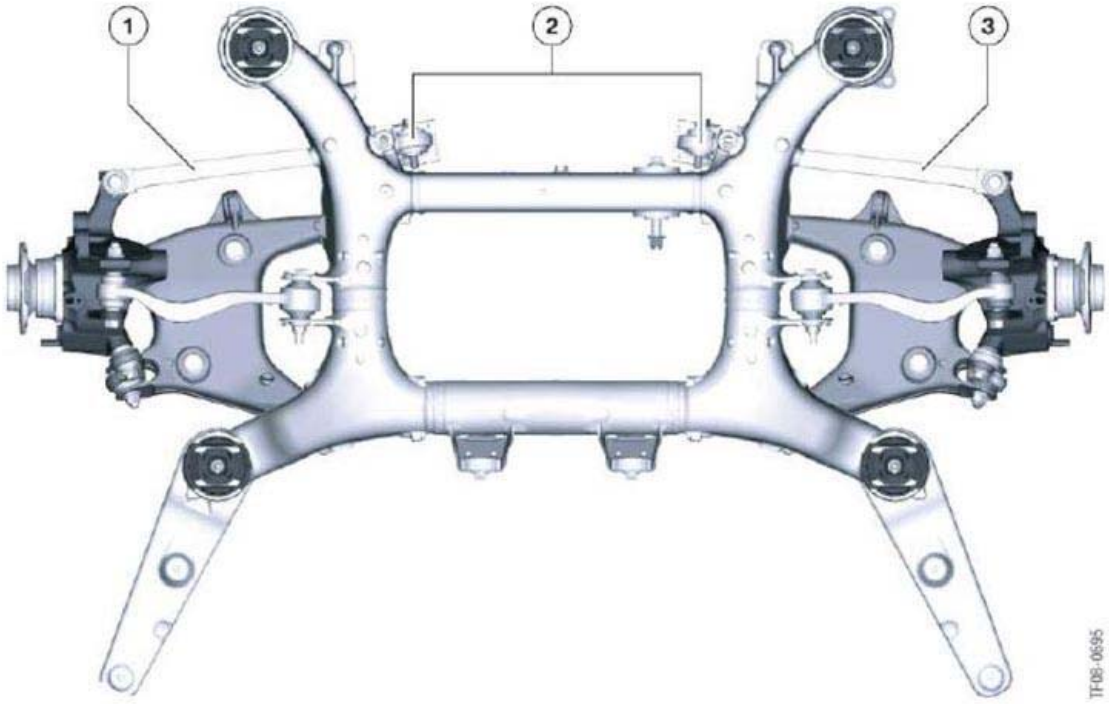


Fig. 5: Identifying Integral V Rear Axle Components Without Integral Active Steering
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENT REFERENCE CHART

Index	Explanation
1	Track rod, right
2	Bearing assemblies, track rod
3	Track rod, left

The design layout reduces the flexible pulling action in the wheel carrier and therefore enables lengthways damping of the wheel control, which is important for rolling comfort, by means of axially soft front link mounts on the rear axle carrier.

Thanks to the position of the spring on the wheel carrier, it is no longer necessary to support the weight of the vehicle on the rubber mounts on the rear axle carrier.

This optimum spring position in conjunction with specific lengthways control guarantees effective isolation of rolling and drive noise while significantly contributing to the refined smooth and quiet vehicle running characteristics.

The main criteria that governed the selection of materials included component weight, production process (cold forming, casting properties, welding properties), strength and deformation characteristics as well as corrosion resistance.

Two versions of the integral-V rear axle are available. Bearing assemblies are fitted on the two track rods if the vehicle is not equipped with integral active steering.

The revolutionary further development of the integral IV rear axle culminates in the BMW patented integral-V rear axle. The new arrangement of the arms and links as well as the use of ball joints facilitates a rear axle with steering capabilities.

Arm arrangement, E65 integral IV rear axle

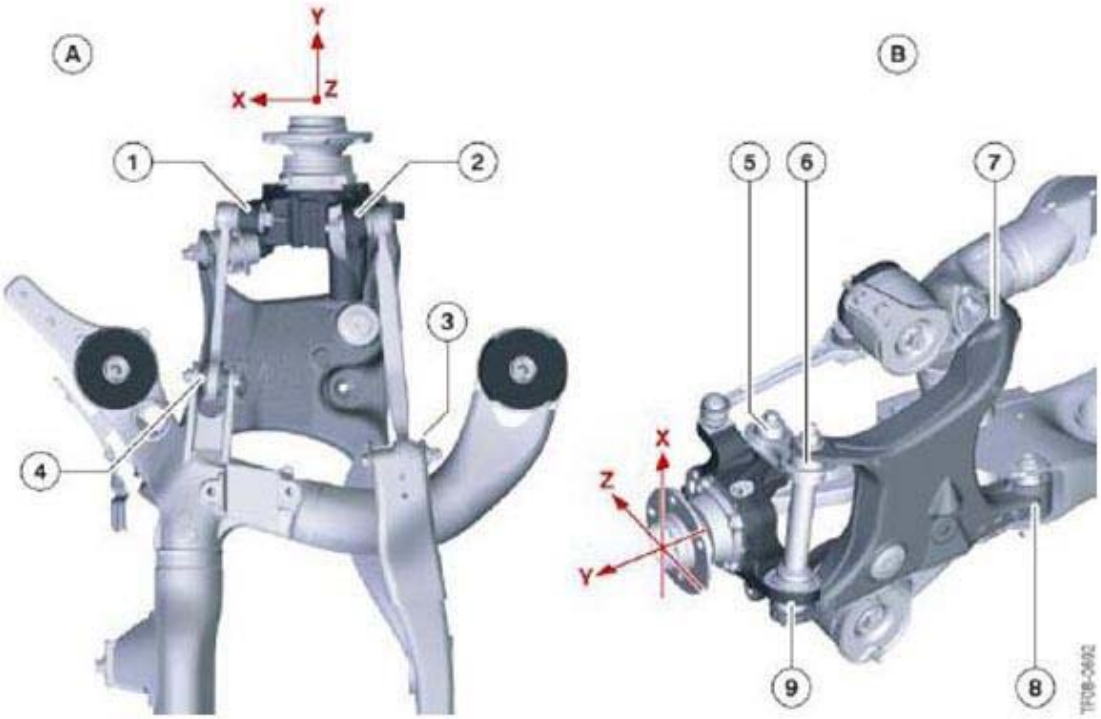


Fig. 6: View Of Arm Arrangement, E65 Integral IV Rear Axle
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Top view (forward direction x)
B	Bottom side view
1	Angle joint
2	Angle joint
3	Rubber mount
4	Rubber mount
5	Rubber mount
6	Rubber mount
7	Rubber mount
8	Rubber mount
9	Ball joint

Viewing the arrangement of the arms and links in the integral IV rear axle of the E65 it is difficult to imaging

that defined steering movement of the rear wheels about the Z-axis could be realized.

Theoretically, i. e. kinematically, the design of the integral IV rear axle could facilitate steering capabilities, however a large actuator would be required that could not be accommodated in the package space available on the F01/F02. This would have to be designed considerably longer and would therefore be decisively heavier and more expensive.

Arm arrangement, integral-V rear axle in the F01/F02

Summary of the design layout:

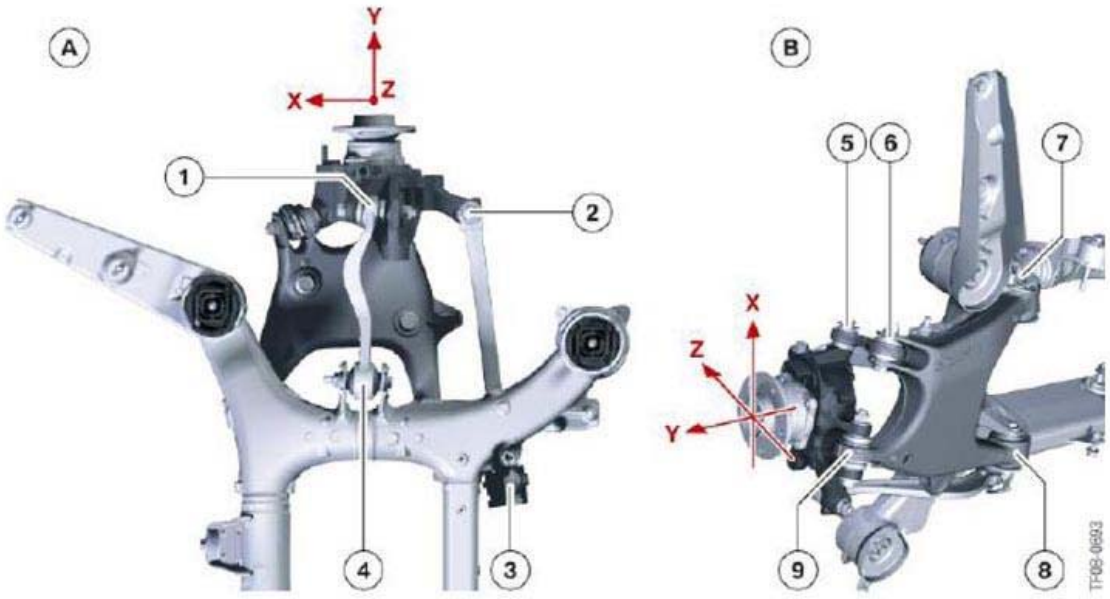


Fig. 7: View Of Arm Arrangement, Integral-V Rear Axle, F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Top view (forward direction x)
B	Bottom side view
1	Ball joint
2	Ball joint
3	Rubber mount
4	Ball joint
5	Rubber mount
6	Rubber mount
7	Rubber mount
8	Rubber mount
9	Ball joint

The system consists of a wheel carrier that is controlled from below by a torsionally rigid A-arm (swinging arm).

At the bottom, the wheel carrier is connected directly by means of a first bearing mount and indirectly by means of a second bearing mount, in connection with an integral link arranged vertically with respect to the plane of the A-arm (swinging arm), to the wheel carrier.

The two rubber mounts on the inside of the vehicle are connected to the rear axle carrier such that they are torsionally soft and can be displaced axially.

The upper transverse control arm lies approximately in the vertical plane of the drive shaft and therefore also at the center point of the wheel.

The rear track rod arranged approximately at the center point of the wheel is either mounted on the rear axle carrier or connected to the actuator of the integral active steering.

Service

NOTE: The track and camber at the rear axle can still be adjusted by means of two eccentric screws, however, a new procedure must be observed!

REAR AXLE DIMENSION REFERENCE CHART

Description (Rear axle data)	F01 (Standard)	F01 (optional HSR)
Wheel base (mm)	3070	3070
Track width	1628	**1650**
Camber	-1° 50' ±15'	-1° 50' ±15'
Camber difference	0° ±30'	0° ±30'
Total toe-in	14' ±10'	16' ± 6'
Thrust angle	0° ±12'	0° ±12'

Damping/suspension

The standard chassis and suspension system of the F01 features steel springs on the front and rear axle. The standard chassis and suspension on the F02 has steel springs on the front axle with the single axle air suspension (EHC) fitted on the rear axle. The F01/F02 is equipped as standard with vertical dynamics control featuring electronically controlled damper systems. In addition, the following combinations are available:

- Standard suspension with single axle air spring
- Dynamic drive with steel springs and VDC dampers
- Dynamic drive with 2 steel springs and single axle air spring and VDC dampers.

BMW is the first car maker to offer as standard a continuously controlled adjusting damper system irrespective of tension/compression.

The outstanding properties of this new (VDC2) adjusting damper are:

- Advanced opening adjustment for improved body stabilization. Realized by adjustments even at low damper speeds.
- Difference between "soft" and "hard" in connection with driving dynamics control easily identifiable by the customer.
- Separately tuned identifier for rolling comfort through tension characteristics irrespective of compression.

Brakes

Function-optimized lightweight construction brakes are used on the F01/F02.

Lightweight brake rotors with riveted aluminum hubs are installed on the front axle, while cast iron rotor are used on the rear axle.

Floating brake calipers are fitted on the front and rear axle. The brake system in the F01/F02 features the known brake wear monitoring system for the CBS indicator.

Technical data, front axle:

TECHNICAL DATA - FRONT BRAKE

Technical data, front brakes	Specification
Brake caliper, piston diameter (mm)	60
Brake disc, thickness (mm)	36
Brake disc diameter (mm)	373
Brake disc diameter (inches)	14.7
Brake disc construction	Aluminum (riveted)
Brake caliper construction	Aluminum

Technical data, rear axle:

REAR BRAKE - TECHNICAL DATA

Technical data, rear brakes	Specification
Brake caliper, piston diameter (mm)	44
Brake disc, thickness (mm)	24
Brake disc diameter (mm)	368
Brake disc diameter (inches)	14.5
Brake disc construction	Cast iron
Brake caliper construction	Cast iron

Brake caliper

Brake calipers with optimized function and efficiency are fitted on the F01/F02.

The frame structure of the floating caliper effectively uses the package space available in the wheel.

In connection with effective brake cooling, the brake system achieves a high degree of thermal efficiency. The aluminum housing of the floating caliper saves weight while ensuring maximum operating efficiency.

Brake disc

The familiar riveted aluminum hub also saves weight while drastically reducing the shielding effect that may occur under harsh braking conditions, i. e. deformation of the brake disc caused by thermal material expansion. Internally ventilated brake discs are fitted on the front and rear axle.

Steering

The steering column in the F01/F02 is ergonomics, comfort and passive occupant designed to conform with the most safety all coupled with characteristic BMW demanding requirements in terms of steering properties.

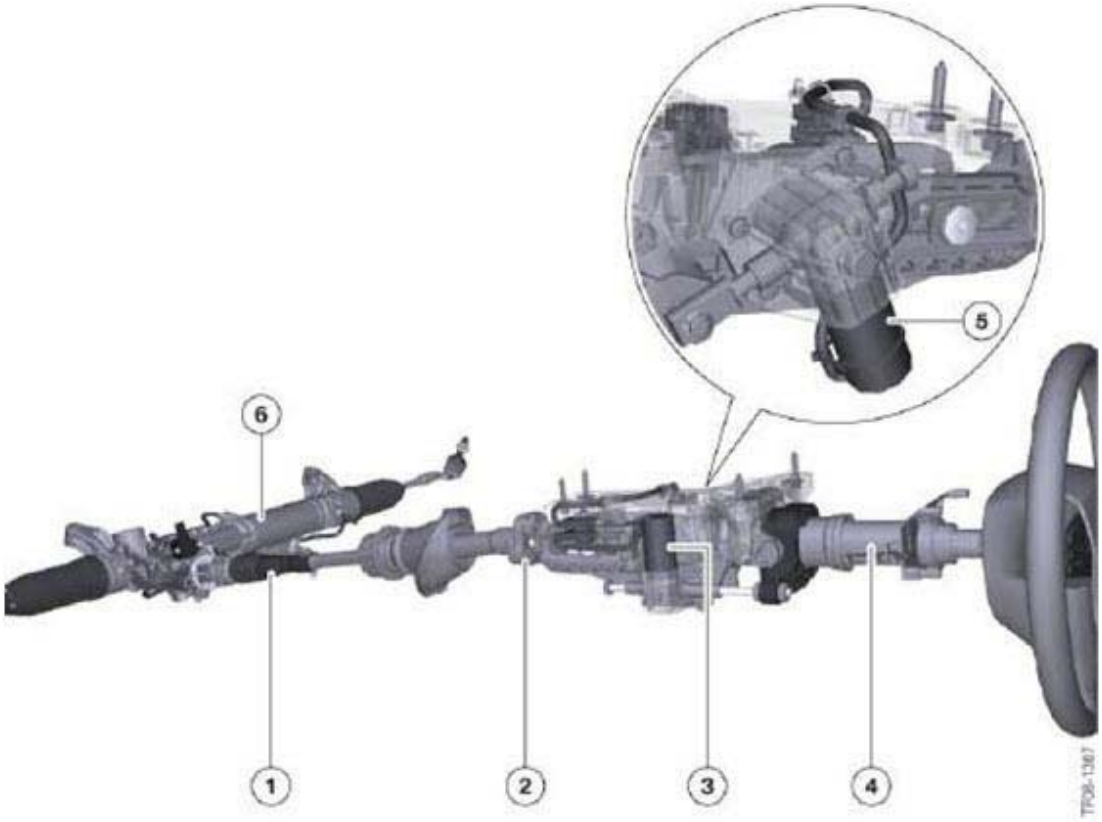


Fig. 8: Identifying Steering Column Components, F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENT REFERENCE CHART

Index	Explanation
1	Splined tube
2	Flexible coupling
3	Actuator motor, left
4	Crash tube

5	Actuator motor, right
6	Steering gear

The F01/F02 is equipped with an electrically operated steering column with infinitely variable horizontal and vertical adjustment as standard.

- Outstanding ergonomics ensured by an optimum adjustment range for the steering wheel position:
  - Horizontal ± 30 mm
  - Vertical ± 20 mm
- Additional comfort function provided by easy entry and exit:
  - When getting in and out of the vehicle, the steering wheel temporarily moves into the topmost position thus providing maximum freedom of movement.
- Outstanding crash safety provided by the familiar, innovative BMW crash system, specifically tuned and featuring force-dependent energy absorbers.

The steering column has a motor for in/out adjustment and a motor for up/down adjustment with a specially developed gear mechanism.

Each of these low-noise drive units is mounted acoustically decoupled executes the adjustment with the aid of motor/driven flexible spindles.

The components of the steering column are optimized in terms of rigidity in the comfort-relevant frequency range to reduce vibration and avoid disturbing steering wheel vibration and have been developed in line with a magnesium and aluminum lightweight construction concept.

The flexible coupling fitted in the steering column represents the perfect means of finely tuning the steering characteristics and driving comfort. Vehicle-specific loop packages are vulcanized in elastomer in this flexible coupling, allowing extremely high torque to be transmitter reliably and precisely. The steering column is thus successfully decoupled from disturbing influences caused by excitation from the road surface (axial impact or radial torque peaks).



Fig. 9: Identifying Crash Sleeve On Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Normal position (travel range 0 mm)
2	Crash position (travel range 80 mm)

The innovative crash system essentially consists of a crash adapter and crash tube. In the event of a crash, the impact energy is progressively reduced for the driver by the crash tube breaking open and deforming, thus providing the advantage of reduced stress on the occupants in the event of a crash (integral part of the 5-star philosophy at BMW).

In addition, the lower and center steering shaft collapses during the crash thus preventing penetration of the steering column into the passenger compartment. The system design also prevents the back displacement of all components in the engine compartment and possible damage to the bulkhead.

Wheels and Tires

Unlike the E65 predecessor, the F01/F02 is fitted with the RunFlat System Component RSC package on board as standard.

Highlights of the safety tires:

The BMW Group has put together a safety package with the aim of avoiding such accidents as well as the risk involved with changing a tire at the side of the road, at night or in wet conditions, in tunnels or at road construction.

The BMW runflat safety system:

- Warns the driver in good time of imminent tire pressure loss so that countermeasures can be taken
- Allows the journey to be continued for a defined distance even in the event of complete loss of tire pressure
- Keeps the tire safely on the rim even in the event of sudden tire pressure loss at high speed.

The system consisting of the RSC tires, rims with EH2+ contour and the electronic tire pressure monitoring system (TPMS), renders a spare wheel or space-saver wheel, breakdown kit or vehicle jack unnecessary and this creates more storage space in the luggage compartment while also saving weight.

Extended Hump rims (EH2+)

The specially shaped rim humps ensure that the RSC tire cannot detach from the rim even in the case of sudden tire pressure loss. This means substantially greater safety particularly when driving at high speed and on winding roads.

TPMS

The Tire Pressure Monitoring System monitors the tire pressure via wheel mounted pressure sensors. A warning lamp informs the driver of any irregularities that occur due to the loss of tire pressure.

NOTE: The TPMS system does not exempt the driver from regularly checking the tire pressure.

After changing the tire pressure or after changing a tire, the TPMS system must be reinitialized in order to restore the target values with the correct tire pressure.

The entire safety package consists of three components:

- Runflat tires
- Extended hump rims (EH2+)
- Tire Pressure Monitoring System (TPMS)

RSC tires with emergency running properties

With its reinforced side walls, additional strip inserts and heat-resistant rubber mixtures, even when completely depressurized, the "self-supporting tire" makes it possible to continue the journey for a limited distance at a maximum speed of 50 mph. This means each tire is also its own spare wheel.

The maximum range after complete tire pressure loss is:

- approximately 250 miles at low vehicle load
- approximately 150 miles at medium vehicle load
- approximately 50 miles at high vehicle load.

ABS, ASC and DSC remain fully operational even in the event of complete tire pressure loss.

When driving with a run flat tire with no pressure, the standard VDC automatically distributes the vehicle weight over the remaining wheels so as to relieve the load on the depressurized tire with the aim of achieving the highest possible range for continued operation.

F01/F02 Wheel sizes

For the benefit of creating a sports appearance and to improve the overall design, compared to the E65/E66 the track width on the F01/F02 has been increased while the wheel arch overhang has been reduced to a minimum.

In addition, the entire range of wheels for the F01/F02 has been aligned flush by correspondingly matching the outer rim offset so that, with the exception of the different rim dimensions, there are no longer any differences between the tire sizes.

The following table lists the standard wheels on the F01/F02.

WHEEL SIZE REFERENCE CHART

Explanation	750i	750Li
Front tire	245/50 R 18 Y 100 Y RSC	245/50 R 18 Y 100 Y RSC
Rear tire	245/50 R 18 Y 100 Y RSC	245/50 R 18 Y 100 Y RSC

Front rim	8J x 18 EH2+LM - IS30	8J x 18 EH2+LM - IS30
Rear rim	8J x 18 EH2+LM - IS30	8J x 18 EH2+LM - IS30

F01 DYNAMIC DRIVING SYSTEMS

INTRODUCTION

Integrated Chassis Management (ICM)

History

A central, higher-level driving dynamics control system was first introduced in BMW vehicles several years ago.

The introduction of the longitudinal dynamics management system in the BMW 3 Series (E9x) was the first step in this direction. The longitudinal dynamics control functions, Dynamic Cruise Control and Active Cruise Control, were integrated into one control unit, the LDM control unit. These integrated functions considerably enhanced the harmony and coordination of drive and brake actuation.

The Vertical Dynamics Management made its debut in the BMW X5 (E70) with the VDM control unit: the integrated Vertical Dynamics Control (VDC) function controls the adjustable dampers. In contrast to the earlier system, not only ride-level heights and vertical acceleration are used as the input signals. Instead, the higher-level control strategy of the Vertical Dynamics Control takes all signals relevant to driving dynamics into account, including, for example, road speed, and longitudinal and lateral acceleration.

The VDM control unit also coordinates the Vertical Dynamic Control and Active Roll Stabilization (ARS) functions. Overall, this meant that wheel contact with the road surface was improved and the vertical movement of the body reduced for a wider variety of road situations.

In addition to the VDM control unit, the BMW X6 (E71) was also equipped with an ICM control unit that for the first time incorporates both the longitudinal and lateral dynamics control functions. The longitudinal and lateral motion of the vehicle is evaluated centrally in the ICM control unit.

Following on from this development, the dynamic driving systems Active Steering and Dynamic Performance Control are now used and their interaction is of course also coordinated by the ICM control unit.

Significant at this stage is the definition of the ICM as the main control unit for the control functions. The actuators on the other hand are activated by control units specially intended for this purpose.

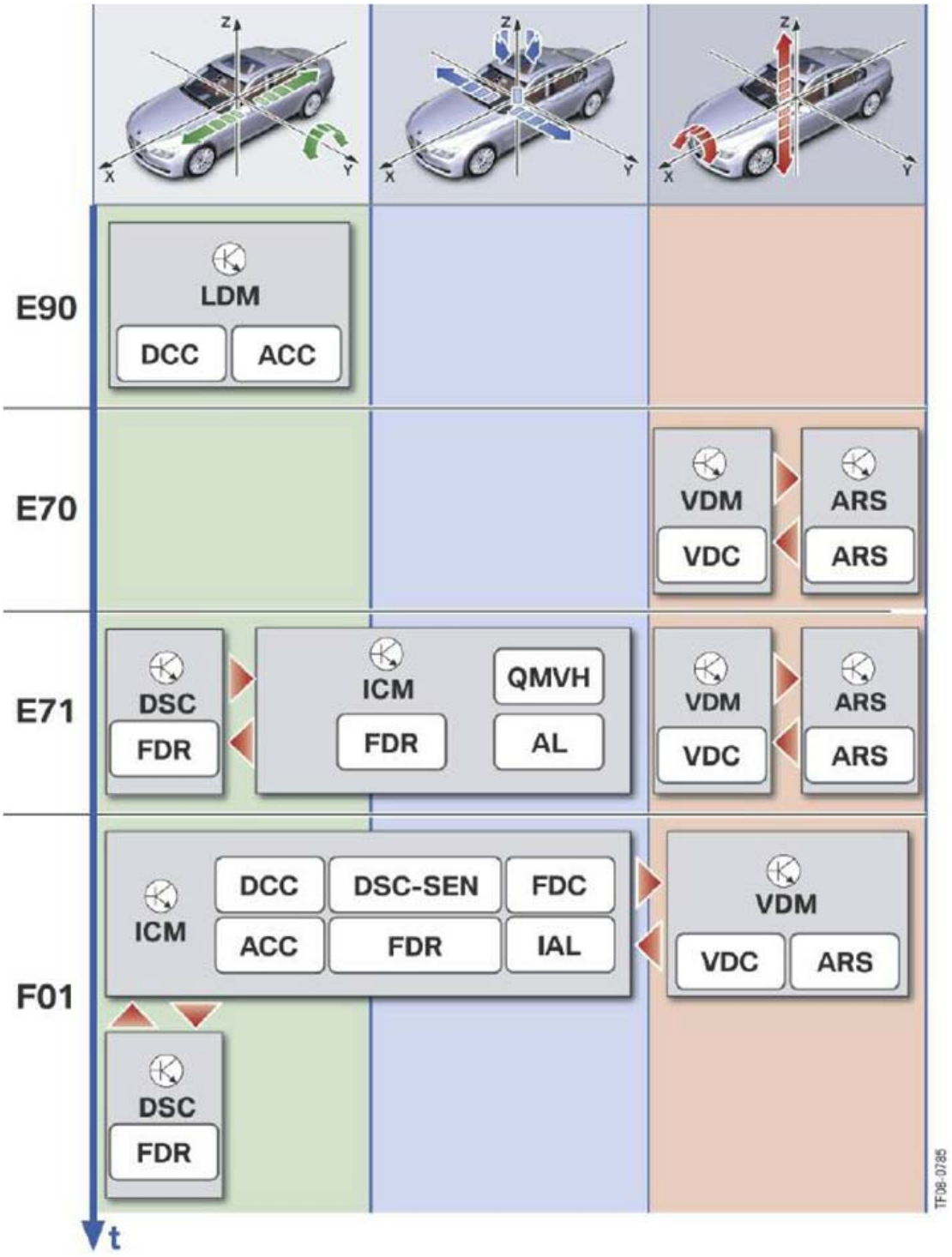


Fig. 10: Evolution Stages Of Integrated Chassis Management
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

LDM	Control unit, Longitudinal Dynamics Management
DCC	Dynamic Cruise Control function (cruise control with braking function)
ACC	Active Cruise Control function
VDM	Control unit, Vertical Dynamics Management
VDC	Vertical Dynamics Control function
ARS	Control unit or function, Active Roll Stabilization (Dynamic Drive)
DSC	Control unit, Dynamic Stability Control
FDR	Driving dynamics control function
ICM	Control unit, Integrated Chassis Management
QMVH	Lateral torque distribution at rear axle (Dynamic Performance Control)
AL	Active Steering function
DSC-SEN	DSC sensor in the ICM control unit
FDC	Driving dynamics control switch
IAL	Integral Active Steering function

The red triangles denote interaction between the control units and functions. This is not always purely be an exchange of sensor signals. Control signals and reference values may be also used (for example) to influence the driving dynamics control in the ICM control unit or the Active Roll Stabilization in the VDM control unit.

New Control Units

Two newly developed control units for dynamic driving systems will also be used in the F01/F02:

- Integrated Chassis Management (ICM) and
- Vertical Dynamics Management (VDM).

Although their names are already familiar from the E70/E71, they differ considerably in their functional range and design.

A multitude of driving dynamics functions is concentrated in these control units.

In addition to central signal provision, the essential functions of the ICM control unit are concerned with longitudinal and lateral dynamics. These include the control function for the new Integral Active Steering, for example.

The vertical dynamics functions on the other hand are incorporated in the VDM control unit: Vertical Dynamics Control in the 2nd generation and Active Roll Stabilization (also: Dynamic Drive).

Although both control units are standard equipment, two expansion stages are available in each case, depending on the options fitted to the vehicle.

ICM control unit expansion stages

The basic version of the ICM control unit is fitted as standard in the F01/F02. In this case, the vehicle is provided with the Servotronic steering system and cruise control driver assistance function with braking function.

The high-performance version of the ICM control unit is used if one or both of the following options are ordered by the customer:

- Integral Active Steering
- Active Cruise Control with Stop&Go function

Expansion stages of VDM control unit

The basic version of the VDM control unit contains the Vertical Dynamics Control function. This is included in the standard equipment of the F01/F02.

The high-performance version of the VDM control unit is fitted if the customer also orders the option Active Roll Stabilization (ARS). The high-performance version also incorporates the output stages required for activation of the hydraulic valves in the ARS.

New Evolution Stage in Driving Dynamics Control

The notion of "Integrated Chassis Management" is significantly developed further in the F01/F02. The two main objectives were to improve the performance and interaction of the individual dynamic driving systems. In order to achieve the desired dynamic effect in each road situation, the most suitable actuator can now be selected and activated. It may of course be useful to operate several actuators in tandem. Examples of this are activating the brakes for individual wheels or superimposing a steering angle using Integral Active Steering.

A further task of the ICM control unit is to make the driving dynamics condition available throughout the entire vehicle through in the form of signals. This is why the DSC sensor in the F01/F02, which was previously fitted separately, has now been integrated into the ICM control unit.

This means that all systems have access to the same information provided by the ICM control unit. As a consequence, the potential for errors, particularly in networked systems, is reduced and the system reliability of systems is increased. Further, this simplifies the diagnosis of the interconnected system as the fault code memory entries for the driving dynamics signals are now stored centrally in the ICM control unit and are no longer distributed between many control units.

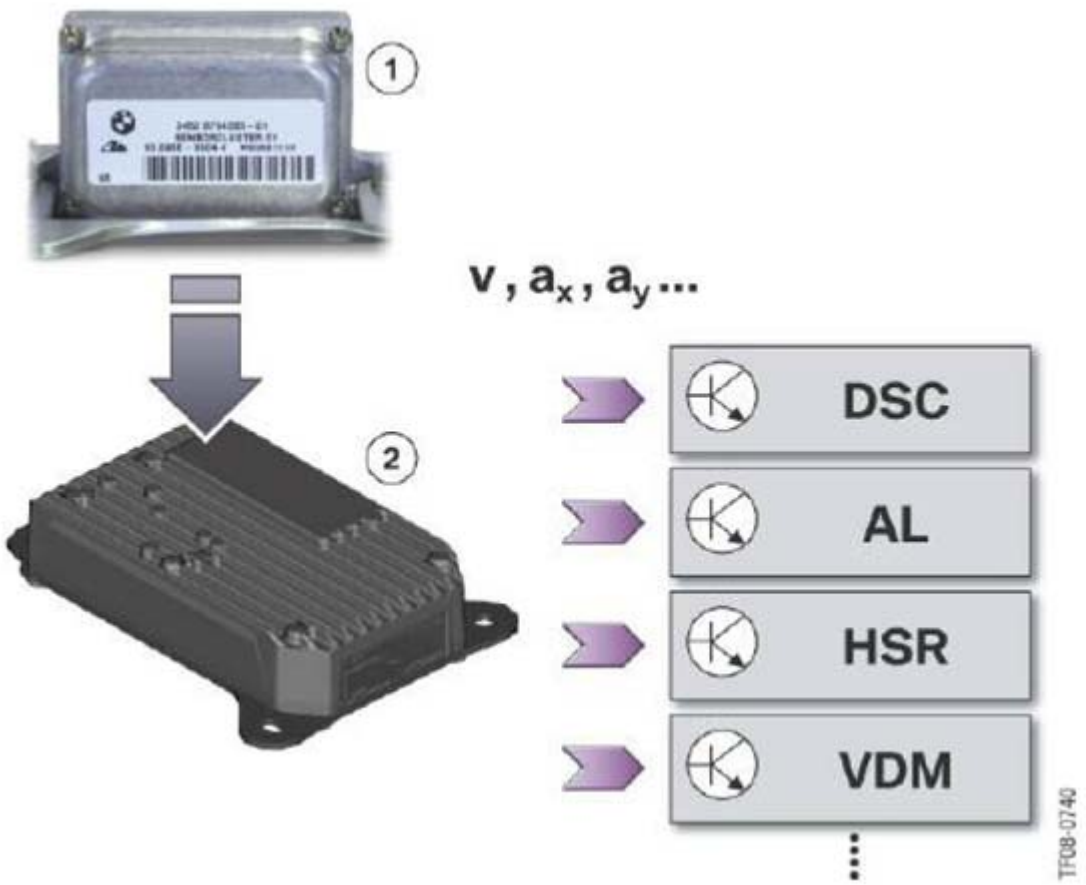


Fig. 11: Identifying Driving Dynamics Signals By ICM Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	DSC sensor integrated into the ICM control unit
2	ICM control unit
v	Road speed
ax	Longitudinal acceleration
ay	Lateral acceleration
DSC	Dynamic Stability Control
AL	Active Steering
HSR	Rear axle slip angle control
VDM	Vertical Dynamics Management

The result for the customer is perfect harmony in terms of vehicle handling - irrespective of the equipment specification and road situation. This uses the possibilities for maximizing convenience, agility and stability to the full.

The customer's experience of this harmony in terms of vehicle handling is especially enhanced by the new

Driving Dynamics Control function. This offers several particularly distinctive vehicle characteristics that determine how the vehicle handling as a whole is perceived by the driver and passengers. The driver can use the driving dynamics switch to select a characteristic that perfectly matches the specific driving requirement or section of road.

Standard Equipment and Options

The following table shows the standard equipment and options available for dynamic driving systems. A specific model (750i) has been selected in order to compare the functions and equipment levels of the E65 and F01.

DYNAMIC DRIVING SYSTEM FUNCTIONAL CHART

Dynamic Driving System	E65/E66		F01/F02	
	Standard	Optional	Standard	Optional
Higher Level Driving Dynamics Systems				
Integrated Chassis Management			•	
Driving Dynamics Control			•	
Longitudinal Dynamics				
Dynamic Stability Control	•		•	
Electro-Mechanical Parking Brake (EMF)	•		•	
Lateral Dynamics				
Servotronic	•		•	
Integrated Active Steering (IAL)				•
Vertical Dynamics				
Electronic Damping Control (continuous) EDC-K		•		
Vertical Dynamics Control 2 (VDC 2)			•	
Active Roll Stabilization	•			•
Electronic Height Control		• (E65/66)	• (F02)	
Driver Assistance				
Cruise Control (FGR)	•			
Cruise Control with			•	

braking function (DCC)				
Active Cruise Control (ACC)		•		
Active Cruise Control with Stop and Go (ACC Stop and Go)				•

SYSTEM OVERVIEW

Installation Locations in the Vehicle

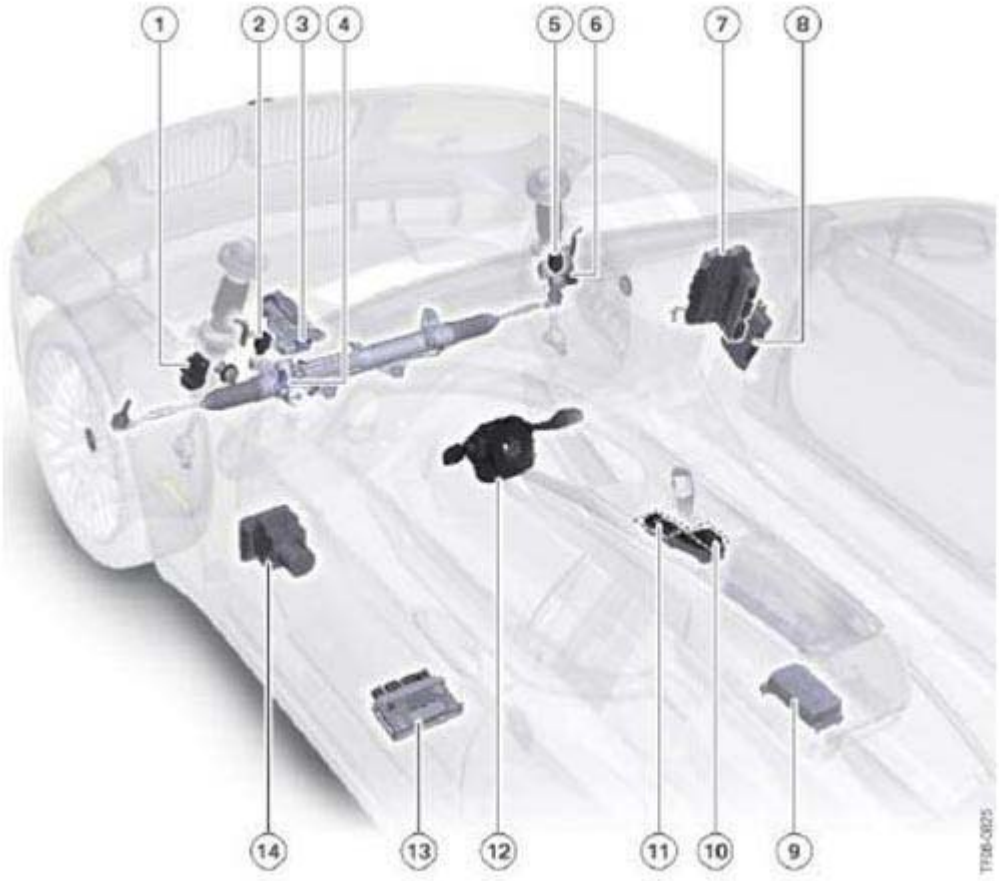


Fig. 12: Identifying Control Units, Sensors And Actuators Of Dynamic Driving Systems, F01/F02 (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENT REFERENCE CHART

Index	Explanation
1	Electronic Damping Control satellite, front left
2	Ride-height sensor, front left
3	Valve for electronic flow rate adjustment of power

	steering pump (EVV)
4	Servotronic valve
5	Ride-height sensor, front right
6	Electronic Damping Control satellite, front right
7	Junction box electronics and fuse carrier, front
8	Control unit for Vertical Dynamics Management
9	Control unit for Integrated Chassis Management
10	Buttons for electromechanical parking brake and Automatic Hold
11	Driving dynamics switch and DTC button
12	Steering column switch cluster with steering angle sensor
13	Control unit for Active Steering
14	Control unit and hydraulic unit for Dynamic Stability Control

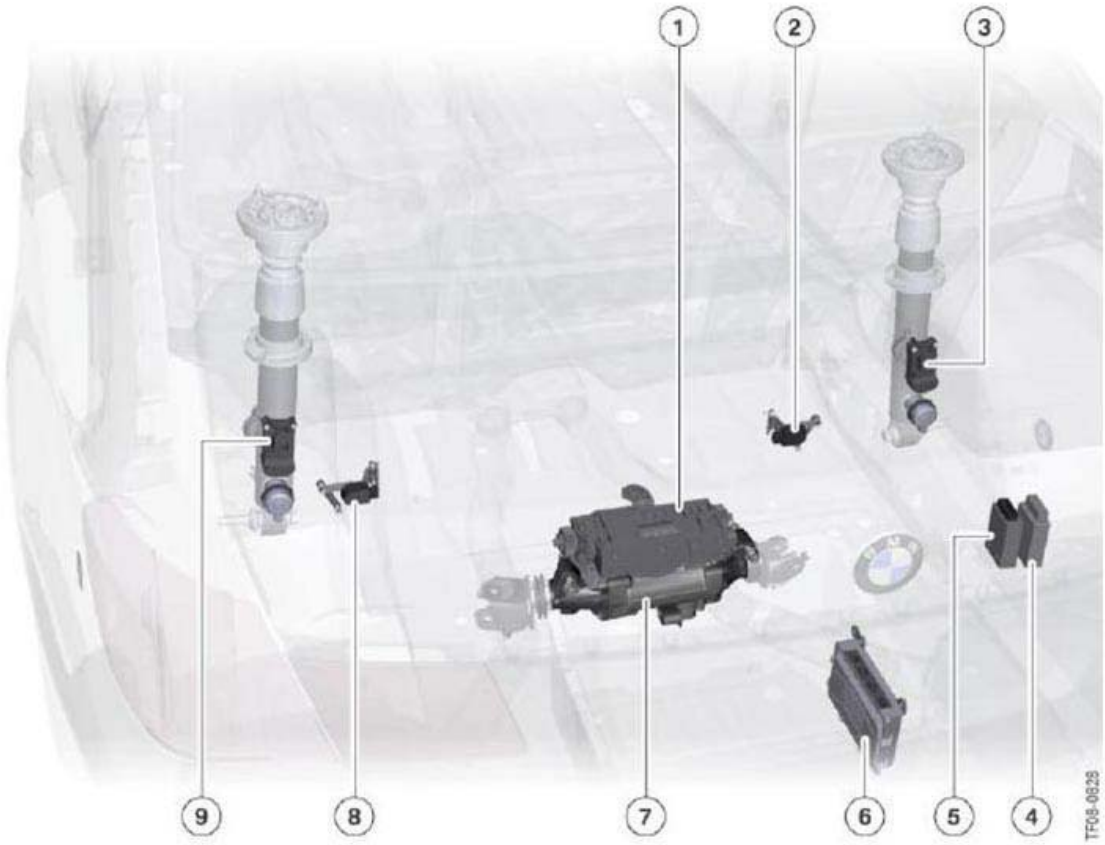


Fig. 13: Identifying Control Units, Sensors And Actuators Of Dynamic Driving Systems, F01/F02 (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENT REFERENCE CHART

Index	Explanation
1	Control unit and actuating unit for electromechanical parking brake
2	Ride-height sensor, rear right
3	Electronic Damping Control satellite, rear right
4	Control unit for TPMS
5	Control unit for electronic ride-height control
6	Control unit for rear axle slip angle control
7	Actuating unit for rear axle slip angle control
8	Ride-height sensor, rear left
9	Electronic Damping Control satellite, rear left

Both graphics show the installation locations of the most important control units, sensors and actuators of the dynamic driving systems in the F01/F02. These have been split into two graphics to maintain clarity of overview and not for functional reasons.

Bus System Overview for Dynamic Driving Systems

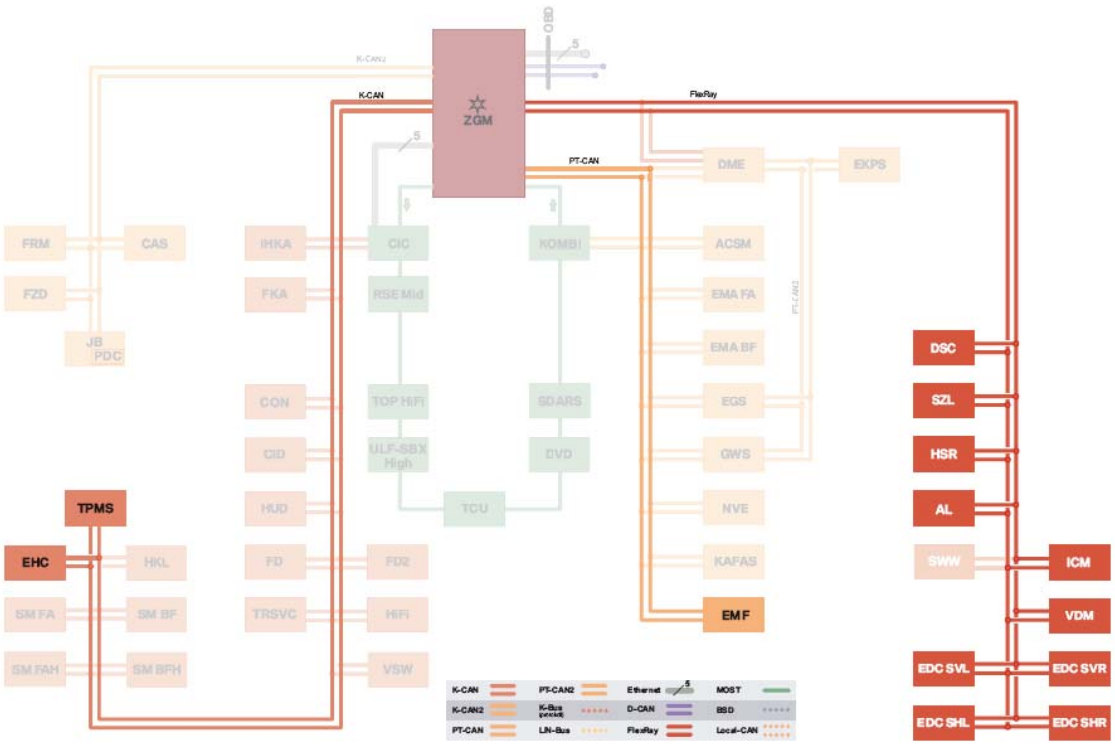


Fig. 14: Bus System Overview For Dynamic Driving Systems
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX DESCRIPTION CHART

Index	Explanation
AL	Active Steering

DSC	Dynamic Stability Control
EHC	Electronic ride-height control
EDC SHL	Electronic Damping Control satellite, rear left
EDC SHR	Electronic Damping Control satellite, rear right
EDC SVL	Electronic Damping Control satellite, front left
EDC SVR	Electronic Damping Control satellite, front right
EMF	Electromechanical parking brake
ICM	Integrated Chassis Management
HSR	Rear axle slip angle control
TPMS	Tire Pressure Monitoring System
SZL	Steering column switch cluster with steering angle sensor
VDM	Vertical Dynamics Management
ZGM	Central gateway module

Integrated Chassis Management System Circuit Diagram

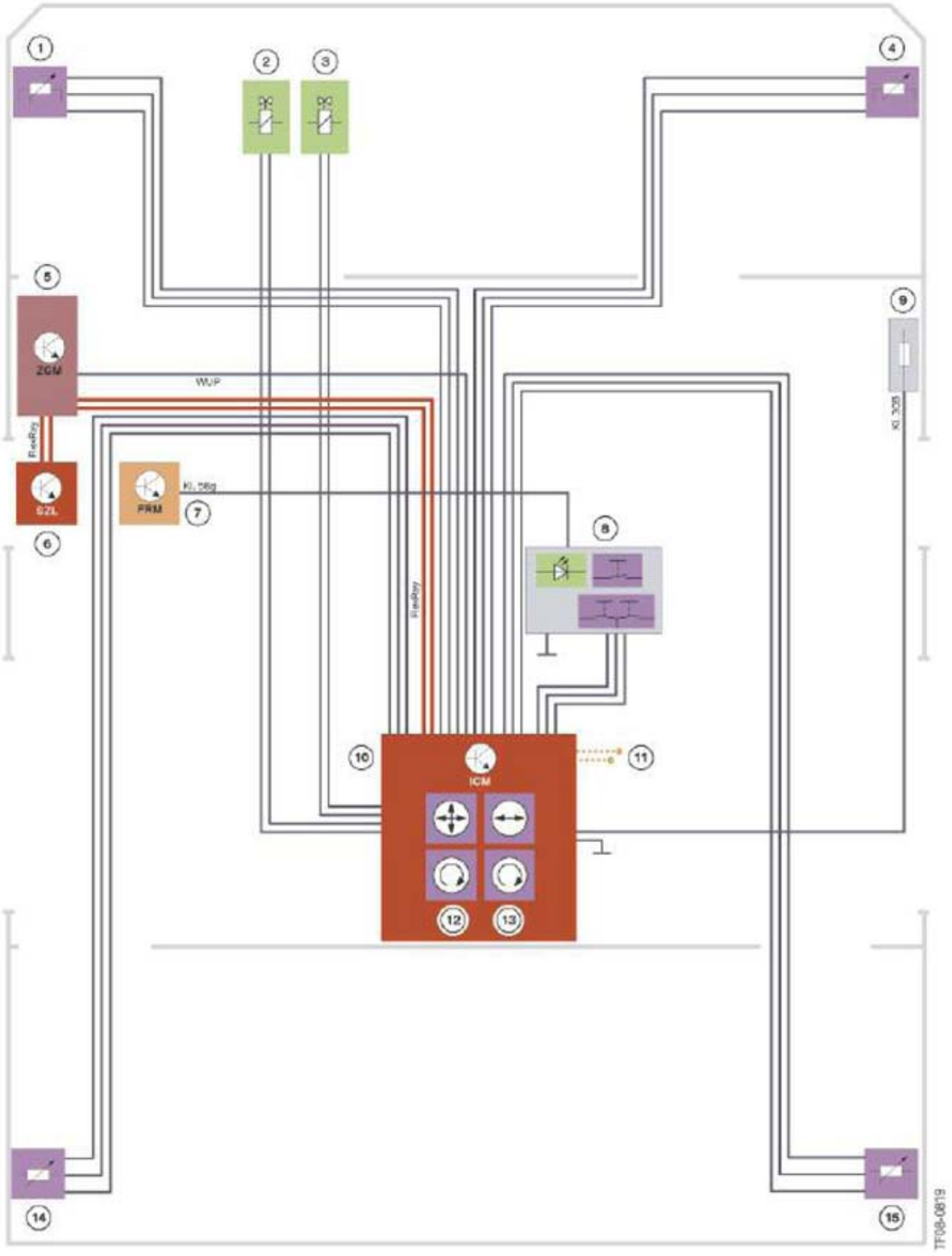


Fig. 15: Integrated Chassis Management System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Ride-height sensor, front left
2	Servotronic valve
3	EVV valve
4	Ride-height sensor, front right
5	Central gateway module
6	Steering column switch cluster with steering angle sensor
7	Footwell module
8	Driving dynamics switch and DTC button
9	Fuse for ICM control unit (fuse carrier at front, junction box electronics)
10	Integrated Chassis Management
11	Local CAN
12	DSC sensor in the ICM control unit (longitudinal acceleration, lateral acceleration, yaw rate)
13	Redundant DSC sensor in the ICM control unit (lateral acceleration, yaw rate)
14	Ride-height sensor, rear left
15	Ride-height sensor, rear right

The purpose of the local CAN is to connect the ICM control unit to the radar sensors for the Active Cruise Control with Stop&Go function.

Driving Dynamics Control System Circuit Diagram

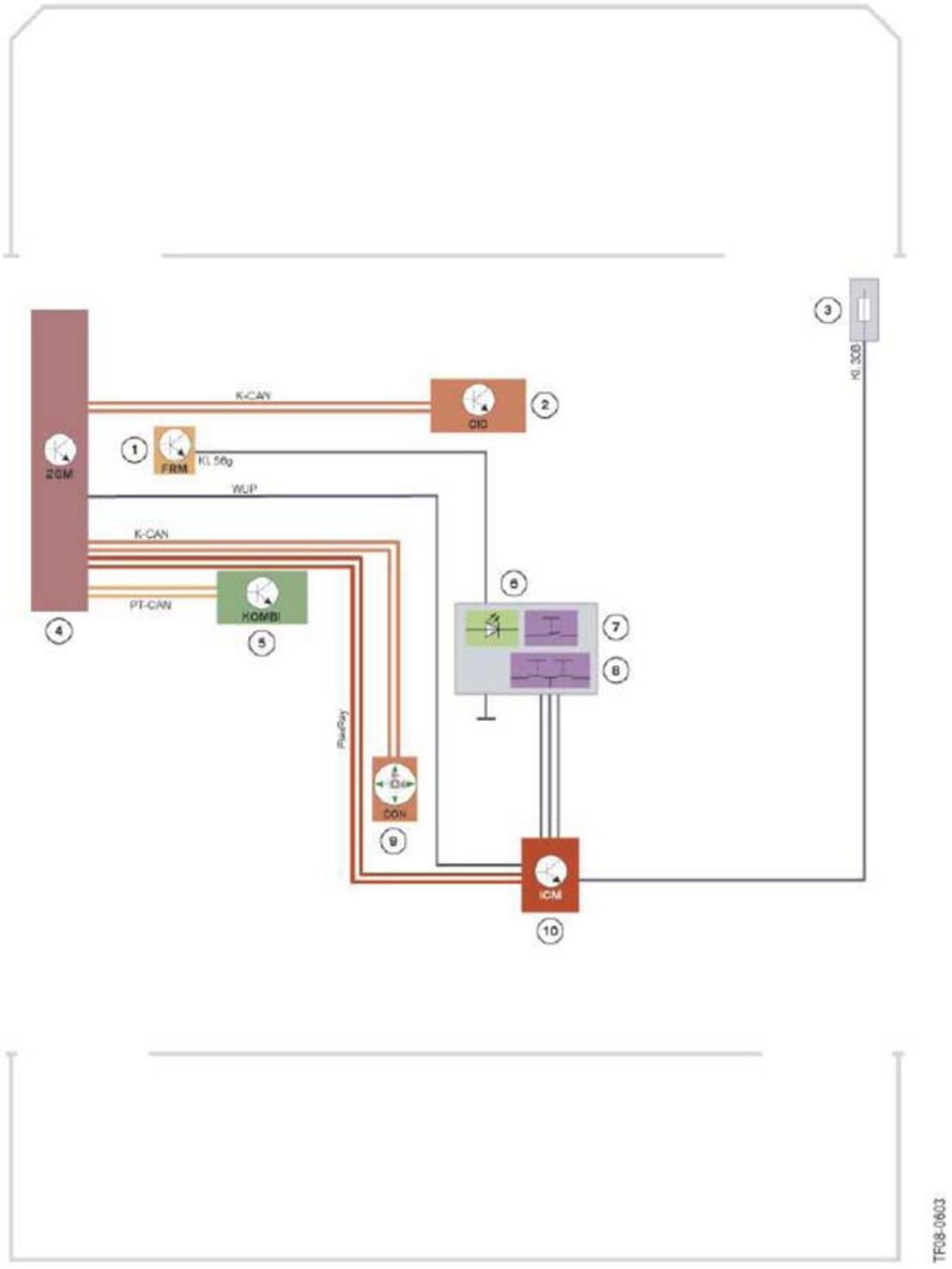


Fig. 16: Driving Dynamics Control System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Footwell module
2	Central Information Display
3	Fuse for ICM control unit (fuse carrier at front, junction box electronics)
4	Central gateway module
5	Instrument cluster
6	Operating unit for center console with locating lamp
7	DTC button
8	Driving dynamics switch
9	Controller
10	Integrated Chassis Management

This system circuit diagram shows the operator control and display elements for the driving dynamics control function. For clarity of overview, the drive and dynamic driving systems upon which the driving dynamics control acts have been omitted. These are described in the Functions section instead.

FUNCTIONS

Integrated Chassis Management

Overview

With the E71, the notion of a higher-level driving dynamics control system was implemented for the first time in a standard model. This central function is also referred to as "Integrated Chassis Management" ("ICM" for short) and is integrated in the control unit of the same name in the E71.

The previous strategy was to use one control unit to perform the control tasks for each main movement direction. This approach was not employed in the E71 or the F01/F02.

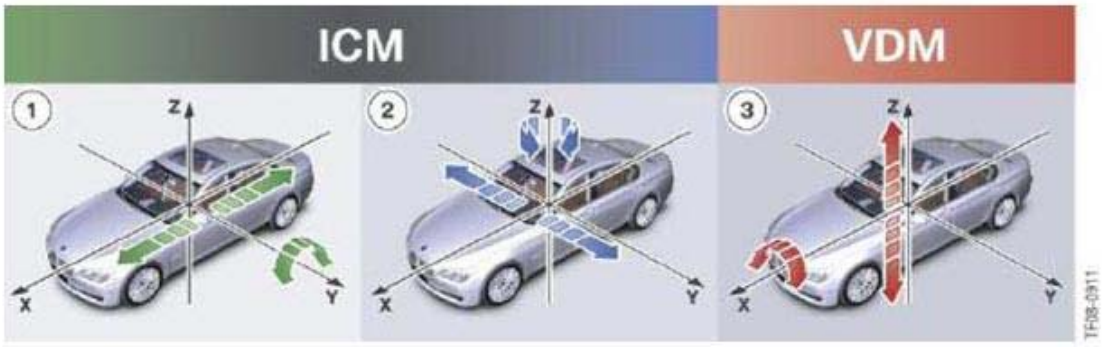


Fig. 17: Identifying Control Units And Main Movement Directions Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Longitudinal dynamics

2	Lateral dynamics
3	Vertical dynamics
ICM	Integrated Chassis Management
VDM	Vertical Dynamics Management

As is the case in the E71, the new ICM control unit in the F01/F02 essentially performs the calculations for the control functions that influence the longitudinal and lateral dynamics. The actuators are activated by separate control units (e. g. AS control unit). The functional range of the ICM control unit in the F01/F02 has grown considerably when compared to the E71.

The Vertical Dynamics Management (VDM) is still responsible for controlling the vertical dynamics. The vertical dynamic control and dynamic drive functions are therefore accommodated in the VDM control unit. Signals that provide information on the current driving situation are obviously exchanged between the ICM and VDM.

The main focus of this section is to describe the functions of the ICM control unit.

An introductory overview of these functions is provided in the following illustration and explanation. The functions are dealt with in more depth in the following chapters.

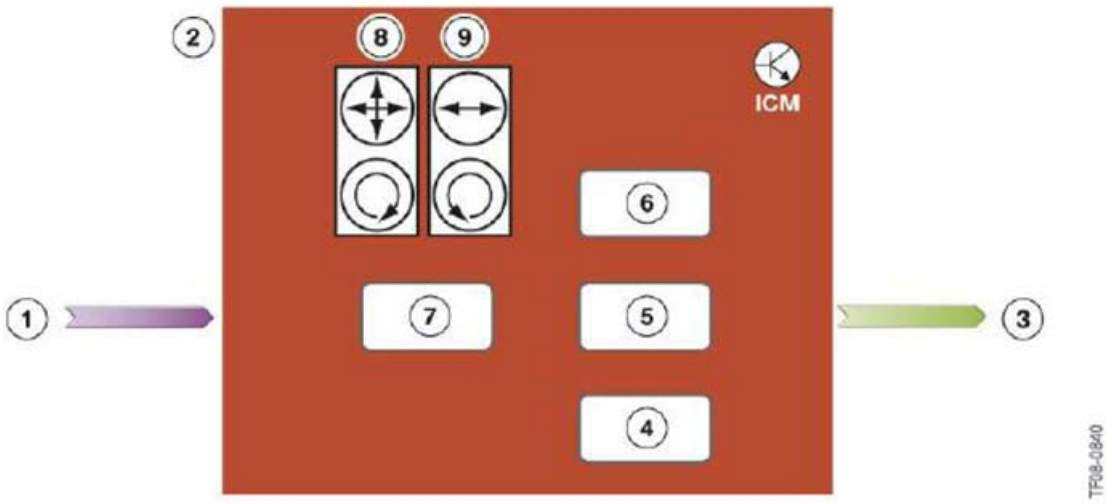


Fig. 18: Identifying ICM Control Unit Functions
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Input signals from external sensors
2	Integrated Chassis Management
3	Output signals (target values at actuators and actuator control units)
4	Driver assistance functions

5	"Central driving dynamics and steering control" function
6	"Sensor signal processing and signal provision" function
7	"Driving dynamics control" function
8	DSC sensor in the ICM control unit (longitudinal acceleration, lateral acceleration, yaw rate)
9	Redundant DSC sensor in the ICM control unit (lateral acceleration, yaw rate)

Signal Provision

The ICM control unit reads signals from external and also internal sensors. These sensor signals are processed and converted into physical signals that describe the driving dynamics of the vehicle, and are subsequently made available to a large number of systems in the vehicle. Examples of these signals are road speed and lateral acceleration.

The central driving dynamics control system in the ICM firstly evaluates the current driving condition and driver's command, also taking the dynamic driving systems installed in the vehicle into account.

On the basis of this information, the system decides whether or not to intervene in the driving dynamics, and also the extent the intervention. The highly intelligent dynamic driving systems permit slight and barely noticeable interventions as soon as e. g. a tendency towards understeering is detected.

A coordinator ensures that the most suitable actuator is activated in each case. Where several actuators are used simultaneously, a great deal of importance has been placed on ensuring that these interventions are in perfect harmony.

The driving dynamics control provides the driver with the choice of one of four driving dynamics settings (Normal, Comfort, Sport and Sport+). By making this choice, the driver influences the central driving dynamics control system and therefore all dynamic driving systems and drive train systems. All systems are matched appropriately to every setting and, most importantly, their interaction with each other within one specific setting is also perfectly coordinated. The status of the Dynamic Stability Control is also taken into account thus ensuring that two additional driving dynamics specifications are possible.

The ICM control unit is also responsible for the Servotronic function including valve actuation. This steering control function is also influenced by the driving dynamics control.

Driver Assistance Functions

The ICM control unit incorporates the "Cruise control with braking" and "Active Cruise Control with Stop&Go" control functions. In addition, the ICM coordinates activation of the vibration actuator in the steering wheel for the "Lane Departure Warning" and "Active Blind Spot Detection" driver assistance functions.

Signal Provision

Signals from integrated sensor system

The sensors that were previously accommodated separately in the DSC sensor are now installed in the ICM control unit. The following variables can be recorded with these sensors.

- Longitudinal acceleration and pitch of the road or vehicle in the longitudinal direction
- Lateral acceleration and pitch of road or vehicle in lateral direction
- Rotational speed around vertical axis (yaw rate)

The sensor signals are initially referenced to the sensor housing. However, to be useful to the dynamic driving systems, these variables must be referenced to the vehicle coordinate system. The ICM control unit performs the necessary conversion. A synchronization process is carried out when the ICM control unit is started up during which appropriate correction values are determined and saved.

NOTE: Calibration of the sensors integrated into the ICM control unit is necessary in the following cases:

- **the ICM control unit has been replaced or**
- **if requested by the test schedule in the diagnostic system due to a fault code memory entry.**

The calibration must be performed with the vehicle standing on a level surface in the longitudinal and lateral direction. Terminal 15 must be switched on.

Signals from External Sensors

The ICM control unit imports the following signals that are important for dynamic driving systems from external sources:

- Wheel speeds, four signals transmitted via FlexRay from DSC.
- Ride-level heights, four signals, wired directly to ICM control unit.
- Steering wheel angle, transmitted via FlexRay from steering column switch cluster.
- Position of actuators for Active Steering and rear axle slip angle control, transmitted via FlexRay.

The ICM calculates the actual **speed** at which the vehicle moves along the driving axis on the road based on the four **wheel-speed signals.** If dynamic driving systems intervene and affect the wheel speeds, this is taken into account in the calculation. The status of the ABS control (for example) is also imported in this instance.

The road speed thus determined for the first time in the F01/F02 is now used as the reference for practically all systems in the vehicle. This means that a multiple calculation no longer needs to be performed in many other control units.

The ICM control unit also derives the following information from the wheel-speed signals:

- **Distance** travelled
- **Wheel tolerance check:** The marginal differences in wheel speeds (e. g. due to differences in tire

diameter) are identified and adjusted by the ICM.

- **Snow chain detection:** If snow chains are fitted, the driver can enter this information manually via the Central Information Display. The wheel speeds are also used by the HSR control unit to automatically determine whether snow chains are mounted on the rear wheels. The result of this identification is transmitted to the ICM control unit via the FlexRay.

Although, from a theoretical standpoint, it may be more appropriate to assign the **ride-height sensors** to the Vertical Dynamics Management, the four ride-height sensors are directly connected to the ICM control unit.

The ICM control unit imports the analog voltage signals of the ride-height sensors. These are converted into the actual ride-level heights in millimeters. To perform this conversion, the ICM control unit must be able to map the voltage signals it receives to reference values as otherwise it will not be able to determine the actual ride-level heights. These reference values are determined by means of a synchronization procedure.

The harmonized ride-level heights are made available by the ICM control unit as bus signals. They are imported from:

- the Vertical Dynamics Management system for the Vertical Dynamics Control and Active Roll Stabilization and also from the
- footwell module for the headlight-range adjustment function.

The ride-level heights are not transmitted as bus signals for the purposes of electronic ride-height control (EHC). Instead, an additional direct line connection exists between the ride-height sensors of the rear axle and the EHC control unit.

The ICM control unit determines the resulting steering lock angle of the front wheels based on the steering wheel angle and location of the Active Steering actuator motor.

As the rear axle can also be steered, a reliable conclusion regarding the driving dynamics cannot be obtained purely on the basis of the steering angle of the front wheels. This is why the ICM control unit also takes the steering angle of the rear wheels into account. The **effective steering angle** (of the front and rear wheels) is then determined using both steering angles.

This is a purely theoretical computing value that indicates the steering lock of the vehicle's front wheels that would be required to achieve the same vehicle motion if the rear axle could not be steered. The easiest way for all systems in the vehicle to evaluate the data on the steering wheel movement is to use this effective steering angle.

Processing and distribution of signals

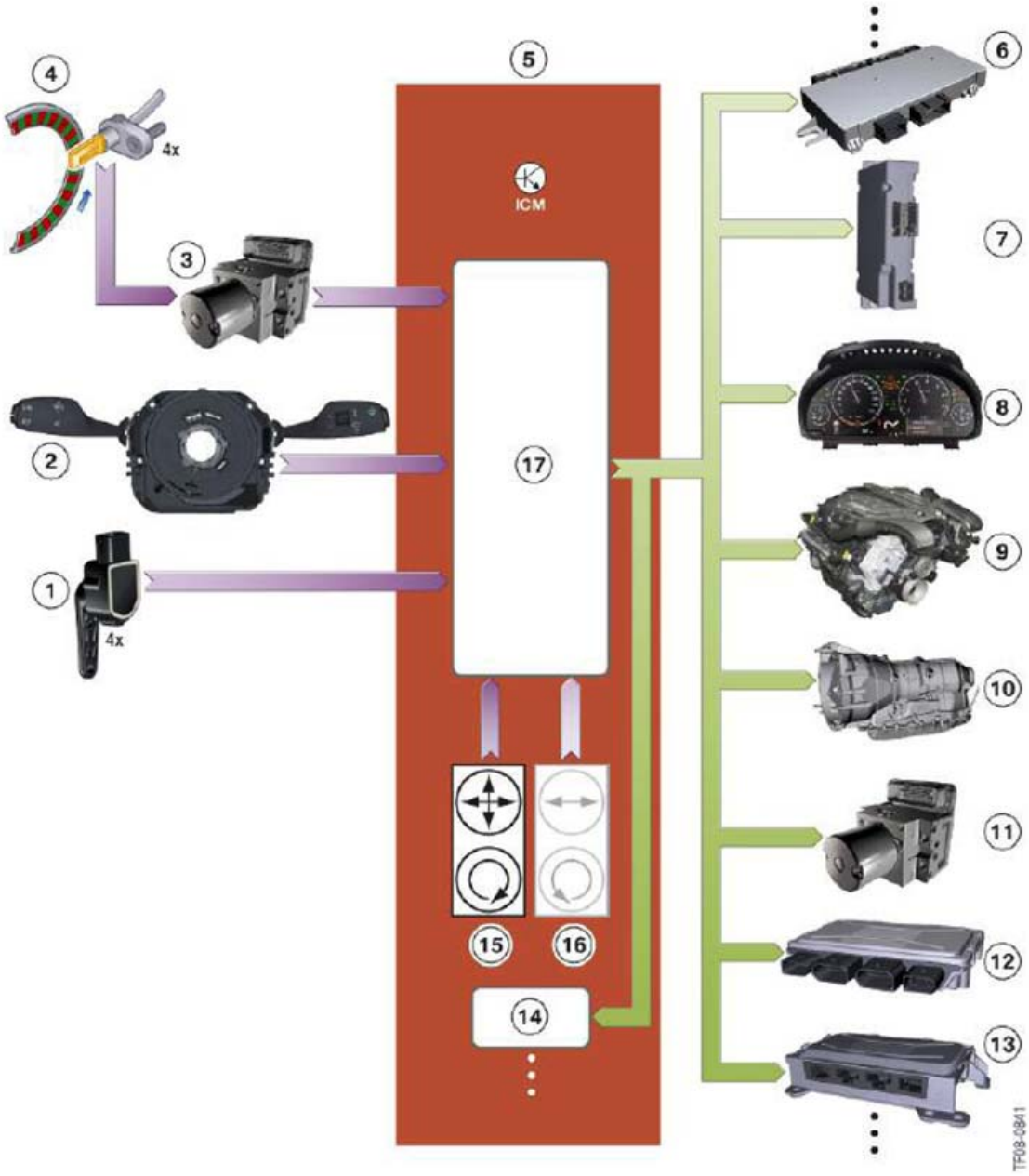


Fig. 19: ICM Signals Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Ride-height sensors
2	Steering column switch cluster with steering angle sensor
3	Dynamic Stability Control
4	Wheel-speed sensors

5	Integrated Chassis Management
6	Footwell module
7	KAFAS control unit
8	Instrument cluster
9	Engine control system
10	Electronic transmission control unit
11	Dynamic Stability Control
12	AS control unit
13	HSR control unit
14	Driving dynamics functions in the ICM control unit
15	DSC sensor in the ICM control unit (longitudinal acceleration, lateral acceleration, yaw rate)
16	Redundant DSC sensor in the ICM control unit (lateral acceleration, yaw rate)
17	"Signal processing" function in the ICM control unit

The signals from the sensors are processed before being made available in the vehicle via the FlexRay bus system. Specific examples of this have already been referred to above. To formulate this in more general terms, the ICM control unit uses all available sensor signals and several computing models to improve the quality of the signals provided. This means that they contain fewer errors and therefore allow the signal "users" (e. g. the dynamic driving systems) to operate with a greater degree of precision.

A new aspect of the F01/F02 is that the signals are not available to just a few systems in the vehicle.

In the F01/F02, the signals provided by the ICM are not used exclusively by the dynamic driving systems. The drive control units, driver assistance systems, information systems and body electrical system share the signals, instead of recording or preparing these separately.

NOTE: This has a distinct advantage when it comes to the diagnosis of signal faults: Faults in all signals described here are stored centrally in the fault memory of the ICM control unit.

In previous vehicles, it was possible for one signal fault to produce a large number of branches in the test schedule trees. The ICM architecture in the F01/F02 means that the test schedule can quickly pinpoint the ICM control unit in the event of a signal fault. The test schedule then shows the effective repair measure in each case.

Higher-level Driving Dynamics Control

Observation of the Driving Condition

The Integrated Chassis Management (ICM) control unit calculates the current driving situation from the signals listed below. This essentially means the longitudinal and lateral dynamic driving condition.

- Wheel speed signals from all four wheels

- Lateral acceleration
- Yaw rate

The ICM control unit therefore knows how the vehicle is actually moving at this point.

To be able to optimize the vehicle behavior, the dynamic driving systems require information about how the driver wishes the vehicle to move. The driver's command is determined from the following signals:

- Accelerator pedal angle and current engine torque and gear ratio
- Application of the brake pedal and current brake pressure
- Effective steering angle and steering-angle speed.

The driving condition and driver's command are provided both internally and externally by the ICM control unit. The central driving dynamics control acts as a receiver internally in the ICM control unit. The control units of the dynamic driving systems (e. g. DSC) are the external receivers. They receive the driving condition and the driver's command from the ICM control unit via the FlexRay bus system.

Central Driving Dynamics Control

The aim of the interventions by the dynamic driving system is to improve agility and traction. If required, they can of course also restore the stability of the vehicle. In previous vehicles, separate systems existed that were designed to do this and although they in fact communicated with each other, they tended to have a more restricted range of tasks. The interaction of all systems that ultimately determines the overall driving characteristics was therefore difficult to coordinate.

The Integrated Chassis Management of the F01/F02 incorporates the central driving dynamics control. This compares the command given by the driver with the actual movement of the vehicle at that point and therefore determines whether intervention of the dynamic driving system is required, and also the extent of the intervention.

The yawing force is an output variable of the central driving dynamics control system. This produces a rotation of the vehicle that is superimposed on the existing movement of the vehicle.

This can be used to "readjust" the driving characteristics if the result identified does not match the driver's command. Classic examples of this are understeering or oversteering driving characteristics.

A new feature of the ICM installed in the F01/F02, however, is that the dynamic driving systems are already deliberately activated before a deviation of this nature is identified. The interventions of the dynamic driving systems therefore take place long before the driving characteristics become unstable.

This produces a far more harmonious effect in the vehicle than would be possible from a conventional chassis design. The vehicle reacts neutrally in many more situations and does not even begin to understeer or oversteer. This new function is possible through the use of extremely precise computing models and new control strategies that can be used to evaluate and influence the driving characteristics.

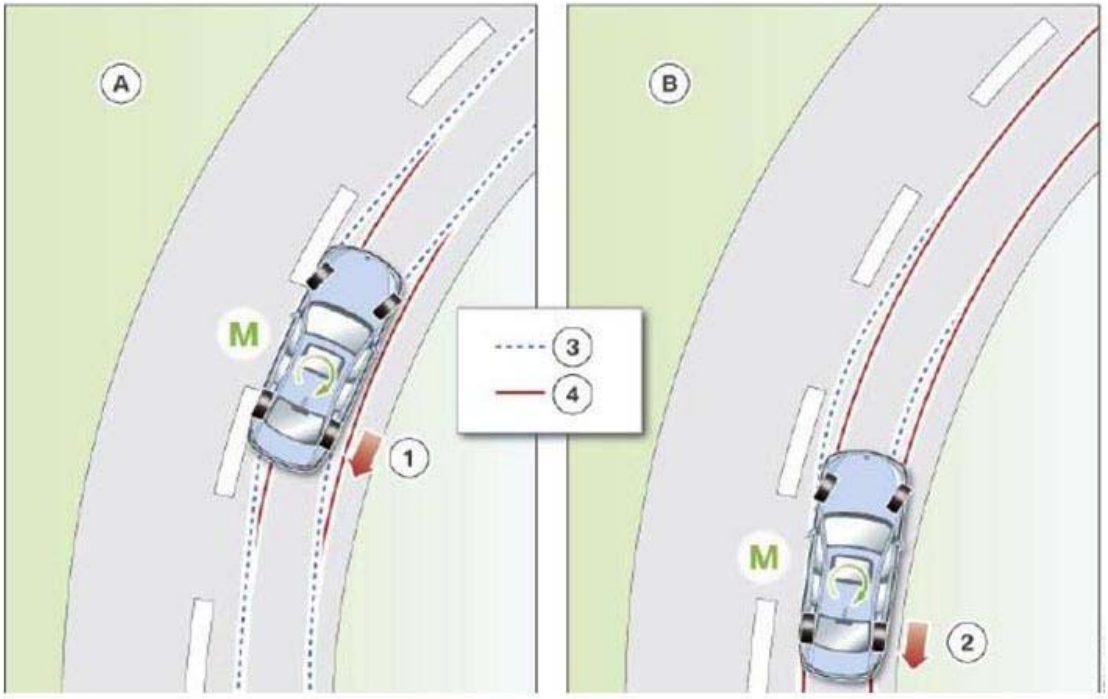


Fig. 20: View Of Influencing Driving Characteristics Using Driving Dynamics Control System
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Correction of unstable driving characteristics
B	Intervention at an early stage to achieve neutral driving characteristics
1	Braking intervention at individual wheels in order to correct understeering
2	Braking intervention at individual wheels in order to prevent understeering
3	Course of an understeered vehicle
4	Course of a vehicle with neutral driving characteristics
M	Yawing force that acts on the vehicle due to braking intervention (at individual wheels)

Coordinated Intervention by the Dynamic Driving Systems

The following intervention options for producing the yawing force calculated by the central driving dynamics control system have been available up till now (and will of course remain available) -the corresponding dynamic driving systems are shown in brackets:

- Individual activation of the wheel brake (DSC)

- Adjustment of the current engine torque (ASC+T, DSC, MSR)
- Adjustment of the steering angle of the front wheels, regardless of the driver's input (Active Steering).

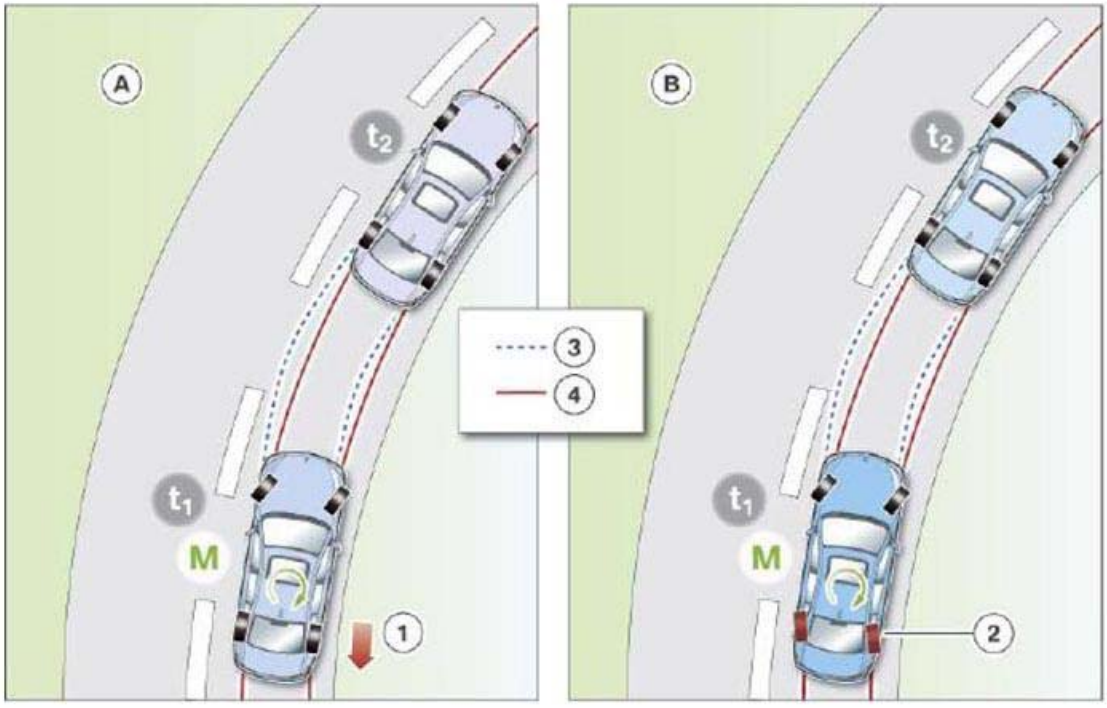


Fig. 21: View Of Possible Driving Dynamics Interventions During Understeering
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Prevention of understeering by means of braking at individual wheels
B	Prevention of understeering by means of steering intervention at rear axle
1	Braking intervention at individual wheels
2	Steering intervention at the rear axle
3	Course of an understeered vehicle
4	Course of a vehicle with neutral driving characteristics
M	Yawing force that acts on the vehicle due to braking intervention (at individual wheels)

The option of influencing the lateral dynamics of the vehicle - the rear axle slip angle control (HSR) - was available for the first time in the F01/F02. The customer only receives this innovative dynamic driving system in combination with the established Active Steering feature. This option is referred to as "Integral Active Steering".

A function referred to as "Actuator coordination" follows the central driving dynamics control. This decides which dynamic driving system should be used to produce the yawing force in the specific road situation.

For example, if the vehicle has a tendency to sharply understeer this can be counteracted by means of selective braking intervention at the back wheel on the inside of the curve. If the vehicle is equipped with Integral Active Steering, the same objective can be achieved more harmoniously by applying an appropriate steering angle at the rear axle.

As both actuating options are limited, it may also be beneficial to apply both at once. If understeering is avoided the driver becomes aware of this due to the considerable increase in agility.

The F01/F02 is the first instance where genuine functional networking between the integrated chassis management and Vertical Dynamics Management functions also takes place. This does not simply mean that the ICM records and processes ride-height information and then delivers it to the VDM.

The ICM also actively controls the Active Roll Stabilization as an integral part of central driving dynamics control in order to influence the self-steering characteristics. As the conventional chassis design already demonstrates, a more rigid anti-roll bar on one axle means that the overall achievable cornering stability on the same axle is lower. The effects of more or less rigid anti-roll bars can be emulated with the aid of the hydraulic motors in the anti-roll bars of the Dynamic Drive. This means that the central driving dynamics control of the ICM can selectively influence the degree of available lateral force on one axle via the active anti-roll bars of Dynamic Drive.

If the vehicle is currently oversteering, the cornering force at the rear axle is insufficient. The roll stabilizing torque at the rear axle tends to reduce in this case. This loss of torque is compensated for by additional cornering stability at the rear axle which helps stabilize the vehicle.

The activity of the central driving dynamics control in the ICM control unit is summarized in the input/output graphic on the following page.

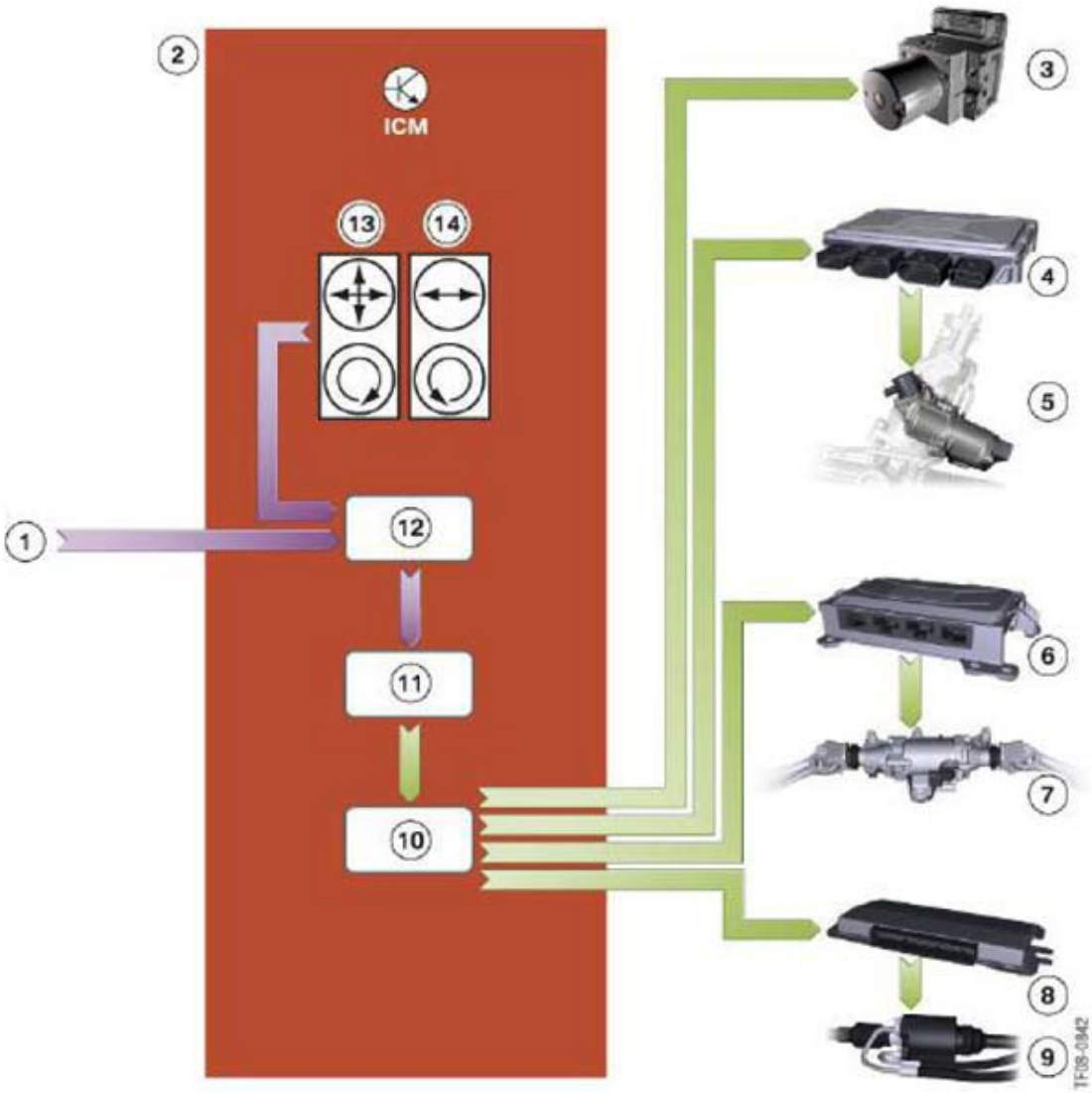


Fig. 22: Input/Output Signal Diagram - Central Driving Dynamics Control In ICM
Courtesy of BMW OF NORTH AMERICA, INC.

CENTRAL DRIVING DYNAMICS CONTROL LEGENDS

Index	Explanation
1	Input signals from external sensors
2	Integrated Chassis Management
3	Dynamic Stability Control
4	AS control unit
5	AS actuating unit
6	HSR control unit
7	HSR actuating unit
8	VDM control unit
9	Active anti-roll bar

10	"Actuator coordination" function
11	"Central driving dynamics control" function
12	"Sensor signal preparation" function
13	DSC sensor in the ICM control unit (longitudinal acceleration, lateral acceleration, yaw rate)
14	Redundant DSC sensor in the ICM control unit (lateral acceleration, yaw rate)

Distributed functions: ICM and actuator control units

A description of the distribution of tasks between the ICM and the other driving dynamics control units follows using Integral Active Steering as an example.

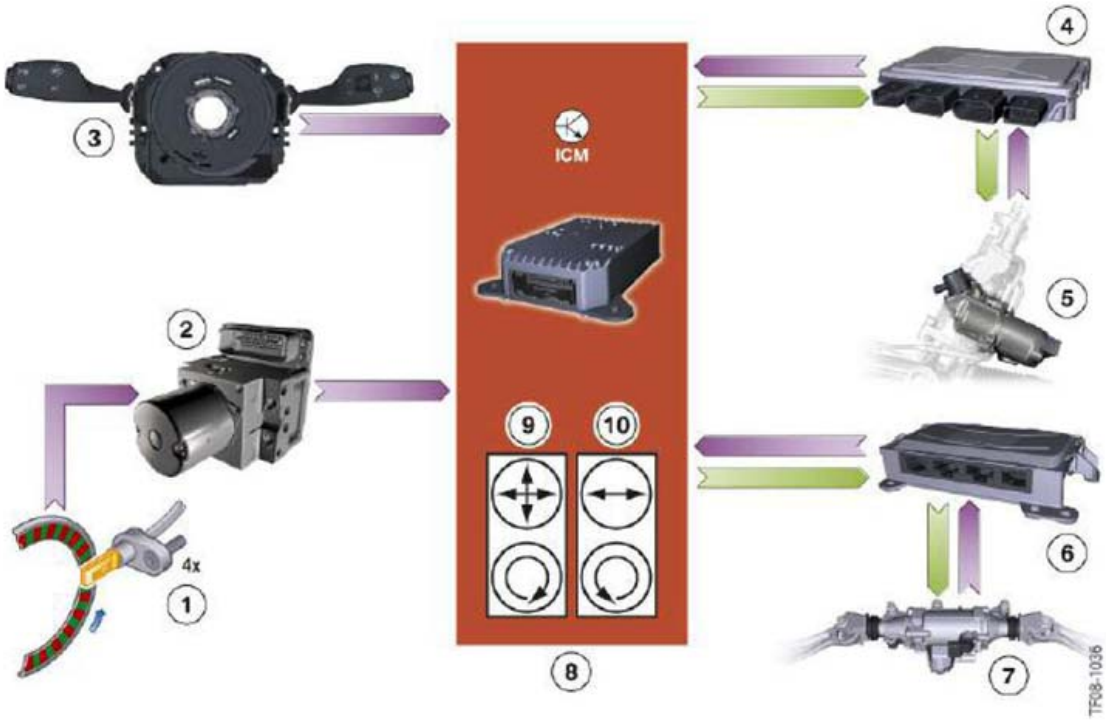


Fig. 23: Input/Output Signal Diagram - ICM And Actuator Control Units AS And HSR
Courtesy of BMW OF NORTH AMERICA, INC.

ICM AND ACTUATOR CONTROL UNIT LEGENDS

Index	Explanation
1	Wheel-speed sensors
2	Dynamic Stability Control
3	Steering column switch cluster with steering angle sensor
4	AS control unit
5	AS actuating unit

6	HSR control unit
7	HSR actuating unit
8	Integrated Chassis Management
9	DSC sensor in the ICM control unit (longitudinal acceleration, lateral acceleration, yaw rate)
10	Redundant DSC sensor in the ICM control unit (lateral acceleration, yaw rate)

The Integrated Chassis Management (ICM) is the control unit that performs the calculations for higher-level driving dynamics functions of the Integral Active Steering.

The Integrated Chassis Management uses the current driving situation and the driver's directional input to calculate the individual setpoint values for the variable steering-transmission ratio and the Yaw-Rate Control Plus. Once these have been prioritized, the ICM produces a reference value for the AS and HSR control unit respectively. This is a reference angle that should be set at the front or rear wheels.

The AS control unit receives this reference value and has the principal task of controlling the actuating elements in order to achieve the reference value. The AS control unit is therefore purely an actuator control unit. The same applies for the HSR control unit: this is also an actuator control unit. As with the AS control unit, this control unit is purely responsible for implementing the reference steering angle requested by the ICM.

This type of task distribution was implemented for the first time with the introduction of the ICM in the E71. The expansions in the F01/F02 mean that

- the ICM now controls all longitudinal and lateral dynamics systems centrally (AS, HSR and also DSC) and that
- ICM is the master control unit both in the linear range and also in unstable driving conditions.

However, the interface between the Integrated Chassis Management and Dynamic Stability Control is a special case.

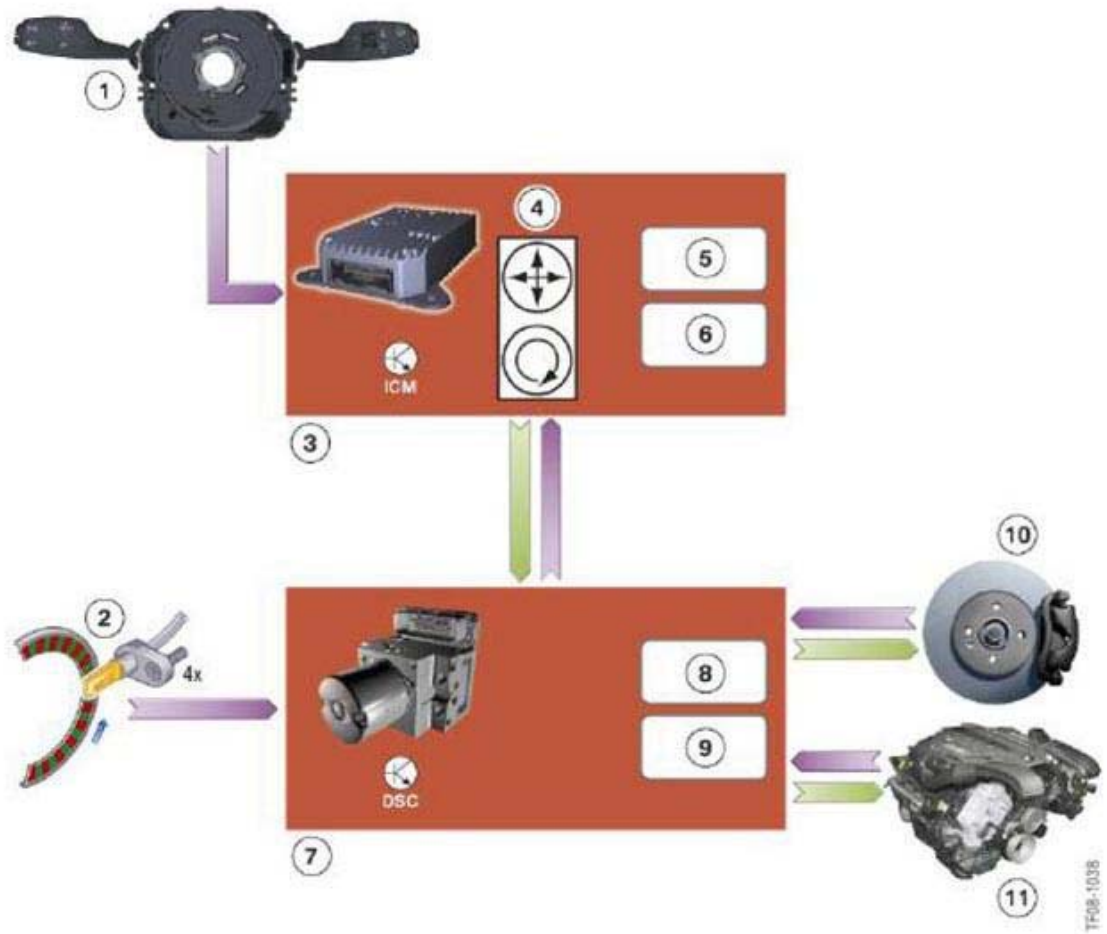


Fig. 24: Input/Output Signal Diagram - ICM And DSC
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Steering column switch cluster with steering angle sensor
2	Wheel-speed sensors
3	Integrated Chassis Management
4	DSC sensor in the ICM control unit (longitudinal acceleration, lateral acceleration, yaw rate)
5	"Driving dynamics control" function in the ICM control unit
6	"Actuator coordination" function
7	Dynamic Stability Control
8	"Driving dynamics control" function in DSC control unit
9	"Actuator control" function

10	Wheel brake
11	Drive

The Dynamic Stability Control also has its own internal driving dynamics controller that normally implements the reference value (reference yawing force) sent from the ICM control unit in the F01/F02. This is achieved through braking intervention at individual wheels and also by influencing the input torque.

The DSC driving dynamics controller is also able to detect an unstable road situation itself using corresponding signals on the driving condition provided by the ICM in which case the stabilizing braking or engine interventions are implemented automatically by DSC. Corresponding feedback is of course also sent to the ICM. In this case, the interventions of the driving dynamics control in the ICM are cancelled.

Control and Adjustment of Steering

The **Servotronic** function in the F01/F02 is included in the basic steering and Integral Active Steering (option). This speed-dependent power steering assistance function is implemented by the Servotronic valve at the steering gear.

The Servotronic valve is always activated from the ICM control unit irrespective of the equipment specification. It follows that the ICM control unit also incorporates the logic of the Servotronic function.

Again, regardless of the options fitted, the steering system also contains a proportional valve that is also controlled by the ICM control unit. The volumetric flow in the steering hydraulic circuit can be adjusted electronically assisted by this valve which is why it is also referred to as an "electronic volumetric flow adjustment" valve, or EVV valve for short.

This valve is also controlled by the ICM control unit. The volumetric flow generated by the power steering pump is distributed between a circuit to the steering valve and a bypass circuit according to the level of power steering assistance required. This distribution is infinitely variable. The less power steering assistance is required, the more hydraulic oil is diverted to the bypass circuit. Because the hydraulic oil in the bypass circuit has no task to perform, this means that the power steering pump consumes less power. In this way, the EVV valve contributes to **reducing** fuel consumption and **CO_2 emissions.**

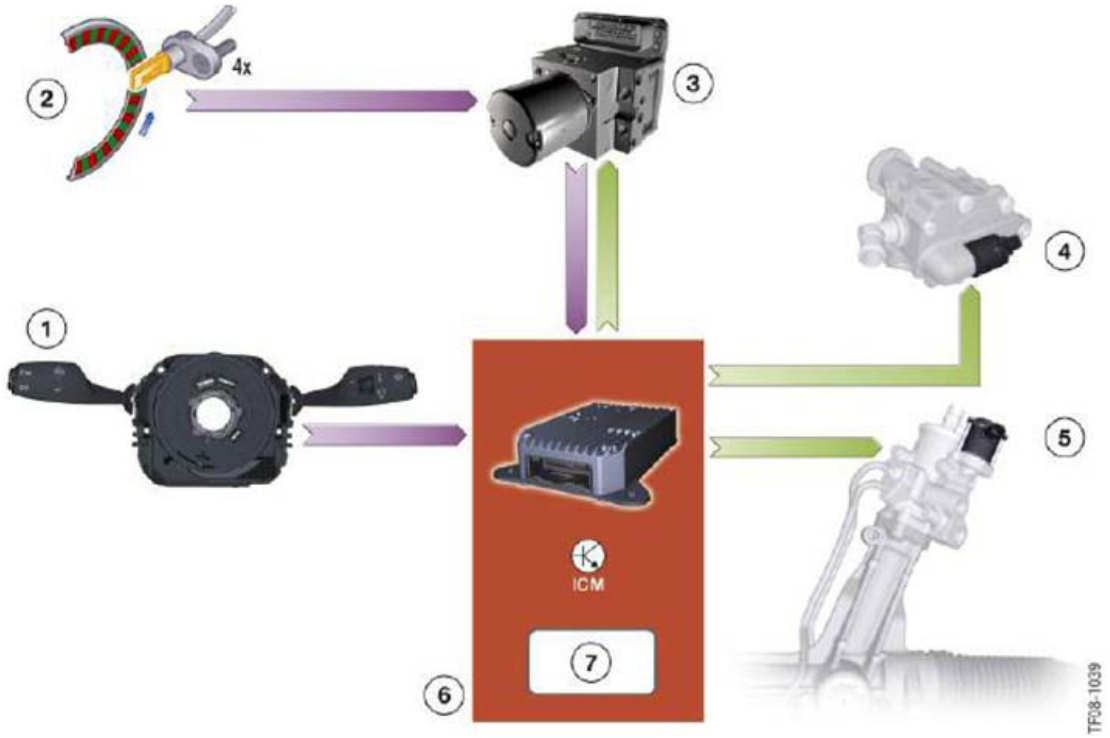


Fig. 25: Input/Output Signal Diagram - Control Of Steering By ICM
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Steering column switch cluster
2	Wheel speed sensor
3	Dynamic Stability Control
4	EVV valve
5	Servotronic valve
6	Integrated Chassis Management
7	"Steering control" function

Driver Assistance Functions

Depending on the equipment specification, two driver assistance functions that act on the longitudinal dynamics of the vehicle can be integrated in the ICM control unit:

- **Cruise control with braking function** (Dynamic Cruise Control, DCC) and
- **Active cruise control with stop&go function** (ACC Stop&Go).

The Adaptive Brake Assistant function is included in the same equipment package as ACC Stop&Go.

The ACC Stop&Go function has been integrated into the ICM control unit in the F01/F02. This dispenses with

the need for a separate LDM control unit. The DCC function that is calculated in the Dynamic Stability Control in the E70, for example, has been accommodated in the ICM control unit of the F01/F02.



Fig. 26: Input/Output Signal Diagram - Driver Assistance Systems - Longitudinal Dynamics
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Short range radar sensors (SRR)
2	Long range radar sensors (LRR)
3	Footwell module
4	Control panel for driver assistance functions
5	Steering column switch cluster
6	Control panel for DCC or ACC Stop&Go on multi-function steering wheel
7	Integrated Chassis Management
8	Drive
9	Dynamic Stability Control
10	Instrument cluster
11	"DCC" function
12	"ACC Stop&Go and Adaptive Brake Assistant" functions

The ICM control unit performs an additional important function for the **Lane Departure Warning** and **Active Blind Spot Detection** driver assistance systems. As both systems warn the driver via a vibration in the steering wheel, a coordinator function is required. This is integrated in the ICM control unit.

The ICM control unit generates a reference value for the vibration based on the warning requirements for the lane departure warning (KAFAS control unit) and the lane change warning (SWW sensor). The amplitude of the vibration varies depending on what triggered the warning.

The reference value is transmitted to the steering column switching cluster via the FlexRay bus system then put into effect via the steering wheel module (LRE) or the vibration actuator in the steering wheel.

The Input/Output graphic below is intended as an overview only.



Fig. 27: Input/Output Signal Diagram - Coordination Of Steering Wheel Vibration
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Radar sensor, lane change warning
2	KAFAS control unit
3	Camera for lane departure warning

4	Footwell module
5	Control panel for driver assistance functions
6	Integrated Chassis Management
7	Steering column switch cluster
8	Steering wheel electronics (LRE) and vibration actuator in steering wheel
9	Lane change warning display in door mirror
10	Instrument cluster
11	Coordination function for steering wheel vibration

Driving Dynamics Control

History

Control elements are already installed in a number of BMW vehicles that the driver can use to switch individual systems to a sporting mode. This includes the sports setting of the automatic selector lever. In this case, only the shift characteristics of the automatic gearbox are influenced.

The system behaves in a similar manner when the SPORT button for the Electronic Damping Control or Vertical Dynamics Control (shown below) is used. This only changes the characteristic (hardness) of the shock absorber.

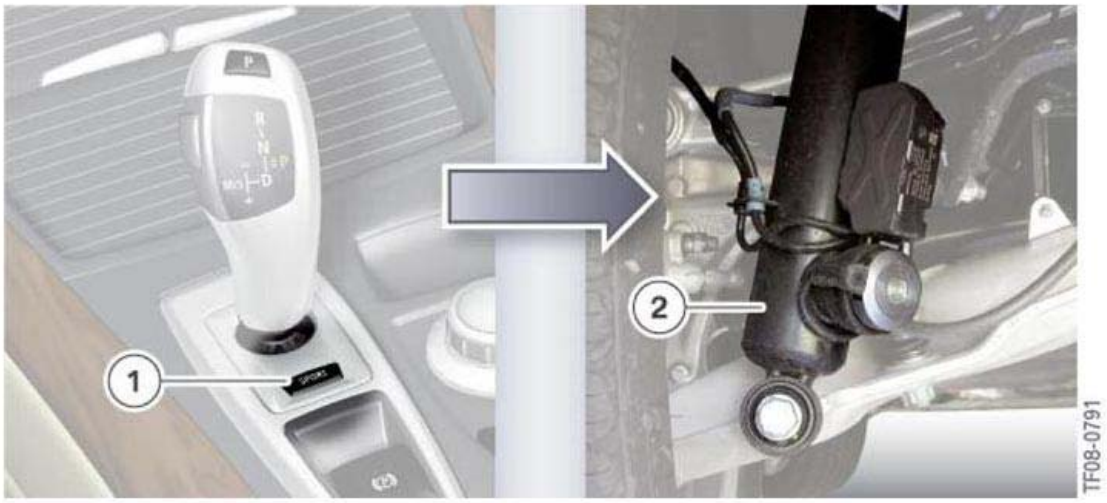


Fig. 28: Identifying SPORT Button, E70/ E71
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	SPORT button
2	Vertical Dynamics Control with electronically adjustable shock absorbers

All other drive and dynamic driving systems therefore be found as it would need to remain in their basic setting. A suitable harmonize the damping action in both sporting compromise for this basic setting must mode and standard mode.

A SPORT button that influences several systems was introduced for the first time in the E85/E86. The corresponding "driving dynamics control" function effects a changeover between a standard mode and a sporting mode in the steering, automatic gearbox and accelerator pedal. This meant it was now possible to coordinate these three systems far more effectively in both modes with the result that the customer now experiences a car that is uncompromisingly tailored to "Sport" in every sense.

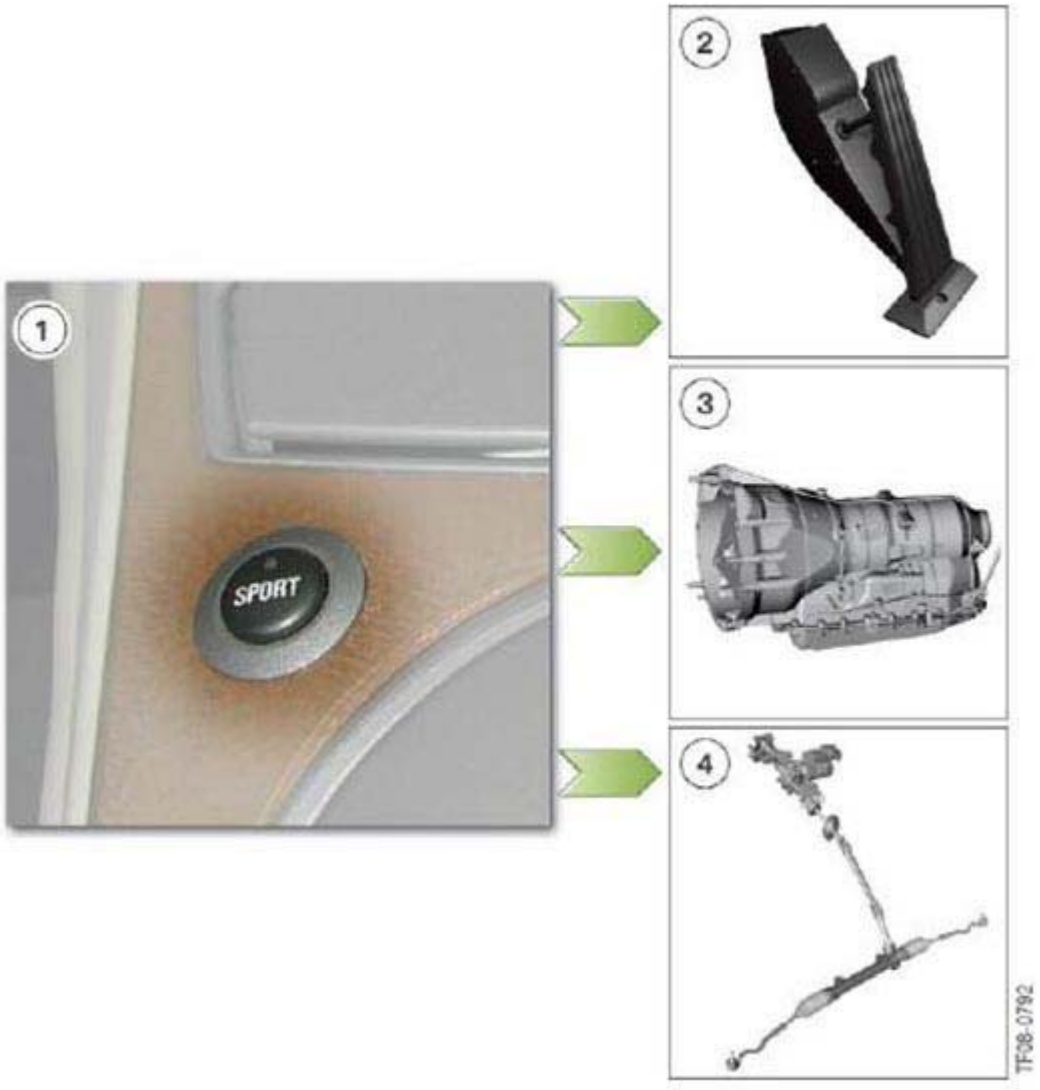


Fig. 29: Identifying SPORT Button, E85/E86
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	SPORT button

2	Accelerator pedal
3	Automatic transmission
4	Steering

The new driving dynamics control in the F01/F02 contains two groundbreaking new features when compared to the E85/E86:

1. All drive and dynamic driving systems installed in the vehicle are comprehensively switched over.
2. Four settings are available. The status of the Dynamic Stability Control is also taken into account thus ensuring that two additional settings are possible.

The driving dynamics control is operated via a new driving dynamics switch and the DTC button positioned directly in front of it.

The changeover operations for many drive and driving dynamics functions are therefore bundled in the driving dynamics control of the F01/F02. The vehicle as a whole then behaves as the driver would expect in accordance with his/her chosen setting.

This bundling can make the handling characteristics of the vehicle considerably more distinctive and less compromising.

Conversely, many individual, and also sometimes meaningless, combinations are avoided (example: sports steering combined with comfort-oriented damping).



Fig. 30: Identifying DTC Button And Driving Dynamics Switch
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	DTC button
2	Driving dynamics switch

Mode of Action of Driving Dynamics Control in F01/F02

Networking of Systems

The systems involved in the "driving dynamics control" function are shown in the following Input/Output illustration.



Fig. 31: Input/Output Signal Diagram - Driving Dynamics Control
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Controller
2	Driving dynamics switch and DTC button
3	Integrated Chassis Management
4	Accelerator pedal
5	Automatic transmission
6	Steering
7	Vertical Dynamics Control with electronically adjustable shock absorbers
8	Active anti-roll bar
9	Dynamic Stability Control
10	Instrument cluster

11	Central information display

The driver operates the driving dynamics control using the driving dynamics switch and the DTC button. The ICM control unit imports the control signals then determines on the basis of this which new mode the driving dynamics control should adopt. The mode thus determined is transmitted to the relevant drive and dynamic driving systems for implementation. These are:

- The engine control system for the accelerator pedal characteristic.
- The electronic gearbox control for driving programs and shift speed.
- The Vertical Dynamics Management system for the Vertical Dynamics Control and Active Roll Stabilization.
- The Dynamic Stability Control.
- The ICM control unit itself that controls the power steering assistance (Servotronic) and the steering-transmission ratio (Active Steering).

The ICM control unit also prompts the display of the relevant mode in the instrument cluster and also in the Central Information Display. In addition to selecting a mode, the driver can use the controller to make further settings.

Operation and display

The driver can select the four main modes using the driving dynamics switch. These main modes are designated as follows:

- Comfort
- Normal
- Sport
- Sport+

After the vehicle is started, the driving dynamics control is always in "Normal" mode. When the driving dynamics switch is moved to the "Sport" position, the driving dynamics control initially changes to "Sport" mode and then to "Sport+" mode if this button is pressed again. If the driver moves the driving dynamics switch to the "Comfort" position, the mode changes in the opposite direction, i. e. from "Sport" to "Normal" mode.

The DTC button provides the driver with two additional modes:

- Traction
- DSC off

The "Traction" mode can be activated by briefly pressing the DTC button. This works irrespective of which driving dynamics control mode was previously active. "DSC off" is activated by holding the DTC button pressed for longer. The "Traction" and "DSC off" modes can be switched off by pressing the DTC button again. The driving dynamics control subsequently returns to "Normal" mode. If the driver instead presses one of the two rocker switches at the driving dynamics switch to deactivate the "Traction" or "DSC off" modes, the driving dynamics control subsequently enters "Sport" or "Comfort" mode (depending on which rocker switch is

pressed).

Each time the driving dynamics switch or DTC button is pressed this immediately prompts a reaction in the instrument cluster display. The changeover to "Sport" mode is shown below.



Fig. 32: Instrument Cluster Display - "Sport" Mode
Courtesy of BMW OF NORTH AMERICA, INC.

After some time, unless the driving dynamics switch is pressed, a more compact version of the display for the driving dynamics control appears.



Fig. 33: Instrument Cluster Display - "Sport" Mode (More Compact Display)
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 34: Instrument Cluster Display - "Traction" Mode
Courtesy of BMW OF NORTH AMERICA, INC.

The two modes "Traction" and "DSC off" present a special case in terms of their display requirements. In addition to the text entry, the yellow DSC indicator and warning lamps must be activated.



Fig. 35: Instrument Cluster Display - "DSC off" Mode
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **New symbols are now used for the yellow DSC indicator and warning lamp and the DTC button. The new DSC symbols used for the first time in the F01/F02 replace the symbols previously used.**

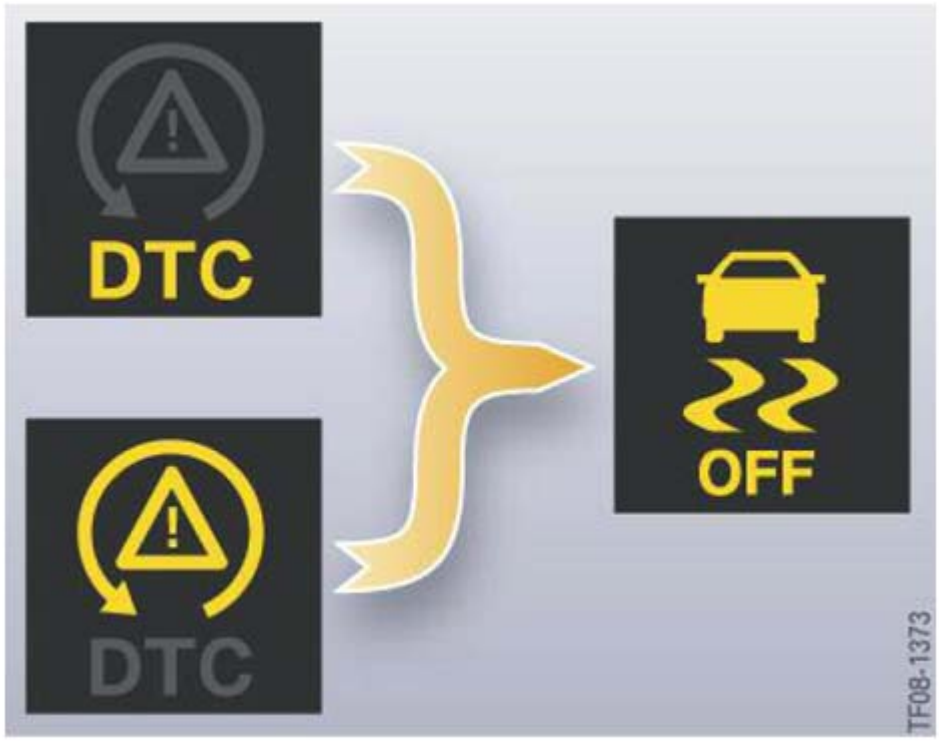


Fig. 36: Identifying DSC Indicator And Warning Lamp On Instrument Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

Two different symbols were formerly used for the two states "DTC mode" and "DSC off" and were displayed in the instrument cluster. Since the launch of the F01/F02, only one symbol has been used for both states.

The new symbols are being gradually introduced in all newly developed vehicles. The reason for this are changes to legislation that require automobile manufacturers to produce a uniform display format.

This legislation also specifies that the text message "off" must be displayed as soon as the DSC function is restricted, as is the case in the "Traction" and "Sport+" modes.

When the DTC button or the driving dynamics switch is pressed, an assistance window appears at the same time as the instrument cluster display in the Central Information Display. The name of the newly selected mode appears there together with an explanatory text.

In the "Sport" mode the driver also has the option of configuring this. Assisted by the controller, the driver can choose whether to apply the "Sport" mode to the drive systems, or the dynamic driving systems or both.

SPORT MODE CONFIGURATION

Configuration of the "Sport" mode	Drive systems	Chassis and dynamic driving systems
Drive and chassis (factory setting)	Sports	Sports
Drive only	Sports	Normal
Chassis only	Normal	Sports

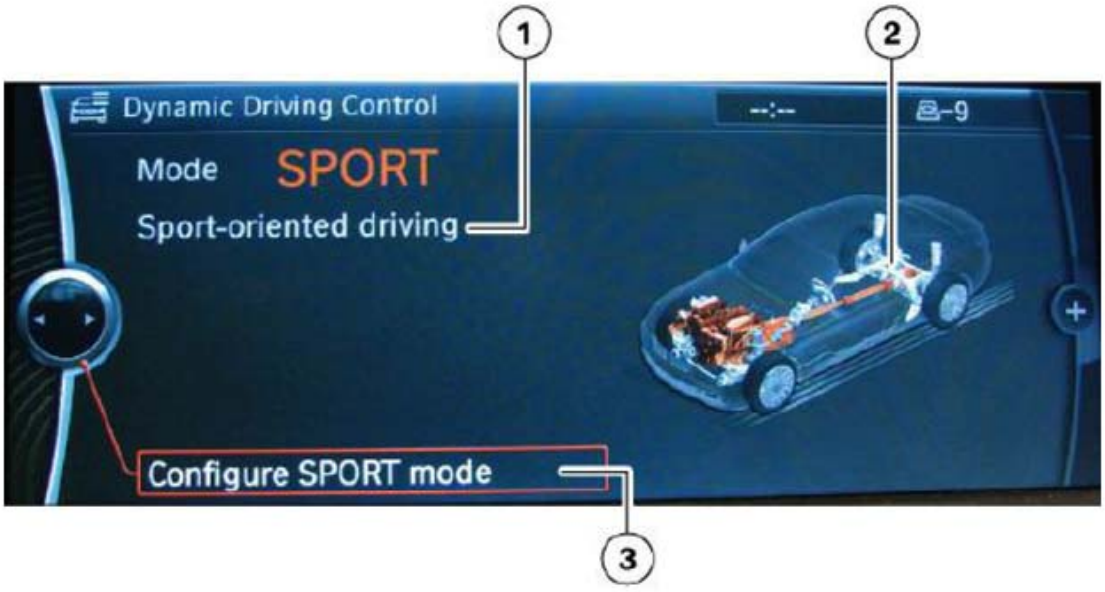


Fig. 37: Dynamic Driving Control Display - Assistance Window, "Sport" Mode
Courtesy of BMW OF NORTH AMERICA, INC.

DRIVE SYSTEM MODE

Index	Explanation

1	Text description of the area(s) in which "Sport" mode is applied (shown here: chassis only and/or dynamic driving systems)
2	Visual description of the area(s) in which "Sport" mode is applied
3	Menu for configuration of "Sport" mode

Modes and their effects

This chapter describes the effects of the individual modes in the drive and dynamic driving systems. As the individual systems are switched over together in a coordinated manner, this lends coherence to the overall behavior of the vehicle. This of course also means that meaningless combinations, such as a sports accelerator pedal characteristic combined with a highly comfort-oriented automatic gearbox shift program, are avoided and meaningful combinations for the mode are integrated instead.

This is why when compared to earlier vehicles, the configuration of individual systems can to a great extent now be uncompromisingly tailored to one mode. The driver therefore not only experiences coherent vehicle response characteristics in all modes, he/she will also sense the differences between the individual modes far more acutely.

The table below demonstrates this, particularly through the comparison between the "Normal" and "Sport" modes.

DRIVE SYSTEM MODE

	Comfort	**Normal**	**Sport**	**Sport+**
Drive systems				
Accelerator pedal characteristic	Normal	Normal	Sports	Sports
Shift program, automatic gearbox	Normal	Normal	Sports	Sports
Shift speed, automatic gearbox	Normal	Normal	Sports	Sports
Chassis and dynamic driving systems				
Power steering assistance	Normal	Normal	Sports	Sports
Integral Active Steering	Normal	Normal	Sports	Sports
Dynamic Stability Control	DSC on	DSC on	DSC on	DTC (sports)
Vertical Dynamics Control	Comfortable	Normal	Sports	Sports
Active anti-roll bar	Normal	Normal	Sports	Sports
The configuration shown here in "Sport" mode applies for both drive and dynamic driving systems.				

If the "Comfort" and "Normal" modes are compared instead, it is evident that the configuration differs in one

dynamic driving system only: the Vertical Dynamics Control. This characteristic of the "Comfort" mode does not happen by chance and takes several peripheral factors into account:

- Most drive and dynamic driving systems ensure that driving is sufficiently comfortable in the "Normal" configuration; this is something that BMW 7 Series customers would expect. The Servotronic already offers requirement-based power steering assistance with maximum comfort, for example.
- The "Normal" configuration does not necessarily mean adherence to a single, defined system characteristic. The shift program of the automatic gearbox is only one example of how the current driving condition and driver's command are taken into account in order to bring the behavior of the relevant system into line with these requirements.
- Most drivers relate a desire for greater comfort with the suspension and damping characteristics. This requirement is particularly relevant when driving on poor or uneven roads.

This means that the "Comfort" mode also embraces the philosophy of driving dynamics control which is to achieve a coherent vehicle response characteristic that meets the expectations of the driver.

The "Sport" and "Sport+" modes also differ in terms of the coordination of one specific dynamic driving system: the Dynamic Stability Control. In the "Sport" mode, a decidedly sports-oriented overall vehicle behavior is available to the driver.

Although it is assumed that many drivers would like to use this "Sport" mode, the DSC remains in normal operating mode and stabilizes the vehicle in a timely manner as required. The familiar intervention thresholds (slip, sideslip angle) that the driver has become accustomed to in the "Comfort" and "Normal" modes remain unchanged. This ensures that less proficient drivers are not taken by surprise when the DTC subsequently intervenes in the sportier DTC mode.

Only once a proficient driver deliberately selects the second sports mode "Sport+" will gentle drifts also become available due to the higher wheel slip and sideslip angle.

The two additional modes that the driver can select using the DTC button produce the effects on the drive and dynamic driving systems shown below.

DRIVE SYSTEM MODE

	Normal	**Traction**	**DSC off**
Drive systems			
Accelerator pedal characteristic	Normal	Normal	Normal
Shift program, automatic gearbox	Normal	Normal	Sports
Shift speed, automatic gearbox	Normal	Normal	Sports
Chassis and dynamic driving systems			
Power steering assistance	Normal	Normal	Sports
Integral Active Steering	Normal	Normal	Sports
Dynamic Stability	DSC on	DTC	DSC off

Control			
Vertical Dynamics Control	Normal	Normal	Sports
Active anti-roll bar	Normal	Normal	Sports

The "Traction" mode is similar to the familiar DTC mode of the DSC in former BMW vehicles. All other drive and dynamic driving systems remain in their normal configuration which makes its main application clear: the purpose of "Traction" mode is to improve traction, e. g. when driving off on a loose subsurface. Sports driving takes a background role instead as the "Sport+" and "Sport" modes are available for this.

The stabilizing DSC interventions are switched off in the "DSC off" mode. Only the braking interventions that support traction are performed i. e. Electronic Differential Lock Control.

In this case, most other drive and dynamic driving systems are in the sports configuration. This means that the aim of "DSC off" mode is to support pure driving; a direct bond between the driver, vehicle and road.

Although initially it may seem astonishing that the accelerator pedal characteristic remains in the normal configuration in both "Traction" and "DSC off" modes, this setting is deliberate. When driving off on a loose subsurface and also when driving in a highly sports-oriented manner with the DSC switched off, it is especially important that the driver can apply engine torque extremely sensitively. This is much easier to do using a normal rather than a more sports-oriented accelerator pedal characteristic.

The sports-oriented accelerator pedal characteristic translates the accelerator pedal angle into a higher torque requirement at the engine. This torque requirement is then also put into effect more quickly by the engine control system.

As a result, the driver perceives the response characteristics of the drive, and therefore the vehicle, as more sports-oriented. However, the driver cannot use this to apply engine torque sensitively.

SYSTEM COMPONENTS

ICM Control Unit

Only the system components that are linked to the new architecture of the dynamic driving systems in the F01/F02 are described in this Product Information. In essence, this is the new ICM control unit and the periphery equipment directly connected to this control unit.

Three other Product Information packages are available in which descriptions of the system components for the individual dynamic driving systems are provided:

- Longitudinal dynamics systems
- Lateral dynamics systems
- Vertical dynamics systems

Design of the Two Control Unit Versions

An ICM control unit is installed in every F01/F02. Each ICM control unit contains the following, irrespective of the equipment installed in the vehicle:

- Two microprocessors
- A FlexRay controller
- Output stages for activating valves in the steering system
- Integrated sensor system for driving dynamics variables (previously: DSC sensor)

The essential tasks of one of the microprocessors are the calculation of control functions, communication processing and activation of the output stages. The main task of the second processor is to monitor safety-relevant functions and bring about a system shut down in the event of a fault.

The other components of the ICM control unit listed above are described in the following chapters.

Two versions of the ICM control unit exist. The version installed in the vehicle depends on the equipment.

If the vehicle is equipped with one or both of the following options

- Integral Active Steering (IAL, SA 2VH) or
- Active Cruise Control with Stop&Go function,

the high-performance version of the ICM control unit is installed.

If neither of these options are installed in the vehicle, the basic version of the ICM control unit is used. The two versions of the ICM control unit are differentiated externally by their part numbers.

The internal layout of the high-performance version differs from the internal layout of the basic version in the following ways:

- Larger microprocessor (required to calculate the Integral Active Steering control and active speed control)
- Redundant sensor system for lateral acceleration and yaw rate (safety requirement for Integral Active Steering).

The following graphics make these differences clear.

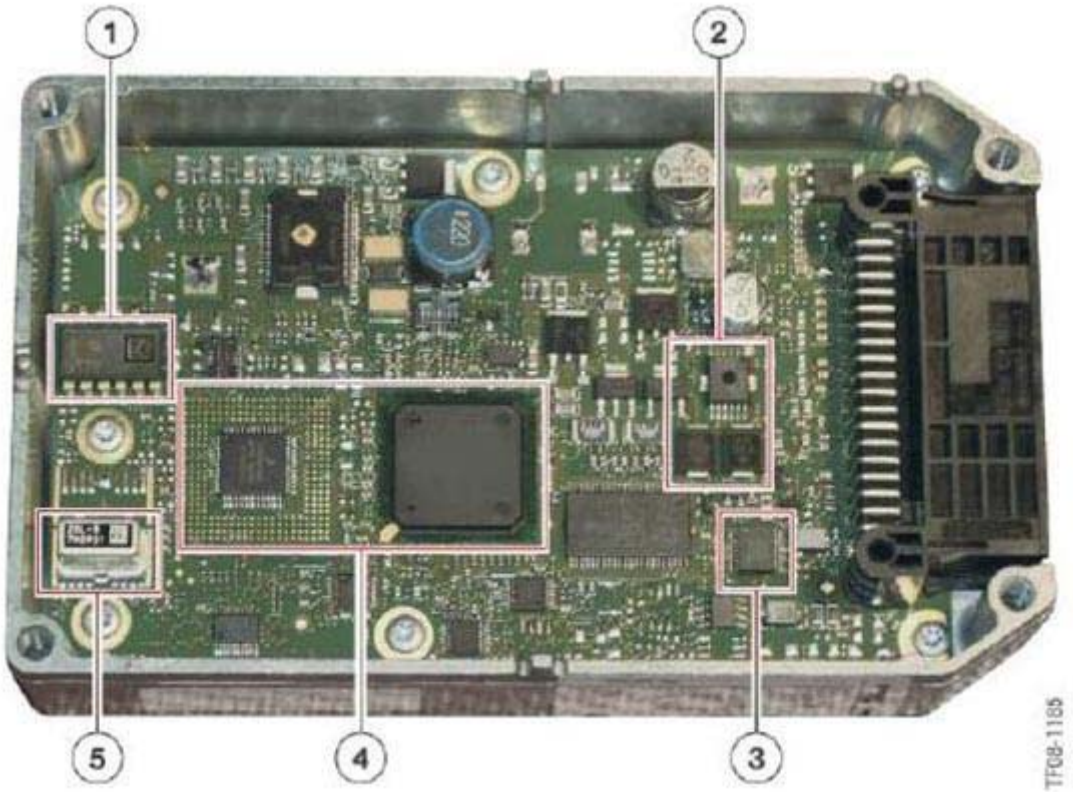


Fig. 38: Identifying ICM Control Unit, Basic Version
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Acceleration sensor (longitudinal and lateral acceleration)
2	Output stages for Servotronic and EVV valves
3	Controller for FlexRay connection
4	Two microprocessors (basic version)
5	Yaw rate sensor

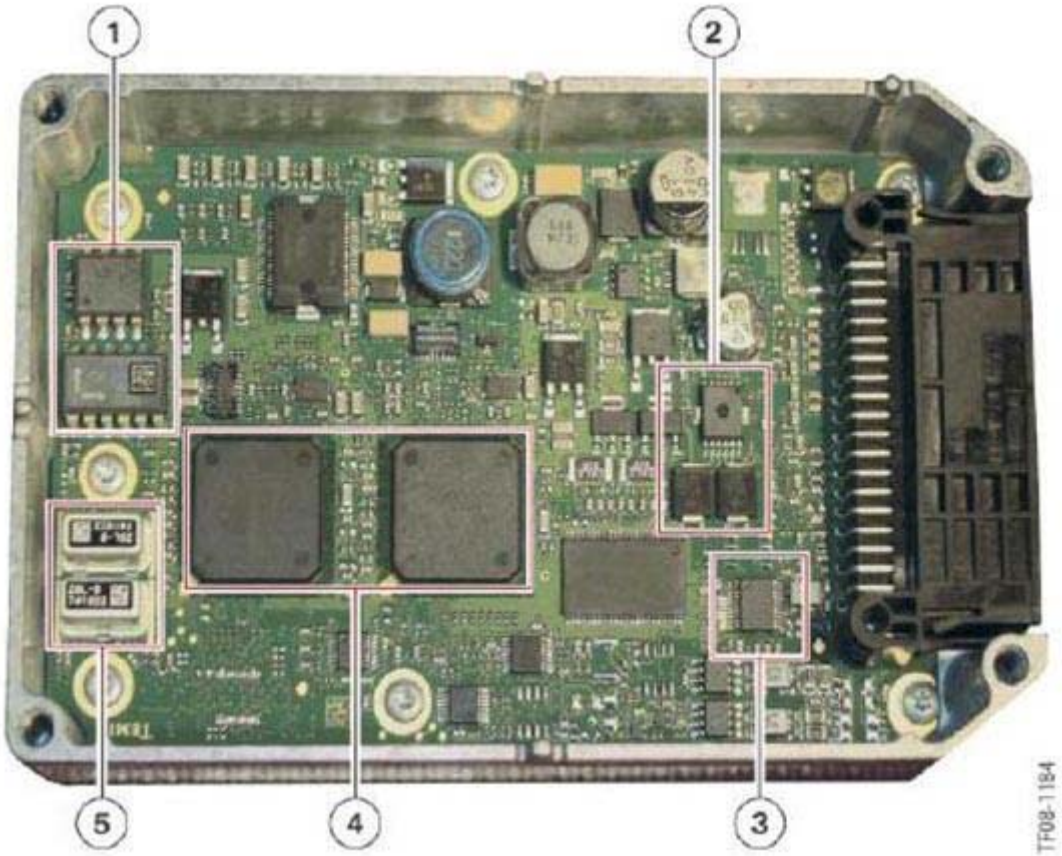


Fig. 39: Identifying ICM Control Unit, High-Performance Version
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Acceleration sensors (1 for longitudinal acceleration, 2 for lateral acceleration)
2	Output stages for Servotronic and EVV valves
3	Controller for FlexRay connection
4	Two microprocessors (high-performance version)
5	Yaw rate sensors (2x)

Integrated sensor system

The sensors that were previously accommodated separately in the DSC sensor are now installed in the ICM control unit.

The ICM control unit uses these sensors to calculate variables that provide key information on the vehicle's dynamic state:

- Longitudinal acceleration and pitch of the vehicle in the longitudinal direction

- Lateral acceleration and pitch of the vehicle in the lateral direction
- Yaw rate.

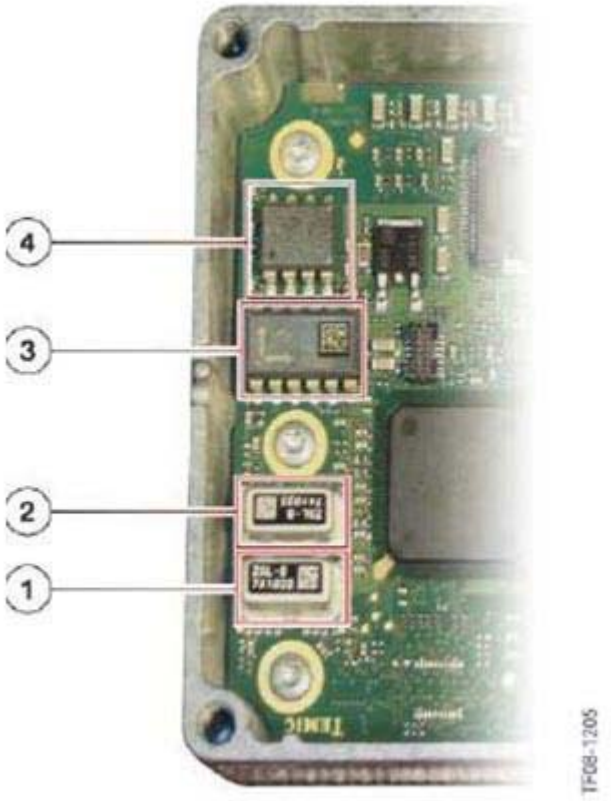


Fig. 40: Identifying Yaw Rate Sensor, Longitudinal And Lateral Acceleration Sensor And Second Redundant Yaw Rate Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Yaw rate sensor
2	Second redundant yaw rate sensor
3	Longitudinal and lateral acceleration sensor
4	Second redundant lateral acceleration sensor

All sensors integrated into the ICM control unit are known as micromechanical sensors. By applying this principle, the dimensions of these sensors can be reduced to the extent that they can be accommodated in housings that are similar in size to microprocessor housings. The sensors are of course designed on the basis of prevailing stresses in the vehicle (thermal, mechanical). However, when servicing the vehicle, the ICM control unit must be handled with the same degree of care as the familiar DSC sensor.

NOTE: The ICM control unit must not be exposed to strong vibrations. The integrated sensor system will be destroyed if the housing is struck by hard objects, or if

the control unit is dropped. The control unit must not be installed in the vehicle in this case.

The **longitudinal and lateral acceleration** sensors operate according to the capacitive principle. They consist of two electrodes, that mesh in a comb-like form. One of the electrodes has a unidirectional moving bearing which means that if a force acts on the sensor, the electrode is displaced. This changes the gap between the two electrodes and in turn changes the capacitance which is calculated back to the size of the force applied by means of evaluating circuits.

Instead of recording the acceleration directly, the sensors record it indirectly by **measuring the force** on the sensor element. The force applied may have several causes and the sensor cannot differentiate between these:

- Inclination of the vehicle or road (e. g. gradient accelerating force)
- Change in speed (drive or braking force)
- Cornering (centrifugal force).

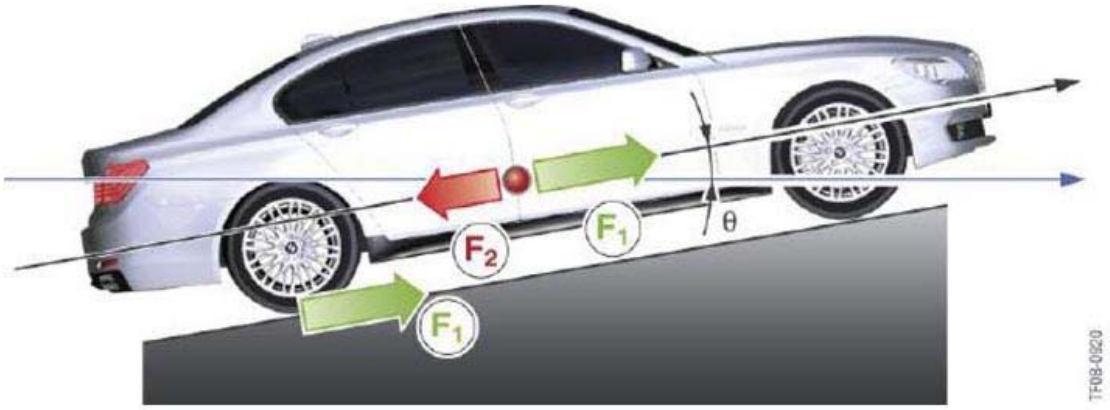


Fig. 41: Identifying Longitudinal Forces Acting On Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
F_1	Motive force
F_2	Gradient accelerating force
	Inclination of road

In the graphic two longitudinal forces are shown acting on the vehicle: a motive force and a gradient accelerating force. These forces are produced due to the inclination of the road. As a result, a force acts on the vehicle and can be calculated as follows:

$F_{resulting} = F_1 - F_2$

Only the resulting force can be measured by the sensor. The measured force is processed in the control unit. The

change in road speed is taken into account.

The actual acceleration of the vehicle and the gradient of the road are the only calculation results provided.

A similar calculating process is used for the lateral direction. The calculation results produced in this case are the lateral tilt and lateral acceleration of the vehicle.

The sensor that determines the **yaw rate** also employs the principle of force measurement, a principle also used by the acceleration sensors. The yaw rate sensor measures the force that acts on a sensor element oscillating across the direction of rotation.

The sensor signals are initially referenced to the sensor housing. However, in order to be useful to the dynamic driving systems, these variables must be referenced to the vehicle coordinate system. The ICM control unit performs the necessary conversion.

A synchronization process is carried out when the ICM control unit is started up during which corresponding correction values are determined and saved.

NOTE: **Calibration of the sensors integrated into the ICM control unit is necessary in the following cases**

- **the ICM control unit has been replaced or**
- **if requested by the test schedule in the diagnostic system due to a fault code memory entry.**

The calibration must be performed with the vehicle standing on a level surface in the longitudinal and lateral direction. Terminal 15 must also be switched on.

Connector

The control unit has a 54-pin plug via which the power supply, sensors, actuators and bus systems are connected.

As is the case with the controller housing, the plug does not have a watertight design. This is The control unit has a 54-pin plug via which not necessary as it is installed on the inside of the vehicle.



Fig. 42: Identifying ICM Control Unit Installation Location
Courtesy of BMW OF NORTH AMERICA, INC.

Installation Location

The ICM control unit is installed in the center console behind the sensor for the crash safety module. This means that the position of the control unit and its integrated sensor system in the vehicle, near to its center of gravity, is ideal from the point of view of driving dynamics. The mounting points on the body are precisely determined and are measured when the vehicle is manufactured and must not be replaced with any other mounting points.

The housing of the control unit is connected to the metal body of the transmission tunnel with four screws and spacer sleeves made of aluminum. The control unit must be mounted on the vehicle body free of play as otherwise vibrations may be induced in the control unit housing which would severely impair the operation of the integrated sensor system. A secondary task of this mounting is to conduct heat away from the control unit to the body.

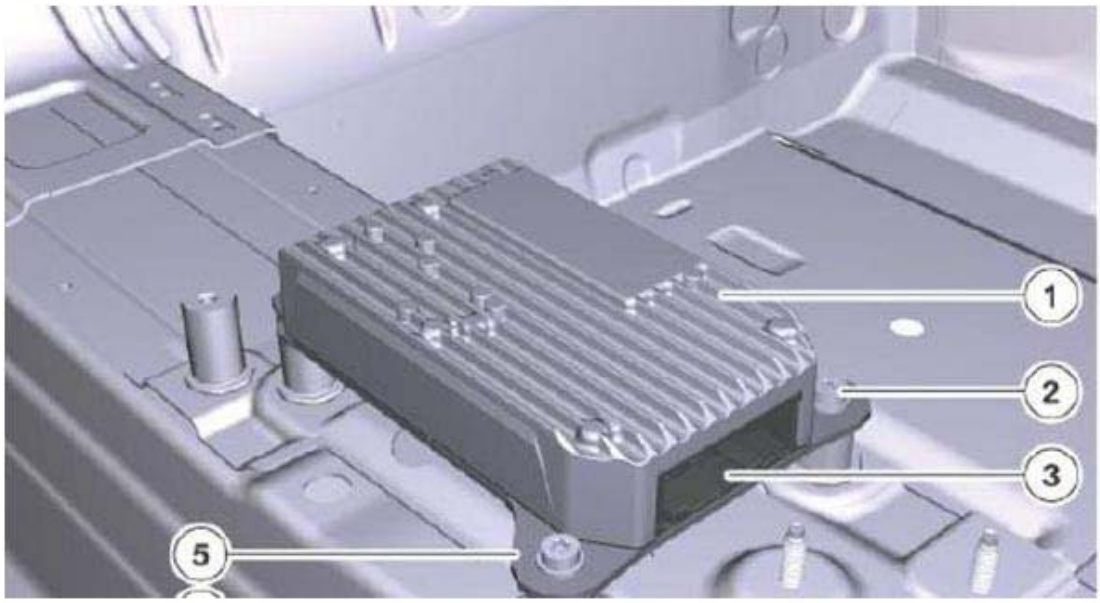


Fig. 43: Identifying ICM Control Unit Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Upper section of housing
2	Mounting bolt
3	Connector
4	Spacer sleeve
5	Lower section of housing

For the mounting to be able to perform these tasks, the following points must be observed when mounting and replacing the ICM control unit:

NOTE: **Only screws and spacer sleeves that are in perfect condition may be used. Deformed or damaged fixing elements must not be used.**
The mounting screws in the reamed holes must be tightened first, followed by the other two screws. The tightening torque specified in the repair instructions must be observed without fail.
A check must then be carried out to make sure the control unit is mounted securely and free of play.
To ensure sufficient heat dissipation and to avoid vibrations, the sides and top of the control unit housing must not come into contact with other vehicle components. Instead, the spaces provided around the control unit as part of the engineering design must always remain free of other components.

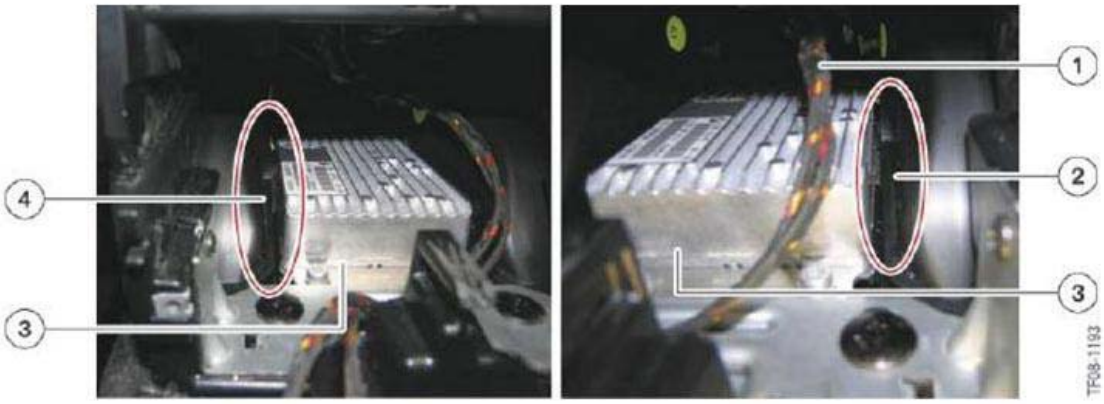


Fig. 44: Identifying ICM Control Unit Installation Situation
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Wiring harness, e. g. for rear display
2	The compartment on the right next to the ICM control unit must remain unoccupied
3	ICM control unit
4	The compartment on the left next to the ICM control unit must remain unoccupied

The wiring harness that runs in the center console in particular must never be routed in, or even pushed into, the spaces on either side of the ICM control unit.

Replacement and Start-up

Removing and installing the ICM control unit

The ICM control unit performs tasks that are important for many vehicle functions, e. g. provision of sensor signals. If the vehicle were operated without the ICM control unit installed, a large number of vehicle functions would not be available. In the area of dynamic driving systems, for example, the Servotronic and stabilization functions would no longer be available. In addition, fault code memory entries would inevitably also be generated in many control units.

NOTE: If the ICM control unit needs to be replaced, the repair instructions must be observed without fail.
For example, the vehicle battery must be disconnected before removing the control unit and reconnected following the installation. This is the only way to ensure synchronized restarting of the control unit assembly.

NOTE: Once the new ICM control unit has been installed, it must be started up with the assistance of the diagnostic system. To do this, the following steps must be carried out (depending on the equipment specification):

- **Calibration of the sensors integrated into the ICM**
- **Calibration of the ride-height sensors**
- **Initialization of the Integral Active Steering.**

Calibration of the sensors integrated into the ICM

The signals from the acceleration and yaw rate sensors integrated into the ICM are referenced to their housing. However, in order to be useful to the dynamic driving systems, these variables must be referenced to the vehicle coordinate system. In order for the ICM control unit to be able to carry out the necessary conversion, it requires corresponding correction values. These are determined during the one-off calibration procedure and stored in the ICM control unit.

NOTE: The instructions of the diagnostic system must be followed precisely during calibration of the sensors integrated into the ICM. It is particularly important for the vehicle to be standing on a surface that is level in both the longitudinal and lateral directions. If this is not the case, incorrect correction values will be determined that may cause the dynamic driving system to malfunction.

Calibration of the ride-height sensors

The measurement signals from the ride-height sensors are evaluated by means of voltage measurement in the ICM control unit. The ICM control unit cannot calculate the actual ride-level heights in millimeters on the basis of this information alone. To perform this calculation, the ICM control unit must be able to map the voltage signals it receives to reference values. This is the only way to establish a relationship between the measurement signals and the actual ride-level heights at the wheels. These reference values are determined during a synchronization procedure.

NOTE: The ride-height signals in the ICM must be synchronized in the following cases

- **following replacement of the ICM control unit,**
- **following replacement of a ride-height sensor or**
- **if prompted to do so by the test schedule of the diagnostic system (due to a fault code memory entry in the ICM).**

The synchronization does not have to be carried out if a wheel has been changed.

NOTE: The following points must be observed in order to perform the synchronization using the diagnostic system

- **the air suspension control operations must be blocked (remove fuse for EHC control unit)**
- **the ride-level heights must be measured using a tape measure and**

- **the rim size must be determined.**

The diagnostic system also refers to the ride-level height reference values (design position). These values are used by the diagnostic system and ICM to calculate the reference values for the conversion that are ultimately saved in the ICM control unit.

The ride-height signals in the EHC control unit (if installed) and the ride-height signals in the ICM control unit must be synchronized together.

Initialization of the Integral Active Steering

The ICM control unit calculates the higher-level control functions for the Integral Active Steering. The output signals of this control function are the reference steering angles, that should be set at the front and rear axle.

This is performed by the AS and HSR actuator control units together with the actuators. The actual angle set at the front and rear axle is sent to the ICM control unit as acknowledgment. The control circuit of the driving dynamics control system closes once this information has been received.

To determine this information correctly, the Integral Active Steering must be initialized. During this initialization procedure, the center of the steering gear at the front axle is determined and the corresponding signal values are stored (for example).

NOTE: The Integral Active Steering must be initialized under the following circumstances:

- **the ICM, AS or steering column switch cluster control unit has been replaced or**
- **the steering angle sensor in the steering column switch cluster has been calibrated or**
- **the steering gear has been replaced or**
- **if requested by the diagnostic system due to a fault code memory entry in the test schedule.**

During the calibration the diagnostic system issues several prompts to steer from one limit position to the other. The internal combustion engine should be running and the vehicle should be standing on the ground of the workshop when calibration is in progress. These marginal conditions most closely resemble the conditions under which the customer operates the vehicle and deliver the best initialization results. If the front wheels are resting on revolving and sliding supports, or are suspended in mid air if the vehicle is raised, this may lead to unsatisfactory results.

Calibration of the steering angle sensor in the steering column switch cluster

In addition to the signals from the motor-position sensors of the Integral Active Steering, the ICM control unit also imports the signal from the steering angle sensor in the steering column switch cluster. This is used by the ICM to determine the effective steering angle ("see **FUNCTIONS**" section).

This is why it is important that the ICM receives a correctly mapped value from the steering angle sensor.

NOTE: **The steering angle sensor must be calibrated if the steering column switch cluster is replaced or reprogrammed. A calibration must also be performed if this is requested in the test schedule of the diagnostic system as the result of a fault code memory entry.**
The steering angle sensor must be calibrated before the ICM can calculate a correct effective steering angle and make this available via the bus system.

NOTE: **Once the steering angle sensor has been calibrated, the instructions of the diagnostic system must be precisely followed.**
The vehicle must be standing on even ground during calibration. The steering wheel must be in the straight-ahead position (visually).

Start-up, short range radar sensors

If the option "Active speed control with stop&go function" is installed in the vehicle, this will include the necessary radar sensors.

Although short range radar sensors are intelligent sensors that perform the functions of a control unit they cannot be accessed directly via the diagnostic system. The ICM control unit acts as a "go-between" between the short range radar sensors and the diagnostic system which is why the ICM also controls the start-up process for the short range radar sensors.

NOTE: **The short range radar sensors for ACC Stop&Go must be started up if one (or both) short range radar sensor(s) is/are replaced. In this instance, the diagnostic system communicates with the ICM control unit. The ICM in turn controls the corresponding functions in the short range radar sensors.**

The installation position and, most importantly, the angle at which they are installed relative to the vehicle's longitudinal axis, are entered in the newly installed short range radar sensors during start-up. A measurement does not need to be carried out in this case. The angle entered is the angle predetermined by the construction and the form of the bumper support.

Periphery of ICM Control Unit

Bus Systems

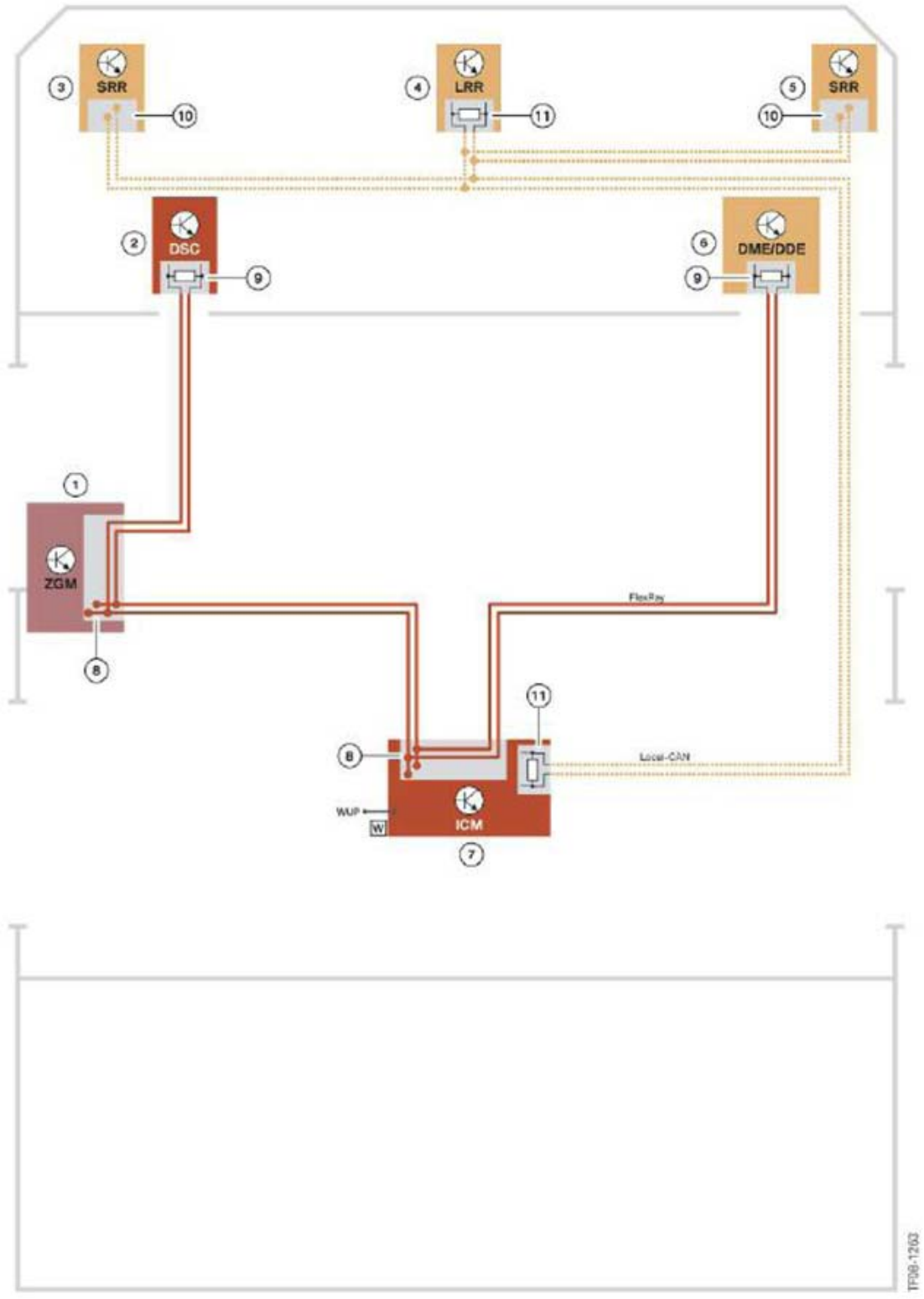


Fig. 45: Routing Diagram - ICM Control Unit With Flexray, Local CAN And Wake-Up Line
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Central gateway module
2	Dynamic Stability Control
3	Short range radar sensor (SRR), left
4	Long range radar sensor (LRR)
5	Short range radar sensor (SRR), right
6	DME/DDE control unit
7	ICM control unit
8	FlexRay routing and continuation without terminating resistor
9	Routing of FlexRay with terminating resistor
10	Routing of local CAN without terminating resistor
11	Routing of local CAN with terminating resistor
W	ICM control unit can be woken up
WUP	Wake-up line

FlexRay

The ICM control unit is connected to the FlexRay controller via the FlexRay bus system. The communication with virtually all partner control units is handled by the microprocessors in the ICM.

The FlexRay is routed to the ICM control unit (from the central gateway module) and continues from there (to the DME/DDE). The ICM control unit is related to the FlexRay, i. e. not an end node. This is why it does not have a terminating resistor for the FlexRay.

Local CAN

A further bus system, a local CAN, is connected to the ICM control unit in addition to the FlexRay. This serves the ICM exclusively for the purposes of communication with the active speed control radar sensors. This local CAN therefore performs the same tasks as the sensor CAN in the E6x LCI that connects the LDM control unit to the radar sensors. It transmits information on road users that has been recorded by the radar sensors.

The local CAN operates in the same way as the PT-CAN with a data transfer rate of 500 kBit/s. There are two terminating resistors for the local CAN, each with 120. One of these is in the ICM control unit, the second is integrated in the long range radar sensor (LRR). The close range sensors (SRR) are routed to the local CAN via short lines.

The pins for the local CAN are only connected at the plug of the ICM control unit if it is a high-performance version.

Wake-up line

The ICM control unit is also connected to the wake-up line. The ICM control unit can be woken up via the wake-up line.

Power Supply

The only external power supply to the ICM control unit is with terminal 30B. This is made available by the junction box electrical system and the fuse carrier at the front.

The electronics and integrated sensor system are therefore supplied inside the ICM control unit. Additionally, the ride-height sensors connected to the ICM control unit and the output stages for activation of the valves for the steering unit are also supplied.

Ride-height Sensors



Fig. 46: Identifying Ride-Height Sensors Components
Courtesy of BMW OF NORTH AMERICA, INC.

RIDE-HEIGHT SENSOR COMPONENT REFERENCE CHART

Index	Explanation
1	Connector
2	Housing
3	Arm (pivoting)

Design and principle of operation

The angle of a pivoting arm is converted to a voltage signal via the ride-height sensors. The greater the angle (with reference to a defined starting position), the greater the output voltage generated by a Hall sensor element.

Versions

Four ride-height sensors are installed in every F01/F02 as standard equipment.

However, the ride-height sensors installed in the vehicle are available in different versions. Different ride-height sensors are used on the left and right of the front axle.

Different ride-height sensors are also used on the rear axle. The reasons for this in both cases are the available installation space and the starting position.

Double or single-type ride-height sensors are used at the rear axle, depending on whether the vehicle is equipped with electronic ride-height control (EHC). Single-type ride-height sensors are always used at the front axle.

RIDE-HEIGHT SENSOR VERSIONS

Type of ride-height sensors at the	Front axle	Rear axle
Without electronic ride-height control	single	single
With electronic ride-height control	single	double

Interface with ICM control unit

As shown in the system circuit diagram, each ride-height sensor (irrespective of the version) is connected to the ICM control unit by three lines. The double-type ride-height sensors at the rear axle are also connected to the EHC control unit according to the same principle via three additional lines.

Power is supplied by the ICM control unit to the ride-height sensor via one of the lines. The sensor uses the second line to deliver its measurement signal (0-5 V DC voltage). The third line is connected to a common ground inside the ICM control unit.

The measurement signal is evaluated by means of voltage measurement in the ICM control unit. The ICM control unit cannot calculate the actual ride-level heights in millimeters on the basis of this information alone. To perform this calculation, the ICM control unit must be able to map the voltage signals it receives to reference values. This is the only way to establish a relationship between the measurement signals and the actual ride-level heights. These reference values are determined during a synchronization procedure.

NOTE: The ride-height signals in the ICM must be synchronized in the following cases

- **following replacement of the ICM control unit,**
- **following replacement of a ride-height sensor or**
- **if prompted to do so by the test schedule of the diagnostic system (due to a fault code memory entry in the ICM).**

The synchronization does not have to be carried out if a wheel has been changed.

Driving Dynamics Switch

The driving dynamics switch and DTC button are integral components of the center console operator control unit.



Fig. 47: Identifying Driving Dynamics Switch And DTC Button Installation Location
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	DTC button
2	Driving dynamics switch, "SPORT" rocker switch
3	Driving dynamics switch, "COMFORT" rocker switch

The new driving dynamics switch consists of two buttons labeled "COMFORT" and "SPORT". This is a rocker switch that returns automatically to the center position after it is pressed. The center position corresponds to the "no button pressed" status.

Both buttons of the driving dynamics driving switch are connected directly to the ICM control unit via two lines. The ICM control unit applies a voltage at these lines. Both buttons are connected to the ground via a resistance network. The ICM control unit can determine the following by back-scanning the voltage obtained:

- whether a button has been pressed and, if so, which of the two buttons,
- whether breaks in the wiring exist and
- whether a short to ground has occurred.

In previous vehicles, the familiar DTC button is connected electrically, e. g. to the IHKA control unit (E70/E71). In the F01/F02 on the other hand, the DTC button is connected to the ICM control unit via an electrical wire. A voltage is applied to this wire by the ICM control unit. The DTC button connects to the ground. The ICM control unit can determine by means of voltage measurement whether the DTC button is operated.

The "Driving dynamics control" function in the ICM control unit evaluates the operation of the driving dynamics switch and DTC button and uses this as the basis for determining the corresponding mode ("see **FUNCTIONS**" section). The ICM control unit sends signals via the bus system to inform the driver at the instrument cluster which mode has been set.

The footwell module supplies power to the center console operator control unit via terminal 58g for the locating lamp.

Valves of Steering Unit

The proportional valve that adjusts the electronic flow (EVV valve) and the Servotronic valve is activated directly from the ICM control unit. The ICM control unit contains the necessary output stages that are built up using power semiconductors.

Each valve is connected by two lines to the ICM control unit. The ICM control unit calculates the reference values for the aperture of both valves based on the road speed, steering angle and steering-angle speed input signals. These reference values are converted to a pulse-width-modulated signal that is applied at the lines leading to the valves. This means that the ICM control unit can change the aperture of the valves at any time.

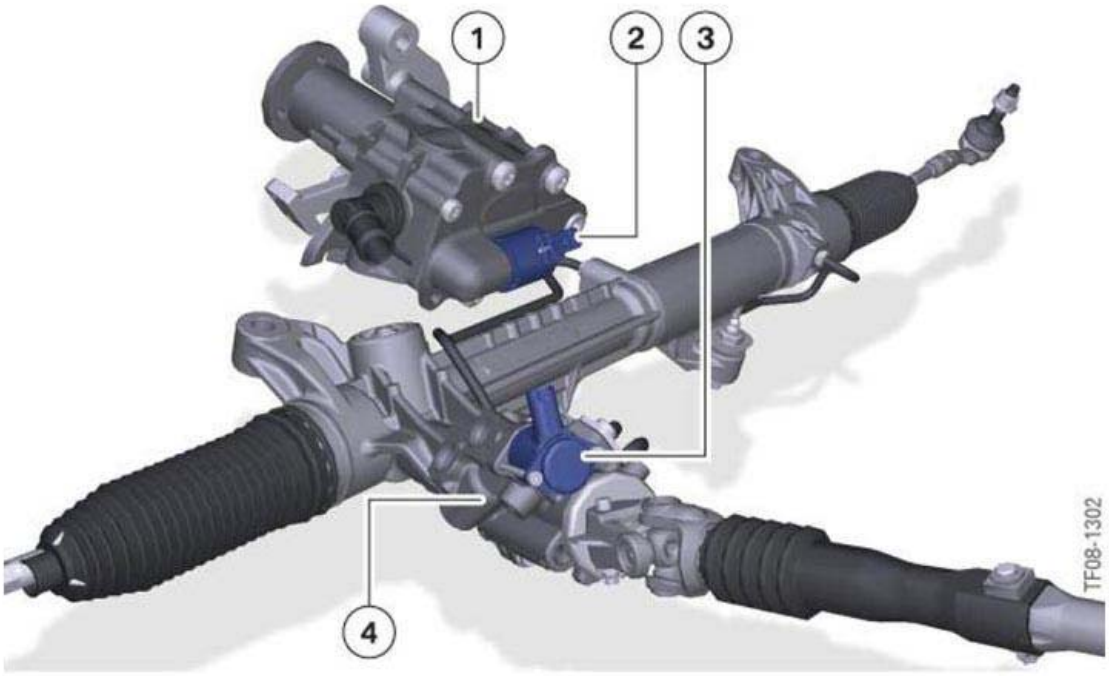


Fig. 48: Identifying Steering Unit Valves
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Power steering pump
2	Valve for electronic flow rate adjustment (EVV valve)
3	Servotronic valve
4	Housing of control valve for hydraulic power steering

SERVICE INFORMATION

What Points must be Observed During Servicing

ICM Control Unit

NOTE: If the ICM control unit needs to be replaced, the repair instructions must be observed without fail.
For example, the vehicle battery must be disconnected before removing the control unit and reconnected following the installation. This is the only way to ensure synchronized restarting of the control unit assembly.

NOTE: The ICM control unit must not be exposed to strong vibrations. The integrated sensor system will be destroyed if the housing is struck by hard objects, or if

the control unit is dropped. The control unit must not be installed in the vehicle in this case.

NOTE: **Only screws and spacer sleeves that are in perfect condition may be used to mount the ICM control unit. Deformed or damaged fixing elements must not be used.**
The mounting screws in the reamed holes must be tightened first, followed by the other two screws. The tightening torque specified in the repair instructions must be observed without fail.
A check must then be carried out to make sure the control unit is mounted securely and free of play.

NOTE: **Once the new ICM control unit has been installed, it must be started up with the assistance of the diagnostic system. To do this, the following steps must be carried out (depending on the equipment specification):**

- **Calibration of the sensors integrated into the ICM**
- **Calibration of the ride-height sensors**
- **Initialization of the Integral Active Steering.**

Diagnosis in the Event of Signal Faults

NOTE: **The ICM control unit itself contains sensors that provide the following signals:**

- **longitudinal acceleration**
- **lateral acceleration**
- **yaw rate.**

The wheel-speed signals are recorded and made available by the DSC control unit. The steering wheel angle is determined by the steering angle sensor in the steering column switch cluster.
The ICM control unit processes all the sensor signals and makes these available in the form of bus signals to other systems in the vehicle.
If fault code memory entries for these signals exist, the following procedure is recommended when working through the test schedules:
Start with the test schedule for the control unit that is providing the signals. The most important signal sources for dynamic driving systems are the ICM, DSC and steering column switch cluster. You will be able to get to the root of the fault and eliminate it more quickly using this procedure.
Instead, the test schedules for the control units that receive these signals only contain references to the transmitter control units which means they do not lead directly to the ultimate cause/solution of the fault.

Sensors in the ICM

NOTE: **Calibration of the sensors integrated into the ICM control unit is necessary in the following cases**

- **the ICM control unit has been replaced or**
- **if requested by the test schedule in the diagnostic system due to a fault code memory entry.**

The calibration must be performed with the vehicle standing on a level surface in the longitudinal and lateral direction. Terminal 15 must also be switched on.

NOTE: **The instructions of the diagnostic system must be followed precisely during calibration of the sensors integrated into the ICM. It is particularly important for the vehicle to be standing on a surface that is level in both the longitudinal and lateral directions.**
If this is not the case, incorrect correction values will be determined that may cause the dynamic driving system to malfunction.

Ride-height Sensors

NOTE: **The ride-height signals in the ICM must be synchronized in the following cases:**

- **following replacement of the ICM control unit,**
- **following replacement of a ride-height sensor or**
- **if prompted to do so by the test schedule of the diagnostic system (due to a fault code memory entry in the ICM).**

The synchronization does not have to be carried out if a wheel has been changed.

NOTE: **The following points must be observed in order to perform the synchronization using the diagnostic system**

- **the air suspension control operations must be blocked (remove fuse for EHC control unit)**
- **the ride-level heights must be measured using a tape measure and**
- **the rim size must be determined.**

The diagnostic system also refers to the ride-level height reference values (design position).

These values are used by the diagnostic system and ICM to calculate the reference values for the conversion that are ultimately saved in the ICM control unit.

The ride-height signals in the EHC control unit (if installed) and the ride-height signals in the ICM control unit must be synchronized together.

Steering Column Switch Cluster with Steering Angle Sensor

NOTE: The steering angle sensor must be calibrated if the steering column switch cluster is replaced or reprogrammed. A calibration must also be performed if this is requested in the test schedule of the diagnostic system as the result of a fault code memory entry.
The steering angle sensor must be calibrated before the ICM can calculate a correct effective steering angle and make this available via the bus system.

NOTE: Once the steering angle sensor has been calibrated, the instructions of the diagnostic system must be precisely followed. The vehicle must be standing on even ground during calibration. The steering wheel must be in the straight-ahead position (visually).

Integral Active Steering

NOTE: The Integral Active Steering must be initialized under the following circumstances

- **the ICM, AS or steering column switch cluster control unit has been replaced or**
- **the steering angle sensor in the steering 1 column switch cluster has been calibrated or**
- **the steering gear has been replaced or**
- **if requested by the diagnostic system due to a fault code memory entry in the test schedule.**

Displays and Operation

NOTE: New symbols are now used for the yellow DSC indicator and warning lamp and the DTC button. The new DSC symbols used for the first time in the F01/F02 replace the symbols previously used.

F01 LONGITUDINAL DYNAMICS SYSTEMS

INTRODUCTION

Refinements in Detail

The longitudinal dynamics systems described in this document comprise the following:

- Dynamic stability control (DSC) and

- Electromechanical parking brake (EMF)

Both DSC and EMF are standard equipment on all F01/F02 models. Thus BMW has consistently continued the standards set by the E65/E66 and the E70/E71. Both systems are based on the technology used on the E70/E71.

However, many specific details have had to be changed. Those changes were essential to ensure that DSC and EMF could be seamlessly integrated in the new dynamic handling system complex on the F01/F02.

As far as the Dynamic Stability Control was concerned, co-ordination with the central dynamic handling controller on the Integrated Chassis Management (ICM) master control unit had to be taken into consideration. And the new "dynamic handling control" function also affects the way the DSC operates. The thresholds and the nature of the DSC interventions have to be adapted to suit the setting selected.

Thus the DSC doesn't simply contain a setting that suits a luxury-class vehicle such as the F01/F02. Instead, several different settings have been developed which correspond to the characteristics of the various dynamic handling control settings.

In addition to adaptation to handling characteristics, there are numerous other changes to the Dynamic Stability Control on the F01/F02 which relate to location, display features, fault diagnosis and repair.

Starting from the basis of the system on the E70/E71, the electromechanical parking brake has been adapted to the requirements of the F01/F02. That includes such things as location and attachment to the vehicle. In addition, design enhancements have been introduced to make the EMF actuator quieter in operation.

This reference document sets out in detail all the changes to the Dynamic Stability Control and electromechanical parking brake that are specific to the F01/F02.

However, features of the two systems that are familiar from the E70/E71 are not repeated in this document. Those details can be found in the respective training manuals.

SYSTEM OVERVIEW

Components on the Vehicle

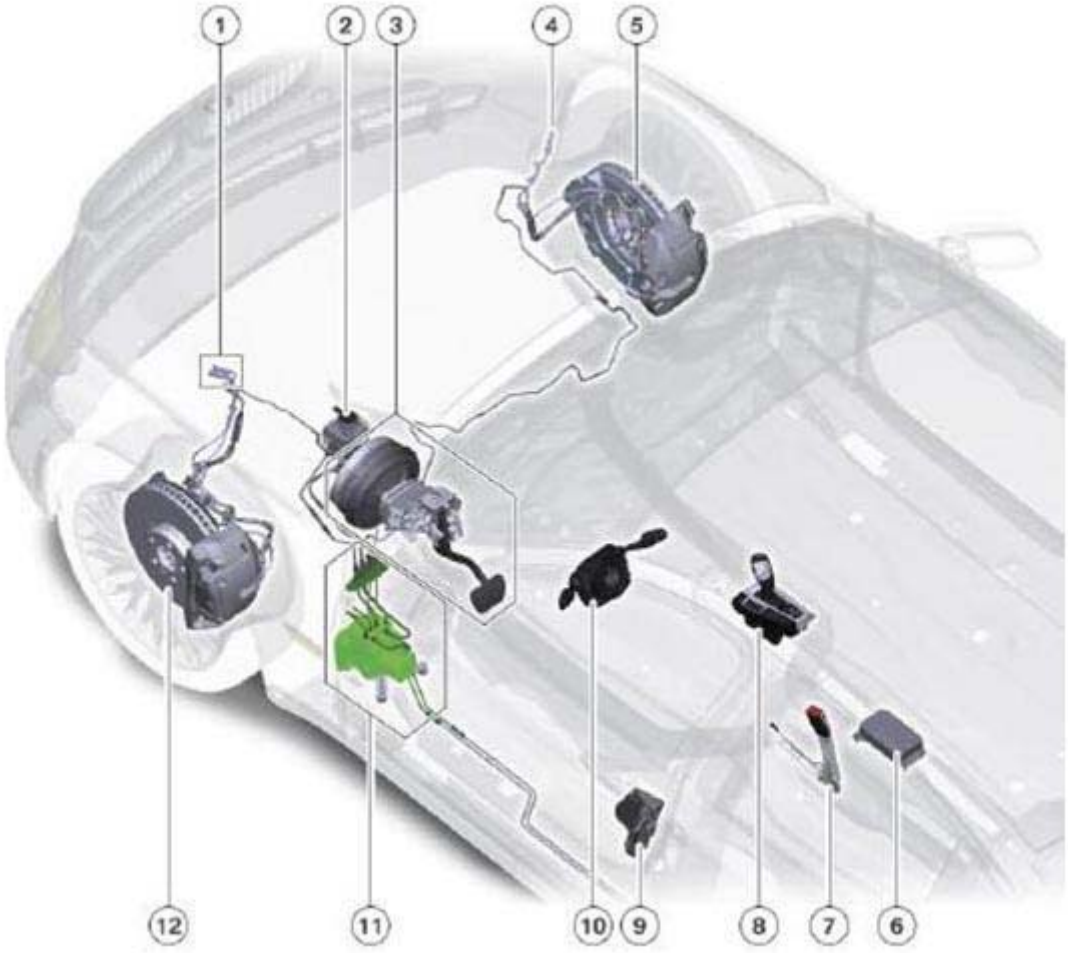


Fig. 49: Identifying Dynamic Stability Control And Electromechanical Parking Brake Components, F01/F02 (Front Half Of Vehicle)
Courtesy of BMW OF NORTH AMERICA, INC.

DYNAMIC STABILITY CONTROL SYSTEM COMPONENT REFERENCE CHART

Index	Explanation
1	Connection for front left wheel-speed sensor and brake-pad wear sensor
2	Brake fluid reservoir with brake fluid level switch
3	Brake pedal cluster (brake pedal, brake servo unit, tandem master cylinder)
4	Connection for front right wheel-speed sensor
5	Wheel brake, front right
6	Integrated Chassis Management control unit
7	Seat belt buckle contact, driver's seat
8	Center console control panel (DTC button, handling setting switch, parking brake button, automatic hold button)

9	Door switch, driver's door
10	Steering column switch cluster with steering-angle sensor
11	DSC control unit and hydraulic modulator
12	Wheel brake, front left

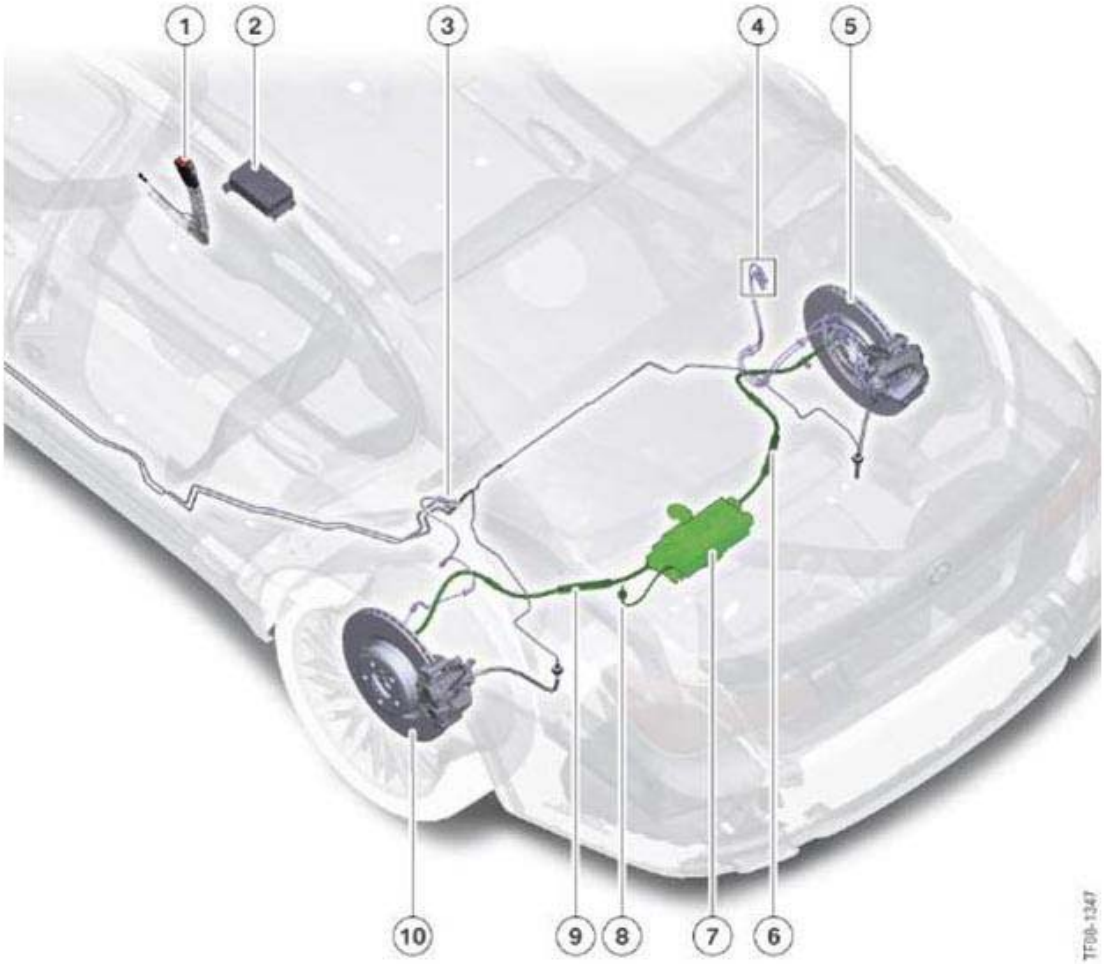


Fig. 50: Identifying Dynamic Stability Control And Electromechanical Parking Brake Components, F01/F02 (Rear Half Of Vehicle)
Courtesy of BMW OF NORTH AMERICA, INC.

DYNAMIC STABILITY CONTROL AND ELECTROMECHANICAL PARKING BRAKE COMPONENTS REFERENCE CHART

Index	Explanation
1	Seat belt buckle contact, driver's seat
2	Integrated Chassis Management control unit
3	Connection for rear left wheel-speed sensor
4	Connection for rear right wheel-speed sensor and brake-pad wear sensor

5	Wheel brake, rear right
6	Right EMF brake cable
7	Electromechanical parking brake control unit and actuator unit
8	Emergency release EMF
9	Left EMF brake cable
10	Wheel brake, rear left

Bus System Overview for DSC and EMF

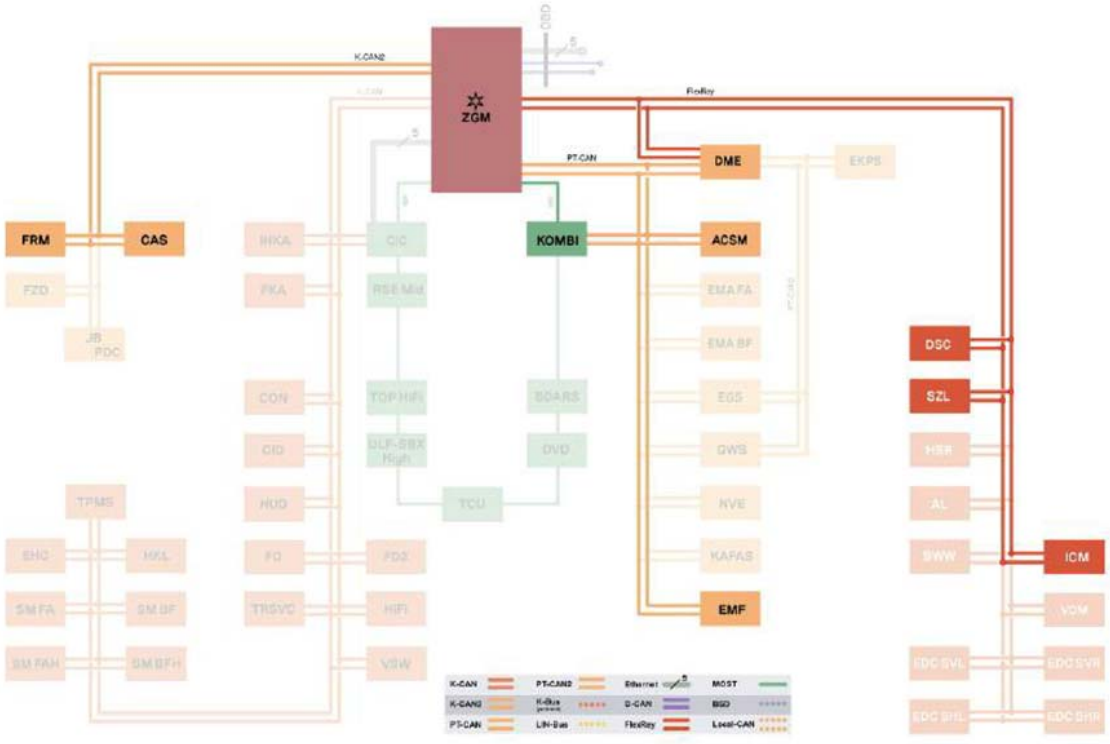


Fig. 51: Overview Of Bus System For DSC And EMF
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
ACSM	Advanced Crash Safety Module
CAS	Car Access System
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
EMF	Electromechanical Parking Brake
FRM	Footwell Module
ICM	Integrated Chassis Management
KOMBI	Instrument Cluster

SZL	Steering column switch cluster with steering-angle sensor
ZGM	Central Gateway Module

System Circuit Diagrams

Dynamic Stability Control

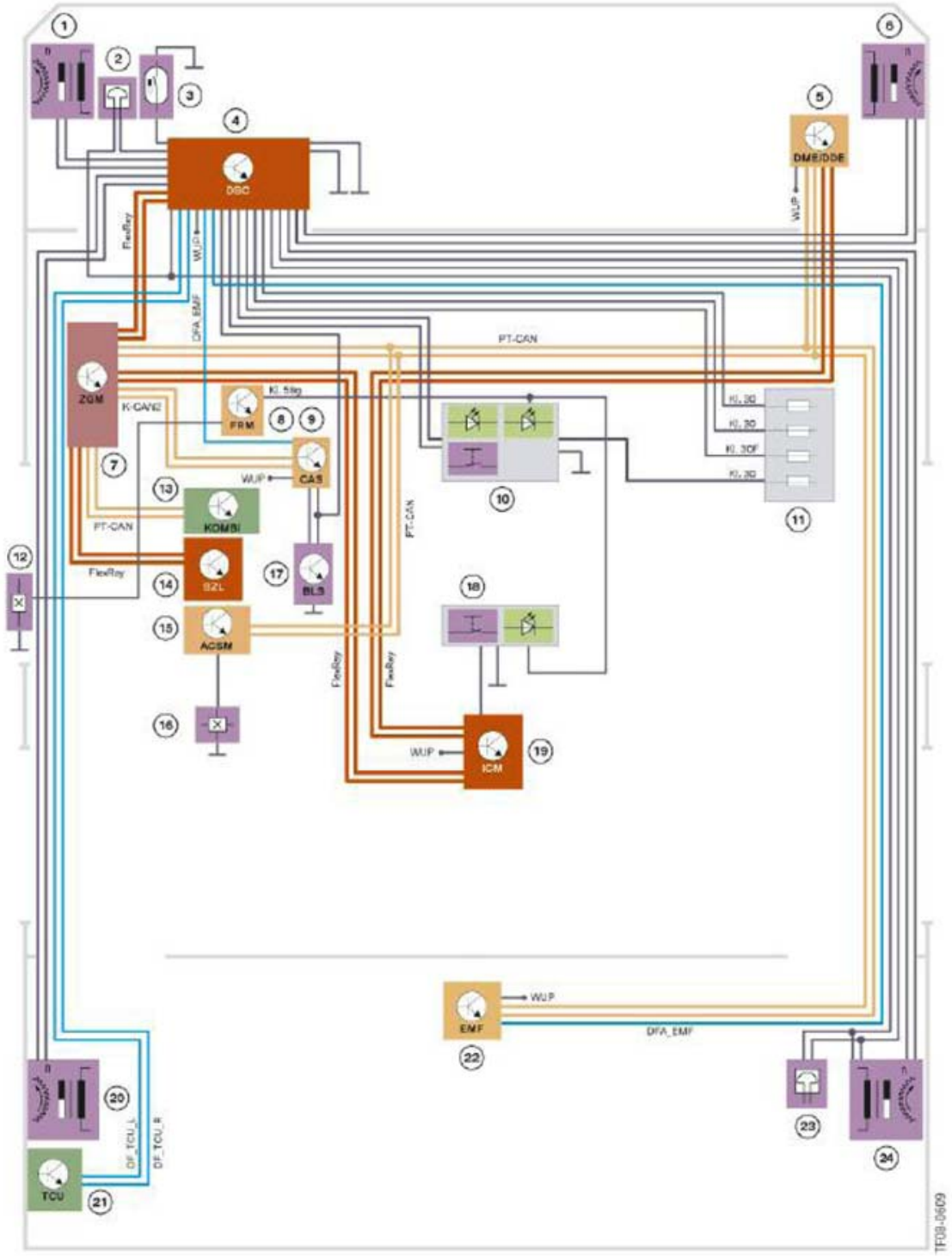


Fig. 52: Dynamic Stability Control System Circuit Diagrams
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Wheel-speed sensor, front left
2	Brake pad wear sensor, front left
3	Brake fluid level switch
4	Dynamic stability control (DSC)
5	Digital Motor Electronics/Digital Diesel Electronics
6	Wheel-speed sensor, front right
7	Central Gateway Module
8	Footwell module
9	Car Access System
10	Auto-H button with function indicator and illumination
11	Fuses for DSC electronics, valves, pump motor and Auto-H button (front fuse board, junction box electronics)
12	Door switch, driver's door
13	Instrument cluster
14	Steering column switch cluster with steering-angle sensor
15	Crash Safety Module
16	Seat belt buckle contact, driver's seat
17	Brake light switch
18	DTC button with illumination
19	Integrated Chassis Management
20	Wheel speed sensor, rear left
21	Telematics Control Unit
22	Electromechanical parking brake
23	Brake pad wear sensor, rear right
24	Wheel-speed sensor, rear right

FUNCTIONS

DSC Functions

Overview

The Dynamic Stability Control on the F01/F02 (DSC F0x) essentially incorporates the same functions as on the E70/E71 (DSC E7x).

As the DSC F0x is based on the same highly advanced technology as the DSC E7x, all DSC functions on the F01/F02 achieve outstanding performance in terms of:

- dynamic response (brake pressure can be generated extremely quickly).
- control precision (brake pressure can be adjusted extremely precisely and without significant fluctuation).

- noise emission (operation of the valves and the hydraulic pump is quieter than the previous generations).
- tactile response (unpleasant feedback from the brake pedal has been substantially reduced, e. g. pedal vibration during brake modulation).

Differences between the DSC functions on the E70/E71 and F01/F02 arise from the different drivetrain configurations (4-wheel drive/rear-wheel drive). Therefore, the DSC F0x does not include the "Hill Descent Control (HDC)" function specific to 4-wheel drive vehicles.

Instead of the 4-wheel-drive version of the automatic differential brake (ADB-X), the DSC F0x uses the version for vehicles with rear-wheel drive (ADB).

A new subfunction of the ADB is that traction-control brake modulation is available even when the DSC is switched off. This subfunction is called "Electronic Differential Lock Control" and is described in one of the subsections below.

DSC FUNCTION REFERENCE CHART

Function	DSC ON	Traction	DSC OFF
Anti-lock braking system (ABS)	•	•	•
Electronic brake force distribution (EBV)	•	•	•
Cornering Brake Control (CBC)	•	•	•
Engine drag torque control (MSR)	•	•	•
Automatic Stability Control (ASC)	•	X	
Automatic Differential Brake (ADB)	•	X	X
Dynamic handling control (FDR)	•	X	
Brake modulation for increased agility	•	•	
Dry braking	•	•	•
Start assist	•	•	•
Brake readiness	•	•	•
Fading assistance	•	•	•
Dynamic Brake Control (DBC)	•	•	•
Automatic Hold combined with electromechanical parking brake (EMF)	•	•	•
Run Flat Indicator (RPA)	•	•	•
Condition Based Service	•	•	•

(CBS)			

Symbols:

• = Function active

X = Function has adapted control thresholds

= Can be switched on/off by driver

DSC and Integrated Chassis Management

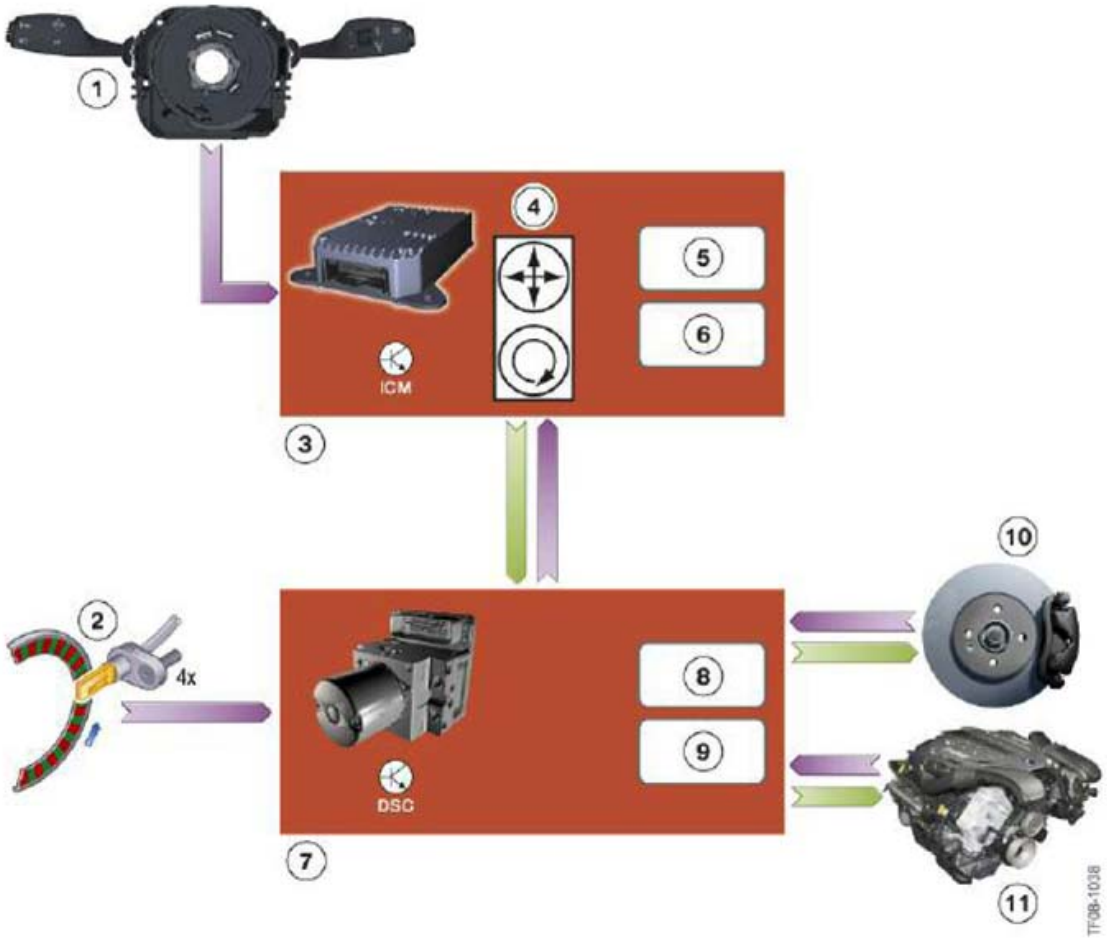


Fig. 53: Input/Output Signal Diagram - Interaction Of ICM And DSC
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Steering column switch cluster with steering-angle sensor

2	Wheel speed sensors
3	Integrated Chassis Management
4	Integral DSC sensor (linear acceleration, lateral acceleration and yaw rate)
5	"Dynamic handling control" function on ICM
6	"Actuator co-ordination" function on ICM
7	Dynamic Stability Control
8	"Dynamic handling control" function on DSC
9	"Actuator control" function on DSC
10	Brake
11	Drivetrain

On previous vehicles, the DSC control unit contained the central dynamic handling control functions. A dynamic handling control complex remains part of the DSC F0x. However, it is controlled by the central dynamic handling controller on the ICM (as are the other dynamic handling systems).

The ICM calculates the current handling status and the vehicle response desired by the driver. To do so, it makes use not only of the signals from the DSC sensor integrated in the ICM but also of those from external sensors such as the steering angle sensor and the wheel-speed sensors. If a difference between the response desired by the driver and the reaction of the vehicle is detected, the central dynamic handling controller on the ICM calculates a required compensatory yaw force.

The purpose of that yaw force is to bring about a yawing motion on the part of the vehicle that is superimposed over the existing movement of the vehicle. In that way, the vehicle handling can be corrected retrospectively, so to speak, when it threatens to become unstable. The highly advanced DSC technology and the central dynamic handling controller on the ICM even make is possible to optimize handling characteristics in advance. One example of that is brake modulation for the purposes of improved agility, which is described in one of the subsections further on.

Subordinate to the central dynamic handling controller on the ICM is an "actuator coordination" function. It decides whether and to what degree the DSC dynamic handling system is to contribute to producing the required yaw force.

The required force is signalled to the DSC's dynamic handling controller, which puts it into action by operating the actuators represented by the brakes and drivetrain.

Simple implementation of the settings specified by the ICM is, however, not the only task of the DSC's dynamic handling controller on the F01/F02. It also continues to independently perform the following original DSC functions:

- Anti-lock braking system (ABS)
- Cornering Brake Control (CBC)
- Automatic Stability Control (ASC)
- Engine drag torque control (MSR)

- Automatic Differential Brake (ADB)

The numerous additional functions over and above pure handling dynamics control are also carried out largely independently by the DSC and without intervention by the ICM.

- Functions which help to reduce stopping distance: they include brake drying, brake standby, brake fade prevention and dynamic brake control. The efficiency of the brake standby and dynamic brake control functions is further improved in combination with the "ACC Stop&Go" optional extra.
- Convenience functions which make driving easier, e. g. Automatic Hold, which is performed by the DSC and EMF in combination.
- The stresses on and wear of brake components are monitored with the aid of computation models. Based on information such as brake pressure and brake temperature and the signals from the brake-pad wear sensors, a remaining service life expressed as a mileage is calculated. The owner can view that information as a subfunction of Condition Based Service and use it as an aid to planning servicing appointments.

DSC Displays and Controls

New DSC symbols

There is a new set of symbols for Dynamic Stability Control displays and controls. Starting on the F01/F02, this new DSC symbol set replaces the symbols previously used.

Previously there were two different symbols displayed on the instrument cluster for the statuses "DTC mode" and "DTC off".

As of launch of the F01/F02, there is now only one symbol for both statuses. However, the drive can distinguish between the two statuses by means of additional information in text form.

The new DSC symbol set relates not only to the display but also the labeling of the DTC button.

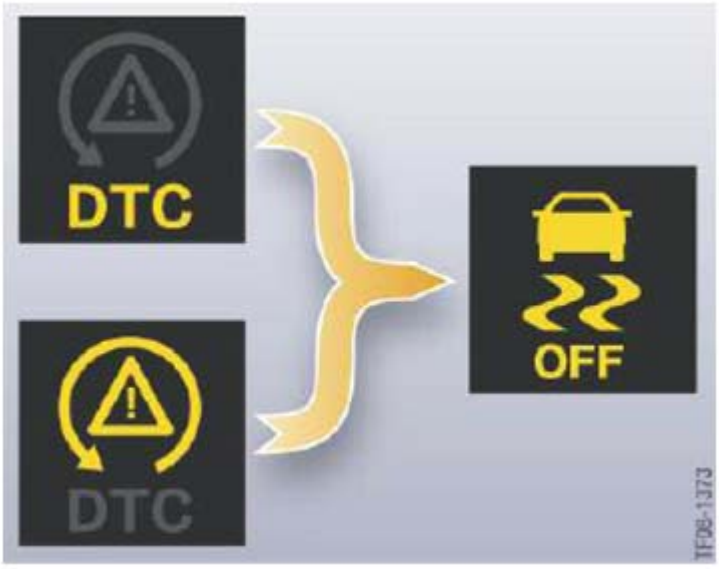


Fig. 54: Identifying DSC Indicator And Warning Lamp On Instrument Cluster
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 55: Identifying DSC Symbols
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	DTC button
2	DSC indicator and warning lamp on the instrument cluster: o DSC switched off or o DSC in DTC mode
3	DSC indicator and warning lamp on the instrument cluster: o DSC control sequence active (flashing)

	○ DSC failure (permanently lit)

The new symbols will gradually be introduced on all new vehicles as they are phased in. The reason for the change of symbols are the new legal requirements which oblige all car manufacturers to use standardized display symbols. That will enable motorists to immediately recognize the controls and displays of a DSC system as such regardless of the brand of car they are driving.

The regulations also require that even merely limited DSC function must result in display of the word "off". That is the case in "DTC mode", in which the stabilizing interventions take place at a later stage.

DSC modes

As familiar from previous vehicles, the Dynamic Stability Control on F01/F02 incorporates the following function modes:

- DSC on
- DTC (Dynamic Traction Control)
- DSC off

In the "DSC on" mode, all DSC functions are fully active. The stabilizing interventions in brake and engine function take place at an early stage. That makes it easier for less expert drivers to regain control of a vehicle that is becoming unstable.

In "DTC mode" the stabilizing interventions take place at a slightly later stage.

The Automatic Stability Control and Automatic Differential Brake functions allow a greater degree of wheelspin. That improves traction when pulling away on loose surfaces such as uncompacted snow. The dynamic handling control function does not come into action until a larger sideslip angle is reached than in "DSC on" mode.

In "DSC off" mode, the stabilizing interventions by:

- the dynamic handling controller,
- the Automatic Stability Control and

are switched off.

Especially safety-critical DSC functions such as ABS remain fully active in all DSC modes, however.

The mode "DSC off" is aimed at the undiluted driving experience, the direct connection between the driver, vehicle and the road.

Integration in dynamic handling control

A new feature of the DSC modes on the F01/F02 is that they are integrated in the dynamic handling control function. Dynamic handling control is activated by means of the handling setting switch and the DTC button.

Dynamic handling control enables the driver to choose one of six possible vehicle handing modes. The dynamic handling controller then controls all drivetrain and dynamic handling systems simultaneously and in co-ordination with one another. The result is totally harmonious handling in all modes.



Fig. 56: Identifying DTC Button And Handling Setting Switch
Courtesy of BMW OF NORTH AMERICA, INC.

The vehicle handling modes are called:

- Comfort
- Normal
- Sport
- Sport+
- Traction

- DSC off

When the vehicle is first started, the dynamic handling controller is always in "Normal" mode.

The table below shows what mode the Dynamic Stability Control is in for each of the vehicle handling modes.

The other dynamic handling systems and drivetrain control systems are switched in and out as appropriate to the vehicle handling mode selected.

INDEX REFERENCE CHART

Index	Explanation
1	DTC button
2	Handling setting switch

VEHICLE HANDLING MODE REFERENCE CHART

Vehicle handling mode	DSC mode
Comfort	DSC on
Normal	DSC on
Sport	DSC on
Sport +	DTC
Traction	DTC
DSC OFF	DSC off

DSC Functions in Detail

ADB Active Even When DSC is Off

The DSC function ADB has been around for a long while on a wide variety of BMW vehicles and especially in the form of the ADB-X version on the xDrive models.

If one of the wheels of a driven axle is spinning, it cannot transmit any driving force (torque) to the road. And because the differential distributes the torque equally between the two wheels, the other wheel on the axle can not transmit any driving force either.

ADB brakes the spinning wheel so that the driving torque and braking force are in equilibrium on that wheel. Then, by virtue of the differential, an equal amount of driving torque is applied to the wheel that is not spinning. And because that wheel is offered grip by the road surface, a driving force can be transmitted that results in forward motion of the vehicle.

Thus ADB increases traction on slippery surfaces and has a similar effect to a differential lock.

- On the **xDrive** models, ADB-X remains active even when the DSC is switch off in order to achieve improved traction, especially when driving off road.
- On vehicles with **rear-wheel drive** , that individual braking of the driving wheels was previously only active when the DSC was active or in "DTC" mode.

- On the new F01/F02 (and the top 1 Series and 3 Series models) that ADB subfunction remains active even when the DSC is switched off.

That function is called **"Electronic Differential Lock Control"** and uses the DSC to emulate the effect of a differential lock on the driving wheels. In contrast with previous arrangements, such brake modulation for the purposes of increasing drive transmission takes places even if the driver has switched off the DSC.

Brake Modulation for Increasing Agility

The highly advanced hardware of the DSC F0x enables brake modulation to be carried out without unpleasant feedback for the driver. On the F01/F02, that capability is utilized to influence the vehicle's self-steering characteristics is a specifically targeted way.

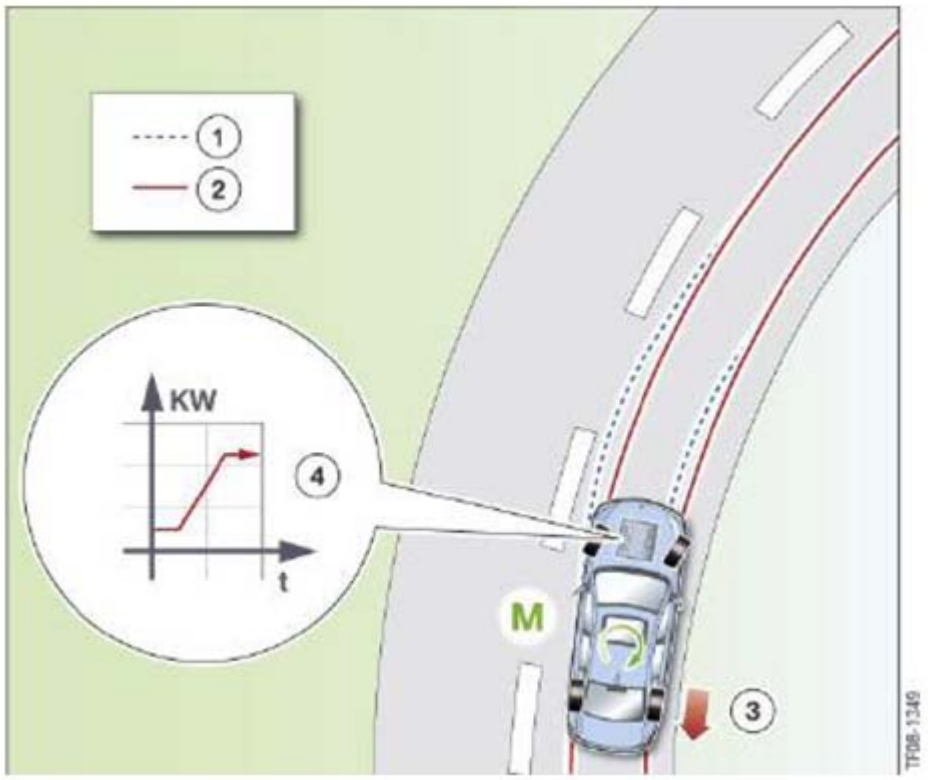


Fig. 57: View Of Brake Modulation For Increasing Agility
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Course of an understeering vehicle
2	Course of a vehicle with neutral handling
3	Individual modulation of brakes to prevent understeer
4	Increased engine torque to compensate for braking

	force
M	Yaw force acting on the vehicle as a result of individual modulation of brakes

If the vehicle begins to understeer, e. g. when cornering quickly, the central dynamic handling controller on the ICM detects the very first indications that it is starting to happen. A required setting is transmitted to the DSC requiring it to apply the brake on the rear wheel on the inside of the bend. The DSC sensitively applies the required setting and without generating a level of noise perceptible by the driver. The uneven braking effect thus produced, creates a yaw force acting around the vehicle's center of gravity. As a result, the vehicle turns towards the inside of the bend, doesn't understeer and corners with absolutely neutral handling.

This type of brake modulation increases road safety because it prevents the vehicle drifting towards the outside of the bend. The disadvantage, however, is that the vehicle is slowed slightly by the application of the brake and thus a degree of momentum is lost.

Therefore, in typical BMW fashion, the solution is taken a step further. Whenever handling stability considerations allow, the engine torque is increased simultaneously with brake application. The higher engine torque is transmitted to the road by the wheel on the outside of the bend that is not being braked. The control strategy ensures that the increase exactly matches the retardation by the brake application.

While that DSC function is active, there is no display of any kind on the instrument cluster.

In that way, highly advanced components (DSC) and intelligent control strategies are combined to produce an overall effect that substantially improves agility without impairing the handling stability of the vehicle.

Automatic Hold

This function has been around since the E65, on which it was called "Auto-P". The Automatic Hold function was also used on the E70/E71.

Although the Automatic Hold function is computed on the DSC control unit, it can not be put into effect without an electromechanical parking brake (EMF). The EMF is always required whenever the DSC hydraulic modulator is unable to permanently hold the vehicle stationary. In particular, that is the case when the engine is switched off.

When the Automatic Hold function is active, the driver first of all brakes the vehicle to a standstill. It is then held stationary by the DSC hydraulic modulator. That is achieved by maintaining the final brake pressure applied by the driver. If the vehicle starts to roll on an incline, the DSC hydraulic modulator actively generates brake pressure.

Pressing the accelerator causes the brake pressure to be released and the vehicle starts to move again. Automatic holding and releasing of the brakes in that way makes driving in easier in conditions such as urban traffic and stopping at traffic lights or stop-and-go driving in traffic tailbacks.

After the engine is started, the function can be activated until the next time the engine is switched off. To do so, the driver's door must be closed and the driver's seatbelt fastened. The function can, of course, also be manually deactivated before the engine is switched.

The footwell module reads the signal from the door switch. The ACSM control unit analyses the signal from the seat belt buckle contact. The two signals are transmitted to the DSC control unit via the bus systems. One signal that is not analyzed for the Automatic Hold function on the F01/F02 is the driver's seat occupancy signal.

Conversely, the Automatic Hold function is automatically deactivated if the driver's door is opened and the driver's seatbelt unfastened. To prevent the vehicle rolling away in that situation, the EMF parking mode is activated. As long as the engine is running, the parking mode is effected by means of the DSC hydraulic modulator. If the driver switches the engine off, the function is taken over by the EMF actuator unit.

NOTE: Before the vehicle is driven into a car wash, the Automatic Hold function has to be deactivated as otherwise the brakes are applied when the vehicle is stationary and it can not be rolled.

The Automatic Hold function is activated and deactivated by means of the button marked "AUTO H" on the center console. Activation of the function is acknowledged by the function indicator lamp (green LED in the button). Whenever the green LED is lit, the Automatic Hold function is active. The status of the Automatic Hold function is also indicated on the instrument cluster.

The various function statuses and how they are indicated are summarized below.

AUTOMATIC HOLD FUNCTION DESCRIPTION CHART

Status of Automatic Hold function	Function indicator lamps in buttons	Display on instrument cluster
Switched off		
Switched on and on standby (e. g. when vehicle is moving)		
Switched on and active (vehicle is being held stationary)		
Deactivated by driver getting out		

of vehicle or switching engine off		

When Automatic Hold is holding the vehicle stationary, two additional internal DSC subfunctions are activated: roll-away monitoring and slide detection.

The roll-away monitoring function is described in the section "EMF functions".

The slide detection function is designed to intervene if the vehicle starts to slide after stopping, i. e. if all four stationary wheels start to slip. That can happen on a steep slope when the road is slippery, for instance. If the driver were holding the vehicle stationary and became aware of such a situation, he/she would release the brake. In that way the vehicle can at least be steered as it rolls down the slope.

The slide detection function is based on exactly the same principle. When the vehicle is being held stationary by Automatic Hold, the slide detection function monitors the signals from the wheel-speed sensors. The DSC releases the pressure on one of the brakes in alternation while keeping the others under pressure. If the wheel-speed sensor registers a movement from the wheel on which the brake is released, then obviously the entire vehicle must be moving. That means that the other wheels, on which the brakes are applied, must be sliding while locked. Under those circumstances, the condition "sliding" would be detected.

The response to detection of sliding is progressive release of brake pressure so that the vehicle becomes steerable. The driver is made aware of the critical situation by a Check Control message and an audible warning signal.

Interface for Adaptive Braking Assistance

The function "Adaptive Braking Assistance" implemented as a co-ordinated strategy by the DSC and Adaptive Cruise Control with Stop&Go function is also available on the F01/F02. It is a function that was previously introduced on the E60/E61 LCI.

The interface relates to two functions on the Dynamic Stability Control:

- brake standby and
- dynamic braking control.

"Brake standby" can be activated by a request signal transmitted by the ICM control unit. That happens when a potential collision situation has been detected with the aid of the radar sensors. And, of course, "brake standby" is also activated if the internal DSC criteria familiar from previous models are met (minimum speed, rapid release of accelerator pedal).

The threshold for triggering dynamic braking control can be influenced by ACC Stop&Go. If a potential

collision situation is detected, the ICM control unit sends out a signal requesting lowering of the activation threshold. To be precise, the activation threshold is the rate of increase of brake pressure applied by the driver that has to be exceeded in order to dynamic braking control (braking assistance). That makes it easier for the driver to trigger dynamic braking control. This function is the only means by which a driver braking hesitantly can activate dynamic braking control.

SYSTEM COMPONENTS

DSC Components

DSC Unit

The DSC unit on the F01/F02 essentially uses the same technology as on the E70/E71.

Versions

The DSC unit comprises the DSC control unit and the hydraulic modulator. The two are attached to one another in such a way as to form a waterproof unit.

The repair kits available are either

- the complete DSC unit with pre-filled hydraulic modulator or
- the DSC control unit on its own.

There is a seal integrated in the casing of the DSC control unit at precisely the point where it joins the hydraulic modulator. That is the reason why the DSC control unit can be replaced separately (seal is replaced at the same time). The hydraulic modulator, by contrast, can not be replaced separately because the seal would be damaged when the two parts were separated. The required degree of waterproofing would then no longer be provided.

There are two versions of the DSC unit which differ by virtue of the number of pressure sensors fitted.

DSC VERSION DESCRIPTION CHART

Optional extra ACC/ACC Stop&Go	Number of pressure sensors	Brake pressures measured
No	1	Pressure applied by driver
Yes	3	Pressure applied by driver Pressure in front-wheel brake circuit Pressure in rear-wheel brake circuit

The DSC unit with only one pressure sensor uses a computation model to determine the pressures in the front and rear brake circuits. The degree of accuracy obtained is sufficient for the functions of the dynamic handling systems and the cruise control with braking function. The optional extras ACC and ACC Stop&Go require a higher degree of accuracy for determining the brake pressure generated and modulated by the Dynamic Stability Control. Therefore, the two additional brake sensors are fitted in the front and rear brake circuits.

Hydraulic modulator

With its highly advanced pump design, the hydraulic modulator also offers an enhanced degree of control accuracy. There are 2 groups of 3 pump elements with a diameter of 6.5mm and intake-optimized units. This pump design produces, firstly, substantially improved pressure generation dynamics. And secondly, the pressure increments during pressure generation are smaller. Together with the improved design of the valves, the overall effect is less pedal feedback during brake modulation.

For the driver this is noticeable in as far as the pedal pulsation can now only be felt very slightly during ABS braking. There is a pressure sensor for detecting the pressure applied by the driver in the hydraulic modulator.

DSC control unit

Like the hydraulic modulator, the DSC control unit on the F01/F02 is also based on the one used on the E70/E71.

Specifically, the following special features and differences should be noted:

- FlexRay connection
- Wiring of the new DTC button
- Wheel-speed signals for electromechanical parking brake, Car Access System and Telematic Control Unit

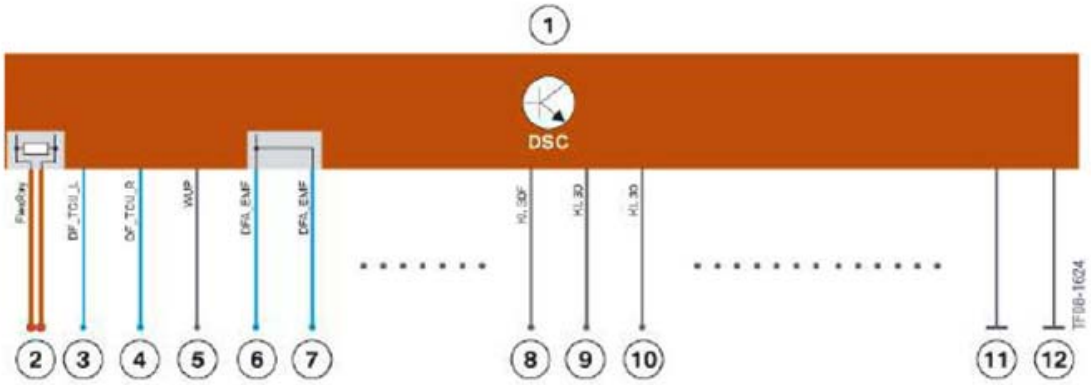


Fig. 58: Overview Of Connections On DSC Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	DSC control unit
2	FlexRay input with terminal resistor
3	DF_TCU_L, front left wheel-speed signal for Telematic Control Unit (TCU)
4	DF_TCU_R, front right wheel-speed signal for TCU
5	WUP, wake-up line
6	DFA_EMF, wheel-speed signal for Car Access

	System (CAS)
7	DFA_EMF, wheel-speed signal for electromechanical parking brake (EMF)
8	Power supply for DSC module (Terminal 30F)
9	Power supply for valves (Terminal 30)
10	Power supply for pump motor (Terminal 30)
11	Ground for DSC module
12	Ground for valves and pump motor

The DSC control unit on the F01/F02 is connected to the FlexRay and not, as on previous vehicles, to the PT-CAN and F-CAN.

The FlexRay is brought to the DSC control unit (from the ZGM) and ends there. The DSC control unit is thus the terminal node of the FlexRay. Accordingly, it contains a terminal resistor for the FlexRay.

On previous vehicles, the DTC button was electrically analyzed by the IHKA control unit, for instance (E70/E71). On those vehicles, the button operation signal is transmitted via bus systems to the DSC control unit.

The new DTC button on the F01/F02 is connected to the ICM control unit instead. The DTC button and the associated function is part of the "dynamic handling control" function on the F01/F02. As that, in turn, is computed on the ICM control unit, the DTC button has been connected to the ICM control unit. The ICM control unit then signals the appropriate vehicle handling mode via the FlexRay. The DSC control unit analyses the signalled mode and adapts its function accordingly.

For the EMF and CAS control units, the information about vehicle standstill is of particular importance. For those two systems, the DSC control unit provides the DFA_EMF signal. It is a calculated signal computed from the speeds of the two rear wheels. It is transmitted as a pulse-width modulated signal on a dedicated line to the EMF and CAS control units.

If there is a Telematic Control Unit (TCU) fitted on the vehicle but no navigation system, the TCU control unit has to take on the task of determining vehicle location. That is necessary for the manual and automatic emergency call functions. The signals from the GPS aerial are insufficient for that purpose as it has to be possible to determine the vehicle's location even if the GPS signals are temporarily unavailable. In that case, the TCU control unit uses the speed signals from the two front wheels to calculate the road speed and changes of direction when cornering. The wheel-speed signals are provided by the DSC control unit and transmitted to the TCU control unit by a directly wired connection (DF_TCU_L and DF_TCU_R).

The power supply for the DSC unit is split into three: control unit, valves and pump motor are supplied by separate leads. That prevents interference from the load circuits (inductive loads) being transferred to the electronic circuitry.

The DSC control unit is also connected to the wake-up line. The wake-up line is used to wake up the DSC control unit.

Location and repair

The DSC unit is located in the vehicle underbody, set back somewhat from the wheel arch. That location applies to both left and right-hand-drive vehicles.

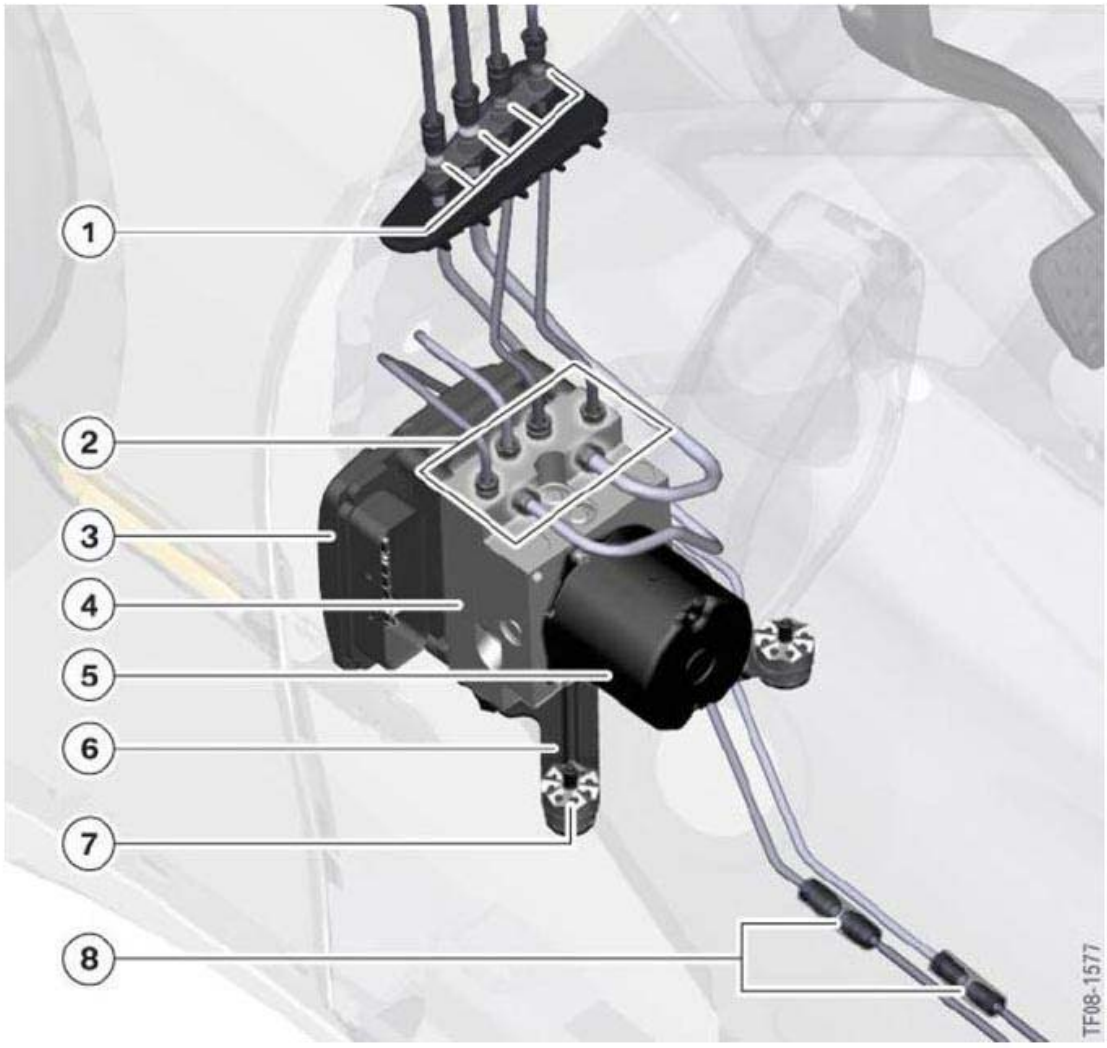


Fig. 59: Identifying DSC Unit Location, F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Quick-release hydraulic pipe unions, 4 off
2	Screw-fit hydraulic pipe unions, 6 off
3	DSC control unit
4	DSC valve manifold
5	DSC pump motor
6	DSC unit mounting bracket
7	Bolt fixing with vibration damper for DSC unit
8	Screw-fit hydraulic pipe unions, 2 off

Six short lengths of hydraulic pipe are connected to the DSC unit by screw-fit unions.

Four of those hydraulic pipes run upwards from the hydraulic modulator and terminate at a block with quick-release unions. They are connected by those quick-release unions to the pipes running off to other parts of the vehicle. Specifically, that is the two pipes to the left and right front brakes and the two pipes to the tandem master cylinder.

The two remaining hydraulic pipes run to the rear. They are connected by quick-fit unions to the pipes running off to other parts of the vehicle. In this case, they lead to the left and right rear brakes.

If the DSC unit has to be replaced, first of all the vehicle underbody trim has to be removed in the appropriate places. When the DSC unit is removed, the six short lengths of hydraulic pipe referred to above are removed with it. Therefore, before removal, the four quick-release unions (4) and the two screw-fit unions (8) have to be disconnected. The short lengths of hydraulic pipe subsequently have to be removed and fitted to the new DSC unit.

Only after the DSC unit has been removed can the DSC control unit be separated from the hydraulic modulator, if necessary, and new one fitted.

The braking system must always be bled whenever the DSC unit has been removed and refitted/replaced.

The precise procedures for the individual repair operations in connection with the DSC unit are described in the Repair Instructions.

Sensors for DSC

Wheel speed sensors

The same type of wheel-speed sensor is used on the F01/F02 as on the E70/E71 (DF11i made by Robert Bosch GmbH).

They are four active wheel-speed sensors, all four of which are connected by dedicated two-core leads directly to the DSC control unit. The wheel-speed data is transmitted to the DSC control unit as a pulse-width-modulated signal.

The active wheel speed sensors enable detection of direction of rotation and clearance gap.

Detection of direction of rotation is required for the hill-start assistance and Automatic Hold functions, among others. The clearance-gap sensing function allows sensor positioning faults to be detected. If there is too much play in the wheel bearings, the wheel-speed signal can also become unreliable. That situation is also detectable by the clearance- gap sensing capability of the wheel-speed sensors.

It can therefore be guaranteed that the DSC control unit only operates on the basis of correctly detected wheel-speed signals.

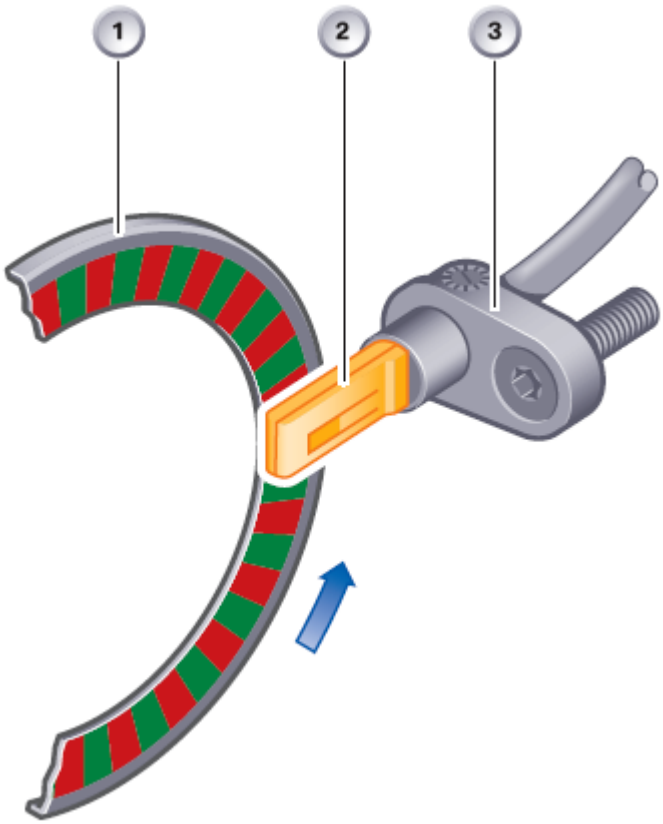


Fig. 60: Identifying Wheel Speed Sensors Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Sensor ring/ferromagnetic wheel bearing seal carrier
2	IC sensor with Hall sensor
3	Sensor housing

The DSC control unit broadcasts the wheel-DSC sensor in ICM speed sensor signals via the FlexRay network and directly wired links to the other systems on the vehicle.

The DSC sensor, which was previously a separate component, has been integrated in the ICM control unit on the F01/F02.

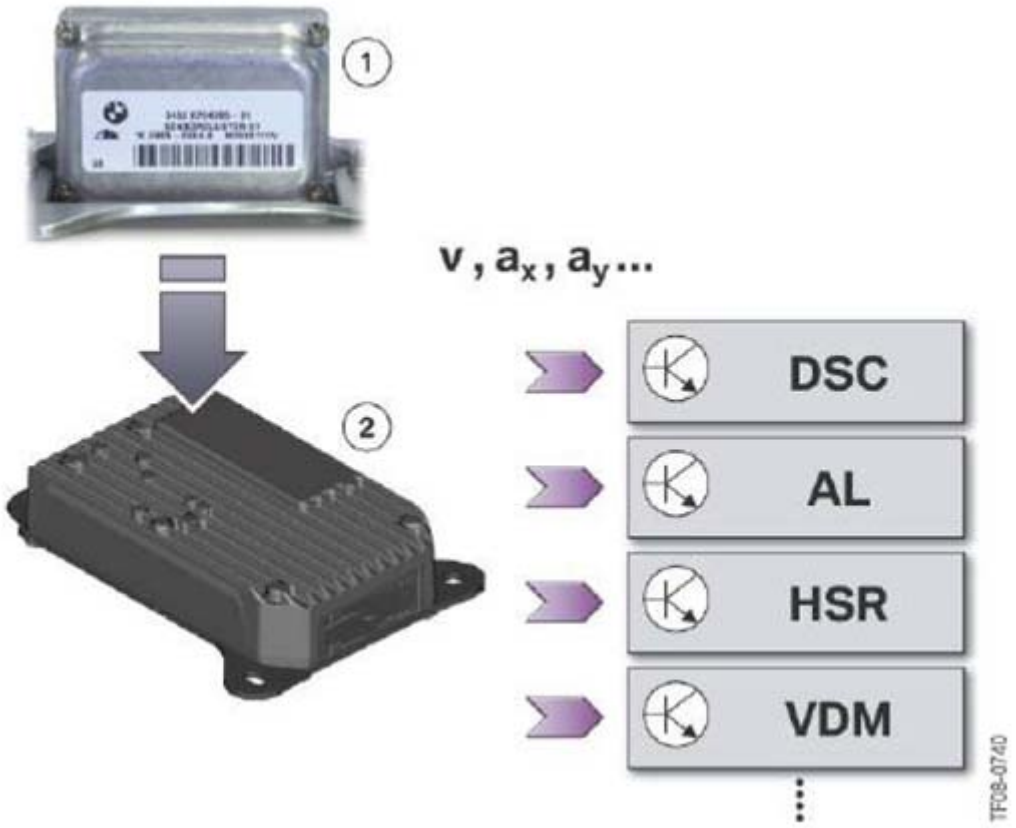


Fig. 61: Identifying Dynamic Handling Signals By ICM Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	DSC sensor integrated in ICM control unit
2	ICM control unit
v	Road speed
ax	Linear acceleration
ay	Transverse acceleration
DSC	Dynamic Stability Control
AL	Active steering
HSR	Rear suspension slip angle control
VDM	Vertical Dynamics Management

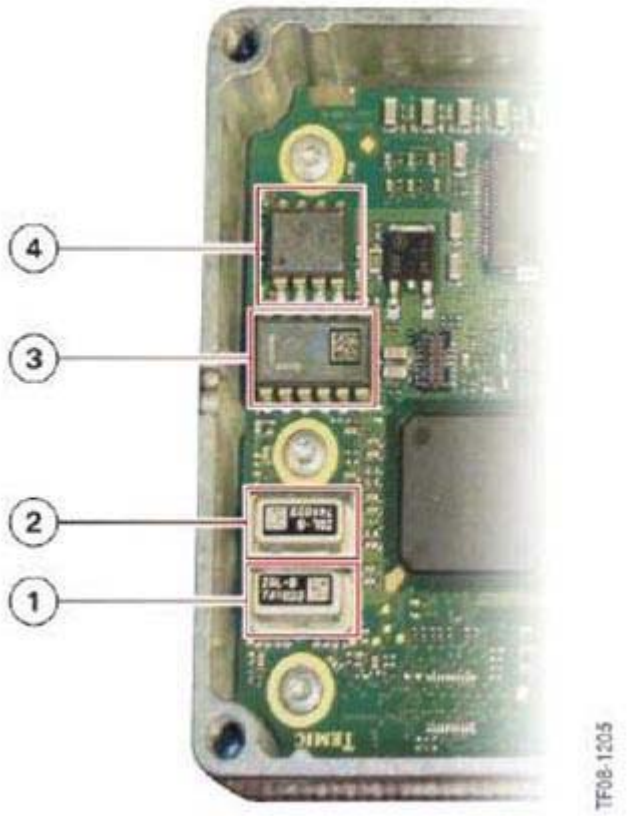


Fig. 62: Identifying Yaw Rate Sensor, Second, Back-Up Yaw Rate Sensor And Linear And Lateral Acceleration Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Yaw rate sensor
2	Second, back-up yaw rate sensor
3	Linear and lateral acceleration sensor
4	Second, back-up lateral acceleration sensor

With the aid of the signals from those integrated sensors and the wheel-speed signals provided by the DSC control unit, the ICM control unit calculates the following variables that are of significance for the vehicle's dynamic handling status:

- Road speed
- Linear acceleration and pitch
- Lateral acceleration and roll
- Yaw rate

Steering-angle sensor in SZL

With the aid of the steering-angle sensor, the SZL is able to provide the following signals via the FlexRay bus system:

- Steering angle
- Steering rate

Those variables are used as input signals by the dynamic handling systems to determine the driver's intention when cornering. On the F01/F02 it is important to note that the steering-angle sensor signals are first analyzed by the ICM control unit and then provided to control units of the other dynamic handling systems as the "effective steering-angle signal".

Detection of the steering angle and the steering rate is performed by an optical proximity sensor, the optical steering angle sensor.

Information such as the absolute steering angle or the steering wheel rotation is calculated. The optical steering-angle sensor detects steering angles from -640° to +640°.

If the SZL suffers a power loss, e. g. if the battery terminals are disconnected, the steering wheel rotation data is lost. The SZL is then initially unable to determine the absolute steering angle and can only identify the relative steering angle.

This temporary fault status can be remedied by turning the steering wheel from lock to lock. Alternatively, the SZL can detect the straight-ahead position from the wheel-speed signals from the front wheels when driving in a straight line.

In either case, the absolute steering angle is then known again.

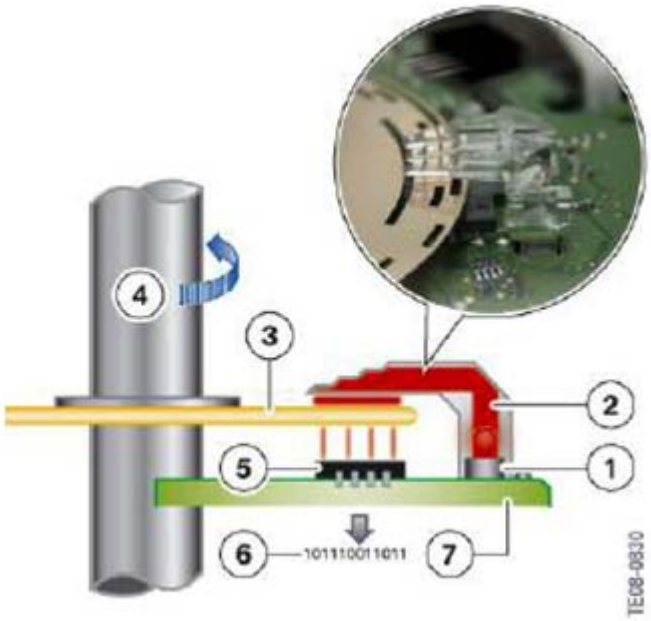


Fig. 63: Schematic Diagram Of Optical Steering-Angle Sensor, F01/F02

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Light-emitting diode
2	Fiber optics unit
3	Code disc
4	Steering column
5	Photo-transistors
6	Output: Conversion to electrical signals
7	PCB

NOTE: If at least one of the following conditions exists, the steering column switch cluster has to perform steering-angle sensor calibration:

- **Wheel alignment carried out**
- **SZL replaced or re-programmed**
- **Diagnosis system test procedure specifies calibration.**

NOTE: When calibrating the steering angle sensor, the instructions given by the diagnosis system must be followed precisely.
The vehicle must be standing on a level surface during calibration. The steering wheel must be aligned visually in the straight-ahead position.

SERVICE INFORMATION

Important Points for Servicing and Repairs

Dynamic Stability Control (DSC)

General details

NOTE: The modes "Dynamic Traction Control" (DTC) and "DSC off" are still used on the F01/F02. However, on the F01/F02, the DSC modes are integrated in the "dynamic handling control" function, which rather than controlling individual systems, controls the system complex of all drivetrain and dynamic handling systems.

NOTE: There is a new set of symbols for DSC displays and controls on the F01/F02.



Fig. 64: Identifying DSC Symbols
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic hold function

The Automatic Hold function is activated/deactivated by means of a button on the center console control panel. The Automatic Hold status is indicated by the function indicator lamp on the button and an indicator lamp on the instrument cluster.



Fig. 65: Instrument Cluster Display - Automatic Hold Indicator Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

For Automatic Hold to be activated, the driver's seatbelt must be fastened and the driver's door closed.

NOTE: Before the vehicle is driven into a car wash, the Automatic Hold function has to be deactivated as otherwise the brakes are applied when the vehicle is stationary and it can not be rolled.

DSC unit

There are two versions of the DSC unit which have either one or three pressure sensor(s) (vehicles without/with "Active Cruise Control" optional extra)

NOTE: The repair kits available are either

- **the complete DSC unit with pre-filled hydraulic modulator or**
- **the DSC control unit on its own.**

The hydraulic modulator can not be replaced separately.

NOTE: **The DSC unit is located in the vehicle underbody, set back somewhat from the wheel arch.**

NOTE: **If the DSC unit has to be replaced, first of all the vehicle underbody trim has to be removed.**
When the DSC unit is removed, the six short lengths of hydraulic pipe are removed with it. Therefore, before removal, the four quick-release unions at the top and the two screw-fit unions at the bottom have to be disconnected from the hydraulic pipes.
The short lengths of hydraulic pipe subsequently have to be removed and fitted to the new DSC unit.

Signals and sensors

NOTE: **The wheel speed sensors are connected to the DSC control unit. The DSC control unit processes the wheel-speed sensor signals and broadcasts them via the FlexRay network to other systems, in particular the Integrated Chassis Management.**

NOTE: **The DSC control unit does not only provide the wheel-speed signals in the form of bus signals. They are transmitted to the EMF, CAS and TCU control units by direct wired links.**

NOTE: **The DSC sensor, which was a separate component on previous vehicles, has been integrated in the ICM control unit. The ICM control unit processes the important sensor signals for the Dynamic Stability Control and supplies them in the form of bus signals. Those signals are:**

- **Yaw rate**
- **Transverse acceleration**
- **Linear acceleration**
- **Steering angle**
- **Vehicle speed.**

NOTE: **The DSC sensor in the ICM control unit has to be calibrated if**

- **the ICM control unit has been replaced or**

- **the testing sequence on the diagnosis system demands it on the basis of a fault memory entry.**

Calibration must be performed with the vehicle on a surface that is level both lengthways and side to side. Terminal 15 must also be switched on.

NOTE: **If at least one of the following conditions exists, the steering column switch cluster has to perform steering-angle sensor calibration:**

- **Wheel alignment carried out**
- **SZL replaced or re-programmed**
- **Diagnosis system test procedure specifies calibration.**

NOTE: **When calibrating the steering angle sensor, the instructions given by the diagnosis system must be followed precisely.**
The vehicle must be standing on a level surface during calibration. The steering wheel must be aligned visually in the straight-ahead position.

Overview of EMF Functions

Normal Operation

Parking brake application

The driver can activate the EMF parking brake function by pulling on the parking brake button. Thus the way in which the parking brake button is operated emulates the action of a handbrake lever.

The signal from the parking brake button is read by the EMF control unit and transmitted to the DSC control unit as a bus signal. The DSC control unit then decides whether to use the DSC hydraulic modulator or the EMF actuator unit to implement the parking brake function. If the engine is running, the vehicle is held stationary by using the DSC hydraulic modulator; otherwise the EMF actuator unit is used.

The parking brake function is possible at any logical terminal status, i. e. at:

- Terminal 0
- Terminal R
- Terminal 15 (and Terminal 50)

Parking brake application at Terminal 0 is specifically made possible by the fact that the EMF control unit is supplied by Terminal 30 and the parking brake button is connected directly to the EMF control unit. If the driver operates the parking brake button at Terminal 0, the EMF control unit is woken up. The EMF control unit in turn wakes up the other control units on the vehicle. Only then can the EMF control unit receive the important signals relating to vehicle standstill. In addition, the changed status of the parking brake can be displayed after the system has been woken up.

The status "parking brake on" is indicated by a red LED on the parking brake button and an indicator lamp on the instrument cluster.

The driver does not have to operate any other controls to apply the parking brake.

Once the parking brake is on, pulling the parking brake button again has no effect.



Fig. 66: Instrument Cluster Display - Parking Brake ON
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Function indicator lamp on parking brake button
2	Indicator lamp on instrument cluster

Roll-away monitoring

The roll-away monitoring function is computed on the DSC control unit. It is active while the vehicle is being held stationary by:

- the DSC hydraulic modulator or
- the EMF actuator unit.

The condition for activation of roll-away monitoring is thus that either the EMF parking brake function or the Automatic Hold function is active.

Roll-away monitoring observes the signals from the wheel-speed sensors. If any of the wheel-speed sensors signals movement of the wheel, that indicates that the vehicle is rolling. Since, however, the vehicle is supposed to be stationary by virtue of the brake pressure applied by the hydraulic system or the EMF actuator, the roll-away monitoring function has to intervene. The hydraulic brake pressure is increased by control signals to the DSC hydraulic modulator or EMF electric motor in order to increase the braking force. In that way the rolling is counteracted.

Release

In similar fashion to the operation of a handbrake lever, the EMF is released by pushing the parking brake button in.

But in order that the parking brake function is actually cancelled, Terminal 15 must also be on and one of the following conditions must be met:

- Brake pedal depressed or
- Automatic transmission parking lock engaged.

That prevents the vehicle rolling away if another occupant of the vehicle apart from the driver presses in the parking brake button (child safety feature).

Once the parking brake is released, the function indicator lamp on the parking brake button and the indicator lamp on the instrument cluster go out.



Fig. 67: Instrument Cluster Display - Parking Brake Released
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Function indicator lamp on parking brake button
2	Indicator lamp on instrument cluster

Dynamic braking

The law requires that vehicles have two means of applying the brakes. On the F01/F02, the second means (the brake pedal being the first) is the parking brake button on the center console.

If the parking brake button is pulled out while the vehicle is in motion, a defined degree of braking is applied by the DSC system. That function is intended for emergency situations in which the driver is unable to apply the brakes by pressing the brake pedal. Other occupants of the vehicle can also bring the vehicle to a standstill in that way if, for example, the driver suddenly loses consciousness.

Dynamic braking hydraulically applies brake pressure at all four brakes. The stabilization functions of Dynamic Stability Control remain fully functional and the brake lights are switched on. That represents a major advantage over a manual parking brake.

Braking takes place only while the parking brake button is pulled out. The degree of deceleration set by the DSC is increased progressively from initially 3 m/s2 to 5 m/s2.

During dynamic braking, the parking brake indicator light on the instrument cluster comes on. In addition, a Check Control message and an audible warning signal are issued to make the driver aware of the critical situation.

If the driver uses the brake pedal and the parking brake button at the same time to slow down, the DSC control unit prioritizes. The greater braking requirement is put into effect.

If dynamic braking is continued to the point of standstill, the vehicle continues to be held stationary after the parking brake button is released. The indicator lamp on the instrument cluster remains on. The driver can then release the parking brake (as described above).

Emergency release

A mechanical emergency release facility is provided in order to be able to release the parking brake in the event of the electromechanical actuator unit failing or insufficient power supply.

NOTE: Caution: secure vehicle to prevent it rolling before operating the emergency release!

NOTE: After a power supply failure, it may still not be possible to move the vehicle even after releasing the brake with the emergency release facility. The automatic transmission parking lock may still be engaged.
In that case, the parking brake must first be released with the emergency release facility. Then the automatic transmission parking lock must be released using the emergency release facility. To do so, the appropriate tool must remain engaged in the parking lock emergency release.

The parking brake emergency release status is indicated on the instrument cluster.

The parking brake indicator lamp shows yellow.



Fig. 68: Instrument Cluster Display - Parking Brake Emergency Release/Fault
Courtesy of BMW OF NORTH AMERICA, INC.

The driver is shown the same indication (together with a check control message) if the parking brake has a fault.

When the parking brake is to be used again after an emergency release, that can not be done mechanically but only electrically. It requires pushing in the parking brake button once as if to release the parking brake. The familiar conditions for releasing the parking brake must also be met.

Service Function

Installation Mode

EMF installation mode is required for the purposes of replacing the EMF actuator unit or the brake cables. The EMF can be set to installation mode with the aid of the BMW diagnosis system. This mode is comprised of two subfunctions:

- Setting the EMF actuator unit to the installation position
- Preventing the EMF parking brake function.

To set the unit to the installation position, the brake cables are extended to the maximum length. That is the essential requirement for being able to remove and refit the cables.

While work is being carried out on the actuator unit, the brake cables or the duo-servo parking brake, the EMF must not be inadvertently or deliberately applied. Doing so would risk causing injury. Installation mode prevents the EMF parking brake function.

That means that pulling out the parking brake button as if to apply the parking brake has no effect.

Installation mode is indicated on the instrument cluster by the parking brake indicator lamp flashing yellow.



Fig. 69: Instrument Cluster Display - Parking-Brake Installation Mode
Courtesy of BMW OF NORTH AMERICA, INC.

Installation mode can be cancelled in two ways:

- By the performing the service function "Reset installation mode" using the BMW diagnosis system
- By driving the vehicle; when doing so, a minimum speed must be exceeded.

Once installation mode has been successfully cancelled, the parking-brake indicator lamp on the instrument panel goes out.

Running-in the Brakes

The function for running-in the parking brakes only has to be carried out if

- the linings of the duo-servo parking brakes have been replaced or
- the rear brake discs have been replaced.

In either case, a material/surface pairing then initially exists which does not yet have the optimum frictional properties. That means that the required braking forces could not be achieved.

The brake running-in function removes play between the two surfaces forming the frictional pairing, i. e. the brake linings and the inside of the brake disc recess. It also wears-in the surfaces. Both operations are essential to achieving the required frictional coefficient between the two surfaces.

The brake running-in function is prepared with the aid of the BMW diagnosis system. It is started by pulling out the parking brake button once. The parking brake indicator lamp flashes red throughout the entire sequence.

While running-in the parking brakes, the EMF applies a defined force to the duo-servo parking brakes. That force is substantially lower than the brake force required to hold the vehicle stationary. The rear wheels are then rotated either on a brake dynamometer or by driving the vehicle on the road.

NOTE: The precise procedure for running-in the parking brakes is described in the

Repair Instructions under the heading "Adjusting the parking brake". The instructions given there must be followed exactly.

EMF Components

This section deals only with the special features of the actuator unit and the controls for the electromechanical parking brake. On the F01/F02, as on numerous other BMW models, the braking force for the parking brake is produced by the familiar duo-servo parking brakes on the two rear wheels.

EMF Actuator Unit

The complete EMF actuator unit and especially the electric motor and gearing have been optimized for use on the F01/F02. That is noticeable in particular by quieter operation during actuation.

The EMF actuator unit is made up of the following main components:

- EMF control unit
- Electric motor
- Gearbox
- Force sensor

Those components are housed in a plastic casing that can not be opened. In the event of a fault, the EMF actuator unit can only be replaced as a complete unit.

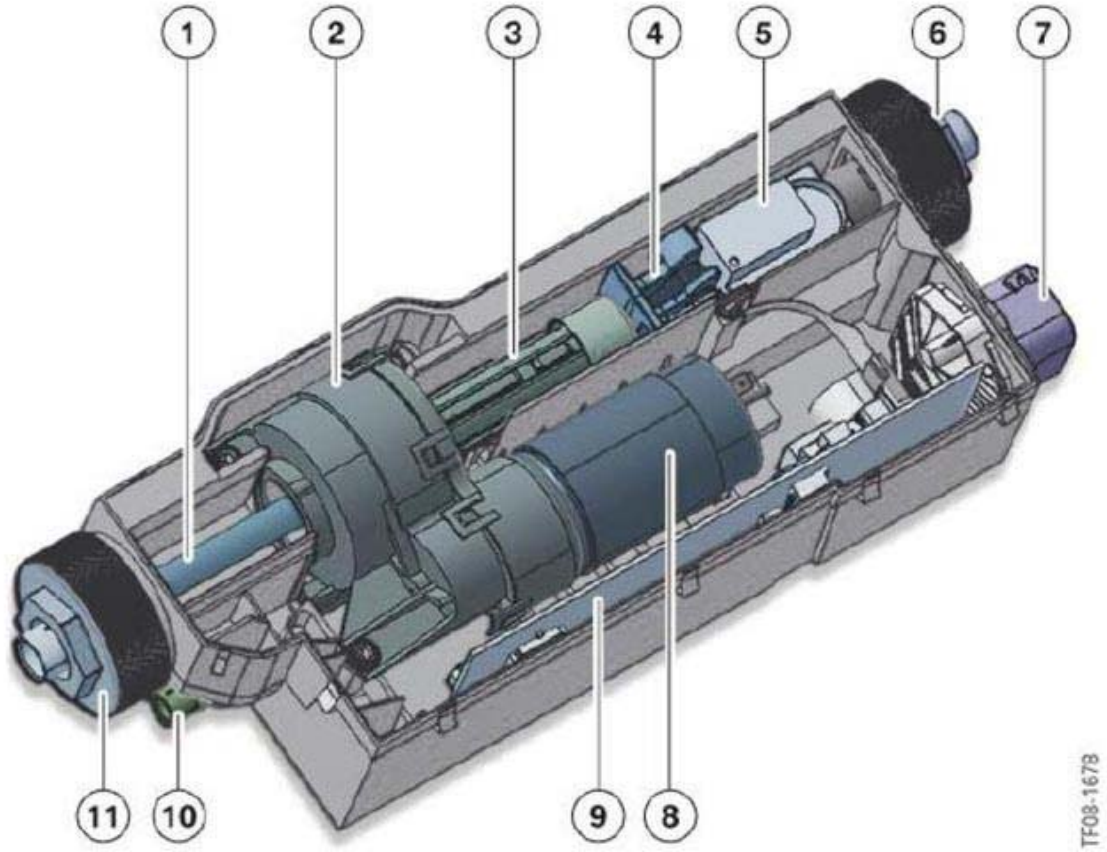


Fig. 70: Identifying EMF Actuator Unit Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Spindle
2	Gearbox
3	Splined shaft
4	Emergency release mechanism
5	Force sensor
6	Sleeve nut for right brake cable
7	Connector
8	Electric motor
9	Control unit circuit board
10	Entry/exit for emergency release cable
11	Sleeve nut for left brake cable

EMF control unit

As on the E70, the EMF control unit on the F01/F02 is integrated in the actuator unit casing and is also identical

in design to the one on the E70. It is the actuation controller for the EMF functions. It therefore controls the electric motor and reads the signals from the force sensor.

The most important control signal from outside is that from the parking brake button. The parking brake button is directly wired to the EMF control unit.

The EMF control unit is connected to the PTCAN. Integrated in the EMF control unit is one of the two terminal resistors for the PT-CAN. The EMF control unit communicates via the PT-CAN with its most important partner, the DSC control unit. As the DSC control unit is only connected to the FlexRay, the central gateway module is required to transfer the signals between the PT-CAN and the FlexRay.

A special place among the input signals is occupied by the information relating to vehicle standstill. The EMF actuator unit must not be activated while the vehicle is moving but rather only when it is stationary. Otherwise, the vehicle handling would become unstable due to the rear wheels locking up. The EMF control unit detects vehicle standstill on the basis of the following three input signals:

- Road speed (provided by Integrated Chassis Management via bus systems)
- Rear axle speed (provided by engine management via PT-CAN)
- Wheel-speed signal "DFA_EMF" (calculated by Dynamic Stability Control and transmitted via direct wired link to EMF control unit).

Only when those three signals definitively indicate vehicle standstill does the EMF control unit allow operation of the actuator unit.

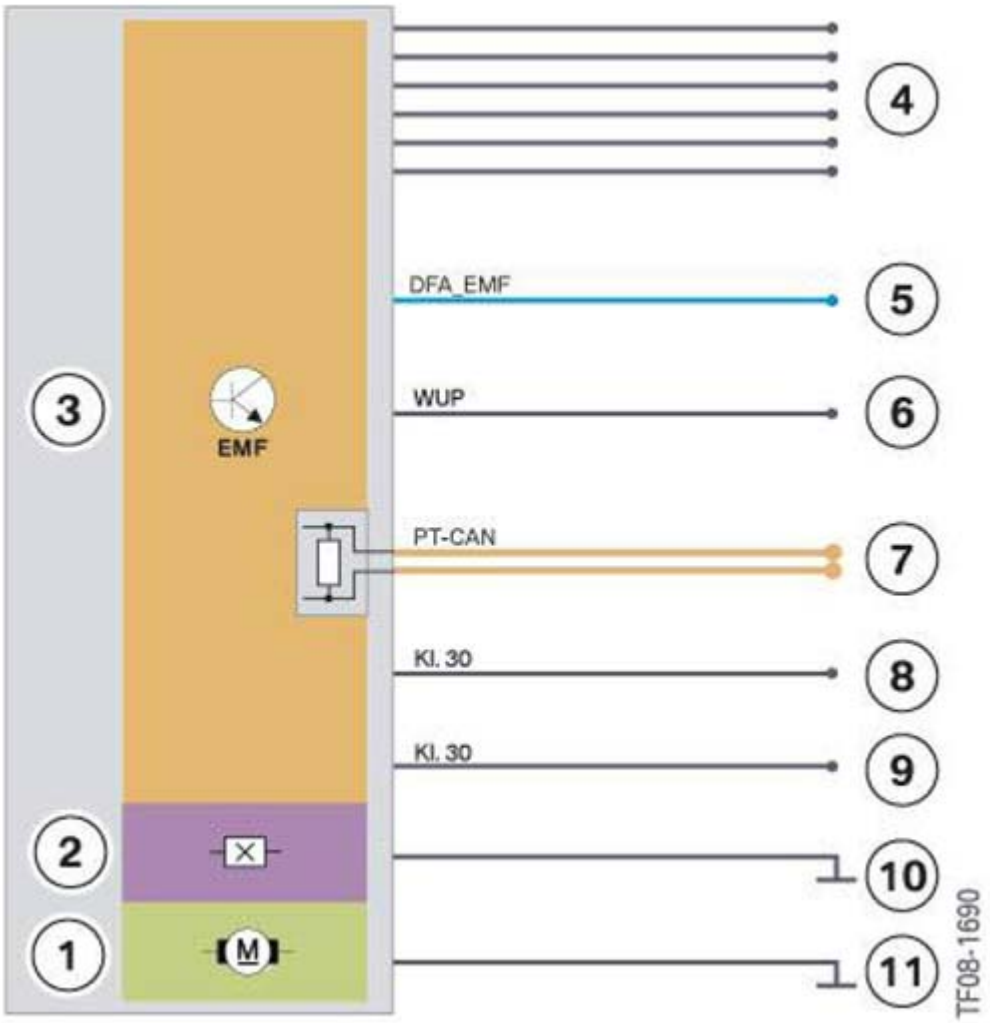


Fig. 71: Overview Of Connections On EMF Actuator Unit
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Electric motor
2	Force sensor
3	EMF control unit
4	Signal leads for parking brake button and function indicator lamp
5	DFA_EMF, wheel-speed signal from DSC
6	WUP, wake-up line
7	PT-CAN input with terminal resistor
8	Power supply for EMF control unit (Terminal 30)
9	Power supply for electric motor (Terminal 30)
10	Earth for EMF control unit

11	Earth for electric motor

Force sensor

Technically speaking, the force sensor is a travel sensor that operates according to the Hall effect. Between the two brake cables there is a spring with a defined strength. That strength is stored on the EMF control unit. Therefore, it can determine the force acting on the cables from the change in the length of the spring.

The force acting on the brake cables is an important input variable for the control algorithm on the EMF control unit. When the parking brake is applied, the EMF control unit has to ensure that a specific required force is applied to the brake cables. The EMF control unit calculates that required force on the brake cables directly from the legally required holding force on the wheels. The latter has to be great enough to safely keep the vehicle stationary on an uphill or downhill gradient of up to 20 %.

Over the life of the cables, a slight degree of stretching can occur. However, that does not corrupt the force-sensor signal. The spring does not, of course, start to compress until a force is acting on the cables. If, due to stretching, the cables are initially loose when in the released position, then no force is acting on the spring. Only when a force is applied to the cables, and, therefore, to the spring by operation of the electric motor does the spring compress. Then the force sensor sends the appropriate signal to the EMF control unit.

Bracket

To attach the EMF actuator unit to the vehicle's structural components, a multi-angled bracket is used. That design allows the EMF actuator unit itself to remain virtually identical in dimensions (to the one on the E70/E71). Adaptation to the geometry of the surrounding components on the different vehicles is achieved by the specific design of the mounting bracket.

The bracket for the EMF actuator unit locates at the top on a boss on the rear suspension subframe. Fixing of the bracket at the bottom differs according to whether the vehicle is fitted with Integrated Active Steering or not. Vehicles with Integrated Active Steering have an actuator for the rear-wheel steering on the rear suspension. The bracket for the EMF actuator then rests on the rear-wheel steering actuator bracket. The two brackets are joined by two bolts.

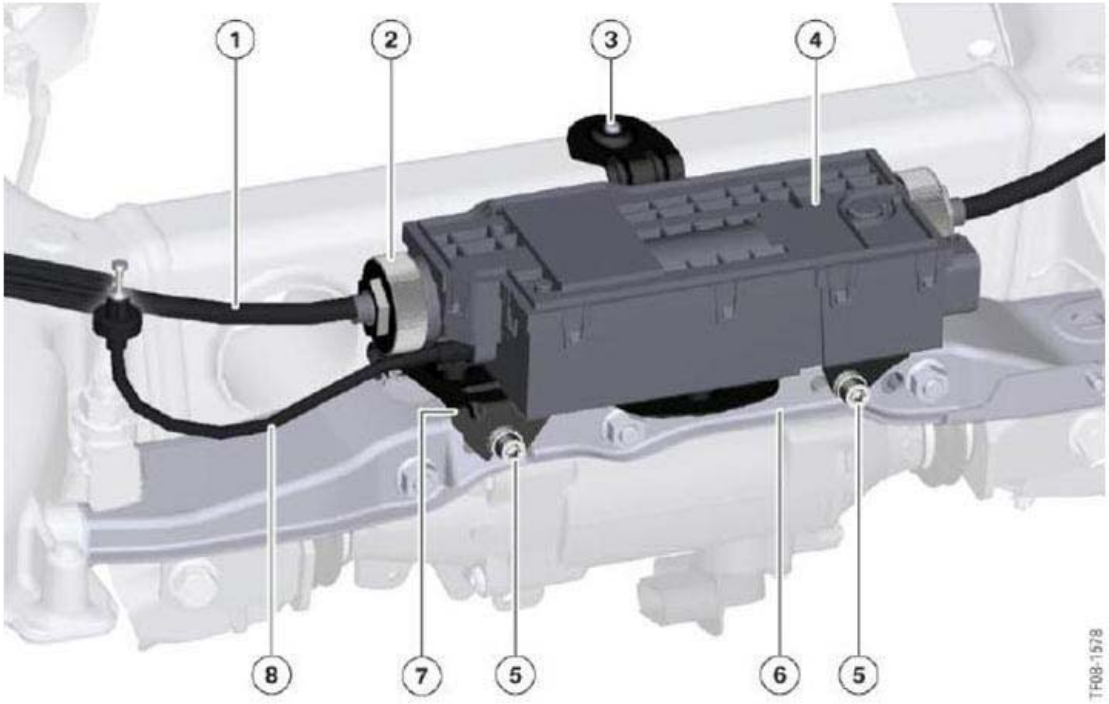


Fig. 72: Identifying EMF Actuator Unit Bracket And HSR Actuator Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Left brake cable
2	Sleeve nut for left brake cable
3	Boss on rear suspension subframe
4	EMF actuator unit
5	Bolt joining EMF actuator and HSR actuator brackets
6	HSR actuator bracket
7	EMF actuator unit bracket
8	Emergency release cable

On vehicles without Integrated Active Steering, the bracket for the EMF actuator unit is attached to the rear suspension subframe by the same two bolts.



Fig. 73: Identifying EMF Actuator Unit Bracket Without HSR Actuator Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Bowden cable, emergency release
2	Left brake cable
3	Sleeve nut for left brake cable
4	EMF actuating unit
5	Bolt fixing EMF actuator to mounting bracket
6	Bolt fixing EMF actuator to rear suspension subframe
7	EMF actuator unit bracket
8	Rear suspension subframe
9	Track rod

The bracket and the EMF actuator unit itself are also attached to one another by bolts. If replacement is necessary, both the bracket and the EMF actuator unit itself can be ordered as separate parts.

Controls

Parking Brake Button

The parking brake button supplies the EMF control unit with the button operation signal. The signal is duplicated on the parking brake button and transmitted to the EMF control unit via double direct wired connections. It not only enables the EMF control unit to distinguish between the resting position and the two directions of operation (release/apply). Faults can also be detected (e. g. broken circuit, short circuit). If such a fault is detected, the function of the parking brake can still be maintained in most cases.



Fig. 74: Identifying Parking Brake Button With Function Indicator Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

In contrast with the button on the E70/E71, the parking brake button on the F01/F02 has a function indicator lamp. It is an LED that tells the driver when the parking brake is on. The EMF control unit directly controls that LED.

It is important to note that the button directly behind it for the Automatic Hold function is not wired to the EMF control unit but to the DSC control unit.

Emergency release

The cable for emergency release of the parking brake is accessible via the trunk.

However, the cable is located underneath the trunk floor trim, which on the F01/F02 can not be simply taken out.

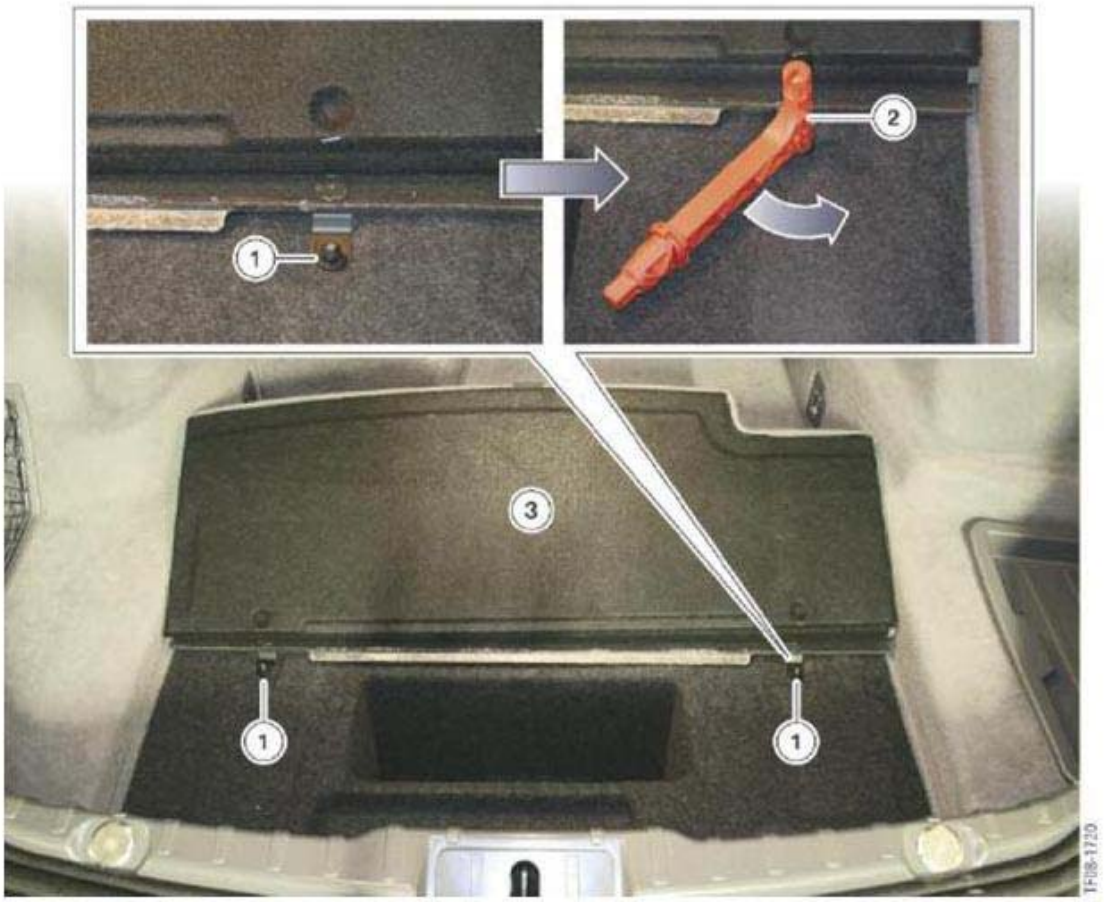


Fig. 75: Removing Trunk Floor Trim, F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Plastic nut (size 10mm)
2	Emergency release tool
3	Trunk floor trim

Under a flap there are two plastic nuts which fix be removed. The emergency release tool (red the trunk floor trim in place. Those nuts must T-shaped handle) incorporates a plastic first be undone before the trunk floor trim can socket for unscrewing the nuts.

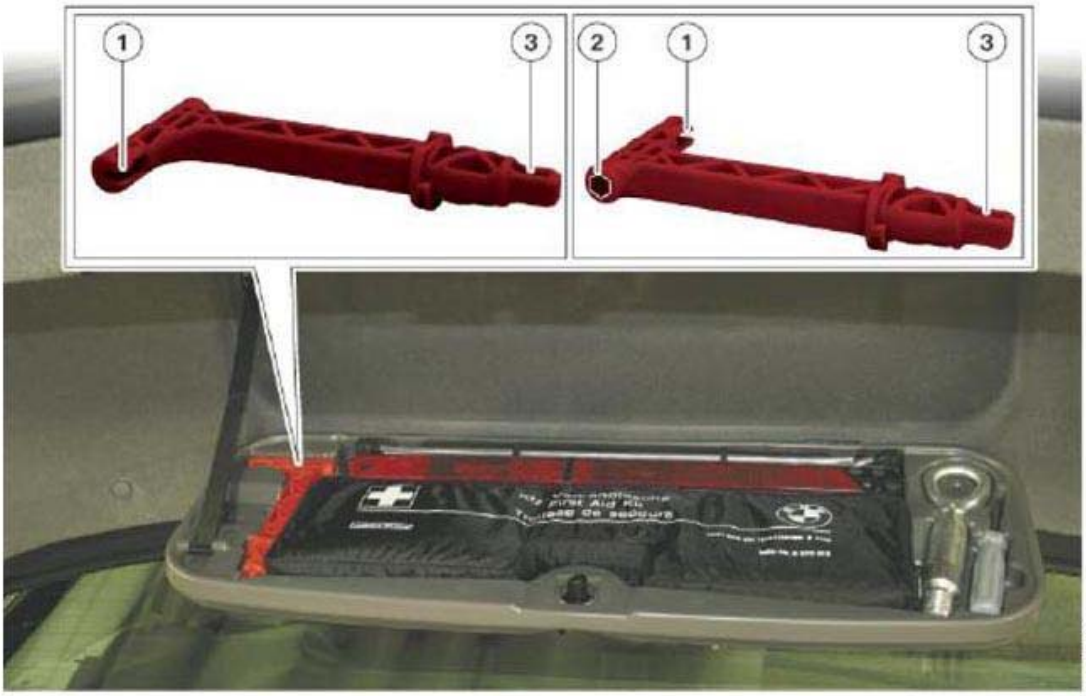


Fig. 76: Identifying Emergency Release Tool, F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Slot for accepting the EMF emergency release cable
2	Socket (size 10mm) for unscrewing the plastic nuts on the trunk floor trim
3	Square key for releasing the automatic transmission parking lock

Once the trunk floor trim has been removed, the emergency release cable is directly accessible. The handle of the release tool is hooked onto the end of the emergency release cable by means of the slot provided.

Pulling the cable up operates the emergency release mechanism in the EMF actuator unit. There is a noticeable jolt when it releases. The cables to the two duo-servo parking brakes are then released from the force acting on them. The parking brake is thus released.

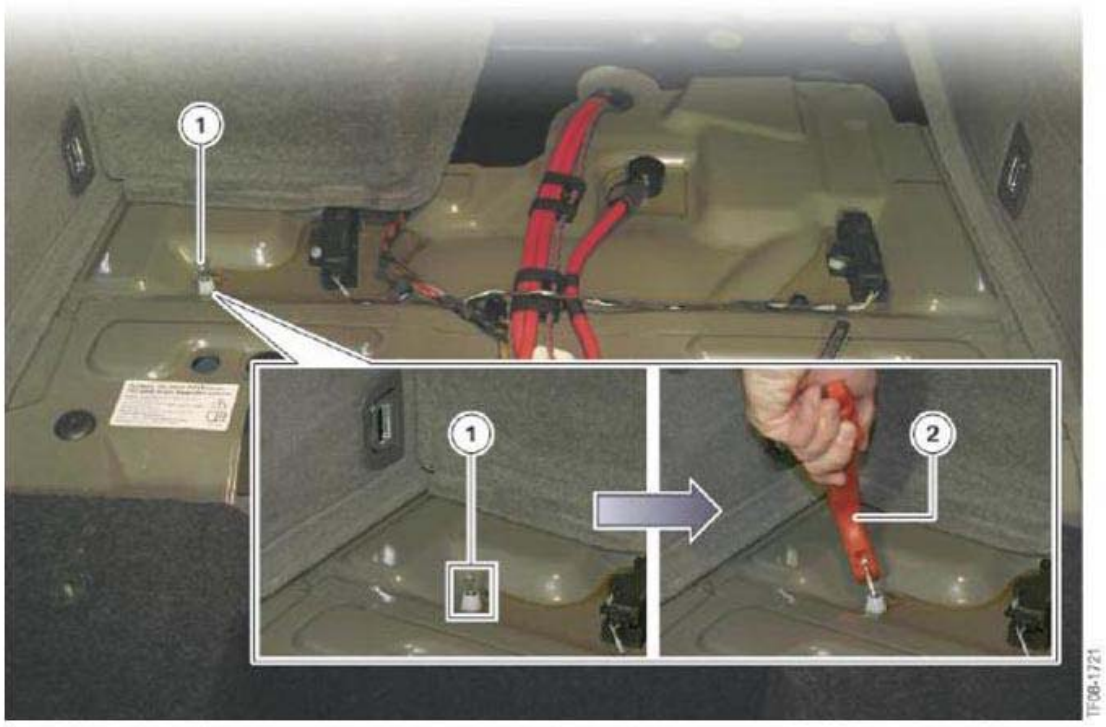


Fig. 77: Releasing Electromechanical Parking Brake, F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Bowden cable, emergency release (EMF)
2	Emergency release tool

Electromechanical Parking Brake (EMF)

General details

The electromechanical parking brake (EMF) is applied/released by means of the parking brake button on the center console control panel. The parking brake status is indicated by the function indicator lamp on the button and an indicator lamp on the instrument cluster.



Fig. 78: Instrument Cluster Display - Parking Brake ON
Courtesy of BMW OF NORTH AMERICA, INC.

The EMF can be applied in all logical terminal statuses (Terminal 0, Terminal R, Terminal 15, Terminal 50). The conditions for release of the EMF are: Terminal 15 active and brake pedal depressed or automatic transmission parking lock engaged.

Emergency release

The EMF can be released in an emergency by means of a cable. That cable is accessible through the trunk and is under the trunk floor trim. To effect emergency release of the EMF, the red T-shaped handle from the vehicle toolkit is required.

NOTE: Secure vehicle to prevent it rolling before operating the emergency release!

NOTE: After a power supply failure, it may still not be possible to move the vehicle even after releasing the brake with the emergency release facility. The automatic transmission parking lock may still be engaged.
In that case, the parking brake must first be released with the emergency release facility. Then the automatic transmission parking lock must be released using the emergency release facility. The appropriate tool must remain engaged in the parking lock emergency release for that purpose.

NOTE: When the parking brake is to be used again after an emergency release, it can only be done by pushing in the parking brake button. The familiar conditions for releasing the parking brake must also be met.

Installation mode

NOTE: Installation mode sets the EMF actuator unit to the installation position (brake

cables extended to maximum). It also prevents the EMF being accidentally applied, e. g. when carrying out repairs.

NOTE: Installation mode can be cancelled either by means of a service function or by driving the car.

Running-in the brakes

While running-in the parking brakes, the EMF applies a defined force to the duo-servo parking brakes.

NOTE: The function for running-in the parking brakes only has t be carried out if:

- **the linings of the duo-servo parking brakes have been replaced or**
- **the rear brake discs have been replaced.**

NOTE: The precise procedure for running-in the parking brakes is described in the Repair Instructions under the heading "Adjusting the parking brake". The instructions given there must be followed exactly.

EMF actuating unit

The EMF actuator unit is made up of the following main components:

- EMF control unit
- Electric motor
- Gearbox
- Force sensor.

NOTE: In the event of a fault, the EMF actuator unit can only be replaced as a complete unit.

NOTE: The following are available as separate parts:

- **the EMF actuator unit itself**
- **the bracket for the EMF actuator unit and**
- **the cables.**

NOTE: The EMF control unit detects vehicle standstill on the basis of the following signals:

- **Road speed (from ICM)**
- **Rear axle speed (from DME)**
- **Wheel-speed signal "DFA_EMF" (from DSC).**

Only when those three signals definitively indicate vehicle standstill does the EMF control unit allow operation of the actuator unit.

NOTE: The EMF control unit is connected to the PT-CAN. Integrated in the EMF control unit is a terminal resistor for the PT-CAN.

NOTE: The EMF control unit is connected to the wake-up line.
If the driver operates the parking brake button at Terminal 0, the EMF control unit is woken up. The EMF control unit in turn wakes up the other control units on the vehicle via the wake-up line.

NOTE: On vehicles with the Integrated Active Steering optional extra, the bracket for the EMF actuator unit is bolted to the bracket for the HSR actuator.
On vehicles without Integrated Active Steering, the bracket for the EMF actuator unit is bolted to the rear suspension subframe.

System Circuit Diagram

Electromechanical Parking Brake

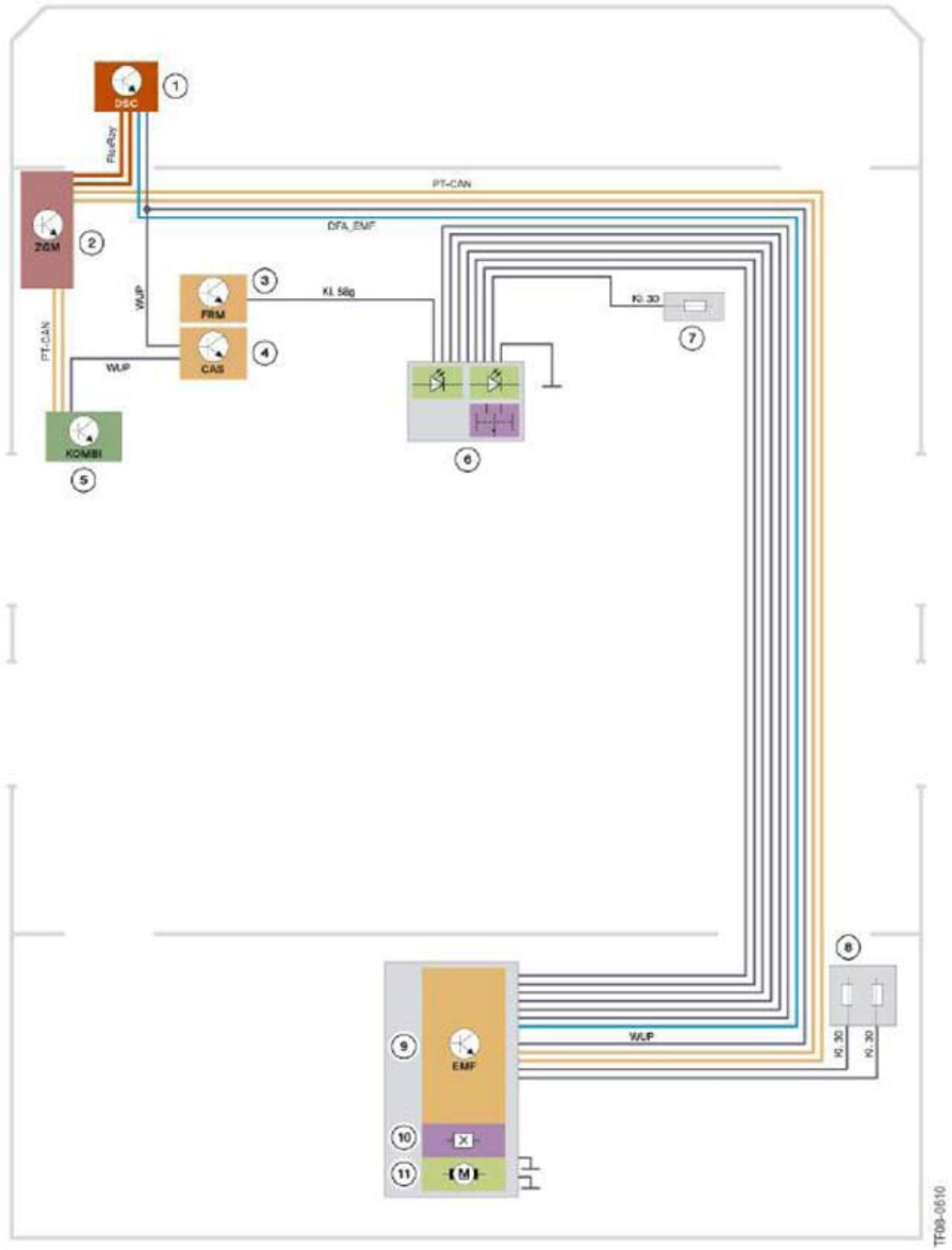


Fig. 79: Electromechanical Parking Brake System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Dynamic Stability Control
2	Central Gateway Module
3	Footwell module
4	Car Access System
5	Instrument cluster
6	Parking brake button with function indicator and illumination
7	Fuse for parking brake button (front fuse board, junction box electronics)
8	Fuses for EMF electronics and electric motor (rear fuse board in trunk)
9	EMF control unit
10	EMF force sensor
11	EMF electric motor

F01 LATERAL DYNAMICS SYSTEMS

INTRODUCTION

BMW Steering Systems - Innovative and technically always something special

Since the introduction of the first EPS electric power steering system on the E85 in 2002, the variety of technical innovations on steering systems has rapidly expanded. Before then the following systems were used:

- Hydraulic power steering
- Speed-sensitive power steering (Servotronic)

The next major step with steering systems then came with the E60 and the revolutionary Active Steering system, which not only had the Servotronic function but also incorporated speed-sensitive modulation of the steering angle.

BMW also improved the electric power steering (EPS) system and used it in a variety of forms.

The main difference between hydraulic and electric power steering is in the method of generating the power assistance force that reduces the amount of force that the driver has to apply to the steering wheel.

In order to further inventively optimize the advantages of Active Steering on the new 7 Series, **Integrated Active Steering** has now been developed and is described in this document.

Current BMW Steering Systems

BMW STEERING SYSTEM DESCRIPTION CHART

Model Series	Standard steering systems	Optional steering systems
1-Series (E8X)	Hydraulic power steering	Active Steering

3-Series (E9X)	Servotronic	Active Steering
5-Series (E60)	Servotronic	Active Steering
6-Series (E63/E64)	Servotronic	Active Steering
7-Series (E65/E66)	Servotronic	N/A
X3 (E83)	Hydraulic power steering	Servotronic
X5/X6 (E70/E71)	Hydraulic power steering	Active Steering
Z4 (E85/E86)	C-EPS	N/A
Z4M (E85/E86)	Hydraulic power steering	N/A
EPS = Electric Power Steering		
C-EPS = Column mounted EPS		

SYSTEM OVERVIEW

Integrated Active Steering

General Details

Integrated Active Steering is an innovative and logical development of the Active Steering system developed by BMW.

With Active Steering, a steering angle amplification factor reduces the steering effort on the part of the driver and combines the capabilities of "steer by wire" systems with authentic steering feedback.

By intervening in the steering independently of the driver's actions, it is also able to perform a stabilizing function in terms of vehicle handling.

In order to move further ahead in terms of handling dynamics, the familiar Active Steering has now been logically extended by the addition of active rear-wheel steering on the new BMW 7 Series.

Active Steering of the rear wheels is a logical extension of Active Steering and the two are now combined as an all-in one system referred to as Integrated Active Steering.

Integrated Active Steering is available as an option on the F01/F02 because the standard steering system is the Servotronic.

Components of Servotronic Steering (standard)

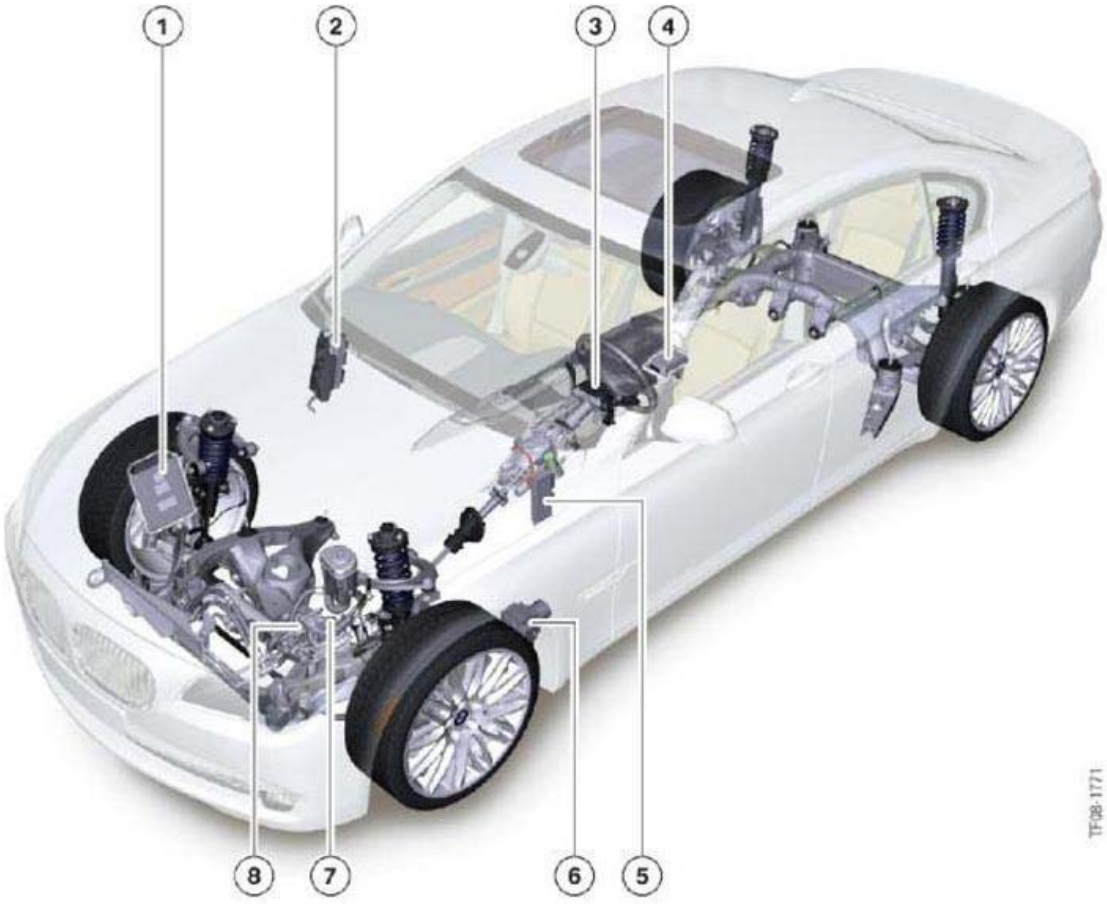


Fig. 80: Identifying Servotronic Steering Components (Standard)
Courtesy of BMW OF NORTH AMERICA, INC.

SERVOTRONIC STEERING (STANDARD) COMPONENT REFERENCE CHART

Index	Explanation
1	DME
2	Front power distribution box
3	SZL
4	ICM
5	ZGM
6	DSC
7	Servotronic valve
8	Electronic volumetric flow control (EVV) valve

Components of Integrated Active Steering

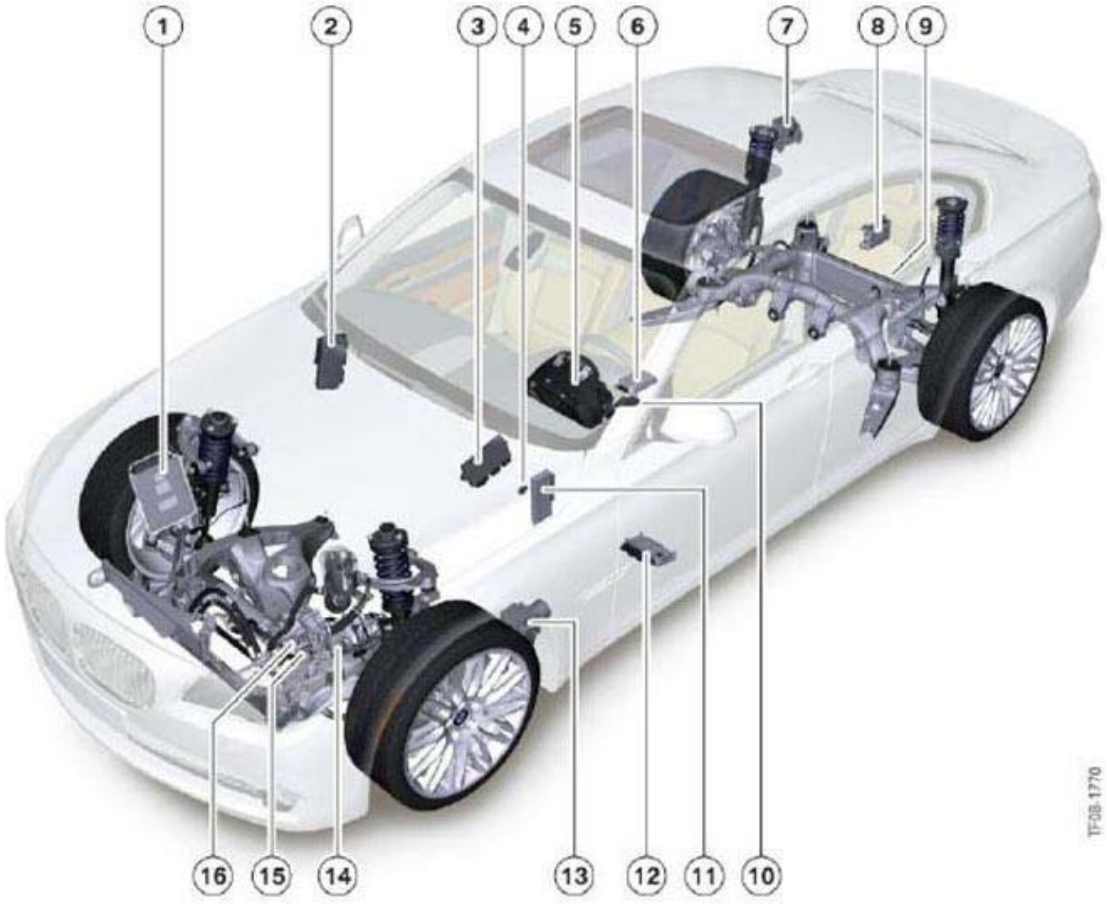


Fig. 81: Identifying Integrated Active Steering Components
Courtesy of BMW OF NORTH AMERICA, INC.

INTEGRATED ACTIVE STEERING COMPONENT REFERENCE CHART

Index	Explanation
1	DME
2	Front power distribution box
3	CAS
4	Brake light switch
5	Instrument cluster
6	Integrated Chassis Management (ICM)
7	Rear power distribution box
8	HSR control unit
9	Rear-wheel steering actuator (HSR)
10	SZL
11	ZGM
12	Active Steering actuator control unit
13	DSC

14	Active Steering actuator motor with motor angular position sensor and lock
15	Electronic volumetric flow control (EVV) valve
16	Servotronic valve

Bus Diagram for Lateral Dynamics Systems

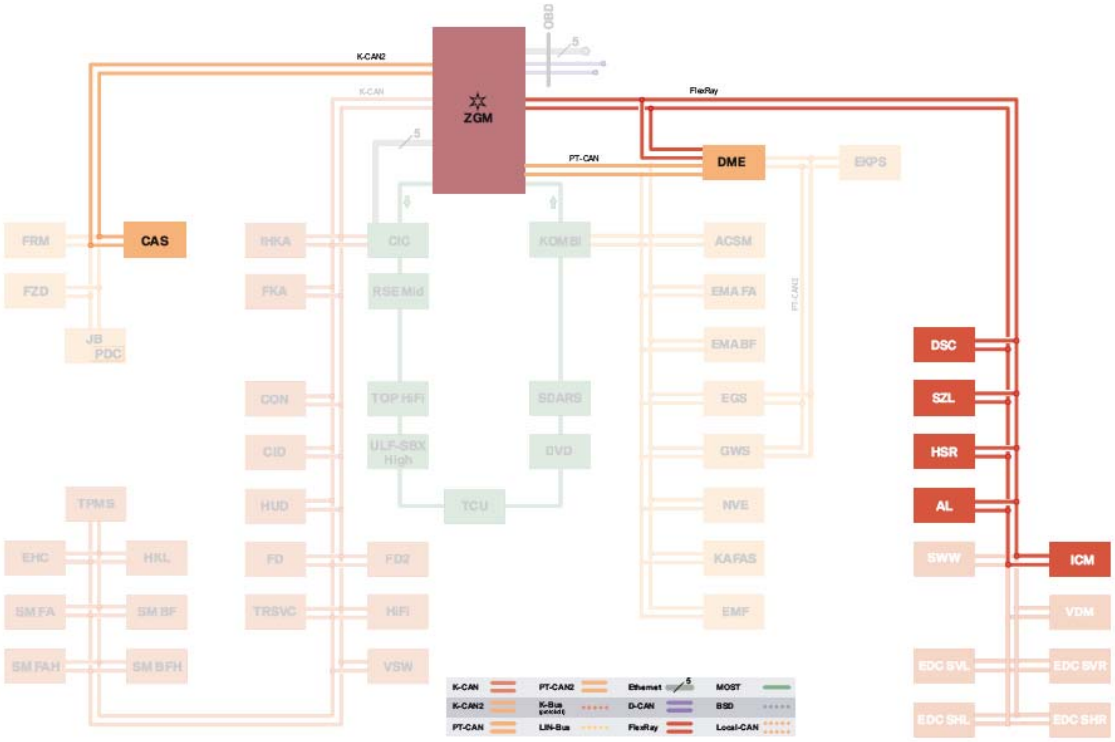


Fig. 82: Bus Diagram For Lateral Dynamics Systems
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
CAS	Car Access System
ZGM	Central Gateway Module
DME	Digital Motor Electronics
DSC	Dynamic stability control
SZL	Steering column switch cluster
HSR	Rear-wheel steering control unit
AL	Active Steering
ICM	Integrated Chassis Management

System Circuit Diagram for Servotronic System

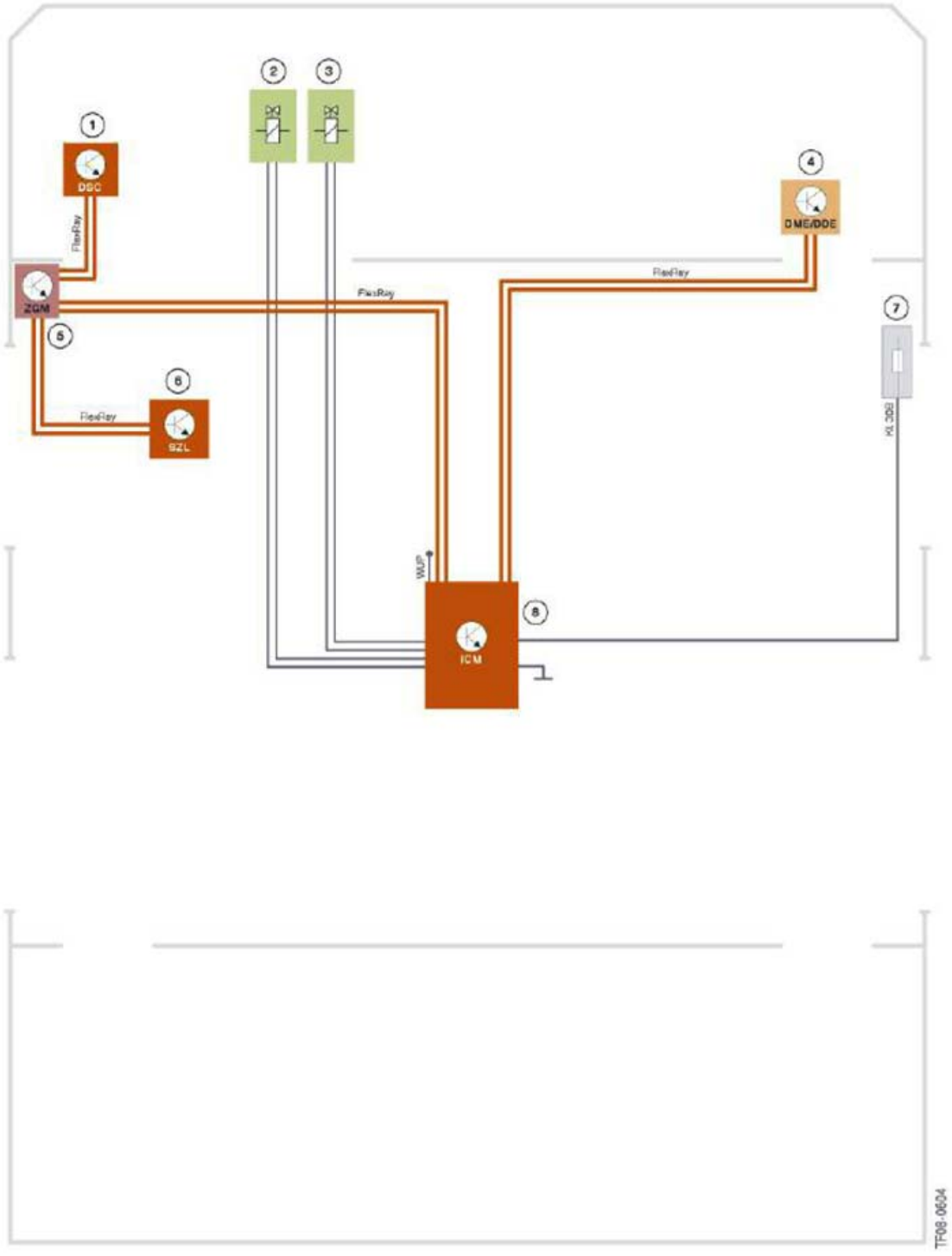


Fig. 83: Servotronic System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Dynamic stability control
2	Electronic volumetric flow control (EVV) valve
3	Servotronic valve
4	Digital Motor Electronics
5	Central Gateway Module
6	Steering column switch cluster
7	Front power distribution box
8	Integrated Chassis Management

System Circuit Diagram for Integrated Active Steering

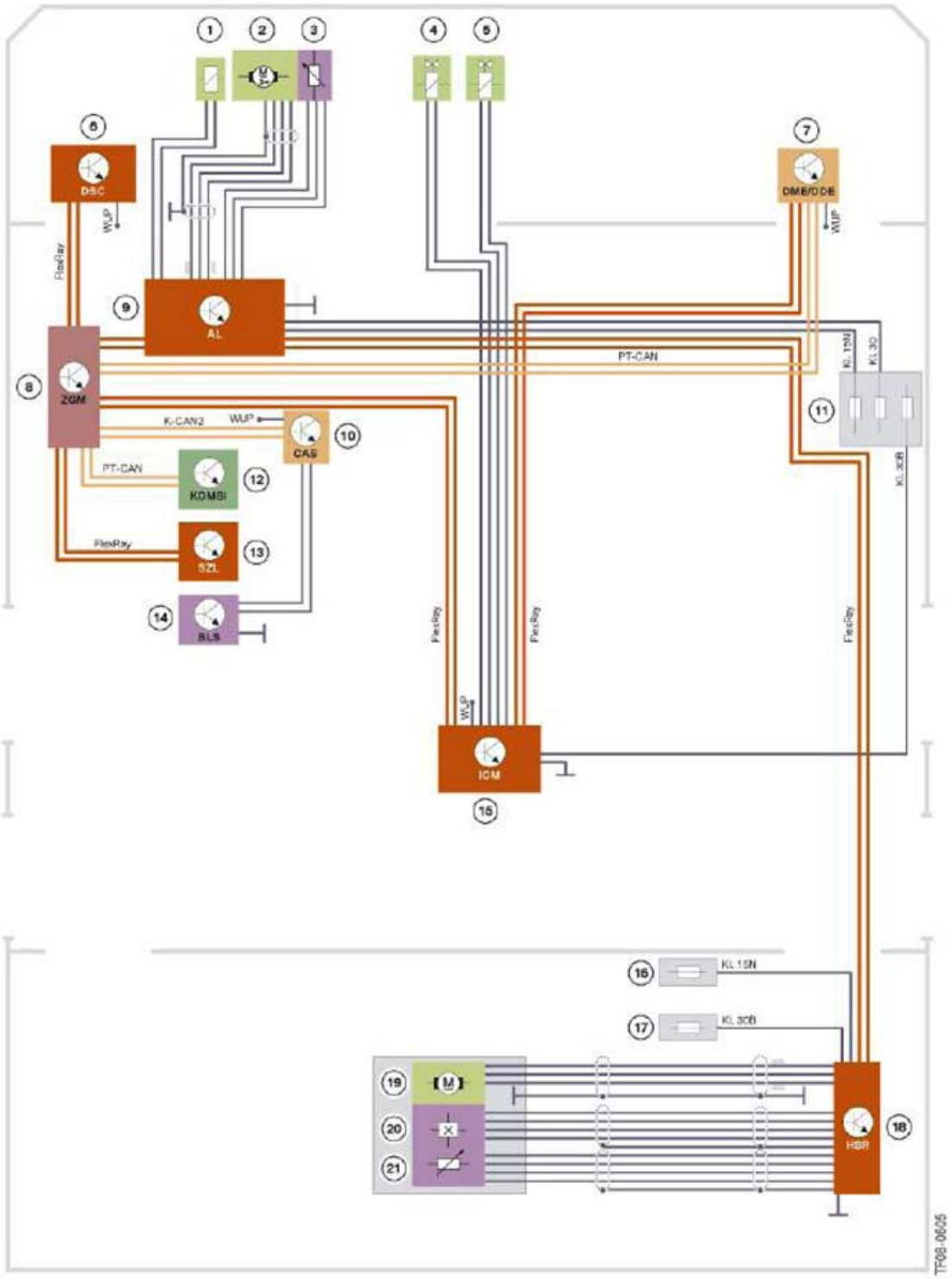


Fig. 84: Integrated Active Steering System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Active Steering lock
2	Active Steering electric motor
3	Active Steering motor angular position sensor
4	Electronic volumetric flow control (EVV) valve
5	Servotronic valve
6	Dynamic stability control
7	Digital Motor Electronics
8	Central Gateway Module
9	Active Steering
10	Car Access System
11	Front power distribution box
12	Instrument cluster
13	Steering column switch cluster
14	Brake light switch
15	Integrated Chassis Management
16	Right rear power distribution box
17	Battery power distribution box
18	Rear suspension slip angle control
19	HSR electric motor
20	Hall-effect sensor
21	Track-rod position sensor

FUNCTIONS

Steering Systems

Implementation of the Integrated Active Steering function has essentially been made possible by the new ICM system complex on the F01/F02.

The Servotronic function including valve control is also taken over by the ICM control unit. That steering control function is also influenced by the Driving Dynamics Control function.

Advantages of Integrated Active Steering:

- Extension of Active Steering (AL) by the addition of rear-wheel steering (HSR)
- Variable steering-gear ratio (steering angle amplification factor)
- Independent control of rear-wheel steering angle (steer by wire)
- Servotronic
- Handling stabilization functions
- Reduction of braking distance under split surface braking conditions.

Supply of Signals

Signals from external sensors

The ICM control unit reads the following signals that are essential to the Integrated Active Steering from external sensors:

- Four wheel-speed signals sent via Flexray by the DSC
- Steering angle sent via Flexray by steering column switch cluster
- Status of AL and HSR actuators transmitted via Flexray.

However, because the rear-wheels are steerable, the steering angle of the front wheels alone is not definitive for dynamic handling control purposes. Therefore, the ICM control unit also takes the steering angle of the rear wheels into account. Ultimately, the effective steering angle is calculated from the two steering angles (front and rear wheels). The effective steering angle indicates the angle to which the front wheels would have to be turned to bring about the same vehicle response without steerable rear wheels. That variable is the easiest for all vehicle systems to use to analyze the steering action.

Control and Modulation of Steering

Both the basic steering system and the optional Integrated Active Steering on the F01/F02 incorporate the **Servotronic** function. That speed-sensitive power assistance function is effected by way of the Servotronic valve on the steering gear.

The Servotronic valve is always controlled by the ICM control unit regardless of the equipment options fitted. Accordingly, the Servotronic function algorithm is stored on the ICM control unit.

Similarly regardless of equipment options, the steering system also always incorporates a proportional control valve which is controlled by the ICM control unit. With the aid of that valve, the power steering pump's volumetric flow rate can be electronically adjusted. For that reason it is also referred to as the **"electronic volumetric flow control"** valve (EVV valve).

That valve too is controlled by the ICM control unit. Depending on the degree of power assistance demanded at the time, the volumetric flow rate delivered by the power steering pump is split between the steering valve and a bypass circuit. The ratio of that split can be infinitely varied. The less power assistance is required, the more hydraulic fluid is diverted into the bypass circuit. As the hydraulic fluid does not have to do any work in the bypass circuit, less power is required to drive the power steering pump. Consequently, the proportional control valve helps to **reduce** fuel consumption and **CO_2 emissions.**

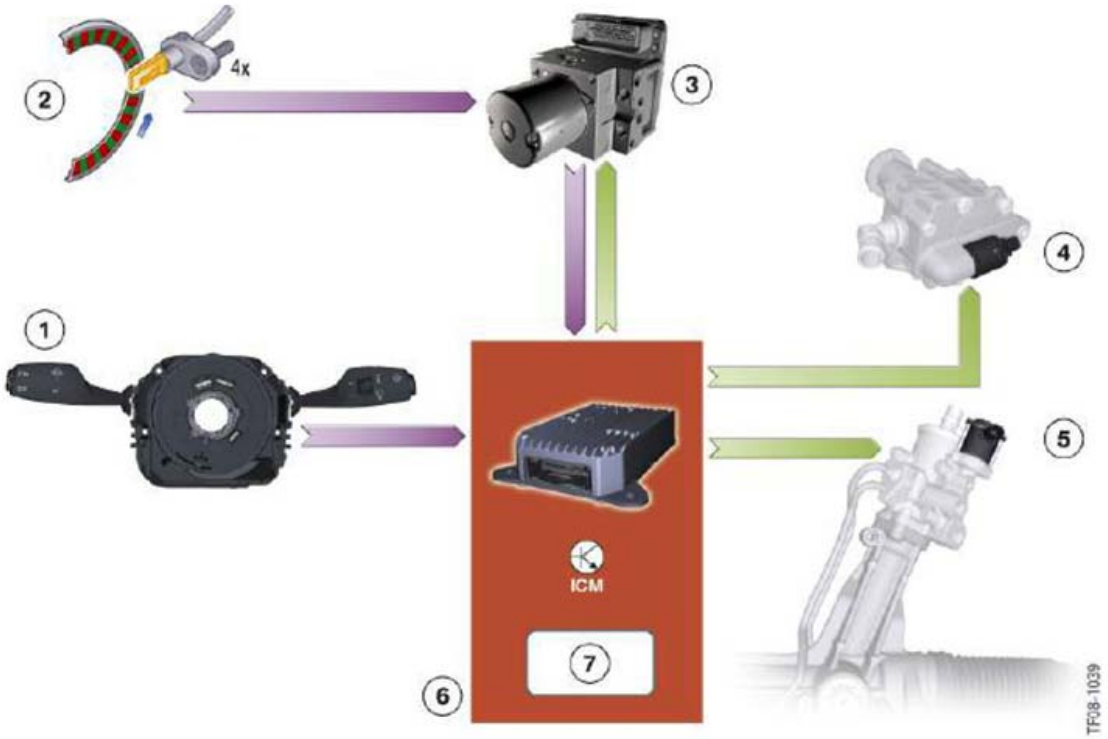


Fig. 85: Input/Output Signal Diagram - Control Of Steering By ICM
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Steering column switch cluster
2	Wheel speed sensor
3	Dynamic stability control
4	Electronic volumetric flow control (EVV) valve
5	Servotronic valve
6	Integrated Chassis Management
7	"Steering control" function on ICM

Higher-level Dynamic Handling Control

Centralized Dynamic Handling Control

The interventions by the dynamic handling control systems are performed with the aim of improving agility and traction. Quite obviously, they also re-stabilize the vehicle when required. On previous vehicles the various functions were performed by a number of discrete systems which, although they communicated with one another, nevertheless had strictly defined limits to their spheres of operation. Accordingly, the interaction of all systems which ultimately determines the overall handling response, was difficult to harmonize.

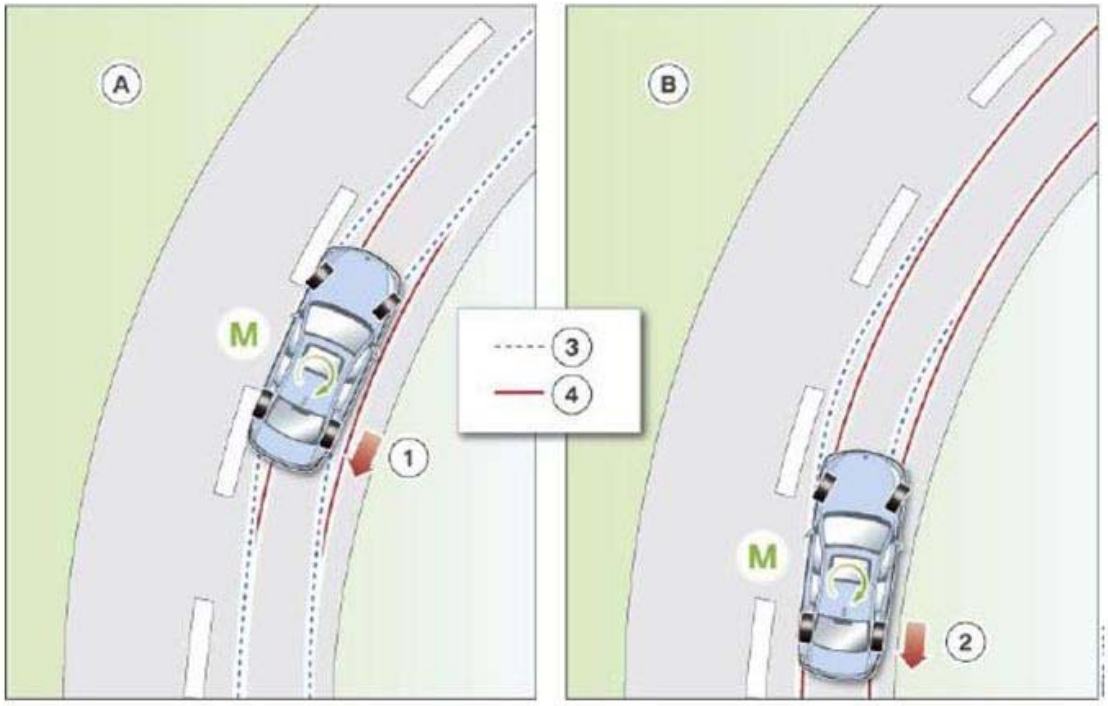


Fig. 86: View Of Influence On Handling Characteristics By Dynamic Handling Control System
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Correction of unstable handling
B	Early intervention to bring about neutral handling
1	Individual modulation of brakes to correct understeer
2	Individual modulation of brakes to prevent understeer
3	Course of an understeering vehicle
4	Course of a vehicle with neutral handling
M	Yaw force acting on the vehicle as a result of individual modulation of brakes

The Integrated Chassis Management system on the F01/F02 employs centralized dynamic handling control. It compares the vehicle response desired by the driver with the actual motion of the vehicle at that moment. By so doing, it is able to determine whether and in what way intervention in the dynamic handling systems is required.

The output variable of the centralized dynamic handling control system is a yaw force. It brings about a yawing motion on the part of the vehicle that is superimposed over the existing movement of the vehicle. In that way, the behavior of the vehicle can be "corrected" if a difference from what is desired by the driver is detected. The classic examples of that are vehicle understeer or oversteer.

A new feature of the ICM on the F01/F02, however, is that the dynamic handling systems are brought into action even before such a discrepancy is detected. Thus, the interventions by the dynamic handling systems take place long before the vehicle becomes unstable. As a result, the vehicle feels much better balanced than would be achievable with a conventional suspension and steering set-up. The vehicle displays neutral handling characteristics in many more situations and does not even begin to under or oversteer. This new function is made possible by very precise computation models and new control strategies by which the handling characteristics can be assessed and influenced.

Co-ordinated Intervention by the Dynamic Handling Systems

The possibilities for intervention available in the past (and, of course, still available now) in order to generate the required yaw force calculated by the central dynamic handling controller are listed below. In brackets in each case are the dynamic handling systems concerned.

- Modulation of individual brakes (DSC)
- Adjustment of engine torque (ASC+T, DSC, MSR)
- Adjustment of front-wheel steering angle independently of driver input (Active Steering).

Subordinate to the centralized dynamic handling control system is an "actuator coordination" function. It decides which dynamic handling system can be used to produce the yaw force in the particular situation concerned.

For example, if the vehicle is exhibiting significant understeer, it can be counteracted by controlled braking of the rear wheel on the inside of the bend. If the vehicle has Integrated Active Steering, the same effect can be brought about even more harmoniously by steering the rear wheels to an appropriate degree.

As both means of intervention are limited in their degree, it can also be useful to use them both simultaneously. Avoidance of understeer is noticeable to the driver in the shape of a significant gain in agility.

The F01/F02 is also the first model on which there is true functional networking between the Integrated Chassis Management and vertical dynamics management functions. But that doesn't simply mean that the ICM registers the ride height data, processes it and passes to the VDM.

An integral component of the dynamic handling control system is that the ICM also actively initiates the Dynamic Drive function in order to affect the self-steering characteristics. As is familiar from conventional suspension and steering designs, a stiffer anti-roll bar results in a lower achievable overall lateral friction force at the pair of wheels concerned. The actuator motors in the Dynamic Drive anti-roll bars can be used to simulate the effect of stiffer and more flexible anti-roll bars.

Thus the ICM centralized dynamic handling control system can use the Dynamic Drive's active anti-roll bars to selectively control the available lateral friction force at a pair of wheels. If the vehicle is oversteering, that means there is too little lateral friction force on the rear wheels. In that case, it is better to reduce the roll limiting force on the rear suspension. In return, there is a gain in lateral friction force on the rear wheels which helps to stabilize the vehicle.

The input/output diagram on the following page summarizes the effect of the centralized dynamic handling control functions on the ICM control unit.

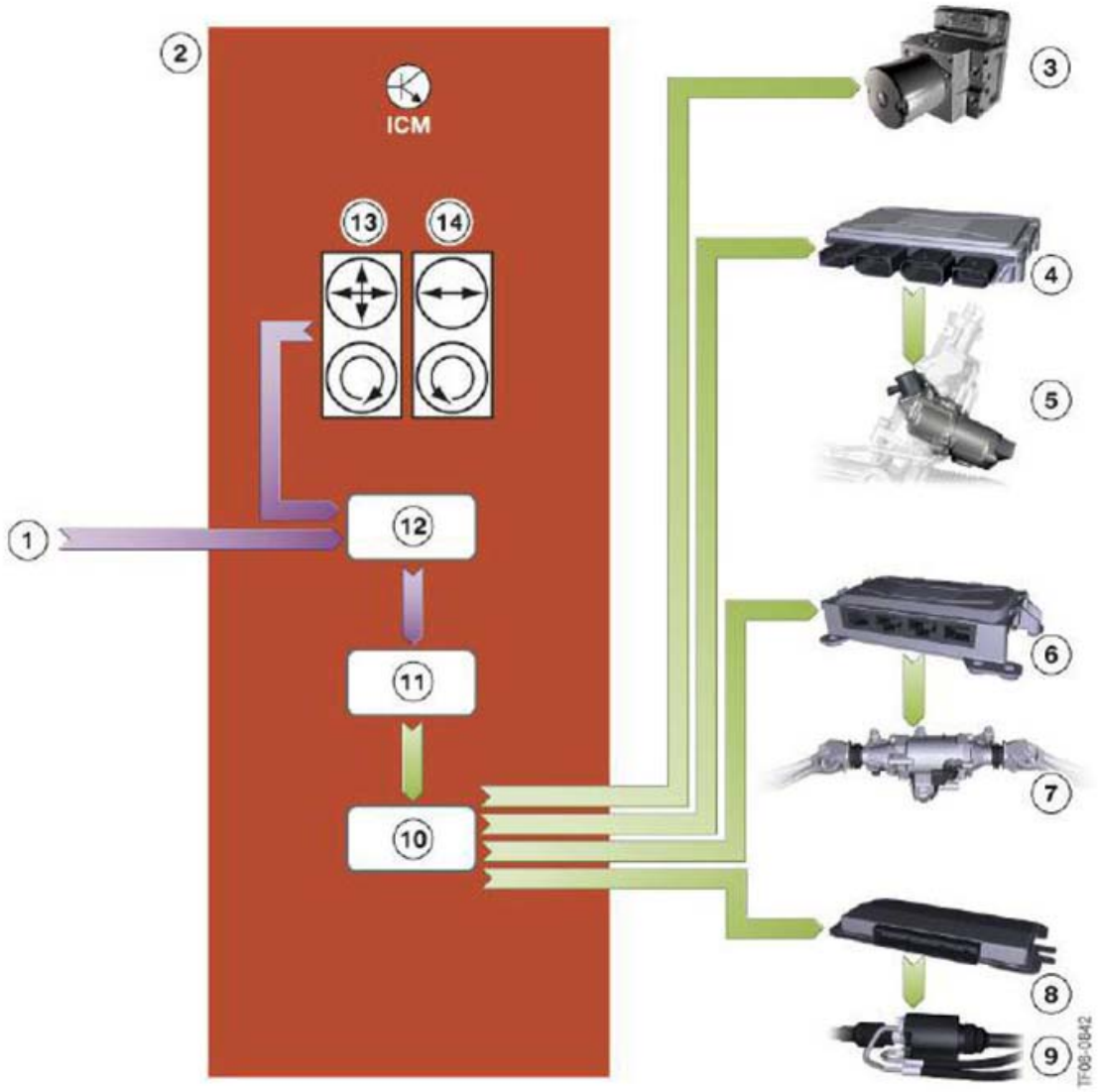


Fig. 87: Input/Output Signal Diagram - Centralized Dynamic Handling Control On ICM
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Input signals from external sensors
2	Integrated Chassis Management (ICM)
3	Dynamic stability control
4	Active Steering control unit
5	AS actuating unit
6	HSR control unit
7	HSR actuator unit
8	VDM control unit
9	Active stabilizer bar

10	"Actuator co-ordination" function on ICM
11	"Centralized dynamic handling control" function
12	"Sensor signal processing" function
13	Integrated DSC sensor (combined linear acceleration, lateral acceleration and yaw rate sensor)
14	Integrated DSC sensor (additional combined lateral acceleration and yaw rate sensor)

Distributed Functions: ICM and Actuator Control Units

The distribution of functions between the ICM and the other dynamic handling control units in the case of Integrated Active Steering is described below.

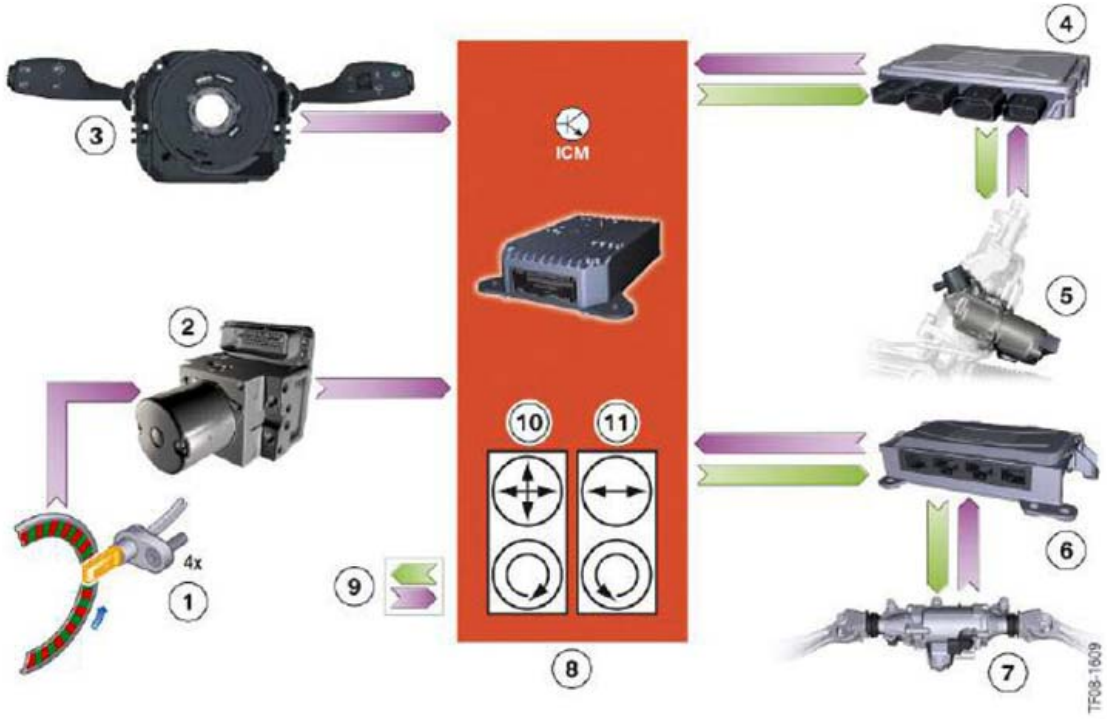


Fig. 88: Input/Output Signal Diagram - ICM And Actuator Control Units AL And HSR
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Wheel speed sensors
2	Dynamic stability control
3	Steering column switch cluster with steering-angle sensor
4	Active Steering control unit

5	AS actuating unit
6	HSR control unit
7	HSR actuator unit
8	Integrated Chassis Management (ICM)
9	Other input and output signals(1)
10	Integrated DSC sensor (combined linear acceleration, lateral acceleration and yaw rate sensor)
11	Integrated DSC sensor (additional combined lateral acceleration and yaw rate sensor)
(1) Instrument cluster failure BLS-CAS braking DME engine torque increase.	

The Integrated Chassis Management is the control unit which computes the higher-level dynamic handling control functions for the Integrated Active Steering.

From the current vehicle handling status and the desired course indicated by the driver, the Integrated Chassis Management calculates individual settings for the variable steering- gear ratio and the superimposed yaw rate. Once they have been prioritized, the ICM provides a required setting in each case for the AL and HSR control units. The setting specified is a required steering angle to be applied to the front and rear wheels respectively.

The AL control unit receives the required setting and has the main job of controlling the actuators so as to correctly apply the specified setting. Thus the AL Active Steering control unit is purely an actuator control unit. The same applies to the HSR control unit. It too is an actuator control unit. Like the AL control unit, it is responsible only for implementing the required steering angle specified by the ICM.

With the introduction of the ICM on the E71, this type of function distribution was used for the first time. On the F01/F02, it has been expanded to the extent that

- the ICM now controls all linear and lateral dynamics systems (AL, HSR and also DSC) and
- the ICM is the master control unit both for linear dynamics and unstable handling situations.

The interface between the Integrated Chassis Management and the Dynamic Stability Control (DSC) represents a special case.

Functional Areas of Integrated Active Steering

Low Speed Range

The variable steering-gear ratio of the Active Steering component reduces steering effort to approximately 2 turns of the steering wheel from lock to lock. In the low speed range up to approximately 37 mph, the variable steering-gear ratio for the front wheels is combined with a degree of opposite rear-wheel steer. The effect is to increase vehicle agility.

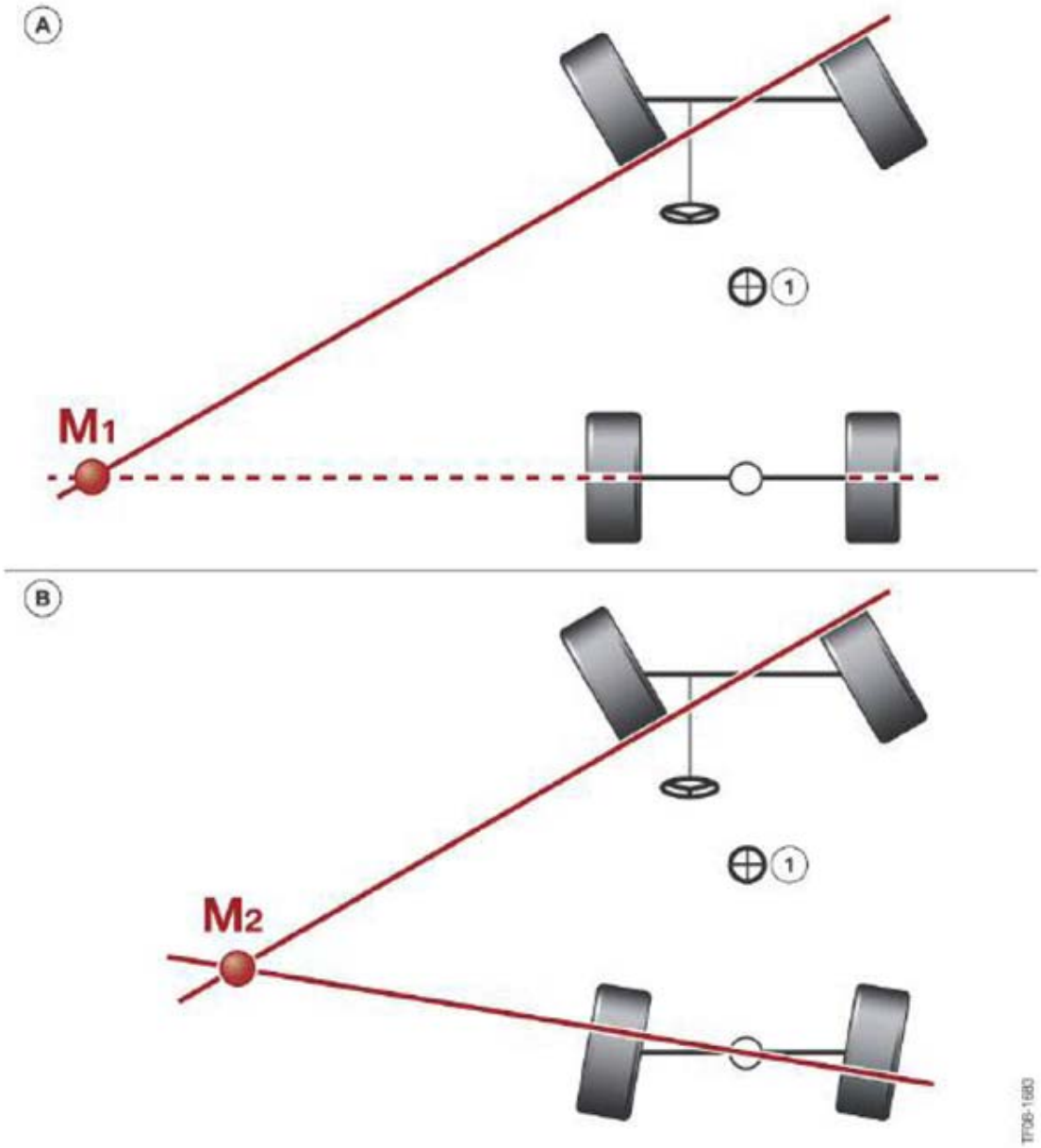


Fig. 89: Identifying Conventional Steering System Variable Steering-Gear Ratio - Low Speed Range
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Conventional steering system
B	Integrated Active Steering
M1	Momentary axis 1
M2	Momentary axis 2
1	Center of vehicle

When the steering wheels of a vehicle are turned, it follows a curved path around what is called the momentary axis "M".

In the case of conventional vehicles, that momentary axis is positioned at a point along the extension of a line passing through the center of the rear wheels.

Active Steering intervention turns the rear wheels in the opposite direction at speeds up approximately 37 mph.

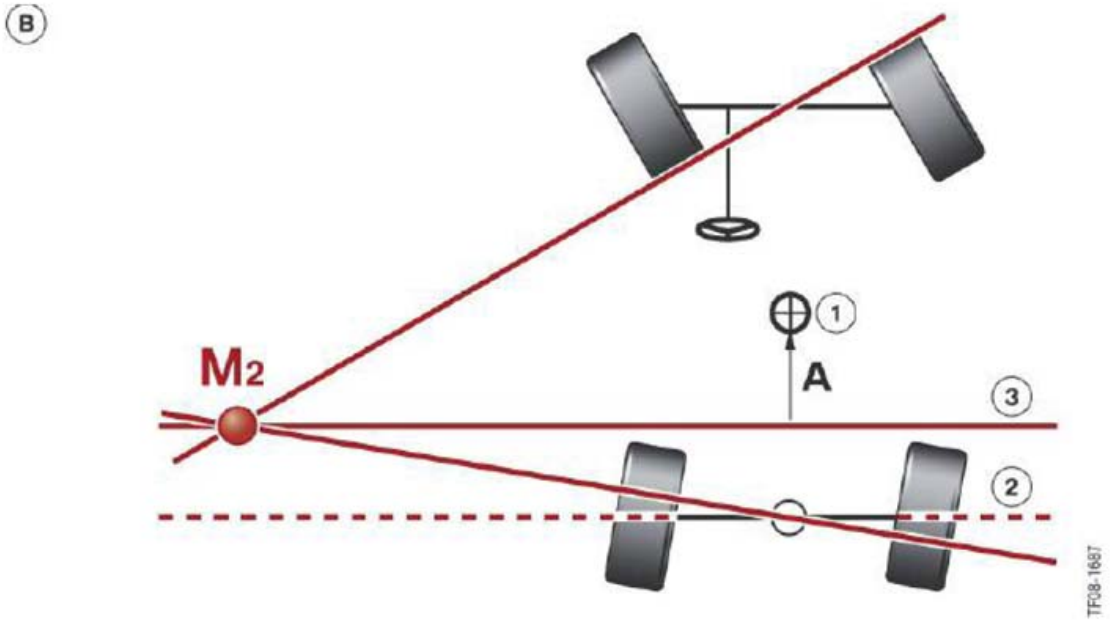


Fig. 90: Identifying Integrated Active Steering Variable Steering-Gear Ratio - Low Speed Range
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Effective wheelbase reduction
B	Integrated Active Steering
M2	Momentary axis 2
1	Center of vehicle
2	Straight line through Center of rear wheels
3	Axis of rotation closer to center of vehicle

The consequence of the rear-wheel steering intervention is that the axis of rotation moves closer to the center of the vehicle with the same amount of steering effort.

In terms of agility and dynamic handling, that is equivalent to a vehicle with a shorter wheelbase.

High Speed Range

As the vehicle speed increases, the degree of steering angle amplification by the Active Steering component is

reduced. The steering-gear ratio becomes less direct.

At the same time, the steering strategy adopted by the Integrated Active Steering changes. Whereas, at low speeds, the rear wheels are steered in the opposite direction to the front wheels, at higher speeds the rear wheels are steered in the same direction as the front.

The momentary axis moves further back, equivalent to a vehicle with a longer wheelbase, producing more stable straight-line handling. The radius of the curve becomes longer.

By the combination with the Active Steering, an additional amount is added to the steering angle of the front wheels so that the radius of the curve and the required amount of steering lock remain at the familiar level.

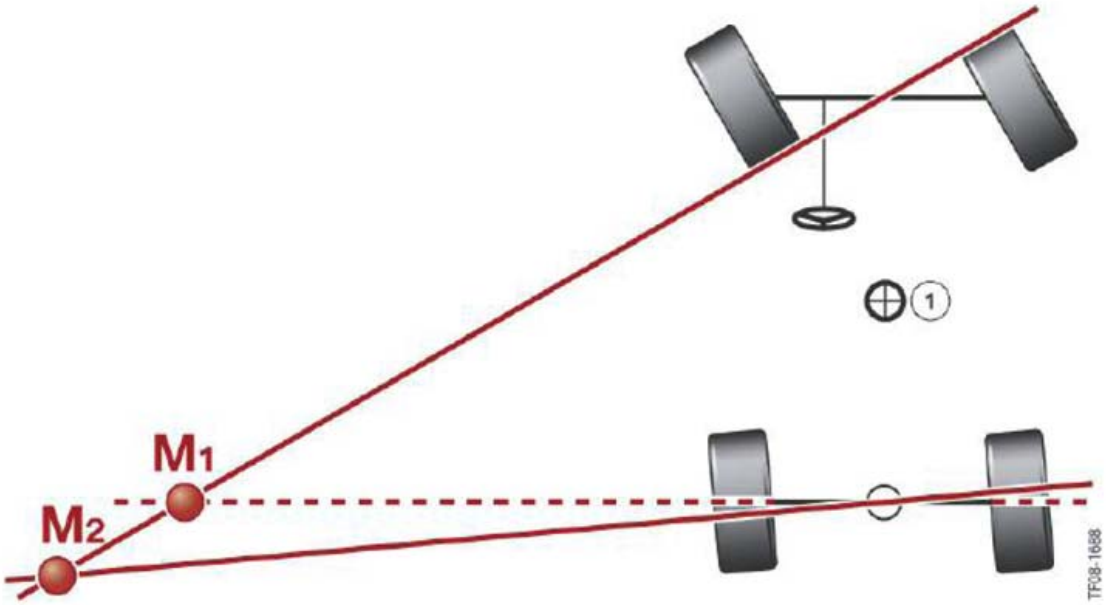


Fig. 91: Identifying Variable Steering-Gear Ratio - High Speed Range
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
M1	Momentary axis 1
M2	Momentary axis 2
1	Center of vehicle

All in all, co-ordination of the steering interventions at front and rear makes lane changes and steering maneuvers considerably easier to negotiate without sacrificing agility or balance.

Combination of the Active Steering with the new rear-wheel steering system offers benefits for the driver at all speeds.

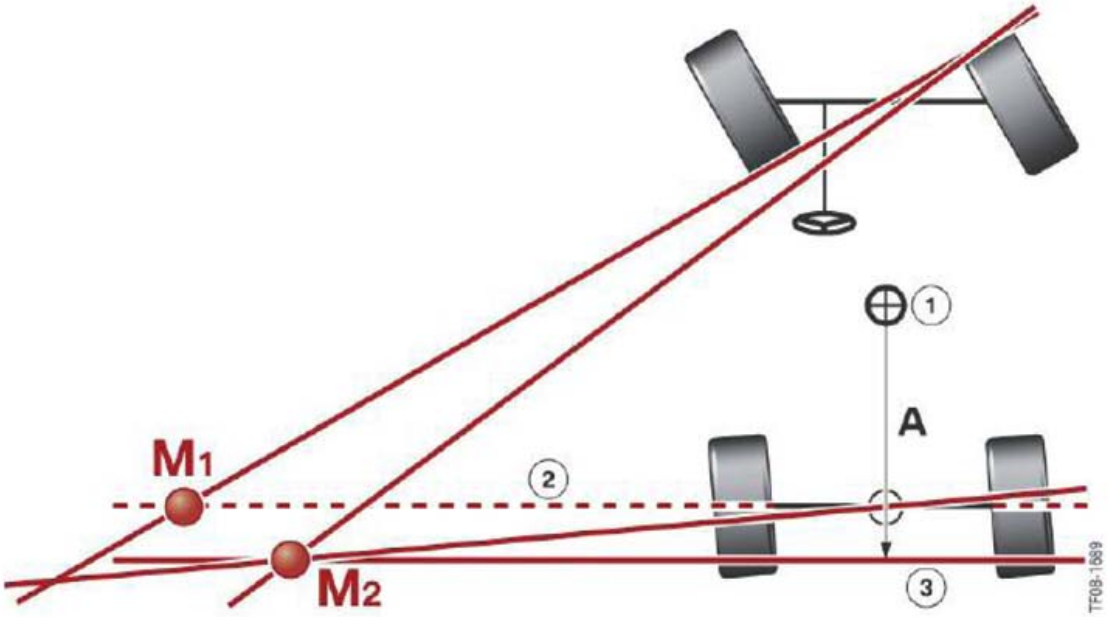


Fig. 92: Identifying Variable Steering-Gear Ratio - High Speed Range (Effective Wheelbase Increase)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
M1	Momentary axis 1
M2	Momentary axis 2
A	Effective wheelbase increase
1	Center of vehicle
2	Straight line through center of rear wheels
3	Axis of rotation further from center of vehicle

Handling Stabilization by Integrated Active Steering When Understeering

When changing lanes quickly, all vehicles have a tendency to produce a significant yaw response and can sometimes start to oversteer.

If the ICM dynamic handling controller detects a difference between the response desired by the driver and the reaction of the vehicle, it initiates co-ordinated steering interventions on the front and rear wheels. The speed of the stabilizing intervention is such that it is hardly discernible by the driver.

Braking interventions by the DSC, which have a decelerating effect, can be largely dispensed with.

The end result is that the vehicle is more stable and more effectively damped.

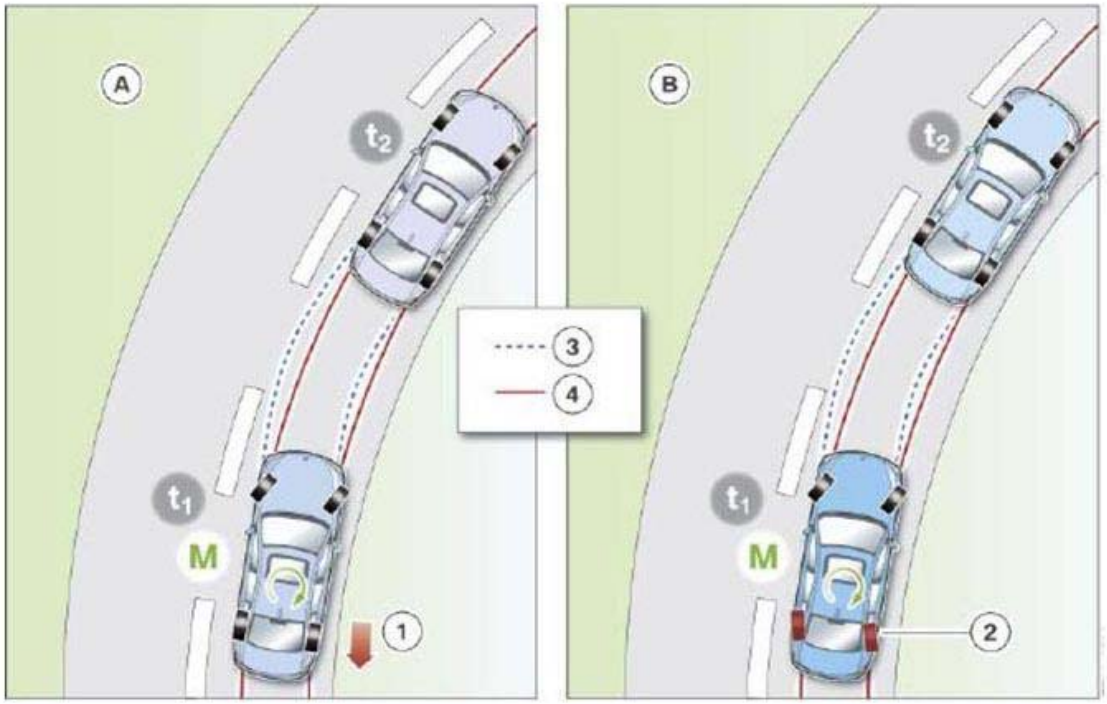


Fig. 93: View Of Possible Dynamic Handling Interventions When Understeering
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Prevention of understeer by individual brake modulation (DSC)
B	Prevention of understeer by rear-wheel steering intervention (IAL)
1	Individual brake modulation (DSC)
2	Rear-wheel steering intervention (IAL)
3	Course of an understeering vehicle
4	Course of a vehicle with neutral handling
M	Yaw force acting on the vehicle as a result of dynamic handling system intervention

If the driver underestimates how sharp a bend is when driving quickly on a country road, he/she can be caught out by sudden understeer.

By virtue of its inherent features, Active Steering was only able to react to vehicle oversteer.

Integrated Active Steering incorporating active rear-wheel steering is now also able to make corrective interventions when the vehicle is oversteering and thus further increases active safety.

Handling Stabilization by Integrated Active Steering Under Split Surface Braking Conditions

Hard braking on road surfaces which provide less grip for the wheels on one side of the vehicle than on the other causes the vehicle to yaw towards the side with more grip.

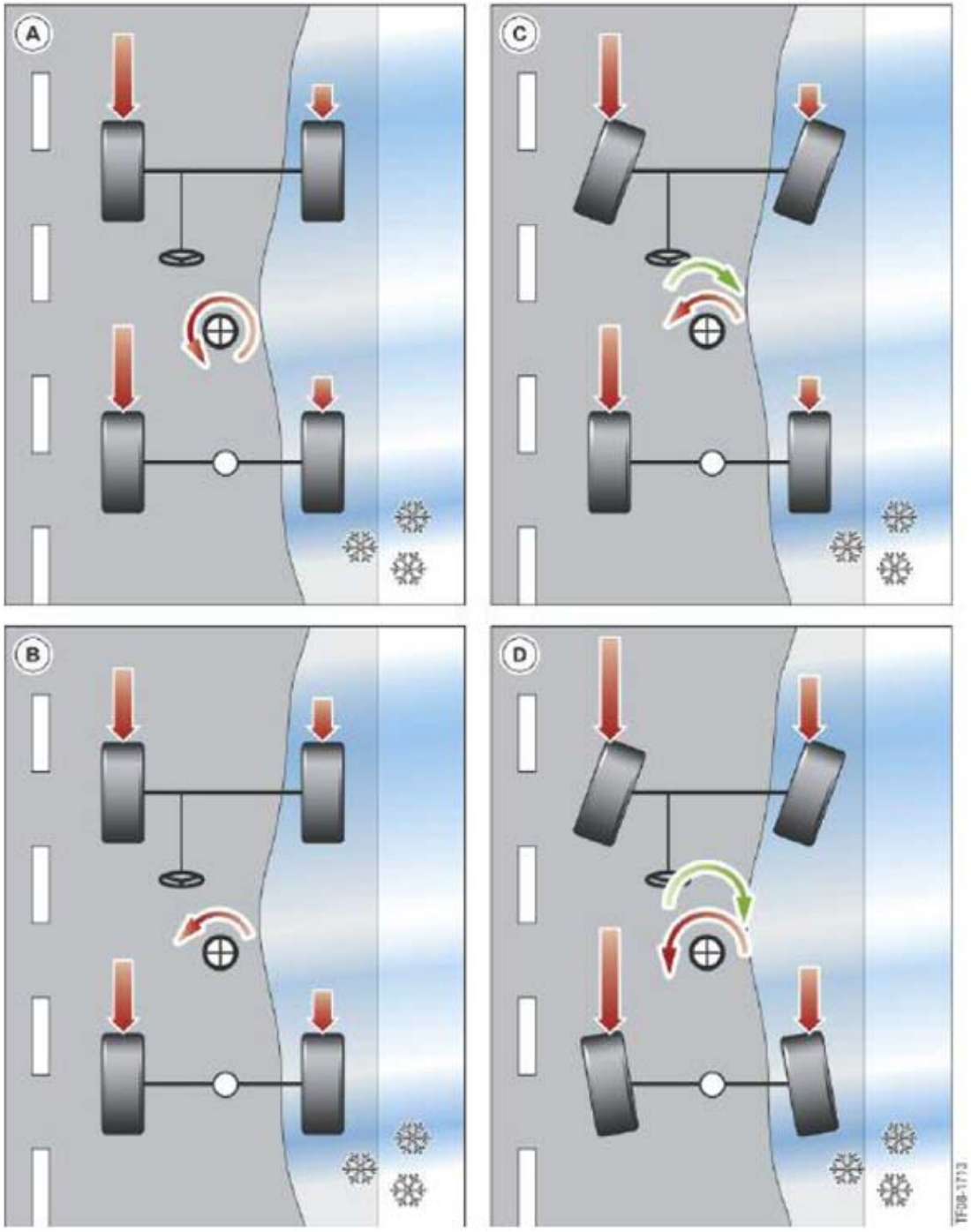


Fig. 94: View Of Handling Stabilization By Integrated Active Steering Under Split Surface Braking Conditions
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Vehicle without DSC
B	Vehicle with DSC
C	Vehicle with DSC and AL (yaw force compensation on E90)
D	Vehicle with DSC and Integrated Active Steering

Under emergency braking, the driver of a conventional vehicle then has to correct the vehicle's course.

Under such split surface braking conditions, the dynamic handling controller generates a stabilizing yaw force by opposite steering interventions on the front and rear wheels.

A) Without DSC

In the case of a vehicle without DSC, maximum braking effect is achieved by the wheels on the dry side of the road, while those on the wet or icy side produce very little retardation.

As a result, a very substantial yaw force acting in an counterclockwise direction is produced, causing the vehicle to swerve to the right.

B) With DSC

A vehicle equipped with DSC brakes the individual wheels more sensitively in order to keep the yaw force within manageable limits for the driver, which however, slightly increases the braking distance.

C) With DSC and AL

The additional "yaw force compensation" function represents a significant safety feature.

When braking on road surfaces with differences in frictional coefficient between one side of the vehicle and the other (tarmac, ice or snow), a turning force is generated around the vehicle's vertical axis (yaw force) rendering the vehicle unstable. In such cases, the DSC calculates the required steering angle for the front wheels and the Active Steering implements it by actively applying opposite lock.

As a result, an opposing yaw force around the vertical axis is generated, "compensating" for the original yaw force (cancelling it out, i. e. the vehicle is stabilized by intelligent coordination of DSC brake modulation and AL steering, constituting a safety feature unique in this class of vehicle).

D) With DSC, dynamic handling controller and Integrated Active Steering

Under such split surface braking conditions, the dynamic handling controller generates a stabilizing yaw force by opposite steering interventions on the front and rear wheels.

That counteracts movement of the vehicle caused by the uneven braking forces.

At the same time, maximum braking force can be applied in order to achieve a short braking distance.

Integrated Active Steering is a logical development from the Active Steering systems. The functions of the systems complement each other perfectly, taking the driving experience to a new dimension.

Integrated Active Steering Special Function

Quite obviously, Active Steering systems must not be capable of being switched on or off by the driver.

In the case of Integrated Active Steering, there is a special feature in that regard because if snow chains are fitted to the rear wheels, Active Steering of the rear wheels must be disabled.

When snow chains are fitted, the rear-wheel steering is deactivated in order to ensure that the wheels are always free to rotate.

Automatic snow-chain detection assists the driver and indicates the detected status on the Control Display. This does not remove the responsibility for manually changing the setting.



Fig. 95: Control Display - Tire Chains Installed
Courtesy of BMW OF NORTH AMERICA, INC.

When show chains are used, the setting on the iDrive Settings menu must be changed to "Show chains fitted".

If the maximum speed of 50 kph (31mph) for driving with snow chains is exceeded, the rear-wheel steering is reactivated regardless of the "Snow chains fitted" setting.

Automatic snow chain detection

It is possible to detect from the wheel-speed sensor signals a characteristic pattern produced by the motion of the wheel when show chains are fitted (only with BMW-approved show chains). From that characteristics signal pattern, the control unit is able to detect whether show chains are fitted on each individual wheel.

SYSTEM COMPONENTS

Steering Systems

There are two lateral dynamics systems available on the F01/F02:

- Servotronic
- Integrated Active Steering

Servotronic Components

The proportional valve for electronic volumetric flow control (EVV valve) and the Servotronic valve are directly controlled by the ICM regardless of whether the Servotronic or Integrated Active Steering is fitted.

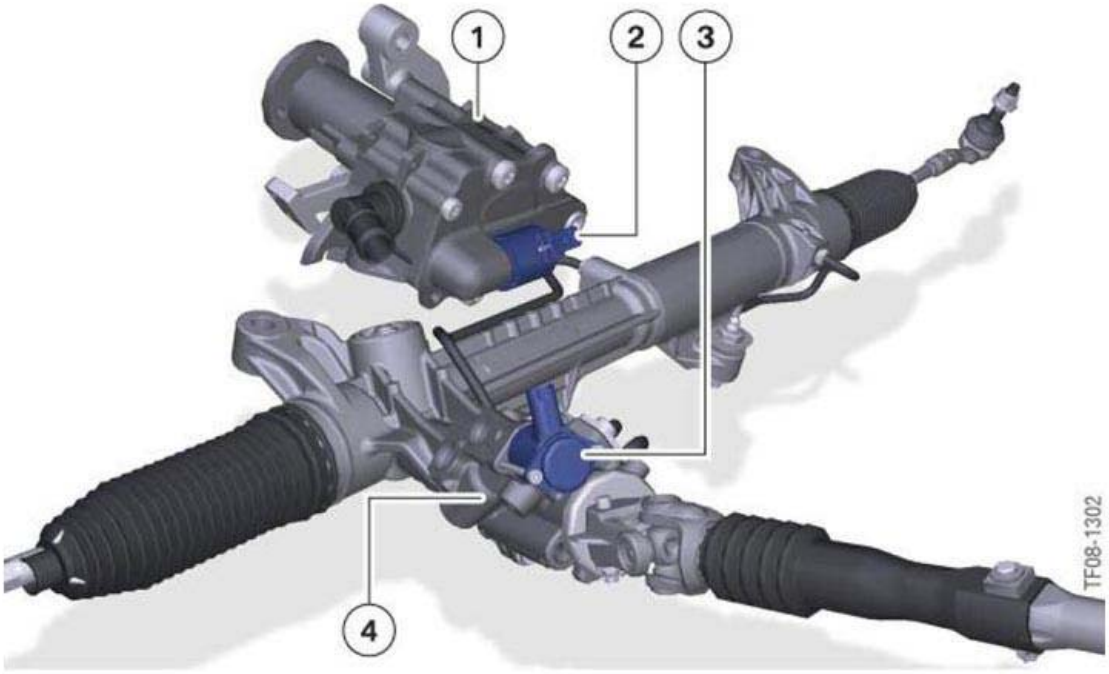


Fig. 96: Identifying Servotronic Components
Courtesy of BMW OF NORTH AMERICA, INC.

SERVOTRONIC COMPONENTS REFERENCE CHART

Index	Explanation
1	Hydraulic pump
2	Electronic volumetric flow control valve (EVV valve)
3	Servotronic valve
4	Hydraulic power steering control valve body

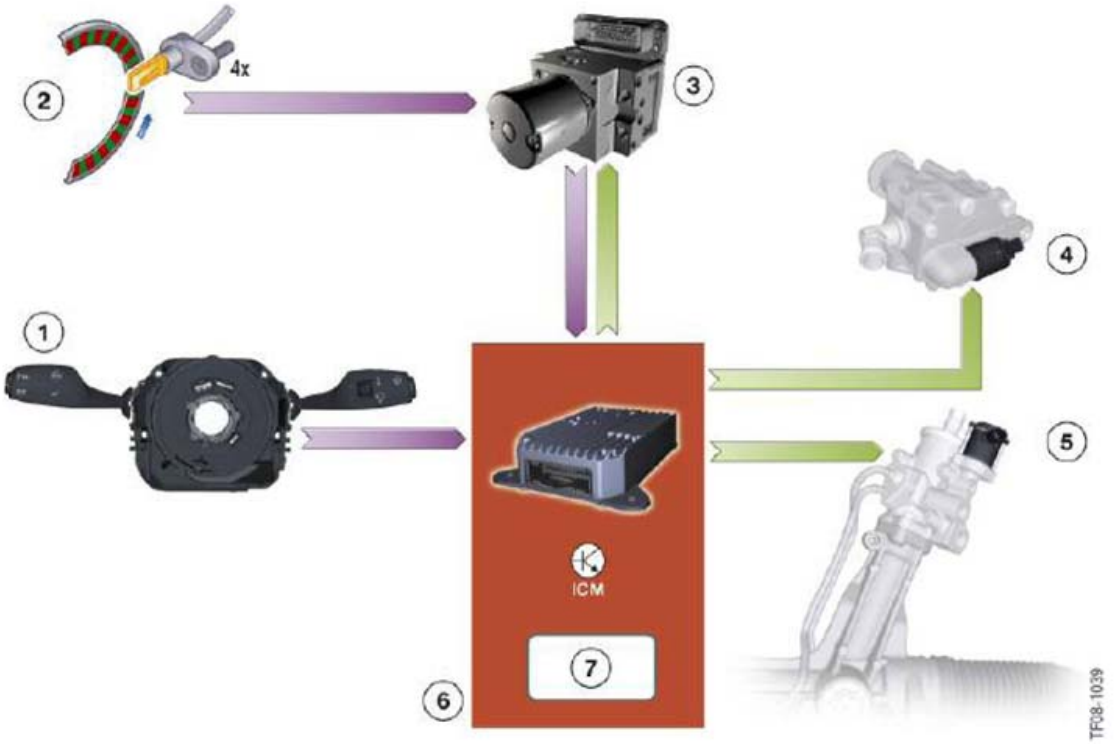


Fig. 97: Input/Output Signal Diagram - Control Of Steering By ICM
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Steering column switch cluster (SZL)
2	Wheel speed sensor
3	Dynamic stability control (DSC)
4	Electronic volumetric flow control (EVV) valve
5	Servotronic valve
6	Integrated Chassis Management (ICM)
7	"Steering control" function

Components of Integrated Active Steering

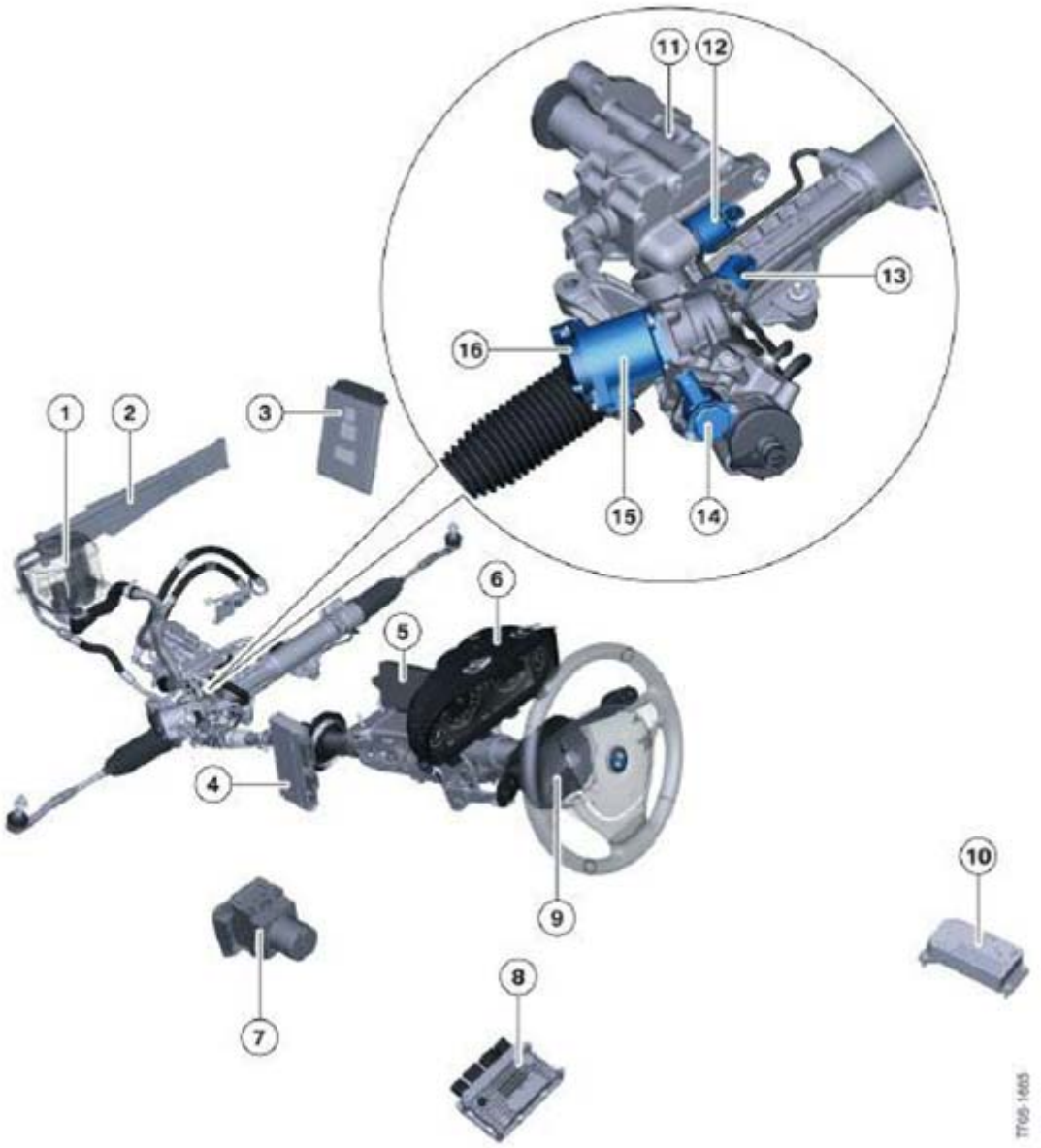


Fig. 98: Identifying Integrated Active Steering Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Hydraulic fluid reservoir
2	Power steering cooler
3	DME
4	ZGM
5	CAS
6	Instrument cluster
7	DSC

8	AL
9	SZL
10	ICM
11	Hydraulic pump
12	Electronic volumetric flow control (EVV) valve
13	Lock
14	Servotronic valve
15	Actuator unit electric motor
16	Motor angular position sensor

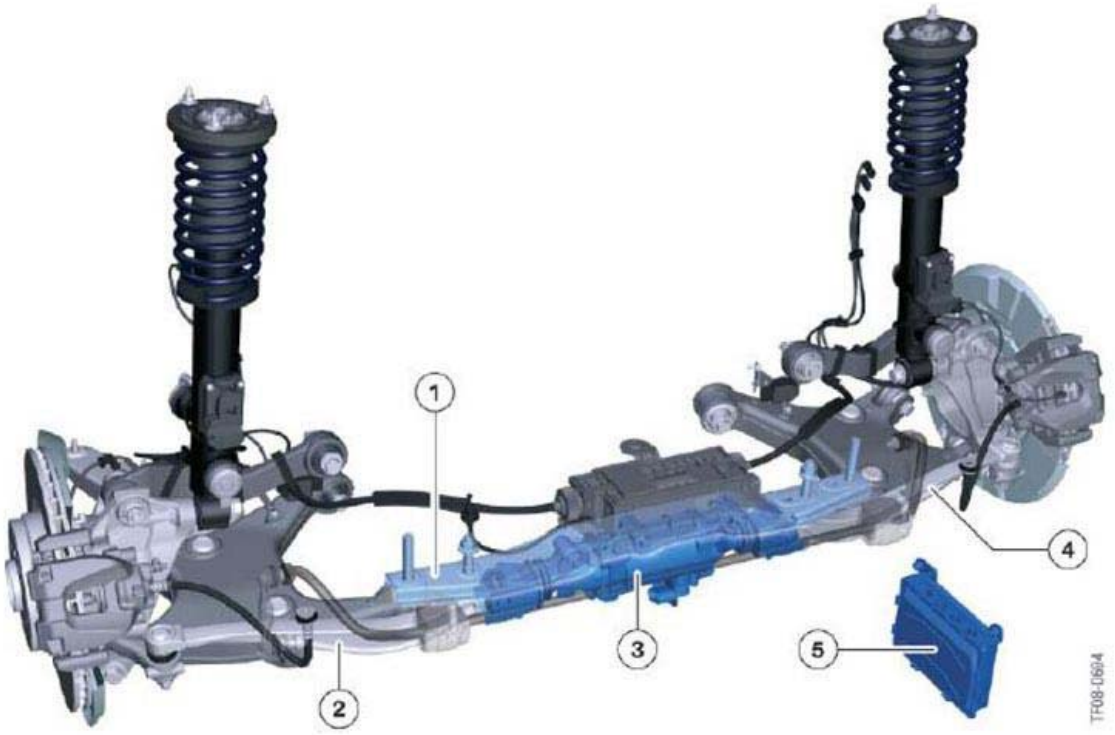


Fig. 99: HSR Actuator Location On Rear Suspension
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Mounting plate
2	Left track rod
3	HSR actuator
4	Right track rod
5	HSR control unit

The special actuator on the rear suspension is fixed underneath a mounting plate on the rear suspension subframe.

The electromechanical actuator is positioned between the two new track rods of the Integral V rear suspension. The rear-wheel steering system has its own actuator control unit which is responsible for controlling and monitoring the actuator.

It was previously the state of the art that control systems were largely independent of one another.

On the F01/F02, the Integrated Chassis Management (ICM) system brings the separate systems together.

A central ICM control unit in the ICM architecture replaces the previous dynamic handling sensors and forms a central dynamic handling controller.

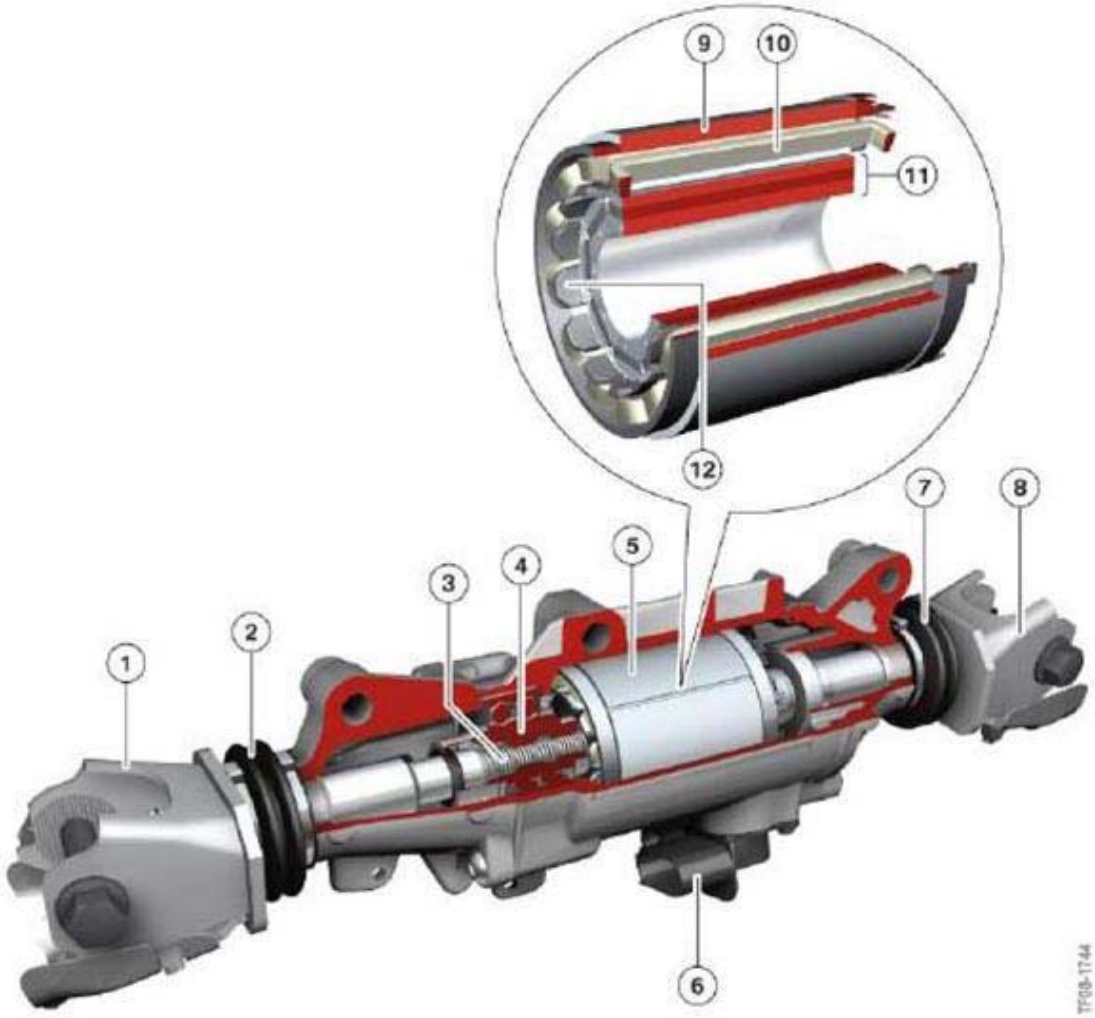


Fig. 100: Identifying HSR Actuator
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Left track rod joint

2	Left shaft gaiter
3	Worm shaft
4	Worm nut
5	Electric motor
6	Electrical connector
7	Right shaft gaiter
8	Right track rod joint
9	Iron jacket
10	Winding stator
11	Permanent magnet
12	Carrier/armature winding iron core

The electromechanical actuator essentially consists of an electric motor which moves the two track rods by means of a worm-and-nut steering gear.

The actuator is designed for a maximum travel of ±8 mm, which brings about a maximum steering angle of ±3° at the roadwheel.

The worm-and-nut rear-wheel steering gear is self-inhibiting. That means that if the system fails, the vehicle adopts exactly the same handling characteristics as a vehicle without rear-wheel steering.

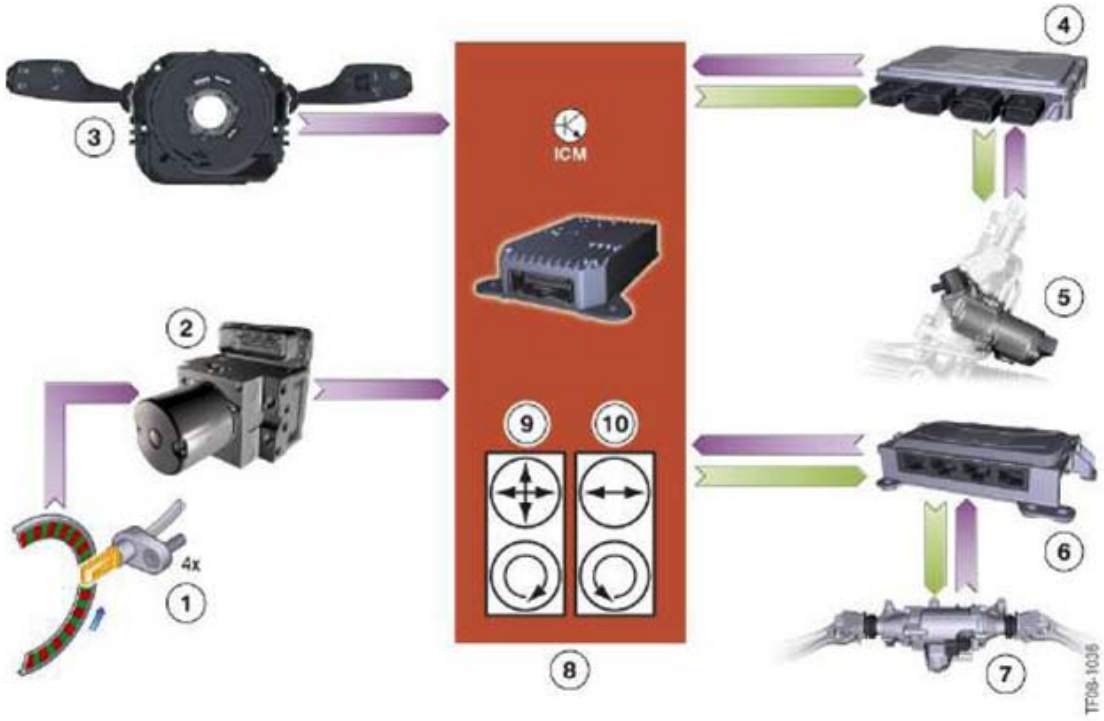


Fig. 101: Input/Output Signal Diagram - ICM
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Wheel speed sensors
2	DSC
3	SZL with steering-angle sensor
4	Active Steering control unit
5	AS actuating unit
6	HSR control unit
7	HSR actuator unit
8	ICM
9	DSC sensor in ICM (linear acceleration, lateral acceleration and yaw rate sensor)
10	Back-up DSC sensor in ICM (lateral acceleration and yaw rate sensor)

F01 VERTICAL DYNAMICS SYSTEMS

INTRODUCTION

New Generation of Familiar Systems

General

Nowadays, the dynamic handling systems are subdivided into three groups according to the co-ordinate axis that their function relates to.

Development continued over the years with the EDC II (E24) and EDC III (E31, E38 and E39) and ultimately the EDC-K ("K" stands for continuous) in the E65.

The E65 then became the first model to feature a new vertical dynamics system called **ARS** Active Roll Stabilization, which was marketed as "Dynamic Drive".

The existing vertical dynamics systems are also complemented by the **EHC** electronic ride-height control system which made its BMW debut on the E39 (air springs on 2 wheels) and E53 (air springs on all 4 wheels).

With the arrival of the E70 came an increasing level of system integration in the area of dynamic handling and for the first time a central control unit was used for the vertical dynamics systems which was called the **VDM** Vertical Dynamics Management unit.

With the new **VDC** Vertical Dynamics Control function, independent electronic damper control for each wheel was realized for the first time.

On the E70, and subsequently also on the E71, VDC was combined with ARS under the name of Adaptive Drive.

On the F01/F02, that constant development of the vertical dynamics systems has continued and the new generation of vertical dynamics management is referred to internally as **VDC II.**

System Overview

General

The following systems are available on the F01/F02:

- Electronic ride-height control (EHC)
- Active Roll Stabilization (ARS)
- Electronic ride-height control (EHC)

VDC (also called VDC II) is fitted as standard on the F01/F02. ARS and EHC are offered as optional extras on the F01, whereas EHC is standard on the F02.

Components of Vertical Dynamics Control (standard equipment)

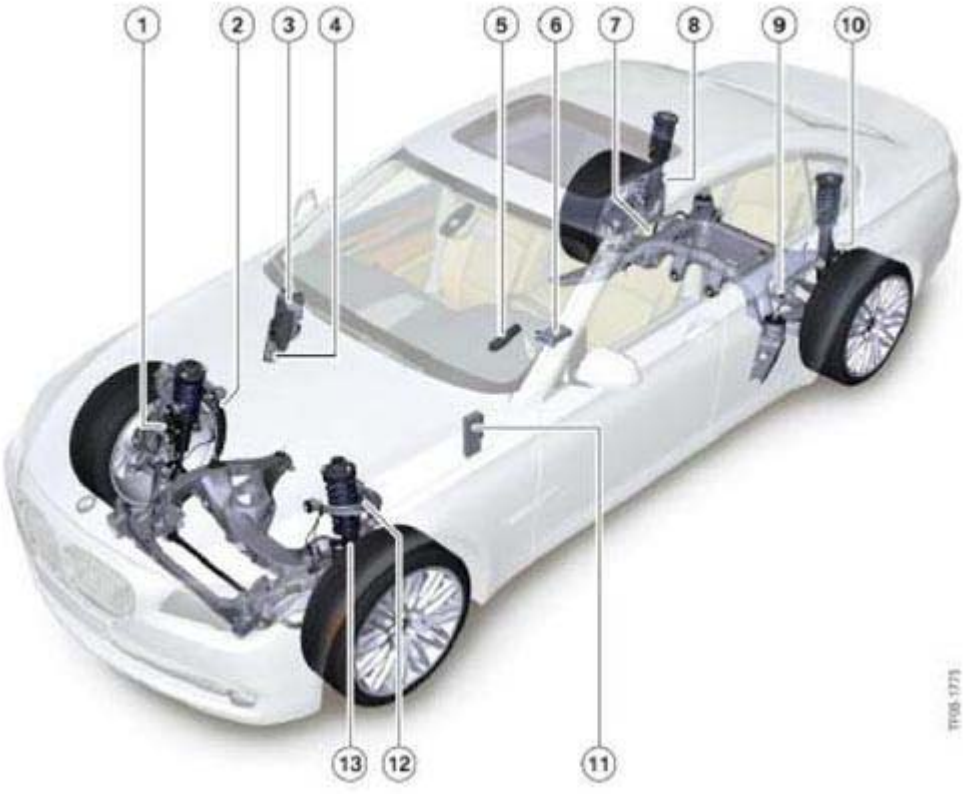


Fig. 102: Identifying Vertical Dynamics Control Components (Standard Equipment)
Courtesy of BMW OF NORTH AMERICA, INC.

VERTICAL DYNAMICS CONTROL COMPONENT REFERENCE CHART

Index	Explanation

1	EDC_SVR
2	Ride-height sensor, front right
3	Front power distribution box
4	VDM
5	Handling setting switch
6	ICM
7	Ride-height sensor, rear right
8	EDC_SHR
9	Ride-height sensor, rear left
10	EDC_SHL
11	ZGW
12	Ride-height sensor, front left
13	EDC_SVL

Components of Active Roll Stabilization with VDC

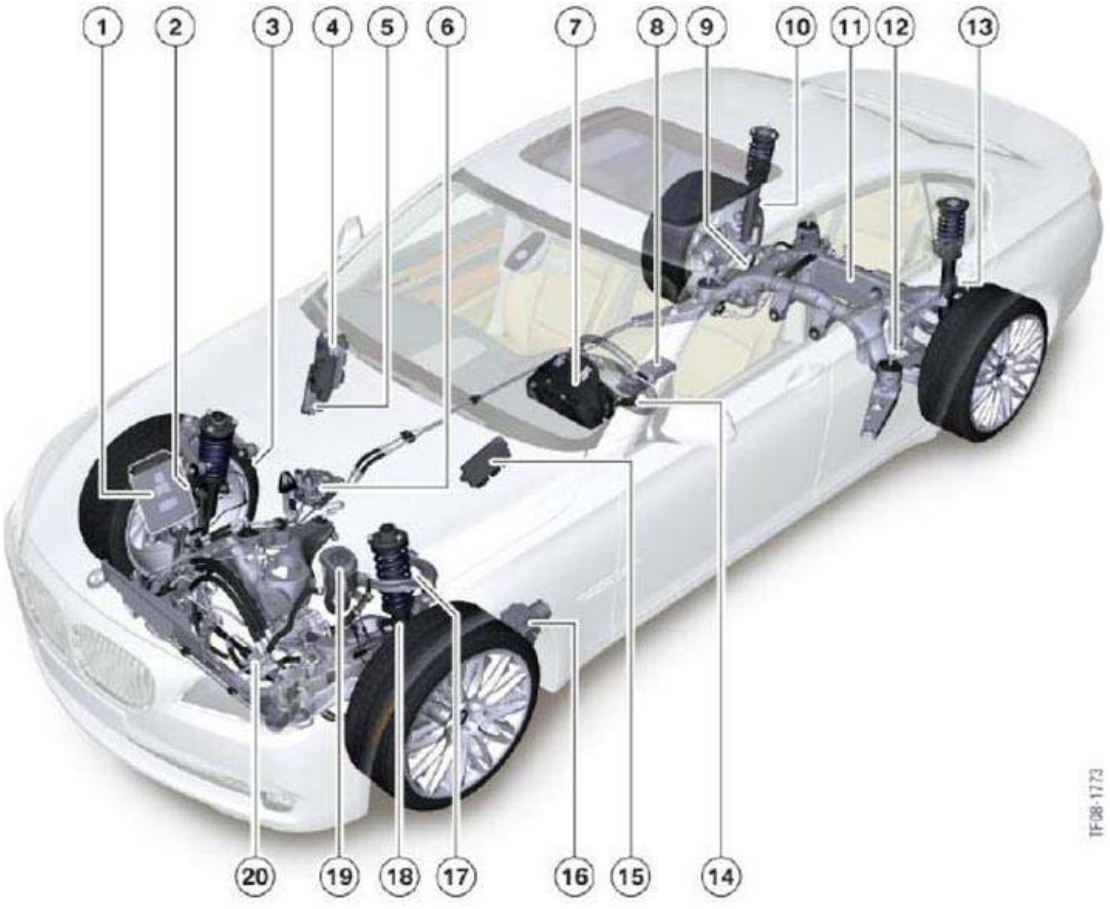


Fig. 103: Identifying Active Roll Stabilization Components With VDC
Courtesy of BMW OF NORTH AMERICA, INC.

ACTIVE ROLL STABILIZATION WITH VDC COMPONENT REFERENCE CHART

Index	Explanation
1	DME
2	EDC_SVR
3	Ride-height sensor, front right
4	Front power distribution box
5	VDM
6	ARS valve manifold
7	Instrument cluster
8	ICM
9	Ride-height sensor, rear right
10	EDC_SHR
11	Rear-suspension hydraulic motor
12	Ride-height sensor, rear left
13	EDC_SHL
14	SZL
15	ZGM
16	DSC
17	Ride-height sensor, front left
18	EDC_SVL
19	Hydraulic fluid reservoir
20	Front-suspension hydraulic motor

Components of electronic ride-height control

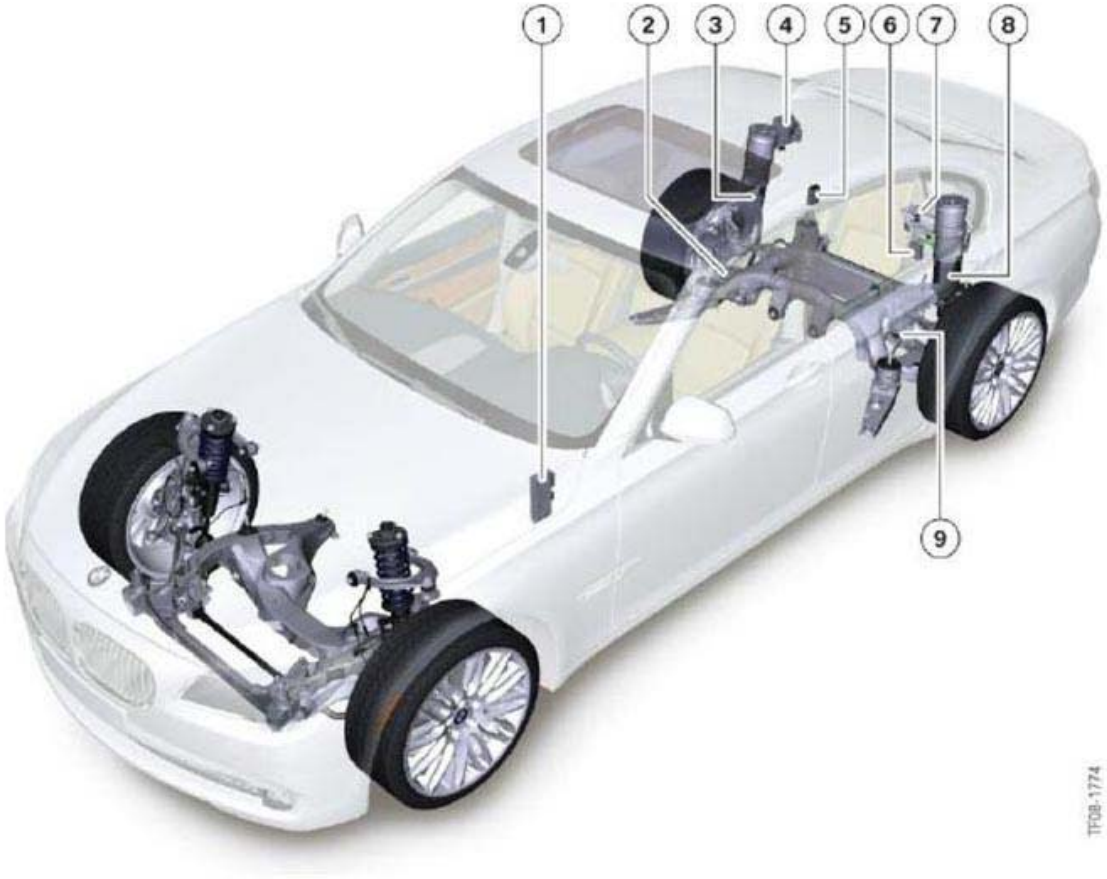


Fig. 104: Identifying Electronic Ride-Height Control Components
Courtesy of BMW OF NORTH AMERICA, INC.

ELECTRONIC RIDE-HEIGHT CONTROL COMPONENT REFERENCE CHART

Index	Explanation
1	ZGM
2	Ride-height sensor, rear right
3	EDC_SHR
4	Rear power distribution box
5	EHC
6	Air supply relay
7	LVA, air supply unit
8	EDC_SHL
9	Ride-height sensor, rear left

Bus System Overview for Vertical Dynamics Systems

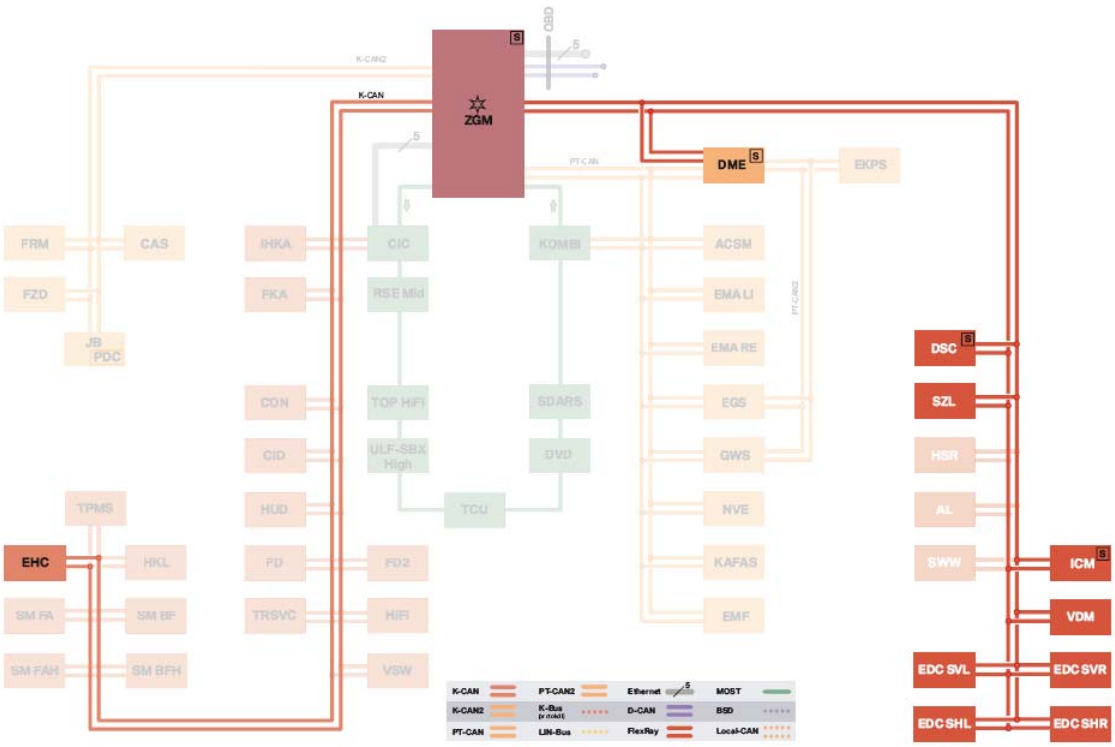


Fig. 105: Bus System Overview For Vertical Dynamics Systems
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
EHC	Electronic ride-height control
ZGM	Central Gateway Module
DME	Digital Motor Electronics
DSC	Dynamic stability control
SZL	Steering column switch cluster
ICM	Integrated Chassis Management
VDM	Vertical Dynamics Management
EDC SVL	Electronic Damper Control satellite, front left
EDC SHL	Electronic Damper Control satellite, rear left
EDC SVR	Electronic Damper Control satellite, front right
EDC SHR	Electronic Damper Control satellite, rear right

System Circuit Diagrams

VDC System Circuit Diagram

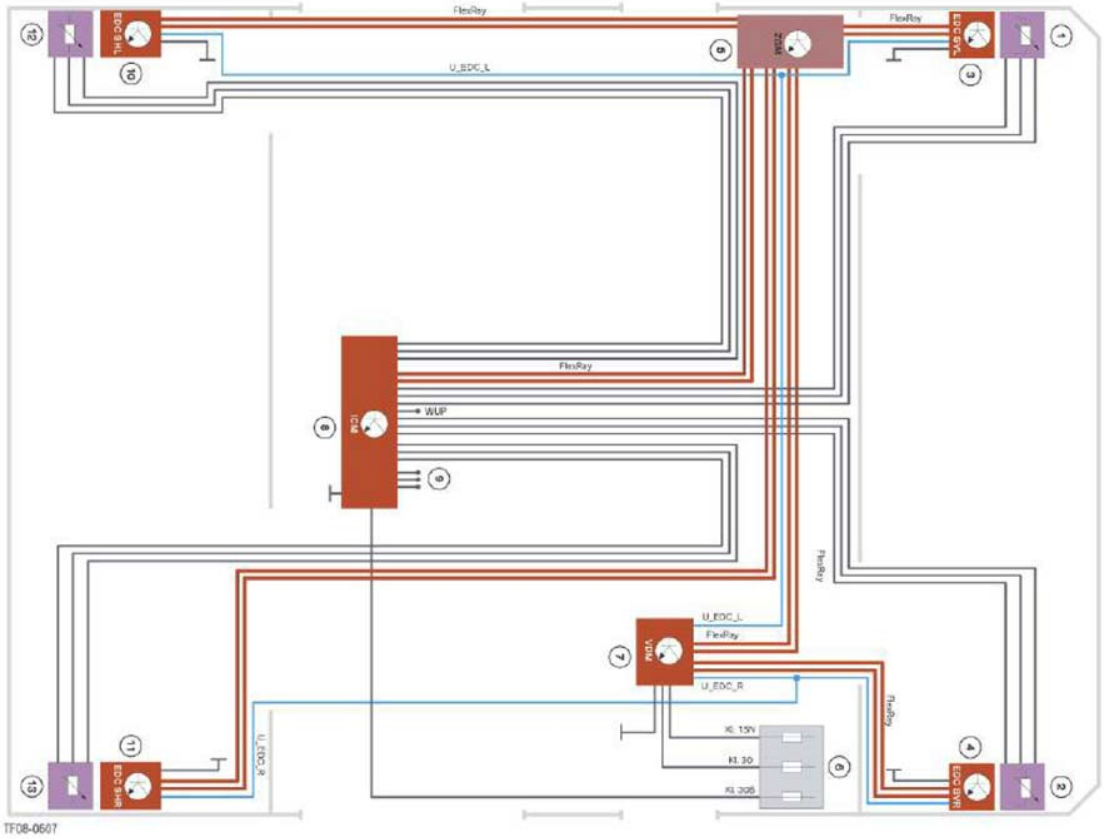


Fig. 106: VDC System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Ride-height sensor, front left
2	Ride-height sensor, front right
3	Electronic Damper Control satellite, front left
4	Electronic Damper Control satellite, front right
5	Central Gateway Module
6	Front power distribution box
7	Vertical Dynamics Management
8	Integrated Chassis Management
9	Connection for handling setting switch
10	Electronic Damper Control satellite, rear left
11	Electronic Damper Control satellite, rear right
12	Ride-height sensor, rear left
13	Ride-height sensor, rear right

VDC and ARS System Diagram

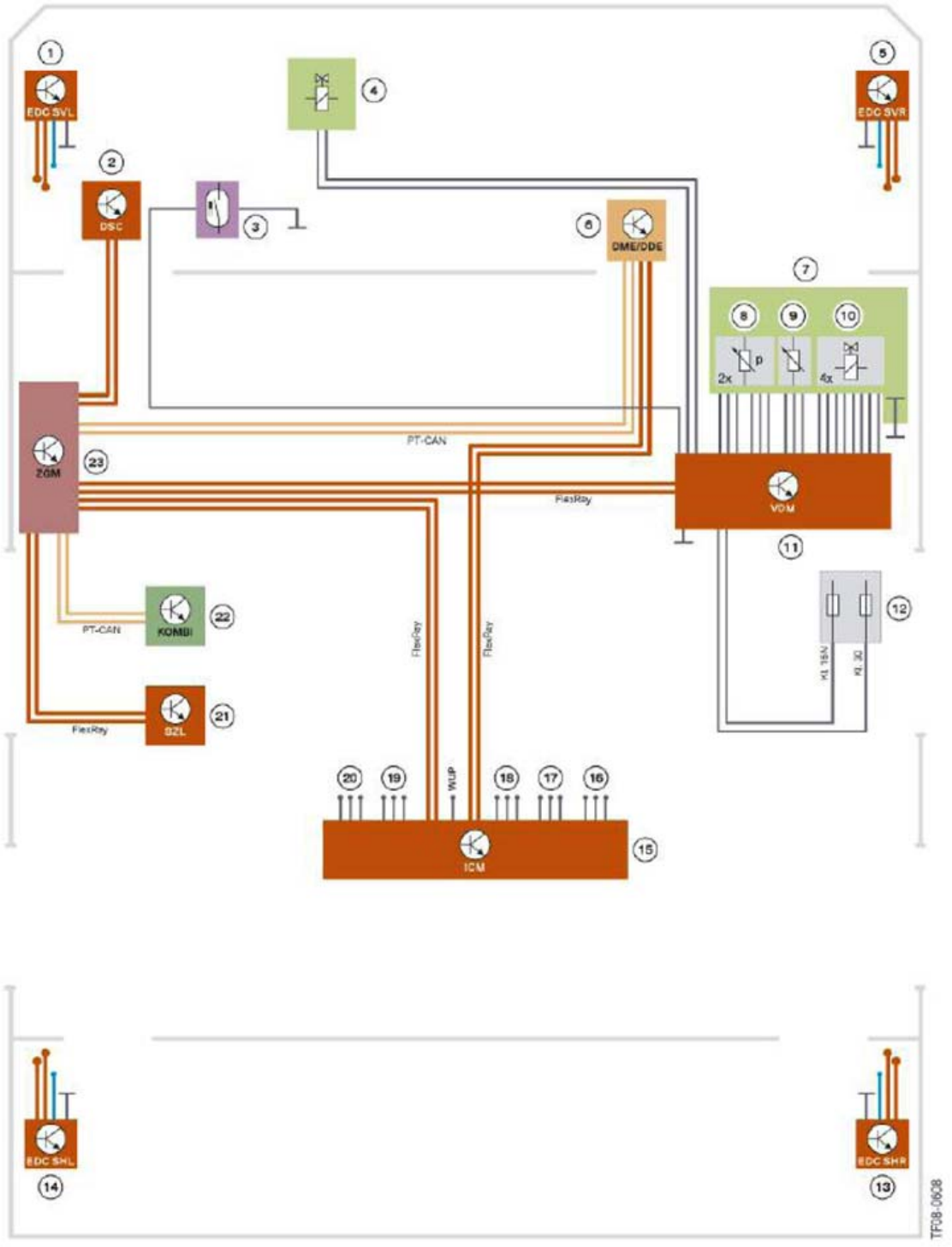


Fig. 107: VDC And ARS System Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Electronic Damper Control satellite, front left
2	Dynamic Stability Control
3	Hydraulic fluid level sensor
4	Intake restrictor valve
5	Electronic Damper Control satellite, front right
6	Digital Motor Electronics/Digital Diesel Electronics
7	ARS valve manifold
8	Front suspension pressure sensor/rear suspension pressure sensor
9	Switch-position detector
10	Failsafe, directional control and pressure valves
11	Vertical Dynamics Management
12	Front power distribution box
13	Electronic Damper Control satellite, rear right
14	Electronic Damper Control satellite, rear left
15	Integrated Chassis Management
16	Ride-height sensor, rear left
17	Ride-height sensor, front left
18	Ride-height sensor, front right
19	Ride-height sensor, rear right
20	Connection for handling setting switch
21	Steering column switch cluster
22	Instrument cluster
23	Central Gateway Module

EHC System Diagram

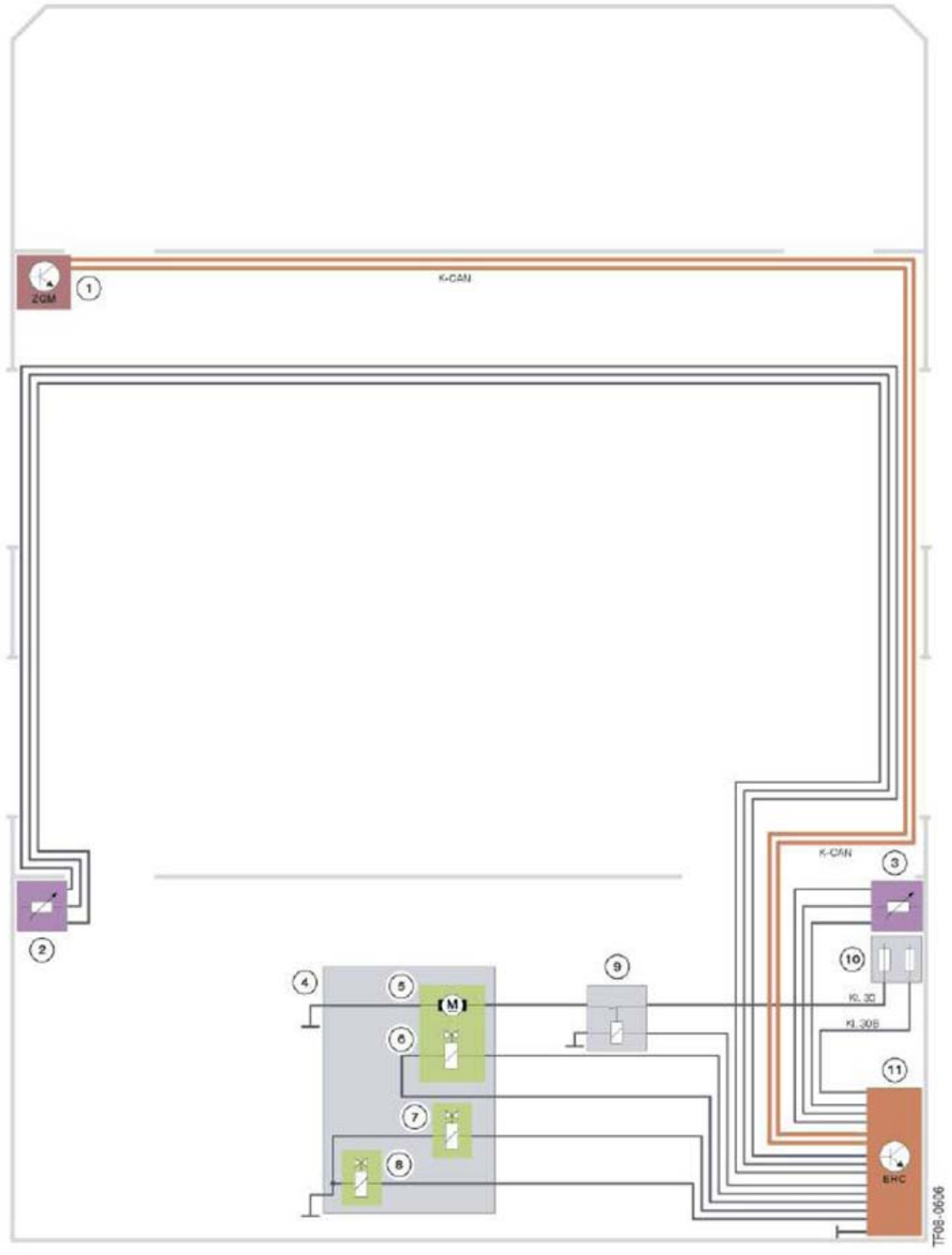


Fig. 108: EHC System Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Central Gateway Module
2	Ride-height sensor, rear left
3	Ride-height sensor, rear right
4	Air supply unit
5	Compressor unit
6	Solenoid valve, left side
7	Solenoid valve, right side
8	Air exhaust valve
9	Air supply relay
10	Rear power distribution box
11	Electronic ride-height control

EHC Pneumatics Diagram

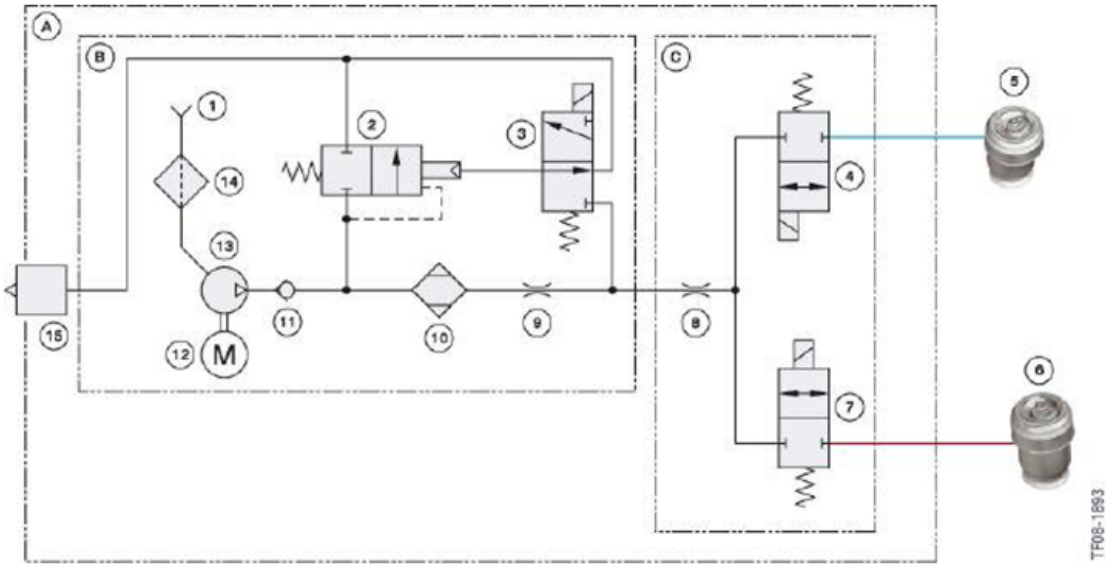


Fig. 109: EHC Pneumatics Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	LVA, air supply unit
B	Compressor unit
C	Solenoid valve block
1	Air intake (by left rear light unit)
2	Pressure limiting/holding valve
3	Air exhaust valve
4	Solenoid valve, right side
5	Air spring, rear right

6	Air spring, rear left
7	Solenoid valve, left side
8	Restrictor
9	Restrictor
10	Air drier
11	Non-return valve
12	Electric motor
13	Compressor
14	Air cleaner
15	Air exhaust silencer

ACTIVE ROLL STABILIZATION (ARS)

General Information

Active Roll Stabilization was first fitted on the 7 Series predecessor, the E65/E66, and has been used in similar form since on the E6x and E7x models.

This section only describes the essential details and modifications of the ARS on the F01/F02.

As Vertical Dynamics Control (VDC) is fitted as standard on the F01/F02, the ARS optional extra (now also available in the US markets) is always offered as a combination.

In customer communications, ARS continues to be marketed under the name "Dynamic Drive" on the F01/F02.

System Dynamics

VDC and ARS have to respond with the appropriate speed in the event of rapid lane changes, rapid cornering or rapid changes of direction on winding country roads.

The ARS systems on previous model series had a separate control unit with the appropriate output stages for controlling the ARS valve manifold. The system architecture on the F01/F02 now features two different vertical dynamics management (VDM) control units:

- If ARS is not fitted, the VDM has no output stages for ARS valve manifold control
- If ARS is fitted, the VDM has output stages for ARS valve manifold control

The system dynamics of ARS and VDC are determined by the duration of the following stages:

SYSTEM DYNAMICS OF ARS AND VDC

Process	Time
Signal detection by sensors, processing of sensor signals in the control unit, valve control	approximately 10 ms
Change of direction, reversal of force direction, directional control valve	approximately 30 ms

Pressure increase (force per wheel) 0 -> 30 bar (0 -> 350 N) 0 -> 180 bar (0 -> 2100 N)	approximately 120 ms approximately 400 ms

Operating States

Straight-ahead travel

When the engine is started, the pump delivers hydraulic fluid to the system and a back pressure builds up. The pressure difference of approximately 1 bar which exists between the chambers of the control motor is very small and has no effect on the anti-roll bar.

The pressure valves for the front-axle anti-roll bar (PVV) and rear-axle anti-roll bar (PVH) are not supplied with current and are therefore open. The hydraulic fluid can flow back into the fluid reservoir directly. The pump's new intake restrictor valve is energized so that the circulation pressure can be substantially lowered when driving in a straight line in order to reduce CO2 emission. This condition remains unchanged as long as the vehicle is travelling straight ahead. The system function is displayed continuously up to 10 mph. The full stabilization capacity is available from 10 mph upwards.

Cornering

As the vehicle enters a bend, the signals from the lateral acceleration sensor in the ICM are sent to the VDM control unit. The control unit then sends a pulse-width modulated (PWM) signal to the pressure valves for the front and rear-suspension hydraulic motors and simultaneously stops restriction of pump intake by switching off the power to the intake restrictor valve. The greater the lateral acceleration, the higher is the PWM signal current for the pressure valves. The stronger the current supplied to the valve, the more the valve closes and the higher the pressure which builds up in the anti-roll bars.

The pressures at the anti-roll bars are detected by pressure sensors (10, 11) and signalled to the control unit. The direction valve (9) is activated by the control unit to create a pressure build-up which corresponds to the progression of the bend (left or right-hand bend). A sensor (8) detects the switching position of the direction valve.

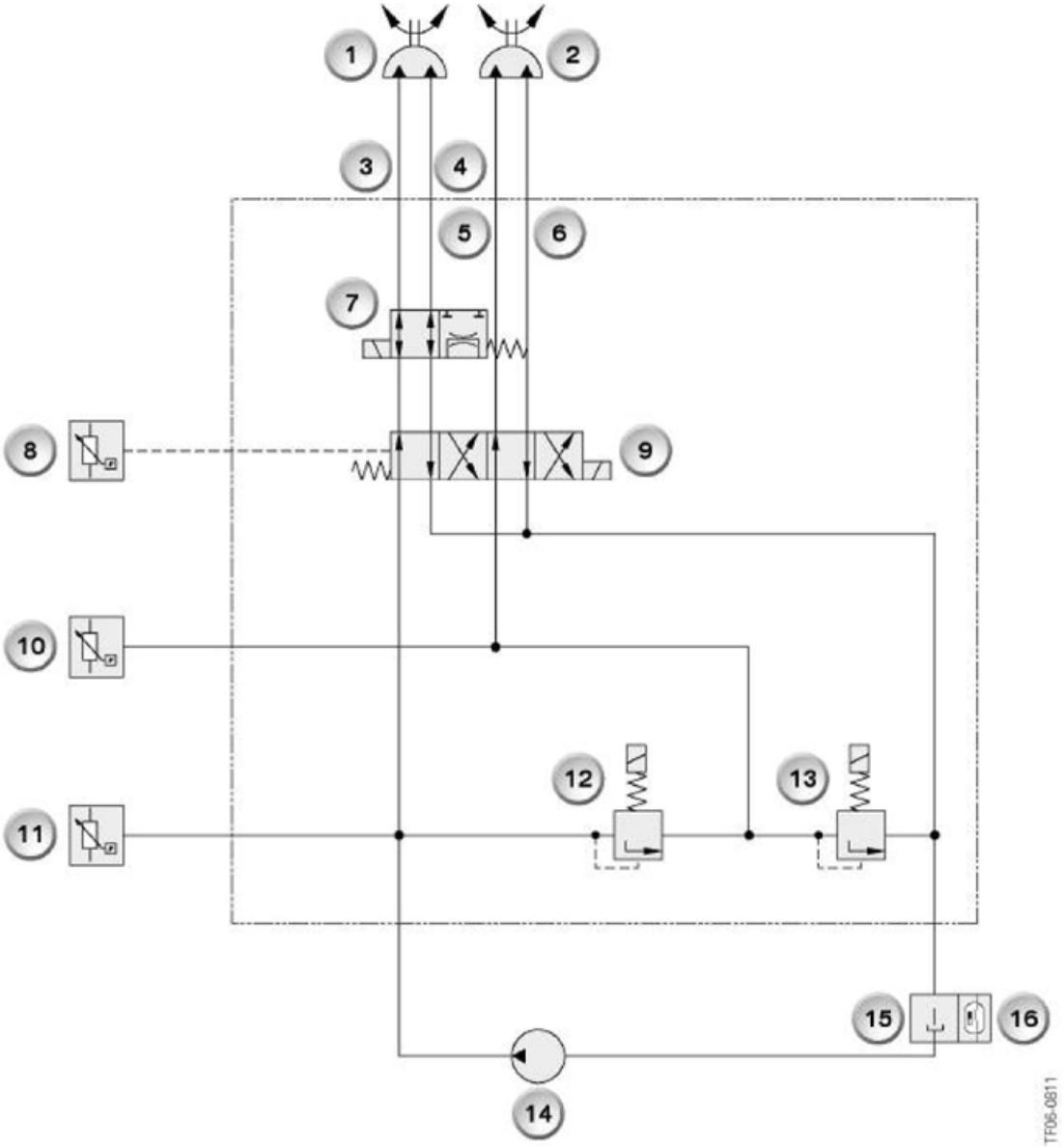


Fig. 110: Hydraulic Circuit Diagram, Normal Function - Failsafe Valve Supplied With Current
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Front hydraulic motor (SMV)
2	Rear hydraulic motor (SMH)
3	Front-suspension hydraulic circuit 1 (V1)
4	Front-suspension hydraulic circuit 2 (V2)
5	Rear-suspension hydraulic circuit 1 (V1)
6	Rear-suspension hydraulic circuit 1 (V1)
7	Failsafe valve (FS)

8	Switch-position detector (SSE)
9	Directional control valve (RV)
10	Rear-suspension pressure sensor (DSH)
11	Front-suspension pressure sensor (DSV)
12	Front-suspension pressure valve (PVV)
13	Rear-suspension pressure valve (PVH)
14	Tandem pump (P)
15	Fluid reservoir (HB)
16	Fluid level sensor

Safety Concept

General information

The safety concept prevents malfunctioning of the system by monitoring signals and responds in a defined manner to faults caused by external problems on interfacing units or systems. System monitoring essentially comprises of the following monitoring functions:

- Monitoring of the power supply voltage
- Monitoring of the electrical circuits for the valves and sensors within the system
- Monitoring of FlexRay bus communication and checking signal plausibility
- Monitoring hydraulic function when the vehicle is in motion and predrive test

If a fault is detected, a defined response is initiated according to the significance of the fault (function impairment). The VDM control unit records the fault in the fault memory and displays the response on the instrument cluster.

Limited function (fall-back level)

If a system fault has been detected which allows continued operation of the system with limited functionality, this is indicated together with a warning message



ARS indicator lamp (yellow)

Fig. 111: Identifying ARS Indicator Lamp (Yellow)
Courtesy of BMW OF NORTH AMERICA, INC.

Serious fault (fall-back level)

If a serious fault is detected, the ARS system is set to "failsafe mode" and this is indicated on the instrument

cluster. A CC message advises the driver to take corners more slowly.



Fig. 112: Identifying ARS Indicator Lamp (Yellow)
Courtesy of BMW OF NORTH AMERICA, INC.

If the failsafe condition is activated, the failsafe valve is closed by means of a spring. The hydraulic fluid in the front anti-roll bar is sealed in, thereby ensuring an adequate anti-roll effect and an understeer effect equivalent to that of a conventional suspension and steering system. The failsafe situation is shown by the hydraulic circuit diagram below.

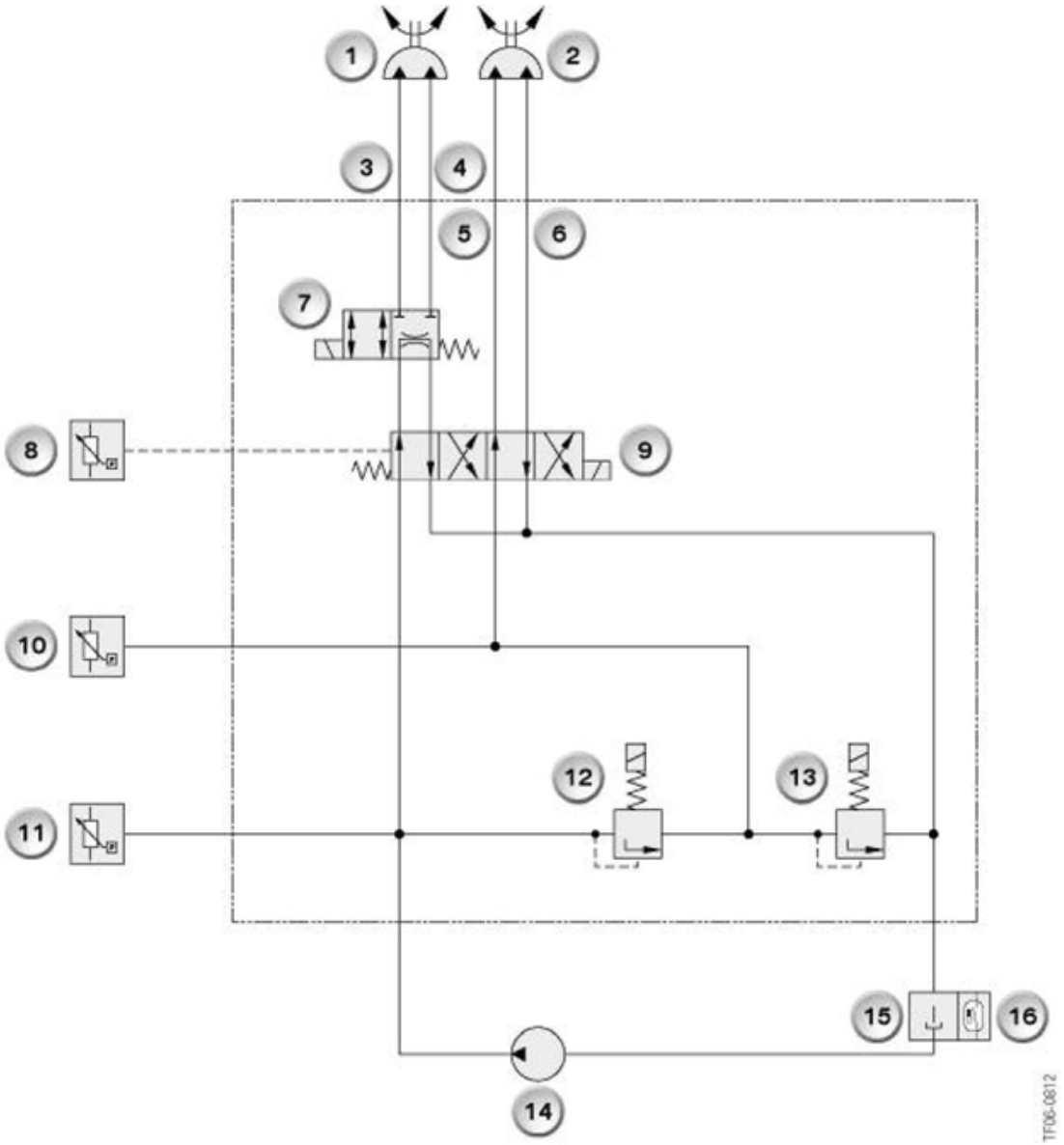


Fig. 113: Failsafe Function Or Neutral Position Hydraulic Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Front hydraulic motor (SMV)
2	Rear hydraulic motor (SMH)
3	Front-suspension hydraulic circuit 1 (V1)
4	Front-suspension hydraulic circuit 2 (V2)
5	Rear-suspension hydraulic circuit 1 (V1)
6	Rear-suspension hydraulic circuit 1 (V1)
7	Failsafe valve (FS)

8	Switch-position detector (SSE)
9	Directional control valve (RV)
10	Rear-suspension pressure sensor (DSH)
11	Front-suspension pressure sensor (DSV)
12	Front-suspension pressure valve (PVV)
13	Rear-suspension pressure valve (PVH)
14	Tandem pump (P)
15	Fluid reservoir (HB)
16	Fluid level sensor

Fluid loss due to external leakage

The hydraulic circuits of the ARS system and the steering system are linked to one another by virtue of a shared fluid reservoir. The VDM control unit monitors the fluid level in the reservoir by means of a fluid level sensor. Loss of fluid due to external leakage in the hydraulic circuits of the ARS or steering systems leads to a drop in the fluid level in the shared fluid reservoir. Fluid loss can result in total failure of the ARS system and impairment of the steering system. If the fluid level sensor trips, the ARS system is set to failsafe mode and a fault is registered on the VDM control unit.



Fig. 114: Identifying ARS Indicator Lamp (Red)
Courtesy of BMW OF NORTH AMERICA, INC.

Simultaneously, a CC message is issued warning of impairment of ARS system and steering system function. The driver is instructed to carefully bring the vehicle to a halt and switch off the engine.

Initialization/reset performance

When the VDM control unit is booted up, various checks and initialization routines are executed. They include checks of the electrical circuits for the valves and the sensors within the system, an authentication check involving querying the VIN number on the CAS and testing FlexRay communication. The system is not enabled until the tests have been successfully completed. Occurring faults are stored and displayed.

Predrive test

Every time the engine is started or the vehicle is stopped, an automatic quick test of the hydraulic function of the failsafe valve and front-suspension pressure regulating valve is carried out which lasts only 450 ms and is imperceptible to the driver. That test is only started when the engine is running and the vehicle is stationary, provided no other fault is present. If the predrive test identifies a fault, the appropriate fault response is initiated.

COMPONENTS

Active Roll Stabilization (ARS)

Control Unit

The VDM control unit is located in the passenger compartment near the right-hand A-pillar. The VDM control unit receives its power supply via Terminal 15N and is protected by a 5A fuse. The VDM control unit is activated exclusively by the Car Access System (CAS) via a Terminal 15N lead as of status "Ignition ON".

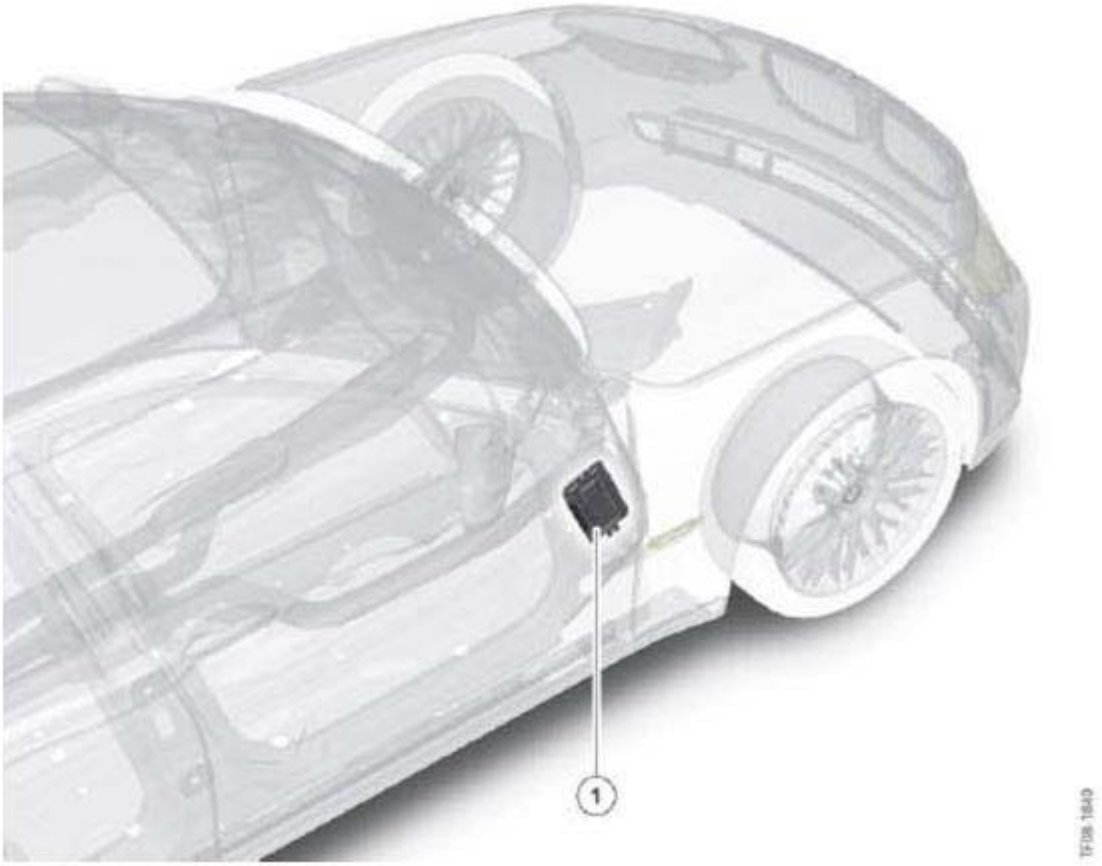


Fig. 115: Identifying VDM Control Unit Location
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	VDM control unit

A vehicle authentication process takes place when the system is started. This compares the vehicle identification number from the CAS with the vehicle identification number which is encoded on the VDM control unit.

That is followed by a check of the VDM control unit's hardware and software. All outputs (valve solenoids and sensors) are subjected to a comprehensive check for short circuits and circuit breaks. If there is a fault, the

system switches the actuators to a safe-driving mode.

The VDM control unit switches off if the voltage is too low/too high.

VDM control unit inputs

From the input signals, the VDM control unit calculates the control signals to the actuators. The input signals are also checked for plausibility and used for system monitoring.

The VDM control unit receives the following input signals:

- FlexRay bus
- Front-suspension circuit pressure (analog)
- Rear-suspension circuit pressure (analog)
- Switch position detector reading (analog)
- Fluid level sensor signal (analog)

The most important control signal for the ARS function is the lateral acceleration measured by the ICM control unit, which is sent to the VDM via the FlexRay bus. Additional lateral dynamics information from the FlexRay bus which is also provided by the ICM comprises the road speed signal and the steering angle. From that, the stabilization requirement is calculated and the relevant active forces are applied. The road speed and steering angle information is also used to improve the reaction time of the system.

VDM control unit outputs

All outputs are compatible with diagnostics and protected against short-circuit. The outputs include controls for:

- Pressure regulating valves for front and rear axle
- Failsafe valve
- Directional valve
- Intake restrictor valve
- 5 V power supply for the sensors:
    - Pressure sensors at the front and rear axle
    - Switch-position detector (SSE)

The valves are controlled by the supply of current regulated by pulse-width modulation (PWM). The current measurements of the individual coil currents are designed with redundancy. The valve currents are mutually checked for plausibility on a continuous basis.

Thanks to the current measurement, the pressure can be set more precisely and the switch valves can be monitored electronically. Fault symptoms of the output signals are:

- Short circuit to Terminal 30 and Terminal 31
- Open circuit and

- Valve short circuits
- Sensor power supply faults

A message is sent to the DME via the FlexRay bus from the central dynamic handling controller on the ICM. The message contains information on how much power the tandem pump currently requires to supply the active anti-roll bars. In this way, output at the engine can be increased to satisfy the additional power requirement. A regular data signal (alive signal) is broadcast and read by other VDM control units to identify whether the system is still active. In addition, a function status signal is broadcast which communicates the status of the ARS function. The VDM control unit transmits an additional status message via the FlexRay to the instrument cluster in order to actively initiate display messages.

That status message is assigned a priority among all suspension/steering messages by the message co-ordinator on the ICM control unit and passed to the instrument cluster. All signal faults are recorded and permanently stored in the fault memory. If the alive signal fails, the ICM control unit automatically sends a message to the instrument cluster to activate the ARS warning lamp.



Fig. 116: Identifying ARS Indicator Lamp (Red)
Courtesy of BMW OF NORTH AMERICA, INC.

Oscillating Motor

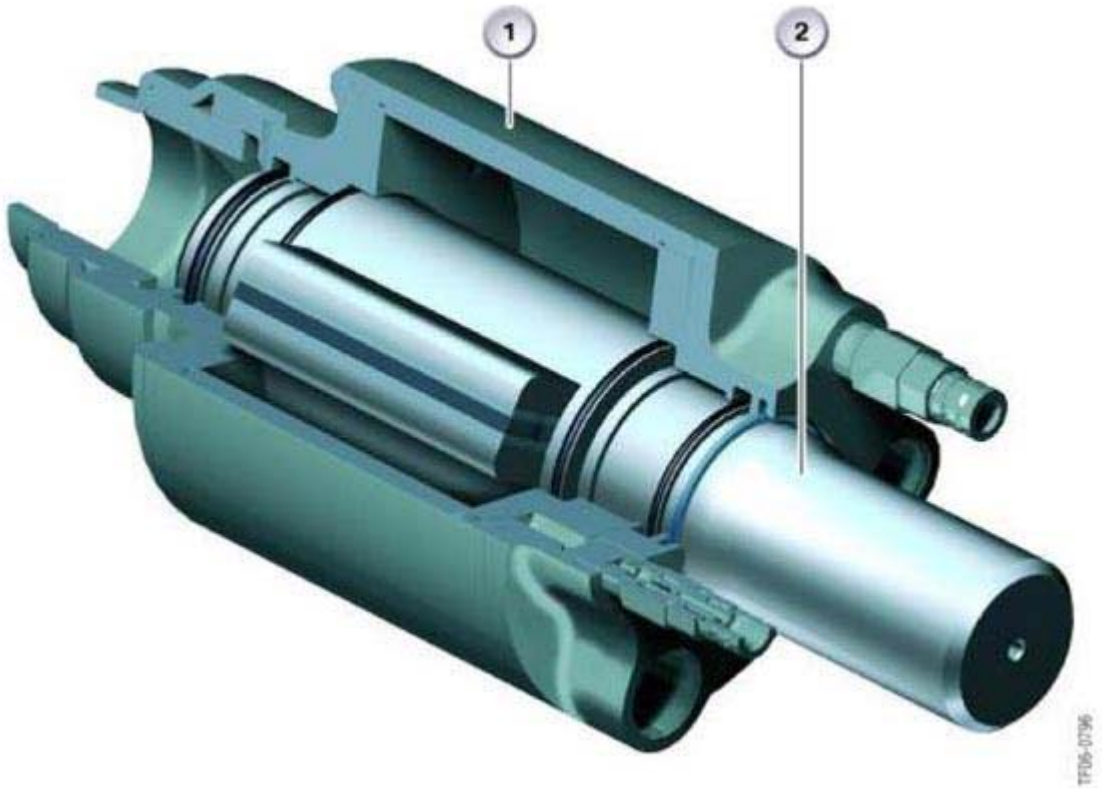


Fig. 117: Identifying Oscillating Motor Housing And Oscillating Motor Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Oscillating motor housing
2	Oscillating motor shaft

The hydraulic motor and the hydraulic motor body are each attached to one half of the anti-roll bar. The active anti-roll bar consists of the oscillating motor and the anti-roll bar halves fitted to the oscillating motor, with press-fitted roller bearings for their connection to the axle carriers. The use of roller bearings ensures optimum comfort thanks to better response and reduced control forces. A thin coating of grease on the roller bearing does not impair the function of the active anti-roll bar.

Operating principle of oscillating motors

The oscillating motor has three functions to perform:

- The oscillating motor transfers the torque into the anti-roll bars.
- The hydraulic motor isolates the two halves of the anti-roll bar
- In the event of system failure (failsafe mode), the front axle anti-roll bar creates sufficient damping via the oscillating motor hydraulic fluid (hydraulic locking). The front suspension anti-roll bar then works like a conventional anti-roll bar.

Exception: if the hydraulic motor chambers no longer contain any fluid as a result of a leak, the front suspension anti-roll bar cannot provide a damping force. The opposing chambers in the oscillating motor are connected to one another. The same pressure exists in both chambers. Two chambers are supplied with high-pressure fluid using one connection. The two other chambers are connected to the tank via the return line.

The forces F_H (High) or F_L (Low) are created as a result of the differences in pressure. Since F_H is greater than F_L , a torque M_S is produced, which causes the shaft to turn in relation to the housing.

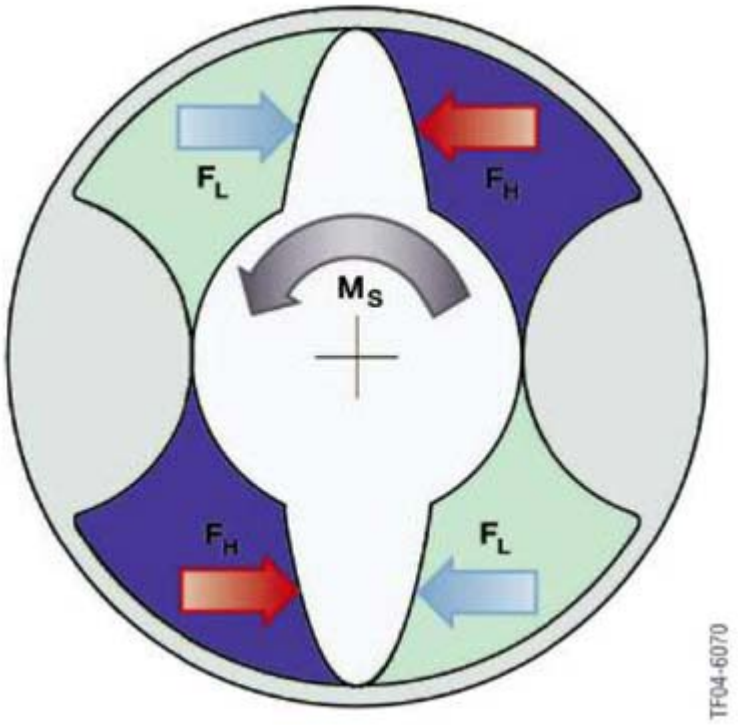


Fig. 118: Oscillating Motor Section Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Since one half of the stabilizer bar is connected to the shaft, and the other with the housing, the two halves turn in opposite directions. This torque MS generates the active moment MA around the vehicle longitudinal axis via the anti-roll bar connections which counteracts the rolling moment M during cornering.

The shell is forced upwards on the outside of a curve, and dragged down on the inside of a curve. The maximum level of body torque on the front and rear suspension occurs when there is a high rate of lateral acceleration. The system pressure is then 180 bar on the front suspension and also 180 bar on the rear suspension. If the oscillating motor twists as a consequence of external forces (road excitation, e. g. bumps or potholes), the oscillating motor then acts as a torsional-vibration damper.

As a result of the twisting action, fluid is forced out of the two chambers. The displaced fluid flows through the pipes and the hydraulic valve manifold, the hydraulic resistance of which produces a damping effect. In the event of failsafe locking (hydraulic locking), the oscillating motor can only twist with a very high damping effect as a consequence of the hydraulic jamming in the oscillating motor.

Function of pressure relief valves

When the vehicle is driven on poor road surfaces, the movements of the anti-roll bar produce transient low pressures (cavitation) and pressure peaks in the hydraulic motors which can cause rattling noises. To prevent those noises, pressure relief valves and internal pulsation dampers have been fitted on the front hydraulic motor. The pressure relief valves allow filtered air to flow into the hydraulic motor to prevent cavitation. That small quantity of air is absorbed by the hydraulic fluid (Pentosin) to form an emulsion which is discharged in the course of subsequent operation of the hydraulic motor. The surplus air is separated out in the expansion tank.

Front Suspension Active Anti-roll Bar

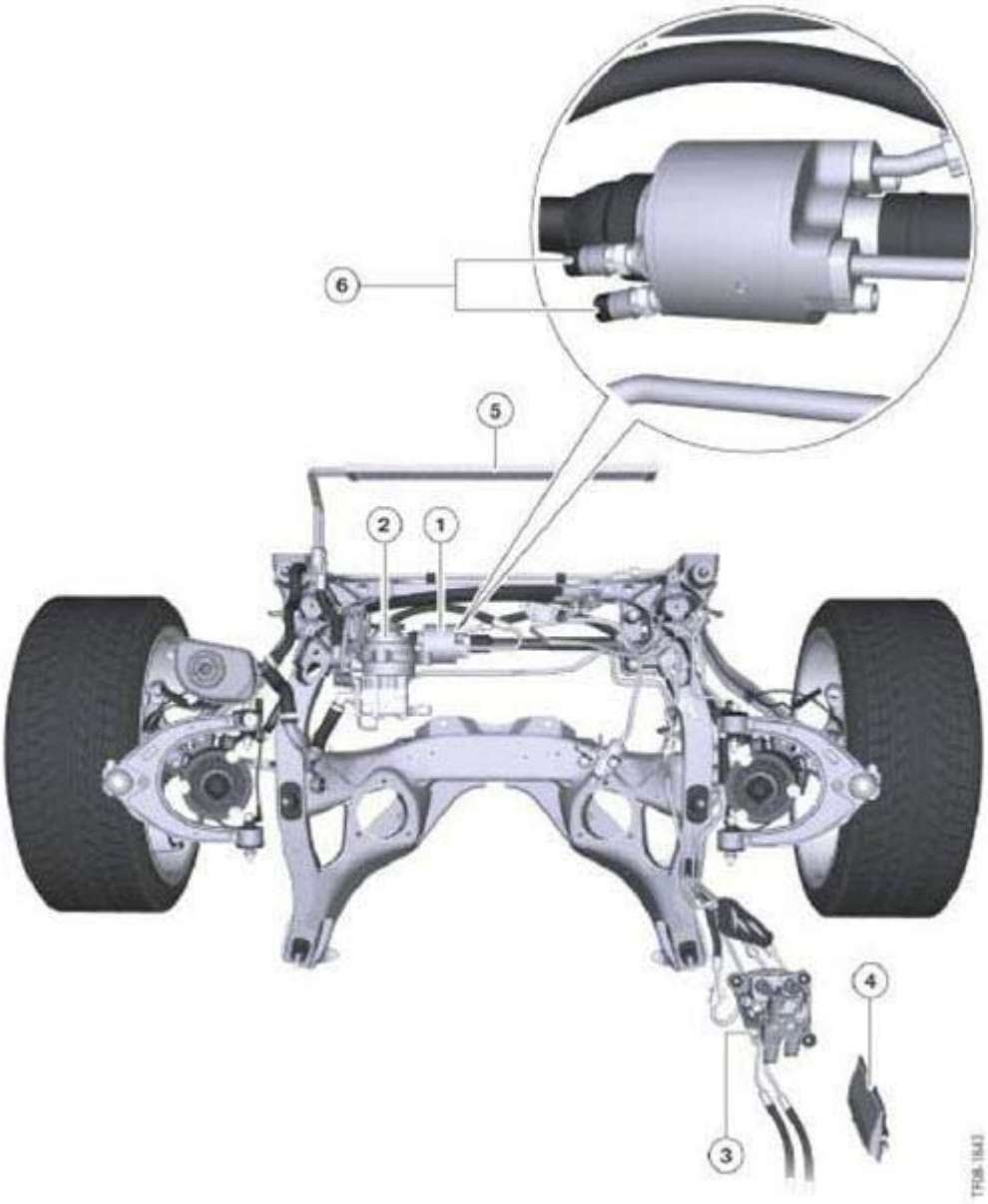


Fig. 119: Identifying Front Suspension Active Anti-Roll Bar Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Front-suspension hydraulic motor
2	Tandem pump
3	ARS hydraulic valve manifold
4	VDM
5	Hydraulic cooler
6	Air filter element

The anti-roll bar is mounted on the front suspension subframe. The anti-roll bar links are attached to the pivot bearing. There are two pressure relief valves on the hydraulic motor of the front suspension anti-roll bar.

On the pressure relief valves there are air filter elements (black plastic caps) attached. Those black air filter caps with Goretex inserts must not be removed.

Rear Suspension Active Anti-roll Bar

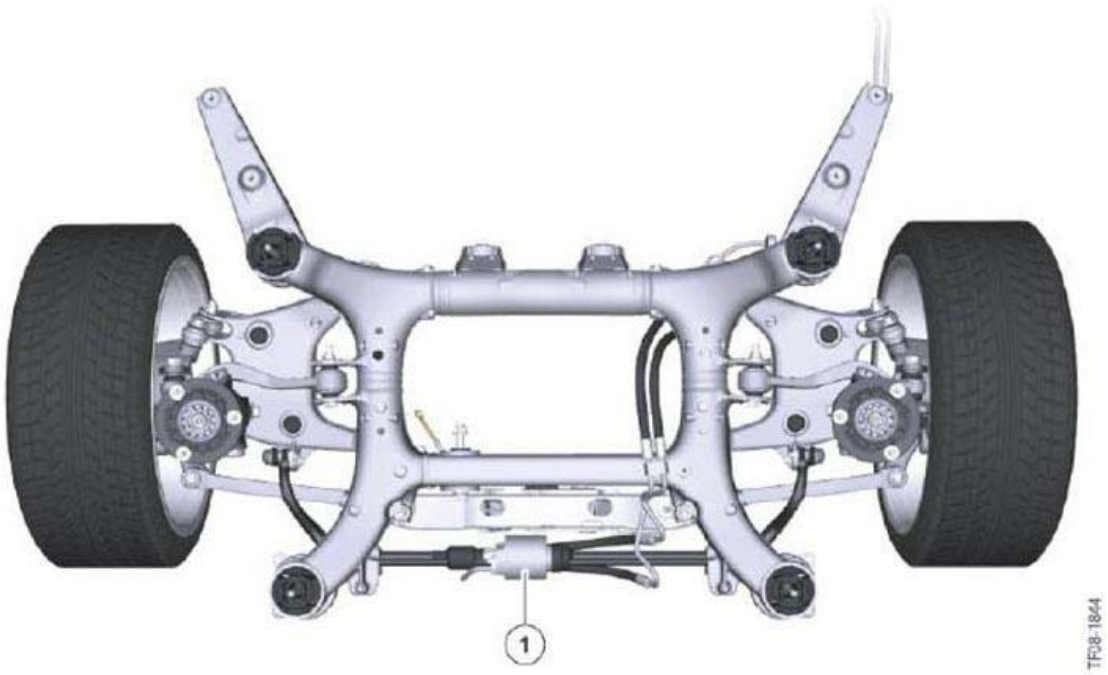


Fig. 120: Identifying Rear Suspension Active Anti-Roll Bar Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Rear suspension hydraulic motor

The anti-roll bar is mounted behind the rear suspension subframe. The anti-roll bar links are attached to the rear suspension swing arms.

On the hydraulic motor for the rear suspension anti-roll bar, blanking plugs are fitted in place of the pressure relief valves.

ARS Hydraulic Valve Manifold

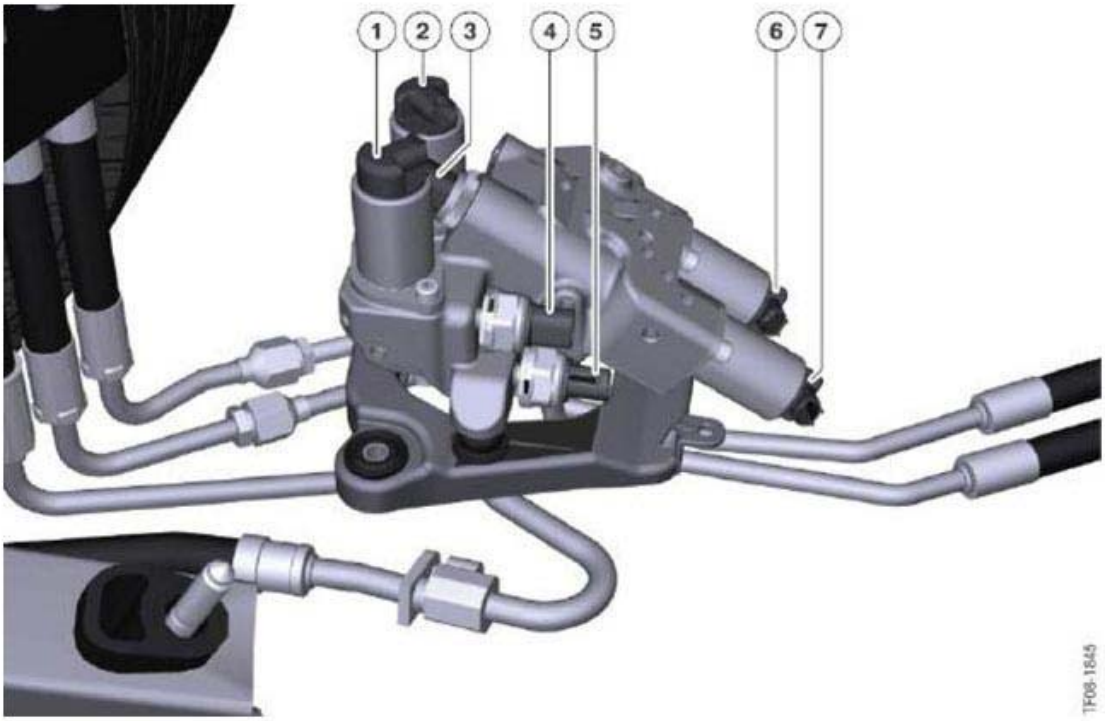


Fig. 121: Identifying ARS Hydraulic Valve Manifold Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Front-axle pressure valve [PVV]
2	Rear-axle pressure valve [PVH]
3	Switch-position detector [SSE]
4	Front-axle pressure sensor [DSV]
5	Rear-axle pressure sensor [DSH]
6	Failsafe valve [FS]
7	Direction valve [RV]

The hydraulic valve block is located on the floor plate of the vehicle behind the front right-hand wheel housing level with the front right-hand door. The hydraulic valve block is connected to a carrier plate bolted to the body. The hydraulic valve block houses the following valves and sensors:

- 2 pressure valves; 1 for the front suspension and 1 for the rear suspension [these are proportional pressure limiting valves]
- 1 directional control valve

- 1 failsafe valve
- 2 pressure sensors; 1 sensor for the front suspension, 1 sensor for the rear suspension
- Switch-position detector

Tandem Pump



Fig. 122: Identifying Tandem Pump Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Radial piston pump (ARS)
2	Intake restrictor valve
3	Electronic volumetric flow control (EVV) valve
4	Vane pump (power steering)

The hydraulic pumps fitted in this model series were based on a modular design principle. Depending on the engine and equipment specification, a suitably dimensioned hydraulic pump is flange-mounted to the engine in the same installation space.

Decisive equipment features for these tandem pumps:

- Basic steering
- Integrated Active Steering (IAL)
- CO2 reduction measures
- Dynamic Drive (ARS)
- Dynamic Drive (ARS) and Integrated Active Steering (IAL)
- Intake restrictor valve

The hydraulic pump driven by the engine's poly-V belt is, on vehicles with Dynamic Drive, invariably a tandem pump, which consists of a radial-piston pump section for ARS and a vane pump section for the power steering.

Radial-piston pump section of the tandem pump

This radial piston pump has 8 pistons in a single row and is designed for a maximum pressure of 210 bar.

When the engine is idling, the pump speed is approximately 750 RPM. At that speed, the radial piston pump section delivers a minimum fluid flow rate of approximately 5.5 l/min at a pressure of approximately 3 bar. Consequently an adequate fluid flow rate is guaranteed even at idling speed.

At a pump speed of 1450 RPM, the maximum fluid flow rate is limited to approximately 9 l/min.

New feature

As a CO2 reduction measure when driving in a straight line, the fluid flow rate of the radial piston pump is restricted by a restrictor valve on the intake side, thereby substantially reducing the circulation pressure and, therefore, the engine power used to drive the pump. As a result, active control of the intake restrictor valve makes a positive contribution to the CO2 equation.

The Dynamic Drive and hydraulic power steering share a common fluid reservoir and fluid cooler.

VERTICAL DYNAMICS CONTROL

General Information

When driven vigorously or on an uneven road surface, a vehicle tends to respond with undesirable body movements. BMW first developed Vertical Dynamics Control for the E70 and was able to effectively reduce such body motion as a result.

VDC improves the following driver-perception related vehicle characteristics according to road surface conditions:

- Body-related ride comfort (primary ride comfort)
- Roadwheel-related ride comfort (secondary ride comfort)
- Dynamic handling (transitional response, agility) even with more comfortable suspension setting.

BMW is the first manufacturer to offer a damper adjustment system that is continuously controllable independently of damper compression/extension as is the case with the VDC (2) on the F01/F02.

The essential improvements compared with VDC (1) are:

- 1 EDC control valve for damper extension control
- 1 EDC control valve for damper compression control
- "Pre-opening adjustment" for improved body stabilization (has adjustment effect even at low damper rates)
- Driver-perceptible broad spread in conjunction with the handling setting switch (difference between soft and hard characteristics)
- Separately adjustable characteristic for roadwheel-related ride comfort (extension characteristic independent of compression characteristic)

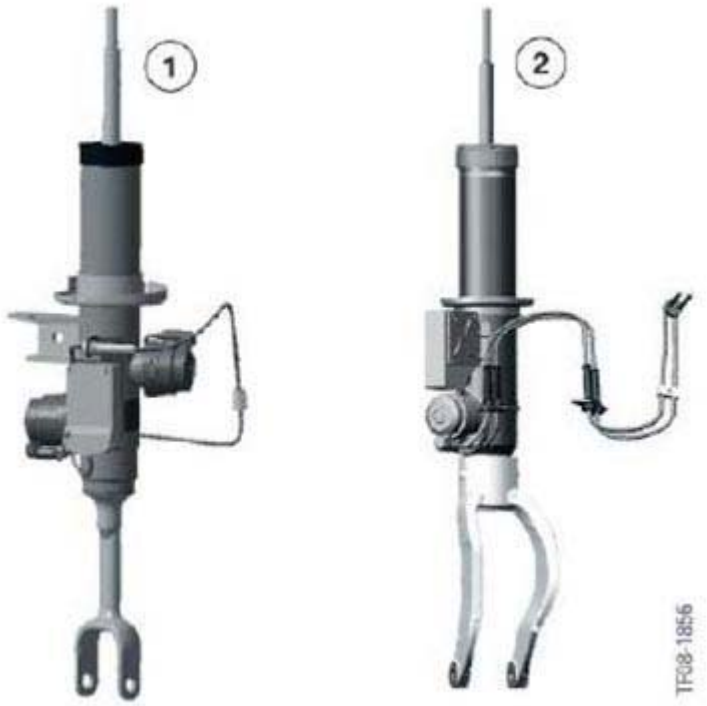


Fig. 123: Identifying VDC Front Dampers
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Front damper, VDC 2

2	Front damper, VDC 1

VDC DAMPER REFERENCE CHART

	VDC 1	VDC 2
Model	On E70/E71 included in Adaptive Drive Equipment package	Standard equipment in F01/F02
Program selection	Sport button next to gear selector	Handling setting switch next to gear selector
Program type	Sport/Comfort	Coordinated integration in all dynamic handling control functions
Control unit	VDM control module, right rear of luggage compartment 4 EDC satellite control modules directly on damper units	VDM control module, front right A-pillar 4 EDC satellite control modules directly on damper units
Damper	Twin tube, gas filled shock absorbers	Twin tube, gas filled shock absorbers
Fault diagnosis	VDM and EDC satellite control modules fully diagnosable	VDM and EDC satellite control modules fully diagnosable
Programming	VDM and EDC satellite control modules flash-programmable	VDM and EDC satellite control modules flash-programmable
Coding	VDM and EDC satellite control modules codable	VDM and EDC satellite control modules codable
Malfunction display	Messages in the Control Display or instrument cluster	Messages in the Control Display or instrument cluster
Testing	BMW diagnostic systems	BMW diagnostic systems

Signal Processing

- The vertical movement of the wheels is detected by the wheel-acceleration sensors integrated in the EDC satellite control units
- From the wheel acceleration rates and the ride height signals (FlexRay bus) the vehicle body motion is calculated
- In addition, signals such as the vehicle road speed are read from the FlexRay bus for the purpose of determining required damping forces.

Signal processing/VDC (2) controller

Individual damping forces are calculated for each individual wheel according to the vehicle body motion, the wheel motion and the additional signals read from the FlexRay bus, and are sent every 2.5 ms to the EDC satellite control units.

Damping Force Adjustment

- Stored on each EDC satellite control module is the actual individual damper characteristic, making it

possible to minimize differences from the specified characteristic arising from manufacturing tolerances

- From the specified damping force and the damper characteristic data map, the EDC satellite control units calculate the required current to be applied to the damper extension valve and compression valve

VERTICAL DYNAMICS CONTROL (VDC)

Control Unit

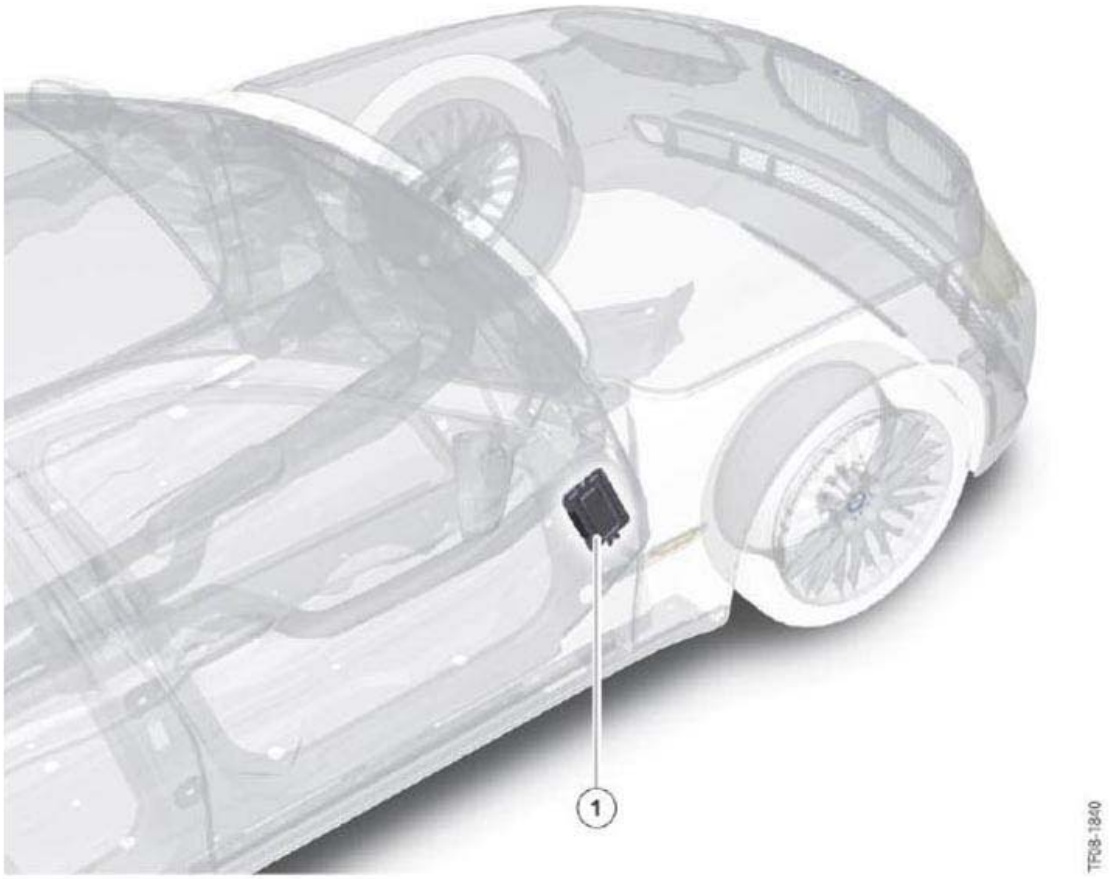


Fig. 124: Identifying VDM
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	VDM

The location of the VDM control unit is dependent on the country in which the vehicle is sold.

- On left-hand drive vehicles the control unit is fitted inside the passenger compartment near the right A-pillar (as illustrated)
- On right-hand drive vehicles the control unit is fitted inside the passenger compartment near the left A-pillar

There are two different versions of the VDM control unit according to the equipment options fitted on the vehicle.

- The basic version of the VDM control unit is used if the vehicle has only the standard VDC equipment
- The high-speed version of the VDM control unit is used if, as well as the standard VDC system, the vehicle also has ARS Active Roll Stabilization (Dynamic Drive). In that case, the output stages for controlling the ARS valve manifold are also integrated in the VDM control unit.

EDC Satellite Control Unit with Damper

The VDC dampers on the rear suspension are either steel-spring or air-spring versions depending on the optional equipment fitted.

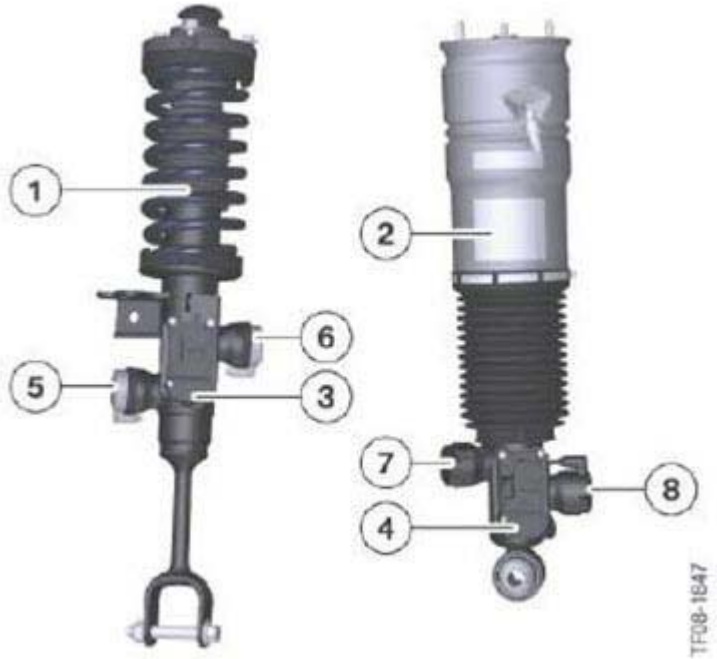


Fig. 125: Identifying EDC Satellite Control Module And VDC Damper
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	VDC damper with steel spring
2	VDC damper with air spring
3	Front EDC satellite control module
4	Rear EDC satellite control module
5	EDC data-map valve for compression control
6	EDC data-map valve for extension control
7	EDC data-map valve for extension control
8	EDC data-map valve for compression control

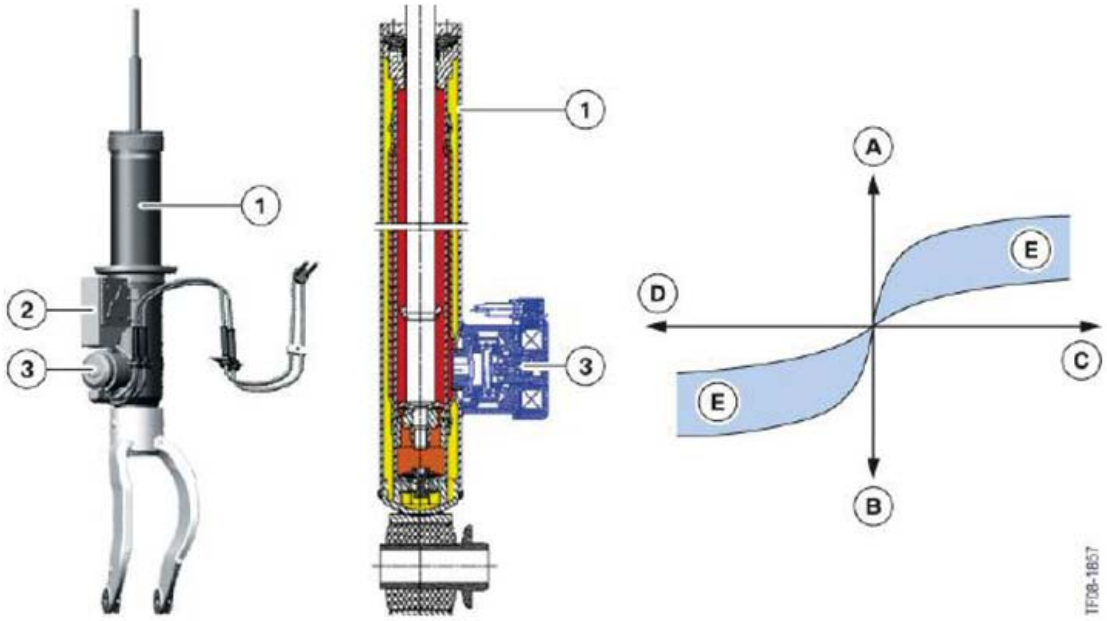


Fig. 126: Identifying EDC Satellite Control Unit And Damper Tube
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Damper tube
2	EDC satellite control unit
3	EDC data-map valve for extension and compression control
A	FE = Extension force
B	FC = Compression force
C	VE = Extension velocity
D	VC = Compression velocity
E	Extension and compression characteristic data map

Difference between a VDC (1) and a VDC (2) damper:

A VDC (1) damper with only one EDC data map valve uses combined extension/compression adjustment which has to be cycled extremely rapidly.

With this type of control, the damper adjustment is based on wheel frequency.

The wheel frequency is the frequency at which the wheel oscillates along the z-axis.

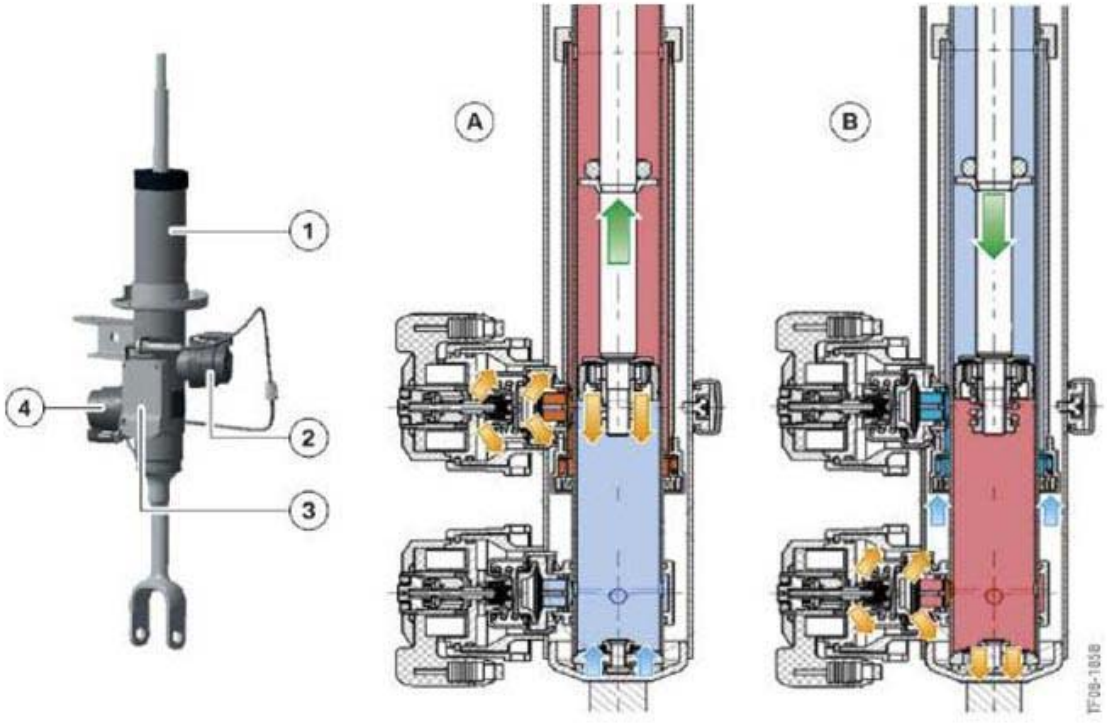


Fig. 127: VDC Damper Fluid Flow Diagram With EDC Data-Map Valves
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Extension progression
B	Compression progression
1	Damper tube
2	EDC data-map valve for extension
3	EDC satellite control unit
4	EDC data-map valve for compression

A VDC (2) damper with two EDC data-map valves uses independent extension/compression adjustment which does not demand such a high cycling rate.

With this type of control, the damper adjustment can be based on body frequency.

The body frequency is the frequency at which the body oscillates along the z-axis.

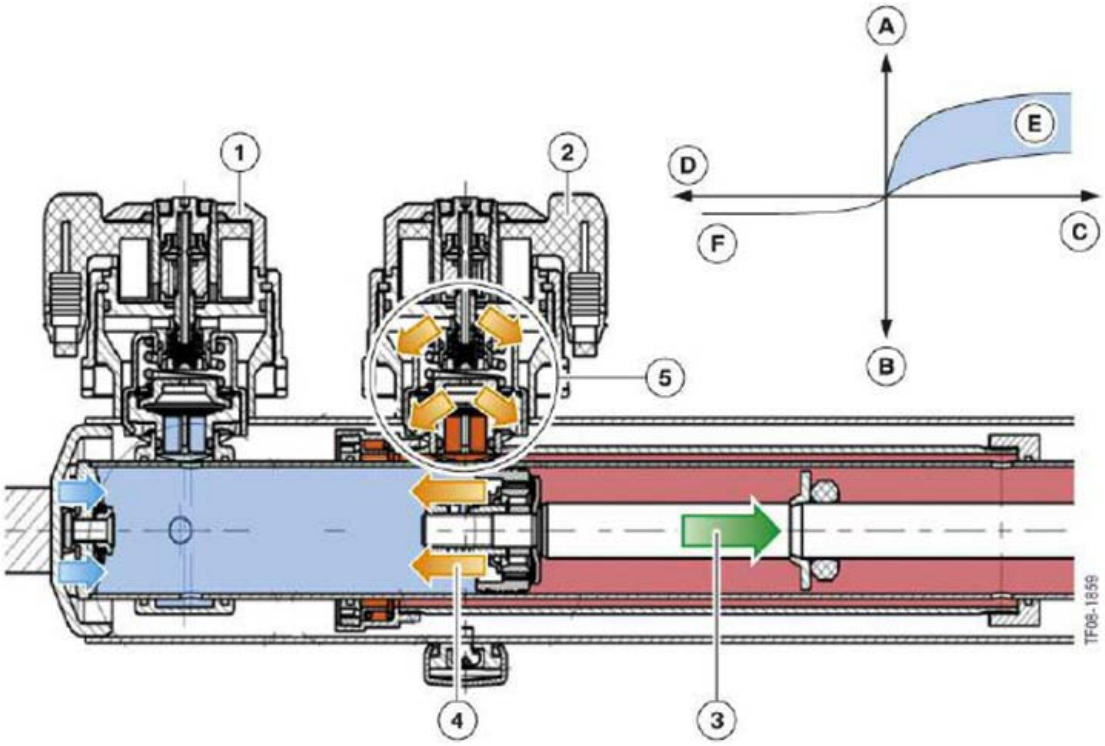


Fig. 128: EDC Satellite Control Unit Fluid Flow Diagram During Extension
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	EDC data-map valve for compression
2	EDC data-map valve for extension
3	Force/direction of piston rod movement
4	Fluid medium
5	Data-map control
A	FE = Extension force
B	FC = Compression force
C	VE = Extension velocity
D	VC = Compression velocity
E	Extension data map
F	Compression data map

The two EDC data-map valves firstly enable independent extension control and, therefore, data-map compatible design, and secondly independent compression control and, therefore, data-map compatible design.

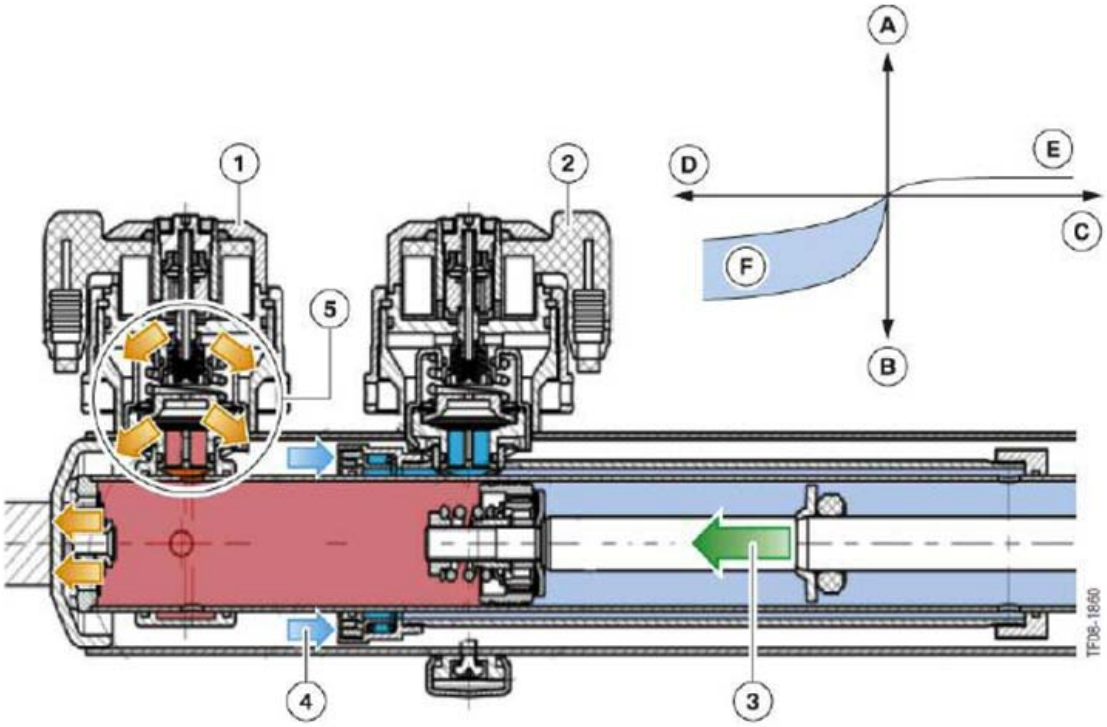


Fig. 129: EDC Satellite Control Unit Fluid Flow Diagram During Compression
Courtesy of BMW OF NORTH AMERICA, INC.

Control strategy

The fundamental control principle is known as the "Skyhook system", the name of which reveals the primary control objective of holding the vehicle stationary in a vertical direction regardless of driving situation as if suspended from a "hook in the sky".

To achieve this highest of all comfort objectives, the movements of the entire body have to be evaluated. Thus an overall analysis is performed of the ride height data and z-axis acceleration rates.

Furthermore, VDC regulation takes into consideration steering inputs (e. g. transition from straight-ahead travel to cornering) based on the steering angle curve. If VDC detects a rapid increase in the steering angle, the controller infers that the vehicle is entering a bend and can preventively adjust the dampers on the outside of the bend to a harder setting in advance. Thus VDC assists the ARS system, if fitted, and contributes to reducing vehicle roll (roll tendency).

Moreover, VDC is able to detect the braking operations by the driver based on the brake pressure information supplied by DSC. A high brake pressure normally results in pitching of the vehicle body; VDC counteracts that effect by setting the front dampers to higher damping forces. This also results in an improvement in the front/rear brake force distribution, which in turn reduces the braking distance (by comparison with a vehicle without VDC).

On the E70/E71 with VDC (1), the "Sport" button for switching between comfort and sports setting only affected the VDC characteristics.

With the introduction of the handling setting switch, the VDC setting is incorporated in a number of modes which bring about a coordinated overall setting across all systems.

Ride-height Sensor



Fig. 130: Identifying Ride-Height Sensor Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Electrical connector
2	Sensor housing
3	Lever

The angle of a pivoting lever is converted into a voltage signal by the ride height sensor. The greater the angle (relative to a defined starting or zero position), the greater is the output voltage. It is generated by a Hall-effect sensor element.

Designs

There are always four ride-height sensors fitted on all F01/F02 models.

The ride-height sensors fitted all operate according to the same principle but there are different designs (different part numbers). The reason for the differences are the available space and the starting position (zero position) of the individual ride-height sensors.

Depending on whether or not the vehicle is fitted with Electronic Height Control (EHC), double or single ride-height sensors are fitted on the rear suspension.

On the front suspension, single ride-height sensors are always used.

FRONT AND REAR SUSPENSION DESIGNS

	Front suspension	Rear suspension
EHC, not fitted	Single RHS	Single
EHC, fitted	Single RHS	Double

RHS = Ride-height sensor

ELECTRONIC RIDE-HEIGHT CONTROL

Function of Air Springs

The various control modes on the F01/F02 are similar to those on other model series such as the E70:

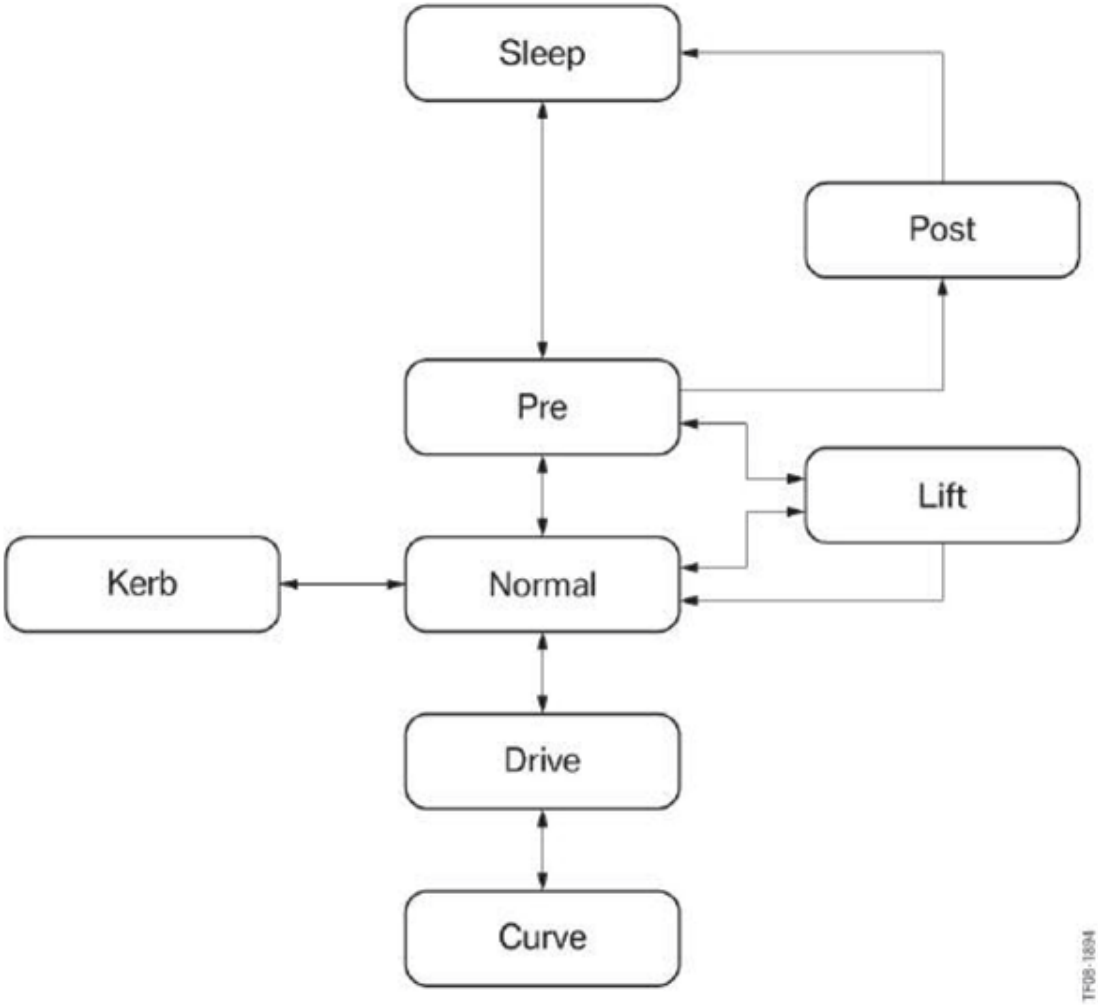


Fig. 131: EHC Control Mode Flowchart, F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

Control Modes with Single-axle Air Suspension

Ongoing control operations are not affected by transitions from one mode to another. However, in the case of load cutout OFF (VA_AUS), control operations are always concluded in order to safeguard system deactivation. The EHC control unit then sets Sleep mode.

IMPORTANT: All technical data quoted are code-specified as at SOP.

Sleep Mode

The vehicle is in Sleep mode at the latest by the time it has been parked for longer than a few minutes without a door or hood/trunk lid being operated or the terminal status changing. This is the initial state of the control system. No control function is performed in Sleep mode. The control system goes into Pre-mode when a wake-up signal is received by the EHC control unit.

Post-mode

Post-mode is activated in order to compensate for any inclination or to adjust the ride height after driving and between the Pre-mode and Sleep mode.

Duration of Post-mode is limited to approximately 1 minute. This mode is only executed if the engine has been running before the system switches into this mode. If the engine has not been running, the system switches directly from Pre-mode to Sleep mode.

Control adjustments are made within a tight tolerance band using the following coding parameters:

POST MODE CODING PARAMETER

Coding parameter	Value
niv_post_up_e	- 59 mm
niv_post_up_d	- 07 mm
niv_post_down_e	+ 06 mm
niv_post_down	+ 04 mm

The fast signal filter is used.

In the event of an inclination (Kerb mode), the control operation takes place for the nominal heights applicable in this situation.

Pre-mode

Pre-mode is activated by the "Load cutout OFF" signal (e. g. in response to opening of the door or unlocking with the radio remote control). The Pre-mode then stays set for 16 minutes and is restarted with a change in status.

The ride height of the vehicle is monitored and evaluated with a wide tolerance band.

In Pre-mode, the vehicle is only controlled up to the nominal height if the level is significantly below the nominal height. This control tolerance ensures that the vehicle is only controlled up in the case of large loads in order to increase the ground clearance prior to departure. Small loads give rise to small compression travel and this is compensated only when the engine is started. This control setting helps to reduce the battery load.

PRE MODE CODING PARAMETERS

Coding parameter	Value
niv_pre_up_e	- 09 mm
niv_pre_up_d	- 07 mm
niv_pre_down_e	+ 09 mm
niv_pre_down_d	+ 07 mm
niv_pre_mw_up	- 59 mm(1)
niv_pre_mw_down	0 mm
pre_delay_counter	20 min
(1) Average figure	

With single-axle air suspension, the vehicle is controlled down when the mean value of both ride height signals is > 0 mm and one side is in excess of + 10 mm.

In this mode, only the mean value of the two ride height signals (fast filter) is considered when deciding whether there is a need for a control operation.

There is no inclination detection in Pre-mode.

Normal Mode

Normal mode is the starting point for the vehicle's normal operating state. It is obtained by way of the "Engine running" signal.

Levelling is possible. The compressor starts up as required.

NORMAL MODE CODING PARAMETER

Coding parameter	Value
niv_normal_up_e	- 09 mm
niv_normal_up_d	- 07 mm
niv_normal_down_e	+ 09 mm
niv_normal_down_d	+ 07 mm

A narrower tolerance band than that in Pre-mode can be used because the battery capacity does not have to be protected. The fast filter is used with a narrow tolerance band of ± 10 mm. In this way, ride level compensation takes place outside a narrow tolerance band of ± 10 mm. The faster filter allows the system to respond immediately to changes in ride level. Evaluation and control are performed separately for each wheel.

When a speed signal is detected, the EHC control unit switches into Drive mode. When the vehicle is stopped,

the EHC control unit remains in Drive mode. The system switches back into Normal mode only when a door or the luggage compartment lid is also opened. If none of the doors or the luggage compartment lid is opened, the vehicle logically cannot be loaded or unloaded.

This prevents a control operation happening when the vehicle is, for example, stopped at traffic lights and the ride height is above the mean value due to a possible pitching motion at the rear axle.

Drive Mode

Drive mode for the single-axle air suspension is activated when a speed of > 1 km/h is detected.

DRIVE MODE CODING PARAMETERS

Coding parameter	Value
niv_drive_up_e	- 07 mm
niv_drive_up_d	- 05 mm
niv_drive_down_e	+ 09 mm
niv_drive_down_d	+ 07 mm

Low-pass filters are used. In this way, only changes in ride height over a prolonged period of time (1000 seconds) are corrected. These are merely the changes in ride height, caused by vehicle compression and a reduction in vehicle mass due to fuel consumption. The high-pass filter (fast filter) is used during the control operation. The slow filters are reinitialized at the end of the control operation. The markedly dynamic height signals caused by uneven road surfaces are filtered out.

Kerb (curb)

KERB MODE CODING PARAMETERS

Coding parameter	Value
niv_delta_kerb_e	28 mm
niv_delta_kerb_d	24 mm
kerb_delay	<1s

The Kerb mode prevents the inclination caused by the vehicle mounting an obstacle with only one wheel from being compensated. Compensation would cause a renewed inclination of the vehicle and result in a renewed control operation after the wheel came off the obstacle.

Kerb mode is activated if the difference in height between the left and right-hand side of the vehicle is > 24 mm and is present for longer than 0.9 seconds. No speed signal may be present for this mode to be set. The system switches from single-wheel control to axle control.

Kerb mode is quit if the difference between the left and right-hand side of the vehicle is < 28 mm and this difference remains for longer than 0.9 seconds or if the speed is > 1 km/h.

If the system switches from Kerb mode to Sleep mode, this status is stored in the EEP-ROM.

If the vehicle is being loaded or unloaded in Kerb mode, the EHC control unit calculates the mean value for the

axle from the changes in ride height determined from the spring travel on the right and left-hand side.

A change in ride level is initiated if the mean value of compression or rebound at the axle is outside the tolerance band of ± 10 mm. The left and right sides of the vehicle are raised or lowered in parallel. The height difference between the two sides is maintained.

Curve

Since rolling motions have a direct impact on the measured ride levels, an unwanted control operation would be initiated during longer instances of cornering with an appropriate roll angle in spite of the slow filtering of the Drive mode. The control operations during cornering would cause displacement of the air volume from the outer side to the inner side of the curve. Once the curve is completed, this would produce an inclination which would result in a further control operation. Curve mode prevents that adjustment by stopping slow filtering when cornering is detected and cancelling any adjustment that may have been started.

Curve mode is activated upwards a lateral acceleration of > 2 m/s2 and deactivated at < 1.0 m/s2. The lateral acceleration is recorded by the DSC sensor.

Substitute conditions:

CURVE MODE CODING PARAMETERS

Coding parameter	Value
time_curve_exit	252 s
niv_delta_curve_e	20 mm
niv_delta_curve_d	16 mm
speed_curve	50 km/h (31 mph)

Lift

The Lift mode is used to prevent control operations when a wheel is changed or during work on the vehicle while it is on a lifting platform.

LIFT MODE CODING PARAMETERS

Coding parameter	Value
niv_lift_up	60 mm
niv_lift_down	Unlimited
kerb_delay	<1s
time_ex_liftdetect	approximately 40 s
speed_lift_exit2	3 km/h

This mode is detected when the permitted rebound travel at one or more wheels is exceeded > 55 mm. A jacking situation is also detected and the ride height stored if the lowering speed drops below the level of 2 mm/s for 1 second.

If the vehicle is raised only slightly and the permitted rebound travel has not yet been reached, the control

operation attempts to readjust the ride height. If the vehicle is not lowered, a car jack situation is recognized after a specific period of time and this ride height is stored.

A reset is performed if the vehicle is again 10 mm below this stored ride height.

Special Modes (Transport, Belt)

Transport mode is set and cancelled by means of diagnostics control. It serves to increase the ground clearance in order to ensure safe transportation of vehicles on transporter trucks. The nominal height of the vehicle is raised in this mode by 30 mm.

When Transport mode is activated, the air suspension symbol is lit on the variable indicator lamp on the instrument cluster and a message is shown on the Check Control display to alert the driver to this special mode.

Control operations do not take place in this mode because the vehicle mass does not change during transportation.

Belt mode is set during assembly in the works to prevent control operations.

When Belt mode is activated, the air suspension symbol is lit in the variable indicator lamp in the instrument cluster and a message is output in the Check Control display to alert the driver to this special mode.

Production-line mode is cleared by means of diagnostics control only. The Belt mode can no longer be set.

New EHC control units (spare part) are supplied with Belt mode set.

Control operations are not performed, the safety concept only operates with limited effect.

CONTROL MODES REFERENCE CHART

Control modes	Single-axle air suspension
Sleep	No control, load cutout on
Post	Approximately 1 minute fast filter 2 s, very narrow tolerance band -59 mm/-07 mm, control ends at +06/+04 mm
Pre	Approximately 16 minutes fast filter 2 s, wide tolerance band adjusted up at -09 mm, adjusted down at mean value (-59 mm) +09 mm and one side > 10 mm
Normal	Engine running: fast filter 2 s, narrow tolerance band -09 mm/+09 mm
Drive	v > 1 km/h, slow filter 1000 s, narrow tolerance band -07 mm/+07 mm
Kerb	**ON when:** difference between left and right-hand sides of vehicle > 24 mm, longer than 0.9 s changeover from single-wheel control to two-wheel control

	OFF when: difference between left and right-hand sides of vehicle < 28 mm, t = 0.9 s or v > 1 km/h
Curve	**ON when:** lateral acceleration > 2 m/s2 **OFF when:** lateral acceleration < 1.0 m/s2
Lift	**ON when:** rebound travel > 60 mm at one or more wheels **Jack on at:** lowering speed drops below 2 mm/s for 1 s, ride height stored **OFF when:** level change < -10 mm, ride height drops below stored setting by more than 10 mm

Method of Operation

Initialization/reset behavior

Different checks and initialization are carried out when the EHC control unit is powered up after a reset (triggered by an undervoltage or also by load cutout off VA_AUS).

The system is only enabled after the tests have been successfully completed and starts to execute the control programs on a cyclical basis. Occurring faults are stored and displayed.

Control sequence

In an ongoing control operation, the high-pass filter (fast filter) is always used to prevent the controlled height from overshooting the specified setting.

If a low-pass filter (slow filter) were used to calculate the ride height, brief changes of ride height would be "absorbed".

The low-pass filter is used when the vehicle is in motion (see **NORMAL MODE**) to filter out vibrations induced by prevailing road conditions on this basis of this method of filtering.

The high-pass filter is used to respond quickly to ride level deviations from setpoint. These take place while the vehicle is stationary in the event of large load changes (see **PRE-MODE**).

Both sides of the vehicle are controlled individually, i. e. even the setpoint/actual-value comparison for both sides is carried out individually.

Exception: check for falling below the minimum height in Pre-mode and Kerb mode. The left/right mean values are taken into consideration here. The following stipulations are applicable here:

- Raising or lowering
- All valves controlled with control in the same direction
- Individual wheel deactivation

To ensure reliable closing of the non-return valve in the air drier, the exhaust valve is operated briefly for 200

ms by the EHC control unit after each control sequence.

The permissible ON period is monitored while performing upward adjustment operations.

Safety concept

The safety concept is intended to inhibit any system malfunction, particularly unintentional control operations, through the monitoring of signals and function-relevant parameters.

If faults are detected, the system is switched over or shut down depending on the components concerned. The driver is informed of any faults by the display, and detected faults are stored for diagnostic purposes.

In order to ensure high system availability, existing faults, as far as possible, are cleared with terminal 15 ON.

This is done by resetting the logistics counter to zero. However, the fault memory content in the EEPROM is retained and can be read out for diagnostic purposes. The system is then operational again. Fast fault detection means that existing faults are detected before control operations can take place.

Only lowering is permitted if:

- the power supply voltage drops below the permissible minimum of 9 volts.
- the permissible compressor duty periods, and therefore compressor temperatures, based on a temperature duty period algorithm* are exceeded.

A reset is carried out if the voltage is within the required range of 9 to 16 volts or after expiry of the compressor pause period of approximately 100 seconds.<

Only raising is permitted if:

- The permissible control down period of 40 seconds is exceeded.
- The reset takes place the next time the vehicle is driven or after the next control-up procedure.

No control if:

- The permissible supply voltage of 16 volts is exceeded.

The reset takes place as soon as the voltage is within the required range.

*** Temperature duty period algorithm:**

In order to prevent overheating problems when the compressor is running or when outside temperatures are very high, a temperature duty period algorithm has been implemented.

T_{Start} (starting temperature) is assumed from the coil resistance of the exhaust valve and the theoretical temperature change is calculated on the basis of the change in coil resistance.

ELECTRONIC RIDE-HEIGHT CONTROL (EHC)

Control Unit

The EHC control unit is located in a module carrier in the rear of the luggage compartment on the right-hand side.



Fig. 132: Identifying Air Supply (LVA) And EHC Control Module On Mounting Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Air supply (LVA)
2	EHC control module on mounting bracket

The EHC control unit is fully compatible with diagnostics.

The EHC control unit receives the following signals:

- Vehicle ride height
- Load cutout signals
- Terminal 15 ON/OFF
- Vehicle speed
- Lateral acceleration
- "Engine running" signal
- Hatch status.

The EHC control unit decides on a case-by case basis whether a control operation is required in order to compensate for changes in load.

It is thus possible to optimally adapt the frequency, specified heights, tolerance thresholds and battery load to the relevant situation by means of the control operation.

Air Supply Unit (LVA)

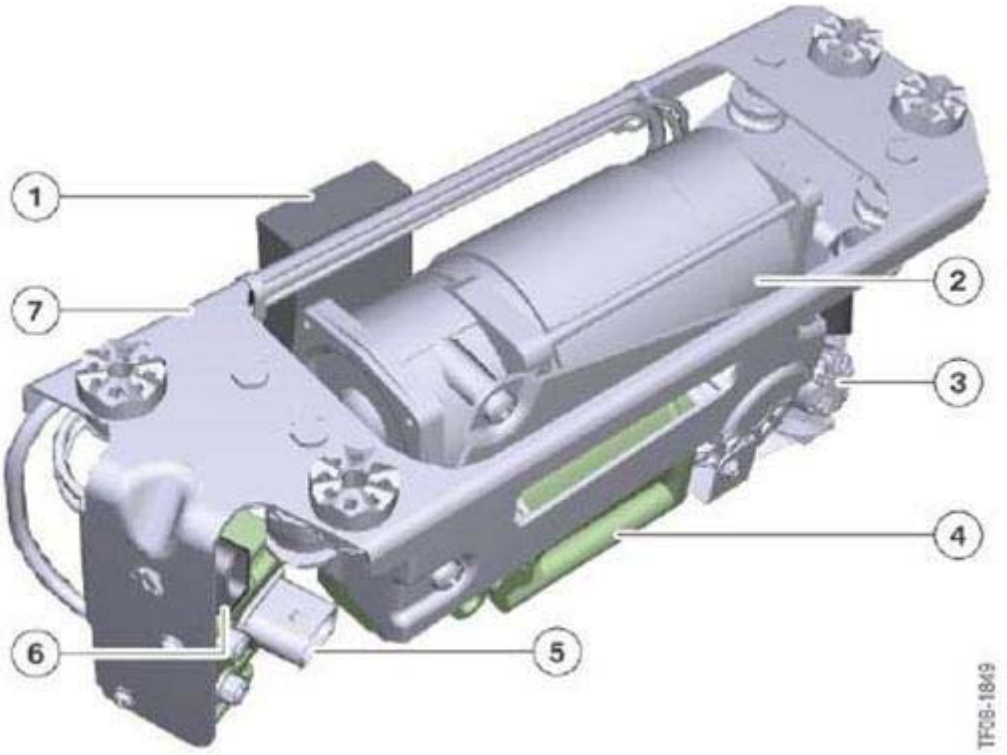


Fig. 133: Identifying Air Supply Unit Components, Top View
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Compressor relay
2	Electric motor
3	Air exhaust silencer
4	Air drier
5	Electrical connector, 3-pin, for valve manifold
6	Electrical connector, 2-pin, for electric motor
7	Component carrier

The air supply unit is mounted at the rear of the vehicle on the trunk floor.

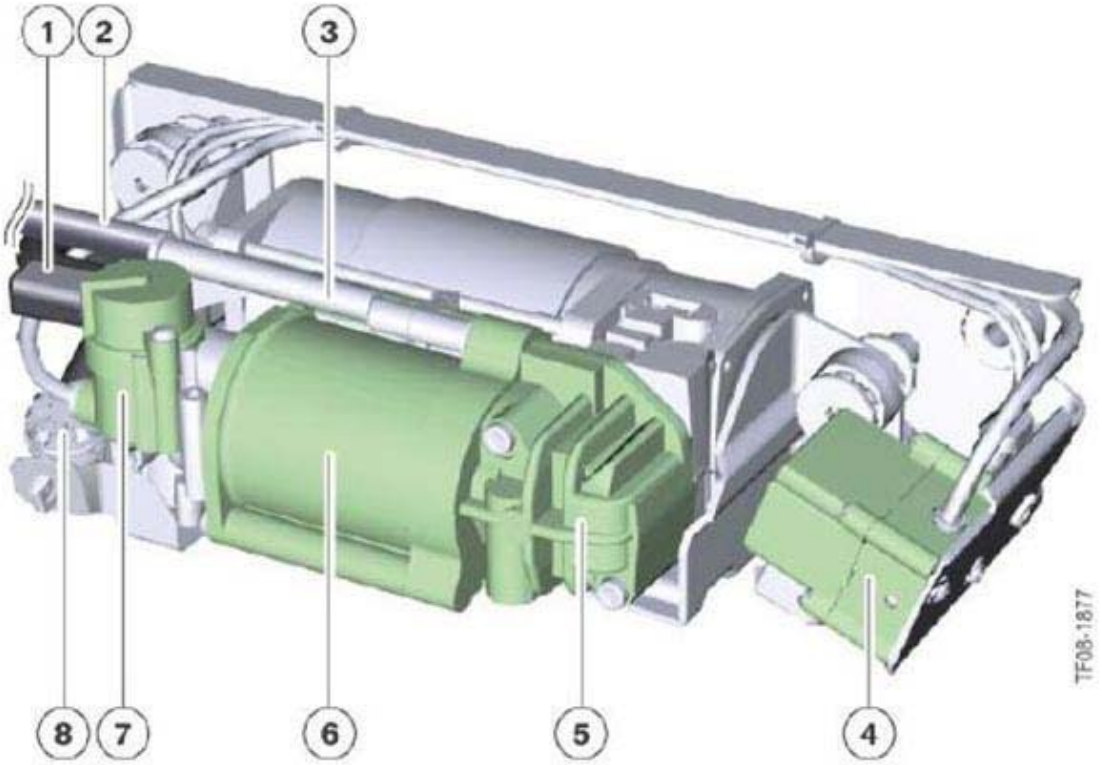


Fig. 134: Identifying Air Supply Unit Components, Bottom View
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Electrical connector, 2-pin, for exhaust valve
2	Air intake line to left rear light unit
3	Air intake
4	Valve block
5	Compressor
6	Air drier
7	Air exhaust valve
8	Air exhaust silencer

Air Suspension



Fig. 135: Identifying Air Suspension Components
Courtesy of BMW OF NORTH AMERICA, INC.

AIR SUSPENSION SYSTEM COMPONENT REFERENCE CHART

Index	Explanation
1	Left air spring strut
2	Right air spring strut
3	EHC control unit
4	Air supply unit
5	Compressor relay

Ride-height Sensor



Fig. 136: Identifying Ride-Height Sensor Components
Courtesy of BMW OF NORTH AMERICA, INC.

RIDE-HEIGHT SENSOR COMPONENT REFERENCE CHART

Index	Explanation
1	Electrical connector
2	Sensor housing
3	Lever

The angle of a pivoting lever is converted into a voltage signal by the ride height sensor. The greater the angle (relative to a defined starting or zero position), the greater is the output voltage. It is generated by a Hall-effect sensor element.

Designs

There are always four ride-height sensors fitted on all F01/F02 models.

The ride-height sensors fitted all operate according to the same principle but there are different designs (different part numbers). The reason for the differences are the available space and the starting position (zero position) of the individual ride-height sensors.

Depending on whether or not the vehicle is fitted with Electronic Height Control (EHC), double or single ride-height sensors are fitted on the rear suspension.

On the front suspension, single ride-height sensors are always used.

FRONT AND REAR SUSPENSION DESIGN

	Front suspension	Rear suspension

EHC, not fitted	Single RHS	Single
EHC, fitted	Single RHS	Double

F01 CRUISE CONTROL SYSTEMS

INTRODUCTION

Trusted Driver Assistance Systems

BMW has long since offered a comprehensive range of driver assistance systems. These make it easier for the driver to control the vehicle, by

- providing the driver with information,
- prompting the driver how to act or
- actively intervening in the way the vehicle is driven.

The systems presented have, for the most part, already been tried and tested in BMW vehicles for many years. These include:

- Cruise control with braking function
- Active Cruise Control with Stop&Go function
- Adaptive Brake Assistant with warning function.

The F01/F02 will, see refinements and enhancements to improve customer benefits further still.

Standard and Optional Equipment

The following table is a comparison of standard equipment and options available for driver assistance systems. This comparison is between the E65 and F01:

DRIVER ASSISTANCE SYSTEM STANDARD AND OPTIONAL EQUIPMENT REFERENCE CHART

System	E65		F01	
	Std.	Optional	Std.	Optional
Higher level Integrated Chassis Management			•	
Driver Assistance Systems				
Cruise control (FGR)	•			
Cruise control with braking function (Dynamic Cruise Control - DCC)			•	

Active Cruise Control		•		
Active Cruise Control with Stop and Go				•
Adaptive Brake Assistant with warning function				•
Active Blind Spot Detection (Lane Change Warning)				•

In the F01/F02, "Dynamic Cruise Control" (DCC) supersedes the cruise control (FGR) function available as standard in the E65.

The optional extra "Active Cruise Control with Stop&Go function" (ACC Stop&Go) provides optimum assistance to the driver not only in smoothly flowing traffic but also in traffic jam situations. Both systems are based on the new architecture of the Integrated Chassis Management (ICM).

The primary aim of both items of optional equipment, ACC and ACC Stop&Go, is to relax the driver and, therefore, to make an improvement to the comfort/convenience area of the vehicle.

To assist the driver in panic braking situations as well, each of these items of optional equipment has been enhanced by the Adaptive Brake Assistant function. This safety function, which was first available in the E6x LCI, has been supplemented by a new warning function in the F01/F02. It alerts the driver to a risk of collision detected by the long-range radar sensor. This enables the driver to intervene even faster and, potentially, to avoid an accident.

SYSTEM OVERVIEW

Components in the Vehicle

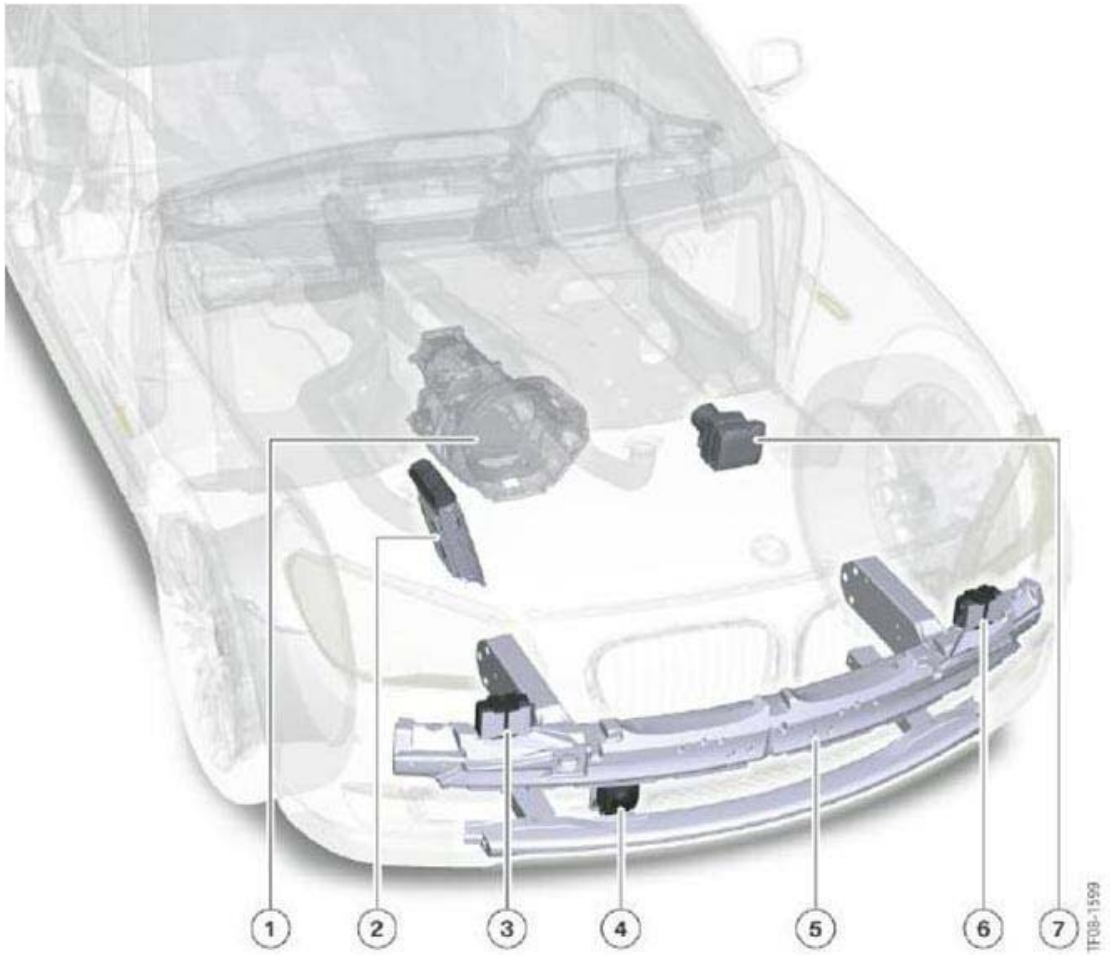


Fig. 137: Identifying DCC, ACC Stop & Go Components, F01/F02 (View From Front)
Courtesy of BMW OF NORTH AMERICA, INC.

DCC/ACC STOP AND GO SYSTEM COMPONENTS REFERENCE CHART

Index	Explanation
1	Electronic transmission control module
2	Engine control system
3	Short-range radar sensor (SRR), right
4	Long-range radar sensor (LRR)
5	Bumper cross-member
6	Short-range radar sensor (SRR), left
7	Dynamic Stability Control

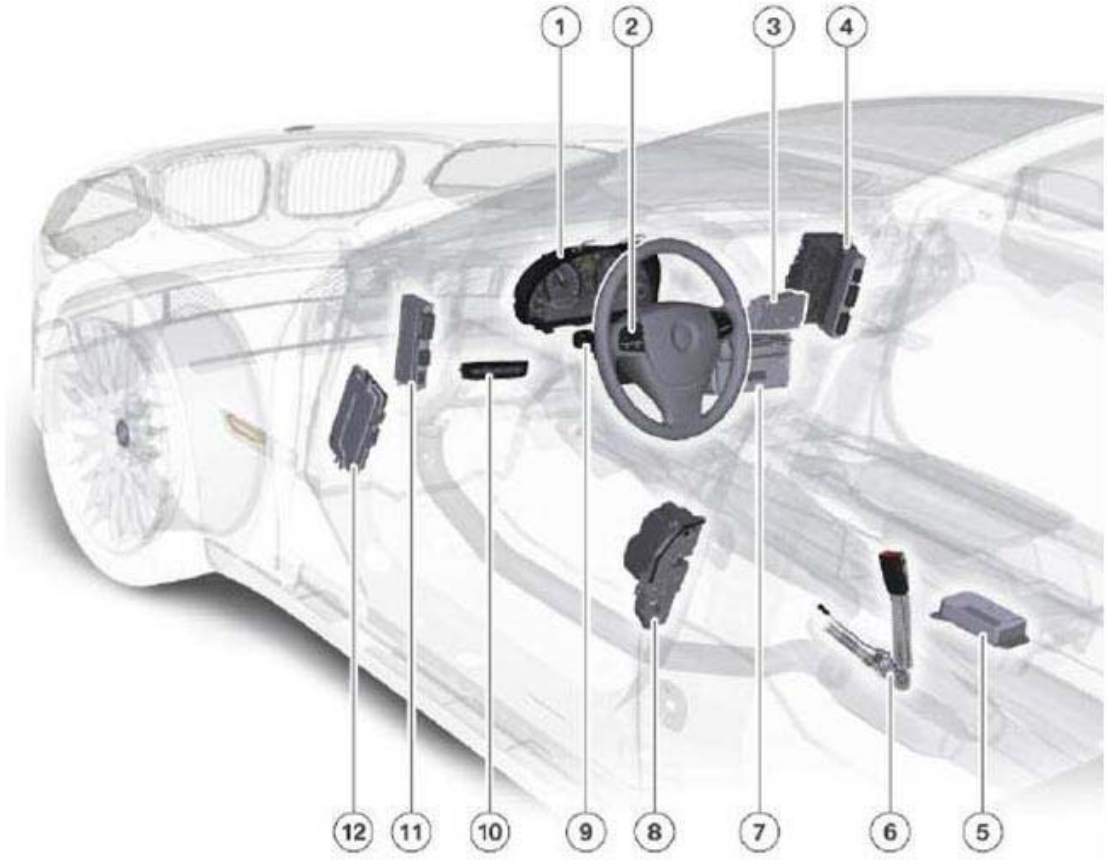


Fig. 138: Identifying DCC, ACC Stop & Go Components, F01/F02 (Side View)
Courtesy of BMW OF NORTH AMERICA, INC.

DCC/ACC STOP AND GO SYSTEM COMPONENTS REFERENCE CHART

Index	Explanation
1	Instrument cluster
2	Multifunction steering wheel button pad
3	Crash safety module
4	Front fuse carrier, junction box electronics
5	Control unit for Integrated Chassis Management
6	Seat belt buckle contact, driver's seat
7	Car Information Computer
8	Door switch, driver's door
9	Steering column switch cluster with steering angle sensor
10	Driver assistance systems operating unit
11	Central gateway module
12	Footwell module

Bus System Overview

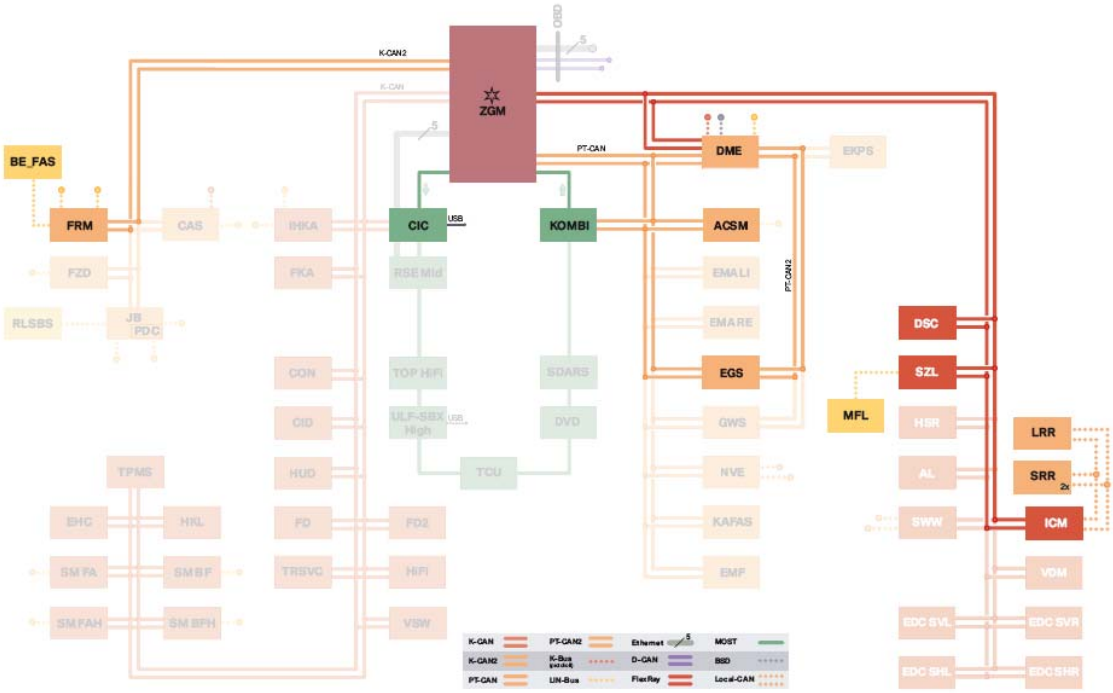


Fig. 139: Overview Of Bus System
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
ACSM	Crash safety module
BE_FAS	Driver assistance systems operating unit
CIC	Car Information Computer
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
EGS	Electronic transmission control unit
FRM	Footwell module
KOMBI	Instrument cluster
ICM	Integrated Chassis Management
JB	Junction box electronics
LRR	Long-range radar sensor (LRR)
MFL	Multifunction steering wheel button pad
SRR	Short-range radar sensor (SRR)
SZL	Steering column switch cluster with steering angle sensor
ZGM	Central gateway module

System Circuit Diagram

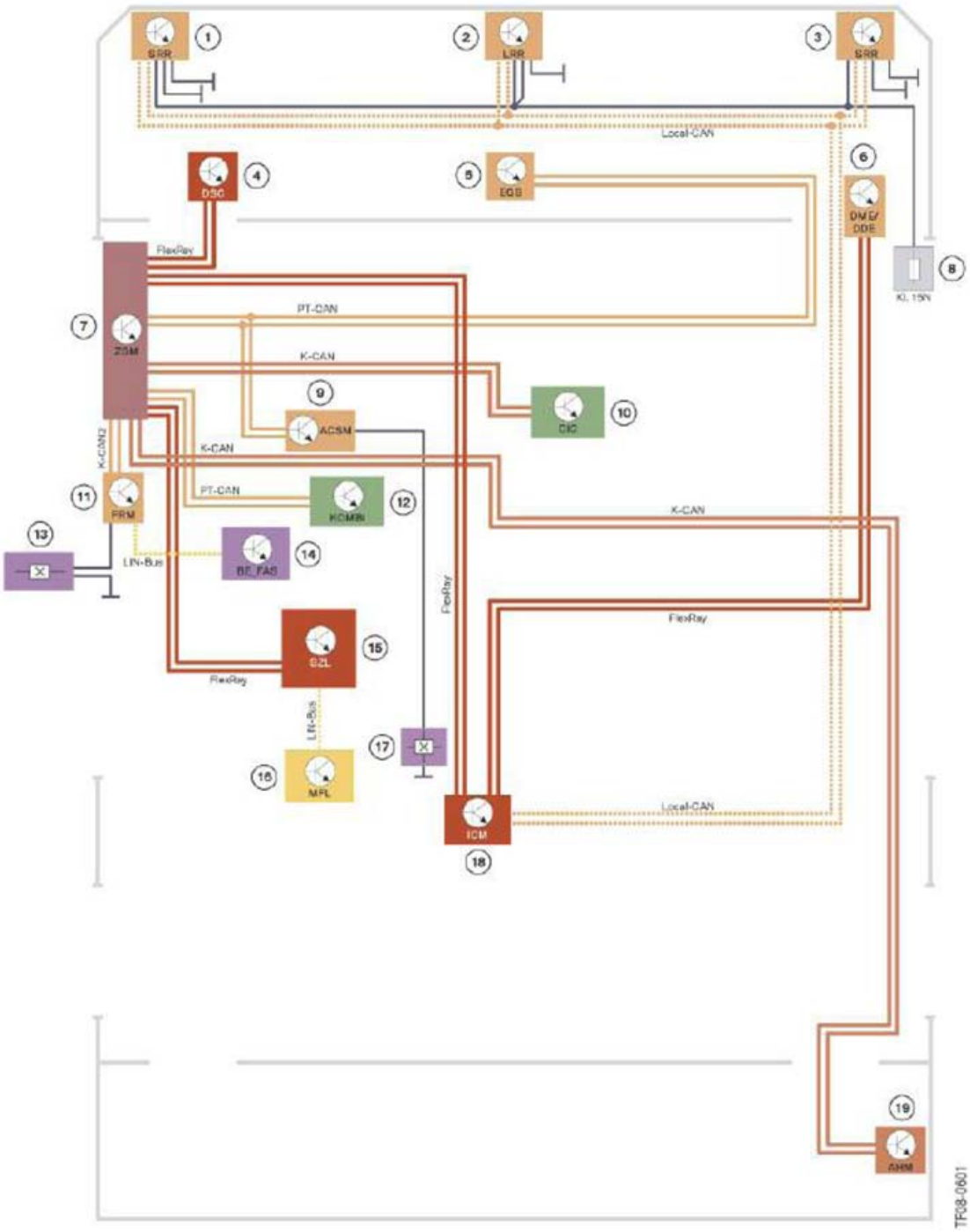


Fig. 140: System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Short-range radar sensor, left
2	Long-range radar sensor

3	Short-range radar sensor, right
4	Dynamic Stability Control
5	Electronic transmission control unit
6	Digital Motor Electronics
7	Central gateway module
8	Fuse for long-range radar sensor and short-range radar sensors
(front	fuse carrier, junction box electronics)
9	Crash safety module
10	Car Information Computer
11	Footwell module
12	Instrument cluster
13	Door switch, driver's door
14	Driver assistance systems operating unit
15	Steering column switch cluster with steering angle sensor
16	Multifunction steering wheel button pad
17	Seat belt buckle contact, driver's seat
18	Integrated Chassis Management

FUNCTIONS

Technical Networking Overview

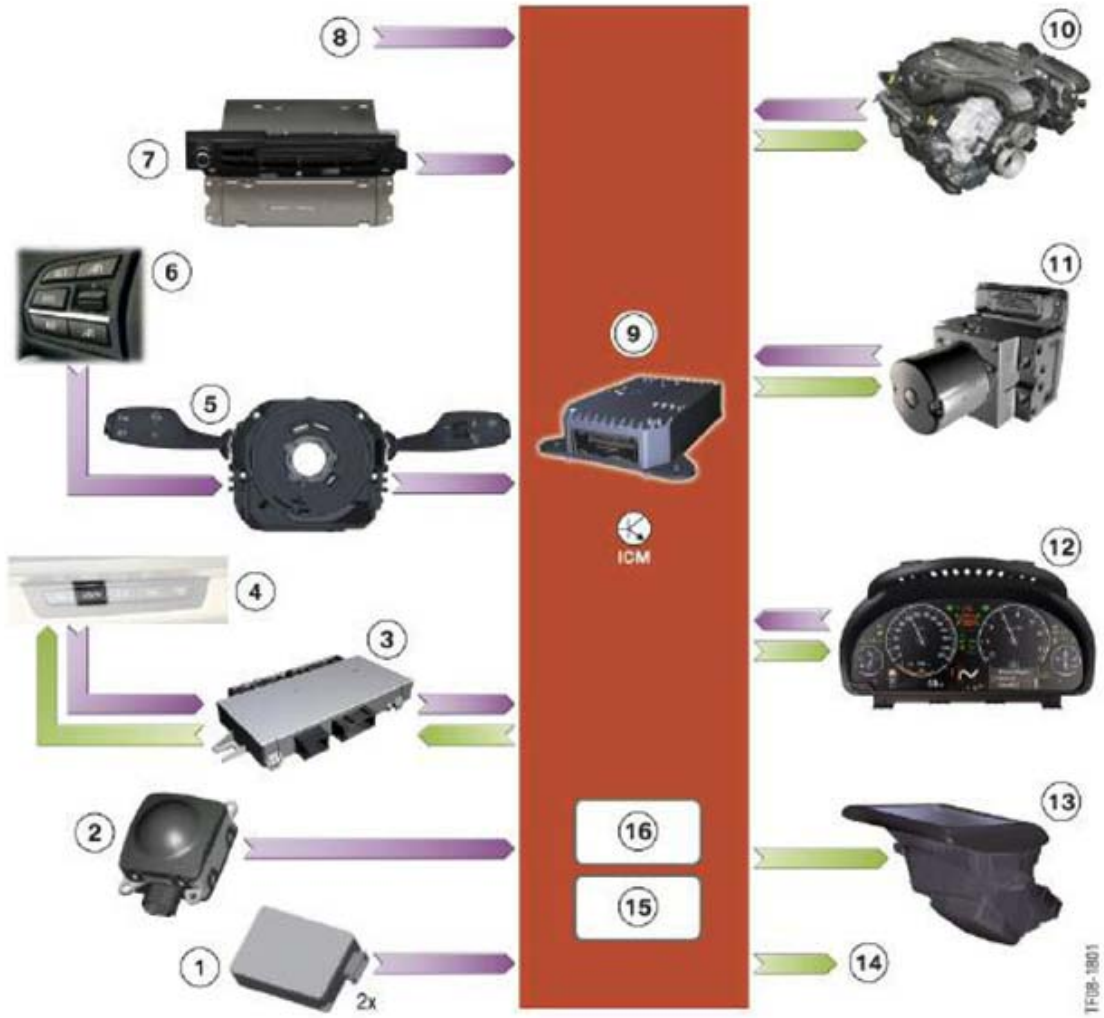


Fig. 141: ACC Stop&Go Input/Output Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation	Explanation
1	Short-range radar sensors	• Detecting near objects • Pre-processing object data • Transmitting a list of object data to the ICM control unit on the local CAN
2	Long-range radar sensor	• Detecting distant objects, pre-processing object data and transmitting a list of object data for ACC Stop&Go to the ICM control unit on the local CAN • Detecting distant objects, pre-

		processing object data, establishing trigger criteria for the functions of the Adaptive Brake Assistant and transmitting them to the ICM control unit on the local CAN
3	Footwell module	• Forwarding button-stroke signals from the driver assistance systems operating unit to the ICM control unit • Forwarding the request of the ICM control unit to activate/deactivate the function illumination to the driver assistance systems operating unit • Generating the door contact signal (for recognition of driver's intention to get out)
4	Driver assistance systems operating unit	• Evaluating button strokes and transmitting the result to the footwell module • Activating/deactivating the function illumination at the request of the footwell module
5	Steering column switch cluster	• Forwarding the operating signals from the MFL button pad to the ICM control unit (for DCC/ACC Stop&Go) • Generating a number of other signals (e. g. steering wheel angle, turn signal operation)
6	MFL button pad	• Generation of driver control signals (for DCC/ACC Stop&Go)
7	Car Information Computer	• Generating the GPS position (deactivation of the short-range radar sensors of ACC Stop&Go in the vicinity of radio astronomy stations) • Generating road type and course of road segments to permit adaptation of controller parameters by ACC Stop&Go • Setting selected by the driver for collision warning of the Adaptive Brake Assistant
		• Terminal status, engine running

8	Other input signals	(from CAS) • Drive position of the automatic transmission (from EGS) • State of driver's seat belt buckle contact (from ACSM) • State of all actuators (e. g. drive, DSC, EMF, Kombi) necessary to the operation of DCC/ACC Stop&Go
9	Integrated Chassis Management (ICM)	• Analysis of objects and selection of relevant object (for ACC Stop&Go) • Interpretation of operating signals and generation of display signals (for DCC/ACC Stop&Go) • Regulation of straight-line speed and cornering speed (for DCC/ACC Stop&Go) • Distance regulation (for ACC Stop&Go) • Control of drive train and brake actuators by outputting nominal values to the FlexRay (for ACC Stop&Go) • Gateway between local CAN and FlexRay (for diagnostics and programming of the long-range radar sensor) • Gateway between local CAN and FlexRay (for the functions of the Adaptive Brake Assistant)
10	Drive train, comprising engine and transmission (DME and EGS)	• Implementation of the nominal values of the ICM control unit (for DCC/ACC Stop&Go) • Generation of signals from drive forces (for DCC/ACC Stop&Go)
11	Dynamic Stability Control (DSC)	• Implementation of the nominal values of the ICM control unit (for DCC/ACC Stop&Go) • Monitoring of stationary vehicle with ACC Stop&Go active • Implementation of the functions of the Adaptive Brake Assistant at the request of the ICM control unit (precharging of the brake system and

		reduction in the threshold of the hydraulic Brake Assistant) • Supply of signals relating to motion status of the car and brake pressure
12	Instrument cluster	• Implementation of the displays requested by the ICM control unit (for DCC/ACC Stop&Go and for the collision warning of the Adaptive Brake Assistant) • Generation of the signal for displayed speed (for DCC/ACC Stop&Go)
13	Head-up display	• Implementation of the displays requested by the ICM control unit (for DCC/ACC Stop&Go and for the collision warning of the Adaptive Brake Assistant)
14	Other output signals	• Calling up the Assistant window for setting the collision warning time (on CIC)
15	Control functions	• The control functions for both DCC and ACC Stop&Go are integrated into the ICM control unit
16	Status control	• ICM controls the status of DCC and ACC Stop&Go in accordance with received operating signals (and other signals). The status is needed outside the ICM control unit specifically for display information in the instrument cluster and in the head-up display • The activation and deactivation of the collision warning is also controlled by the ICM.

Cruise Control with Braking Function

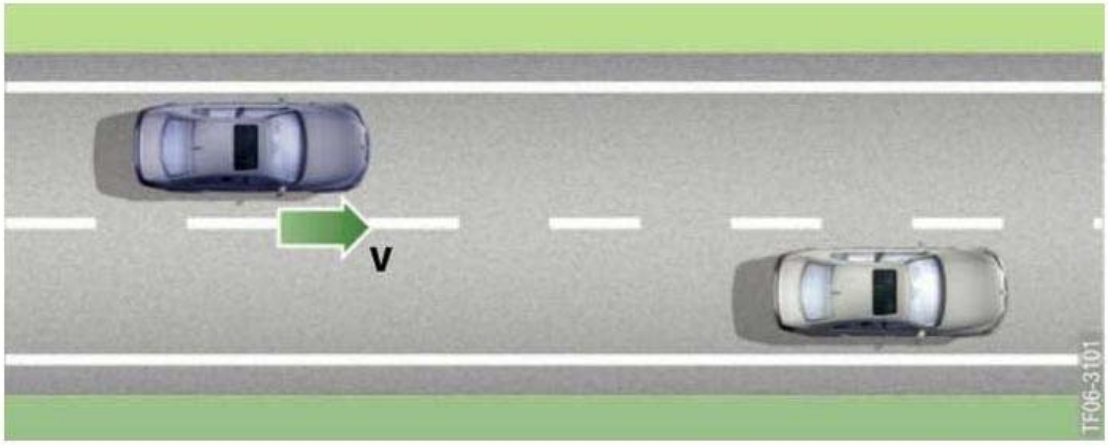


Fig. 142: Overview Of Cruise Control
Courtesy of BMW OF NORTH AMERICA, INC.

The cruise control with braking function has already featured in the BMW 3 Series (E9x). It is also referred to as "Dynamic Cruise Control" (DCC).

It relieves the burden on the driver on quiet roads by maintaining a constant speed regardless of the resistance to vehicle motion (gradient, payload).

It also offers the driver the opportunity to adjust the set speed in small or large increments, which is then set and maintained by the system by controlling power output and braking. The brakes are also controlled during steep downhill driving if sufficient deceleration is not achieved by engine drag-torque alone.

Dynamic Cruise Control in the F01/F02 is not computed in the DSC control unit as it is in other vehicles. Instead, it has been integrated into the ICM control unit.

The function has, of course, been newly configured for optimum compatibility with the F01/F02. Due to the new vehicle interior, there are differences in how the function is operated and how information is displayed by comparison with the function implemented in other vehicles. These are described here.

Operation and display

In the F01/F02, Dynamic Cruise Control is no longer operated by means of an operating lever. Instead, the driver can operate the function conveniently using a button pad on the multifunction steering wheel.



Fig. 143: Identifying Set, I/O And RSE Buttons With Rocker Switch
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	SET button to activate
2	Rocker switch to change the set speed
3	I/0 button to switch on and off
4	RES button to resume a stored set speed

To prevent accidental activation, the function remains inoperable until the I/0 button has been pressed after the vehicle has started. This switches the function to standby. This state is acknowledged in the instrument cluster by a green indicator light lighting up.

With the function in standby, the driver is now able to activate cruise control. To do this, the driver can press the SET button used to store the vehicle's current road speed as the set speed. An active state is indicated by a green indicator light in the circumference of the speedometer dial lighting up.

There is an alternative way to activate the function if a set speed has already been stored. This is indicated by an orange indicator light in the circumference of the speedometer dial. If the driver wants to use this speed value as the set speed, he simply has to press the RES button. Dynamic Cruise Control then accelerates or decelerates the vehicle to this speed value automatically.

While the function is active, the driver is able to increase or decrease the set speed at any time. There are two adjustment increments available. The rocker switch offers two different increments in either direction. First, the set speed is altered in increments of 1 km/h each time the rocker switch is pressed; second, it is altered in increments of 10 km/h.

NOTE: In the F01/F02, the adjustment range for the set speed is 30 km/h (18 mph) to 230 km/h (142mph).

If the rocker switch is pressed and held, the system will accelerate/decelerate the vehicle until the rocker switch is released. This is known as a "comfort dynamics" function as featured in the E9x and E6x LCI.

To deactivate the system, the driver can simply operate the brake pedal like before. Or, the driver can deactivate the system by pressing the I/0 button. The system is then returned to standby and keeps the set speed last used stored in its memory.

If the driver then presses the I/0 button once more, the system is completely switched off and the green indicator light in the instrument cluster goes out.

There follows a summary of the most important displays for Dynamic Cruise Control.

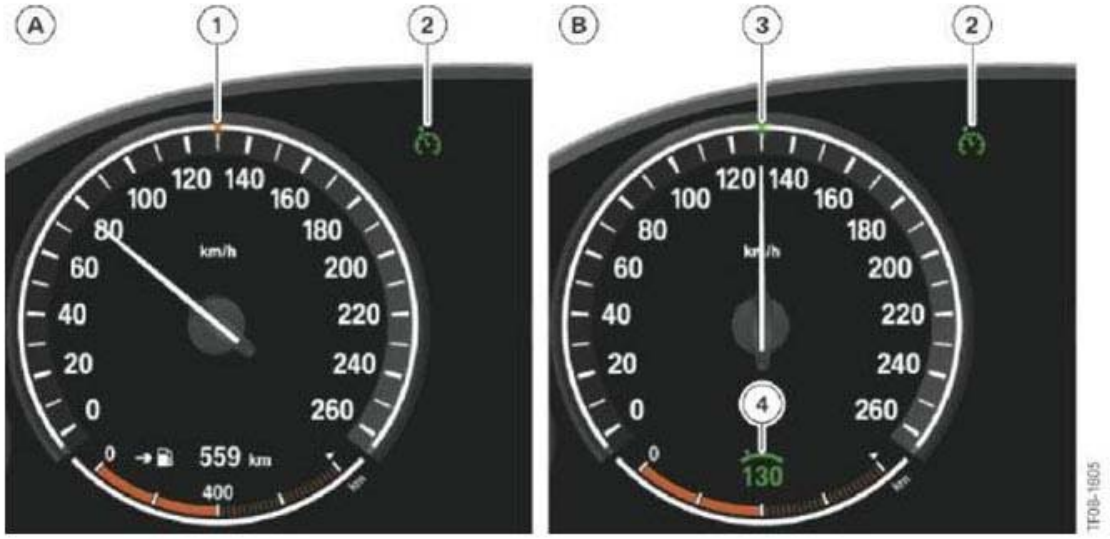


Fig. 144: Display Indicator For Dynamic Cruise Control
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	"Standby" state
B	"Active" state
1	Orange LED: set speed of 130 km/h (81 mph) stored
2	Indicator light for Dynamic Cruise Control
3	Green LED: actively maintaining a set speed of 130 km/h (81 mph)
4	Set speed displayed numerically: briefly displayed at the time of function activation or whenever the set speed is changed

In the event of particular operating states, the displays shown here are supplemented by information messages displayed below the speedometer. This is the case, for instance, if the driver attempts to activate the system even though not all the activation criteria have been fulfilled (e. g. speed less than 18 mph).

In the F01/F02, a difference in the way Dynamic Stability Control interacts with Dynamic Cruise Control has been introduced. This is explained by the following example: Using the "Dynamic Performance Control", the driver has selected a mode in which DSC is inactive (e. g. "Sport+" mode). If the driver now activates cruise control, DSC will be activated automatically. This is accompanied by an automatic changeover from "Dynamic Performance Control" to "Normal" mode. In previous vehicles, the driver was unable to activate cruise control without activating DSC manually first.

Active Cruise Control with Stop&Go Function

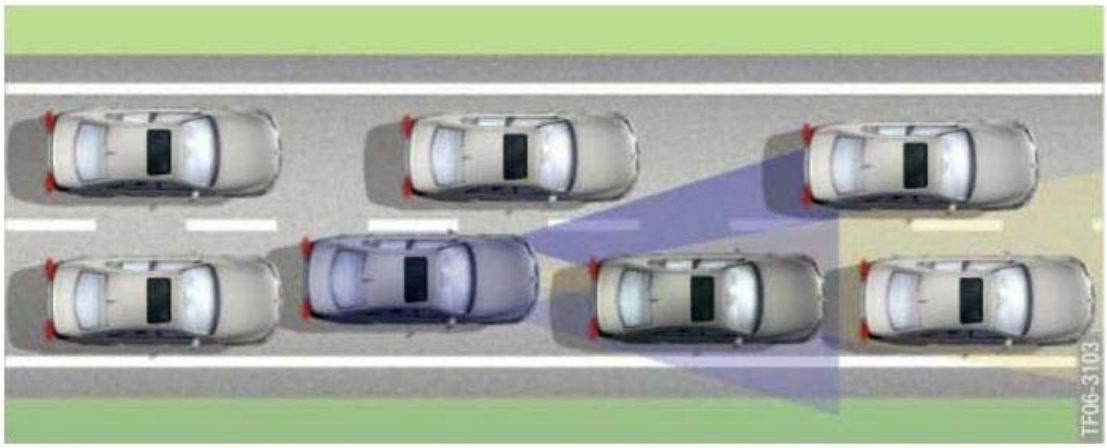


Fig. 145: Traffic Jam Situation
Courtesy of BMW OF NORTH AMERICA, INC.

The ACC Stop&Go function in the F01/F02 is largely identical to that in the E6x LCI.

ACC Stop&Go extends the operating range of the former ACC system to include low speeds down to a standstill. In other words, speed and distance from the vehicle in front are automatically controlled at those speeds as well.

ACC Stop&Go will automatically stop the car if necessary and then indicate to the driver as soon as it detects that it is possible to start moving again. To pull away again, the driver has to acknowledge this message. The pulling-away process is controlled fully automatically by ACC Stop&Go only if the duration of the standstill is very short.

Thus, ACC Stop&Go provides optimum assistance for the driver not only in moving traffic but also in traffic jams such as are more and more frequently encountered on highways. However, this system (in common with ACC) is not intended for use in urban areas for negotiating junctions or traffic lights.

The functions of ACC Stop&Go in the F01/F02 differ from those in the E6x LCI in the following areas:

- Operation and display

- Behavior in response to driver's intention to get out.

Operation and display

ACC Stop&Go and DCC are activated/deactivated in a very similar way. The driver is able to activate ACC Stop&Go not only while the vehicle is in motion, but also when the vehicle is stationary, provided the system has detected another vehicle in front. To activate ACC Stop&Go at a standstill, the driver has to depress the brake pedal and press the SET or RES button at the same time. The activation conditions that applied to the E6x LCI similarly apply here:

- Brake pedal must not be depressed
- Automatic transmission must be in Drive
- Parking brake must not be activated
- Radar sensors must be operational and not dirty
- There must be no system fault present.



Fig. 146: Identifying Buttons And Switches Of Active Cruise Control System
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	SET button to activate
2	Button for reducing the distance
3	Rocker switch to change the set speed
4	Button for increasing the distance
5	I/0 button to switch on and off
6	RES button to resume a stored set speed

If Dynamic Stability Control was inactive before, in the F01/F02 it is activated as soon as ACC Stop&Go is activated. At the same time, the "Dynamic Performance Control" automatically changes to "Normal" mode (same behavior as for DCC).

Similarly, ACC Stop&Go cannot be deactivated by means of the I/0 button while the vehicle is stationary unless the brake pedal is depressed at the same time.

NOTE: In the F01/F02, the adjustment range for the set speed is 30 km/h (18 mph) to 230 km/h (142mph).

By comparison with DCC, a vehicle with ACC Stop&Go has an MFL button pad that additionally features two buttons for making distance adjustments.

Each (short) button stroke to change the distance increases the desired distance used by ACC Stop&Go for its control process by one increment at a time. A total of four increments are available to the driver.

The most important display functions of ACC Stop&Go in the F01/F02 are illustrated below.

As with DCC, the display symbols for ACC Stop&Go are supplemented by messages displayed below the speedometer as and when necessary.

If the vehicle is equipped with the head-up display option, the ACC displays also appear there, provided the driver has configured them to do so.

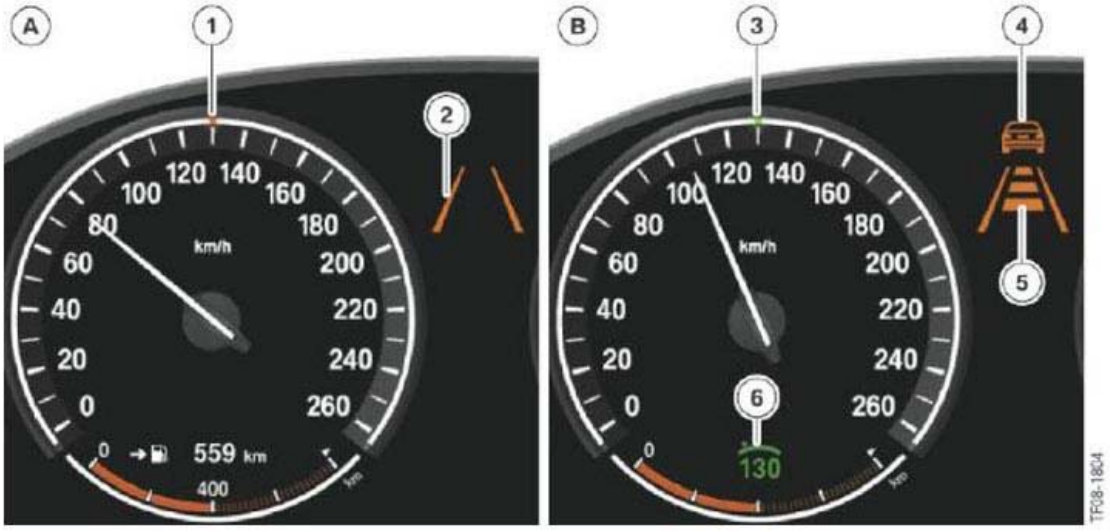


Fig. 147: Display Indicator For ACC Stop & Go
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	"Standby" state

B	"Active" state
1	Orange LED: set speed of 130 km/h (81 mph) stored
2	Lines that indicate "standby" mode
3	Green LED: set speed of 130 km/h (81 mph) selected by the driver (the speedometer needle is not pointing at the LED here because the vehicle in front is travelling slower than the set speed)
4	Car symbol: vehicle ahead detected by ACC Stop&Go
5	Bars: represent the distance increment selected by the driver
6	Set speed displayed numerically: briefly displayed at the time of function activation or whenever the set speed is changed

Behavior in response to the driver's intention to get out

ACC Stop&Go uses the DSC hydraulics to reliably slow the vehicle to a halt and keep it stationary.

Without a supply of electricity, the DSC hydraulics are, however, unable to indefinitely maintain the braking force necessary to keep the vehicle stationary.

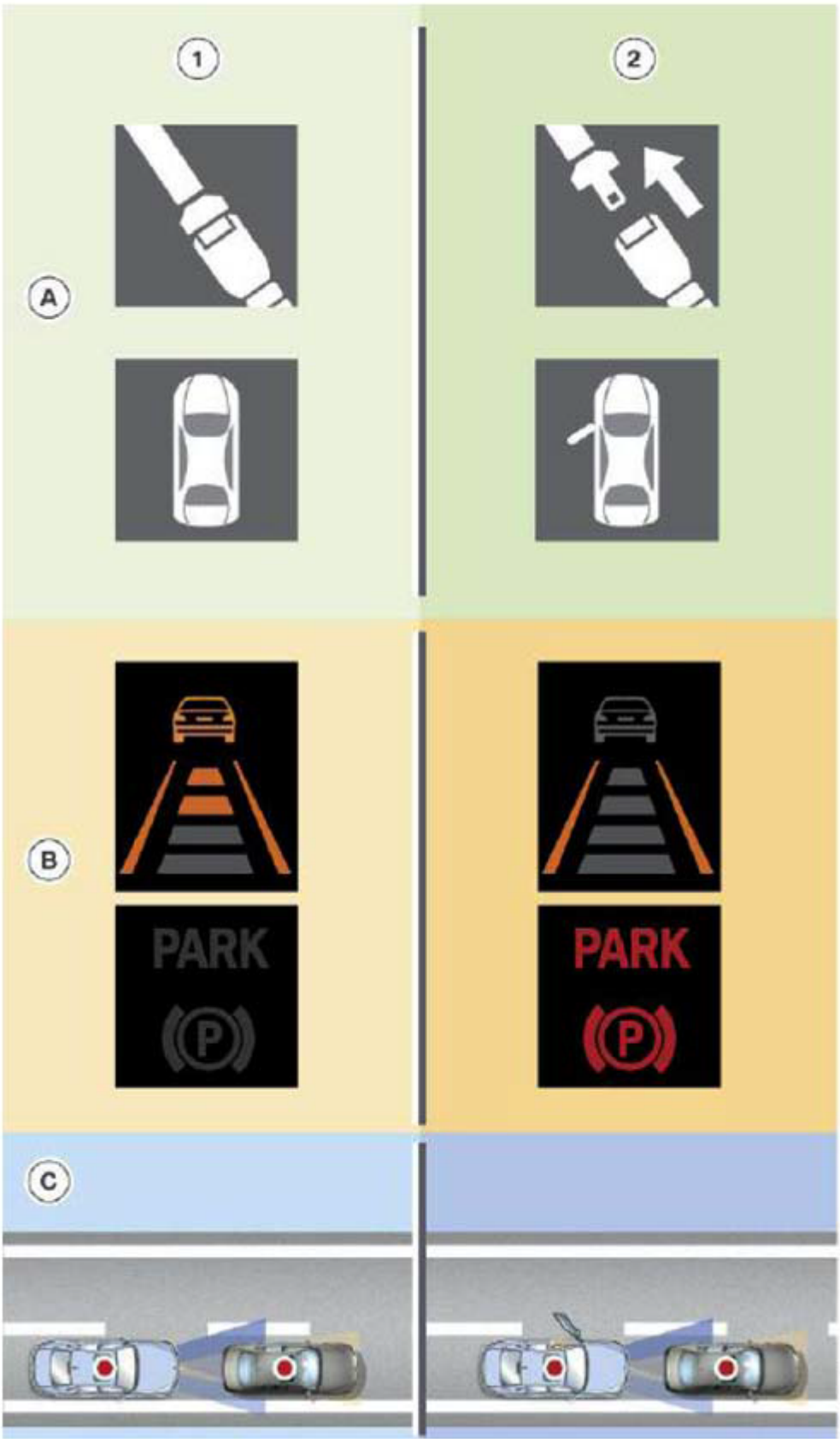

1
2
A
B
PARK
PARK
C
TF08-1878

Fig. 148: Driver's Intention
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	State of driver's seat belt and driver's door
B	Displays of ACC Stop&Go and parking brake in the instrument cluster
C	Road traffic situation or perceptible response of vehicle with ACC Stop&Go
1	ACC Stop&Go is active and has automatically braked the vehicle to a halt behind a vehicle in front. The DSC hydraulics hold the vehicle stationary (and are monitored by the DSC control unit).
2	The driver has undone the seatbelt and opened the driver's door. This is evaluated as an unequivocal signal for the driver's intention to get out. DSC detects this state and activates the parking brake function. As a result, the vehicle can be held stationary for any length of time, even if the driver gets out. The parking brake indicator light indicates that the parking brake has been applied. ACC Stop&Go detects that the parking brake has been applied and switches off automatically.

By contrast with the E6x LCI, the F01/F02 is equipped with an electromechanical parking brake (EMF). This is able to assume the function of holding the vehicle stationary if

- DSC is no longer able to maintain the hold function due to a fault or overload,
- the driver gets out or
- the engine is switched off.

Thanks to the EMF, therefore, ACC Stop&Go also benefits from improvements designed to enhance comfort while the vehicle is stationary. Drivers of an E6x LCI had to be issued with a warning if they were about to get out with ACC Stop&Go still active. They were reminded to secure the vehicle against rolling away. They had to apply the parking brake manually.

In the F01/F02, however, the parking brake function of the EMF is activated automatically whenever the driver is about to get out of the vehicle with ACC Stop&Go still active.

The driver's intention to get out of the F01/F02 is detected by the signals of the seat belt buckle contact (driver's) and door contact (driver's door). A signal from the seat occupancy detection (driver's seat) is not used in the F01/F02.

While the vehicle is being held stationary by ACC Stop&Go, the DSC unit takes over all monitoring and control processes. The DSC also controls the system's behavior in response to the driver's intention to get out of

the vehicle. For ACC Stop&Go, this is absolutely identical to that implemented for the DSC-internal Automatic Hold function (the "see **F01/F02 LONGITUDINAL DYNAMICS SYSTEMS**" Product Information).

ACC Stop&Go is deactivated automatically if, from the bus signals it receives, it detects that the parking brake function has been activated. Now the vehicle is still held stationary but by the parking brake function instead.

Adaptive Brake Assistant with Warning Function

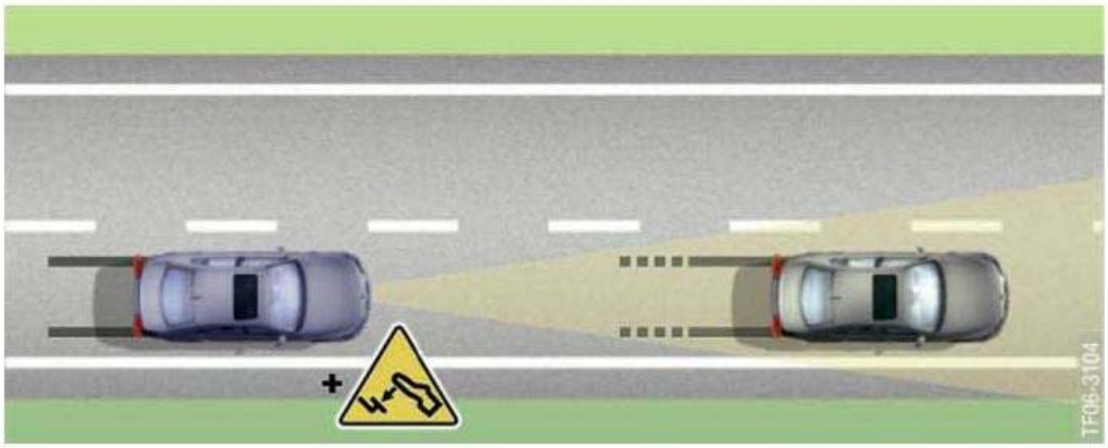


Fig. 149: Operating Range Of Adaptive Braking Assistant (Panic Braking Situation)
Courtesy of BMW OF NORTH AMERICA, INC.

As Featured in the E6x LCI

The Adaptive Brake Assistant has been carried over from the E6x LCI. This function is included automatically if the customer orders the ACC Stop&Go option, or in some countries, the ACC option.

Adaptive Braking Assistance offers the greatest benefit in situations where the vehicle is following another vehicle. If the vehicle in front brakes hard, it is detected by the long-range radar sensor. The two subfunctions of

- precharging the brake system (also known as the "brake readiness" function) and
- lowering the threshold for the hydraulic Brake Assistant

assist the driver to perform the braking operation to best effect and thus in the best case to avoid a rear-end collision with the vehicle in front.

In the F01/F02, this function is no different from the function implemented in the E6x LCI. The long-range radar sensor gathers data on the road users ahead of the vehicle. The data are supplemented by data relating to the driving status of the customer's vehicle, and both types of data are used as a basis for calculating a collision avoidance rate of deceleration. This is the rate of deceleration at which the driver would have to brake in order to avoid a collision with the vehicle in front. If the calculated collision avoidance deceleration is above a stored threshold value, the brake system begins to precharge and the activation threshold for the hydraulic Brake Assistant is reduced.

All sensor-related and processing functions of Adaptive Braking Assistance are computed in the long-range

radar sensor. However, the computed output variables have to be transmitted to the DSC control unit because that is where they are put into action. To make this possible, the ICM control unit acts as a gateway between the local CAN and the FlexRay.

In the DSC control unit, there are still more conditions that need to be fulfilled before these two subfunctions can be carried out. (Example: road speed must be higher than a defined minimum speed.)

However, the Adaptive Braking Assistance technology also has limits and cannot react fast enough in situations such as other road users cutting in right in front of the vehicle. Driving with care and anticipation remains the fundamental imperative even with Adaptive Braking Assistance!

NOTE: The Adaptive Brake Assistant and its subfunctions, precharging the brake system and lowering the threshold for the hydraulic Brake Assistant are always active and does not have to be switched on separately by the driver.

New warning function

In the F01/F02, the Adaptive Brake Assistant is supplemented by a warning function. This useful "collision warning" is designed to draw the driver's attention to hazardous situations in good time. The driver is then assisted by the subfunctions of the Adaptive Brake Assistant, which provide optimum deceleration in this kind of emergency situation.

The driver is able to switch the collision warning on and off. Its state (on/off) remains stored for the duration of the current driving cycle (key-specific).

The field of application in which the collision warning offers the greatest benefit to the customer is as follows: The customer is driving behind a vehicle that brakes suddenly and hard.

If the customer has activated the collision warning, he is given notification in two stages that a hazardous situation has been detected and the customer is thereby prompted to intervene:

- Advance warning
- Acute warning.

The time at which the warning has to be issued is, again, calculated by the long-range radar sensor based on the collision avoidance deceleration. Each warning stage has its own threshold values.



Fig. 150: Setting Warning Time
Courtesy of BMW OF NORTH AMERICA, INC.

Setting the advance warning

In the event of an advance warning, powerful braking by the driver is sufficient to allay the situation. If the acute warning is issued, the driver must brake immediately and with maximum force to avoid a collision.

The driver has some control over the threshold value for the activation of the first stage, the advance warning. From an Assistant window in the Central Information Display, the driver is able to select one of three warning times for the advance warning:

- Early
- Late
- Off (no advance warning given).

For the collision warning, the ICM control unit is responsible for the following control tasks. The switching on and off, the activation conditions, the fault monitoring and the adjustment of the warning time are all computed by the ICM. In addition, the ICM control unit forwards the warning request from the long-range radar sensor to the instrument cluster and (if fitted) the head-up display, where the warning is issued.

Issuing of the warning

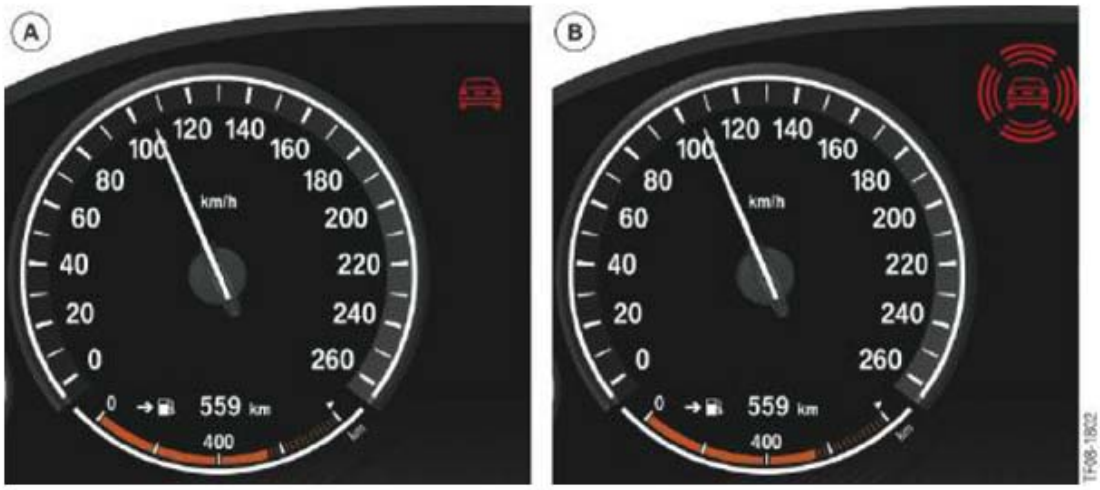


Fig. 151: Display Instrument Cluster For Collision Warning
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Stage 1: Advance warning
B	Stage 2: Acute warning

The advance warning is represented by the red car symbol in the instrument cluster. In the event of an advance warning, it lights up constantly. As there is no audible signal, this visual warning signal is the only signal for the advance warning.

In the event of an acute warning, the car symbol in the instrument cluster begins to flash. Since an immediate intervention by the driver is required, this visual signal is supplemented by an audible tone.



Fig. 152: Display - Collision Warning In Head-Up
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
A	Stage 1: Advance warning
B	Stage 2: Acute warning

This particular high-frequency tone is used only for the acute warning and differs distinctly from other tones that are issued, e. g. with Check Control messages.

If the vehicle is equipped with the head-up display, the visual displays of the collision warning are seen by the driver even more directly and therefore even sooner.

In the head-up display, the advance warning is represented by a significantly enlarged red car symbol. As with the instrument cluster display, the advance warning is indicated by the symbol lighting up constantly.

In the event of an acute warning, the car symbol in the head-up display begins to flash. At the same time, the parts of the display that are irrelevant to this emergency situation are hidden so as not to distract the driver unnecessarily. These displays include those of the navigation system, for example. As soon as the acute warning is over, all the displays in the head-up display re-appear. The same distinctive tone for the acute warning is used in vehicles with head-up display.

NOTE: **The collision warning is active only if the driver has switched it on at the driver assistance systems operating unit.**
As the advance warning is the first warning stage, its timing is configurable but it can also be switched off.

Fault states

The functions of the Adaptive Brake Assistant depend on the faultless operation of the long-range radar sensor in particular, but also of the ICM control unit and the DSC unit. If one of these essential system components is limited in its availability in any way, these functions may no longer work correctly and would need to be deactivated.

The driver is given notification of this condition. If, for example, a fault is present at the time the system is switched on, the function illumination of the collision warning will not be activated. From this, the driver can infer that the collision warning is not available.

If a fault were to occur some time after the system was switched on, the driver could fail to, see the function illumination go out. For this reason, a Check Control message is issued as an additional warning measure. There are two different symbols, and each one is supplemented by a relevant instruction.

FAULT STATES





Collision warning deactivated (due to unfavorable operating conditions, e. g. dirty long-range radar sensor)	Collision warning failure (due to genuine faults or defective components)

SYSTEM COMPONENTS

Vehicle-specific Modifications in Detail

Long-range Radar Sensor

In terms of physical design, the long-range radar sensor (LRR) for ACC Stop&Go in the F01/F02 is largely identical to the one fitted in the E6x LCI.

Functionally, however, it differs from the sensor in the E6x LCI in that it also calculates the new collision warning of the Adaptive Brake Assistant.

In the F01/F02, the long-range radar sensor no longer has a connection to the wake-up line. Instead, it is supplied with power by terminal 15N and is thus hard switched. Terminal 15N is tapped off at the front fuse carrier. The long-range radar sensor contains a terminating resistor (for the local CAN) as it does in the E6x LCI.

The installation location of the long-range radar sensor and the way it is mounted have been adapted to the structural conditions specific to the F01/F02.



Fig. 153: Installation Location Of Long-Range Radar Sensor In F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Fixed bearing
2	Connector
3	Screw for horizontal adjustment
4	Housing/radome
5	Screw for vertical adjustment
6	Bracket

NOTE: In the F01/F02, the long-range radar sensor is fitted with the connector at the top. It should therefore be noted that the adjustment screws have had to be relocated.

NOTE: Adjusting the long-range radar sensor on vehicles with Integral Active Steering: Before the adjustment device is set up and the actual adjustment work can begin, it is necessary to bring the actuator for the rear-wheel steering to the straight-ahead position. It is essential that the instructions of the diagnostic

system and Repair Instructions be observed.

Short-range radar sensors

The short-range radar sensors (SRR) used for ACC Stop&Go in the E6x LCI have undergone a hardware revision. New, integrated switch circuits have been implemented. The principle of operation, however, is much the same. The table below compares the sensors' properties with those of the Lane Change Warning.

SHORT RANGE RADAR SENSOR/LANE CHANGE WARNING SYSTEM COMPARISON CHART

Characteristic	Radar sensors for Lane Change Warning	Short-range radar sensors for ACC Stop&Go
Modulation method	LF MSK (Linear Frequency Modulation Shift Keying)	PD (pulse doubler)
Mid-range transmission frequency 24 GHz	24 GHz	24 GHz
Bandwidth	100 MHz	> 1 GHz
Distance measurement	Based on the propagation time of one chirp(1)	Based on pulse propagation time
Measurement of relative speed	Based on frequency shift (Doppler effect)	Based on phase difference (Doppler effect)
Angle measurement	Ratio of two phase values (two simultaneous measurements)	Ratio of two phase values (two successive measurements)
Transmission output (typical maximum value)	Approximately 40 mW (typical), Approximately 100 mW (maximum)	Approximately 0.08 mW (average), Approximately 100 mW (single pulse)
Range (dependent on type of measured object)	At least 50 m, up to 70 m	At least 10 m, up to 20 m
Horizontal angular width of beam	Approximately -70° to +80°	+/-40°
Vertical angular width of beam	Approximately +/-6.5°	Approximately 20°
(1) Characteristic signal segment with changing frequency		

NOTE: As in the E6x LCI, the short-range radar sensors cannot be programmed. While they do have a self-diagnostics function, accessing the ICM control unit is the only means by which it is possible to read their fault code memory entries.

The short-range radar sensors on the left and right are identical, as they are in the E6x LCI. Each of the short-range radar sensors detects its respective installation position from the pin that is assigned to ground in the wiring harness.

In the F01/F02, the short-range radar sensors -like the long-range radar sensor - are supplied with power by terminal 15N, which is supplied in turn by the front fuse carrier. There is no connection to the wake-up line.

The local CAN is connected to the short-range radar sensors by two short stub lines, which begin at the long-range radar sensor.

The short-range radar sensors have no terminating resistor for the local CAN.

The F01/F02 and the E6x LCI differ greatly in the installation location of the short-range radar sensors and in the way they are mounted. The key differences are illustrated here using as an example a short-range radar sensor fitted on the right-hand side when viewed in the direction of travel.



Fig. 154: Identifying Housing/Antenna Cover, Bracket And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Bracket
2	Connector
3	Housing/antenna cover

In the F01/F02, the short-range radar sensors are fitted on top of the bumper carrier (and no longer on its front). For this reason, the bracket had to be completely redesigned. It now grips the housing of the short-range radar sensor from behind. To guarantee the necessary level of stability and reliability, the bracket now also has a reinforcement rib. This runs vertically to the front of the antenna cover. The rib was positioned here in order to minimize its interference with the propagation of radar waves.

NOTE: **The material for the bracket (and thus for the rib) was also selected specifically for this particular application. Emergency repairs that use other plastic parts are not permitted. Otherwise, there is a risk that the short-range radar sensors may not work correctly.**

For the short-range radar sensors, a distinction is made between the following types of fault:

- **Sensors dirty:** The short-range radar sensors can no longer function reliably if their antenna is covered by snow, slush or ice. If this condition is detected, a corresponding signal is sent to the ICM control unit. The ACC Stop&Go function is deactivated as a result. A separate Check Control message informs the driver about this special case. There is no fault code memory entry.
- **External interference with radar signal processing:** Radar sensors used by other vehicle manufacturers may interfere with the signal evaluation of the short-range radar sensors. If such a problem is detected, the ACC Stop&Go is deactivated. It can be switched on again by the driver as soon as the vehicle is far enough away from the vehicle causing the interference. This malfunction is logged in the fault code memory of the ICM control unit. However, there is no repair action that can be taken. Instead, the customer should be informed of the cause of the fault (external interference).
- **Temporary fault:** The causes of this type of fault include communication faults, overvoltage, undervoltage and thermal overloads in the short-range radar sensors. In these cases, it is necessary to proceed as instructed by the test plan in the diagnostic system. The short-range radar sensors must not be replaced unless the test plan prompts you to do so.
- **Control unit fault:** If one of the short-range radar sensors is affected by a control unit fault, the only way to rectify the fault is to replace the defective sensor.
- **Sensors maladjusted:** As with the long-range radar sensor, the short-range radar sensors in interaction with the ICM control unit are also able to detect a maladjustment caused by an accident. If the calculated degree of maladjustment exceeds a certain limit, the ACC Stop&Go function is shut down. An entry in the fault memory indicates the cause of the fault. To correct the fault, observe the instructions in the diagnostic system and Repair Instructions.

In the F01/F02, too, as with the long-range radar sensor, there is no means of adjusting the short-range radar sensors.

NOTE: **If a short-range radar sensor has been replaced with a new one, it is necessary to commission the sensor using the diagnostic system. While commissioning is in progress, new short-range radar sensors are taught their respective installation position and, importantly, their angle relative to the vehicle longitudinal axis. A measurement does not need to be carried out in this case. The angle entered is the angle predetermined by the construction and the form of the bumper support.**

NOTE: **Great care must taken during repair work carried out at the front end. If the bumper carrier is deformed or if the bumper trim is scratched or dented, the short-range radar sensors may no longer work correctly. The specified structural clearances between the short-range radar sensors and the bumper trim must also be maintained. The Repair Instructions must be observed**

without fail.

New Components

Integrated Chassis Management

The new ICM control unit in the F01/F02 essentially performs the calculations for the control functions that influence the longitudinal and lateral dynamics. The ICM control unit also contains the control functions of "Dynamic Cruise Control" and "Active Cruise Control with Stop&Go function".

In addition, the ICM coordinates the control of the vibration actuator in the steering wheel for the "Lane Departure Warning" and "Lane Change Warning" driver assistance functions. Also integrated into the ICM control unit are micromechanical sensors that supply the driving dynamics signals (in previous vehicles, these were generated by the separate DSC sensor).

Two versions

An ICM control unit is installed in every F01/F02. Which of the two available versions of the ICM control unit is fitted depends on the vehicle's equipment level.

If the vehicle is equipped with one or both of the following options

- Integral Active Steering (IAL) or
- Active Cruise Control with Stop&Go function (ACC Stop&Go),

the high-performance version of the ICM control unit is installed.

If neither of these options are installed in the vehicle, the basic version of the ICM control unit is used.

The internal layout of the high-end version differs from the internal layout of the basic version in the following ways:

- Larger microprocessor (required to calculate the Integral Active Steering control and active speed control)
- Redundant sensor system for lateral acceleration and yaw rate (safety requirement for Integral Active Steering).

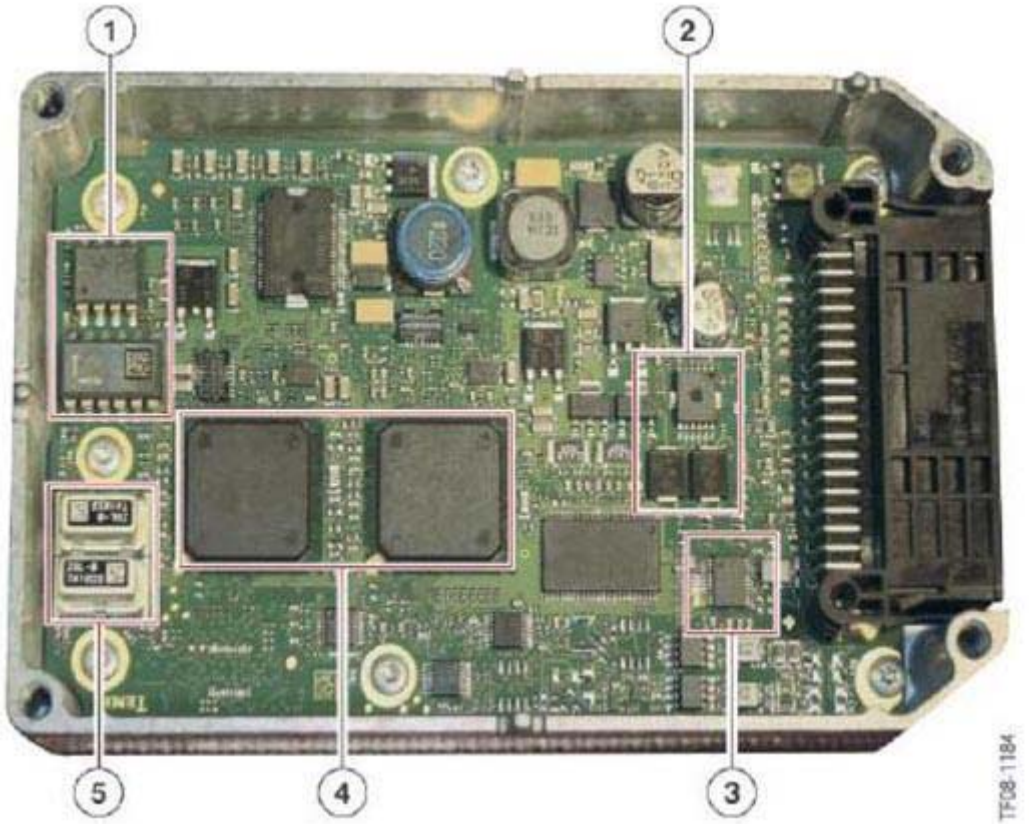


Fig. 155: Identifying ICM Control Unit (High-End Version) Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Acceleration sensors (1 for longitudinal acceleration, 2 for lateral acceleration)
2	Output stages for Servotronic and EVV valves
3	Controller for FlexRay connection
4	Two microprocessors (high-performance version)
5	Yaw rate sensors (2x)

Electrical interfaces

The control unit has a 54-pin plug via which the power supply, sensors, actuators and bus systems are connected.

As is the case with the controller housing, the plug does not have a watertight design. This is not necessary as it is installed on the inside of the vehicle.

The ICM control unit is connected to the integrated FlexRay controller via the **FlexRay** bus system. A detailed description of the new features of the FlexRay network is provided in the Product Information for the F01/F02

bus systems. The communication with most partner control units is handled by the microprocessors in the ICM via the FlexRay.

The FlexRay is routed to the ICM control unit (from the central gateway module) and continues from there (to the DME). The ICM control unit is related to the FlexRay, i. e. not an end node. This is why it does not have a terminating resistor for the FlexRay.

A further bus system, a **local CAN** , is connected to the ICM control unit in addition to the FlexRay. Its sole purpose is to enable the ICM to communicate with the long-range radar sensor and the short-range radar sensors. This local CAN therefore performs the same tasks as the sensor CAN in the E6x LCI that connects the LDM control unit to the sensors. It transmits information on road users that has been recorded by the sensors.

The local CAN operates in the same way as the PT-CAN with a data transfer rate of 500 kBit/s. There are two terminating resistors for the local CAN, each with 120.. One of these is in the ICM control unit, the second terminating resistor is integrated in the long-range radar sensor. The local CAN is routed to the short-range radar sensors by short stub lines.

The pins for the local CAN are only connected at the plug of the ICM control unit if it is a high-end version.

The ICM control unit is also connected to the **wake-up line.** The ICM control unit can be woken up via the wake-up line.

Power is supplied from the front fuse carrier by terminal 30B.

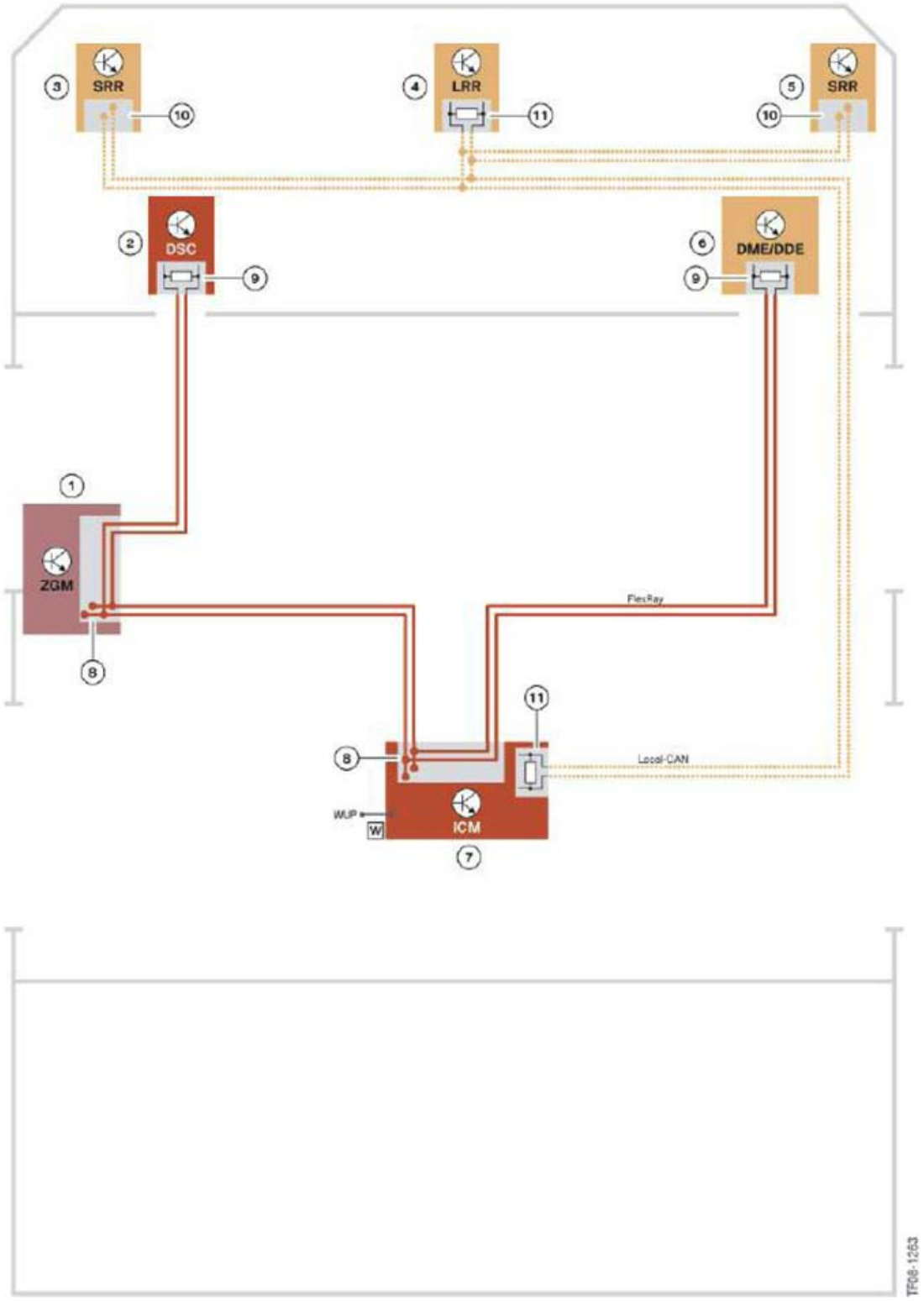


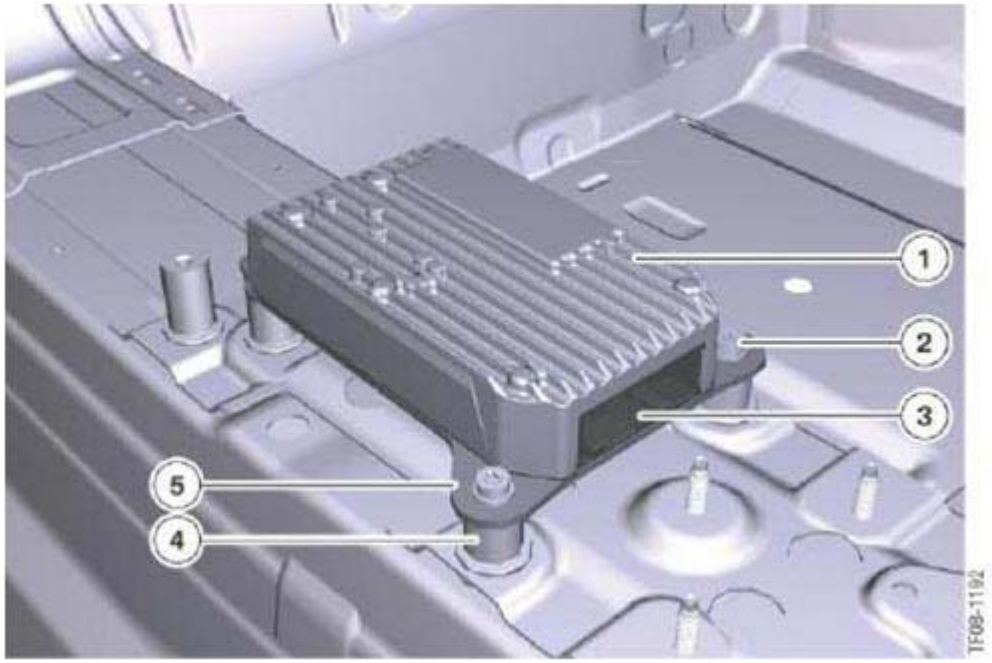
Fig. 156: Electrical Interfaces Of ICM Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Central gateway module
2	Dynamic Stability Control
3	Short-range radar (SRR) sensor, left
4	Long-range radar sensor (LRR)
5	Short-range radar sensor (SRR), right
6	DME control unit
7	ICM control unit
8	FlexRay routing and continuation without terminating resistor
9	Routing of FlexRay with terminating resistor
10	Routing of local CAN without terminating resistor
11	Routing of local CAN with terminating resistor
W	ICM control unit can be woken up
WUP	Wake-up line

Installation location

The ICM control unit is installed in the center console behind the sensor for the crash safety module. This means that the position of the control unit and its integrated sensor system in the vehicle -near to its center of gravity -is ideal from the point of view of driving dynamics. The mounting points on the body are precisely determined and are measured when the vehicle is manufactured and must not be replaced with any other mounting points.



Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Upper section of housing
2	Mounting bolt
3	Connector
4	Spacer sleeve
5	Lower section of housing

The housing of the control unit is connected to the metal body of the transmission tunnel with four screws and spacer sleeves made of aluminum. The control unit must be mounted on the vehicle body free of play as otherwise vibrations may be induced in the control unit housing which would severely impair the operation of the integrated sensor system. A secondary task of this mounting is to conduct heat away from the control unit to the body.

For the mounting to be able to perform these tasks, the following points must be observed when mounting and replacing the ICM control unit:

NOTE: Only screws and spacer sleeves that are in perfect condition may be used. Deformed or damaged fixing elements must not be used.
The mounting screws in the reamed holes must be tightened first, followed by the other two screws. The tightening torque specified in the repair instructions must be observed without fail.
A check must then be carried out to make sure the control unit is mounted securely and free of play.

To ensure sufficient heat dissipation and to avoid vibrations, the sides and top of the control unit housing must not come into contact with other vehicle components. Instead, the spaces provided around the control unit as part of the engineering design must always remain free of other components.

Removing and installing the ICM control unit

The ICM control unit performs tasks that are important for many vehicle functions, e. g. provision of sensor signals. If the vehicle were operated without the ICM control unit installed, a large number of vehicle functions would not be available. In the area of dynamic driving systems, for example, the Servotronic and stabilization functions would no longer be available. In addition, fault code memory entries would inevitably also be generated in many control units.

NOTE: If the ICM control unit needs to be replaced, the repair instructions must be observed without fail.
For example, the vehicle battery must be disconnected before removing the control unit and reconnected following the installation. This is the only way to ensure synchronized restarting of the control unit assembly.

NOTE: Once the new ICM control unit has been installed, it must be started up with the assistance of the diagnostic system. To do this, the following steps must be carried out (depending on the equipment specification):

- **Calibration of the sensors integrated into the ICM**
- **Calibration of the ride-height sensors**
- **Initialization of the Integral Active Steering.**

Commissioning the short-range radar sensors

In vehicles with the ACC Stop&Go option, the ICM control unit also plays an important role in the interaction with the short-range radar sensors.

Although short range radar sensors are intelligent sensors that perform the functions of a control unit they cannot be accessed directly via the diagnostic system. The ICM control unit acts as a "go-between" between the short range radar sensors and the diagnostic system which is why the ICM also controls the start-up process for the short range radar sensors.

NOTE: The short range radar sensors for ACC Stop&Go must be started up if one (or both) short range radar sensor(s) is/are replaced. In this instance, the diagnostic system communicates with the ICM control unit. The ICM in turn controls the corresponding functions in the short range radar sensors.

Display and Operating Controls

Driver assistance systems operating unit



Fig. 158: Identifying Driver Assistance Systems Operating Unit Buttons

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Function illumination
2	Button for the warning function of the Adaptive Brake Assistant

The driver assistance systems operating unit contains a button for switching the collision warning on and off. The operating unit is connected to the footwell module (FRM) on the LIN bus. A bus signal from the FRM notifies the ICM control unit when the button has been pressed.

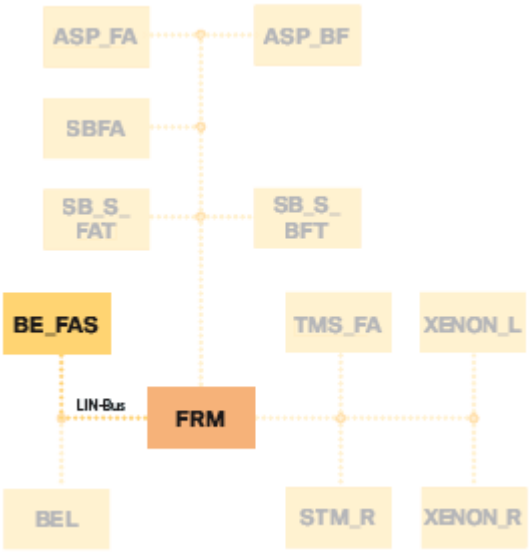


Fig. 159: LIN Bus Subscribers At Footwell Module
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
BE_FAS	Driver assistance systems operating unit
FRM	Footwell module

The ICM does not allow the collision warning to switch on unless the entire system is working faultlessly. It is only then that a bus signal providing positive feedback is sent to the FRM in order to have the function illumination in the button light up. If, however, a fault is present in any part of the entire system, the function illumination remains off even if the button is pressed. From this, the driver can infer that the collision warning is not available.

Multifunction steering wheel button pad

Which version of the MFL button pad on the left-hand spoke of the multifunction steering wheel is fitted

button pad on the right-hand spoke, which is the same regardless of whether the vehicle is equipped with DCC or ACC Stop&Go.

The operation and function of the buttons were described in the "functions" section.

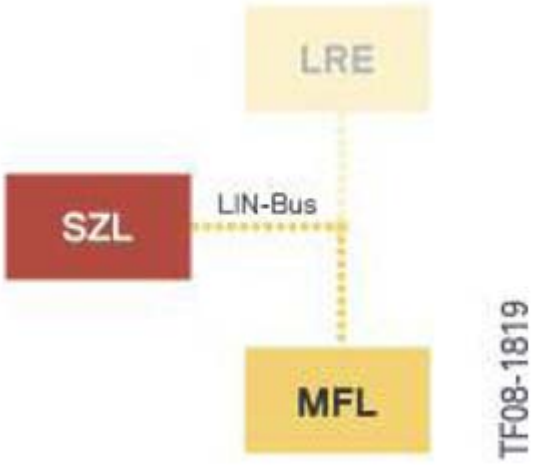


Fig. 160: LIN Bus Subscribers At Steering Column Switch Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
MFL	Multifunction steering wheel
SZL	Steering column switch cluster

The electronics of the multifunction steering wheel evaluate the button strokes on both MFL button pads. On the LIN bus, the signals are transmitted to the steering column switch cluster (SZL). The SZL forwards the button stroke signals to the ICM control unit on the FlexRay. This is where the signals for controlling the DCC and ACC Stop&Go function are evaluated.

There is no function illumination on the MFL button pad. For this reason, no feedback is sent by the ICM control unit to the MFL button pad as it is to the driver assistance systems operating unit.

TRANSMISSION

Clutch - Repair

2121 CLUTCH WITH DRIVING DISC

00..... PRECAUTIONARY MEASURES ON VEHICLES WITH ACTIVE PEDESTRIAN PROTECTION SYSTEM

WARNING: Danger to life!

Triggering the active pedestrian protection system while the engine compartment lid is open may cause serious injury by the retaining hooks.

Use protection systems when carrying out all work with bonnet open (front protective cover and head protection system retaining hook).

Cover front panel in area of engine compartment lid catches with protective cover (1).

Order number, protective cover 81 47 2 159 868.

Support engine compartment lid a suitable tool.

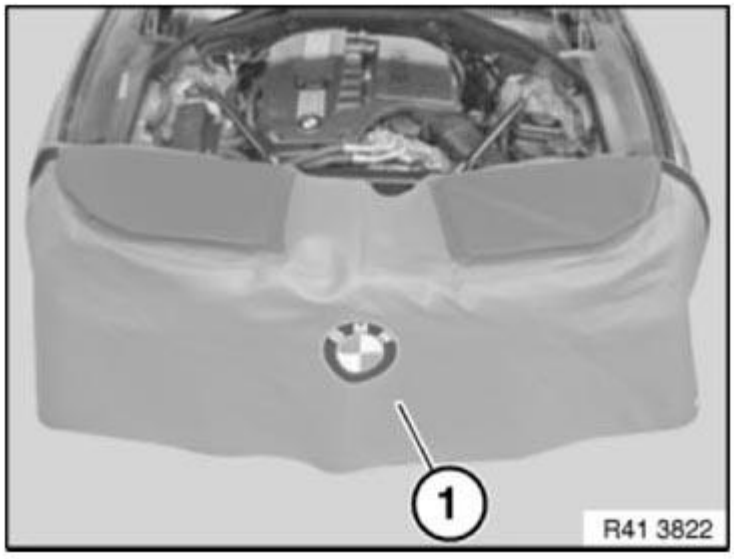


Fig. 1: Identifying Front Panel Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Use Velcro strips (2) to fasten head protection (1) to catch hook.

Order number for head protection catch hook (pair) 81 47 2 159 869.

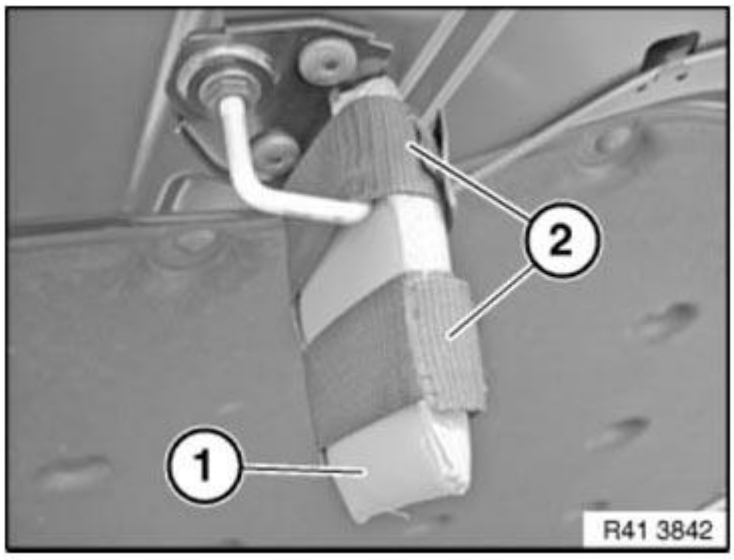


Fig. 2: Identifying Fasten Head Protection To Catch Hook With Velcro Strips
Courtesy of BMW OF NORTH AMERICA, INC.

1122513 REPLACING ROLLER BEARING FOR DUAL-MASS FLYWHEEL (N63)

Notes

NOTE: FLYWHEEL removed!

Using hydraulic press (1) and special tool 21 2 051, press roller bearing out of dual-mass flywheel downwards on engine side.

IMPORTANT: Risk of damage:
Roller bearing must not be driven out.

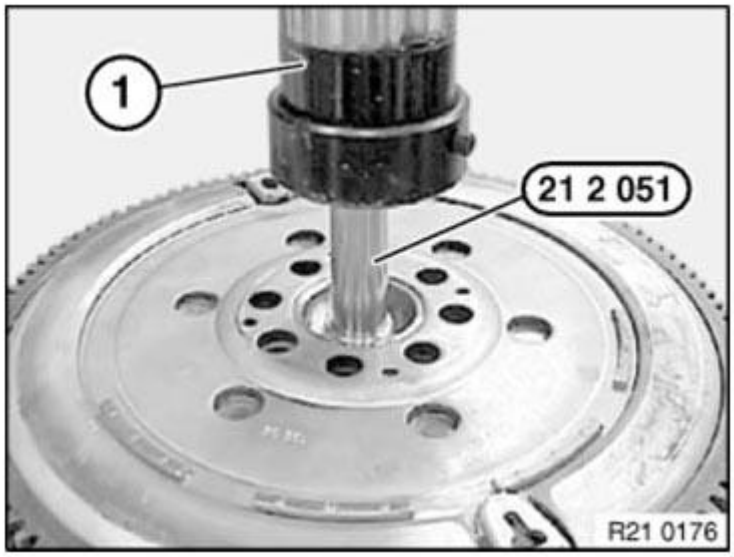


Fig. 3: Pressing Roller Bearing Into Dual-Mass Flywheel Using Special Tool 21 2 051 And Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.

Push roller bearing (2) onto special tool 21 2 052.

Using hydraulic press (1), press roller bearing into dual-mass flywheel as far as it will go on clutch side.

IMPORTANT: Risk of damage:
Observe press-in instruction:

- **Roller bearing must not be driven in.**
- **Roller bearing mounting force/travel monitored:**

  Min. 2000 N 1 mm before end of pressing in.

  Max. 15, 000 N during entire press-in procedure.GEAR SHIFT MECHANISM - REPAIR

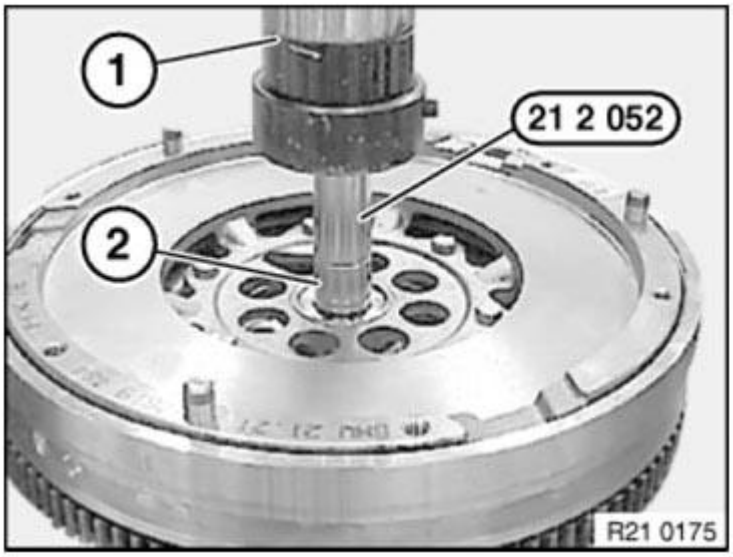


Fig. 4: Pressing Roller Bearing Into Dual-Mass Flywheel Using Special Tool 21 2 052 And Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.

SPECIFICATIONS INDEX

750Li

SPECIFICATIONS INDEX

750Li SPECIFICATIONS INDEX

System	Specification/Procedure
Air Conditioning	
Service	**TECHNICAL DATA**
Torque	**TIGHTENING TORQUES**
Axle Shaft Nut	
Rear	310 Ft. Lbs. (420 N.m)
Battery	**BATTERY**
Brakes	
Bleeding Sequence	RR, LR, RF, LF
Disc Brakes	**TECHNICAL DATA**
Torque	**TIGHTENING TORQUES**
Charging	
Generator	**ALTERNATOR**
Torque	**ALTERNATOR**
Drive Belts	
Adjustment	NA
Belt Routing	**DRIVE BELT FOR ALTERNATOR**
Engine Cooling	
General Service Specifications	**COOLING SYSTEM**
Radiator Cap Pressure	**RADIATOR**
Thermostat R & I	**THERMOSTAT AND CONNECTIONS**
Water Pump R & I	**WATER PUMP WITH DRIVE**
Engine Mechanical	
Compression	**ENGINE IN GENERAL**
Oil pressure	Oil pressure should be more than 14 psi (96 kPa) at idle and 58-87 psi (400-600 kPa) control pressure.
Overhaul	**TECHNICAL DATA**
Torque	**TIGHTENING TORQUES**
Fluid Specifications	See FLUIDS under MAINTENANCE tab. From within Manager or Service Writer, click the "30/60/90 Interval" or Maint." button.
Flywheel/Flex Plate Torque	**FLYWHEEL**
Fuel System	
Fuel Filter Location	On left frame rail and in fuel tank

Fuel Filter R & I	**REPLACING OUTER FUEL FILTER** or **FUEL FILTER WITH PRESSURE REGULATOR**
Pressure Release Procedure	NA
Pressure Specification	75 psi (517 kPa)
Fuel Pressure Test Procedure	**FUEL PRESSURE**
Ignition	
Firing Order & Cylinder Identification	**FIRING ORDER & CYLINDER IDENTIFICATION**
Ignition Wires (Routing)	Coil on plug
Spark Plug	
Type	NGK BKR 6EQUP
Gap	Spark plug gap is not adjustable.
Torque	23 Ft. Lbs. (31 N.m)
Starting	
Starter	**STARTER**
Torque	**STARTER**
Wheel Alignment	
Adjustment Specifications	**TECHNICAL DATA**
Torque	**TIGHTENING TORQUES**
Wheel & Tire	
Wheel Lug Nut Torque	103 Ft. Lbs. (140 N.m)

ACCESSORIES AND BODY, CAB

Communication Systems - Repair

8410 CELLULAR TELEPHONE

84 10 810 REMOVING AND INSTALLING (REPLACING) TELEMATIC COMMUNICATION BOX

IMPORTANT: Read and comply with notes on protection against electrical damage (ESD PROTECTION) .

Comply with notes and instructions on **HANDLING OPTICAL FIBRES** .

Necessary preliminary work:

- Clamp off **BATTERY NEGATIVE LEAD** .
- Remove **LEFT LUGGAGE COMPARTMENT WHEEL ARCH PANEL** .
- For F10: Partially remove luggage compartment wheel arch trim on left.

Unscrew nuts (1).

Tightening torque: 6, 0 Nm

Release screw (2).

Tightening torque: 6, 0 Nm

Remove holder and Telematic Communication Box (3) in direction of arrow.

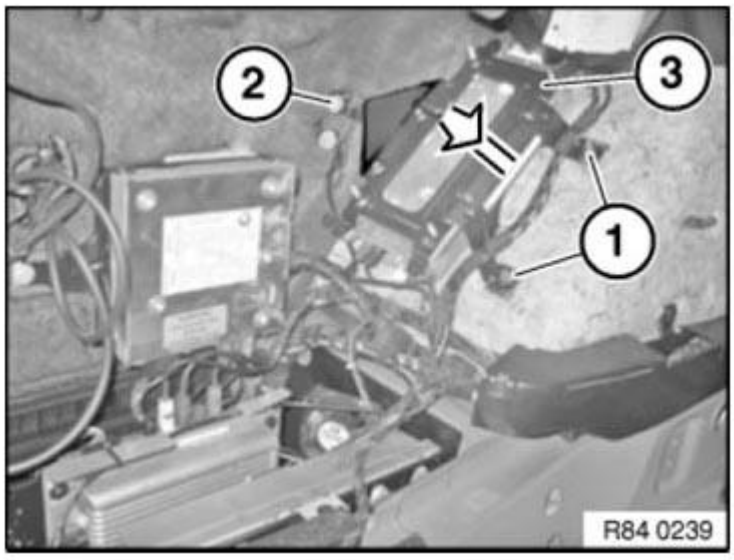


Fig. 1: Removing TCU Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Graphic similar

Unlock and disconnect all plug connections in area (1).

Release all nuts (2).

Tightening torque: 3, 3 Nm

Remove Telematic Communication Box (3) from holder.

Installation note:

Note color coding of plug connection.

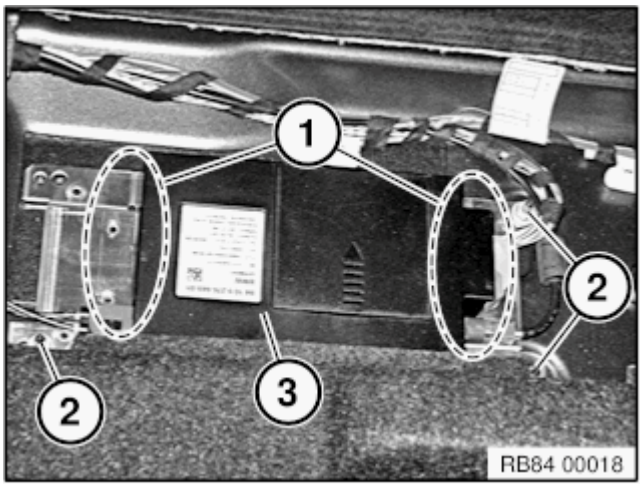


Fig. 2: Identifying Telematic Communication Box, Connectors, And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **VEHICLE PROGRAMMING/ENCODING** .

84 10 050 REMOVING AND INSTALLING (REPLACING) USB HUB

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work

- Remove **TRIM PANEL FOR DOOR PILLAR, (BOTTOM) LEFT**

Disconnect plug connection (1).

Release screws (2) and remove USB hub (3).

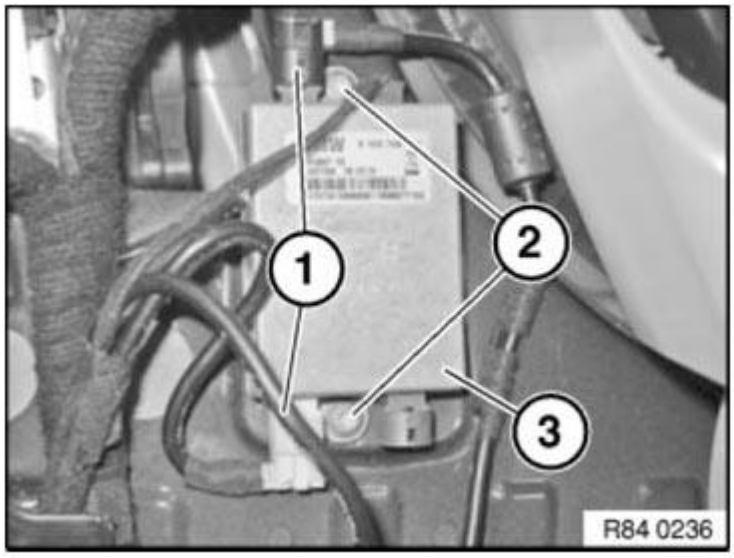


Fig. 3: Identifying Plug Connection With USB Hub And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING/ENCODING** .

84 10 705 REMOVING AND INSTALLING/REPLACING BASE PLATE

Necessary preliminary tasks

- Remove **CENTRE ARMREST STORAGE COMPARTMENT**

NOTE: Unlock base plate (1) and fold upwards.

Unfasten screws (2).

Feed out base plate (1) and remove.

Installation:

Ensure correct cable routing in base plate (1).

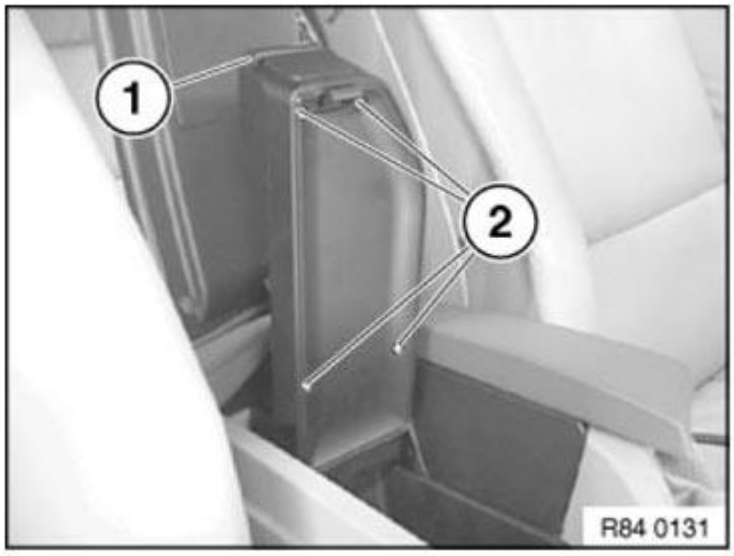


Fig. 4: Identifying Base Plate With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

84 10 720 REMOVING AND INSTALLING/REPLACING BASE PLATE (IN CENTER ARMREST AT REAR)

Necessary preliminary tasks

- Fold down center armrest
- Open upper armrest section

Slide in special tool 00 9 341 as pictured and release catch.

Remove base plate (1) in direction of arrow.

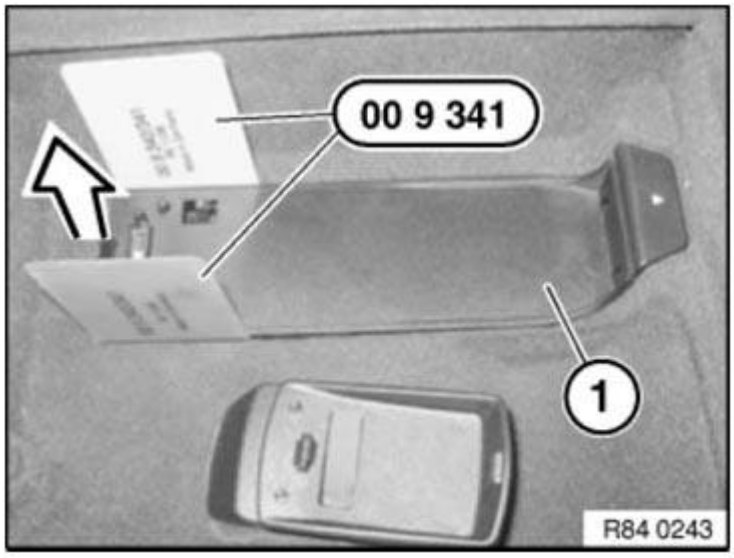


Fig. 5: Removing Base Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect, remove base plate.

Installation:

Catches (2) must not be damaged.

Ensure correct routing of cables.

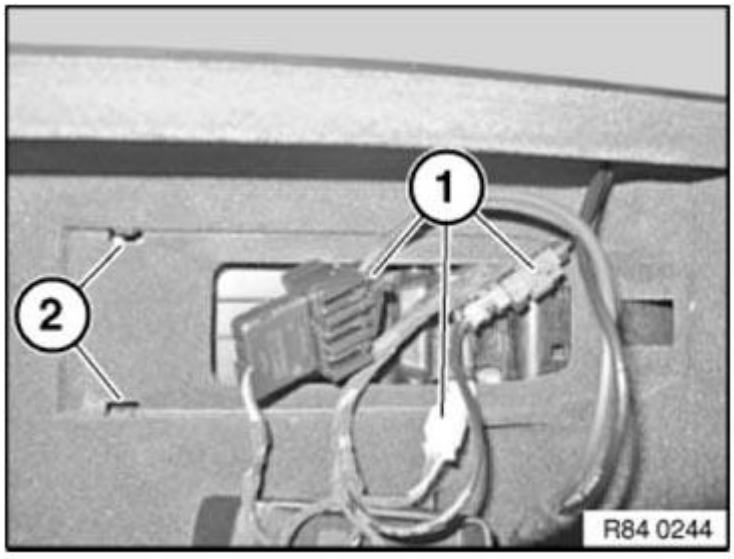


Fig. 6: Identifying Plug Connections And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

8411 TRANSCEIVER, HANDSET+SUPPORT, CARD READER

84 10 810 REMOVING AND INSTALLING (REPLACING) TELEMATIC COMMUNICATION BOX

See **REMOVING AND INSTALLING (REPLACING) TELEMATIC COMMUNICATION BOX**.

84 11 660 REMOVING AND INSTALLING/REPLACING TELEMATIC CONTROL UNIT (TCU) (SA633/SA639)

IMPORTANT: Read and comply with notes on protection against electrical damage (ESD PROTECTION) .

NOTE: Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM**
- Partially remove wheel arch panel left at F10

Unscrew nuts (1).

Release screw (2).

Remove TCU holder (3) in direction of arrow.

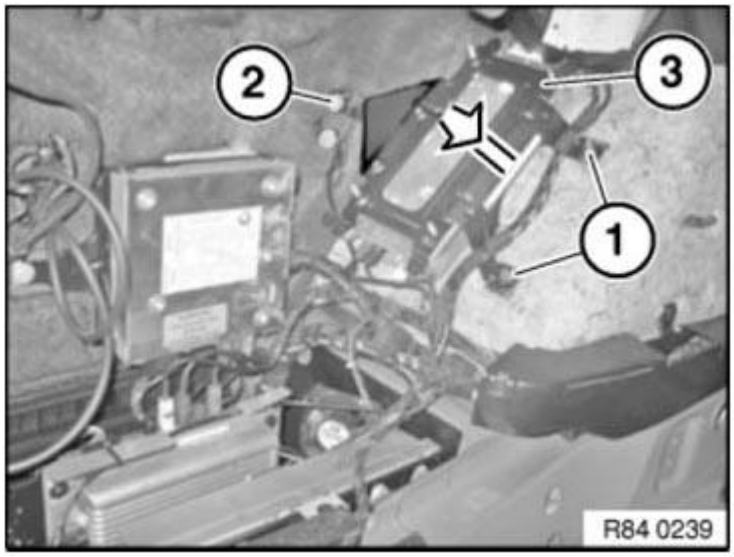


Fig. 7: Removing TCU Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Unfasten aerial plug (2) and disconnect.

Release all nuts.

Remove TCU (3) from holder (4).

Installation:

Observe color coding of aerial plugs (2).

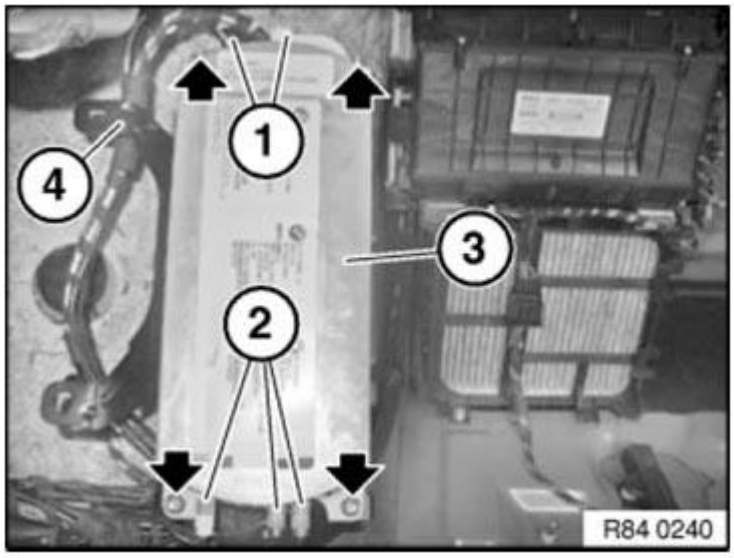


Fig. 8: Identifying Plug Connections, Aerial Plug With TCU And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out **VEHICLE PROGRAMMING/ENCODING**

84 31 550 REMOVING AND INSTALLING/REPLACING HANDS-FREE MICROPHONE, DRIVER'S SIDE

Lever out microphone cover (1) at front in direction of arrow.

Disconnect plug connection underneath and remove microphone cover (1).

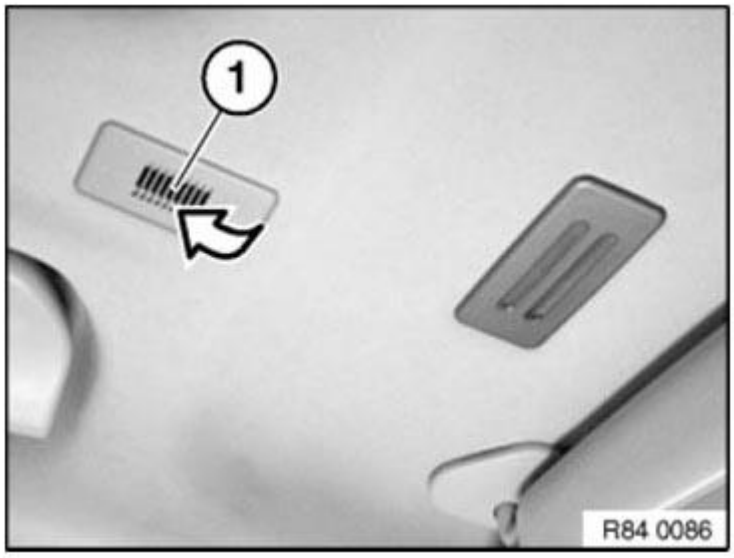


Fig. 9: Removing Microphone Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock retaining lug (1) and feed out hands-free microphone (2) in direction of arrow.

Installation note:

Arrow on hands-free microphone (2) points in direction of travel.

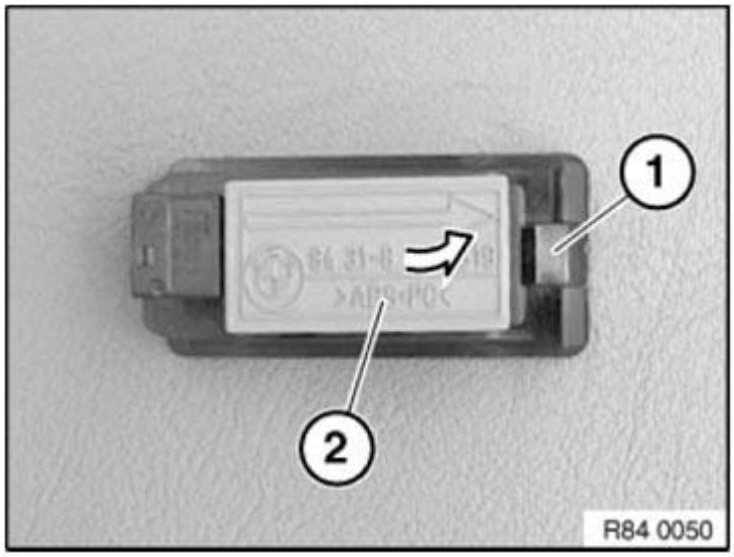


Fig. 10: Removing Hands-Free Microphone
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Disconnecting the plug connection for the handsfree microphone or emergency call button results in fault memory entries in the telephone control

unit (limitation in the emergency call system).

After fitting, read out fault memory and if necessary delete entries.

84 31 551 REMOVING AND INSTALLING/REPLACING HANDS-FREE MICROPHONE, PASSENGER SIDE

Operation is described in:

Removing **HANDS-FREE MICROPHONE, DRIVER'S SIDE**

8421 HANDHELD COMPUTER

84 21 542 REMOVING AND INSTALLING (REPLACING) HANDSFREE CHARGING ELECTRONICS (HIGH)

Operation is described in:

REMOVING AND INSTALLING (REPLACING) HANDSFREE CHARGING ELECTRONICS (OPTIONAL EXTRA SA644)

Replacement

- Carry out **VEHICLE PROGRAMMING/ENCODING**

84 21 535 REMOVING AND INSTALLING (REPLACING) HANDSFREE CHARGING ELECTRONICS (OPTIONAL EXTRA SA644)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

NOTE: Comply with notes and instructions on HANDLING OPTICAL FIBRES .

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM**
- Partially remove wheel arch panel left at F10

Unlock plug connections (1) and disconnect.

Unscrew nuts (2).

Remove hands-free charging electronics (3).

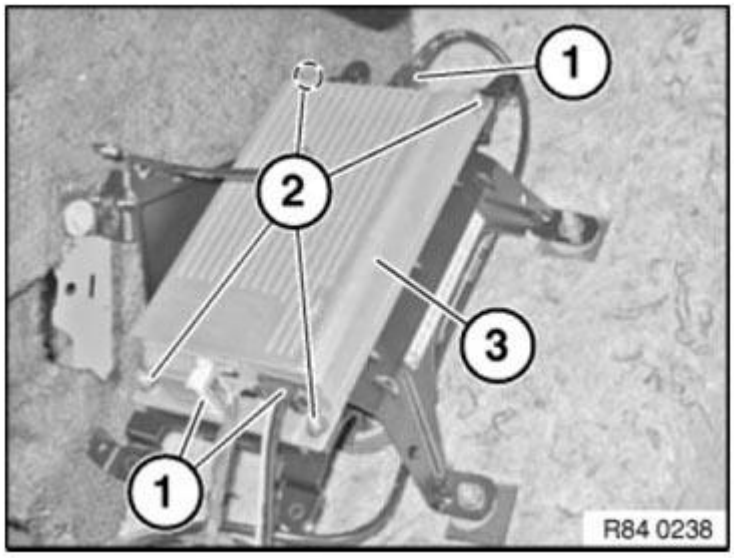


Fig. 11: Identifying Hands-Free Charging Electronics With Plug Connections And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out **VEHICLE PROGRAMMING/ENCODING**
- If necessary, log mobile phone on to vehicle

84 21 545 REMOVING AND INSTALLING/REPLACING HANDS-FREE CHARGING ELECTRONICS (HIGH) (USB/AUDIO INTERFACE) (OPTION SA633/SA639)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

NOTE: Comply with notes and instructions on HANDLING OPTICAL FIBRES .

Necessary preliminary work

- Clamp off **BATTERY NEGATIVE LEAD**
- Disconnect both negative battery cables for F03
- Remove **LEFT LUGGAGE COMPARTMENT WHEEL ARCH PANEL**
- If necessary, remove **AMPLIFIER** (without F03)

Unlock plug connections (1) and disconnect.

Unfasten screws (2).

Remove hands-free charging electronics (3).

Installation note:

Make sure plug connections are correctly engaged.

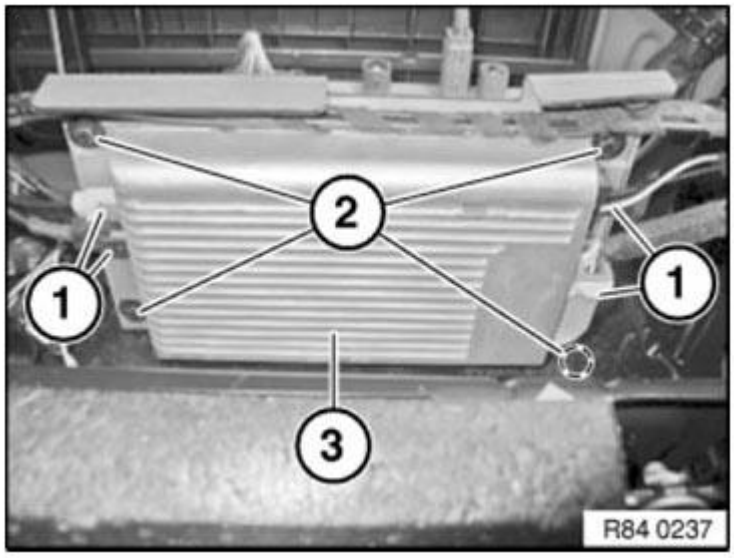


Fig. 12: Identifying Hands-Free Charging Electronics With Plug Connections And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out **VEHICLE PROGRAMMING/ENCODING**

8431 HANDS-FREE SYSTEM, MICROPHONE, SPEAKER

84 31 550 REMOVING AND INSTALLING/REPLACING HANDS-FREE MICROPHONE, DRIVER'S SIDE

Lever out microphone cover (1) at front in direction of arrow.

Disconnect plug connection underneath and remove microphone cover (1).

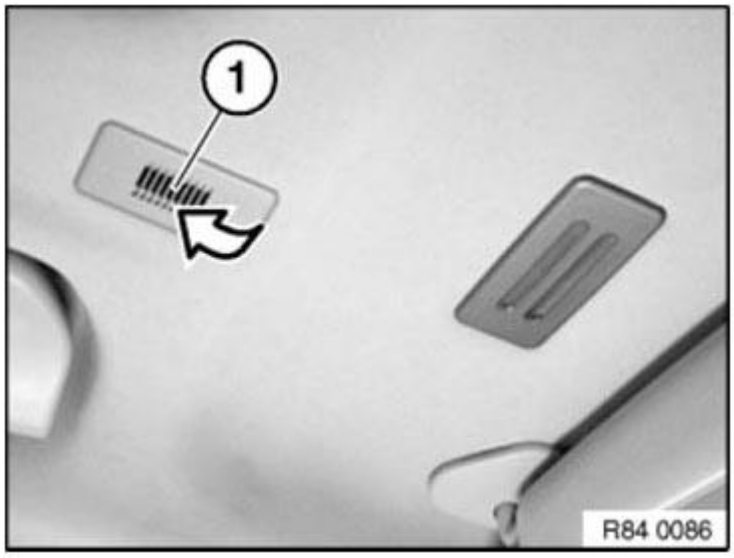


Fig. 13: Removing Microphone Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock retaining lug (1) and feed out hands-free microphone (2) in direction of arrow.

Installation note:

Arrow on hands-free microphone (2) points in direction of travel.

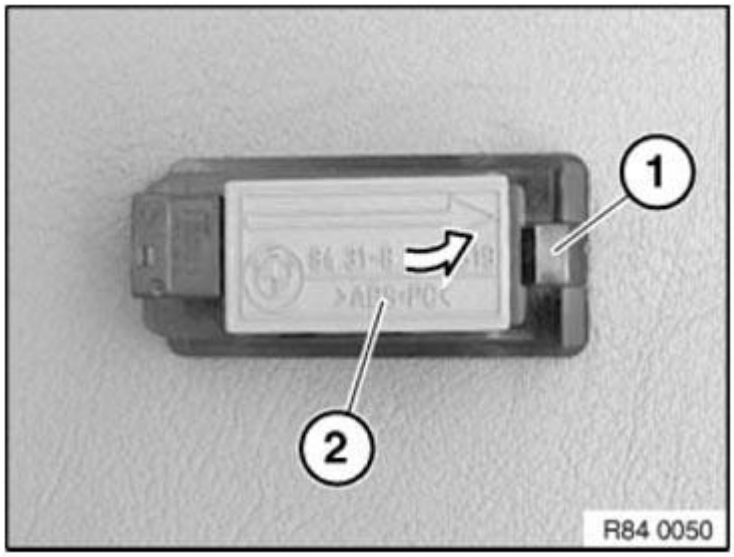


Fig. 14: Removing Hands-Free Microphone
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Disconnecting the plug connection for the handsfree microphone or emergency call button results in fault memory entries in the telephone control

unit (limitation in the emergency call system).

After fitting, read out fault memory and if necessary delete entries.

84 31 551 REMOVING AND INSTALLING/REPLACING HANDS-FREE MICROPHONE, PASSENGER SIDE

Operation is described in:

Removing **HANDS-FREE MICROPHONE, DRIVER'S SIDE**

84 31 020 REMOVING AND INSTALLING/REPLACING HANDS-FREE SYSTEM SPEAKER

Necessary preliminary work

- Remove trim panel for pedal assembly. See **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (US ONLY)** .

Disconnect plug connection (1).

If necessary, release cable straps from latch mechanisms (2).

Unlock latch mechanisms (2) and remove speaker (3) from mounting.

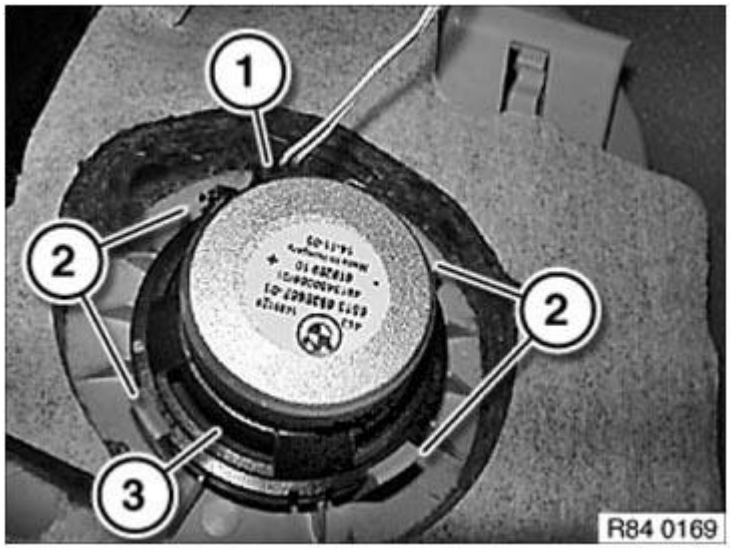


Fig. 15: Identifying Speaker, Latch Mechanisms With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Latch mechanisms (2) must not be damaged.

Guide lugs of mounting must be seated in grooves of speaker (3).

Speaker (3) must snap audibly into place in mounting.

8450 ANTENNA

84 50 060 REMOVING AND INSTALLING/REPLACING BLUETOOTH AERIAL (UP TO 03/2010)

Necessary preliminary tasks

- Remove **BOTH TRIM PANELS FOR ROOF PILLAR**
- Remove **BOTH REAR GRAB HANDLES**
- Remove **INTERIOR ROOF LIGHT**
- Remove **UPPER B-PILLAR TRIM**
- Remove **BOTH FRONT GRAB HANDLES**

Remove auxiliary brake light trim (1) in direction of arrow from headlining (2).

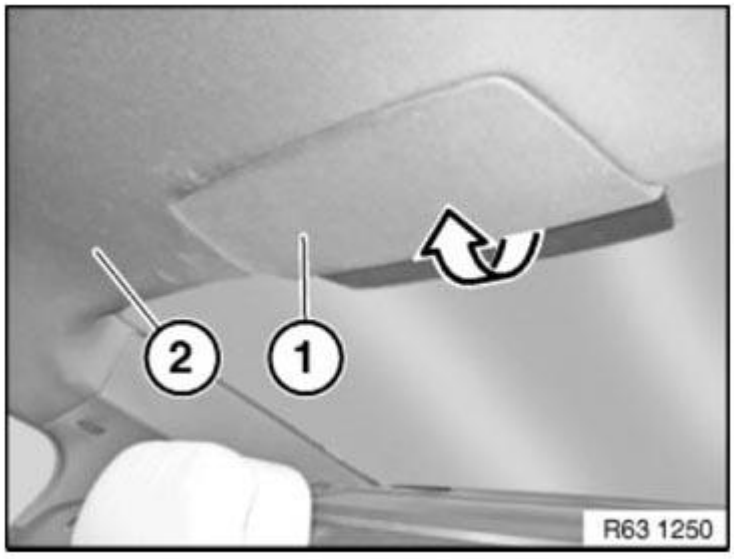


Fig. 16: Removing Auxiliary Brake Light Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip headlining.

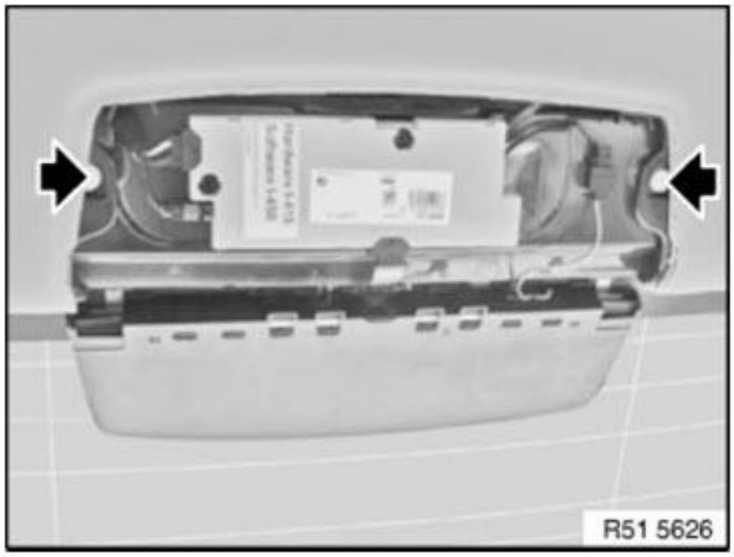


Fig. 17: Locating Headlining Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).



Fig. 18: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Partially lower headlining (1).

Installation note:

Make sure edge protection (2) is correctly seated.

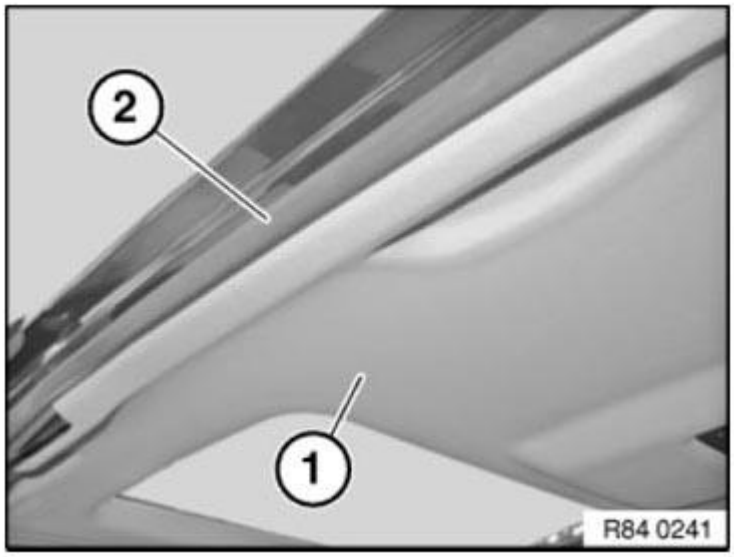


Fig. 19: Identifying Lower Headlining And Edge Protection
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unclip Bluetooth aerial (2) and remove.

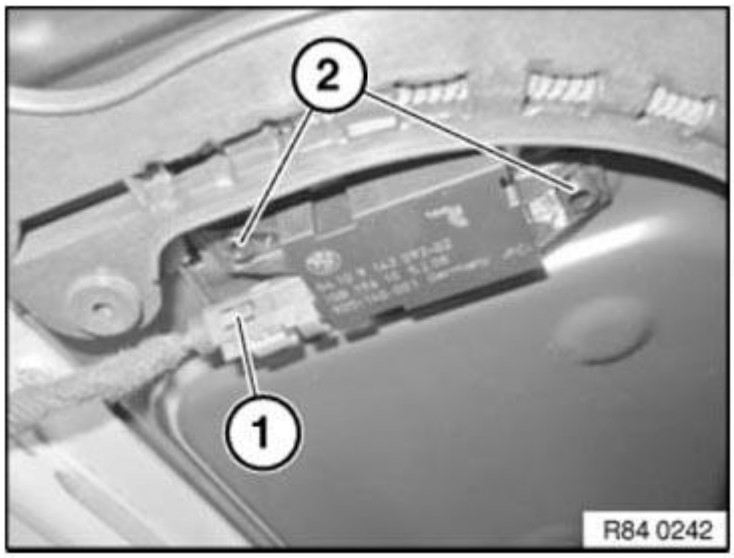


Fig. 20: Identifying Bluetooth Aerial And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

84 50 060 REMOVING AND REFITTING/REPLACING BLUETOOTH AERIAL (03/2010 ON)

Necessary preliminary tasks

Remove **REAR LEFT DOOR SILL COVER STRIP**

Lay floor trim (1) to one side.

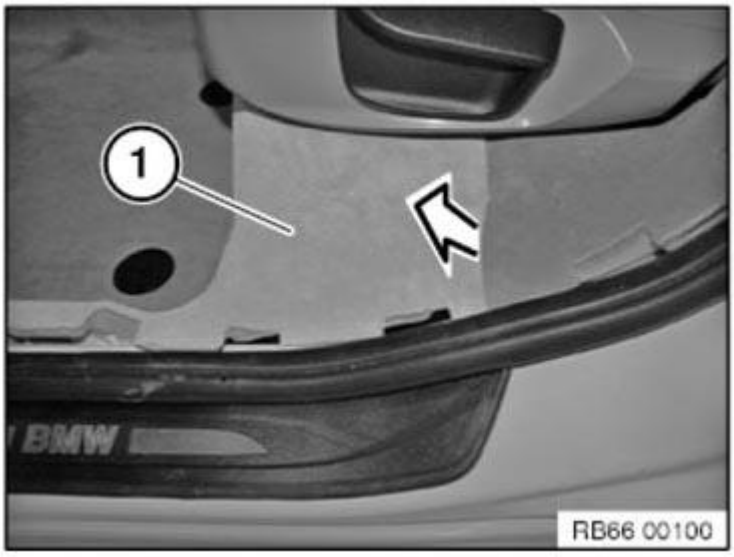


Fig. 21: Laying Floor Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip Bluetooth aerial (1) in direction of arrow.

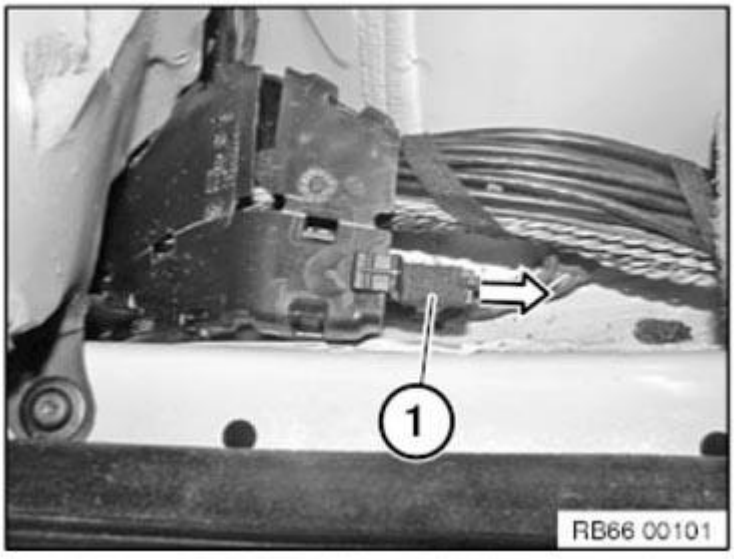


Fig. 22: Removing Bluetooth Aerial
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Bluetooth aerial lead is connected to Telematic Control Unit/Combox.

F01, F02, F03, F04, F10, F11, F18

Telematic Control Unit/Combox is located underneath **LUGGAGE COMPARTMENT LEFT WHEEL ARCH PANEL**

F07

Telematic Control Unit/Combox is located underneath spare wheel well front trim panel

Expose Bluetooth aerial lead to Telematic Control Unit/Combox and unplug connector.

65 20 030 REMOVING AND INSTALLING/REPLACING EMPTY HOUSING FOR ROOF-MOUNTED AERIAL

Notes

WARNING: Risk of injury!

Special tool has sharp edges!

Adapt working height to vehicle height with non-tilting and non-slip platform.

Handle special tool correctly and make sure it is positioned without tilting or slipping on the vehicle.

Risk of damage!

In order to prevent dents in the roof, do not exert any pressure on the roof.

IMPORTANT: Note to customer:

In order to guarantee a permanent connection and adhesive curing:

After bonding the empty housing for the roof-mounted aerial, wait 24 hours before driving the vehicle through a car wash.

NOTE: Clean roof.

Mask roof (2) around empty housing for roof-mounted aerial (3) with yellow plastic adhesive tape (1). To do so, slide plastic adhesive tape under empty housing (3) slightly.

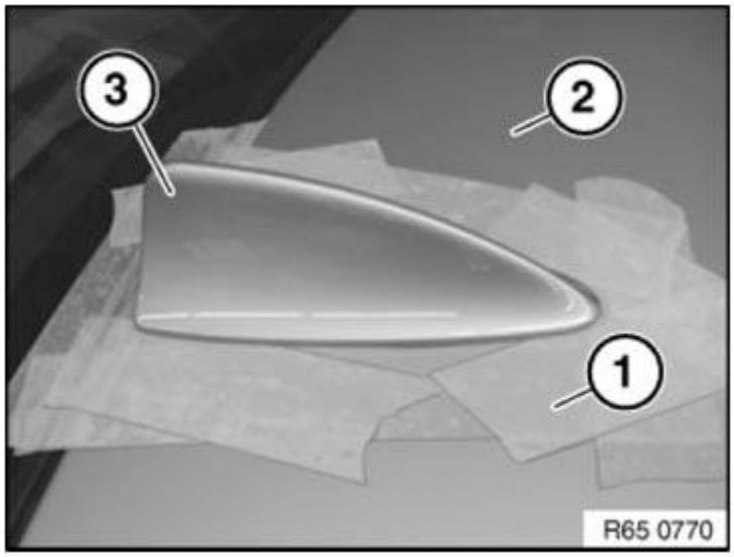


Fig. 23: Identifying Roof With Adhesive Tape And Housing
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Make sure your arms do not cross over (1) when holding special tool 65 2 010 .

Pull handle must always be ahead of the guiding hand (2).

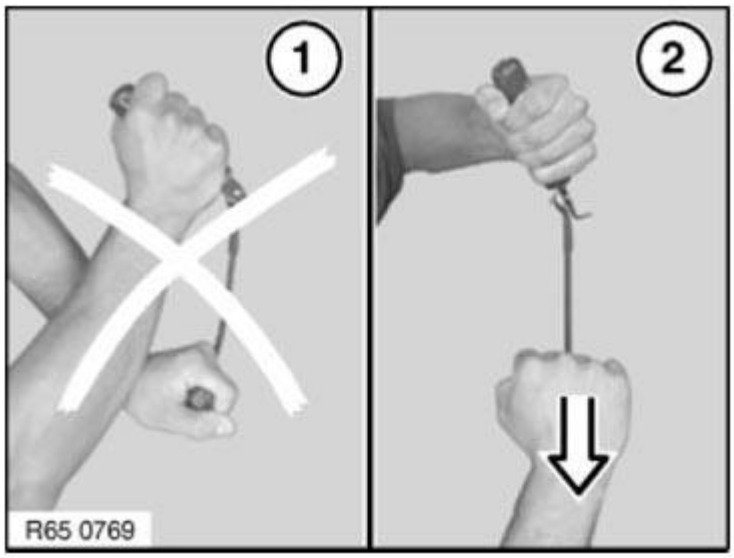


Fig. 24: Identifying Proper Position Of Holding Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

To avoid damaging the paintwork on the roof and empty housing (3), do not fit special tool 65 2 010 skew.

Cut through adhesive bead all round with special tool **65 2 010** .

Pull on handle (1) and align blade on handle (2).

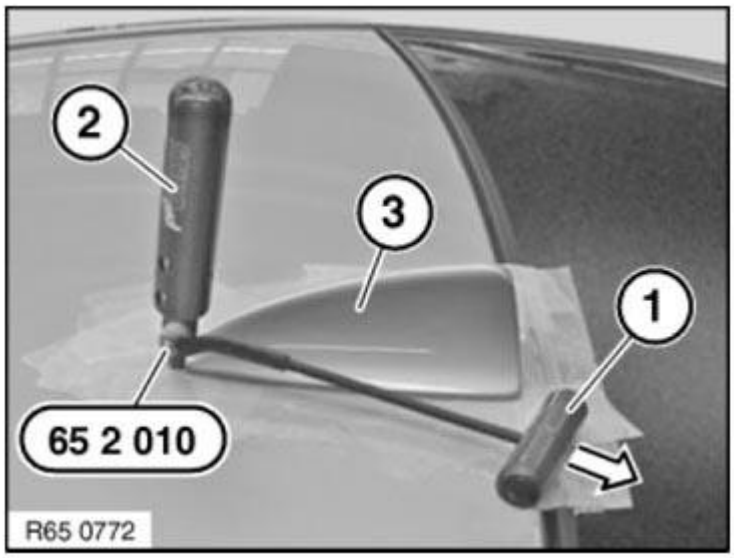


Fig. 25: Cutting Adhesive Bead Using Special Tool 65 2 010
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Use sharp blades only. Replace blade if necessary.

- Refer to **65 2 010** .

Remove empty housing (3).

Installation

- Empty housing for roof-mounted aerial is secured with window glass adhesive. All preparatory operations correspond to the **WINDOW CEMENTING INSTRUCTIONS** .

NOTE: Replace empty housing for roof-mounted aerial if centering pins (1) on empty housing are damaged.

Bonding surface (2) must be clean and free from grease.

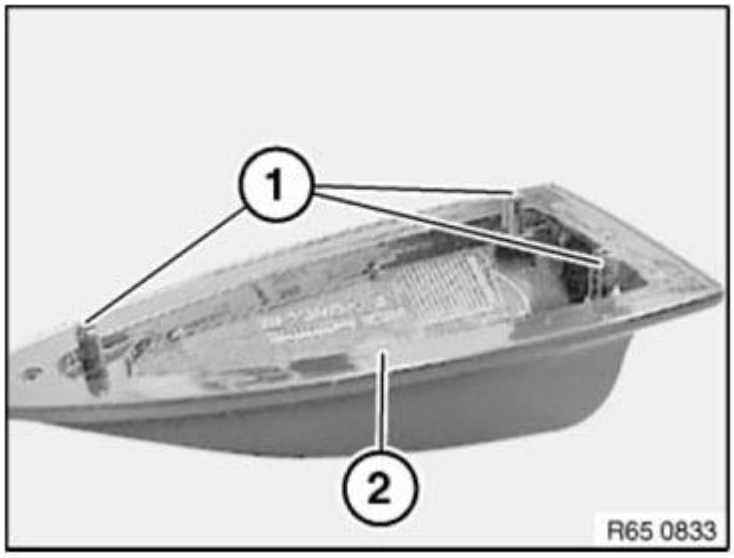


Fig. 26: Identifying Centering Pins And Bonding Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Position two spacers (1) on cleaned empty housing.

Dimensions:

A. 10 mm
B. 14 mm

Position spacer (2) centrally and flush with shoulder of adhesive flange.

IMPORTANT: Use spacers without fail!

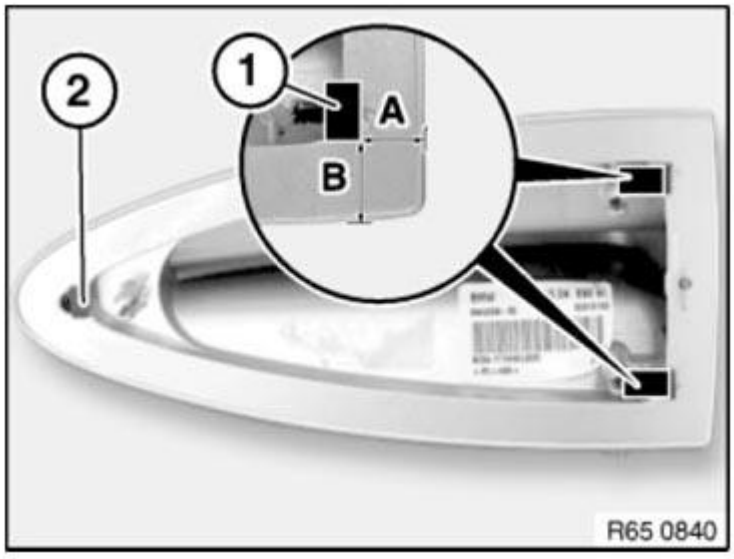


Fig. 27: Identifying Spacer Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Apply trace of adhesive bead all round outer contour as follows.

Distance between adhesive bead and edge of aerial cover:

A. 6.5 mm ±1 mm

Start and end of bead trace must have an overlap length of max. 10 mm.

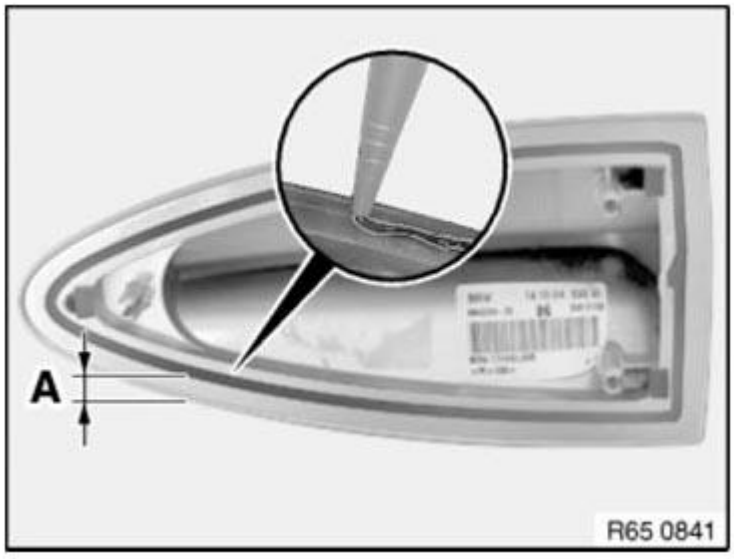


Fig. 28: Identifying Distance Between Adhesive Bead And Edge Of Aerial Cover
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To prevent the adhesive from escaping, the adhesive bead diameter must not exceed max. 2.5 mm to 4.5 mm.

NOTE: Attach the empty housing coated with adhesive by hand. To spread the adhesive better, move the housing back and forth horizontally slightly when pressing down.

Secure empty housing if necessary with adhesive tape and press down uniformly.

After bonding, leave vehicle to stand for at least 3 hours at room temperature.

ENGINE

Cooling System - Repair

1700 COOLANT, CHECKING COOLING SYSTEM

17..... BLEED AND FILL THE COOLING SYSTEM FOR THE CHARGE AIR COOLER WITH THE VACUUM FILLING UNIT

See **VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT**.

1700009 CHECKING COOLING SYSTEM FOR WATERTIGHTNESS (N54, N63)

Notes

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

Protective measures/rules of conduct

- Wear safety goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of skidding due to coolant on the floor.
Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

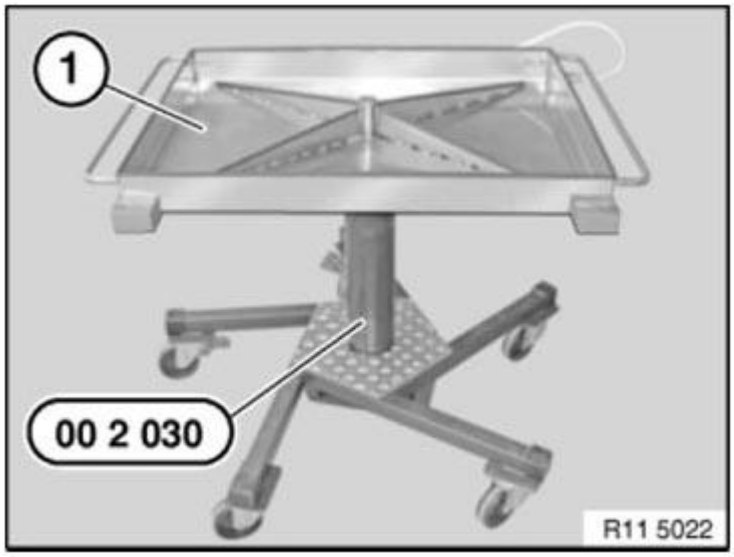


Fig. 1: Lifting Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open the sealing cap on the coolant expansion tank. Fit special tools (1) 17 0 101 and (2) 17 0 113.

Build up **EXCESS PRESSURE** , wait approx. 2 minutes.

Cooling system is impervious to watertightness if pressure drop is max. 0.1 bar.

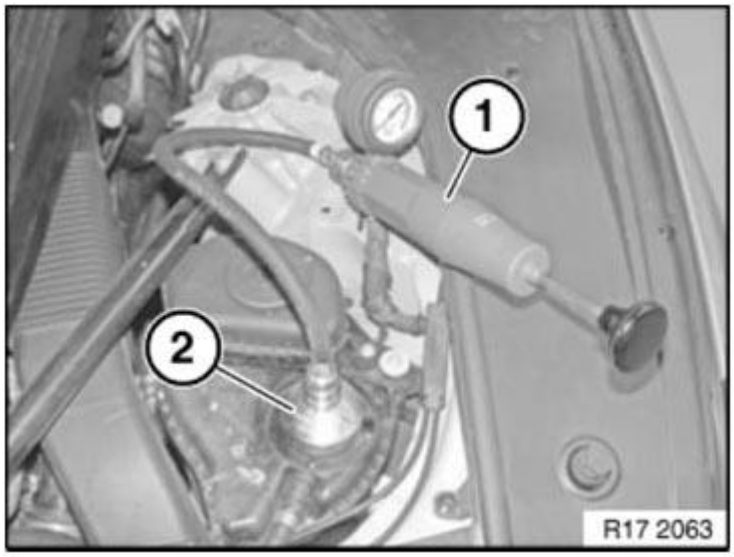


Fig. 2: Checking Pressure Drop In Cooling System Using Special Tools (17 0 101 And 17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in sealing cap

NOTE: While the driving at high ambient temperatures, the design may cause the pressure relief valve in the sealing cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves toes when the vehicle has cooled down. These toes do not indicate whether the sealing cap is defective or not. When the vehicle has been in standstill for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the sealing cap to stick; therefore repeat the test procedure for the sealing cap 2 to 3 times.
Replace the sealing cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in sealing cap

Screw sealing cap (1) onto special tool 17 0 114.

Build up pressure with special tool (hand pump) 17 0 101; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

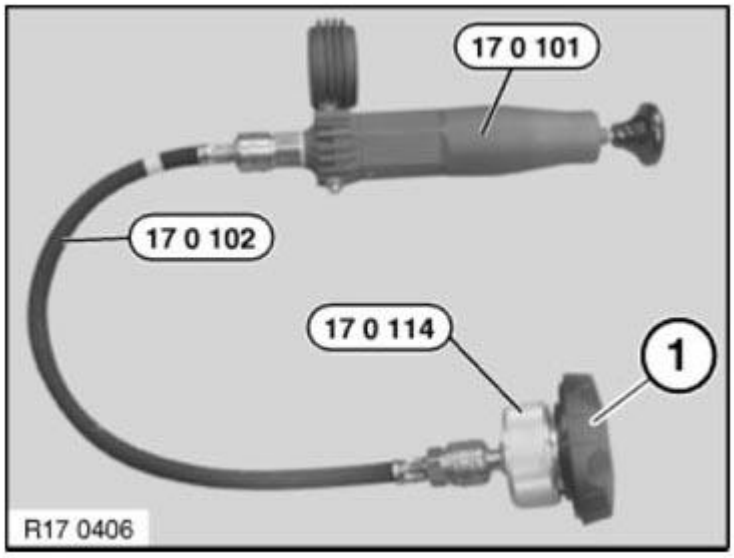


Fig. 3: Checking Pressure Relief Valve In Screw Cap Using Special Tool (17 0 114)
Courtesy of BMW OF NORTH AMERICA, INC.

1700005 DRAINING AND ADDING COOLANT (N63)

Notes

WARNING: Risk of scalding!

The repair work on the cooling system should only be carried out on an engine that has cooled down!

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

Installation note:

Use only recommended coolant and observe mixture ratio. See **COOLING SYSTEM - OPERATING FLUIDS** .

Protective measures/rules of conduct

- Wear safety goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: For dirt contamination of the cooling system (e.g. by engine oil), the cooling system must be rinsed with water until all dirt contamination is removed!

IMPORTANT: Risk of skidding due to coolant on the floor.
Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

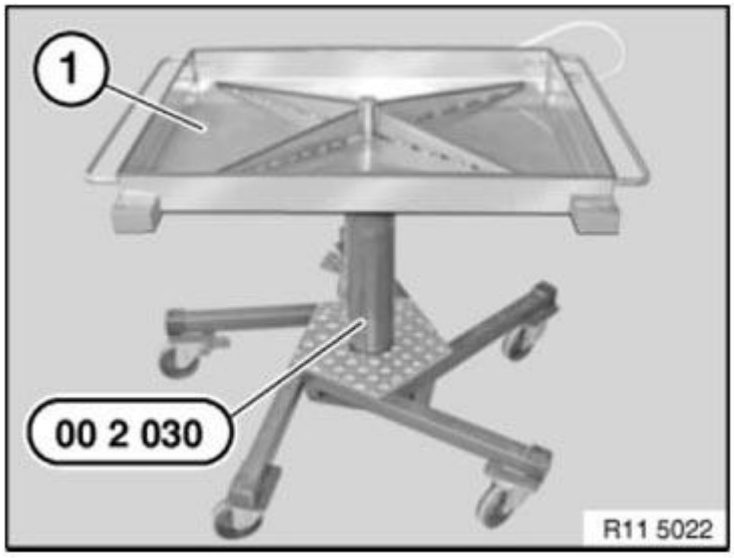


Fig. 4: Lifting Of Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary work

- Remove front **UNDERBODY PROTECTION** .

Draining coolant

Open sealing cap (1) on coolant expansion tank.

Installation note:

Close the sealing cap (1) until the arrows line up.

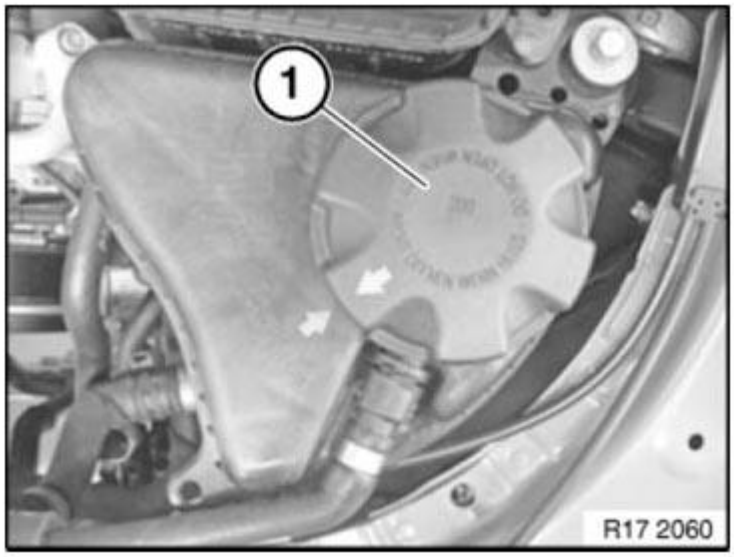


Fig. 5: Identifying Coolant Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, the fan cowl is shown removed.

Unlock and detach coolant hose (1) from radiator.

Drain, catch and dispose of coolant.

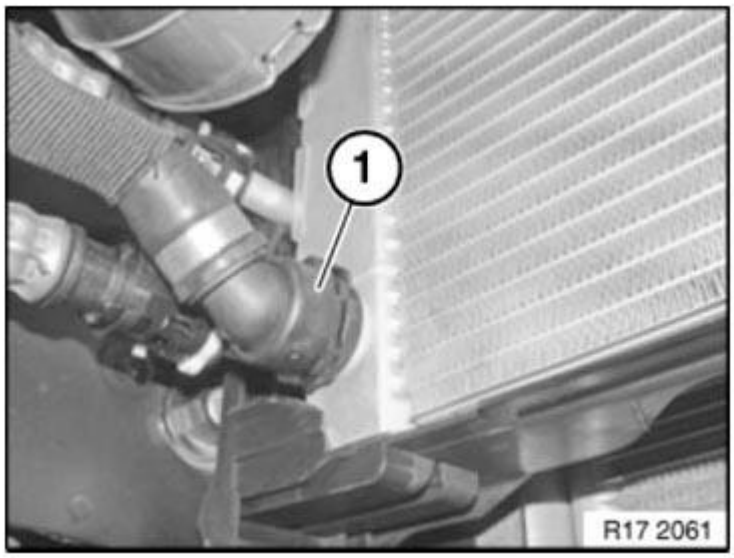


Fig. 6: Identifying Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant

Use only recommended coolant and observe mixture ratio. See **COOLING SYSTEM - OPERATING FLUIDS** .

Observe **FILLING CAPACITIES** .

Fill and vent **COOLING SYSTEM** .

Observe bleeding instructions without fail

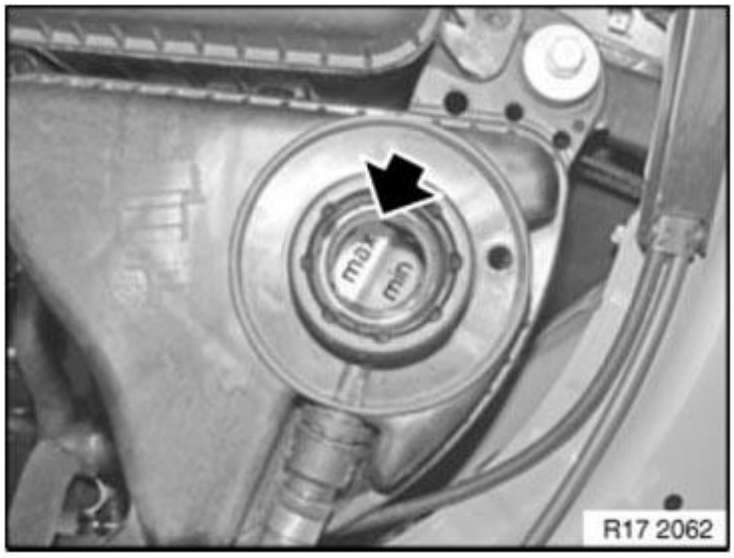


Fig. 7: Identifying Coolant Level
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

CHECK COOLING SYSTEM FOR LEAKS .

1700... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM

WARNING: Danger of scalding! Work on the cooling system should only be carried out when the engine has cooled down.

IMPORTANT: Wear protective gloves and safety goggles.

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant.
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: Open cooling system only when it has cooled down.
Opening the cooling system while hot can result in air entering the system. This can cause overheating with permanent damage to the engine.

IMPORTANT: You must protect the alternator against contamination before carrying out any work on the cooling circuit.

Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Do not fill coolant expansion tank over MAX level as overfilling will cause the coolant to overflow. This may give rise to traces of residual coolant on the expansion tank or in the engine compartment and wrongly suggest possible leakages.

Recycling

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

NOTE: To disconnect coolant hoses, use commercially available disconnect tools such as HAZET brand tools (see table).

HAZET TOOL DESCRIPTION CHART

HAZET no.:	Description
4590-1	Disconnect tool, length (mm): 150
4590-2	Disconnect tool, length (mm): 180
4590-3	Disconnect tool, length (mm): 253
4590/2	Disconnect/plier set
4590/3	Disconnect/plier set

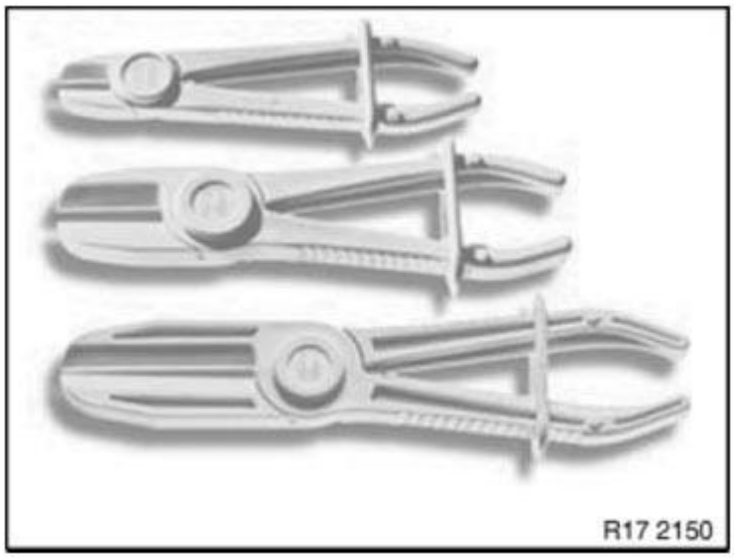


Fig. 8: Identifying Disconnect Tools
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Tightening torque, hose clamps 17 00 1AZ .

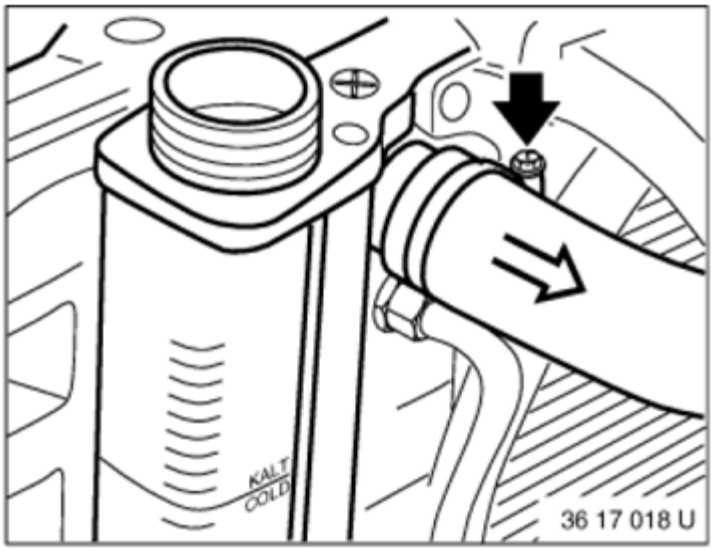


Fig. 9: Disconnecting Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Instructions for disassembly/assembly of coolant hose quick-connect couplings

Disassembly of quick-connect coupling

Pull out lock (1) and (2). Pull off hose.

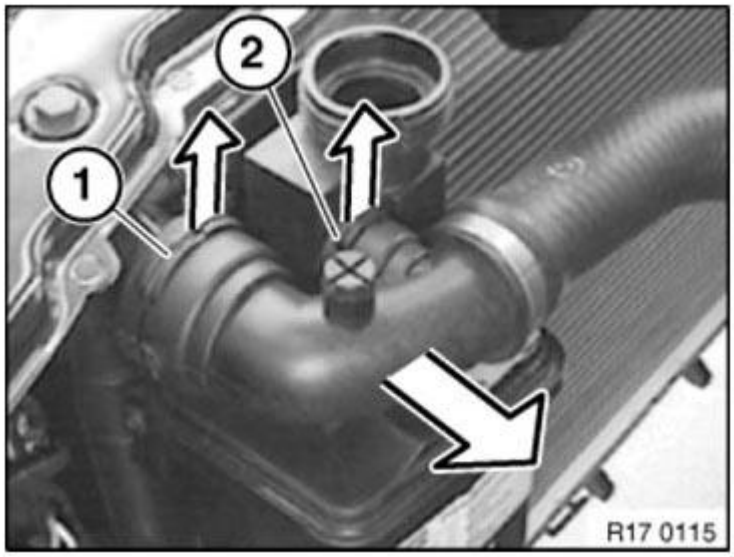


Fig. 10: Disassembling Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check O-rings (1).

Do not coat O-rings (1) with anti-seize agent.

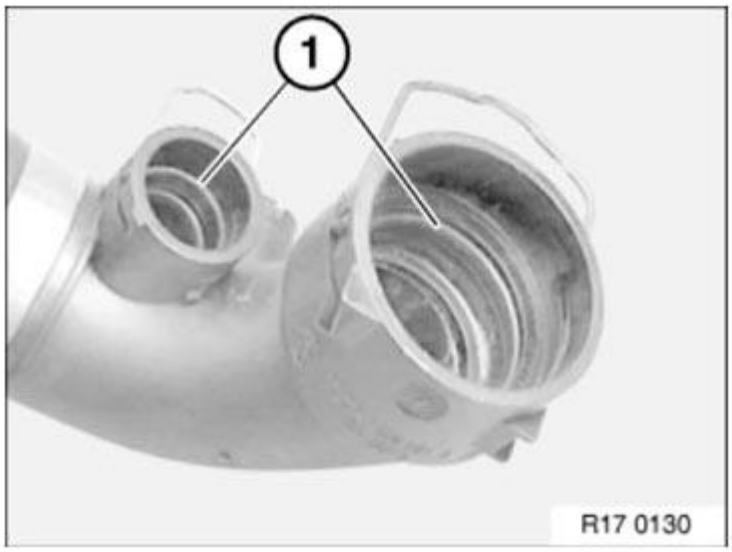


Fig. 11: Identifying O-rings
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly of quick-connect coupling

Press in lock (1) before installing fast-release coupling.

Push on hose.

Quick-connect coupling must clearly snap audibly into place.

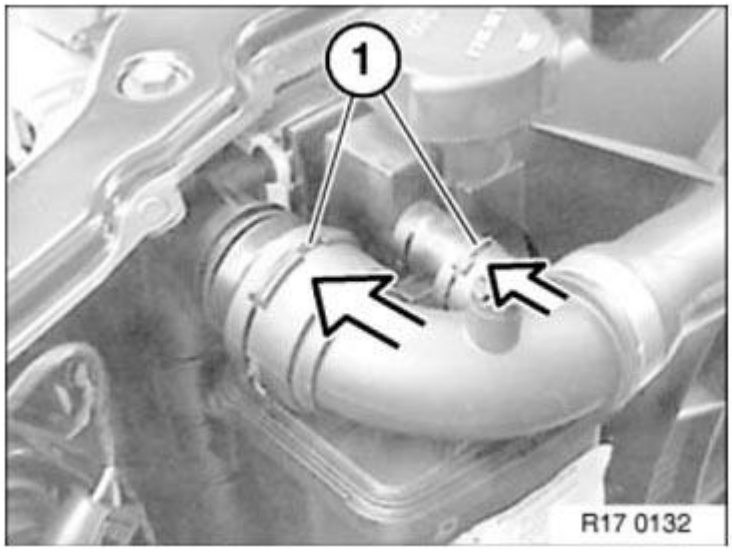


Fig. 12: Assembling Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

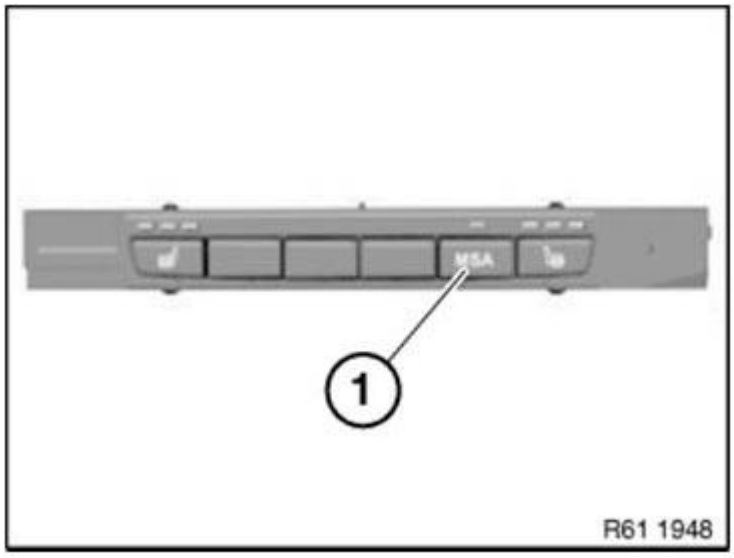


Fig. 13: Identifying Automatic Engine Start/Stop Switch (MSA)
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

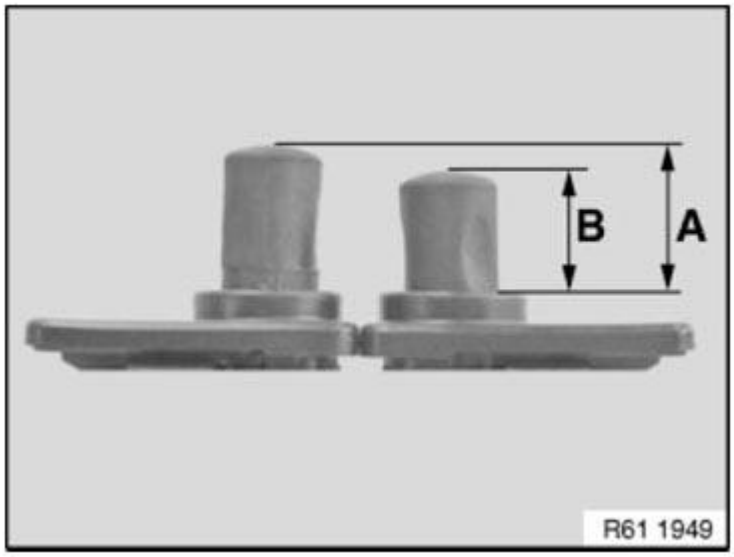


Fig. 14: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

1700039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT

Notes

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant when carrying out repair work on the cooling circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- No.- 81 39 152 473

**IMPORTANT: Risk of slipping due to coolant on the floor.
Risk of injury!**

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

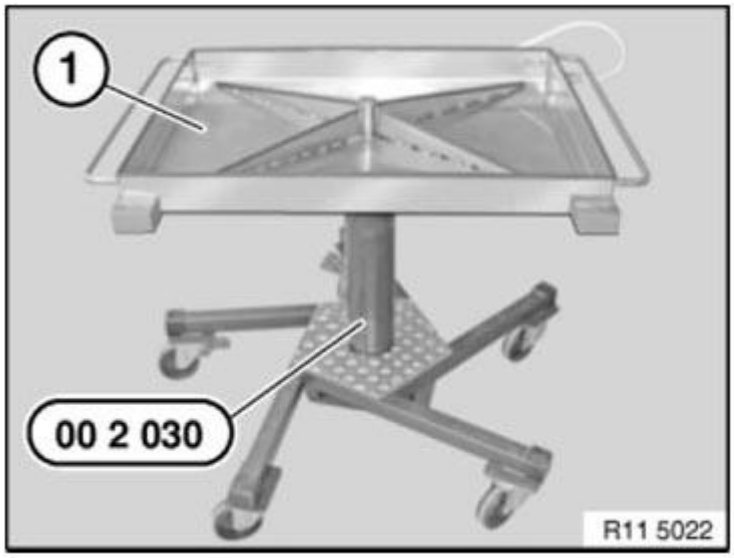


Fig. 15: Lifting Of Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Graphic shows the N63, procedure for other engines identical.

**IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.
If necessary, replace damaged and porous coolant hoses.**

Vacuum filling unit consists of

- Filling unit with vacuum meter and shutoff valves
- Filler hose
- Coolant container
- Venturi nozzle
- Compressed air connection (max. 6 bar)
- Outgoing-air hose (lead outgoing-air hose into a collecting container)

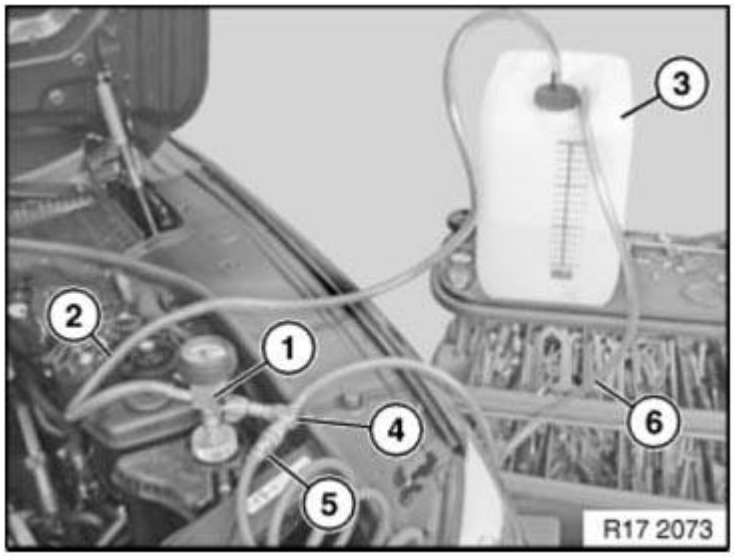


Fig. 16: Identifying Vacuum Filling Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Preconditions

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
  - Use only recommended coolant and observe mixture ratio. See **COOLING SYSTEM - OPERATING FLUIDS** .
  - Observe **FILLING CAPACITIES** .
- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set heating to maximum temperature.

Application

Connect filling unit (1) with adapter (2) 17 0 113 to coolant expansion tank.

Shutoff valves (A) and (B) must be closed.

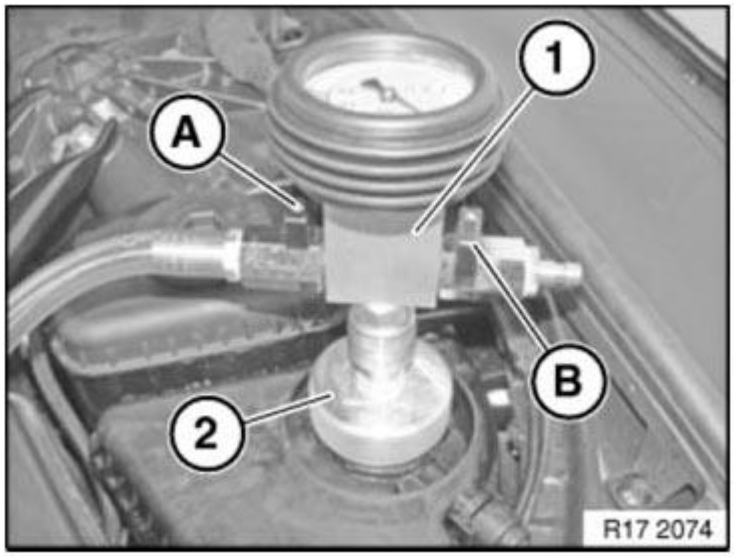


Fig. 17: Identifying Coolant Filling Unit With Adapter And Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

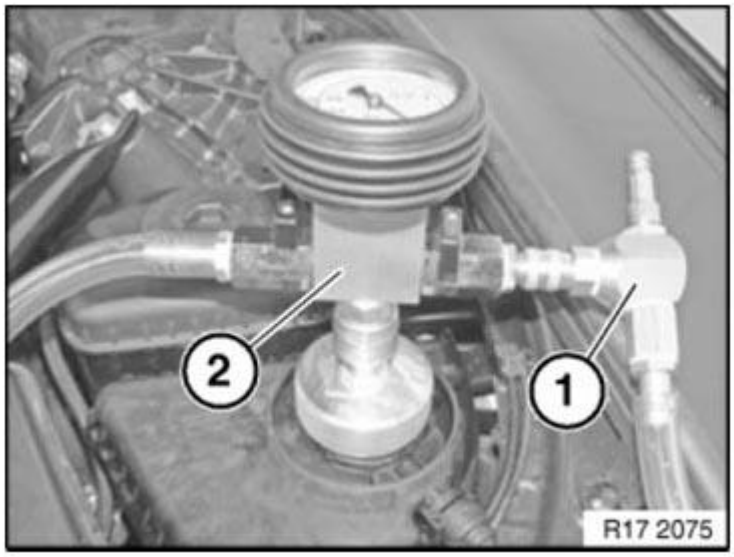


Fig. 18: Identifying Coolant Filling Unit With Venturi Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1) and open shutoff valve (B).

The venturi nozzle produces a flow noise.

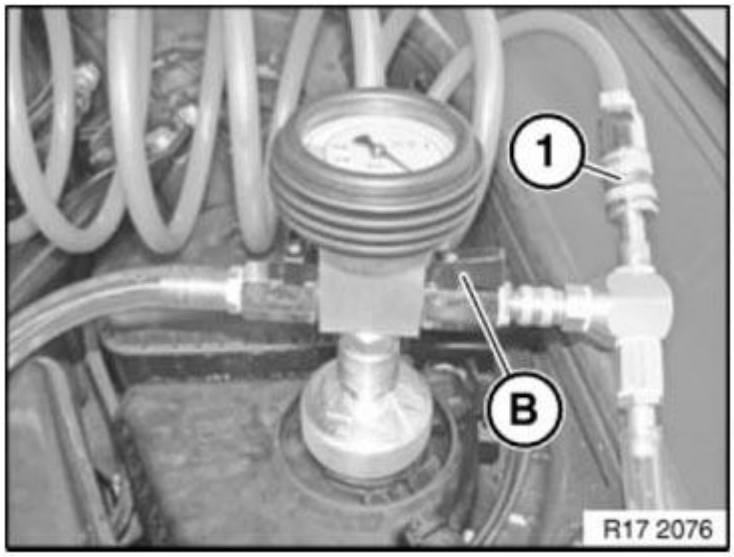


Fig. 19: Identifying Shut-Off Valve With Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shutoff valve (A) until the filling hose (1) is free of bubbles. Close shutoff valve (A) again. The filling hose (1) is vented in this way.

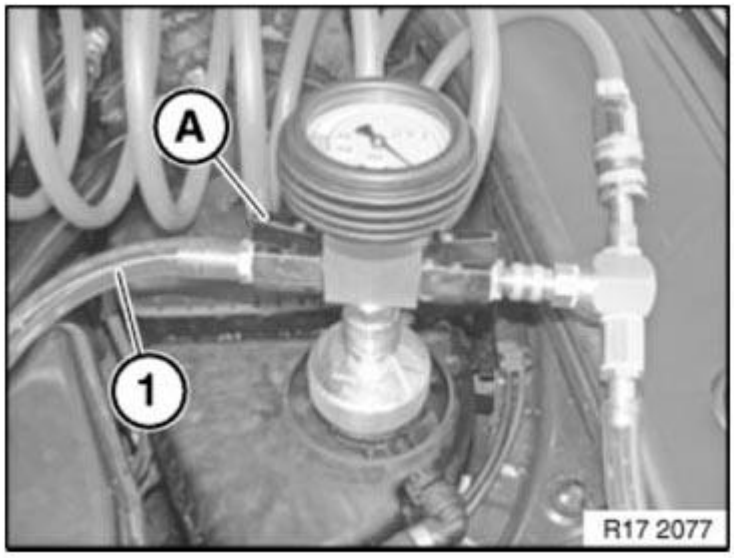


Fig. 20: Identifying Coolant Filling Hose With Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shutoff valve (B) remains open. Approx. 1 minute. Generate vacuum in cooling circuit. The final vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale on the vacuum meter.

NOTE: The coolant hoses contract during vacuum build-up.

Then close shutoff valve (B) again.

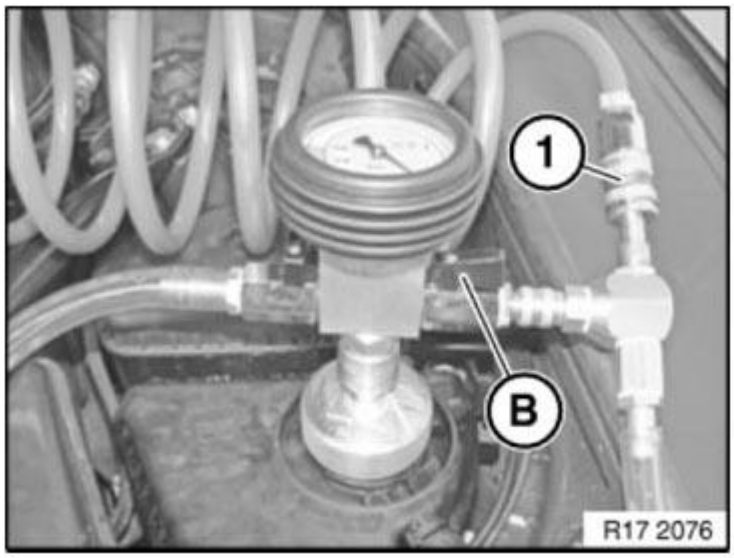


Fig. 21: Identifying Coolant Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Both shutoff valves (A) and (B) must be closed. Then seal Venturi nozzle (1).

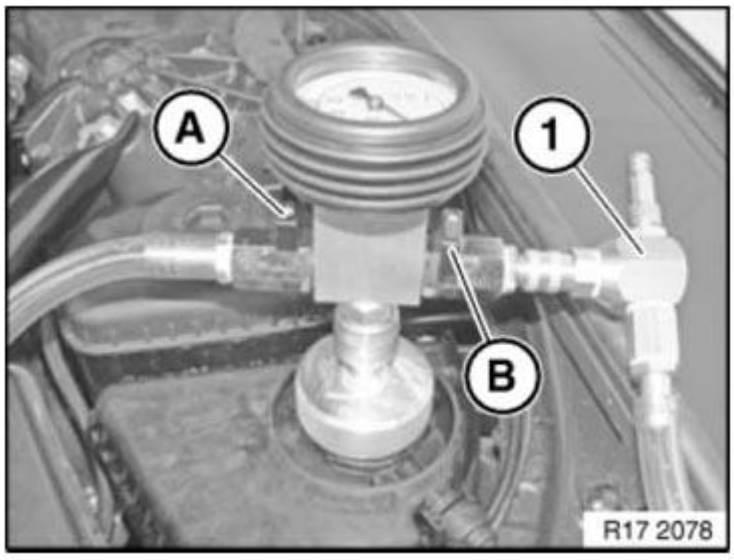


Fig. 22: Identifying Venturi Nozzle With Shut Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must hold the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In the event of leaks, check **COOLING SYSTEM FOR LEAKS** .

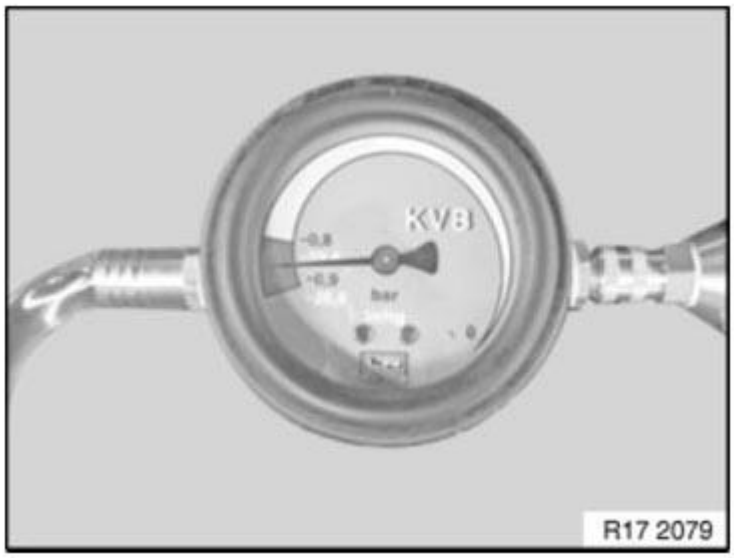


Fig. 23: Checking Cooling System For Leaks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently PREMIXED COOLANT in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
Position the filling unit container at the same height as the coolant expansion tank.

Shutoff valve (B) remains closed during the filling process.

To fill the cooling system, open shutoff valve (A) to filling unit container.

Coolant is now added.

The filling process is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

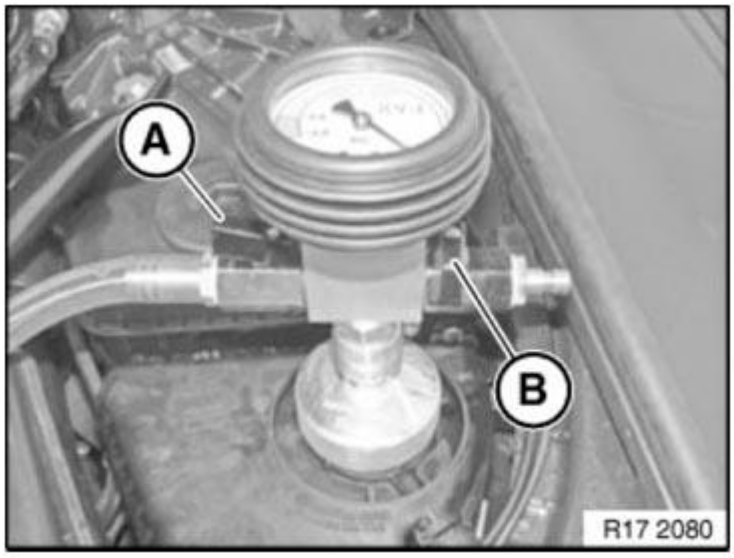


Fig. 24: Identifying Cooling System Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, reduce remaining vacuum. Open shutoff valve (B) to do so.

Remove filling unit with adapter from expansion tank.

Adjust coolant level to max.

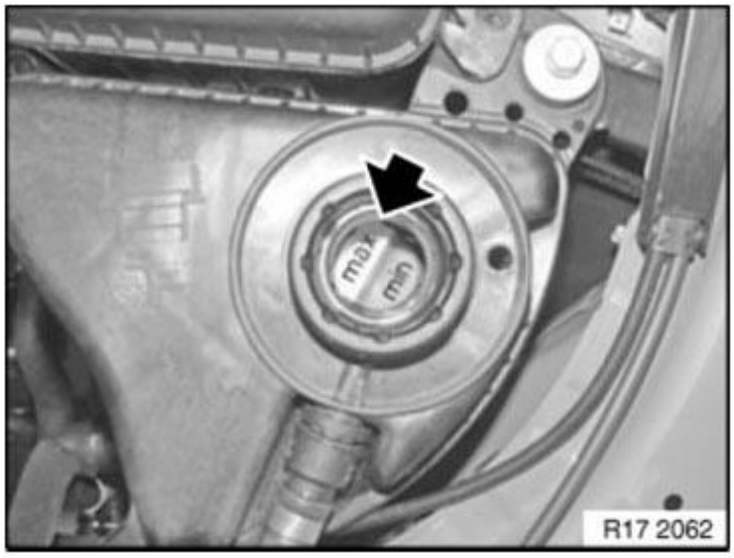


Fig. 25: Adjusting Coolant Level To Maximum
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation note:

Close the sealing cap (1) until the arrows line up.

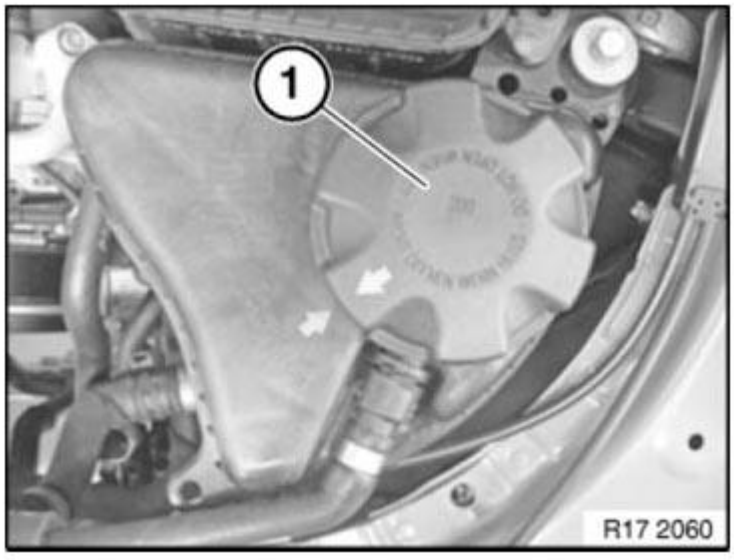


Fig. 26: Identifying Coolant Expansion Tank Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of cooling system.

Check **COOLING SYSTEM FOR LEAKS** .

17..... VENTING COOLING SYSTEM FOR INTERCOOLER (N63)

Notes

WARNING: Danger of scalding!
Open sealing cap only after engine has cooled down.

IMPORTANT: Cooling system for intercooler has a separate cooling circuit.
Coolant is added at intercooler expansion tank.
Electric coolant pump!
FOLLOW INSTRUCTIONS FOR WORKING ON COOLING SYSTEM .

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of partial quantities of

coolant, replace these quantities which have been drained with new coolant.

**IMPORTANT: Risk of slipping due to coolant on the floor.
Danger of injury!**

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifter).

Recycling

Observe country-specific waste-disposal regulations.

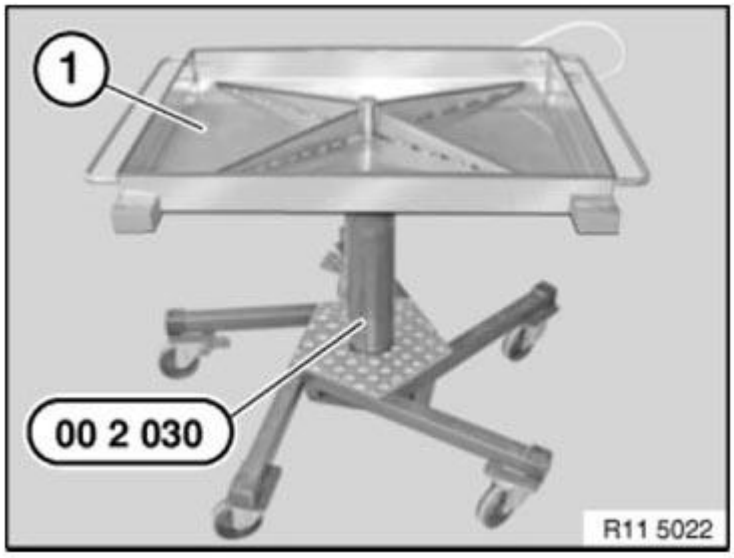


Fig. 27: Lifting Of Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following venting procedure is necessary when a part is replaced in the cooling system or when the cooling system is refilled.

Add coolant

Coolant is added at intercooler expansion tank.

Use only recommended coolant and observe mixture ratio. See **COOLING SYSTEM - OPERATING FLUIDS** .

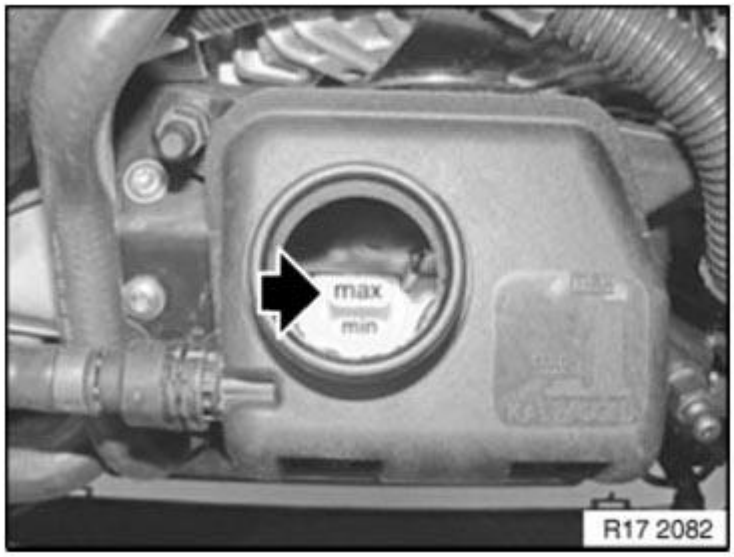


Fig. 28: Identifying Coolant Level
Courtesy of BMW OF NORTH AMERICA, INC.

Venting cooling system

NOTE: Do not leave the coolant expansion tank cap open during the venting procedure.

1. Add coolant up to top edge of expansion tank. Coolant must not drop any further! No drop in coolant for approx. 1 minute.
2. Connect battery charger.
3. Switch on ignition.
4. Set heater to maximum temperature. Press "Automatic" button. Then reduce fan to lowest setting.
5. Press accelerator pedal for 15 seconds to floor. **Engine** must **not** be started.
6. The venting procedure is started when the accelerator pedal is pressed and takes approx. 12 minutes.
7. Refill expansion tank up to top edge immediately after drawing off until empty.
8. Adjust expansion tank to maximum level at end of venting process.
9. Check cooling system for leaks.
10. Close expansion tank.
11. If the venting procedure has to be carried out again, allow DME to drop completely (ignition key removed for approx. 3 minutes), then repeat from Point 5.

1710 RADIATOR, EXPANSION TANK, PIPES

1700009 CHECKING COOLING SYSTEM FOR WATERTIGHTNESS (N54, N63)

Notes

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

Protective measures/rules of conduct

- Wear safety goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of skidding due to coolant on the floor.
Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

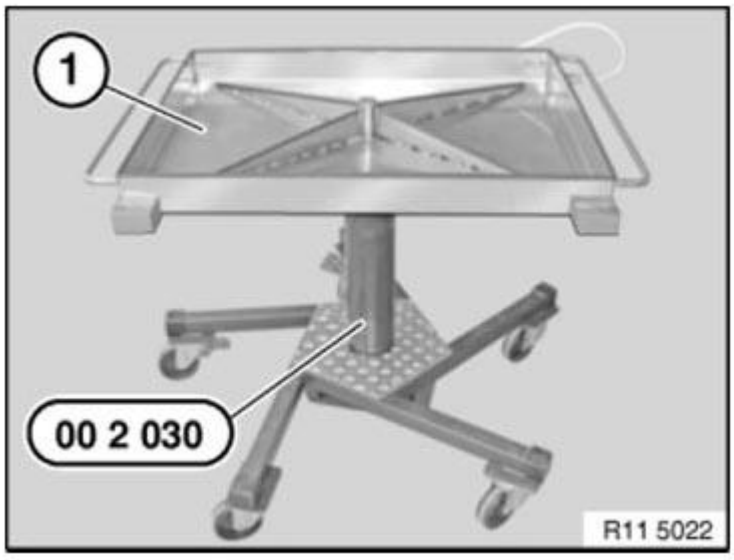


Fig. 29: Lifting Of Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open the sealing cap on the coolant expansion tank. Fit special tools (1) 17 0 101 and (2) 17 0 113.

Build up **EXCESS PRESSURE** , wait approx. 2 minutes.

Cooling system is impervious to watertightness if pressure drop is max. 0.1 bar.

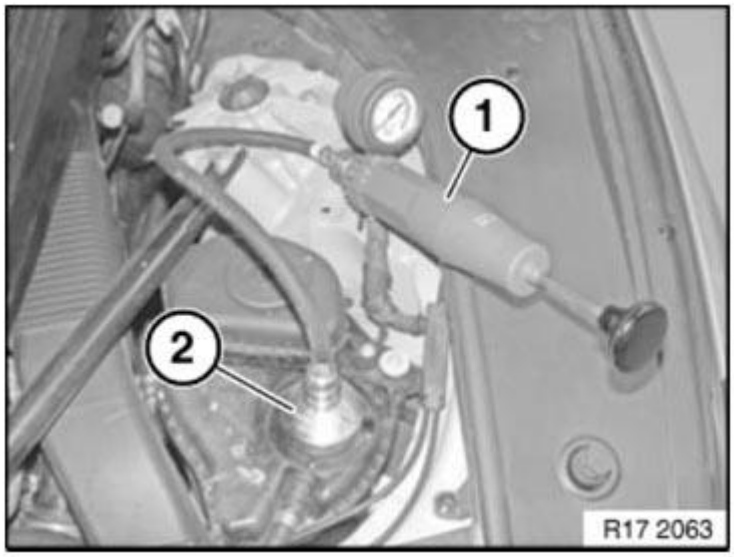


Fig. 30: Checking Pressure Drop In Cooling System Using Special Tools (17 0 101 And 17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in sealing cap

NOTE: While the driving at high ambient temperatures, the design may cause the pressure relief valve in the sealing cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves toes when the vehicle has cooled down. These toes do not indicate whether the sealing cap is defective or not. When the vehicle has been in standstill for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the sealing cap to stick; therefore repeat the test procedure for the sealing cap 2 to 3 times. Replace the sealing cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in sealing cap

Screw sealing cap (1) onto special tool 17 0 114.

Build up pressure with special tool (hand pump) 17 0 101; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

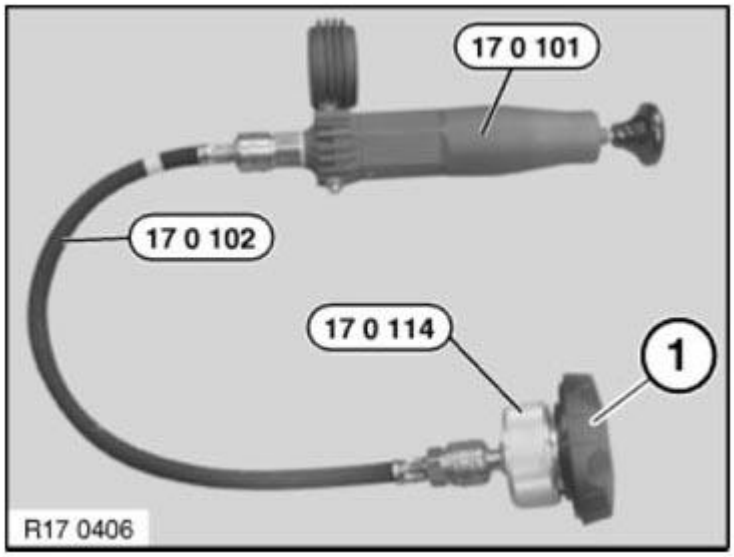


Fig. 31: Checking Pressure Relief Valve In Screw Cap Using Special Tool (17 0 114)
Courtesy of BMW OF NORTH AMERICA, INC.

64 53...INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

IMPORTANT: Even when they are correctly installed or due to normal driving, coolers (oil cooler, radiator, charge air cooler) or air conditioning capacitors may show slight impressions or deformations on their discs (picture).

This is not damage.

Radiators, cooler or capacitors are not to be replaced in this case.

NOTE: The deformations shown in illustration "1" (see Fig. 32) can be bent back with a standard fin comb.

Damage to lines carrying media or on the flat pipe require replacement of the radiator/ or air conditioning condenser. Examples of such damage are shown in illustrations "2", "3", "4", "5", and "6" (see **Fig. 32**).

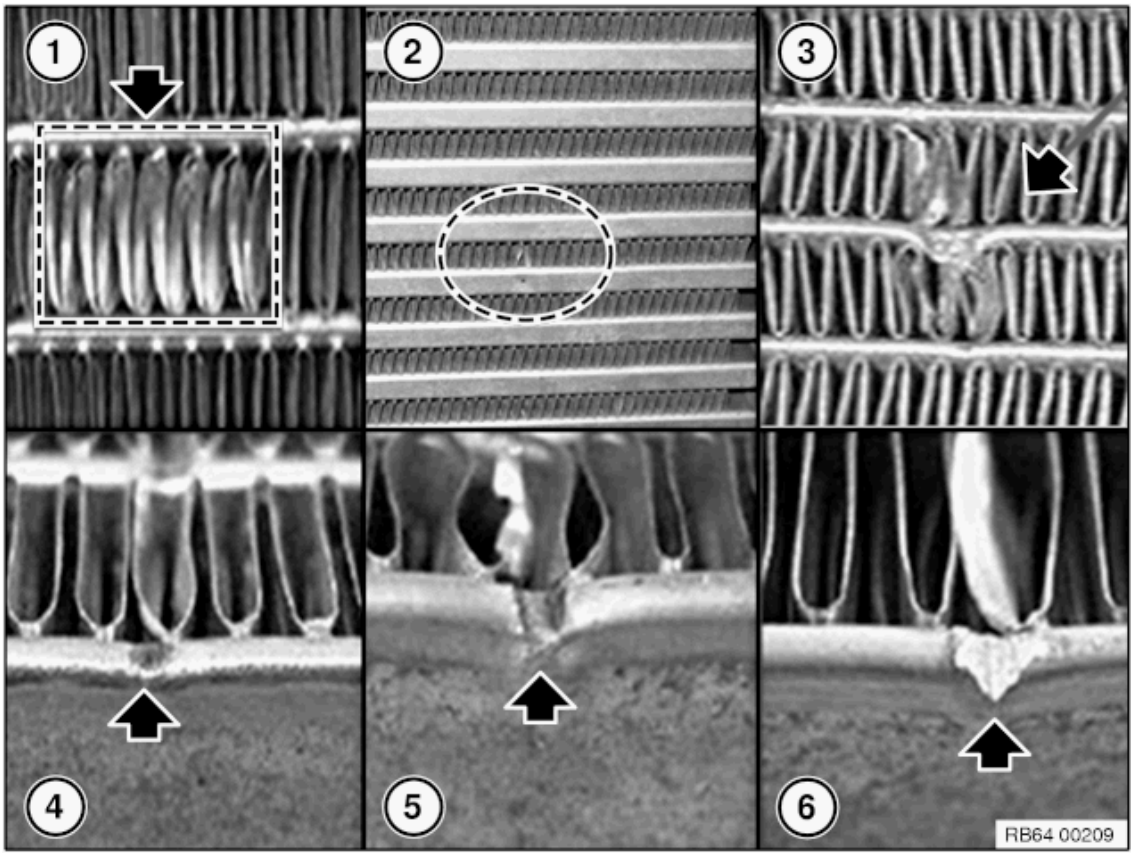


Fig. 32: Identifying Damage And Deformations
Courtesy of BMW OF NORTH AMERICA, INC.

1711 ENGINE RADIATOR WITH ATTACHMENT

64 53...INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

See **INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS**.

1711000 REMOVING AND INSTALLING RADIATOR (N63, N74)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: Wear safety goggles and protective gloves.

Necessary preliminary tasks

- Remove **FAN COWL** .
- Drain **COOLANT** .

- Draw off **A/C SYSTEM** .
- Unlock and detach coolant hoses on radiator.

Release screws (1).

Tightening torque **17 10 6AZ** .

Detach A/C lines (2) and place to one side.

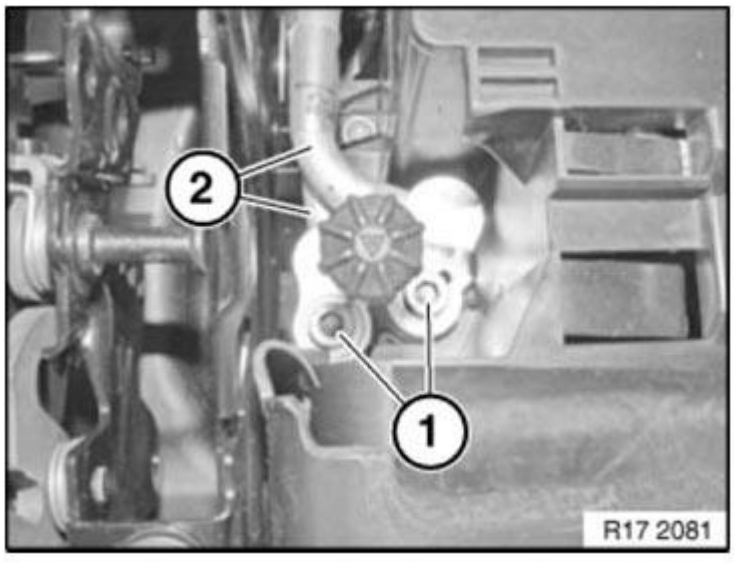


Fig. 33: Identifying A/C Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing rings.

Release screws (1) on left and right from cover (3).

Tightening torque **17 10 1AZ** .

Release screws (2) behind sealing lip.

Tightening torque **17 10 1AZ** .

Lift out cover (3).

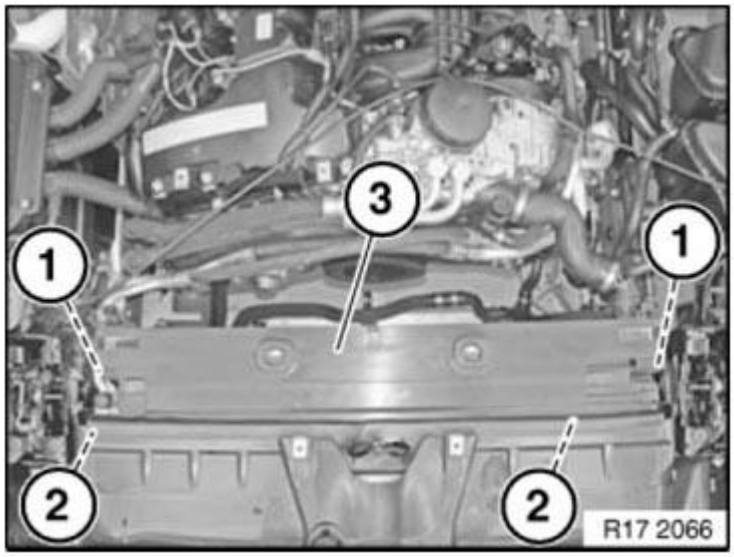


Fig. 34: Identifying Radiator Cover With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove radiator (1) towards top.

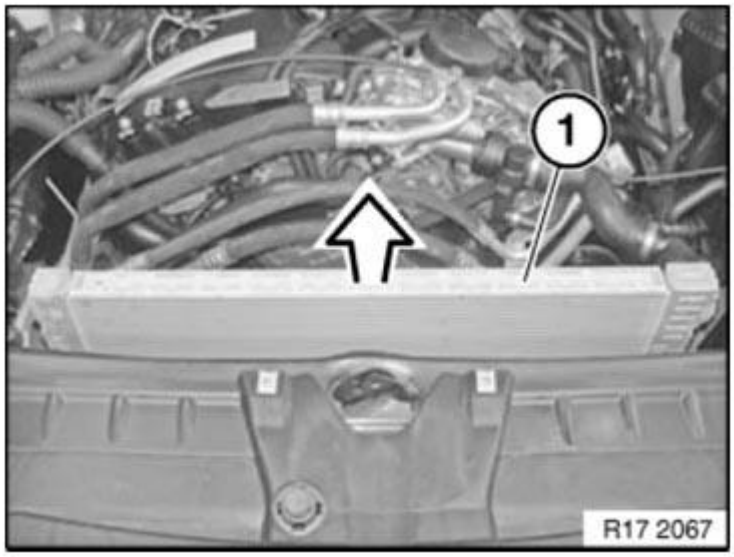


Fig. 35: Removing Radiator Towards Top
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

Fill **A/C SYSTEM** .

Check **COOLING SYSTEM** for leaks.

1711100 REMOVING AND INSTALLING/RENEWING COOLANT EXPANSION TANK (N63)

Necessary preliminary work

- Drain **COOLANT** .
- Remove left **TRAILING LINK** .
- Remove left intake duct.
- Release **EXPANSION TANK** for hydraulic steering or dynamic drive and place to one side.

Release screw (1).

Tightening torque **17 10 2AZ** .

Release and disconnect coolant hoses (2).

Raise expansion tank (3)

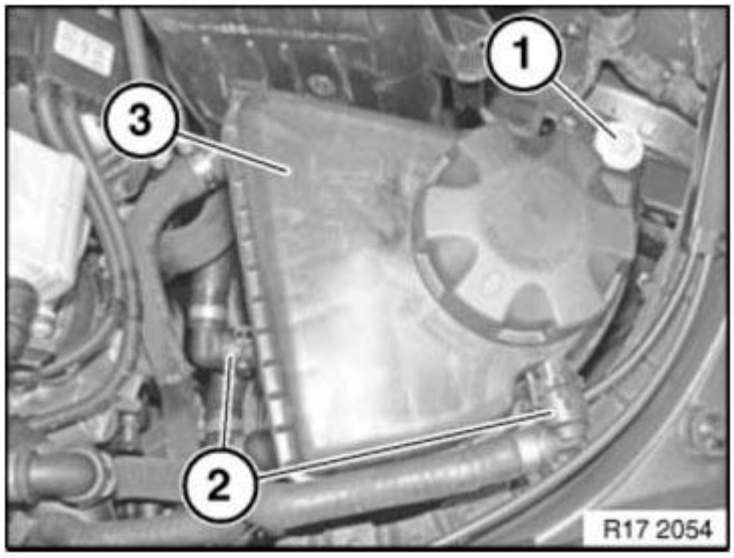


Fig. 36: Identifying Coolant Expansion Tank With Hoses And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector (1) on coolant level switch and disconnect.

Remove expansion tank (2).

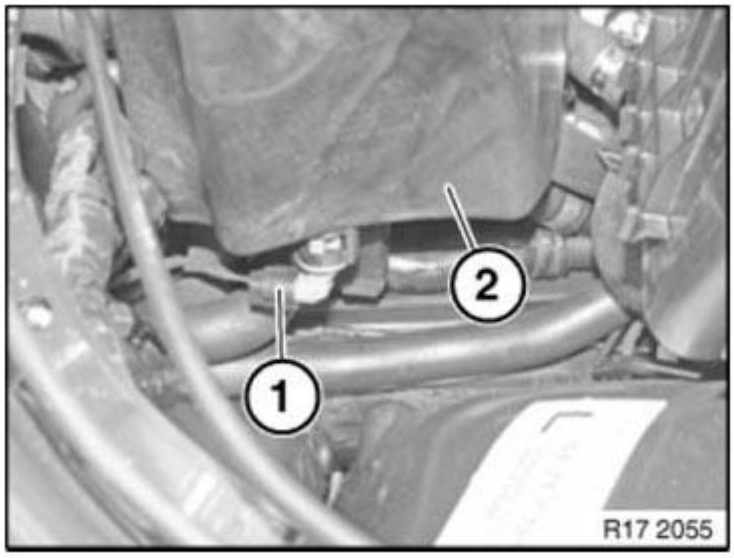


Fig. 37: Identifying Coolant Expansion Tank With Coolant Level Switch Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

Check cooling system for **LEAK TIGHTNESS** .

1711370 REMOVING AND INSTALLING/REPLACING COOLING COIL FOR POWER STEERING (N63, N74)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

IMPORTANT: When working on the oil and cooling circuit, protect the alternator against dirt/contaminants.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Necessary preliminary tasks

- Remove **A/C CONDENSER**
- After completing this operation, check fluid level in hydraulic steering fluid reservoir. See **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** or **BLEEDING POWER STEERING UNIT** .

Remove circlips (1).

Unlock lines (2) and detach from cooling coil.

Press in catches (3) and pull cooling coil together with module carrier upwards.

IMPORTANT: Catch and dispose of emerging oil.

Installation:

Reinstall circlips.

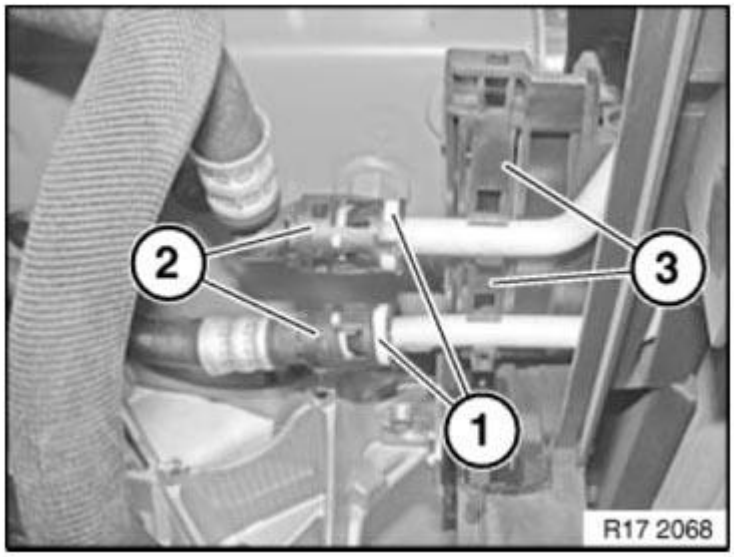


Fig. 38: Identifying Pressure Lines With Catches And Circlips
Courtesy of BMW OF NORTH AMERICA, INC.

Release module carrier (2) in direction of arrow.

Lift out cooling coil (1) together with module carrier (2).

Installation:

When replacing cooling coil, modify module carrier on left and right.

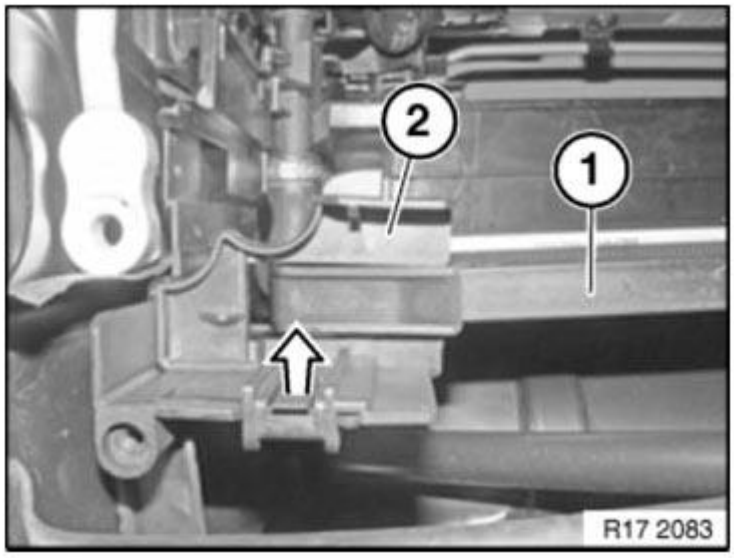


Fig. 39: Releasing Module Carrier Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

Check hydraulic steering for leaks.

1711370 REMOVING AND INSTALLING/REPLACING COOLING LOOP FOR HYDRAULIC STEERING (ALPINA B7 N63)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: When carrying out repair work on the oil and cooling circuit, protect the alternator against dirt contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Necessary preliminary work

- Remove **RADIATOR** .
- Remove **RADIATOR** for charge air cooler.
- Remove **AIR CONDITIONING CONDENSER**

The cooling loop for the hydraulic steering is fitted at the front in the radiator package.

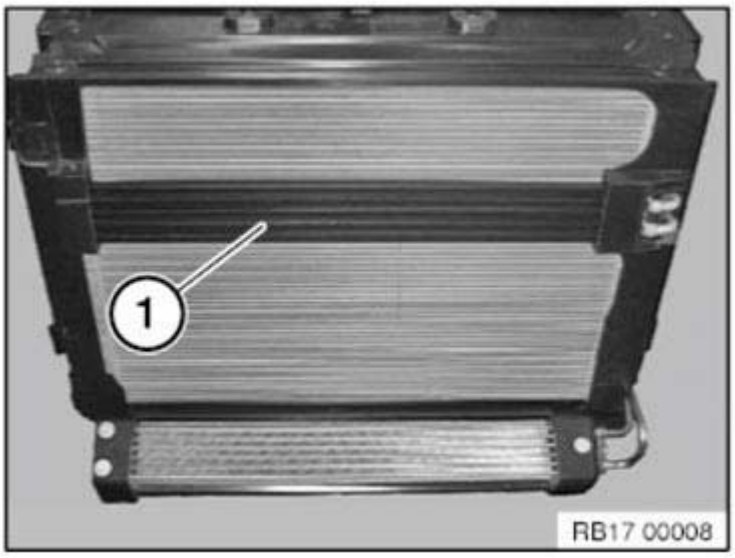


Fig. 40: Identifying Cooling Loops For Hydraulic Steering In Radiator Package
Courtesy of BMW OF NORTH AMERICA, INC.

Remove circlips.

Unlock lines (1) and detach from cooling loop.

Installation note:

Fit the angled line at the top.

All lines must engage audibly and be secured with the circlip against slipping!

IMPORTANT: Catch and dispose of emerging oil.

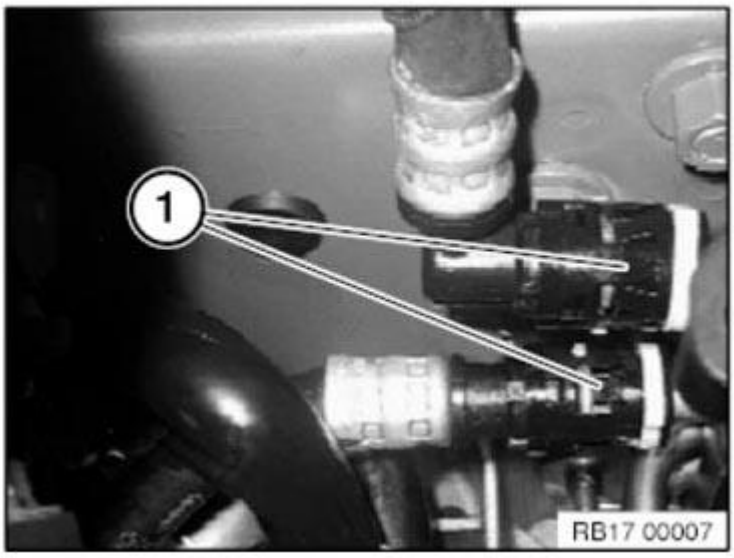


Fig. 41: Identifying Cooling Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 10 9AZ** .

Feed out and remove the cooling loop.

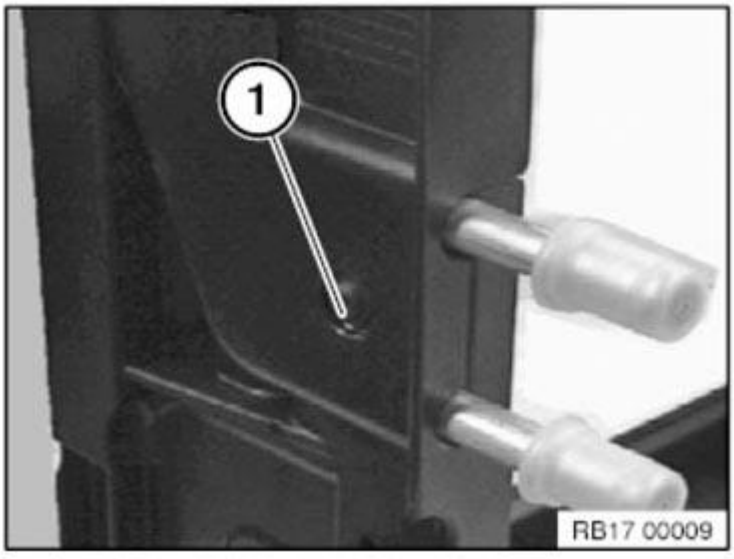


Fig. 42: Identifying Cooling Loop Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

AFTER COMPLETING THIS REPAIR WORK, CHECK OIL LEVEL IN OIL RESERVOIR OF HYDRAULIC STEERING .

If Dynamic Drive is fitted, execute **COMMISSIONING FOR DYNAMIC DRIVE** .

Check hydraulic steering for leak tightness.

1711150 REMOVING AND INSTALLING/REPLACING ENGINE OIL COOLER (N54, N63)

Necessary preliminary tasks

- Remove front right **WHEEL ARCH TRIM** .

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the engine oil circuit.
When removing engine oil lines and engine oil cooler, seal off all openings with suitable plugs.
To avoid engine damage, do not allow any dirt particles to get into the engine oil circuit.

Recycling

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Release screw (1).

On N54 release retainer.

Tightening torque **17 22 6AZ** .

Release screw (2).

Tightening torque **17 22 8AZ** .

Unlock oil lines (3) and detach from engine oil cooler flange.

Seal off engine oil cooler flange and engine oil lines.

Catch and dispose of emerging oil.

Remove engine oil cooler (4).

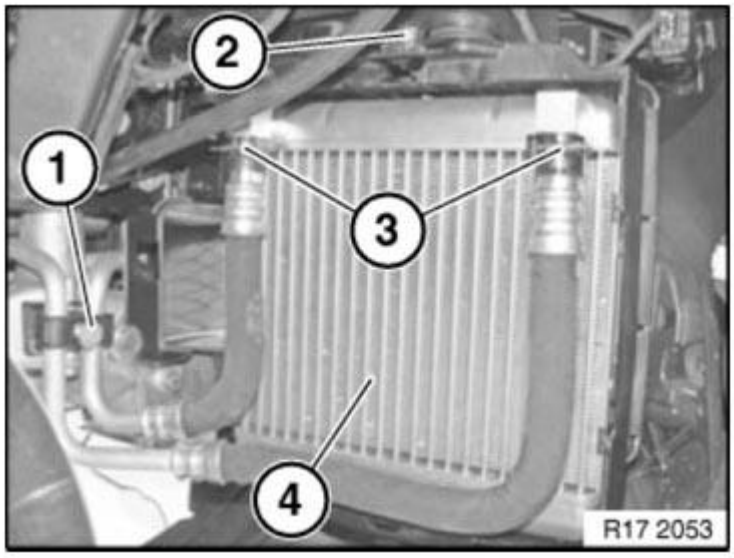


Fig. 43: Identifying Engine Oil Cooler With Oil Lines And Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

1711035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N63)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Remove **CROSS-MEMBER**
- Remove intake duct on left and right
- Remove front **UNDERBODY PROTECTION**

Detach coolant hose from fan cowl at retainer (1).

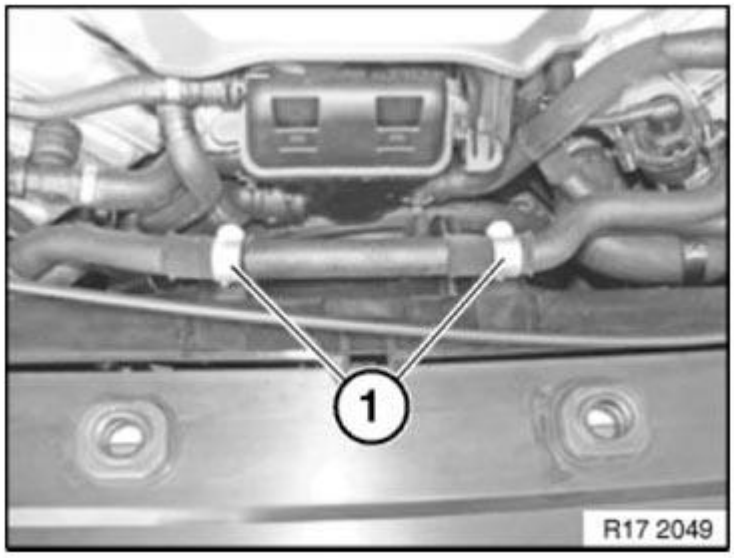


Fig. 44: Identifying Coolant Hose Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug (1) on fan cowl.

Release screw (2) on holder for coolant hoses.

Tightening torque **17 10 5AZ** .

Detach coolant hoses with holder from fan cowl.

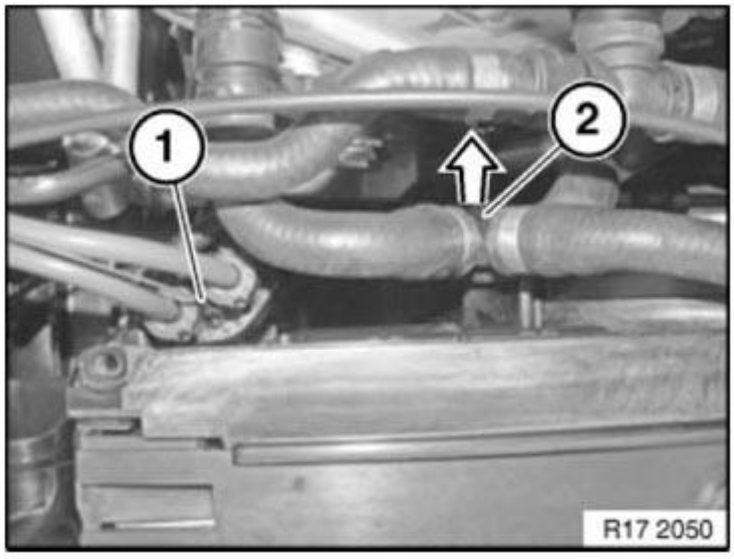


Fig. 45: Detaching Coolant Hoses From Fan Cowl
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 10 3AZ** .

Detach transmission oil cooler upwards from fan cowl.

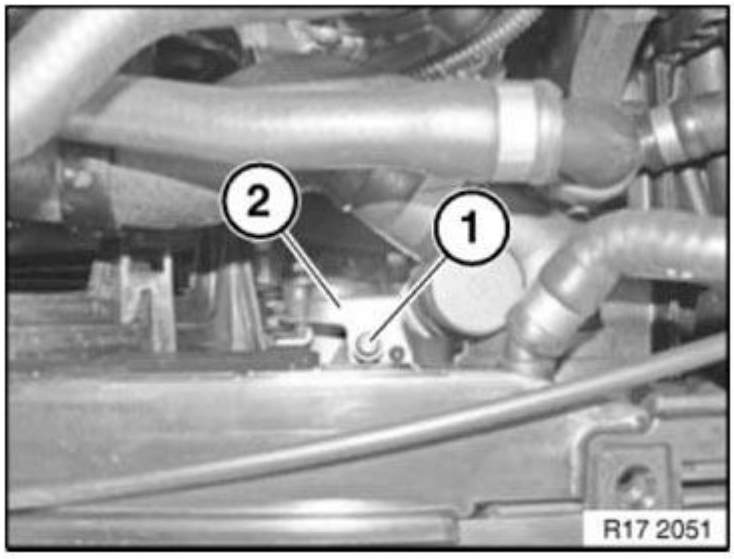


Fig. 46: Identifying Transmission Oil Cooler Retainer With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip fan cowl (1) at retainers (2) on left and right, feed out in upward direction and remove.

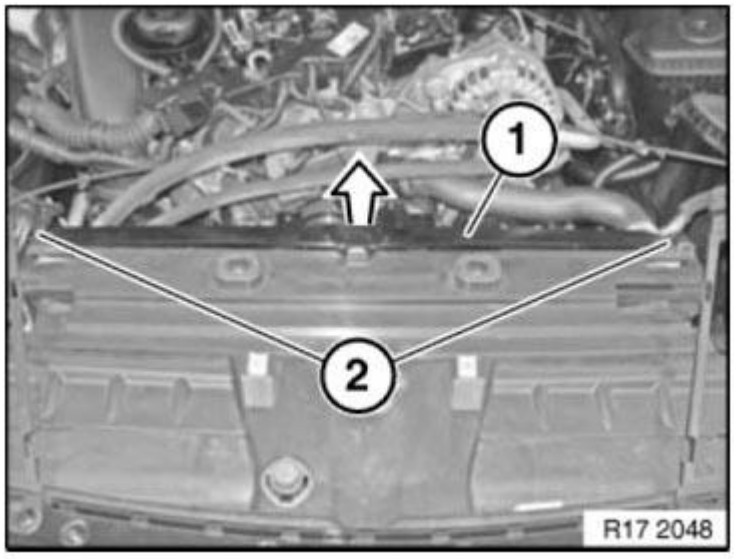


Fig. 47: Removing Fan Cowl In Upward Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert retaining tab (1) at bottom on module carrier.

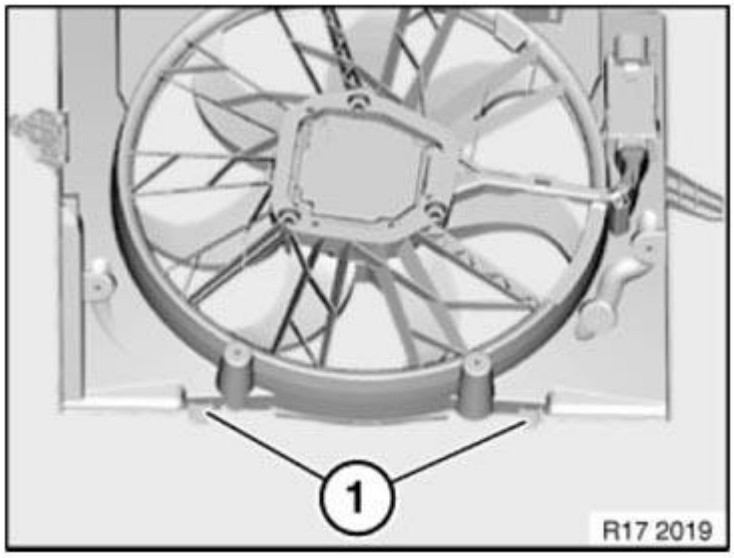


Fig. 48: Identifying Fan Cowl Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Reassemble the vehicle.
Clear fault memory.

1722080 REMOVING AND INSTALLING/REPLACING FEED AND RETURN LINES FOR ENGINE OIL COOLER (N63)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: Wear protective gloves and safety goggles.

IMPORTANT: Adhere to conditions of absolute cleanliness when performing repair work on the engine oil circuit.
When removing engine oil pipes and engine oil cooler, seal off all openings with suitable plugs.
To avoid engine damage, do not allow any dirt particles to get into the engine oil circuit.

Recycling

Engine oil escapes when the engine oil pipe is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Lower **FRONT AXLE SUPPORT** .
- Remove **WHEEL ARCH PANEL** front section on right.

Release screw (1).

Tightening torque **17 22 4AZ** .

Release screw (2).

Tightening torque **17 22 5AZ** .

Remove engine oil pipes from oil filter control housing and oil sump.

Catch and dispose of emerging oil.

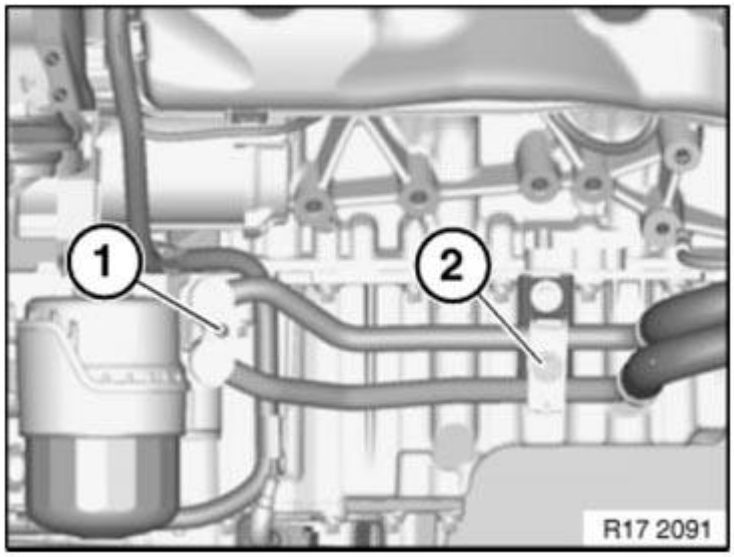


Fig. 49: Identifying Engine Oil Pipes Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace all sealing rings of engine oil pipes!

Release screw (1).

Tightening torque **17 22 6AZ** .

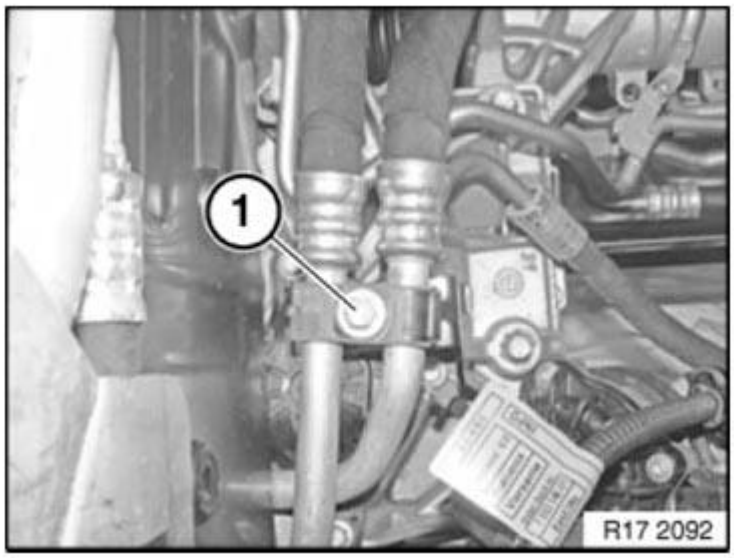


Fig. 50: Identifying Engine Oil Pipes Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 22 6AZ** .

Unlock engine oil pipes (3) and detach from engine oil cooler (4).

Feed out engine oil pipes (3) and remove.

Catch and dispose of emerging oil.

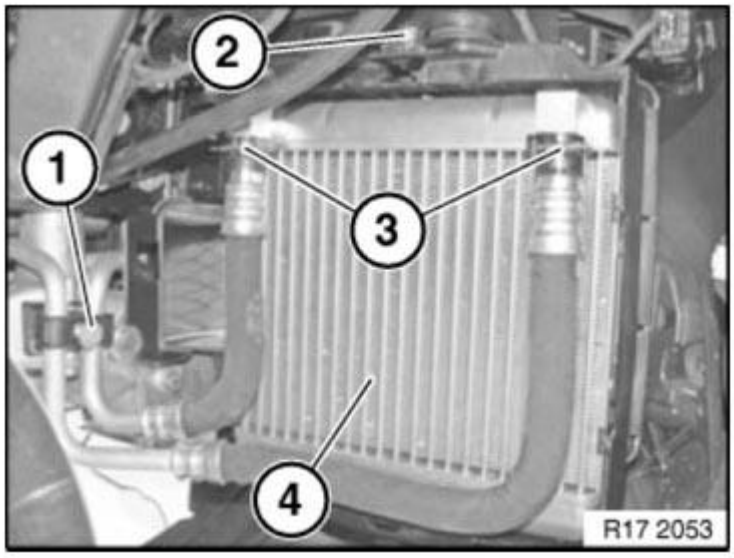


Fig. 51: Identifying Engine Oil Cooler With Engine Oil Pipes And Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completion of repair work, check engine oil level. Refill if necessary. Check engine oil pipes for tightness.

1713020 REMOVING AND INSTALLING/REPLACING INTERCOOLER EXPANSION TANK (N63)

IMPORTANT: Danger of scalding!
Only perform this work after engine has cooled down.

Necessary preliminary tasks

- Remove **ACOUSTIC COVER**
- Drain coolant for intercooler

Release screws (1).

Tightening torque **17 10 7AZ** .

Release coolant hoses (2) from expansion tank (3) and detach.

Installation:

Replace faulty clamps.

Remove expansion tank (3).

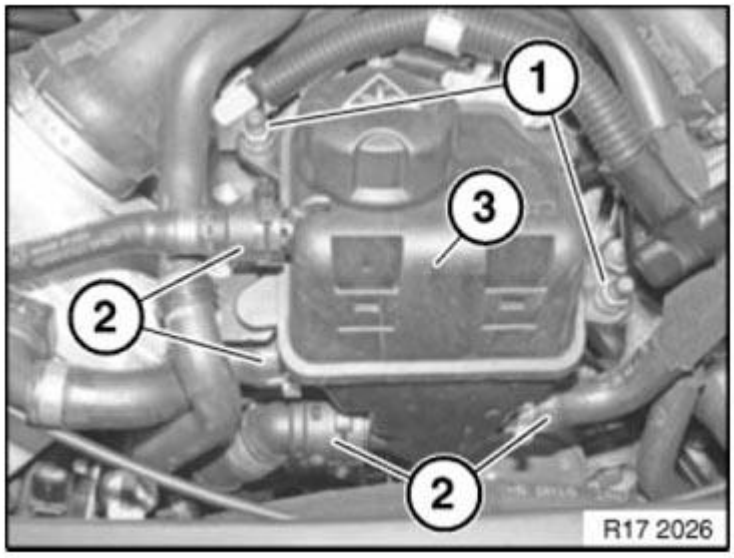


Fig. 52: Identifying Intercooler Expansion Tank With Coolant Hoses And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

After completing work, fill intercooler with coolant.

Vent **COOLING SYSTEM** for intercooler.

Check cooling system for intercooler for leaks.

1711120 REMOVING AND INSTALLING/REPLACING RADIATOR FOR CHARGE AIR COOLER (N63, N74)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: When carrying out repair work on the coolant circuit, protect the alternator from dirt contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Necessary preliminary work

- Remove **COOLING LOOP** for hydraulic steering (**not** ALPINA B7).
- Drain coolant for charge air cooler.

Release and disconnect coolant hoses (1).

Release lock (2).

Pull lines (3) with holder upwards.

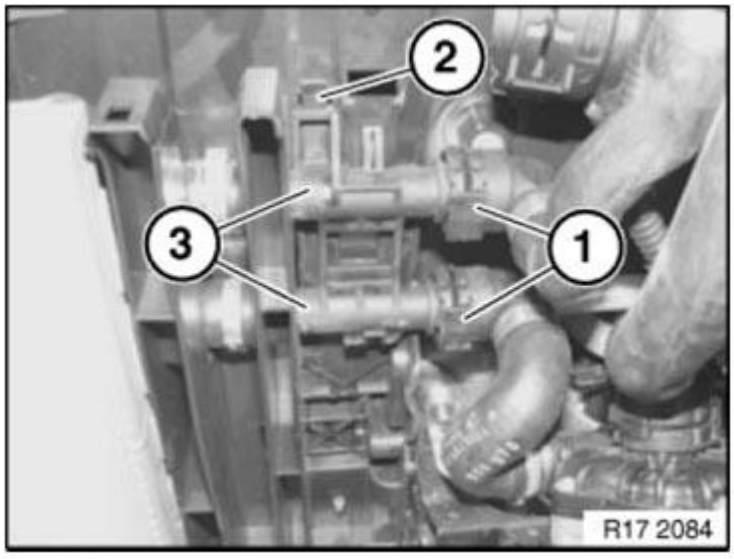


Fig. 53: Identifying Coolant Hoses With Pressure Lines And Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out radiator for charge air cooler (1).

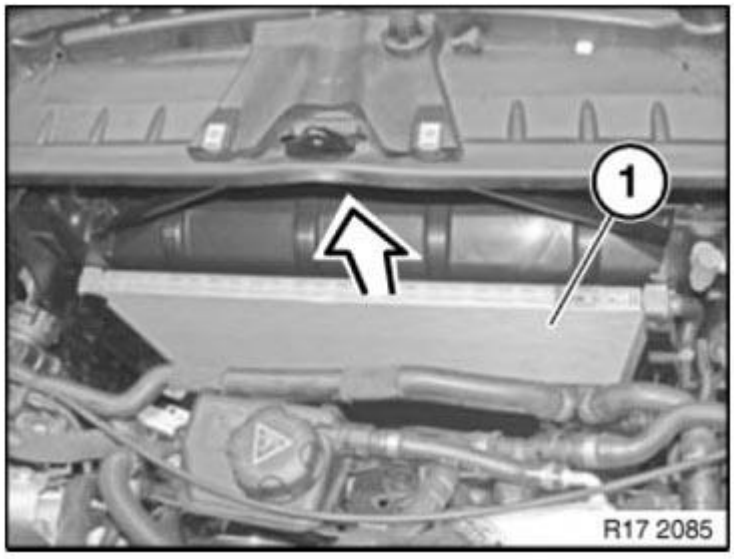


Fig. 54: Lifting Out Radiator For Charge Air Cooler
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

After completing the repair work, fill charge air cooler with coolant.

Vent **COOLING SYSTEM FOR CHARGE AIR COOLER** .

Check cooling system for tightness.

Assemble engine.

1711040 REMOVING AND INSTALLING/REPLACING THERMOSTAT CARTRIDGE (N63, N74)

IMPORTANT: Risk of scalding!
Only perform this repair work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable container.

Transmission oil emerges when the engine oil lines are detached from transmission oil cooler.

Catch and dispose of escaping transmission oil in a suitable container.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Drain **COOLANT** .
- Remove **FAN COWL** .

Release and disconnect coolant hoses (1).

Unscrew nuts (2).

Tightening torque **17 10 4AZ** .

Remove thermostat insert (3).

Installation note:

- Clean contact surfaces.

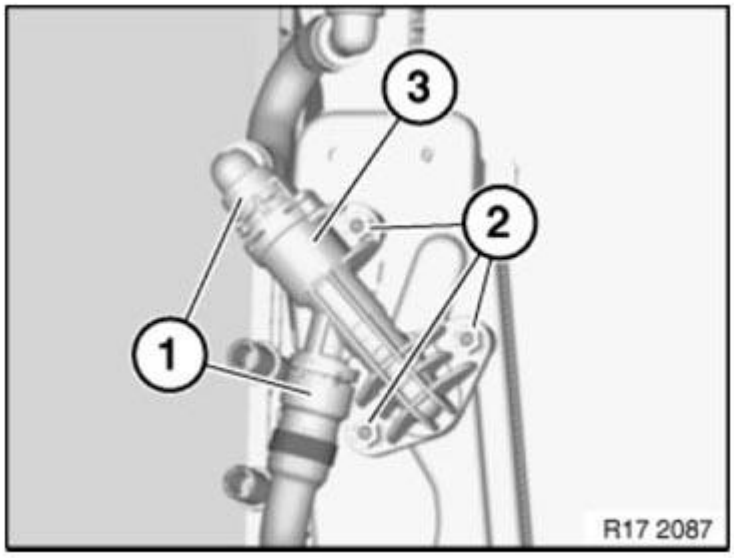


Fig. 55: Identifying Coolant Hoses With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check the **OIL LEVEL** in the automatic transmission. If necessary, top up automatic transmission fluid.

1722010 REMOVING AND INSTALLING/REPLACING TRANSMISSION OIL COOLER (ALPINA B7 N63)

WARNING: Risk of scalding!
Only perform this work after engine has cooled down.

IMPORTANT: Wear safety goggles and protective gloves.

Necessary preliminary work

- Remove front **BUMPER TRIM**

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the transmission oil circuit.
When removing transmission oil lines and the transmission oil cooler, seal off all openings with suitable plugs.
To avoid transmission damage, do not allow any dirt particles to get into the transmission oil circuit.

Recycling

Transmission oil escapes when oil lines are released. Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.

Release screw (1) on line clip.

Tightening torque **17 22 1AZ** .

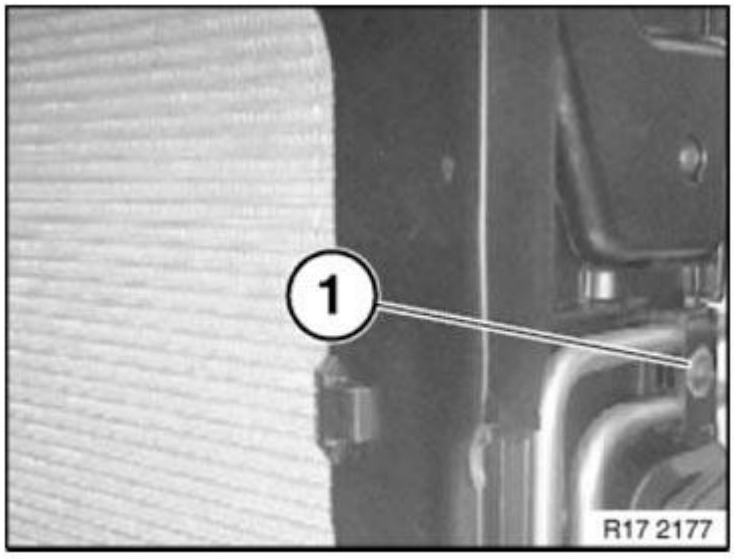


Fig. 56: Identifying Line Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on transmission oil cooler.

Tightening torque **17 22 2AZ** .

Detach oil lines from transmission oil cooler.

Replace O-rings.

Seal oil lines with suitable sealing plugs.

Catch and dispose of escaping transmission oil.

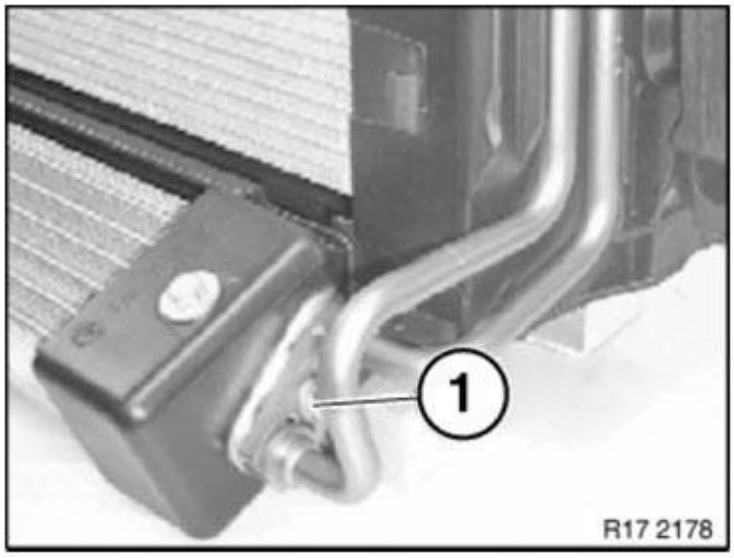


Fig. 57: Identifying Transmission Oil Cooler Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the right side, the procedure for the left side is identical.

Press together the retaining clips (1) on the left and right

Remove transmission oil cooler towards front.

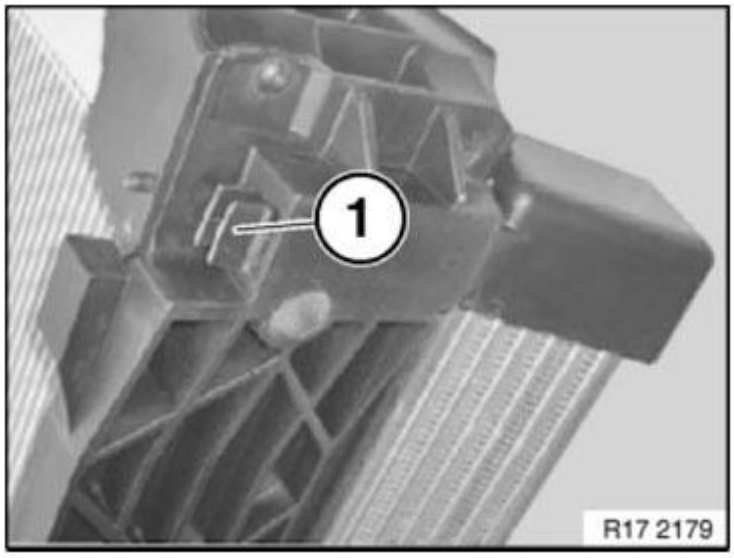


Fig. 58: Identifying Transmission Oil Cooler Mounting Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Only when replacing transmission oil cooler, modify holders on left and right.

Release screw (1).

Tightening torque **17 22 3AZ** .

Remove holders on left and right.

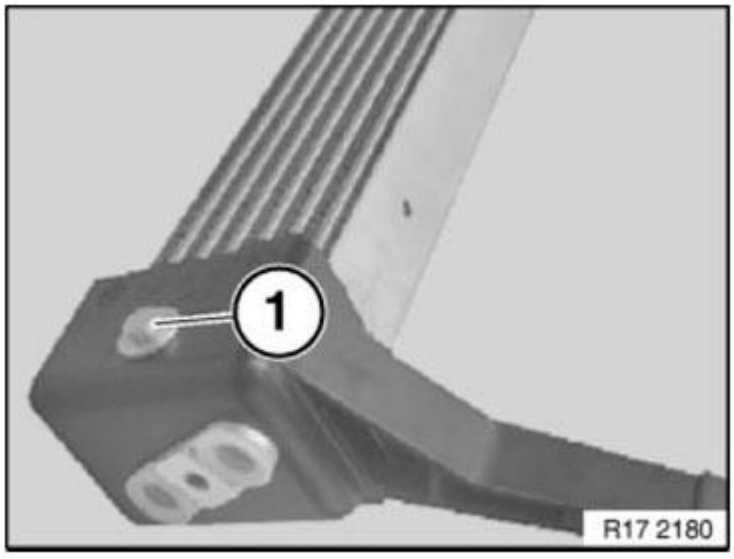


Fig. 59: Identifying Transmission Oil cooler Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check transmission oil level and top up transmission oil if necessary.

1721 OIL COOLER

1721500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION)

Notes

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.
Flushing can only be carried out with the automatic transmission removed.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to BMW Service Operating Fluids) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

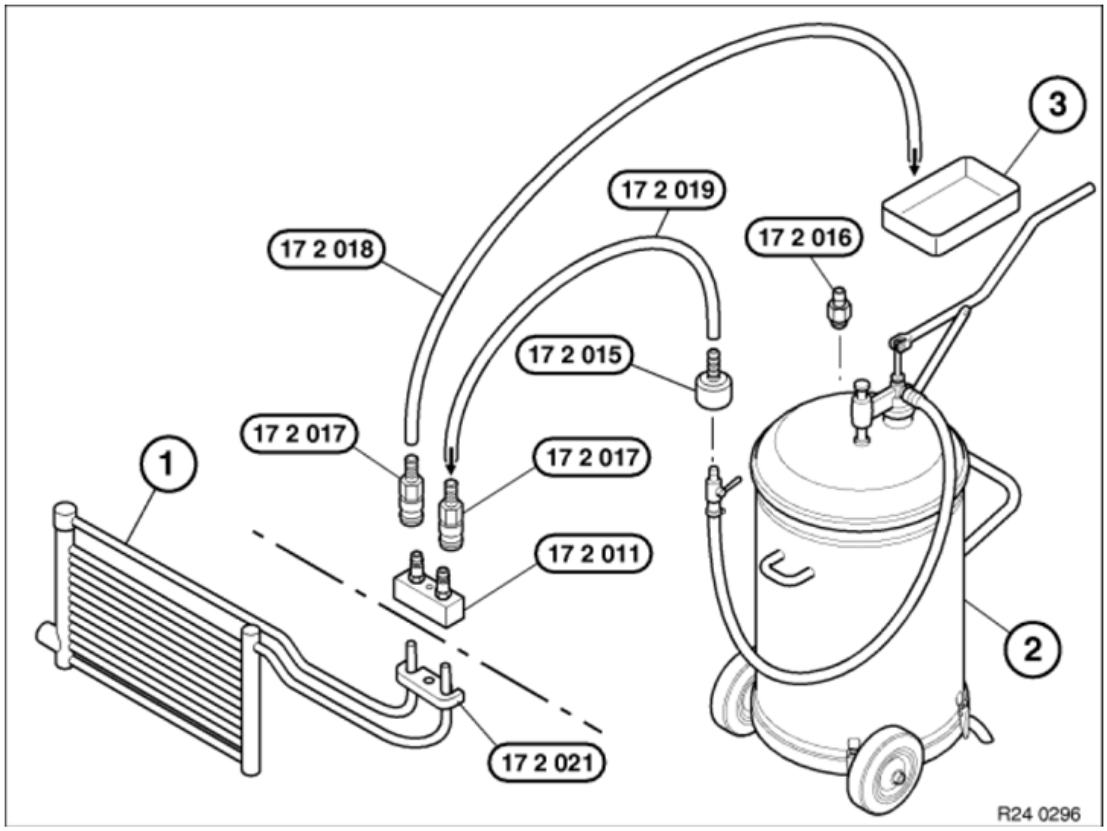
Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid (refer to BMW Service Operating Fluids).

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Arrangement, flushing apparatus for transmissions A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 60: Arrangement Flushing Apparatus For Transmissions (A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 011 Adapter for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

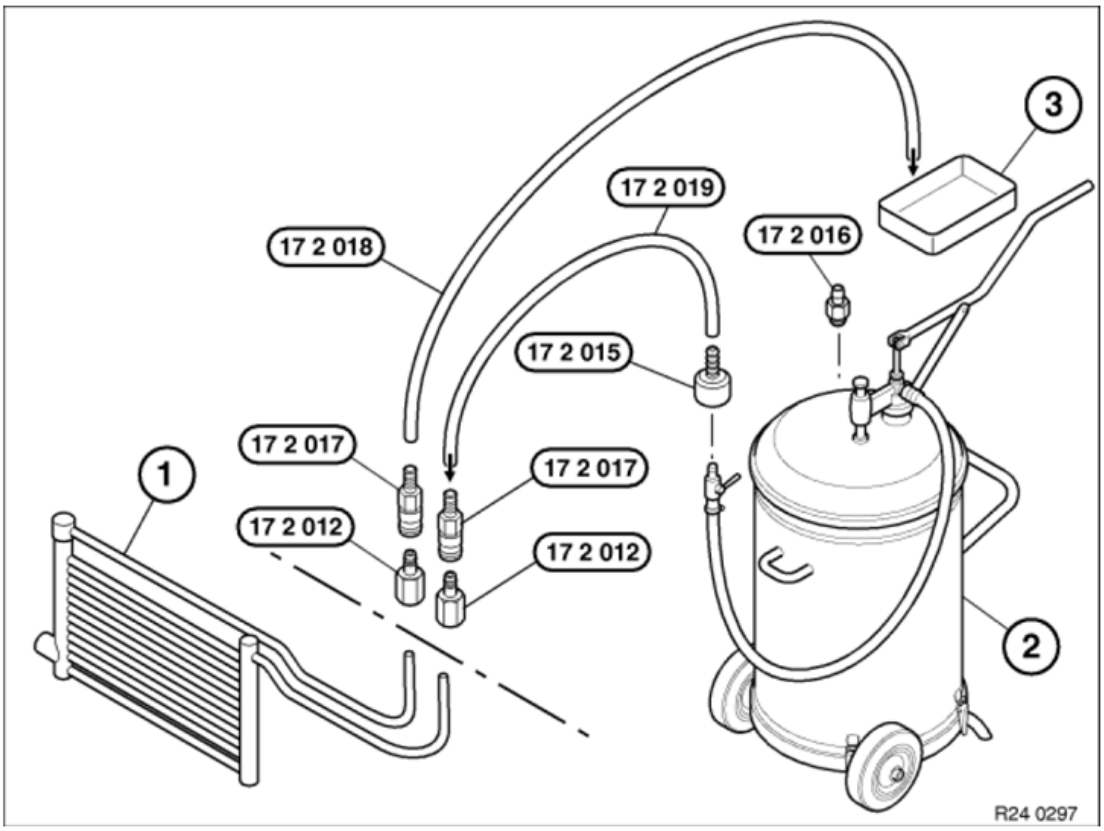
17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 2 021 Mounting plate for adapter 17 2 011 for transmissions A5S 325Z, GA6HP26Z

Arrangement of flushing apparatus for transmission A4S 310R



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 61: Arrangement Of Flushing Apparatus For Transmission (A4S 310R)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

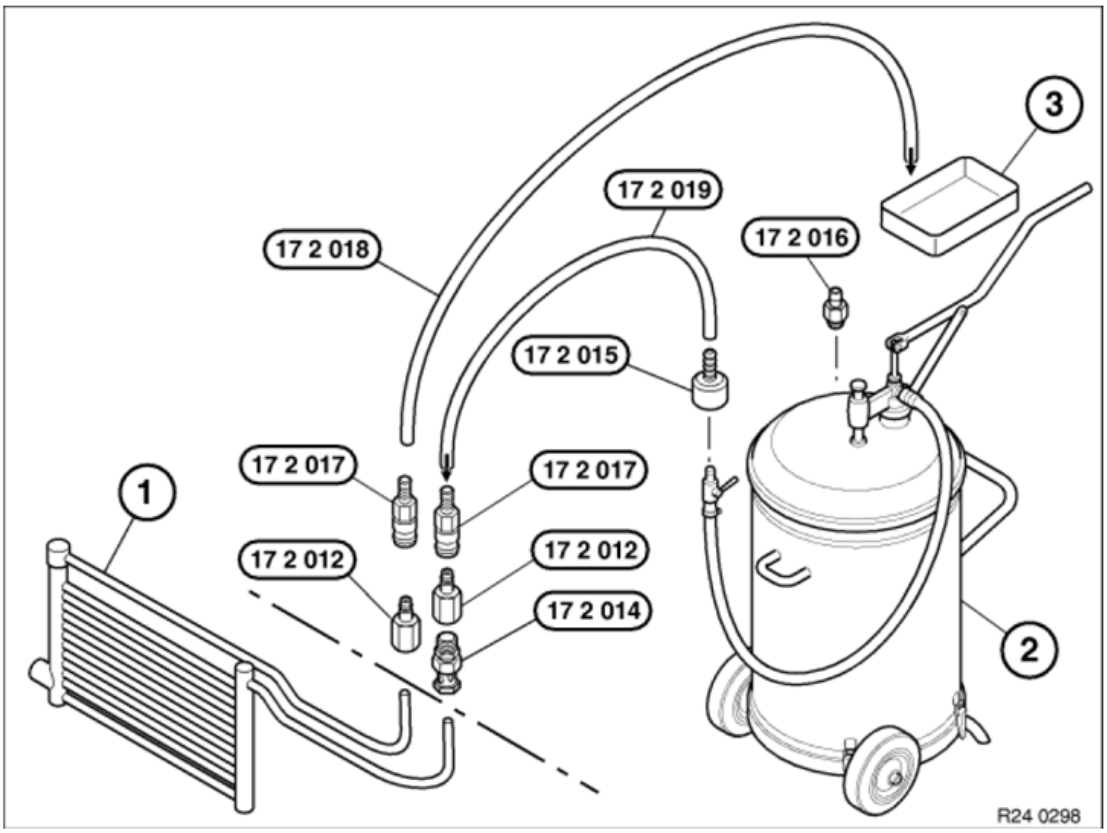
17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A4S 300J



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 62: Arrangement Of Flushing Apparatus For Transmission (A4S 300J)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 014 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

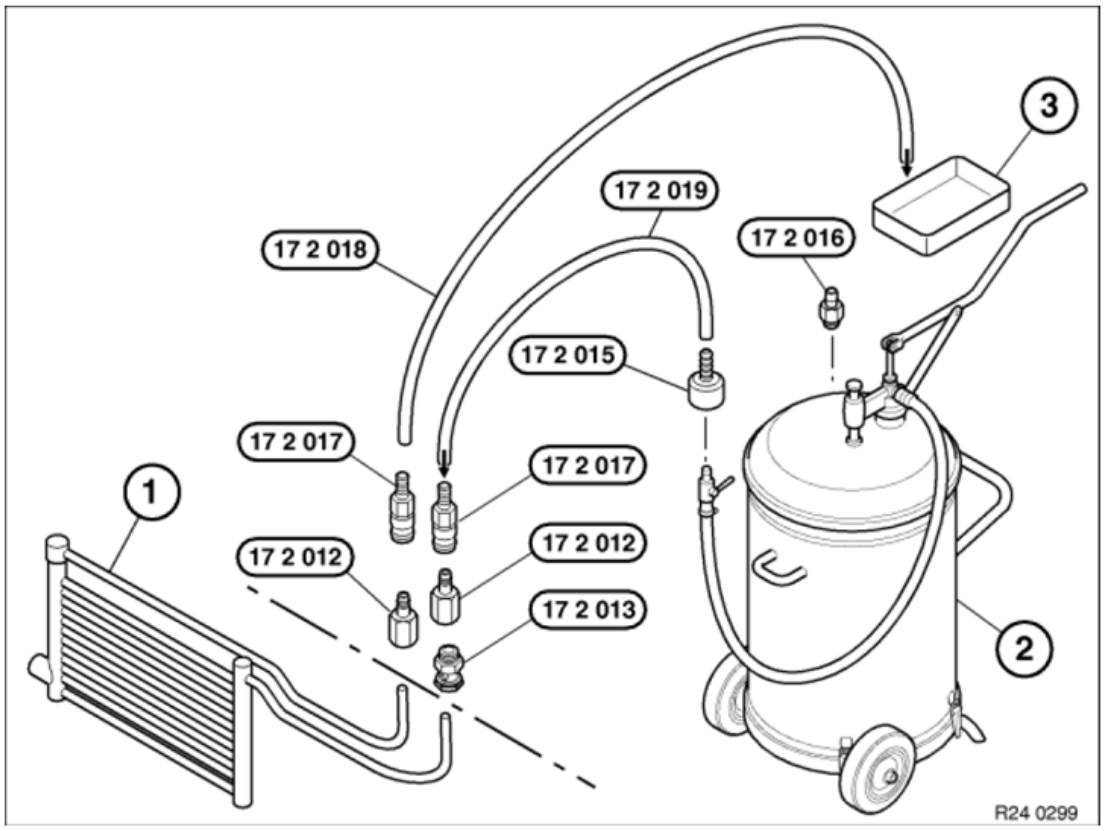
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A5S 440Z



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 63: Arrangement Of Flushing Apparatus For Transmission (A5S 440Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 013 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

1721500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION) (GA6HP19Z, GAHP26Z, GA6HP32Z)

Notes

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to **OPERATING FLUIDS**) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid (refer to **OPERATING FLUIDS**).

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

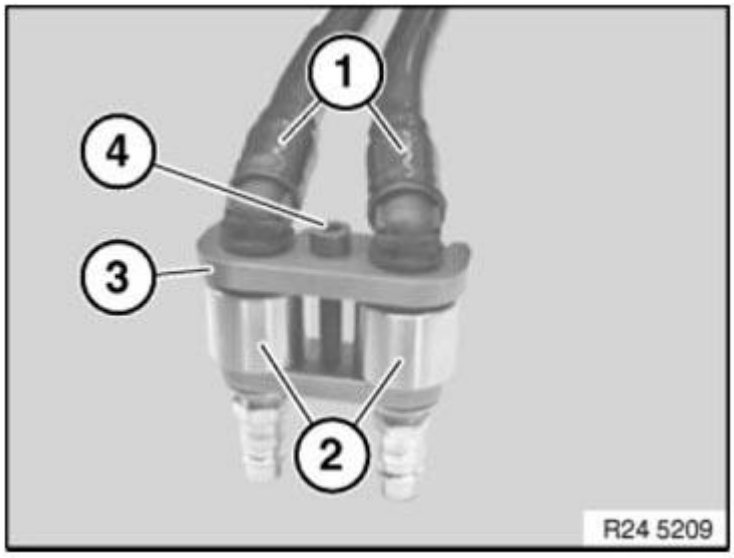
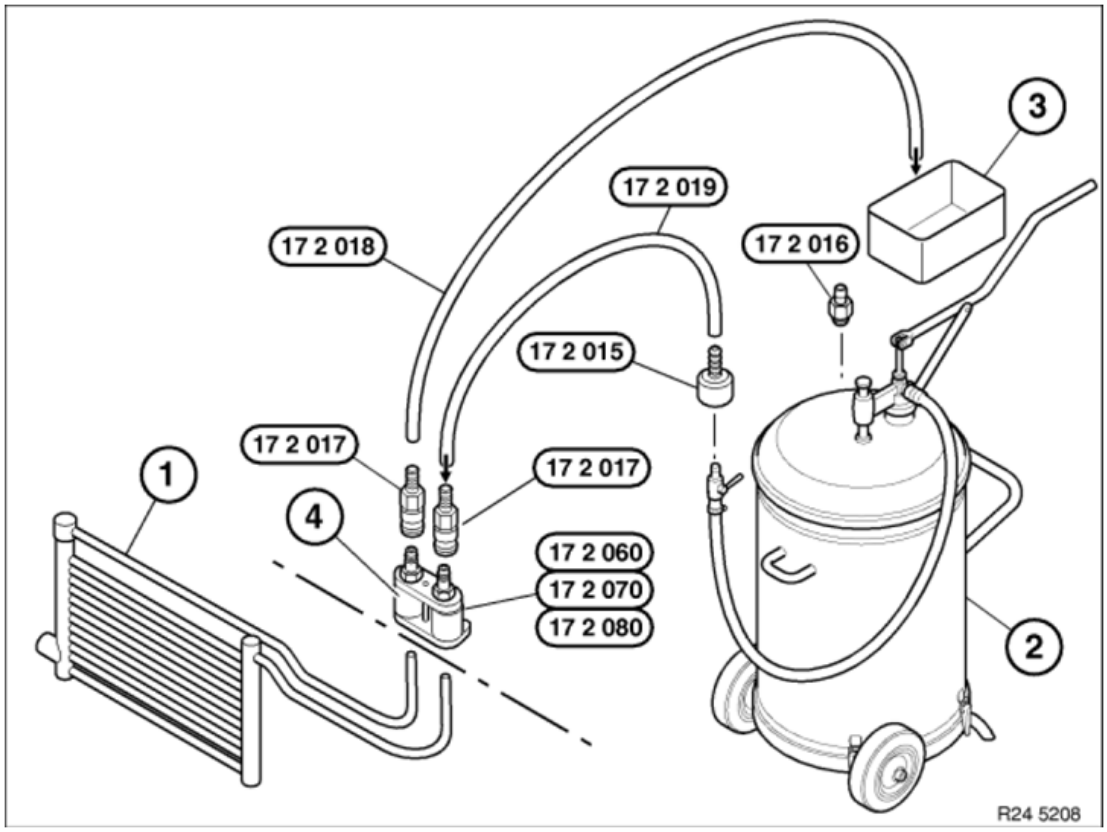


Fig. 64: Identifying Hydraulic Lines, Adapter, Clamping Bars With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for transmissions GA6HP19Z, GA6HP26Z, GA6HP32Z



1) Transmission-oil cooler with lines

2) Oil collection unit

Fig. 65: Arrangement Of Flushing Apparatus For Transmissions (GA6HP19Z, GA6HP26Z, GA6HP32Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission-oil cooler with lines
2. Oil collection unit

   17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

   17 2 016 Connection for oil collection unit (2), manufacturer: Horn

   17 2 017 Quick-release coupling (2 pieces)

   17 2 019 Hose to oil collection unit (2)

3. Oil drip tray

   17 2 018 Hose to oil drip tray (3)

4. Adapter with clamping bar

17 2 060 Adapter with clamping bar for aluminium lines and steel lines with aluminium connection (line diameter 12 mm) GA6HP19Z

17 2 070 Adapter with clamping bar (line diameter 15 mm) GA6HP26Z, GA6HP32Z, TCT for N54 engine

17 2 080 Adapter with clamping bar for fuel lines GA6HP26Z

1711150 REMOVING AND INSTALLING/REPLACING ENGINE OIL COOLER (N54, N63)

Necessary preliminary tasks

- Remove front right **WHEEL ARCH TRIM** .

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the engine oil circuit.
When removing engine oil lines and engine oil cooler, seal off all openings with suitable plugs.
To avoid engine damage, do not allow any dirt particles to get into the engine oil circuit.

Recycling

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Release screw (1).

On N54 release retainer.

Tightening torque **17 22 6AZ** .

Release screw (2).

Tightening torque **17 22 8AZ** .

Unlock oil lines (3) and detach from engine oil cooler flange.

Seal off engine oil cooler flange and engine oil lines.

Catch and dispose of emerging oil.

Remove engine oil cooler (4).

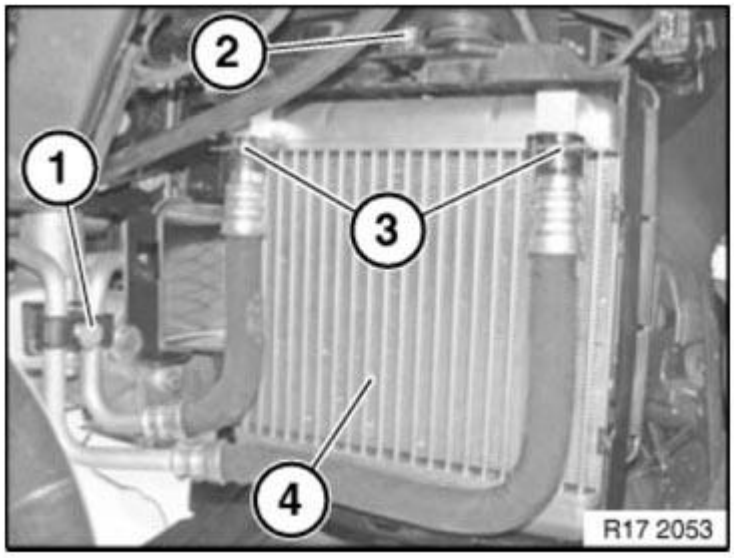


Fig. 66: Identifying Engine Oil Cooler With Oil Lines And Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

1722080 REMOVING AND INSTALLING/REPLACING FEED AND RETURN LINES FOR ENGINE OIL COOLER (N63)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: Wear protective gloves and safety goggles.

IMPORTANT: Adhere to conditions of absolute cleanliness when performing repair work on the engine oil circuit.
When removing engine oil pipes and engine oil cooler, seal off all openings with suitable plugs.
To avoid engine damage, do not allow any dirt particles to get into the engine oil circuit.

Recycling

Engine oil escapes when the engine oil pipe is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Lower **FRONT AXLE SUPPORT** .
- Remove **WHEEL ARCH PANEL** front section on right.

Release screw (1).

Tightening torque **17 22 4AZ** .

Release screw (2).

Tightening torque **17 22 5AZ** .

Remove engine oil pipes from oil filter control housing and oil sump.

Catch and dispose of emerging oil.

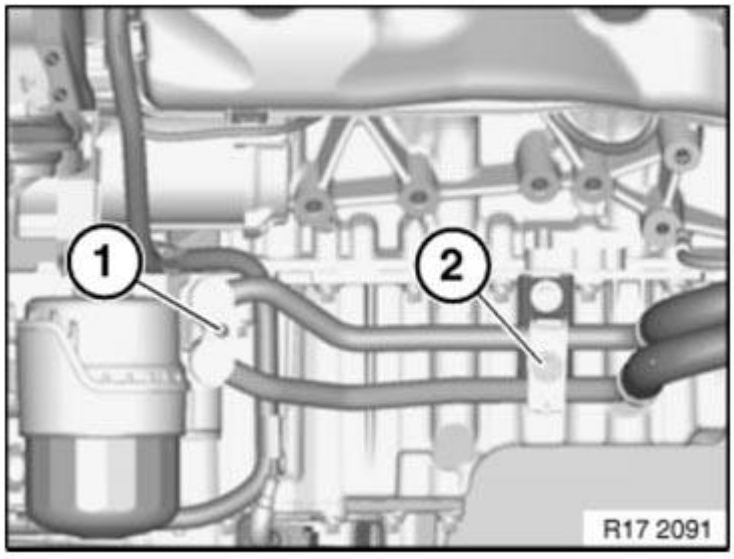


Fig. 67: Identifying Engine Oil Pipes Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace all sealing rings of engine oil pipes!

Release screw (1).

Tightening torque **17 22 6AZ** .

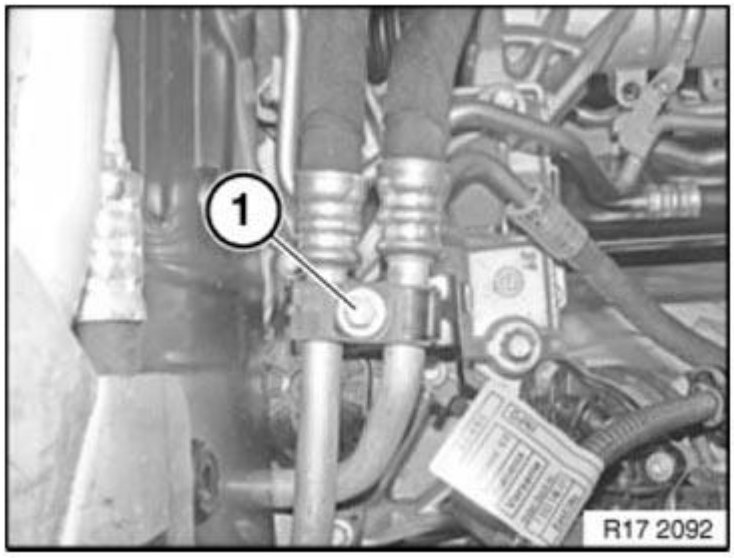


Fig. 68: Identifying Engine Oil Pipes Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 22 6AZ** .

Unlock engine oil pipes (3) and detach from engine oil cooler (4).

Feed out engine oil pipes (3) and remove.

Catch and dispose of emerging oil.

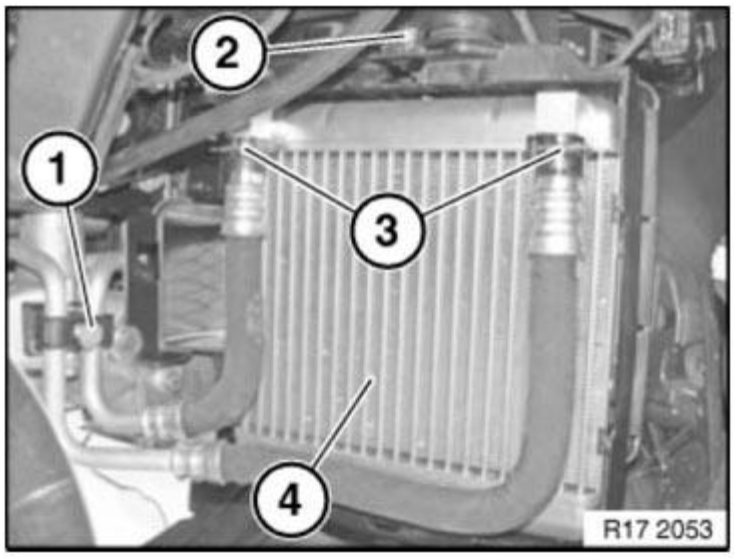


Fig. 69: Identifying Engine Oil Cooler With Engine Oil Pipes And Mounting Screw

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completion of repair work, check engine oil level. Refill if necessary. Check engine oil pipes for tightness.

1722010 REMOVING AND INSTALLING/REPLACING TRANSMISSION OIL COOLER (ALPINA B7 N63)

WARNING: Risk of scalding!
Only perform this work after engine has cooled down.

IMPORTANT: Wear safety goggles and protective gloves.

Necessary preliminary work

- Remove front **BUMPER TRIM**

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the transmission oil circuit.
When removing transmission oil lines and the transmission oil cooler, seal off all openings with suitable plugs.
To avoid transmission damage, do not allow any dirt particles to get into the transmission oil circuit.

Recycling

Transmission oil escapes when oil lines are released. Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.

Release screw (1) on line clip.

Tightening torque **17 22 1AZ** .

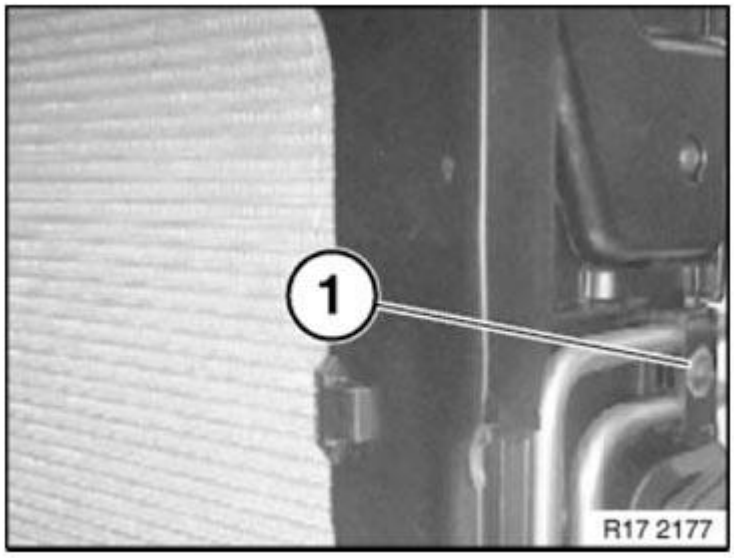


Fig. 70: Identifying Oil Pipe Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on transmission oil cooler.

Tightening torque **17 22 2AZ** .

Detach oil lines from transmission oil cooler.

Replace O-rings.

Seal oil lines with suitable sealing plugs.

Catch and dispose of escaping transmission oil.

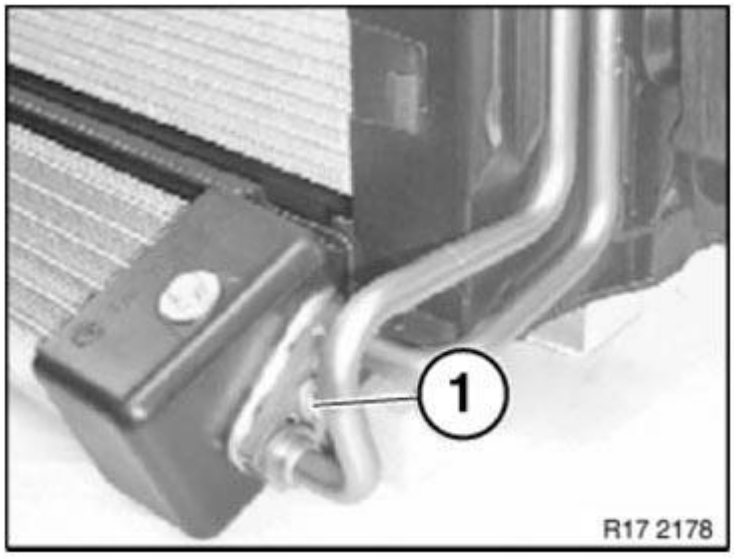


Fig. 71: Identifying Transmission Oil Cooler Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the right side, the procedure for the left side is identical.

Press together the retaining clips (1) on the left and right

Remove transmission oil cooler towards front.

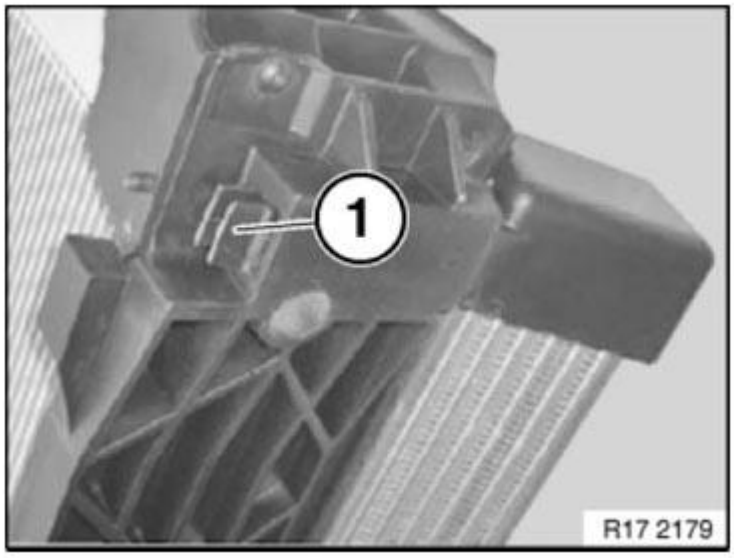


Fig. 72: Identifying Transmission Oil Cooler Mounting Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Only when replacing transmission oil cooler, modify holders on left and right.

Release screw (1).

Tightening torque **17 22 3AZ** .

Remove holders on left and right.

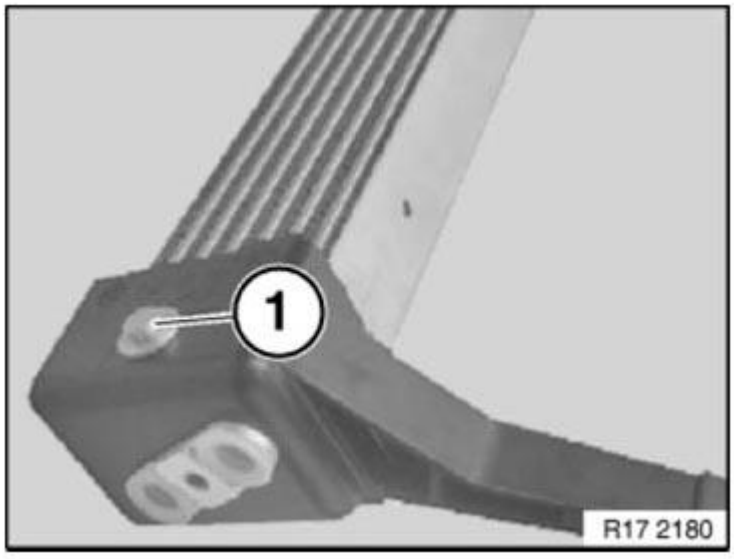


Fig. 73: Identifying Transmission Oil Cooler Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check transmission oil level and top up transmission oil if necessary.

1722 OIL COOLER LINES

1721500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION)

Notes

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.
Flushing can only be carried out with the automatic transmission removed.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to BMW Service Operating Fluids) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

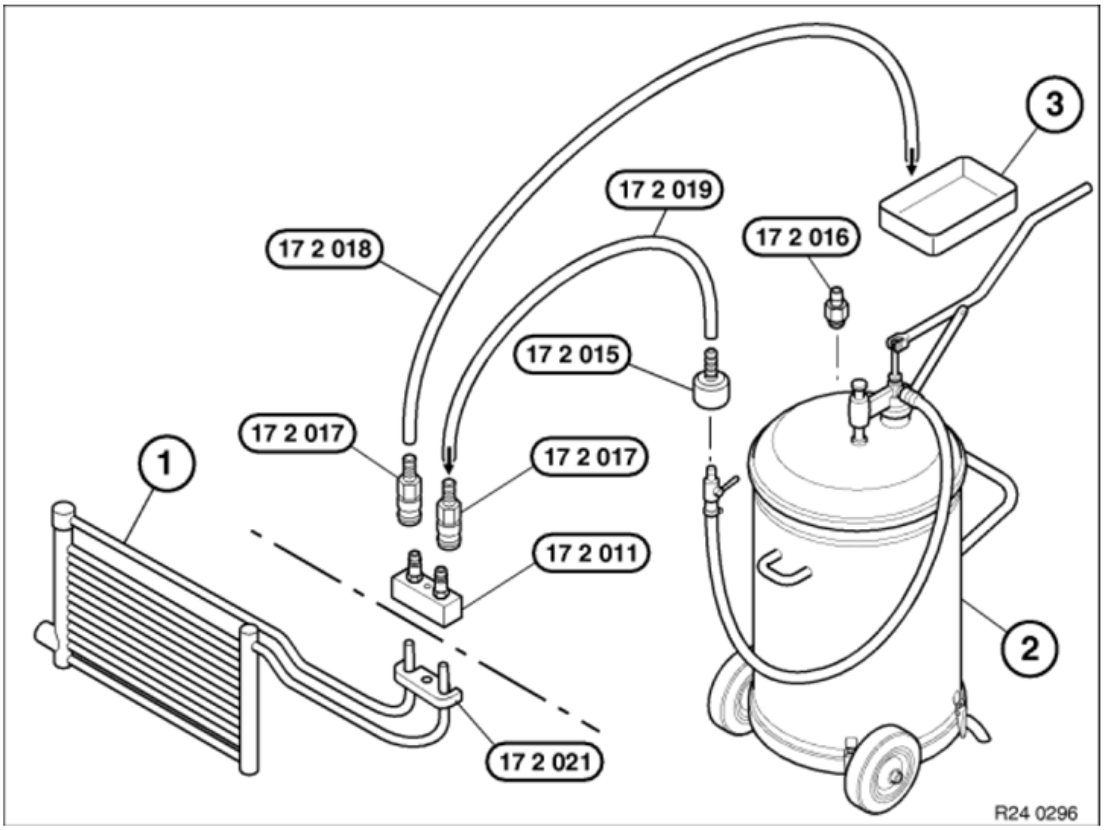
Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid (refer to BMW Service Operating Fluids).

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Arrangement, flushing apparatus for transmissions A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 74: Arrangement Flushing Apparatus For Transmissions A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 011 Adapter for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

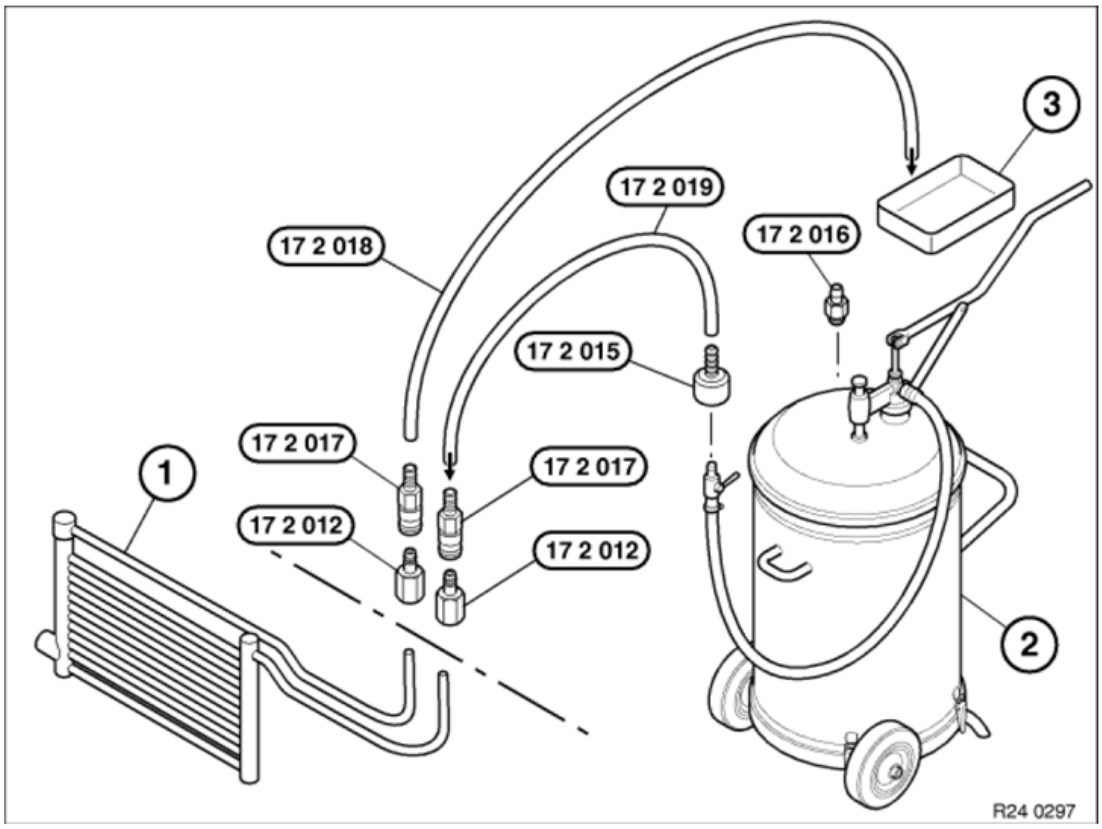
17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 2 021 Mounting plate for adapter 17 2 011 for transmissions A5S 325Z, GA6HP26Z

Arrangement of flushing apparatus for transmission A4S 310R



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 75: Arrangement Of Flushing Apparatus For Transmission A4S 310R
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

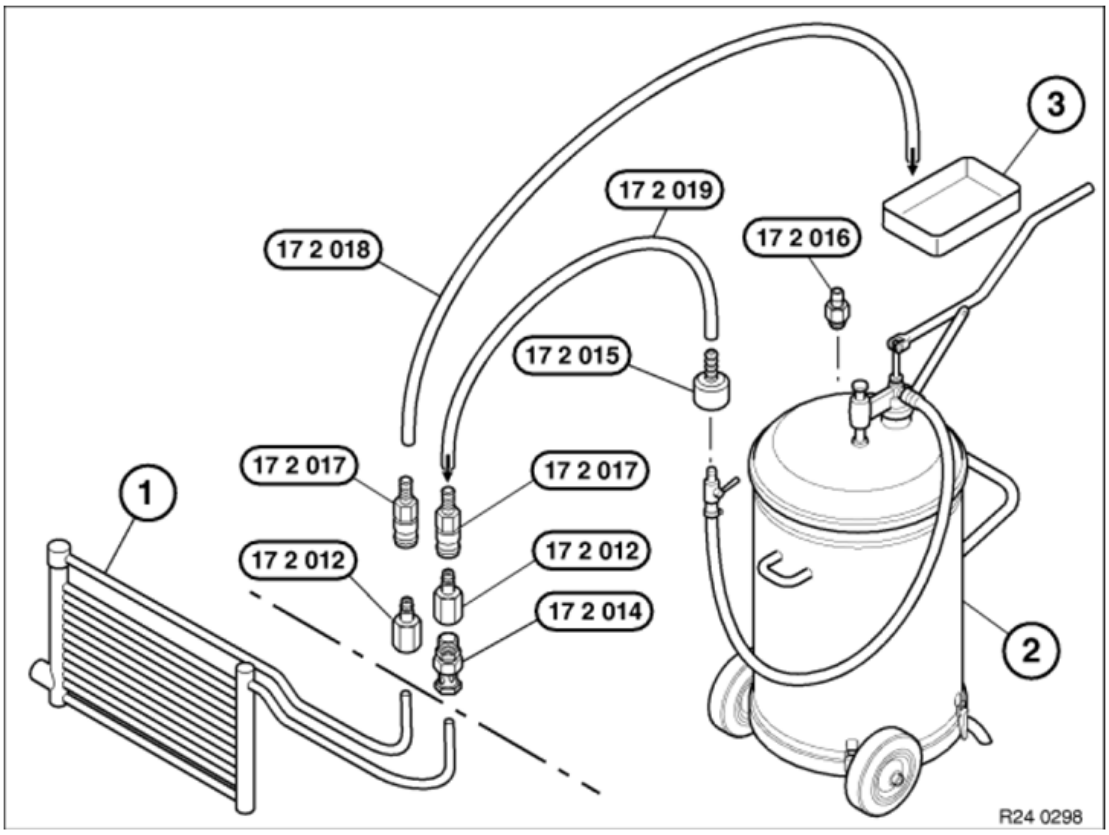
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A4S 300J



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 76: Arrangement Of Flushing Apparatus For Transmission A4S 300J
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 014 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

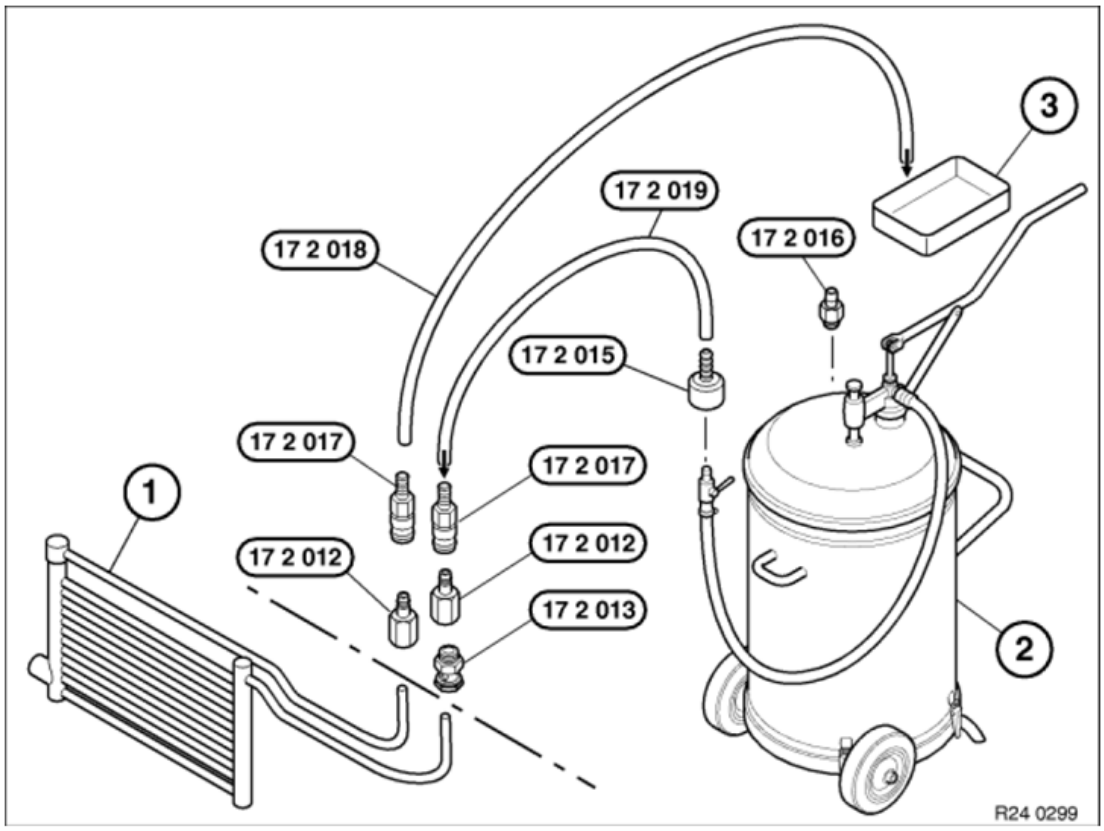
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A5S 440Z



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 77: Arrangement Of Flushing Apparatus For Transmission A5S 440Z
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 013 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

1721500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION) (GA6HP19Z, GAHP26Z, GA6HP32Z)

Notes

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to **OPERATING FLUIDS**) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid (refer to **OPERATING FLUIDS**).

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

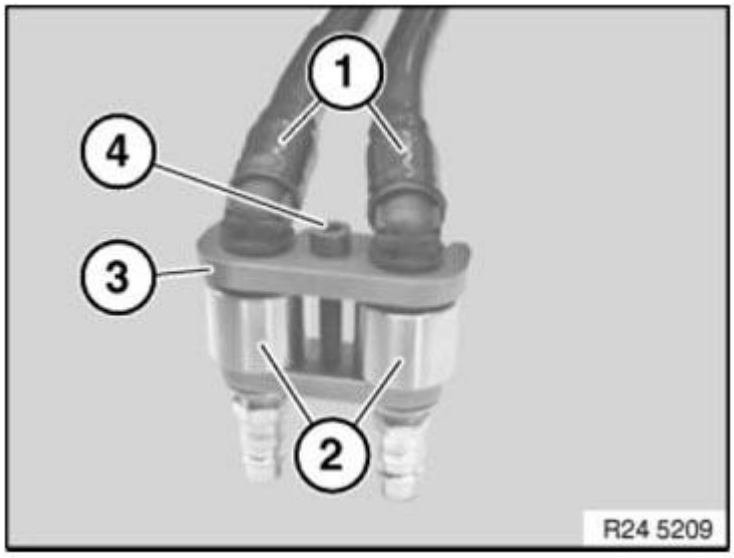


Fig. 78: Identifying Hydraulic Lines, Adapters, Clamping Bars With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for transmissions GA6HP19Z, GA6HP26Z, GA6HP32Z

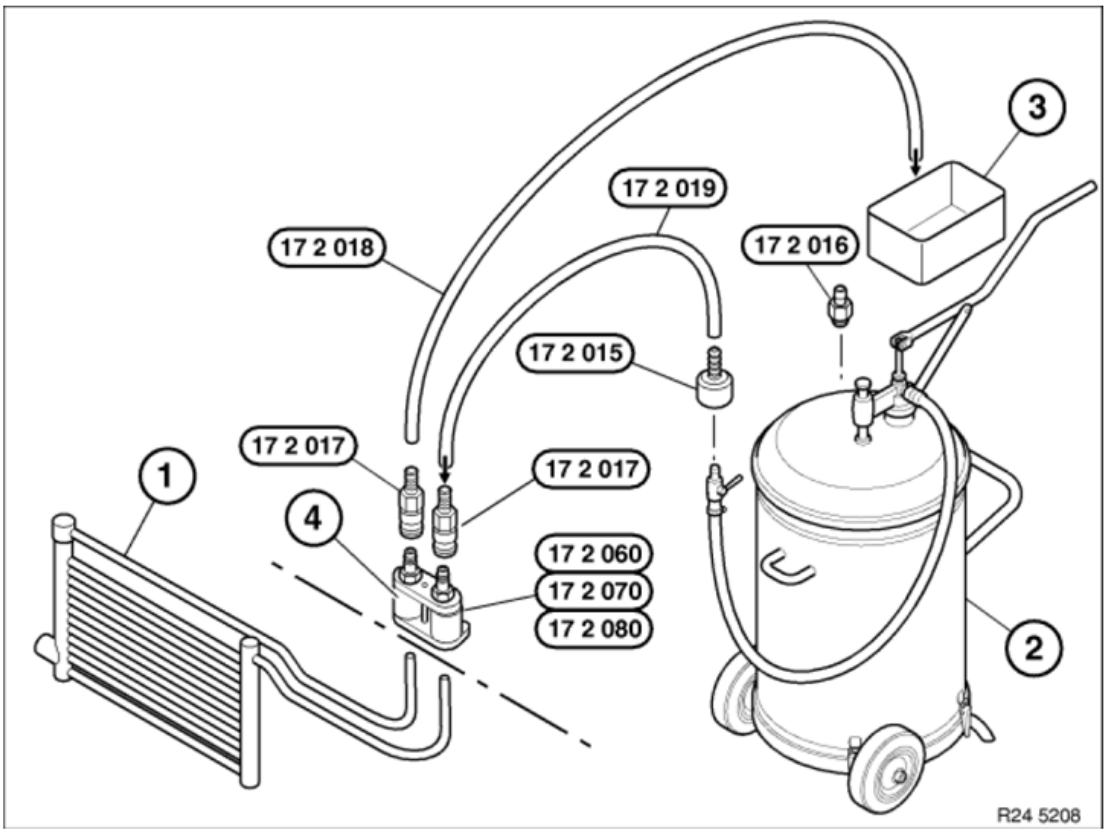


Fig. 79: Arrangement Of Flushing Apparatus For Transmissions (GA6HP19Z, GA6HP26Z, GA6HP32Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission-oil cooler with lines
2. Oil collection unit

   17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

   17 2 016 Connection for oil collection unit (2), manufacturer: Horn

   17 2 017 Quick-release coupling (2 pieces)

   17 2 019 Hose to oil collection unit (2)

3. Oil drip tray

   17 2 018 Hose to oil drip tray (3)

4. Adapter with clamping bar

   17 2 060 Adapter with clamping bar for aluminium lines and steel lines with aluminium connection (line diameter 12 mm) GA6HP19Z

   17 2 070 Adapter with clamping bar (line diameter 15 mm) GA6HP26Z, GA6HP32Z, TCT for N54 engine

   17 2 080 Adapter with clamping bar for fuel lines GA6HP26Z

1722080 REMOVING AND INSTALLING/REPLACING FEED AND RETURN LINES FOR ENGINE OIL COOLER (N63)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: Wear protective gloves and safety goggles.

IMPORTANT: Adhere to conditions of absolute cleanliness when performing repair work on the engine oil circuit.
When removing engine oil pipes and engine oil cooler, seal off all openings with suitable plugs.
To avoid engine damage, do not allow any dirt particles to get into the engine oil circuit.

Recycling

Engine oil escapes when the engine oil pipe is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Lower **FRONT AXLE SUPPORT** .
- Remove **WHEEL ARCH PANEL** front section on right.

Release screw (1).

Tightening torque **17 22 4AZ** .

Release screw (2).

Tightening torque **17 22 5AZ** .

Remove engine oil pipes from oil filter control housing and oil sump.

Catch and dispose of emerging oil.

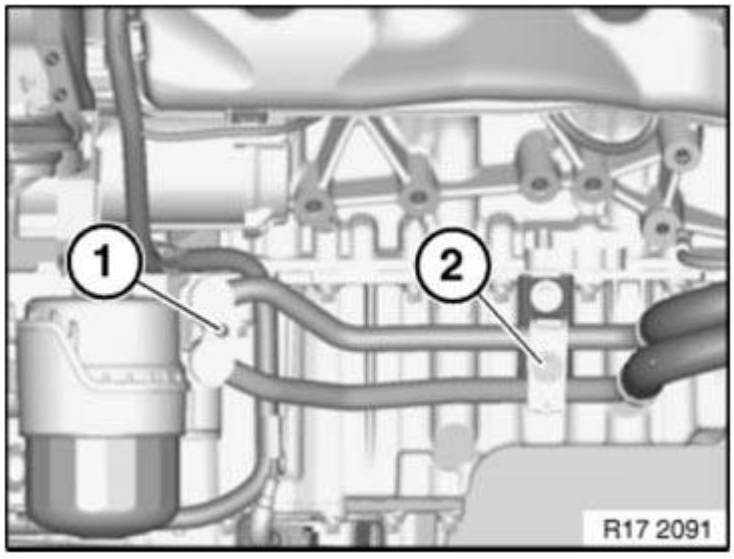


Fig. 80: Identifying Engine Oil Pipes Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace all sealing rings of engine oil pipes!

Release screw (1).

Tightening torque **17 22 6AZ** .

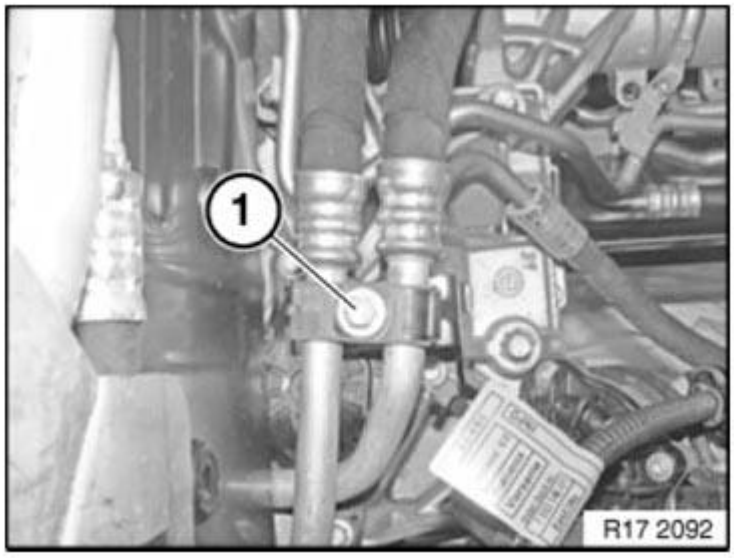


Fig. 81: Identifying Engine Oil Pipes Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 22 6AZ** .

Unlock engine oil pipes (3) and detach from engine oil cooler (4).

Feed out engine oil pipes (3) and remove.

Catch and dispose of emerging oil.

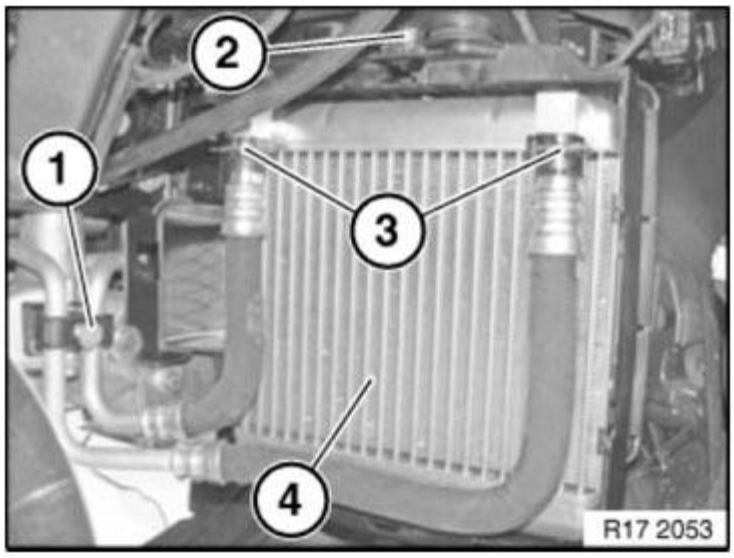


Fig. 82: Identifying Engine Oil Cooler With Engine Oil Pipes And Mounting Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completion of repair work, check engine oil level. Refill if necessary. Check engine oil pipes for tightness.

1722010 REMOVING AND INSTALLING/REPLACING GEARBOX OIL COOLER FOR AUTOMATIC TRANSMISSION (N63, N74)

IMPORTANT: Risk of scalding!
Only perform this repair work after engine has cooled down.

Necessary preliminary work

- Drain **COOLANT** .
- Remove **FAN COWL** .

Recycling

Catch and dispose of drained coolant in a suitable container.

Transmission oil emerges when engine oil lines are detached from transmission oil cooler.

Catch and dispose of escaping transmission oil in a suitable container.

Observe country-specific waste disposal regulations.

Release and disconnect coolant hoses (1).

Unlock transmission oil lines (2) and detach.

Remove transmission oil cooler (3).

NOTE: When replacing transmission oil cooler (3), modify THERMOSTAT INSERT (4).

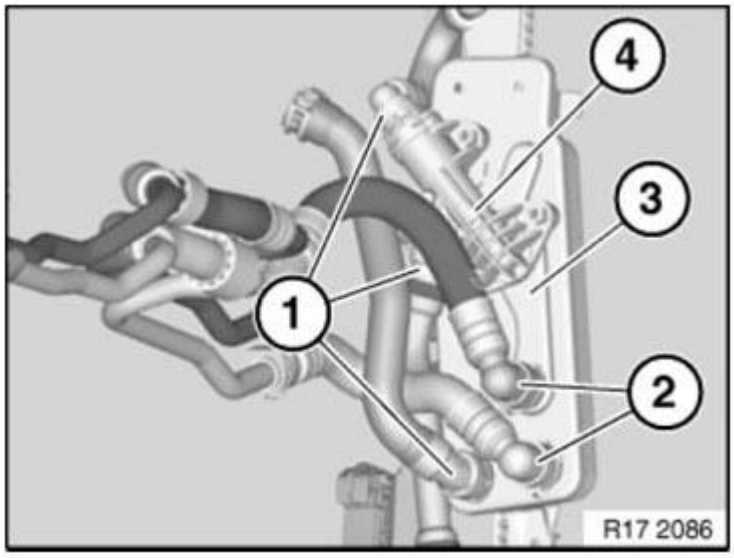


Fig. 83: Identifying Transmission Oil Cooler, Coolant Hoses, Transmission Oil Lines And Thermostat Insert
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.
Check OIL LEVEL in automatic transmission. If necessary, top up automatic transmission fluid.

1722010 REMOVING AND INSTALLING/REPLACING TRANSMISSION OIL COOLER (ALPINA B7 N63)

WARNING: Risk of scalding!
Only perform this work after engine has cooled down.

IMPORTANT: Wear safety goggles and protective gloves.

Necessary preliminary work

- Remove front **BUMPER TRIM**

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the transmission oil circuit.
When removing transmission oil lines and the transmission oil cooler, seal off all openings with suitable plugs.
To avoid transmission damage, do not allow any dirt particles to get into the transmission oil circuit.

Recycling

Transmission oil escapes when oil lines are released. Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.

Release screw (1) on line clip.

Tightening torque **17 22 1AZ** .

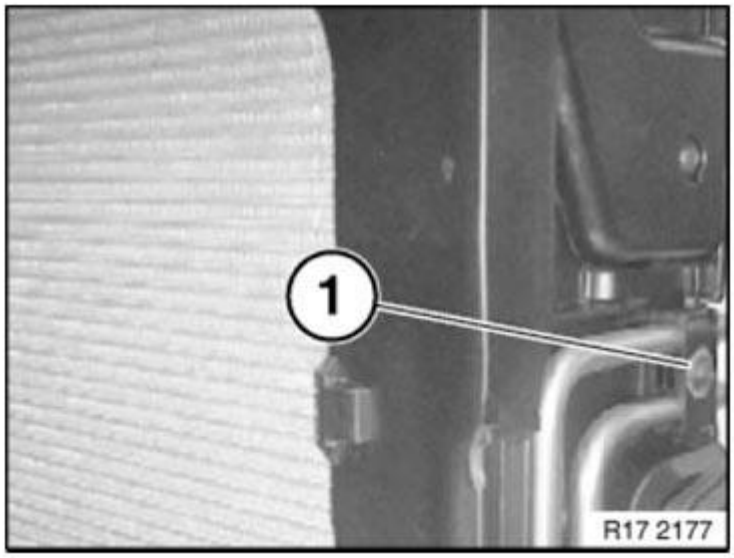


Fig. 84: Identifying Line Clip Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on transmission oil cooler.

Tightening torque **17 22 2AZ** .

Detach oil lines from transmission oil cooler.

Replace O-rings.

Seal oil lines with suitable sealing plugs.

Catch and dispose of escaping transmission oil.

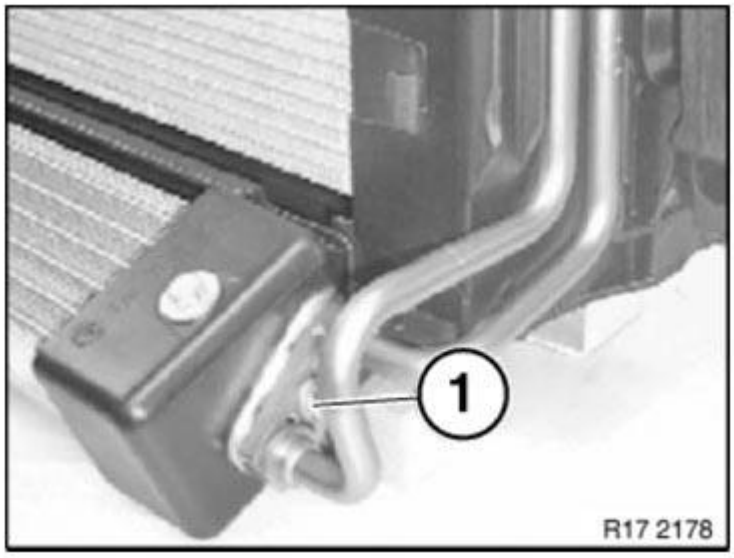


Fig. 85: Identifying Transmission Oil Cooler Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the right side, the procedure for the left side is identical.

Press together the retaining clips (1) on the left and right

Remove transmission oil cooler towards front.

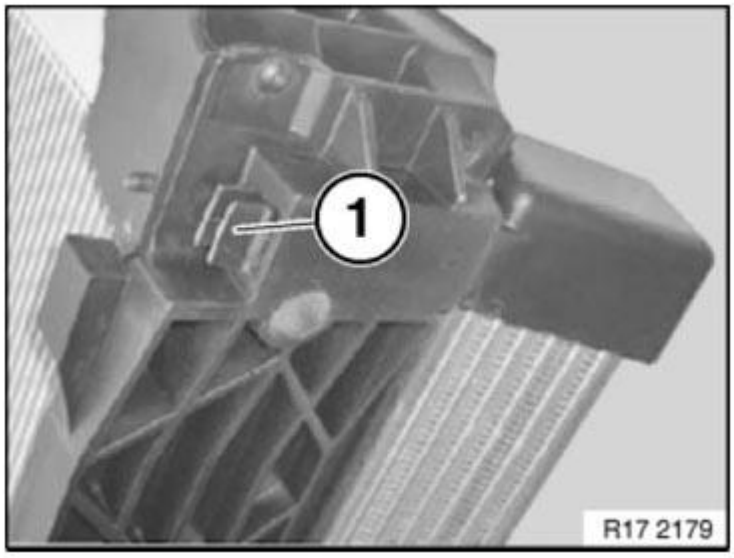


Fig. 86: Identifying Transmission Oil Cooler Mounting Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Only when replacing transmission oil cooler, modify holders on left and right.

Release screw (1).

Tightening torque **17 22 3AZ** .

Remove holders on left and right.

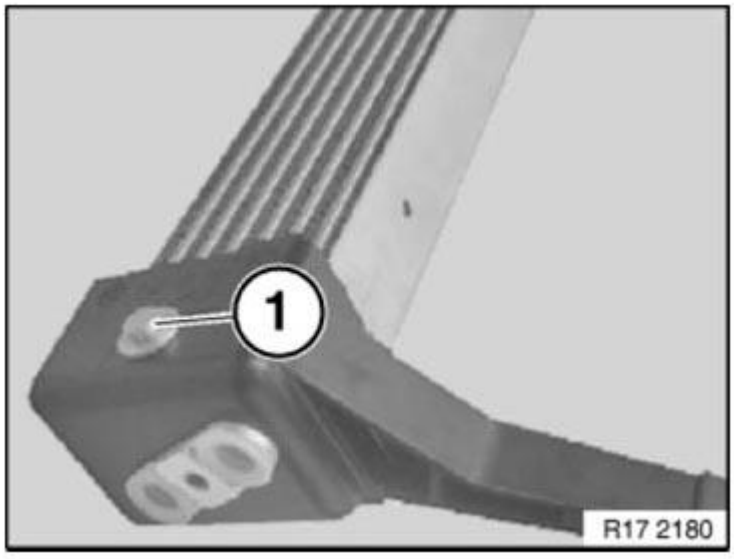


Fig. 87: Identifying Transmission Oil Cooler Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check transmission oil level and top up transmission oil if necessary.

1751 CHARGE AIR COOLER WITH MOUNT

64 53...INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

See **INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS**.

1751001 REMOVING AND INSTALLING/REPLACING LEFT CHARGE AIR COOLER (N63)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down!

Necessary preliminary work

- Remove **ACOUSTIC COVER**
- Remove front **UNDERBODY PROTECTION** .

- Remove **FAN COWL** .
- Drain coolant for charge air cooler.

Release clamp (1).

Tightening torque **13 71 8AZ** .

Release clamp (2).

Replace clamp (2).

Remove left charge-air duct (3).

Installation note:

Check the gasket on the exhaust turbocharger. replacing if necessary.

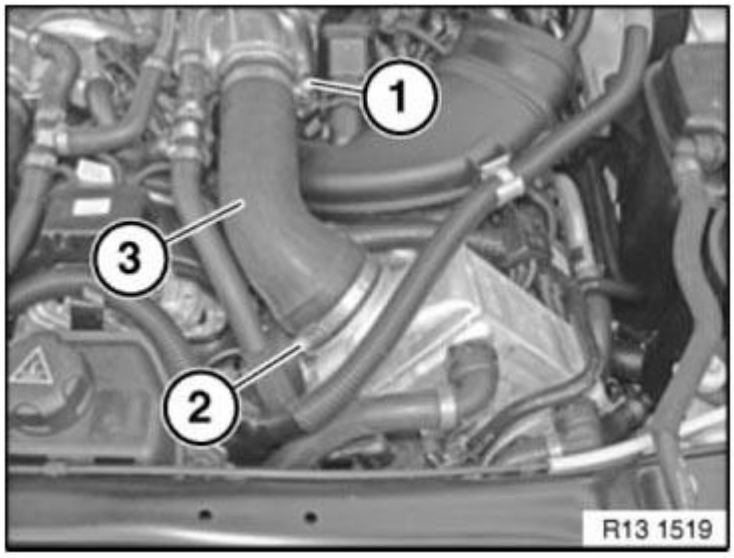


Fig. 88: Identifying Left Charge-Air Duct With Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When loosening the coolant hoses from the charge air cooler, make sure that the connector remains connected to the throttle body. Coolant may not penetrate the plug connection at the throttle body.

Release and disconnect coolant hoses (1).

Remove tank vent valve (2) from charge air cooler (3).

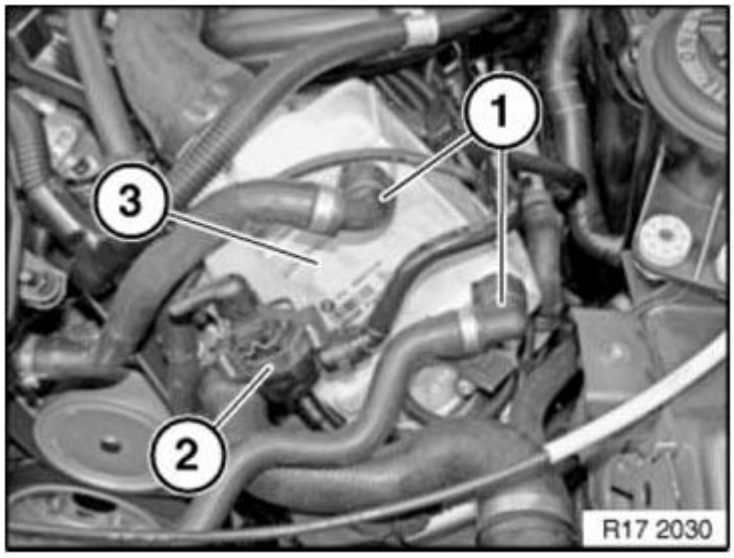


Fig. 89: Identifying Charge Air Cooler, Tank Vent Valve And Charge Air Cooler
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector (1) and remove.

Release screw (2).

Tightening torque **13 71 6AZ** .

Installation note:

Screw (2) is longer than screws (3)

Release screws (3).

Tightening torque **13 71 6AZ** .

Release clamp (4) on throttle valve unit.

Tightening torque **13 71 7AZ** .

Lift out charge air cooler.

Replace faulty hose clamps.

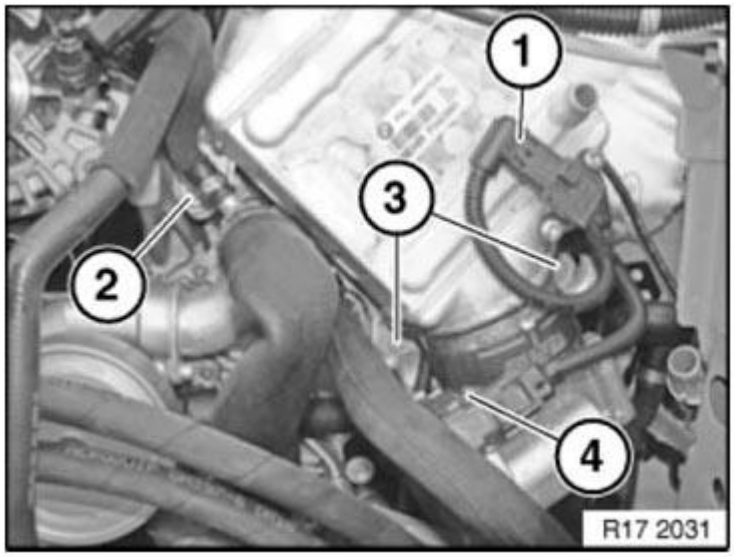


Fig. 90: Identifying Charge Air Cooler With Connector, Mounting Screws And Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

After completing all repair work, bleed the **COOLING SYSTEM FOR THE CHARGE AIR COOLER** .

1751001 REMOVING AND INSTALLING/REPLACING RIGHT CHARGE AIR COOLER (N63)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down!

Necessary preliminary work

- Remove **ACOUSTIC COVER**
- Remove front **UNDERBODY PROTECTION** .
- Remove **FAN COWL** .
- Drain coolant for charge air cooler.

Release clamp (1).

Tightening torque **13 71 8AZ** .

Release clamp (2).

Replace clamp (2).

Remove right charge-air duct (3).

Check the seal on the exhaust turbocharger. replacing if necessary.

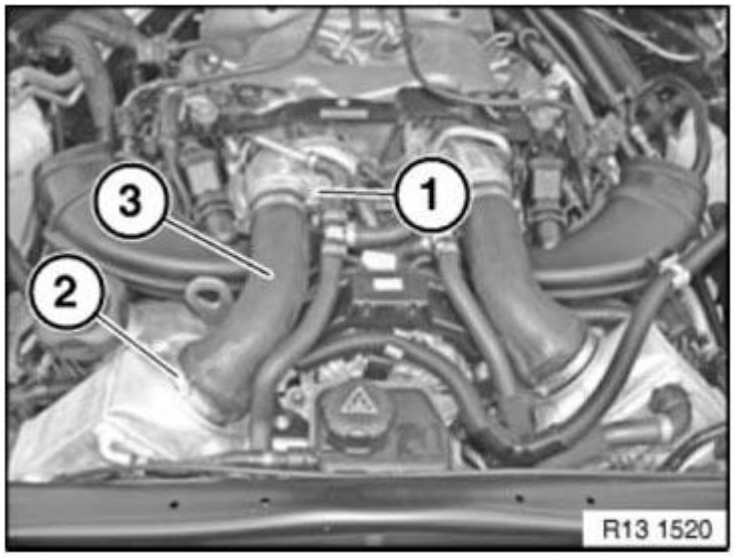


Fig. 91: Identifying Right Charge Air Duct With Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When loosening the coolant hoses from the charge air cooler, make sure that the connector remains in place on the throttle body. No coolant may penetrate the plug connection on the throttle body.

Release and disconnect coolant hoses (1).

Detach coolant hose (2) from charge air cooler.

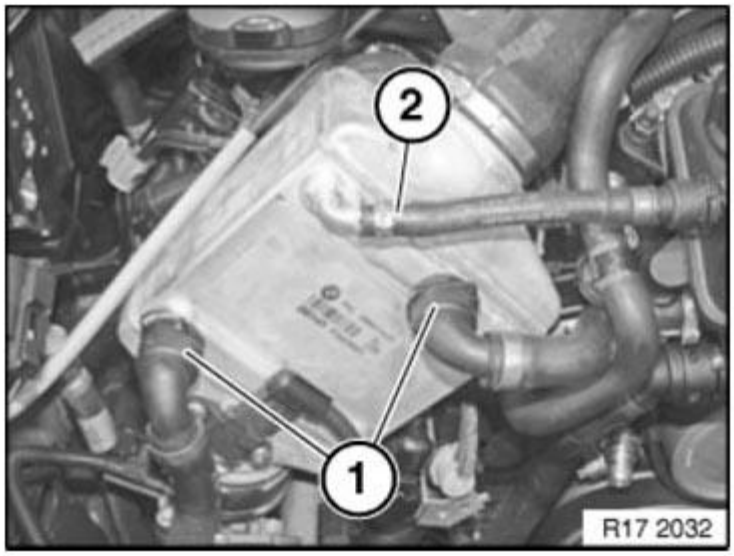


Fig. 92: Identifying Coolant Hoses

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector (1) and remove.

Release screw (2).

Tightening torque **13 71 6AZ** .

Installation note:

Screw (2) is longer than screws (3)

Release screws (3).

Tightening torque **13 71 6AZ** .

Release clamp (4) on throttle valve unit.

Tightening torque **13 71 7AZ** .

Lift out charge air cooler.

Replace faulty hose clamps.

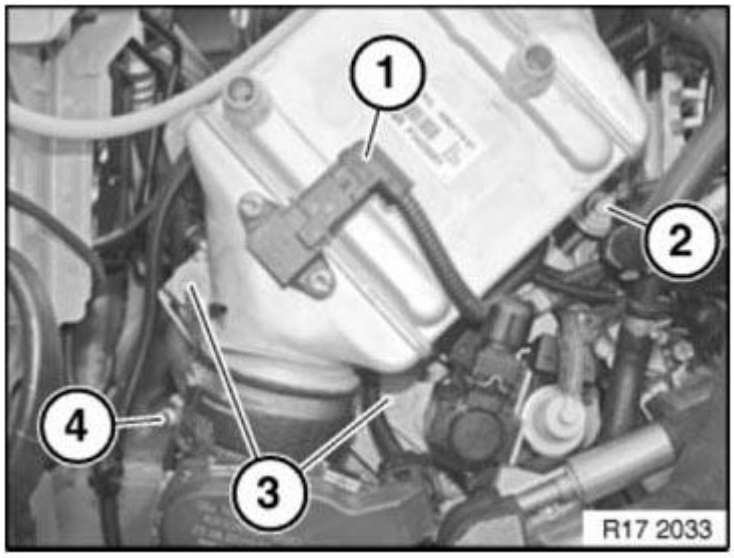


Fig. 93: Identifying Charge Air Cooler With Connector, Mounting Screws And Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

After completing all repair work, vent the **COOLING SYSTEM FOR THE CHARGE AIR COOLER** .

GENERAL INFORMATION

Diagnostic Connector (DLC) Locations

DOMESTIC CARS

CHRYSLER GROUP LLC

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

CHRYSLER GROUP LLC - DOMESTIC CARS

Application	Connector Location
Acclaim	
1989-90	Under Left Side Of Dash
1991-92	On Left Front Fender Panel, Near Shock Tower
1993-94	Near Battery
1995	Behind Left Side Of Dash, Near Fuse Block
Aries, Caravelle, Dynasty, E Class, Executive Sedan, LeBaron Sedan, New Yorker, Reliant, Town & Country, 400 & 600	
1984-85	On Left Fender Apron, Behind Battery (2.2L Only)
1986-87	On Front Of Right Shock Tower (2.2L & 2.5L Only)
1988-89	On Left Fenderwell
1990	Under Left Side Of Dash
1991-92	On Left Front Fender Panel, Near Shock Tower
1993 (Except New Yorker)	Near Battery
1993 (New Yorker)	On Left Fender Panel Near PCM
Avenger (1995-00)	Under Center Of Dash, Near Center Console
Breeze, Cirrus & Stratus (1995)	Left Of Steering Column, On BCM
Charger, Horizon, Omni, Rampage, Scamp & Turismo	
1985-89	
2.2L Carbureted	On Left Fender Apron
2.2L Turbo	On Front Of Right Shock Tower
Concorde, Intrepid, LHS, New Yorker, Vision & 300M	
1993-95	Behind Left Side Of Dash
1996-97	Under Left Side Of Dash, Near Center

	Console
Daytona	
1984-87	On Front Of Right Shock Tower
1988-89	On Left Fenderwell
1990-92	On Left Front Fender Panel, Near Shock Tower
1993	On Left Front Inner Fender Or Under Steering Column
Dynasty	
1990	Under Left Side Of Dash
1991-93	On Left Fender Panel, Near SBEC/PCM
Fifth Avenue	
1990	Under Left Side Of Dash
1991-93	On Left Fender Panel Near SBEC/PCM
Horizon & Omni (1989-90)	Under Left Side Of Dash
Imperial	
1981-83	CCC Connector Left Of Air Cleaner
1990	Under Left Side Of Dash
1991-93	On Left Fender Panel Near SBEC/PCM
LeBaron Coupe & Convertible	
1985-87	On Right Front Shock Tower
1988-89	On Left Fenderwell
1990-92	On Left Front Fender Panel, Near Shock Tower
1993	On Left Front Inner Fender Or Under Steering Column
1994	Near Battery
1995	Behind Left Side Of Dash, Near Fuse Block
Lancer	
1985-87	On Right Front Shock Tower
1988-89	On Left Fenderwell
Laser	
1990-94	Above Left Kick Panel, Near Fuse Block
1995	Under Left Side Of Dash, Near Center Console
Monaco & Premier	
1990	On Right Front Fender Panel
1991-92	On Left Fender Panel, Next To SBEC
	Under Headlight Switch, Under Left Side

Neon (1995)	Of Dash
Shadow	
1985-87	On Right Front Shock Tower
1988	On Left Fenderwell
1989	Under Dash, To Right Of Steering Column
1990	On Left Fender Front Panel, Near SBEC
1991-92	On Left Front Fender Panel, Near Shock Tower
1993-94	Near Battery
Spirit & Sundance	
1985-87	On Right Front Shock Tower
1989-90	Under Left Side Of Dash
1991-92	On Left Front Fender Panel, Near Shock Tower
1993-94	Near Battery
1995	Behind Left Side Of Dash, Near Fuse Block
Talon	
1990-94	Above Left Kick Panel, Near Fuse Block
1995-98	Under Left Side Of Dash, Near Center Console

FORD MOTOR CO.

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

FORD MOTOR CO. - DOMESTIC CARS

Application	Connector Location
Bobcat & Pinto	On Center Of Right Fender Apron
Capri	
1980-85	On Center Of Left Front Fender Apron
1986	On Left Rear Corner Of Engine Compartment
Continental	
1984-89	On Right Rear Corner Of Engine Compartment
1990-91	On Right Rear Corner Of Firewall, On Electronic Assembly Cover

1992	On Right Fender Apron
1993-94	VIP Connectors (2) On Right Rear Of Engine Compartment, On PCM Cover
Contour & Mystique	
1995	On Left Rear Corner Of Engine Compartment
Cougar & Thunderbird	
1982-90	On Left Fender Apron
1991	On Rear Of Right Front Fender Panel
1992	Front Of Right Shock Tower
1993	2 Connectors In Right Rear Corner Of Engine Compartment
1994	On Right Side Of Engine Compartment & Below Glove Box
1995	
3.8L	On Right Side Of Engine Compartment & Below Glove Box
4.6L	Behind Right Side Of Dash, Below Glove Box
1996	Lower Right Side Of Dash, Below Glove Box
Crown Victoria, Grand Marquis & Lincoln Town Car	
1983 & 1987	On Right Fender Apron
1985-86 & 1988-90	On Left Fender Apron
1992	On Left Front Fender Panel
1993-94	On Top Of Left Front Wheelwell
Escort, EXP, Lynx & Tracer	
1985-90	On Right Fender Apron Near Firewall
1991	On Left Rear Of Engine Compartment
1992	On Right Rear Of Engine Compartment, Near Cowl
1993-95	On Left Side Of Firewall
LTD & Marquis	
1983	On Left Fender Apron
1984-86	On Left Rear Corner Of Engine Compartment
Mark VII	
1984-87	On Right Rear Corner Of Engine Compartment
1988-90	Front Of Right Fender Apron
1991	On Right Side Of Engine Compartment, Near Thermactor

	Solenoids
Mark VIII	
1993-96	On Top Of Left Wheelwell
Mustang	
1980-85	On Center Of Left Front Fender Apron
1986-91	On Left Rear Corner Of Engine Compartment
1992	On Left Shock Tower, Near Ignition Coil
1993	2 Connectors On Right Front Strut Tower
1994-95	Behind Right Front Strut Tower & Right Of Steering Column
Probe	
1991-92	On Left Rear Corner Of Engine Compartment
1993	DLC - Behind Left Side Of Dash; STI Connector - On Left Inner Fender Panel
1994-95	On Left Front Inner Fender Panel
Sable & Taurus	
1986-87 (3.0L Only)	Near Alternator
1988-90	
2.5L	On Engine Harness Near PCV Hose
3.0L	On Right Rear Corner Of Engine Compartment
1991	On Right Rear Corner Of Engine Compartment, On ECA Cover
1992	On Right Rear Corner Of Engine Compartment, Below MAP Sensor
1993-95	Right Rear Of Engine Compartment
Tempo & Topaz	
1984-92	On Right Rear Corner Of Engine Compartment
1993-94	In Engine Compartment, On Left Strut Tower

GENERAL MOTORS

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

GENERAL MOTORS - DOMESTIC CARS

Application	Connector Location
Allante	Enter Diagnostic Mode By Pressing OFF & WARM Buttons On Instrument Panel
Bonneville (1980-81)	ECU Connector On Upper Right Kick Panel
Brougham (1987-92)	Bottom Center Of Instrument Panel
Camaro & Firebird (1980)	Diagnostic Ground Lead Connector On Right Shroud Above ECM
Caprice Classic	
1980-81	ECU Connector On Upper Right Kick Panel
1982-88	Under Center Of Instrument Panel
Catalina	ECU Connector On Upper Right Kick Panel
Cavalier (1982-88)	On Side Of Fuse Block
Cimarron	On Side Of Fuse Block
Century	Under Left Of Dash Ashtray
Corvette (1980-83)	In Center Console, Under Ashtray
Custom Cruiser	
1980-81	ECU Connector On Upper Right Kick Panel
1982-88	Under Center Of Instrument Panel
DeVille (1981-88)	Enter Diagnostic Mode By Pressing OFF & WARMER Buttons On Instrument Panel
Delta 88	ECU Connector On Upper Right Kick Panel
Eldorado (1981-88)	Enter Diagnostic Mode By Pressing OFF & WARMER Buttons On Instrument Panel
Electra (1980-81)	ECU Connector On Upper Right Kick Panel
Estate Wagon	ECU Connector On Upper Right Kick Panel
Fiero	Under Ashtray Or Cigar Lighter Panel Within Center Console
Firenza	On Side Of Fuse Block
Fleetwood (1981-88)	Enter Diagnostic Mode By Pressing OFF & WARMER Buttons On Instrument Panel
Fleetwood Brougham	On Bottom Center Of Dash, Near Ashtray

Impala (1982-88)	Under Center Of Instrument Panel
LeMans	ECM Connector On Right Kick Panel Or Under Left Side Of Dash
LeSabre (1980-81)	ECU Connector On Upper Right Kick Panel
LeSabre Wagon (1982-88)	Under Center Of Instrument Panel
Monza	Under Right Side Of Dash
Ninety-Eight (1980-81)	ECU Connector On Upper Right Kick Pane
Nova	Behind Right Strut Tower
Parisienne	Under Center Of Instrument Panel
Reatta	
1988-92 (MFI)	Enter Diagnostic Mode By Pressing OFF & WARM Buttons On Instrument Panel
1991-93	Above Parking Brake Pedal
Riviera	
1980-85 (Carbureted)	Under Left Or Center Of Dash
1986-92 (MFI)	Enter Diagnostic Mode By Pressing OFF & WARM Buttons On Instrument Panel
Safari	Under Center Of Instrument Panel
Seville (1981-88)	Enter Diagnostic Mode By Pressing OFF & WARMER Buttons On Instrument Panel
Skyhawk	Under Right Side Of Dash
Starfire	Under Right Side Of Dash
Sunbird	On Side Of Fuse Block, Under Right Side Of Dash
Toronado	
1980-85 (Carbureted)	Under Left Or Center Of Dash
1986-92 (MFI)	Enter Diagnostic Mode By Pressing OFF & WARM Buttons On Instrument Panel
Trofeo	
1988-92 (MFI)	Enter Diagnostic Mode By Pressing OFF & WARM Buttons On Instrument Panel
1991-93	Above Parking Brake Pedal
2000	On Side Of Fuse Block

DOMESTIC LIGHT TRUCKS & VANS

CHRYSLER GROUP LLC

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

CHRYSLER GROUP LLC - DOMESTIC LIGHT TRUCKS & VANS

Application	Connector Location
Caravan, Grand Caravan, Grand Voyager, Mini Ram Van, Town & Country, & Voyager	
1984-92	On Left Side Fender Apron
1993	On Left Fender Front Fender Panel, Near SBEC
1994-95	On Wiring Harness, On Center Of Firewall
Dakota	
1987-88	On Right Side Fender Apron
1989	On Left Side Of Firewall
1990-92	On Right Side Of Firewall
1993-95	On Right Rear Corner Of Engine Compartment
Jeep	
Cherokee (1992-95)	On Left Front Fender Apron, Behind Air Cleaner
Comanche	On Left Front Fender Apron, Behind Air Cleaner
Grand Cherokee & Wagoneer	
1993-95	
PCM	On Right Rear Of Engine Compartment, Near PCM
TCM	Behind Left Side Of Instrument Panel
Wrangler (1992-95)	On Left Side Of Firewall, Near PCM
Pickup & Ramcharger	
1985-90	On Left Side Of Firewall
1991-93	On Left Front Fender Panel, Next To SBEC/PCM
1995 Pickup	On Right Side Of Firewall
Ram Wagon & Van	
1985-90	On Left Side Of Firewall
1991-95	On Center Of Firewall, Near SBEC/PCM

FORD MOTOR CO.

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

FORD MOTOR CO. - DOMESTIC LIGHT TRUCKS & VANS

Application	Connector Location
Aerostar	
1986-90	On Left Front Fender
1991	Near Starter Relay
1992	On Left Front Inner Fender Panel
1993-95	On Left Side Of Firewall
Bronco	
1982-85	
6-Cylinder	On Left Front Fender
V8	On Right Inner Fender Panel
1986-87	On Right Front Fender, Near Starter Relay
1988-92	On Left Fender Apron
1993-95	2 Connectors In Left Rear Of Engine Compartment, On Bracket
1996-	Below Glove Box
Bronco II	
1983-85	On Right Front Inner Fender Panel (2.3L Only)
1986-90	On Right Front Fender Apron
Excursion	Behind Center Of Dash
Explorer & Mountaineer (1991-94)	On Right Rear Of Engine Compartment, Near A/C-Heater Blower
Pickup	
1982-85	
6-Cylinder	On Left Front Fender
V8	On Right Inner Fender Panel
1986-87	On Right Front Fender, Near Starter Relay
1988-92	On Left Fender Apron
1993-95	2 Connectors In Left Rear Of Engine Compartment, On Bracket
1996-	Below Center Of Instrument Panel
Pickup (F250 Heavy Duty & F350)	Under Right Side Of Dash
Ranger	
1983-85	On Right Front Inner Fender Panel (2.3L Only)

1986-90	On Right Front Fender Apron
1991	Behind Engine Compartment Fuse/Relay Block
1992	On Left Front Inner Fender Panel
1993-95	On Rear Of Engine Compartment Fuse/Relay Block
Van	
1986-92	On Right Fender Apron
1993-95	On Left Front Corner Of Engine Compartment
1996	
5.8L (49 State, Over 8600 GVW) & 7.5L (Except Calif.)	On Left Front Corner Of Engine Compartment
All Others	Under Left Side Of Dash
1997-98	
Diesel	Under Left Side Of Dash
All Others	Left Front Corner Of Engine Compartment
Villager (1993)	On Left Side Of Engine Compartment, Below Coolant Reservoir

GENERAL MOTORS

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

GENERAL MOTORS - DOMESTIC LIGHT TRUCKS & VANS

Application	Connector Location
Astro & Safari Van (1986-87)	Under Left Corner Of Cowl
"S" & "T" Series Blazer, Bravada, Envoy, Jimmy, Pickup & Sonoma	
1982-85	
1.9L	Under Left Side Of Dash, Behind ECM
2.0L & 2.8L	Under Ashtray
2.5L	Under Left Side Of Dash
1986-87	Under Ashtray
Van ("G" Series) (1982-87)	Under Driver's Seat

IMPORTED CARS & TRUCKS

ACURA

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

ACURA - IMPORTED CARS & TRUCKS

Application	Connector Location
Integra	
1991-93	Behind Right Kick Panel
1994-97	Behind Glove Compartment
1998-02	Behind Right Side Of Center Console
Legend	
1991-93	Under Right Side Of Dash, Above PGM-FI ECU/PCM
1994-95	Behind Glove Compartment
NSX (1997-01)	Under Glove Compartment
SLX	Behind Lower Left Corner Of Dash, Behind Cover
Vigor	
1992-93	Under Right Side Of Dash, Near Center Console
1994	Behind Glove Compartment
2.2CL & 2.3CL	In Front Of Shift Lever, Behind Ashtray
2.5TL	In Front Of Shift Lever, Behind Ashtray
3.0CL	In Front Of Shift Lever, Behind Ashtray
3.2TL & 3.5RL	In Front Of Shift Lever, Behind Ashtray

AUDI

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

AUDI - IMPORTED CARS & TRUCKS

Application	Connector Location
A4	
1996	Next To Rear Ashtray
1997-01 (1.8L Turbo)	Behind Cover, Under Left Side Of Steering Column
1997-99 (2.8L V6)	Under Cover, Next To Rear Ashtray
1997-	Under Left Side Of Dash, Behind Cover

A6	
1995	Under Ashtray, In Front Storage Compartment Of Center Console
1996-97	Under Cover, Next To Parking Brake Handle
Cabriolet	
1994-96	In Fuse/Relay Block, On Left Side Of Dash
1997-98	Under Ashtray, At Rear Of Center Console
Coupe GT, 4000S & 4000S Quattro	In Fuse Socket, On Fuel Pump Relay
80	In Fuse Socket, On Fuel Pump Relay
90	
1988-92	In Fuse Socket, On Fuel Pump Relay
1993	In Main Fuse/Relay Block, On Plenum Tray
1994-95	In Fuse/Relay Block, On Left Side Of Dash
100	
1989-91	Under Left Side Of Dash
1992-94	In Auxiliary Relay Station No. 1, On Left Rear Of Engine Compartment
5000CS Quattro, 5000CS Turbo & 5000S	In Fuse Socket, On Fuel Pump Relay

BENTLEY

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

BENTLEY - IMPORTED CARS & TRUCKS

Application	Connector Location
1996-00	
All Models	In Glove Compartment
2001-04	
Arnage	Below Left Side Of Dash
2001-	
Azure Convertible	In Glove Compartment
Continental	In Glove Compartment

BMW

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

BMW - IMPORTED CARS & TRUCKS

Application	Connector Location
Z3	Behind Cover, On Right Side Of Center Console
Z4 & Z8	Under Left Side Of Dash, Left Of Steering Column, Behind Cover
318 & 325	
1991	On Bracket, Above Thermostat Housing
1992-95	On Right Rear Of Engine Compartment
1996	Under Left Side Of Dash, Behind Panel Labeled OBD
330	Behind Cover, Under Left Side of Dash Above Hood & Trunk Releases
524t	On Top Rear Of Engine
525i & 535i	
1990-91 (Black 20-Pin Connector)	Left Rear Corner Of Engine Compartment
1992-95	Outside Of Engine Compartment Fuse/Relay Block
528e	On Intake Manifold Bracket, Behind Thermostat Housing
635CSi	On Bracket, Next To Fuse/Relay Block
735i	
1986-87	On Bracket, On Top Of Engine
1988-92	On Right Side Of Engine Compartment, On Shock Tower
740 & 750	Under Left Side Of Dash, Behind Panel Labeled OBD
740i & 740iL (1993-01)	Behind Cover On Lower Left Corner Of A/C Control Panel
745Li	In Left Side Kickpanel, Behind Cover Labeled OBD
750iL	Behind Cover On Lower Left Corner Of A/C Control Panel

DAIHATSU

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

DAIHATSU - IMPORTED CARS & TRUCKS

Application	Connector Location
Charade	At Upper Section Of Transmission
Rocky	On Right Front Fender Panel

CHRYSLER GROUP LLC

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

CHRYSLER GROUP LLC - IMPORTED CARS & TRUCKS

Application	Connector Location
Colt & Summit	
1986-87	Above Inside Of Glove Compartment
1988	On Left Rear Corner Of Engine Compartment
1989-98	Under Left Side Of Dash, Near Fuse/Relay Block
Colt Vista	
1987	Behind Glove Compartment
1988-89	Under Left Side Of Dash, Near Hood Release Handle
1990-96	Under Right Side Of Dash
Conquest & Starion	Behind Glove Compartment
Expo	Under Left Side Of Dash, Near Fuse/Relay Block
Medallion	On Left Side Of Firewall
Pickup	Under Left Side Of Dash, Near Fuse/Relay Block
Ram-50	Under Left Side Of Dash, Near Fuse/Relay Block
Sigma	In Glove Compartment
Stealth	
1991-98	Under Left Side Of Dash, On Fuse/Relay Block
1999	Under Left Side Of Dash, Left Of Center Console
Summit Wagon	Under Right Side Of Dash
Vista Wagon	Under Right Side Of Dash

FERRARI

FERRARI - IMPORTED CARS & TRUCKS

Application	Connector Location
All Models	
1996-	Behind Left Side Of Dash

FORD MOTOR CO.

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

FORD MOTOR CO. - IMPORTED CARS & TRUCKS

Application	Connector Location
Aspire	
1994-95	On Left Rear Corner Of Engine Compartment
1996-97	Under Left Side Of Dash
Capri	
1991	Behind Right Side Of Dash, Behind Glove Compartment
1992	
1.3L	On Left Rear Corner Of Engine Compartment
1.6L	On Right Rear Corner Of Engine Compartment
1993-94	On Right Rear Corner Of Engine Compartment
Festiva	
1992-93	
1.3L	On Left Rear Corner Of Engine Compartment
1.6L	On Right Rear Corner Of Engine Compartment
Merkur XR4Ti	On Right Front Fender Apron, Near Battery
Scorpio	On Right Rear Corner Of Engine Compartment
Tracer	On Left Rear Corner Of Engine Compartment

GENERAL MOTORS

NOTE: This table provides a quick reference for self-diagnostic connector locations,

when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

GENERAL MOTORS & GEO - IMPORTED CARS & TRUCKS

Application	Connector Location
LeMans	Behind Right Kick Panel, Above ECM
Metro	
1989-95	Under Left Side Of Dash, Near Fuse Block
1996	Under Right Side Of Dash, Near Center Console
1997-01	Under Left Side Of Dash
Prizm & Prizm LSi	
1989-95	On Left Front Strut Tower
1996-02	Under Left Side Of Dash
Spectrum	Under Right Side Of Dash, Above A/C-Heater Blower Motor
Sprint	On Left Front Shock Tower, Near Battery
Storm	
1990-91	Behind Right Side Of Dash, Above A/C-Heater Blower Motor
1992-93	Behind Right Kick Panel
Tracker	
1989-95	Under Left Side Of Dash, Near Fuse Block
1996	In Engine Compartment, Near MAP Sensor
1997-	Under Left Side Of Dash

HONDA

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

HONDA - IMPORTED CARS & TRUCKS

Application	Connector Location
Accord	
1990-95	Behind Right Side Of Dash, Above Kick Panel
1996-97	Behind Ashtray In Center Console
Civic (1992-95)	Behind Right Side Of Dash, Near

	PGM-FI ECM
Civic Del Sol	
1992-95	Behind Right Side Of Dash, Near PGM-FI ECM
1996-97	Under Removable Cover On Right Side Of Center Console
CR-V	Behind Passenger Side Of Center Console
Element	
2003-11	Above Gas Pedal, Below Fuse Block
Insight (2010-11)	Below Left-of-Center Of Dash
Odyssey	
1995	Behind Right Side Of Dash, Above Kick Panel
1996-98	Behind Passenger Side Of Center Console
Passport (1995)	Behind Left Kick Panel
Prelude	
1992-95	Behind Center Console
1996	Under Beverage Holder In Center Console
1997-02	Under Removable Cover On Right Side Of Center Console
S2000	Behind Right Side Of Center Console

HYUNDAI

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

HYUNDAI - IMPORTED CARS & TRUCKS

Application	Connector Location
Accent (1995)	In Coin Box
Sonata	
1989	Under Left Side Of Dash, In Fuse Block
1990	
W/Passive Seat Belt Restraints	In Fuse Block
W/O Passive Seat Belt Restraints	On Lower Left Of Steering Column

INFINITI

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

INFINITI - IMPORTED CARS & TRUCKS

Application	Connector Location
G20 (1993-95)	In ECCS Control Unit, Behind Center Console
I30 (1995)	Beside Fuse Box
J30	
1993	Under Left Side Of Dash
1994-95	In ECM, Behind Right Kick Panel
1996-98	Under Left Side Of Dash
M30	Under Left Side Of Dash, Near Fuse Block
Q45	
1990-93	Under Left Side Of Dash, Near Fuse Block
1994-95	In ECM, Behind Right Kick Panel

ISUZU

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

ISUZU - IMPORTED CARS & TRUCKS

Application	Connector Location
Amigo & Pickup	
1986-89	Under Left Side Of Dash
1990-95	Behind Left Kick Panel, Near ECM
1998-00	Lower Left Corner Of Dash, Behind Small Cover
Hombre	Under Lower Left Side Of Dash, Behind Cover
Impulse	
1986-89	Under Left Side Of Dash, Above ECU
1990-92	Behind Right Kick Panel
1993-95	Behind Left Kick Panel, Near ECM
I-Mark	Behind Right Side Of Dash, Above A/C-Heater Blower Motor
Oasis	Behind Right Side Of Center Console

Rodeo	
1991-95	Behind Left Kick Panel
1996-	Lower Left Side Of Dash, Behind Small Cover
Stylus	Behind Right Kick Panel
Trooper & Trooper II	
1986	Under Left Side Of Dash
1987-91	Under Center Console
1992	
DOHC	Behind Center Of Dash, Right Of Steering Column
SOHC	Under Left Side Of Dash
1993-95	Under Left Side Of Dash, Right Of Steering Column
1996-02	Lower Left Side Of Dash, Behind Small Cover
VehiCROSS	Under Left Side Of Dash

JAGUAR

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

JAGUAR - IMPORTED CARS & TRUCKS

Application	Connector Location
XJR (1995-97)	Near Center Console
XJS	
1992	On Left Rear Trunk Wheel Arch, Behind Trim Panel
1993-94	Under Battery Tray, On Right Front Of Luggage Compartment
1995-96	Near Center Console
XJ6	
1992	On Left Rear Of Engine Compartment
1993-94	Under Battery Tray, On Right Front Of Luggage Compartment
1995-97	Under Left Side Of Dash, Near Center Console
XJ12	Near Center Console

KIA

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

KIA - IMPORTED CARS & TRUCKS

Application	Connector Location
Sephia	
1994	On Center Of Firewall
1995 & 1996	
1.6L	Under Center Of Dash, Mounted On Floorboard
2.0L	Under Right Side Of Dash, Near Kick Panel
Sportage	
1994	On Center Of Firewall
1995 & 1996	
1.6L	Under Center Of Dash, Mounted On Floorboard
2.0L	Under Right Side Of Dash, Near Kick Panel

LAND ROVER

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

LAND ROVER - IMPORTED CARS & TRUCKS

Application	Connector Location
Defender 90	Behind Fuse Cover, In Center Of Console
Range Rover	Under Right Side Of Dash, In Footwell

LEXUS

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

LEXUS - IMPORTED CARS & TRUCKS

Application	Connector Location
ES Series	
1990-91	
DLC	Near Left Shock Tower

Total Diagnostic Communication Link Connector	Under Left Side Of Dash
1992-94	
DLC No. 1	On Bracket, Behind Right Front Strut Tower
DLC No. 2 & 3	Under Left Side Of Dash
1995-97	In Fuse Box At Lower Left Of Dash
GS Series	
1990-95	
DLC No. 1	On Bracket, On Top Of Engine
DLC No. 2	Under Left Side Of Dash
1996-00	In Fuse Box At Lower Left Of Dash
LS Series	
1990-94	
DLC No. 1	On Bracket, On Top Of Engine
DLC No. 2	Under Left Side Of Dash
1995-00	In Fuse Box At Lower Left Of Dash
SC Series	
1992-95	
DLC No. 1	On Bracket, Behind Right Front Strut Tower
DLC No. 2 & 3	Under Left Side Of Dash
1996-00	In Fuse Box At Lower Left Of Dash

MAZDA

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

MAZDA - IMPORTED CARS & TRUCKS

Application	Connector Location
B-Series	
1987-88	On Right Front Fender Apron
1989-93	
Engine Control Check Connector (Black 6-Pin)	Near Windshield Washer Motor
Trouble Codes Connector (Green 1-Pin)	Near Black 6-Pin Connector (Engine Control)
1994-95	On Right Front Fender Panel
Miata (1990-95)	On Left Rear Of Engine Compartment, Near Master Cylinder
MPV (1989-95)	
Engine Control Unit (Green 6-Pin & 1-Pin Connectors)	On Left Side Of Engine Compartment,

	Near Inner Fender Panel
MX-3	Mounted On Bracket, On Left Front Strut Tower
MX-6 & 626	
1988	Behind Left Front Shock Tower
1989	On Left Front Corner Of Engine Compartment
1990-91	At ECU Connector Terminal
1992	On Left Rear Corner Of Engine Compartment
1993	On Side Of Fuse/Relay Block, Near Battery
1994-95	On Left Front Fender Apron
Navajo	
1991-93	On Right Rear Corner Of Engine Compartment
1994-95	On Right Front Fender Panel
Protege	
1987-89	On Passenger's Footwell (Left Foot Area)
1990-95	On Left Side Of Firewall, Near Wiper Motor
RX7	
1986-88 (3 Check Connectors)	At Left & Right Corners Of Engine Compartment
1989-91 (Green 6-Pin Connector)	Behind Ignition Coil
1993-95	On Bracket, On Left Front Strut Tower
323	
1986-88	Front Left Of Engine Compartment, Near Ignition Coil
1989 (Green 6-Pin & Green 1-Pin Connectors)	On Left Side Of Firewall
1990-95	On Left Side Of Firewall, Near Wiper Motor
929	
1989	Near Air Cleaner
1990-91 (Green 6-Pin Connector)	In Left Front Corner Of Engine Compartment
1992-93	Mounted On Air Cleaner Housing
1994-95	On Left Front Strut Tower

MERCEDES-BENZ

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

MERCEDES-BENZ - IMPORTED CARS & TRUCKS

Application	Connector Location
C-Class (1994)	On Right Rear Of Engine Compartment
E-Class	
1994-97	On Right Rear Of Engine Compartment
G-Class	Under Left Side Of Dash, Behind Cover
ML-Class	Under Left Side Of Dash, Behind Cover
S-Class	
140 Platform (1994-99)	On Right Rear Of Engine Compartment
190 Series	
1986-87	On Left Rear Of Engine Compartment
1988-93	
All Models	In Engine Compartment, On Left Front Fender
California (OBD)	On Right Side Of Firewall, Near Battery
1994	On Right Rear Of Engine Compartment
260E	
1987	On Left Front Fender Apron, Next To Ignition Control Module
1988-89	
All Models	In Engine Compartment, On Left Front Fender
California (OBD)	On Right Side Of Firewall, Near Battery
300 Series	
1986-87	On Left Front Fender Apron, Next To Ignition Control Module
1988-92	
All Models	In Engine Compartment, On Left Front Fender
California (OBD)	On Right Side Of Firewall, Near Battery
1993	
Except 300E	Left Fender Apron
300E	Right Rear Corner Of Engine

	Compartment
1994-95 (All Models)	On Right Rear Of Engine Compartment
400 & 500 Series	
1993	
12-Pin Connector	On Rear Of Left Front Inner Fender Panel
38-Pin (Impulse Readout)	In Module Box, On Right Rear Of Engine Compartment
1994-95	On Right Rear Of Engine Compartment
420SEL & 560 Series (Except 2.2L)	
1986-89	
All Models	In Engine Compartment, On Left Front Fender
California (OBD)	On Right Side Of Firewall, Near Battery
1990-91	In Engine Compartment, On Left Front Fender
560 Series (2.2L)	On Lower Left Side Of Engine Connector

MITSUBISHI

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

MITSUBISHI - IMPORTED CARS & TRUCKS

Application	Connector Location
Diamante (1992-98)	Under Left Side Of Dash, Near Fuse/Relay Block
Expo	Under Left Side Of Dash, Near Fuse/Relay Block
Montero	
1986-88	Left Rear Corner Of Engine Compartment
1989-91	Behind Glove Compartment
Pickup	Under Left Side Of Dash, Near Fuse/Relay Block
Raider	
1987-88	Left Rear Corner Of Engine Compartment
1989	Behind Glove Compartment

3000GT	
1991-98	Under Left Side Of Dash, On Fuse/Relay Block
1999	Under Left Side Of Dash, Left Of Center Console

NISSAN

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

NISSAN - IMPORTED CARS & TRUCKS

Application	Connector Location
Altima	
1993-94	On Driver-Side Of Center Console, Above Accelerator Pedal
1995-96	Below Fuse Box
Maxima	
1989-94	Under Left Side Of Dash
1995-96	Below Fuse Box
NX & Sentra	Under Left Side Of Dash, Near Fuse Block
Pulsar NX	
1986	Above Right Side Of Dash, Below Wiper Motor
1987	Above Steering Column
Quest (1993-95)	
CONSULT Tester Connector	On Driver-Side Of Center Console, Above Accelerator Pedal
Self-Test Connector	Located Near Starter
Stanza	Below Center Of Dash, Near Center Console
Van	On Right Side Of Engine Compartment, Behind Fuel Filter
200SX (1995-96)	Below Fuse Box
240SX	
1991-94	Under Left Side Of Dash, Below Fuse Block
1995-96	In Glove Box
300ZX (1990)	Near Parking Brake

PEUGEOT

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

PEUGEOT - IMPORTED CARS & TRUCKS

Application	Connector Location
505 Series	On Lower Left Side Of Engine Connector

PORSCHE

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

PORSCHE - IMPORTED CARS & TRUCKS

Application	Connector Location
911 Series	
1992-95	In Passenger's Footwell
1996	Left Side Of Center Console
928S	Top Front Of Engine
944 Series	On Left Side Of Engine Compartment

RENAULT

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

RENAULT - IMPORTED CARS & TRUCKS

Application	Connector Location
Sportwagon	
Engine Diagnostic	On Center Of Firewall
Fuel Injection Diagnostic	Right Rear Of Engine Compartment, Behind Airflow Meter

ROLLS-ROYCE

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

ROLLS-ROYCE - IMPORTED CARS & TRUCKS

Application	Connector Location

All Models	
1996-00	In Glove Compartment
2001-	Under Left Side Of Dash

SAAB

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

SAAB - IMPORTED CARS & TRUCKS

Application	Connector Location
900 Series	
1986-90	In Front Of Fuse/Relay Panel
1991-93	Under Back Seat, On Right Side
1994	
Convertible	Under Rear Seat
Hatchback	Under Steering Column
All Others	Under Right Front Seat
9000 Series	
1990	On Left Side Of Engine Compartment
1991-92	Under Passenger's Seat
1993	On Left Of Firewall
1994-95	Under Right Front Seat

SUBARU

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

SUBARU - IMPORTED CARS & TRUCKS

Application	Connector Location
Brat, Coupe, Hatchback, Sedan & Wagon	
1987	
Read Memory Connector	Under Left Side Of Dash, Next To MFI/SMFI Control Unit
Test Mode Connector	
MFI	On Left Side Of Dash, Next To MFI Control Unit
Sequential MFI	On Left Side Of Firewall
1988-89	On Left Side Of Dash, Next To ECU

Forester	Under Left Side of Dash, Behind Cover
Justy	
1987-88	
Read Memory Connector (Factory)	On Right Front Fender, Near Strut Tower
Test Mode Connector	On Driver-Side Kick Panel Or ECU
1989-95	
Read Memory Connector (Factory)	Under Left Side Of Dash
Test Mode Connector	On Driver-Side Kick Panel Or ECU
Legacy	
1990-94	
Check Connector (Black Connector)	Behind Right Side Of Steering Column, Near Heater Case
Diagnostic Connector (Black 4-Pin Connector)	Behind Right Side Of Steering Column, Near Heater Case
Read Memory Connector (Black Connector)	Behind Knee Panel, Right Of Steering Column
Select Monitor Connector (Yellow Connector)	Behind Right Side Of Steering Column, Near Heater Case
Test Mode Connector (Green Connector)	Behind Knee Panel, Right Of Steering Column
1995-	Under Left Side Of Dash, Behind Cover
Loyale	
1990-91	
MFI (5-Pin Connector)	In Front Of ECU
SMFI (Yellow 9-Pin & Black 13-Pin Connectors)	Near Brake Booster
1992-95	
Diagnostic Check Connector (Yellow 9-Pin & Black 13-Pin Connectors)	Behind Brake Booster
Diagnostic Read-Memory Connector (2-Single Wire Connectors)	Behind Left Front Strut Tower
Outback & Outback Sport	Under Center Of Dash
SVX	
1992-96	Under Left Side Of Dash
1997	Right Of Steering Column, On Center Console

SUZUKI

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

SUZUKI - IMPORTED CARS & TRUCKS

Application	Connector Location
Esteem (1995)	Near Battery
Samurai	
1986-90	Under Right Side Of Dash, Behind Glove Compartment
1991-92	On Right Side Of Firewall
1993-95	Under Left Side Of Dash, In Fuse Block
Sidekick & X90	
1989-91	Under Left Side Of Dash, In Fuse Block
1992-93	
ALDL Connector	Under Left Side Of Dash
Engine Connector	Under Left Side Of Dash, Near Fuse Block
1994-96	In Engine Compartment, Near Battery
Swift	
1989-91	Under Left Side Of Dash, In Fuse Block
1992	
ALDL Connector	Under Left Side Of Dash
Diagnostic Test Terminal	In Fuse Block
1993-95	Under Left Side Of Dash, In Fuse Block

TOYOTA

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

TOYOTA - IMPORTED CARS & TRUCKS

Application	Connector Location
Camry	
1983-90	Next To Brake Master Cylinder
1991	Near Left Front Shock Tower
1992-95	
4-Cylinder	Near Wiper Motor
V6	Under Left Side Of Dash
Celica	

1983-84	Next To Battery
1985-95	Behind Left Front Shock Tower
Celica Supra	Rear Of Battery, Near Relay Panel (2-Pin Connector)
Corolla	
Front Wheel Drive	
1987	Side Of Left Front Shock Tower (2-Pin Connector)
1988-94	Behind Left Front Shock Tower
Rear Wheel Drive	
1985-86	Side Of Right Front Shock Tower (2-Pin Connector)
1987	Right Rear Corner Of Engine Compartment
Cressida	
1988-93	
Check Connector	On Left Front Shock Tower
Total Diagnostic Communication Link Connector	Under Left Side Of Dash
Land Cruiser (1988-94)	Near Wiper Motor
MR2	
1986-90	Near Airflow Meter
1992-95	On Right Rear Of Engine Compartment, Near MAP Sensor
Paseo (1992-95)	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery
Pickup	
1984-86	Near Ignition Coil, Near Master Cylinder (2-Pin Connector)
1987-90	Right Front Inner Fender Panel, Near Relay Block
1992-94	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery
Previa	
1992-93	Under Front Of Driver's Seat
1994	
Except Supercharged	Under Center Console, Near Parking Brake Lever
Supercharged	Under Cover, On Top Center Of Instrument Panel
1995-97	On Top Center Of Instrument Panel
RAV4	Under Dash, Near Center Console
Starlet	

1981-82	On Instrument Panel Fuse Block, On Top Of Dash
1983-84	Right Rear Of Engine Compartment
Supra	
1986-90	Rear Of Battery, Near Relay Panel
1991-92	On Left Front Shock Tower
1993-94	
DLC No. 1	On Right Side Of Firewall
DLC No. 2	Under Left Side Of Dash, Near Kick Panel
Tacoma & T100	
1993	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery
1994-95	
Except OBD-II DLC	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery
OBD-II DLC	Under Left Side Of Dash
Tercel	
1987-90	In Engine Compartment, Next To Master Cylinder
1991-94	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery
1995-98	Near Steering Column
Van	Near Airflow Meter
4Runner	
1985-86	Near Ignition Coil, Next To Master Cylinder (2-Pin Connector)
1987-95	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery

VOLKSWAGEN

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

VOLKSWAGEN - IMPORTED CARS & TRUCKS

Application	Connector Location
Cabrio	
1996	In Center Console, Below Tachometer
1997-02	On Center Dash, Behind Panel Near

	Ashtray
Corrado	Under Center Console Trim Plate
Fox	Under Center Console, Near Shift Lever
Golf	
1993	On Center Of Dash, Below A/C-Heater Control Knobs
1994	Under Center Console
1998-03	In Center Console
Golf III 2.0L	
1995-96	Below A/C-Heater Control Panel
1997-98	On Center Dash, Behind Panel Adjacent To Ashtray
GTI	
1993	On Center Of Dash, Below A/C-Heater Control Knobs
1994	Under Center Console
GTI 2.8L	On Center Dash, Behind Panel Adjacent To Ashtray
Jetta	
1993	On Center Of Dash, Below A/C-Heater Control Knobs
1994	Under Center Console
Jetta III 2.0L	
1995-96	Below A/C-Heater Control Panel
1997-98	On Center Dash, Behind Panel Adjacent To Ashtray
Jetta/Jetta III 2.8L	On Center Dash, Behind Panel Adjacent To Ashtray
New Beetle	Lower Part of Dash, In Front Of Shift Lever
Passat	
1992-94	Under Center Console, Forward Of Shift Lever
1995-97	On Center Dash, Behind Panel Near Ashtray
Toureg	
2004-2007	In the cover of the drivers side footwell, to right of engine hood release lever

VOLVO

NOTE: This table provides a quick reference for self-diagnostic connector locations.

when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

VOLVO - IMPORTED CARS & TRUCKS

Application	Connector Location
C30	Under Left Center Of Dash
C70	Behind Cover, Below Parking Brake Lever
S40	Under Left Center Of Dash
S70	Behind Cover, Below Parking Brake Lever
S90	Behind Cover, Below Parking Brake Lever
V40	Under Left Center Of Dash
V70 (1997-00)	Behind Cover Below Parking Brake Lever
V90	Behind Cover, Below Parking Brake Lever
240	
1986-92	Left Rear Corner Of Engine Compartment
1993	Behind Left Front Strut Tower
740 & 760	
1986-92	
Ignition System	On Left Front Fender Apron
Fuel Injection (1990-92 Only)	Left Rear Corner Of Engine Compartment
780	On Left Front Fender, Behind Air Cleaner Housing
850	
1993	On Center Console, Forward Of Shift Lever & Near ECM
1994-95	
Non-Turbo	On Right Front Strut Tower
Turbo	Behind Cover, Forward Of Shift Lever
1996-97	Behind Cover, Forward Of Shift Lever
940	
1991-93	
Ignition System	On Left Front Fender Apron
Fuel Injection	Left Rear Corner Of Engine Compartment
1994-95	Behind Left Front Strut Tower

960	
1992-95	On Left Front Strut Tower
1996	In Center Console, To Right Of Parking Brake Lever
1997	Behind Cover, Forward Of Shift Lever

ACCESSORIES AND BODY, CAB

Distance Systems, Cruise Control - Special Tools

66 DISTANCE SYSTEMS, CRUISE CONTROL

663140 OPPS DEVICE

0495303 663140 OPPS device MW

Note: (OPS package) (complete set)

Consisting of:

1 = 0495304 OPS device

NOTE: To order the OPS devices, please contact the appropriate SIEMENS hotline.

2 = 0495305 Cable

NOTE: (OBD cable, incl. CAN line)

3 = 0495306 Adapter cable

NOTE: (LAN adapter cable) To order the LAN adapter cable, please contact the appropriate SIEMENS hotline.

NOTE: Specify the LAN adapter cable model (crossed or uncrossed).

ACCESSORIES AND BODY, CAB

Distance Systems, Cruise Control - Repair

6620 PARK DISTANCE CONTROL

66 20 517 REMOVING AND INSTALLING/RENEWING A CENTER FRONT LEFT ULTRASONIC SENSOR

Necessary preliminary work

- Remove **MIDDLE LEFT OR RIGHT RADIATOR GRILLE**

Release retaining tabs (2).

Press ultrasonic sensor from outside towards inside and remove.

Unfasten plug connection (2) and disconnect.

Installation note:

Retaining tabs (2) must not be damaged!

Make sure ultrasonic sensor is securely seated.

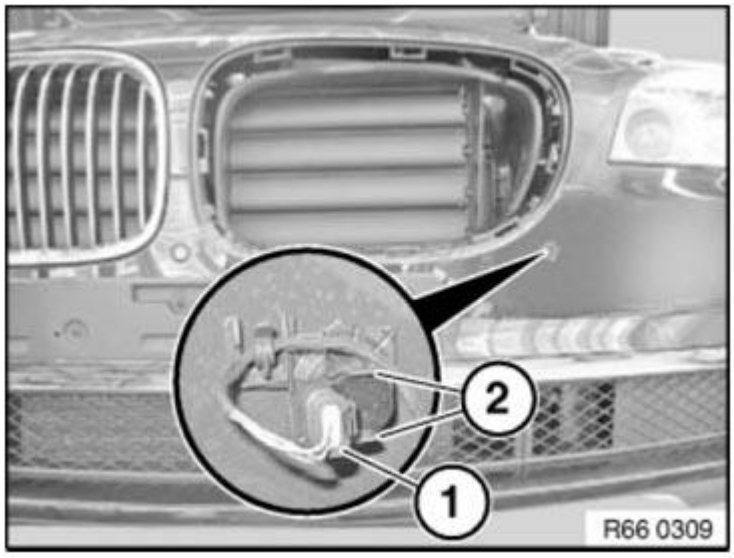


Fig. 1: Identifying Plug Connection With Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure rubber ring (1) is correctly seated on ultrasonic sensor (2).

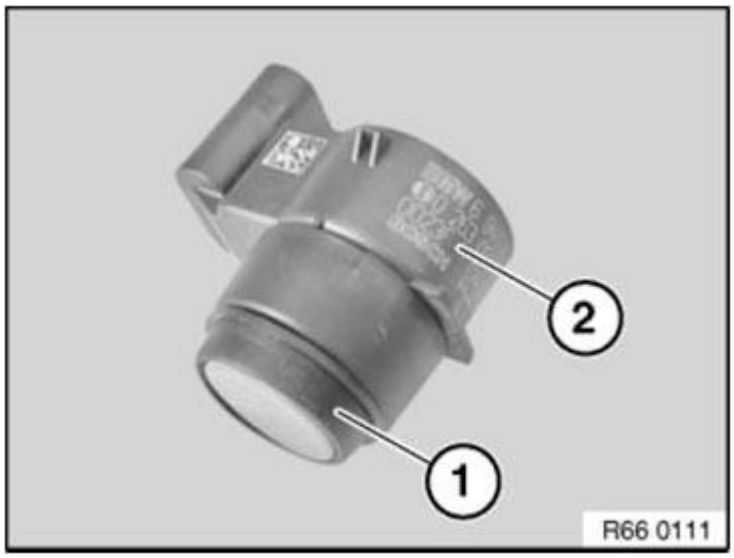


Fig. 2: Identifying Rubber Ring And Ultrasonic Transducer
Courtesy of BMW OF NORTH AMERICA, INC.

66 20 519 REMOVING AND INSTALLING/RENEWING A CENTER FRONT RIGHT ULTRASONIC SENSOR

The following repair work is described in:

REMOVING AND INSTALLING/RENEWING A CENTRE FRONT LEFT ULTRASONIC SENSOR

66 20 521 REMOVING AND INSTALLING/REPLACING A FRONT CENTER ULTRASONIC SENSOR

Necessary preliminary tasks

- Remove **MIDDLE LEFT OR RIGHT RADIATOR GRILLE**

Release retaining tabs (2).

Press ultrasonic sensor from outside towards inside and remove.

Unfasten plug connection (2) and disconnect.

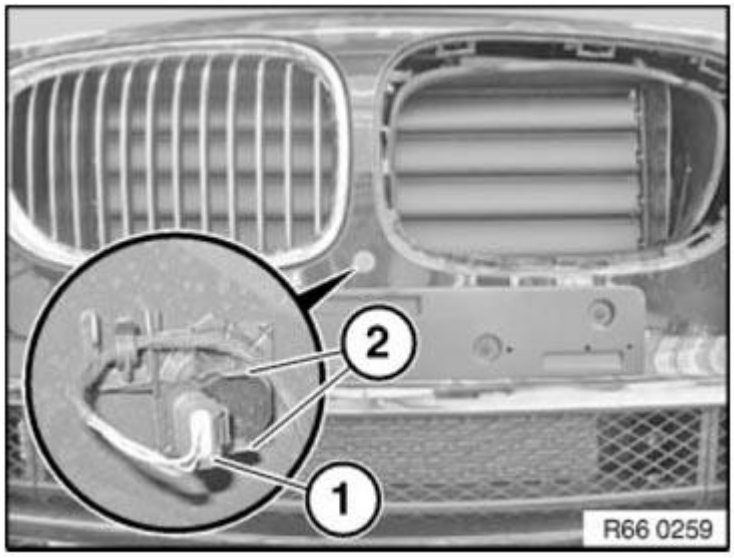


Fig. 3: Identifying Plug Connection With Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining tabs (2) must not be damaged!

Make sure ultrasonic sensor is securely seated.

Installation

Make sure rubber ring (1) is correctly seated on ultrasonic sensor (2)!

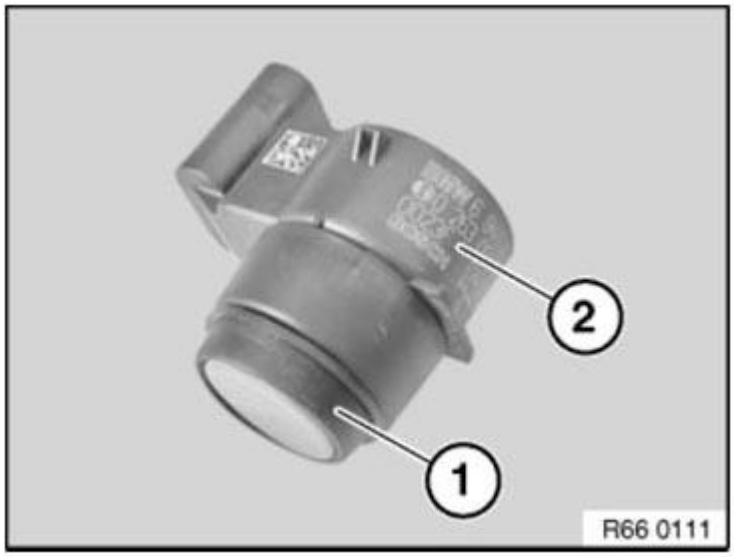


Fig. 4: Identifying Rubber Ring And Ultrasonic Transducer

Courtesy of BMW OF NORTH AMERICA, INC.

66 20 515 REMOVING AND INSTALLING/REPLACING A FRONT LEFT ULTRASONIC TRANSDUCER

Release the expanding rivet at marked points.

Fold wheel arch panel (1) to one side.

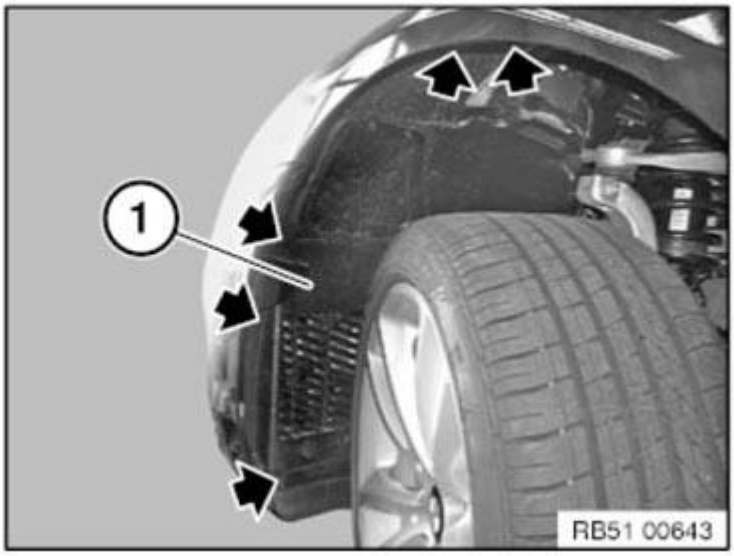


Fig. 5: Locating Wheel Arch Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unclip ultrasonic transducer from retaining tabs (2).

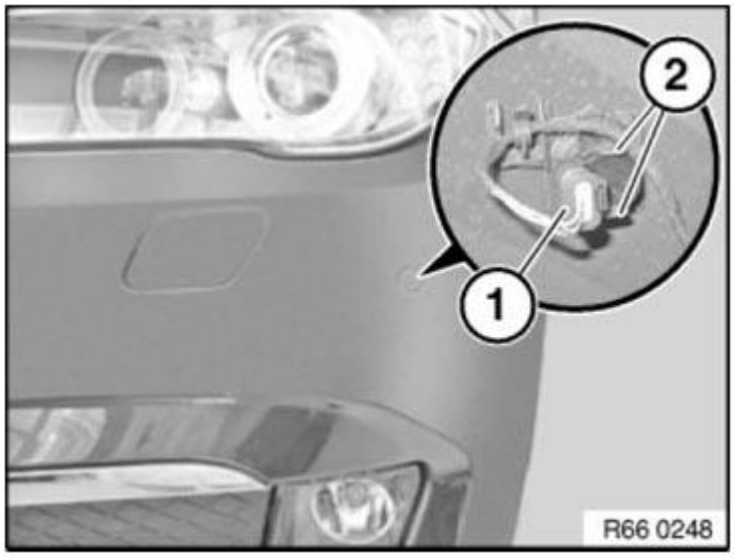


Fig. 6: Identifying Plug Connection With Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Retaining tabs (2) must not be damaged!

Make sure ultrasonic sensor is securely seated.

Installation note:

Make sure rubber ring (1) is correctly seated on ultrasonic sensor (2).

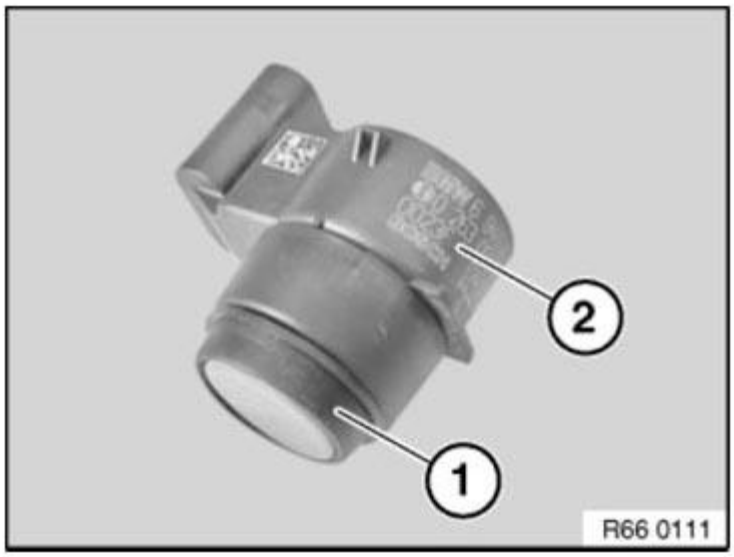


Fig. 7: Identifying Rubber Ring And Ultrasonic Transducer

Courtesy of BMW OF NORTH AMERICA, INC.

66 20 516 REMOVING AND INSTALLING/REPLACING A FRONT RIGHT ULTRASONIC SENSOR

The following procedure is identical to:

- Removing and installing/renewing **A FRONT LEFT ULTRASONIC SENSOR**

66 20 542 REMOVING AND INSTALLING/REPLACING A REAR ULTRASONIC TRANSDUCER

Necessary preliminary work

- Remove **REAR BUMPER TRIM**

Unfasten plug connection (1) and disconnect. Unlock latch mechanisms (2) and pull ultrasonic transducer (3) out of bracket.

Installation note:

Retaining tabs (2) must not be damaged!

Make sure ultrasonic sensor is securely seated.

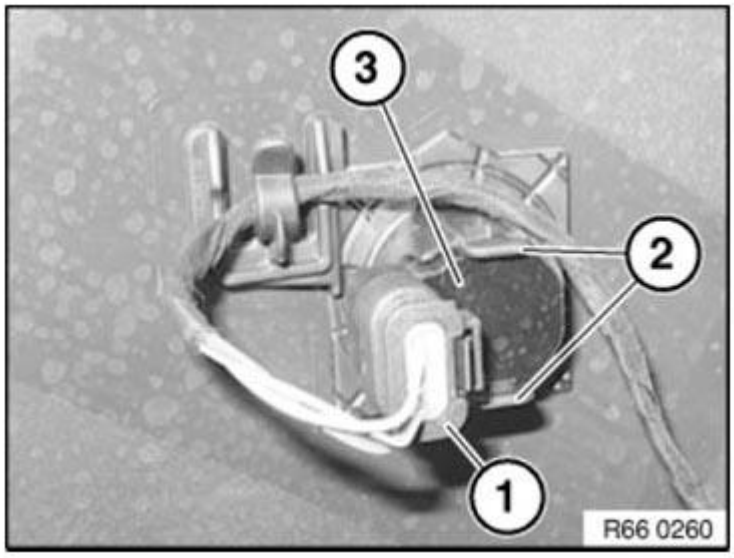


Fig. 8: Identifying Plug Connection, Tabs And Ultrasonic Transducer
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure rubber ring (1) is correctly seated on ultrasonic sensor (2).

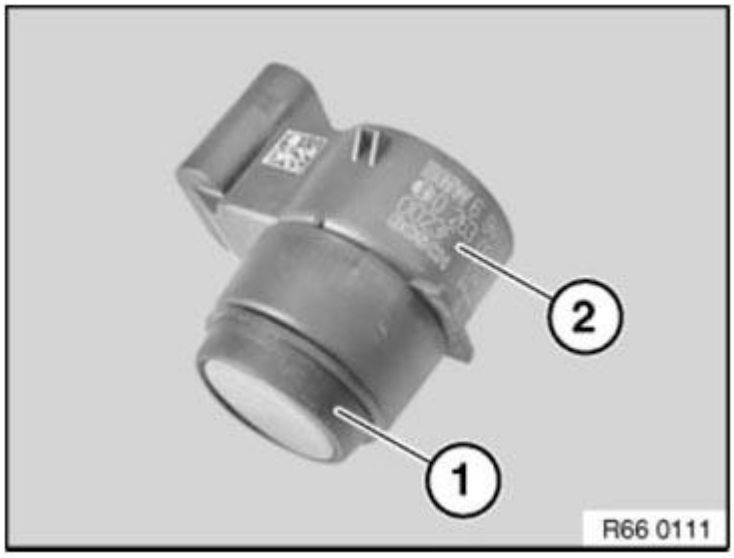


Fig. 9: Identifying Rubber Ring And Ultrasonic Transducer
Courtesy of BMW OF NORTH AMERICA, INC.

6631 ADAPTIVE CRUISE CONTROL

66 31 001 ADJUSTING ACC SENSOR (FRR SENSOR)

NOTE: This document applies to the entire F series with the new ACC sensor (FRR - Full Range Radar).

Special tool required:

- Holder **36 1 100**
- Active Cruise Control ACC adjusting device, complete. Order number: 81 10 0 021 292. Consisting of:
  1. Mirror, complete
  2. Wheel laser
  3. Slotted diaphragm
  4. Control holder (for initial installation of rail)
  5. Rail
  6. Setup and Operating Instructions (not shown)

NOTE: A mounting which is not included in the delivery specification is required to support the wheel laser. Use either the quick-action clamp from the existing KDS or ACC wheel holder (36 1 100).

NOTE: Follow NOTES ON ACC ADJUSTING DEVICE (FRR SENSOR).

NOTE: **To set the ACC sensor, connect the BMW diagnosis system and fit the ACC adjusting device.**

Select ACC calibration in diagnosis.

- **Service function**
- **Chassis and suspension**
- **ACC cruise control**
- **Start-up of ACC sensor**

Handle ACC adjusting device in accordance with mounting and Owner's Handbook provided with device.

66 31 010 ADJUSTING REMOTE SENSOR (LRR SENSOR)

Notes

Carry out adjustment of long-range sensor (1) with special tool **36 1 130** by means of adjusting screws (2) and (3).

(2) = horizontal adjustment
(3) = vertical adjustment

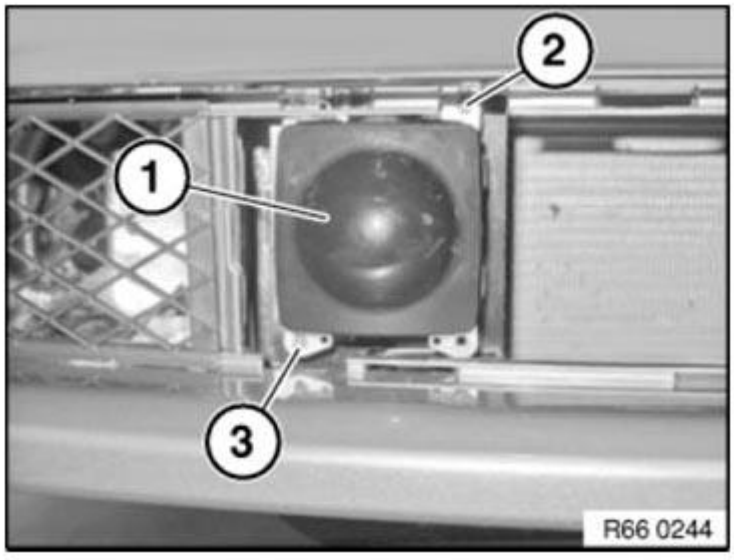


Fig. 10: Identifying Long-Range Sensor With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool required:

Active Cruise Control ACC adjusting device, complete.

Order number: 81 10 0 021 292

Consisting of:

1. Mirror, complete
2. Wheel laser
3. Slotted diaphragm
4. Control bracket (for initial installation of rail)
5. Rail
6. Setup and Owner's Handbook (not shown)

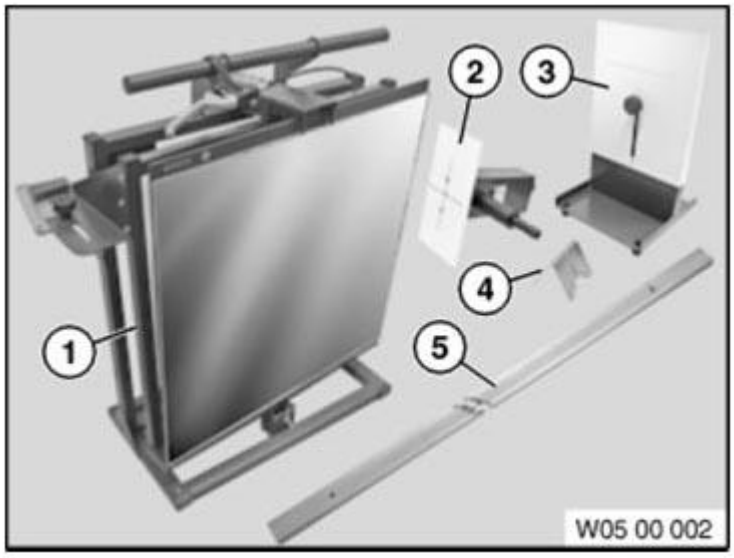


Fig. 11: Identifying Mirror, Wheel Laser And Slotted Diaphragm
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A holder which is not included in the scope of delivery is required to support the wheel laser. Use either the quick-action clamp from the existing KDS or ACC wheel holder (36 1 100).

NOTE: To adjust the ACC sensor, connect the BMW diagnosis system and fit the ACC adjusting device.

Select ACC system in diagnosis. Start test module "ACC adjustment" (service functions) and proceed in accordance with instructions.

Handle ACC adjusting device in accordance with mounting and Owner's Handbook provided with device.

NOTE: Further information on the ACC adjusting device can be found in the BMW

Workshop Equipment and Planning Documentation.

66 31 010 NOTES ON ACC ADJUSTING DEVICE (FRR SENSOR)

NOTE: This document applies to the entire F series with the new ACC sensor (FRR - Full Range Radar).

NOTE: The following step must be taken if there is an "Incorrectly adjusted sensor" fault entry or there is a suspicion of frontal damage:

IMPORTANT: The vehicle must be parked on a flat, horizontal surface!

NOTE: For purposes of clarity, graphic shows holder (1) removed.

Hold square (2) against holder (1) as shown.

Limit stop leg length: approx. 105 mm

Check vertical orientation in direction of travel with bubble level (3).

Replace holder if necessary.

IMPORTANT: After replacing the holder, check the ACC sensor position again using the square (2) and bubble level (3).

If the ACC sensor position is still not right, check the support for the bumper panel at the bottom front for damage and replace if necessary.**CHECK THE SUPPORT FOR THE BUMPER PANEL AT THE BOTTOM FRONT FOR DAMAGE AND REPLACE IF NECESSARY** .

A damaged/bent holder (1) indicates mechanical misuse of the vehicle and cannot be handled as a warranty case.

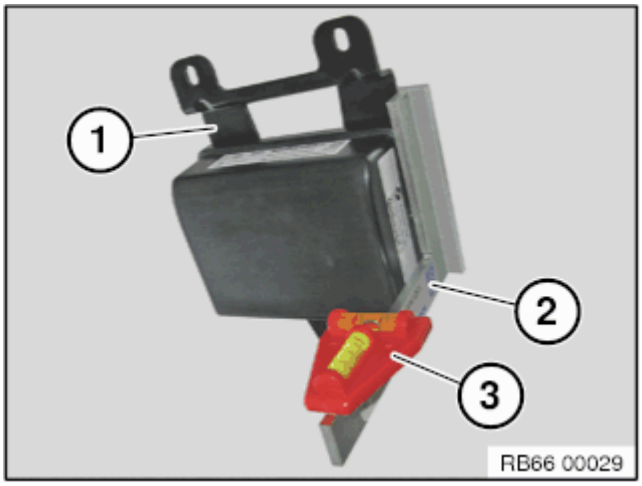


Fig. 12: Checking Holder Position
Courtesy of BMW OF NORTH AMERICA, INC.

Requirements for the measurement area for ACC adjusting device

Dimensions:

1. Area behind the mirror of at least 80 cm that cane be entered
2. Distance between mirror and vehicle 80 cm +/- 5 cm
3. Total area of work area 360 cm x 660 cm

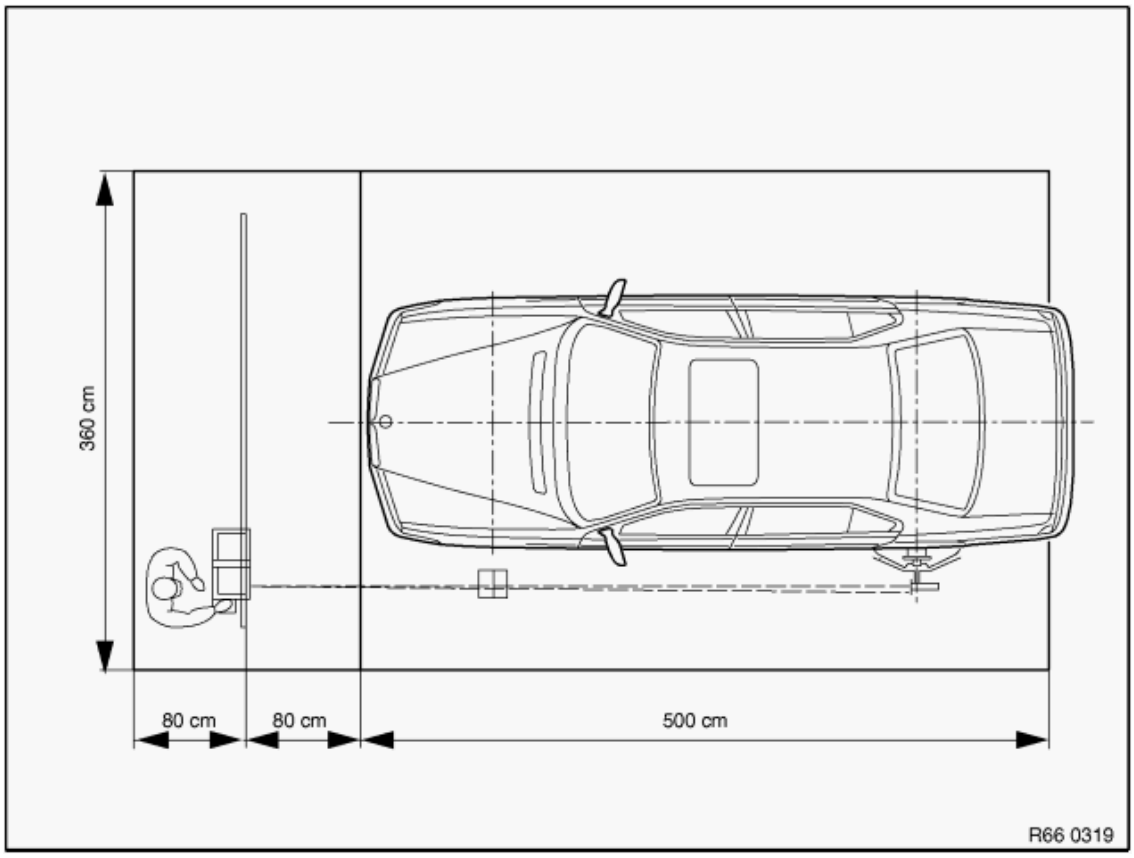


Fig. 13: Identifying Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

Maximum irregularity of floor surface:

- Floor surface - adjusting device < or = 1 mm
- Floor surface - vehicle < or = 10 mm

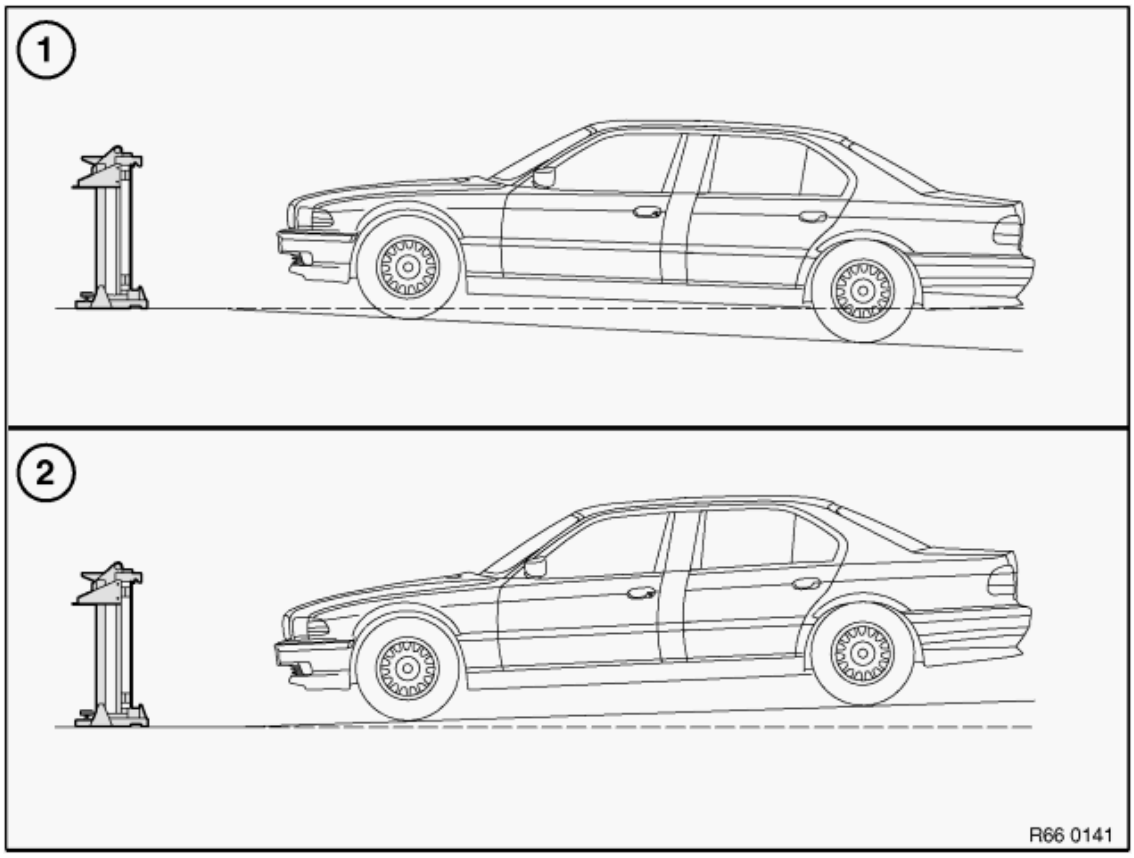


Fig. 14: Identifying Maximum Upward/Downward Incline Angles
Courtesy of BMW OF NORTH AMERICA, INC.

Maximum angle of inclination of floor surface - vehicle:

- Downward incline of floor surface maximum 3°, see illustration (1) in **Fig. 14**
- Upward incline of floor surface maximum 1°, see illustration (2) in **Fig. 14**

NOTE: Setting up the ACC adjusting device (one-off task) comprises the following steps:

- Assembly of adjusting device
- Assembly of rail
- Basic setting of adjusting device on measurement area

Detailed instructions for setup and operation are enclosed with every ACC adjusting device.

66 31 006 REMOVING AND INSTALLING (REPLACING) ACC SENSOR

Necessary preliminary tasks

- Remove the ornamental **GRILLE FOR THE BUMPER PANEL (CENTRE)** .

Loosen screws in marked area on the rear side of the ACC sensor (1).

Tightening torque **66 31 1AZ** .

Unfasten plug connection (2) and disconnect.

Remove ACC sensor (1).

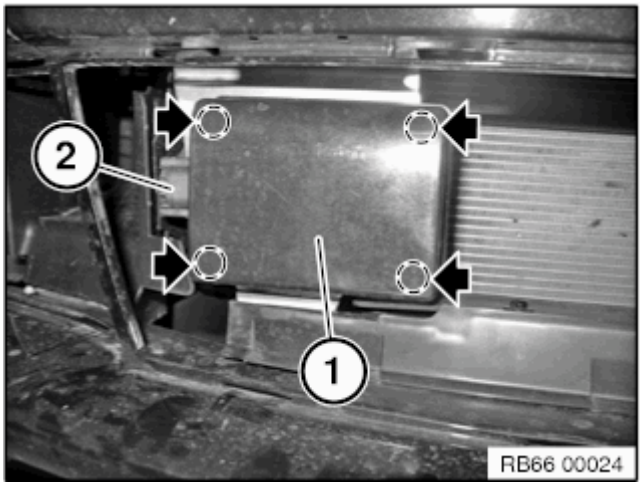


Fig. 15: Removing ACC Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

If applicable, **ADJUST THE ACC SENSOR**.

Replacement:

- Carry out **VEHICLE PROGRAMMING AND ENCODING**
- **ADJUSTING ACC SENSOR**

66 31 020 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SHORT-RANGE SENSOR (SRR SENSOR)

IMPORTANT: To ensure correct SRR operation, there must be no mechanical damage (e.g. dents) to the bumper in the sensor area, nor must filler work or multilayer paintwork (more than two paint coats) have been carried out.

Necessary preliminary tasks

- Remove front **BUMPER TRIM**

Unlock plug connection (1) on SRR (2) and disconnect.

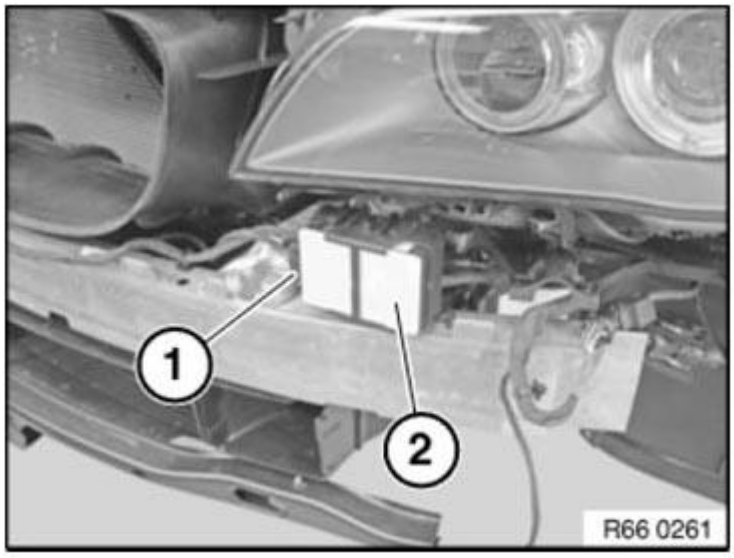


Fig. 16: Identifying Plug Connection On SRR
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, component shown removed!

Lever SRR (1) with a suitable tool (3) from holder (4).

Retaining lug (2) on holder (4) must be exposed.

Slide SRR (1) in direction of arrow out of holder (4).

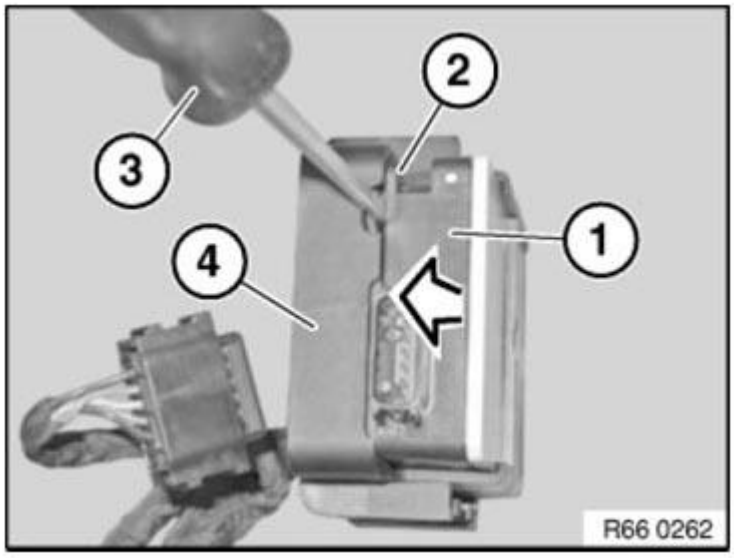


Fig. 17: Sliding SRR Out Of Holder
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

Adjustment can only be carried out with the BMW diagnosis system:

Service functions:

- Chassis
- Cruise control (ACC)
- Adjust short-range sensors

66 31 016 REMOVING AND INSTALLING/REPLACING LONG-RANGE SENSOR (LRR SENSOR)

Necessary preliminary tasks

- Remove **TRIM GRILLE** for bumper trim, middle.
- Version with Sports package only:

Remove **NUMBER/LICENSE PLATE BASEPLATE**

(number/license plate baseplate conceals sensor adjusting screw)

IMPORTANT: Secure LRR sensor (2) against falling out.

Cover bumper in working area (1) with adhesive tape.

Using special tool **00 9 317** unclip LRR sensor (2) from brackets on both sides.

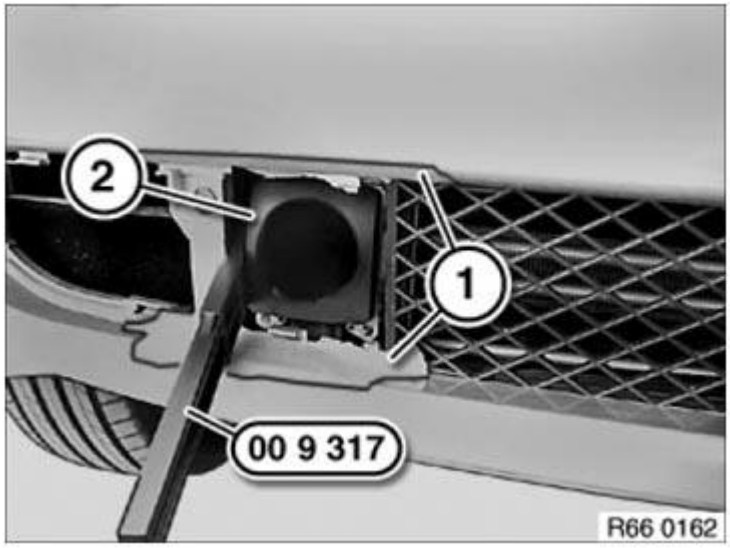


Fig. 18: Removing LRR Sensor From Brackets Using Special Tool 00 9 317

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

LRR sensor must be felt and heard to snap into place.

IMPORTANT: Secure LRR sensor (1) against falling out.

Disconnect plug connection (2) and remove sensor (1).

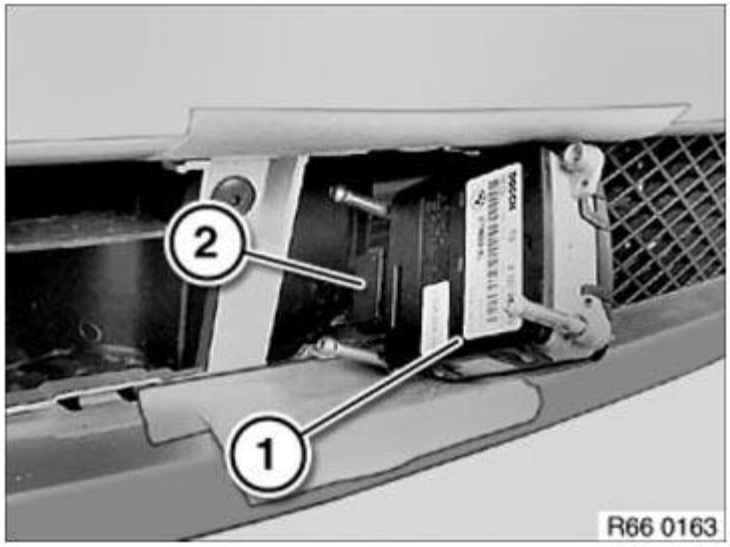


Fig. 19: Identifying LRR Sensor With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

-
- Adjust **LONG-RANGE SENSOR**
- Carry out **PROGRAMMING/CODING**

Replacement

Carry out rough adjustment of ACC sensor (1) at adjusting screws (2).

- Measurement A [mm]: 43

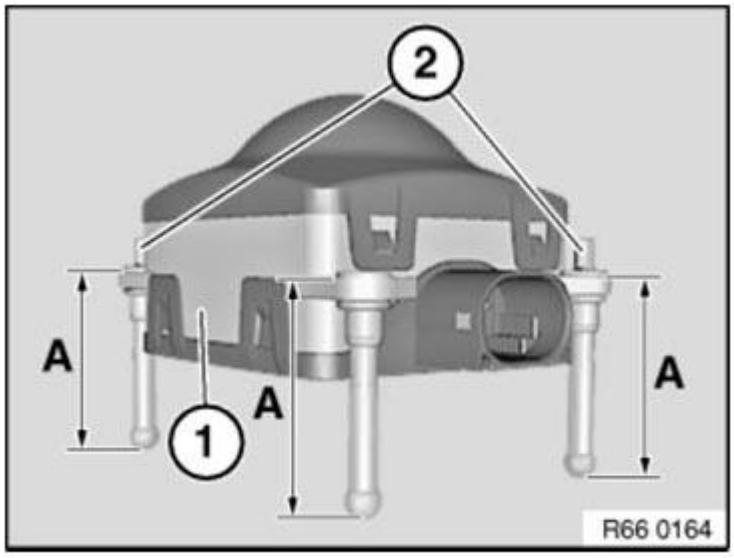


Fig. 20: Identifying ACC Sensor With Adjusting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

6632 LANE CHANGE WARNING

66 32 020 REMOVING AND INSTALLING/REPLACING SENSOR FOR LANE CHANGE WARNING (HC2 SENSOR) ON LEFT OR RIGHT

Necessary preliminary work

- Remove **REAR BUMPER TRIM**

Disconnect plug connection (1).

Unfasten screws (2).

Remove HC2 sensor (3).

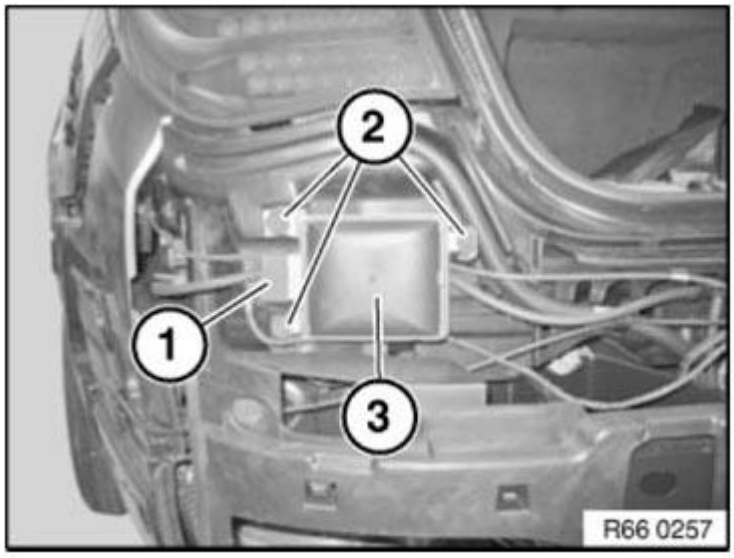


Fig. 21: Identifying HC2 Sensor And Plug Connection With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If, in the event of side damage to the vehicle, it is not necessary to replace the tail panel, observe the following points:

Fit middle bumper panel guide on undamaged side.

Use middle bumper panel guide as a gauge in order to check or correct the position of the remaining connecting points.

Middle bumper panel guide must be able to be fitted without tension.

Replacement:

- Carry out **VEHICLE PROGRAMMING AND ENCODING** .

Replacement/after body repair:

- Execute diagnosis job
- Initial operation
- Lane change warning sensor system

6633 PARKING ASSIST SYSTEM

66 33 008 REMOVING AND INSTALLING / REPLACING PARK ASSIST CONTROL UNIT

Necessary preliminary work:

Remove **RIGHT LUGGAGE COMPARTMENT WHEEL ARCH PANEL** .

Unlock plug connection (1) and disconnect.

Pull out parking maneuvering assistant control unit (2) towards top out of mounting (3).

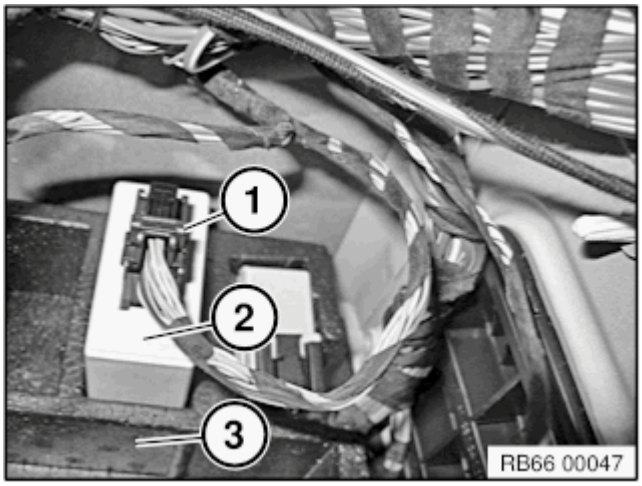


Fig. 22: Identifying Control Unit, Mounting, And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/ENCODING** .

66 33 010 REMOVING AND INSTALLING/REPLACING ULTRASOUND SENSOR FOR PARKING ASSISTANT

IMPORTANT: Risk of damage!

Repair work in area (1) is not permitted.

Replace **SIDE WALL** .

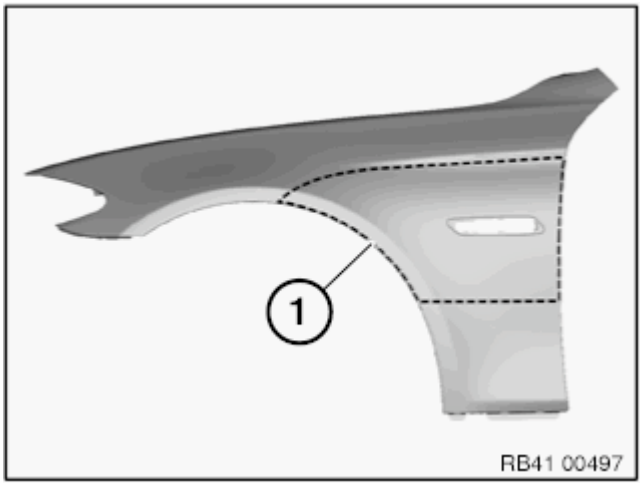


Fig. 23: Identifying Area For No Repair Work Permitted
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic diagrams are examples.

IMPORTANT: There must be no pressure exerted on PMA sensor surface (1)!

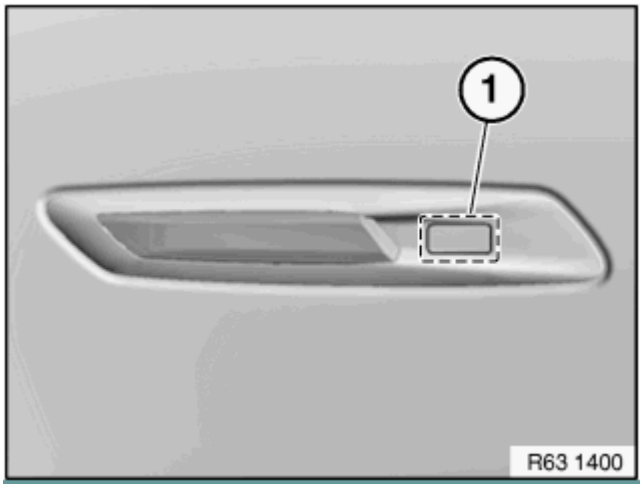


Fig. 24: Identifying Surface Of PMA Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Side wall area all around front side repeater with PMA sensor must not be damaged due to the measuring accuracy!

Unclip trim strip on side wall (1) with special tool **00 9 327** .

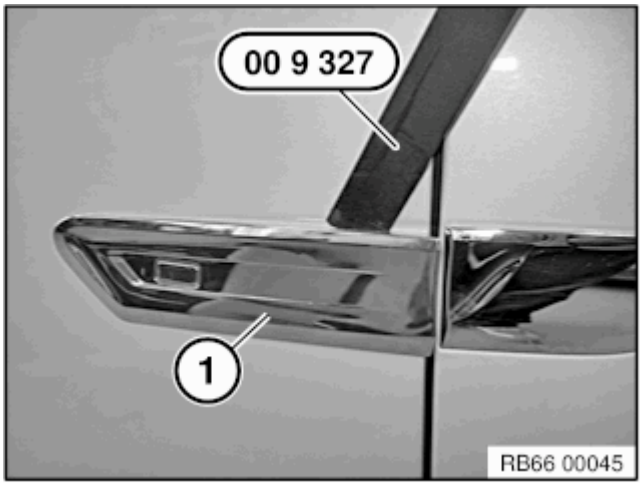


Fig. 25: Un-Clipping Trim Strip On Side Wall Using Special Tool 00 9 327
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connection (1) and disconnect.

Remove trim strip on side wall (2).

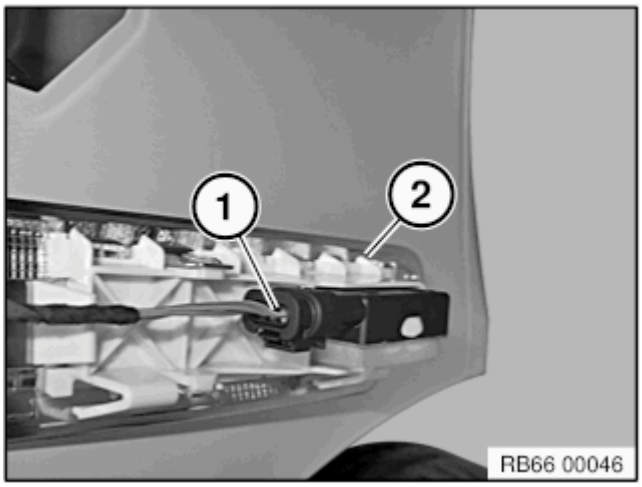


Fig. 26: Identifying Connector At Side Wall Trim Strip
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Carefully unlock catches with a suitable tool. Remove PMA sensor (1) from trim strip on side wall (2).

Installation note:

Catches must lock correctly!

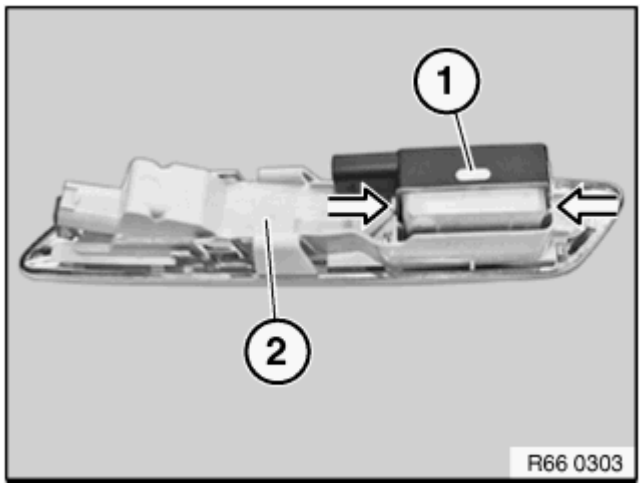


Fig. 27: Identifying PMA Sensor At Side Wall Trim Strip
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Decoupling ring must not be crushed.

Installation note:

Moisten decoupling ring (2) prior to fitting with approved anti-friction agent.

Make sure decoupling ring (2) is correctly seated on parking maneuvering assistant sensor (1)!

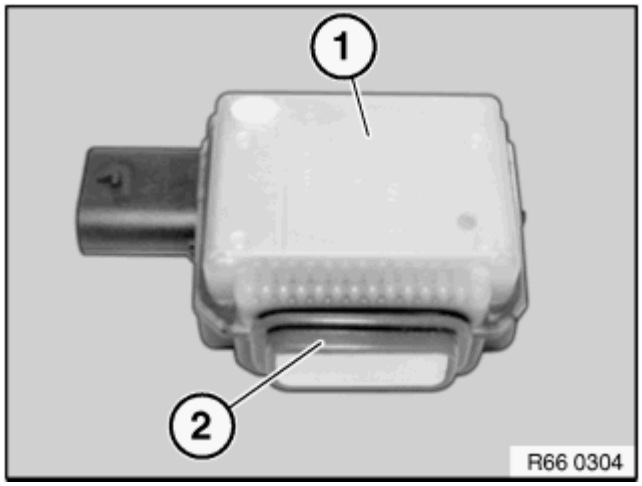


Fig. 28: Identifying Ultrasound Sensor And Decoupling Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

After installation, check decoupling ring (1) is correctly seated!

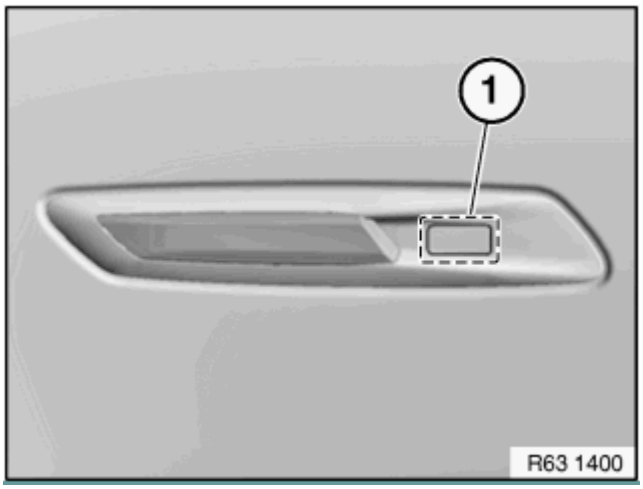


Fig. 29: Identifying Surface Of PMA Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

6651 FRONT CAMERA

66 51 030 REMOVING AND INSTALLING/REPLACING CAMERA FOR LANE DEPARTURE WARNING

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Expand two-part mirror base cover (1) by pressing from below and detach.

Feed out two-part mirror base cover (1) and remove.

NOTE: Catches of two-part mirror base cover (1) must not be damaged.

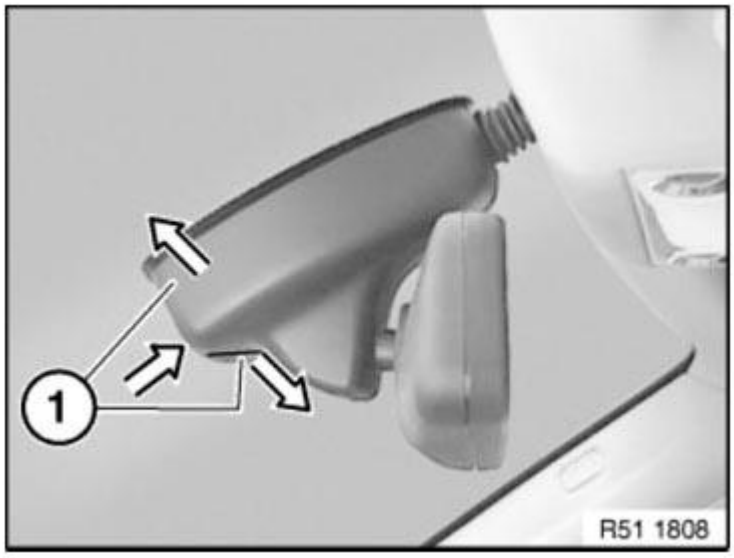


Fig. 30: Expanding Two-Part Mirror Base Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Slide camera (1) in direction of arrow out of mounting.

Disconnect plug connection (2).

Installation:

Make sure camera (1) is firmly seated in mounting.

Replacement

Carry out calibration via BMW diagnosis system:

Service functions:

- Body
  - Lane departure warning
    - Calibrate camera

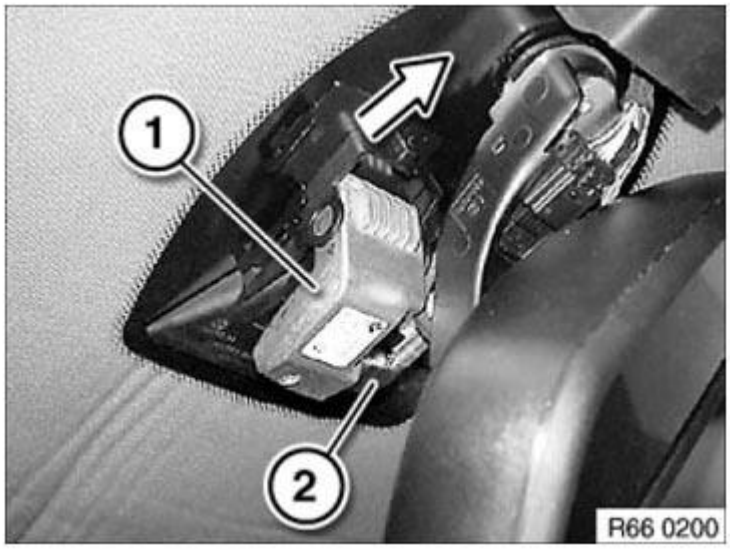


Fig. 31: Sliding Camera Out Of Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

6653 REVERSING CAMERA

66 53 010 CALIBRATING REVERSING CAMERA

WARNING: Danger of injury!

Laser beam at adjustment unit.

Do not look into the beam!

Laser class 2

As per EN 60825-1: 1994

P< or = 1 mW

Lambda = 632.8 nm

NOTE: Observe information on use of CORGHI KDS QUICK-ACTION CLAMP!

NOTE: Calibration of reversing camera must be carried out after the following work:

- **Removal and installation/replacement of reversing camera**
- **Body repair work rear at rear end of vehicle**
- **Adjusting procedure for tailgate**

IMPORTANT: Follow instructions and specifications in procedure.

To obtain an optimum result, always adhere to the following conditions:

- **Vehicle standing level on headlight aiming station**
- **Correct tire pressure (see label on vehicle).**
- **Vehicle is free of load**
- **Rear seat bench is unoccupied**
- **Do not swap seats during calibration**
- **Steering wheel in straight-ahead position**
- **Do not move steering wheel**

NOTE: Once the laser has been aligned to the camera lens, it is necessary to calibrate the reversing camera via the DIS Tester.

Also switch on reversing camera by means of PDC button.

Calibration can only be carried out with the BMW diagnosis system.

Service functions:

- Complete vehicle
- Body
- Camera systems

Secure KDS quick-action clamp on rear wheels on both sides.

Insert ball stud (1) in guide (2) up to limit position and secure with screw (3).

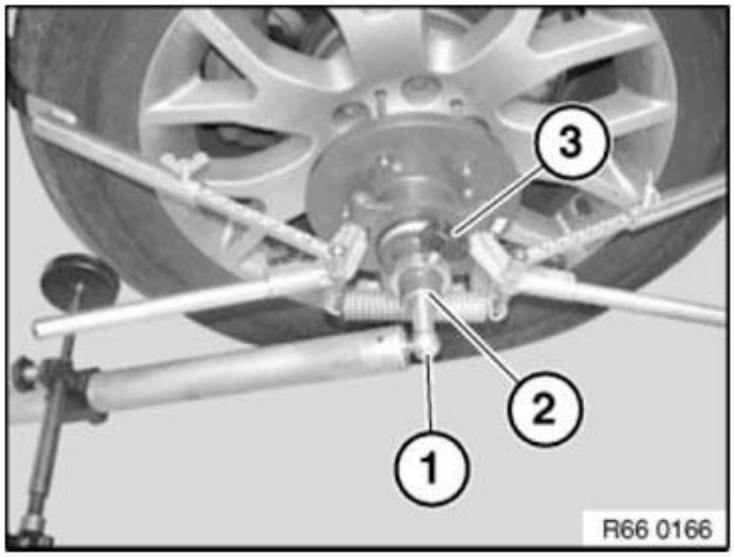


Fig. 32: Identifying Ball Stud Of Guide With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

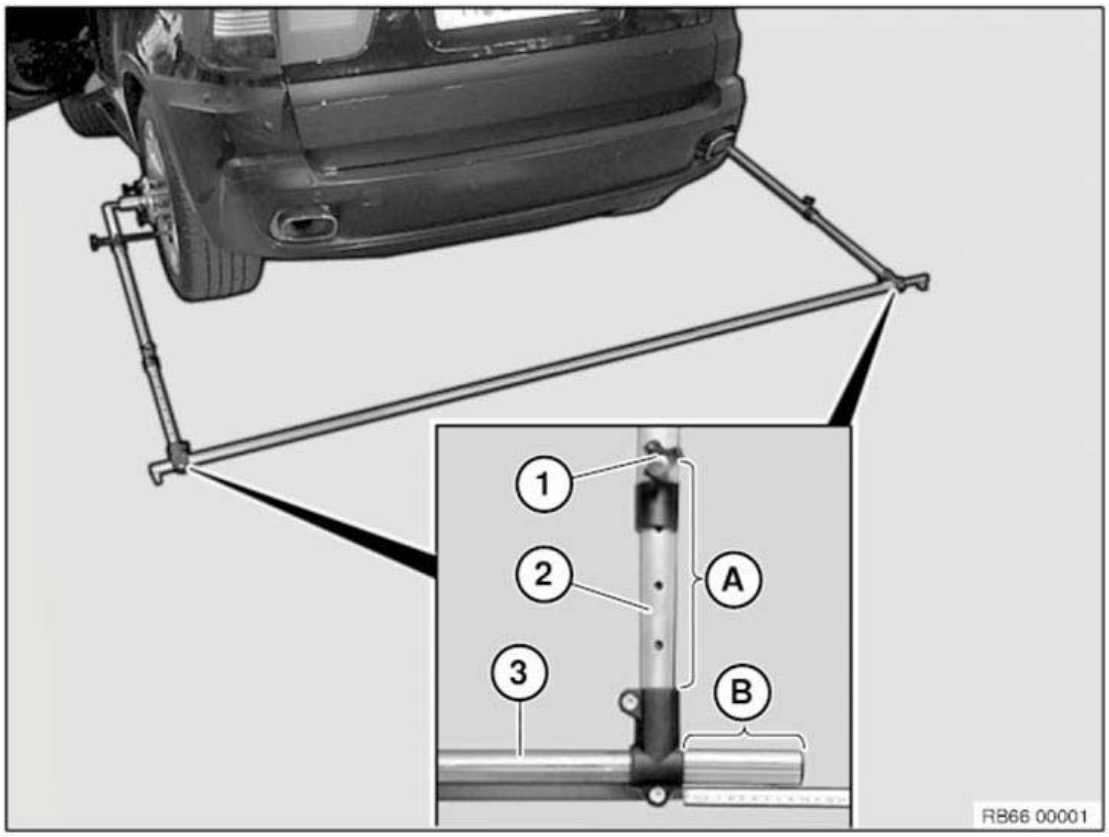


Fig. 33: Identifying Plug Position Of He Bolt On Rail And Cross-Rod Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

The plug position (A) of he bolt (1) on the rail (2) and dimension (B) of the cross-rod (3) must be adjusted on

both sides depending on the vehicle type.

Position target (1) on transverse rod with scale and align to zero point on scale (2).

Secure target (1) using knurled screws (3).

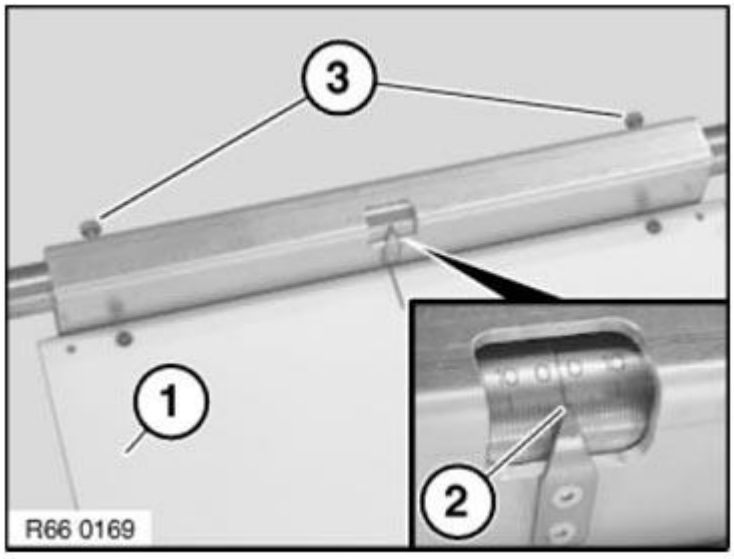


Fig. 34: Identifying Position Target On Transverse Rod And Scale With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

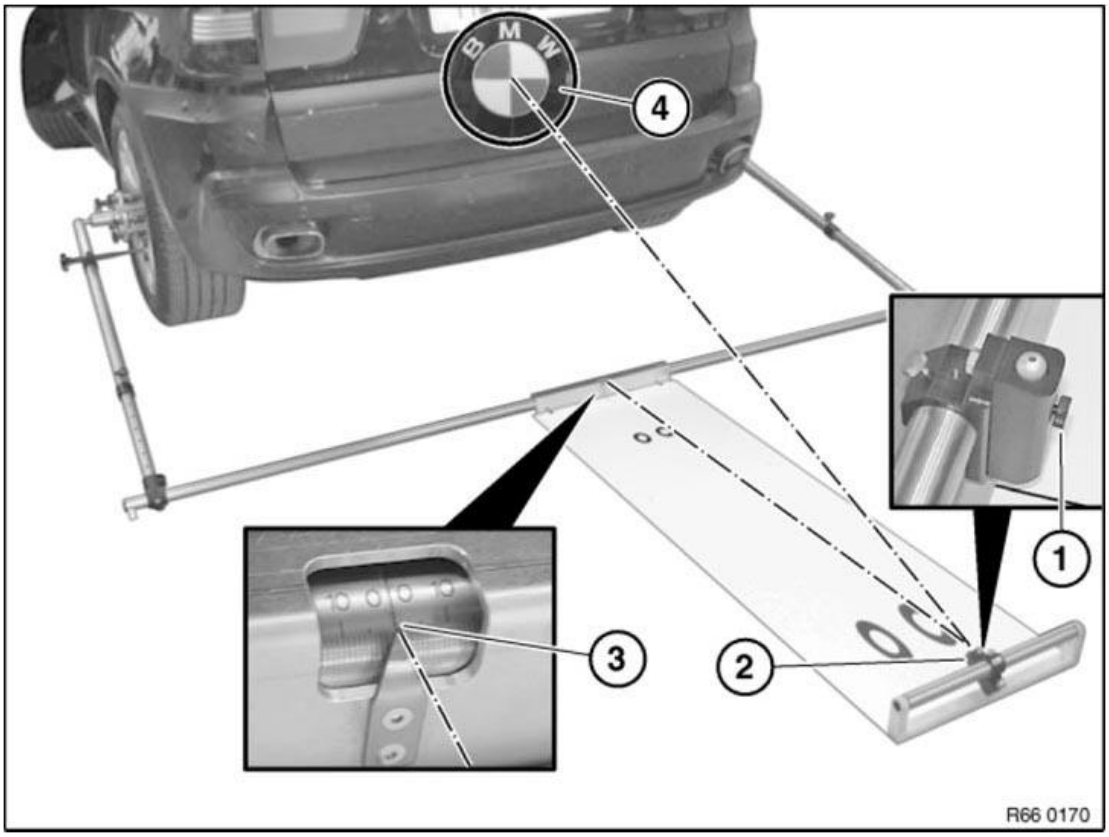


Fig. 35: Identifying BMW Badge, Scale And Laser Pointer With Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Switch on laser pointer (2) with knurled screw (1).

Align laser pointer first to zero point on scale (3), then upwards to center of BMW badge (4).

In the event of a laser deviation from the BMW badge center, this must be compensated for by shifting the complete linkage in the corresponding direction.

After realigning the target, check the position of the laser again and correct if necessary.

Align contact surface (1) on both sides to tire sidewall.

Tighten linkage simultaneously on both sides with adjusting screw (2).

NOTE: After securing linkage, check position of laser pointer again on vehicle's BMW badge.

If necessary, correct by means of adjusting screws.

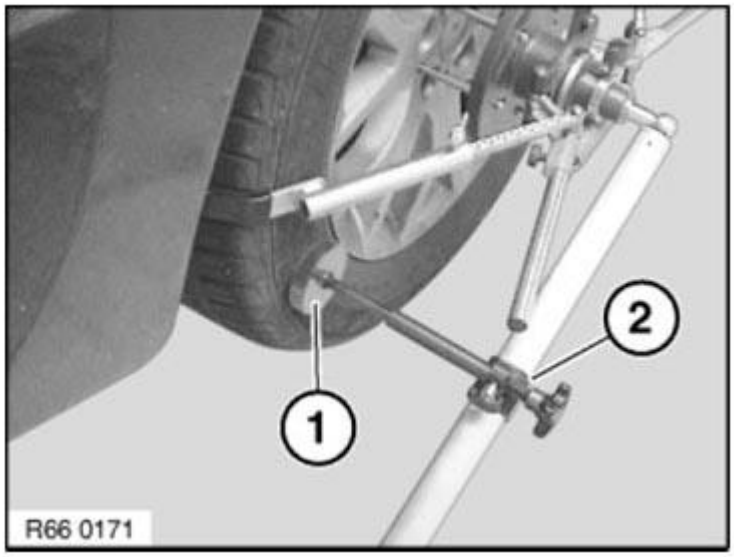


Fig. 36: Identifying Contact Surface With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

66 53... INSTRUCTIONS FOR ADAPTING ADJUSTMENT UNIT FOR REVERSING CAMERA (CORGHI KDS QUICK-ACTION CLAMP)

The following operations should only be carried out when using the tool kit for calibrating the reversing camera for the first time.

NOTE: The operation is described for the left-hand side; proceed in the same way for the right-hand side.

Remove support plate (1) from spindle (2).

Replace spindle (2) by spindle (3).

Press support plate (1) on to spindle (3).

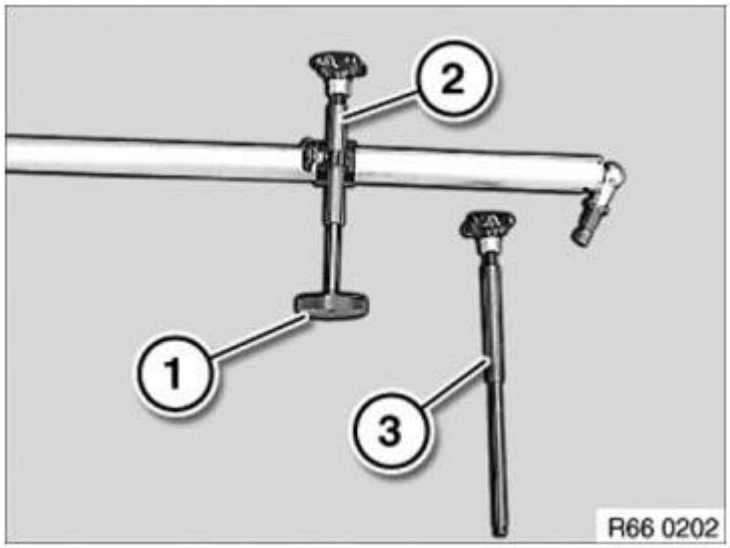


Fig. 37: Identifying Support Plate On Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

Release retaining clip (1).

Remove ball pin (2) from rod (3).

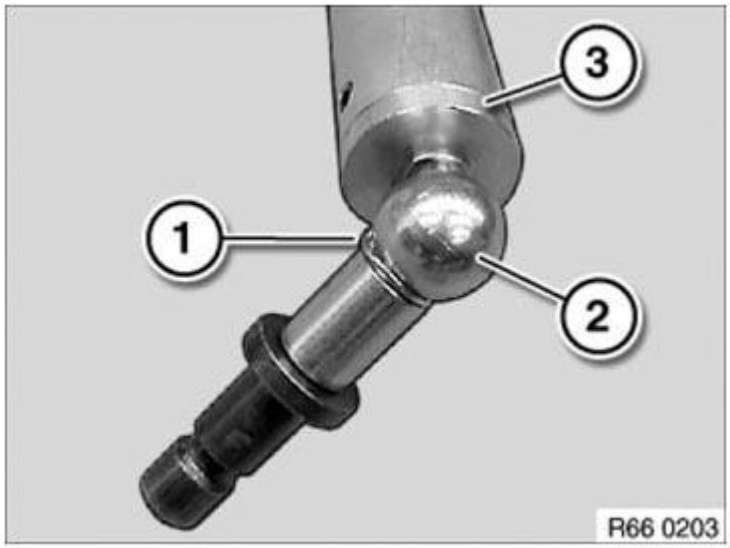


Fig. 38: Identifying Retaining Clip And Ball Pin From Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Fit new ball pin (1) on rod (2) and secure with retaining clip (3).

Fit ball pin (1) on CORGHI KDS quick-release clamp and secure.

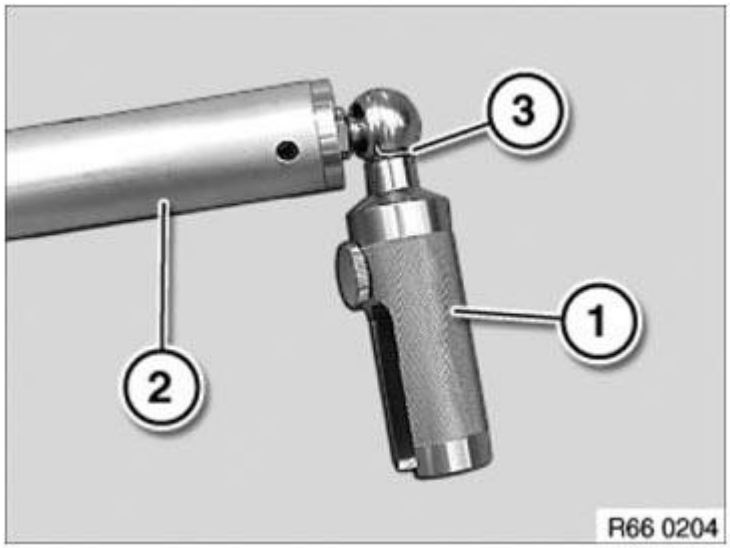


Fig. 39: Identifying Ball Pin On Rod With Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all spacers (1) on cross bar (2).

NOTE: Follow the same procedure for calibrating the reversing camera.

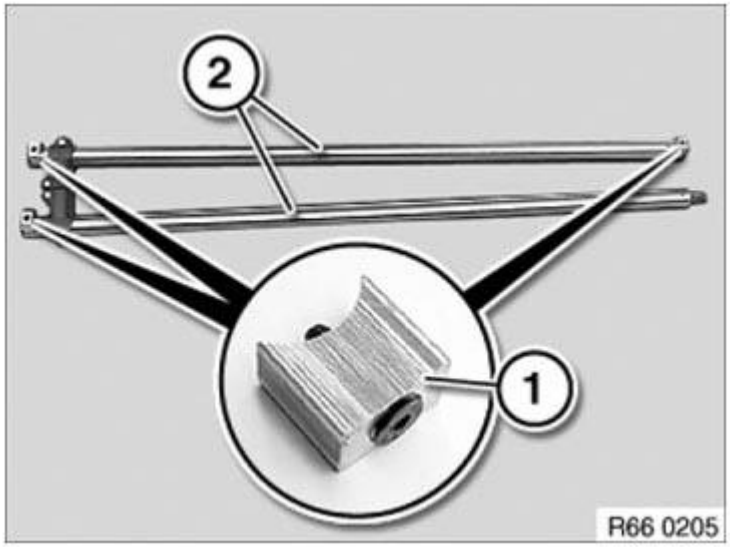


Fig. 40: Identifying Spacers On Cross Bar
Courtesy of BMW OF NORTH AMERICA, INC.

66 53 180 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR REVERSING CAMERA

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD

PROTECTION) .

Necessary preliminary work

- Remove **LUGGAGE COMPARTMENT WHEEL ARCH PANEL ON LEFT** .

Unlock plug connections (2) and disconnect.

Unscrew nuts (1).

Remove control unit (3) in direction of arrow.

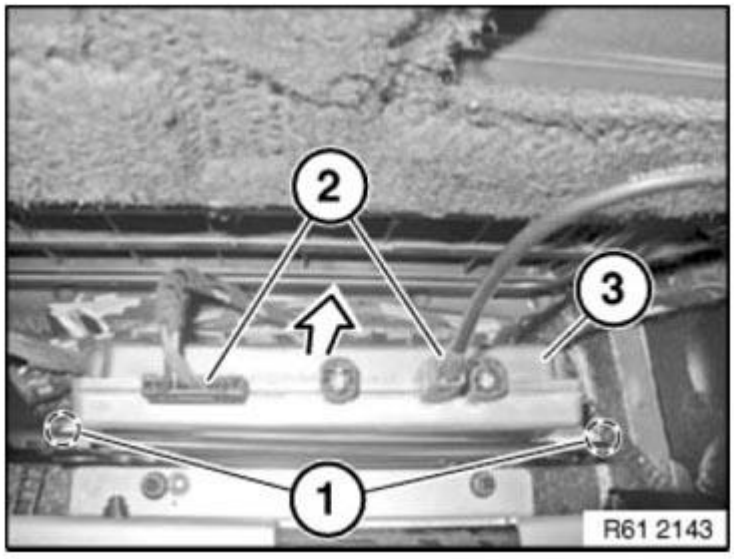


Fig. 41: Removing Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **PROGRAMMING/ENCODING** .
- **CALIBRATE REVERSING CAMERA**

66 53 020 REMOVING AND INSTALLING (REPLACING) REVERSING CAMERA

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary work

- Remove **CENTRE TAILGATE TRIM STRIP**

Unlock latch mechanisms (2) and lever reversing camera holder (3) out of center tailgate trim strip (4).

Feed reversing camera (1) out of camera holder (3).

Replacement:

Remove protective film from lens of reversing camera (1).

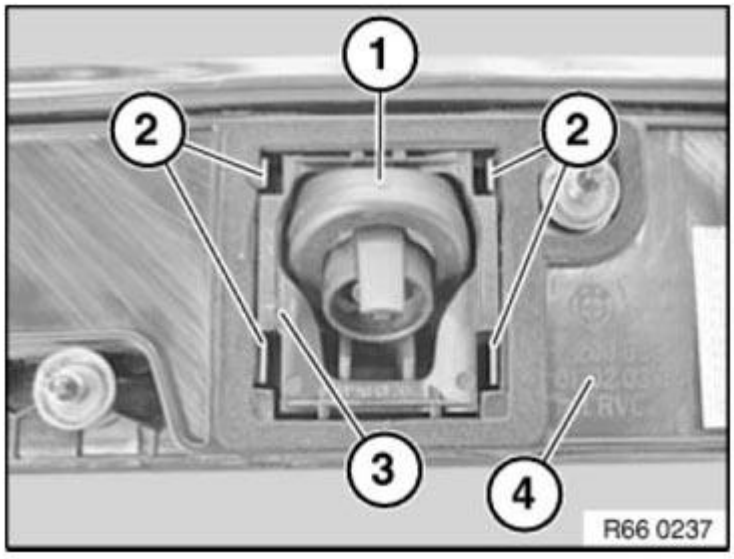


Fig. 42: Identifying Latch Mechanisms And Lever Reversing Camera Holder Out Of Centre Tailgate Trim Strip
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Calibrate **REVERSING CAMERA**

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING**

66 53 050 REMOVING AND INSTALLING/RENEWING THE TOP VIEW CAMERA

Necessary preliminary work

- Remove **RETAINING RING ON EXTERIOR MIRROR**

Unfasten plug connection (1) and disconnect.

Unfasten screws (2).

Remove exterior mirror camera (3).

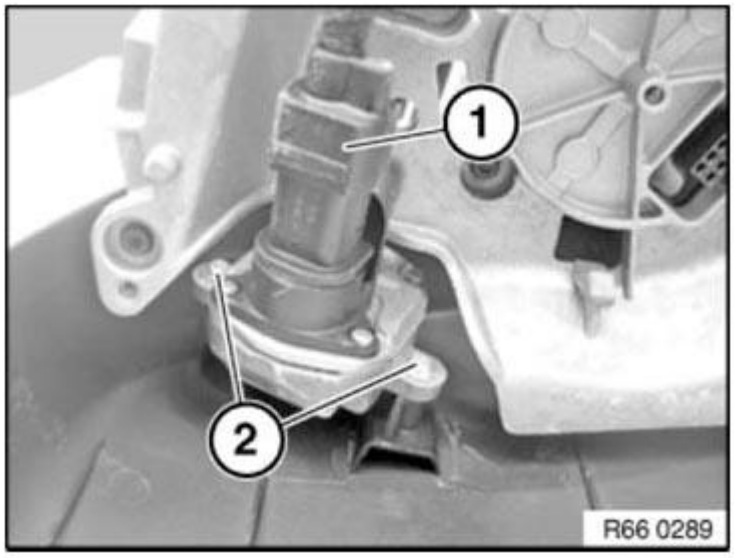


Fig. 43: Identifying Plug Connection With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Calibration

1. Mount KDS quick-release clamp on the side being calibrated: e.g. front left (Mounting the KDS quick-release clamp wheel center.)
2. Calibration is performed via BMW dia system:
    - Service function
        - Body
            - All-round camera
                - Calibration of all-round vision camera

66 53 170 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR TOP-/REAR-/SIDE-VIEW CAMERA

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work

- Remove **LUGGAGE COMPARTMENT WHEEL ARCH PANEL ON LEFT** .

Unlock plug connections (2) and disconnect.

Unscrew nuts (1).

Remove control unit (3) in direction of arrow.

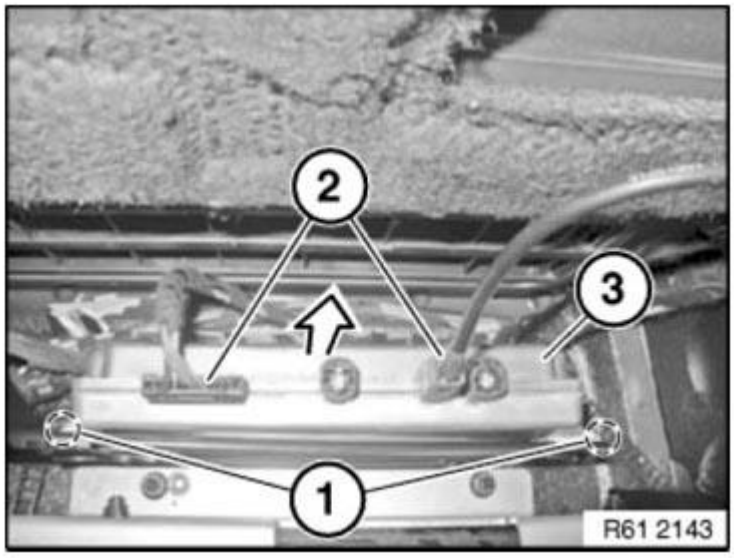


Fig. 44: Removing Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out **PROGRAMMING/ENCODING** .
- **CALIBRATE REVERSING CAMERA**

51 11... REMOVING AND INSTALLING/REPLACING HOLDER FOR SIDE VIEW CAMERA ON LEFT OR RIGHT

Necessary preliminary work

- Remove **SIDE VIEW VIDEO CAMERA**
- Pull side view video camera holder off bumper with a suitable tool (holder is secured with double-sided adhesive tape).

Installation

Holder (1) is encoded against incorrect installation.

Identification (2) indicates on which side of the vehicle holder (1) is stuck in.

For installation position observe shape of holder (1).

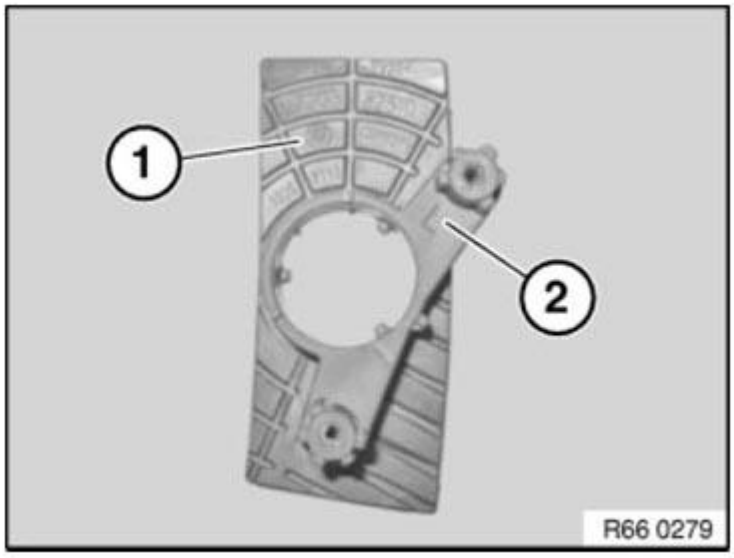


Fig. 45: Identifying Installation Position Of Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Clean bonding surface on bumper trim (4) and remove adhesive residues.

To position holder (1) optimally, pre-install camera (3) on holder (1) before sticking in the holder.

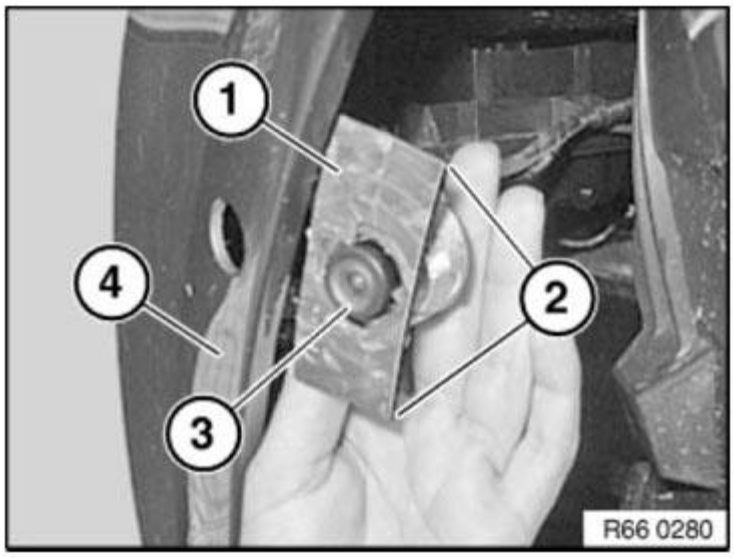


Fig. 46: Installing Camera On Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Outer edge (2) on holder (1) must be flush with outer bumper edge (4).

66 53 030 REMOVING AND INSTALLING/REPLACING SIDE VIEW CAMERA ON LEFT OR RIGHT

NOTE: Picture shows front wheel removed for purposes of clarity

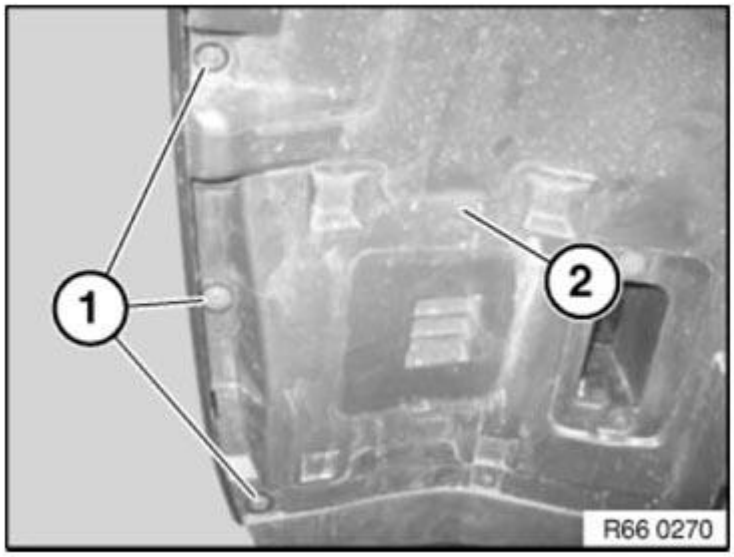


Fig. 47: Identifying Wheel Arch Panel With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Fold wheel arch panel (2) to one side.

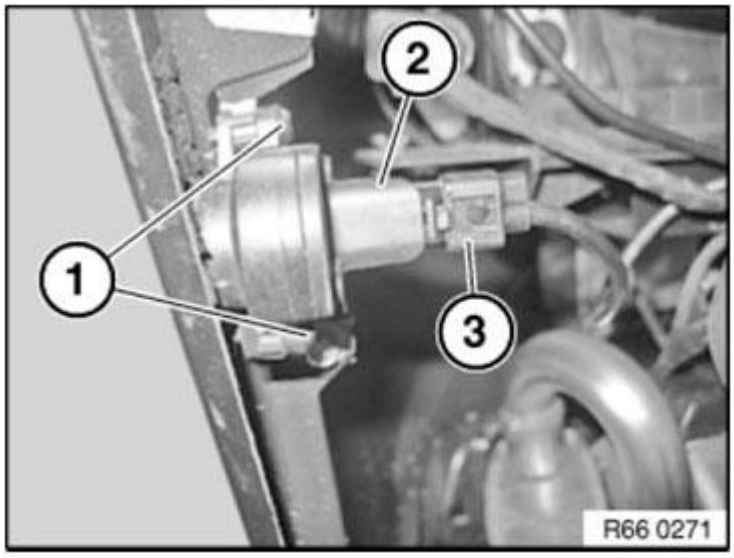


Fig. 48: Identifying Plug Connection, Camera With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove side view camera (2).

Unlock plug connection (3) and disconnect.

6654 NIGHT VISION

66 54 001 AXIALLY ADJUSTING NIGHT VISION CAMERA

NOTE: Mechanical setting - as described in the following - is only possible axially.

Vertical alignment can only be carried out with the BMW diagnosis system:

- **Service functions**
- **Body**
- **Night vision electronics**
- **Calibration night vision electronics camera**

NOTE: Installation location: Adjusting screw, Night Vision Camera F01, 02, 03:

Fold lid (1) in engine compartment lid gasket fixture mounting upwards as pictured.

NOTE: (2) = Installation location, adjusting screw, night vision camera

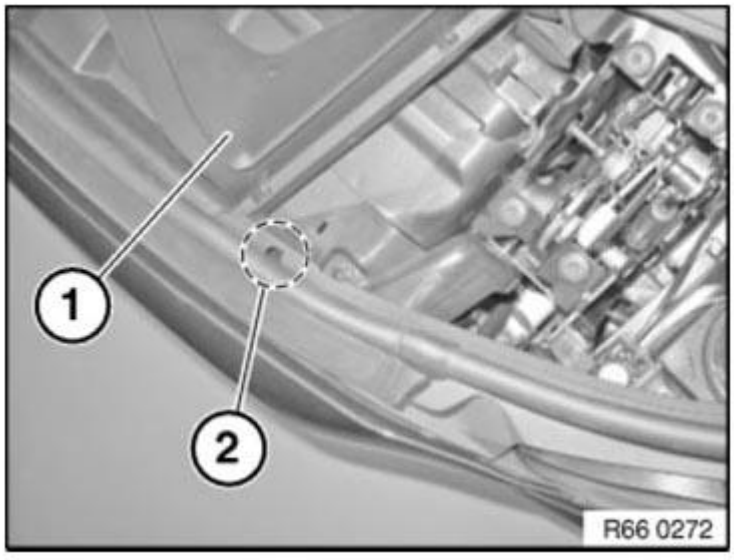


Fig. 49: Identifying Installation Location And Engine Compartment Lid
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Installation location: Adjusting screw, Night Vision Camera F07, F10, 11, 18, F12, 13:

Fold up engine compartment lid seal (1) as shown.

NOTE: (2) = Installation location, adjusting screw, night vision camera

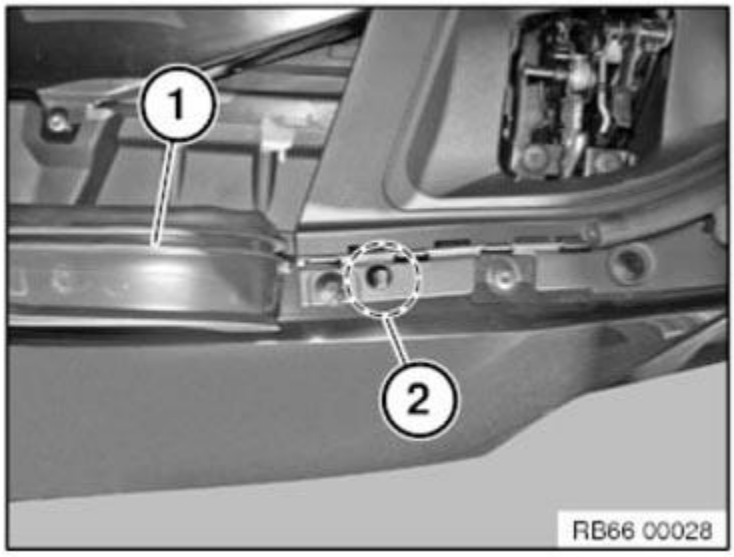


Fig. 50: Identifying Installation Location And Engine Compartment Lid Seal
Courtesy of BMW OF NORTH AMERICA, INC.

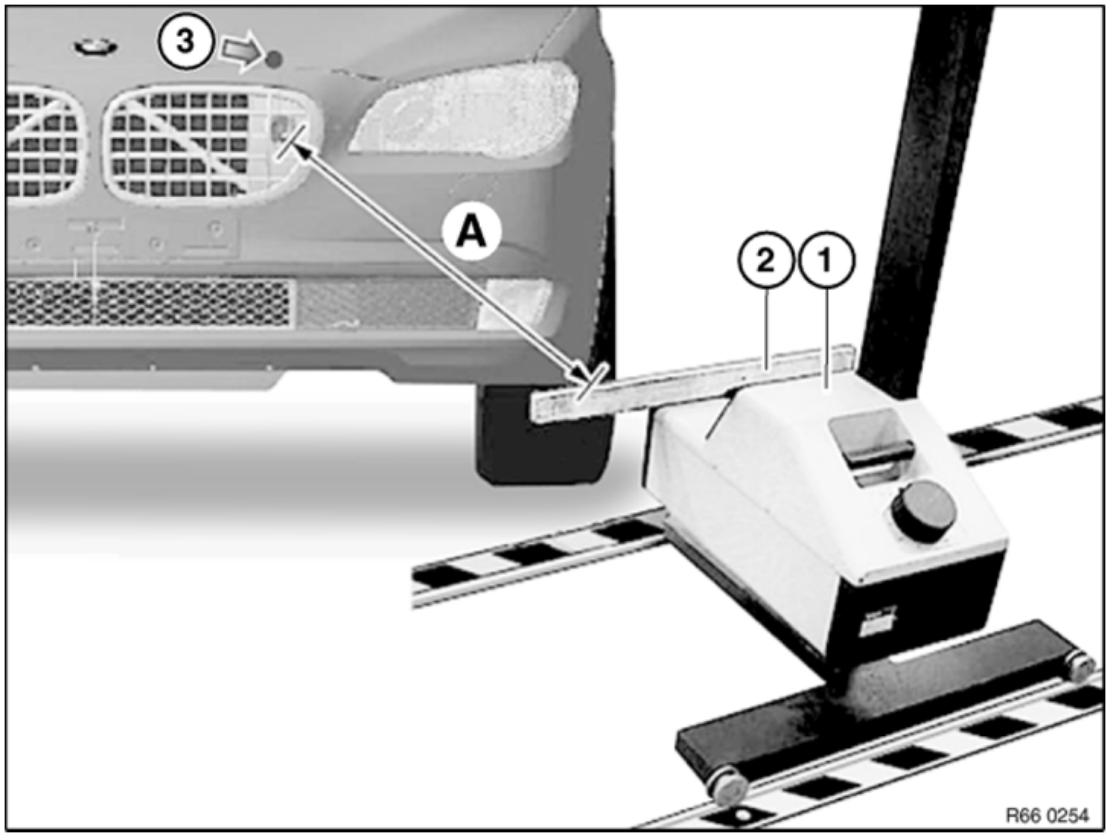


Fig. 51: Adjusting Night Vision Camera At Adjusting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Front of vehicle must be parallel at distance (A) to headlight aiming device (1).

(A) = 2 m

Align a suitable straight object (2), e.g. a spirit level, horizontally on headlight aiming device.

Slowly carry out axial adjustment of night vision camera at adjusting screw (3).

NOTE: Image shows the CID picture in the vehicle.

If necessary, align the image of the night vision camera with aid of a second person.

Yellow help line (1) is displayed using diagnosis job.

Upper edge (2) must be aligned using adjusting screw parallel to yellow help line (1) in the CID.

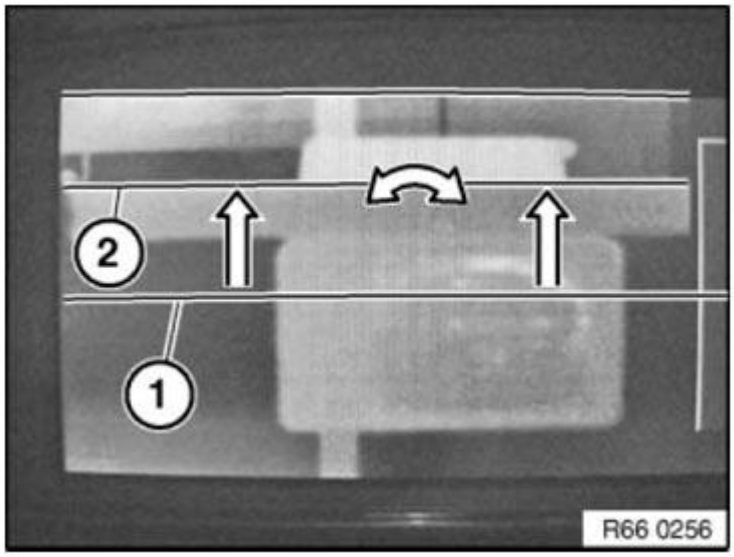


Fig. 52: Aligning Upper Edge Parallel To Yellow Help Line In CID
Courtesy of BMW OF NORTH AMERICA, INC.

66 54 010 REMOVING AND INSTALLING COMPLETE NIGHT VISION CAMERA

IMPORTANT: Read and comply with NOTES on protection against electrostatic discharge (ESD protection).

Necessary preliminary work

- Remove **MIDDLE LEFT RADIATOR GRILLE**

Release screws (2) on holder for camera (1).

Unclip latch mechanisms (3) on camera holder (1).

Remove camera including holder (1).

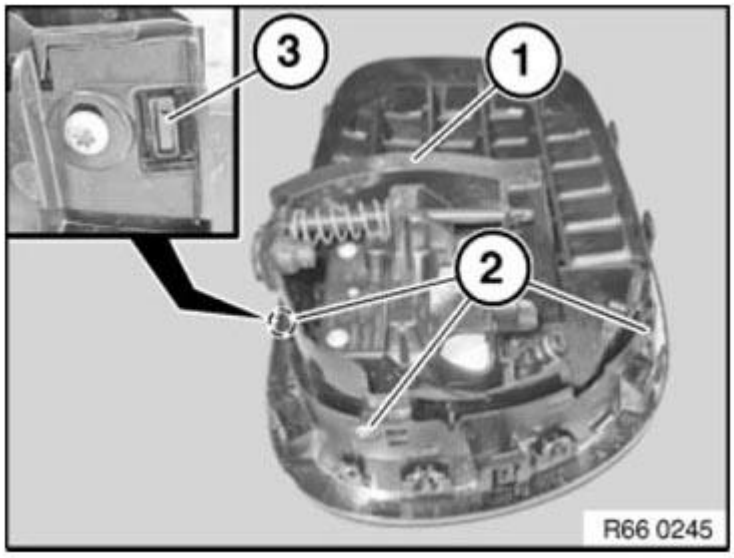


Fig. 53: Identifying Latch Mechanisms On Camera Holder
Courtesy of BMW OF NORTH AMERICA, INC.

66 54 005 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR NIGHT VISION SYSTEM

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

Necessary preliminary work

- Disconnect **BATTERY CABLE**
- Remove **FOLD-DOWN COMPARTMENT ON DRIVER'S SIDE**

Release plug connections (1) and disconnect.

Release bolt (2) and remove control unit (3) in direction of arrow.

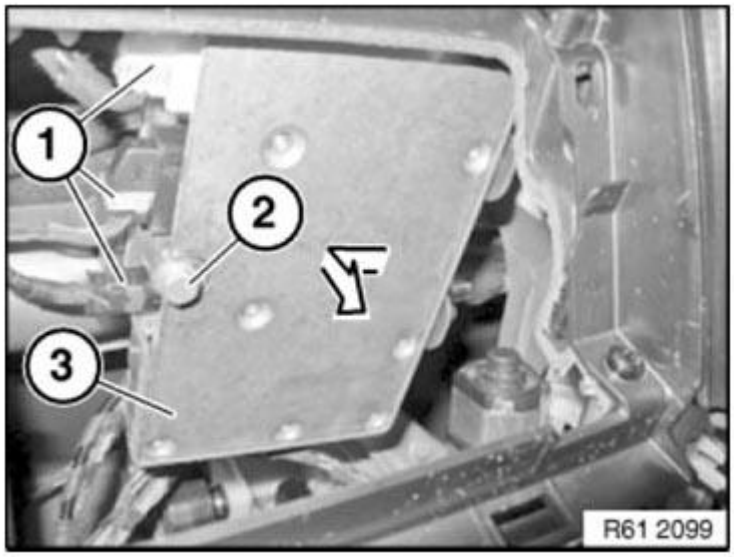


Fig. 54: Removing Control Unit Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Guides (1) on control unit (2) must be seated correctly in the correct bracket.

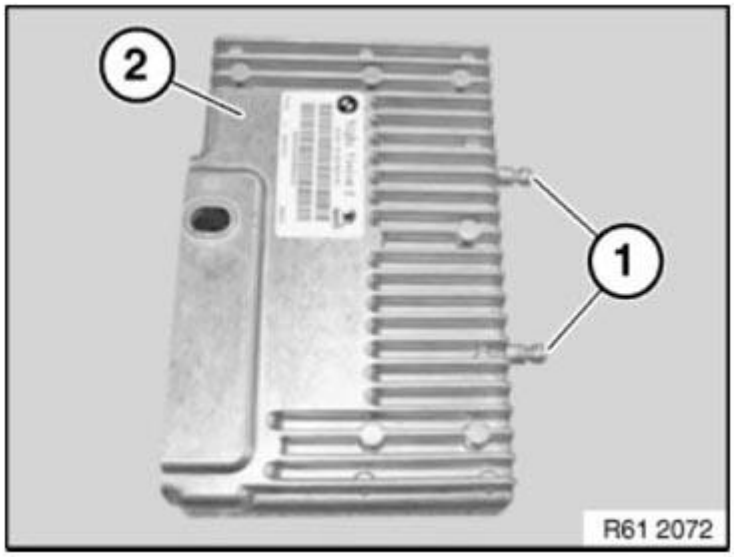


Fig. 55: Identifying Guides On Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out **VEHICLE PROGRAMMING AND ENCODING** .

NOTE: New component contains a CD with deblocking code.

CD is requested during encoding/programming by the SSS.

66 54 015 REPLACING LENS COVER FOR NIGHT VISION CAMERA

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary work

- Completely remove **NIGHT VISION CAMERA**

Unlock latch mechanisms (1) and unfasten cover (2) in direction of arrow.

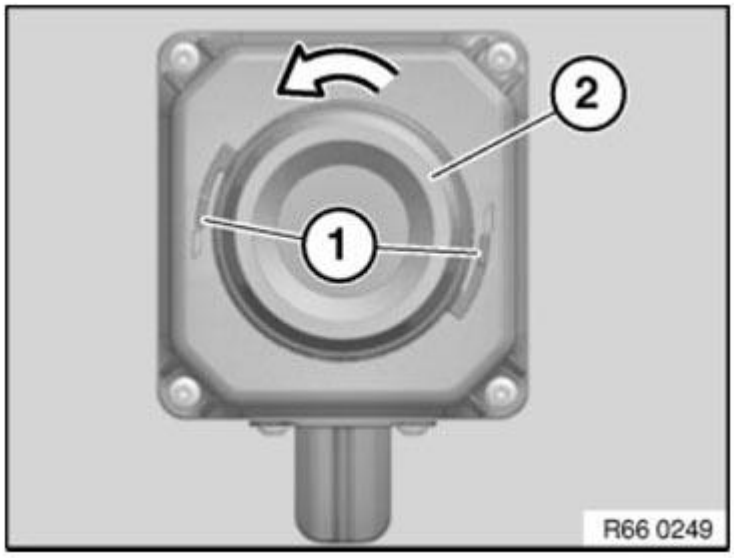


Fig. 56: Turning Lens Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove sealing ring (1).

IMPORTANT: Adjoining surface of lens must not be damaged when sealing ring is removed!

Installation note:

Replace sealing ring.

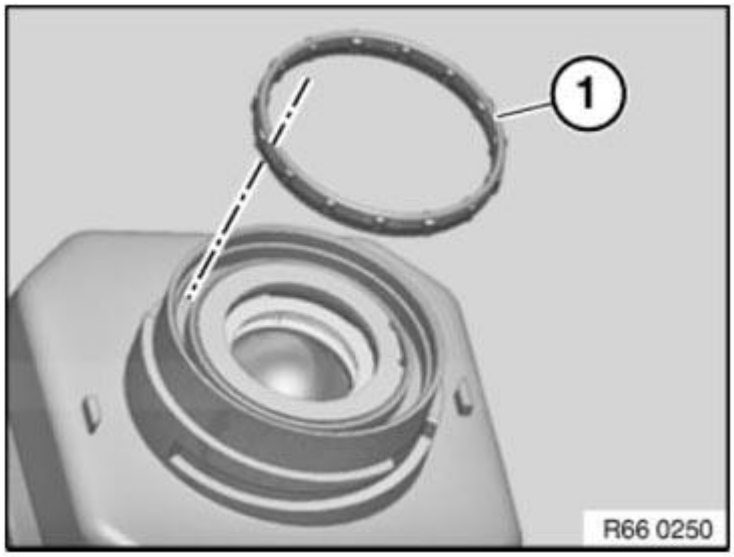


Fig. 57: Removing Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Thoroughly clean seal recess (1) with cleaning agent* containing alcohol and cotton bud.

*BMW part number: 83 11 0009712

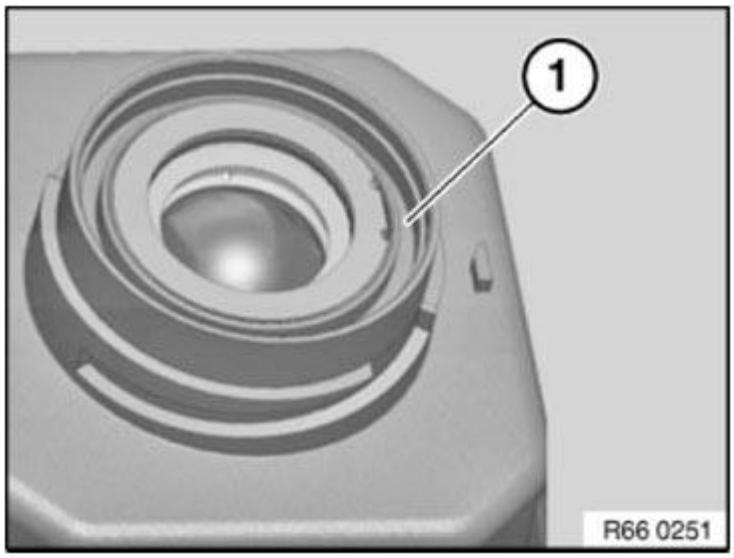


Fig. 58: Identifying Seal Recess
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Adjust **NIGHT VISION CAMERA**
- Fill up with washer fluid

66 54 511 REPLACING NIGHT VISION CAMERA

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

IMPORTANT: New component contains a CD with deblocking code.

Enable code CD is requested during coding/programming by the SSS.

Coding/programming without the enable code CD is not possible!

Necessary preliminary work

- Removing **SPRAY NOZZLE FOR NIGHT VISION CAMERA**

Release screws (2) on holder for camera (1).

Unclip catches (3) on camera holder (1).

Remove camera including holder (1).

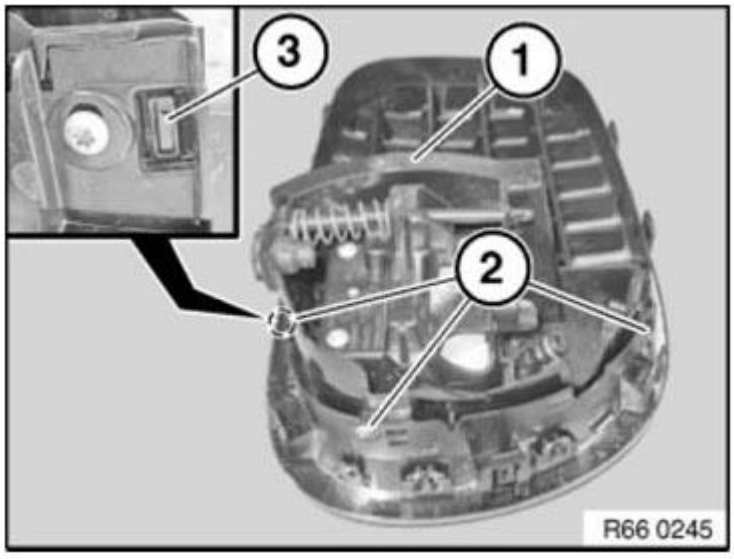


Fig. 59: Identifying Catches, Camera On Camera Holder And Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release lock (1) at adjusting screw (2) and press upwards in direction of arrow.

At same time twist out adjusting screw (2) and pull out complete pin with spring.

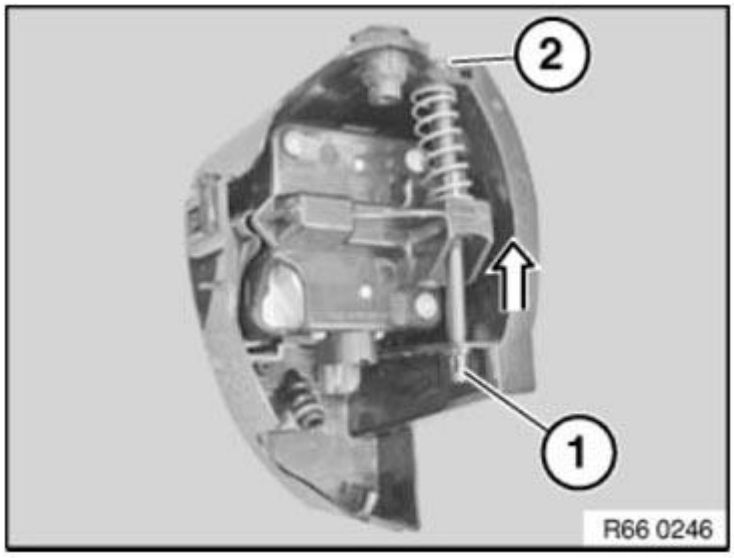


Fig. 60: Pressing Lock Upward At Adjusting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Holder (2) and fixture (3) must also be replaced when replacing camera (1).

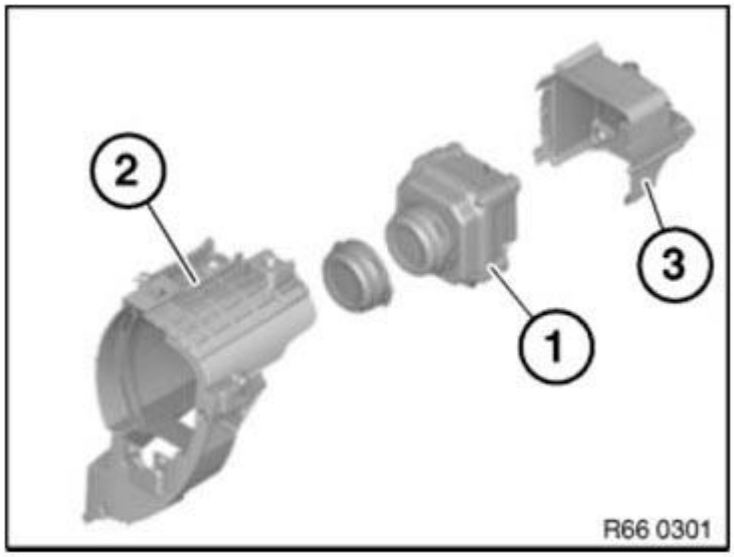


Fig. 61: Identifying Holder, Fixture And Camera
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly of individual parts:

Place mount (2) on camera.

Tighten screws (1).

Tightening torque **66 54 1AZ** .

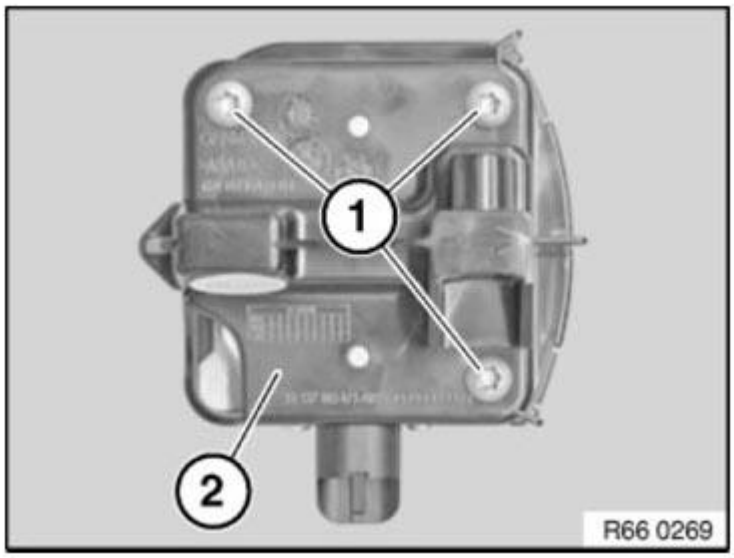


Fig. 62: Identifying Mount On Camera With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Insert camera (2) with mount in holder.

Retaining lugs (1) on the mount must engage correctly in the guides on the holder (3).

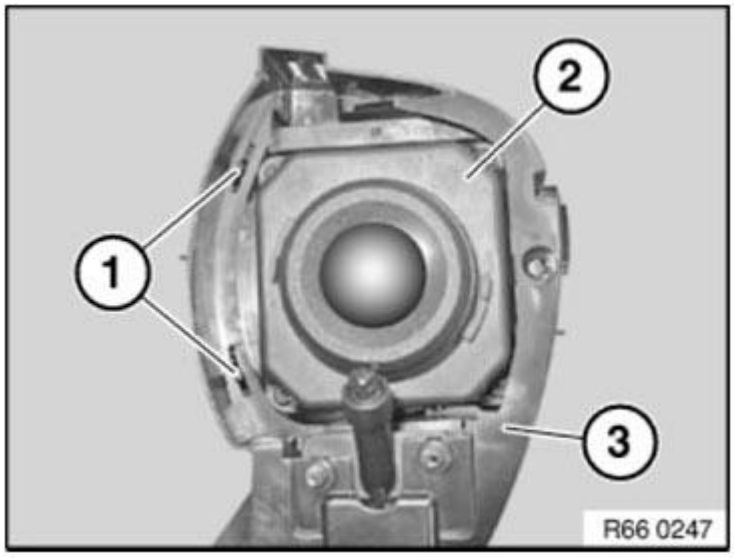


Fig. 63: Identifying Camera And Lugs With Mount In Holder
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Adjust **NIGHT VISION CAMERA**

Replacement:

Carry out **VEHICLE PROGRAMMING AND ENCODING** .

ACCESSORIES AND BODY, CAB

Distance Systems, Cruise Control - Tightening Torques

ACC SENSOR

66 31 ACC SENSOR

TIGHTENING TORQUE SPECIFICATION - ACC SENSOR

		Type	Thread	Tightening specification	Measure
1AZ	Holder, ACC sensor, to base plate, ACC sensor	F01, F02		Replace screws	4 Nm

NIGHT VISION CAMERA

66 54 NIGHT VISION CAMERA

TIGHTENING TORQUE SPECIFICATION - NIGHT VISION CAMERA

		Type	Thread	Tightening specifications	Dimension
1AZ	Cover, rear	F01/F02/F03/F04/F07/F10/F11/F18/F12/F13	M5	Replace Torx screw	
				To 05/2010 Pan-head screw, part number 7 678 083	8 Nm
				From 05/2010 Pan-head screw, part number 9 241 365	5.5 Nm

TRANSMISSION

Double Clutch Gearbox - Repair

28 DOUBLE CLUTCH GEARBOX

00..... PRECAUTIONARY MEASURES ON VEHICLES WITH ACTIVE PEDESTRIAN PROTECTION SYSTEM

WARNING: Danger to life!

Triggering the active pedestrian protection system while the engine compartment lid is open may cause serious injury by the retaining hooks.

Cover front panel in area of engine compartment lid catches with protective cover (1).

Order number, protective cover 81 47 2 159 868.

Support engine compartment lid a suitable tool.

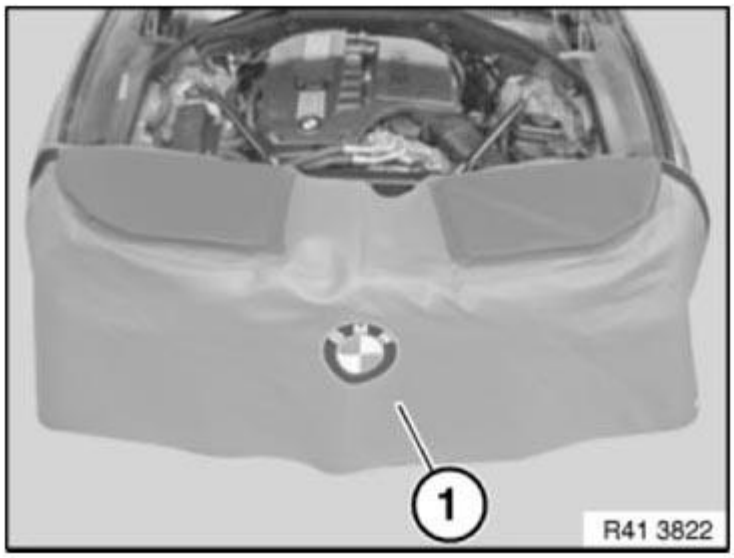


Fig. 1: Identifying Front Panel Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Use Velcro strips (2) to fasten head protection (1) to catch hook.

Order number for head protection catch hook (pair) 81 47 2 159 869.

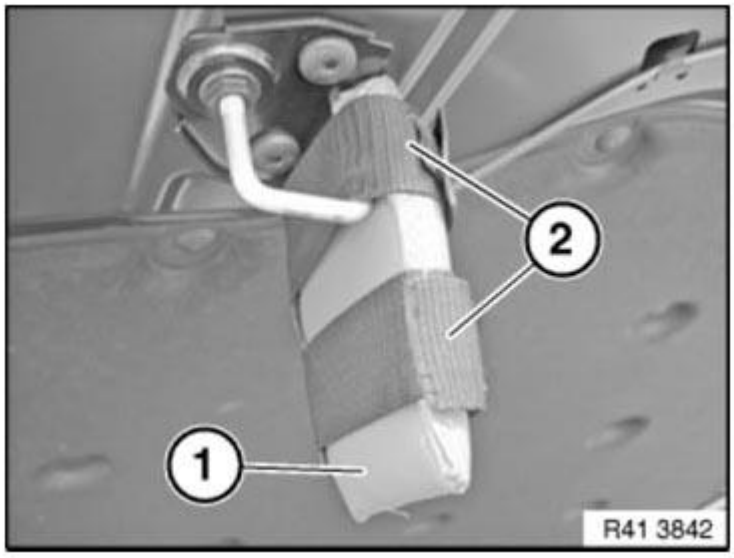


Fig. 2: Identifying Fasten Head Protection To Catch Hook With Velcro Strips
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Driver Information Systems - Overview

DISPLAYS, INDICATORS AND CONTROLS

INTRODUCTION

As in all other BMW models, the operating and control concept of the new BMW 7 Series F01/F02 is based on clear and optimum structuring of the cockpit. Fewer switches simplify logical operation. The display, indicator and control elements are organized in a hierarchical arrangement corresponding to their function.

This product information covers exclusively the following topics:

- Instrument cluster and
- Central Information Display, CID.

NOTE: All other display systems such as "Head-Up Display", "Night Vision 2", "Connected Service" and "Personal Profile" are described in detail in separate sections of this course's reference material.

Display, Operating and Control Concept

With the new BMW 7 Series F01/F02, a new operating and control concept is being introduced at BMW. In addition to the main menu, there is an arrangement of four direct access buttons, a Back button and an Option button in the immediate vicinity of the controller.



Fig. 1: Display Operating And Control Concept Of BMW7 Series F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

OPERATING AND CONTROL CONCEPT OF BMW7 SERIES REFERENCE CHART

Index	Explanation
1	Head-up display (HUD)
2	Instrument cluster
3	Central Information Display (CID)
4	Favorite buttons for individual assignment
5	Controller
6	Gear selector switch (GWS)
7	Steering column stalk/steering wheel
8	Operating unit for driver assistance systems (BEFAS)

Instrument Cluster

The instrument cluster is a new development. It has four analog needle instruments based on full-surface Black Panel technology.

With this display technology, the symbols of the individual functions only become visible when the ignition is switched on.

At first glance, the instrument cluster appears as a black surface, without an arrangement of digits and different-colored function symbols.

The two large dials show the road speed and engine speed.

The two small dials indicate the fuel level on the left-hand side and the oil temperature on the right-hand side.

Most of the indicator lamps arranged are in the center, at the top between the two large dials and above the two small dials.

A permanent background image in orange gives the instrument cluster a certain 3D representation. The TFT display is located in the lower part of the instrument cluster, in the center

between the two small dials. The display for the Entertainment mode is located on the right-hand side of the display;

the Navigation display is in the center; and the display for Check Control messages is on the left.



Fig. 2: Display BMW7 Series Instrument Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

Central Information Display (CID)

The Central Information Display, CID, is a further development of the CID already used in BMW models.

The new BMW 7 Series F01/F02 features very similar software as used in the CID installed in the BMW 3 Series with a CIC.

As on all new BMW models, the system is operated by means of the central control element, the controller.



Fig. 3: Display Telephone
Courtesy of BMW OF NORTH AMERICA, INC.

The is an operating unit for the following functions:

- CD/Multimedia
- Radio
- Telephone
- Navigation
- Contacts
- BMW Assist
- Vehicle Info (Owner's Manual)
- Settings

Personal Profile

The "Personal Profile" systems allows the driver to set several functions in the BMW 7 Series F01/F02 to suit his/her personal requirements.

Personal Profile stores the data entered by the driver such as automatic setting of the outside mirrors or speed-dependent volume in the corresponding control units.

As soon as the vehicle is unlocked using the identification transmitter, the system recognizes the corresponding settings belonging to the identification transmitter.

Up to three different basic settings can be adapted for three different persons. The precondition is that each of the three persons has his/her own identification transmitter.

Controls on the Steering Wheel

There are blocks of buttons in the steering wheel on the left and right.

The controls for the cruise control function are located on the left-hand side of the steering wheel.

The controls for operation of the radio and telephone functions are on the right.



Fig. 4: Identifying Controls On Steering Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING WHEEL CONTROLS REFERENCE CHART

Index	Explanation
1	Set button, Save speed
2	Reduce distance button
3	Toggle switch + - Change speed
4	Increase distance button
5	Enable/disable, interrupt DCC/ACC
6	Resume/call-up stored speed button
7	Knurled wheel Select radio station
8	MODE button Switch audio sources
9	Toggle switch + Change volume
10	Toggle switch - Change volume
11	Hands-free button
12	Telephone button

Controller

The operating and control concept of the controller on the F01/F02 has been extended to include a number of toggle switches that can be a great advantage for menu guidance.

In addition to a possibility to open the main menu in the CID, an arrangement of toggle switches for the most important menu items in the main menu is located in the immediate vicinity of the controller.



Fig. 5: Identifying Center Console On BMW7 Series F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

BMW7 SERIES CENTER CONSOLE REFERENCE CHART

Index	Explanation
1	CD toggle switch
2	Main Menu toggle switch
3	Telephone toggle switch
4	Navigation toggle switch
5	Controller
6	Radio toggle switch
7	Option toggle switch
8	Back toggle switch
9	Parking brake, automatic
10	PDC button
11	Side View button
12	Parking brake, electrical

13	Driving dynamics switch, DSC button
14	Gear selector lever

SYSTEM OVERVIEW

The system circuit diagram for the outside temperature is displayed below.

The diagram is structured in such a way that only the control units and control elements directly involved in the instrument cluster are shown.

The instrument cluster receives a large number of different bus signals that provide information (speed, CC messages, etc.) for the various displays and indicators. These bus signals are requests to the instrument cluster and are therefore not listed in this product information.

The only directly connected component that can be seen in the system circuit diagram is the outdoor temperature sensor.

This input signal is read directly in the instrument cluster and made available from here to all other bus users. The outdoor temperature sensor wiring "passes through" the junction box and is processed directly by the instrument cluster.

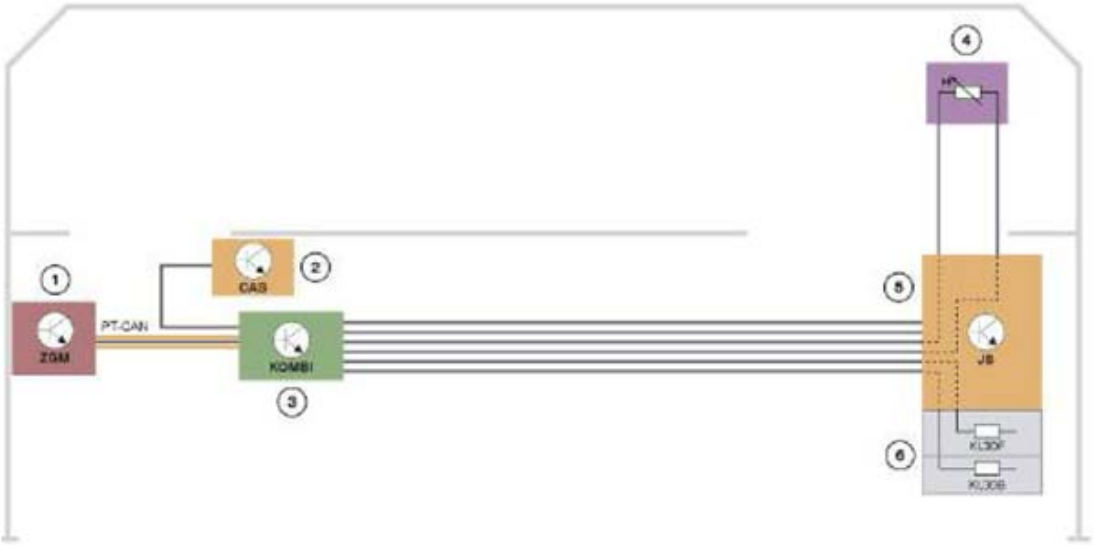


Fig. 6: System Circuit Diagram For Outside Temperature
Courtesy of BMW OF NORTH AMERICA, INC.

OUTSIDE TEMPERATURE SYSTEM REFERENCE CHART

Index	Explanation
1	Central Gateway Module (ZGM)
2	Car Access System (CAS)
3	Instrument Cluster

4	Outside Temperature Sensor
5	Junction Box
6	Front Distribution Box

PRINCIPLES OF OPERATION

Instrument Cluster

The instrument cluster receives information on the wiring harness in the form of analog and digital electrical signals. These signals are processed and displayed in the instrument cluster or passed on as information to other control units.

On the new BMW 7 Series F01/F02, the instrument cluster has a number of functions that are new to BMW or have changed in relation to existing BMW models.

Black Panel Technology

The F01/F02 is the first BMW vehicle to utilize Black Panel technology. This is a panel, the back of which is coated with black film that virtually covers the entire surface portion of the instrument cluster.

Black Panel technology is used on the instrument cluster, control panels for IHKA/AUDIO and FKA.

On the instrument cluster, the area that is not covered by the Black Panel is designed in such a way that the symbols of the lamps are not visible when switched off.

The Black Panel surface appears homogeneously dark, which means that no details from the background area can be detected.

The two large accentuating rings for the speedometer and tachometer and two small dial areas for the fuel gauge and oil temperature are galvanized.



Fig. 7: Instrument Cluster Display For Off Position
Courtesy of BMW OF NORTH AMERICA, INC.

Instrument Cluster - Off

When the instrument cluster is switched off, the analog indicators are at their zero point, the active area of the display is switched off and the rings in the display area are not closed.



Fig. 8: Instrument Cluster Display For Vehicle Awake Position
Courtesy of BMW OF NORTH AMERICA, INC.

Instrument Cluster - Vehicle Awake

When the vehicle is awake, the analog indicators are at their zero point, the active area of the display is switched on only to complete the lower portion of the rings in the display area.

NOTE: The control panels for the integrated automatic air-conditioning system (IHKA), AUDIO and rear automatic heater/air conditioner (FKA) are also designed in this new technology.

TFT Display

A horizontal TFT display with a resolution of 960 x 160 pixels is integrated in the instrument cluster underneath the dials.

The large mechanical, analog dials are open at the bottom. These dials are closed by graphics. The graphics are displayed digitally and contain specific functional indicators such as the range or current consumption.

The display enables the prioritization of information with the following representations:

- under right dial - display of audio and telephone lists that can be operated via the multifunction display, MFL
- under left dial - display of longer, two-line Check Control texts
- center display area - the navigation information, including other navigation texts under the left-hand and right-hand dial.

This structure of the instrument cluster enables flexible use of the display area and keeps the signature BMW

appearance for the large dials for road speed and engine speed.

The most important information that appears depending on the content and prioritization is:

- Navigation display
- Voice input acknowledgement
- Traffic information
- Infotainment (audio and telephone)
- Check Control messages
- Acknowledgments of assistance systems.

The background image is activated in orange and is always displayed as soon as anything appears in the display.

Schematic Breakdown of the Display Area

The graphic in the page below shows the schematic breakdown of the display area in the instrument cluster. Nighttime design is activated in the display when the parking lights or headlights are on.

Daytime-nighttime Design

The daytime-nighttime design differs with regard to the color assignment of some text and graphic elements.



Fig. 9: Display Indicators For Nighttime Design
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 10: Display Indicators For Daytime Design
Courtesy of BMW OF NORTH AMERICA, INC.

The following displays change from white to orange:

- Scales and scale lettering of the large and small dials
- Basic indicators, e.g. time, outside temperature
- Gear indicators
- On-board computer and navigation displays
- CC texts and texts for operation acknowledgments
- Text and line for rear seat belt status

Under the following conditions, nighttime design is activated in the display:

- Side lights ON
- Low-beam headlights ON, in darkness or in a tunnel.

NOTE: The texts in the CBS reset menu and the test functions are always in white, independently of the daytime/nighttime view.

Schematic Breakdown of the Display Area

The following graphic shows the schematic breakdown of the display area in the instrument cluster.



Fig. 11: Schematic Breakdown Of Display Area On Instrument Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

DISPLAY AREA BREAKDOWN DESCRIPTION CHART

Index	Explanation
1	Two-color flush-mounted pointer
2	FAS status indicator FAS information FAS warnings
3	Rear seat belt status Entertainment (symbols) Communication (symbols) PTT acknowledgement (symbols)
4	Fuel consumption indicator (analog) Gearbox position Manual gear indicator Shift recommendation Display FDS menu Automatic engine start-stop function
5	Entertainment lists FDS menu Navigation "Coming Road"
6	Navigation (junction view) Lane Guiding Condition Based Service Test menu
7	Check Control messages Operation acknowledgments Traffic information Navigation (Distance to Junction)
8	Range (analog and digital) On-board computer Operation acknowledgments (symbols) Speed Limit Info
9	Check Control (symbol) Traffic information (symbols)
10	Reset button Trip distance recorder

On-board Computer

On-board computer function in the instrument cluster.

The on-board computer functions can be called up by briefly pressing the on-board computer button on the steering column stalk.

Pressing the on-board computer button again displays information in the following order:

- Range

- Average fuel consumption
- Average speed
- Distance (Nav destination entered)
- Estimated time of arrival (Nav destination entered)
- Date



Fig. 12: Identifying On-Board Computer, High Beam Assistance Button And Left Stalk Switch
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING COLUMN STALK LEGENDS

Index	Explanation
1	On-board Computer Button
2	High Beam Assistance Button
3	Left Stalk switch



Fig. 13: Display Range, Average Fuel Consumption, Speed, Distance, Time Of Arrival And Date
Courtesy of BMW OF NORTH AMERICA, INC.

ON-BOARD COMPUTER FUNCTIONS REFERENCE CHART

Index	Explanation
1	Range: If the value displayed for the range is greater than the highest value on the scale, the analog indicator is on the right-hand edge of the scale. The digital indicator shows the current value.
2	Average fuel consumption: The display is a maximum of 2 digits plus one decimal place in US mpg.
3	Average speed: The display is a maximum of 3 digits plus one decimal place in US mph.
4	Distance (Nav destination entered): In addition to the 4-digit display of the digital distance value, the distance to the destination is shown in the analog range display as a dot. Distances are always shown without decimal places.
5	Estimated time of arrival (Nav destination entered): In addition to the display of the estimated time of arrival, the distance to the destination is shown in the analog range display as a dot.
6	Date: The date is always shown with a leading "0" and with the last two numbers of the year.

Low Range Warning

If the range is too low, the driver is given a visual warning.

The analog bar gauge and the bar background change color from orange to yellow. The range appears in numbers, overlaying any other on-board computer displays.

The range can be called up by pressing the on-board computer button again.



Fig. 14: Display Low Range Warning
Courtesy of BMW OF NORTH AMERICA, INC.

Operation Acknowledgments

Operation acknowledgments are shown for 6 seconds in the display area in the left-hand dial. These are overlaid on top of the numerical range display and/or the on-board computer display as well as the average value of the range scale lettering. Any necessary supplementary texts are shown centrally below the dial; the basic indicator "Time" is then hidden.



Fig. 15: Display Operation Acknowledgments
Courtesy of BMW OF NORTH AMERICA, INC.

Central Information Display

Main Menu

The display in the main menu consists of the following menu items:

- CD/Multimedia
- Radio
- Telephone
- Navigation
- Contacts
- Vehicle Info
- Settings.



Fig. 16: Display Telephone
Courtesy of BMW OF NORTH AMERICA, INC.

In addition to this main menu, an arrangement of toggle switches for the most important menu items in the main menu is located in the immediate vicinity of the controller.

The relevant button can be used to call up the following menu items:

- MENU
- CD
- Radio
- TEL
- NAV
- BACK and OPTION.



Fig. 17: Identifying MENU, CD, Radio, TEL, NAV, BACK And OPTION
Courtesy of BMW OF NORTH AMERICA, INC.

Option Menu

The "Options" menu always consists of three permanently active (selectable) menu items and, depending on the submenu, a number of variable additional functions.

The three permanently active (selectable) menu items are:

- Split screen on
- Split screen content
- Screen off.



Fig. 18: Display Split Screen On
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Whenever a menu is selected, if the controller is moved to the right in the open "TV" menu, the Options menu for this menu is displayed.

Status Bar

The most important information on the various functions, for example the reception level of the telephone, the time, or the selected radio station as of ignition on, are displayed permanently in the status bar.



Fig. 19: Display Telephone
Courtesy of BMW OF NORTH AMERICA, INC.

STATUS BAR FUNCTIONS CHART

Index	Explanation
1	Menu item
2	Time
3	Reception level of the telephone
4	Audio selection

CD/Multimedia Menu

This menu item groups the higher-level drives such as CD/DVD, the created music collections, the interface connections IPOD/USB, AUX and Bluetooth as well as the Tone functions.

The main menu is displayed as of terminal 15 ON.

To call up the menu:

- Press the controller and then push it to the left
- Turn the controller until the desired function is highlighted, then press to activate

NOTE: Direct selection of the first menu level is also possible by pressing the CD button twice.

The first menu level contains the following submenus:

- CD/DVD
- Music collection
- External devices
- Tone

Further entries or information are linked to each menu item.



Fig. 20: Display CD/Multimedia Menu Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Radio Menu

The "Radio" menu is one of the most frequently used functions. Certain menu items are specific to the vehicle equipment and are not available to the customer before they have been enabled.

The main menu is displayed as of terminal 15 ON.

To call up the menu:

- Press the controller and then push it to the left
- Turn the controller until the desired function is highlighted, then press to activate.

NOTE: Direct selection of the first menu level is also possible by pressing the RADIO button twice.

The first menu level contains the following submenus:

- FM

- AM
- Stored radio stations
- Tone.

Further entries or information are linked to each menu item.



Fig. 21: Display Radio Menu Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Telephone Menu

In the Telephone menu, the phonebook entries can be displayed and sorted according to various criteria. This menu is also used for showing missed calls.

In addition, the interface for Bluetooth connectivity is integrated in this menu.

NOTE: Certain services are not available to the customer before they have been enabled.

The main menu is displayed as of terminal 15 ON.

To call up the menu:

- Press the controller and then push it to the left
- Turn the controller until the desired function is highlighted, then press to activate.

NOTE: Direct selection of the first menu level is also possible by pressing the TEL button twice.

- Active calls
- Telephone book
- Repeat dialling
- Dial number
- Bluetooth.

Further entries or information are linked to each menu item.



Fig. 22: Display Telephone Menu Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Navigation Menu

The Navigation menu contains all the functions necessary for operating the navigation system.

The main menu is displayed as of terminal 15 ON.

To call up the menu:

- Press the controller and then push it to the left
- Turn the controller until the desired function is highlighted, then press to activate.

NOTE: Direct selection of the first menu level is also possible by pressing the NAV button twice.

The first menu level contains the following submenus:

- Destination input
- Address book

- Last destinations
- Points of interest
- Map
- Traffic information
- Course of route.

Further entries or information are linked to each menu item.



Fig. 23: Display Navigation Menu Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Contacts Menu

The "Contacts" menu is another function in which new addresses of persons or companies can be stored in the vehicle.

NOTE: Certain services are not available to the customer before they have been enabled.

The main menu is displayed as of terminal 15 ON.

To call up the menu:

- Press the controller and then push it to the left
- Turn the controller until the desired function is highlighted, then press to activate.

The first menu level contains the following submenus:

- New contacts

- My contacts.

Further entries or information are linked to each menu item.



Fig. 24: Display Contacts Menu Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Vehicle Info Menu

BMW ASSIST Menu

The "Vehicle Info" menu contains all the information regarding the condition, service intervals, the on-board computer and the journey computer of the vehicle.

In addition, this menu contains for the first time a Quick Guide and the electronic Owner's Handbook for the vehicle.

NOTE: Certain services are not available to the customer before they have been enabled.

The main menu is displayed as of terminal 15 ON.

To call up the menu:

- Press the controller and then push it to the left
- Turn the controller until the desired function is highlighted, then press to activate.

The first menu level contains the following submenus:

- Quick Guide

- Picture search
- Owner's Handbook
- On-board computer
- Journey computer
- Vehicle status.

Further entries or information are linked to each menu item.



Fig. 25: Display Vehicle Info Menu Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Settings Menu

The individual user settings can be defined in the Settings menu.

NOTE: Certain services are not available to the customer before they have been enabled.

The main menu is displayed as of terminal 15 ON.

To call up the menu:

- Press the controller and then push it to the left
- Turn the controller until the desired function is highlighted, then press to activate.

The first menu level contains the following submenus:

- Head-Up Display
- Central screen

- Time/date
- Language/units
- Tone
- Limit
- Air conditioner
- Light
- Door locking
- Luggage compartment lid.

Further entries or information are linked to each menu item.



Fig. 26: Display Settings Menu Screen
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM COMPONENTS

Instrument Cluster

The instrument cluster is clipped into place in the dashboard with two clips. A shroud prevents reflections in the acutely angled windscreen.

The instrument cluster comprises the following components:

- Four dials
- Indicator and warning lamps
- TFT color display
- Acoustic output takes place via the head unit
- Button for resetting the trip distance recorder and selecting Condition Based Service in CBS menu.

Press the button for > 4 seconds to select the Workshop menu. Operation is then by means of the reset button of the trip distance recorder.

- Connected components which serve to activate the displays and indicators in the instrument cluster (see).

The following components are described in detail:

- Display areas
- Indicator and warning lamps
- TFT display.

Display Areas

The instrument cluster features display areas for:

- Speedometer
- Rev counter
- Economy control (fuel consumption indicator)
- Fuel gauge
- Oil-temperature indicator
- Indicator and warning lamps
- Display
- Program and gear indicator in the display.

Rev Counter

On the BMW7 Series F01/F02, engine speed is displayed using the following signal chain:

- The DME control unit sends the engine speed across the PT-CAN to the instrument cluster.
- Using a characteristic curve, step pulses for actuating the stepper motor are assigned to the effective engine speed.

Economy Control (fuel consumption indicator)

The fuel consumption indicator (economy control) is an analog indicator in the instrument cluster.

Fuel Gauge

The fuel level is indicated in the small dial on the left.

A pictogram of a fuel pump lights up in the display of the instrument cluster when the level drops below a factory-coded threshold (standard = 8 l gasoline).

A warning tone additionally sounds on reaching the reserve threshold.

Outside Temperature Indicator

The temperature sensor measures the outside temperature and displays it in the instrument cluster.

In ignition key position "0", the instrument cluster applies terminal 30g current to the temperature sensor every 20 minutes.

The instrument cluster makes the current outside temperature available in the form of a data telegram via the PT-CAN.

Indicator and Warning Lamps

The indicator and warning lamps are activated by the processor in the instrument cluster.

All important and legally stipulated indicator and warning lamps are activated at terminal 15 ON during the pre-drive check.

The indicator and warning lamps can be illuminated in different colors or combinations.



Fig. 27: Display Indicator And Warning Lamps For Rear Fog Light
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The indicator lamp for the rear fog light is not active.

TFT Display (thin-film transistor)

The TFT display is divided into the following 7 display areas:

- Symbols, e.g. CBS messages
- On-board computer
- Messages, e.g. traffic information
- Navigation display

Service Interval Display (CBS)

- Entertainment list, e.g. radio
- Gear program indicator
- Symbols, e.g. outside temperature.



Fig. 28: TFT Display Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Manipulation Dot

If a dot appears in the middle under the trip distance recorder and odometer, different data are stored in the TFT display and in the CAS 4.

The manipulation dot is shown when, for example, a comparison of the stored vehicle identification numbers indicates that they do not match.

NOTE: Different data may be caused, for example, by replacing one of these two control units.

Acoustic Generators

Audible warnings are given in support of check control messages. All of the acoustic outputs requested in the instrument cluster are generated in the Car Information Computer, CIC. The sound patterns of the various acoustic outputs are also stored in the CIC.

An acoustic generator is built into the instrument cluster fro the turn indicator sound.

The footwell module is responsible for control of the direction indicator function via the K-CAN2.

The vehicles additionally feature an ignition key warning and a seat belt warning.

An uninterrupted warning tone sounds when the driver's door is opened with terminal 15 OFF and the identification transmitter in place.

The audible signal is switched off by closing the door or after 30 minutes.

The seat belt warning is activated at terminal 15 ON if the seat belt buckle contact is not closed.

The audible warning is intermittent and is no longer than 6 seconds. The indicator and warning lamp remains

on.

On-board Computer

The on-board computer available for the BMW 7 Series F01/F02 contains a journey computer which includes the following functions:

- Start of journey
- Duration of journey
- Distance covered
- Average fuel consumption 2
- Average speed 2.

Showing Indicators

The on-board computer displays are shown and scrolled in the instrument cluster via the on-board computer button on the steering column lever for the direction indicator lights.

The individual functions appear in the display of the instrument cluster directly underneath the speedometer.

Once terminal R is switched on, the computer will display the on-board computer function that was displayed last.

All other functions can be selected by pressing the on-board computer button on the steering column lever.

The sequence of the displayed on-board computer functions is always the same.

The menu guidance is described in detail in the section entitled "Functions".



Fig. 29: Identifying Steering Column Switches
Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INFORMATION

Instrument Cluster Test Functions

The test functions are shown in the TFT display of the instrument cluster.

To Start Function Test

- Terminal R ON or terminal 15 ON.
- Press and hold the reset button in the instrument cluster for 10 seconds (set/reset).

or

- by holding down the setting button in the instrument cluster and simultaneously switching on terminal R.

Display of Test Functions

The test functions appear in the center of the TFT display, between the two dials.

Only tests one through four are unlocked. All other test functions are unlocked by entering the sum of the digits in the vehicle identification number while in test function 4.

To End Test Function

- Ignition key at terminal R or terminal 15 ON.
- Press and hold the reset button for longer than 10 seconds.

The main menu appears in the instrument cluster

- Press the reset button repeatedly until "Test End" is highlighted and then hold down the reset button until the words "Test End?" appear or
- call up test function 19 (RESET).

NOTE: To protect against unauthorized access, all test functions (with the exception of test 1 and test 2), are locked again after a RESET and "sleep cycle".

Overview of Test Functions

Only the main test functions are listed in the following table.

In addition to the majority of test functions, there are further equivalent functions for which a similar display appears in the instrument cluster.

All the described test functions can also be performed via the BMW diagnostics system.

BMW DIAGNOSTICS SYSTEM REFERENCE CHART

Index	Explanation
1	Identification
2	System test
3	Test End
4	Unlock test functions

5	Current consumption
6	Range consumption
7	Fuel gauge values
8	Coolant temperature, outside temperature
9	On-board computer average values
10	Speedometer/revolution counter
11	Display of operating voltage
12	Trigger acoustic signals
13	Read fault codes
14	Dim LCD
15	Dim/PWM signal
16	Condition Based Service
17	Check Control
18	Correction factor for consumption values
19	Software reset/RAM reload

Component Replacement and Trial Replacement

There are three possible combinations for replacing the instrument clusters and Car Access System 4, CAS 4.

- Instrument cluster defective, CAS 4 OK
- CAS 4 defective, instrument cluster OK
- CAS 4 and instrument cluster must be replaced.

Simultaneous replacement of CAS 4 and the instrument cluster should be avoided. The odometer reading will be lost as a result.

In principle, it is also possible to carry out a trial replacement of the instrument cluster and CAS 4.

Central Information Display (CID)

Service Mode

The controller can be used to activate the Service mode functions.

The Service mode is a special facility which provides information about the status of the display and user control system.

NOTE: This function was created to aid in diagnosis and is not intended for the customer.

The Service mode can be used, for example, to read out hardware/software versions for the Central Information Display or control units in the CIC system network.

As an addition to the comprehensive facilities of the diagnosis system, the Service mode serves as a simple means of quickly accessing diagnostic data without a BMW diagnosis system.

Activating the Service Mode

In the main menu, push the controller forwards and hold there for longer than 10 seconds.

Tactile feedback will then be generated.

Then proceed as follows:

- Turn the controller 3 stops clockwise
- Turn controller 3 stops anticlockwise
- Turn controller 1 stops clockwise
- Turn controller 1 stops anticlockwise
- Turn controller 1 stops clockwise
- Press the controller; the Service mode is added as the last menu item in the "Settings" menu.

The first menu level contains the following submenus:

- Navigation Service
- Telephone
- Gracenote.



Fig. 30: Display Navigation Service
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Push the controller in any direction to return to the main menu.

HEAD-UP DISPLAY

INTRODUCTION

The very name "Head-Up" describes the principle benefit of this system. The Head-up Display (HUD) projects a virtual image into the driver's field of vision. Important information such as cruise control details or graphical directions from the navigation system are projected onto the windshield and are thus permanently visible within the driver's field of view.

The driver of a BMW thus has the important data and graphics put up in his field of view, just like a pilot in his jet fighter.

The head-up display in the new BMW 7 Series incorporates various functions aimed at enhancing road safety and driver convenience.

That includes display of:

- Information from the DCC cruise control system
- Information from the navigation system
- Check Control messages
- Road speed

Having the displays in the driver's direct field of view increases safety, as the eyes are always on the traffic.



Fig. 31: Display Head-Up (HUD) On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM OVERVIEW

Head-up Display System Schematic Circuit Diagram

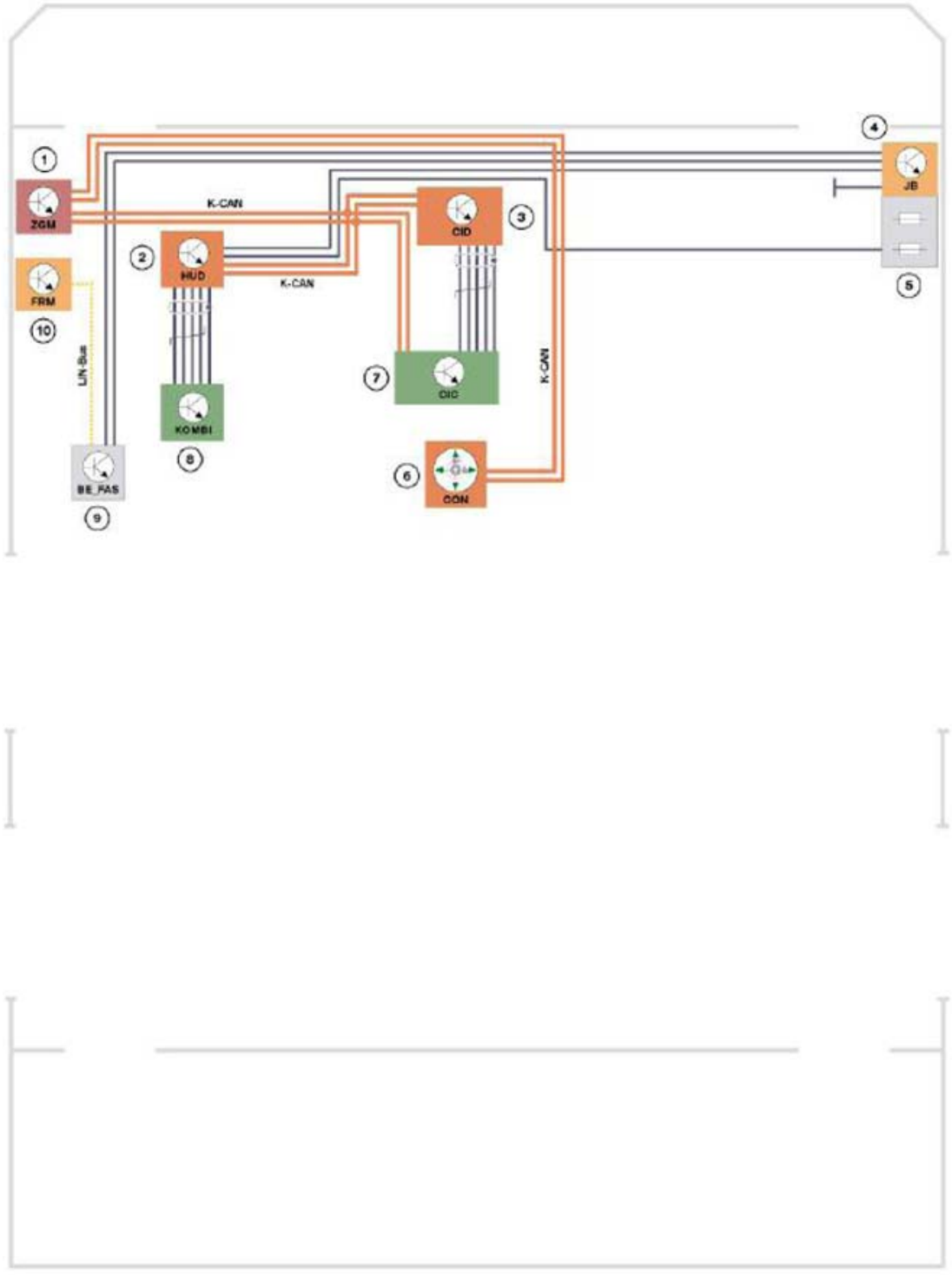


Fig. 32: Schematic Head-Up Display System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

HEAD-UP DISPLAY SYSTEM LEGENDS

Index	Explanation
1	Central Gateway Module (ZGM)
2	Head-up display (HUD)
3	Central Information Display (CID)
4	Junction box (JB)
5	Front power distribution box
6	Controller
7	Car Information Computer (CIC)
8	Instrument cluster (KOMBI)
9	Driver assistance system control panel (BAFAS)
10	Footwell module (FRM)
K-CAN	Body controller area network
LIN-Bus	Local Interconnect Network bus

HUD CONTROL UNIT K-ACN SIGNALS REFERENCE CHART

In/out	Information	Source/sink	Function
In	Road speed	Instrument cluster	Display in the HUD
In	Check control message	Instrument cluster	Display in the HUD
In	Dimming/brightness	Rain and driving light sensor (RLS) via roof function Center (FZD)	Brightness adjustment
In	Height adjustment	CIC	Height adjustment
In	Brightness offset	CIC	Brightness adjustment
In	DCC	EHB3 (Adaptive Brake Assistant Warning)	Display in the HUD
In	Function selection	CIC	What is displayed in the HUD
In	On/Off switch	BAFAS	Switching the HUD On/Off
In	Navigation	CIC	Display in the HUD

SYSTEM FUNCTIONS

The Principle

The HUD can be compared to a projection device. A light source is required to project the HUD information. The two LED arrays (red and green) serve as the light source. The image content is created by the TFT projection display. The TFT projection display can be compared to a filter which admits or blocks light.

An optical imaging element determines the shape, distance and size of the HUD images.

The image appears to float freely over the road, the windshield acts as a deflecting mirror.

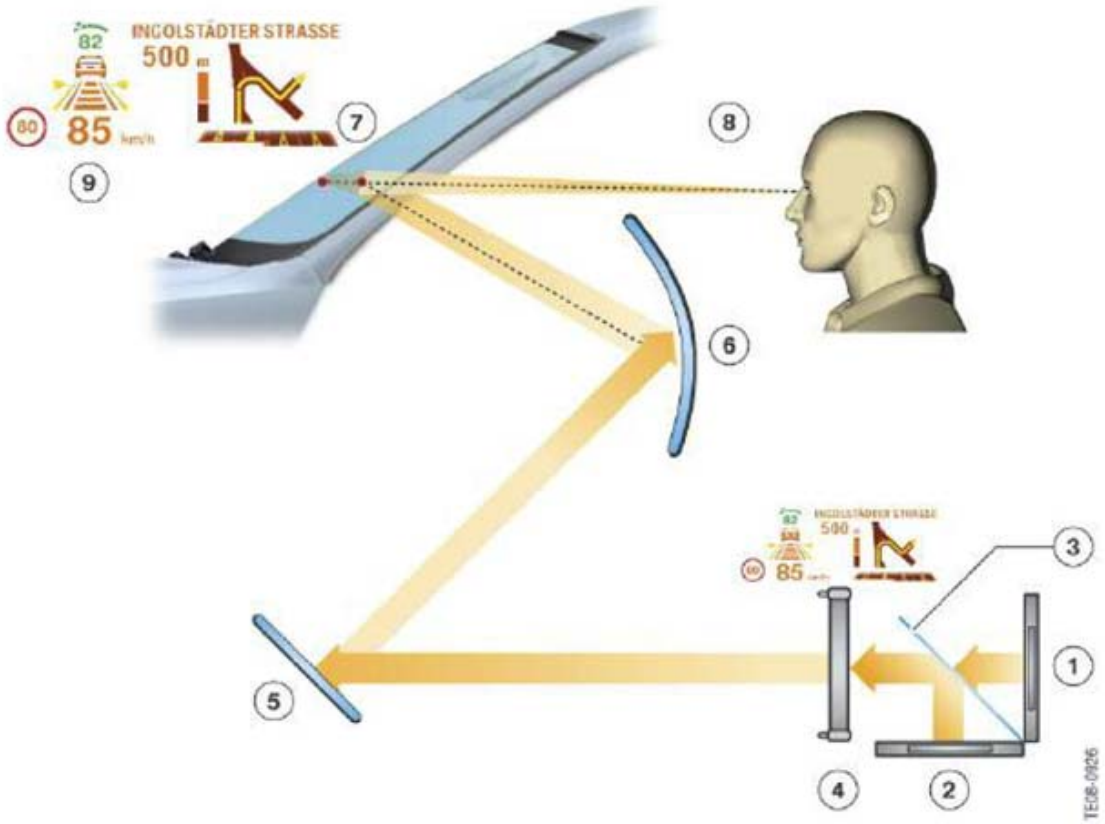


Fig. 33: Principle Of Head-Up Display
Courtesy of BMW OF NORTH AMERICA, INC.

HEAD-UP DISPLAY SYSTEM LEGENDS

Index	Explanation
1	LED array, green
2	LED array, red
3	Transparent mirror
4	TFT projection display
5	Plane mirror
6	Curved mirror
7	Windshield
8	Observer's point of vision
9	Projected image

Projection Distance

The projected HUD image content appears at a distance of approximately 2.7 m from the observer's eye.

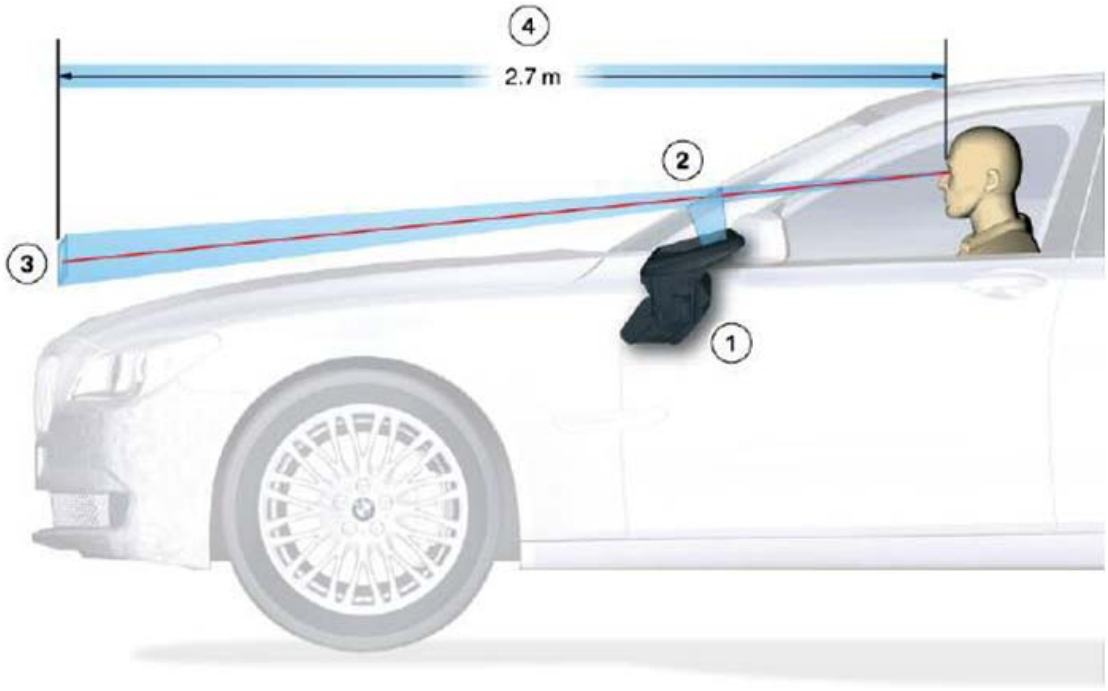


Fig. 34: Projection Distance Of HUD Image
Courtesy of BMW OF NORTH AMERICA, INC.

PROJECTION DISTANCE LEGENDS

Index	Explanation
1	Head-up display
2	Windshield
3	Projected Image
4	Projected distance

Switch-on Conditions

The following conditions are required to release the light:

- Terminal 15 ON
- Button (HUD) pressed on the driver assistance system control panel, BEFAS.

Switch-on Performance

The HUD receives the terminal 30 ON status via the K-CAN. The HUD is partially ready for operation from terminal R ON. That means that:

- The HUD can communicate with the other electrical-system devices via the K-CAN
- The TFT projection display is initialized and blanked
- The LEDs are off.

The HUD receives the terminal 15 ON status via the K-CAN. The HUD is ready for operation from terminal 15 ON. This permits the following actions:

- Switching on of the backlighting by the button on the BAFAS
- HUD height adjustment
- Adjustment of HUD brightness
- Display of information via the HUD.

When the vehicle is started, the vehicle is set to terminal 50 status. In terminal 50, i.e. Lights Off, the HUD goes into a hold status. This hold status is maintained until shortly after the end of the terminal 50 status.



Fig. 35: Display ON/OFF Button On BAFAS
Courtesy of BMW OF NORTH AMERICA, INC.

Switch-off Conditions

The HUD is switched off under the following conditions:

- Button on the BAFAS pressed
- Terminal R OFF

Brightness Offset

Brightness offset is a PIA Personal Profile function. Brightness offset allows the customer to set and save his/her own individual HUD default brightness setting. Each time the HUD is switched on, this setting is used as the brightness offset for the HUD.

The brightness setting is adjusted with the controller via the CID. Any value between -10 and +10 can be set. The mid-position value is 0.

The value is transferred via the K-CAN to the HUD.



Fig. 36: Display Brightness Setting Screen
Courtesy of BMW OF NORTH AMERICA, INC.

The brightness setting is automatically corrected in order to compensate for different light conditions. Compensation is based on signals from the rain and light sensor.

The automatic brightness setting is configured in such a way that no HUD brightness jumps occur.

The differing light conditions depend, for instance, on:

- Environmental conditions, such as day, night, sunshine, clouds, rain, fog, snow, etc.
- Surrounding structural features, such as tunnels, underground car parks, etc.
- The driver can adjust the brightness of the instrument lighting with the knurled wheel.
- From terminal 58g lights on, the HUD brightness is determined by the brightness setting of the instrument lighting.

The brightness is dependent on the following conditions:

- Dimmer-wheel setting
- Brightness offset
- Rain/light sensor, RLS

Operating-hours Counter

The HUD incorporates individual service-time counters for the HUD and the LED arrays.

Display Area of Head-up Display

The HUD size is approximately 200 mm x 100 mm with a display resolution of 480 x 240 pixels. The HUD is

separated into 2 display areas. The individual fields are "optically" separated in the image so that they can be identified more easily.

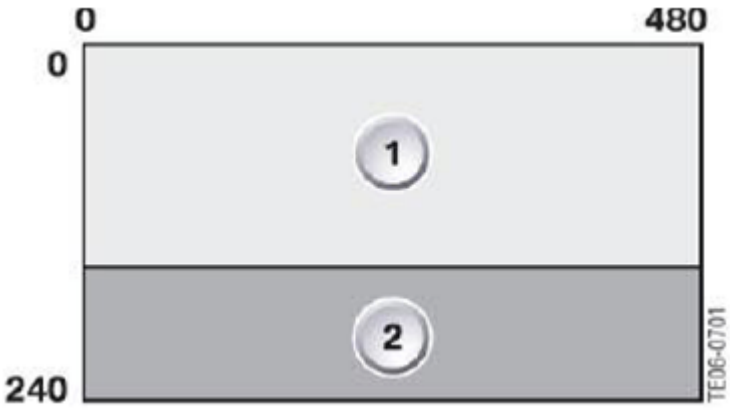


Fig. 37: Display Area On Head-Up Display
Courtesy of BMW OF NORTH AMERICA, INC.

DISPLAY AREAS REFERENCE CHART

Index	Explanation
1	Navigation/CC display area
2	Road speed/Cruise control display area

The upper area shows navigation information and CC messages in the form of symbol, bar display and text.

The lower area shows speed-related displays in the form of unit, current speed and cruise control.

Color Selection

Symbols (such as e.g. warning symbols) are specified by the individual control units. The color specifications are adopted by the instrument cluster for display and representation on the HUD.

"Flat" 2D symbols are used for optimum visibility and readability.

The colors are:

- Orange as the standard color
- Red or yellow for warning messages
- Green for the set speed
- The HUD background is transparent

SYSTEM COMPONENT

The head-up display is fitted above the steering column, immediately behind the instrument cluster. It is fastened to the bulkhead supporting structure by three hexagon-head bolts.

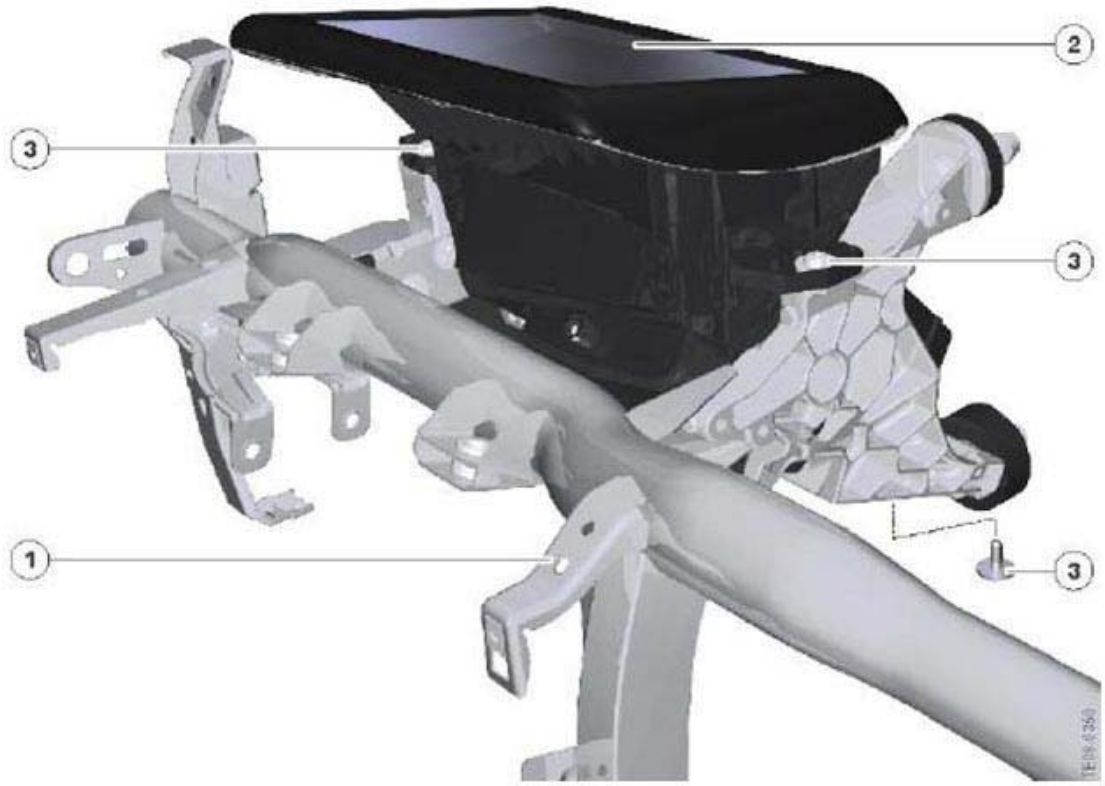


Fig. 38: Identifying Carrier Bracket, Head-Up Display (HUD), Hexagonal Bolt On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING COLUMN LEGENDS

Index	Explanation
1	Carrier bracket
2	Head-up display HUD
3	Hexagon bolt

The head-up display comprises the following components:

- Cover glass
- Mirrors
- 2 LED arrays
- TFT projection display
- PCB
- Housing

The following components are required in addition to the components listed above:

- Windshield
- Light module and BEFAS

- Rain/light sensor
- Roof function Center and junction box
- HUD trim

The following controls are required to operate the HUD:

- On/Off button on the BEFAS
- Light switch in the light switch cluster
- Instrument-lighting dimmer
- Controller

Cover Glass

The cover glass is made from scratch-resistant, coated polycarbonate (PC) and forms the top cover of the HUD. The cover glass protects the interior of the HUD against dust and objects accidentally placed on it.

The glass combined with the HUD trim are curved so that any incident light is not reflected back to the driver.

It also guarantees unobstructed projection of the display information onto the windshield without interference from stray light effects, for instance.



Fig. 39: Identifying Plane Mirror
Courtesy of BMW OF NORTH AMERICA, INC.

Mirrors

Two mirrors are fitted in the head-up display. They reflect the information in the display onto the windshield.

The concave mirror (1) is responsible for compensating for the curvature of the windshield and for the size and distance of the image.

The flat mirror (2) is a deflecting mirror to keep the beam in the space provided.

The convex mirror is made of plastic while the flat mirror is made of glass.



Fig. 40: Identifying Curved And Plane Mirrors On HUD
Courtesy of BMW OF NORTH AMERICA, INC.

HUD MIRROR REFERENCE CHART

Index	Explanation
1	Curved mirror
2	Plane mirror

LED Array

There are two LED arrays. The LED array is an arrangement of LEDs in one plane and acts as the back lighting for the TFT projection display. The LED array generates the light required for the HUD brightness. The LED arrays consist of red and green LEDs. The LEDs generate the brightness of the HUD content as controlled by the master PCB.

PCB

The following components among others are incorporated on the PCB:

- K-CAN interface
- Processor (CPU)
- LVDS controller
- EEPROM memory
- Power supply

The video signals are passed on to the display by the instrument cluster via an LVDS lead.



Fig. 41: Identifying PCB
Courtesy of BMW OF NORTH AMERICA, INC.

Housing

The casing is made of aluminum and consists of a bottom section and the plastic cover. The (aluminum) cooling fins and the electrical power supply are attached to the bottom section. The cover glass is integrated into the cover.



Fig. 42: Identifying Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Windshield

The windshield is a "special design" that is essential for projection of the displays. The outer and inner glass panes are bonded to a plastic film, just like in the standard windshield. Unlike in the standard windshield, this

plastic film is not parallel but is tapered over the entire area of the windshield.

The taper prevents the HUD from displaying images twice. The taper tip points downwards and starts at a distance of approximately 10 cm to the bottom edge of the windshield.

The end of the taper is located at approximately 2/3 windshield height. In the top third of the windshield, the plastic film runs parallel to the outer and inner glass panes. The thickness of the taper tip is 0.8 mm. The thickness of the end of the taper is 1 mm.

The total thickness of the bottom edge of the windshield is 4.5 mm. The total thickness of the top edge of the windshield is 4.7 mm.

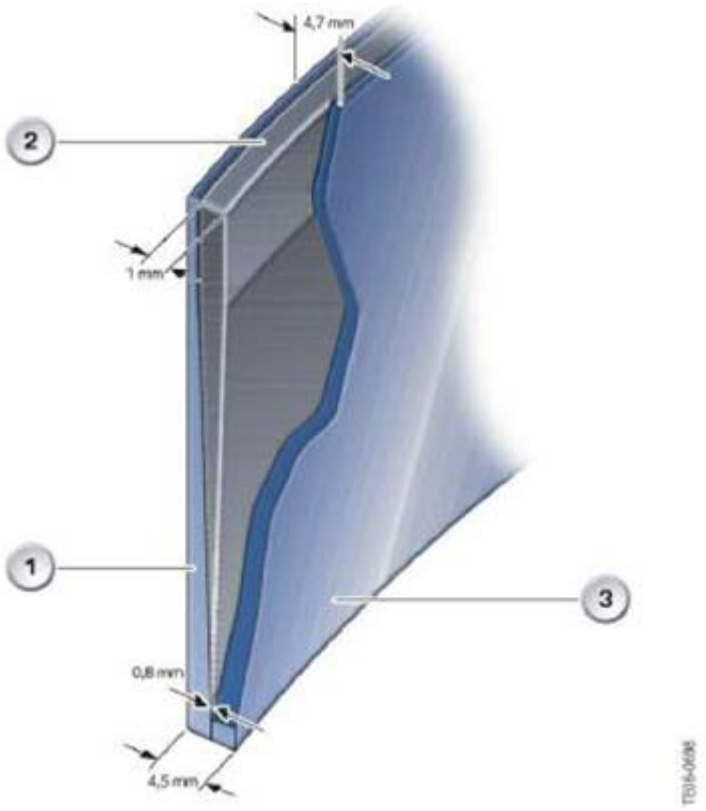


Fig. 43: Identifying Plastic Film, Outer And Inner Glass Pane On Windshield
Courtesy of BMW OF NORTH AMERICA, INC.

WINDSHIELD LEGENDS

Index	Explanation
1	Outer glass pane
2	Plastic film
3	Inner glass pane
mm	Unit of measurement in mm

Incorrect Windshield Fitted

The HUD image is always reflected on the windshield. These two images are overlaid by the angle of inner surface and outer surface of the taper in the HUD screen, so that the driver windshield only sees "one" image.

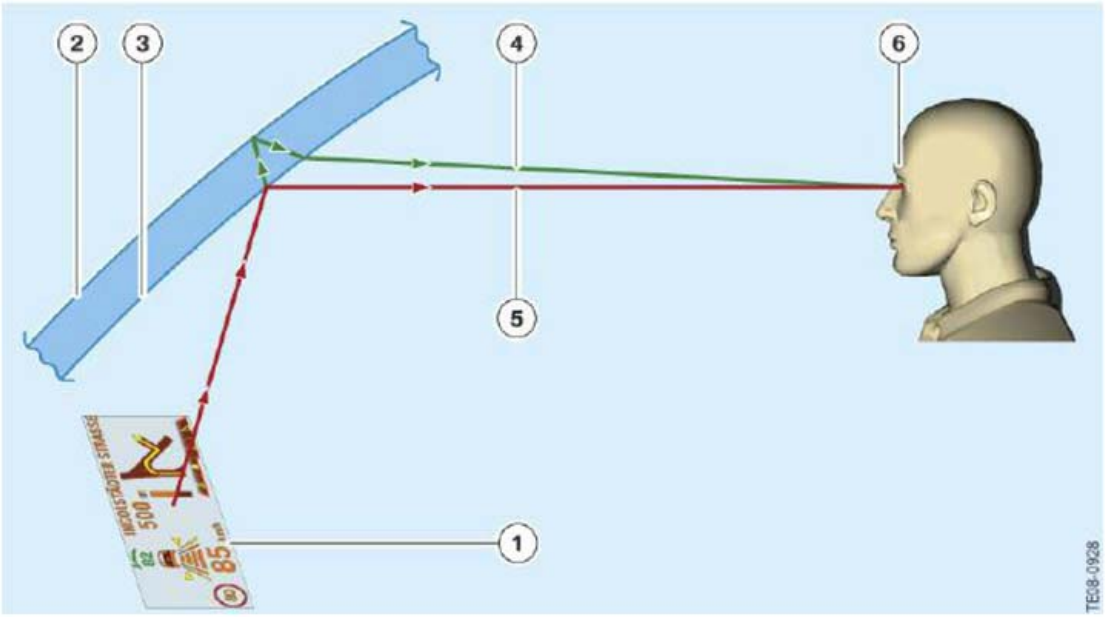


Fig. 44: Identifying Double Reflection On HUD Screen
Courtesy of BMW OF NORTH AMERICA, INC.

WINDSHIELD REFLECTIONS REFERENCE CHART

Index	Explanation
1	Display
2	Outer surface of the windshield
3	Inner surface of the windshield
4	Reflection on the outer surface of the windshield
5	Reflection on the inner surface of the windshield
6	

Because of the angle of tilt of the glass in a standard windshield, the two reflected images are offset against one another.

The illustration below shows the result when a Rain/light sensor standard windshield is fitted.



Fig. 45: Double Display By HUD
Courtesy of BMW OF NORTH AMERICA, INC.

The rain and light sensor provides the brightness signal over the LIN bus to the roof function Center FZD and then to the K-CAN.

Eyebox

The eyebox is the movement space in which the driver can move without his view of the image in the HUD being impaired.

The freedom of movement within the eyebox is roughly:

- 70 mm vertically plus ± 30 mm range of adjustment
- 130 mm horizontally.

The HUD image is not clearly visible outside the eyebox limits.

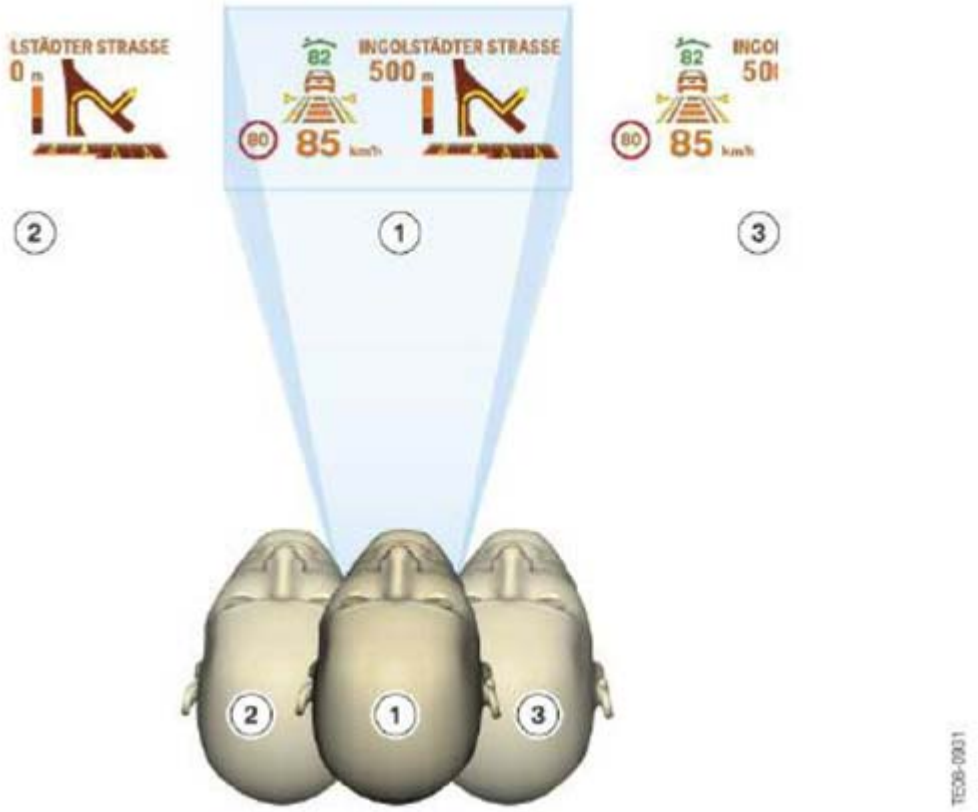


Fig. 46: Identifying Eyebox, Shift To Left/To Right Vision
Courtesy of BMW OF NORTH AMERICA, INC.

LEFT/TO RIGHT VISION REFERENCE CHART

Index	Point of vision	HUD image
1	Within the eyebox	Optimum illumination of the image
2	Offset to the left	Image cut off on the left
3	Offset to the right	Image cut off on the right

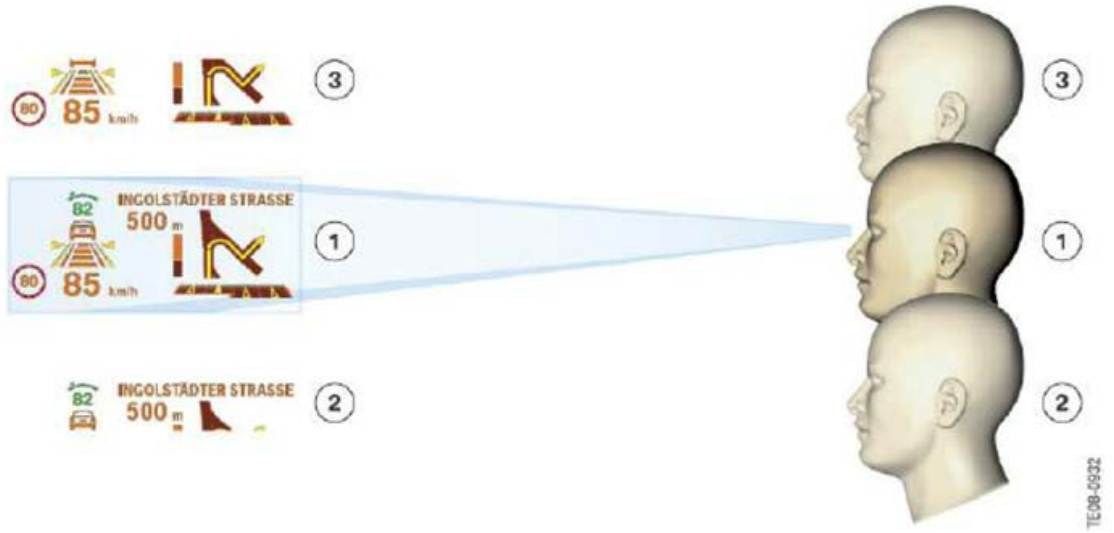


Fig. 47: Eyebox, Shift Upwards/Downwards Vision
Courtesy of BMW OF NORTH AMERICA, INC.

UPWARDS/DOWNWARDS VISION REFERENCE CHART

Index	Point of vision	HUD image
1	Within the eyebox	Optimum illumination of the image
2	Offset downwards	Image cut off at the bottom
3	Offset upwards	Image cut off at the top

Instrument Cluster

For the purposes of filtering the speed reading, a distinction is made between acceleration, braking and coasting phases.

When the car is in the coasting phase, 3 successive values are averaged and then the speed is updated.

Check Control Messages

All CC messages are also displayed on the HUD. The instrument cluster has the master function for the messages. The symbol together with the associated text is transmitted by the instrument cluster. CC messages are given precedence over the display of other information such as navigation-system directions, for instance.

NOTE: A Check Control message is displayed for 8 seconds. If several CC messages occur simultaneously, each one is displayed for 3 seconds.

Controls

The following controls are used in the operation of the HUD:

- ON/OFF button on the BEFAS

- Dimmer wheel in the light switch cluster
- Controller.

Driver Assistance System Control Panel

The HUD On/Off button is located on the BEFAS. The button is resistance-coded and routed directly to the HUD. The HUD can identify the button signals or a button fault using the resistance coding.



Fig. 48: Display ON/OFF Button On BEFAS
Courtesy of BMW OF NORTH AMERICA, INC.

Instrument-lighting Dimming

The dimmer setting is also used for the HUD with active headlights. The dimmer signal is emitted by the light module.



Fig. 49: Instrument-Lighting Dimming Screen

Courtesy of BMW OF NORTH AMERICA, INC.

Controller

The HUD brightness and height settings are adjusted with the Controller via the CID. Brightness setting is also termed brightness offset.

Functions such as e.g. navigation can also be set with the Controller in the Function selection menu. Therefore these settings have an indirect effect on the HUD display.

SERVICE INFORMATION

The following information for the technician is described in this section:

- Adjusting the brightness
- Adjusting the height of the horizon on the HUD
- Vertical rotation of the image
- Test functions
- Replacing the HUD
- HUD
- Diagnostics

Adjusting the Brightness

The brightness of the HUD can be individually adjusted. The CID is the display instrument and the controller the control element for brightness adjustment.

The brightness is set as follows:

- Call up the main menu by pressing the menu button.
- Press the Controller and select the menu option "Settings".
- Turn the Controller until "Head-up display" is selected on the menu bar and then press the Controller to confirm selection.
- Turn the Controller until "Brightness" is selected and then confirm.
- Set the desired brightness by turning the Controller and confirm by pressing.



Fig. 50: Display Brightness Adjustment Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting the Height of the Horizon on the HUD

On the BMW 7 Series F01/F02, the driver can adjust the location of the image and the eyebox to suit his/her particular requirements using the iDrive controller.

The eyebox can be shifted up to a maximum of ± 30 mm upwards or downwards.

The height setting is adjusted as follows:

- Call up the main menu by pressing the menu button.
- Press the Controller and select the menu option "Settings".
- Turn the Controller until "Head-up display" is selected and then press the Controller to confirm selection.
- Turn the Controller until "Height setting" is selected and then press to confirm.
- Set the desired height by turning the Controller and confirm by pressing.



Fig. 51: Display Height Adjustment On HUD
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The height can only be adjusted when the HUD is active.

The height adjustment is in the scope of the PIA. The setting is stored in the EEPROM for each key. If the signal "Radio remote key status" is received when Terminal 30 is on, the mirror moves to the position set for the current key.

The mirror remains in that position as long as the HUD is switched on.

Vertical Rotation of the HUD

The HUD is supplied as standard with a defined basic setting. The HUD image can be rotated in the horizontal by a service technician using vertical rotation, after a change of windshield, for instance.

The display is adjustable within a range of -3° to +3° by means of a motor.

Detailed information may be found in the BMW diagnostic system.

Test Functions

Calling/quitting Test Functions

Certain test functions may be also invoked directly on the HUD without using a BMW diagnostic system, as follows:

- Press and hold the button on the BEFAS for approximately 20 seconds and then release.
- Call up further test functions by pressing the button again.
- To exit this function, press and hold the button on the BEFAS for more than 20 seconds.

Replacing the HUD

Image Defects

Incorrect installation of the HUD or of the windshield may result in faulty HUD projections.

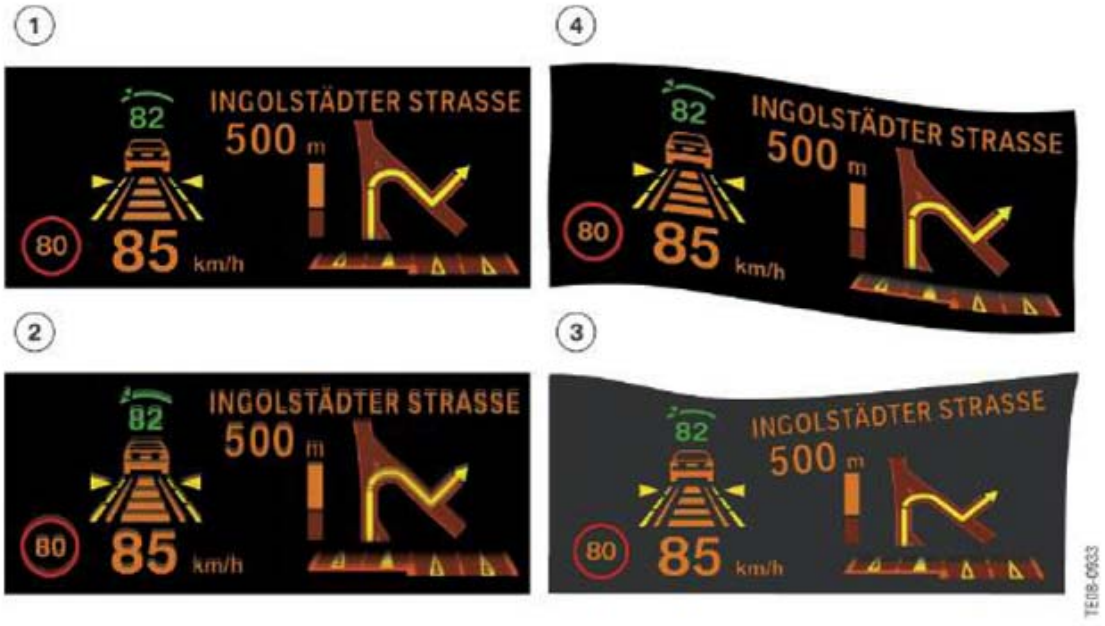


Fig. 52: Display HUD Image Defects
Courtesy of BMW OF NORTH AMERICA, INC.

HUD Image defects are explained as follows:

- Image 1 is compressed, (windshield installed incorrectly)
- Image 2 is duplicated, (wrong windshield installed)
- Images 3 and 4 are distorted, the HUD has been fitted incorrectly

The image is blanked out by light striking the windshield or the HUD in unfavorable light conditions. Excessive heat in the HUD will also cause the image to fade.



Fig. 53: Display Image Defect Caused By Incident Light Or Overheating On HUD
Courtesy of BMW OF NORTH AMERICA, INC.

Correcting Distortion (Warping)

Should the image be distorted after a change of windshield, the image display can be improved using the Warping function. Warping is the technical term for the improvement of the image display.

Detailed information on the subject of warping can be found in the BMW diagnostic system.

Diagnosis

The most important functions for service can be called up in diagnosis. These functions are:

- Initiate self-test
- Read out fault memory
- Delete fault memory
- Read out status
- Specify status

The following errors/faults are stored in the HUD and can be read out with the aid of the diagnosis program:

- Communication faults with the connected bus systems
- Internal HUD faults

Sleep Mode

The following functions are possible in sleep mode:

- Terminal 30b OFF,
  - HUD is switched off completely
- Terminal 30b ON,
  - Monitor K-CAN
- Terminal R soft,
  - Display and LED array off
  - Switch query
  - Diagnostics
  - System test (no display of test cards)
  - Flash program
  - Output data to the display
- Terminal 15 soft,
  - LED array on

BMW NIGHT VISION 2

INTRODUCTION

The BMW Night Vision 2 system provides the driver with a black-and-white image of the driving environment ahead of the vehicle in the control display CD or central information display CID.

BMW Night Vision 2 is a passive system without active infrared illumination. Objects situated ahead of the vehicle are shown in varying degrees of brightness depending on the temperature of these objects. This enables the driver to detect in good time heat-emitting objects such as, for example, persons, animals and other vehicles.

This thermal image is recorded with a Far Infrared camera (FIR) via a special imaging sensor which detects the infrared radiation in a specific wavelength range.

Intelligent algorithms in the control unit makes it possible to automatically detect persons in the image. Following evaluation of distance and direction of movement, a symbol on the central information display CID and in the head-up display HUD warns the driver of any persons at risk.



Fig. 54: Identifying BMW Night Vision 2 System
Courtesy of BMW OF NORTH AMERICA, INC.

The BMW system is distinguished from infrared systems by its robust resistance to dazzling, its long range and its clearly structured image.

The system offers the customer the following advantages:

- Highlighting of non-illuminated, heat emitting objects such as pedestrians, cyclists, vehicles and animals.
- Better overview of the driving situation thanks to the depiction of the route of the road beyond the

headlight cone.

- Improved vision in twilight (dawn/dusk) and darkness.
- Symbol warning of persons at risk in the area ahead of the vehicle.
- No dazzle in the screen image caused by the headlights of oncoming vehicles.
- Display of dark courtyard and garage entrances.

Night Vision 2 is designed as a supporting system, which, with a modified driving style, affords the driver a better overview of the road conditions ahead of the vehicle.

NOTE: The driving speed must be adapted to the relevant visibility conditions.

SYSTEM OVERVIEW

System Circuit Diagram F01/F02

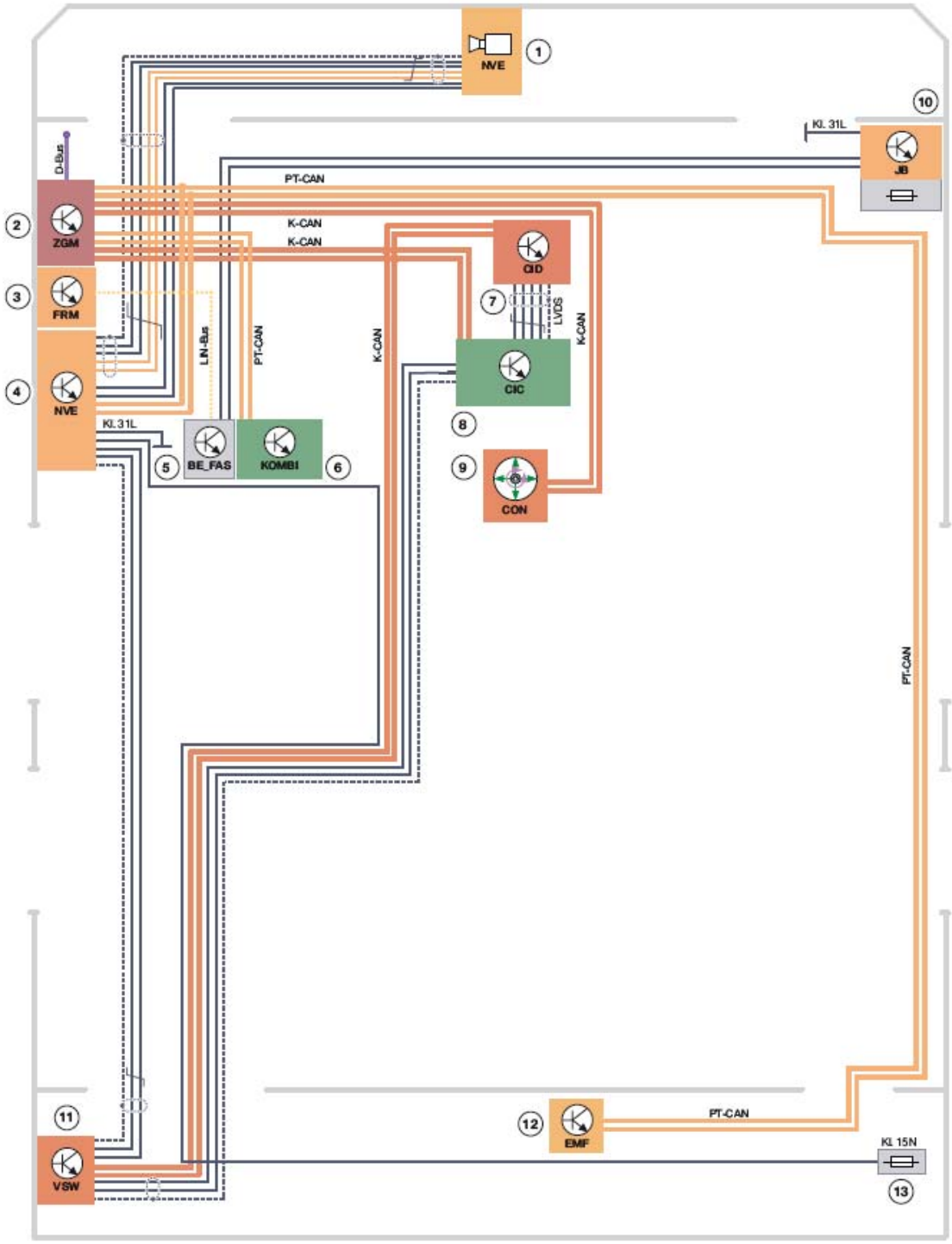


Fig. 55: System Circuit Diagram F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM CIRCUIT DIAGRAM LEGENDS

Index	Explanation
1	Night Vision 2 camera

2	Central gateway module (ZGM)
3	Footwell module (FRM)
4	Night Vision 2 control unit (NVE)
5	Control panel, driver assist systems (BEFAS)
6	Instrument cluster (KOMBI)
7	Central information display (CID)
8	Car Information Computer (CIC)
9	Controller (CON)
10	Junction box (JB)
11	Video switch (VSW)
12	Electromagnetic parking brake (EMF)
13	Power distribution box, rear right
PT-CAN	Powertrain controller area network
K-CAN	Body controller area network
LIN-Bus	Local Interconnect Network bus
D-Bus	Diagnosis bus
KI.31L	Terminal 31, ground
KI.15N	Terminal 15, after running (voltage)

Connection of Control Units and Camera

The Night Vision 2 control unit and the night vision camera are connected through the following cables:

- Private CAN-bus; Diagnosis, programming and camera control
- LVDS-Video; Video signal from the camera
- CAN_POW; Power supply from control unit to camera, heating of camera lens
- Ground; Common ground of camera and control unit for suppressing interference.

The video signal is sent via a shielded LVDS cable between the camera and control unit. In the control unit the signal is converted into an dCVBS (d = differential) video signal and, depending on the equipment specification, transmitted to the CIC or the video switch.

The camera is powered under the following conditions:

- BMW Night Vision 2 switched on by pressing button in control panel of driver assist systems BEFAS
- Rain-driving lights sensor detects twilight or darkness.

The BMW Night Vision 2 control unit is powered by the rear distribution box via terminal 15N.

PT-CAN

The PT-CAN connection of the Night Vision 2 control unit serves to transmit the diagnosis and programming data and to read out the information from the RLS (brightness), the JB (driving lights status, wiper speed) and

ICM (road speed and yaw rate). In addition, the terminal status and the vehicle identification number (VIN) are transferred to the control unit via the PT-CAN.

SYSTEM FUNCTIONS

The BMW Night Vision 2 System Principle

The BMW Night Vision 2 camera is a heat image camera that converts thermal radiation into electronic signals.

The thermal image is converted first by the sensor into electrical signals and then, with the aid of image-processing software, into a visible image in the control display or central information display.

The sensor elements alter the resistance in proportion to the temperature. The higher the temperature, the higher the electrical signal and the whiter the pixel will be shown.

Heat radiation is absorbed and dissipated by virtually every solid or liquid body. However, the heat emitted is not visible to the human eye because it is located in the long-wave infrared range. From a physical standpoint, this represents electromagnetic waves with a wavelength of 8 µm to 15 µm. This long-wave infrared radiation is known as Far Infrared (FIR).

The advantage of utilizing radiation in the far infrared range is the greater range compared with near infrared systems (NIR) with a wavelength of 0.7 µm to 1.4 µm. These systems additionally require illumination in precisely this wavelength. Essentially, FIR systems consist of an optical element, a thermal imaging camera, a control unit and a display.

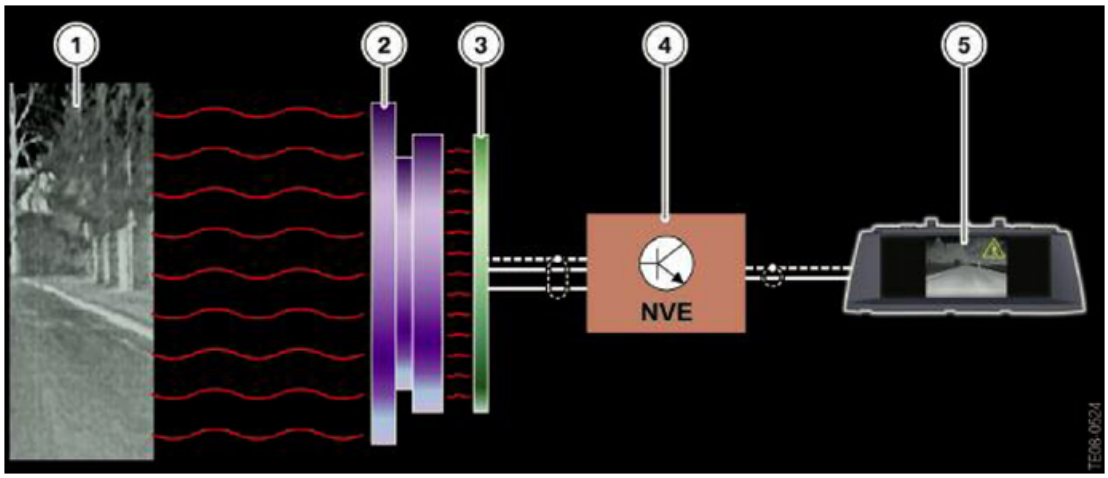


Fig. 56: Identifying BMW Night Vision 2 System Principles
Courtesy of BMW OF NORTH AMERICA, INC.

BMW NIGHT VISION 2 SYSTEM LEGENDS

Index	Explanation
1	Environment ahead of vehicle
2	Optical element

3	Thermal imaging sensor
4	BMW Night Vision 2 control unit
5	Control display

The BMW Night Vision 2 system collects in its front lens the infrared radiation of heat-emitting objects such as persons, animals or vehicles in a specific wave range.

Principle of Pedestrian Detection

The Night Vision 2 control unit is equipped with three processors containing software, which, in addition to image processing for display, execute an automatic person detection function. The software searches the image for objects with human shape and classifies these objects as persons.

Their position, speed and distance to the vehicle are then determined. The risk level is analyzed based on these parameters as well as on the speed and yaw rate of the vehicle and a warning is triggered.

The warning for the driver, indicating persons at risk, is given in the form a corresponding symbol in the central information display CID or head-up display HUD.



Fig. 57: Identifying Symbols On CID
Courtesy of BMW OF NORTH AMERICA, INC.

These ranges change with increasing vehicle speed and follow the direction of the vehicle as a function of the current steering angle (yaw rate).

In order not to unnecessarily distract the driver not all persons identified in the image are signalled by a symbol. Only persons who are in a certain area directly in front of the vehicle are indicated by a symbol.

The system also warns of pedestrians located in an extended area to the left and right of the vehicle and are moving towards the central area (threat of collision).



Fig. 58: Identifying Symbols On HUD
Courtesy of BMW OF NORTH AMERICA, INC.

People who are within the central zone are always indicated. Persons in the extended area are only indicated if they are moving in the direction of the central area.

Under optimum conditions, the automatic pedestrian detection function operates at a distance of up to 100 m. At a driving speed in excess of 100 km/h (62 mph), the time between signalling and passing the person and therefore the reaction time for braking and evasive maneuvers is reduced.

Various Forms of Indication

The following table shows the different forms of indication in the two display instruments CID and HUD.

CID AND HUD INDICATIONS REFERENCE CHART

Situation	Indication in CID	Indication in HUD
No pedestrians in the danger zone.		

		
There is a person at a great distance from the vehicle.		
There is a person at a closer distance from the vehicle.		
A person is crossing the road from right to left.		

A person is crossing the road from left to right.		

Availability Indicator in CID

The availability of the Night Vision 2 system can be restricted by environmental conditions such as heavy rain, extreme +/- temperatures or fluctuations in light conditions.

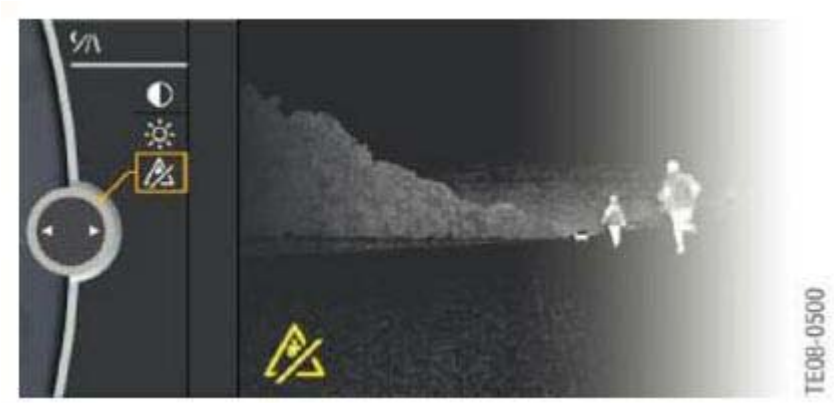


Fig. 59: Display Availability Indicator On CID
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Only non-availability of person detection function is indicated. The symbol corresponds to the "Pedestrian Detection" button in the function bar.

The possible situations for the availability indicator in the CID are listed in the following table.

CID AVAILABILITY INDICATOR DISCRIPTION CHART

Situation	Symbol	Display
The driver has activated the person detection function and the system is available		

		
The driver has activated the person detection function but the system is not available, the Night Vision 2 image is still shown		
The driver has deactivated the person detection function, the Night Vision 2 image is still shown		

Symbols in HUD (Head-up Display)

If a person is detected at a great distance inside the warning range of the system the pedestrian figure will be shown distinctly above the road symbol. This is refered to as long-distance warning.



Fig. 60: Display Long-Distance Warning On HUD
Courtesy of BMW OF NORTH AMERICA, INC.

If a person is detected in close range, inside the warning zone of the system, the pedestrian figure will be shown distinctly on the road symbol. This is refered to as short distance warning.



Fig. 61: Display Short-Distance Warning On HUD
Courtesy of BMW OF NORTH AMERICA, INC.

Warning in Vehicles w/out HUD

The warning symbol is shown on the CID in vehicles without HUD or with HUD deactivated. In addition, the CID initially flashes yellow 3 times when the warning comes on in order to catch the driver's attention.

The warning is shown as soon as a person enters the warning zone directly ahead of the vehicle or a person crosses the road from the left or from the right.

Sequence of signals

The following graphic shows the exact sequence of warning signals and is designed to illustrate the functional principle in connection with the table.

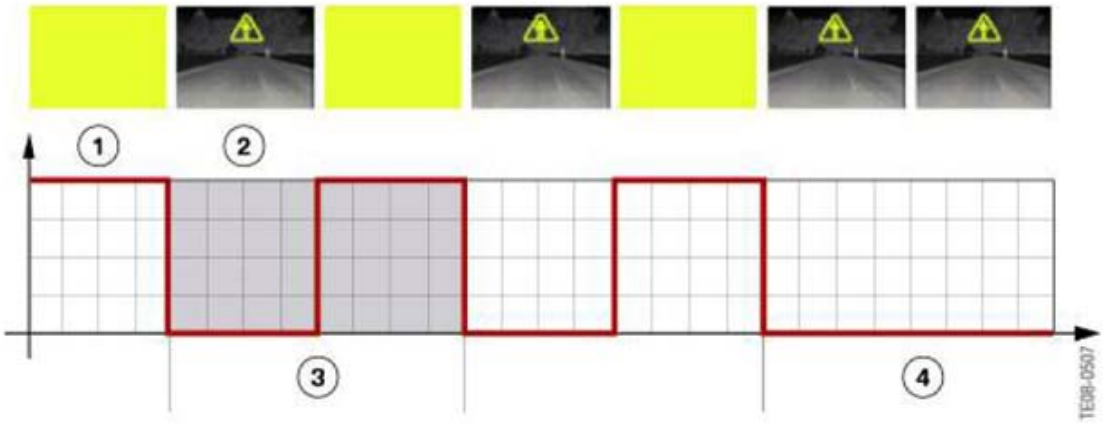


Fig. 62: Identifying Sequence Of Warning Signals
Courtesy of BMW OF NORTH AMERICA, INC.

FUNCTIONAL PRINCIPLE LEGENDS

Index	Explanation
1	Yellow display
2	Normal display
3	Interval approximately 0.5 seconds
4	The warning symbol remains for as long as there is a pedestrian in the danger zone, but at least 3 seconds

Switch-on Conditions

The BMW Night Vision 2 is activated as soon as the button in the control panel of the driver assist systems BEFAS is pressed.

The following basic conditions can exist:

- The rain/driving lights sensor detects sufficient ambient light and the driving lights are switched off; BMW Night Vision 2 is ready for operation approximately 2 seconds after the button in BEFAS is pressed. A message is shown in the control display during this period of 2 seconds.
- The rain/driving lights sensor detects insufficient ambient light and the driving lights are switched on; BMW Night Vision 2 is ready for operation immediately after the button is pressed. BMW Night Vision 2 cannot be activated when
- The driving lights are switched off
- The rain/driving lights sensor detects insufficient ambient light
- The driving speed is greater than 5 km/h (3 mph).

Once BMW Night Vision 2 has been activated, a message appears in the control display to the effect that the system cannot be used at night without headlights.



Fig. 63: Display Night Vision 2 Button On BEFAS
Courtesy of BMW OF NORTH AMERICA, INC.

Operation by iDrive

The individual functions and settings can be selected and activated through the iDrive.

The following settings can be selected on the F01/F02:

- Brightness
- Contrast
- Pedestrian detection.

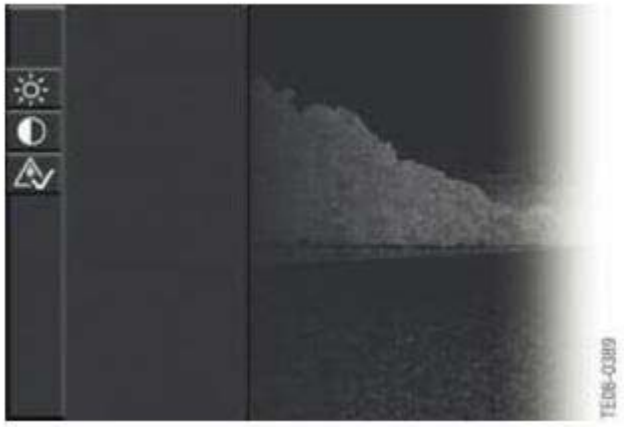


Fig. 64: Display BMW Night Vision 2 Menu On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

Calling Up Menu

The "Night Vision 2" menu can only be selected if the system has been activated by pressing the button in the BEFAS.

Providing the preconditions have been met, the menu can be selected as follows:

- Press the controller, the "BMW Night Vision" menu is shown on the control display.
- Select the desired menu item, e.g. "Brightness", by turning the controller.
- Press the controller to activate the function.
- Set the required value and confirm by pressing.

Contrast and Brightness

Both values can be personalized and changed on a scale between 0 % and 100 %.

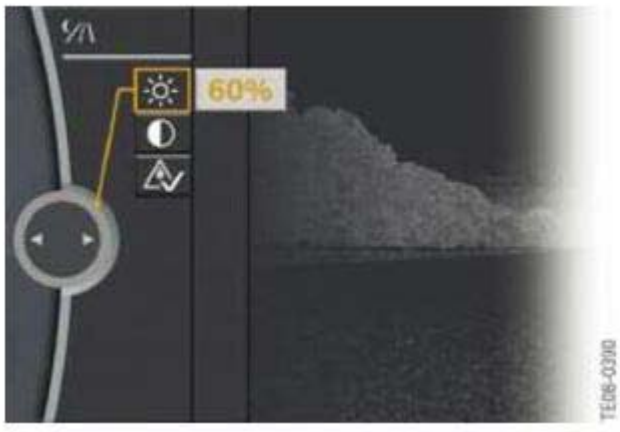


Fig. 65: Display Adjusting Brightness Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Pedestrian Detection

The person detection function can be activated and deactivated.

Visibility

The illumination range in front of the vehicle with low beam is less than 50m/54yd.

Normal driving light illumination by fitted halogen headlights is 100m/109yd.



Fig. 66: Display Activating/Deactivating Person Detection
Courtesy of BMW OF NORTH AMERICA, INC.

The high beam illumination range provided by xenon headlights is 150m/164yd. However, people can only be detected in this range if they are wearing reflective clothing.

Night Vision 2 will detect heat-emitting objects in the image up to a distance of about 300m/328yd, regardless of the amount of reflection their clothing gives off.

Automatic pedestrian detection has a maximum range of 100m/109yd. This specified distance is dependent on weather factors.

The range of vision is also reduced in the Night Vision 2 image in the case of thick fog or heavy rain. Night Vision 2 is designed as a supporting system, which provides the driver a better overview of the road conditions ahead of the vehicle.



Fig. 67: Identifying Comparison Of BMW Night Vision 2 Range Of Vision With Different Headlights
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The driving speed must be adapted to the relevant visibility conditions.

SYSTEM COMPONENTS

The BMW Night Vision 2 system consists of the camera, control unit, camera washer jet, button and the sensor system.

The BMW Night Vision 2 system consists of the following components:

- Night Vision 2 camera with camera bracket in the kidney grille and camera washer jet
- Night Vision 2 control unit
- Button in BEFAS
- Sensor system



Fig. 68: Identifying Button On Control Panel, Night Vision 2 Camera And Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

BMW NIGHT VISION 2 SYSTEM COMPONENTS CHART

Index	Explanation
1	Night Vision 2 camera
2	Night Vision 2 control unit
3	Button in control panel of driver assist systems BEFAS

Night Vision 2 Camera

The thermal imaging camera consists of a heated protective window, optical element and a thermal imaging sensor. The thermal imaging sensor is made up of a multitude of sensor elements.

Each display pixel is assigned one such sensor element. The sensor elements generate an electrical signal as a function of the impinging intensity of heat radiation.

The higher the temperature, the brighter the corresponding pixel will be displayed. The heat radiation is converted into electrical signals on the basis of the principle of a change in resistance.

The image can be replaced up to 30 times per second. In order to ensure an image of consistent quality, it is necessary for the camera to be calibrated approximately every 120 - 180 seconds. This calibration can take up to approximately 0.3 seconds. For this reason, the image may be seen to freeze briefly in the display.



Fig. 69: Identifying Night Vision 2 Camera
Courtesy of BMW OF NORTH AMERICA, INC.

The Night Vision 2 camera is mounted with a bracket directly behind the left kidney grille. The camera is equipped with a sensor which detects heat-emitting objects in the far infrared range (wavelengths from 8 µm to 14 µm). The camera resolution is 324 x 256 pixels.

The maximum angle of view is 24°. The camera operates in an ambient temperature range of -40°C/-40F to +80°C/176°F. The imaging sensor is thermally insulated to provide protection against heat influences from the camera surroundings.

The washer jet is screwed to the camera bracket and is situated directly below the protective window. It is directly connected to the headlight washer system and therefore operates in connection with it.

A heater element is incorporated on the inside of the protective window to prevent it from misting over or freezing up. The heater is located at the edge of the protective window outside the camera's field of vision.

Night Vision 2 Control Unit

The control unit is installed behind the compartment in the area of the A-pillar directly under the light switch cluster.

The control unit calculates the displayed 720 x 480 pixel image from the 324 x 256 pixel raw data image supplied by the camera. Automatic pedestrian detection is executed in the control unit. The diagnosis, programming and coding data are also transmitted to the camera through the control unit.



Fig. 70: Identifying BMW Night Vision 2 Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

The camera and the protective window heater are powered via the control unit. The raw image data from the camera are transmitted through a LVDS cable to the control unit.

The image output by the control unit is made available in the head unit in the form of a dCVBS signal.

The camera-housing cover features a 6-pin plug connection.



Fig. 71: Identifying 6-Pin Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

The button for switching BMW Night Vision 2 on and off is integrated in the BEFAS.



Fig. 72: Display Button On BEFAS BMW7 Series
Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INFORMATION

Adjusting Camera Pivot Position

The pivot position of the camera can be adjusted by means of an adjusting screw at the bracket.



Fig. 73: Identifying Adjusted Camera Pivot Position
Courtesy of BMW OF NORTH AMERICA, INC.

The following steps must be taken to adjust the camera on the F01/F02:

- Open hood(1).
- Remove sealing lip (2) on front panel.
- Open headlight cover (3).
- Position headlight adjustment unit with spirit level in front of vehicle.
- Insert Allen key (4) through the opening in the front panel and set the camera to the required position; the line in the image must be parallel to the spirit level.
- Reassemble all parts that have been removed in reverse order.

Changing Protective Window

In the event of damage the camera protective window can be replaced.



Fig. 74: Replacing Front Lens Of Camera
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing Camera Washer Jet

A washer jet with a direct connection to the headlight washer system for cleaning the protective window is mounted on the camera.

Follow the procedure below to replace the washer jet:

- Remove bumper panel.
- Remove left-side kidney grille.
- Undo two recessed cross head screws (1).
- Release the hose clip on the connecting hose to the headlight washer system and remove the washer jet towards the front.
- Reinstall all parts that have been removed in reverse order.

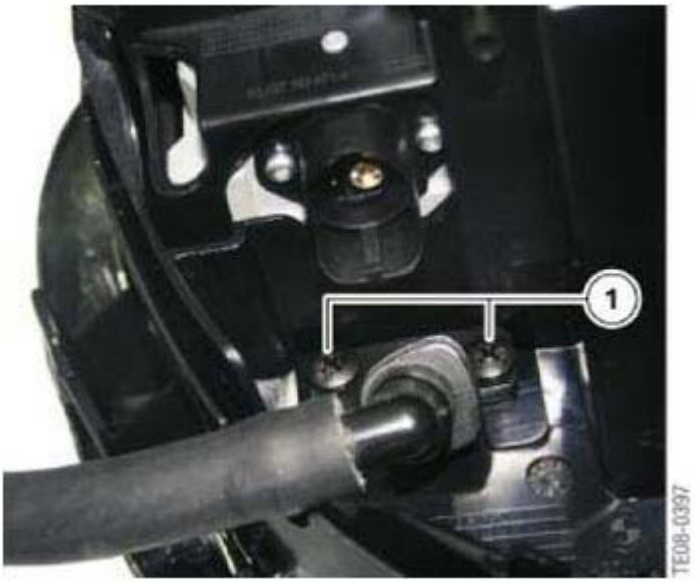


Fig. 75: Identifying Camera Washer Jet
Courtesy of BMW OF NORTH AMERICA, INC.

Displays Indicating Defective System

In the event of a system defect, the following warnings are shown in the F01/F02:

- Check Control message in the instrument cluster.
- The same Check Control message in HUD if installed.

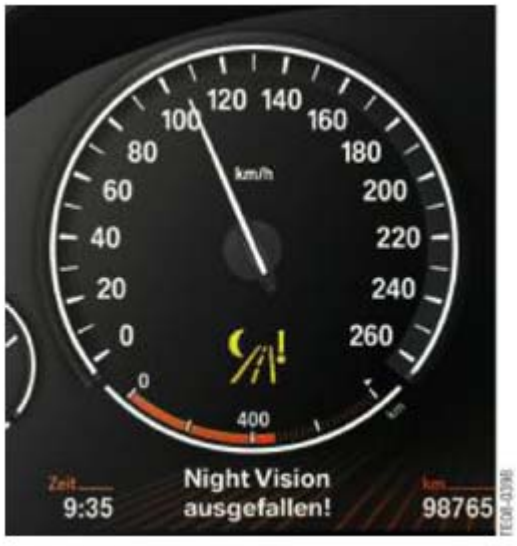


Fig. 76: Display Indicating Defective System
Courtesy of BMW OF NORTH AMERICA, INC.

Programming and Coding

Initializing Software

When replacing the camera, it is always necessary to initialize the software by entering an enable code (FSC).

NOTE: The vehicle identification number (VIN) must always be entered when ordering a new camera or a new control unit.

The camera is programmed by through of the control unit. The control unit receives the programming data for the camera through PT-CAN. The control unit forwards this data to the camera through the "private CAN-bus".

ACTIVE BLIND SPOT DETECTION SYSTEM

INTRODUCTION

Active Blind Spot Detection is a new BMW system. It is being introduced for the first time in the F01/F02 7 Series. The system is designed to assist the driver in making lane change maneuvers by monitoring traffic at the rear and sides of the vehicle. Using two radar sensors it detects vehicles traveling in the rear and along side our vehicle and warns the driver of the position of any unseen vehicles around him traveling in his "Blind Spot".

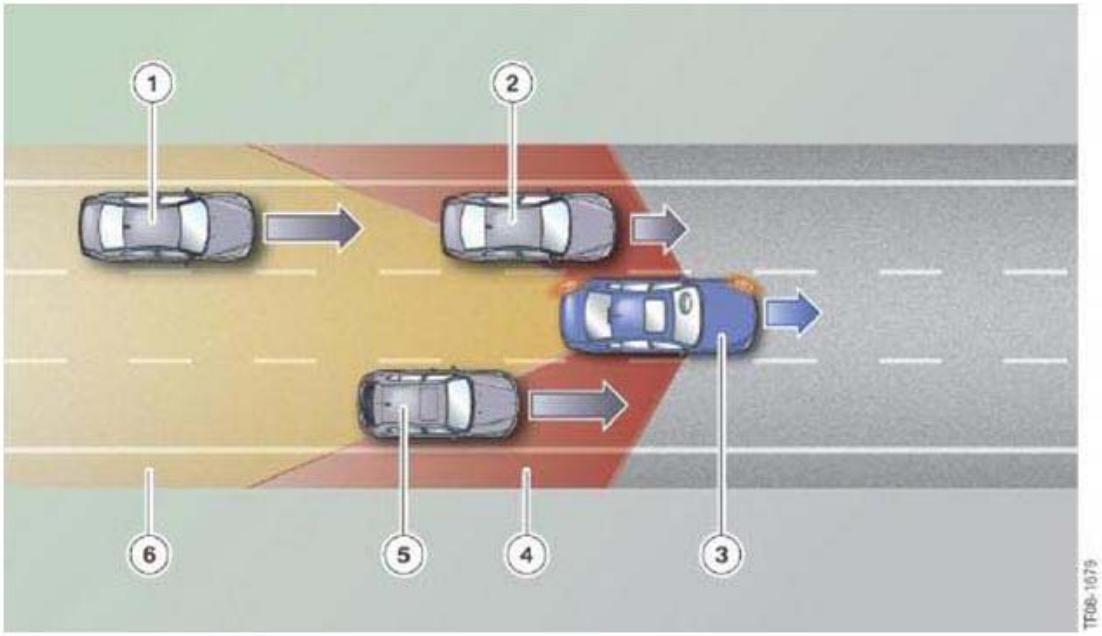


Fig. 77: Identifying Active Blind Spot Detection System On BMW
Courtesy of BMW OF NORTH AMERICA, INC.

ACTIVE BLIND SPOT DETECTION SYSTEM DESCRIPTION CHART

Index	Explanation
1	Fast approaching vehicle on the left-hand neighboring lane
2	Vehicle in the left-hand neighboring lane travelling at the same speed
3	Your own vehicle, with the intention of changing lanes to the left

4	Blind spot area (left/right)
5	Vehicle in the right-hand neighboring lane travelling at a faster speed
6	"Lane change zone"

The active blind spot detection system can detect traffic situations that could be dangerous if your vehicle changes lanes. The driver is informed and warned in two stages.

These kinds of traffic scenarios arise, for example, when distant vehicles rapidly approach from behind. They are then in the "lane change zone" shown in the graphic.

These kinds of situations are difficult for the driver to judge, especially after dark. The radar sensors work completely independently of the light conditions.

A second danger can arise if other vehicles are in the blind spot area. The driver can only be aware of them if he is particularly careful and cautious. However, If he has a lapse of attention, he may not see vehicles in this area.

The radar sensors of the active blind spot detection system detect other vehicles in the neighboring lanes right up to about the middle of your own vehicle. The system can therefore offer the driver valuable assistance in this situation as well.

The first stage of detection is called "information" and it is provided as soon as the system is switched on and a hazardous lane change situation is present. The information is provided by activating warning lights in the door mirrors.

If the driver intends to make a lane change and uses the turn signal stalk to indicate this, a second, more intense stage will then be issued, the "warning".

The corresponding warning light then flashes with high intensity and the steering wheel starts to vibrate. The driver must cancel the lane change and if necessary steer back into his own lane to avoid a dangerous situation.

NOTE: The US marketing term for Lane Change Warning System (SWW) is Active Blind Spot Detection. These two systems are one and the same and are not to be confused with Lane Departure Warning.

SYSTEM OVERVIEW

The Active Blind Spot Detection system is available as an option on the F01/F02.

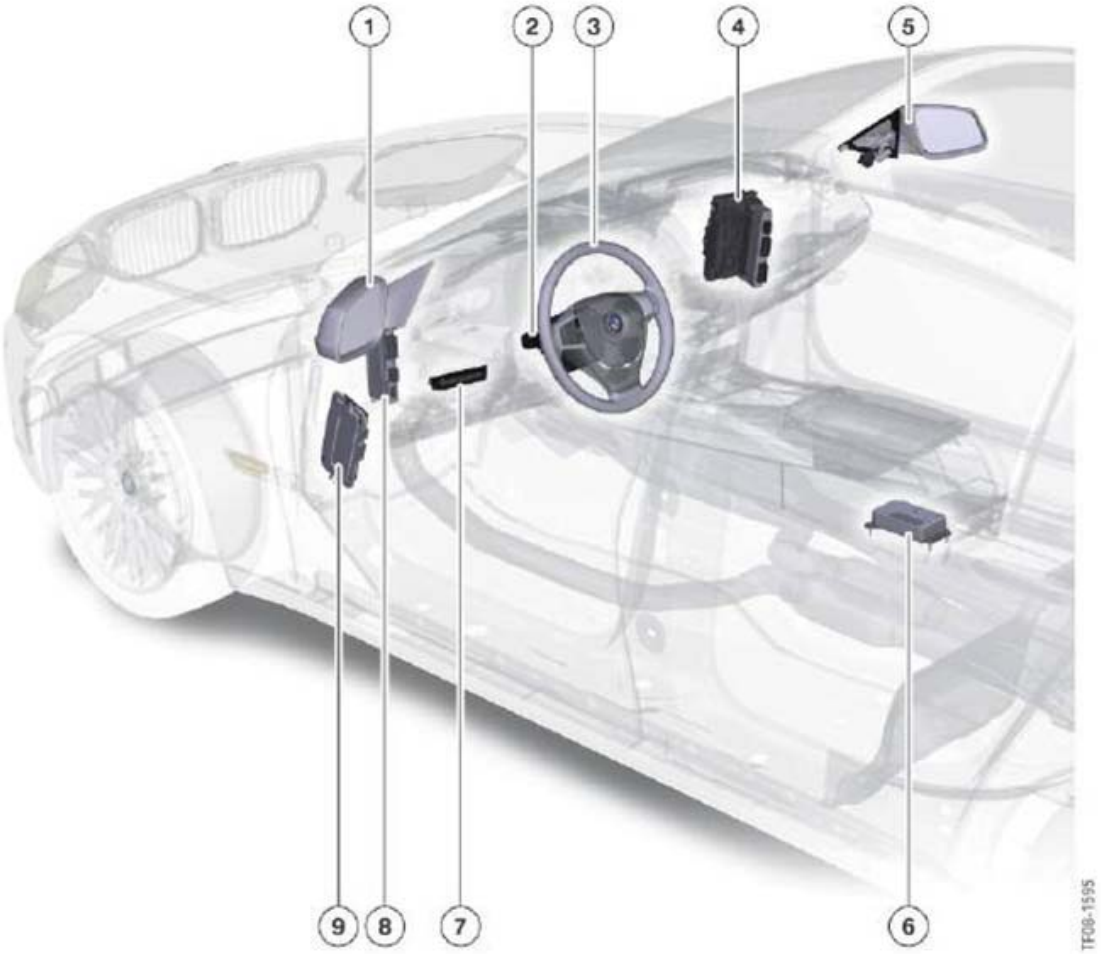


Fig. 78: Overview Of Active Blind Spot Detection System On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

ACTIVE BLIND SPOT DETECTION SYSTEM COMPONENTS CHART

Index	Explanation
1	Driver's door mirror
2	Steering column switch cluster
3	Steering wheel with steering wheel module and vibration actuator
4	Junction box electronics and front fuse carrier
5	Front passenger door mirror
6	Integrated Chassis Management control unit
7	Operating unit for driver assistance systems
8	Central gateway module
9	Footwell module

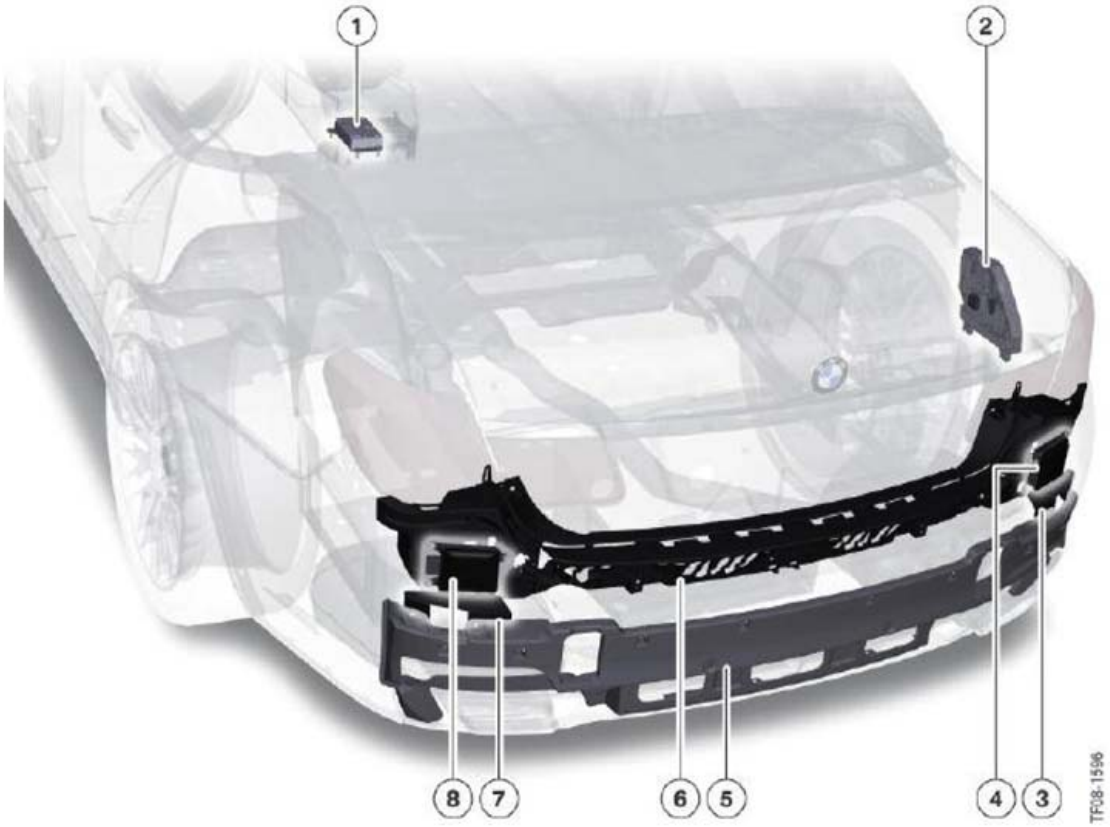


Fig. 79: Identifying Components Of Active Blind Spot Detection System On F01/F02 (Rear View)
Courtesy of BMW OF NORTH AMERICA, INC.

REAR VIEW COMPONENTS REFERENCE CHART

Index	Explanation
1	Integrated Chassis Management control unit
2	Rear fuse carrier in the luggage compartment
3	Bracket for shielding the right-hand radar sensor
4	Right-hand master radar sensor
5	Rear bumper deformation elements
6	Center guide
7	Bracket for shielding the left-hand radar sensor
8	Left-hand SWW2 radar sensor

Bus System Overview

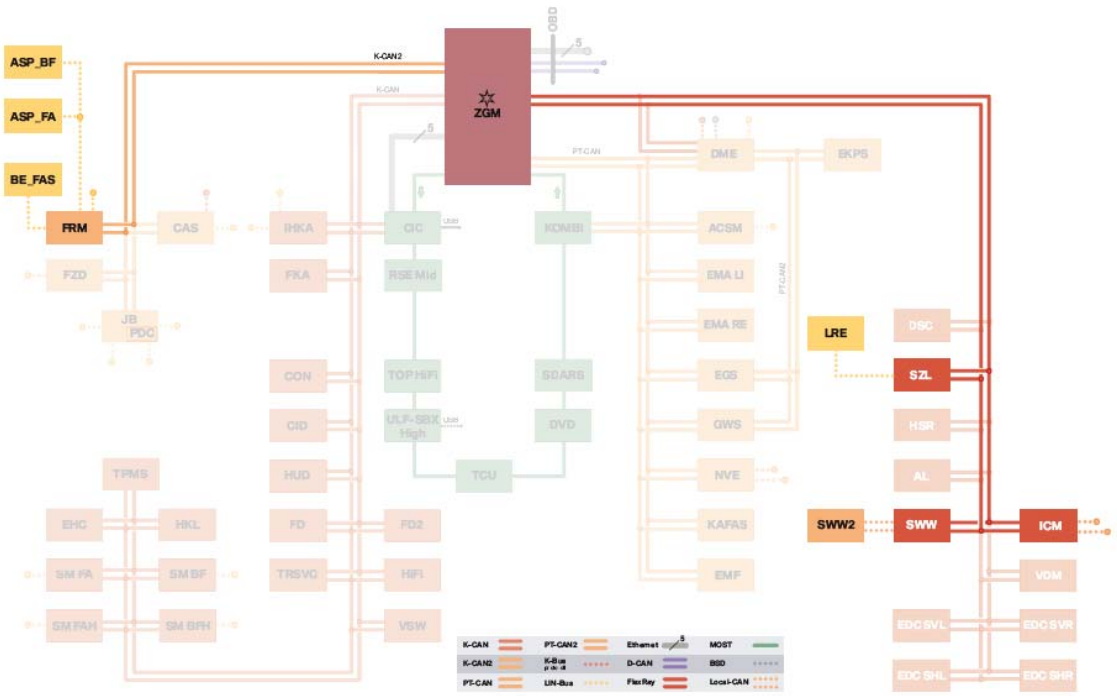


Fig. 80: Bus System Overview Of Active Blind Spot Detection System On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

BUS SYSTEM OVERVIEW LEGENDS

Index	Explanation
ASP_BF	Front passenger door mirror
ASP_FA	Driver's door mirror
BE_FAS	Operating unit for driver assistance systems
FRM	Footwell module
ICM	Integrated Chassis Management
LRE	Steering wheel module
SWW	Master radar sensor for the Active Blind Spot Detection system
SWW2	SWW2 radar sensor for the Active Blind Spot Detection system
SZL	Steering column switch cluster
ZGM	Central gateway module

System Schematic Circuit Diagram

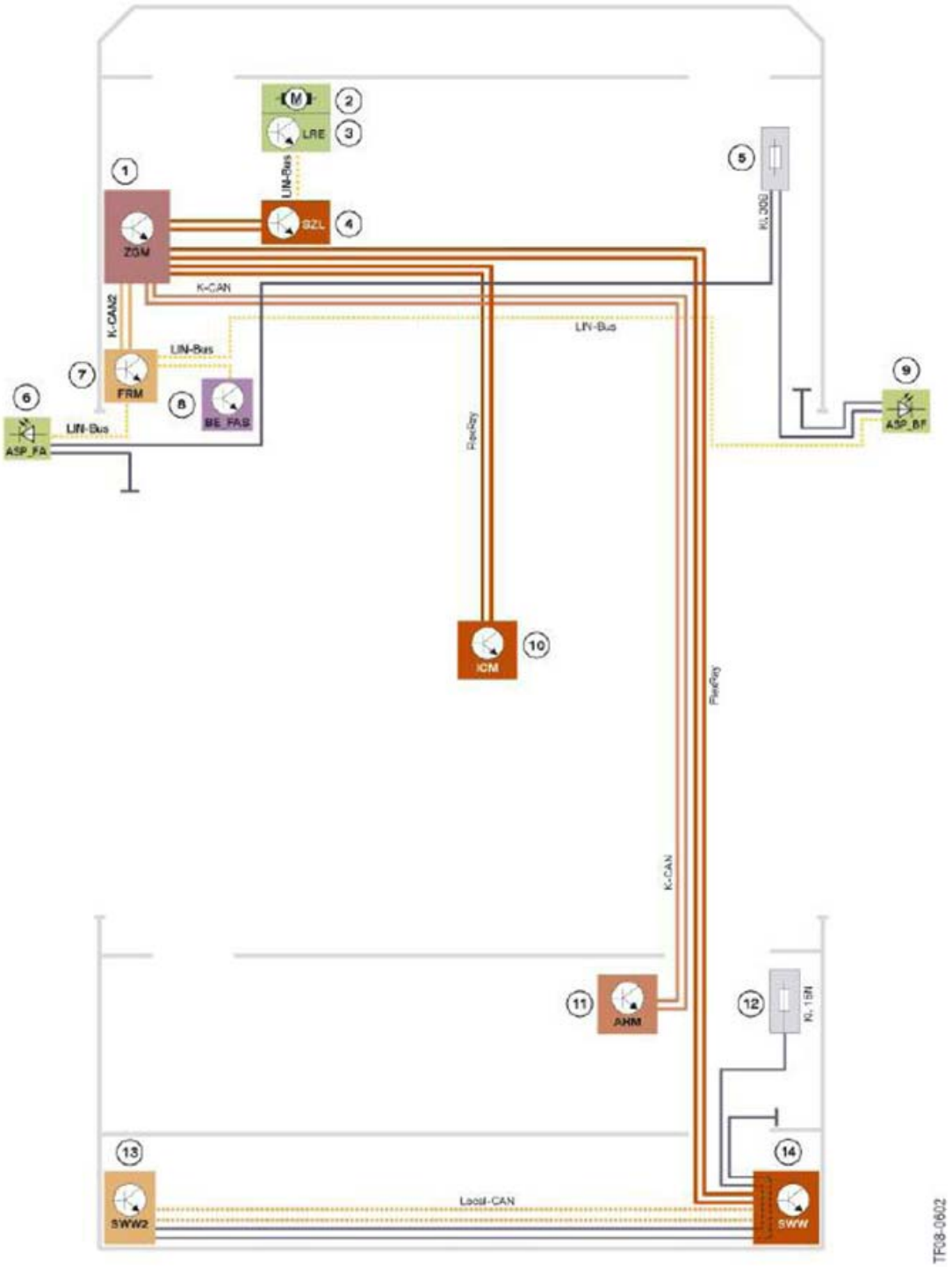


Fig. 81: Active Blind Spot Detection System Schematic
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM SCHEMATIC CIRCUIT DIAGRAM LEGENDS

Index	Explanation
1	Central gateway module

2	Vibration actuator
3	Steering wheel module
4	Steering column switch cluster
5	Fuse for the driver/front passenger door mirrors (front fuse carrier, junction box electronics)
6	Warning light in the driver's door mirror
7	Footwell module
8	Operating unit for driver assistance systems
9	Warning light in the front passenger door mirror
10	Integrated Chassis Management
11	(Not for US)
12	Fuse for the radar sensors in the Active Blind Spot Detection system (rear fuse carrier in the luggage compartment)
13	SWW2 radar sensor for the Active Blind Spot Detection system
14	Master radar sensor for the Active Blind Spot Detection system

SYSTEM FUNCTIONS



Fig. 82: Identifying Blind Spot Detection System Input/Output
Courtesy of BMW OF NORTH AMERICA, INC.

BLIND SPOT DETECTION SYSTEM LEGENDS

Index	Explanation
1	Radar sensor (SWW2)
2	Radar sensor (master)
3	Not for US
4	Steering column switch cluster
5	Footwell module
6	Operating unit for driver assistance systems
7	Integrated Chassis Management
8	Steering wheel module and vibration actuator
9	Driver's door mirror
10	Front passenger door mirror
11	Instrument cluster
12	"Active Blind Spot Detection control unit function"
13	"Steering wheel vibration coordination" function

Detecting Road Users

Both (master and SWW2) radar sensors are used to detect road users. They operate independently of each other in their own respective areas of detection.

First, the position of the road users who have been detected is determined in a longitudinal and lateral direction. Based on this, they are assigned a lane. In doing so a distinction is made between your own lane, the neighboring lanes on the right and left and other neighboring lanes that are further away.

If road users are in your "lane change zone", their approaching speeds to your own vehicle are recorded.

If, instead, a road user is in your blind spot, it is sufficient that you are aware of their presence. His exact position or speed in such cases is not critical for the warning to be issued.

Setting the Necessity for a Warning

The necessity for a warning is determined by the master radar sensor (SWW). To do this, it uses the data which it has collected about road users itself, as well as information from the SWW2 radar sensor.

For the blind spot detection system, only the road users on the immediately neighboring lanes on both sides are relevant. In contrast, road users in your own lane and on other more distant lanes do not pose a danger when you are making a lane change.

The distance and approaching speed of road users in your lane change zone, i.e. of vehicles immediately behind your own vehicle, is a decisive factor as to whether a warning is issued or not. The time remaining for cancelling a lane change maneuver is calculated using the distance (in a longitudinal direction) and their approaching speed. If this time drops below a threshold value for any one of the detected road users, the system decides that it is necessary to give a warning.

Road users in the blind spot lead to a minimal amount of time being calculated for cancelling a lane change. This is why their exact position or speed relative to your own vehicle only has secondary importance. The mere presence of a road user in the blind spot therefore leads to the necessity for a warning.

The blind spot detection system must, of course, also be able to detect transitions from the lane change zone into the area of the blind spot and vice versa. A further challenge for the system is to determine the beginning and the end of the warning necessity when a vehicle in the neighboring lane is slowly overtaken by your own vehicle.

Vehicles that are overtaken very quickly cause the necessity for a warning to be suppressed or at least to end quickly.

In order to depict what the system is doing as reliably as possible to the driver, more than just the current measured values from the radar sensors are used, in particular in these special situations. In addition, the position and speed history of the other road users is taken into account. For example, based on a mathematical model, the system determines the point when an overtaking vehicle leaves the blind spot area and no longer poses a danger.

The master-radar sensor sends the result of the calculation as to whether the necessity for a warning is present or not, to the ICM control unit.

Switching the System On and Off

How the Active Blind Spot Detection system behaves with regard to the driver is ultimately controlled by the Integrated Chassis Management.

This includes:

- Switching it on and off
- Checking the operating conditions
- Checking for faults
- Distinguishing between information and a warning.

A button on the operating unit for the driver assistance systems is used to switch it on and off. The ICM control unit receives the signal by keystroke from the footwell module.

The ICM control unit permits it to be switched on only if no fault is present in the interconnected system and all operating conditions are satisfied.

If the ICM control unit carries out the driver's request to switch it on, the function illumination on the button is switched on as visual feedback. This is also controlled by the Integrated Chassis Management and is executed by the FRM.

If the request to switch it on cannot be carried out, the function illumination remains off. The status (switched on or off) remains key specific regardless of power cycles. If the Active Blind Spot Detection system is on in the current driving cycle, it will be on in the next driving cycle from the start.

If, after switching on the Active Blind Spot Detection, one of the operating conditions is infringed or a fault occurs, it is automatically deactivated. In such a case, the driver would not be able to tell if only the function illumination had switched off. Therefore, a Check Control message is issued (see the section entitled).

Informing and Warning

The system can only generate information or a warning reliably, if the road speed is greater than 50 km/h (31 mph). The function will work at speeds under 50 km/h (31 mph), but not with the high quality and reliability required by BMW. In order not to compromise on the satisfaction of discerning BMW customers, no information or warnings are issued at speeds below 50 km/h (31 mph).

Information is the first stage of assistance that the driver receives from the Active Blind Spot Detection system. The idea is to discreetly make the driver aware of a danger that could arise if he were to change lanes. Information is produced by discreetly illuminating a yellow triangle-shaped warning light in the housing of the door mirror. The warning light is only activated on the side of the vehicle where the necessity for a warning has been detected by the master radar sensor.

Thanks to this concept, the system provides assistance to the driver as early as the preparation phase of a lane change maneuver. The driver can glance briefly in the direction of the door mirror at any to collect information from the Active Blind Spot Detection system as to whether or not a danger exists regarding a lane change.

The discreet manner of the information, on the other hand, does not cause annoyance if the driver wishes to continue to drive straight ahead without making a lane change.

The ICM control unit sends a bus signal that contains a warning request indicating in which door mirror the warning light should light up and with which intensity. In the process, the ICM control unit selects an intensity that is dependent on the surrounding brightness. To do this, it reads a bus signal from the rain/lights/solar/condensation sensor and evaluates it.

The warning request from the ICM control unit travels via the central gateway module to the footwell module, where the signal is routed to the door mirror(s) concerned.

The information is issued to the driver in all cases where all of the following conditions have been satisfied:

- The Active Blind Spot Detection system is switched on
- The road speed is above 50 km/h (31 mph)
- The master radar sensor has detected a necessity for a warning.

The second stage, the warning, should, in comparison, be significantly more prominent than the information. It should reach the driver quickly and directly, if he is still intending to make a lane change despite an impending dangerous situation.

The warning is issued, if the following conditions have been satisfied

- The conditions for information have been satisfied:
- The turn signal is switched on the side of the vehicle where the master radar sensor detected a necessity

for a warning.

The steering column switch cluster issues the signal about the status of the turn signal via the FlexRay to the ICM control unit.

The only difference in the criteria for information and a warning is thus the status of the turn signal. The rear traffic situation or your own driving conditions do not influence it.

The visual aspect of the warning is generated by the respective warning light flashing with a high light intensity. In addition, the steering wheel begins to vibrate.

NOTE: **If the driver changes lanes without using the turn signal, he will only receive the information discreetly from the Active Blind Spot Detection system. The Active Blind Spot Detection system only sends out the more intensive warning, if the driver has switched on the turn signal when he intends to make a lane change.**

Coordinating the Activation of the Vibration Actuator

Like the blind spot detection, the lane departure warning (KAFAS control unit) also uses the vibration actuator to produce a warning signal for the driver. For this, the systems use different amplitudes of vibration.

This is why these must be a coordinator function for controlling the vibration actuator. This is integrated into the ICM control unit.

Using the FlexRay bus system, the coordinated setpoint for the vibration is communicated to the steering column switch cluster and executed via the steering wheel module (LRE) and the vibration actuator in the steering wheel.

Blind Spot Detection from the Customer's Perspective

In this section, example situations are used to explain how the Active Blind Spot Detection system behaves in different traffic scenarios. The emphasis here is not on the technology, but rather on how the customer perceives the system. In all example situations it is assumed that the driver has switched on the Active Blind Spot Detection system and that the road speed of your own vehicle is above 50 km/h (31 mph).

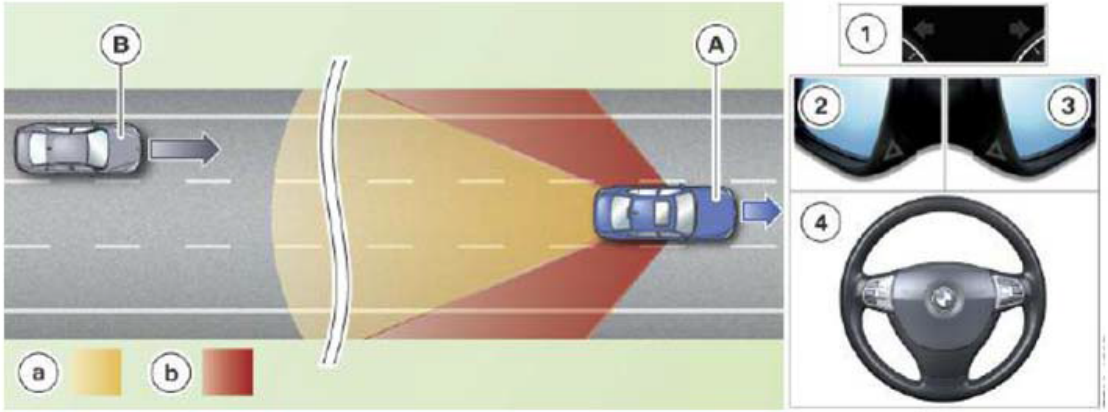


Fig. 83: Traffic Scenario Without Need For Warning
Courtesy of BMW OF NORTH AMERICA, INC.

BLIND SPOT DETECTION TRAFFIC SCENARIO WITHOUT WARNING REFERENCE CHART

Index	Explanation
A	Your own vehicle with blind spot detection
B	Faster vehicle in the left-side neighboring lane outside of the lane change zones
a	Lane change zone
b	Blind spot area
1	Turn signal OFF
2	Warning light in the driver's door mirror OFF
3	Warning light in the front passenger door mirror OFF
4	Steering wheel not vibrating

No Necessity for a Warning

Although another vehicle in the left-hand lane is approaching your own vehicle, neither information or a warning is generated. Even if the driver were to carry out a lane change with his own vehicle, this would not result in a dangerous situation. The time it would take for the other vehicle to reach your own vehicle is considerable.

A sufficient distance will be maintained by accelerating your own vehicle slightly or by a slight deceleration of the other vehicle. There is no necessity at all for the driver to be informed by the Active Blind Spot Detection system.

Information

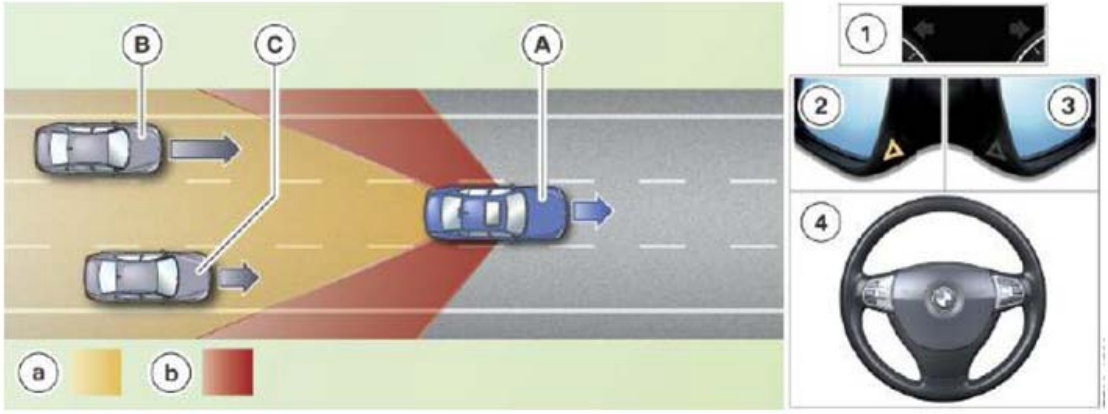


Fig. 84: Traffic Scenario With Information From Blind Spot Detection System
Courtesy of BMW OF NORTH AMERICA, INC.

BLIND SPOT DETECTION TRAFFIC SCENARIO REFERENCE CHART

Index	Explanation
A	Your own vehicle with blind spot detection

B	Faster vehicle in the left-side neighboring lane within the lane change zone
C	Equally fast vehicle as our own, in the right-side neighboring lane within the lane change zone
a	Lane change zone
b	Blind spot area
1	Turn signal OFF
2	Warning light in the driver's door mirror lights up with low intensity
3	Warning light in the front passenger door mirror OFF
4	Steering wheel not vibrating

The vehicle in the left-hand neighboring lane is already in the lane change zone. Because it is still approaching your own vehicle at a high speed, the time the driver would have to cancel a lane change maneuver is short. The blind spot detection system detects the necessity for a warning. Because the driver in his own vehicle does not show any specific intention of making a lane change, only the information and not the warning is issued.

The vehicle in the right-side neighboring lane is at a some what shorter distance from your own vehicle than the vehicle in the left side neighboring lane. It is travelling at the same speed as your own vehicle. The distance to your own vehicle is therefore not decreasing. Thus, there is no necessity for a warning on the right-hand side.

Only the warning light in the driver's door mirror lights up and it does this with low intensity.

Warning - Lane Change Zone

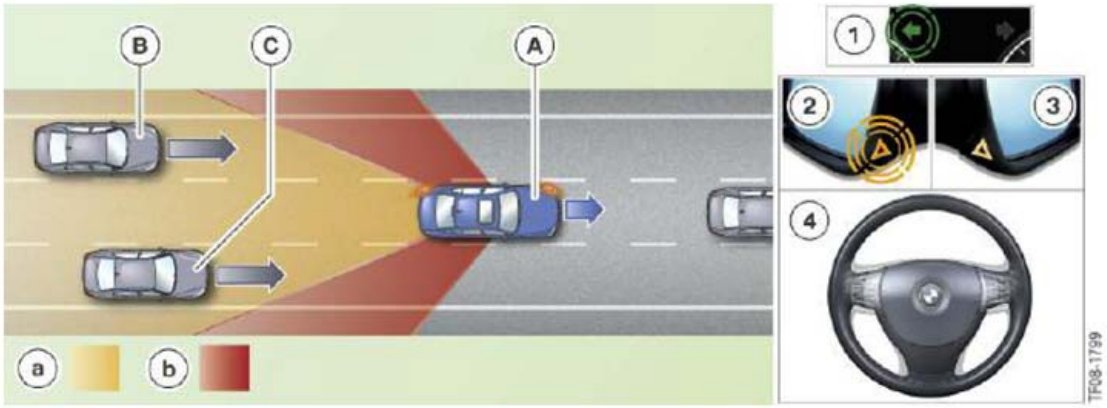


Fig. 85: Traffic Scenario With Warning From Blind Spot Detection System
Courtesy of BMW OF NORTH AMERICA, INC.

BLIND SPOT DETECTION TRAFFIC SCENARIO WITH WARNING REFERENCE CHART

Index	Explanation
A	Your own vehicle with blind spot detection
B	Faster vehicle than our own, in the left-side neighboring lane within the lane change zone
C	Equally fast vehicle as vehicle B, in the right-side neighboring lane within the lane change zone
a	Lane change zone
b	Blind spot area

1	Left turn signal ON
2	Warning light in the driver's door mirror flashes with high intensity
3	Warning light in the front passenger door mirror lights up with low intensity
4	Steering wheel is vibrating

The vehicle in the left-hand neighboring lane is in the lane change zone and is approaching your own vehicle. There is a necessity for a warning therefore on the left-hand side.

Because the driver intends to make a lane change to the left, he has switched on the left turn signal. A lane change maneuver is therefore imminent. In order to attract the attention of the driver quickly and directly, a left-side warning is produced. This means the warning light in the driver's door mirror flashes brightly and in addition the steering wheel vibrates.

The vehicle in the right-side neighboring lane is also approaching your own vehicle at this point. Therefore, the necessity for a warning also exists on the right-hand side. However, because the driver has not switched on the right turn signal, information is issued to this side, but no warning.

Warning - Blind Spot Area

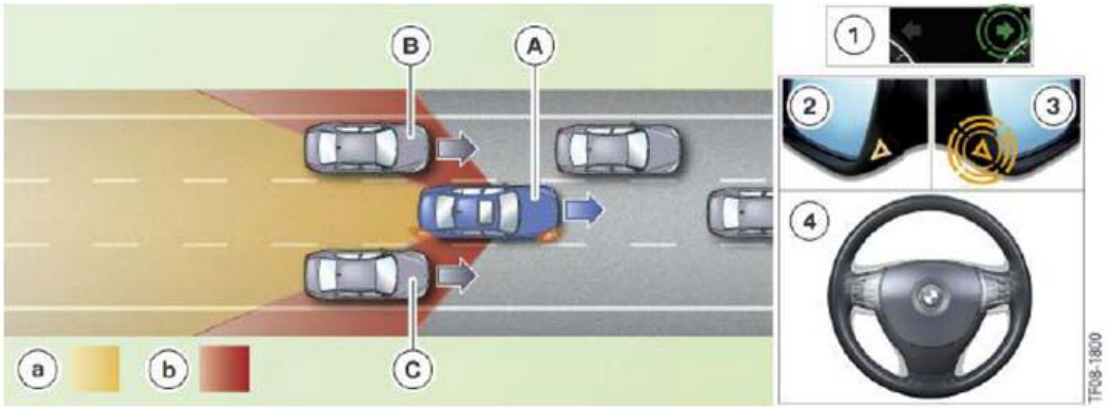


Fig. 86: Traffic Scenario With Vehicles On Blind Spot Area
Courtesy of BMW OF NORTH AMERICA, INC.

BLIND SPOT DETECTION TRAFFIC SCENARIO WITH VEHICLE REFERENCE CHART

Index	Explanation
A	Your own vehicle with blind spot detection
B	Vehicle in the left-side neighboring lane in the blind spot area
C	Vehicle in the right-side neighboring lane in the blind spot area
a	Lane change zone
b	Blind spot area
1	Right turn signal ON
2	Warning light in the driver's door mirror lights up with low intensity
3	Warning light in the front passenger door mirror flashes with high intensity
4	Steering wheel vibrates

Both the vehicle in the left-hand and the vehicle in the right-side neighboring lanes are in the blind spot area. Therefore, the necessity for a warning exists on both sides, independently of how quickly they are travelling.

The driver intends to make a lane change to the right and therefore switches on the right turn signal. This causes the right-side warning to be produced. The warning light in the front passenger door mirror flashes brightly and the steering wheel vibrates.

Information is issued on the left-hand side, but no warning.

SYSTEM COMPONENTS

Radar Sensors

Two radar sensors are fitted in the vehicle for the Active Blind Spot Detection system. The two parts are different, although visually they look the same.

There is a master sensor that is always fitted in the rear of the vehicle on the right-hand side, as well as a SWW2 that is fitted in the rear left-hand side.

The identical features of the master and SWW2 will be introduced first. Then the special features and differences between the master and SWW2 will be described.

Common Features of the Master and SWW2

The sensors of the Active Blind Spot Detection system work according to the RADAR principle (radio detection and ranging). They have some features in common, but also some differences in comparison with the short-range radar sensors for the ACC Stop&Go function. These are listed in the following table.

MASTER AND SWW2 CHARACTERISTIC REFERENCE CHART

Characteristic	Radar sensors of the blind spot detection system	Short-range radar sensors for ACC Stop&Go
Modulation method	LF MSK (linear frequency modulation shift keying)	PD (pulse doppler)
Mid-range transmission frequency	24 GHz	24 GHz
Bandwidth	100 MHz	> 1 GHz
Distance measurement	Based on the propagation time of one chirp (1)	Based on pulse propagation time
Measurement of the relative speed	Based on frequency shift (doppler effect)	Based on phase difference (doppler effect)
Angle measurement	Ratio of two phase values (two simultaneous measurements)	Ratio of two phase values (two successive measurements)
Transmission output (typical maximum value)	Approximately 40 mW (typical), approximately 100 mW (maximum)	Approximately 0.08 mW (average), approximately 100 mW (single pulse)
Range (dependent on type of object measured)	At least 50m, up to 70m	At least 10m, up to 20m

Horizontal angular width of beam	Approximately -70° to +80°	+/-40°
Vertical angular width of beam	Approximately +/-6.5°	Approximately 20°
(1) Characteristic signal segment with changing frequency		

The RADAR principle offers basic advantages with regard to the detection reliability of road users in poor weather conditions. Only when it is exposed to extreme conditions, for example heavy rain or snow, can a reduction in its range occur. If the sensors detect a particularly extreme situation, this status is signalled, so that the function can be switched off and the driver informed.

Both sensors have the functionality of control units. This means that they are compatible with diagnostics and can be programmed and coded.

The sensors are fitted in the rear of the vehicle above the bumper bracket. They are fitted to a large plastic component that is referred to as the "center guide". From the outside the sensors are not visible, because they are hidden by the bumper trim.

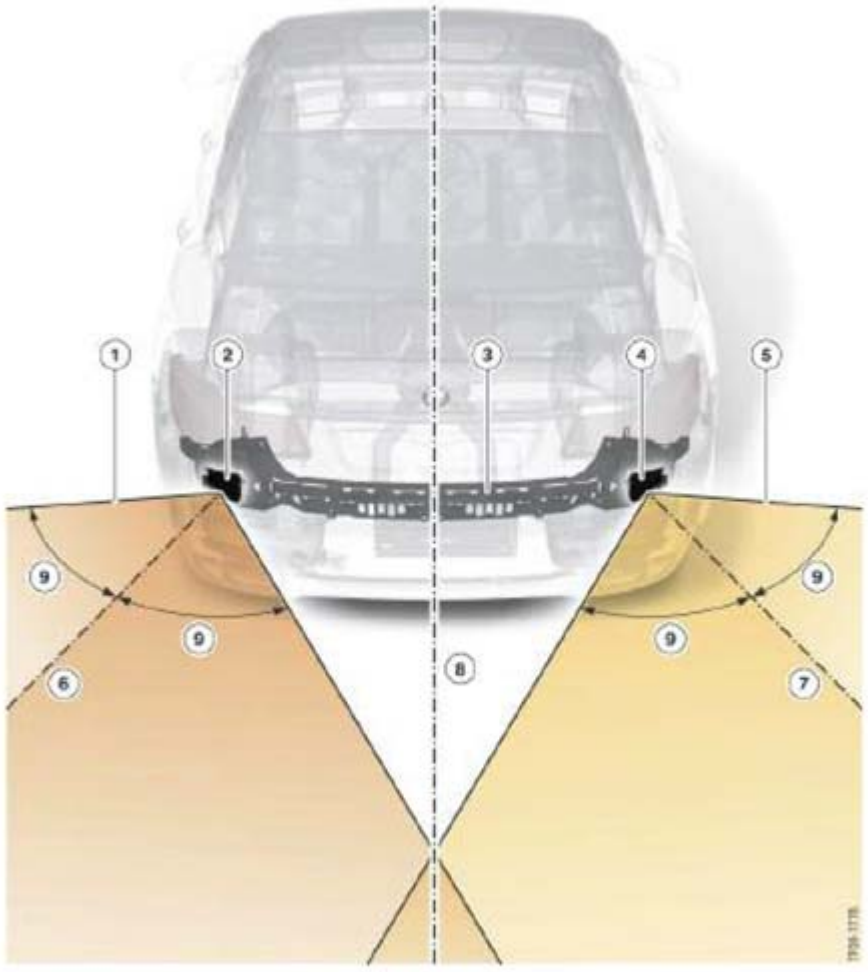


Fig. 87: Overview And Installation Location Of Radar Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

RADAR SENSORS LEGENDS

Index	Explanation
1	Detection zone of the SWW2
2	SWW2
3	Center guide
4	Master
5	Detection zone of the master
6	Symmetrical axis of the SWW2
7	Symmetrical axis of the master
8	Vehicle longitudinal axis
9	Horizontal angular width of beam

As you can see from the graphic, the detection zones of the two sensors overlap. The data on road users that have been detected can therefore not be evaluated separately from each other (for the left and right side of the vehicle). Instead the data is first collected from both sensors and evaluated. Then a decision is made whether the driver must be warned or not.

A detailed view of the installation locations of the master and SWW2 can be seen in the following:

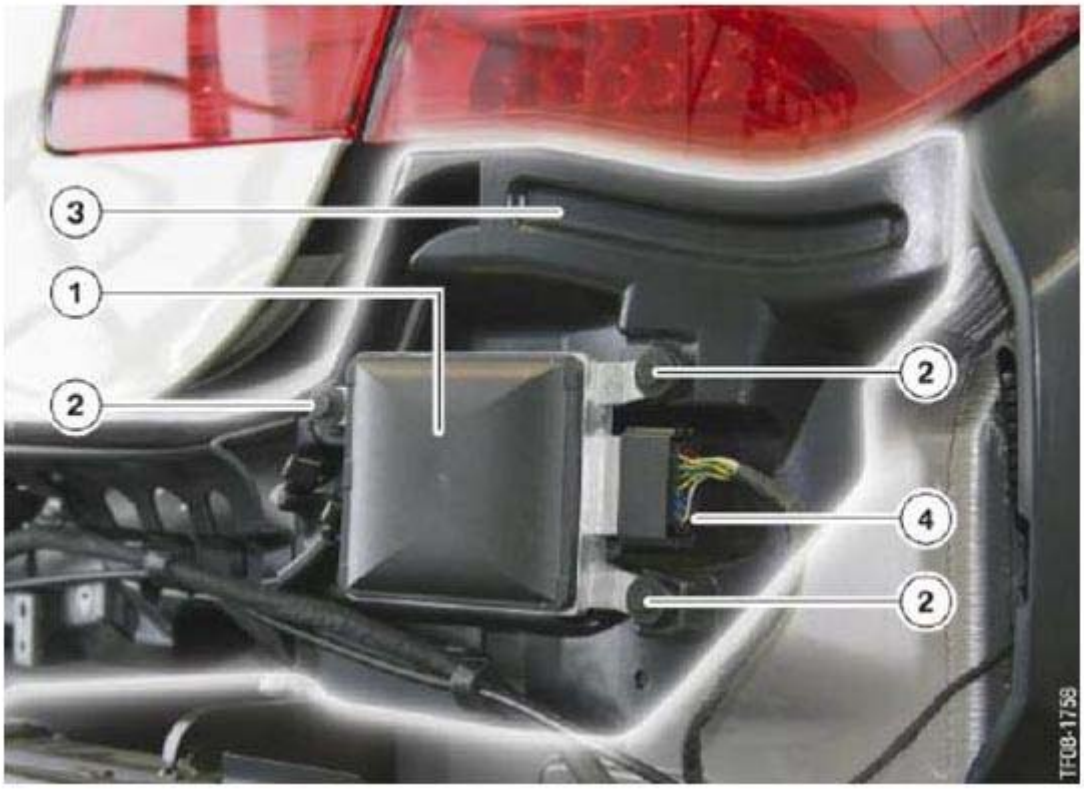


Fig. 88: Identifying Radar Sensor, Centre Guide, Wiring Harness Connector With Mounting Bolts Of Master
Courtesy of BMW OF NORTH AMERICA, INC.

RADAR SENSORS LEGENDS

Index	Explanation
1	Radar sensor for Active Blind Spot Detection (master)
2	Mounting bolts
3	Center guide
4	Wiring harness connector

The fixtures for the sensors do not permit any mechanical adjustment. Instead of the sensors being mechanically adjusted (as is the case with the long-range area sensor in the ACC), they are calibrated using software. When this is done, the actual installation position and above all the alignment of the center axes of the sensors are determined and stored in the sensors. For details please see the section entitled "**CALIBRATING THE RADAR SENSORS**".



Fig. 89: Identifying Radar Sensor, Centre Guide, Wiring Harness Connector With Mounting Bolts Of SWW2
Courtesy of BMW OF NORTH AMERICA, INC.

RADAR SENSORS LEGENDS

Index	Explanation

1	Radar sensor for Active Blind Spot Detection (SWW2)
2	Mounting bolts
3	Center guide
4	Wiring harness connector

RADAR SENSORS LEGENDS

Index	Explanation
1	Radar sensor (SWW2)
2	Bracket for shielding
3	Deformation element



Fig. 90: Identifying Radar Sensor, Bracket For Shielding And Deformation Element
Courtesy of BMW OF NORTH AMERICA, INC.

Two brackets are fitted to the deformation element of the rear bumper that act as a shield for the radar sensors. This prevents malfunctions when processing radar signals that could be caused, for example, by reflections from the road surface. The material used for the bracket was specially selected for this intended use. Therefore, in the event of damage to the brackets, they must be replaced with the correct new part.

Emergency repair using a different plastic part is not permitted. Both radar sensors have a similar structure. The connector and the electronics board are located on the lower section of housing. It is used both for electrical shielding and for dissipating heat.

The board always has a signal processor. This evaluates the radar signals and uses them to generate a list of the objects detected by the sensor. The list contains the distance to each object in a longitudinal and lateral direction and the relative speed. In addition, information is supplied about whether the object is in the blind spot area.

The radar front-end (radome) is used to generate and send radar waves. Of course, the receive circuit is also integrated in it. Sending and receiving is carried out via a planar antenna. The radar waves are transformed into the required shape using the so-called radome.

The plastic radome therefore determines exactly the extent of the detection zone of the sensors. The bumper trim also influences the shape of the detection zone. Calibration must therefore always be done with the bumper trim mounted. If done without the bumper trim, different values are assigned to the measured distances. The measuring result would be distorted and the warning for the driver inappropriate.

The radome and the lower section of housing are cemented together. Repairs to the inside of the sensor are not intended. If the test plan of the diagnostic system requests it, then the sensor must be merely replaced in its entirety.

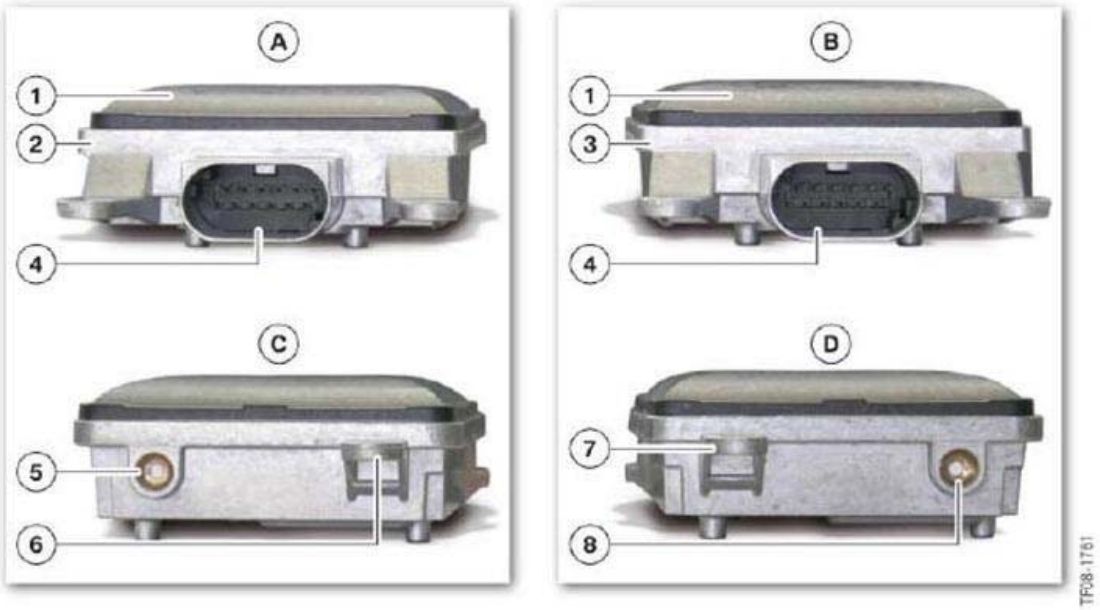


Fig. 91: Side View Of Radar Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

RADAR SENSORS SHIELD LEGENDS

Index	Explanation
A	Outside view of the SWW2
B	Outside view of the master
C	Inside view of the SWW2
D	Inside view of the master
1	Radome
2	Lower section of housing, SWW2

3	Lower section of housing, master
4	Connector
5	Pressure-compensating element, SWW2
6	Mounting eye for the SWW2
7	Mounting eye, master
8	Pressure-compensating element, master

On one side of the lower section of housing, there is an element for producing pressure compensation both on the master and the SWW2. This element contains a membrane with a Teflon coating that is permeable to air and moisture. However, water in liquid form can not permeate the membrane. Pressure compensation is required, because the sensors heat up considerably during operation as a result of electronic power conversion.

Both sensors have an identical looking connector. Even the mechanical encoding of the connector on both sensors is identical. However, the pins are wired differently for master and SWW2. This is why they should only be connected to the intended wiring harness.

How can you distinguish between master and SWW2 then?

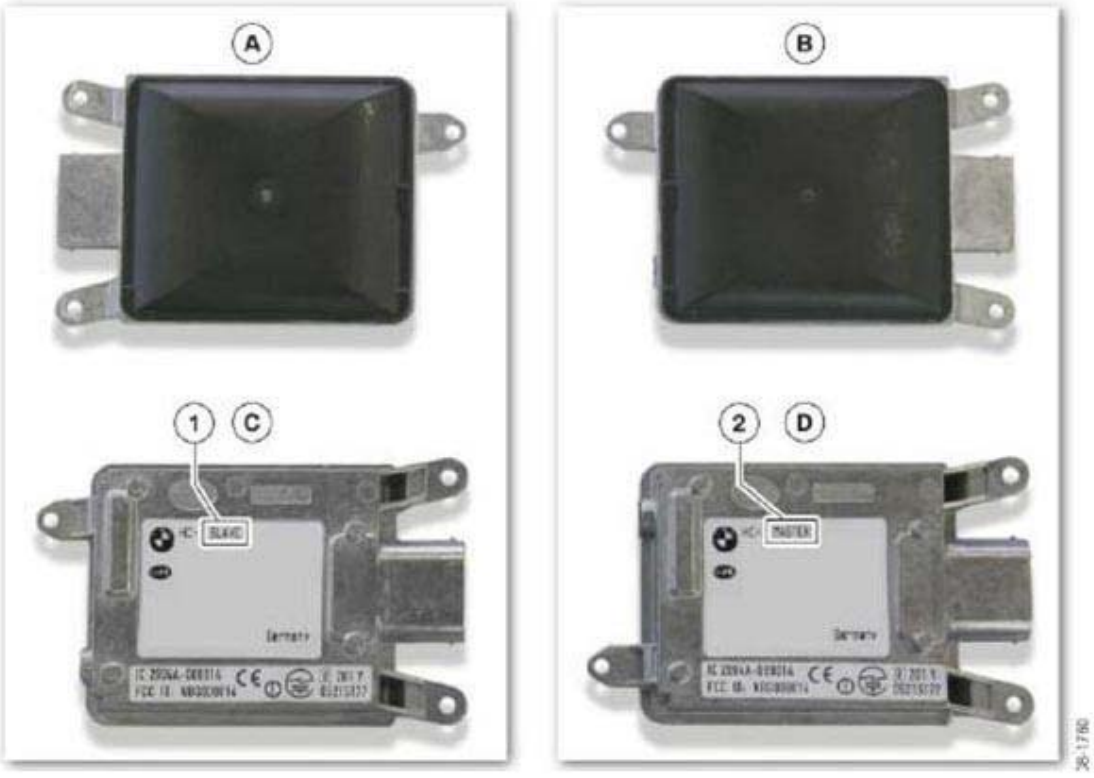


Fig. 92: Upper And Lower Section Of Radar Sensors For Blind Spot Detection System
Courtesy of BMW OF NORTH AMERICA, INC.

RADAR SENSORS LEGENDS

Index	Explanation

A	Upper section of the SWW2
B	Upper section of the master
C	Lower section of the SWW2
D	Lower section of the master
1	Labelling "SWW2"
2	Labelling "master"

The mounting eyes of the lower housing sections on the master and SWW2 are located in different positions. The fixtures for the mounting bolts on the "Center guide" are appropriately positioned. This ensures that the master is mounted only on the right and the SWW2 on the left. Only after installation is complete is it recommended to connect the wiring harness to the sensors.

You can also differentiate between the sensors by using the part number and by the labelling on the lower section of the housing.

Special Features of the SWW2 Radar Sensor

The SWW2 only provides information about the road users in its detection zone. This is why the SWW2 contains only one signal processor for controlling the radar front-end and for evaluating the radar signals. A CAN controller is used to send the data to the master.

The signal processor is also capable of executing the self-diagnostics of the sensor. If SWW2 faults are detected, they are stored in its own EEPROM. They are also transferred to the master and stored there in its fault code memory.

Special Features of the Master Radar Sensor (SWW)

The master performs the same basic tasks as the SWW2 with regard to recording and evaluating data from road users. In addition, the master calculates whether a traffic scenario exists that could be dangerous in the event of a lane change. This calculation is based on data about the road users detected and the state of motion of your own vehicle. If such a situation is detected, the master sends a corresponding signal via FlexRay to the ICM control unit. In addition, the master uses the same path to send signals about the status of both sensors, for example to determine whether they are functioning correctly or there is a fault.

The master executes self-diagnostics in the same way as the SWW2. If, in the process, it detects a fault within itself or a fault is registered by the SWW2, an entry is made in the fault code memory of the master. This makes it possible to read faults with the SWW2 during servicing, even though the diagnostic system is only communicating with the master and as a result is only accessing its fault code memory.

The master contains in addition to the signal processor a further microprocessor for this purpose. This also carries out communication via the FlexRay controller with partner control units, and with the ICM control unit in particular.

Bus Connections

The sensors for Active Blind Spot Detection are connected with two bus systems:

- The master (SWW) is connected to the FlexRay and to the local CAN.
- The SWW2 radar sensor is only connected with the local CAN.

The SWW2 uses the local CAN to transmit the data of all of the road users it has detected to the master. The sensors also utilize the local CAN to exchange internal system status and control signals.

The local CAN is physically set up like the PTCAN and therefore works at a bit rate of 500 kBit/s. Master and SWW2 each have one of the two terminal resistors, each with 120 ohms.

The FlexRay represents the interface between the sensors and the whole vehicle. In this way, the sensors, or to be exact, the master sensor, receives the data about the state of motion of the vehicle (e.g. the road speed and yaw rate).

The master uses this interface to send information about whether the necessity for a warning exists to the ICM control unit.

The FlexRay is routed to the master and is fitted there with a terminating resistor. The master is therefore a terminal node in the FlexRay network.

A detailed description of new features in the FlexRay network can be found in the F01/F02. bus systems training material in ICP and TIS.

Voltage Supply

The SWW sensors are supplied with power via a common fuse with terminal 15. The fuse is located in the rear fuse carrier (in the luggage compartment). The voltage supply is routed to the master and from there to the SWW2.

The wake-up line is therefore not required on the SWW sensors.

NOTE: During the overrun of terminal 15 the SWW sensors save important data in the integrated EEPROM. This includes, for example, fault code memory entries and values calculated during calibration. This data is permanently stored and available again for the next driving cycle. It is therefore important to wait for the overrun from terminal 15 when work is carried out on the SWW sensors, before disconnecting the voltage supply (connector, battery).

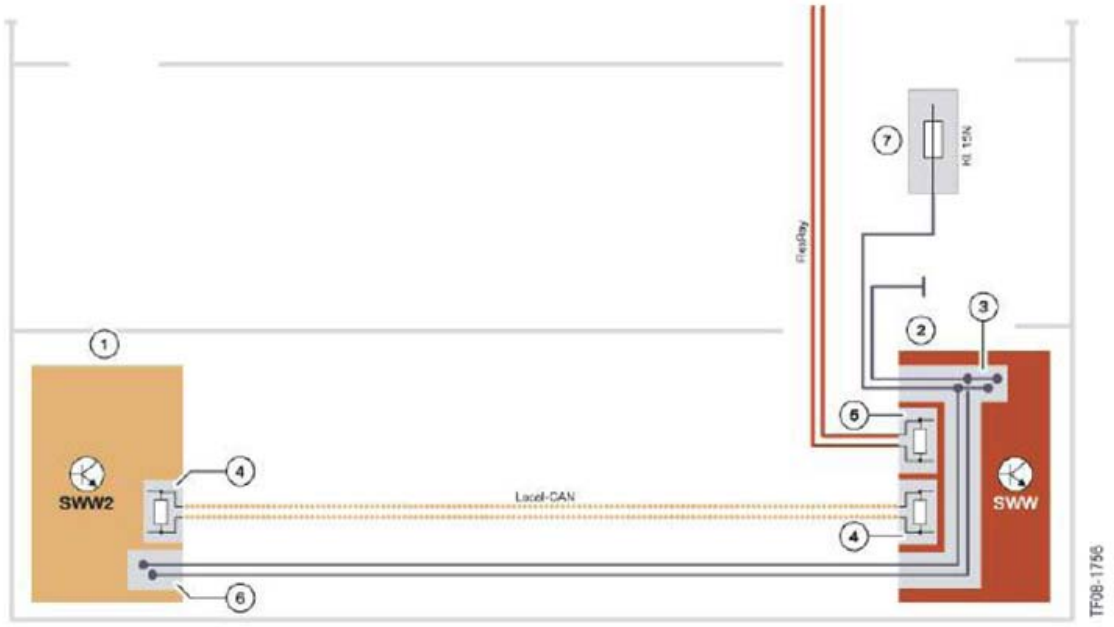


Fig. 93: Bus Systems And Voltage Supply To Radar Sensors Of Blind Spot Detection System
Courtesy of BMW OF NORTH AMERICA, INC.

RADAR SENSORS LEGENDS

Index	Explanation
1	SWW2 radar sensor
2	Master sensor
3	Feed line and continuation of the voltage supply (terminal 15 and ground)
4	Local CAN feed line with a terminating resistor
5	FlexRay feed line with a terminating resistor
	Voltage supply feed line (terminal 15 and ground)
7	Fuse for SWW sensors (rear fuse carrier in the luggage compartment

Calibrating the Radar Sensors

The calibration process is carried out with use of the ISTA diagnostic system. Calibration is performed for both sensors of the Active Blind Spot Detection system successively.

Reasons for calibration

The radar sensors of the Active Blind Spot Detection system measure the position and speed of road users approaching from the rear. This measurement is taken by the sensor housing as a reference value. In order to make a decision as to whether the driver should be warned or not, the measured data must be related to the vehicle's coordinate system. For this the exact location of the sensors must be known.

The installation location of the sensors is principally specified by the position of the retaining bore in "center guide". However, the sensor may be incorrectly aligned during installation or as a result of the tolerances of supporting parts. This applies in particular to the angle formed by the sensor axis and the vehicle longitudinal

axis. If the deviation between the actual angle and the angle specified in the design is too large, this would interfere with the proper functioning of the Active Blind Spot Detection system. Warnings would either be omitted or be produced inappropriately.

The radar sensors must always be calibrated after the following:

- At least one of the radar sensors has been replaced.
- The bumper trim has been replaced.
- Repair work to the supporting parts has been carried out (e.g. to the "center guide").
- The test plan of the diagnostic system requests this due to a fault code memory entry.

Special Situations and Fault Statuses

Communication faults and internal control unit faults are not dealt with here in detail. Problem resolution is carried out in the same manner as with other control units, i.e. with the assistance of the test plan in the diagnostic system.

Instead, the emphasis here is on the statuses which apply specifically to the radar sensors of the Active Blind Spot Detection system. The material presented here should facilitate the diagnostics.

Blindness

"Blindness" here is used to denote heavy interference with the radar sensors, in which they no longer are able, for example, to detect road users at the required range. Blindness can also cause incorrect or omitted warnings.

The radar sensors contain a function which enables it to detect this status during operation. In this case, the master sends a bus signal to the ICM and the Active Blind Spot Detection system is then deactivated. The driver is informed about this by a Check Control message. The blindness status is documented with an entry in the fault code memory for a subsequent workshop visit.

Possible causes of the blindness status are:

- The sensor is covered by a sticker or by a bicycle carrier at the rear.
- Deformation (dents) in the bumper trim, even if for instance it has been repaired with plastic filler.
- Incorrect vertical alignment of the sensors (e.g. upwards) through a deformation of the supporting parts.
- Extremely thick covering of snow/slush on the bumper trim.

Errors in the sensor alignment

In the radar sensors of the Active Blind Spot Detection system, a function is calculated that can detect sensor alignment errors when the vehicle is in motion. This function monitors the data about detected objects as it is processed.

If the detected sensor alignment error is within a range that is still tolerable, the function compensates for the error. This means the data about the detected road users is corrected by the known value. If a sensor alignment error that is too large is detected, the proper functioning of the Active Blind Spot Detection system is no longer

possible. The master then sends a signal to the ICM and the Active Blind Spot Detection system is switched off. The driver is informed about this by a Check Control message.

Reasons for deactivating the system due to detected sensor alignment errors include:

- A new radar sensor was installed without being calibrated (detected immediately).
- The sensor is covered by a sticker or by a bicycle carrier.
- Mechanical damage to the rear of the vehicle with deformation of the supporting parts (e.g. the "Center guide").
- Deformation (dents) in the bumper trim, even if for instance it has been repaired with plastic filler.

Some of the reasons given here could also apply to the "blindness" status. For example, depending on the extent of the deformation of the bumper trim, this can result in blindness.

This kind of deformation can distort the radar signals in such a way that the sensors detect a sensor alignment error.

Rear damage

Two kinds of damage are plausible which require different repair measures:

- Damage exclusively to the bumper trim in the area where the sensor is installed.
- Additional deformation of the bumper bracket or other supporting parts.

Damage to the bumper trim

Of course only damage in the area where the radar waves are emitted from the sensors are relevant. If the bumper trim is deformed there, scratched extensively or it has an uneven thickness due to repairs to the plastic, can interfere with the proper functioning of the radar sensors. Bumper stickers placed over the area can also cause radar interference.

These situations may result in a reduced range, the omission of warnings or the incorrect production of a warning.

In the event of this kind of damage, you must ensure that the sensor installed behind the bumper trim has not been damaged in any way.

The repair entails restoring the original position and the original shape of the bumper trim to ensure proper system operation.

NOTE: The US marketing term for Lane Change Warning System (SWW) is Active Blind Spot Detection. These two systems are one and the same and are not to be confused with Lane Departure Warning.

Damage to supporting parts

If a supporting part (e.g. the bumper bracket or the trunk trim fitted to the "Center guide") is deformed, the sensors for the Active Blind Spot Detection system are probably no longer correctly aligned. This leads to the omission of warnings or that warnings are incorrectly produced.

Your first option is to attempt a calibration. To do this, the bumper trim must be mounted. If the calibration is performed successfully, the misalignment was so small that it could be compensated for in the calibration (using software).

If the calibration produces a deviation in the sensor alignment that is larger than specified by the design, the "center guide" must be correctly realigned. Because the "center guide" acts as a carrier for the sensors, aligning the "Center guide" also repositions the sensors correctly. This process is described in detail in the Repair Instructions.

Based on the spacers that act as gauges, the correct alignment can be restored. In any case, after this kind of body repair, the sensors will have to be calibrated.

Display and Control Elements



Fig. 94: Display Function Illumination And Active Blind Spot Detection Button
Courtesy of BMW OF NORTH AMERICA, INC.

DRIVER ASSISTANCE SYSTEM REFERENCE CHART

Index	Explanation
1	Function illumination
2	Active Blind Spot Detection button

LIN-bus Connections

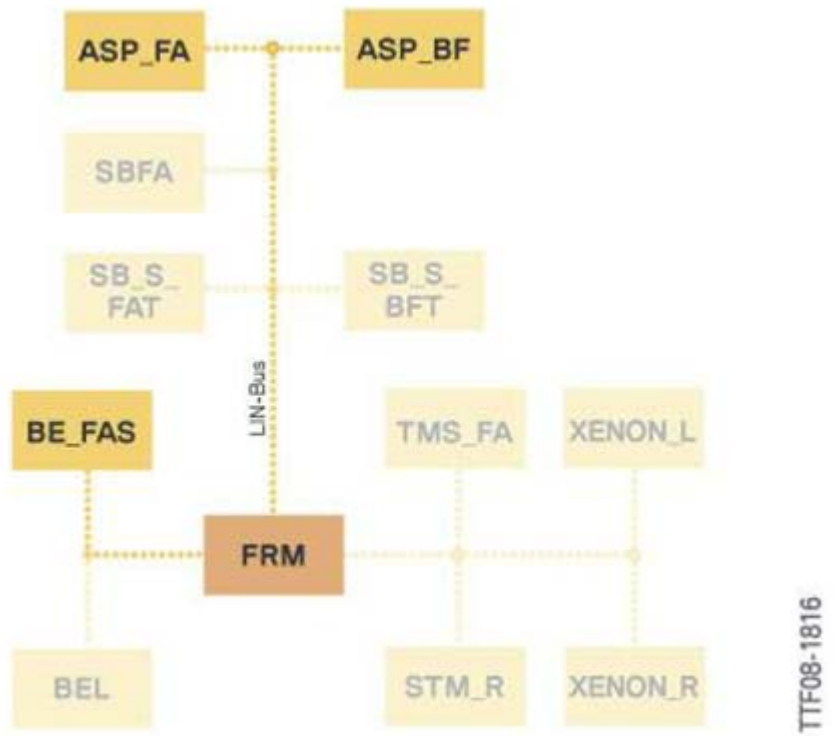


Fig. 95: LIN Bus Connections At Footwell Module
Courtesy of BMW OF NORTH AMERICA, INC.

LIN BUS CONNECTIONS REFERENCE CHART

Index	Explanation
ASP_FA	Driver's door mirror
ASP_BF	Front passenger door mirror
BE_FAS	Operating unit for driver assistance systems
FRM	Footwell module

The operating unit for the driver assistance systems is fitted with a button that can switch the Active Blind Spot Detection system on and off.

The operating unit is connected via the LIN bus to the footwell module (FRM). A bus signal from the FRM to the ICM is used to inform that the button has been pressed.

The ICM only permits the Active Blind Spot Detection to be switched on, if the system is working faultlessly. Only then does it send a positive response via a bus signal to the FRM, to activate the function illumination on the button.

If instead there is a fault with the system, the function illumination remains off despite being pressed. The driver will then know that the system is not available.

Warning Light in the Driver's Door Mirror

There is a triangular-shaped warning light in the left and right door mirror. This lights up two-dimensionally and can be activated in different intensities.

The ICM sends a request together with the requested intensity to the footwell module.

Using the LIN bus, the request is passed on to the electrical system of the respective door mirrors. Amplitude-modulated control is used to light up the LEDs in the door mirror.

Vibration Actuator in the Steering Wheel

The vibration actuator is housed in the six o'clock spoke of the steering wheel. It has the task of causing the steering wheel to vibrate.

The Lane Departure Warning and Active Blind Spot Detection systems use this vibration, in order to alert the driver of dangerous situations. In both systems, the warning is executed by vibrating the steering wheel.

The steering wheel module that controls the vibration actuator is also housed in the interior of the steering wheel. This produces an alternating voltage that causes the vibration actuator to oscillate. The frequency of the alternating voltage is not changed during operation. It is designed so that oscillations from the vibration actuator fit perfectly to the overall steering wheel system.

The amplitude of the alternating voltage can be changed using the steering wheel module. Therefore, you have the option of different systems with varying oscillating amplitudes available to you for the warning.



Fig. 96: Identifying Steering Wheel With Vibration Actuator

Courtesy of BMW OF NORTH AMERICA, INC.

STEERING WHEEL LEGENDS

Index	Explanation
1	Steering wheel module (LRE)
2	Vibration actuator

The E6x LCI is already equipped with the driver assistance system called lane departure warning which has already used steering wheel vibration to warn the driver in a similar way. Here a vibration motor is used as the vibration actuator. An unbalance mass is located on the shaft. If the vibration motor is activated, the unbalance mass rotates and thus produces the vibrations.

The vibration actuator in the F01/F02 has undergone a significant advancement in comparison with the vibration motor. Instead of the unbalance motor, a structural element is used that only oscillates in a longitudinal direction. For this reason, it is known as a "longitudinal oscillator". This active principle has the advantage that the vibrations are only induced in this one direction. The vibration actuator is built into the steering wheel so that the direction of its oscillations corresponds with the direction of rotation of the steering wheel. This provides an ideal expression of the warning and the driver is made immediately aware that he must use the steering wheel to avert the dangerous situation. In addition, this principle to a large extent avoids unwanted side-effects such as noises or oscillations that could be transferred in other directions to the body.

The two brackets connect the vibration actuator with the steering wheel. However, the brackets on the vibration actuator are not screwed to the case, but to the coil carrier.

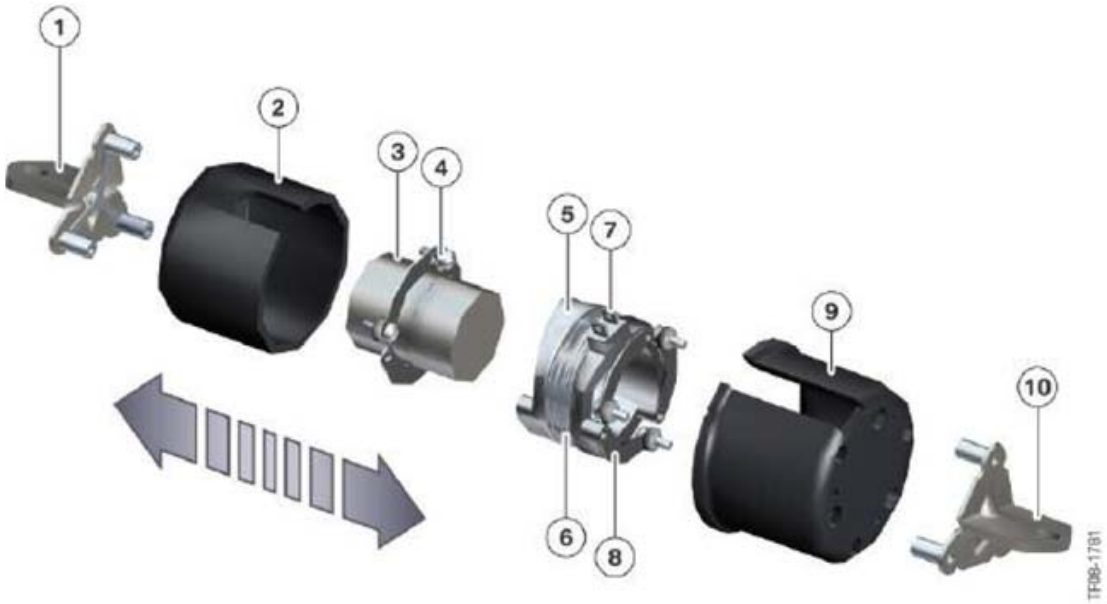


Fig. 97: Exploded View Of Vibration Actuator
Courtesy of BMW OF NORTH AMERICA, INC.

VIBRATION ACTUATOR LEGENDS

Index	Explanation
1	Left bracket
2	Left case section
3	Permanent magnet
4	Spring
5	Coil carrier
6	Coil
7	Electrical connection
8	Spring
9	Right case section
10	Right bracket

This means the coil carrier is fixed in place. The permanent magnet can move instead. It is set into an oscillating motion in the direction shown, when alternating voltage is applied to the coil. The longitudinal movement of the permanent magnet is transferred to both case sections due to its length. This is why the case sections also have a long slot in the electrical connection area to the coil. The springs ensure that the case sections do not hit against their end positions and therefore prevent noises.

The request to activate the vibration actuator is sent from the Integrated Chassis Management over the FlexRay to the steering column switch cluster (SZL). The SZL guides this request via LIN bus further to the steering wheel module (LRE).

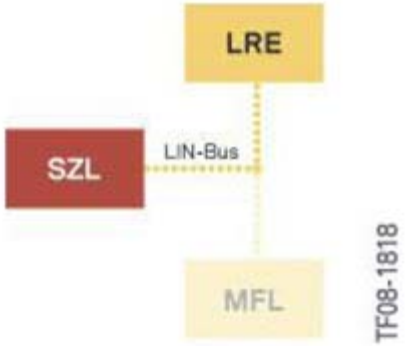


Fig. 98: LIN Bus Subscribers Of Steering Column Switch Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

LIN BUS REFERENCE CHART

Index	Explanation
LRE	Steering wheel module
SZL	Steering column switch cluster

Instrument Cluster

There are no function displays for the Active Blind Spot Detection system in the instrument cluster (different to the lane departure warning). Instead Check Control messages are displayed in the instrument cluster, when the

Active Blind Spot Detection system is not available. A distinction is made between two possible causes:

ACTIVE BLIND SPOT DETECTION SYSTEM CAUSES REFERENCE CHART

	
Active Blind Spot Detection deactivated (due to functional peripheral factors such as, blindness)	Active Blind Spot Detection failure (due to real faults or defects with components)

KAFAS CAMERA

INTRODUCTION

Multifunction Video Camera

With the F01/F02, the customer is able to choose from a comprehensive range of optional driver assistance systems.

The individual systems and function units are becoming ever more densely networked as a result of the shared use of components and signals in some areas.

Depending on the combination of the available options installed, the functions in the F01/F02 are implemented as camera-based systems, both sharing the same camera and the one control unit, the KAFAS control unit.

KAFAS is the Camera Assisted Driver Assistance System.

KAFAS is used for the following combined functions:

- Lane departure warning
- High-beam assistant.



Fig. 99: Display Camera Assisted Driver Assistance System
Courtesy of BMW OF NORTH AMERICA, INC.

FLA (high beam assistant) is part of the ZDA Driver Assistance Package option and will not be available separately on the F01/F02.

The ZDA Driver Assistance Package option includes the following:

- High-beam Assistant
- Lane Departure Warning
- Active Blind Spot Detection

The vehicle comes fitted with the KAFAS control unit and camera. The high-beam assistant option shares the KAFAS camera and the KAFAS control unit with the lane departure warning system.

KAFS LANE DEPARTURE WARNING SYSTEM REFERENCE CHART

Options/Technical specification	
	KAFAS 1 camera 1 control unit 2 functions
Lane departure warning	X
High-beam assistant	X

SYSTEM OVERVIEW

Lane Departure Warning and High-beam Assistant

The overview below illustrates the components used in combining these systems.

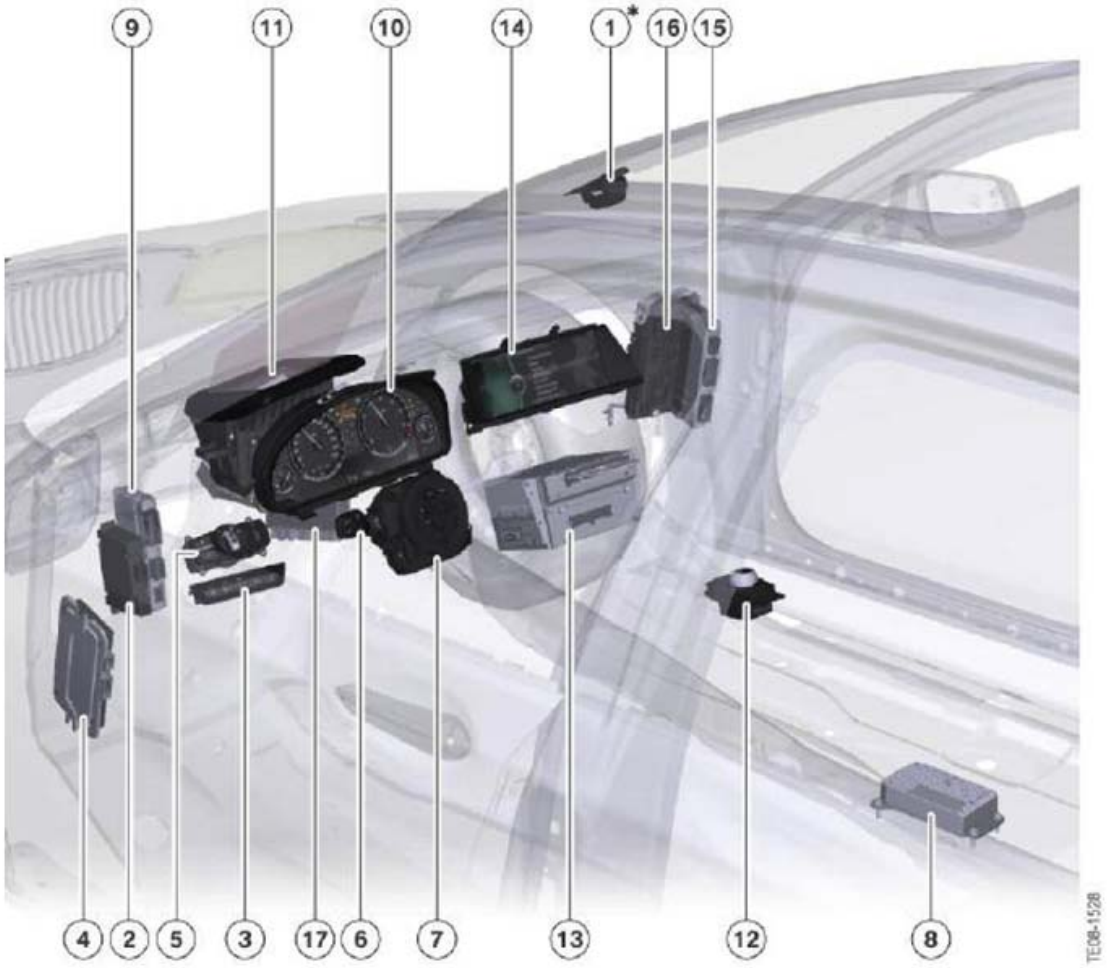


Fig. 100: System Overview Of KAFAS Components
Courtesy of BMW OF NORTH AMERICA, INC.

KAFAS COMPONENTS LEGENDS

Index	Explanation
1	Lane departure warning/High-beam assistant forward-pointing video camera
2	KAFAS control unit (Equipment specification with lane departure warning, evaluation of image data)
3	Driver assistance systems operating unit Lane Departure Warning on/off button
4	Footwell module (FRM) High-beam headlights on/off
5	Light switch (High-beam assistant function in position A or position II)
6	High-beam assistant on/off button on the turn signal stalk on the steering column
7	Steering column switch cluster (SZL) with turn signal stalk on the steering column
8	Integrated Chassis Management (ICM) Road-speed signal
9	Central gateway module (ZGM)
10	Instrument cluster Function display

11	Head-up display (HUD) Function display
12	Controller
13	Car Information Computer (CIC) navigation system, navigation system data
14	Central Information Display (CID)
15	Junction box electronics
16	Front distribution box
17	Car Access System (CAS)

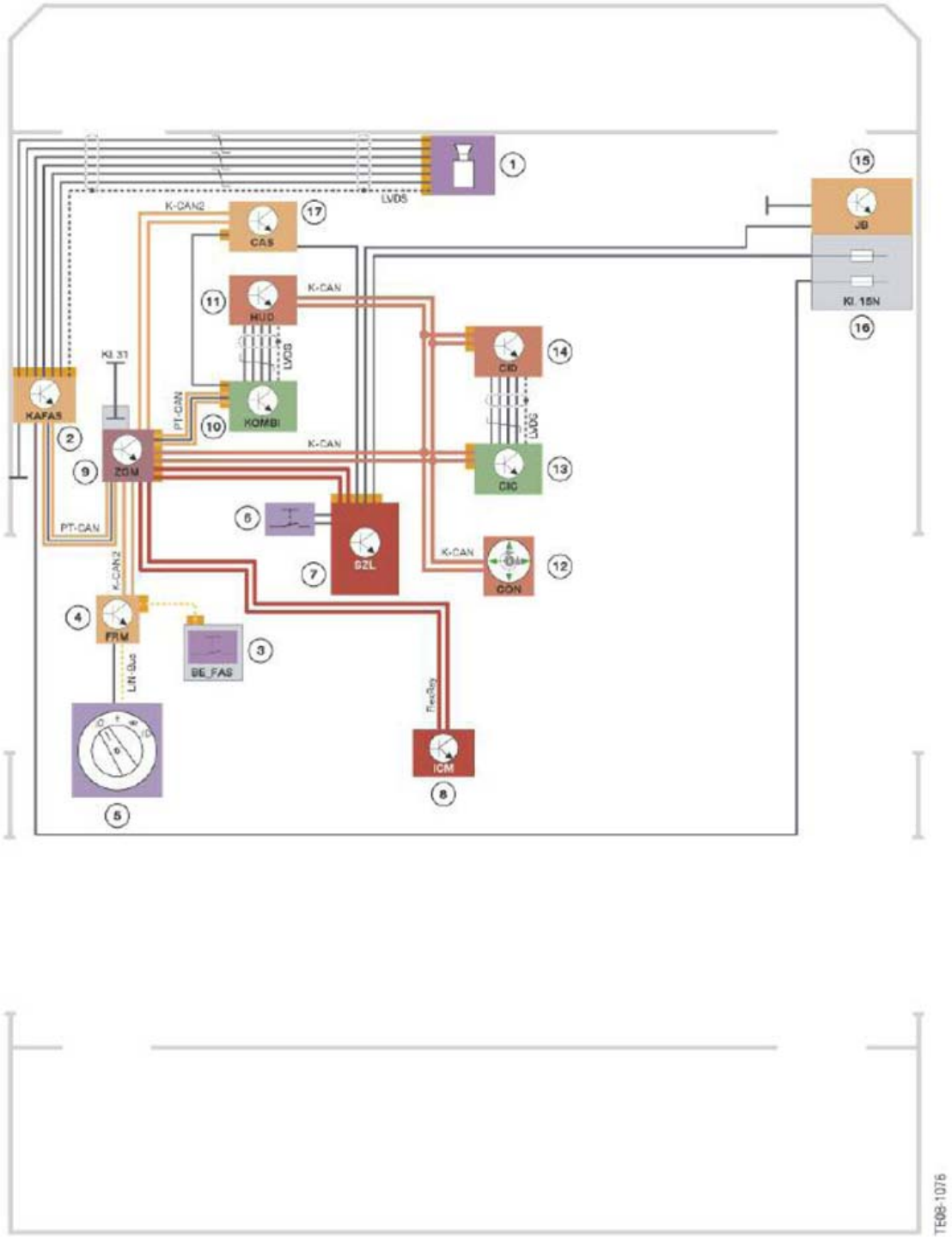


Fig. 101: KAFAS With Lane Departure Warning And High-Beam Assistant Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

LANE DEPARTURE WARNING AND HIGH-BEAM ASSISTANT LEGENDS

Index	Explanation
1	Lane departure warning/High-beam assistant forward-pointing video camera

2	KAFAS control unit (Equipment specification with lane departure warning, evaluation of image data)
3	Driver assistance systems operating unit Lane Departure Warning on/off button
4	Footwell module (FRM) High-beam headlights on/off
5	Light switch (High-beam assistant function in position A or position II)
6	High-beam assistant on/off button on the turn signal stalk on the steering column
7	Steering column switch cluster (SZL) with turn signal stalk on the steering column
8	Integrated Chassis Management (ICM) Road-speed signal
9	Central gateway module (ZGM)
10	Instrument cluster Function display
11	Head-up display (HUD) Function display
12	Controller
13	Car Information Computer (CIC) navigation system, navigation system data
14	Central Information Display (CID)
15	Junction box electronics
16	Front distribution box
17	Car Access System (CAS)

SYSTEM COMPONENTS

Lane Departure Warning

In the F01/F02, a front facing video camera and the corresponding button in the BEFAS control panel indicate that the vehicle is equipped with the lane departure warning.



Fig. 102: Video Camera For Lane Departure Warning
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 103: Display Lane Departure Warning Control Panel
Courtesy of BMW OF NORTH AMERICA, INC.

The image data recorded by the video camera are transmitted to the KAFAS control unit along an LVDS data line. The video camera and the control unit are the components that are fundamental to the lane departure warning's range of functions.

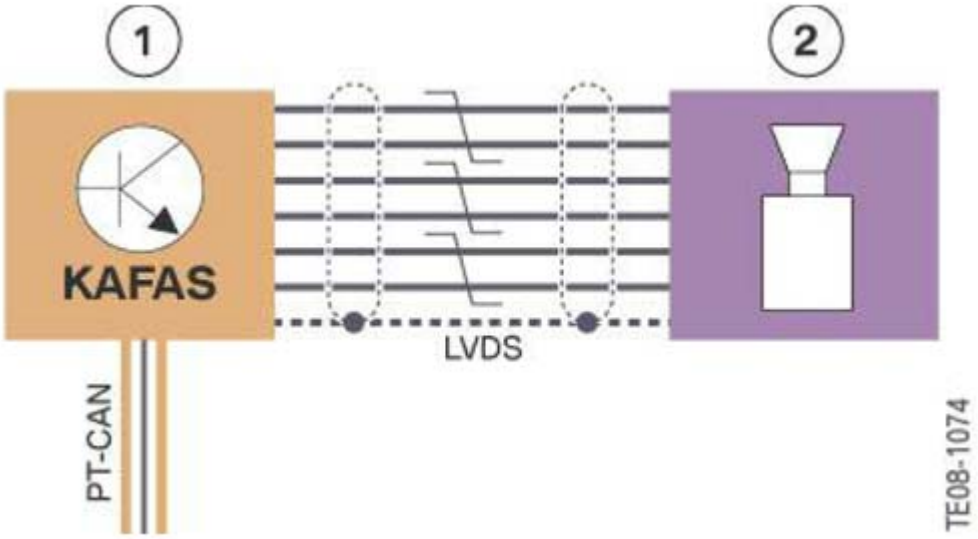


Fig. 104: Identifying KAFAS Control Unit With PT-CAN And Lane Departure Warning Camera With LVDS
Courtesy of BMW OF NORTH AMERICA, INC.

KAFAS CONTROL UNIT WITH PT-CAN REFERENCE CHART

Index	Explanation
1	KAFAS control unit with PT-CAN
2	Lane departure warning video camera with LVDS connection to KAFAS control unit

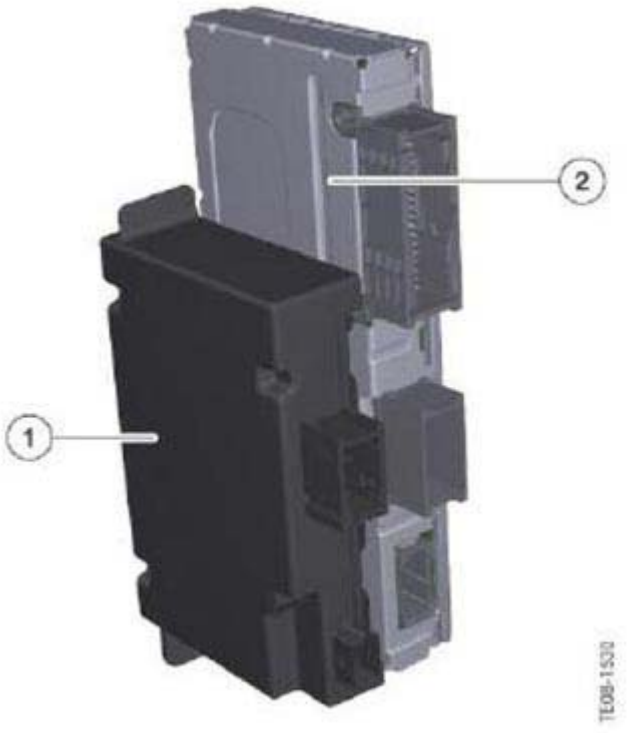


Fig. 105: Identifying KAFAS Control Unit Driver Footwell And Central Module
Courtesy of BMW OF NORTH AMERICA, INC.

KAFAS CONTROL UNIT DRIVER FOOTWELL REFERENCE CHART

Index	Explanation
1	KAFAS control unit Driver's footwell
2	Central gateway module (ZGM)

High-beam Assistant

In combination with the lane departure warning, the high-beam assistant function shares the same video camera and the same KAFAS control unit.

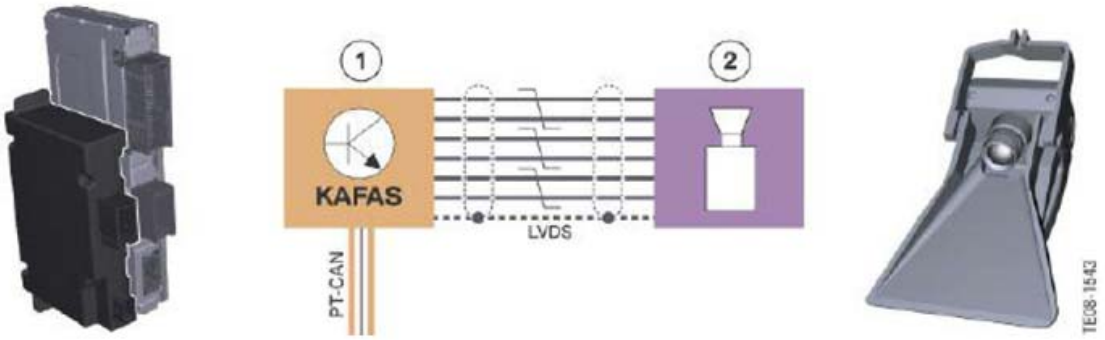


Fig. 106: Identifying KAFAS Control Unit With PT-CAN And Lane Departure Warning Camera With LVDS
Courtesy of BMW OF NORTH AMERICA, INC.

KAFAS CONTROL UNIT WITH PT-CAN REFERENCE CHART

Index	Explanation
1	KAFAS control unit with PT-CAN
2	Lane departure warning video camera with LVDS connection to KAFAS control unit

FUNCTIONAL PRINCIPAL

Lane Departure Warning

The lane departure warning causes the steering wheel to vibrate to warn the driver that the vehicle is threatening to leave the current lane without driver intending it to do so. The prerequisite for this function to work is the presence of road or lane markings that can be recognized by the control unit based on an evaluation of the images recorded by the forward facing video camera.

The system is therefore intended to assist the driver in case of a lapse of attention. Nevertheless, the driver continues to bear full responsibility for the vehicle.

The system is designed to assist the driver on highways, major roads and well maintained country roads. Warnings are given, therefore, only at speeds of over 44 mph.

The driver activates the system using the lane departure warning button in the BEFAS driver assistance control panel.

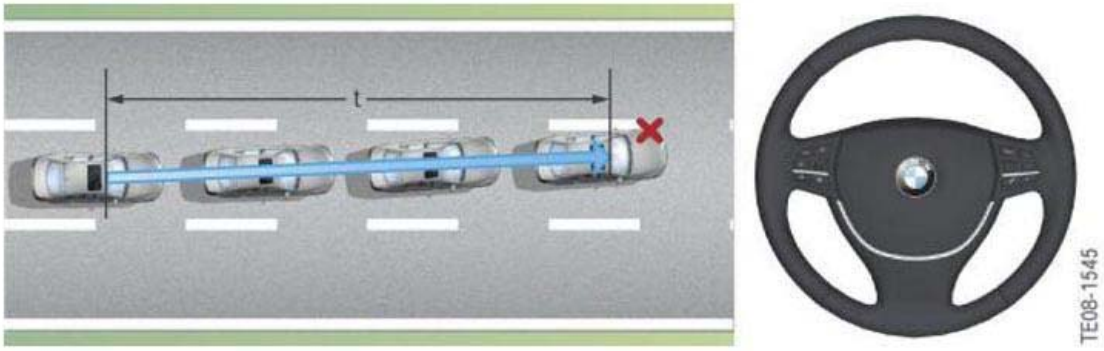


Fig. 107: Identifying Lane Departure Warning
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 108: Display Lane Departure Warning Button On BEFAS Control
Courtesy of BMW OF NORTH AMERICA, INC.

The "system ON" state is indicated in the instrument cluster and, where applicable, in the head-up display by the following symbol.



Fig. 109: Display Lane Departure Warning Switched On
Courtesy of BMW OF NORTH AMERICA, INC.

The activated system is ready as soon as lane markings are detected by the control unit and the vehicle is travelling faster than 44 mph.

The ready state of the system is represented by additional arrow symbols in the display.



Fig. 110: Display Lane Departure Warning Ready
Courtesy of BMW OF NORTH AMERICA, INC.

If the vehicle threatens to drive over a lane marking and leave the lane without the driver intending it to do so, the driver is alerted by a vibrating of the steering wheel.

The lane departure warning senses an intentional change of lane made by the driver from the activation of the turn signal. In this case there is no warning when the vehicle is driven over the lane marking.



Fig. 111: Identifying Steering Wheel And Vibration For Lane Departure Warning On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING WHEEL LEGENDS

Index	Explanation
1	Steering wheel electronics
2	Vibration actuator for the lane departure warning

STEERING COLUMN LEGENDS

Index	Explanation
1	Turn signal/high-beam stalk on the steering column in the F01/F02
2	Turn signal

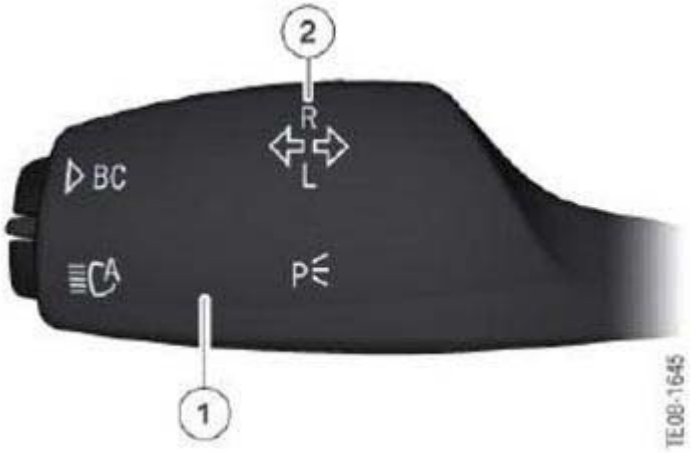


Fig. 112: Identifying Turn Signal And High Beam Stalk On Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

Lane Detection



Fig. 113: F01/F02 Lane Departure Warning Video Camera
Courtesy of BMW OF NORTH AMERICA, INC.

The lane departure warning video camera integrated into the base of the rear-view mirror on the windshield monitors the area ahead of the vehicle. The video camera captures the roadway up to approximately 131ft. to the front of the vehicle and up to approximately 5m/16.4 ft to the right and left.

The image data is sent to the KAFAS control unit along an LVDS data line for analysis. Using image processing technology, the control unit scans the images recorded by the video camera for lane and roadway

markings.

The software in the control unit also checks which lane markings apply to the current lane in which the vehicle is driving.

First, the control unit calculates the vehicle's position relative to the lanes detected in the camera images and then uses this position as basis for converting the data into a lane departure warning.

The fundamental parameters for this calculation are the road speed and steering angle of the vehicle.

Roadway Marking

The roadway markings in the image may differ greatly depending on the country, type of road or prevailing environmental conditions. The system is capable of recognizing a wide range of roadway markings and types of marking.

A lane marking is subject to unequivocal recognition by the video camera and control unit first. The lane traveled must have an average width of at least 2.5m.

Physical Limitations of the Optical System

The lane departure warning functions under a wide range of different environmental conditions.

Due to the physical limitations of the system, system availability may be affected by specific road and environmental conditions, such as snow, fog, rain, or glare and dazzle.

Display and Control Concept

The lane departure warning can be switched on as of terminal 15 ON.

When the ignition is switched on, the lane departure warning system always reverts to the state that was active when the vehicle was last switched off.

Provided lanes can be detected, the lane departure warning is "primed" (ready) above a speed of 40 mph.

Lane departure warning displays



Fig. 114: Display System Active On Screen
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 115: Display System Ready On Screen
Courtesy of BMW OF NORTH AMERICA, INC.

If the lane departure warning is switched on at speeds of under 40 mph, a message will appear in the instrument cluster for 3 seconds indicating availability above a speed of 40 mph.



Fig. 116: Display Availability Of Lane Departure Warning Above 44Mph

Courtesy of BMW OF NORTH AMERICA, INC.

In vehicles equipped with a combination of the lane departure warning and Active Cruise Control with Stop&Go, the displays of each of these systems are also combined.



Fig. 117: Displays Of Lane Departure Warning With ACC On Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Displays of the lane departure warning/Active Cruise Control with Stop&Go

The graphics indicating system active and system ready are displayed in the instrument cluster and also in the head-up display, if the vehicle is equipped with this option.

INSTRUMENT CLUSTER WARNING DISPLAY REFERENCE CHART

Index	Explanation
1	Lane departure warning ready
2	Speed Limit Information (Not for US)



Fig. 118: Display Lane Departure Warning And Speed Limit Information On Screen
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 119: Display Head-Up Display Of F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

The driver can activate or deactivate the display for the lane departure warning in the head-up display from the

Central Information Display using the controller.

Warning

The active system is ready whenever the prerequisites for a lane departure warning have been fulfilled: Lane detected and V > 40 mph.

If the vehicle threatens to drive over the lane marking, the system warns the driver by causing the steering wheel to vibrate.

Based on the detection of one or two lanes, the system first calculates the position of the vehicle in relation to these lanes.

Using the vehicle's steering angle and road speed, the system calculates the time (t) remaining before the vehicle would cross the lane marking.

The warning is output in time before the vehicle crosses the marking.



Fig. 120: Lane Departure Warning Vibration Actuator On Steering Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

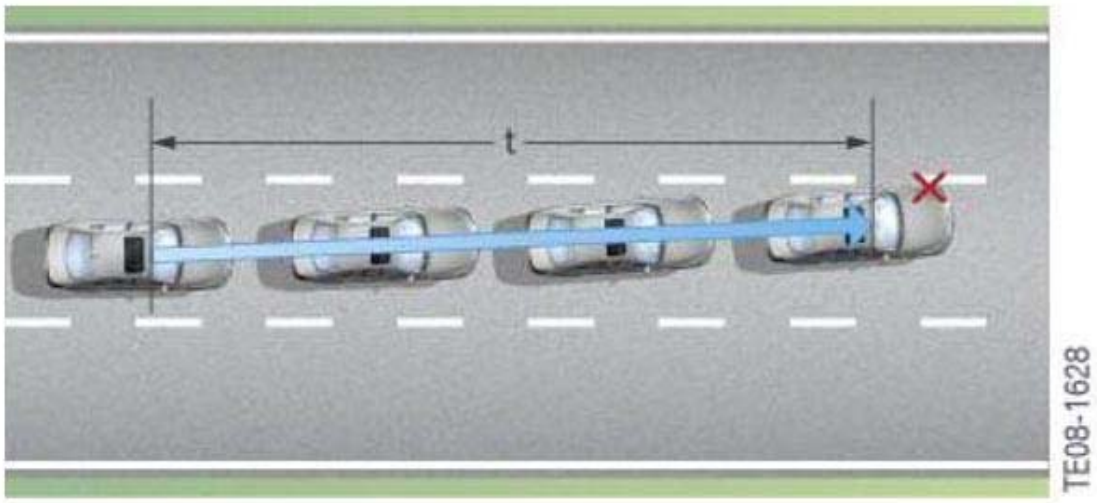


Fig. 121: Identifying F01/F02 Lane Departure Warning
Courtesy of BMW OF NORTH AMERICA, INC.

A warning is output only once on approach to a roadway marking. The warning lasts a maximum of 2.5s. No more warnings are output if the vehicle then continues to drive along the lane marking.

A new warning can only be issued if the vehicle has been steered back into the lane or the vehicle has completed a change of lane.

No warning is given if the control unit has received an input signal indicating the activation of the turn signals because this signal announces that the driver is about to change lane intentionally.

Similarly, no warning is given if the hazard warning lights are switched on.

The warning ends when:

- The driver steers back into the lane
- A lane change is completed
- The vehicle drives along the line for longer than 2.5 seconds
- The turn signal is operated to indicate a change of lane
- The brake pedal is depressed with force (brake-pressure-dependent).

ACTIVATION/DEACTIVATION THRESHOLD REFERENCE CHART

Activation/threshold	Deactivation/threshold
40 mph	37 mph

Signal path for controlling the vibration actuator

Control of the vibration actuator in the steering wheel is initiated by the KAFAS control unit in interaction with the ZGM, ICM and SZL.

The ICM is always included in the control of the vibration actuator so that, in vehicles equipped with both the optional lane change warning and the lane departure warning, the driver is able to distinguish between the warnings of these similar systems.

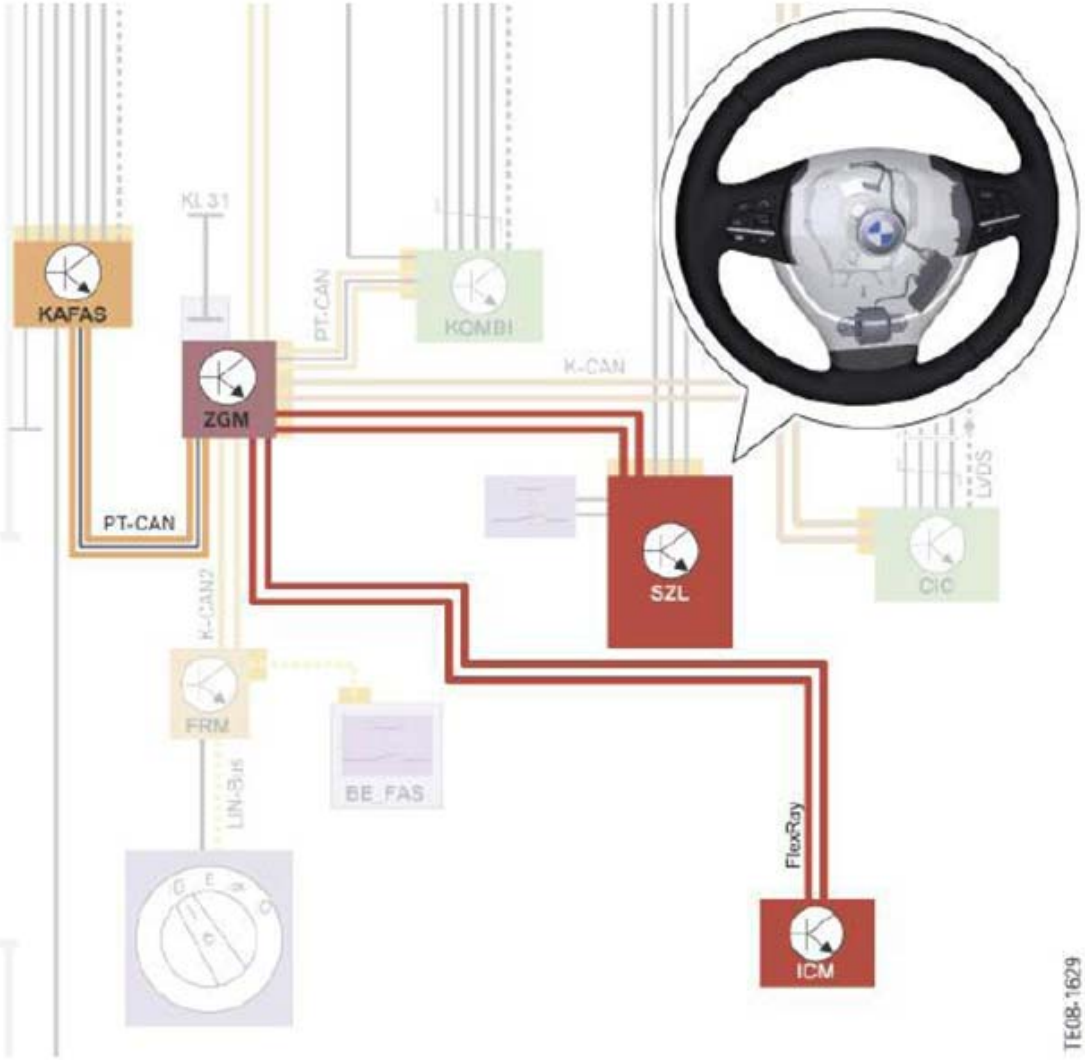


Fig. 122: Control Of Lane Departure Warning Vibration Actuator On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

LANE DEPARTURE WARNING VIBRATION ACTUATOR CONTROLS REFERENCE CHART

Index	Explanation
KAFAS	KAFAS control unit
ZGM	Central gateway module
SZL	Steering column switch cluster
ICM	Integrated Chassis Management

The fundamental prerequisites for system activation and ready state are:

- Road speed higher than 40 mph.
- Left lane, right lane or both lanes are detectable by the system with a sufficient level of certainty.

The local roadway markings, environmental conditions and the physical limitations of an optical system must all be taken into consideration

- The lane departure warning system has been calibrated correctly (see "**SERVICE INFORMATION**").
- There is no fault in the system.

High-beam Assistant

The high-beam assistant (FLA) assists the customer in the use of the high-beam headlights. Depending on the traffic situation, the prevailing ambient light conditions and which lights on the vehicle have been switched on, the FLA switches on the high-beam headlights automatically and thereby relieves the customer of having to switch the high-beam headlights on manually.

High-beams can still be switched on and off manually as usual. The driver always has the capability, and indeed the obligation, to override the system whenever the situation requires it.

HIGH-BEAM ASSISTANT LEGENDS

Index	Explanation
1	Steering column stalk
2	High-beam assistant button
3	Display when high-beam assistant activated
4	Display when high-beam headlights on



Fig. 123: Display High-Beam Assistant Button
Courtesy of BMW OF NORTH AMERICA, INC.

In the F01/F02, the high-beam assistant option is implemented differently depending on the equipment combination.

In combination with the lane departure warning, the high-beam assistant function shares the same video camera and the same KAFAS control unit.

High-beam assistant with the video camera of the lane departure warning and the KAFAS control unit in the F01/F02

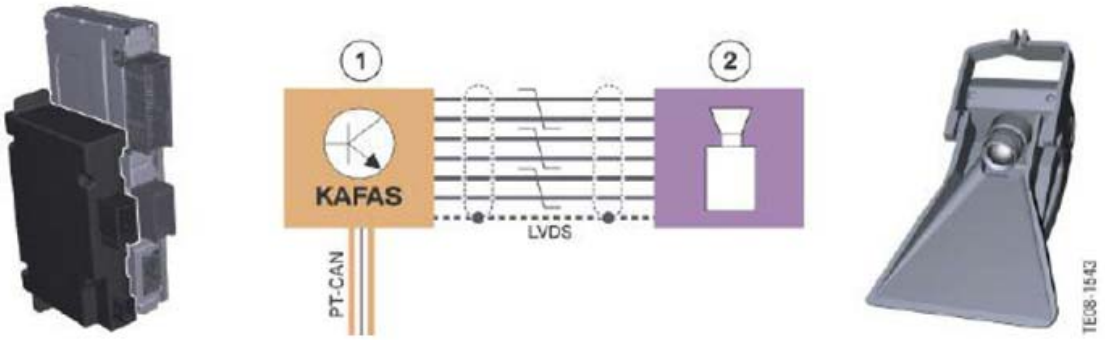


Fig. 124: Identifying KAFAS Control Unit With PT-CAN And Lane Departure Warning Camera With LVDS
Courtesy of BMW OF NORTH AMERICA, INC.

KAFAS CONTROL UNIT REFERENCE CHART

Index	Explanation
1	KAFAS control unit with connection to vehicle electrical system on PTCAN
2	Video camera for lane departure warning and high-beam assistant. The image data sent from the video camera to the KAFAS control unit along the LVDS data line

Operation and Indication

In order for the driver to be able to activate and use the high-beam assistant, the light switch must first be set to Automatic or light switch position II.

In the F01/F02, the high-beam assistant has its own activation button in the turn signal/high-beam stalk on the steering column.

While the high-beam assistant can be activated at any time with the light switch in position II, there is an additional prerequisite in the Automatic position whereby the automatic driving lights controller must have already switched on the lights.



Fig. 125: Display Light Switch On Position A

Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 126: Display Light Switch On Position II
Courtesy of BMW OF NORTH AMERICA, INC.

HIGH-BEAM ASSISTANT BUTTONS REFERENCE CHART

Index	Explanation
1	Turn signal/high-beam stalk on the steering column in the F01/F02
2	High-beam assistant on/off button

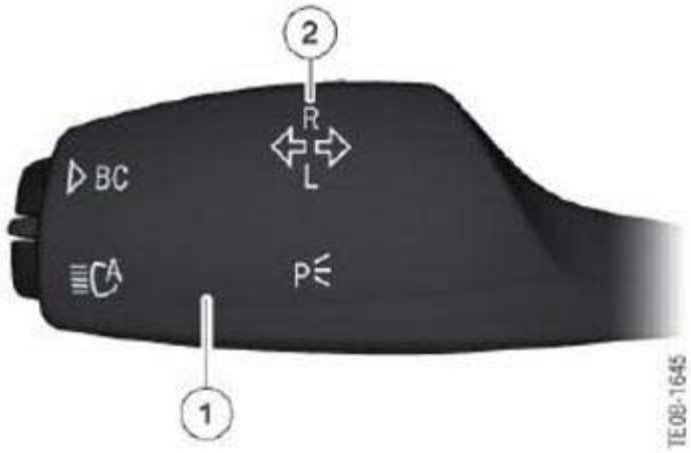


Fig. 127: Identifying High-Beam Assistant And Turn Signal/High-Beam Stalk On Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

An active system is indicated by the following symbol in the instrument cluster.



Fig. 128: Display High-Beam Assistant Activated On Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Depending on the traffic situation, the prevailing ambient light conditions and which lights on the vehicle have been switched on, the high-beam headlights of the vehicle are switched on or off automatically by the footwell module at the request/activation recommendation of the KAFAS control unit.



Fig. 129: Display High-Beam Headlights On Screen
Courtesy of BMW OF NORTH AMERICA, INC.

The switching on and off of the high-beam headlights is indicated by the conventional symbol in the instrument cluster.

Detection of Light in the Field of View of the Video Camera

The video cameras monitor the area ahead of the vehicle for light sources. Vehicles travelling in front and oncoming traffic become recognizable at distances of up to approximately 400m/437yd. The detection range of the video camera is approximately 1, 000m/1093yd. The video camera has a horizontal viewing angle of approximately 15° to the left and right and a vertical viewing angle of approximately 5° up and down.

When active, these special video cameras capture dots of light and, in the process, are able to distinguish between various parameters, e.g. light color and light intensity.

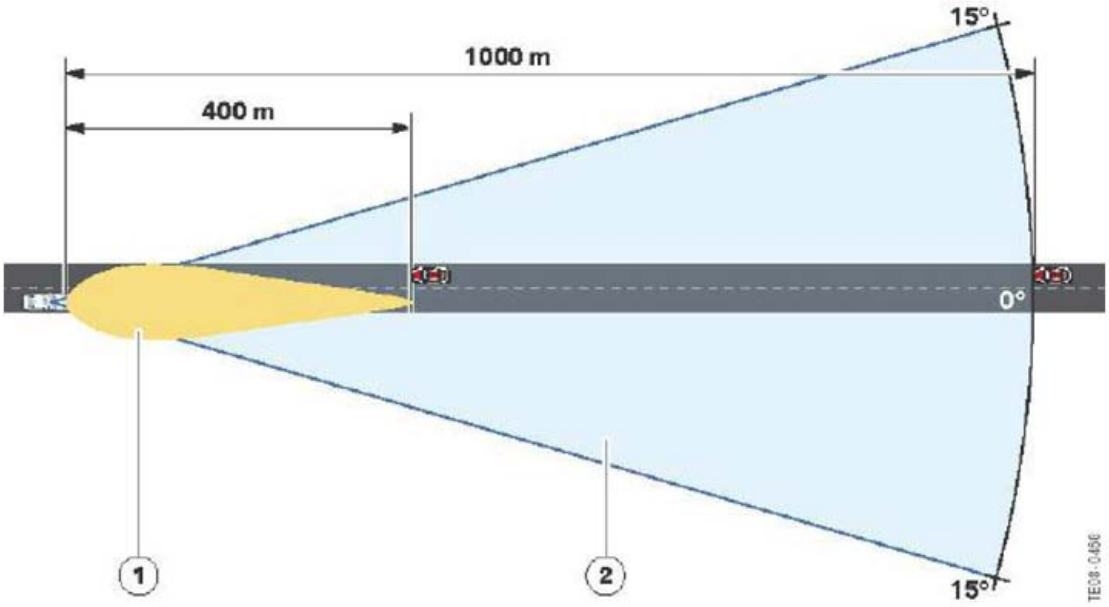


Fig. 130: Field View Of Video Camera On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

VIDEO CAMERA RANGE REFERENCE CHART

Index	Explanation
1	Recognition range
2	Detection range

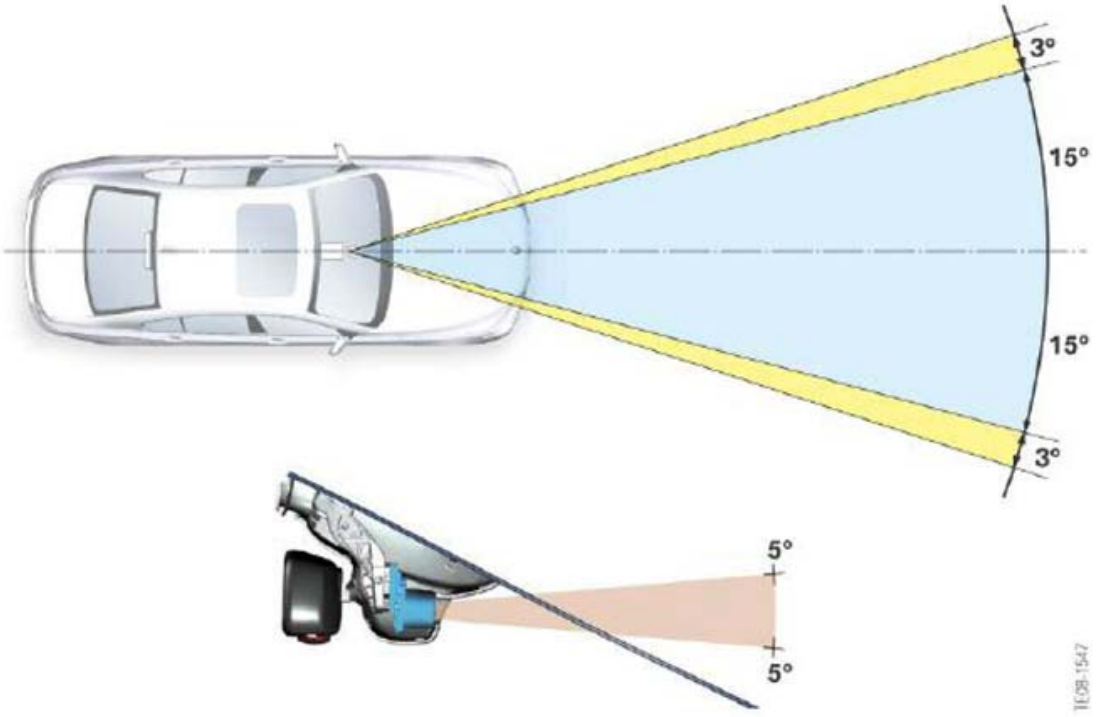


Fig. 131: Horizontal/Vertical Field View Of Video Camera On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

Evaluation of Image Data

The various dots, colors and intensities of light captured by the camera are evaluated by the control unit and, based on the control unit's assessment, a switch-on or switch-off recommendation is sent from the KAFAS control unit to the footwell module.

In addition to the switch-on/switch-off recommendation, road speed is also taken into account.

At speeds below 24mph, the FLA is switched off; at speeds higher than 31mph, it may be switched on, depending on all other parameters.

If the vehicle is in an environment with adequate light, the high-beam headlights do not switch on. The KAFAS control unit sends a switch-off recommendation to the footwell module.

These conditions could be:

- Daylight
- Twilight
- Road lighting
- Illuminated places

The system is designed to switch off the high-beam headlights automatically in response to the following conditions.

- Oncoming traffic
- Preceding traffic
- Detection of background brightness (twilight, street lamps, illuminated places, etc.)
- Driving speed too low

Control of the High-beam Headlights

At the request of the FLA (KAFAS) control unit, the actual switching on and off of the high-beam headlights is always carried out by the footwell module, which is responsible for all of the exterior lighting.

The FLA control unit uses its own image data to assess background brightness.

The decision of the FRM to activate the dipped-beam headlights in A mode is made in the FRM independently of the FLA function. The FRM receives the light signal from the RLSS.

System limitations

In various situations, and under specific environmental conditions, the limitations of a camera-based system begin to impact on functionality.

These limitations may be reached in the following situations.

- Extremely bad weather conditions (e.g. fog or heavy snowfall).
- Poorly illuminated road users (e.g. riders on small motorcycles, cyclists, pedestrians).
- Individual driving situations (e.g. sharp bends, steep hills, traffic coming at right angles from left or right).
- Differentiation between different light sources, reflective traffic signs, etc.
- No recognition of oncoming traffic is possible if only the cone of light is within the video camera's field of view.
- Recognition is possible only if the light source itself is within the field of view of the video camera.

The driver is able to intervene at any time and override the assistance system by switching the high-beam headlights on and off manually.

The driver always bears sole responsibility for the vehicle and the control of the vehicle's lighting.

SERVICE INFORMATION

Lane Departure Warning

The lane departure warning can be ordered has been available:

- Since 03/07 in the
  - E60
  - E61 and
- Since 09/07 in the
  - E63
  - E64

In the event of a replacement of components, the different features of the variants as described in the parts catalogue, and the instructions for the necessary coding and calibration routines stored in the diagnostics and programming system must be observed.

You will also find information on the lane departure warning in the "E60/E61 Lane departure warning" training Information.

High-beam Assistant

The high beam assistant was introduced for the first time in the E60, E61, E63 LCI, E64 LCI BMW models from 2007 Model Year.

The high-beam assistant is not available separately for the F01/F02 and is part of the ZDA Driver Assistance Package option.

Low-sensitivity Mode

A low-sensitivity mode has been implemented in order to comply with the US statutory requirements. In this mode, the sensors are less sensitive.

To activate this mode, the driver must press the turn signal stalk on the steering column forwards for 10 seconds with the vehicle stationary, the lights switched off and terminal 15 ON.

As soon as the high-beam assistant is activated, the driver receives a Check Control message indicating that low-sensitivity mode is active.

The high-beam assistant reverts to its basic state following a power cycle.

Check Control Indicator

The Check Control may display messages under the conditions described below.

CHECK CONTROL INDICATOR REFERENCE CHART

Cause	Condition	Sending unit
Hardware/software defect	"Internal fault"	FLA or footwell module
Sensor field covered	FLA detects covered windshield	FLA

CHECK CONTROL MESSAGES REFERENCE CHART

Check Control message	Condition	Information in Central Information Display
	High-beam assistant not active	High-beam assistant not active. Sensor field covered. Manual activation and deactivation of high-beam.
	High-beam assistant defective	High-beam assistant defective. Have the system checked by the nearest BMW Service.

		
	Sensitivity adjusted	High-beam assistant sensitivity adjusted for automatic high-beam headlights. Possible risk of dazzling oncoming vehicles.

PARK DISTANCE CONTROL

INTRODUCTION

With the F01/F02, the customer is able to choose from a comprehensive range of optional driver assistance systems.

The individual systems and function units are becoming ever more densely networked as a result of the shared use of components, signals and displays in some areas.

These are the optionally available combinations:

- PDC
- Rear-view Camera
- Side View Camera

Park Distance Control (PDC) is standard equipment on the F01/F02, with the ZCE Camera Package available as an option. The Camera Package includes the Rear-view Camera and the Side View Cameras. The TRSVC

control unit is used to manage the different video feeds and display them on the CID in combination with PDC functions.

TRSVC stands for Top Rear Side View Camera diver assistance system.

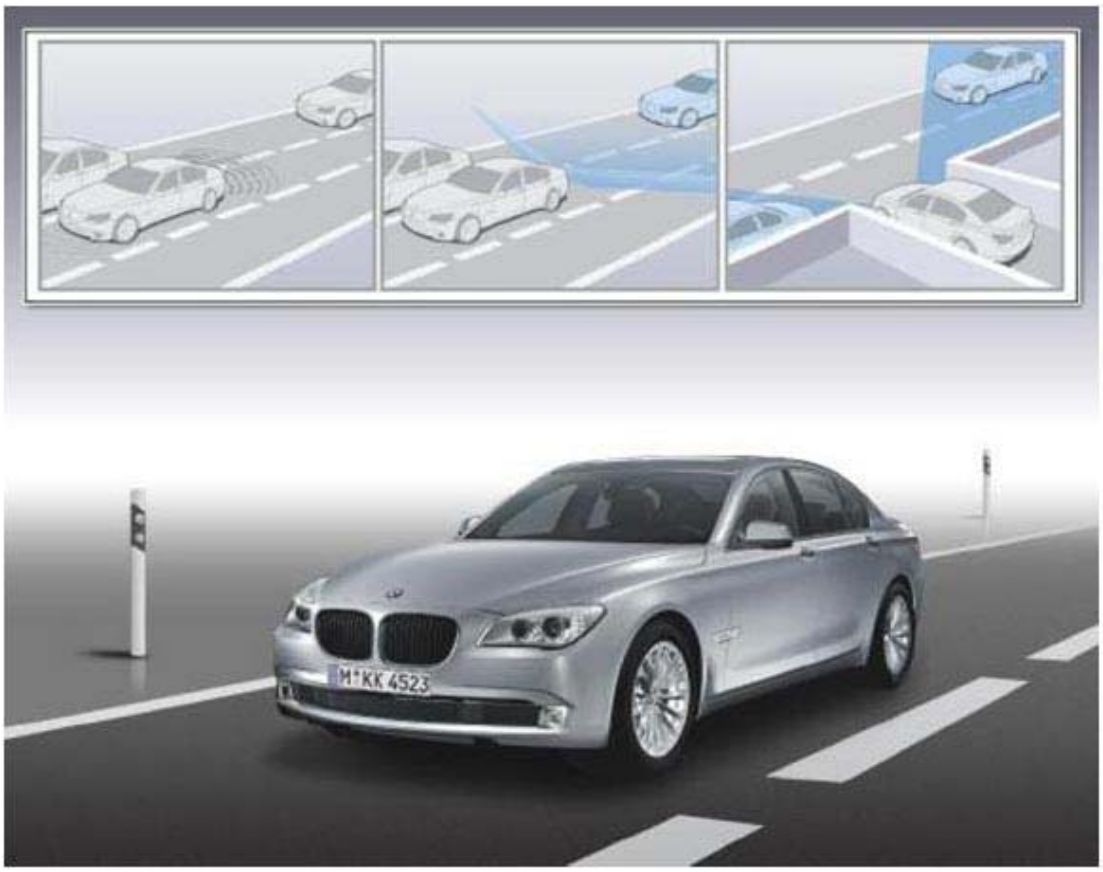


Fig. 132: Top Rear Side View Camera Diver Assistance System
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM OVERVIEW

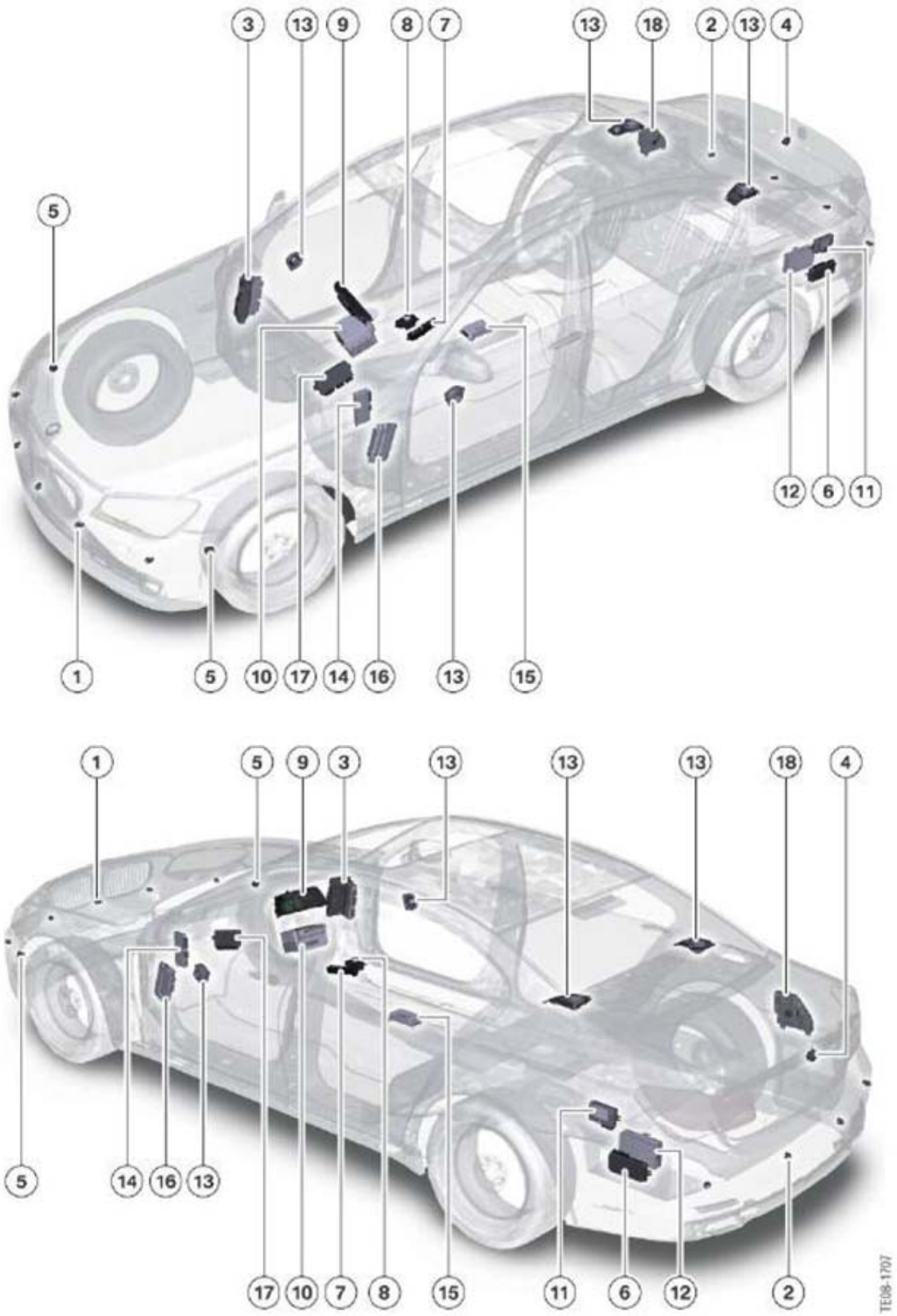


Fig. 133: PDC, Rear View Camera, Side View

Courtesy of BMW OF NORTH AMERICA, INC.

PARK DISTANCE CONTROL LEGENDS

Index	Explanation
1	Park Distance Control (PDC) - Five ultrasonic sensors in the front bumper
2	Park Distance Control (PDC) - Four ultrasonic sensors in the rear bumper
3	Junction box electronics with integrated PDC control unit
4	Rear view camera
5	Side View cameras, left/right
6	TRSVC control unit (Top Rear side View Camera)
7	PDC/rear view camera on/off button and Side View on/off button
8	Controller Control unit for PDC/rear view camera on/off button and Side View on/off button
9	Central Information Display (CID) for displays of PDC/rear view camera/Side View
10	Car Information Computer (CIC) data preparation for displays in the CI
11	Video switch (VSW)
12	Audio amplifier (HiFi) - Audible Distance Warning (PDC)
13	Loudspeakers front left/front right rear left/rear right - Audible Distance Warning (PDC)
14	Central gateway module (ZGM)
15	Integrated Chassis Management (ICM) road-speed signal
16	Footwell module (FRM)
17	Car Access System (CAS)
18	Rear distribution box, luggage compartment

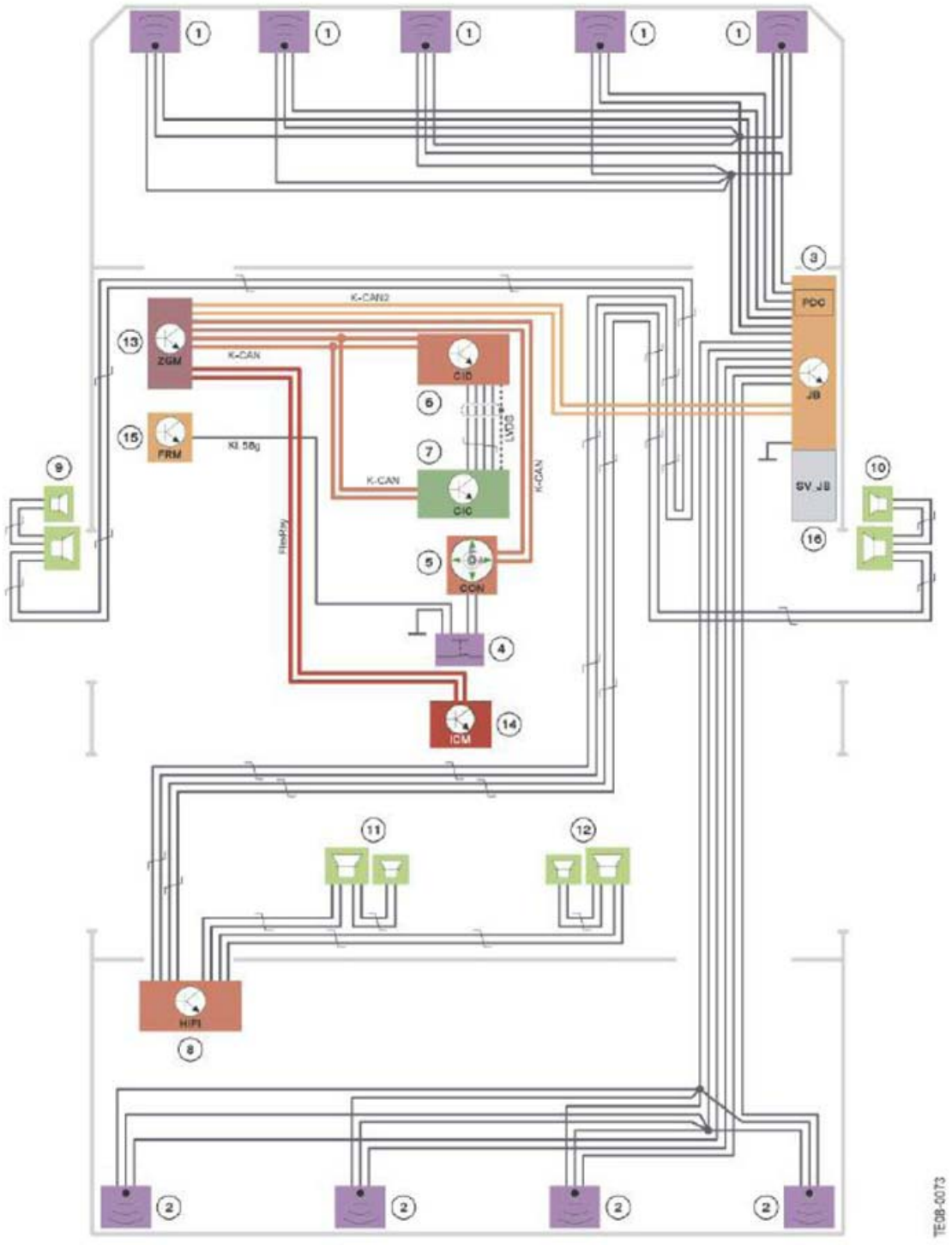


Fig. 134: PDC System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

PARK DISTANCE CONTROL LEGENDS

Index	Explanation
1	Five ultrasonic sensors in the front bumper

2	Four ultrasonic sensors in the rear bumper
3	Junction box electronics with integrated PDC control unit
4	PDC on/off button
5	Controller control unit with PDC on/off button
6	Central Information Display (CID) for PDC displays
7	Car Information Computer (CIC) data preparation for displays in the CID
8	Audio amplifier (HiFi) - Audible distance warning (PDC)
9	Loudspeaker, front left - Audible distance warning (PDC)
10	Loudspeaker, front right - Audible distance warning (PDC)
11	Loudspeaker, rear left - Audible distance warning (PDC)
12	Loudspeaker, rear right - Audible distance warning (PDC)
13	Central gateway module (ZGM) 14 Integrated Chassis Management (ICM) road-speed signal
15	Footwell module
16	Junction box electronics, front distribution box

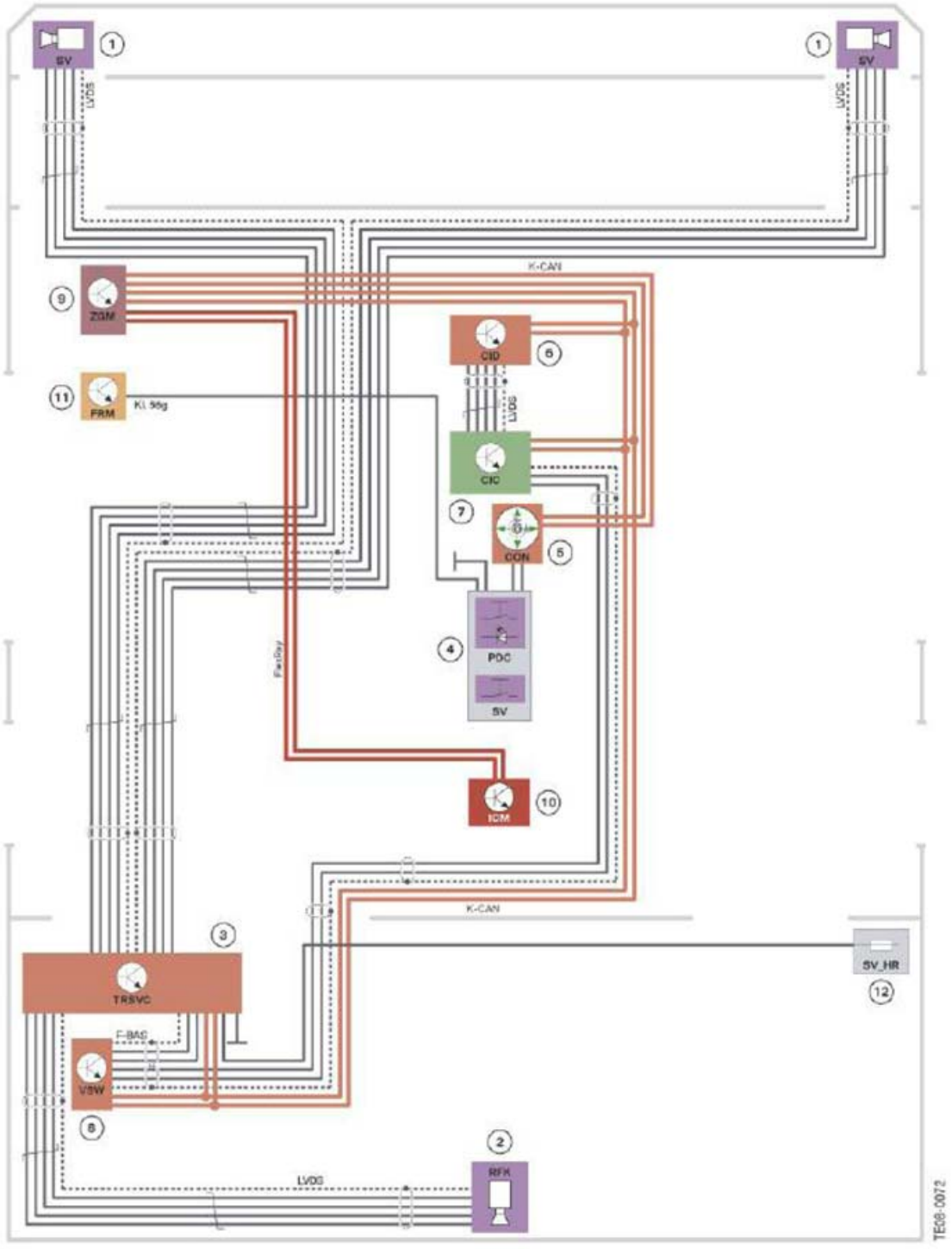


Fig. 135: Rear View And Side View Cameras Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

PARK DISTANCE CONTROL LEGENDS

Index	Explanation

1	Side View cameras, left/right
2	Rear view camera
3	TRSVC control unit (Top Rear Side View Camera)
4	PDC on/off button and Side View on/off button
5	Controller PDC/rear view camera on/off button and Side View on/off button
6	Central Information Display (CID) for displays of PDC/rear view camera/Side View
7	Car Information Computer (CIC) data preparation for displays in the CID
8	Video switch (VSW)
9	Central gateway module (ZGM)
10	Integrated Chassis Management (ICM) road-speed signal
11	Control unit for Footwell module (FRM)
12	Distribution box, luggage compartment

SYSTEM COMPONENTS

Park Distance Control

The Park Distance Control of the F01/F02 is identifiable by the five ultrasonic sensors on the front bumper. The fifth sensor enables a high level of reliability in obstacle recognition to be achieved despite the large front end of the F01.



Fig. 136: F01/F02 Front Bumper With Five Park Distance Control Ultrasonic Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

In the F01, the PDC control unit function has been integrated into the junction box electronics for the first time.



Fig. 137: Identifying PDC Ultrasonic Sensor
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 138: Identifying Junction Box Electronics And Front Distribution Box
Courtesy of BMW OF NORTH AMERICA, INC.

PDC CONTROL UNIT FUNCTION CHART

Index	Explanation
1	Junction box electronics with integrated PDC control unit
2	Front distribution box

Rear View Camera

In the F01, the optional rear view camera requires the vehicle to have been equipped with the PDC option. The rear view camera is located to the right of the recessed handle on the luggage compartment lid.



Fig. 139: Rear View Camera Located To Right On Luggage Compartment Lid
Courtesy of BMW OF NORTH AMERICA, INC.

Side View

The F01/F02 is the first of BMW's vehicles to feature the new Side View Camera.

The function is realized by two digital cameras, one on the front right wheel housing and one on the front left wheel housing. They make it easier for the driver to pull into roads and junctions in which the driver's view to the side is obstructed.

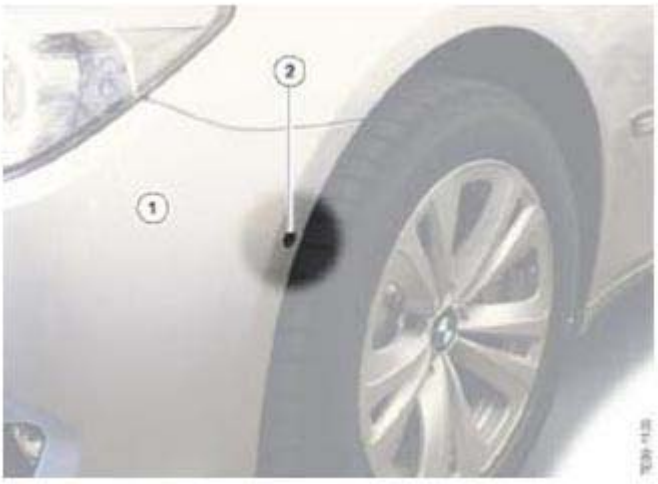


Fig. 140: Identifying Rear View And Side View Camera
Courtesy of BMW OF NORTH AMERICA, INC.

BMW SIDE VIEW CAMERA REFERENCE CHART

Index	Explanation
1	Bumper, front wheel housing
2	Side View camera, left

The driver can activate the Side View cameras using a button in the control panel next to the gear selector lever.

BMW SIDE VIEW CAMERA REFERENCE CHART

Index	Explanation
1	PDC and rear view camera on/off button
2	Side View button



Fig. 141: Identifying Buttons On Center Console Control Panel
Courtesy of BMW OF NORTH AMERICA, INC.

The camera images are shown in the CID in splitscreen view up to a road speed of 30 km/h/19mph.

Like the rear view camera, the two side view cameras send their video signals to the TRSVC control unit along LVDS data lines.

The signals are forwarded along CVBS lines to the video switch VSW and CIC. The CIC sends image data to the CID along LVDS data lines.

The CID is where the image data are displayed.

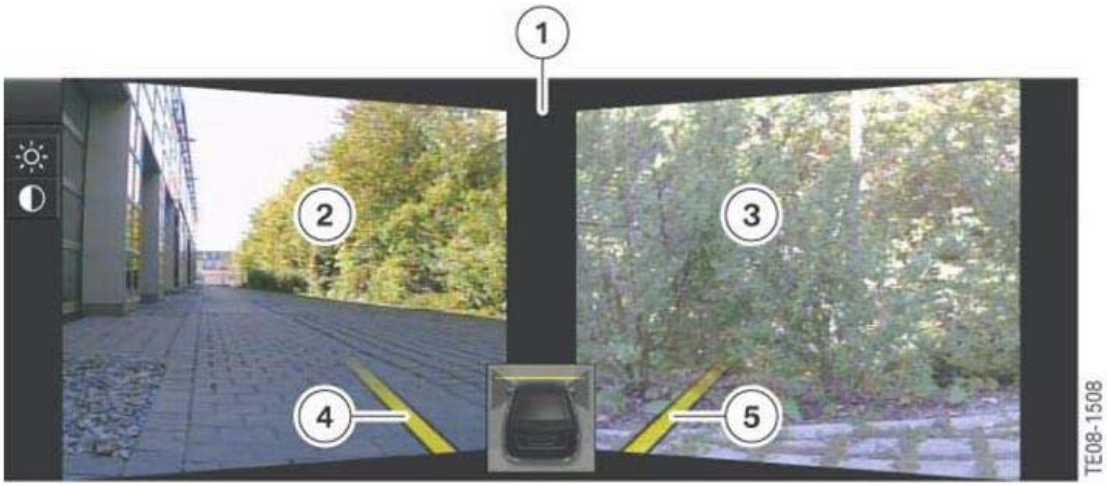


Fig. 142: Display Camera Images On CID Screen
Courtesy of BMW OF NORTH AMERICA, INC.

SIDE VIEW IMAGES REFERENCE CHART

Index	Explanation
1	Splitscreen images from the Side View cameras
2	Splitscreen images from the Side View camera on the left-side wheel housing
3	Splitscreen images from the Side View camera on the right-side wheel housing
4	Projected front of vehicle, view to left
5	Projected front of vehicle, view to right

SYSTEM FUNCTIONS

Park Distance Control

PDC is activated in response to the engagement of reverse gear or the operation of the PDC button next to the gear selector switch.



Fig. 143: Identifying PDC And Rear View Camera ON/OFF And Side View Function Button
Courtesy of BMW OF NORTH AMERICA, INC.

PDC AND REAR VIEW CAMERA REFERENCE CHART

Index	Explanation
1	PDC and rear view camera on/off button
2	Side View button

The audible and visual distance warnings (the results of distance measurements) given to the driver are provided by the audio loudspeakers and by displays in the CID respectively.

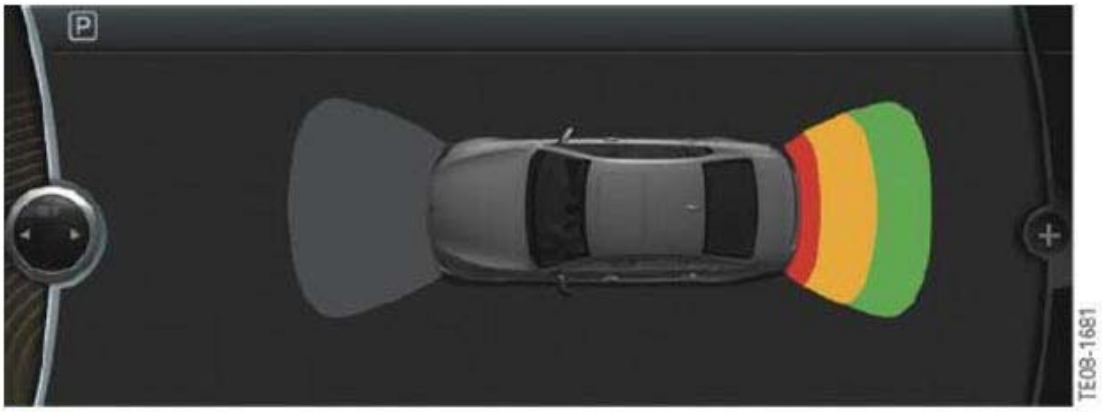


Fig. 144: Display Distance Warning PDC On Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Rear View Camera

With the PDC and rear view camera equipment combination, the controller and the operating menu can be used to toggle between the basic PDC display and the rear view camera image with PDC.



Fig. 145: Display Distance Warning PDC With Rear View Camera Image On Screen
Courtesy of BMW OF NORTH AMERICA, INC.

REAR VIEW CAMERA IMAGE WITH PDC REFERENCE CHART

Index	Explanation
1	Distance warning (PDC) display with option to select rear view camera image
2	Rear view camera image and distance warning (PDC)

To assist the driver, the rear view camera image contains turning-circle lines, lane/parking-aid lines, obstacle markings and, where applicable, zoomed views of the trailer coupling.

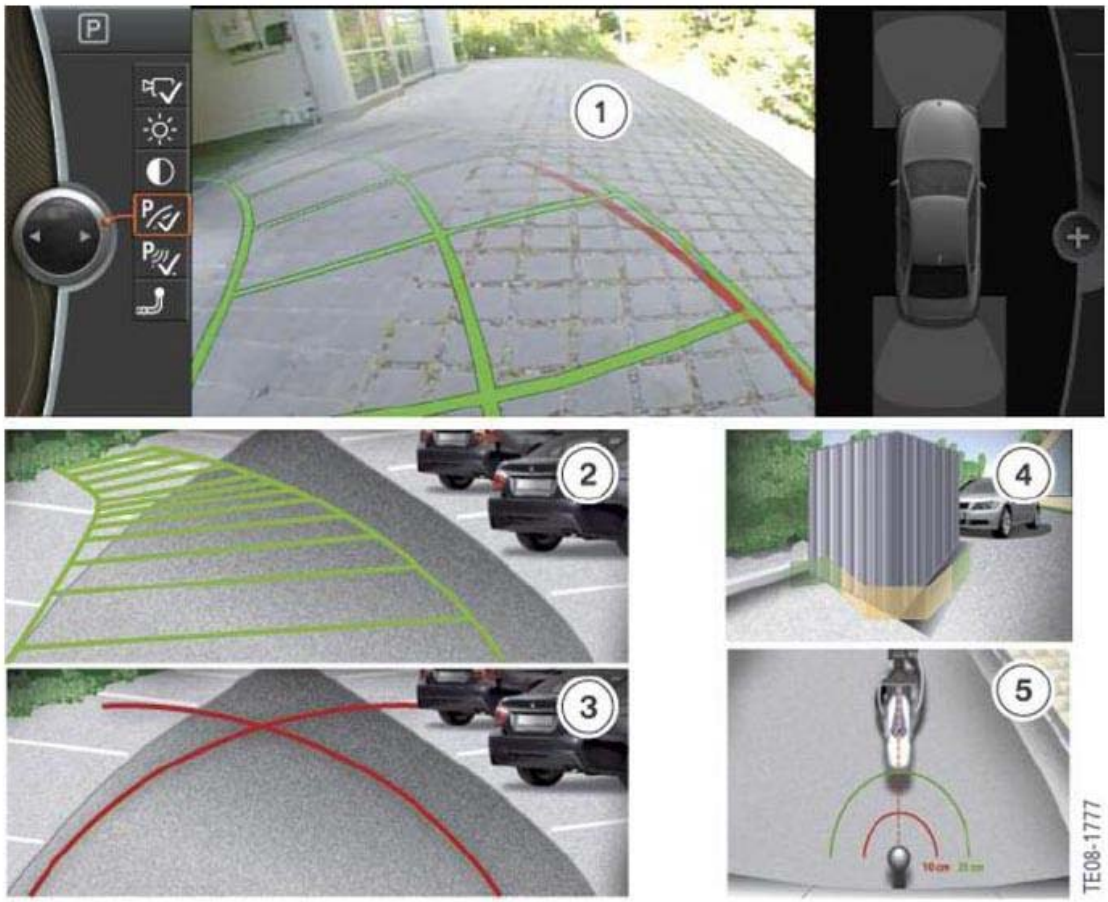


Fig. 146: Overview Of Rear View Camera Assistance Functions
Courtesy of BMW OF NORTH AMERICA, INC.

REAR VIEW CAMERA ASSISTANCE FUNCTION CHART

Index	Explanation
1	Image showing example of a parking-aid line
2	Parking-aid line assistance function
3	Turning-circle line assistance function
4	Obstacle marking assistance function
5	Zoomed trailer coupling assistance function (Not for US)

The rear view camera is deactivated automatically as soon as the vehicle exceeds 12 mph or a distance of 20 m in a forward gear.



Fig. 147: Display Distance Warning With PDC And Rear View Camera Image On Screen
Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INFORMATION

Park Distance Control

During the installation of license plates, license plate carriers and baseplates, care must be taken not to cover the center sensor in the front bumper. Obstructions caused by license plate carriers or even deposits of dirt, snow and ice on the carriers could impair the operation of the center sensor.



Fig. 148: Identifying F01/F02 Front Bumper With Ultrasonic Sensor And License Plate Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

ULTRASONIC SENSOR AND LICENSE PLATE REFERENCE CHART

Index	Explanation
1	Ultrasonic sensor in center of front bumper
2	License plate carrier

NOTE: The procedure for calibrating the rear view camera is based on the E70 rear view camera calibration procedure.

DTC INDEX

N63

SELF-DIAGNOSTICS DTCS

SELF-DIAGNOSTICS DIAGNOSTIC TROUBLE CODE (DTC) LIST

DTC	Description
DTC P11AA	Throttle tight (Bank 1)
DTC P061F	Internal Control Module Throttle Actuator Controller Performance
DTC P11AA	Throttle tight (Bank 1)
DTC P11AB	Throttle tight (Bank 2)
DTC P2100	Throttle Actuator 'A' Control Motor Circuit/Open
DTC P1671	Internal Control Module Throttle Actuator Controller 2 Performance
DTC P210A	Throttle Actuator 'B' Control Motor Circuit/Open
DTC P16D0	Throttle Valve Position Control Throttle Stuck (Bank 1)
DTC P16D1	Throttle Valve Position Control Throttle Stuck (Bank 2)
DTC P110D	Throttle Position Sensor A and B Circuit Range/Performance (Bank 1)
DTC P1417	Throttle Control Incorrect Air Supply (Bank 1)
DTC P11BD	Throttle Position Sensor A and B Circuit Range/Performance (Bank 2)
DTC P1455	Throttle Control Incorrect Air Supply (Bank 2)
DTC P0121	Throttle/Pedal Position Sensor/Switch 'A' Circuit Range/Performance
DTC P1141	Value Comparison Throttle Position Sensor 1 / Hot Film Air Mass Meter (Bank 1)
DTC P0226	Throttle/Pedal Position Sensor/Switch 'C' Circuit Range/Performance
DTC P1163	Value Comparison Throttle Position Sensor 1 / Hot Film Air Mass Meter (Bank 2)
DTC P0221	Throttle/Pedal Position Sensor/Switch 'B' Circuit Range/Performance
DTC P1162	Value Comparison Throttle Position Sensor 2 / Hot Film Air Mass Meter (Bank 1)
DTC P1142	Value Comparison Throttle Position Sensor 2 / Hot Film Air Mass Meter (Bank 2)
DTC P212B	Throttle Position Sensor/Switch 'G' Circuit Range/Performance
DTC P0123	Throttle/Pedal Position Sensor/Switch 'A' Circuit High
DTC P0122	Throttle/Pedal Position Sensor/Switch 'A' Circuit Low
DTC P0228	Throttle/Pedal Position Sensor/Switch 'C' Circuit High
DTC P0227	Throttle/Pedal Position Sensor/Switch 'C' Circuit Low
DTC P0223	Throttle/Pedal Position Sensor/Switch 'B' Circuit High
DTC P0222	Throttle/Pedal Position Sensor/Switch 'B' Circuit Low
DTC P212D	Throttle Position Sensor/Switch 'G' Circuit High
DTC P212C	Throttle Position Sensor/Switch 'G' Circuit Low
DTC P1632	Throttle Valve Adaptation Conditions Not Met (Bank 1)

DTC P1633	Throttle Valve Adaptation Limp-Home Position Unknown (Bank 1)
DTC P16BC	Throttle Valve Adaptation Lower Stop Not Learned (Bank 1)
DTC P16AA	Throttle Valve Adaptation Conditions Not Met (Bank 2)
DTC P16AB	Throttle Valve Adaptation Limp-Home Position Unknown (Bank 2)
DTC P16BD	Throttle Valve Adaptation Lower Stop Not Learned (Bank 2)
DTC P169B	Throttle Valve Adaptation Lower Mechanical Stop Out of Range (Bank 1)
DTC P16BE	Throttle Valve Adaptation Error Lower Return Spring (Bank 1)
DTC P16CC	Throttle Valve Adaptation Upper Desired Position Not Reached (Bank 1)
DTC P16CA	Throttle Valve Adaptation Error Upper Return Spring (Bank 1)
DTC P169C	Throttle Valve Adaptation Lower Mechanical Stop Out of Range (Bank 2)
DTC P16BF	Throttle Valve Adaptation Error Lower Return Spring (Bank 2)
DTC P16CD	Throttle Valve Adaptation Upper Desired Position Not Reached (Bank 2)
DTC P16CB	Throttle Valve Adaptation Error Upper Return Spring (Bank 2)
DTC P16BB	Throttle Valve Actuator Start Test Spring Test Failed (Bank 2)
DTC P16AD	Throttle Valve Actuator Start Test Limp-Home Position Failed (Bank 2)
DTC P16BA	Throttle Valve Actuator Start Test Spring Test Failed (Bank 1)
DTC P169A	Throttle Valve Actuator Start Test Limp-Home Position Failed (Bank 1)
DTC P115F	Throttle/Pedal Position Sensor/Switch 'A' / 'B' Synchronous Operation Correlation (Bank 1)
DTC P117E	Throttle/Pedal Position Sensor/Switch 'A' / 'B' Synchronous Operation Correlation (Bank 2)
DTC P112F	Manifold Absolute Pressure to Throttle Angle -Too High (Bank 1)
DTC P112E	Manifold Absolute Pressure to Throttle Angle -Too Low (Bank 1)
DTC P00BD	Mass or Volume Air Flow 'A' Circuit Range/Performance - Air Flow Too High
DTC P00BC	Mass or Volume Air Flow 'A' Circuit Range/Performance - Air Flow Too Low
DTC P00BC	Mass or Volume Air Flow 'A' Circuit Range/Performance - Air Flow Too Low
DTC P00BD	Mass or Volume Air Flow 'A' Circuit Range/Performance - Air Flow Too High
DTC P00BE	Mass or Volume Air Flow 'B' Circuit Range/Performance - Air Flow Too Low
DTC P00BF	Mass or Volume Air Flow 'B' Circuit Range/Performance - Air Flow Too High
DTC P0103	Mass or Volume Air Flow Sensor 'A' Circuit High
DTC P0102	Mass or Volume Air Flow Sensor 'A' Circuit Low
DTC P010D	Mass or Volume Air Flow Sensor 'B' Circuit High
DTC P010C	Mass or Volume Air Flow Sensor 'B' Circuit Low
DTC P00BF	Mass or Volume Air Flow 'B' Circuit Range/Performance - Air Flow Too High
DTC P00BE	Mass or Volume Air Flow 'B' Circuit Range/Performance - Air Flow Too Low
DTC P0103	Mass or Volume Air Flow Sensor 'A' Circuit High
DTC P0102	Mass or Volume Air Flow Sensor 'A' Circuit Low
DTC P010D	Mass or Volume Air Flow Sensor 'B' Circuit High
DTC P010C	Mass or Volume Air Flow Sensor 'B' Circuit Low
DTC P00BC	Mass or Volume Air Flow 'A' Circuit Range/Performance - Air Flow Too Low
DTC P00BD	Mass or Volume Air Flow 'A' Circuit Range/Performance - Air Flow Too High

DTC P00BE	Mass or Volume Air Flow 'B' Circuit Range/Performance - Air Flow Too Low
DTC P00BF	Mass or Volume Air Flow 'B' Circuit Range/Performance - Air Flow Too High
DTC P2123	Throttle/Pedal Position Sensor/Switch 'D' Circuit High
DTC P2122	Throttle/Pedal Position Sensor/Switch 'D' Circuit Low
DTC P2128	Throttle/Pedal Position Sensor/Switch 'E' Circuit High
DTC P2127	Throttle/Pedal Position Sensor/Switch 'E' Circuit Low
DTC P1224	Pedal Position Sensor 1 and 2 Circuit Range/Performance
DTC P2138	Throttle/Pedal Position Sensor/Switch 'D' / 'E' Voltage Correlation
DTC P12A5	Manifold Absolute Pressure Sensor 'A' Afterrunning Diagnosis Pressure Too High
DTC P12A4	Manifold Absolute Pressure Sensor 'A' Afterrunning Diagnosis Pressure Too Low
DTC P0108	Manifold Absolute Pressure/Barometric Pressure Sensor Circuit High
DTC P119A	Manifold Absolute Pressure Sensor Circuit High (Bank 1)
DTC P0107	Manifold Absolute Pressure/Barometric Pressure Sensor Circuit Low
DTC P119B	Manifold Absolute Pressure Sensor Circuit Low (Bank 1)
DTC P11AE	Manifold Absolute Pressure/Barometric Pressure Sensor Circuit High (Bank 2)
DTC P11AF	Manifold Absolute Pressure/Barometric Pressure Sensor Circuit Low (Bank 2)
DTC P12A7	Manifold Absolute Pressure Sensor 'B' Afterrunning Diagnosis Pressure Too High
DTC P12A6	Manifold Absolute Pressure Sensor 'B' Afterrunning Diagnosis Pressure Too Low
DTC P2229	Barometric Pressure Sensor 'A' Circuit High
DTC P2228	Barometric Pressure Sensor 'A' Circuit Low
DTC P11CB	Barometric Pressure Too High
DTC P321E	Ambient Pressure Sensor Maximum Pressure Implausible
DTC P0129	Barometric Pressure Too Low
DTC P321F	Ambient Pressure Sensor Minimum Pressure Implausible
DTC P12B9	Ambient Pressure Sensor Afterrunning Diagnosis Pressure Too High
DTC P12B8	Ambient Pressure Sensor Afterrunning Diagnosis Pressure Too Low
DTC P11B1	Manifold Absolute Pressure to Throttle Angle - Too High (Bank 2)
DTC P10C7	Internal Mass or Volume Air Flow Sensor 'A' Error
DTC P10C8	Internal Mass or Volume Air Flow Sensor 'B' Error
DTC P0113	Intake Air Temperature Sensor 1 Circuit High (Bank 1)
DTC P0112	Intake Air Temperature Sensor 1 Circuit Low (Bank 1)
DTC P00AD	Intake Air Temperature Sensor 1 Circuit High (Bank 2)
DTC P00AC	Intake Air Temperature Sensor 1 Circuit Low (Bank 2)
DTC P111E	Intake Air Temperature Sensor 1 Maximum Temperature Implausible (Bank 1)
DTC P111F	Intake Air Temperature Sensor 1 Minimum Temperature Implausible (Bank 1)
DTC P113C	Intake Air Temperature Sensor 1 Signal Stuck (Bank 1)
DTC P117F	Intake Air Temperature 1 Too High (Bank 2)

DTC P118F	Intake Air Temperature 1 Minimum Too Low (Bank 2)
DTC P11B2	Intake Air Temperature Sensor 1 Signal Stuck (Bank 2)
DTC P007D	Charge Air Cooler Temperature Sensor Circuit High (Bank 1)
DTC P007C	Charge Air Cooler Temperature Sensor Circuit Low (Bank 1)
DTC P00A3	Charge Air Cooler Temperature Sensor Circuit High (Bank 2)
DTC P00A2	Charge Air Cooler Temperature Sensor Circuit Low (Bank 2)
DTC P10B0	Charge Air Cooler Temperature Too High (Bank 1)
DTC P10B1	Charge Air Cooler Temperature Too Low (Bank 1)
DTC P10B8	Charge Air Cooler Temperature Sensor Signal Stuck (Bank 1)
DTC P10B2	Charge Air Cooler Temperature Too High (Bank 2)
DTC P10B3	Charge Air Cooler Temperature Too Low (Bank 2)
DTC P10B9	Charge Air Cooler Temperature Sensor Signal Stuck (Bank 2)
DTC P0118	Engine Coolant Temperature Sensor 1 Circuit High
DTC P0117	Engine Coolant Temperature Sensor 1 Circuit Low
DTC P316B	Engine Coolant Temperature Signal Stuck Low
DTC P3199	Engine Coolant Temperature Signal Stuck
DTC P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance
DTC P3198	Engine Coolant Temperature 1 Gradient Too High
DTC P316A	Engine Coolant Temperature Signal Stuck High
DTC P00B4	Radiator Coolant Temperature Sensor Circuit High
DTC P00B3	Radiator Coolant Temperature Sensor Circuit Low
DTC P00B2	Radiator Coolant Temperature Sensor Circuit Range/Performance
DTC P3197	Radiator Coolant Temperature Gradient Too High
DTC P316C	Radiator Coolant Temperature Too High
DTC P3196	Cold Start Radiator Coolant Temperature Too High
DTC P00B2	Radiator Coolant Temperature Sensor Circuit Range/Performance
DTC P3195	Radiator Coolant Temperature Signal Stuck High
DTC P0071	Ambient Air Temperature Sensor Circuit 'A' Range/Performance
DTC P10EC	Ambient Air Temperature Implausible
DTC P0073	Ambient Air Temperature Sensor Circuit 'A' High
DTC P0072	Ambient Air Temperature Sensor Circuit 'A' Low
DTC P0070	Ambient Air Temperature Sensor Circuit 'A'
DTC P110F	Ambient Air Temperature Sensor Faulty CAN Signal
DTC P007B	Charge Air Cooler Temperature Sensor Circuit Range/Performance (Bank 1)
DTC P10B4	Charge Air Cooler Temperature Sensor Gradient Too High (Bank 1)
DTC P10B6	Charge Air Cooler Temperature Sensor Offset (Bank 1)
DTC P10D0	Cold Start Charge Air Temperature Too High (Bank 1)
DTC P00A1	Charge Air Cooler Temperature Sensor Circuit Range/Performance (Bank 2)
DTC P10B5	Charge Air Cooler Temperature Sensor Gradient Too High (Bank 2)
DTC P10B7	Charge Air Cooler Temperature Sensor Offset (Bank 2)
DTC P10D3	Cold Start Charge Air Temperature Too High (Bank 2)

	Cylinder Injection Cut-Off, Pressure Too Low in High-Pressure System
DTC P142F	Cylinder Injection Cut-Off, Pressure Too Low in Low-Pressure System
DTC P0201	Injector Circuit/Open - Cylinder 1
DTC P310B	Cylinder 1 High Pressure Injector Low Side/High Side Electrical
DTC P310B	Cylinder 1 High Pressure Injector Low Side/High Side Electrical
DTC P0201	Injector Circuit/Open
DTC P310E	Cylinder 2 High Pressure Injector Low Side/High Side Electrical
DTC P310E	Cylinder 2 High Pressure Injector Low Side/High Side Electrical
DTC P0202	Injector Circuit/Open - Cylinder 2
DTC P0203	Injector Circuit/Open - Cylinder 3
DTC P311B	Cylinder 3 High Pressure Injector Low Side/High Side Electrical
DTC P311B	Cylinder 3 High Pressure Injector Low Side/High Side Electrical
DTC P0203	Injector Circuit/Open - Cylinder 3
DTC P0204	Injector Circuit/Open - Cylinder 4
DTC P311E	Cylinder 4 High Pressure Injector Low Side/High Side Electrical
DTC P311E	Cylinder 4 High Pressure Injector Low Side/High Side Electrical
DTC P0204	Injector Circuit/Open - Cylinder 4
DTC P0205	Injector Circuit/Open - Cylinder 5
DTC P312B	Cylinder 5 High Pressure Injector Low Side/High Side Electrical
DTC P312B	Cylinder 5 High Pressure Injector Low Side/High Side Electrical
DTC P0205	Injector Circuit/Open - Cylinder 5
DTC P0206	Injector Circuit/Open - Cylinder 6
DTC P312E	Cylinder 6 High Pressure Injector Low Side/High Side Electrical
DTC P312E	Cylinder 6 High Pressure Injector Low Side/High Side Electrical
DTC P0206	Injector Circuit/Open - Cylinder 6
DTC P313B	Cylinder 7 High Pressure Injector Low Side/High Side Electrical
DTC P313B	Cylinder 7 High Pressure Injector Low Side/High Side Electrical
DTC P0207	Injector Circuit/Open - Cylinder 7
DTC P0208	Injector Circuit/Open - Cylinder 8
DTC P313E	Cylinder 8 High Pressure Injector Low Side/High Side Electrical
DTC P313E	Cylinder 8 High Pressure Injector Low Side/High Side Electrical
DTC P0208	Injector Circuit/Open - Cylinder 8
DTC P0263	Cylinder 1 Contribution/Balance
DTC P0266	Cylinder 2 Contribution/Balance
DTC P0269	Cylinder 3 Contribution/Balance
DTC P0272	Cylinder 4 Contribution/Balance
DTC P0275	Cylinder 5 Contribution/Balance
DTC P0278	Cylinder 6 Contribution/Balance
DTC P0281	Cylinder 7 Contribution/Balance
DTC P0284	Cylinder 8 Contribution/Balance
DTC P02CD	Cylinder 1 Fuel Injector Offset Learning at Max Limit

	Cylinder 1 Fuel Injector Offset Learning at Min Limit
DTC P02CD	Cylinder 1 Fuel Injector Offset Learning at Max Limit
DTC P02CC	Cylinder 1 Fuel Injector Offset Learning at Min Limit
DTC P02CF	Cylinder 2 Fuel Injector Offset Learning at Max Limit
DTC P02CE	Cylinder 2 Fuel Injector Offset Learning at Min Limit
DTC P02CF	Cylinder 2 Fuel Injector Offset Learning at Max Limit
DTC P02CE	Cylinder 2 Fuel Injector Offset Learning at Min Limit
DTC P02D1	Cylinder 3 Fuel Injector Offset Learning at Max Limit
DTC P02D0	Cylinder 3 Fuel Injector Offset Learning at Min Limit
DTC P02D1	Cylinder 3 Fuel Injector Offset Learning at Max Limit
DTC P02D0	Cylinder 3 Fuel Injector Offset Learning at Min Limit
DTC P02D3	Cylinder 4 Fuel Injector Offset Learning at Max Limit
DTC P02D2	Cylinder 4 Fuel Injector Offset Learning at Min Limit
DTC P02D3	Cylinder 4 Fuel Injector Offset Learning at Max Limit
DTC P02D2	Cylinder 4 Fuel Injector Offset Learning at Min Limit
DTC P02D5	Cylinder 5 Fuel Injector Offset Learning at Max Limit
DTC P02D4	Cylinder 5 Fuel Injector Offset Learning at Min Limit
DTC P02D5	Cylinder 5 Fuel Injector Offset Learning at Max Limit
DTC P02D4	Cylinder 5 Fuel Injector Offset Learning at Min Limit
DTC P02D7	Cylinder 6 Fuel Injector Offset Learning at Max Limit
DTC P02D6	Cylinder 6 Fuel Injector Offset Learning at Min Limit
DTC P02D7	Cylinder 6 Fuel Injector Offset Learning at Max Limit
DTC P02D6	Cylinder 6 Fuel Injector Offset Learning at Min Limit
DTC P02D9	Cylinder 7 Fuel Injector Offset Learning at Max Limit
DTC P02D8	Cylinder 7 Fuel Injector Offset Learning at Min Limit
DTC P02D9	Cylinder 7 Fuel Injector Offset Learning at Max Limit
DTC P02D8	Cylinder 7 Fuel Injector Offset Learning at Min Limit
DTC P02DB	Cylinder 8 Fuel Injector Offset Learning at Max Limit
DTC P02DA	Cylinder 8 Fuel Injector Offset Learning at Min Limit
DTC P02DB	Cylinder 8 Fuel Injector Offset Learning at Max Limit
DTC P02DA	Cylinder 8 Fuel Injector Offset Learning at Min Limit
DTC P02CD	Cylinder 1 Fuel Injector Offset Learning at Max Limit
DTC P02CF	Cylinder 2 Fuel Injector Offset Learning at Max Limit
DTC P02D1	Cylinder 3 Fuel Injector Offset Learning at Max Limit
DTC P02D3	Cylinder 4 Fuel Injector Offset Learning at Max Limit
DTC P02D5	Cylinder 5 Fuel Injector Offset Learning at Max Limit
DTC P02D7	Cylinder 6 Fuel Injector Offset Learning at Max Limit
DTC P02D9	Cylinder 7 Fuel Injector Offset Learning at Max Limit
DTC P02DB	Cylinder 8 Fuel Injector Offset Learning at Max Limit
DTC P10AF	Injector Coding Energy Rated Value Implausible
DTC P10C0	Injector Coding Small Quantity Rated Value Implausible

	Cylinder 1 Fuel Injector Offset Learning at Min Limit
DTC P02CE	Cylinder 2 Fuel Injector Offset Learning at Min Limit
DTC P02D0	Cylinder 3 Fuel Injector Offset Learning at Min Limit
DTC P02D2	Cylinder 4 Fuel Injector Offset Learning at Min Limit
DTC P02D4	Cylinder 5 Fuel Injector Offset Learning at Min Limit
DTC P02D6	Cylinder 6 Fuel Injector Offset Learning at Min Limit
DTC P02D8	Cylinder 7 Fuel Injector Offset Learning at Min Limit
DTC P02DA	Cylinder 8 Fuel Injector Offset Learning at Min Limit
DTC P12AA	Cylinder 1 Injector Small Quantity Adaptation out of Range
DTC P12AB	Cylinder 2 Injector Small Quantity Adaptation out of Range
DTC P12AC	Cylinder 3 Injector Small Quantity Adaptation out of Range
DTC P12AD	Cylinder 4 Injector Small Quantity Adaptation out of Range
DTC P12AE	Cylinder 5 Injector Small Quantity Adaptation out of Range
DTC P12AF	Cylinder 6 Injector Small Quantity Adaptation out of Range
DTC P12B0	Cylinder 7 Injector Small Quantity Adaptation out of Range
DTC P12B1	Cylinder 8 Injector Small Quantity Adaptation out of Range
DTC P0171	System Too Lean (Bank 1)
DTC P0172	System Too Rich (Bank 1)
DTC P0174	System Too Lean (Bank 2)
DTC P0175	System Too Rich (Bank 2)
DTC P0171	System Too Lean (Bank 1)
DTC P0172	System Too Rich (Bank 1)
DTC P0174	System Too Lean (Bank 2)
DTC P0175	System Too Rich (Bank 2)
DTC P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)
DTC P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)
DTC P2099	Post Catalyst Fuel Trim System Too Rich (Bank 2)
DTC P2098	Post Catalyst Fuel Trim System Too Lean (Bank 2)
DTC P114A	Post Catalyst Fuel Trim Via Oxygen Sensor System Too Rich (Bank 1)
DTC P114B	Post Catalyst Fuel Trim Via Oxygen Sensor System Too Lean (Bank 1)
DTC P114C	Post Catalyst Fuel Trim Via Oxygen Sensor System Too Rich (Bank 2)
DTC P114D	Post Catalyst Fuel Trim Via Oxygen Sensor System Too Lean (Bank 2)
DTC P0171	System Too Lean (Bank 1)
DTC P0172	System Too Rich (Bank 1)
DTC P0175	System Too Rich (Bank 2)
DTC P119D	Fuel Trim, Injector Aging Long-Term Adaptation Too High (Bank 1)
DTC P119E	Fuel Trim, Injector Aging Long-Term Adaptation Too High (Bank 2)
DTC P0193	Fuel Rail Pressure Sensor 'A' Circuit High
DTC P0192	Fuel Rail Pressure Sensor 'A' Circuit Low
DTC P3251	Fuel Rail Pressure Sensor Circuit High (Bank 2)
DTC P3250	Fuel Rail Pressure Sensor Circuit Low (Bank 2)

	Low Pressure Fuel System Sensor Circuit High
DTC P2541	Low Pressure Fuel System Sensor Circuit Low
DTC P2540	Low Pressure Fuel System Sensor Circuit Range/Performance
DTC P0088	Fuel Rail/System Pressure
DTC P302A	Fuel Rail Pressure, Maximum Pressure Exceeded (Bank 1)
DTC P302C	Fuel Rail Pressure, Minimum Pressure Fallen Below (Bank 1)
DTC P100B	Fuel Rail/System Pressure - Too High (Bank 2)
DTC P302B	Fuel Rail Pressure, Maximum Pressure Exceeded (Bank 2)
DTC P100A	Fuel Rail/System Pressure - Too Low (Bank 2)
DTC P302D	Fuel Rail Pressure, Minimum Pressure Fallen Below (Bank 2)
DTC P008B	Low Pressure Fuel System Pressure - Too High
DTC P3095	Low Fuel Pressure System Maximum Pressure Exceeded
DTC P3096	Low Fuel Pressure System Minimum Pressure Fallen Below
DTC P303A	Fuel Rail/System Pressure Range/Performance -Pressure Too High (Bank 1)
DTC P303A	Fuel Rail/System Pressure Range/Performance -Pressure Too High (Bank 1)
DTC P303C	Fuel Rail/System Pressure Range/Performance -Pressure Too Low (Bank 1)
DTC P303B	Fuel Rail/System Pressure Range/Performance -Pressure Too High (Bank 2)
DTC P303B	Fuel Rail/System Pressure Range/Performance -Pressure Too High (Bank 2)
DTC P303D	Fuel Rail/System Pressure Range/Performance -Pressure Too Low (Bank 2)
DTC P10ED	Fuel Rail Pressure Sensor 'A' Pressure High
DTC P3283	Fuel Pressure Control Adaptive Fuel Volume Out of Range (Bank 1)
DTC P10EE	Fuel Rail Pressure Sensor 'A' Pressure Low
DTC P3284	Fuel Pressure Control Calculation Adaptive Fuel Volume Implausible (Bank 1)
DTC P10F7	Fuel Rail Pressure Sensor 'B' Pressure High
DTC P3285	Fuel Pressure Control Adaptive Fuel Volume Out of Range (Bank 2)
DTC P10F8	Fuel Rail Pressure Sensor 'B' Pressure Low
DTC P3286	Fuel Pressure Control Calculation Adaptive Fuel Volume Implausible (Bank 2
DTC P15DE	Cold Start Fuel Pressure Too High (Bank 1)
DTC P15DF	Cold Start Fuel Pressure Too Low (Bank 1)
DTC P15EF	Cold Start Fuel Pressure Too Low (Bank 2)
DTC P213F	Fuel Pump System Fault - Forced Engine Shutdown
DTC P1214	Fuel Pump Speed Too High
DTC P1215	Fuel Pump Speed Too Low
DTC P1216	Fuel Pump emergency Operation
DTC P1217	Fuel Pump Overtemperature Condition
DTC P10C4	Low Pressure Fuel System Delivery Rate out of Range
DTC P10C5	Low Pressure Fuel System Delivery Rate out of Range due to Aging
DTC P10C6	Low Pressure Fuel System Delivery Rate Too Low due to Aging
DTC P0004	Fuel Volume Regulator Control Circuit High
DTC P0003	Fuel Volume Regulator Control Circuit Low
DTC P1282	Fuel Volume Regulator Control Circuit High (Bank 2)

	Fuel Volume Regulator Control Circuit Low (Bank 2)
DTC P0234	Turbocharger/Supercharger 'A' Overboost Condition
DTC P0299	Turbocharger/Supercharger 'A' Underboost Condition
DTC P1260	Turbocharger/Supercharger Boost Control Cut-Off (Bank 1)
DTC P15AF	Turbocharger Leak in Supercharger System (Bank 2)
DTC P02CA	Turbocharger/Supercharger 'B' Overboost Condition
DTC P02CB	Turbocharger/Supercharger 'B' Underboost Condition
DTC P0238	Turbocharger/Supercharger Boost Sensor 'A' Circuit High
DTC P0237	Turbocharger/Supercharger Boost Sensor 'A' Circuit Low
DTC P0242	Turbocharger/Supercharger Boost Sensor 'B' Circuit High
DTC P0241	Turbocharger/Supercharger Boost Sensor 'B' Circuit Low
DTC P12A9	Boost Sensor 'A' Afterrunning Diagnosis Pressure Too High
DTC P12A8	Boost Sensor 'A' Afterrunning Diagnosis Pressure Too Low
DTC P12B7	Boost Sensor 'B' Afterrunning Diagnosis Pressure Too High
DTC P12B6	Boost Sensor 'B' Afterrunning Diagnosis Pressure Too Low
DTC P0035	Turbocharger/Supercharger Bypass Valve 'A' Control Circuit High
DTC P0034	Turbocharger/Supercharger Bypass Valve 'A' Control Circuit Low
DTC P0033	Turbocharger/Supercharger Bypass Valve 'A' Control Circuit
DTC P00C2	Turbocharger/Supercharger Bypass Valve 'B' Control Circuit High
DTC P00C1	Turbocharger/Supercharger Bypass Valve 'B' Control Circuit Low
DTC P00C0	Turbocharger/Supercharger Bypass Valve 'B' Control Circuit
DTC P0246	Turbocharger/Supercharger Wastegate Solenoid 'A' High
DTC P0245	Turbocharger/Supercharger Wastegate Solenoid 'A' Low
DTC P0243	Turbocharger/Supercharger Wastegate Solenoid 'A'
DTC P0249	Turbocharger/Supercharger Wastegate Solenoid 'B' Low
DTC P0247	Turbocharger/Supercharger Wastegate Solenoid 'B'
DTC P0040	O2 Sensor Signals Swapped Bank 1 Sensor 1 / Bank 2 Sensor 1
DTC P2195	O2 Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 1)
DTC P2197	O2 Sensor Signal Biased/Stuck Lean (Bank 2 Sensor 1)
DTC P2196	O2 Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 1)
DTC P2198	O2 Sensor Signal Biased/Stuck Rich (Bank 2 Sensor 1)
DTC P2297	O2 Sensor Out of Range During Deceleration (Bank 1 Sensor 1)
DTC P2298	O2 Sensor Out of Range During Deceleration (Bank 2 Sensor 1)
DTC P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)
DTC P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)
DTC P0153	O2 Sensor Circuit Slow Response (Bank 2 Sensor 1)
DTC P0153	O2 Sensor Circuit Slow Response (Bank 2 Sensor 1)
DTC P2414	O2 Sensor Exhaust Sample Error (Bank 1 Sensor 1)
DTC P2415	O2 Sensor Exhaust Sample Error (Bank 2 Sensor 1)
DTC P2243	O2 Sensor Reference Voltage Circuit/Open (Bank 1 Sensor 1)
DTC P112C	O2 Sensor Negative Current or Positive Current Control Circuit/Open (Bank 1

	Sensor 1)
DTC P112C	O2 Sensor Negative Current or Positive Current Control Circuit/Open (Bank 1 Sensor 1)
DTC P2247	O2 Sensor Reference Voltage Circuit/Open (Bank 2 Sensor 1)
DTC P112D	O2 Sensor Negative Current or Positive Current Control Circuit/Open (Bank 2 Sensor 1)
DTC P112D	O2 Sensor Negative Current or Positive Current control Circuit/Open (Bank 2 Sensor 1)
DTC P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)
DTC P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)
DTC P0152	O2 Sensor Circuit High Voltage (Bank 2 Sensor 1)
DTC P0151	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)
DTC P3024	O2 Sensor Initialization Error WRAF-IC (Bank 1 Sensor 1)
DTC P3022	O2 Sensor Disturbed SPI Communication to WRAF-IC (Bank 1 Sensor 1)
DTC P3025	O2 Sensor Initialization Error WRAF-IC (Bank 2 Sensor 1)
DTC P3023	O2 Sensor Disturbed SPI Communication to WRAF-IC (Bank 2 Sensor 1)
DTC P0041	O2 Sensor Signals Swapped Bank 1 Sensor 2 / Bank 2 Sensor 2
DTC P2271	O2 Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 2)
DTC P2270	O2 Sensor Signal Biased/Stuck Lean (Bank 1 Sensor 2)
DTC P2273	O2 Sensor Signal Biased/Stuck Rich (Bank 2 Sensor 2)
DTC P2272	O2 Sensor Signal Biased/Stuck Lean (Bank 2 Sensor 2)
DTC P013A	O2 Sensor Slow Response
DTC P013C	O2 Sensor Slow Response - Rich to Lean (Bank 2 Sensor 2)
DTC P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)
DTC P0158	O2 Sensor Circuit High Voltage (Bank 2 Sensor 2)
DTC P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)
DTC P0157	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 2)
DTC P0136	O2 Sensor Circuit (Bank 1 Sensor 2)
DTC P0140	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 2)
DTC P0156	O2 Sensor Circuit (Bank 2 Sensor 2)
DTC P0160	O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 2)
DTC P013E	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 2)
DTC P014A	O2 Sensor Delayed Response - Rich to Lean (Bank 2 Sensor 2)
DTC P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)
DTC P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)
DTC P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)
DTC P0052	HO2S Heater Control Circuit High (Bank 2 Sensor 1)
DTC P0051	HO2S Heater Control Circuit Low (Bank 2 Sensor 1)
DTC P0050	HO2S Heater Control Circuit (Bank 2 Sensor 1)
DTC P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)
DTC P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)

DTC P0036	HO2S Heater Control Circuit (Bank 1 Sensor 2)
DTC P0058	HO2S Heater Control Circuit High (Bank 2 Sensor 2)
DTC P0057	HO2S Heater Control Circuit Low (Bank 2 Sensor 2)
DTC P0056	HO2S Heater Control Circuit (Bank 2 Sensor 2)
DTC P0135	O2 Sensor Heater Circuit (Bank 1 Sensor 1)
DTC P3026	O2 Sensor Temperature Measurement Operating Temperature not Reached (Bank 1 Sensor 1)
DTC P305D	O2 Sensor Temperature Measurement Operating Temperature during Warmup not Reached (Bank 1 Sensor 1)
DTC P165F	Internal Control Module Measurement Error Oxygen Sensor Heating (Bank 1 Sensor 1)
DTC P0155	O2 Sensor Heater Circuit (Bank 2 Sensor 1)
DTC P3027	O2 Sensor Temperature Measurement Operating Temperature not Reached (Bank 2 Sensor 1)
DTC P305E	O2 Sensor Temperature Measurement Operating Temperature during Warmup not Reached (Bank 2 Sensor 1)
DTC P166F	Internal Control Module Measurement Error Oxygen Sensor Heating (Bank 2 Sensor 1)
DTC P0141	O2 Sensor Heater Circuit (Bank 1 Sensor 2)
DTC P0161	O2 Sensor Heater Circuit (Bank 2 Sensor 2)
DTC P3026	O2 Sensor Temperature Measurement Operating Temperature not Reached (Bank 1 Sensor 1)
DTC P305D	O2 Sensor Temperature Measurement Operating Temperature during Warmup not Reached (Bank 1 Sensor 1)
DTC P165F	Internal Control Module Measurement Error Oxygen Sensor Heating (Bank 1 Sensor 1)
DTC P3027	O2 Sensor Temperature Measurement Operating Temperature not Reached (Bank 2 Sensor 1)
DTC P305E	O2 Sensor Temperature Measurement Operating Temperature during Warmup not Reached (Bank 2 Sensor 1)
DTC P166F	Internal Control Module Measurement Error Oxygen Sensor Heating (Bank 2 Sensor 1)
DTC P013B	O2 Sensor Slow Response
DTC P013D	O2 Sensor Slow Response
DTC P2089	'A' Camshaft Position Actuator Control Circuit High (Bank 1)
DTC P0010	'A' Camshaft Position Actuator Circuit/Open (Bank 1)
DTC P0012	'A' Camshaft Position
DTC P2091	'B' Camshaft Position Actuator Control Circuit High (Bank 1)
DTC P2090	'B' Camshaft Position Actuator Control Circuit Low (Bank 1)
DTC P0013	'B' Camshaft Position
DTC P0015	'B' Camshaft Position
DTC P2093	'A' Camshaft Position Actuator Control Circuit High (Bank 2)

DTC P2092	'A' Camshaft Position Actuator Control Circuit Low (Bank 2)
DTC P0020	'A' Camshaft Position Actuator Circuit/Open (Bank 2)
DTC P0022	'A' Camshaft Position - Timing Over-Retarded (Bank 2)
DTC P2095	'B' Camshaft Position Actuator Control Circuit High (Bank 2)
DTC P2094	'B' Camshaft Position Actuator Control Circuit Low (Bank 2)
DTC P0023	'B' Camshaft Position - Actuator Circuit/Open (Bank 2)
DTC P0025	'B' Camshaft Position - Timing Over-Retarded (Bank 2)
DTC P13BA	'A' Camshaft Tooth Off (Bank 1)
DTC P13BC	'B' Camshaft Tooth Off (Bank 1)
DTC P13BB	'A' Camshaft Tooth Off (Bank 2)
DTC P13BD	'B' Camshaft Tooth Off (Bank 2)
DTC P13B4	Crankshaft / 'A' Camshaft Reference Error (Bank 1)
DTC P13B6	Crankshaft / 'B' Camshaft Reference Error (Bank 1)
DTC P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)
DTC P0017	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor B)
DTC P13B5	Crankshaft / 'A' Camshaft Reference Error (Bank 2)
DTC P13B7	Crankshaft / 'B' Camshaft Reference Error (Bank 2)
DTC P0018	Crankshaft Position - Camshaft Position Correlation (Bank 2 Sensor A)
DTC P0019	Crankshaft Position
DTC P054B	Cold Start 'B' Camshaft Position Timing Over-Retarded (Bank 1)
DTC P054B	Cold Start 'B' Camshaft Position Timing Over-Retarded (Bank 1)
DTC P052B	Cold Start 'A' Camshaft Position Timing Over-Retarded (Bank 1)
DTC P052B	Cold Start 'A' Camshaft Position Timing Over-
DTC P054D	Retarded (Bank 1) Cold Start 'B' Camshaft Position Timing Over-Retarded (Bank 2)
DTC P054D	Cold Start 'B' Camshaft Position Timing Over-Retarded (Bank 2)
DTC P052D	Cold Start 'A' Camshaft Position Timing Over-Retarded (Bank 2)
DTC P052D	Cold Start 'A' Camshaft Position Timing Over-Retarded (Bank 2)
DTC P0478	Exhaust Pressure Control Valve 'A' High
DTC P0477	Exhaust Pressure Control Valve 'A' Low
DTC P0475	Exhaust Pressure Control Valve 'A'
DTC P303E	Controlled Upper Air Shutter Supply Voltage
DTC P303F	Controlled Upper Air Shutter Over Temperature
DTC P304A	Controlled Upper Air Shutter Electrical
DTC P304B	Controlled Upper Air Shutter, Lower Stop Not Detected
DTC P304C	Controlled Upper Air Shutter, Upper Stop Not Detected
DTC P304D	Controlled Upper Air Shutter, Upper Stop Detected Too Early
DTC P300D	Controlled Lower Air Shutter Circuit High
DTC P300E	Controlled Lower Air Shutter Circuit Low
DTC P300F	Controlled Lower Air Shutter Circuit/Open
DTC P0300	Random/Multiple Cylinder Misfire Detected

DTC P0300	Random/Multiple Cylinder Misfire Detected
DTC P0300	Random/Multiple Cylinder Misfire Detected
DTC P0300	Random/Multiple Cylinder Misfire Detected
DTC P0301	Cylinder 1 Misfire Detected
DTC P0301	Cylinder 1 Misfire Detected
DTC P0301	Cylinder 1 Misfire Detected
DTC P0302	Cylinder 2 Misfire Detected
DTC P0302	Cylinder 2 Misfire Detected
DTC P0302	Cylinder 2 Misfire Detected
DTC P0303	Cylinder 3 Misfire Detected
DTC P0303	Cylinder 3 Misfire Detected
DTC P0303	Cylinder 3 Misfire Detected
DTC P0304	Cylinder 4 Misfire Detected
DTC P0304	Cylinder 4 Misfire Detected
DTC P0304	Cylinder 4 Misfire Detected
DTC P0305	Cylinder 5 Misfire Detected
DTC P0305	Cylinder 5 Misfire Detected
DTC P0305	Cylinder 5 Misfire Detected
DTC P0306	Cylinder 6 Misfire Detected
DTC P0306	Cylinder 6 Misfire Detected
DTC P0306	Cylinder 6 Misfire Detected
DTC P0307	Cylinder 7 Misfire Detected
DTC P0307	Cylinder 7 Misfire Detected
DTC P0307	Cylinder 7 Misfire Detected
DTC P0308	Cylinder 8 Misfire Detected
DTC P0308	Cylinder 8 Misfire Detected
DTC P0308	Cylinder 8 Misfire Detected
DTC P0313	Misfire Detected With Low Fuel
DTC P0370	Timing Reference High Resolution Signal 'A'
DTC P1301	Ignition Monitoring Cylinder 1 Spark Duration Too Short
DTC P1302	Ignition Monitoring Cylinder 2 Spark Duration Too Short
DTC P1303	Ignition Monitoring Cylinder 3 Spark Duration Too Short
DTC P1304	Ignition Monitoring Cylinder 4 Spark Duration Too Short
DTC P1305	Ignition Monitoring Cylinder 5 Spark Duration Too Short
DTC P1306	Ignition Monitoring Cylinder 6 Spark Duration Too Short
DTC P1307	Ignition Monitoring Cylinder 7 Spark Duration Too Short
DTC P1308	Ignition Monitoring Cylinder 8 Spark Duration Too Short
DTC P050B	Cold Start Ignition Timing Performance
DTC P13EA	Cold Start Ignition Timing Performance Off Idle
DTC P1383	Ignition Monitoring Malfunction
DTC P13A0	Knock Control Fuel Cut-Off due to Super Knocking Cylinder 1

	Knock Control Fuel Cut-Off due to Super Knocking Cylinder 2
DTC P13A2	Knock Control Fuel Cut-Off due to Super Knocking Cylinder 3
DTC P13A3	Knock Control Fuel Cut-Off due to Super Knocking Cylinder 4
DTC P13A4	Knock Control Fuel Cut-Off due to Super Knocking Cylinder 5
DTC P13A5	Knock Control Fuel Cut-Off due to Super Knocking Cylinder 6
DTC P13A6	Knock Control Fuel Cut-Off due to Super Knocking Cylinder 7
DTC P13A7	Knock Control Fuel Cut-Off due to Super Knocking Cylinder 8
DTC P2301	Ignition Coil 'A' Primary Control Circuit High
DTC P2304	Ignition Coil 'B' Primary Control Circuit High
DTC P2307	Ignition Coil 'C' Primary Control Circuit High
DTC P2310	Ignition Coil 'D' Primary Control Circuit High
DTC P2313	Ignition Coil 'E' Primary Control Circuit High
DTC P2316	Ignition Coil 'F' Primary Control Circuit High
DTC P2319	Ignition Coil 'G' Primary Control Circuit High
DTC P2322	Ignition Coil 'H' Primary Control Circuit High
DTC P0335	Crankshaft Position Sensor 'A' Circuit
DTC P0336	Crankshaft Position Sensor 'A' Circuit Range/Performance
DTC P138F	Crankshaft Position Sensor Signal Synchronization Error
DTC P0370	Timing Reference High Resolution Signal 'A'
DTC P0370	Timing Reference High Resolution Signal 'A'
DTC P1396	Crankshaft Position Sensor Segment Timing Plausibility
DTC P13B0	Camshaft Position Sensor Signal 'A' Synchronization Error (Bank 1)
DTC P0340	Camshaft Position Sensor 'A' Circuit (Bank 1 or Single Sensor)
DTC P1300	Camshaft Position Sensor 'A' Segment Timing Error (Bank 1)
DTC P13B1	Camshaft Position Sensor Signal 'A' Synchronization Error (Bank 2)
DTC P0345	Camshaft Position Sensor 'A' Circuit (Bank 2)
DTC P139A	Camshaft Position Sensor 'A' Segment Timing Error (Bank 2)
DTC P13B2	Camshaft Position Sensor Signal 'B' Synchronization Error (Bank 1)
DTC P0365	Camshaft Position Sensor 'B' Circuit (Bank 1)
DTC P130A	Camshaft Position Sensor 'B' Segment Timing Error (Bank 1)
DTC P13B3	Camshaft Position Sensor Signal 'B' Synchronization Error (Bank 2)
DTC P0390	Camshaft Position Sensor 'B' Circuit (Bank 2)
DTC P139B	Camshaft Position Sensor 'B' Segment Timing Error (Bank 2)
DTC P0328	Knock/Combustion Vibration Sensor 1 Circuit High (Bank 1 or Single Sensor)
DTC P0327	Knock/Combustion Vibration Sensor 1 Circuit Low (Bank 1 or Single Sensor)
DTC P0326	Knock/Combustion Vibration Sensor 1 Circuit Range/Performance (Bank 1 or Single Sensor)
DTC P1328	Knock/Combustion Vibration Sensor 2 Circuit High (Bank 1)
DTC P1327	Knock/Combustion Vibration Sensor 2 Circuit Low (Bank 1)
DTC P135B	Knock/Combustion Vibration Sensor 2 Circuit Range/Performance (Bank 1)
DTC P1330	Knock/Combustion Vibration Sensor 3 Circuit High

DTC P1329	Knock/Combustion Vibration Sensor 3 Circuit Low
DTC P135F	Knock/Combustion Vibration Sensor 3 Circuit Range/Performance
DTC P033D	Knock/Combustion Vibration Sensor 4 Circuit High (Bank 2)
DTC P033C	Knock/Combustion Vibration Sensor 4 Circuit Low (Bank 2)
DTC P033B	Knock/Combustion Vibration Sensor 4 Circuit Range/Performance (Bank 2)
DTC P0420	Catalyst System Efficiency Below Threshold (Bank 1)
DTC P0420	Catalyst System Efficiency Below Threshold (Bank 1)
DTC P0420	Catalyst System Efficiency Below Threshold (Bank 1)
DTC P0430	Catalyst System Efficiency Below Threshold (Bank 2)
DTC P0430	Catalyst System Efficiency Below Threshold (Bank 2)
DTC P2420	Evaporative Emission System Switching Valve Control Circuit High
DTC P2419	Evaporative Emission System Switching Valve Control Circuit Low
DTC P2418	Evaporative Emission System Switching Valve Control Circuit/Open
DTC P0442	Evaporative Emission System Leak Detected (small leak)
DTC P0456	Evaporative Emission System Leak Detected (very small leak)
DTC P1449	Diagnostic Module Tank Leakage (DM-TL) Pump Current Too High
DTC P1448	Diagnostic Module Tank Leakage (DM-TL) Pump Current Too Low
DTC P1434	Diagnostic Module Tank Leakage (DM-TL)
DTC P1447	Diagnostic Module Tank Leakage (DM-TL) Pump Current Too High during Switching Solenoid Test
DTC P240C	Evaporative Emission System Leak Detection Pump Heater Control Circuit High
DTC P240B	Evaporative Emission System Leak Detection Pump Heater Control Circuit Low
DTC P240A	Evaporative Emission System Leak Detection Pump Heater Control Circuit/Open
DTC P2402	Evaporative Emission System Leak Detection Pump Control Circuit High
DTC P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low
DTC P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open
DTC P110E	Internal Code (Service/End-of-Line Test)
DTC P0440	Evaporative Emission System
DTC P0459	Evaporative Emission System Purge Control Valve 'A' Circuit High
DTC P0458	Evaporative Emission System Purge Control Valve 'A' Circuit Low
DTC P0444	Evaporative Emission System Purge Control Valve 'A' Circuit Open
DTC P0463	Fuel Level Sensor 'A' Circuit High
DTC P0462	Fuel Level Sensor 'A' Circuit Low
DTC P1407	Fuel Level Signal 1
DTC P2068	Fuel Level Sensor 'B' Circuit High
DTC P2067	Fuel Level Sensor 'B' Circuit Low
DTC P1408	Fuel Level Signal 2
DTC P144B	Fuel Level / Fuel Consumption Correlation

DTC P0692	Fan 1 Control Circuit High
DTC P0691	Fan 1 Control Circuit Low
DTC P0480	Fan 1 Control Circuit
DTC P14C0	Fan 1 Mechanical or Hardware Defect
DTC P14C0	Fan 1 Mechanical or Hardware Defect
DTC P14C0	Fan 1 Mechanical or Hardware Defect
DTC P14C0	Fan 1 Mechanical or Hardware Defect
DTC P144E	Fan Safety Relay Circuit High
DTC P144D	Fan Safety Relay Circuit Low
DTC P144C	Fan Safety Relay Circuit
DTC P144F	Fan Safety Relay Circuit Range/Performance
DTC P0500	Vehicle Speed Sensor 'A'
DTC P0503	Vehicle Speed Sensor 'A' Intermittent/Erratic/High
DTC P15DA	Wheel Speed Sensor Front/Left Range/Performance
DTC P15DB	Wheel Speed Sensor Front/Right Range/Performance
DTC P15DC	Wheel Speed Sensor Rear/Left Range/Performance
DTC P15DD	Wheel Speed Sensor Rear/Right Range/Performance
DTC P1667	EWS (Electronic Immobilizer) Start Value not yet Programmed
DTC P16CF	EWS (Electronic Immobilizer) Implausible Response
DTC P165A	EWS (Electronic Immobilizer) Interface to ECM, Hardware Error
DTC P1660	EWS (Electronic Immobilizer) Telegram Error
DTC P1661	Timeout EWS (Electronic Immobilizer)-Telegram
DTC P165B	EWS (Electronic Immobilizer) Interface to ECM, Checksum Error
DTC P165C	EWS (Electronic Immobilizer) Data, No Available Storage Possibility
DTC P165D	EWS (Electronic Immobilizer) Data, Faulty Release Code Storage
DTC P1668	EWS (Electronic Immobilizer) Start Value Destroyed
DTC P165E	EWS (Electronic Immobilizer) Data, Checksum Error
DTC U1166	Message Monitoring EWS (Electronic Immobilizer)
DTC U0167	Lost Communication With Vehicle Immobilizer Control Module
DTC P15B0	Terminal 15 Sense Circuit High
DTC P15B1	Terminal 15 Sense Circuit Low
DTC P15B2	Terminal 15 Sense Circuit CAS Error
DTC P15B3	Terminal 15 Sense Circuit Range/Performance
DTC P15B0	Terminal 15 Sense Circuit High
DTC P15B1	Terminal 15 Sense Circuit Low
DTC P1551	External Engine Off Timer Plausibility
DTC P1515	External Engine Off Timer Range/Performance
DTC P2610	ECM/PCM Engine Off Timer Performance
DTC P15E8	External Engine Off Timer Engine Off Time Too Short in Correlation to Cooling-Down Of Engine Coolant
DTC P15E9	External Engine Off Timer Engine Off Time Too Long in Correlation to

	Cooling-Down Of Engine
DTC P2299	Brake Pedal Position / Accelerator Pedal Position Incompatible
DTC P0520	Engine Oil Pressure Sensor/Switch 'A' Circuit
DTC P250F	Engine Oil Level Too Low
DTC P250F	Engine Oil Level Too Low
DTC P1586	Engine Oil Quality Sensor Temperature Measurement
DTC P1587	Engine Oil Quality Sensor Level Measurement
DTC P1521	Engine Oil Quality Sensor Communication Error
DTC P1588	Engine Oil Quality Sensor Permeability Measurement
DTC P15B4	Engine Oil Quality Sensor Permittivity Error
DTC P252A	Engine Oil Quality Sensor Circuit
DTC P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)
DTC P0597	Thermostat Heater Control Circuit/Open
DTC P0599	Thermostat Heater Control Circuit High
DTC P0599	Thermostat Heater Control Circuit High
DTC P0598	Thermostat Heater Control Circuit Low
DTC P0597	Thermostat Heater Control Circuit/Open
DTC P0507	Idle Control System RPM Higher Than Expected
DTC P0506	Idle Control System RPM Lower Than Expected
DTC P1562	Cold Start Idle Air Control System RPM Higher Than Expected (Bank 1)
DTC P1561	Cold Start Idle Air Control System RPM Lower Than Expected (Bank 1)
DTC P0604	Internal Control Module Random Access Memory (RAM) Error
DTC P0604	Internal Control Module Random Access Memory (RAM) Error
DTC P16A0	Internal Control Module Memory Check Sum Error in Boot Software
DTC P16A1	Internal Control Module Memory Check Sum Error in Application Software
DTC P16A2	Internal Control Module Memory Check Sum Error in Data
DTC P16A3	Internal Control Module Non-Volatile Memory (NVMY) Error
DTC P16A4	Internal Control Module Knock Sensor Module Error
DTC P16A5	Control Module Multiple Output Stage SPI-Bus Communication Error
DTC P0687	ECM/PCM Power Relay Control Circuit High
DTC P0686	ECM/PCM Power Relay Control Circuit Low
DTC P16C5	Main Relay Switching Delay
DTC P3287	Internal Control Module Coding Process EEPROM Error
DTC P3239	Control Module Coding Process No Coding
DTC P3288	Control Module Monitoring Engine Variant CAN-Timeout
DTC P3289	Control Module Monitoring Engine Variant Plausibility
DTC P10A5	Injectors Initialization Error (Group 1)
DTC P10A6	Injectors Open Circuit (Group 1)
DTC P10A7	Injectors Discharge Error (Group 1)
DTC P10A8	Injectors Initialization Error (Group 2)

DTC P10A9	Injectors Open Circuit (Group 2)
DTC P10AA	Injectors Discharge Error (Group 2)
DTC P10BA	Injectors Initialization Error (Group 3)
DTC P10BB	Injectors Open Circuit (Group 3)
DTC P10BC	Injectors Discharge Error (Group 3)
DTC P10BD	Injectors Initialization Error (Group 4)
DTC P10BE	Injectors Open Circuit (Group 4)
DTC P10BE	Injectors Open Circuit (Group 4)
DTC P164C	Pedal Position Sensor Potentiometer Supply Channel 1 Electrical
DTC P1625	Pedal Position Sensor Potentiometer Supply Channel 2 Electrical
DTC P15B7	MSA (Engine Start Automatic) Circuit High
DTC P15B6	MSA (Engine Start Automatic) Circuit Low
DTC P0512	Starter Request Circuit
DTC P10C3	Fuel Volume Regulator Safety Relay Control Circuit High
DTC P10C2	Fuel Volume Regulator Safety Relay Control Circuit Low
DTC P10C1	Fuel Volume Regulator Safety Relay Control Circuit
DTC P0669	Control Module Internal Temperature Sensor 'A' Circuit High
DTC P0668	Control Module Internal Temperature Sensor 'A' Circuit Low
DTC P168F	Control Module Self-Test, ACC (Adaptive Cruise Control) Monitoring
DTC P166A	Control Module Self-Test, LDM (Longitudinal Dynamics Management) Monitoring
DTC P16A9	Control Module Self-Test, Speed Monitoring Reset
DTC P16C2	Control Module Self-Test, Speed Limitation Monitoring
DTC P16B0	Control Module Self-Test, Pedal Position Sensor Monitoring
DTC P16B1	Control Module Self-Test, Idle Air Control System Integrated Component Plausibility
DTC P16B2	Control Module Self-Test, Idle Air Control System PD-Component Plausibility
DTC P16B3	Control Module Self-Test, MSR (Engine-Drag-Torque Control) Monitoring
DTC P16C9	Control Module Self-Test, ICM (Integrated Chassis Management) Monitoring
DTC P1603	Control Module Self-Test, Torque Monitoring
DTC P16B6	Control Module Self-Test, ETC Monitoring
DTC P16B7	Control Module Self-Test, Clutch Torque Monitoring Maximum Value Plausibility
DTC P16B8	Control Module Self-Test, Clutch Torque Monitoring Minimum Value Plausibility
DTC P16B9	Control Module Self-Test, Torque Loss Monitoring
DTC P16C1	Control Module Self-Test, Torque Monitoring Current Indicated Value Plausibility
DTC P16CE	Control Module Self-Test, Hardware Monitoring
DTC P323F	Control Module Monitoring Fuel Volume, Air Mass/Lambda - Injected Fuel Volume Correlation

DTC P060E	Internal Control Module Throttle Position Performance
DTC P0605	Internal Control Module Read Only Memory (ROM) Error
DTC P0604	Internal Control Module Random Access Memory (RAM) Error
DTC P0606	Control Module Processor
DTC P060C	Internal Control Module Main Processor Performance
DTC P15E0	Charge Air Cooler Coolant Pump RPM Out of Range
DTC P15E1	Charge Air Cooler Coolant Pump Cut-Off, Internal Temperature Too High
DTC P15E2	Charge Air Cooler Coolant Pump Cut-Off, Overvoltage
DTC P15E4	Charge Air Cooler Coolant Pump Dry Run
DTC P15E5	Charge Air Cooler Coolant Pump Undervoltage
DTC P15E6	Charge Air Cooler Coolant Pump Temperature Threshold 1 Exceeded
DTC P15E7	Charge Air Cooler Coolant Pump Temperature Threshold 2 Exceeded
DTC U117B	Charge Air Cooler Coolant Pump Communication Plausibility
DTC P15CC	Turbocharger Coolant Pump Control Circuit High
DTC P15CB	Turbocharger Coolant Pump Control Circuit Low
DTC P15CA	Turbocharger Coolant Pump Control Circuit/Open
DTC P15CC	Turbocharger Coolant Pump Control Circuit High
DTC P15CB	Turbocharger Coolant Pump Control Circuit Low
DTC P15CA	Turbocharger Coolant Pump Control Circuit/Open
DTC P15CD	Turbocharger Coolant Pump Clamped
DTC P0832	Clutch Pedal Switch 'A' Circuit High
DTC P0831	Clutch Pedal Switch 'A' Circuit Low
DTC P0620	Generator Control Circuit
DTC P325A	Generator Electrical Error Calculated
DTC P0A3B	Generator Over Temperature
DTC P324C	Generator Over Temperature Calculated
DTC P3223	Generator Mechanical
DTC P324E	Generator Regulator Type Implausible
DTC U1132	Lost Communication With Generator via BSD (Bit Serial Data Interface)
DTC P160C	Powermanagement Overvoltage
DTC P160D	Powermanagement Undervoltage
DTC P160A	Powermanagement Exhaustive Discharge
DTC P160F	Powermanagement No-Load Current Error
DTC P160F	Powermanagement No-Load Current Error
DTC P160E	Powermanagement Operation Without Charging of Battery
DTC P150A	Battery Sensor BSD (Bit Serial Data Interface) Extended Communication Circuit
DTC P150B	Battery Sensor BSD (Bit Serial Data Interface) Communication Circuit
DTC P150C	Battery Sensor Firmware Implausible
DTC P150D	Battery Sensor Temperature Error
DTC P150E	Battery Sensor Voltage Error

DTC P150F	Battery Sensor Current Error
DTC P151A	Battery Sensor Terminal 15/30 Wakeup Circuit
DTC P151C	Battery Sensor System Error
DTC P151B	Battery Sensor Wakeup Circuit
DTC P150E	Battery Sensor Voltage Error
DTC P150F	Battery Sensor Current Error
DTC P150D	Battery Sensor Temperature Error
DTC P151C	Battery Sensor System Error
DTC P15C5	Battery Sensor Wakeup Cable Circuit High
DTC P15CE	Battery Sensor Wakeup Cable Circuit Electrical
DTC P15C4	Battery Sensor Wakeup Cable Circuit Low
DTC P15CF	Battery Sensor Variant Plausibility
DTC P15C3	Battery Sensor Wakeup Cable Circuit
DTC P16D2	DTC Report, DTC Sending Buffer Overflow
DTC P16D3	DTC Report, DTC Sending Failed
DTC U1190	Lost Communication With TCM via A- and FA-CAN
DTC U1169	Lost Communication with OBD-Sensor
DTC U1185	Lost Communication with FA-CAN
DTC U119E	Lost Communication With FlexRay
DTC P10DD	FlexRay Hardware Defective
DTC U1184	Lost Communication with A-CAN
DTC P16DC	FlexRay Controller Startup Error
DTC U11B6	Lost Communication With Controlled Upper Air Shutter via LIN
DTC P304F	Controlled Upper Air Shutter Message Monitoring via LIN
DTC U119D	Lost Communication With BSD (Bit Serial Data Interface)
DTC U1117	Message Monitoring Speed Alive Check
DTC U1118	Lost Communication With Speed
DTC U1119	Message Monitoring Speed Check Sum Error
DTC U1197	Message Monitoring Brake Torque Alive Check
DTC U1198	Lost Communication With Brake Torque
DTC U1199	Message Monitoring Brake Torque Check Sum Error
DTC U1195	Message Monitoring Wheel Speed Alive Check
DTC U116D	Lost Communication With Wheel Speed
DTC U1196	Message Monitoring Wheel Speed Check Sum Error
DTC U1120	Lost Communication With Steering Wheel Angle
DTC U1125	Message Monitoring DSC Status Alive Check
DTC U1126	Lost Communication With DSC Status
DTC U1127	Message Monitoring DSC Status Check Sum Error
DTC U11B0	Message Monitoring Torque Request Crankshaft Transmission Data2 via FA-CAN Alive Check
DTC U11B1	Lost Communication With Torque Request Crankshaft Transmission Data2 via

	FA-CAN
DTC U11B2	Message Monitoring Torque Request Crankshaft Transmission Data2 via FA-CAN Check Sum Error
DTC U1101	Lost Communication With Ambient Temperature/Relative Time
DTC U0137	Lost Communication With Trailer Brake Control Module
DTC U1129	Lost Communication With Reverse Status
DTC U11A5	Lost Communication With Status TCM via FA-CAN
DTC U112D	Lost Communication With Control Crash Cut-Off EKP (Electrical Fuel Pump)
DTC U113C	Lost Communication With Time/Date
DTC U113A	Lost Communication With Central Locking System Status
DTC U1193	Message Monitoring Transmission Data via FA-CAN Alive Check
DTC U11A0	Lost Communication With Transmission Data via FA-CAN
DTC U1194	Message Monitoring Transmission Data via FA-CAN Check Sum Error
DTC U11AA	Message Monitoring Torque Request Crankshaft Transmission Data via FA-CAN Alive Check
DTC U11AB	Lost Communication With Torque Request Crankshaft Transmission Data via FA-CAN
DTC U11AC	Message Monitoring Torque Request Crankshaft Transmission Data via FA-CAN Check Sum Error
DTC U119B	Lost Communication With Ambient Temperature
DTC U111C	Lost Communication With Mileage/Range
DTC U111D	Message Monitoring Terminal Status Alive Check
DTC U111E	Lost Communication With Terminal Status
DTC U111F	Message Monitoring Terminal Status Check Sum Error
DTC U11A7	Lost Communication With OBD Data Transmission via FA-CAN
DTC U11B3	Message Monitoring Torque Request Crankshaft Transmission Data2 via A-CAN Alive Check
DTC U11B4	Lost Communication With Torque Request Crankshaft Transmission Data2 via A-CAN
DTC U11B5	Message Monitoring Torque Request Crankshaft Transmission Data2 via A-CAN Check Sum Error
DTC U11A6	Lost Communication With Status TCM via A-CAN
DTC U11A4	Lost Communication With OBD Data Transmission via A-CAN
DTC U11A1	Message Monitoring Transmission Data via A-CAN Alive Check
DTC U11A2	Lost Communication With Transmission Data via A-CAN
DTC U11A3	Message Monitoring Transmission Data via A-CAN Check Sum Error
DTC U11AD	Message Monitoring Torque Request Crankshaft Transmission Data via A-CAN Alive Check
DTC U11AE	Lost Communication With Torque Request Crankshaft Transmission Data via A-CAN
DTC U11AF	Message Monitoring Torque Request Crankshaft Transmission Data via A-CAN Check Sum Error

DTC U1178	Message Monitoring Status EKP (Electrical Fuel Pump) Alive Check
DTC U1128	Lost Communication With Status EKP (Electrical Fuel Pump)
DTC U1179	Message Monitoring Status EKP (Electrical Fuel Pump) Check Sum Error

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Theory & Operation - 750i, 750Li (N63)

DIAGNOSTIC TROUBLE CODE INDEX

DIAGNOSTIC TROUBLE CODE INDEX (THEORY & OPERATION N63)

DTC	Definition
P0420, P0430	Catalyst Monitoring
P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P1396	Misfire Monitoring
P0440	EVAP Canister Purge Solenoid (CPS) Functional Check
P0442, P0456, P1434, P1447, P1448, P1449	EVAP System Leak Measurement (Module DM-TL)
P1434, P1447, P1448, P1449	EVAP Pump Current (Comprehensive Component, appendant to EVAP)
P2418, P2419, P2420	EVAP - DMTL Valve Electrical Check
P240A, P240B, P240C	EVAP - DMTL Heater Electrical Check
P2400, P2401, P2402	EVAP - DMTL Pump Electrical Check
P0444, P0458, P0459	EVAP - Purge Control Valve Electrical Check
P0171, P0174, P0172, P0175	Fuel System Monitoring Lambda Adaptation
P2096, P2098, P2097, P2099	Fuel System Monitoring Trim Control Plausibility Monitoring
P119D, P119E	Diagnosis of Injector Aging
P302A, P302B, P302C, P302D, P3283, P3285, P3284, P3286	Monitoring function - High Pressure Fuel System
P303A, P303B, P303C, P303D	Monitoring function - Fuel Pressure Range Check
P0192, P3250, P0193, P3251	Fuel Rail Pressure Sensor Electrical Check
P10C3, P10C2, P10C1	Volume Control Valve Relay Output Electrical Check
P140E, P142E, P142F	Injection Deactivation
P0462, P2067, P0463, P2068	Fuel Level Sensor Electrical Circuit Continuity Check
P144B	Fuel Level Sensor Signal Correlation Check
P0131, P0151, P0132, P0152	Upstream Oxygen Sensor - Short Circuit Monitoring
P112C, P112D, P2243, P2247	Upstream Oxygen Sensor - Open Circuit Monitoring
P3022, P3023, P3024, P3025	Upstream Oxygen Sensor - Signal Controller Monitoring
P2414, P2415	Upstream Oxygen Sensor - Signal Activity Check
P0040	Upstream Oxygen Sensor - Swapped Sensors Check

P2195, P2197, P2196, P2198	Upstream Oxygen Sensor - Active Signal Check (Shift to lean/rich)
P0133, P0153	Upstream Oxygen Sensor - Signal Dynamic Monitoring (Slow Response)
P2297, P2298	Upstream Oxygen Sensor - Signal Monitoring During DFCO
P3026, P3027, P0135, P0155, P165F, P166F	Upstream Oxygen Sensor - Heater Monitoring
P0030, P0050, P0031, P0051, P0032, P0052	Upstream Oxygen Sensor - Heater Circuit Monitoring
P0137, P157, P0138, P158, P0140, P0160	Downstream Oxygen Sensor - Circuit Monitoring
P013E, P014A	Downstream Oxygen Sensor - Signal Dynamic Check During DFCO
P013A, P013C	Downstream Oxygen Sensor - Dynamic/Transition Time in Sensor Midpoint Range Monitoring
P114A, P114C, P114B, P114D	Downstream Oxygen Sensor - Signal Activity Check
P2270, P2272, P2271, P2273, P0041	Downstream Oxygen Sensor - Signal Check (Stuck lean/rich, Swap)
P0141, P0161	Downstream Oxygen Sensor - Heater Plausibility Monitoring
P0036, P0056, P0037, P0057, P0038, P0058	Downstream Oxygen Sensor - Heater Circuit Monitoring
P0128	Thermostat Monitoring
P0597, P0598, P0599	Thermostat Electrical Check (Comprehensive component attendant to thermostat)
P0117, P0118	Engine Coolant Temperature Electrical Check
P3198	Engine Coolant Temperature Gradient Diagnosis
P3199	Engine Coolant Temperature Stuck Diagnosis
P316A	Engine Coolant Temperature Stuck in Range Diagnosis
P1515	Engine off Timer Monitoring
P0012, P0022, P0015, P0025	Variable Camshaft Timing (Vanos) (detection of mechanical IVVT error)
P13B4, P13B6, P13BA, P13BC, P0340, P0365, P1300, P130A, P13B0, P13B2	Camshaft position sensor (CMP)
P0340, P0345, P0365, P0390	Diagnosis of Signal Plausibility
P1300, P139A, P130A, P139B	Monitoring function - Diagnosis of Period Length
P13B0, P13B1, P13B2, P13B3	Monitoring function - Diagnosis of Synchronization state
P0018	Monitoring function - Crankshaft Camshaft Synchronization
P13B4, P13B5, P13B6, P13B7	Monitoring function - Diagnosis of Mechanical Reference Position

P13BA, P13BB, P13BC, P13BD	Monitoring function - Diagnosis of Mechanical Chain Jump
P0335, P0336, P0370, P138F	Crankshaft Position Sensor (CRK)
P0010, P0020, P2088, P2092, P2089, P2093, P0013, P0023, P2090, P2094, P2091, P2095	Camshaft Position Actuator Electrical Check
P0072, P0073	CAN based Ambient Air Temperature Signal Diagnosis
P0071	Ambient Air Temperature (AAT) Signal Plausibility Check
P113C, P11B2, P111E, P117F, P111F, P118F	Intake Air Temperature Sensor Plausibility Diagnosis
P0112, P00AC, P0113, P00AD	Intake Air Temperature Sensor Electrical Check
P10B8, P10B9, P10B0, P10B2, P10B1, P10B3	Charge Air Cooler Temperature Plausibility Diagnosis
P10B4, P10B5, P10B6, P10B7	Charge Air Cooler Temperature Gradient Diagnosis
P007C, P00A2, P007D, P00A3	Charge Air Cooler Temperature Sensor Electrical Check
P2100, P210A	Electronic Throttle Control (ETC) Power Stage Diagnosis (H-bridge)
P11AA, P11AB, P16D0, P16D1	Electronic Throttle Control (ETC) Motor Control Performance
P1417, P1455	Electronic Throttle Control (ETC) Composite Error
P1632, P16AA, P1633, P16AB, P169B, P169C, P16BC, P16BD, P16BE, P16BF, P16CA, P16CB, P16CC, P16CD	Monitoring function - ETC Adaptation Diagnosis
P16BA, P16BB, P169A, P16AD	Monitoring function - ETC Start Check
P0121, P0226, P0221, P212B	Throttle Position Sensor (TPS) Plausibility Check
P115F, P117E	Throttle Position Sensor (TPS) Ratio Check
P0122, P0227, P0123, P0228, P0222, P212C, P0223, P212D	Throttle Position Sensor Electrical Check
P164C, P1625, P1224	Pedal Position Sensor
P0506, P0507, P1561, P1562	Idle Speed Control Rationality Diagnosis
P00BC, P00BE, P00BD, P00BF, P112E, P11B0, P112F, P11B1	Mass Air Flow and Manifold Absolute Pressure Plausibility Diagnosis
P12B8, P12B9, P12A8, P12B6, P12A9, P12B7, P12A4, P12A6, P12A5, P12A7	Ambient Pressure, Boost Pressure and Manifold Absolute Pressure
P119B, P11AF, P119A, P11AE	Manifold Absolute Pressure Sensor Electrical Check
P10C7, P10C8	Mass Air Flow Sensor Internal Error Diagnosis
P0102, P010C, P0103, P010D	Mass Air Flow Temperature Sensor Diagnosis Electrical Check
P00BC, P00BE, P00BD, P00BF	Mass Air Flow Temperature Sensor Diagnosis Range Check
P0102, P010C, P0103, P010D	Mass Air Flow Sensor Diagnosis Electrical Check

P00BC, P00BE, P00BD, P00BF	Mass Air Flow Sensor Diagnosis Range check
P0503	Vehicle Speed Sensor Signal Plausibility Check
P0500	Vehicle Speed Sensor Signal Check
P0326, P0327, P0328, P135B, P1327, P1328, P135F, P1329, P1330, P033B, P033C, P033D	Knock Sensor (KS)
P0237, P0241, P0238, P0242	Supercharger Boost Sensor Electrical Check

2009 BMW

750i & 750Li

BUZZERS, RELAYS & TIMERS

BUZZERS, RELAYS & TIMERS LOCATION

Component	Location
Bi-Stable Relay Terminal 30F (3)	Rear distribution box. See **Fig. 217**.
Compressor Relay (K1)	Right rear of luggage compartment. See **Fig. 174**.
Electric Fan Cut-Out Relay (K5)	In luggage compartment. See **Fig. 175**.
Fanfare Horn Relay	Front distribution box.
Heated Rear Window Relay (4)	Rear distribution box. See **Fig. 217**.
Ignition Coil & Fuel Injector Release Relay (K6341)	Right rear of engine compartment. See **Fig. 176**.
Relay Terminal 15N (2)	Rear distribution box. See **Fig. 217**.
Relay Terminal 30B (1)	Rear distribution box. See **Fig. 217**.
Volume Control Valves Relay (K6342)	Right rear of engine compartment. See **Fig. 176**.

CIRCUIT PROTECTION DEVICES

CIRCUIT PROTECTION DEVICES LOCATION

Component	Location
Front Distribution Box (Z1)	Right side of dash. See **Fig. 253**.
Front Power Distribution Box (Z4)	Right front of engine compartment. See **Fig. 256**.
Fuse Box (Z3)	Center of luggage compartment. See **Fig. 255**.
Fuse Holder (A8682 & A8683)	Right front of engine compartment. See **Fig. 61**.
Junction Box	Right side of dash.
Rear Distribution Box (Z2)	Right rear of luggage compartment. See **Fig. 254**.

CONTROL UNITS

CONTROL UNITS LOCATION

Component	Location
Accelerator Pedal Module (B81)	On accelerator pedal bracket. See **Fig. 150**.
Active Steering (A65)	Under driver's Footwell. See **Fig. 47**.
All-Round Vision Camera (A167)	Left rear of luggage compartment. See **Fig. 9**.
Camera-Based Driver Assistance Systems (A56)	Lower left end of dash. See **Fig. 42**.
Car Access System (A16)	Right of steering column. See **Fig. 8**.
Car Information Computer (A42)	Center of dash. See **Fig. 32**.
Central Gateway Module (A51)	Lower left end of dash. See **Fig. 40**.
Charge Air Pressure Controller (B2353)	Lower right of engine. See **Fig. 103**.

Crash Safety Module (A11)	Under right side of dash. See **Fig. 1**.
Digital Motor Electronics (A46)	Right rear of engine compartment. See **Fig. 35**.
Driver's Seat Module (A93)	Under driver's seat. See **Fig. 65**.
Dynamic Stability Control (DSC) (A91)	Right of catalytic converter. See **Fig. 64**.
Electronic Ride-Height Control (A61)	Right side of luggage compartment. See **Fig. 45**.
Electronic Steering Wheel Module (A69)	Top of steering column. See **Fig. 49**.
Footwell Module (A58)	Left kick panel. See **Fig. 43**.
Fuel Pump Control (EKPS) (A98)	Right rear of luggage compartment. See **Fig. 66**.
Fuel Tank Leakage Diagnosis Module (A117)	Right rear wheelwell. See **Fig. 4**.
Integrated Chassis Management (A78)	Center console. See **Fig. 55**.
Operation Unit, Driver Assistance System (A3)	Left side of dash. See **Fig. 22**.
Parking Brake Control Module (A90)	Bottom rear of engine compartment. See **Fig. 63**.
Passenger's Seat Module (A26)	Under front passenger's seat. See **Fig. 19**.
Preheating Control Module (A2402)	Left side of engine. See **Fig. 17**.
Rear Axle King Pin Inclination Control (A77)	Right rear of luggage compartment. See **Fig. 54**.
Rear Driver's Side Seat Module (A18)	Under left rear seat. See **Fig. 14**.
Rear Passenger's Seat Module (A4)	Left side of left rear seat back. See **Fig. 30**.
Roof Function Module, Basic Variant (A172)	Center front of roof. See **Fig. 13**.
Roof Function Module, High Variant (A21)	Center front of roof. See **Fig. 16**.
Seat Heating Module, Rear Driver's Side (A44)	Left side of left rear seat back. See **Fig. 34**.
Seat Heating Module, Rear Passenger's Side (A5)	Right side of right rear seat back. See **Fig. 39**.
Slide/Tilt Sunroof Drive Unit (M17)	Center front of roof. See **Fig. 187**.
Telematics Control Unit (A2)	Left side of luggage compartment. See **Fig. 15**.
Tire Pressure Control (A66)	Right rear of luggage compartment. See **Fig. 48**.
Trailer Module (A36)	Right side of luggage compartment. See **Fig. 28**.
Vertical Dynamics Management (A49)	Right kick panel. See **Fig. 38**.
Video Module (A25)	Left rear of luggage compartment. See **Fig. 18**.
Wiper Module (M12)	Left rear of engine compartment. See **Fig. 180**.

MOTORS

MOTORS LOCATION

Component	Location
Automatic Soft-Close Drive, Diver Side Door (A17)	Rear of driver's door. See **Fig. 12**.
Automatic Soft-Close Drive, Left Rear Door (A33)	Rear of left rear door. See **Fig. 26**.
Automatic Soft-Close Drive, Passenger's Door (A31)	Lower rear of front passenger's door. See **Fig. 24**.
Automatic Soft-Close Drive, Right Rear Door (A32)	Rear of right rear door. See **Fig. 25**.
Auxiliary Water Pump (M35)	Left front of engine compartment. See **Fig. 200**.
Backrest-Head Adjustment Drive (Driver's Side) (M46)	On driver's seat back. See **Fig. 199**.

Backrest-Head Adjustment Drive (Right Front Passenger's Side) (M29)	On right front passenger's seat back. See **Fig. 195**.
Backrest-Width Adjustment Drive (Driver's Side) (M73)	On driver's seat back. See **Fig. 199**.
Blower Motor (M26)	Right side of dash. See **Fig. 193**.
Boot Lid Automatic Soft-Close Drive (Y27)	Right rear of luggage compartment. See **Fig. 240**.
Defroster Flap Motor (M61)	On HVAC assembly. See **Fig. 189**.
E-Box Fan (M159)	Left side of engine compartment. See **Fig. 183**.
Electric Fuel Pump (M14)	Top right of fuel tank. See **Fig. 181**.
Electric Motor-Driven Reel Drive (Left) (M164)	Base of left "B" pillar. See **Fig. 185**.
Electric Motor-Driven Reel Drive (Right) (M165)	Base of right "B" pillar. See **Fig. 186**.
Electric Motor-Driven Reel (Left) (A132)	Left "B" pillar. See **Fig. 5**.
Electric Motor-Driven Reel (Right) (A133)	Right "B" pillar. See **Fig. 6**.
Footwell Flap Motor (Left Front) (M21)	On HVAC assembly. See **Fig. 114**.
Footwell Flap Motor (Right Front) (M7)	On HVAC assembly. See **Fig. 153**.
Forward/Backward Adjustment Drive Unit (Driver's Side) (M40)	Under driver's seat. See **Fig. 205**.
Fresh Air Flap Motor (M25)	Right of HVAC assembly. See **Fig. 192**.
Fuel Filler Flap Central Locking Drive (M72)	Right rear of luggage compartment. See **Fig. 219**.
Head-Restraint Height Adjustment Drive (Driver's Side) (M31)	Top of Driver's seat back. See **Fig. 198**.
Head-Restraint Height Adjustment Drive (Right Front Passenger's Side) (M45)	On right front passenger's seat back. See **Fig. 208**.
Independent Heater Circulation Pump (M55)	Lower left front of engine compartment. See **Fig. 169**.
Independent Heating Fuel Metering Pump (M44)	Front left of fuel tank. See **Fig. 207**.
Intercooler Coolant Pump (M60354)	Front of engine. See **Fig. 212**.
Longitudinal Seat Adjustment Drive (Driver's Side) (M68)	On driver's seat back. See **Fig. 216**.
Longitudinal Seat Adjustment Drive (Right Front Passenger's Side) (M1)	Under left rear of right front passenger's seat. See **Fig. 177**.
Lumbar Support-Active Seat Drive Unit (Driver's Side) (M74)	Bottom driver's seat back. See **Fig. 220**.
Lumbar Support-Active Seat Drive Unit (Right Front Passenger's Side) (M42)	On right front passenger's seat back. See **Fig. 206**.
Lumbar Support Drive (Driver's Side) (M30)	Bottom of driver's seat back. See **Fig. 197**.
Lumbar Support Drive (Left Rear Seat) (M82)	On left rear seat back. See **Fig. 224**.
Lumbar Support Drive (Right Front Passenger's Side) (M10)	Under center rear of right front passenger's seat. See **Fig. 178**.
Lumbar Support Drive (Right Rear Seat) (M4)	On right rear seat back. See **Fig. 204**.
Mixing Air Flap Motor (M85)	On rear climate control assembly. See **Fig. 225**.
Mixing Air Flap Motor (M86)	On rear climate control assembly. See **Fig. 225**.

Power Window Drive (Driver's Side) (M11)	Center of driver's door. See **Fig. 179**.
Power Window Drive (Left Rear Door) (M66)	Center of left rear door. See **Fig. 214**.
Power Window Drive (Right Rear Door) (M67)	Center of right rear door. See **Fig. 215**.
Rear Air Conditioning System Blower Motor (M79)	On rear climate control assembly. See **Fig. 222**.
Rear Climate Control Air Distribution Flap Motor (Left) (M77)	On rear climate control assembly. See **Fig. 221**.
Rear Climate Control Air Distribution Flap Motor (Right) (M78)	On rear climate control assembly. See **Fig. 221**.
Rear Compartment Blower Motor (M38)	Rear of center console. See **Fig. 202**.
Rear Compartment Flap Motor (M84)	On HVAC assembly. See **Fig. 114**.
Rear Compartment Footwell Flap Motor (M28)	On HVAC Assembly. See **Fig. 153**.
Rear Stratifying Flap Motor (Left) (M62)	On HVAC assembly. See **Fig. 191**.
Rear Stratifying Flap Motor (Right) (M24)	On HVAC assembly. See **Fig. 191**.
Rear Window Roller Sun Blind Drive (M57)	Under rear package tray. See **Fig. 211**.
Recirculation Air Flap Motor (M91)	Right of HVAC assembly. See **Fig. 192**.
Seat Angle Adjustment Drive (Driver's Side) (M39)	Under driver's seat. See **Fig. 203**.
Seat Angle Adjustment Drive (Right Front Passenger's Side) (M51)	Under right front passenger's seat. See **Fig. 210**.
Seat Back Adjustment Drive (Driver's Side) (M32)	On driver's seat back. See **Fig. 199**.
Seat Back Adjustment Drive (Right Front Passenger's Side) (M3)	On right front passenger's seat back. See **Fig. 196**.
Seat Back Angle Adjustment Drive (Driver's Side) (M71)	On driver's seat back. See **Fig. 218**.
Seat Back Angle Adjustment Drive (Right Front Passenger's Side) (M65)	On right front passenger's seat back. See **Fig. 195**.
Seat Back Width Adjustment Drive (Right Front Passenger's Side) (M36)	On right front passenger's seat back. See **Fig. 195**.
Seat Depth Adjustment Drive (Driver's Side) (M54)	Driver's seat. See **Fig. 205**.
Seat Depth Adjustment Drive (Right Front Passenger's Side) (M37)	Under right front passenger's seat. See **Fig. 201**.
Seat Height Adjustment Drive (Right Front Passenger's Side) (M64)	Under right front passenger's seat. See **Fig. 210**.
Starter Motor (M6510a)	Lower right rear of engine. See **Fig. 213**.
Steering Column Adjustment Motor (M19)	Under steering column. See **Fig. 182**.
Steering Column Inclination Motor (M157)	Right of steering column. See **Fig. 182**.
Stratifying Flap Motor (Left Front) (M9)	On HVAC assembly. See **Fig. 114**.
Sunroof Shade Drive (M27)	Center of roof. See **Fig. 194**.
Ventilation Flap Motor (Center Left) (M23)	On HVAC assembly. See **Fig. 191**.
Ventilation Flap Motor (Center Right) (M22)	On HVAC assembly. See **Fig. 191**.
Ventilation Flap Motor (Left) (M20a)	On HVAC assembly. See **Fig. 190**.
Ventilation Flap Motor (Outside Left) (M20)	On HVAC assembly. See **Fig. 189**.
Ventilation Flap Motor (Right) (M22a)	On HVAC assembly. See **Fig. 190**.

Vibration Motor (M161)	On top of steering column. See **Fig. 184**.

SENDING UNITS & SENSORS

SENDING UNITS & SENSORS LOCATION

Component	Location
Airbag Sensor (Left B-Pillar) (B40)	Left "B" pillar. See **Fig. 5**.
Airbag Sensor (Left Front Door) (B80)	Center of driver's door. See **Fig. 149**.
Airbag Sensor (Right B-Pillar) (B57)	Right "B" pillar. See **Fig. 6**.
Airbag Sensor (Right Front Door) (B28)	In right front door. See **Fig. 108**.
Air Mass Sensor (B6217)	On right air intake. See **Fig. 131**.
Air Mass Sensor 2 (B6227)	On left air intake. See **Fig. 131**.
AUC Sensor (B13)	Left rear of luggage compartment. See **Fig. 76**.
Brake Pad Wear Sensor (Left Front) (B105)	On left front brake caliper. See **Fig. 71**.
Brake Pad Wear Sensor (Right Rear) (B106)	On right rear brake caliper. See **Fig. 72**.
Central Sensor (B23)	Center console. See **Fig. 99**.
Characteristic Map Thermostat (B6279)	Front of engine, below generator. See **Fig. 136**.
Charge Air Pressure Sensor (B65781)	Right front of engine. See **Fig. 92**.
Charge Air Temperature Sensor (B2012)	Between charge air cooler & throttle valve. See **Fig. 91**.
Charge Air Temperature Sensor 2 (B65791)	Top left front of engine. See **Fig. 138**.
Close-Range Sensor (Left) (B36)	Left of front grille. See **Fig. 110**.
Close-Range Sensor (Right) (B34)	Right of front grille. See **Fig. 110**.
Coolant Temperature Sensor (B7)	Right side of engine compartment. See **Fig. 143**.
Crankshaft Sensor (B6203)	Bottom right of engine. See **Fig. 128**.
Electronic Right Vision Module (A80)	Right end of dash. See **Fig. 57**.
Engine Coolant Temperature Sensor (B6236)	Front of engine, below generator. See **Fig. 93**.
Evaporator Temperature Sensor (Front) (B4)	On HVAC assembly. See **Fig. 114**.
Evaporator Temperature Sensor (Rear) (B70)	On rear air conditioner assembly. See **Fig. 144**.
Exhaust Camshaft Sensor (B62142)	Top right rear of engine. See **Fig. 130**.
Exhaust Camshaft Sensor 2 (B62242)	Left rear of engine. See **Fig. 132**.
Exhaust Gas Pressure Sensor (After Catalytic Converter) (B2389)	Right rear of engine. See **Fig. 104**.
Exhaust Gas Pressure Sensor (Before Catalytic Converter) (B2390)	On front of catalytic converter. See **Fig. 103**.
Exhaust Gas Pressure Sensor (Before Turbocharger) (B2455)	Right front of engine. See **Fig. 107**.
Exhaust Gas Temperature Sensor (After EGR Cooler) (B2450)	Top left of engine. See **Fig. 106**.
Front Level Sensor (Left) (B39)	On bracket near left front axle. See **Fig. 113**.
Front Level Sensor (Right) (B35)	On bracket near right front axle. See **Fig. 111**.

Fuel Level Sensor 1 (B21)	Top left Side of fuel tank. See **Fig. 96**.
Fuel Level Sensor 2 (B22)	Top right side of fuel tank. See **Fig. 97**.
Fuel Pressure/Temperature Sensor (B2446)	Left rear of engine. See **Fig. 105**.
Heating Heat Exchanger Temperature Sensor (Left) (B16)	Center left of HVAC plenum. See **Fig. 82**.
Heating Heat Exchanger Temperature Sensor (Right) (B9)	Center right of HVAC plenum. See **Fig. 82**.
Intake Air Temperature/Intake Manifold Pressure Sensor (B65782)	On right intake air duct. See **Fig. 137**.
Intake Air Temperature/Intake Manifold Pressure Sensor 2 (B65792)	On left intake air duct. See **Fig. 139**.
Intake Camshaft Sensor (B62141)	Top right of engine. See **Fig. 130**.
Intake Camshaft Sensor 2 (B62241)	Left rear of engine. See **Fig. 132**.
Intelligent Battery Sensor (B110)	Under center of luggage compartment. See **Fig. 74**.
Knock Sensor (Cylinder 1 & 2) (B6241)	Right side of engine. See **Fig. 133**.
Knock Sensor (Cylinder 3 & 4) (B6242)	Right side of engine. See **Fig. 133**.
Knock Sensor (Cylinder 5 & 6) (B6243)	Left side of engine. See **Fig. 134**.
Knock Sensor (Cylinder 7 & 8) (B6244)	Left side of engine. See **Fig. 134**.
Left Front Airbag Sensor (B51)	Behind left front bumper. See **Fig. 121**.
Long Range Sensor (B50)	Under right side of front grille. See **Fig. 110**.
Oil Condition Sensor (B62540)	Lower right rear of engine. See **Fig. 135**.
Outside Temperature Sensor (B56)	Right front bumper. See **Fig. 125**.
Oxygen Sensor (Before Catalytic Converter) (B62101)	Before left catalytic converter. See **Fig. 129**.
Oxygen Sensor (Behind Catalytic Converter) (B62102)	Behind left catalytic converter. See **Fig. 129**.
Oxygen Sensor 2 (Before Catalytic Converter) (B62201)	Before right catalytic converter. See **Fig. 129**.
Oxygen Sensor 2 (Behind Catalytic Converter) (B62202)	Behind right catalytic converter. See **Fig. 129**.
Radiator Outlet Temperature Sensor (B604)	Lower right front of engine. See **Fig. 126**.
Rail Pressure Sensor (B6027)	Lower right front of engine. See **Fig. 101**.
Rail Pressure Sensor 2 (B6028)	Left side of engine. See **Fig. 127**.
RDC Transmitter (Left Rear) (A8)	Left rear wheelwell. See **Fig. 56**.
RDC Transmitter (Right Front) (A7)	Right front wheelwell. See **Fig. 50**.
RDC Transmitter (Right Rear) (A9)	Right rear wheelwell. See **Fig. 62**.
Rear Compartment Footwell Temperature Sensor (Left) (B14)	Under rear of driver's seat. See **Fig. 77**.
Rear Compartment Footwell Temperature Sensor (Right) (B15)	Under right rear passenger's footwell. See **Fig. 78**.
Rear Level Sensor (Left) (B11)	On bracket near left rear axle. See **Fig. 73**.
Rear Level Sensor (Right) (B11)	On bracket on right rear axle. See **Fig. 112**.

Right Front Airbag Sensor (B45)	Behind right front bumper. See **Fig. 118**.
Roof Outlet Nozzle (Left) (B42)	Left side of roof. See **Fig. 115**.
Roof Outlet Nozzle (Right) (B43)	Right side of roof. See **Fig. 116**.
Seat Occupancy Detection, Passenger Side (A64)	Under right front passenger's seat. See **Fig. 46**.
Solar Rain/Light Fogging Sensor (B156)	Behind inside rear view mirror. See **Fig. 81**.
Transmitter (Front Left) (A6)	Top of left front wheelwell. See **Fig. 44**.
Ultrasonic Sensor (Center Front) (B206)	Center of front grille. See **Fig. 94**.
Ultrasonic Sensor (Inner Left Front) (B27)	Left side of front bumper. See **Fig. 100**.
Ultrasonic Sensor (Inner Left Rear) (B31)	Left side of rear bumper. See **Fig. 109**.
Ultrasonic Sensor (Inner Right Front) (B25)	Right side of front bumper. See **Fig. 100**.
Ultrasonic Sensor (Inner Right Rear) (B29)	Right side of rear bumper. See **Fig. 109**.
Ultrasonic Sensor (Outer Left Front) (B26)	Left side of front bumper. See **Fig. 100**.
Ultrasonic Sensor (Outer Left Rear) (B89)	Left side of rear bumper. See **Fig. 109**.
Ultrasonic Sensor (Outer Right Front) (B24)	Right side of front bumper. See **Fig. 100**.
Ultrasonic Sensor (Outer Right Rear) (B30)	Right side of rear bumper. See **Fig. 109**.
Ventilation Temperature Sensor (Left Front) (B151)	On HVAC plenum, under upper left air discharge outlets. See **Fig. 80**.
Ventilation Temperature Sensor (Right Front) (B152)	On HVAC plenum, under upper right air discharge outlets. See **Fig. 80**.
Wheel Speed Sensor (Left Front) (B101)	Left front wheel hub assembly. See **Fig. 67**.
Wheel Speed Sensor (Left Rear) (B103)	Left rear wheel hub assembly. See **Fig. 69**.
Wheel Speed Sensor (Right Front) (B102)	Right front wheel hub assembly. See **Fig. 68**.
Wheel Speed Sensor (Right Rear) (B104)	Right rear wheel hub assembly. See **Fig. 70**.

SOLENOIDS & SOLENOID VALVES

SOLENOIDS & SOLENOID VALVES LOCATION

Component	**Location**
Active Steering Actuator (B20)	On steering rack assembly. See **Fig. 89**.
Bypass Flap EGR Cooler Changeover Valve (B2440)	Top left of engine. See **Fig. 101**.
Dynamic Drive Valve Block (Y7)	Behind right front wheelwell. See **Fig. 251**.
ECO Valve (Y15)	Left front of engine. See **Fig. 237**.
Engine Mount Electric Changeover Valve (B2231)	Lower left rear of engine. See **Fig. 98**.
Exhaust Flap Electric Changeover Valve (Y42)	Left rear of luggage compartment. See **Fig. 243**.
Exhaust Gas Recirculation Actuator (B2459)	Top front of engine. See **Fig. 93**.
Exhaust VANOS Solenoid Valve (Y6282)	Right front of engine. See **Fig. 249**.
Exhaust VANOS Solenoid Valve 2 (Y6284)	Left front of engine. See **Fig. 250**.
Fuel Injectors (Cylinder 1, 2, 3 & 4) (Y6101, Y6102, Y6103 & Y6104)	Top right of engine. See **Fig. 247**.
Fuel Injectors (Cylinder 5, 6, 7 & 8) (Y6105,	Top left of engine. See **Fig. 248**.

Y6106, Y6107 & Y6108)	
Independent Heating Cooling Changeover Valve (Y26)	Lower left front of engine compartment. See **Fig. 169**.
Intake Throttle Valve (Y11)	Left front of engine. See **Fig. 237**.
Intake VANOS Solenoid Valve (Y6281)	Right front of engine. See **Fig. 249**.
Intake VANOS Solenoid Valve 2 (Y6283)	Left front of engine. See **Fig. 250**.
Lumbar Support Valve Block (Driver's Side) (Y12)	On left front passenger's seat back. See **Fig. 218**.
Lumbar Support Valve Block (Right Front Passenger's Side) (Y13)	On right front passenger's seat back. See **Fig. 196**.
Pressure Converter Wastegate Valve (Y6039)	Front of engine. See **Fig. 244**.
Pressure Converter Wastegate Valve 2 (Y6723)	Front of engine. See **Fig. 244**.
Rail Pressure Regulating Valve (B2262)	Top rear of engine. See **Fig. 102**.
Rear-Axle Slip-Angle Control Actuator (Y17)	Under rear of vehicle. See **Fig. 238**.
Rear Refrigerant Shut-Off Valve (Y34)	On rear climate control assembly. See **Fig. 242**.
Volume Control Valve (B2382)	Lower left rear of engine. See **Fig. 98**.
Volume Control Valve (Y6046)	Top front of engine. See **Fig. 245**.
Volume Control Valve 2 (Y6047)	Left front of engine. See **Fig. 246**.
Water Valve (Y8)	Left rear of engine compartment. See **Fig. 252**.

SWITCHES

SWITCHES LOCATION

Component	Location
Bonnet Contact Switch (S17)	Left front of engine compartment. See **Fig. 228**.
Coolant Level Switch (B18)	In coolant reservoir. See **Fig. 86**.
Multifunction Steering Wheel Switch Block (A152 & A153)	On steering wheel. See **Fig. 7**.
Oil Level Switch (B19)	Left front of engine compartment. See **Fig. 87**.
Oil Pressure Switch (B6231)	Left rear of engine. See **Fig. 90**.
Seat Belt Buckle Contact (Left) (S76)	Center left of rear seats. See **Fig. 231**.
Seat Belt Buckle Contact (Right) (S77)	Center right of rear seats. See **Fig. 231**.
Transmission Selector Switch (S45)	On gear selector. See **Fig. 230**.
Video Switch (A40)	Left side of luggage compartment. See **Fig. 31**.
Washer Fluid Level Switch (B17)	In washer fluid reservoir. See **Fig. 85**.

MISCELLANEOUS

MISCELLANEOUS LOCATION

Component	Location
Battery (G1)	Center of luggage compartment. See **Fig. 170**.
Blower Output Stage (N2)	Right side of dash. See **Fig. 226**.

Bluetooth Antenna (E61)	Under right rear of roof. See **Fig. 163**.
Boot Lid Lift (A43)	Right rear luggage compartment. See **Fig. 33**.
Boot Lid/Tailgate Lock (S30)	Center rear of luggage compartment. See **Fig. 229**.
Bumper Aerial (E27)	Left side of rear bumper. See **Fig. 161**.
Damper Satellite, Front Left (A47)	Bottom of left front strut. See **Fig. 36**.
Damper Satellite, Front Right (A48)	Bottom of right front strut. See **Fig. 37**.
Damper Satellite, Rear Left (A74)	Left rear wheelwell. See **Fig. 51**.
Damper Satellite, Rear Right (A30)	Right rear wheel well. See **Fig. 23**.
Diagnostic Plug (X6)	Under left side of dash. See **Fig. 234**.
Driver's Airbag Inflator Assemblies (B52)	Top of steering column. See **Fig. 122**.
Driver's Knee Airbag Inflator Assemblies (B78)	Lower left side of dash. See **Fig. 148**.
Driver's Seat Active Head Restraint Generator (B47)	In driver's head rest. See **Fig. 119**.
Driver's Seat Belt Tensioner Generator (B44)	Top of right seat track. See **Fig. 117**.
Driver's Side Airbag Inflator Assemblies (B54)	Left side of driver's seat back. See **Fig. 124**.
Electric Auxiliary Heater (Front) (E25)	Center of HVAC plenum. See **Fig. 159**.
Electric Auxiliary Heater (Left Rear) (E24)	Under driver's seat. See **Fig. 158**.
Electric Auxiliary Heater (Right Rear) (E50)	Under right rear passenger's footwell.
Electronic Outer Door Handle Module (Driver) (A27)	Driver's door handle. See **Fig. 20**.
Electronic Outer Door Handle Module (Right Front Passenger) (A76)	Right front door handle. See **Fig. 53**.
Electronic Outside Door Handle (Left Rear) (A28)	Left rear door handle. See **Fig. 21**.
Electronic Outside Door Handle (Right Rear) (A75)	Right rear door handle. See **Fig. 52**.
Electronics Junction Box (A34)	Lower right side of dash. See **Fig. 27**.
Emergency GSM Antenna (E66)	Center of rear package tray. See **Fig. 164**.
Engine Breather Heater (B111)	Lower right side of engine. See **Fig. 75**.
Fanfare Horn (High Range) (H3)	Lower right front of engine compartment. See **Fig. 173**.
Fanfare Horn (Low Range) (H2)	Lower left front of engine compartment. See **Fig. 172**.
Front Bumper Camera (Left) (A112)	Left front wheel well. See **Fig. 2**.
Front Bumper Camera (Right) (A113)	Front of right front wheel well. See **Fig. 3**.
HiFi Amplifier (A37)	Left side of luggage compartment. See **Fig. 29**.
Ignition Coil Cylinder 1, 2, 3 & 4 (T6151, T6152, T6153 & T6154)	Top right of engine. See **Fig. 232**.
Ignition Coil Cylinder 5, 6, 7 & 8 (T6155, T6156, T6157 & T6158)	Top left of engine. See **Fig. 233**.
Independent Auxiliary Heater (E85)	Lower left front of engine compartment. See **Fig. 169**.
Infrared Receiver (Left) (B168)	Behind upper driver's seat back. See **Fig. 83**.
Infrared Receiver (Right) (B169)	Behind upper right front passenger's seat back. See

	Fig. 84.
Interface Box (A168)	Left side of luggage compartment. See **Fig. 10**.
Interface Box, High (A169)	Left side of luggage compartment. See **Fig. 11**.
Interior Aerial (Front Center Console) (E84)	Front of center console. See **Fig. 168**.
Interior Aerial (Rear Window Shelf) (E74)	Center of package tray. See **Fig. 166**.
Interior Aerial (Right Rear Passenger Side) (E83)	On right rear door sill. See **Fig. 167**.
Interior Antenna (Driver's Side) (E23)	On left rear door sill. See **Fig. 157**.
Jumper Start Terminal Point (X2)	Right side of engine compartment. See **Fig. 235**.
Lane Departure Warning Camera (A84)	Behind inside rear view mirror. See **Fig. 59**.
Lane Departure Warning (Slave) (B150)	Above left end of rear bumper. See **Fig. 79**.
Left Head Airbag Inflator Assembly (B53)	Top of left "B" pillar. See **Fig. 123**.
Luggage Compartment Aerial (Driver Side) (E28)	Center left of luggage compartment. See **Fig. 162**.
Luggage Compartment Aerial (Right Front Passenger's Side) (E36)	Center right of luggage compartment. See **Fig. 162**.
Massage Seat Pressure Distributor (Left Rear Seat) (Y29)	On left rear seat back. See **Fig. 224**.
Massage Seat Pressure Distributor (Right Rear Seat) (Y65)	On right rear seat back. See **Fig. 204**.
Microphone 2 (B2)	Right front of roof. See **Fig. 88**.
Night Vision Camera (A81)	Right of left headlight. See **Fig. 58**.
Noise Suppressor Filter (E67)	Left "C" pillar. See **Fig. 165**.
Passenger Airbag Inflator Assemblies (B48)	Top right side of dash. See **Fig. 120**.
Passenger's Knee Airbag Inflator Assemblies (B77)	Lower right side of dash. See **Fig. 146**.
Passenger's Seat Active Head Restraint Generator (B67)	In passenger's head rest. See **Fig. 140**.
Passenger's Side Airbag Inflator Assemblies (B69)	Right side of right front passenger seat back. See **Fig. 142**.
Rear Compartment Fan Motor Output Stage (N4)	Rear of center console. See **Fig. 227**.
Right Head Airbag Inflator Assembly (B68)	Top of right "B" pillar. See **Fig. 141**.
Ring Aerial (B207)	Right side of steering column. See **Fig. 95**.
Roof Aerial (E26-1B, E26-2B, E26-3B & E26-4B)	Center rear of roof. See **Fig. 160**.
Safety Battery Terminal Generator (B73)	Center of luggage compartment. See **Fig. 145**.
Satellite Tuner (A86)	Left rear of luggage compartment. See **Fig. 60**.
Seat Belt Force Limiter Generator (Left Front) (B79)	Base of left "B" pillar. See **Fig. 147**.
Seat Belt Force Limiter Generator (Right Front) (B92)	Base of right "B" pillar. See **Fig. 151**.
Seat Belt Tensioner Generator (Right Front Passenger) (B91)	Below right front passenger seat belt buckle head. See **Fig. 152**.
Siren Tilt Alarm Sensor (H1)	Right rear of luggage compartment. See **Fig. 171**.
Telephone Antenna (Bumper) (E114-1B)	Left rear of luggage compartment. See **Fig. 156**.
Top-HiFi Amplifier (A52)	Left side of luggage compartment. See **Fig. 41**.

TV Antenna 2 (E103)	Right "C" pillar. See **Fig. 154**.
TV Antenna 3 (E104)	Left "C" pillar. See **Fig. 155**.

CONNECTORS

CONNECTORS LOCATION

Component	Location
X13*2B (12 Pin)	Right front of engine compartment. See **Fig. 256**.
X13*3B (12 Pin)	Right front of engine compartment. See **Fig. 256**.
X91*1B	Left rear of engine compartment. See **Fig. 236**.
X96*1B	Left rear of engine compartment. See **Fig. 236**.

GROUNDS

GROUNDS LOCATION

Component	Location
Z10*1B	Left side of luggage compartment. See **Fig. 209**.
Z10*2B	Left front of engine compartment. See **Fig. 260**.
Z10*3B	Right front of engine compartment. See **Fig. 262**.
Z10*4B	Left kick panel. See **Fig. 261**.
Z10*5B	Left kick panel. See **Fig. 261**.
Z10*6B	Right kick panel. See **Fig. 239**.
Z10*7B	Right door sill plate. See **Fig. 263**.
Z10*8B	Right rear of luggage compartment. See **Fig. 259**.
Z10*9B	Left kick panel. See **Fig. 261**.
Z10*10B	Center console. See **Fig. 223**.
Z10*11B	Right kick panel. See **Fig. 239**.
Z10*12B	Left rear of luggage compartment. See **Fig. 241**.
Z10*13B	Front of right quarter panel. See **Fig. 257**.
Z10*14B	Front of left quarter panel. See **Fig. 258**.
Z10*17B	Right rear of luggage compartment. See **Fig. 259**.
Z10*22B	Left kick panel. See **Fig. 261**.

SPLICES

SPLICES LOCATION

Component	Location
X65*1V	Right rear of luggage compartment. See **Fig. 259**.
X66*1V	Right rear of luggage compartment. See **Fig. 259**.
X113*1V	Right door sill plate. See **Fig. 263**.
X114*1V	Right door sill plate. See **Fig. 263**.

X151*1V	Center left of dash. See **Fig. 188**.
X151*2v	Center left of dash. See **Fig. 188**.
X308*1V	Right door sill plate. See **Fig. 263**.
X352*1V	Right rear of luggage compartment. See **Fig. 259**.

COMPONENT LOCATION GRAPHICS

NOTE: Figures may show multiple component locations. Refer to appropriate table for proper figure references.

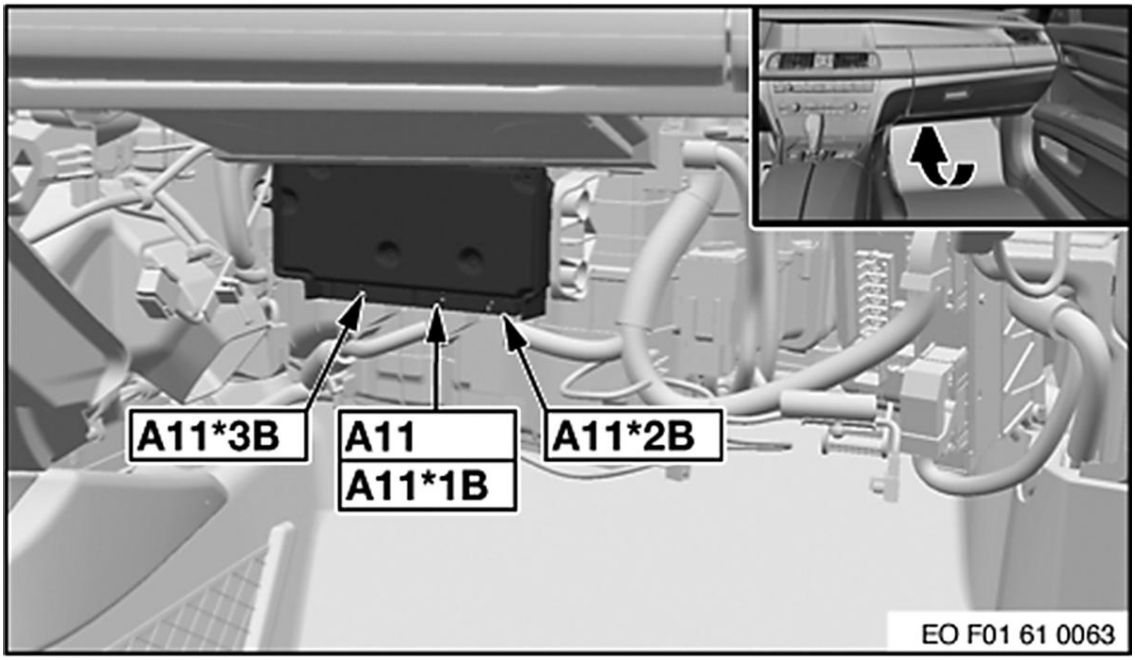


Fig. 1: Under Right Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

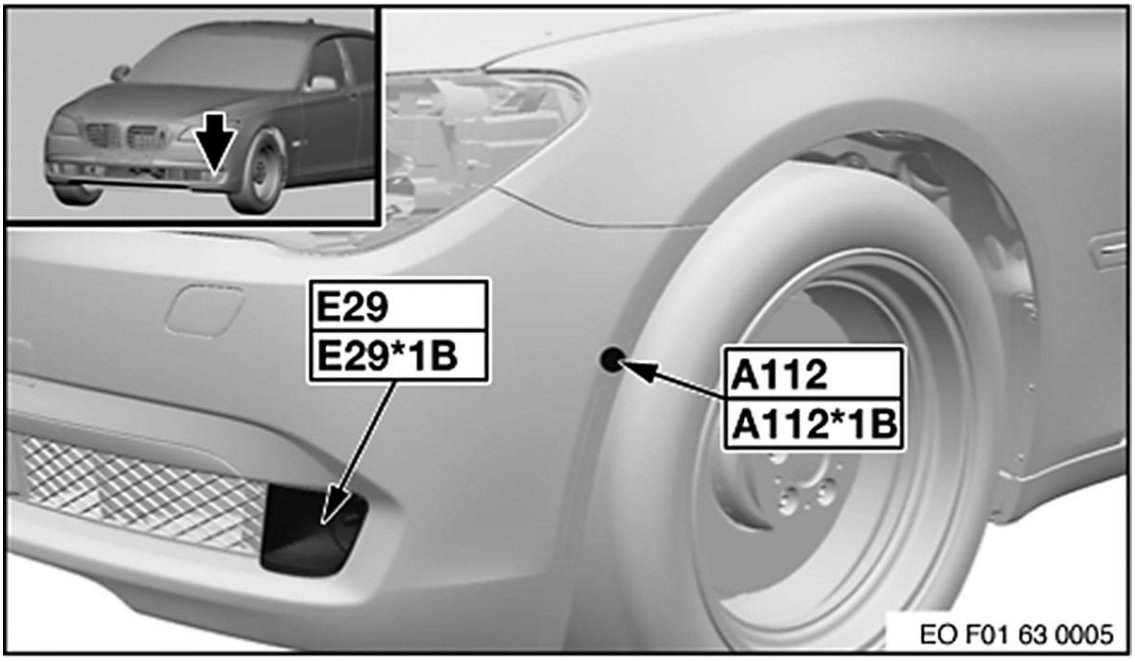


Fig. 2: Left Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

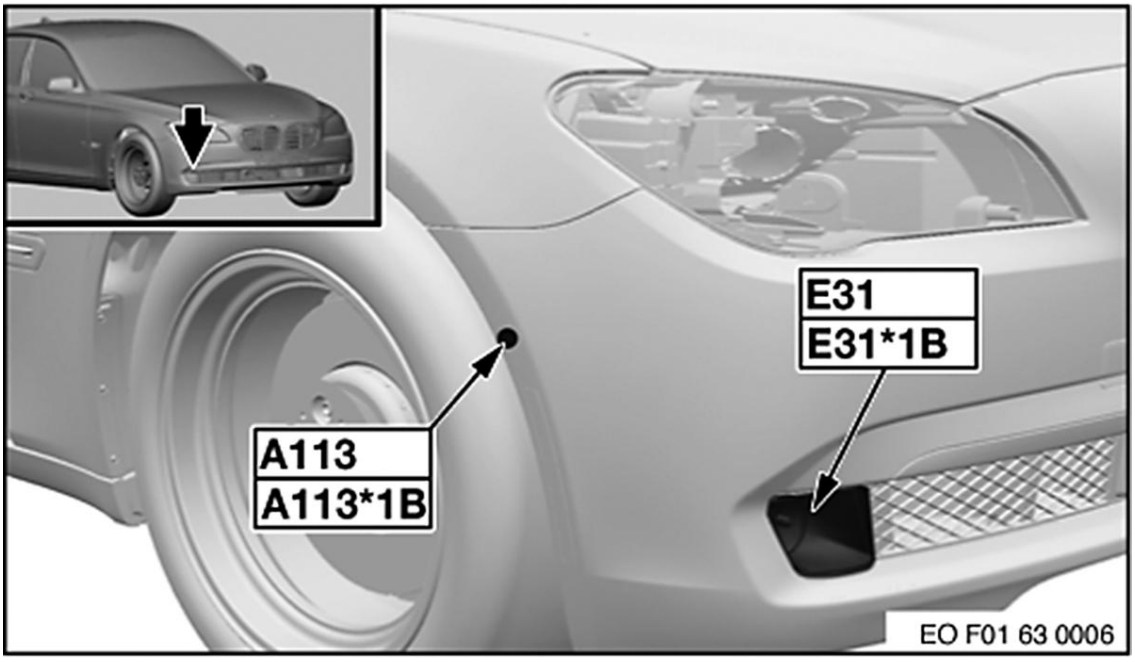


Fig. 3: Right Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

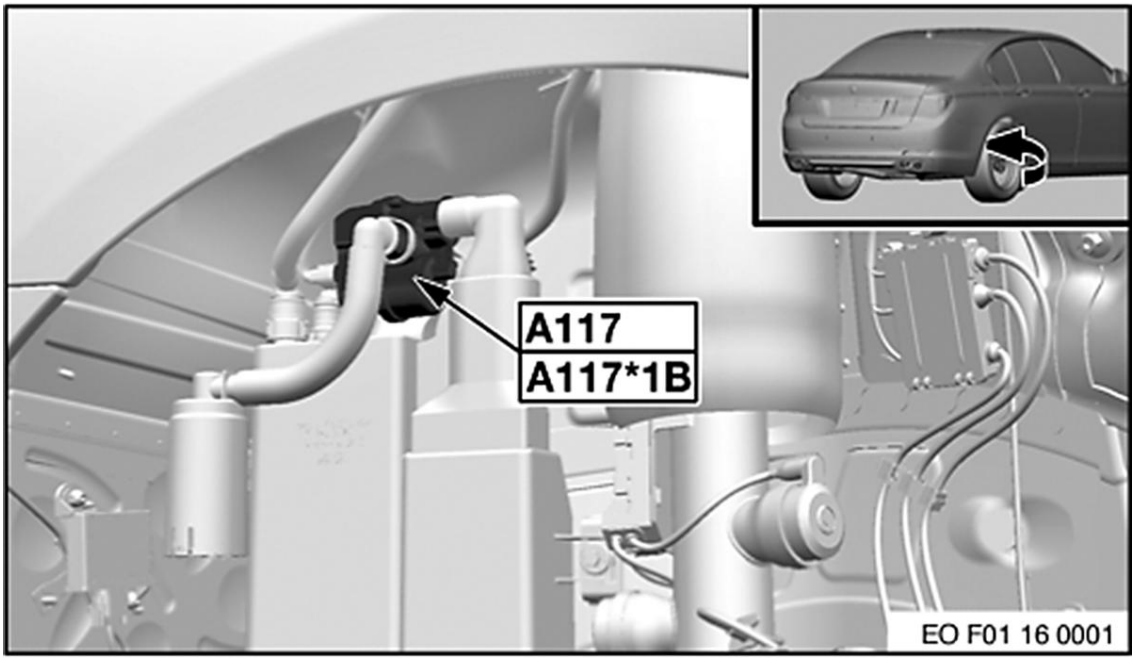


Fig. 4: Right Rear Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

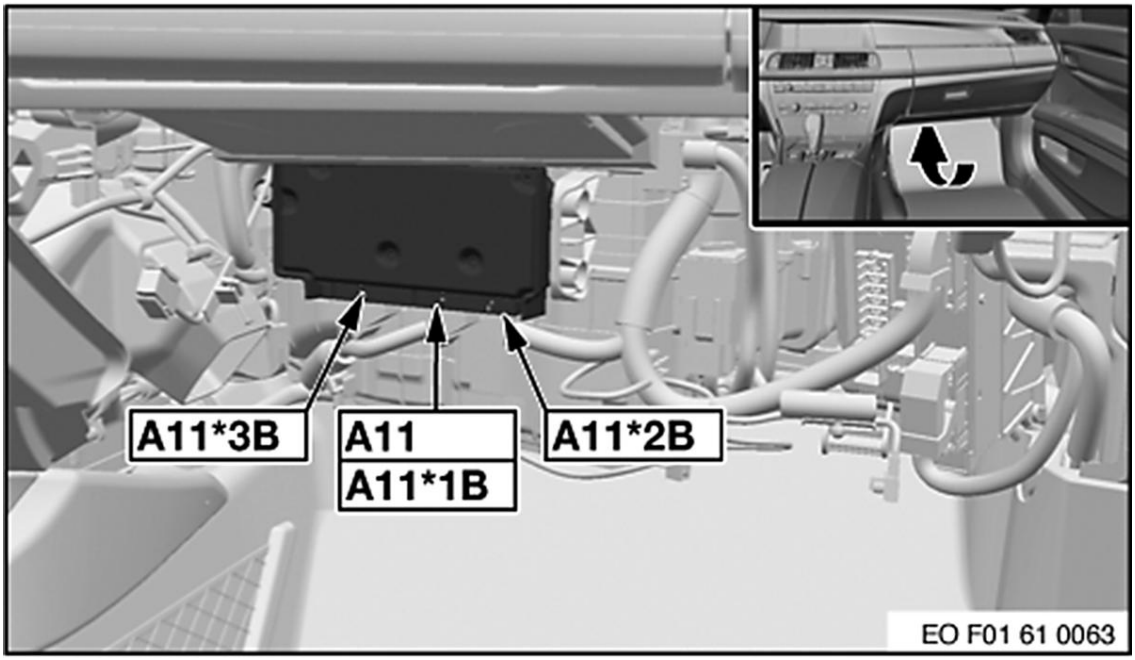


Fig. 5: Left "B" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

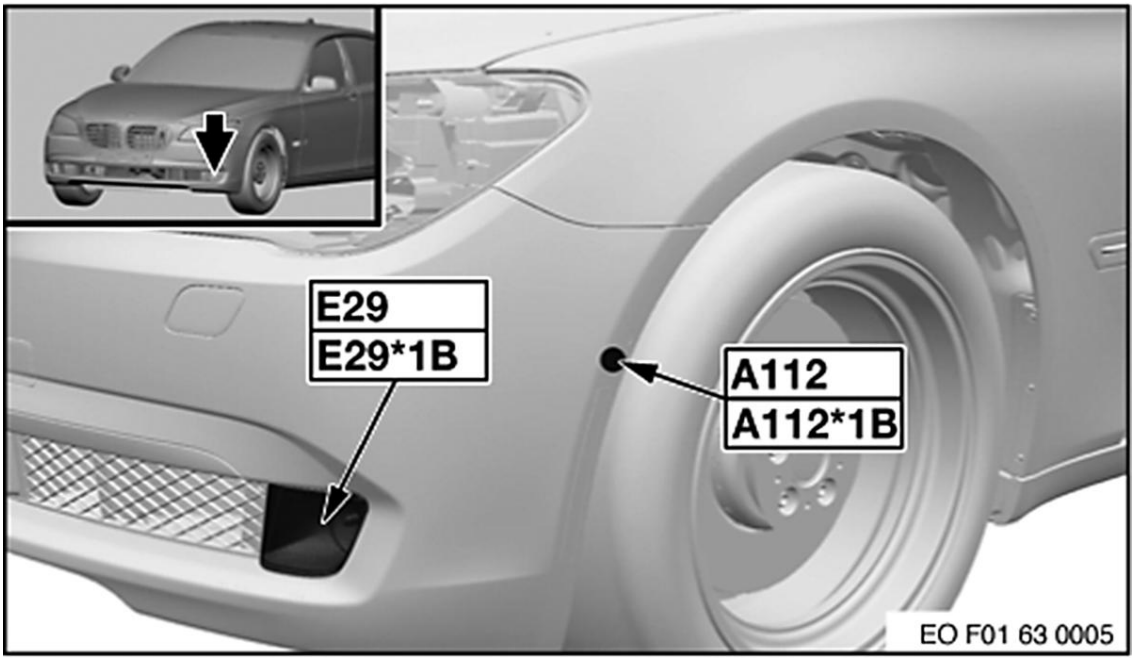


Fig. 6: Right "B" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

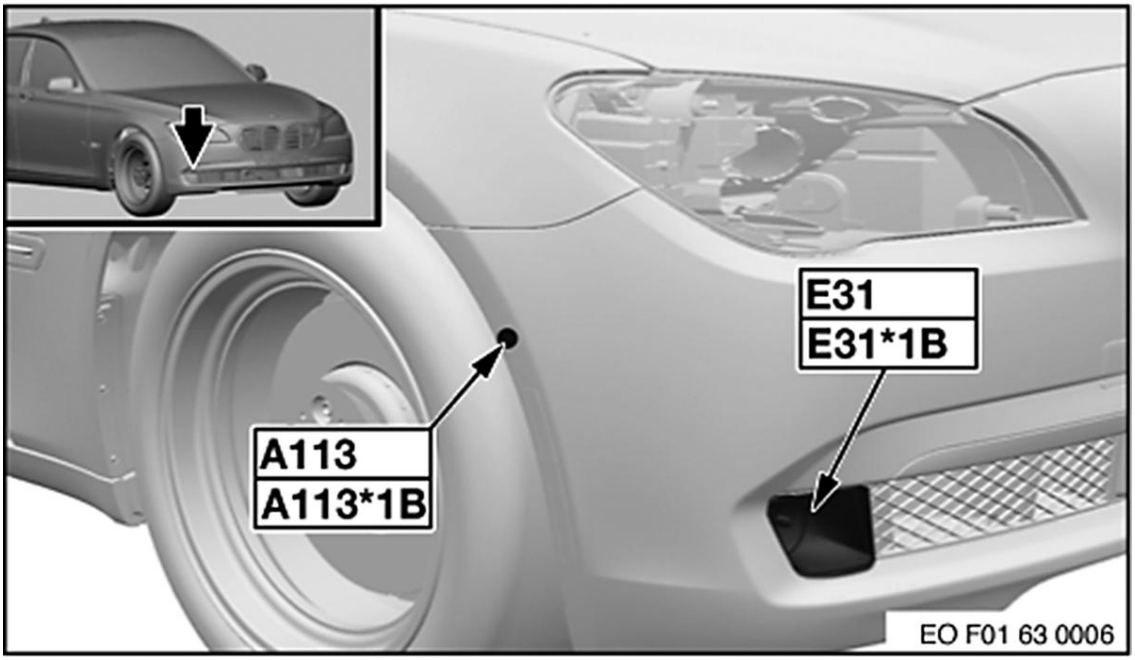


Fig. 7: Steering Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

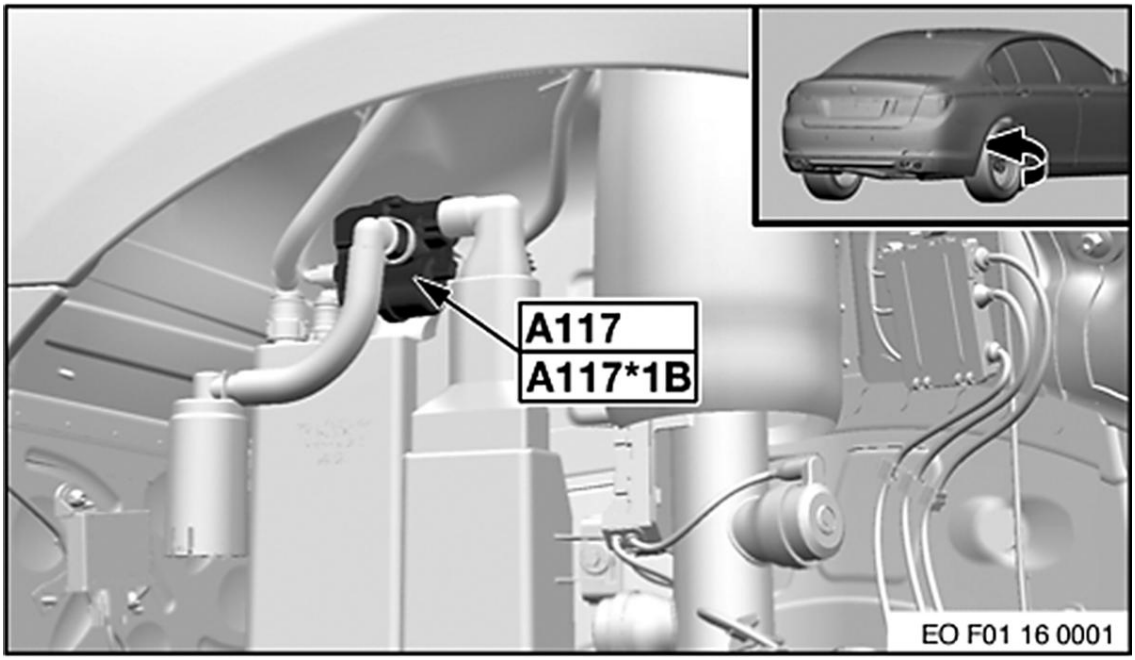


Fig. 8: Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

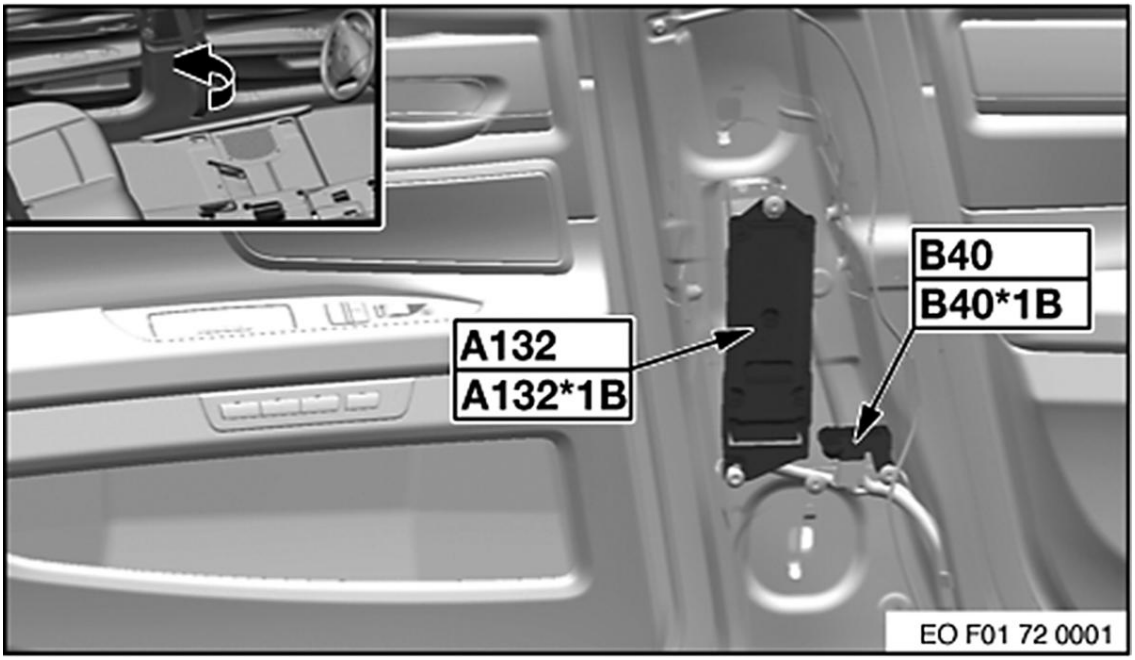


Fig. 9: Left Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

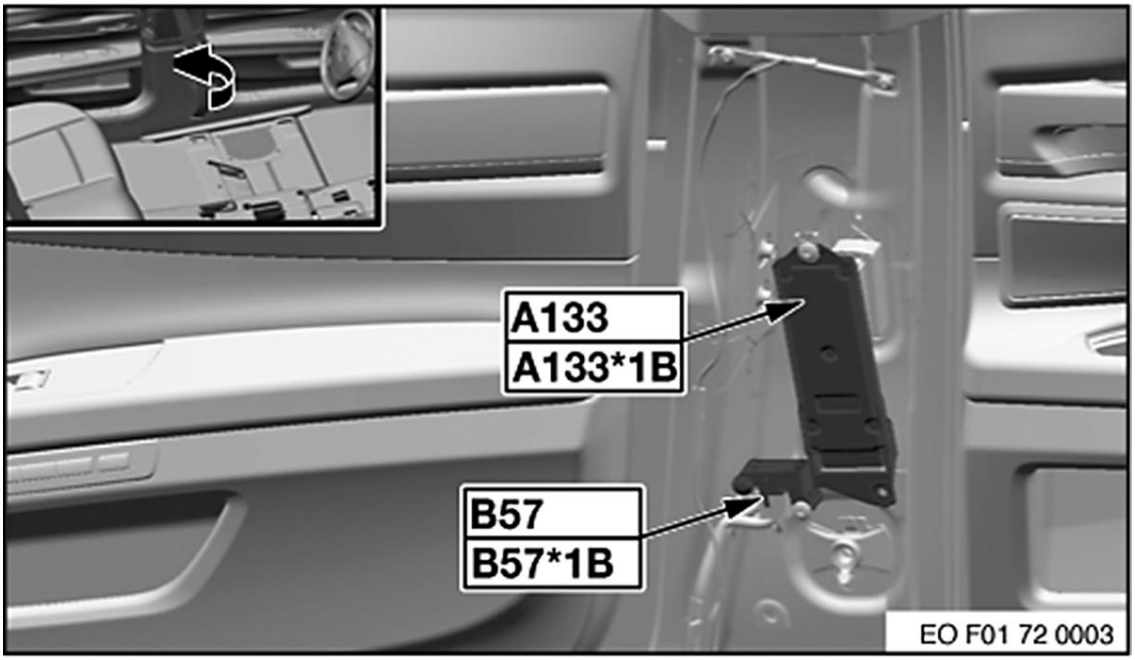


Fig. 10: Left Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

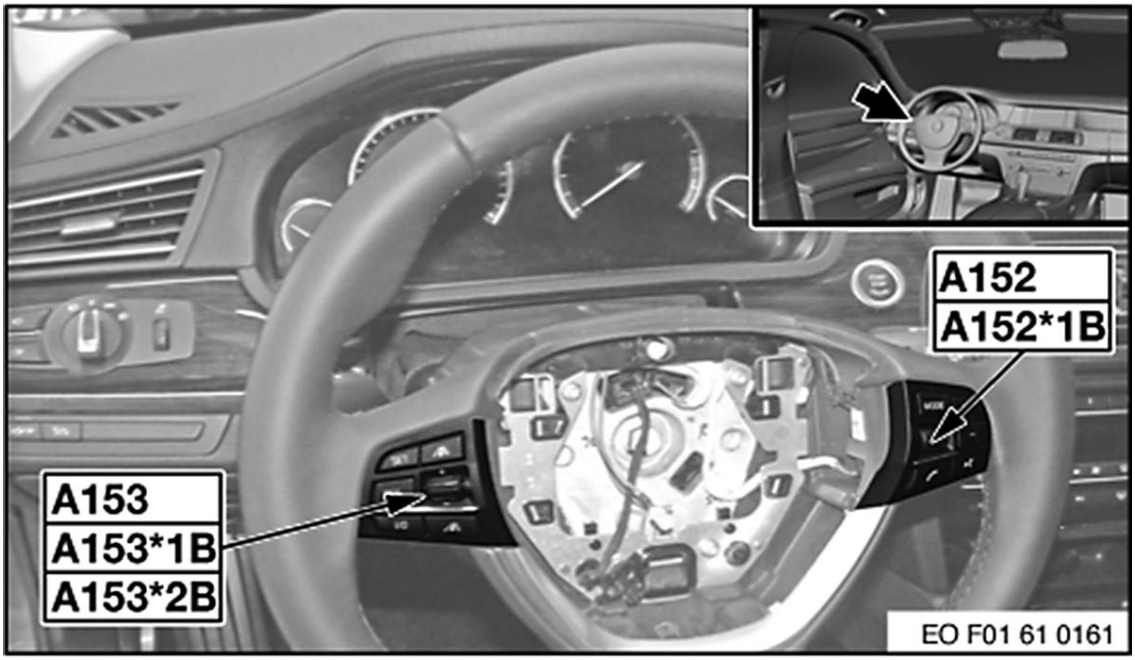


Fig. 11: Left Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

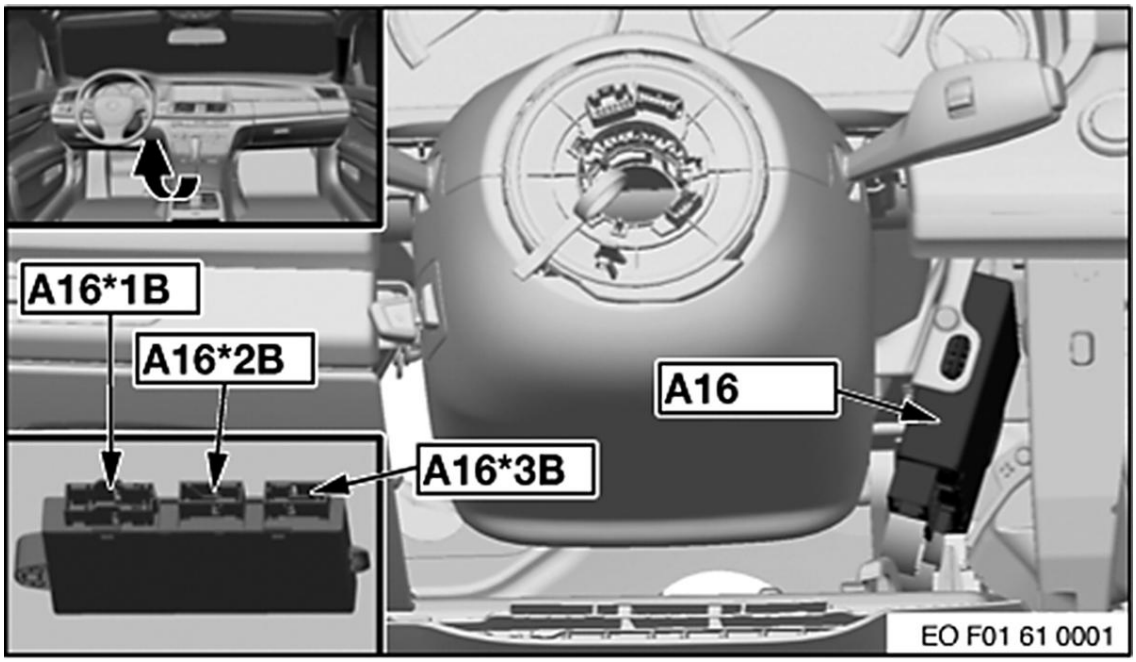


Fig. 12: Driver's Door
Courtesy of BMW OF NORTH AMERICA, INC.

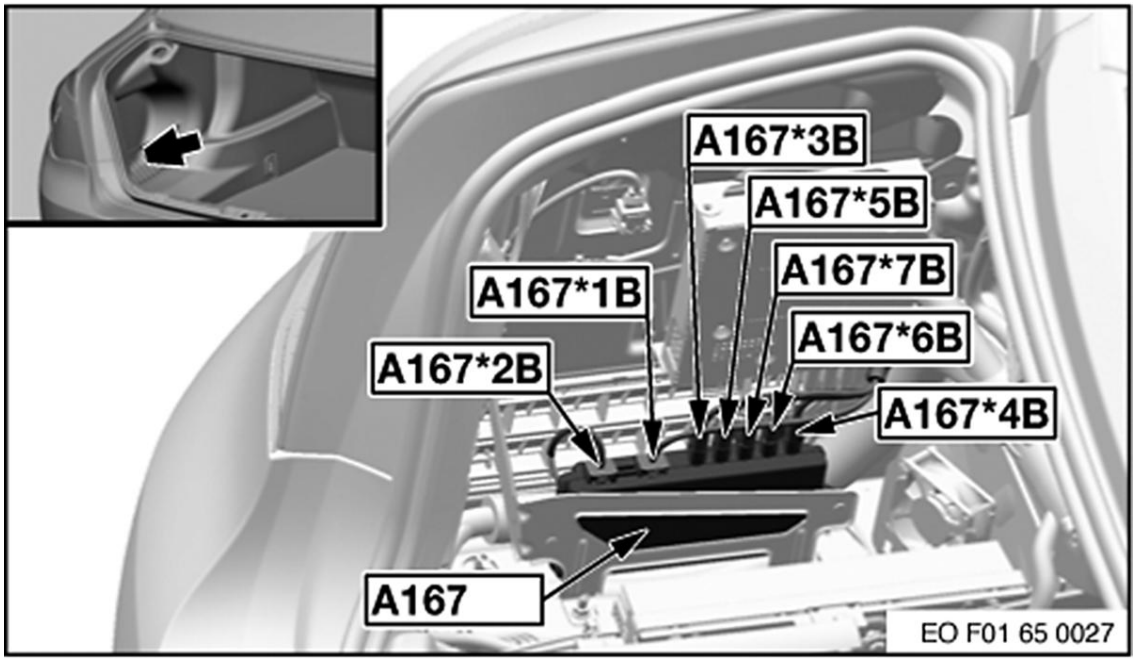


Fig. 13: Center Front Of Roof
Courtesy of BMW OF NORTH AMERICA, INC.

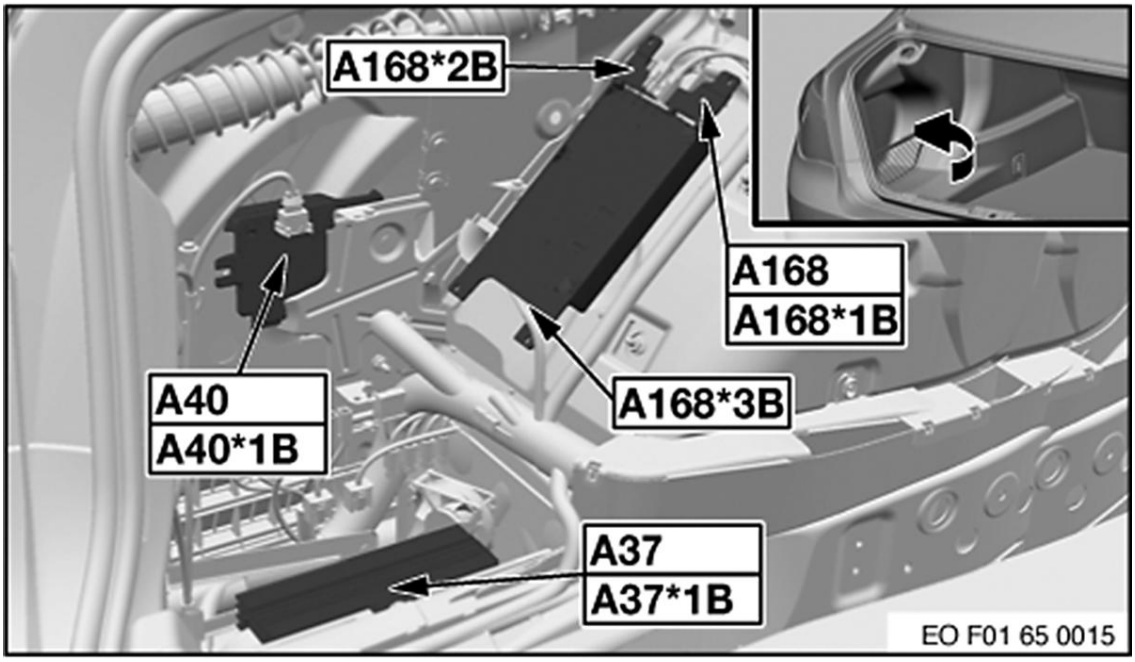


Fig. 14: Left Rear Seat
Courtesy of BMW OF NORTH AMERICA, INC.

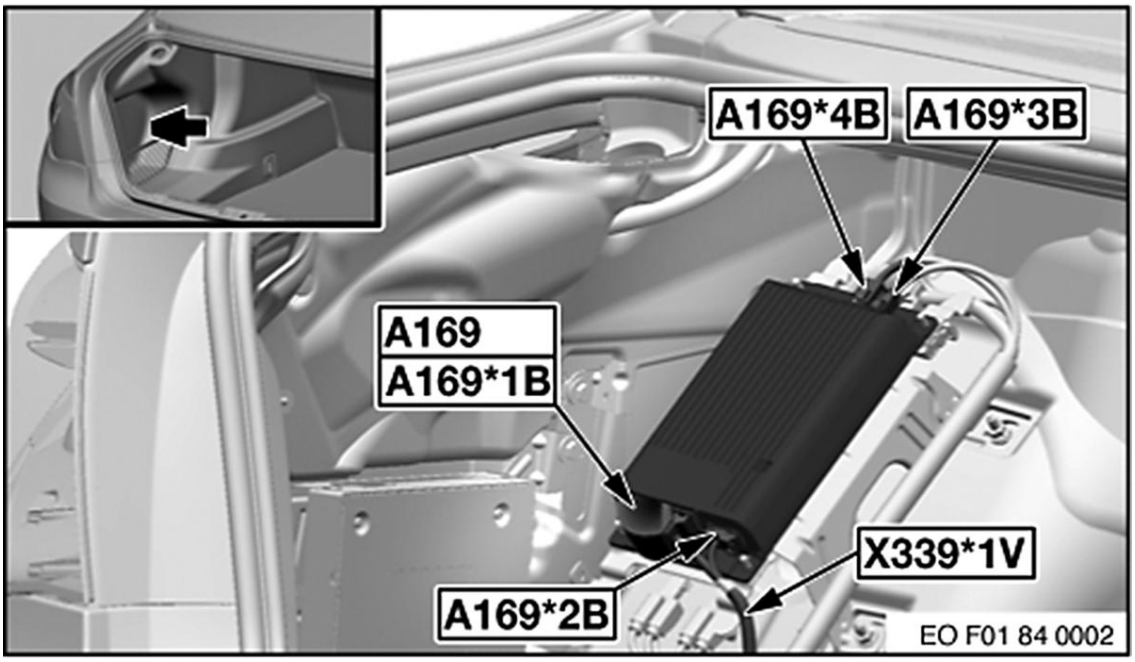


Fig. 15: Left Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

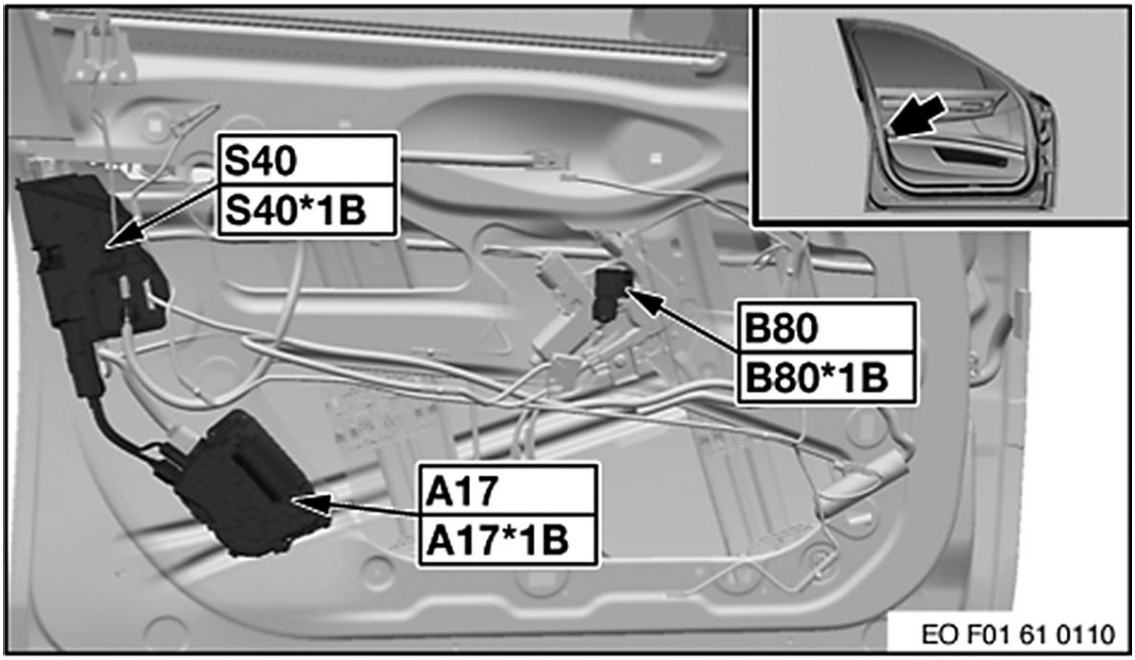


Fig. 16: Center Front Of Roof
Courtesy of BMW OF NORTH AMERICA, INC.

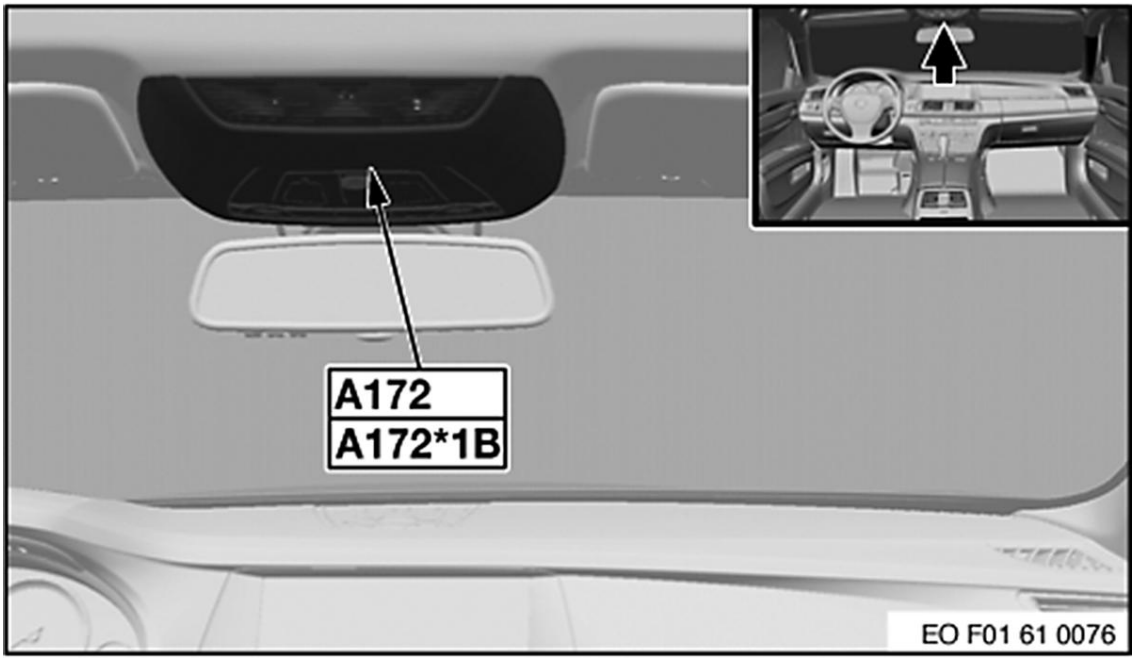


Fig. 17: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

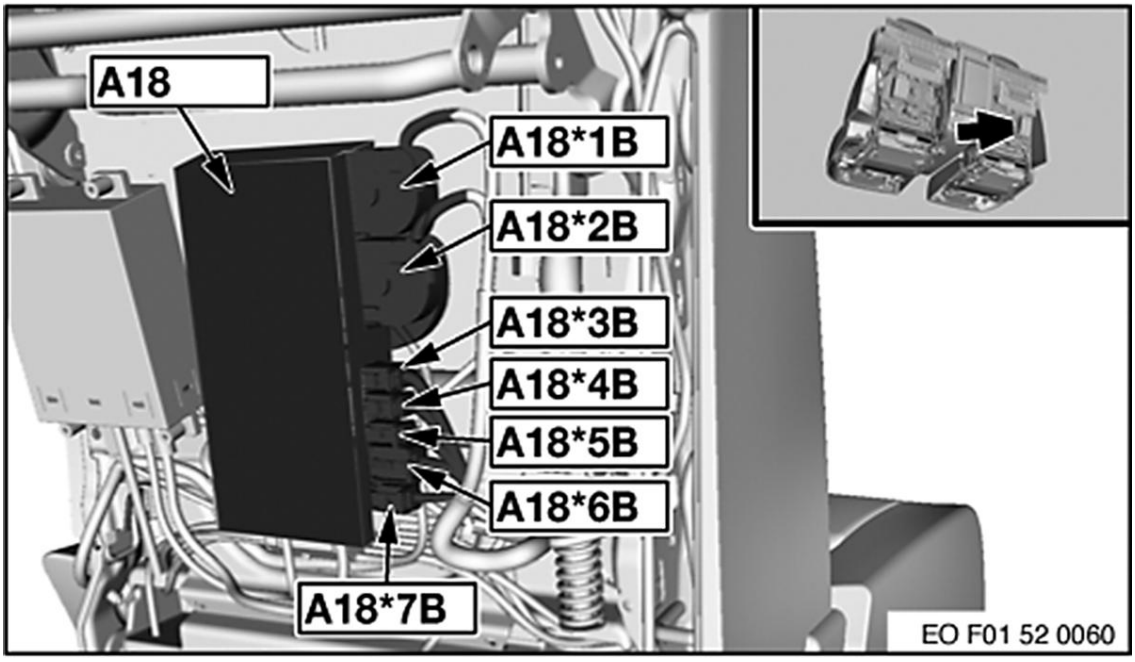


Fig. 18: Left Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

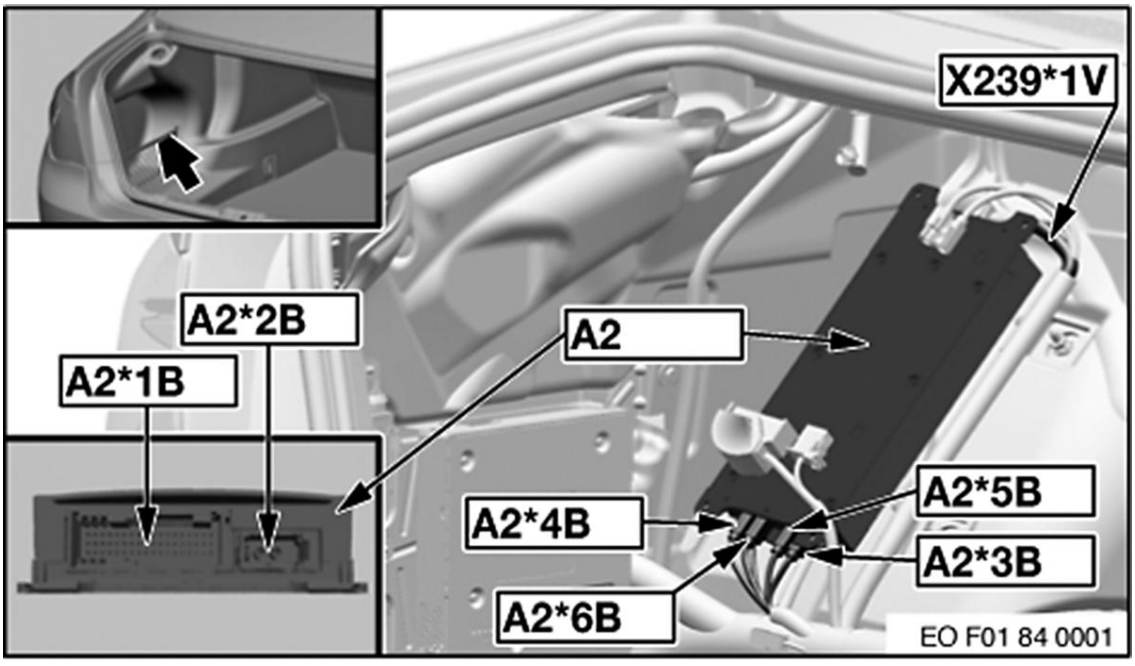


Fig. 19: Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

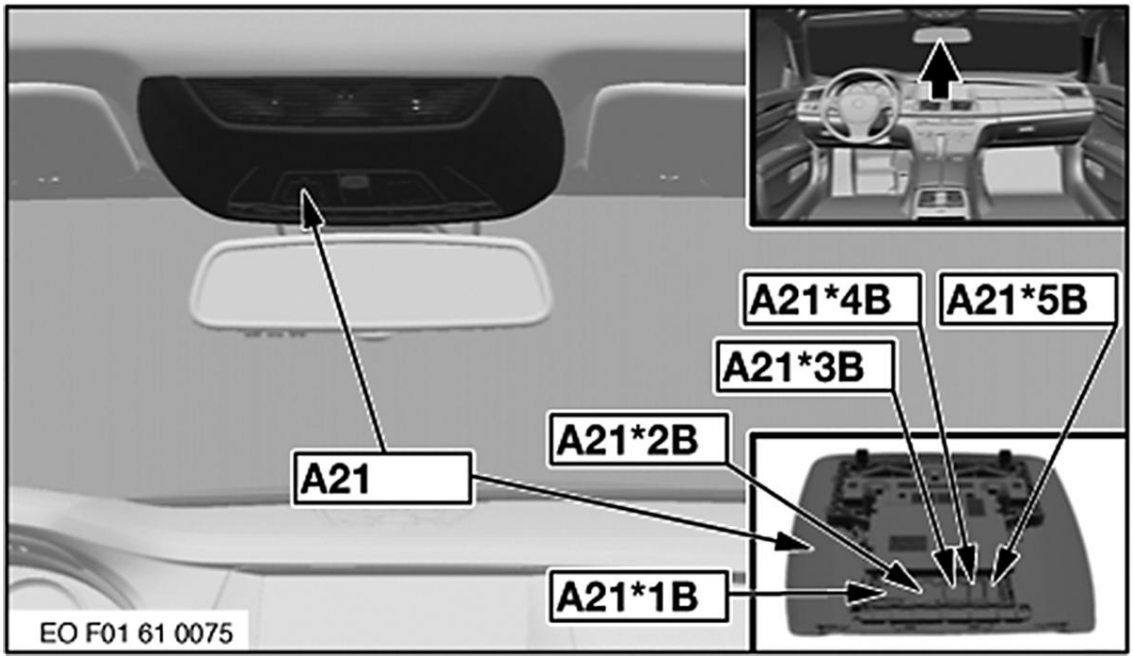


Fig. 20: Driver's Door
Courtesy of BMW OF NORTH AMERICA, INC.

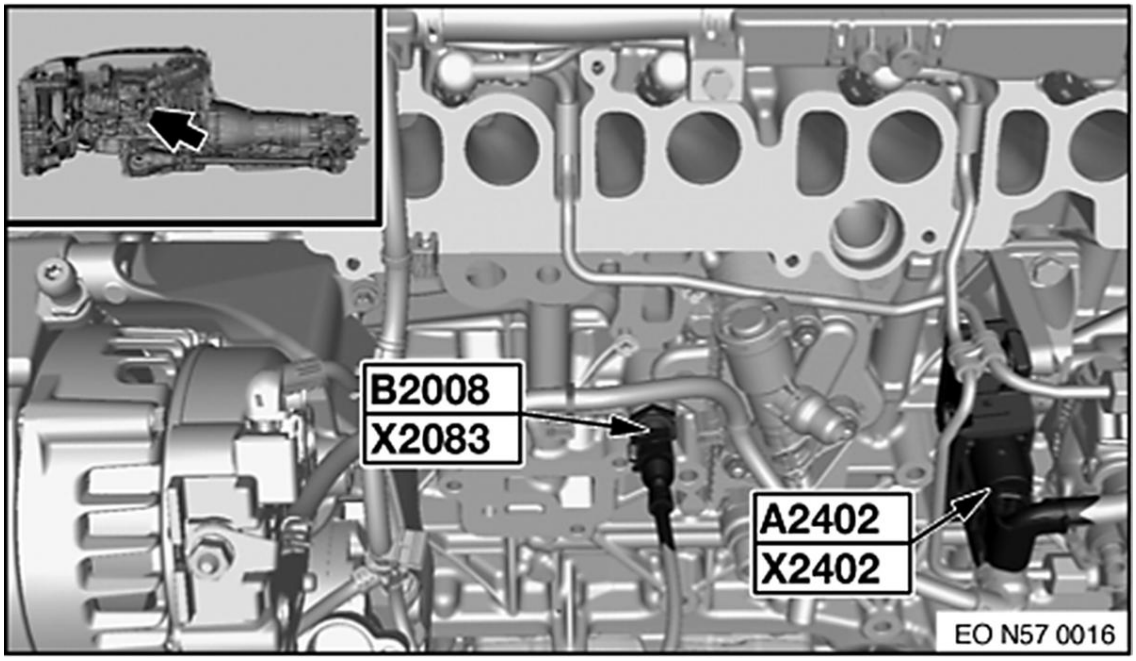


Fig. 21: Left Rear Door
Courtesy of BMW OF NORTH AMERICA, INC.

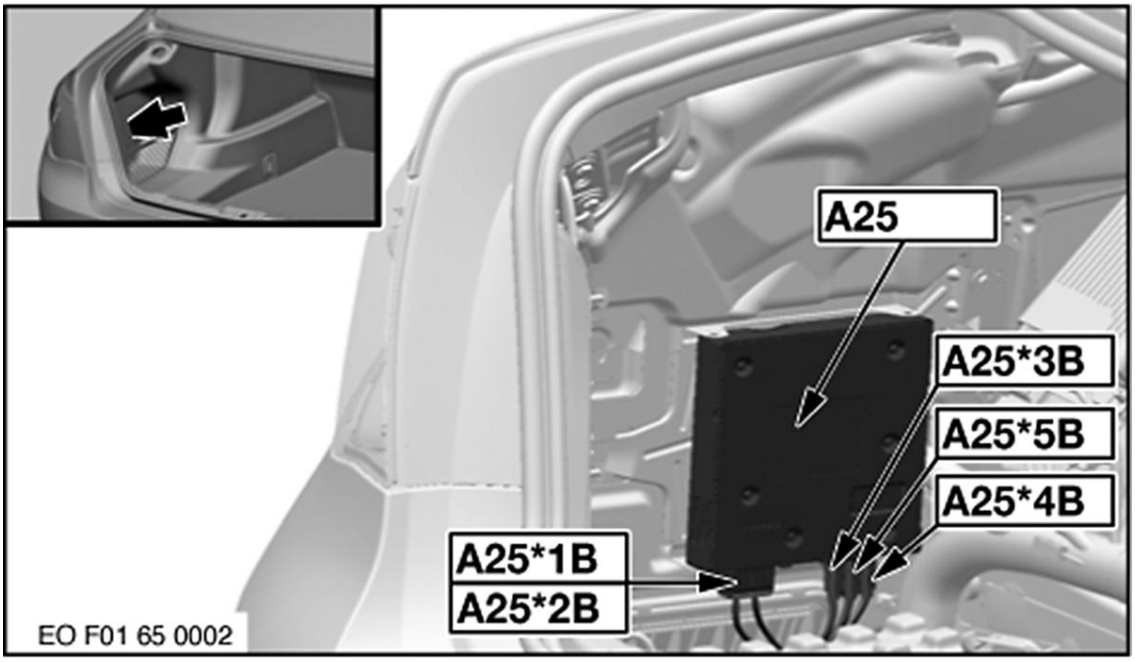


Fig. 22: Left Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

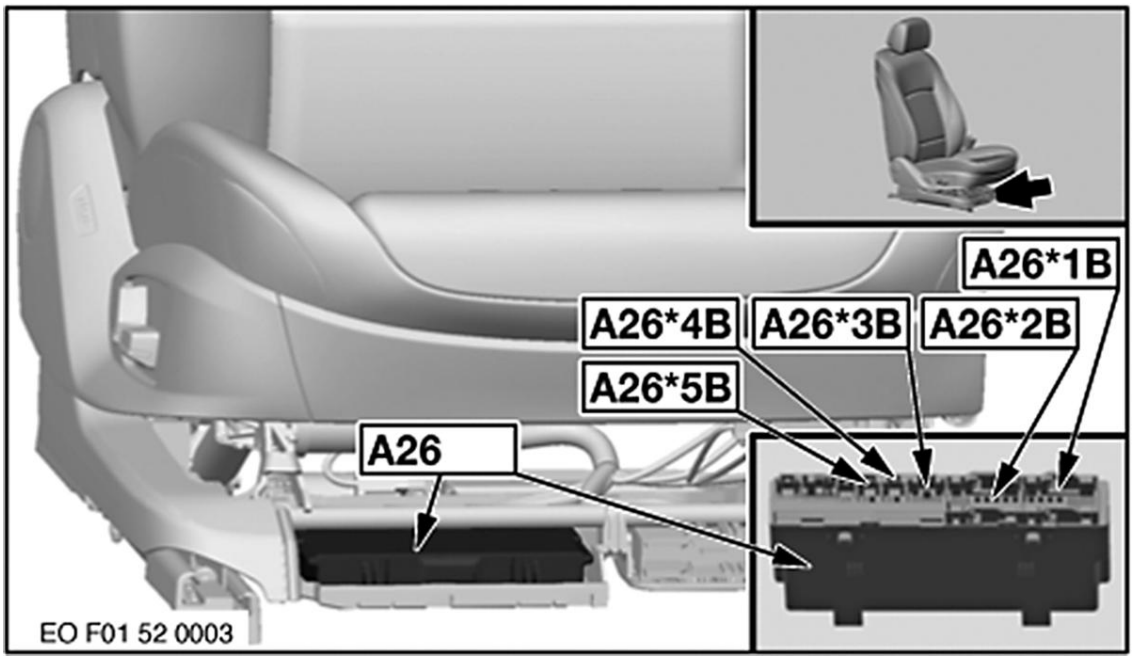


Fig. 23: Right Rear Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

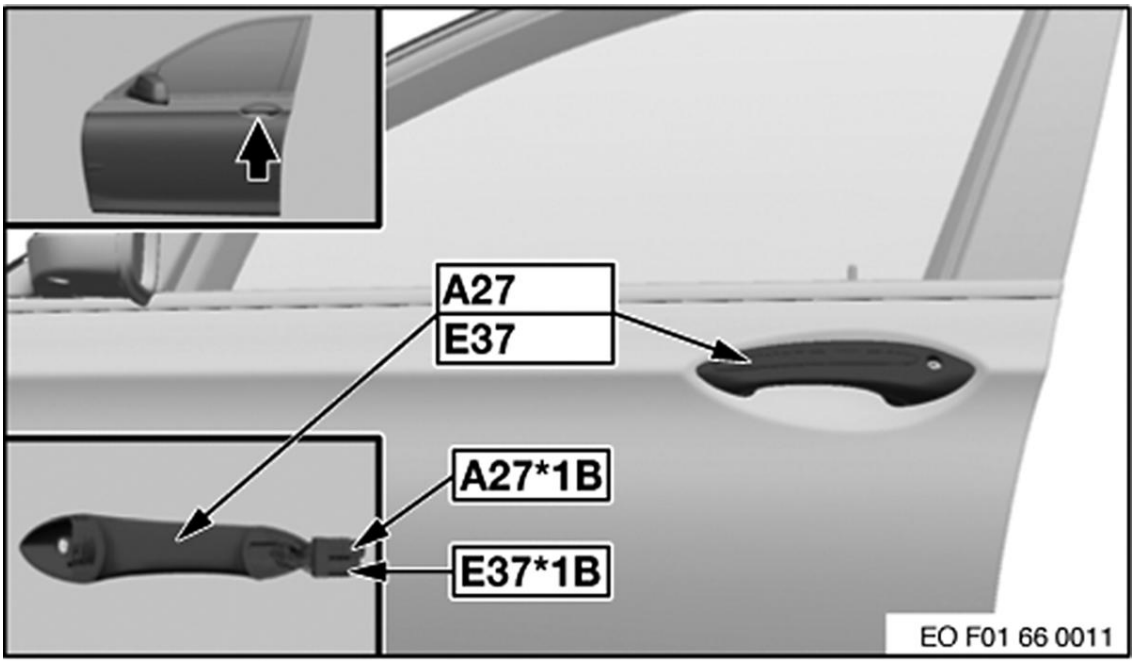


Fig. 24: Front Passenger's Door
Courtesy of BMW OF NORTH AMERICA, INC.

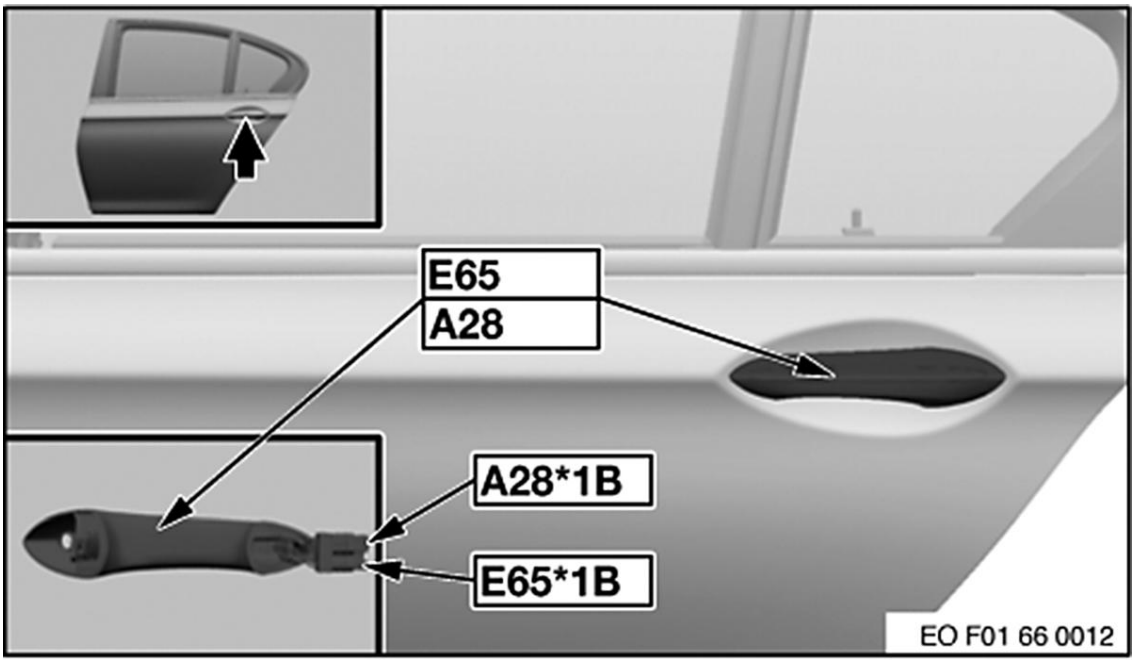


Fig. 25: Right Rear Door
Courtesy of BMW OF NORTH AMERICA, INC.

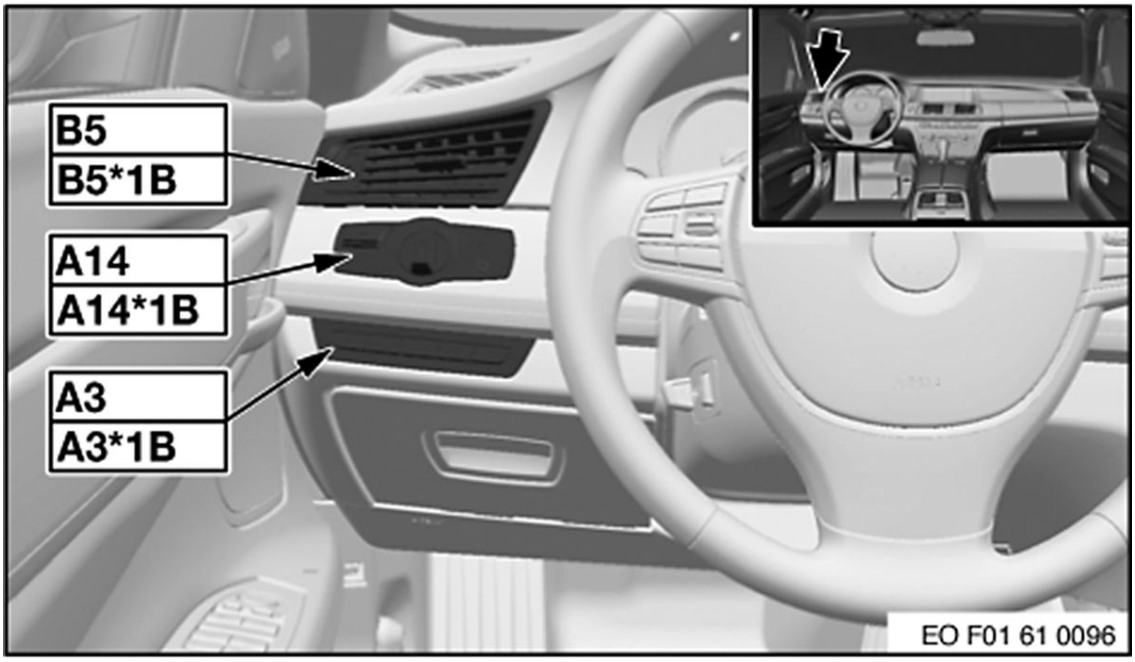


Fig. 26: Left Rear Door
Courtesy of BMW OF NORTH AMERICA, INC.

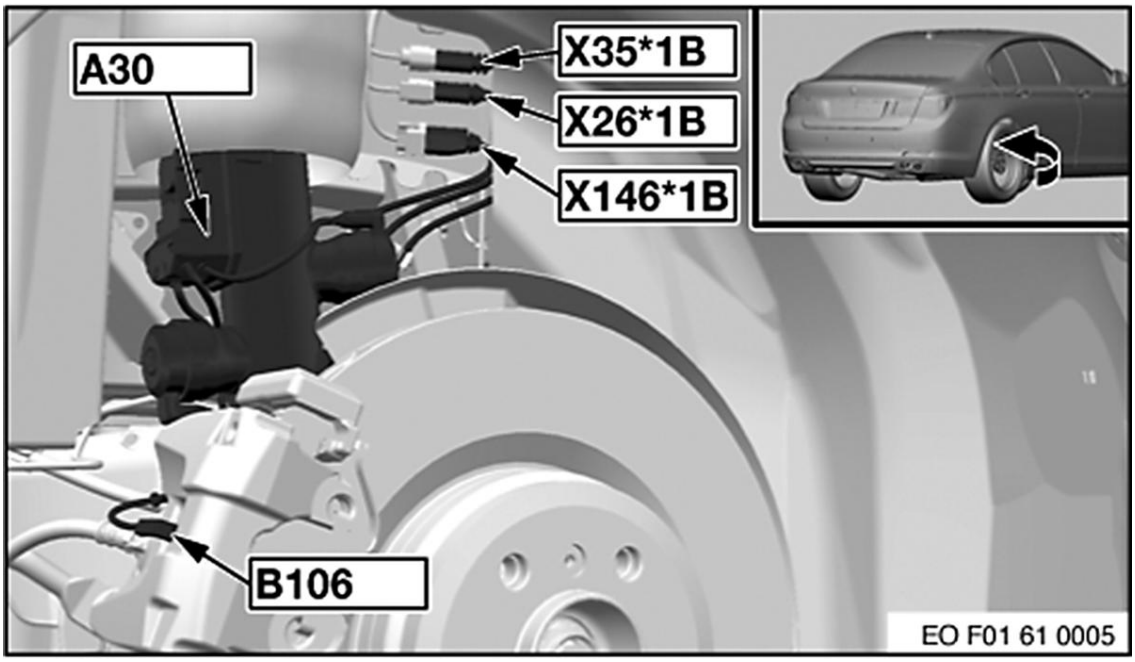


Fig. 27: Right Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

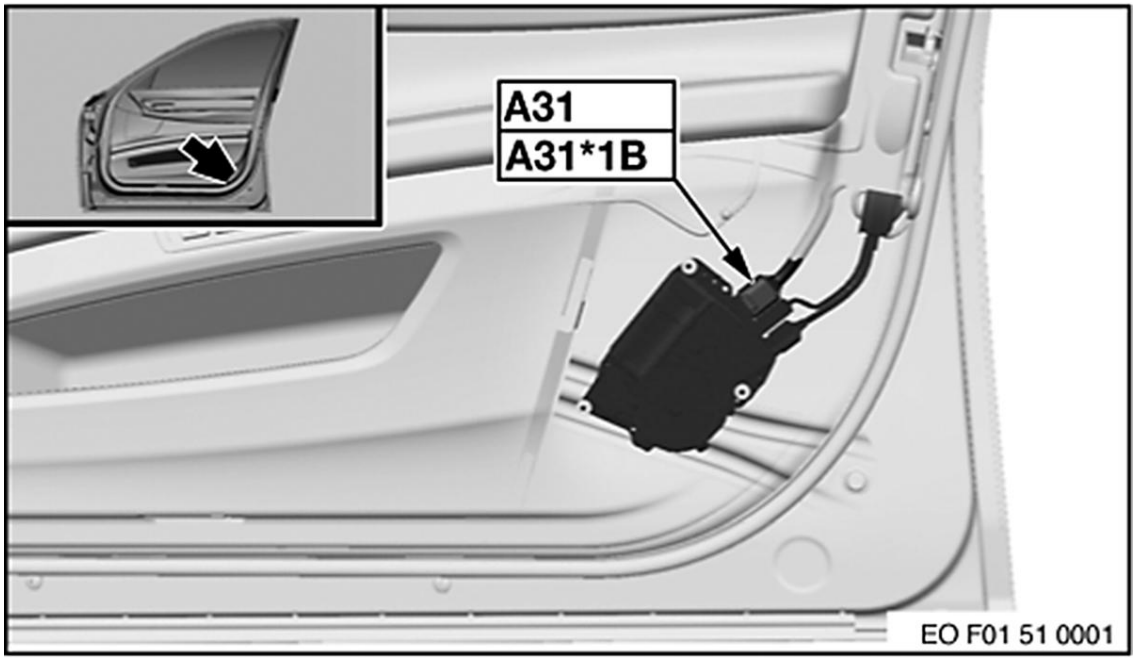


Fig. 28: Right Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

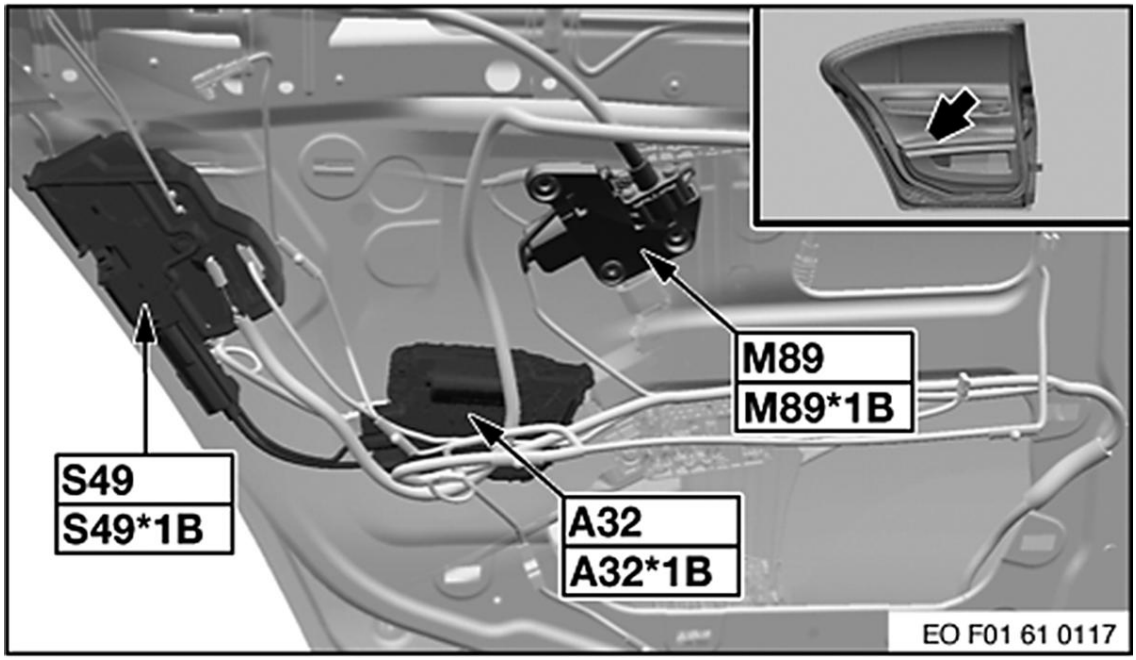


Fig. 29: Left Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

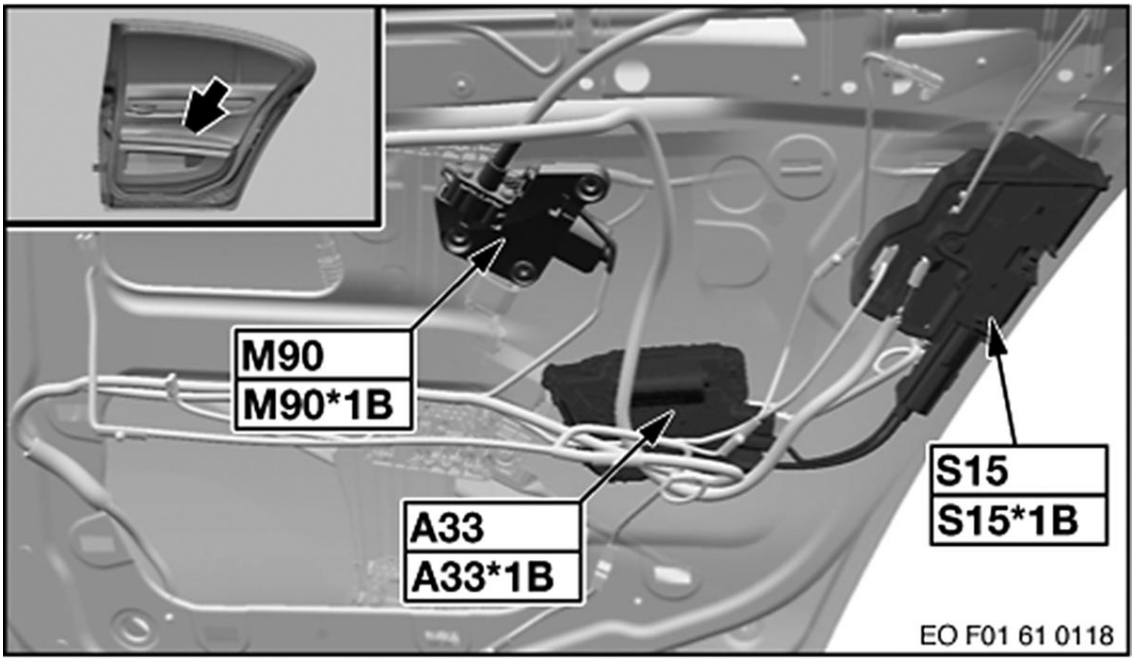


Fig. 30: Rear Seats
Courtesy of BMW OF NORTH AMERICA, INC.

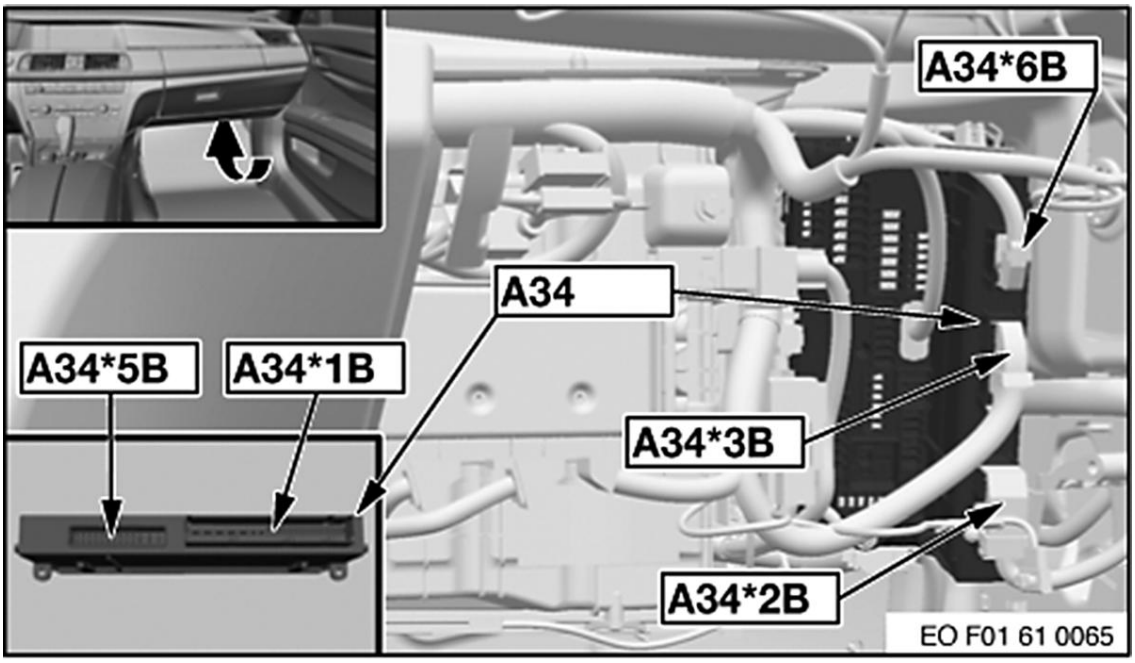


Fig. 31: Left Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

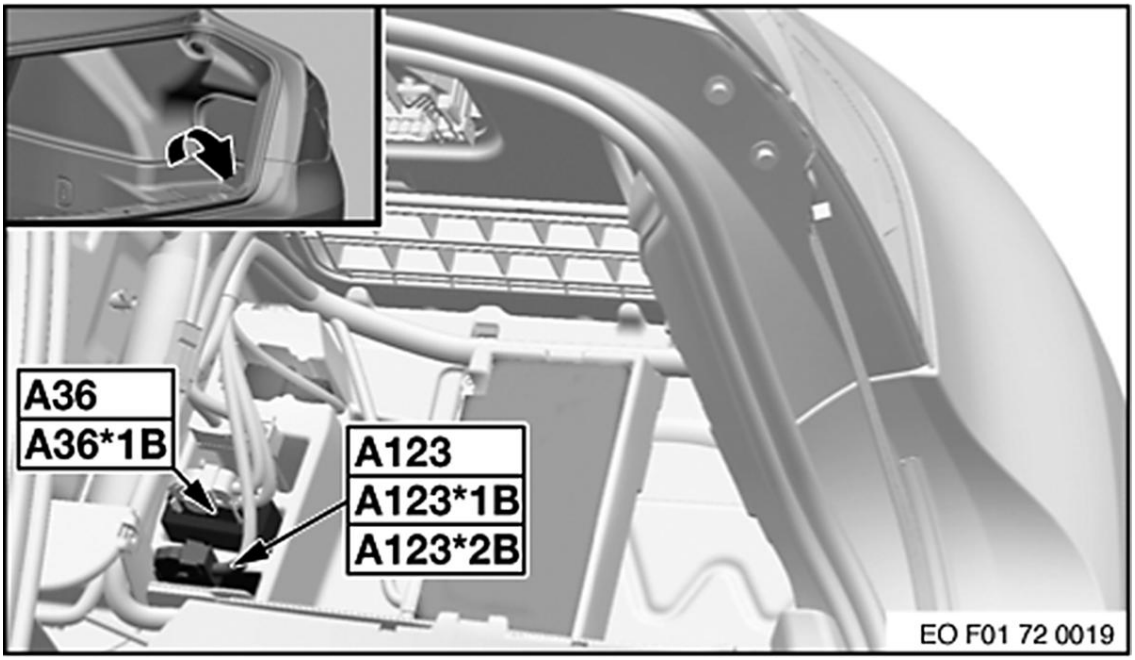


Fig. 32: Center Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

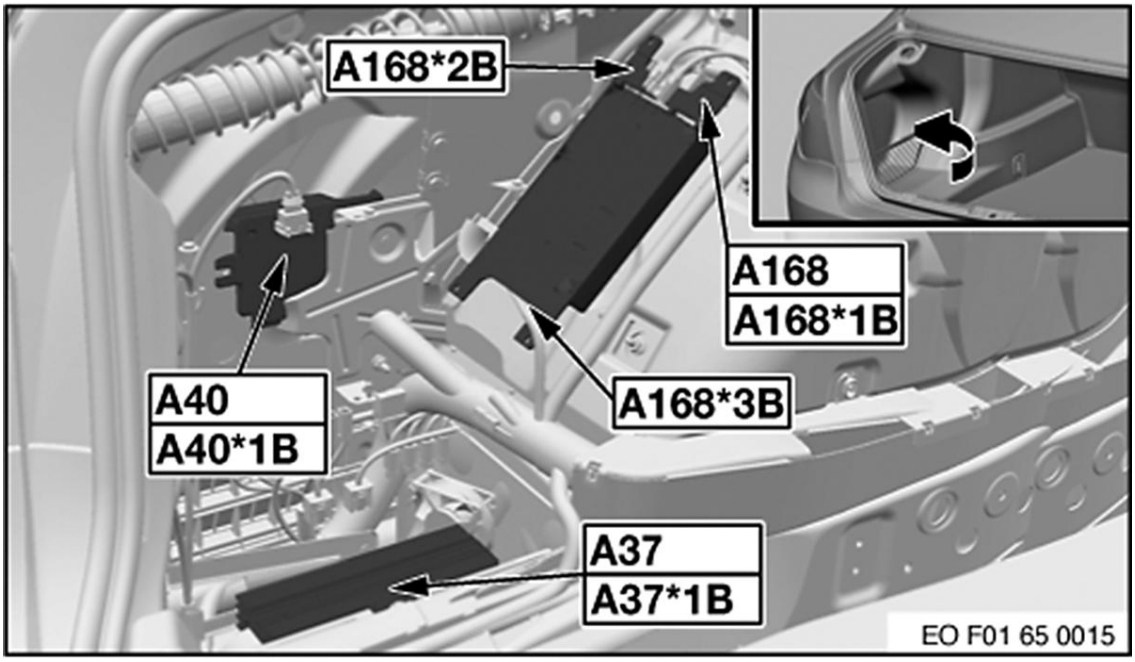


Fig. 33: Right Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

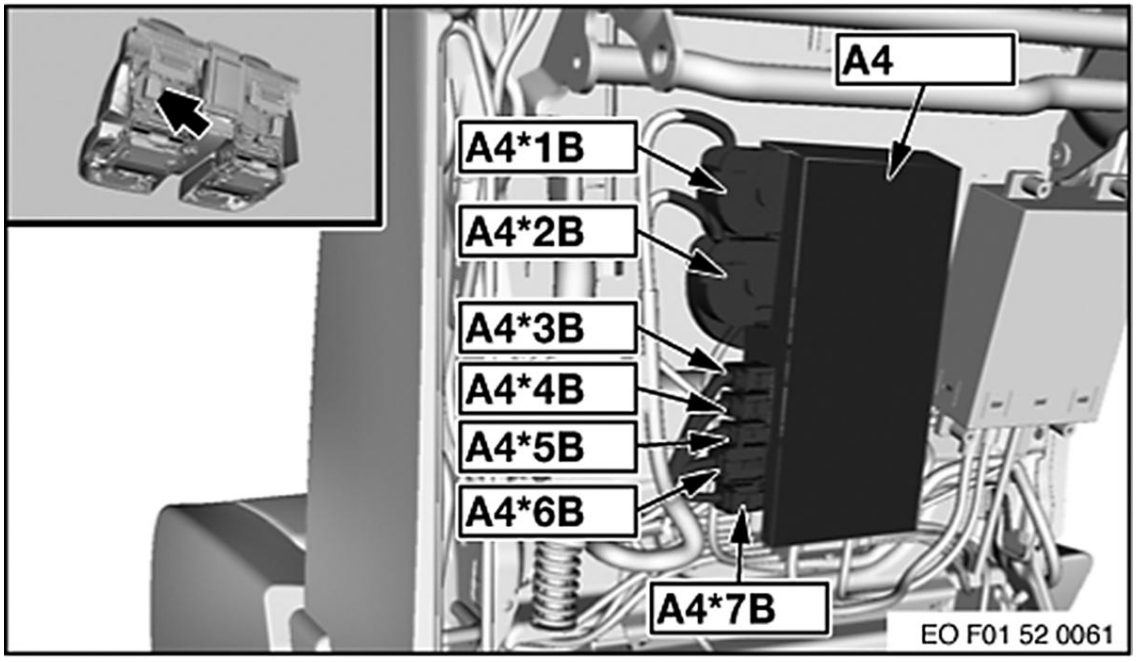


Fig. 34: Rear Seats
Courtesy of BMW OF NORTH AMERICA, INC.

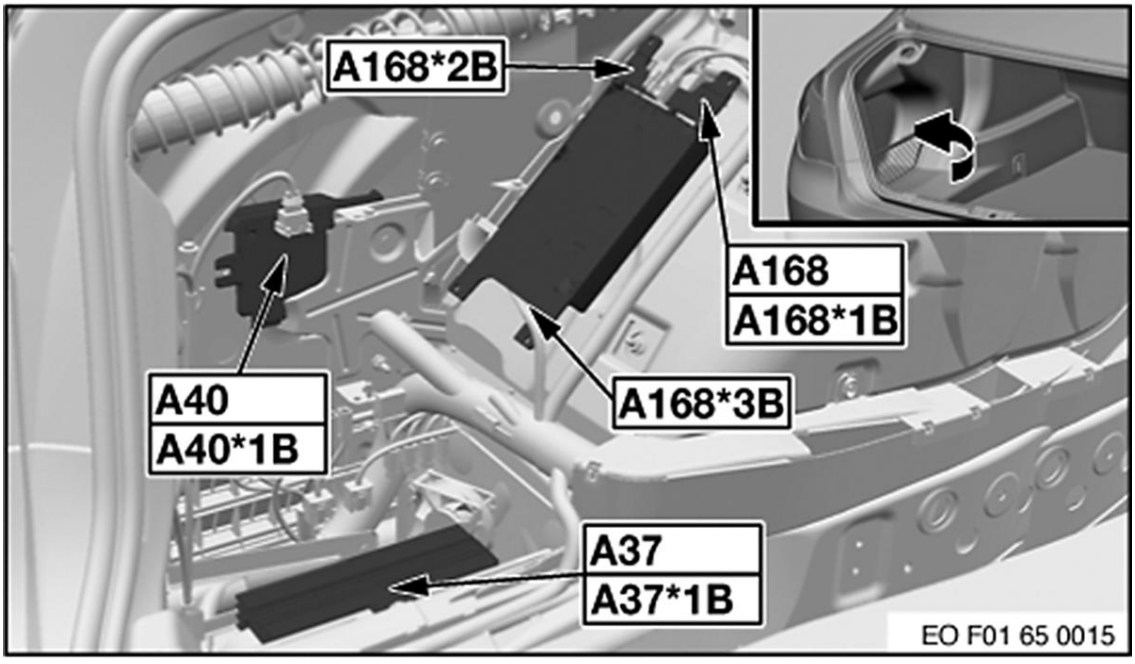


Fig. 35: Right Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

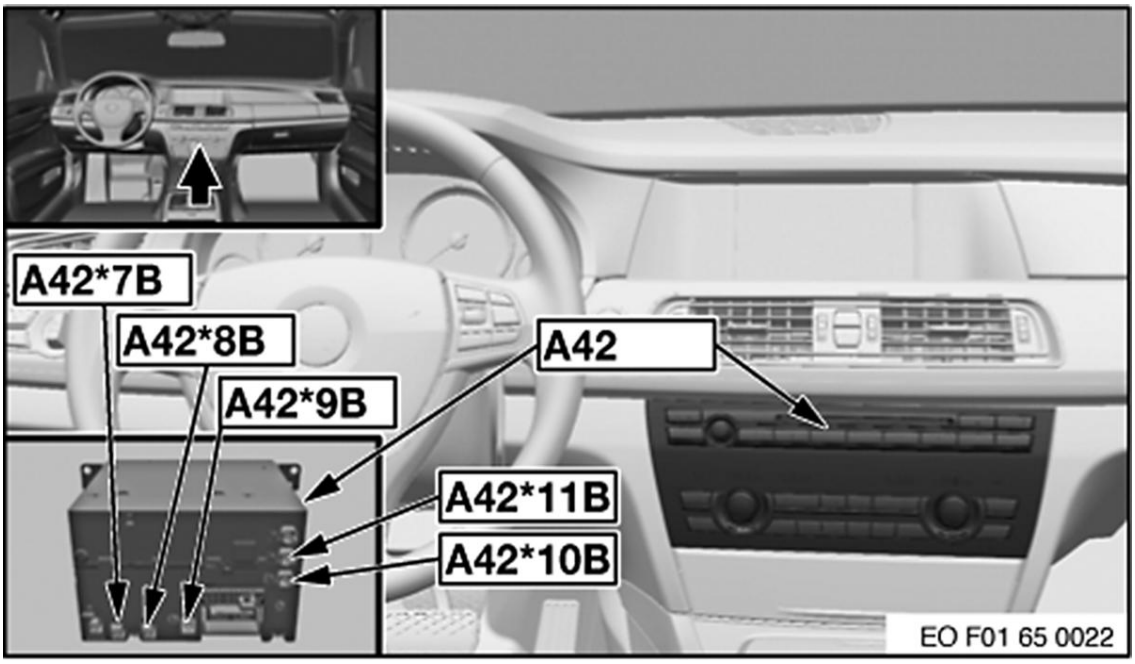


Fig. 36: Left Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

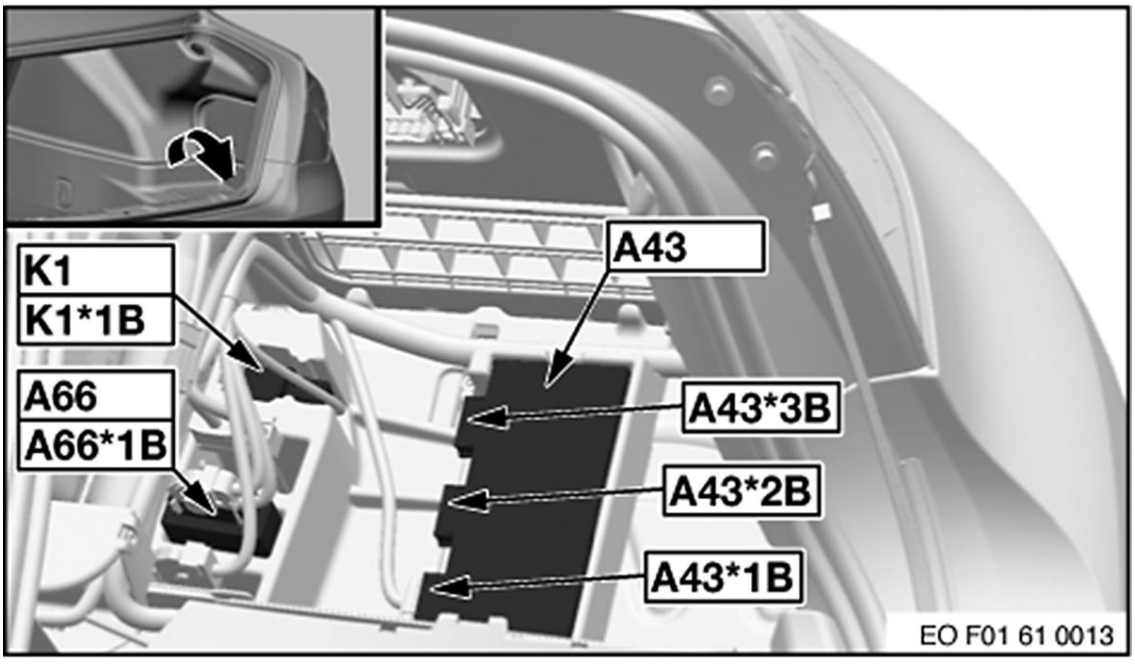


Fig. 37: Right Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

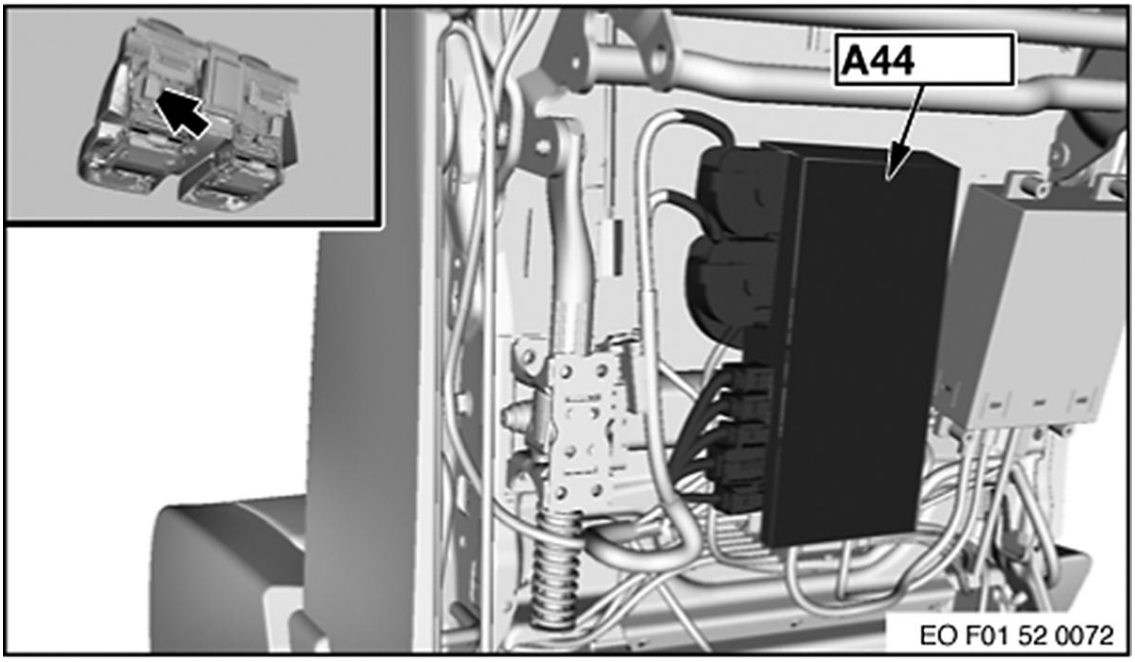


Fig. 38: Right Kick Panel
Courtesy of BMW OF NORTH AMERICA, INC.

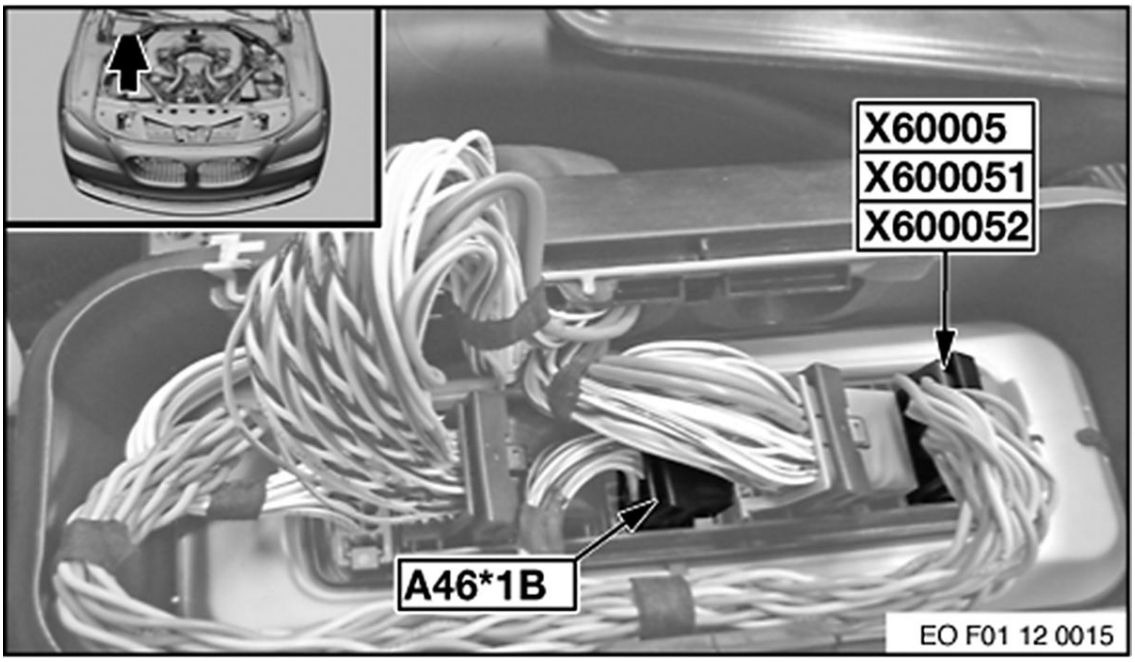


Fig. 39: Rear Seats
Courtesy of BMW OF NORTH AMERICA, INC.

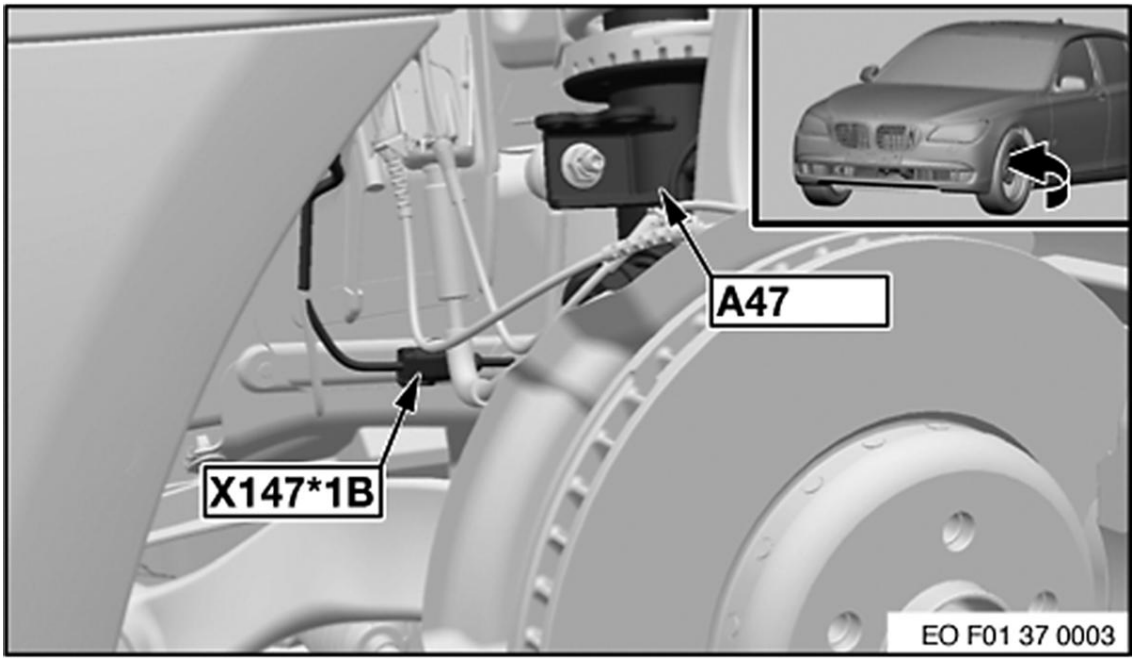


Fig. 40: Left End Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

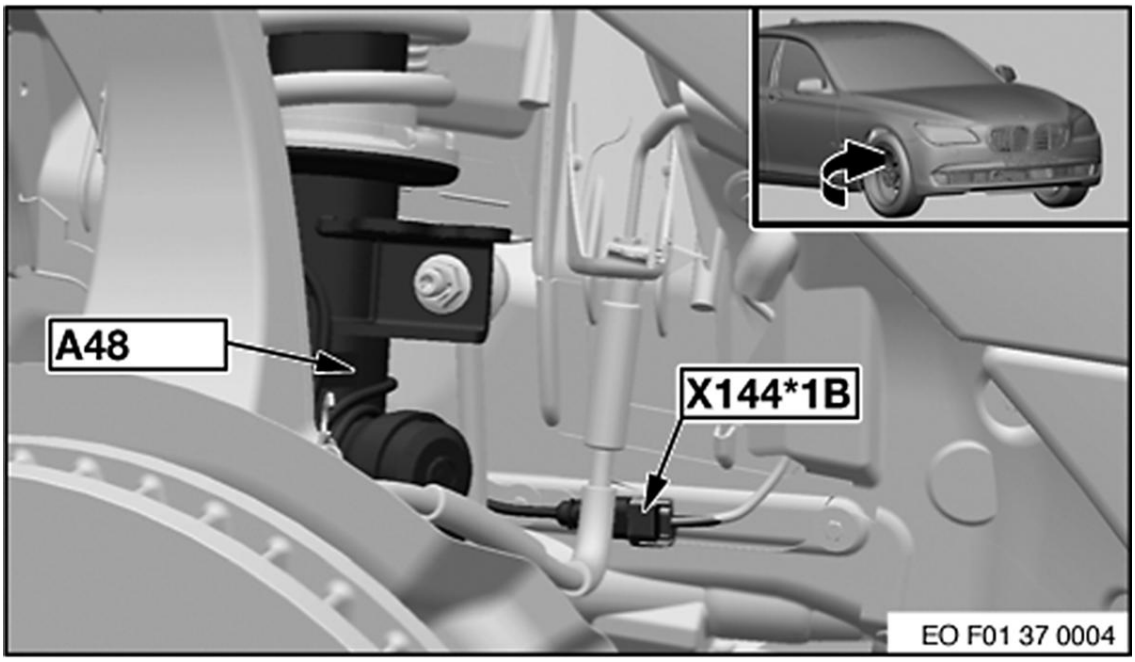


Fig. 41: Left Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

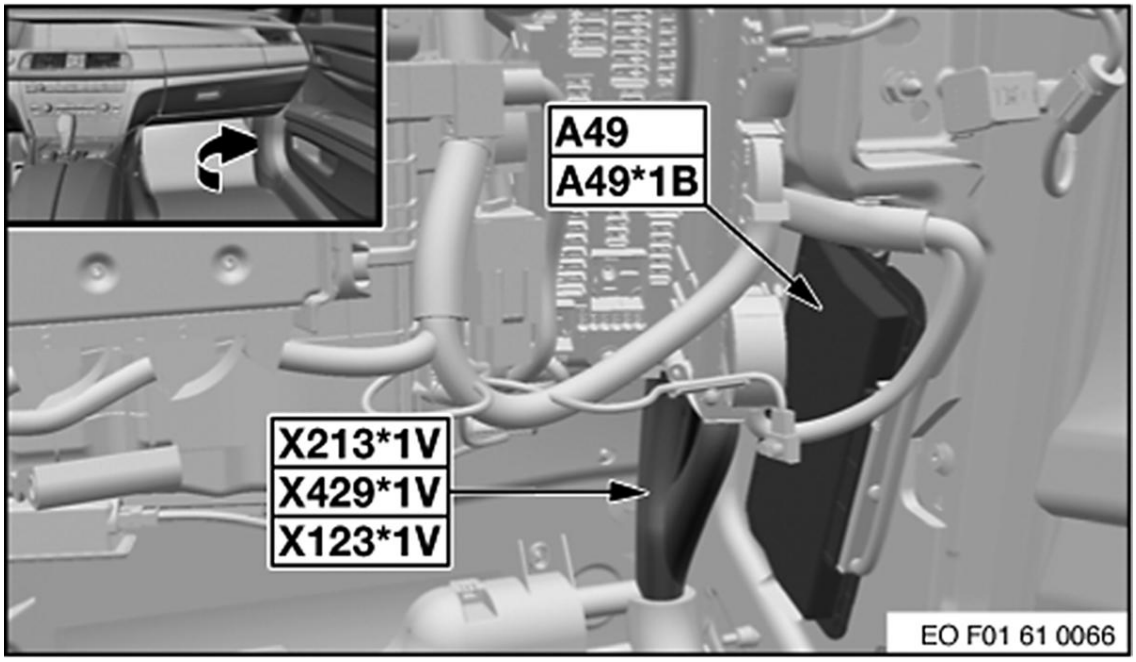


Fig. 42: Left End Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

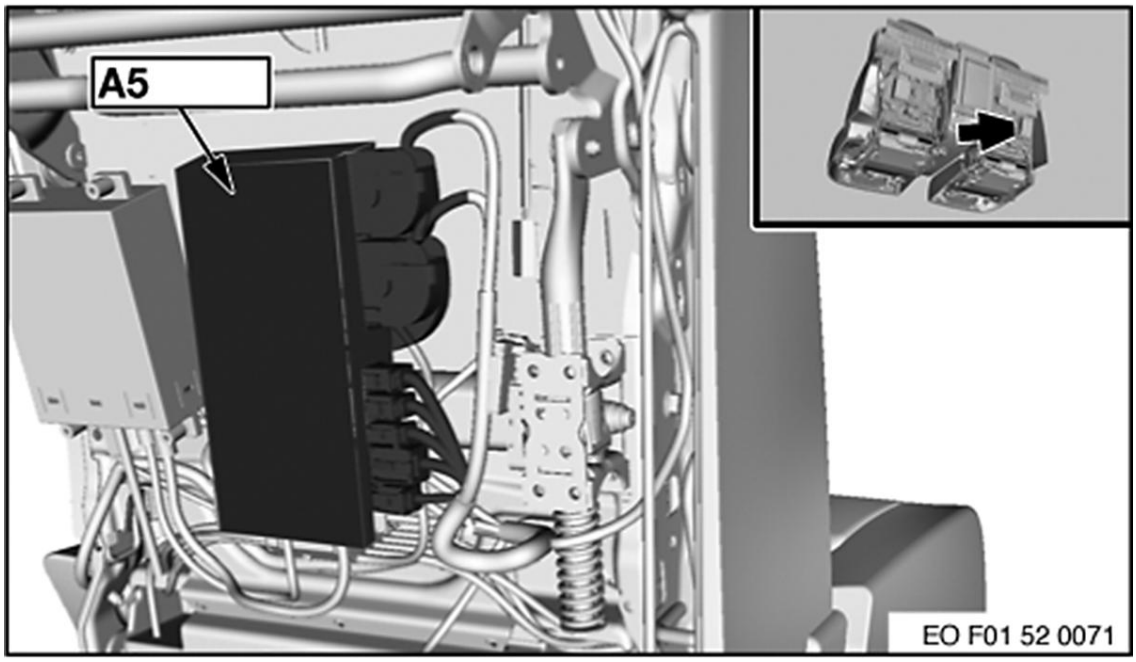


Fig. 43: Left Kick Panel
Courtesy of BMW OF NORTH AMERICA, INC.

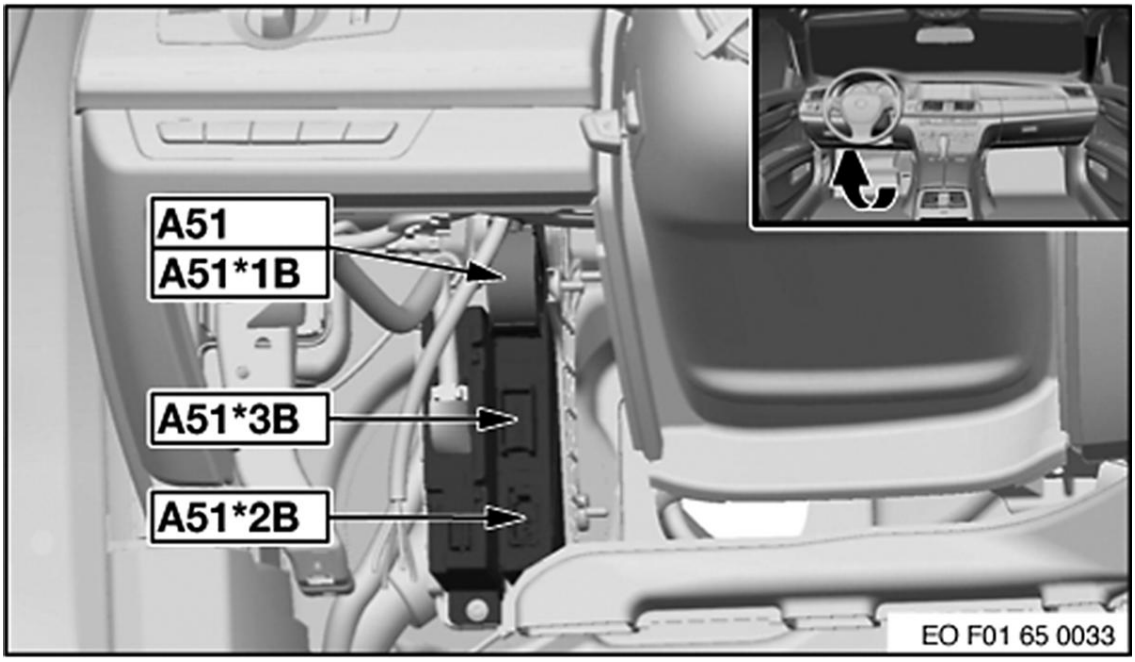


Fig. 44: Left Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

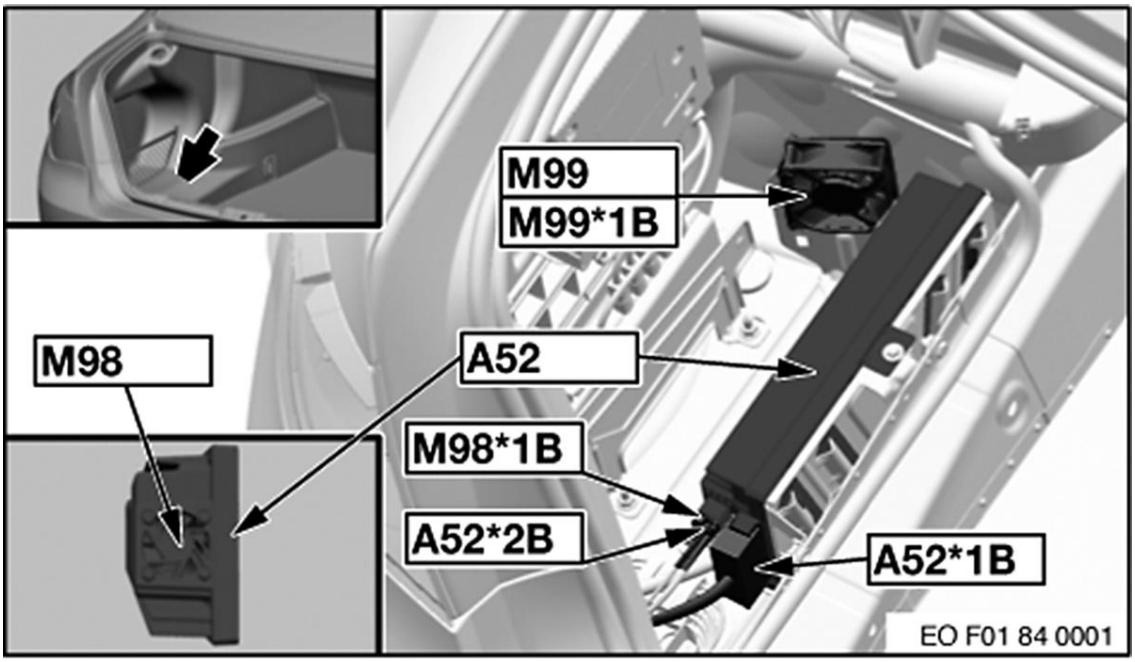


Fig. 45: Right Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

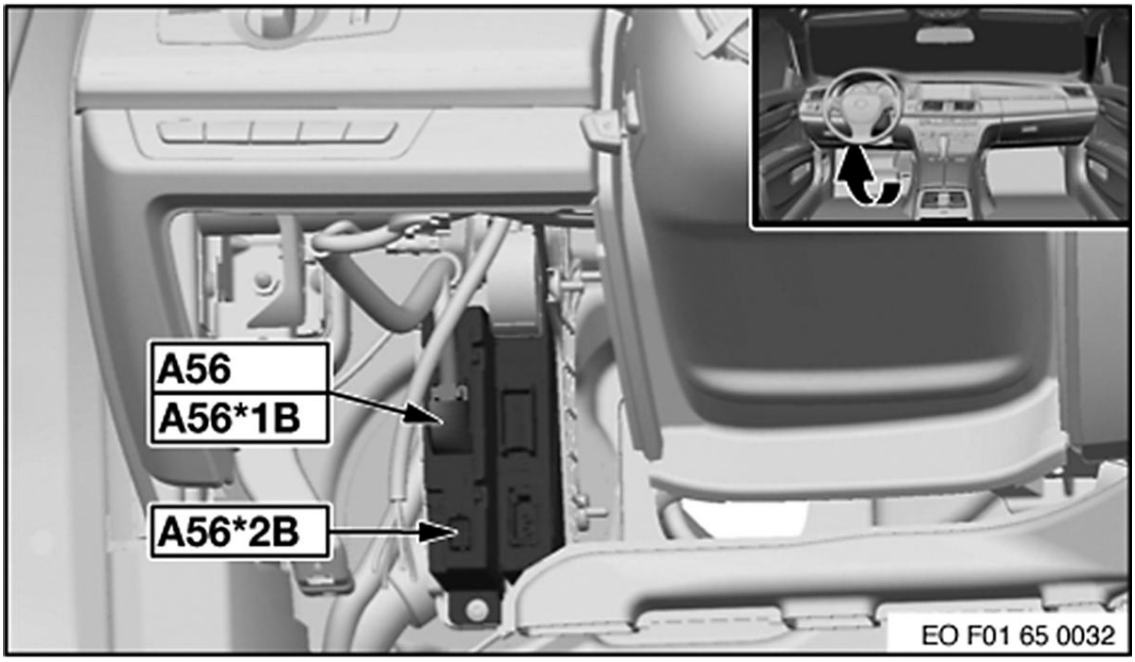


Fig. 46: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

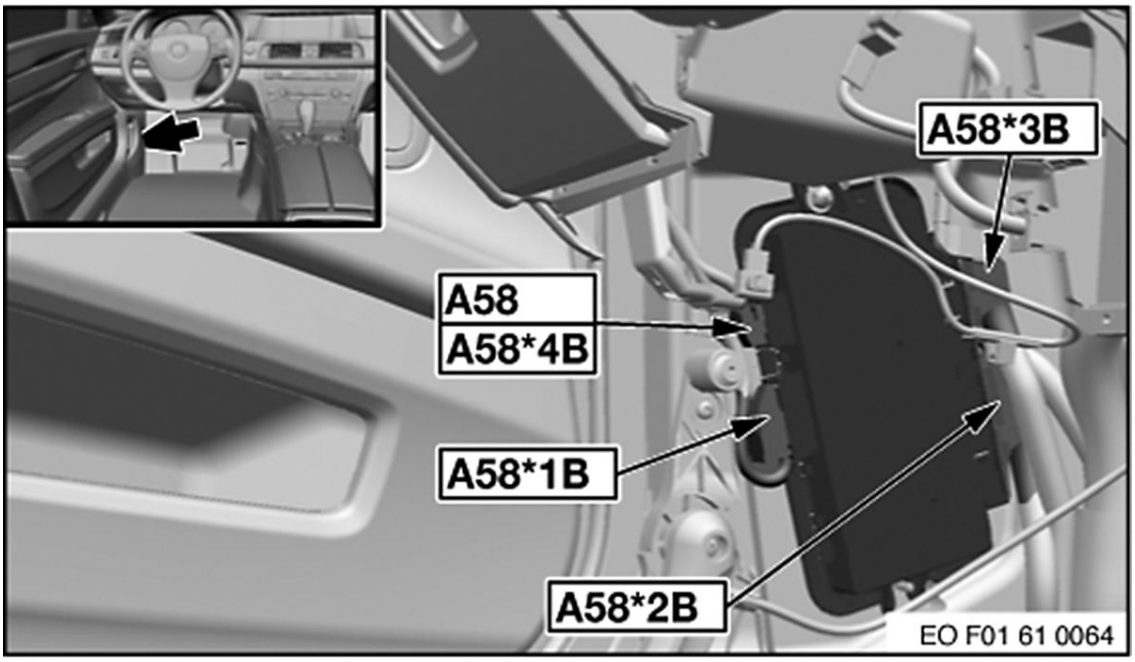


Fig. 47: Under Driver's Footwell
Courtesy of BMW OF NORTH AMERICA, INC.

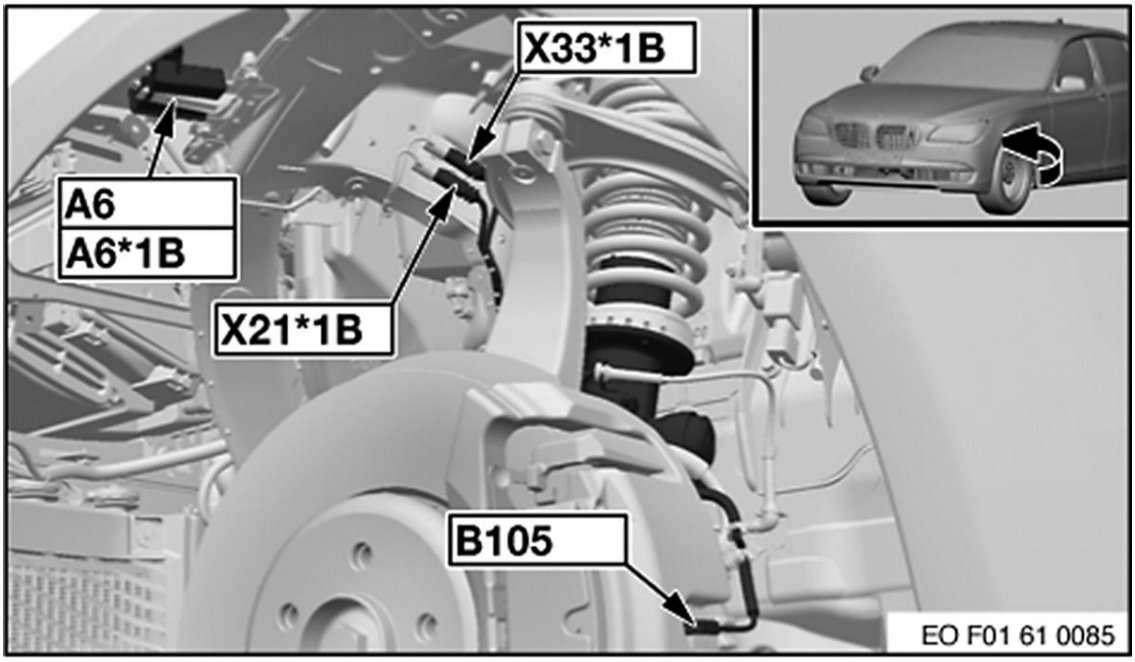


Fig. 48: Right Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

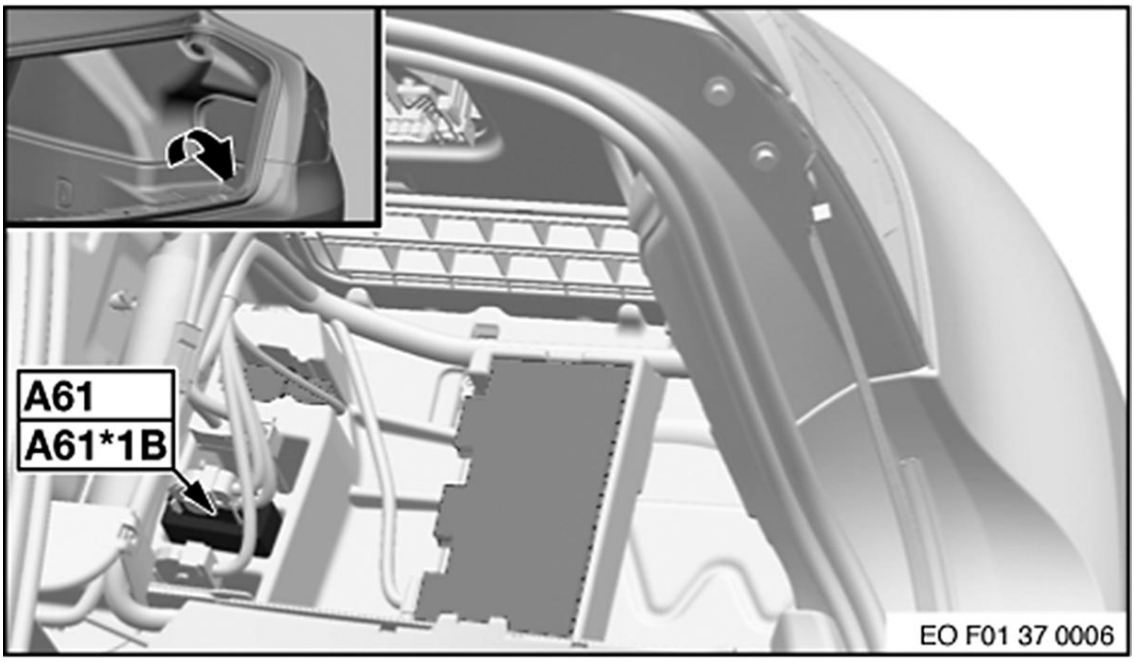


Fig. 49: Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

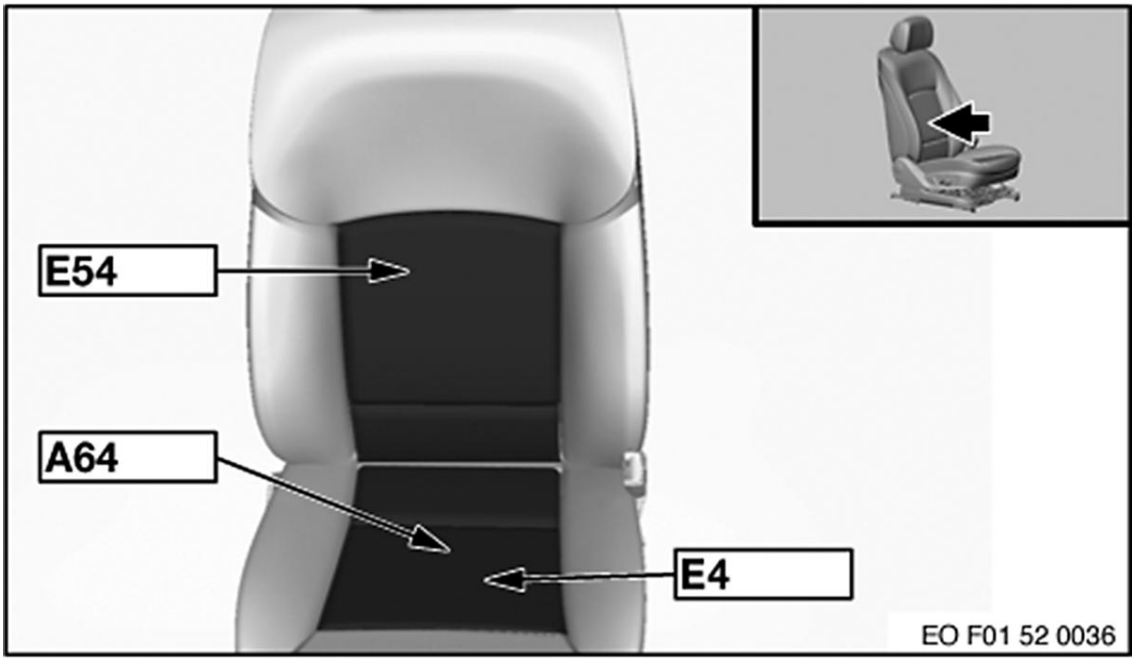


Fig. 50: Right Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

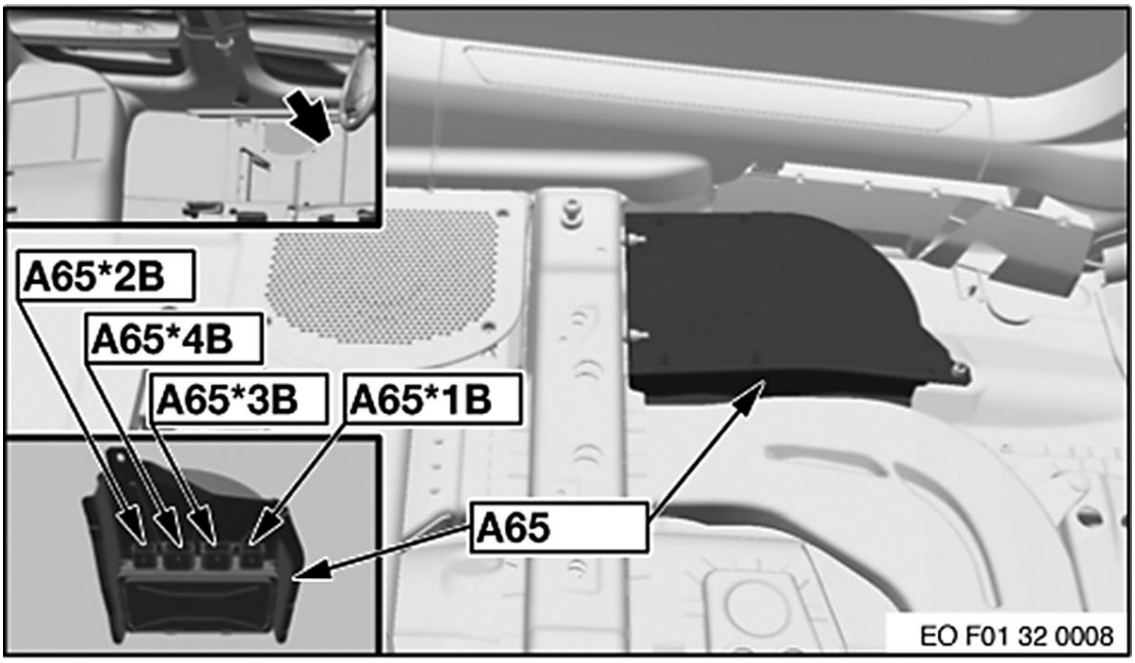


Fig. 51: Left Rear Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

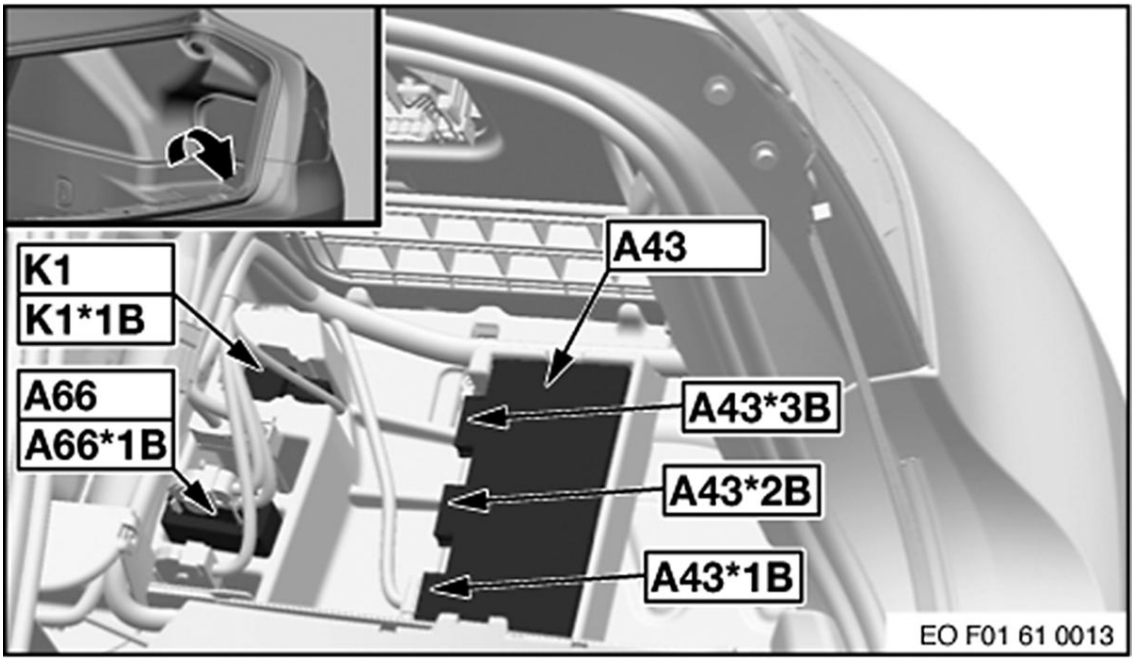


Fig. 52: Right Rear Door
Courtesy of BMW OF NORTH AMERICA, INC.

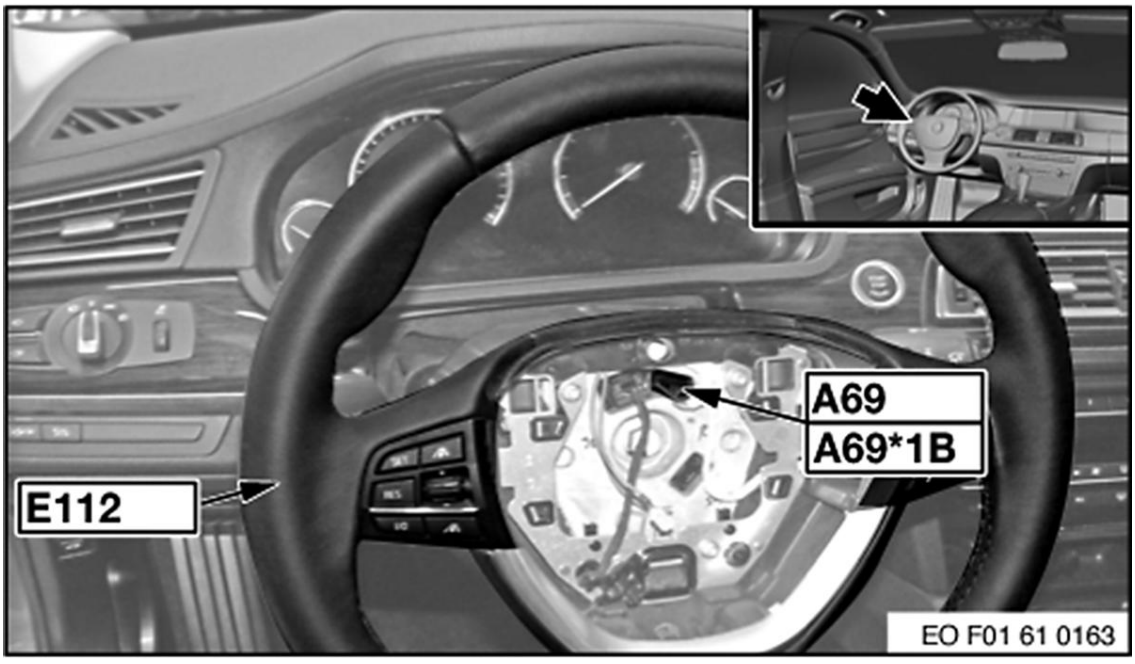


Fig. 53: Right Front Door
Courtesy of BMW OF NORTH AMERICA, INC.

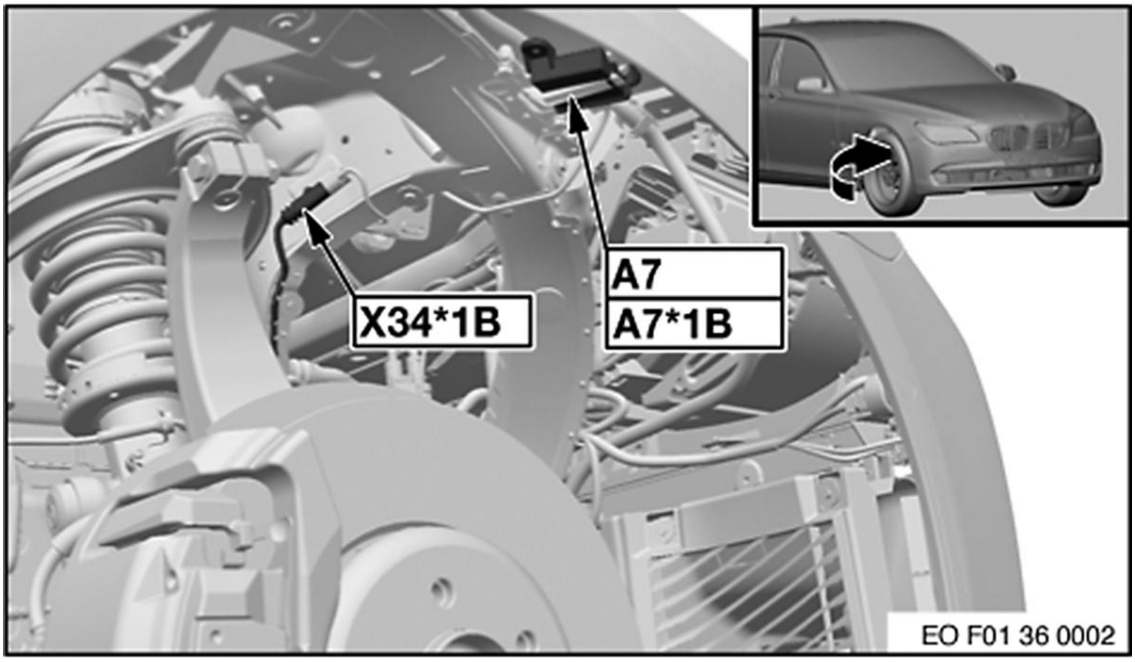


Fig. 54: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

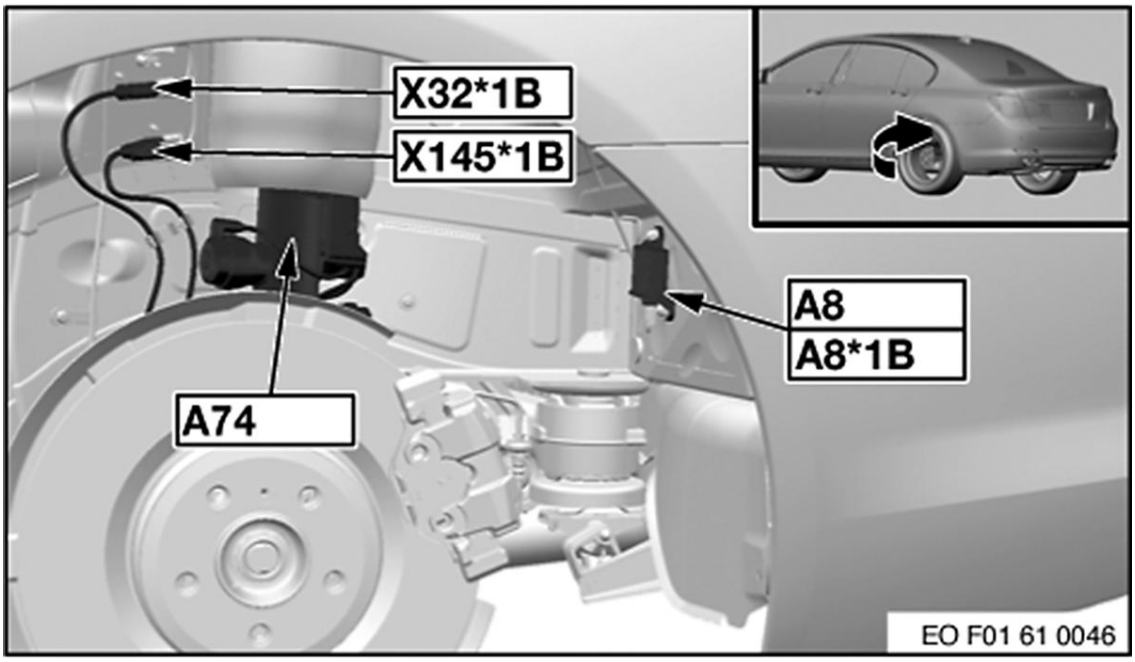


Fig. 55: Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

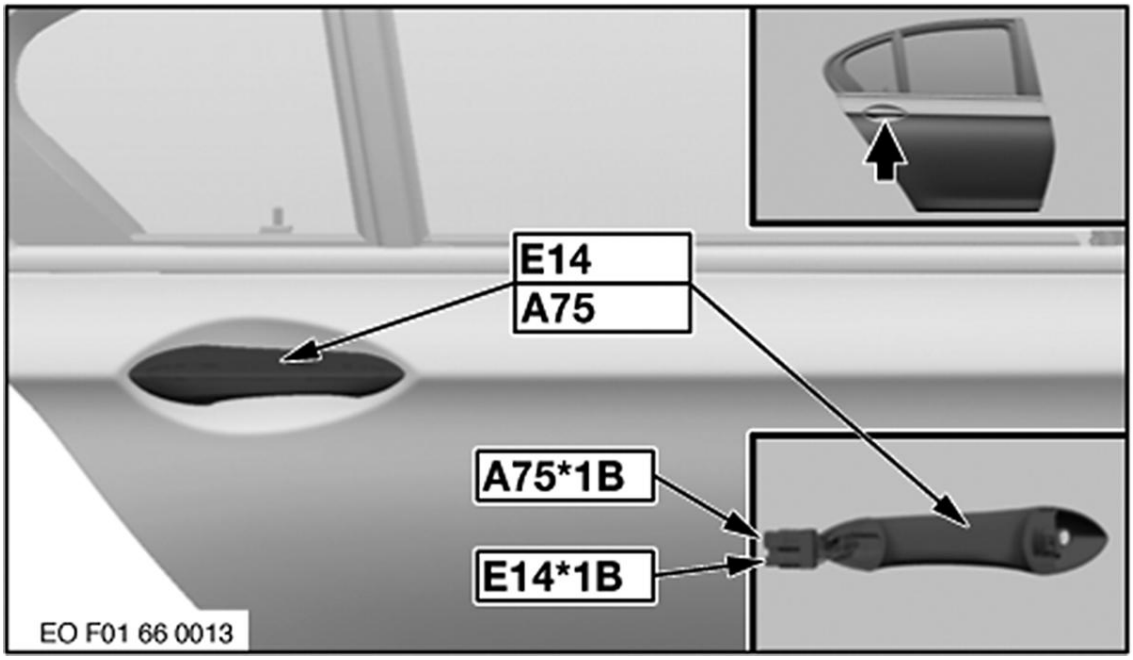


Fig. 56: Left Rear Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

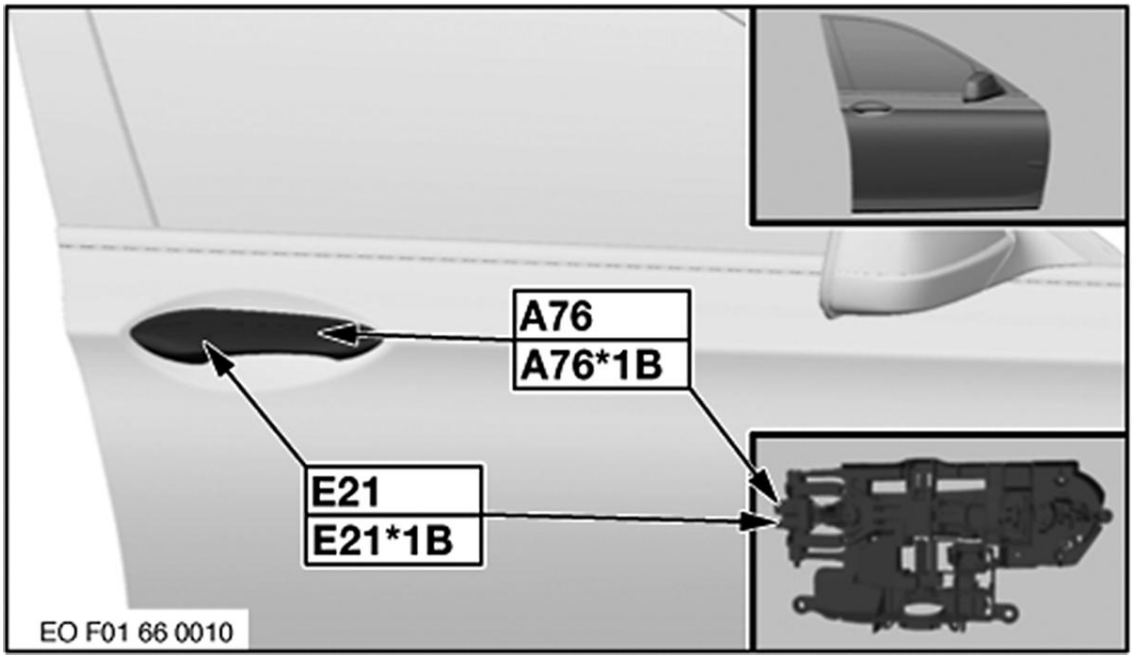


Fig. 57: Right End Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

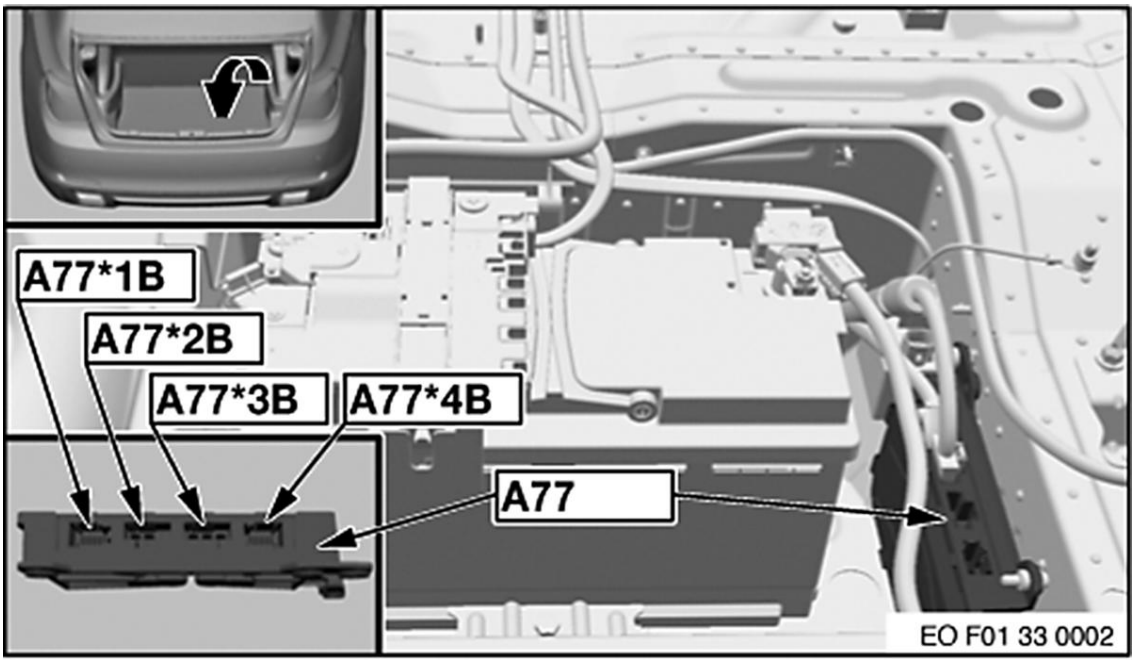


Fig. 58: Front Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

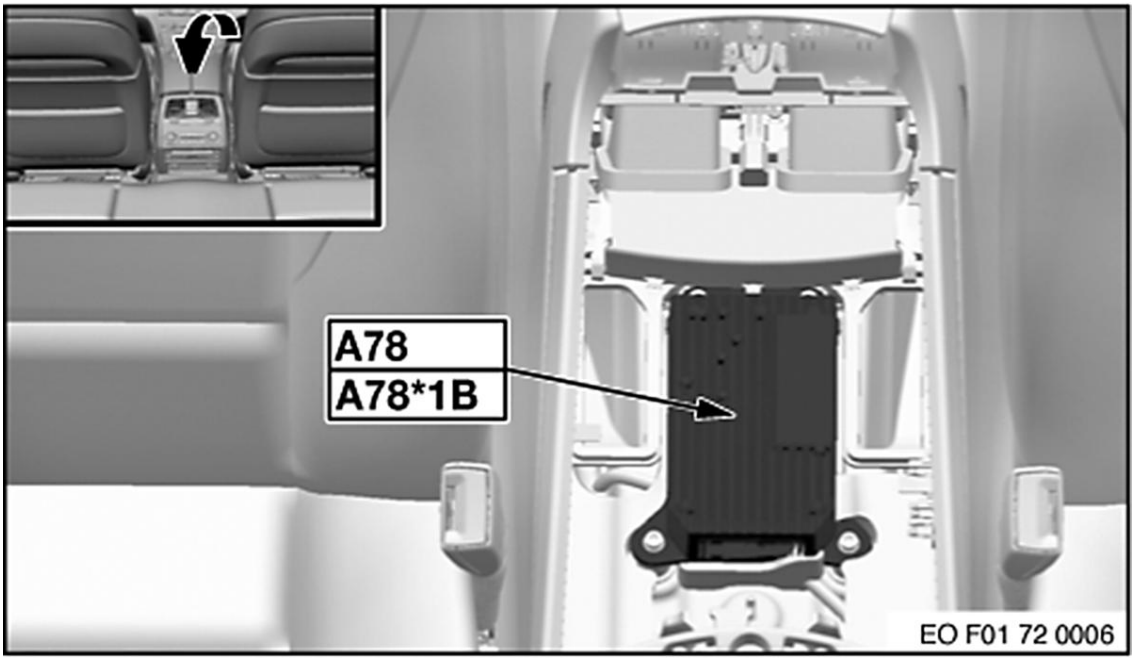


Fig. 59: Head Liner
Courtesy of BMW OF NORTH AMERICA, INC.

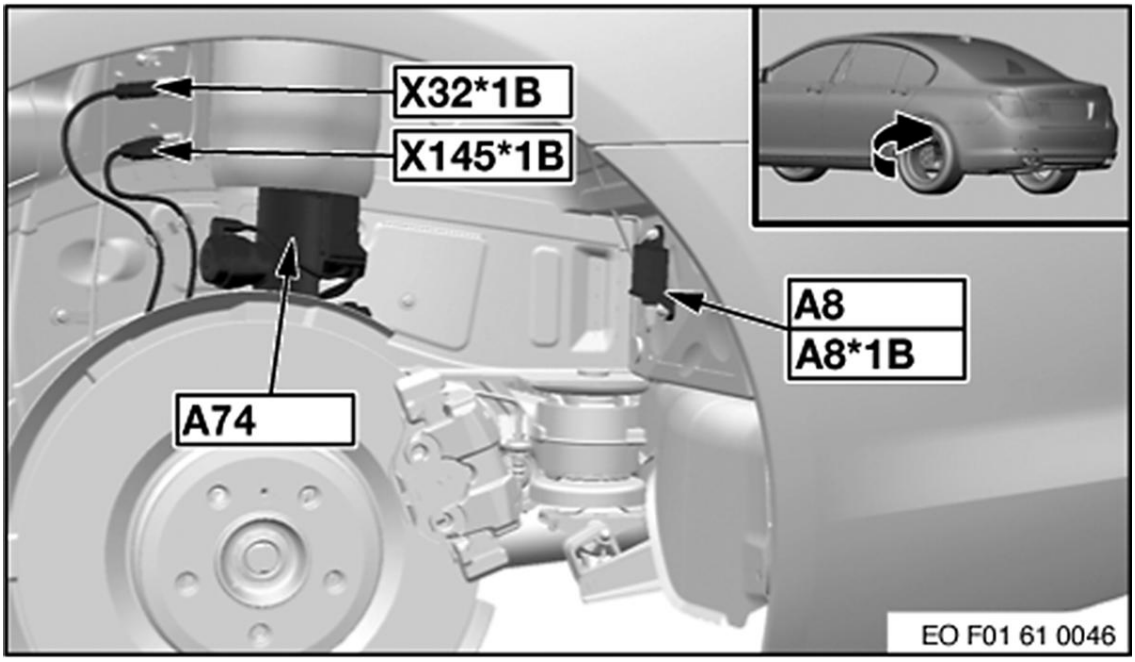


Fig. 60: Left Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

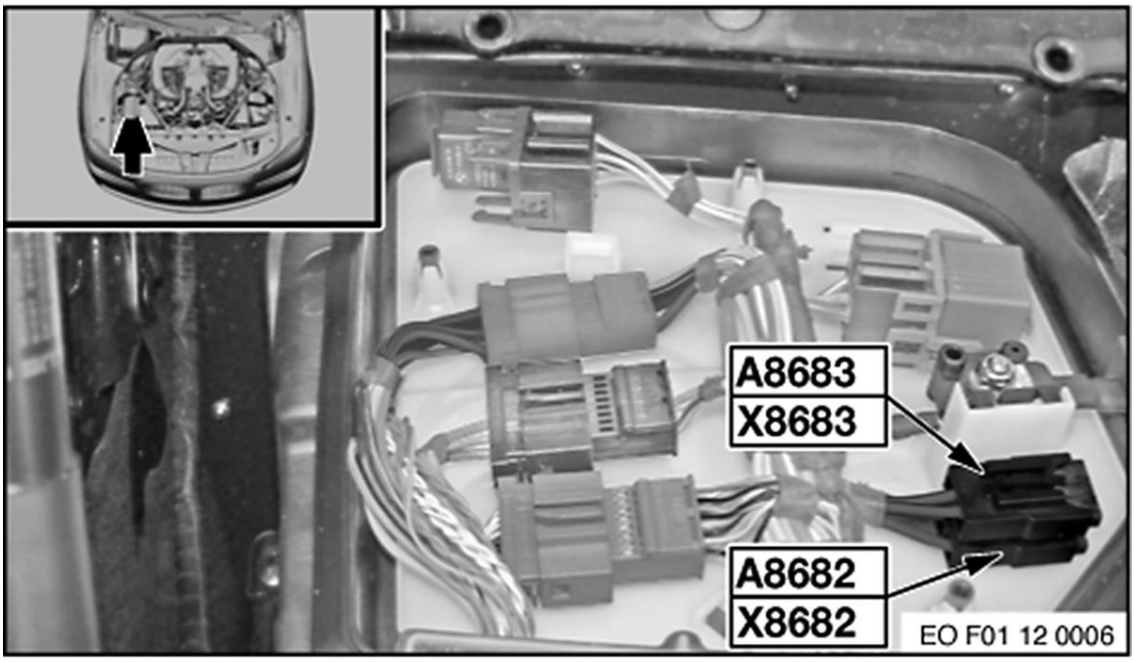


Fig. 61: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

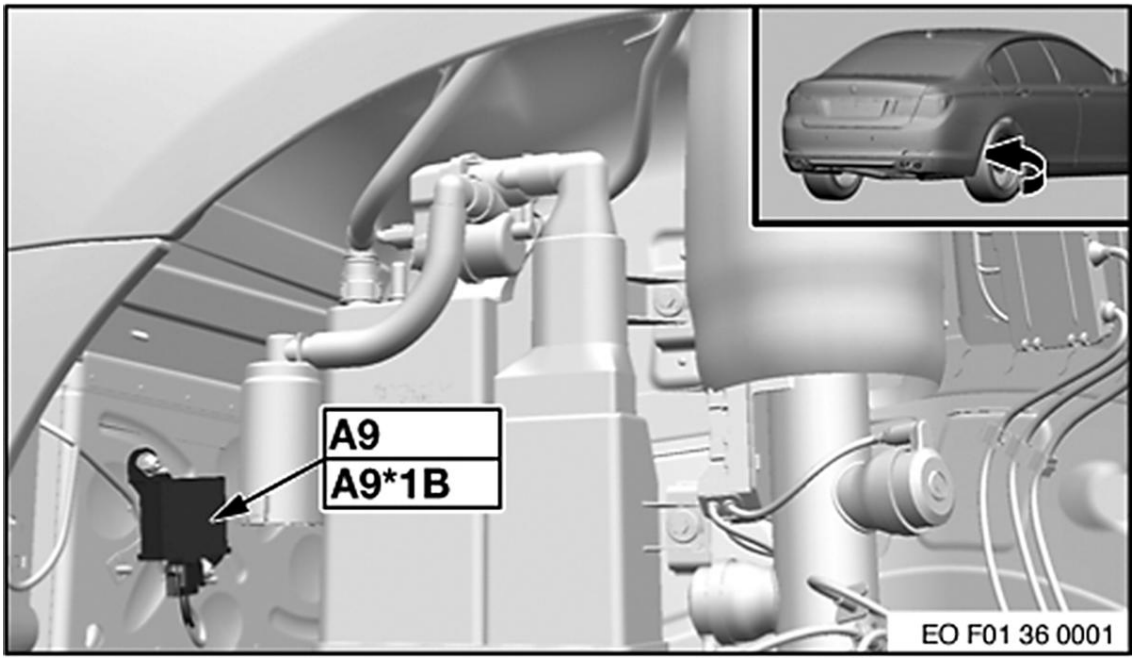


Fig. 62: Right Rear Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

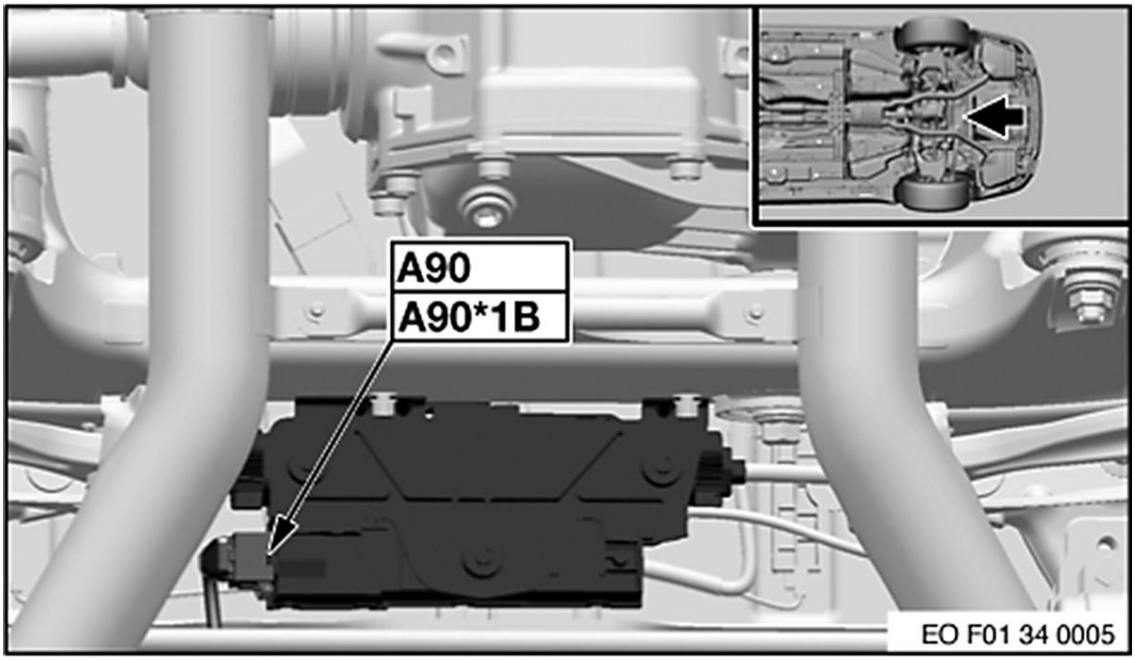


Fig. 63: Under Front Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

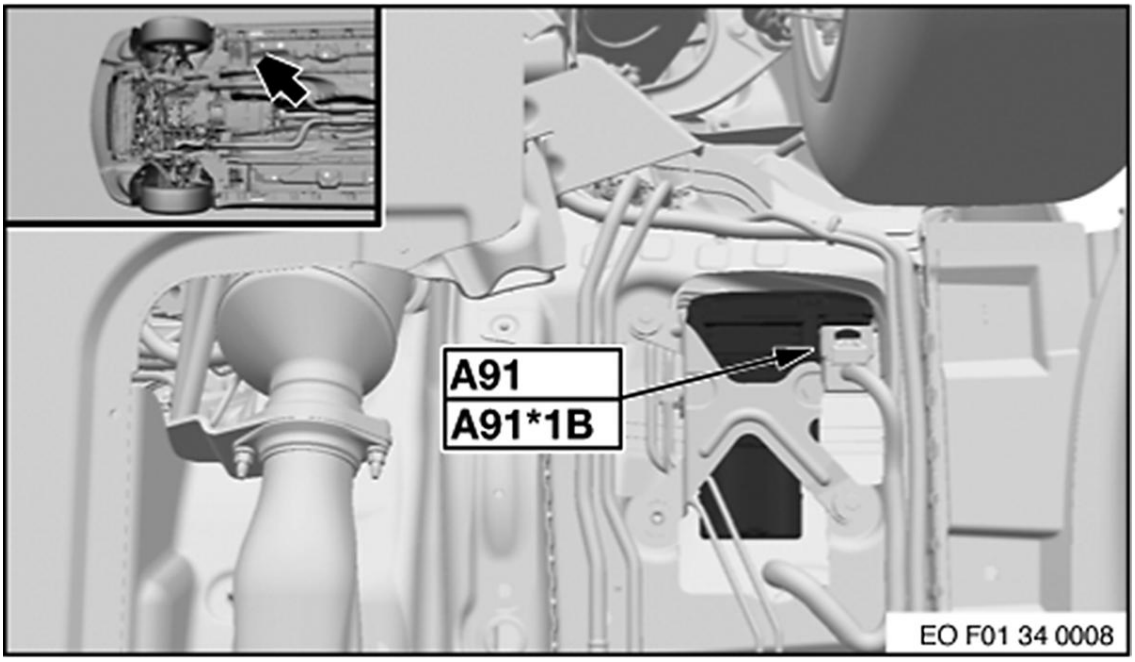


Fig. 64: Under Left Front Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

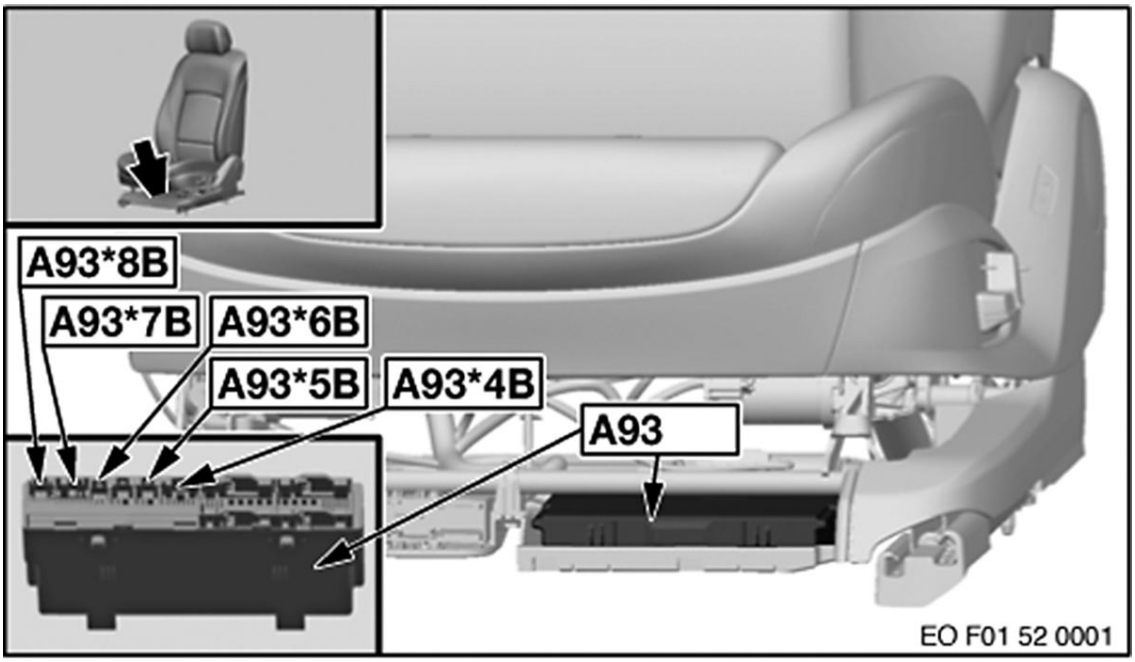


Fig. 65: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

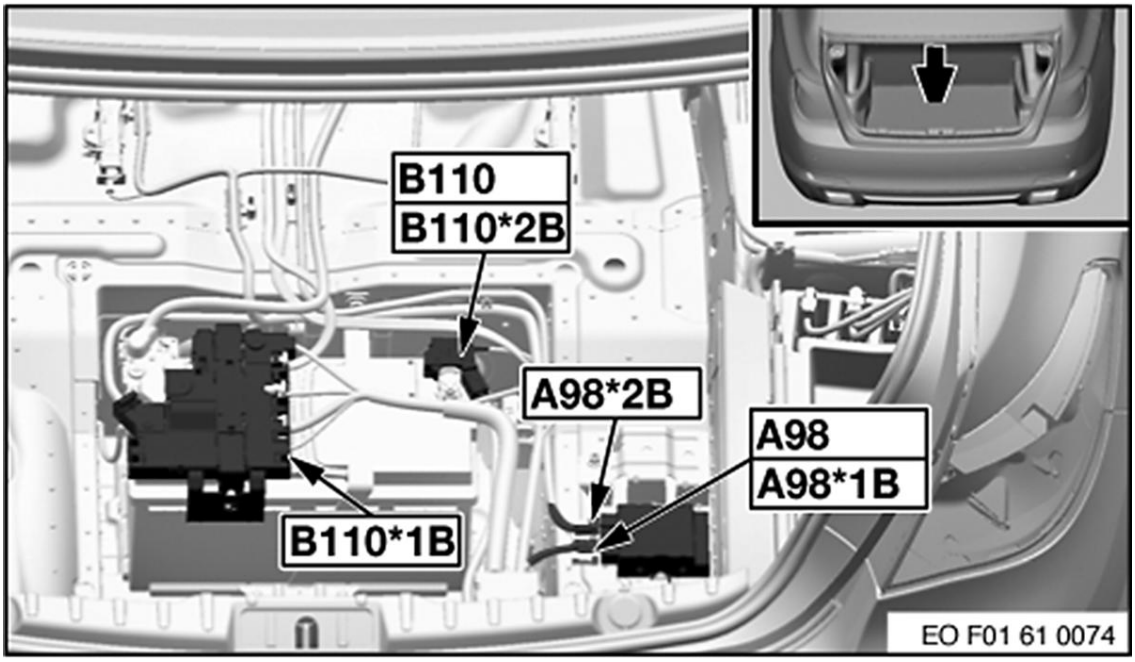


Fig. 66: Right Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

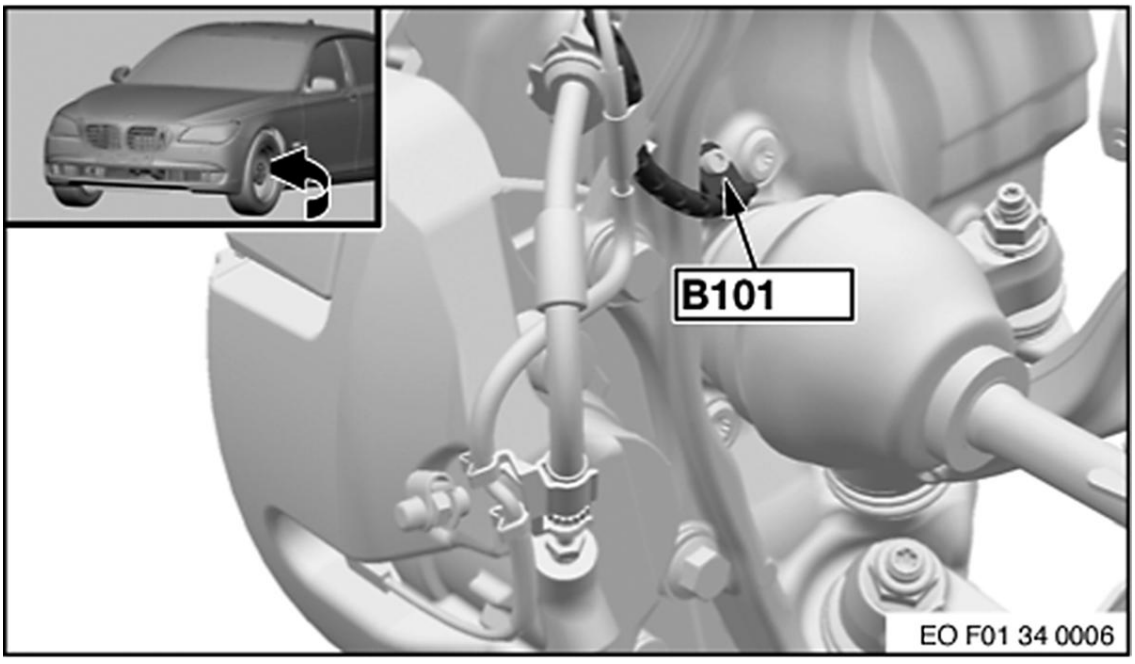


Fig. 67: Left Front Wheel Hub Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

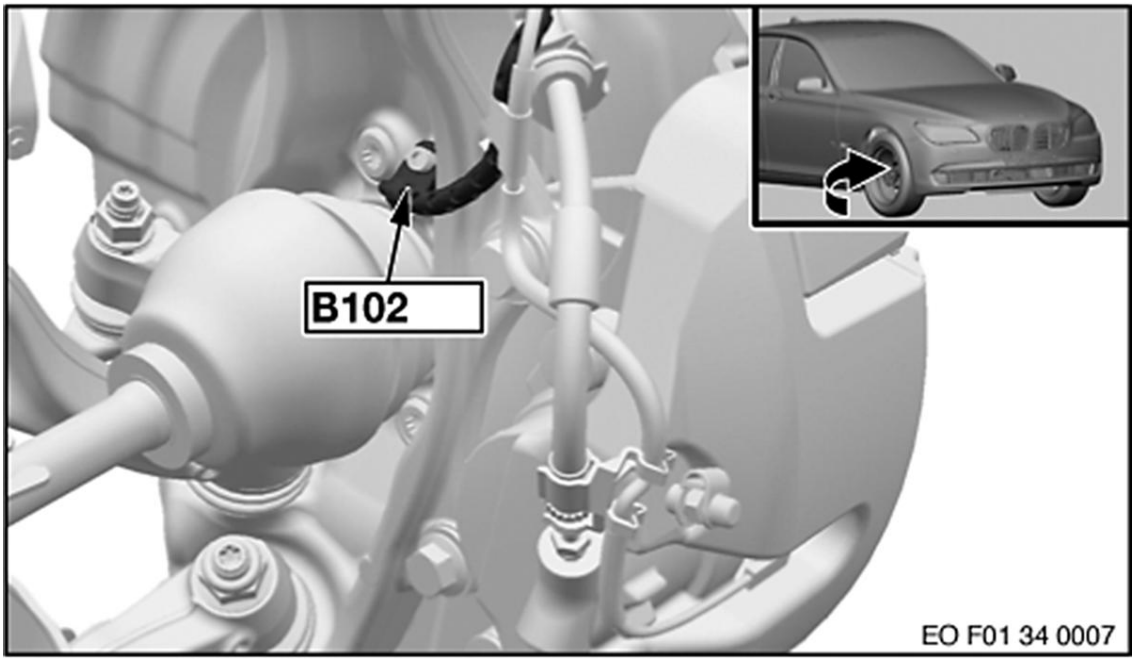


Fig. 68: Right Front Wheel Hub Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

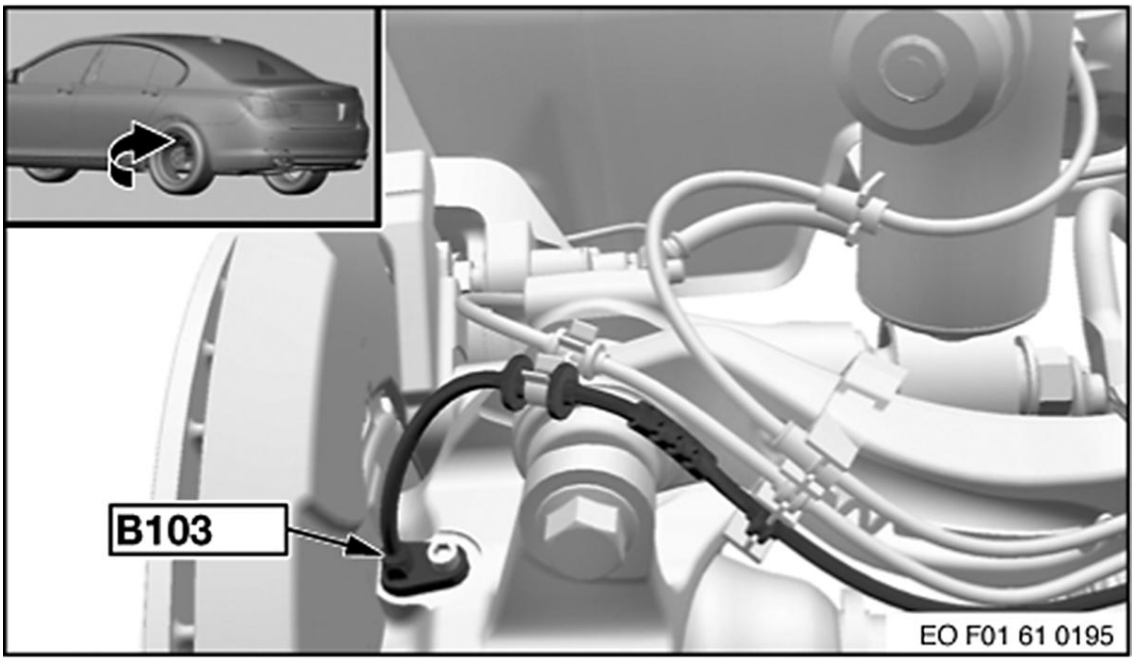


Fig. 69: Left Rear Wheel Hub Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

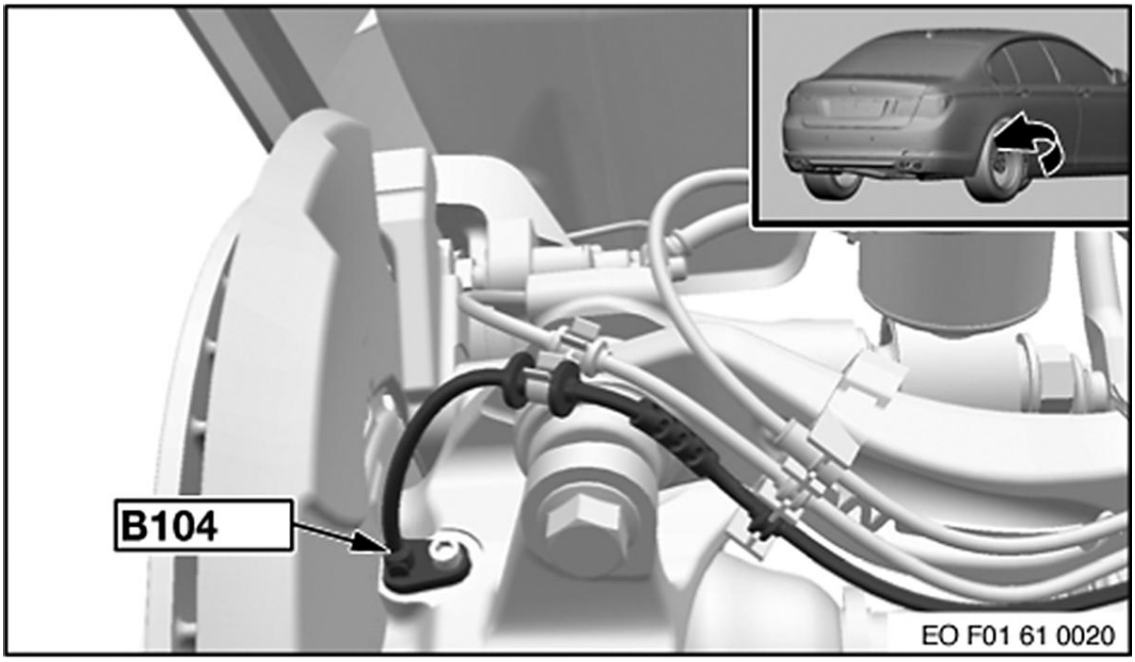


Fig. 70: Right Rear Wheel Hub Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

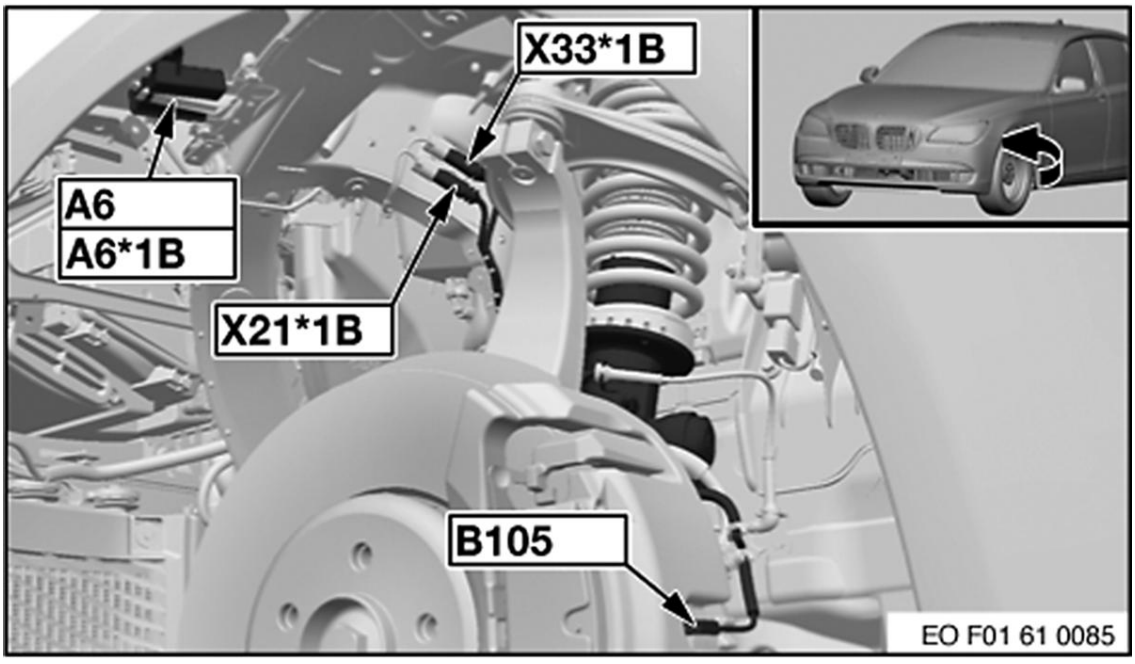


Fig. 71: Left Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

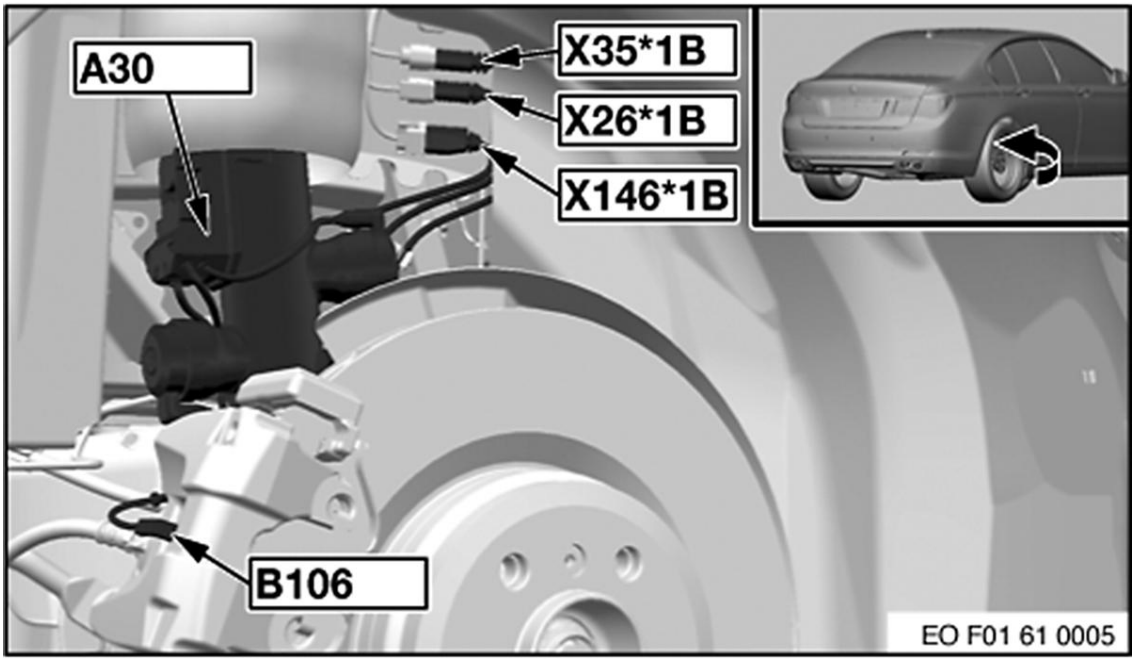


Fig. 72: Right Rear Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

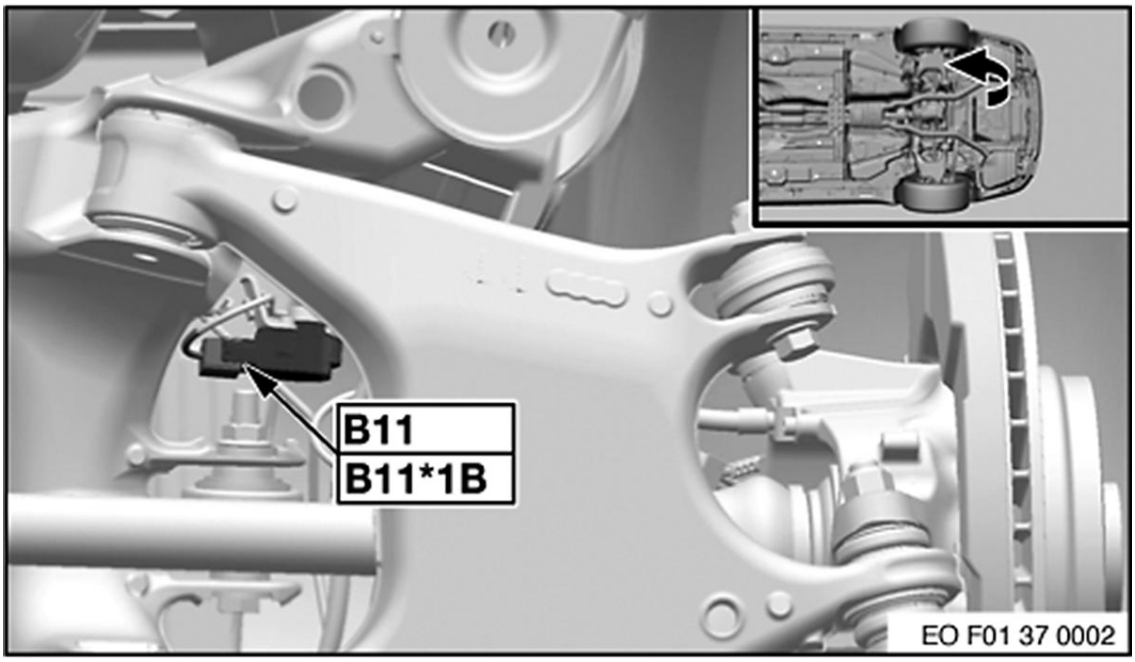


Fig. 73: Left Rear Axle
Courtesy of BMW OF NORTH AMERICA, INC.

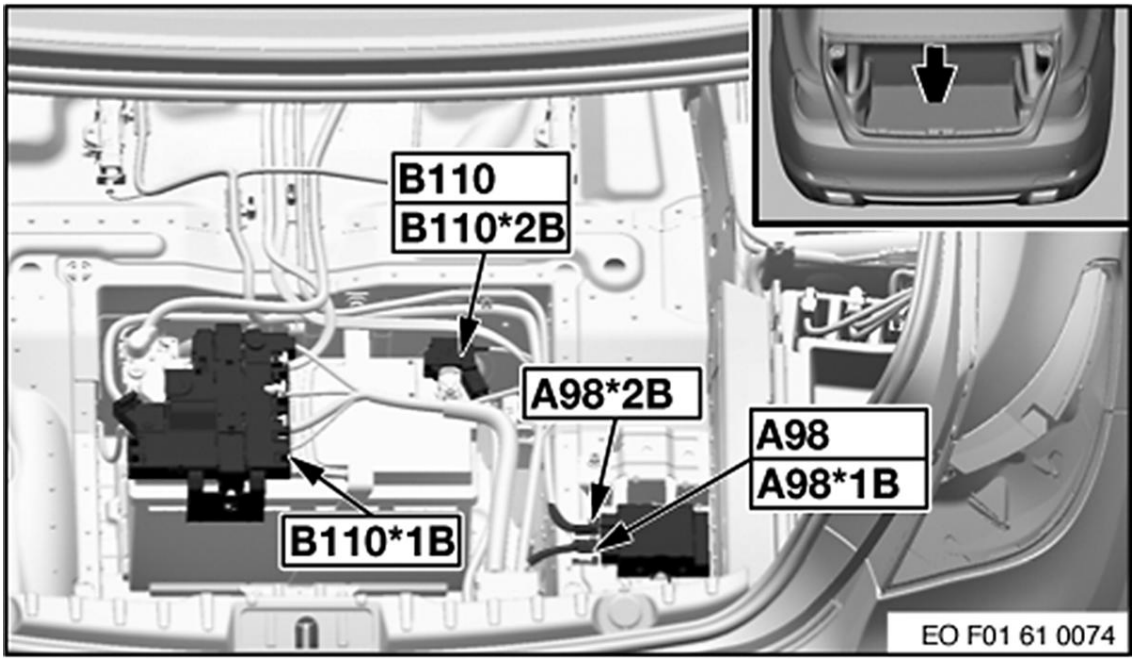


Fig. 74: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

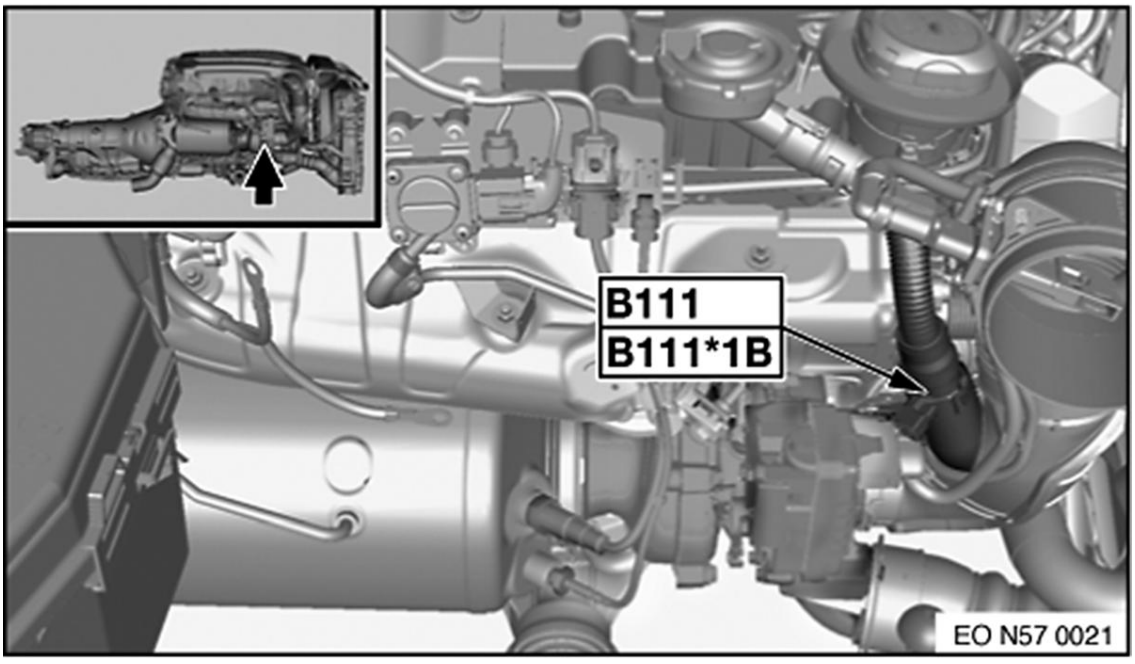


Fig. 75: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

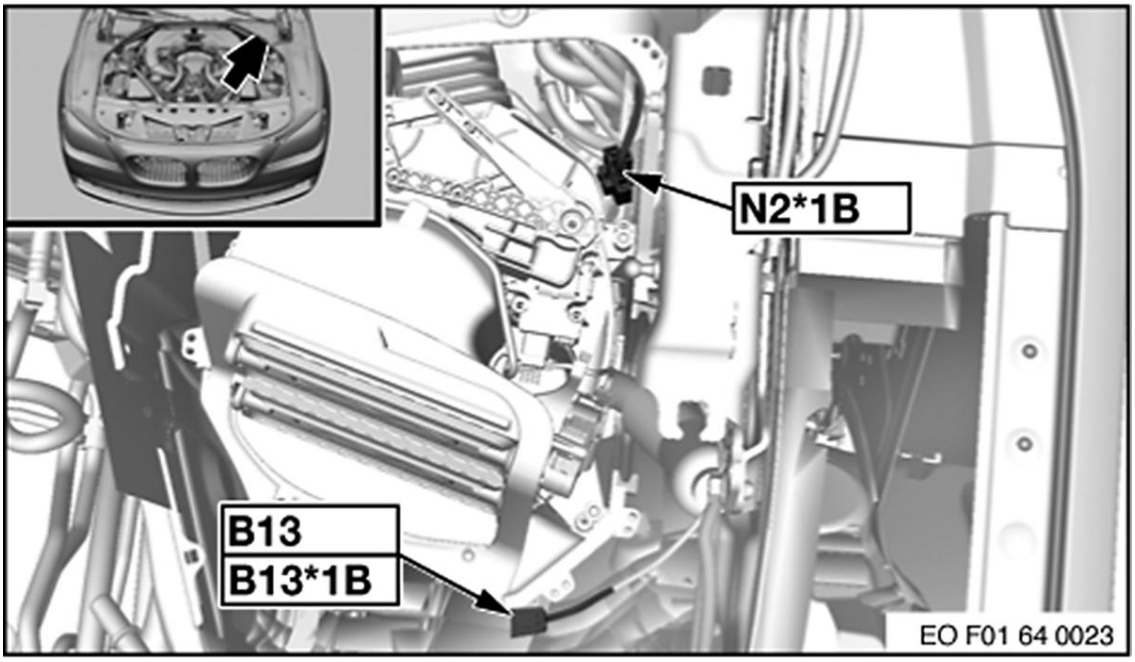


Fig. 76: Left Side Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

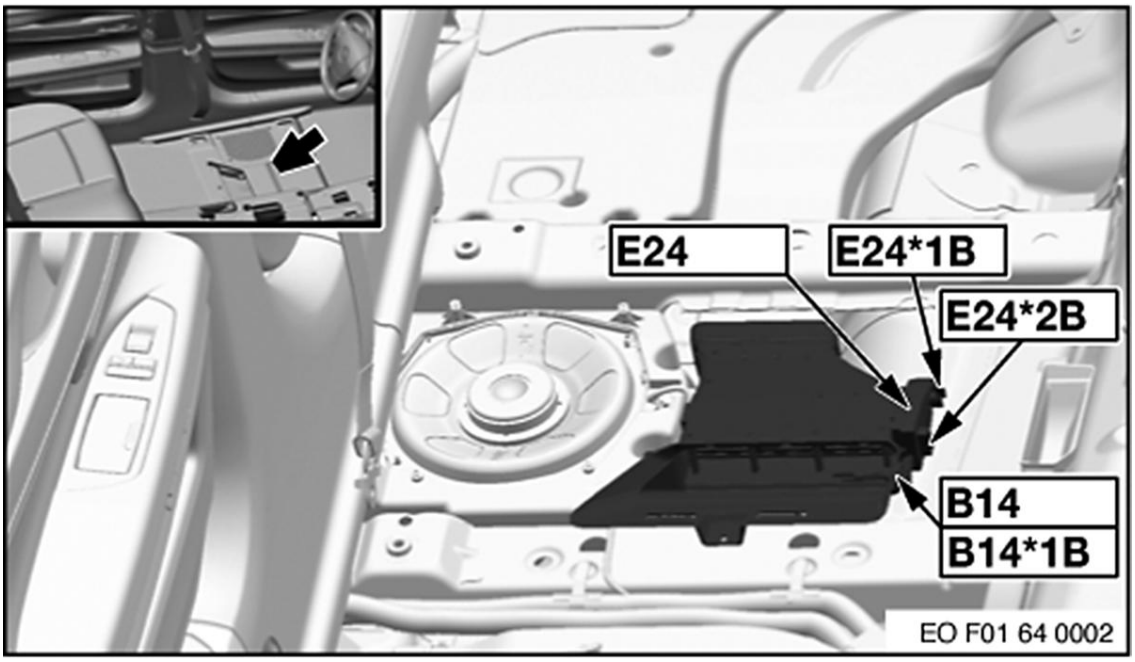


Fig. 77: Under Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

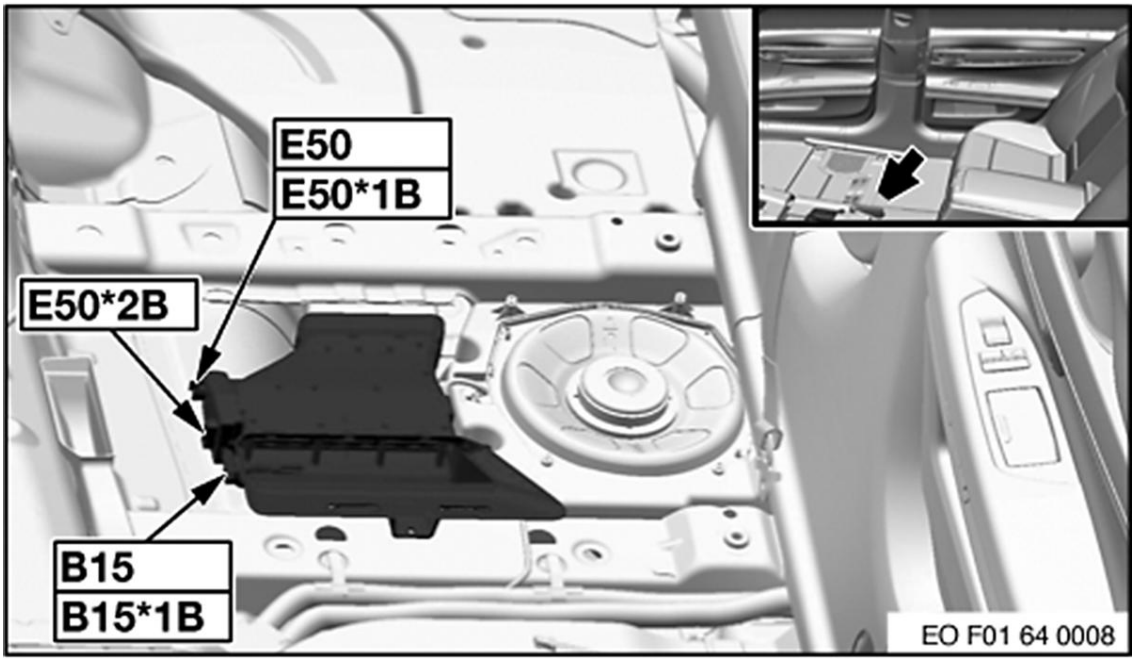


Fig. 78: Right Rear Passenger's Footwell
Courtesy of BMW OF NORTH AMERICA, INC.

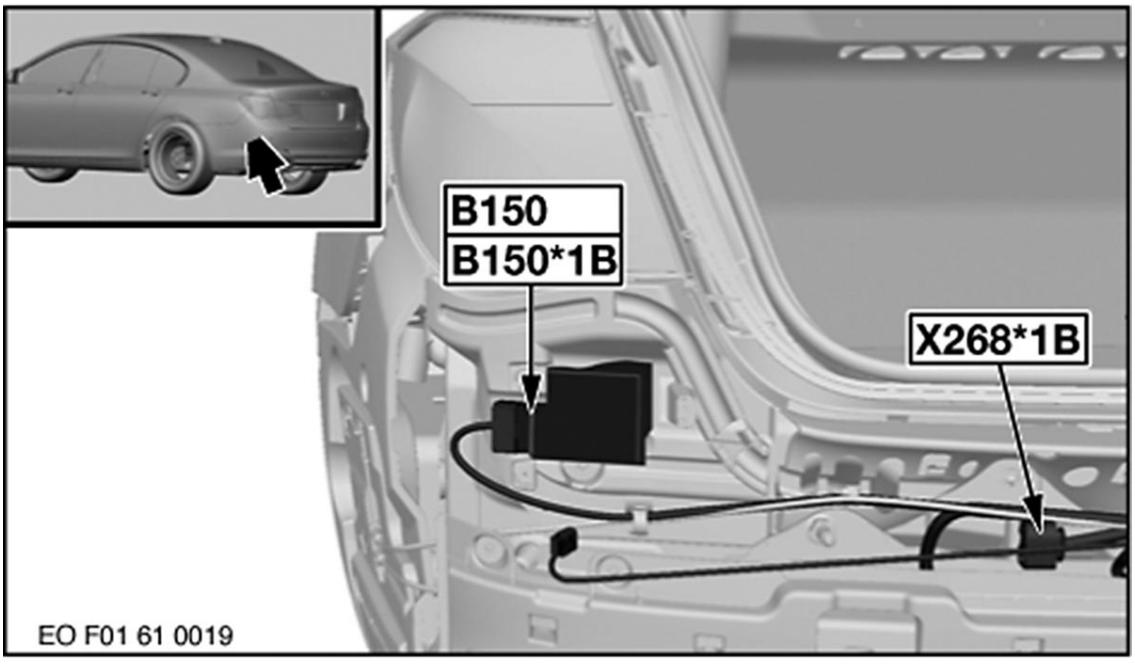


Fig. 79: Left Rear Corner Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

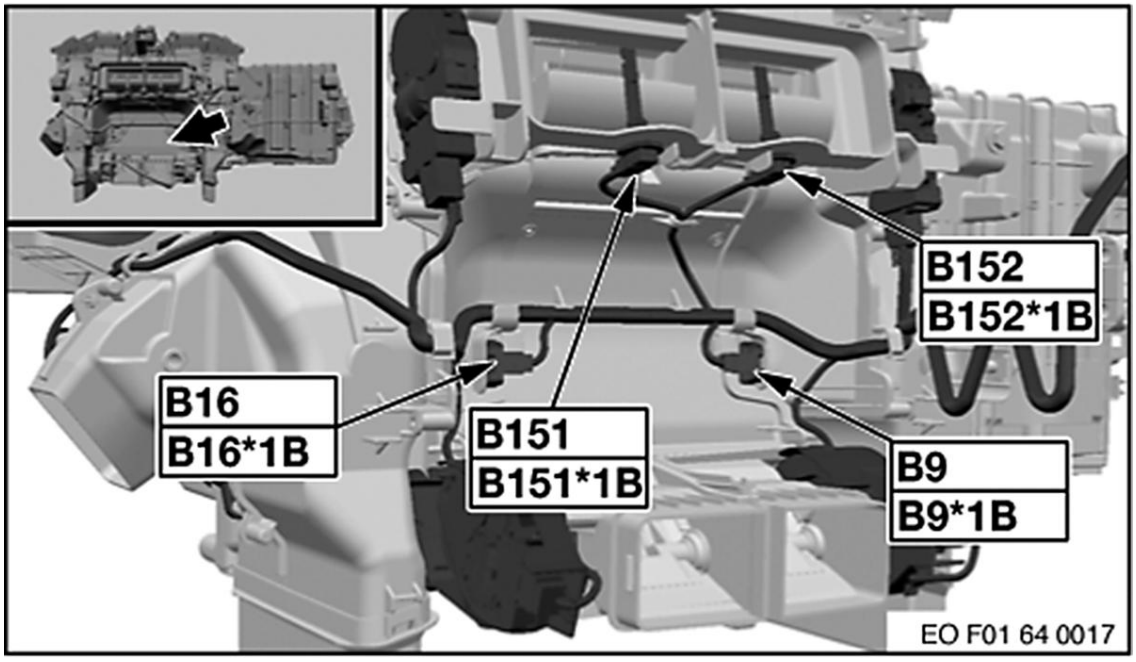


Fig. 80: HVAC Plenum
Courtesy of BMW OF NORTH AMERICA, INC.

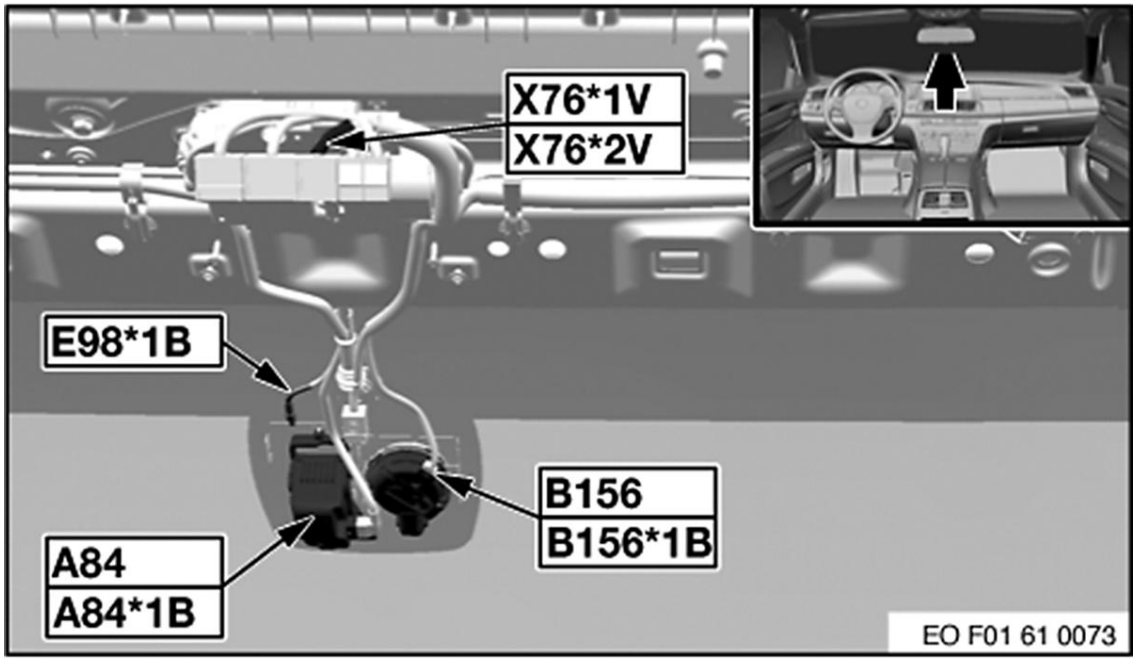


Fig. 81: Center Of Headliner
Courtesy of BMW OF NORTH AMERICA, INC.

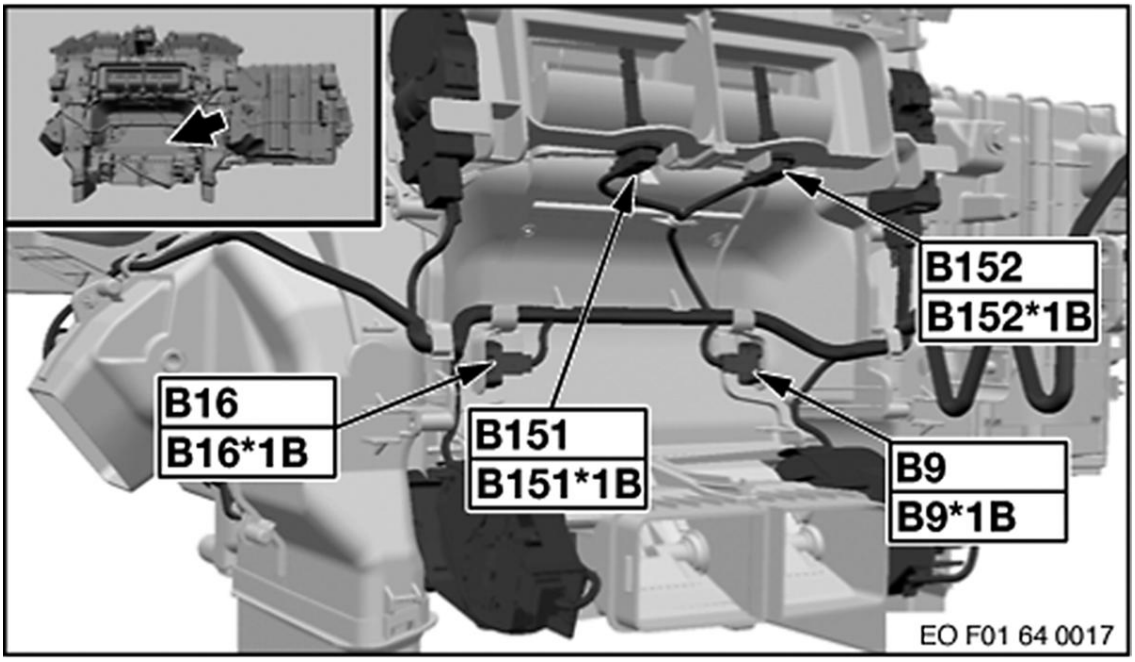


Fig. 82: HVAC Plenum
Courtesy of BMW OF NORTH AMERICA, INC.

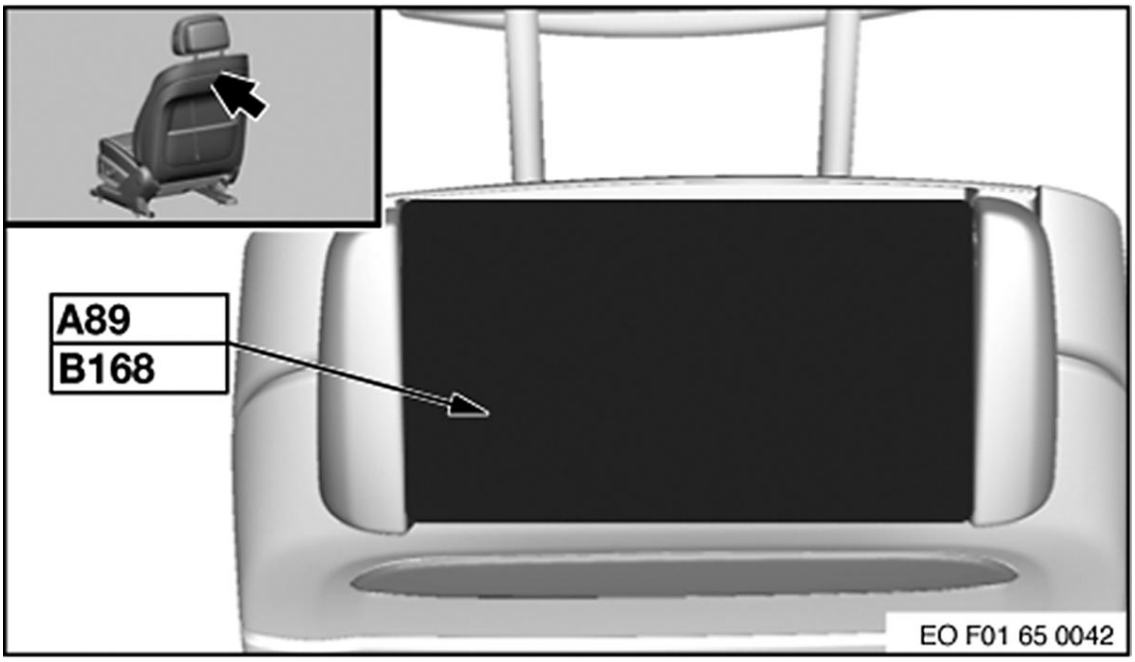


Fig. 83: Driver's Seat Back
Courtesy of BMW OF NORTH AMERICA, INC.

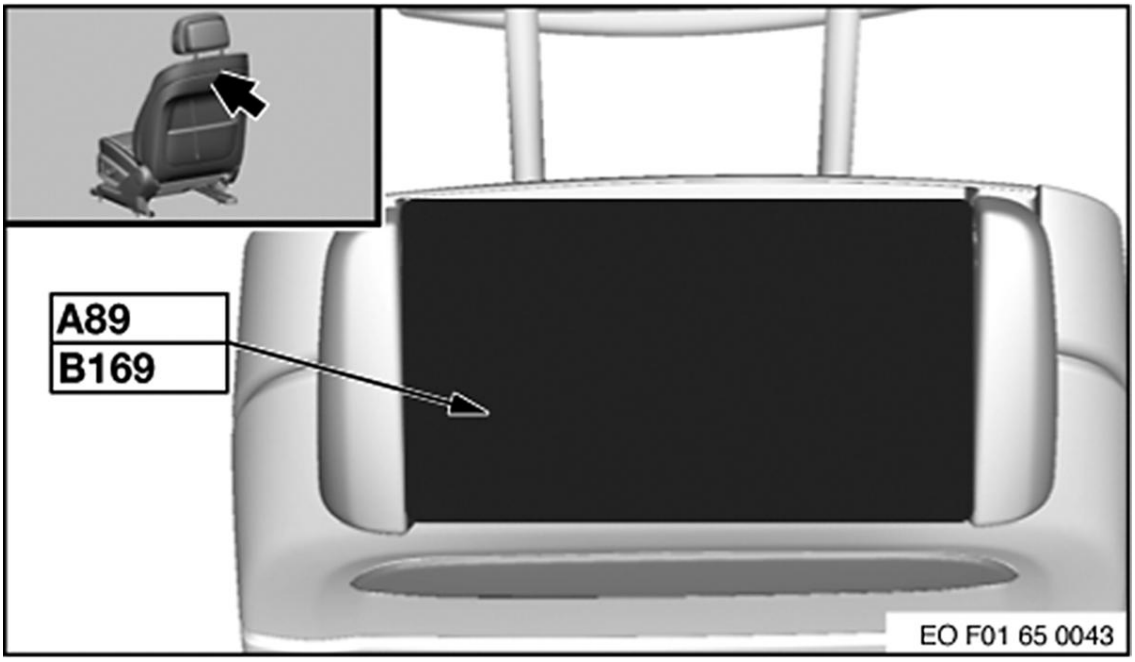


Fig. 84: Right Front Passenger's Seat Back
Courtesy of BMW OF NORTH AMERICA, INC.

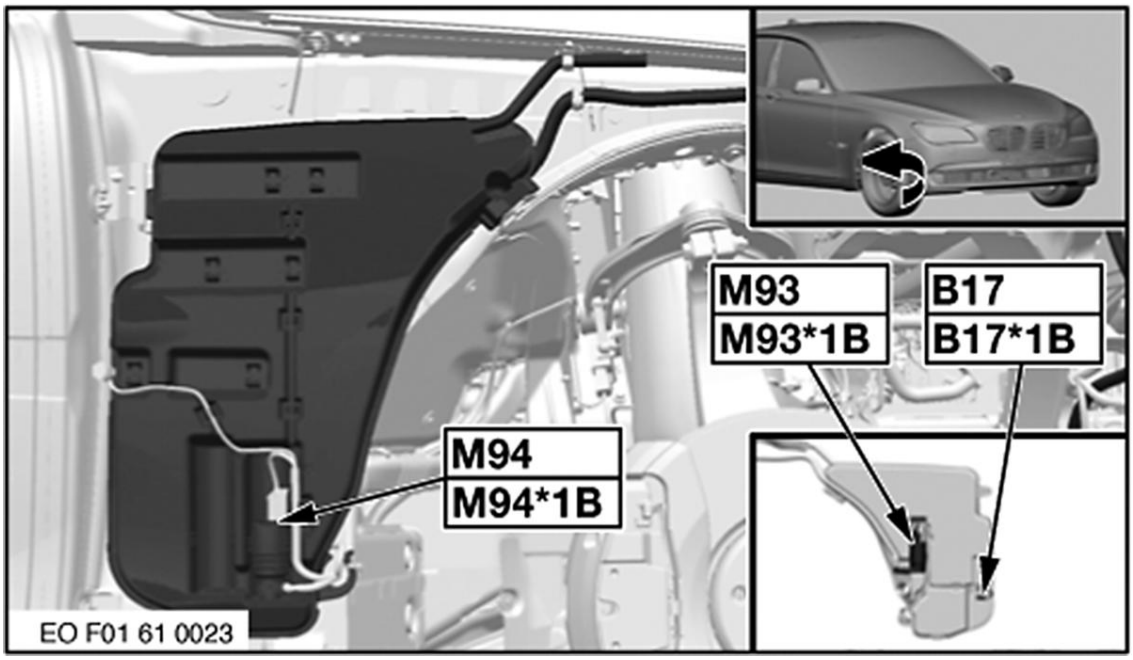


Fig. 85: Right Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

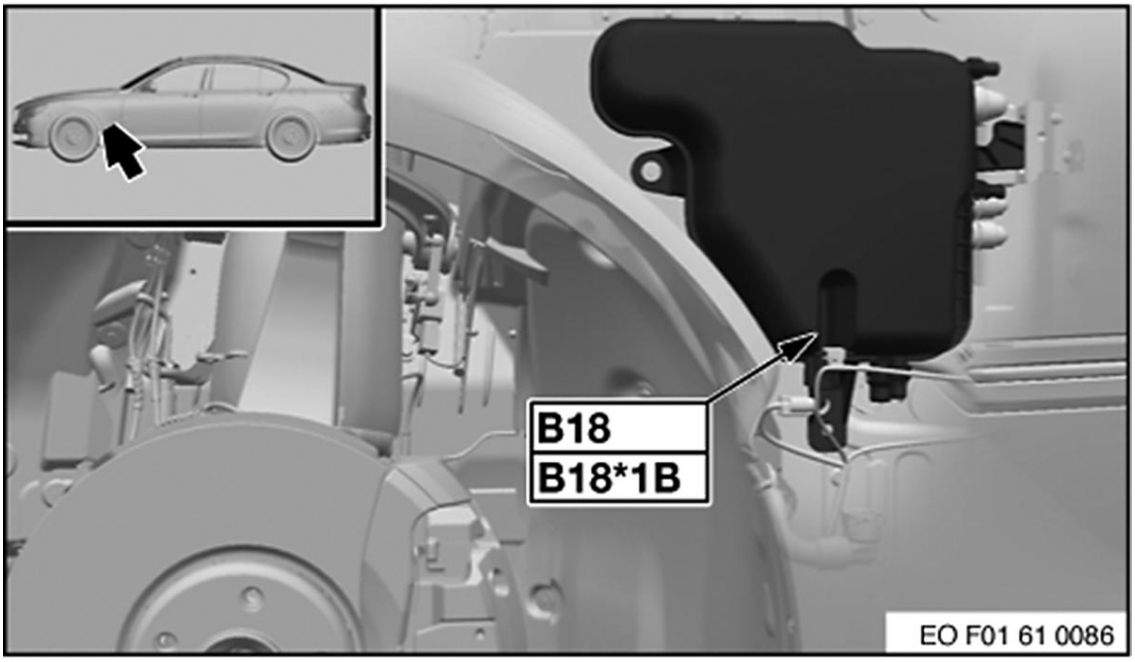


Fig. 86: Left Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

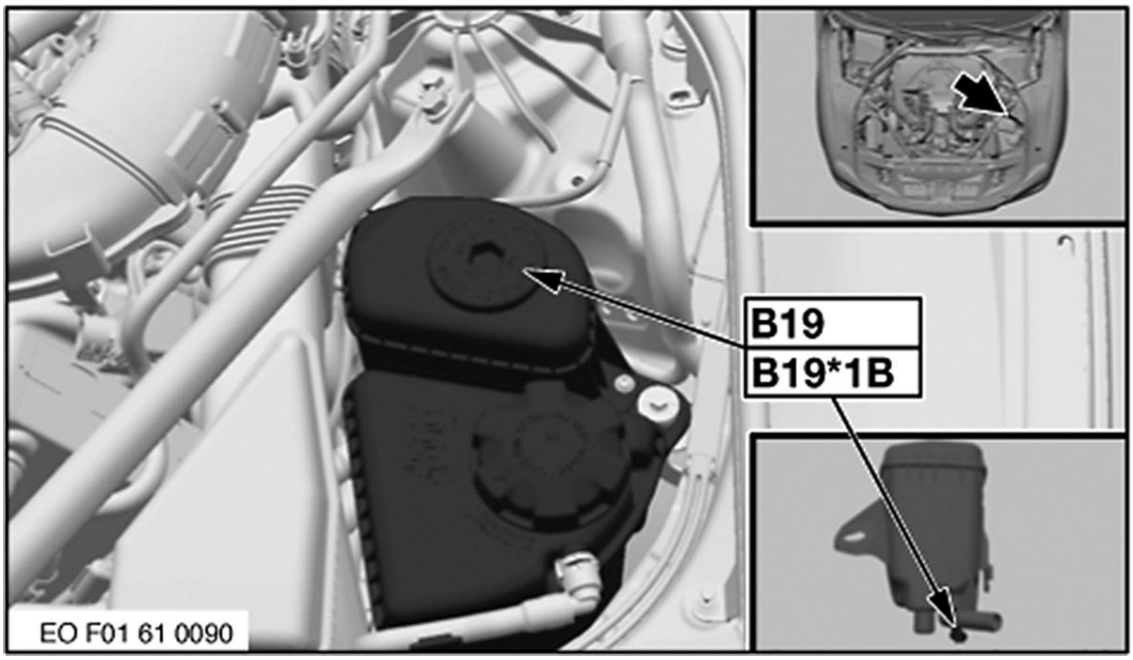


Fig. 87: Left Side Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

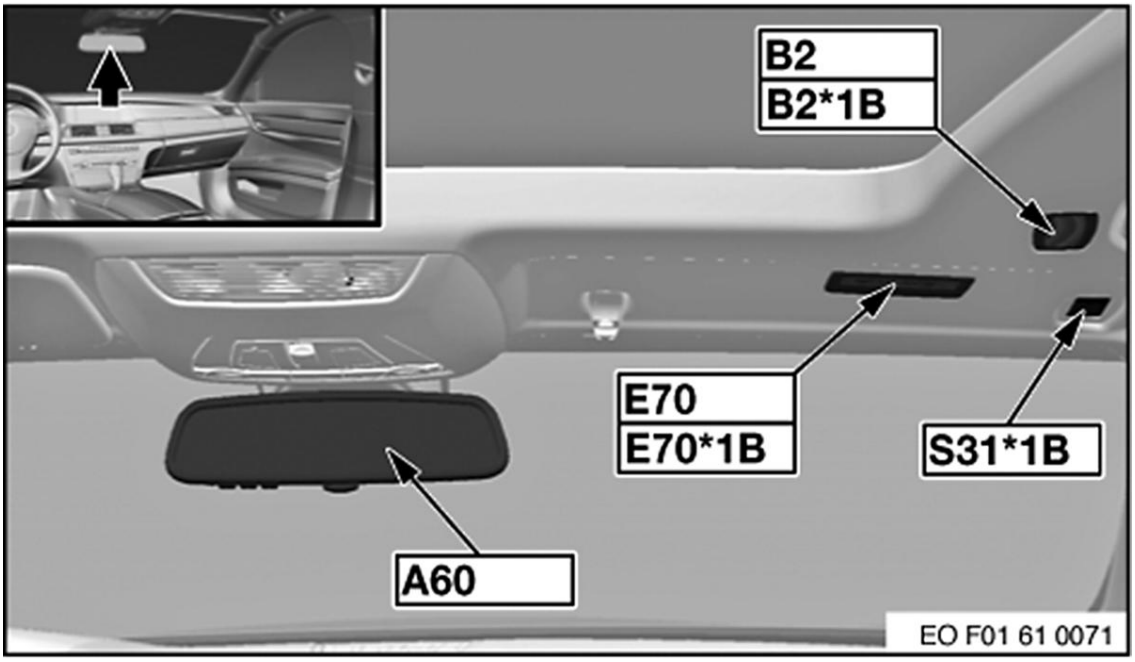


Fig. 88: Right Front Of Roof
Courtesy of BMW OF NORTH AMERICA, INC.

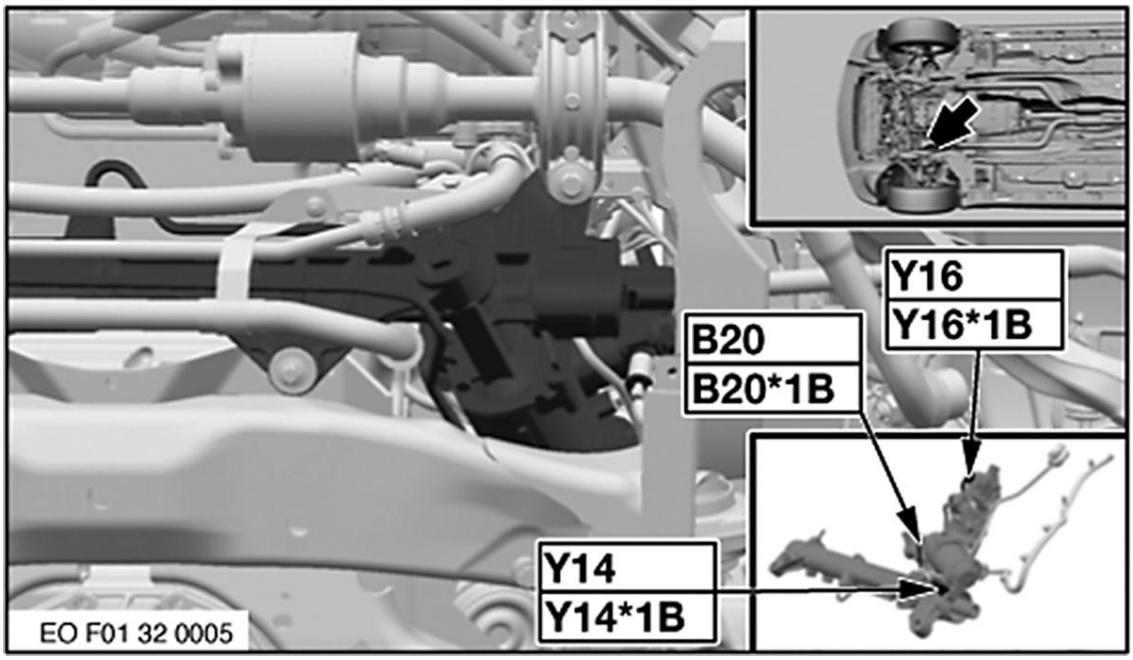


Fig. 89: Steering Rack Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

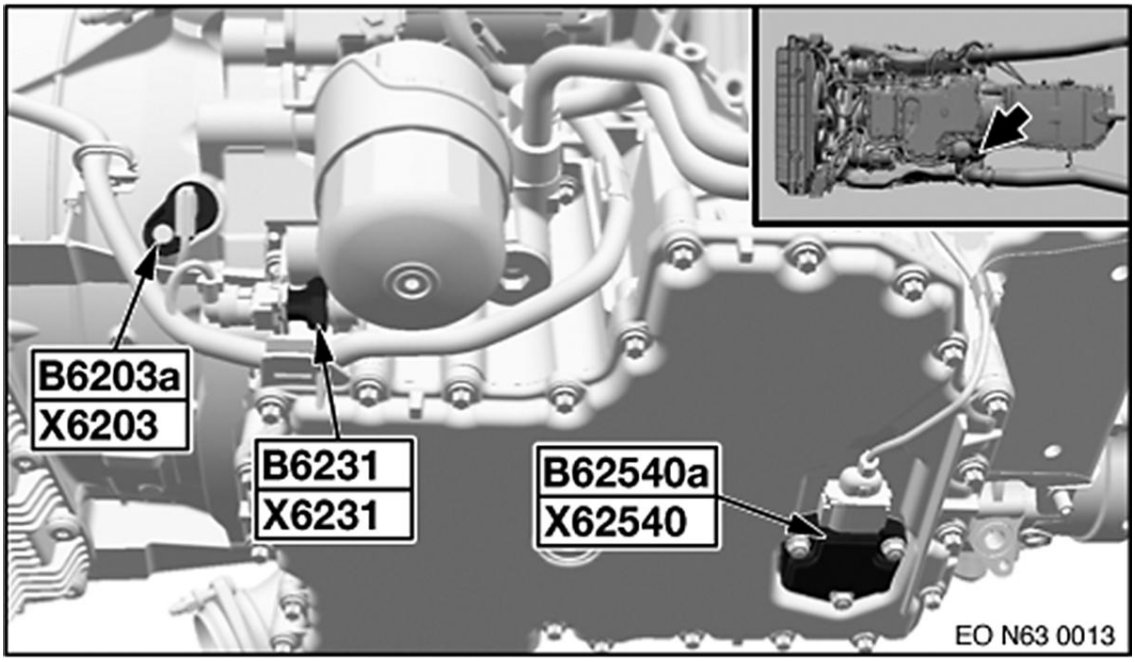


Fig. 90: Bottom Rear Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

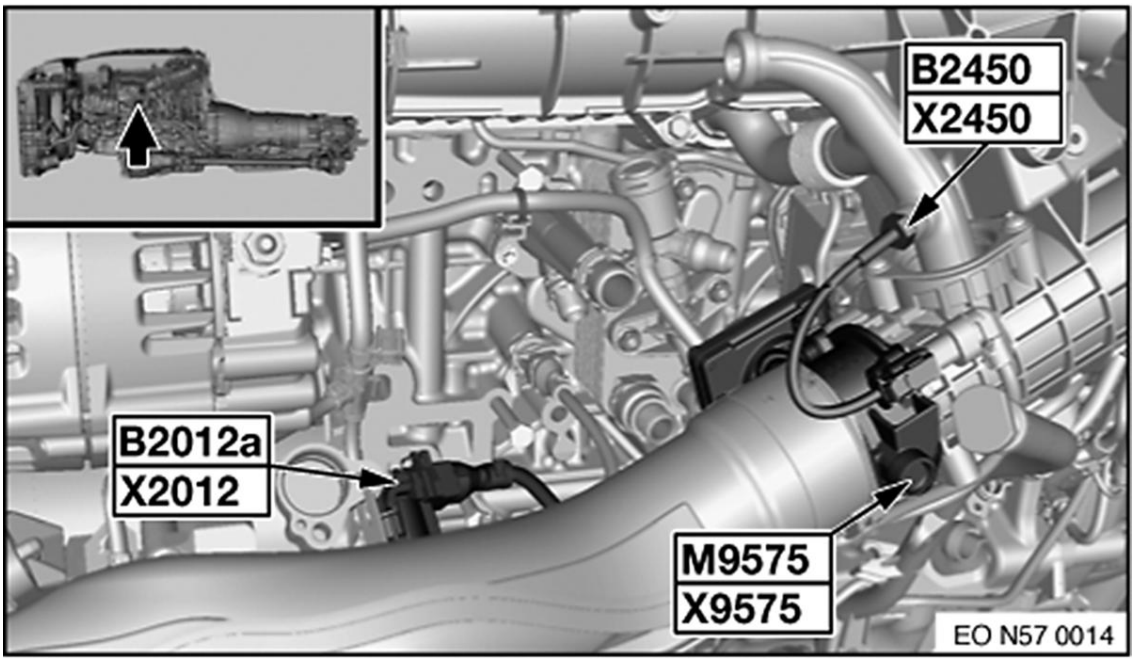


Fig. 91: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

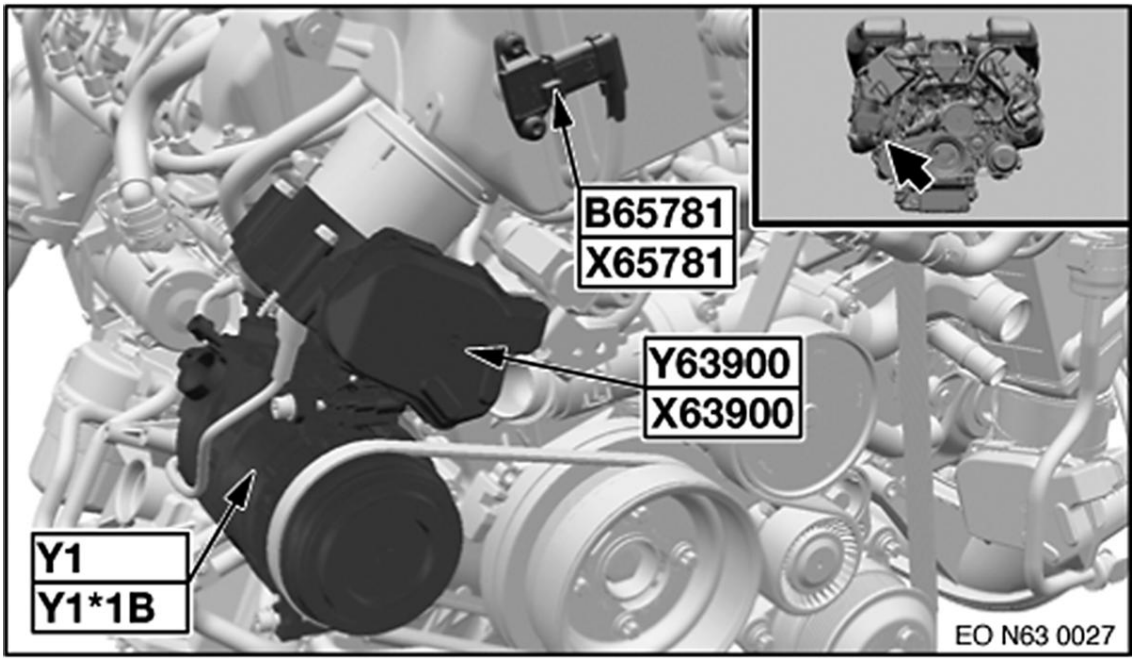


Fig. 92: Right Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

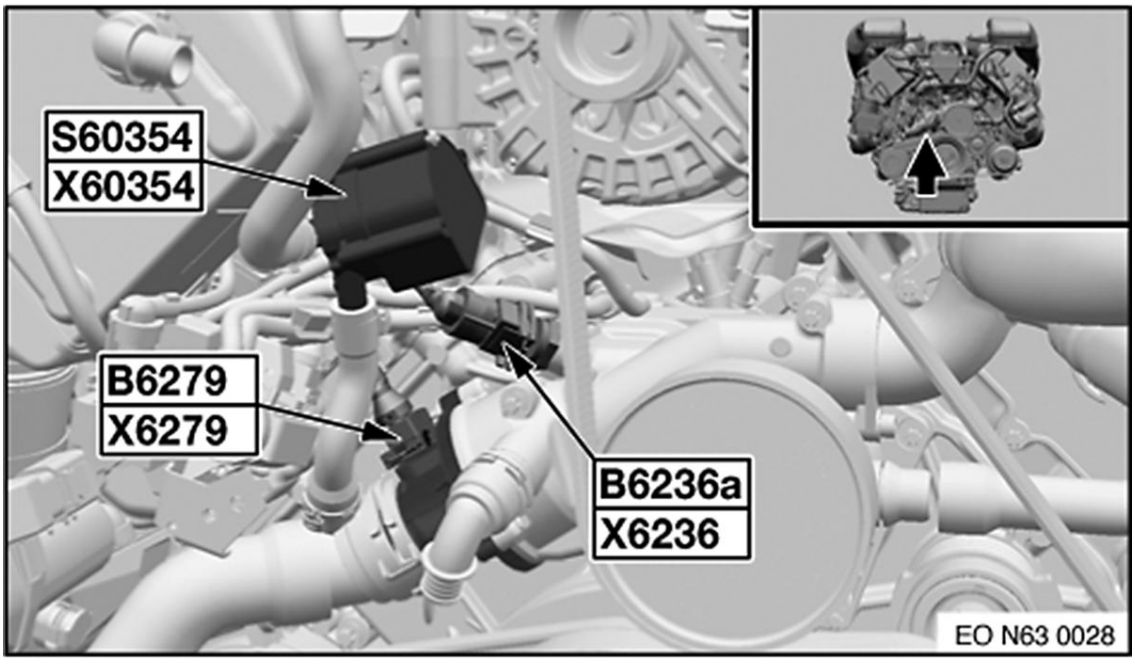


Fig. 93: Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

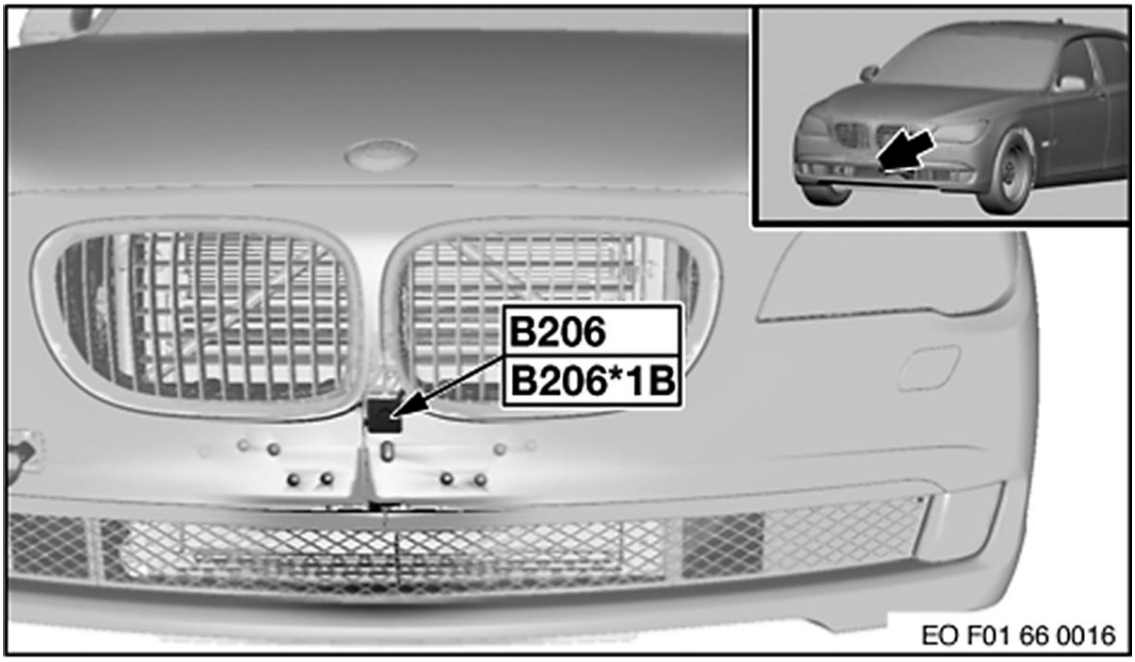


Fig. 94: Front Grille
Courtesy of BMW OF NORTH AMERICA, INC.

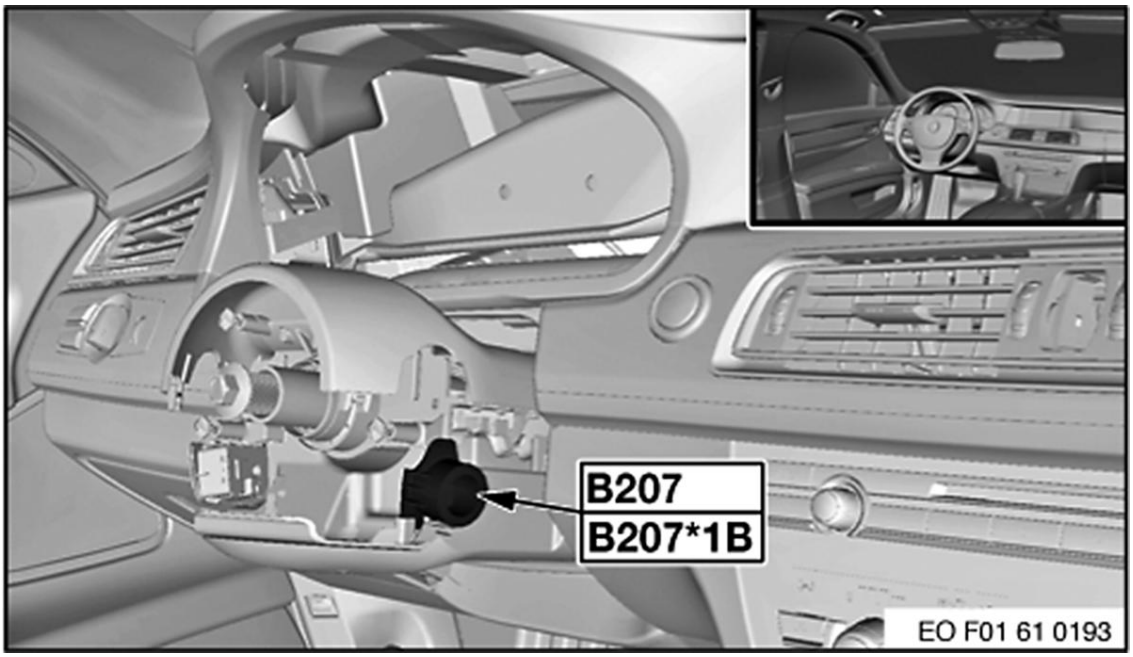


Fig. 95: On Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

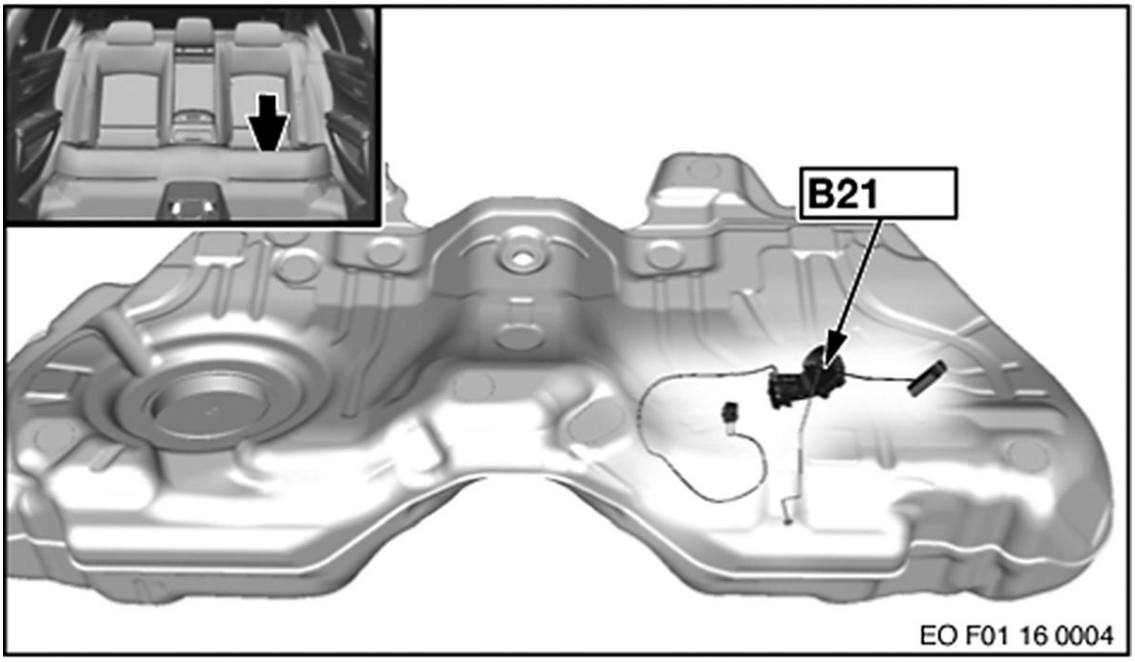


Fig. 96: Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

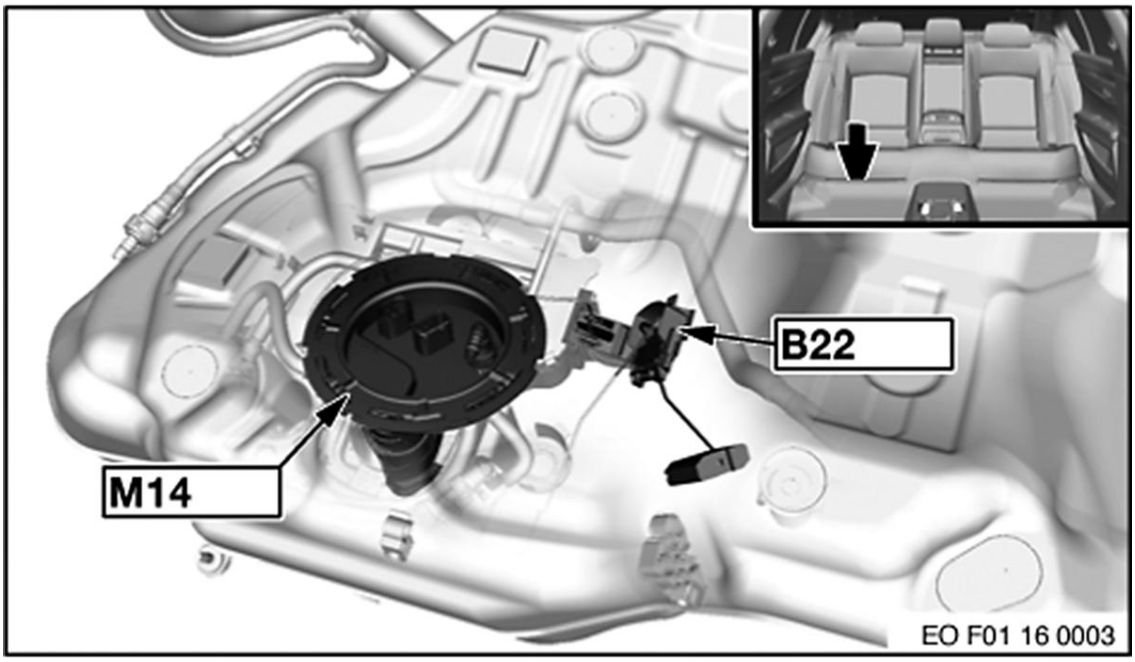


Fig. 97: Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

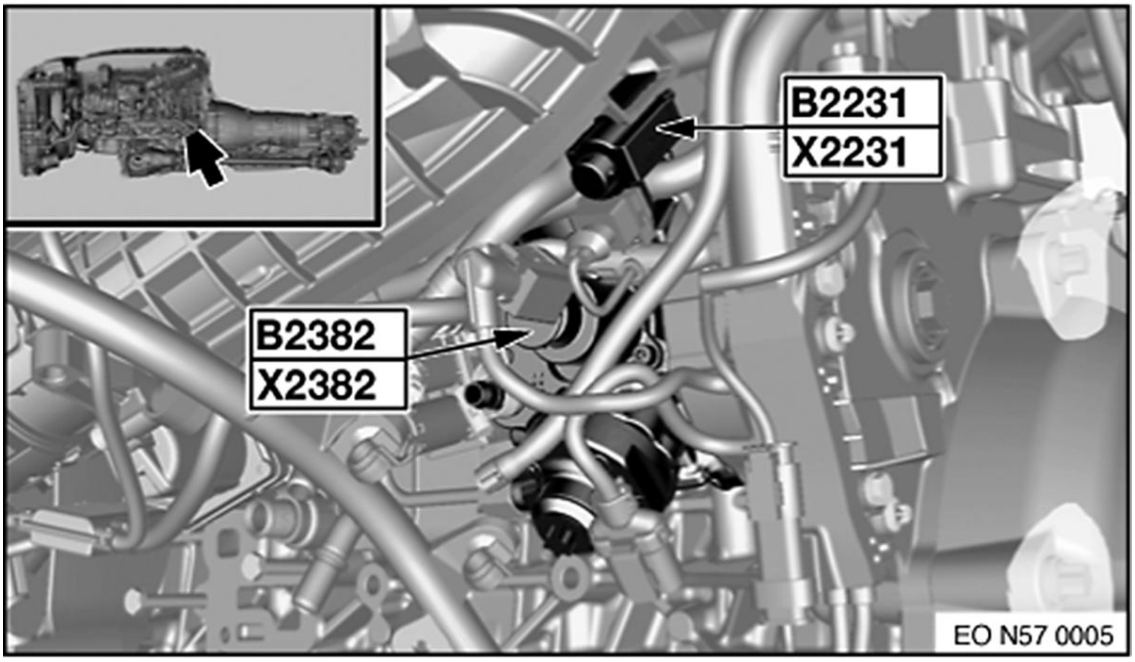


Fig. 98: Left Rear Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

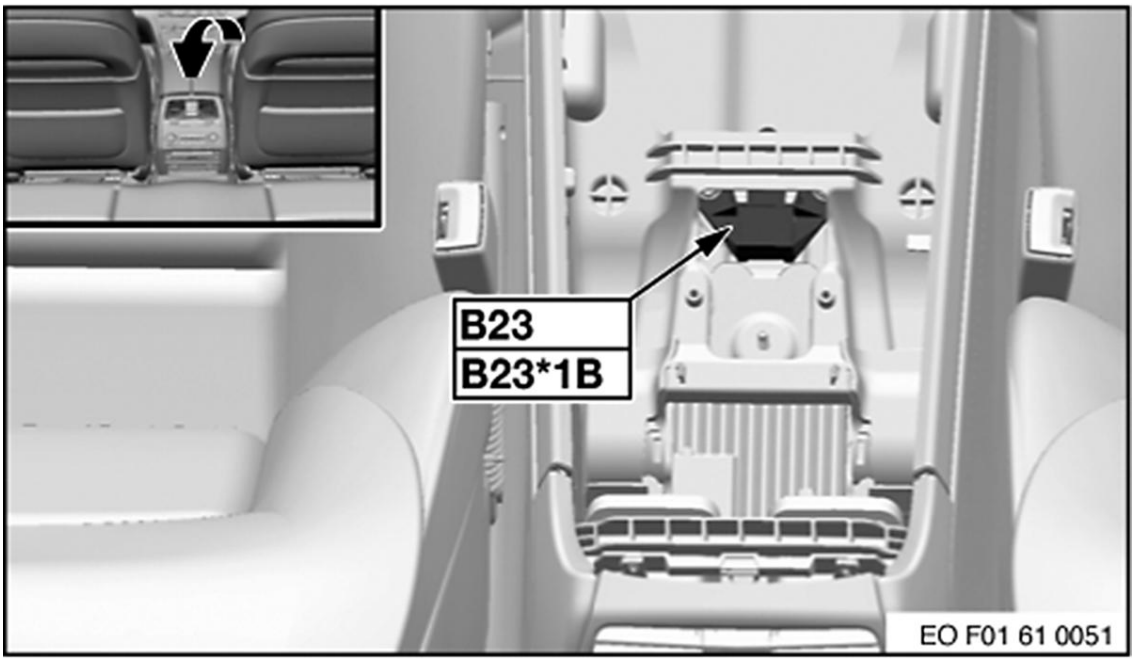


Fig. 99: Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

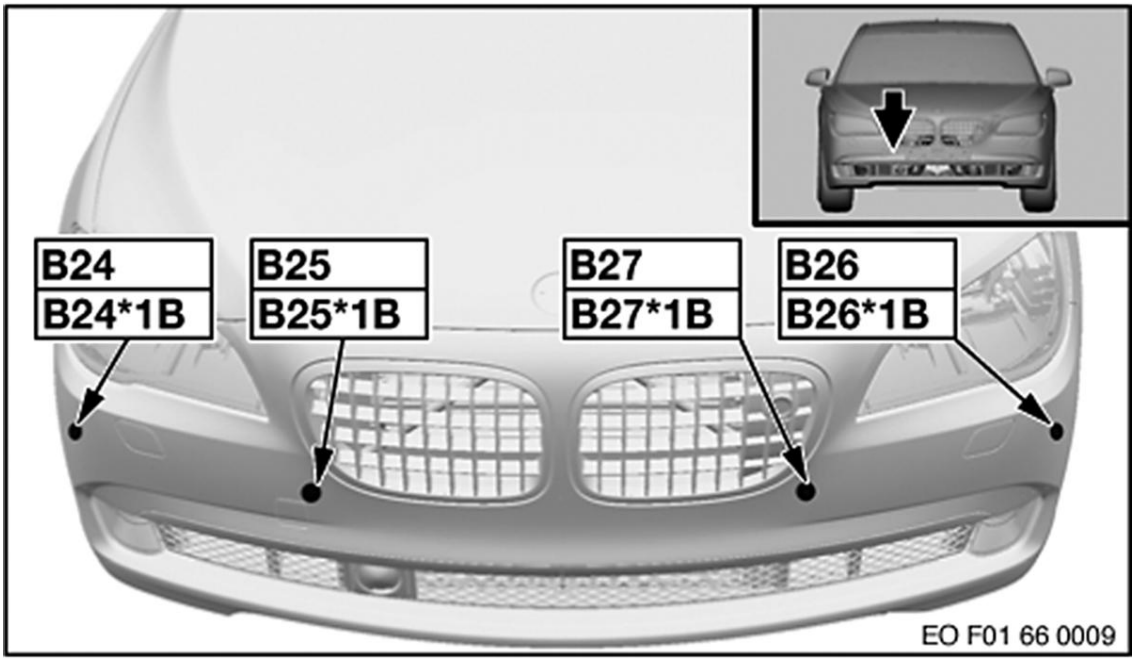


Fig. 100: Front Bumper
Courtesy of BMW OF NORTH AMERICA, INC.

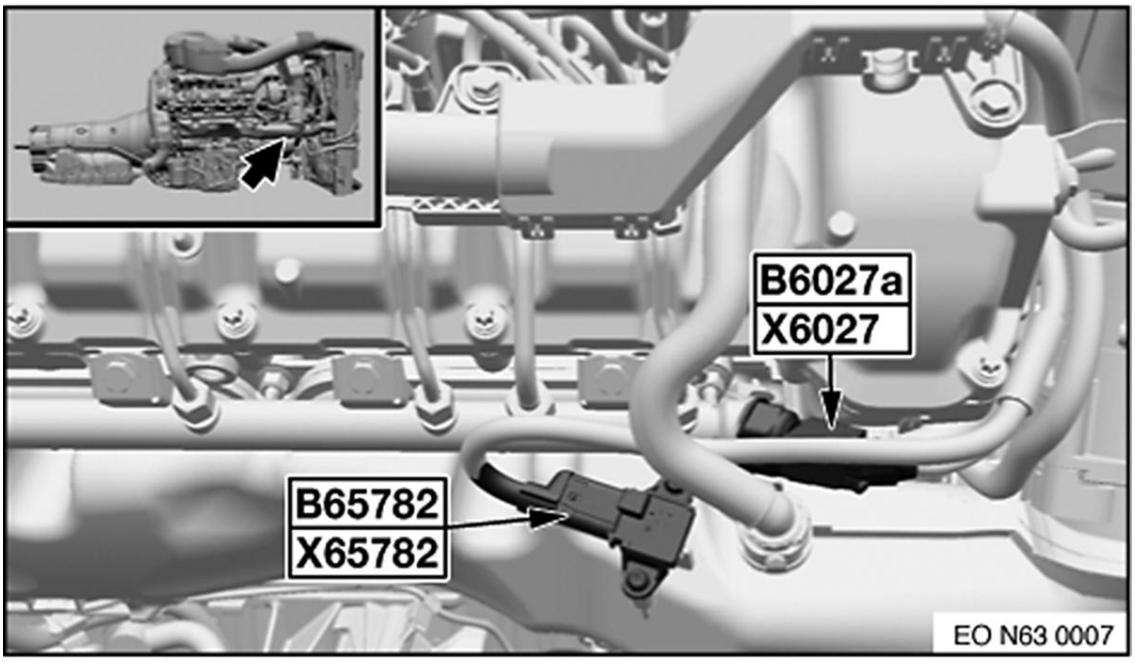


Fig. 101: Right Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

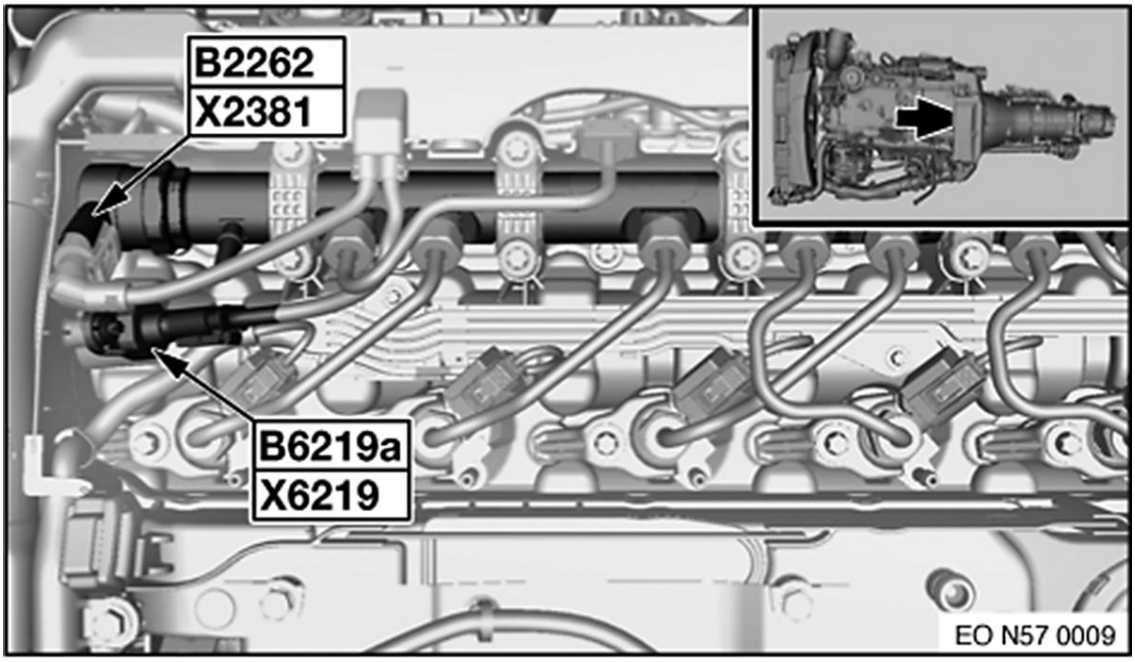


Fig. 102: Top Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

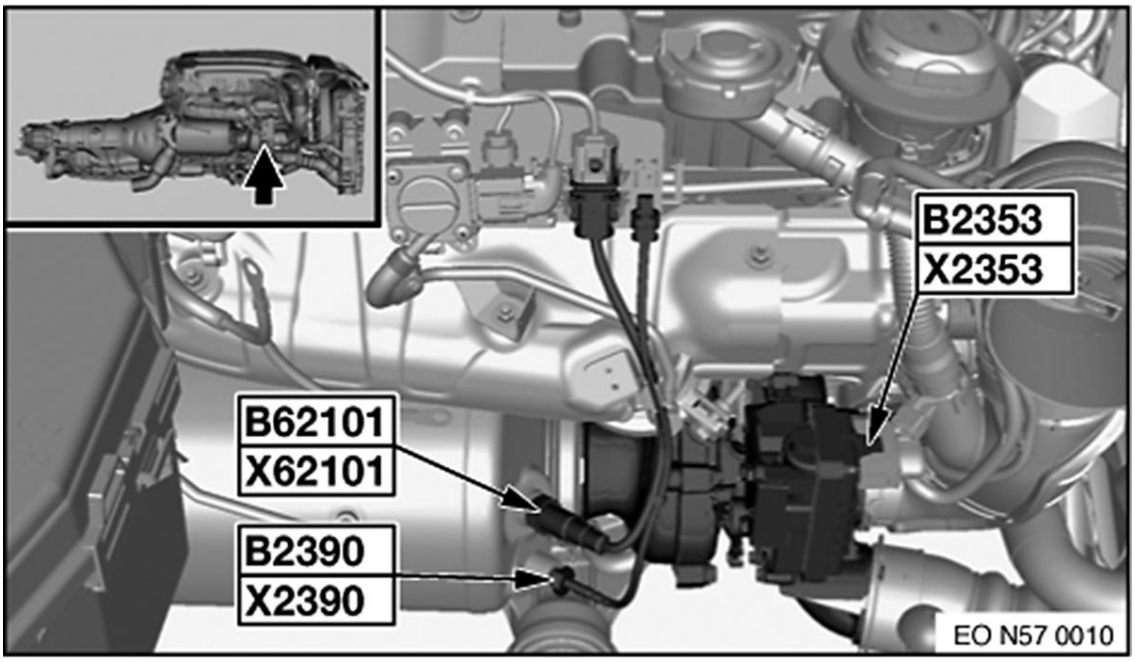


Fig. 103: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

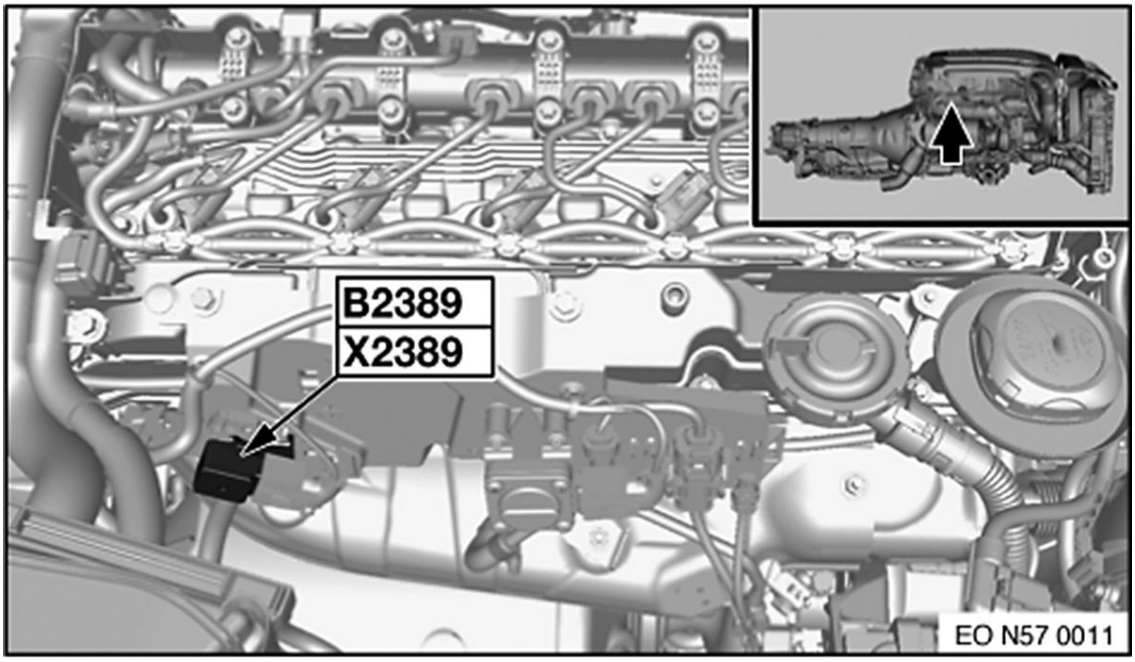


Fig. 104: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

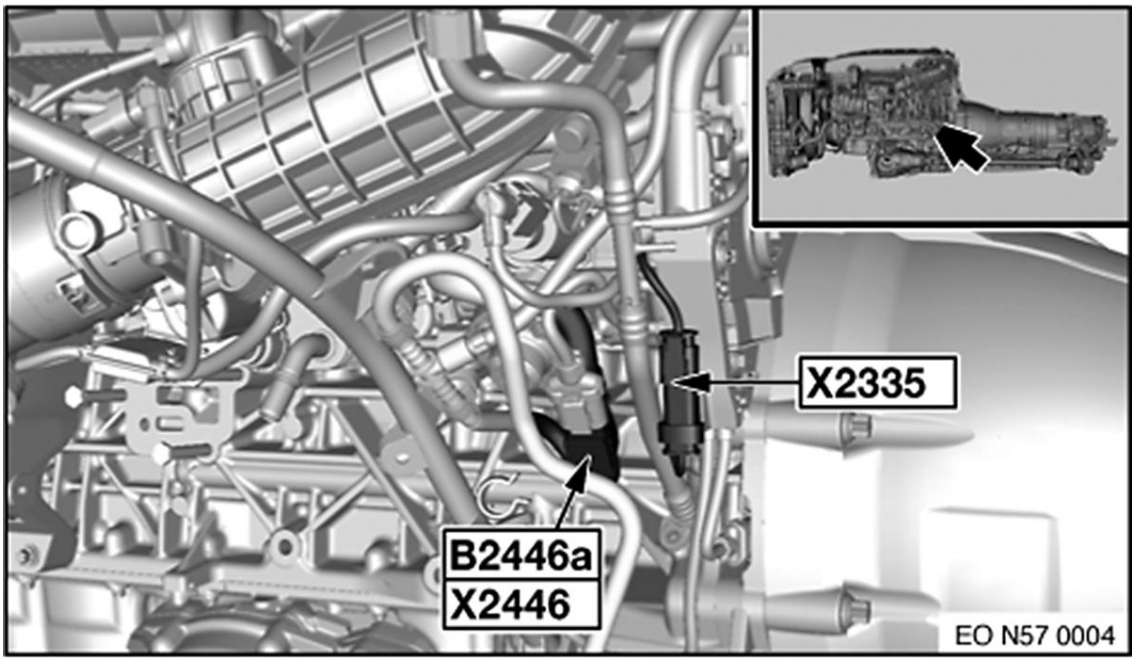


Fig. 105: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

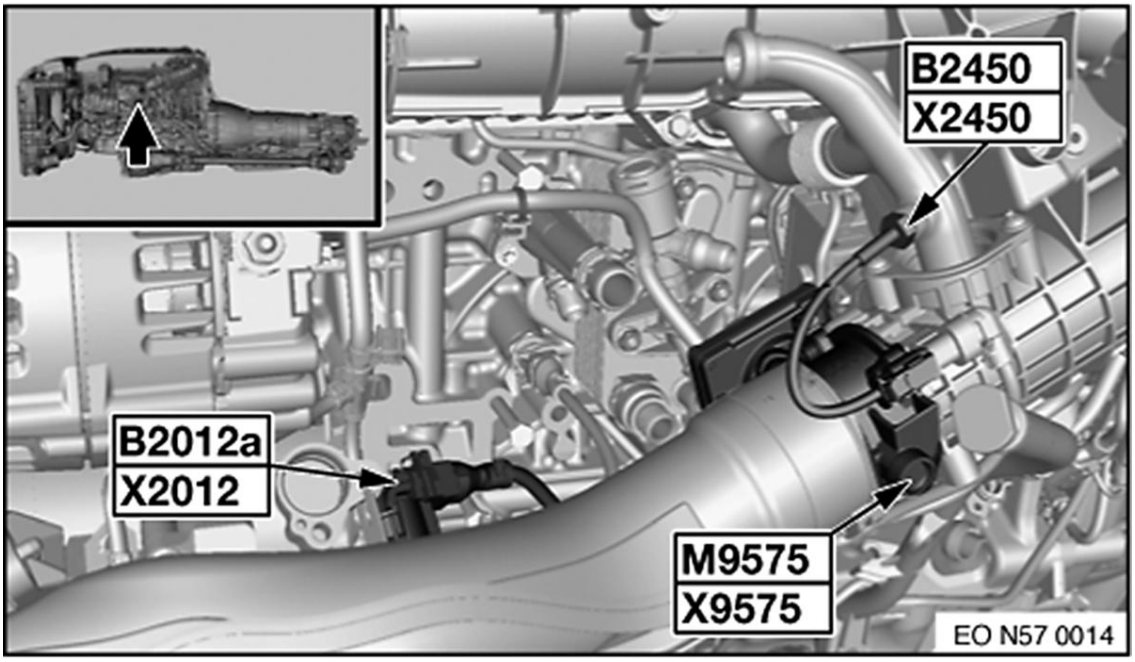


Fig. 106: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

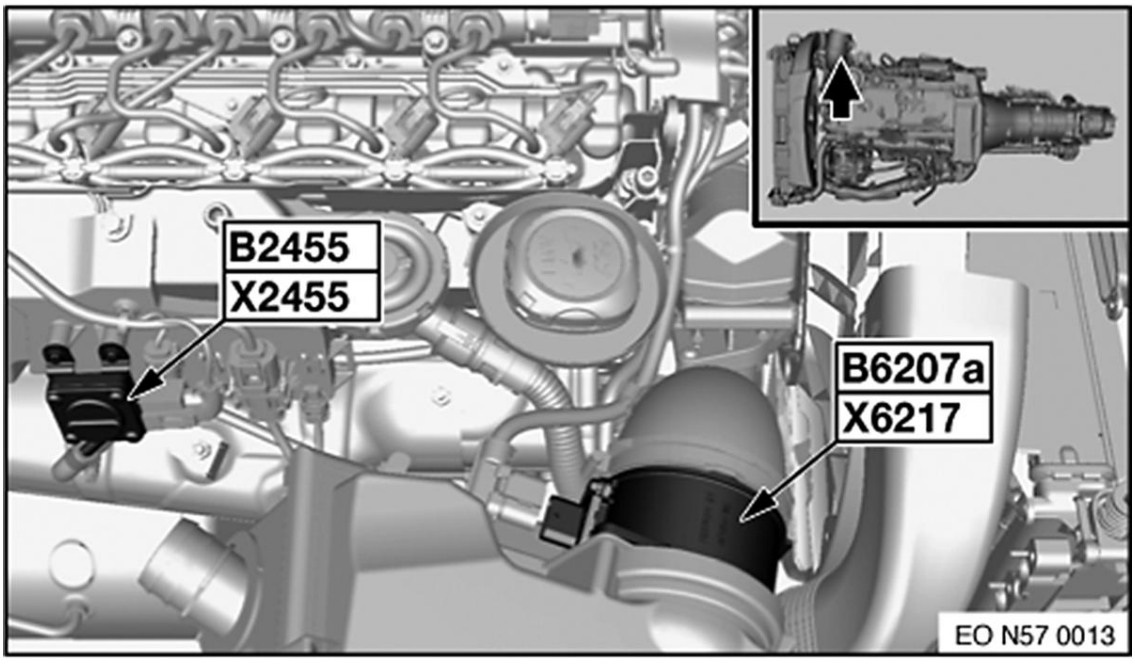


Fig. 107: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

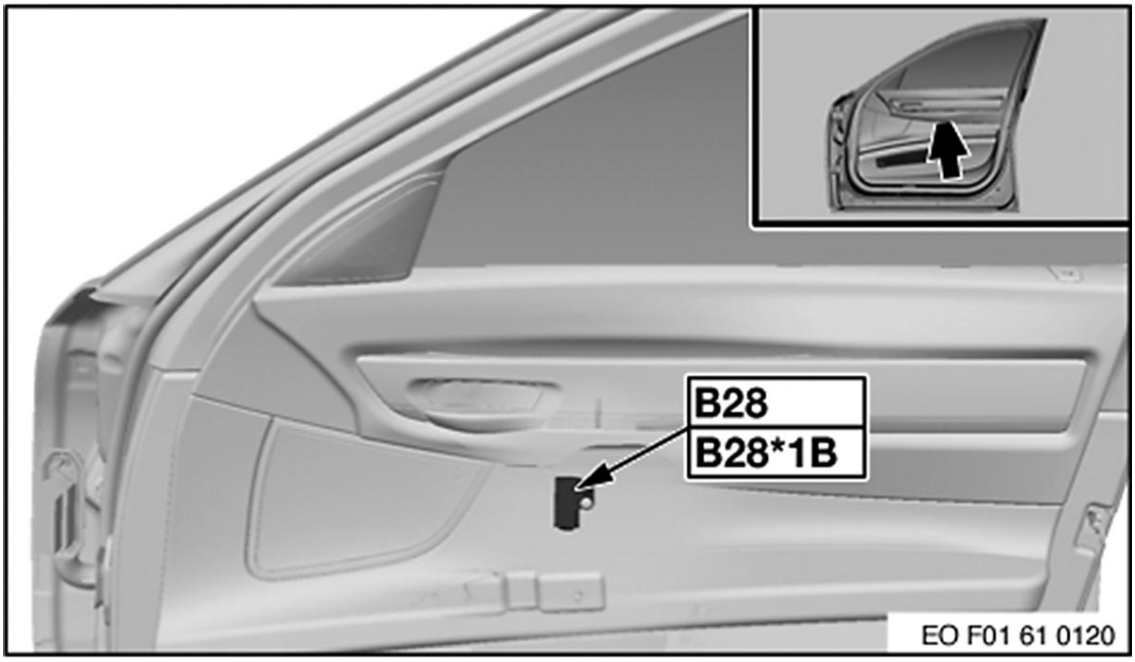


Fig. 108: Right Front Door
Courtesy of BMW OF NORTH AMERICA, INC.

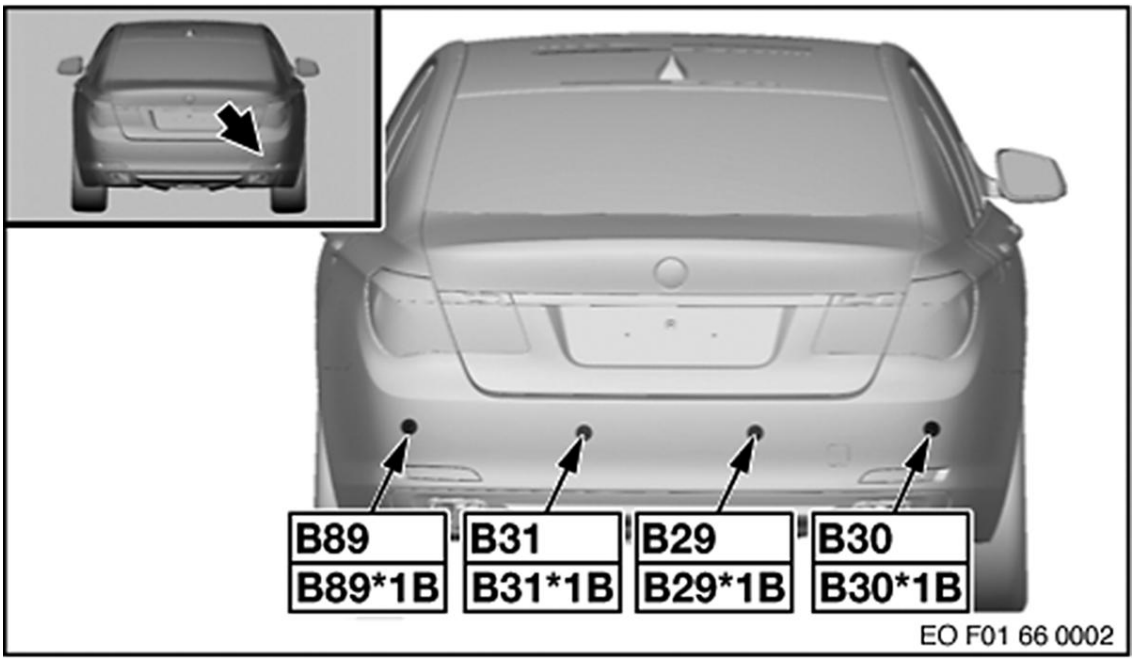


Fig. 109: Rear Bumper
Courtesy of BMW OF NORTH AMERICA, INC.

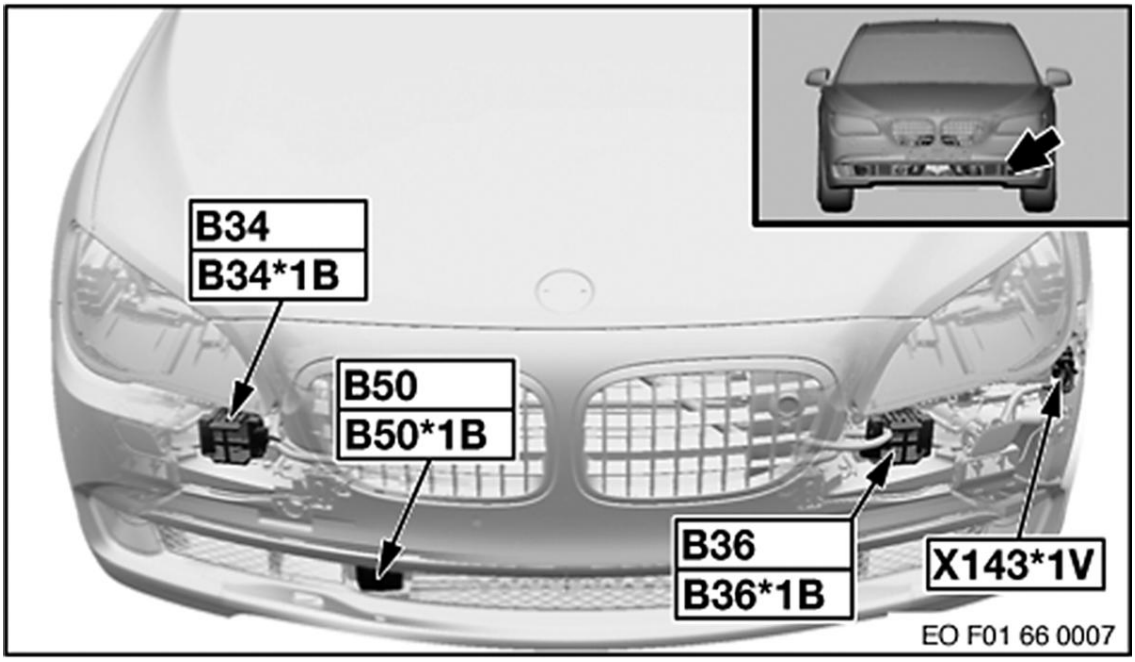


Fig. 110: Front Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

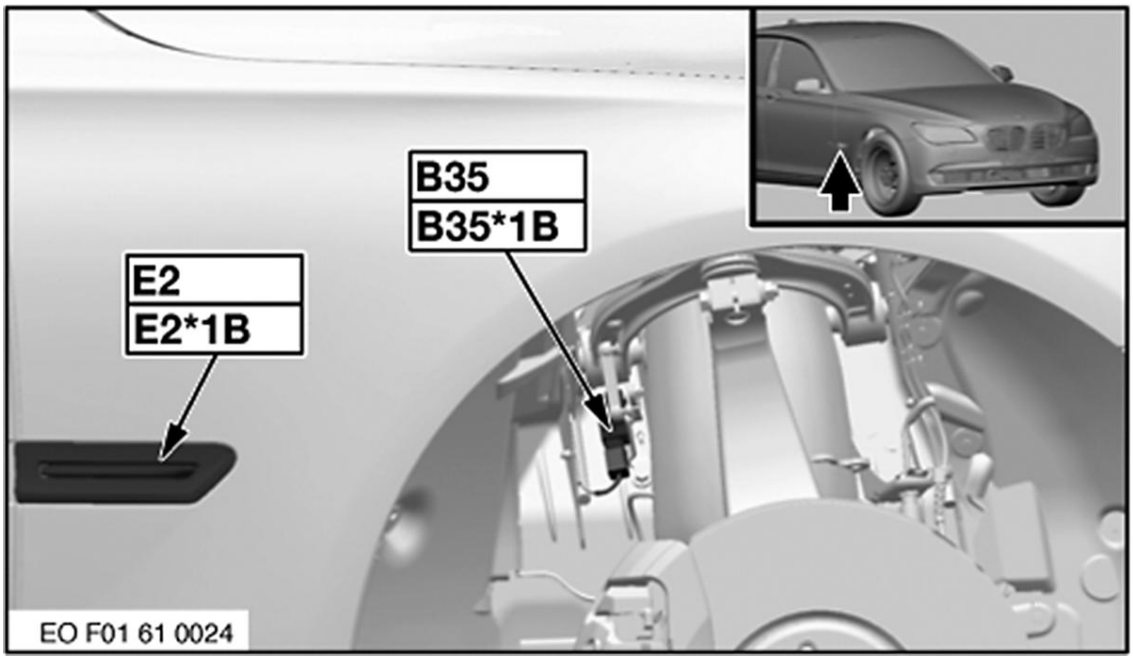


Fig. 111: Right Front Axle
Courtesy of BMW OF NORTH AMERICA, INC.

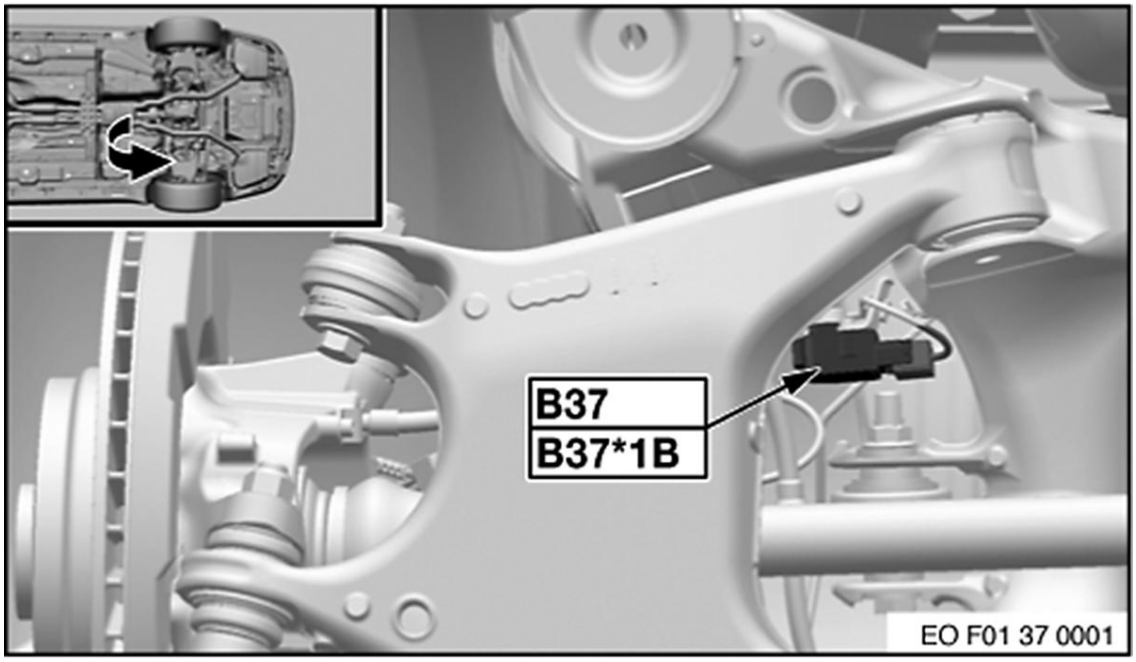


Fig. 112: Right Rear Axle
Courtesy of BMW OF NORTH AMERICA, INC.

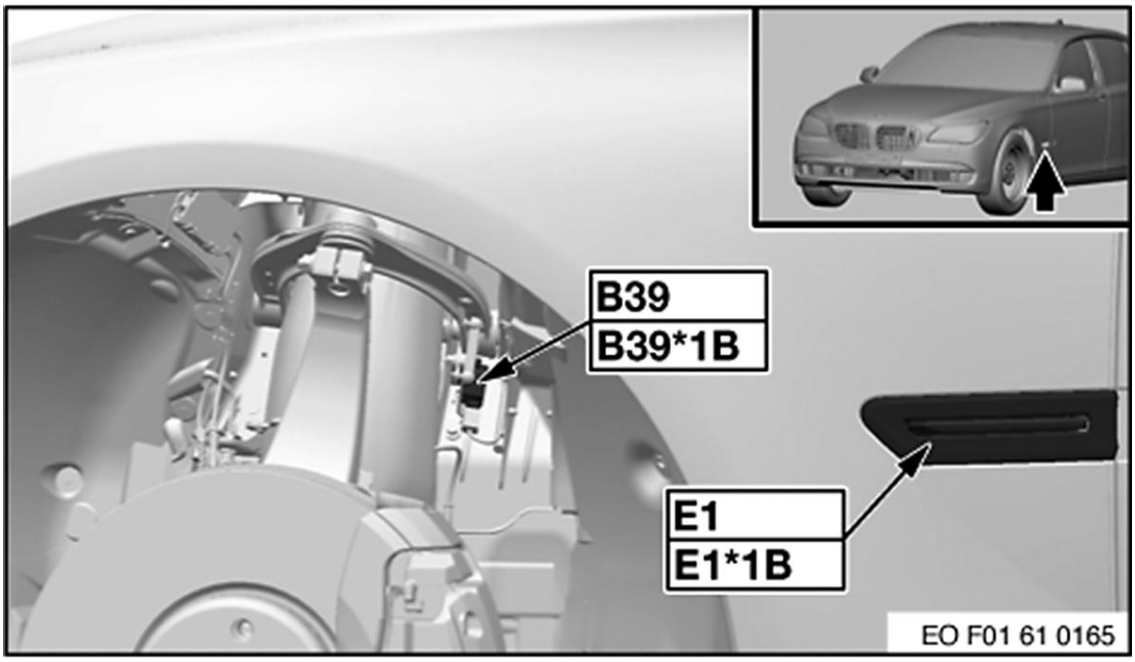


Fig. 113: Left Front Axle
Courtesy of BMW OF NORTH AMERICA, INC.

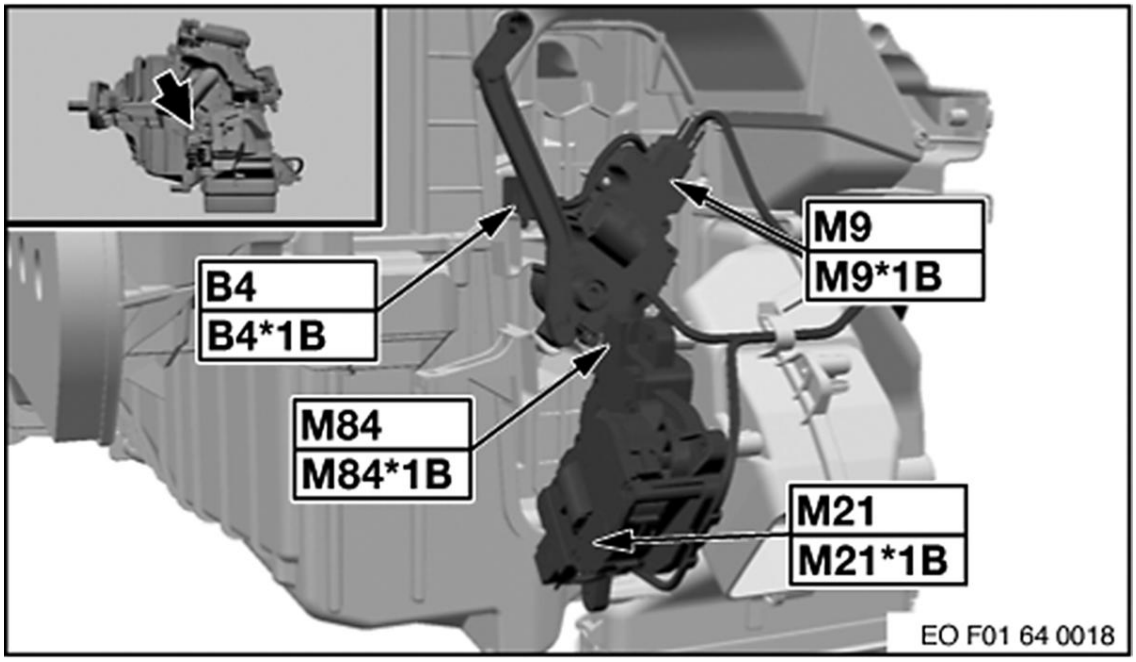


Fig. 114: HVAC Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

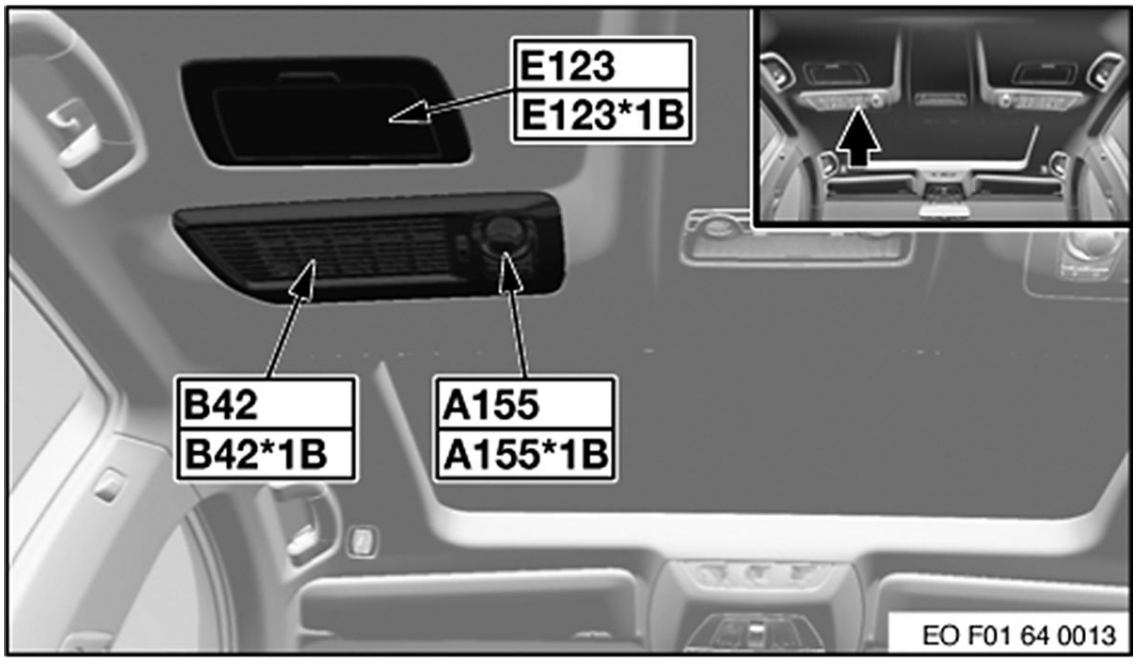


Fig. 115: Left Side Of Roof
Courtesy of BMW OF NORTH AMERICA, INC.

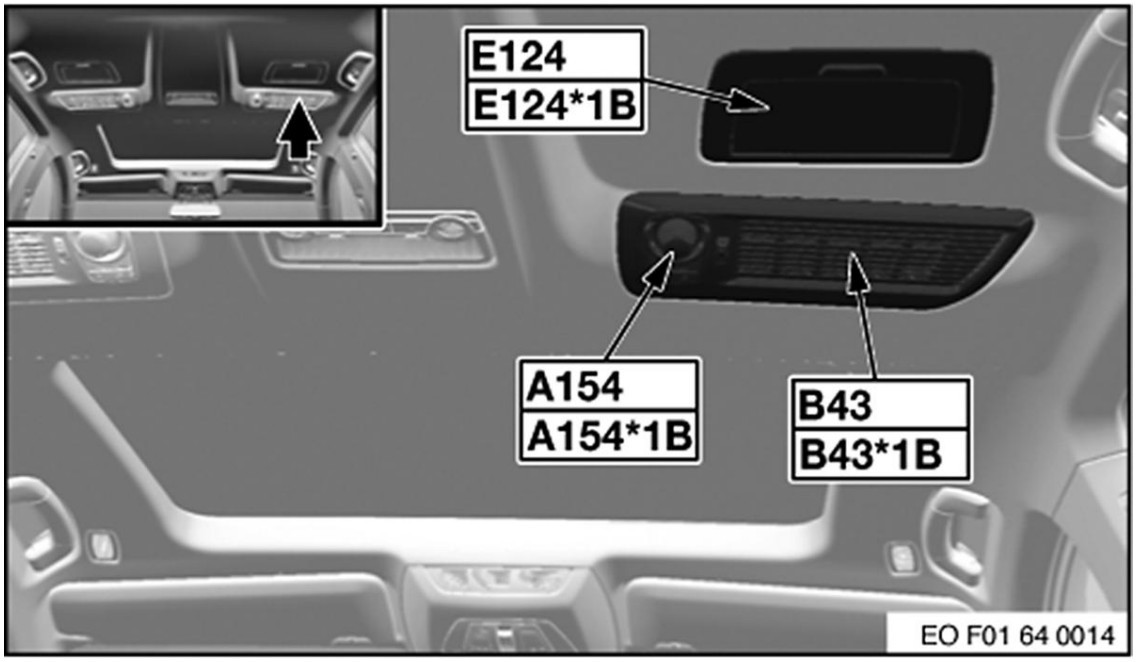


Fig. 116: Right Side Of Roof
Courtesy of BMW OF NORTH AMERICA, INC.

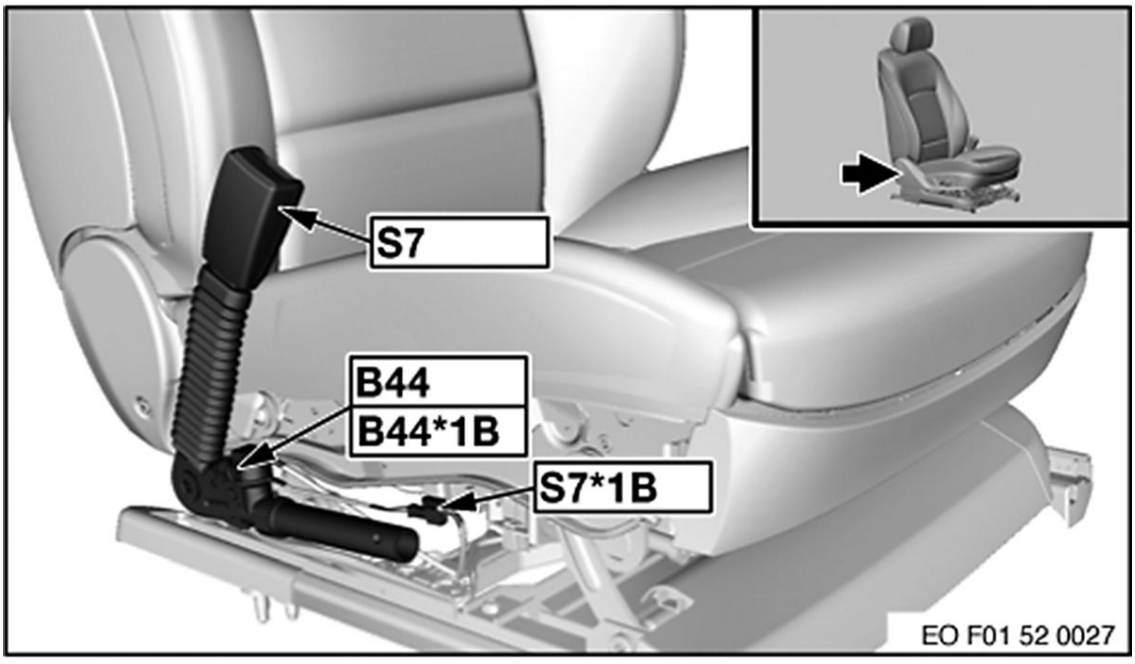


Fig. 117: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

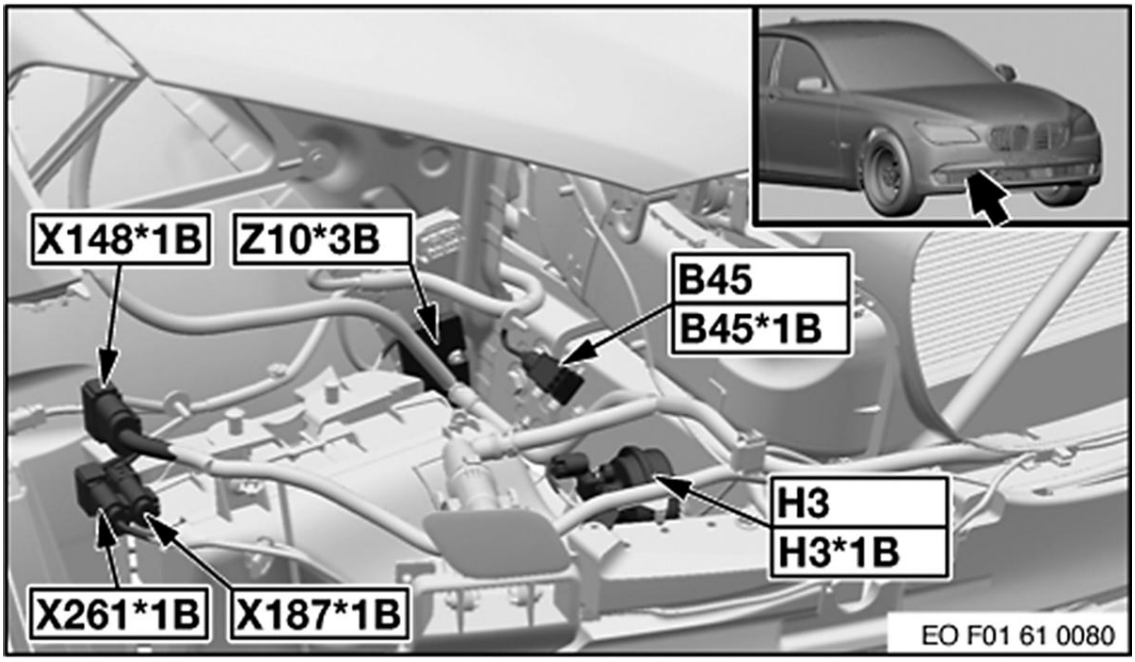


Fig. 118: Right Front Corner Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

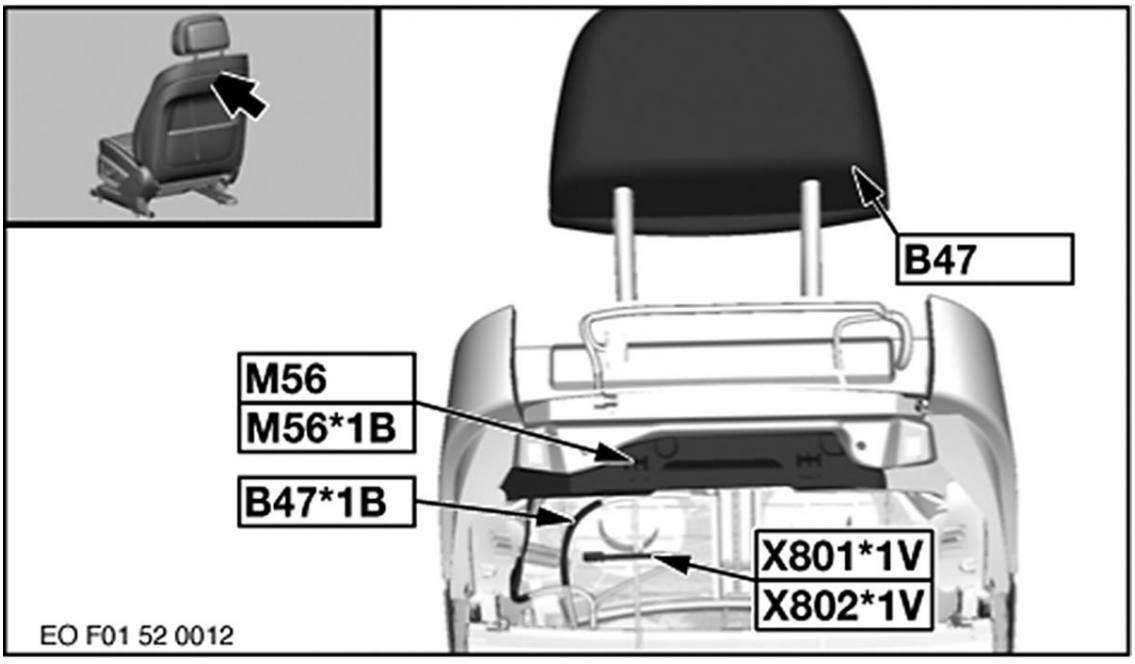


Fig. 119: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

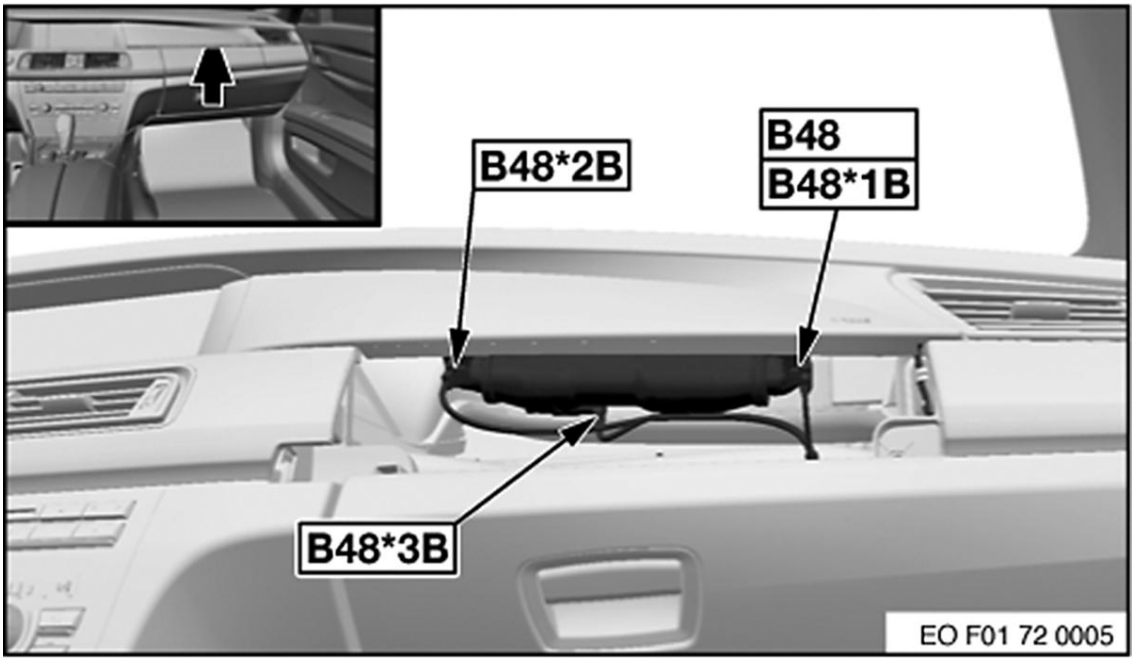


Fig. 120: Right Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

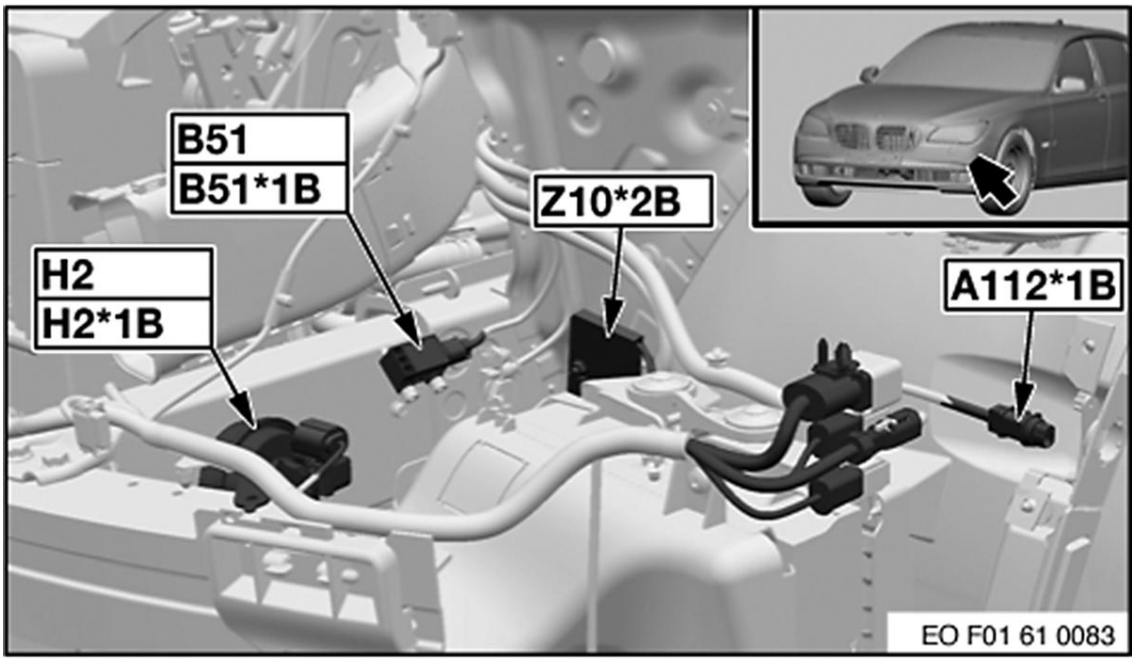


Fig. 121: Left Front Corner Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

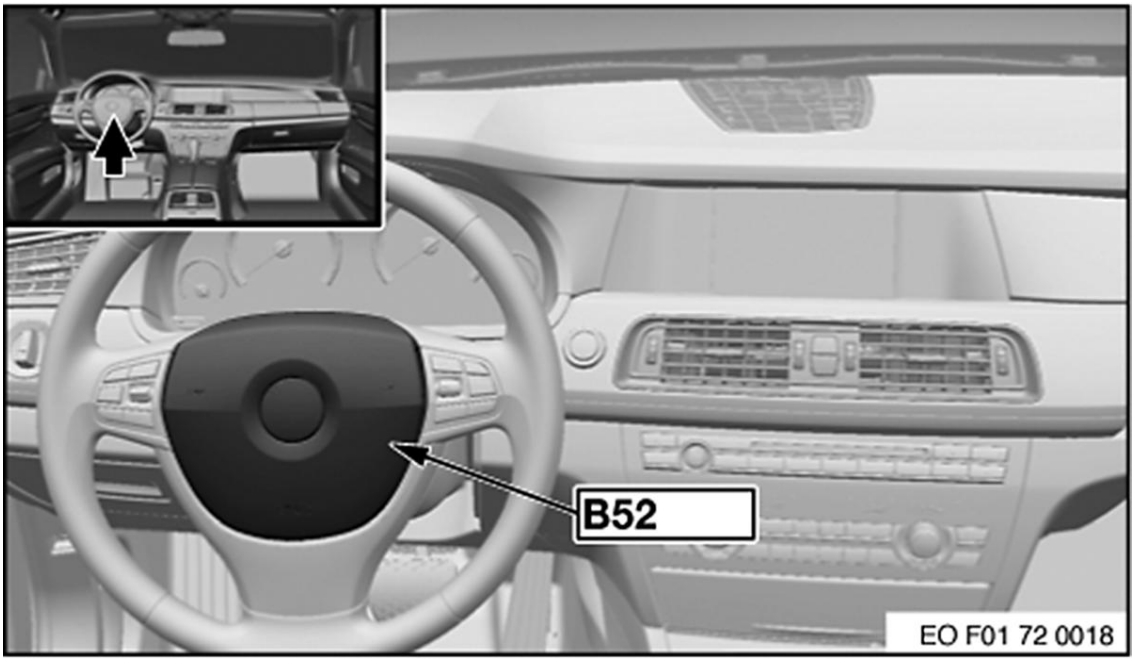


Fig. 122: Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

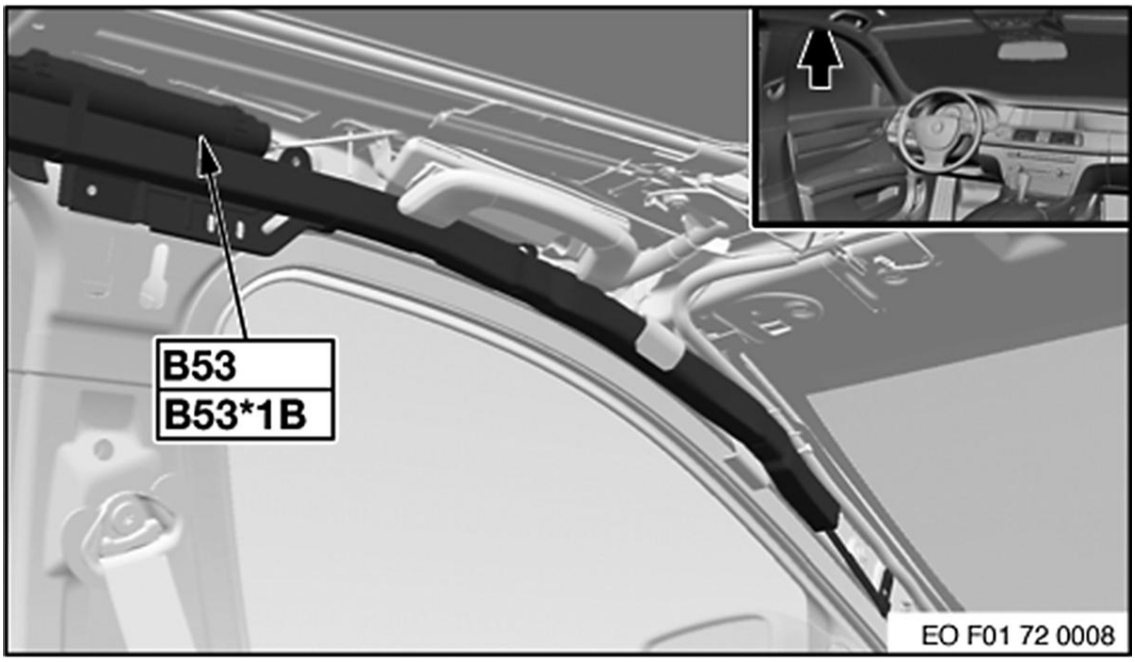


Fig. 123: Top Of Left "B" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

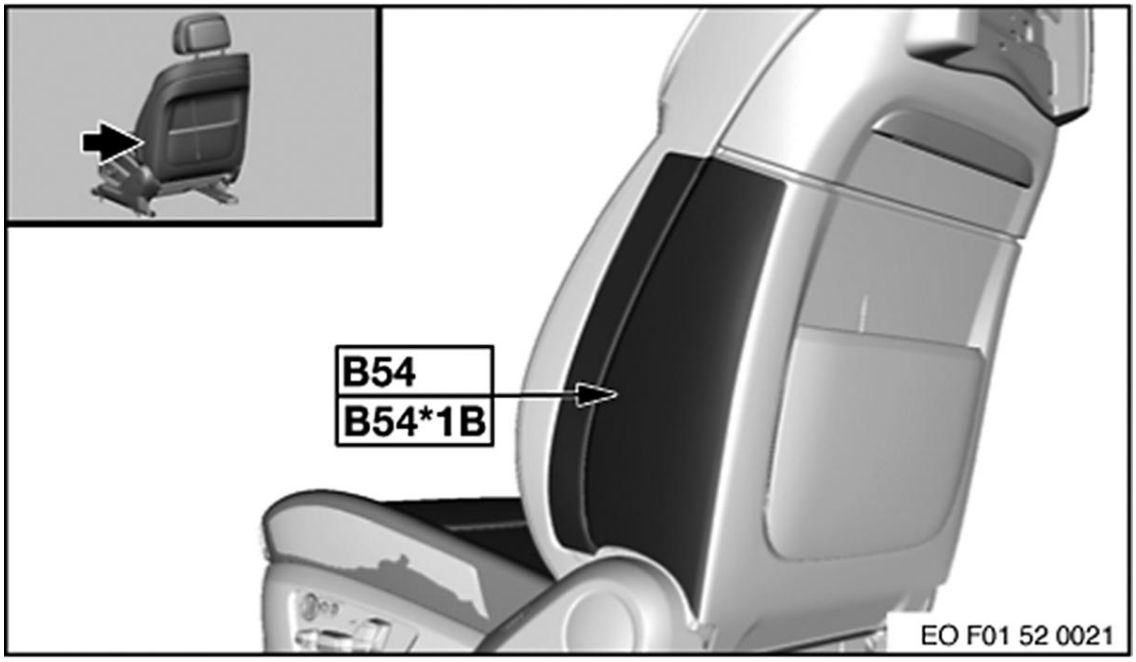


Fig. 124: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

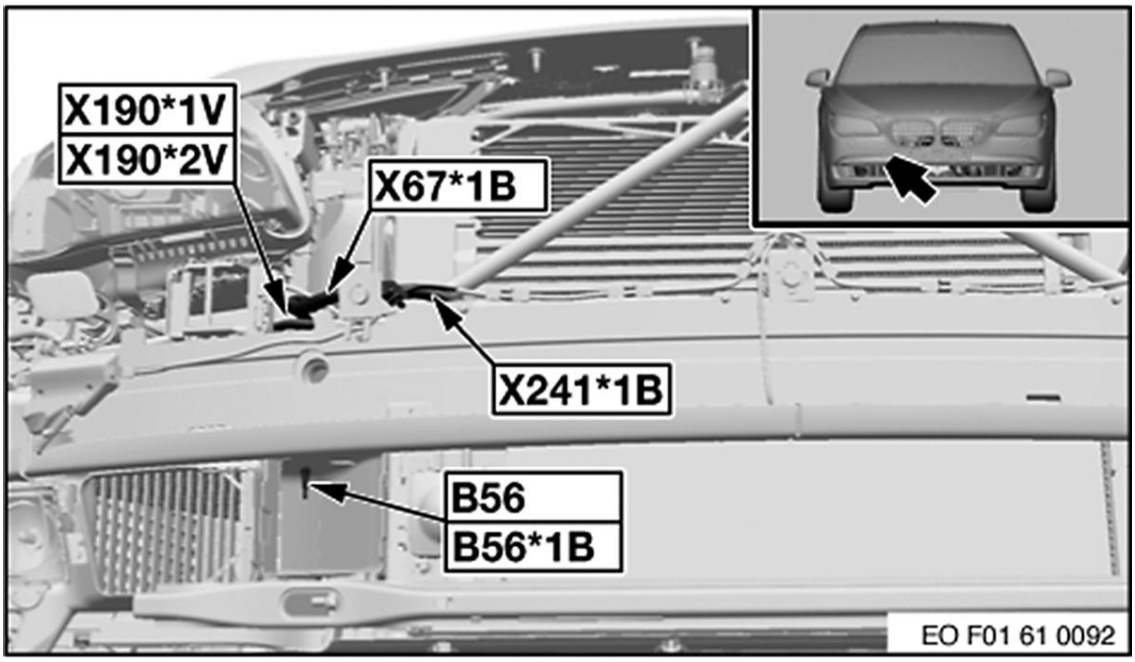


Fig. 125: Right Front Bumper
Courtesy of BMW OF NORTH AMERICA, INC.

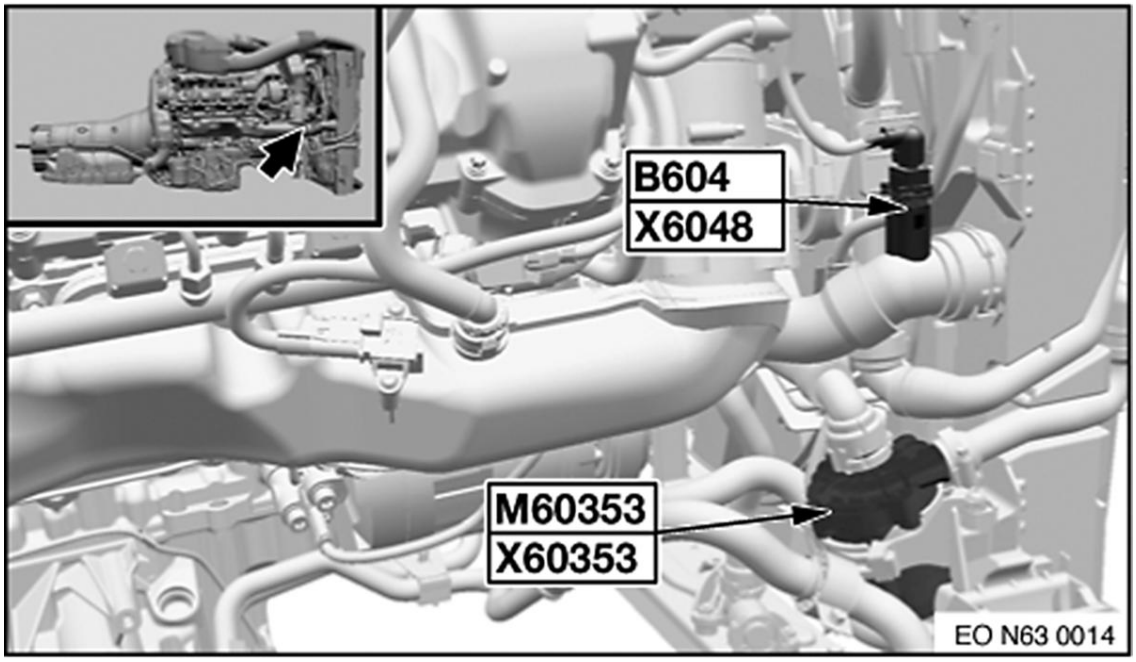


Fig. 126: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

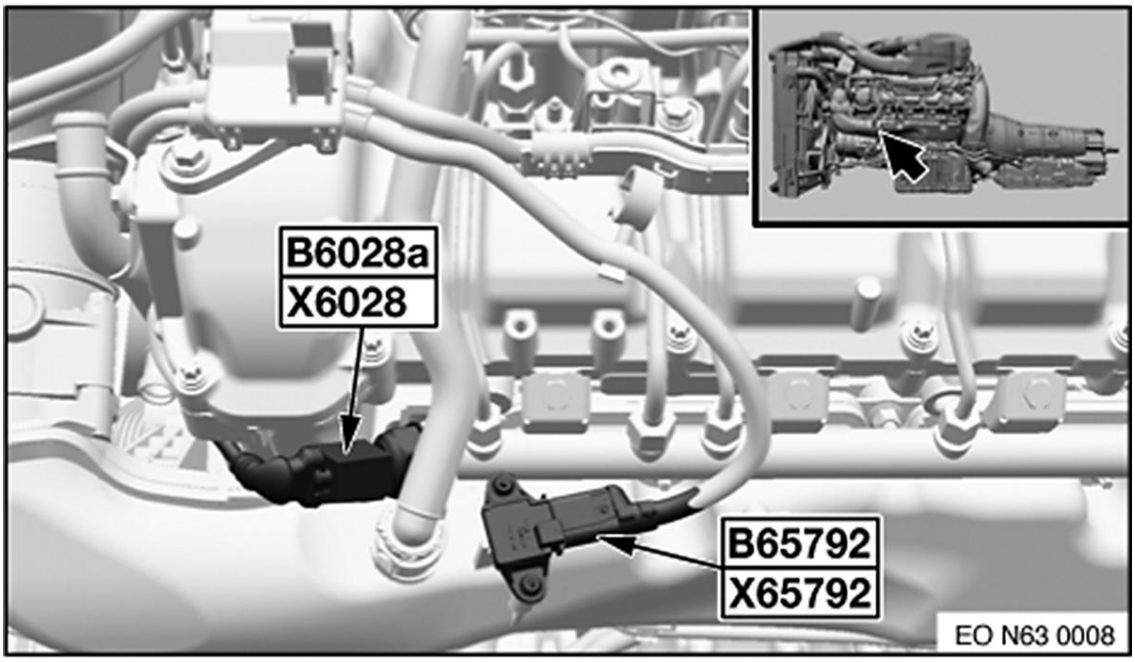


Fig. 127: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

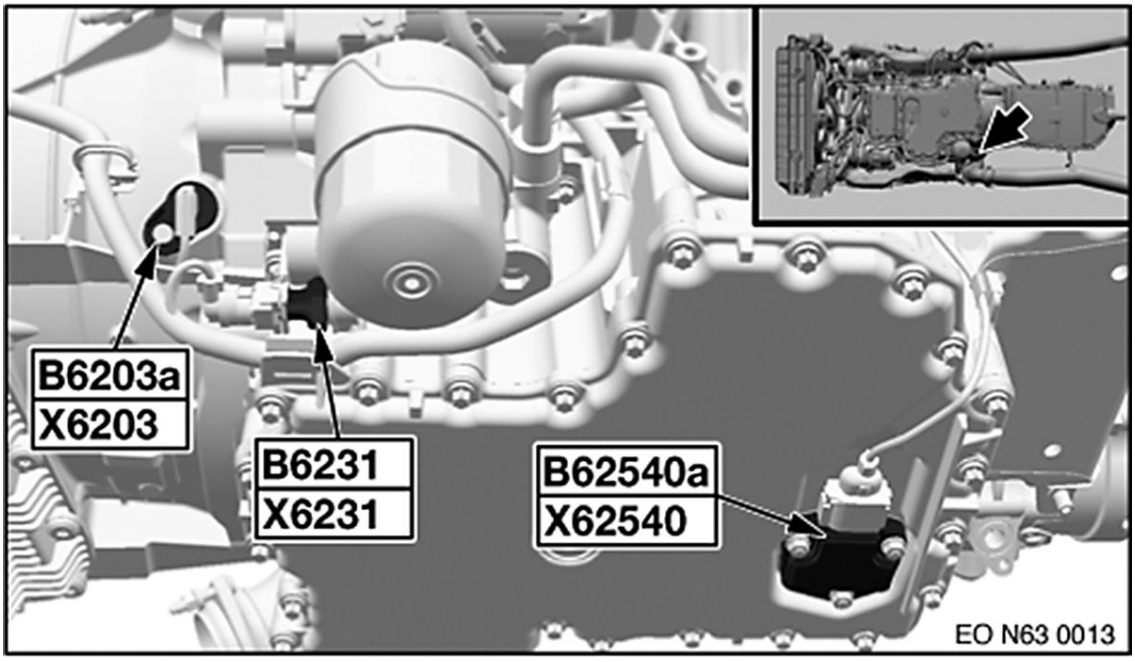


Fig. 128: Bottom Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

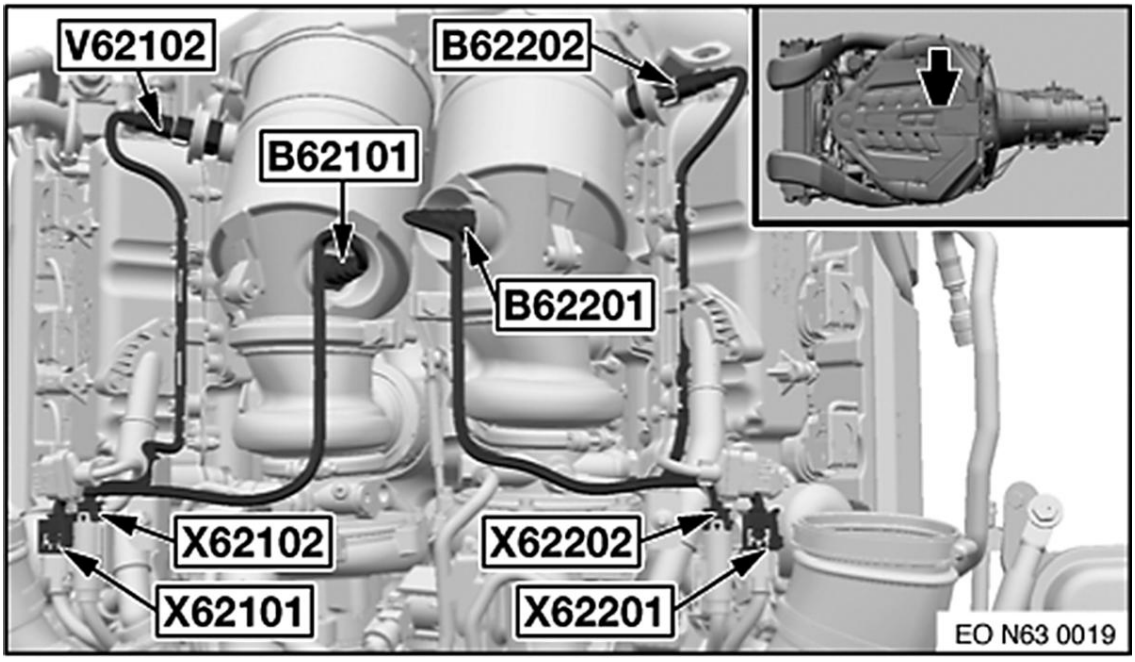


Fig. 129: Rear Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

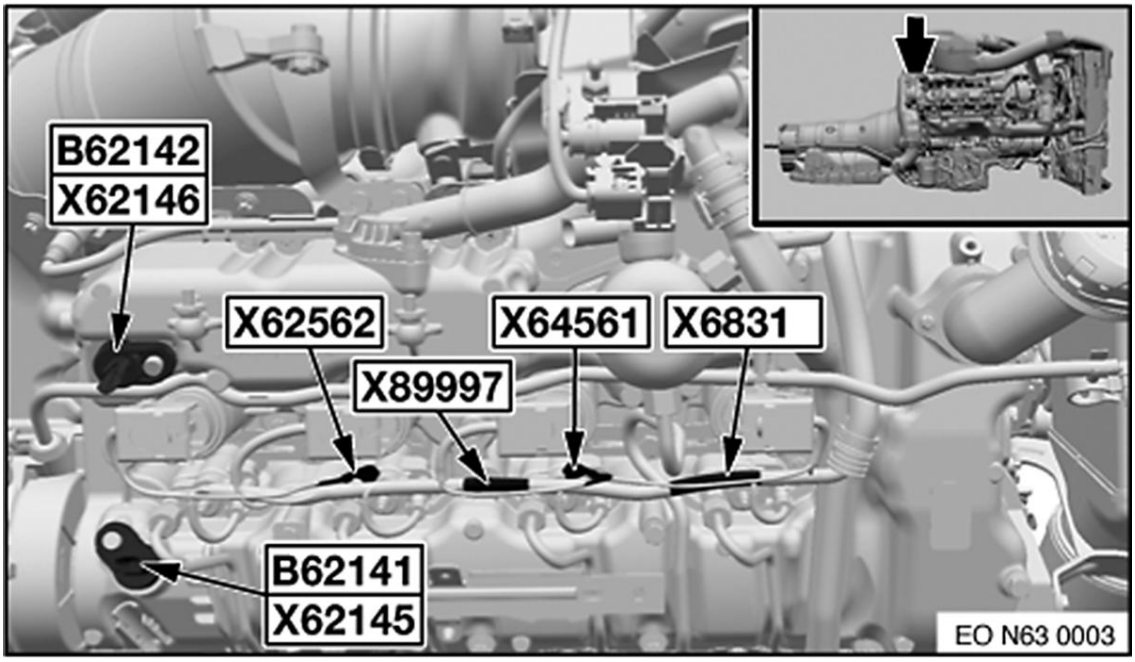


Fig. 130: Right Rear Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

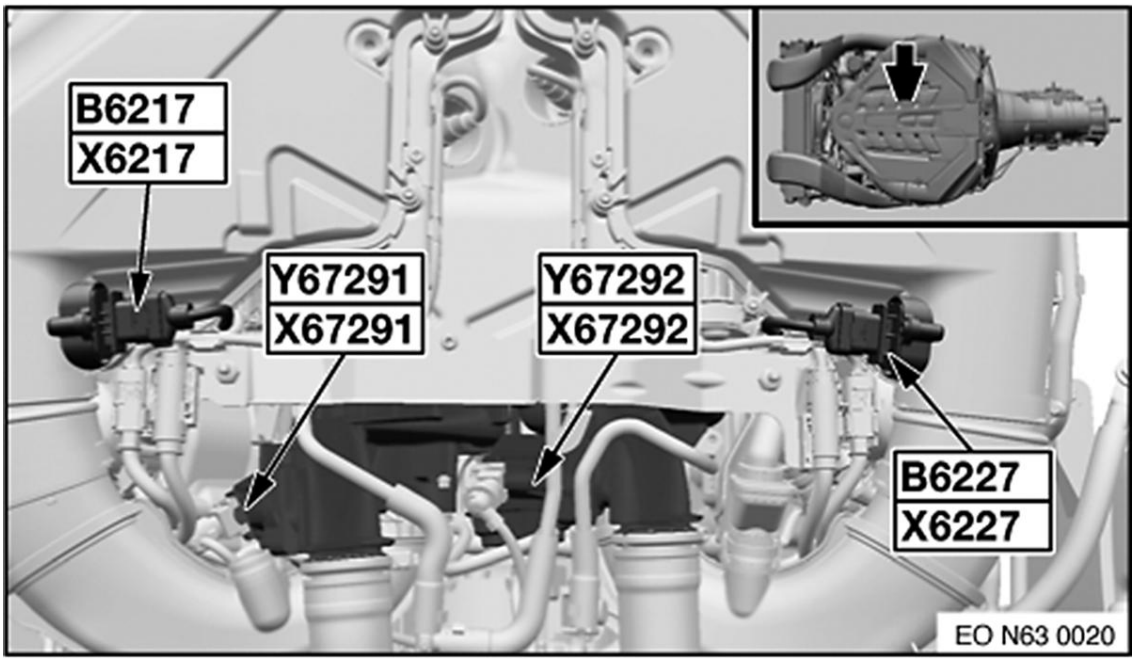


Fig. 131: Top Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

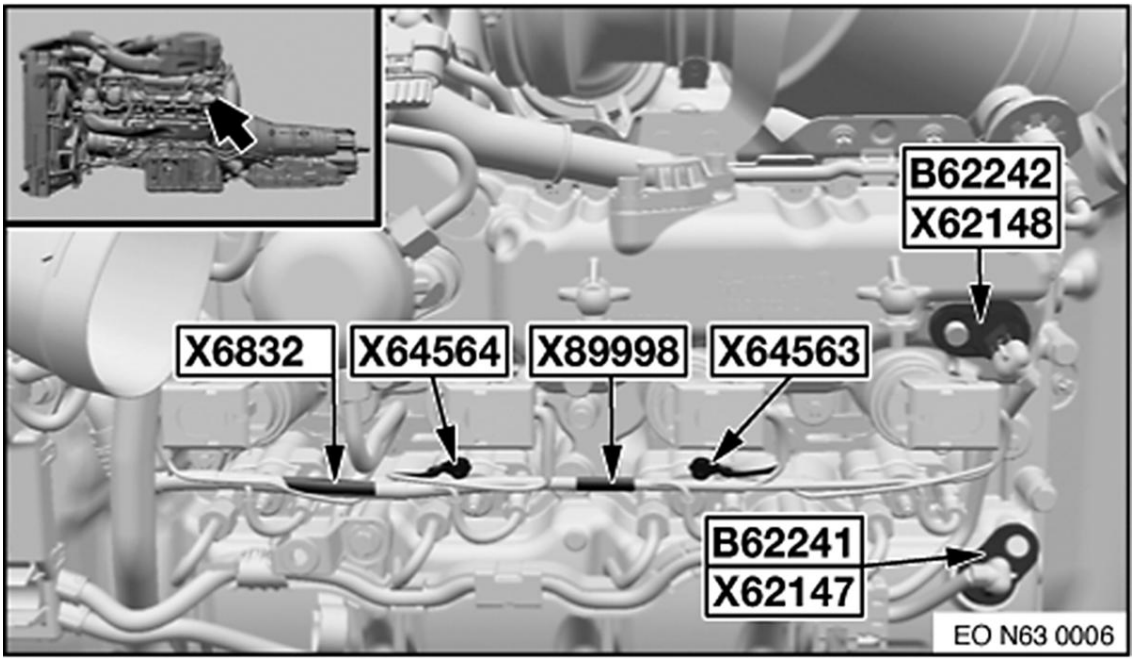


Fig. 132: Left Rear Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

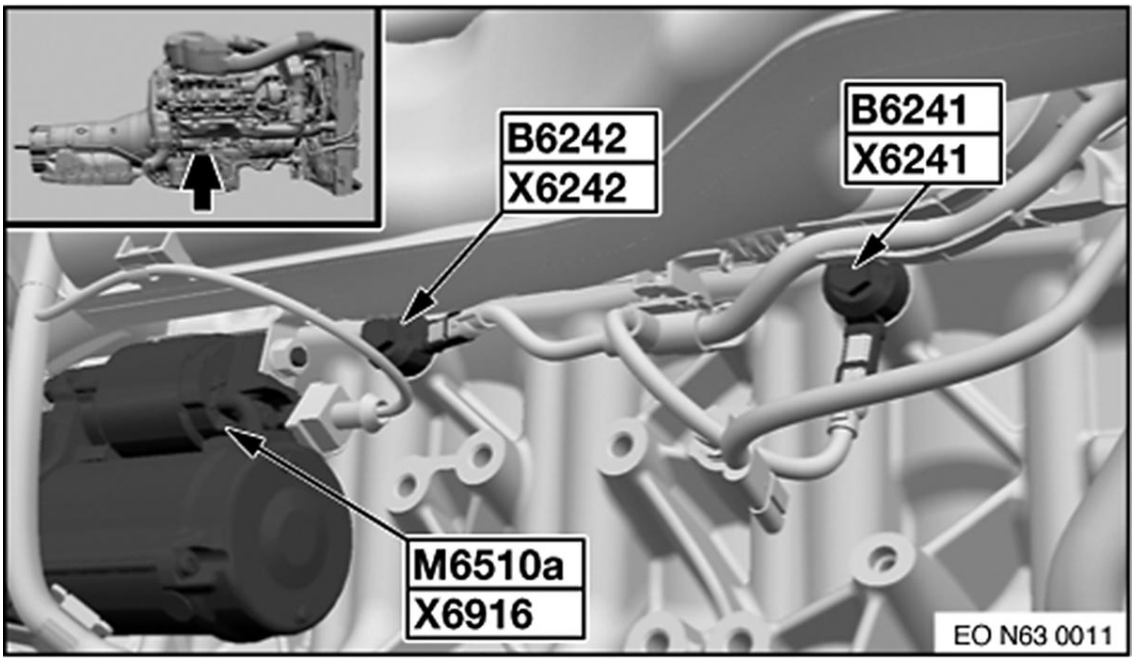


Fig. 133: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

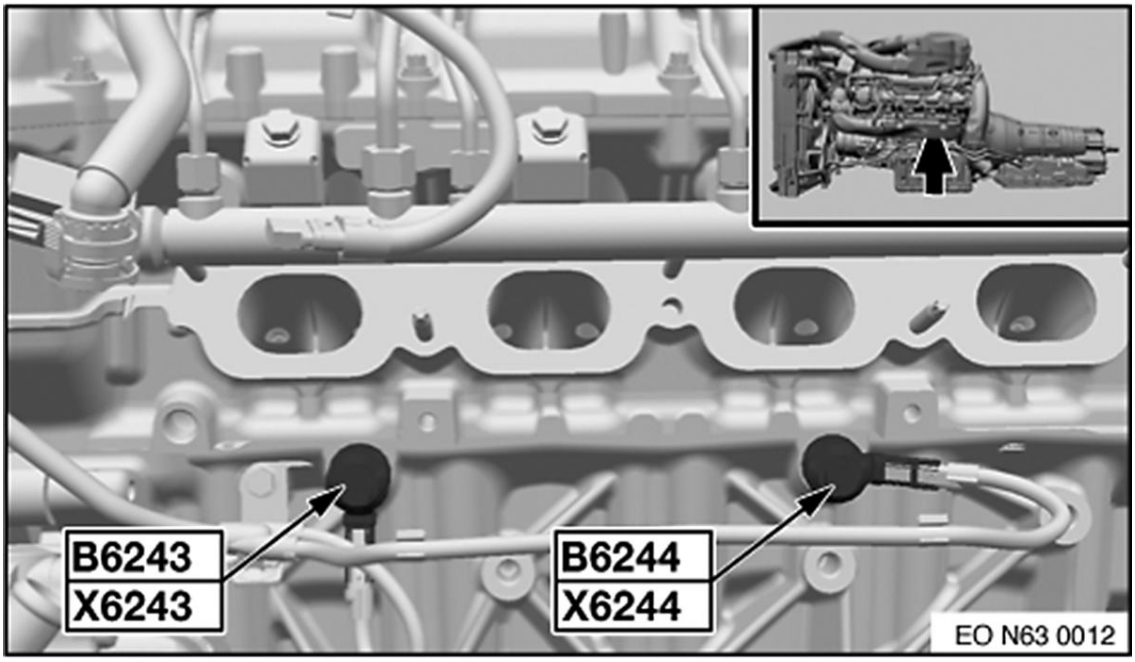


Fig. 134: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

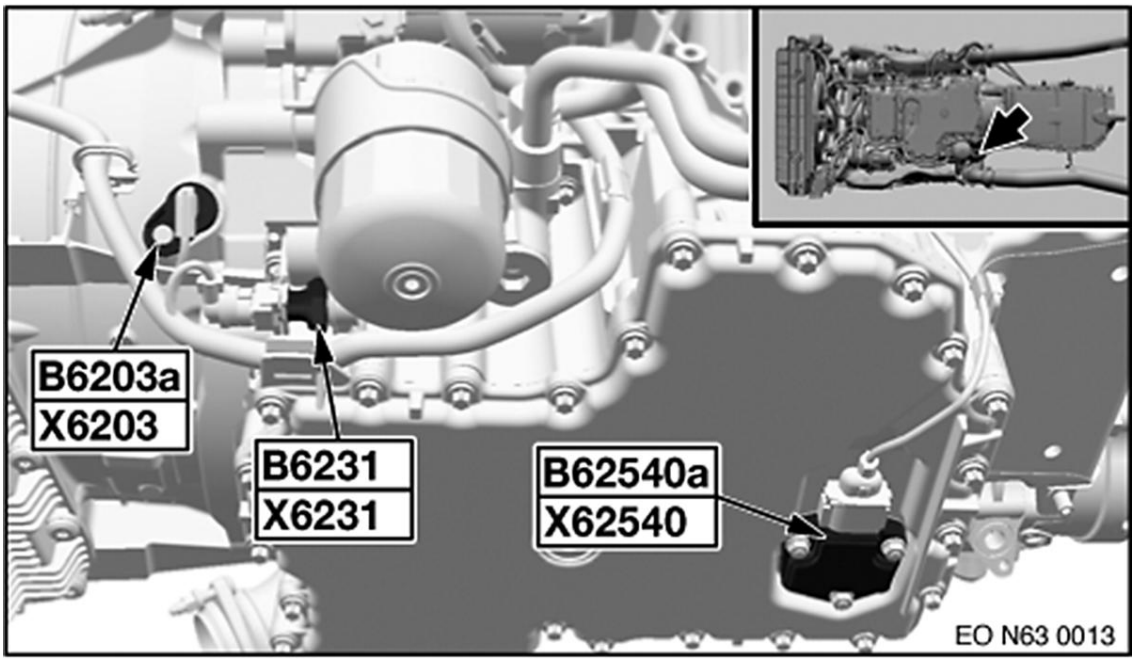


Fig. 135: Bottom Rear Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

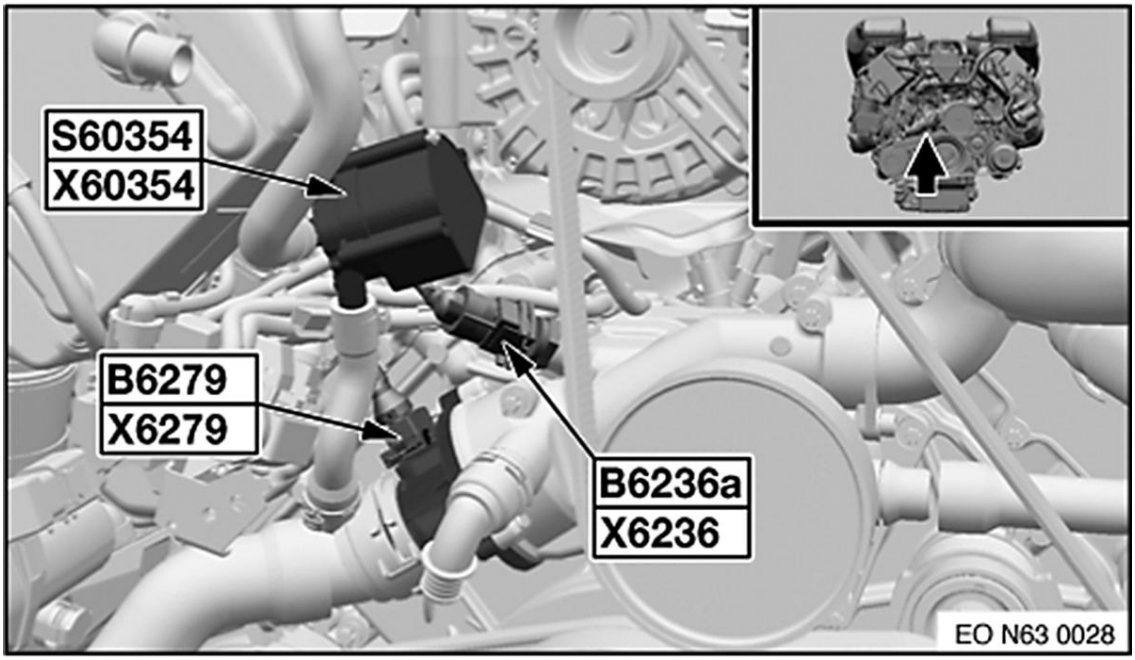


Fig. 136: Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

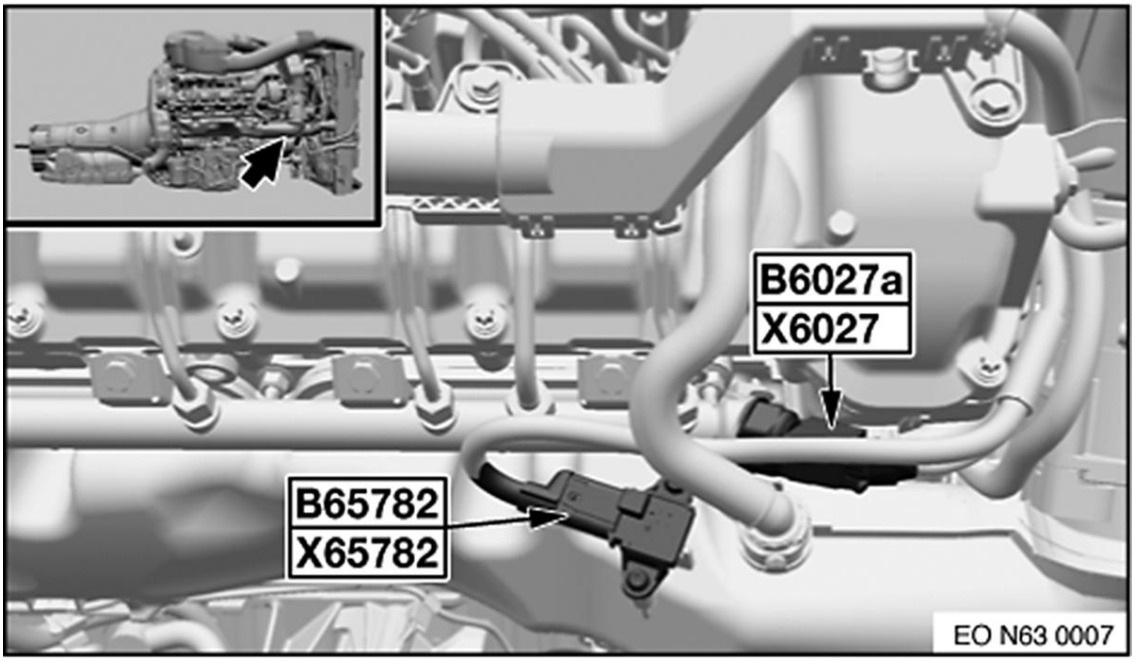


Fig. 137: Right Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

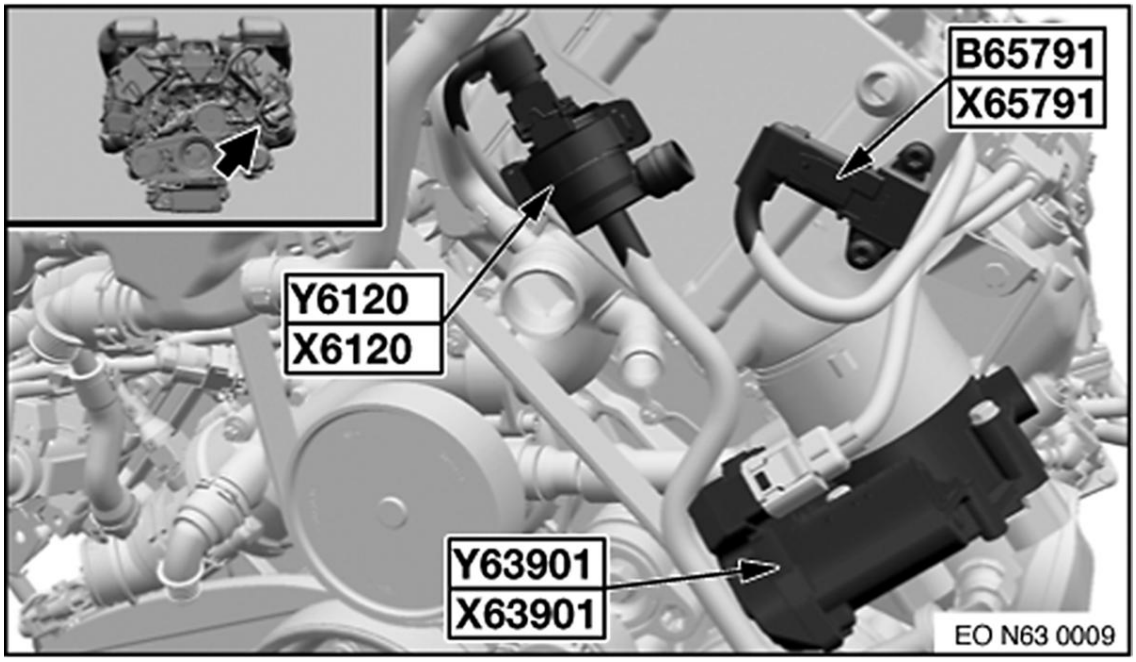


Fig. 138: Left Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

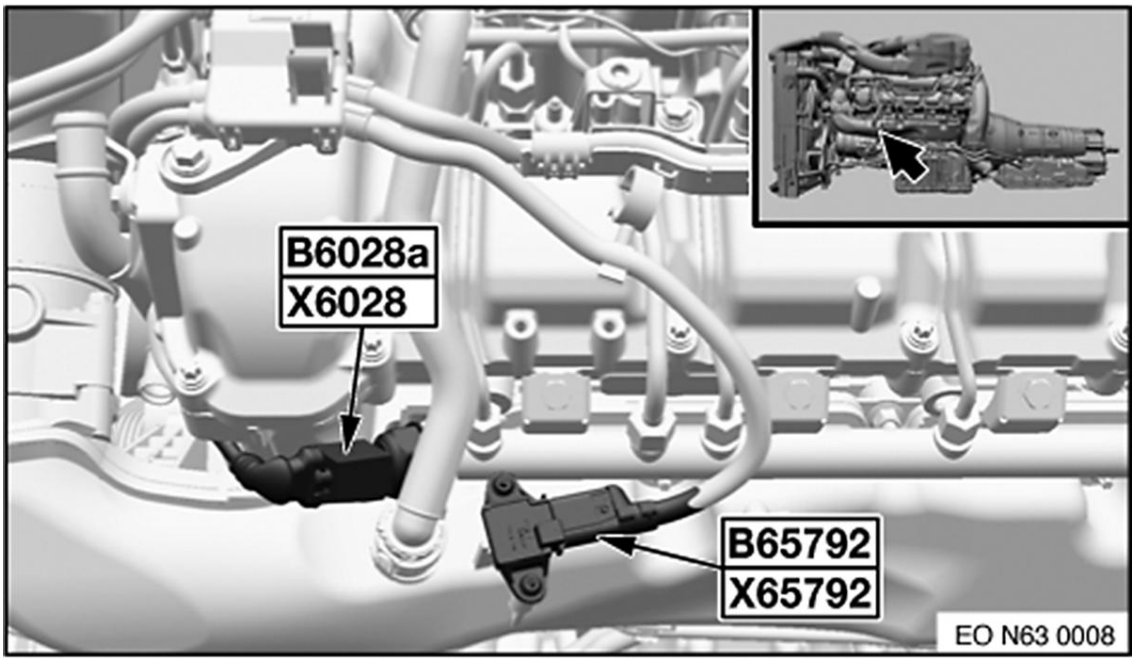


Fig. 139: Left Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

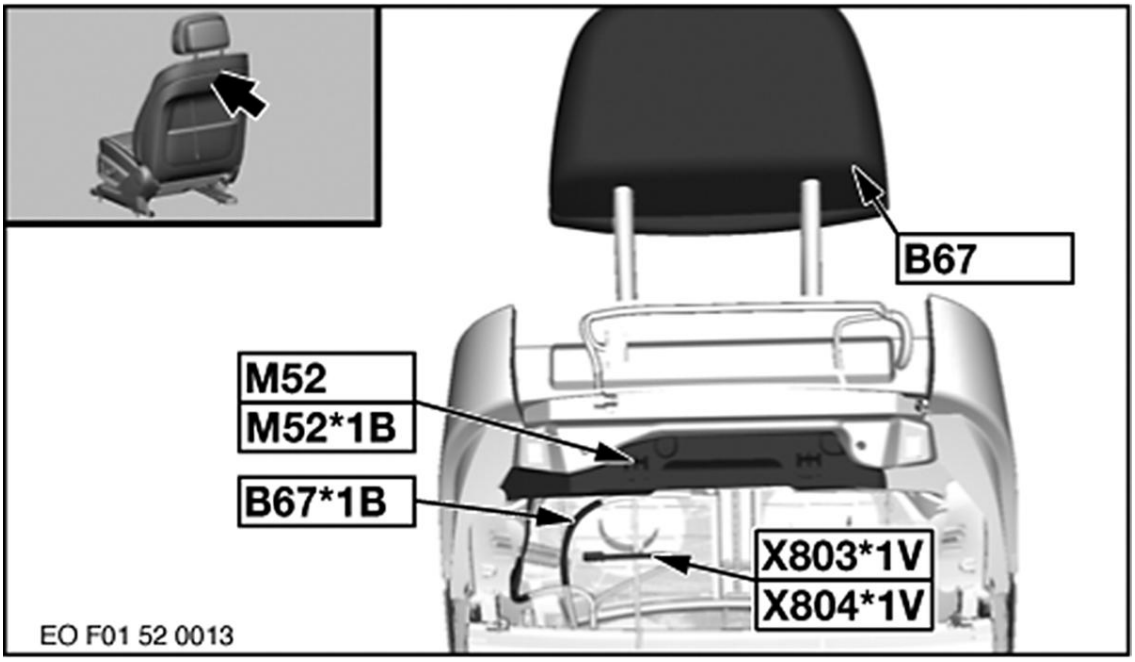


Fig. 140: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

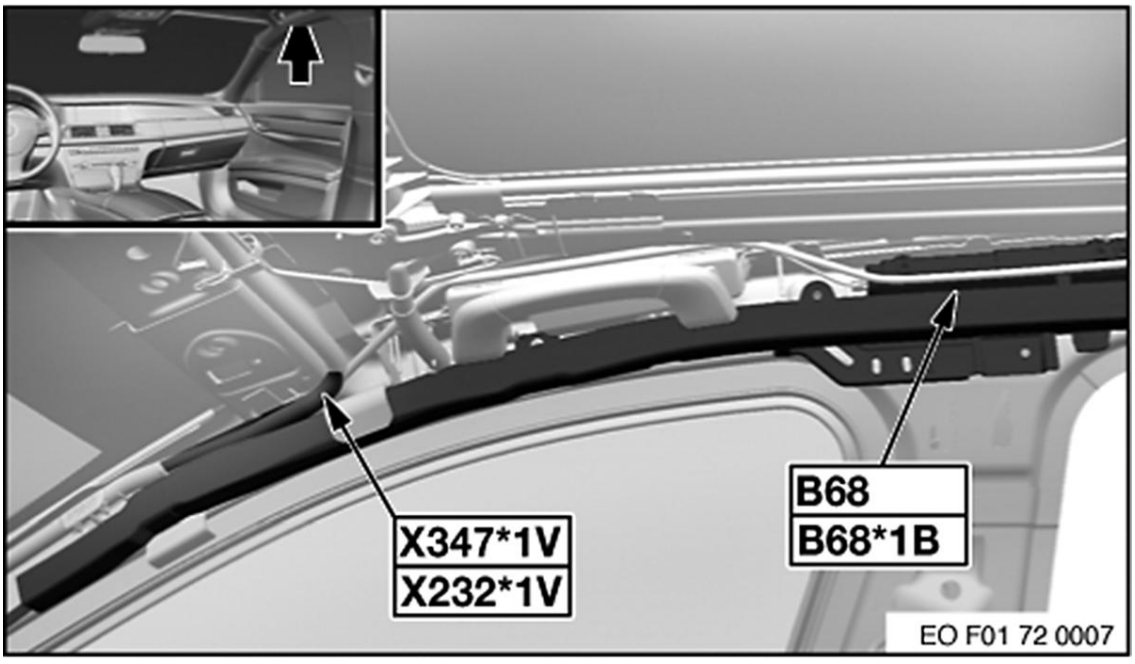


Fig. 141: Top Of Right "B" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

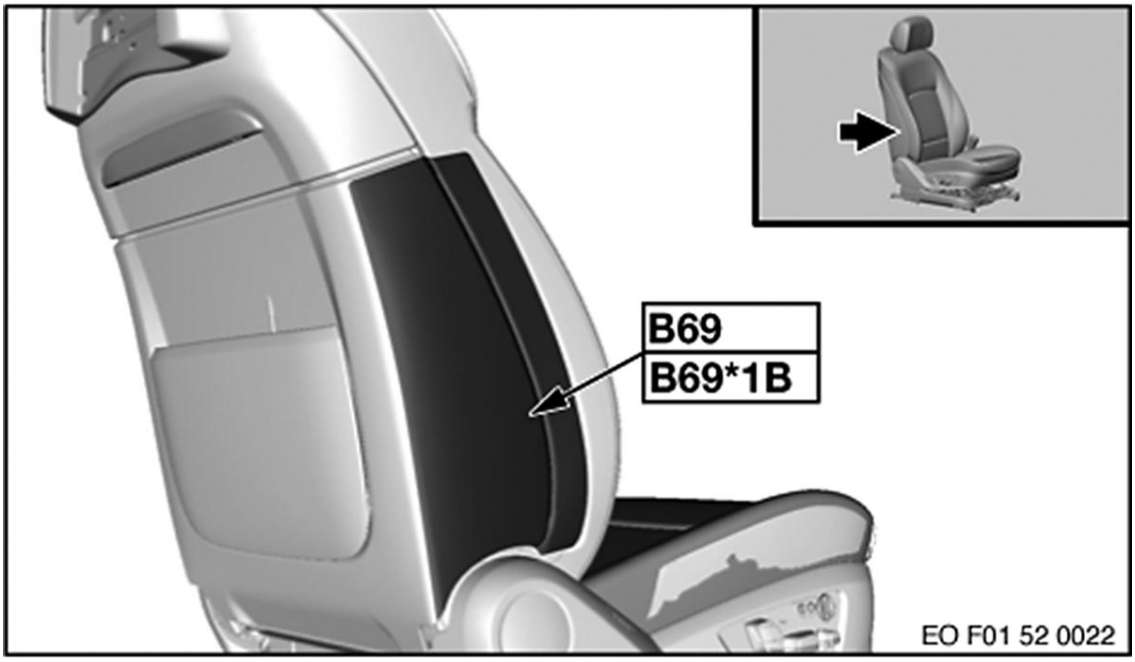


Fig. 142: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

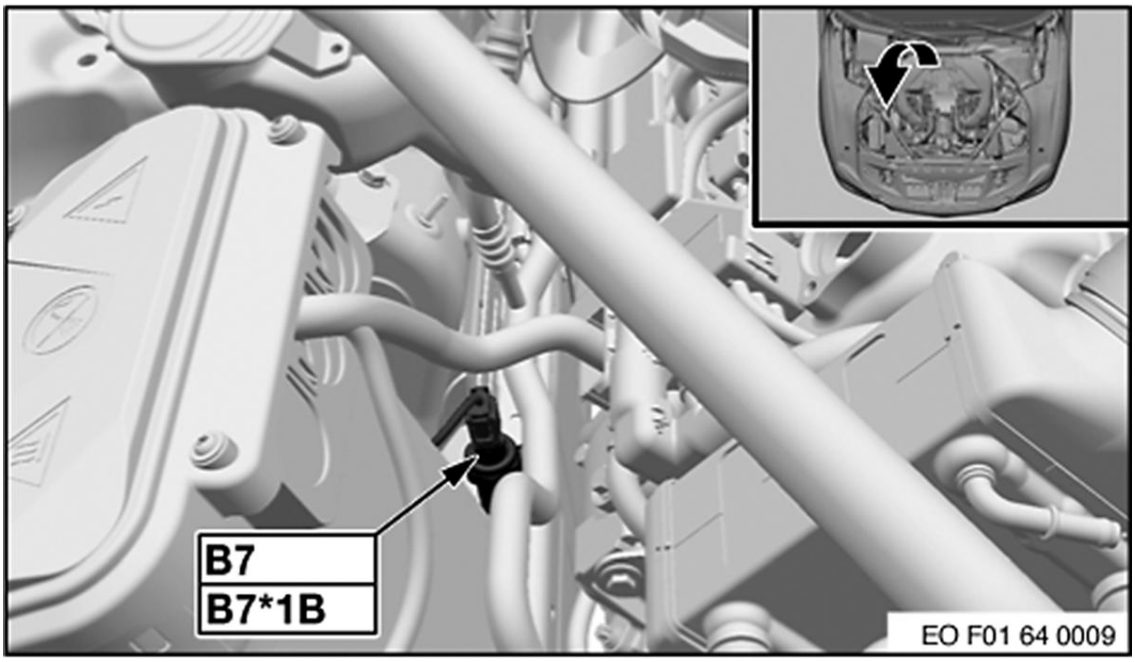


Fig. 143: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

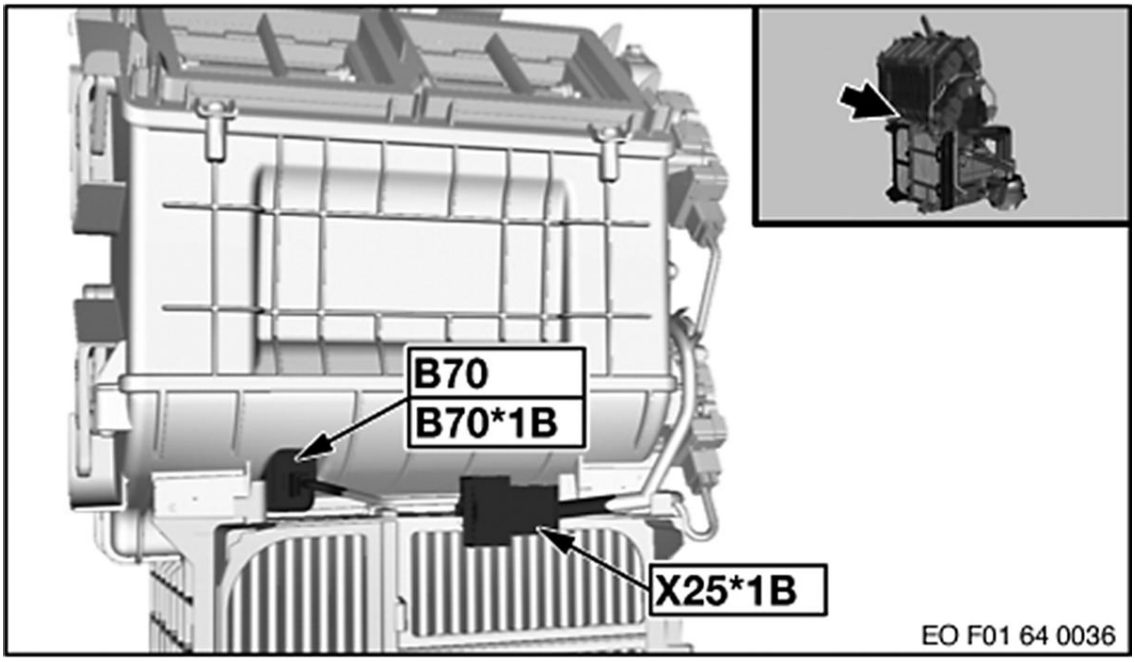


Fig. 144: Rear Air Conditioner Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

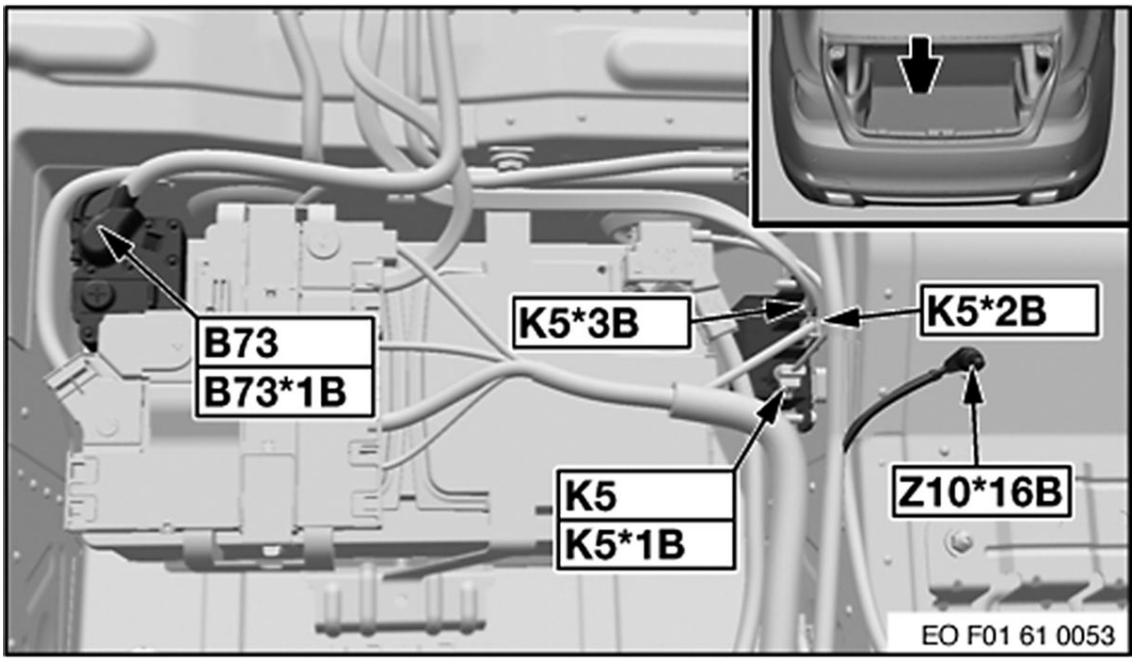


Fig. 145: Center Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

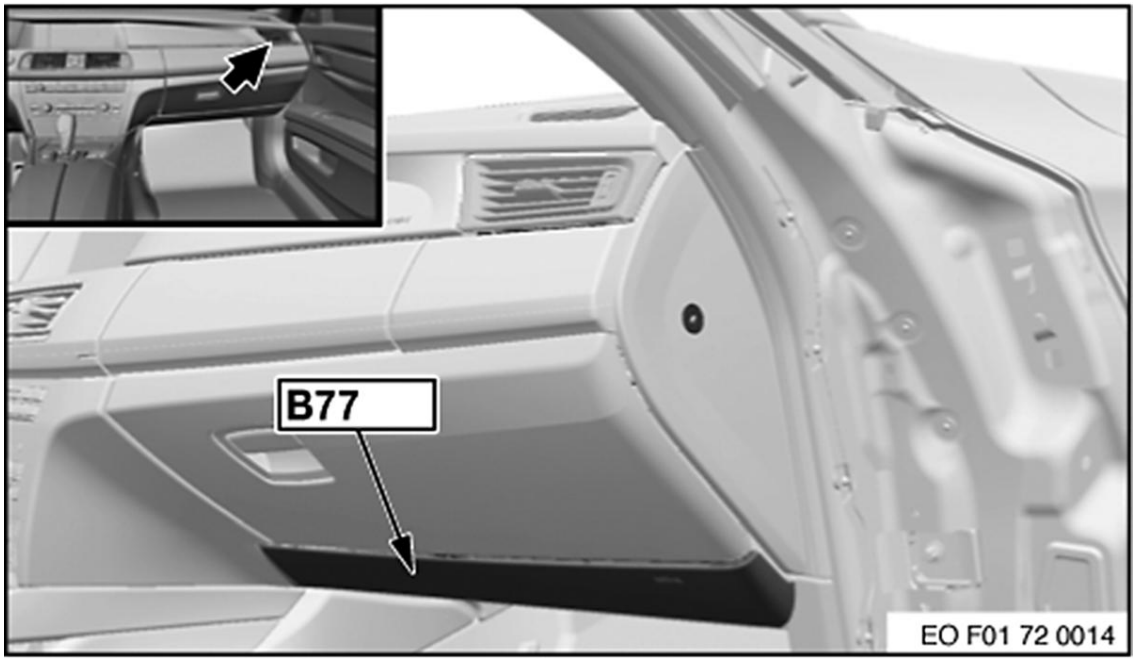


Fig. 146: Right Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

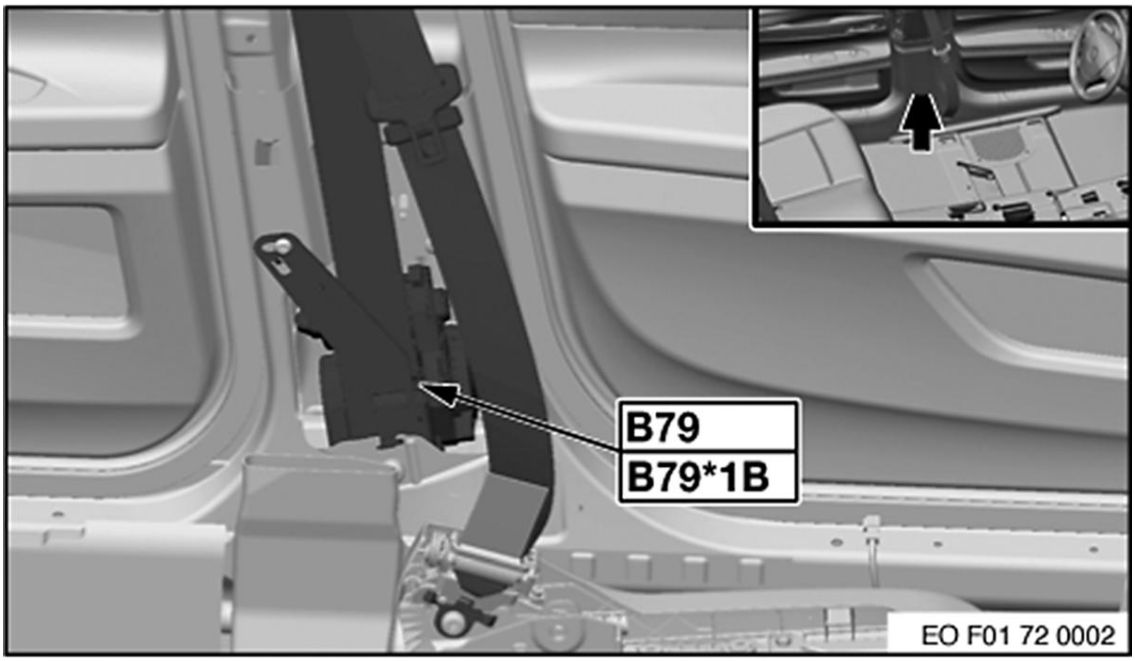


Fig. 147: Left "B" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

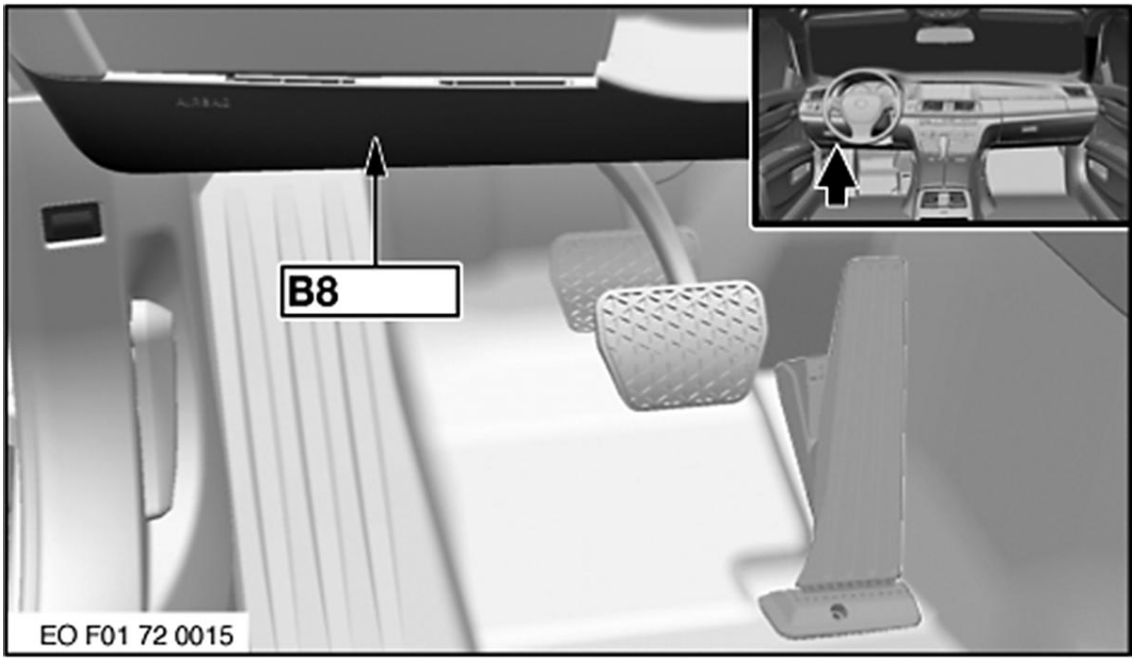


Fig. 148: Left Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

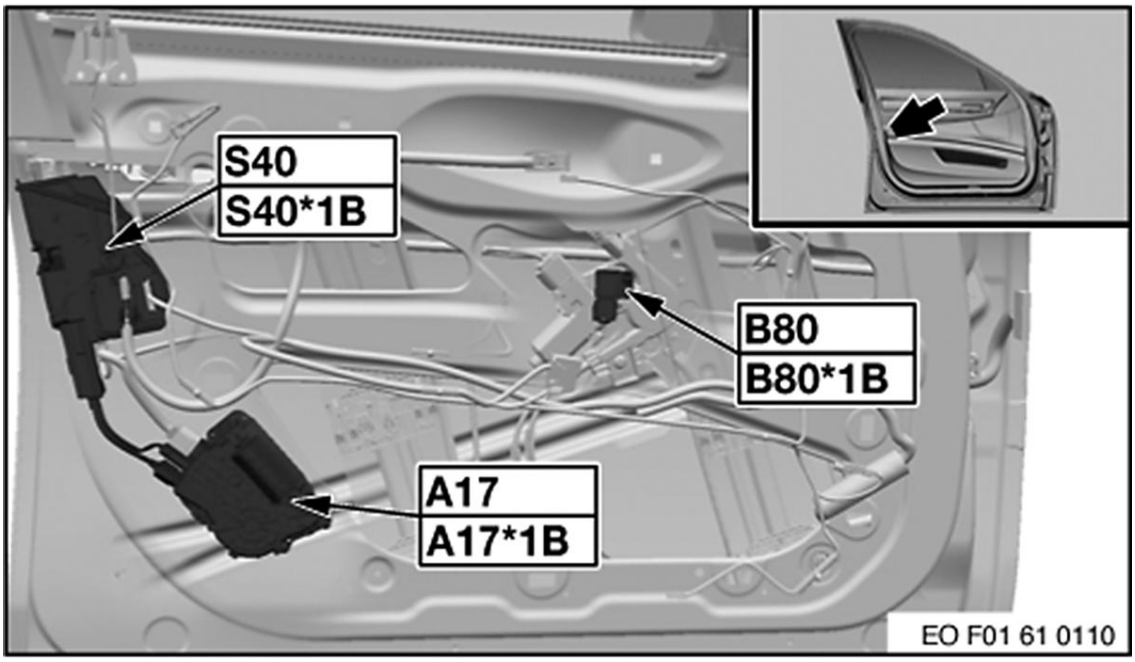


Fig. 149: Driver's Door
Courtesy of BMW OF NORTH AMERICA, INC.

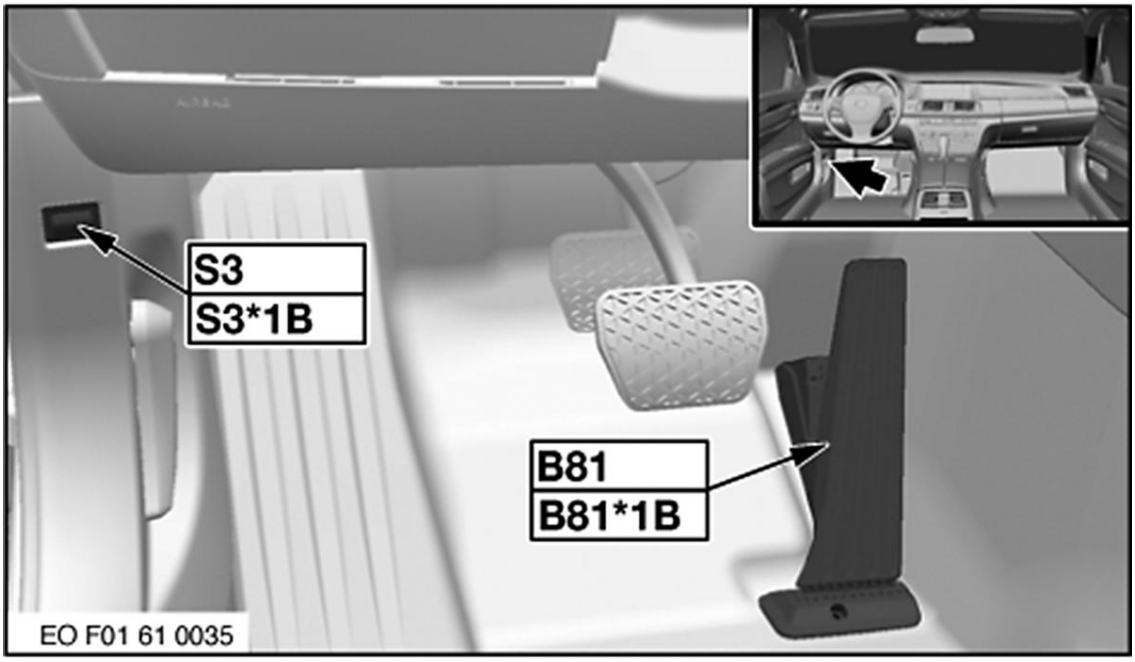


Fig. 150: Driver's Footwell
Courtesy of BMW OF NORTH AMERICA, INC.

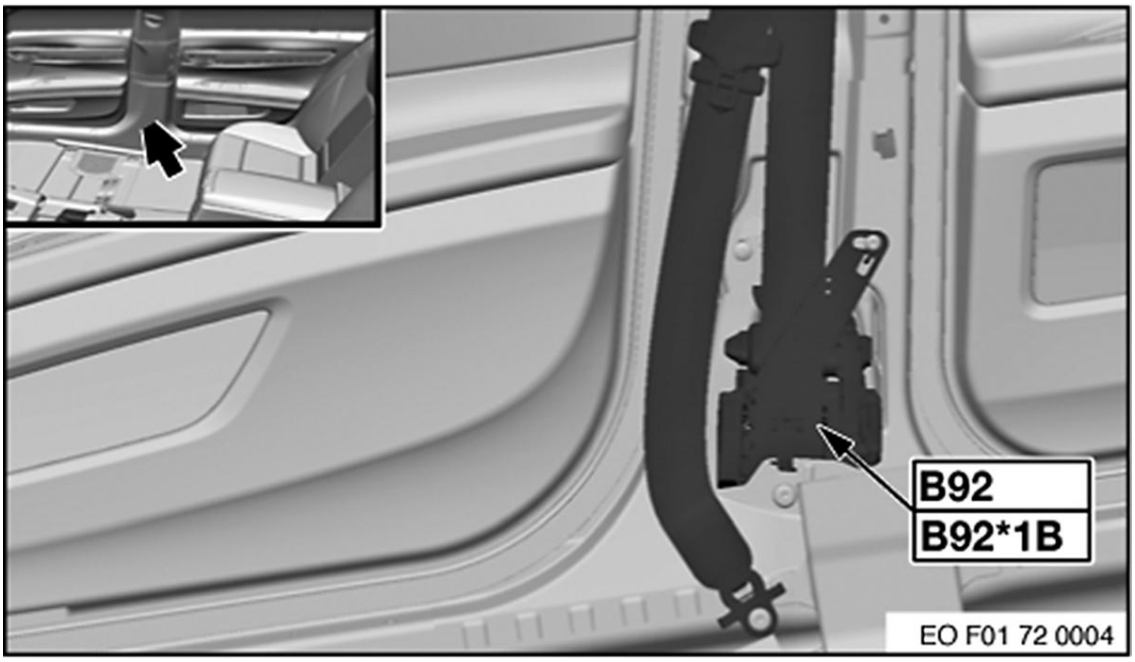


Fig. 151: Right "B" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

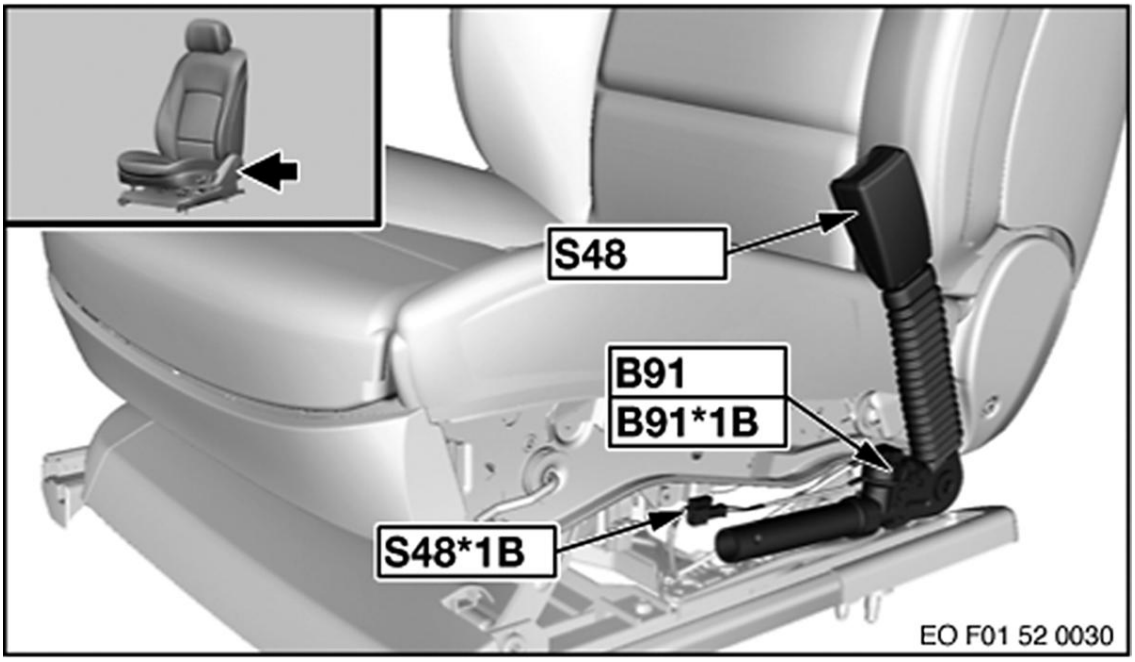


Fig. 152: Right Front Passenger Seat
Courtesy of BMW OF NORTH AMERICA, INC.

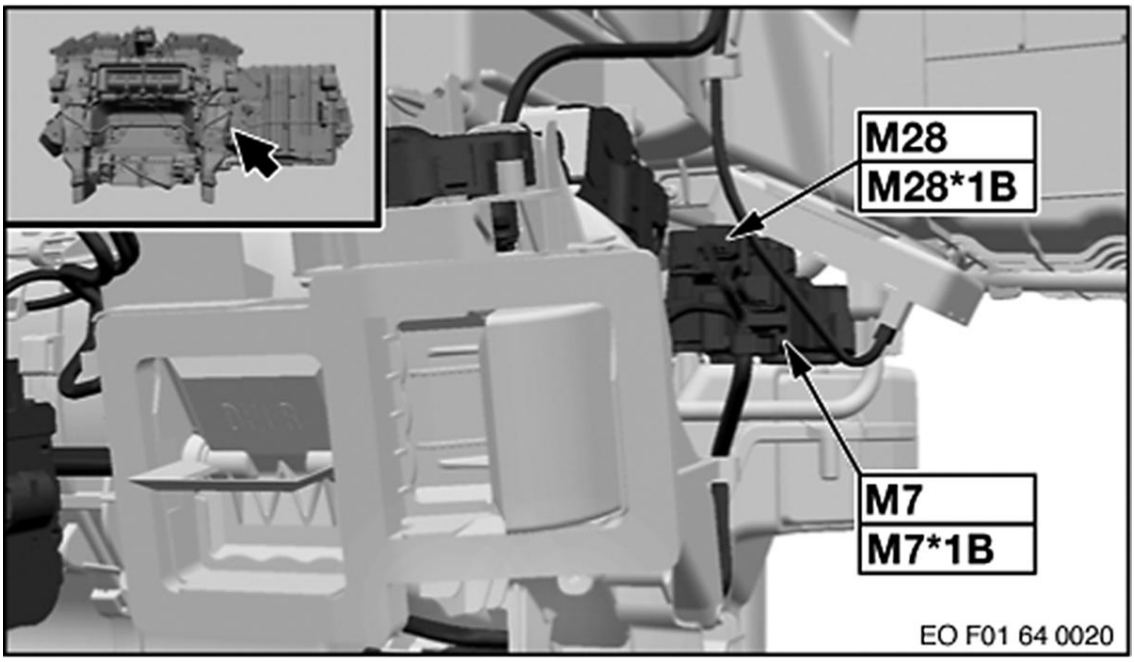


Fig. 153: HVAC Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

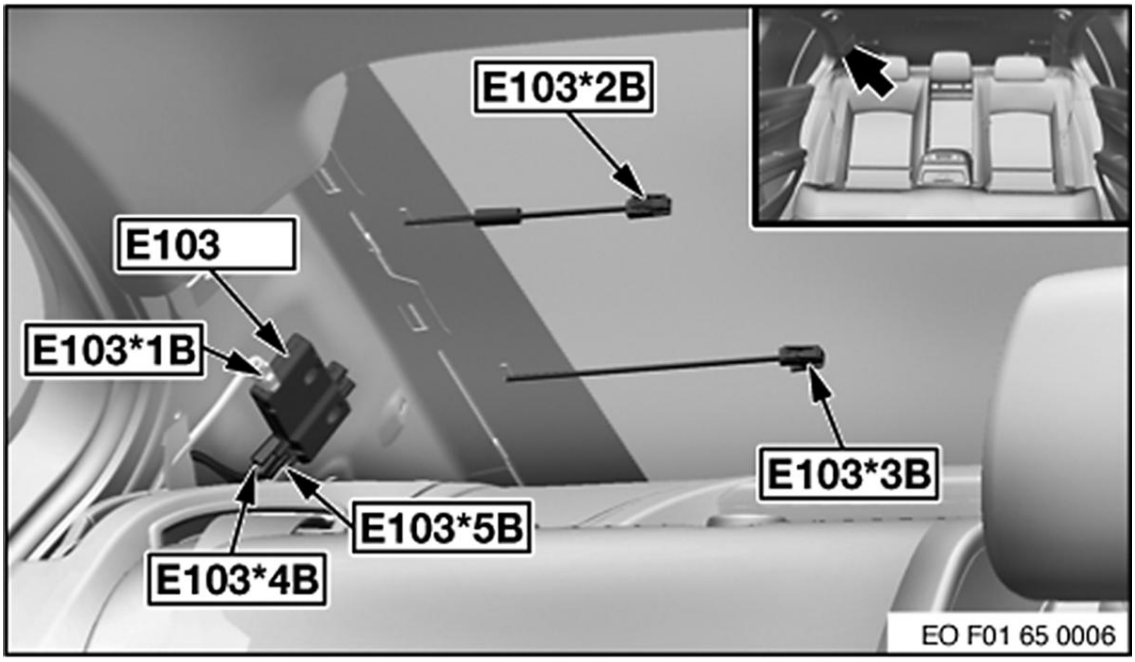


Fig. 154: Right "C" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

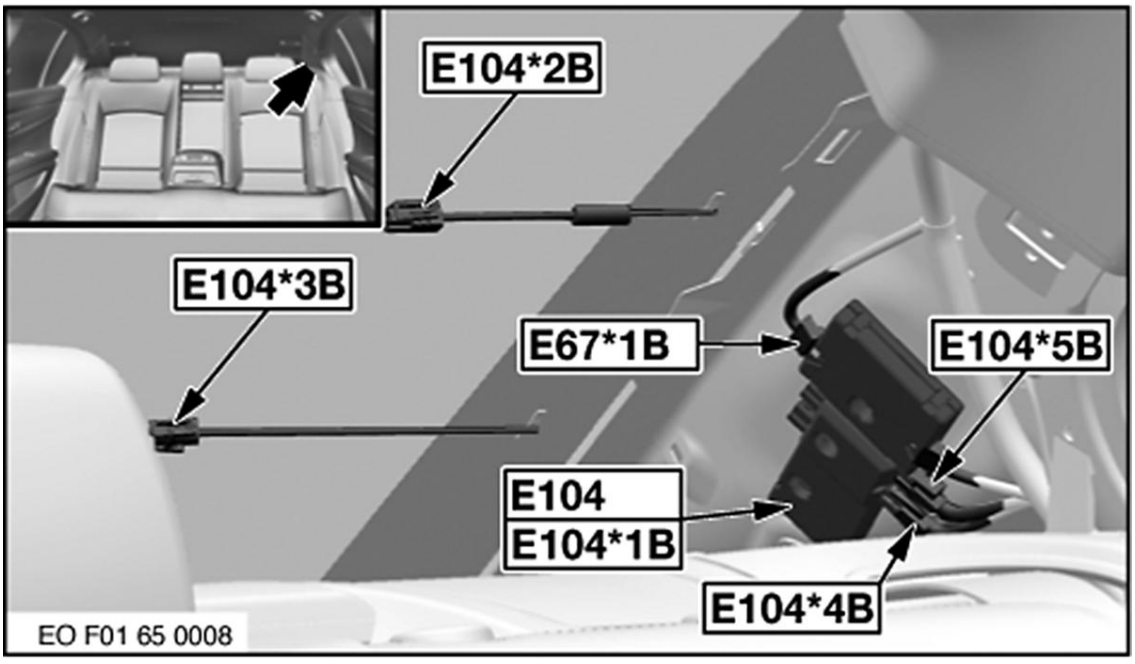


Fig. 155: Left "C" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

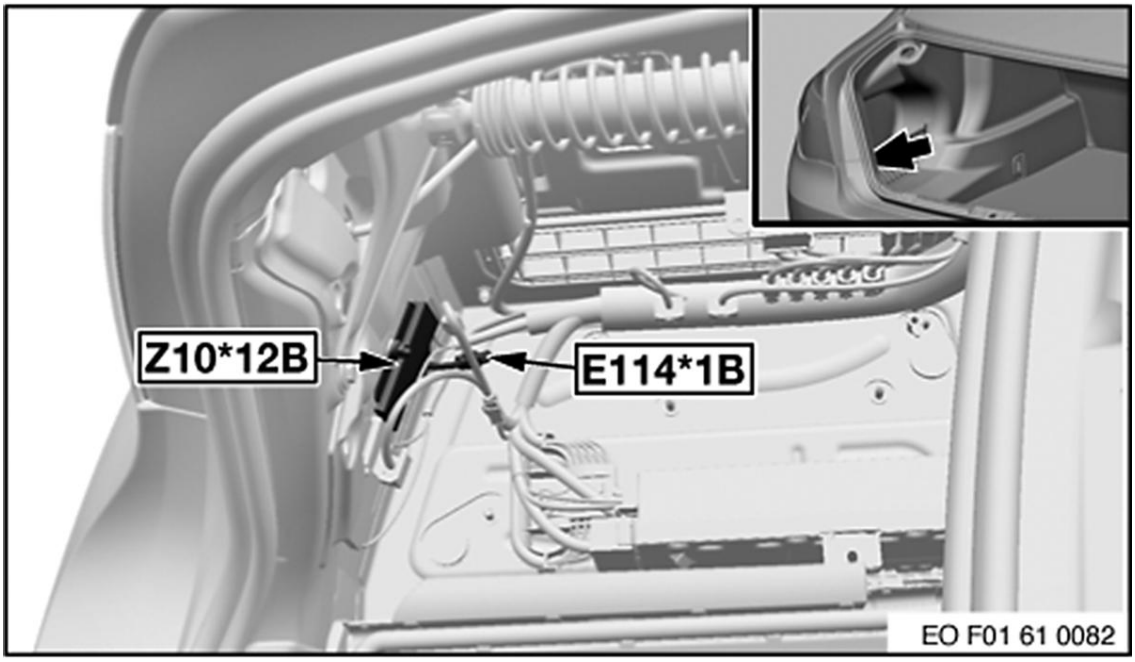


Fig. 156: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

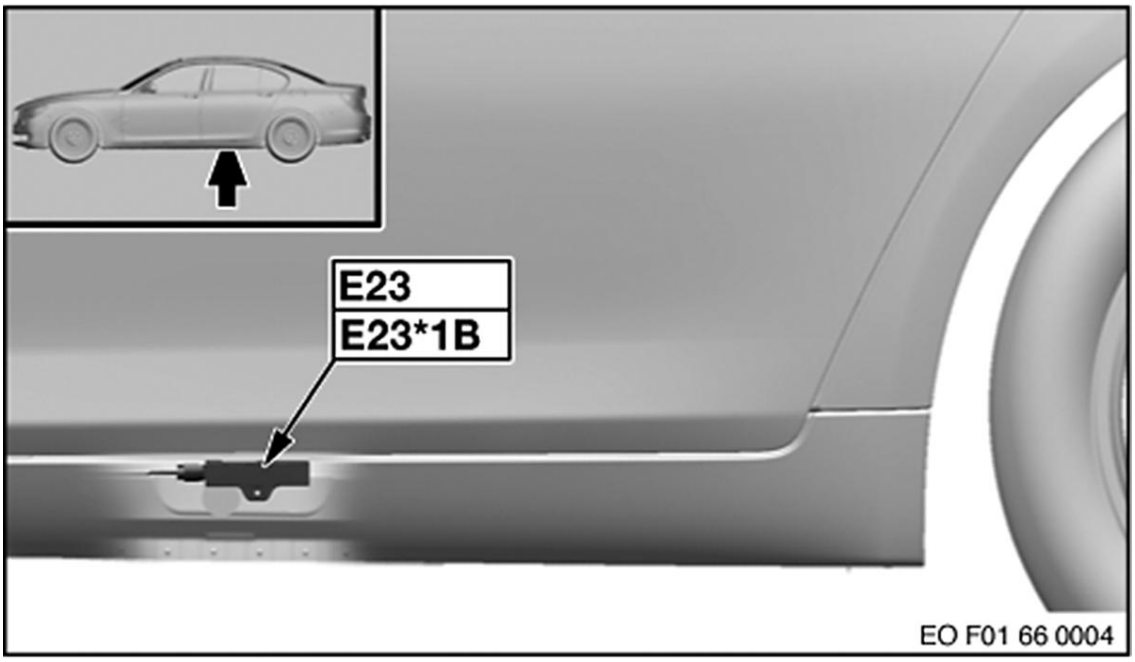


Fig. 157: Left Rear Door Sill
Courtesy of BMW OF NORTH AMERICA, INC.

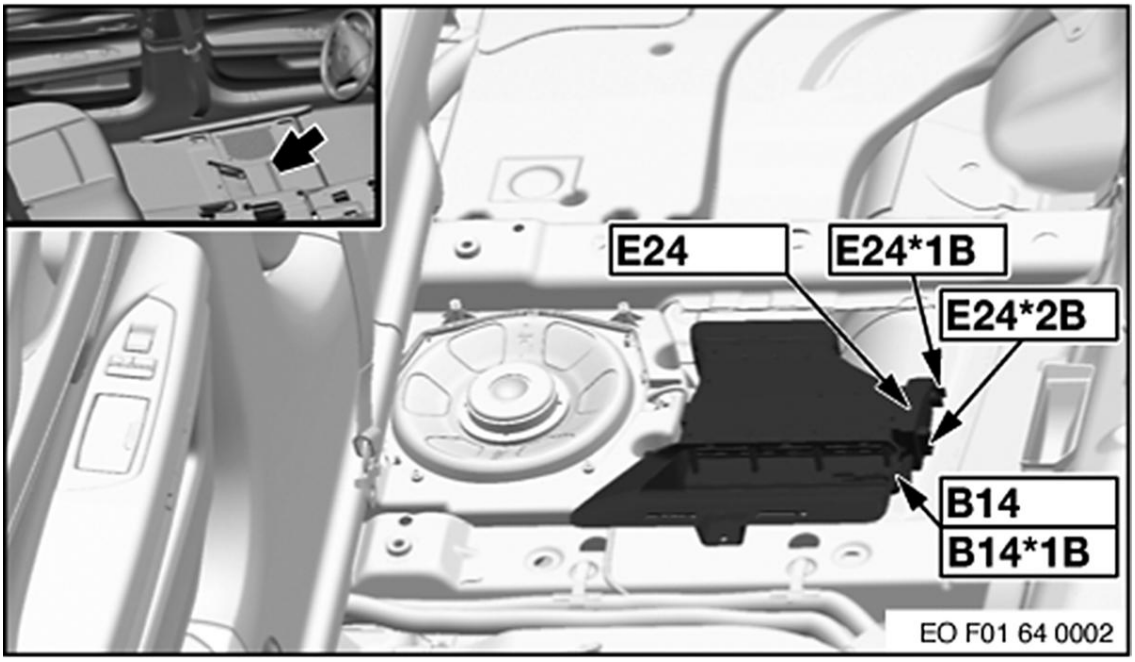


Fig. 158: Under Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

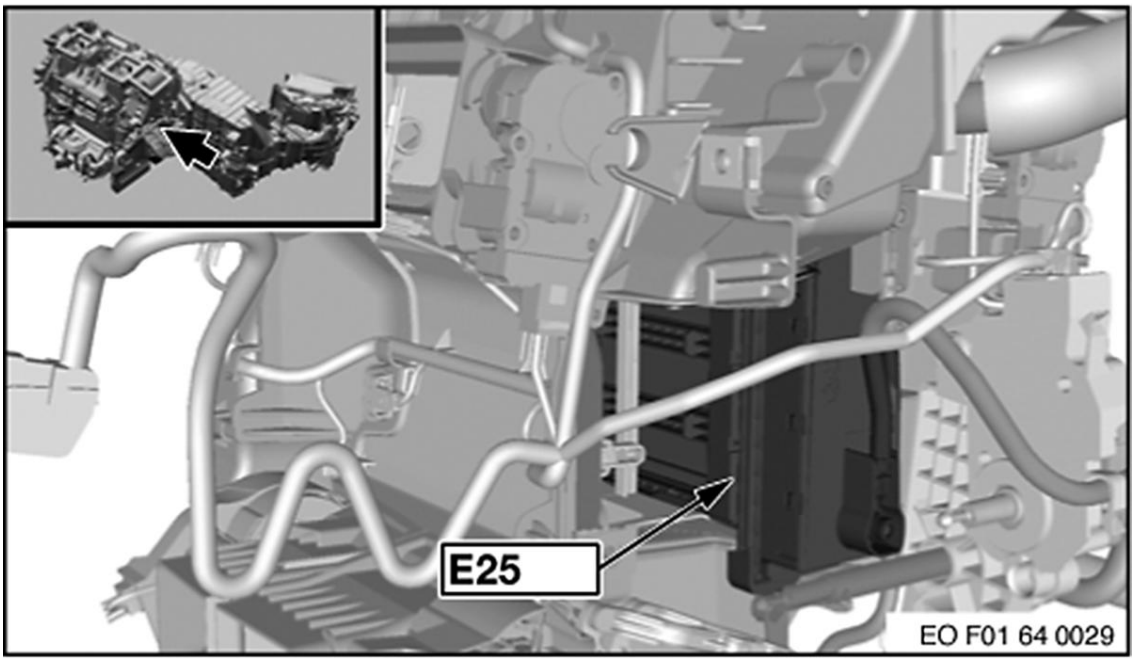


Fig. 159: HVAC Plenum
Courtesy of BMW OF NORTH AMERICA, INC.

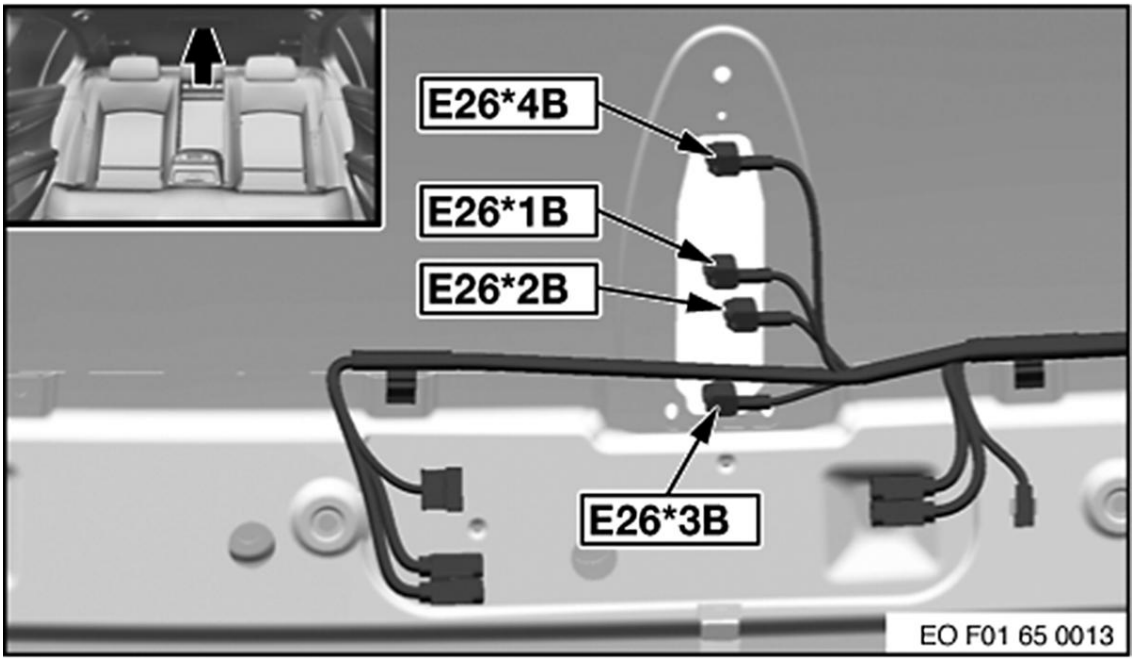


Fig. 160: Rear Of Roof
Courtesy of BMW OF NORTH AMERICA, INC.

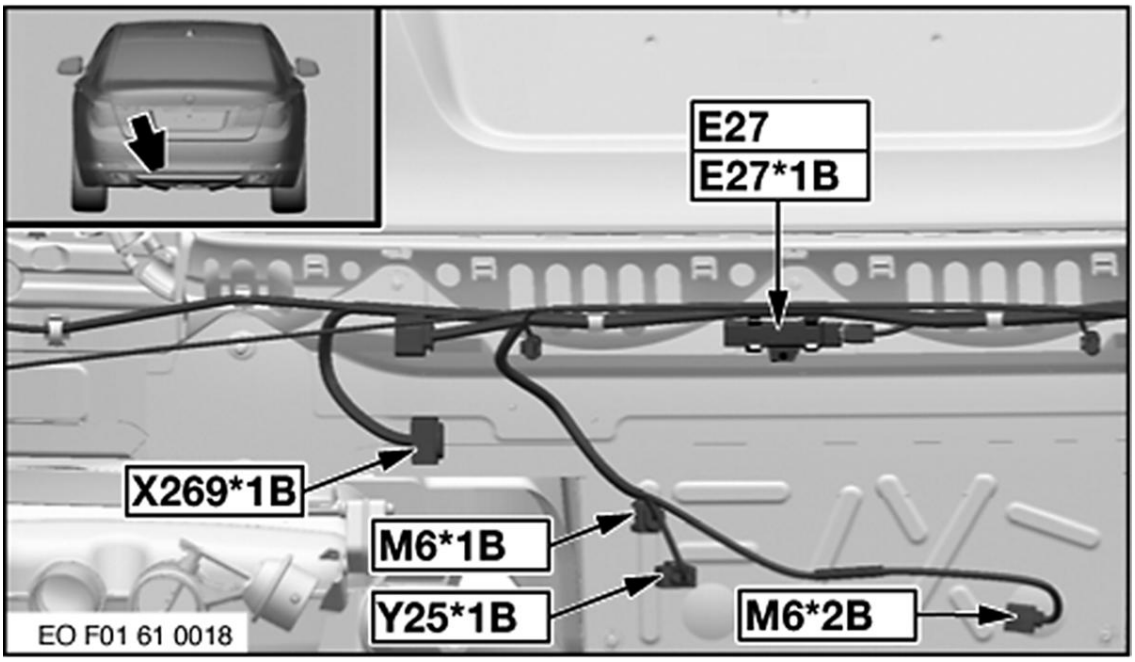


Fig. 161: Rear Bumper
Courtesy of BMW OF NORTH AMERICA, INC.

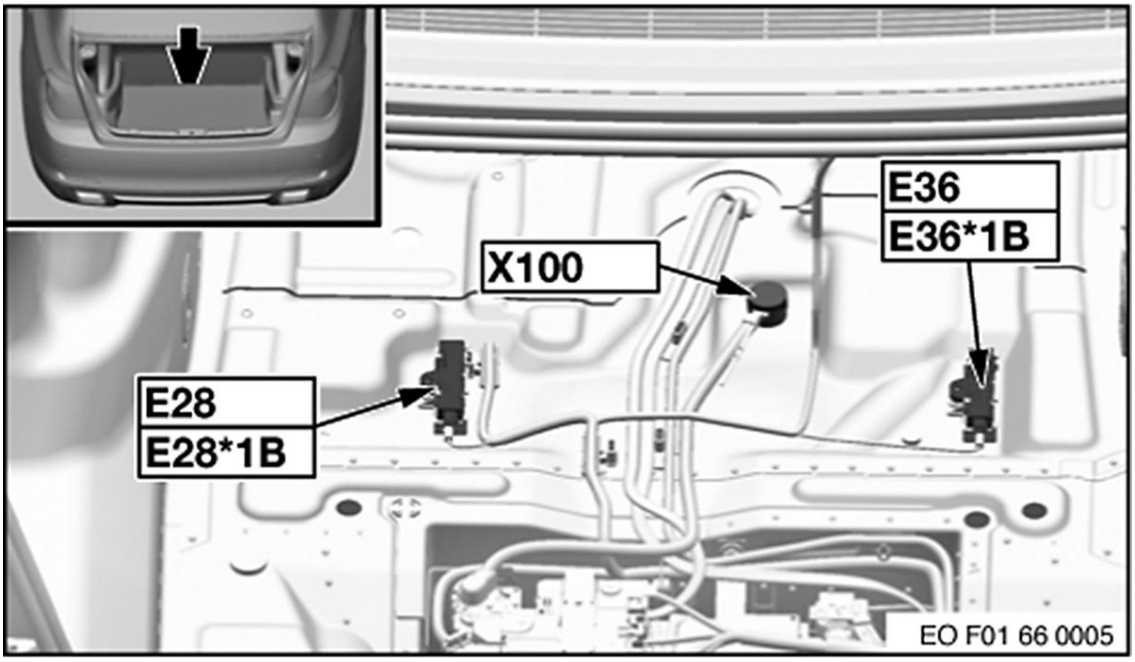


Fig. 162: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

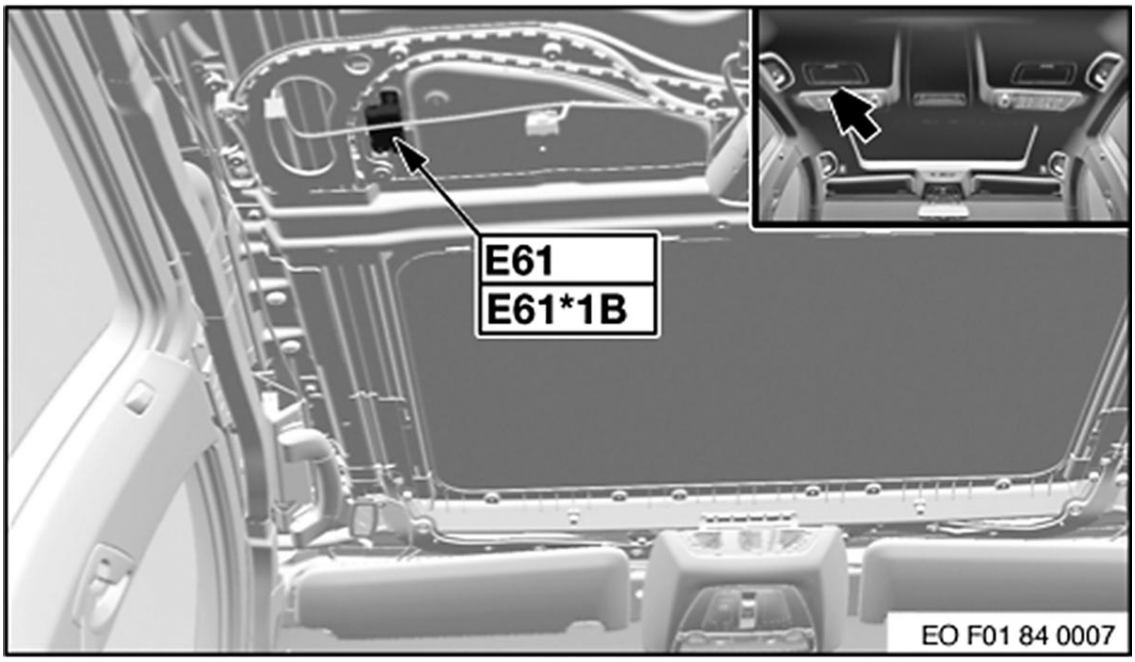


Fig. 163: Right Rear Of Roof
Courtesy of BMW OF NORTH AMERICA, INC.

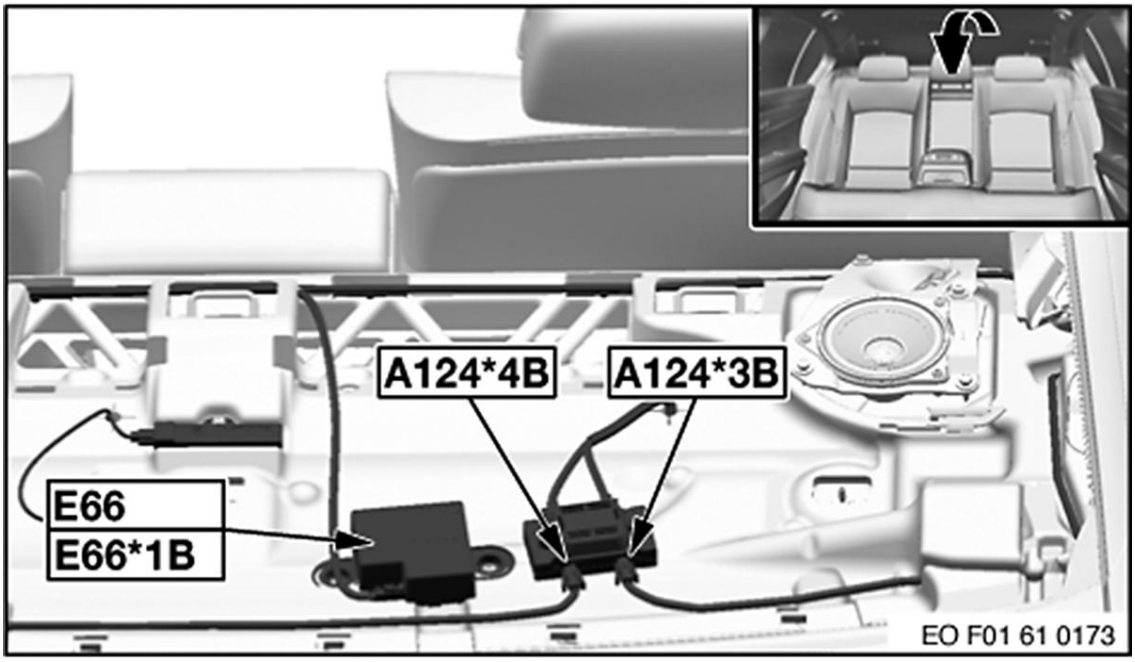


Fig. 164: Rear Package Tray
Courtesy of BMW OF NORTH AMERICA, INC.

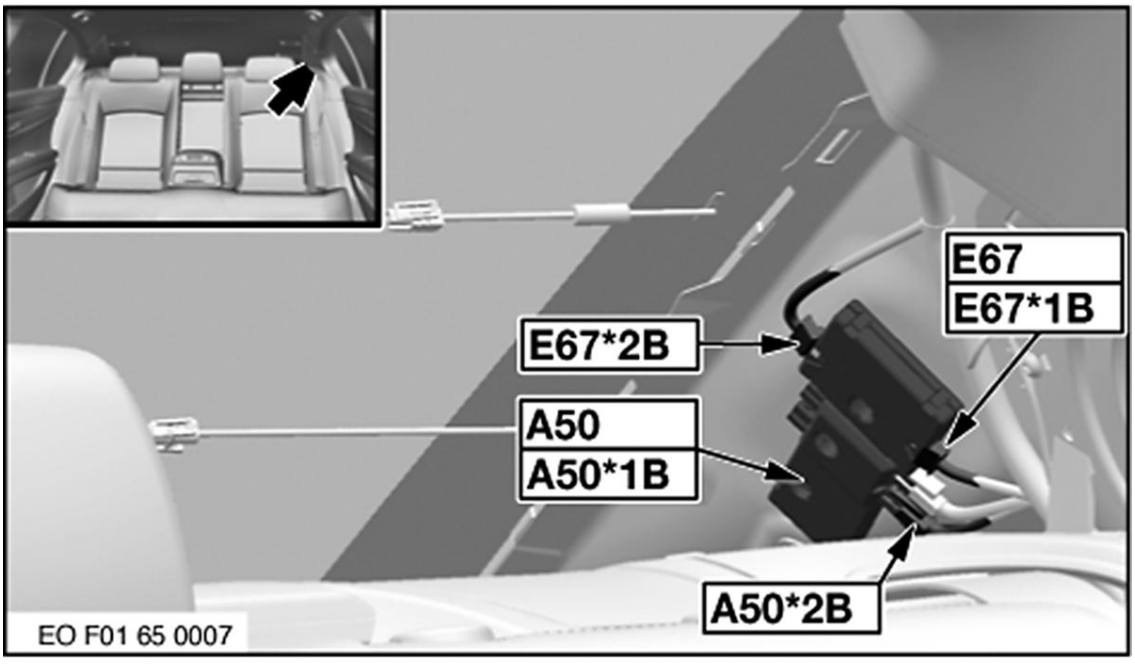


Fig. 165: Left "C" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

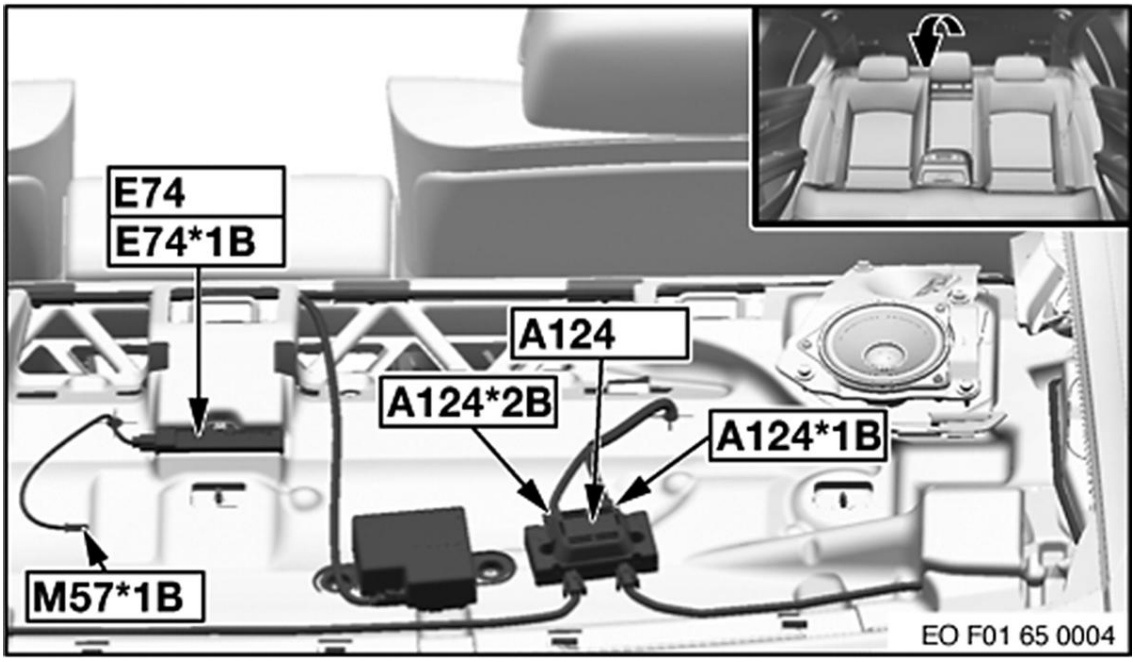


Fig. 166: Package Tray
Courtesy of BMW OF NORTH AMERICA, INC.

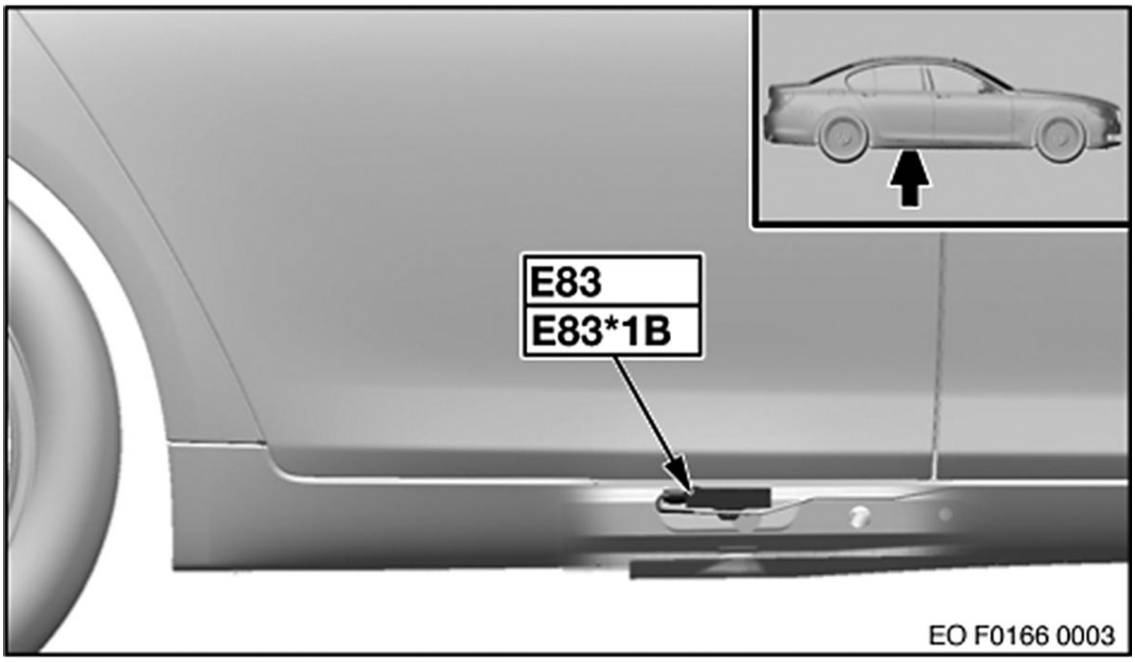


Fig. 167: Right Rear Door Sill
Courtesy of BMW OF NORTH AMERICA, INC.

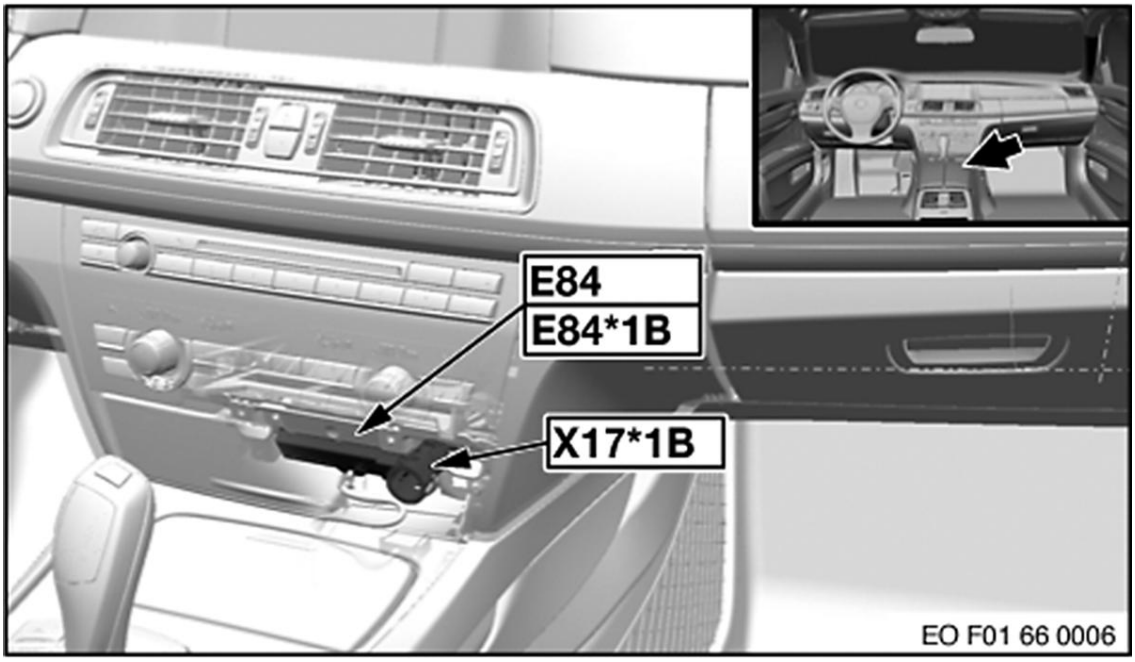


Fig. 168: Front Of Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

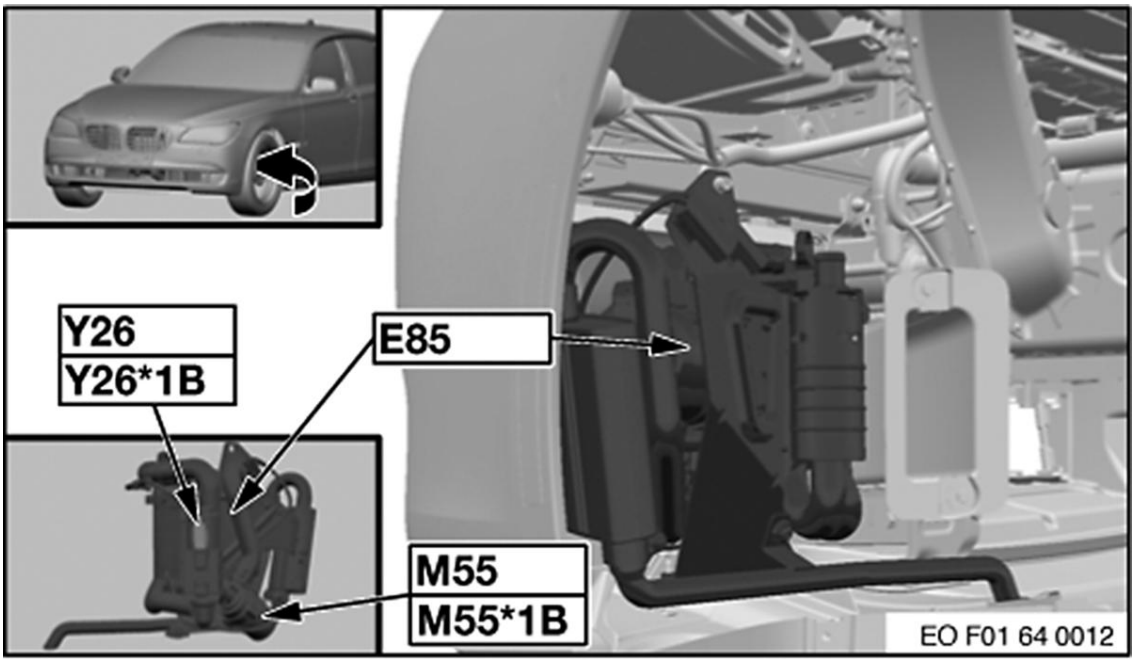


Fig. 169: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

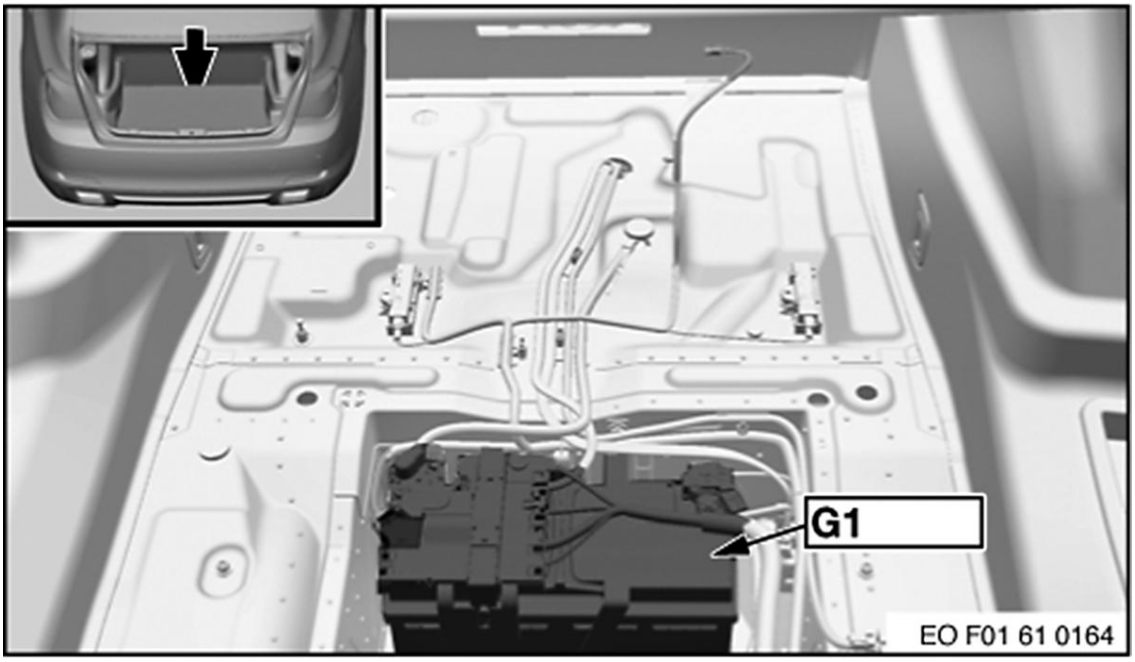


Fig. 170: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

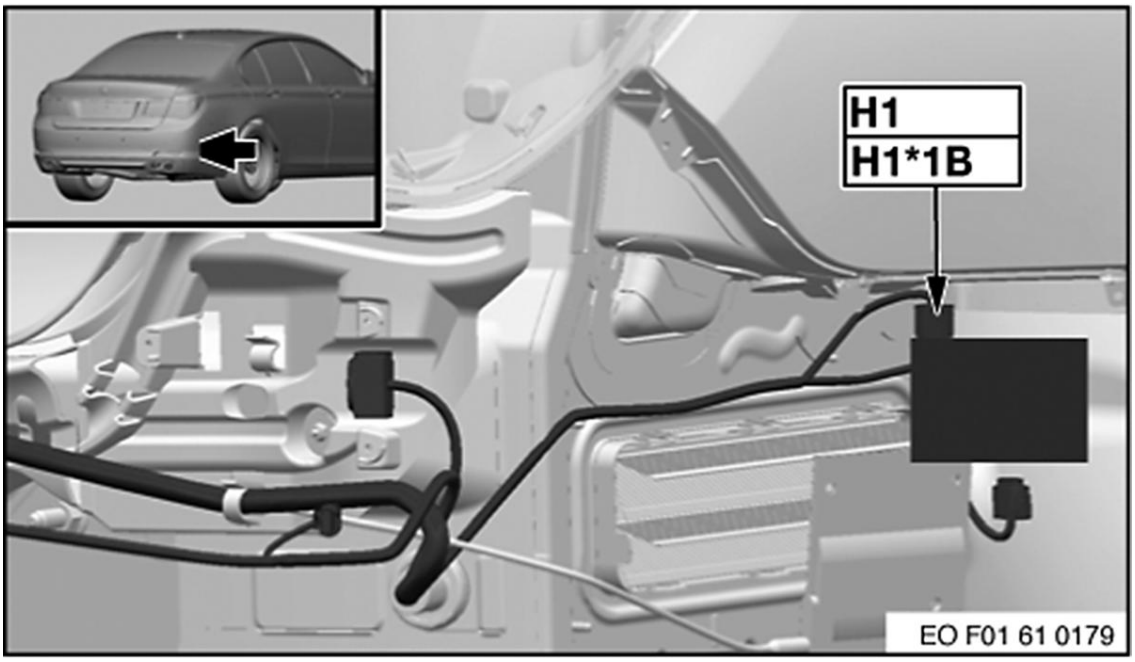


Fig. 171: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

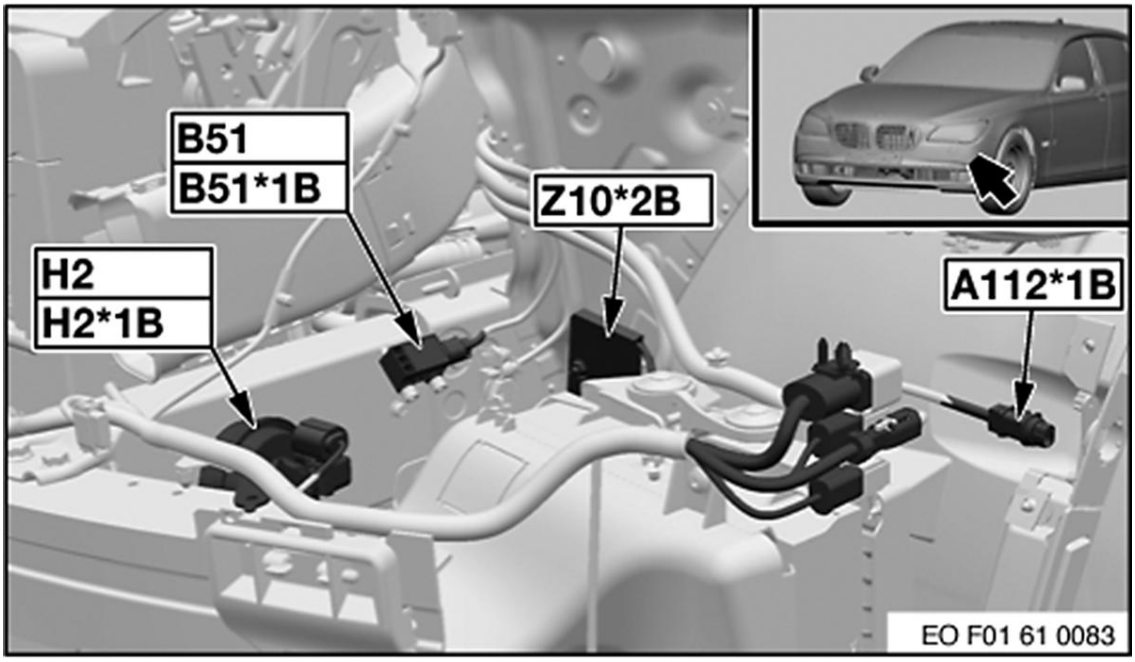


Fig. 172: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

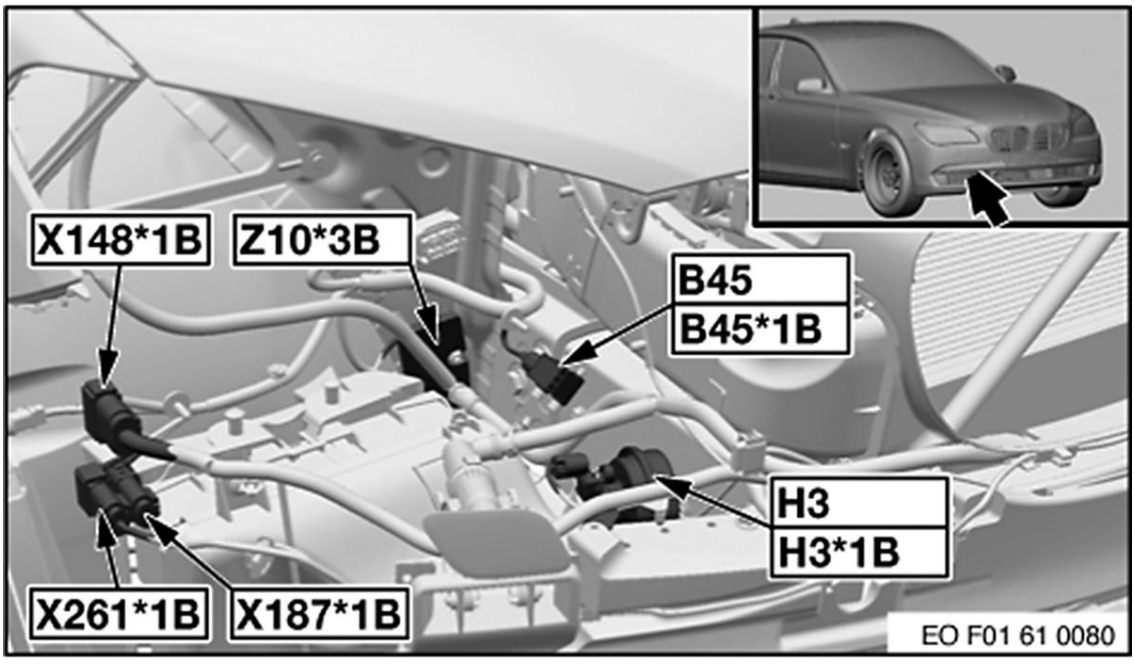


Fig. 173: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

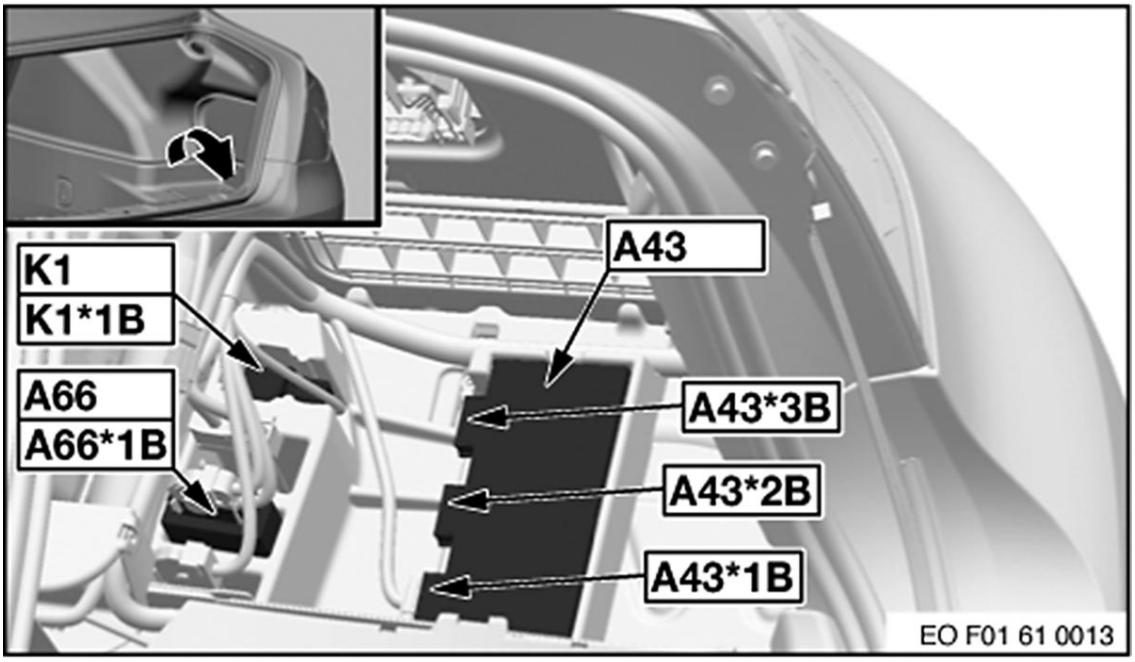


Fig. 174: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

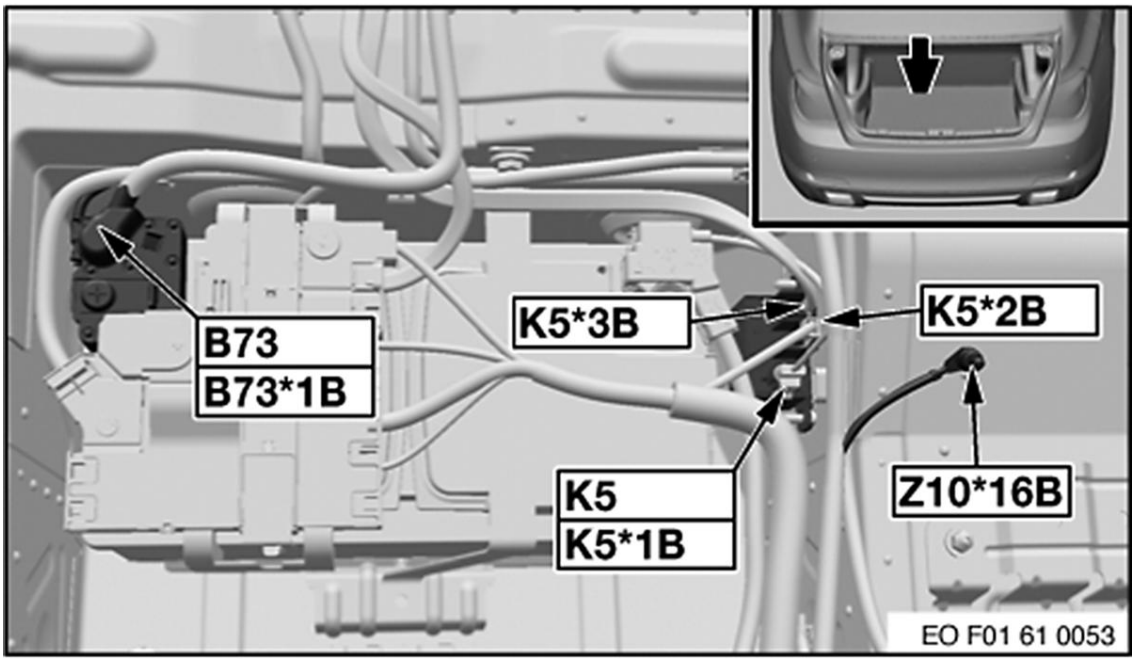


Fig. 175: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

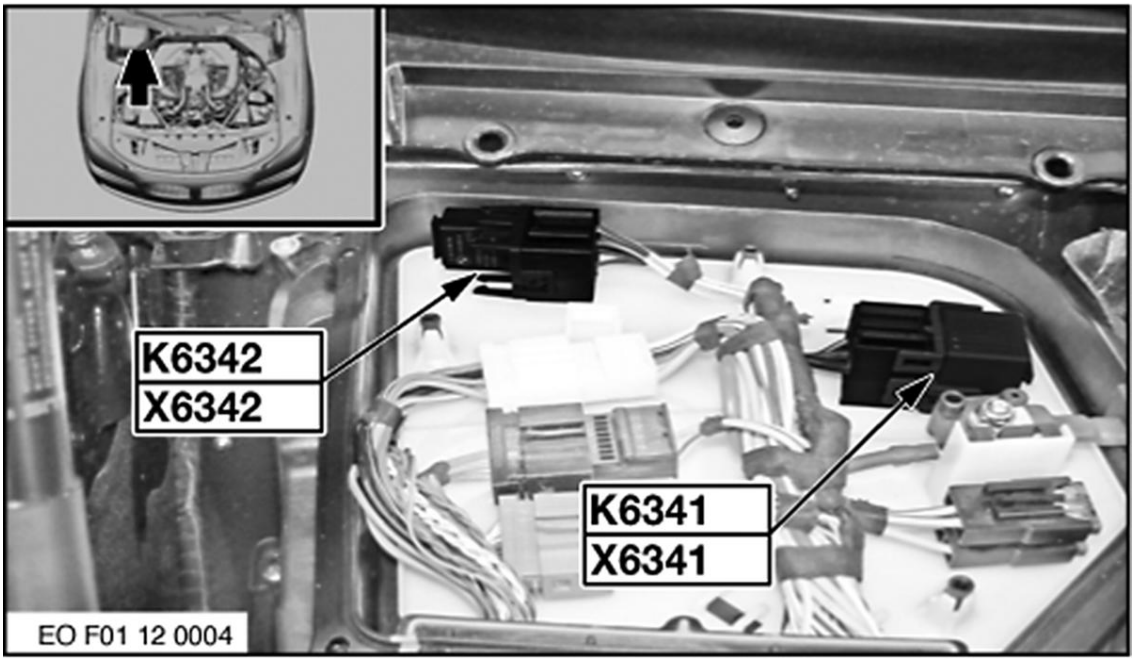


Fig. 176: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

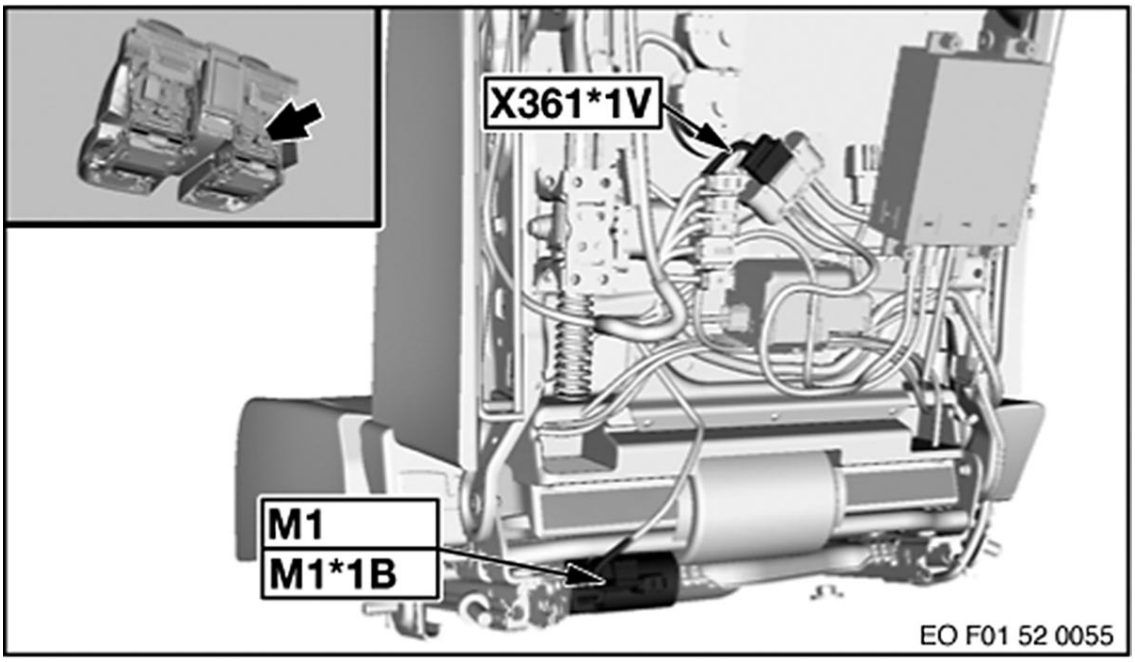


Fig. 177: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

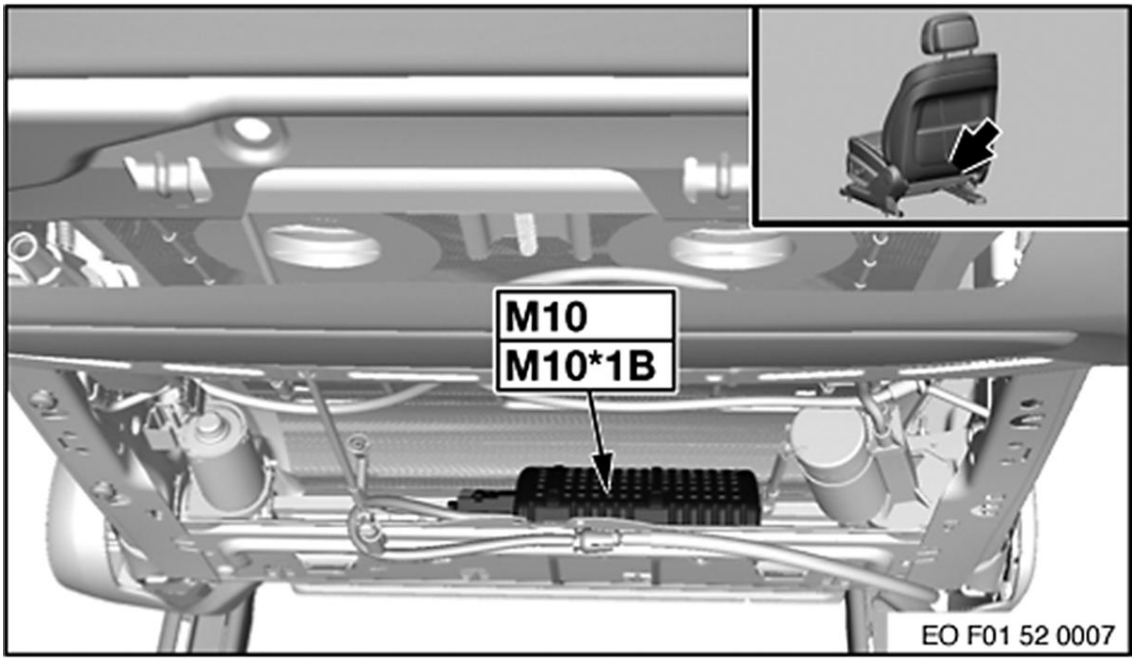


Fig. 178: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

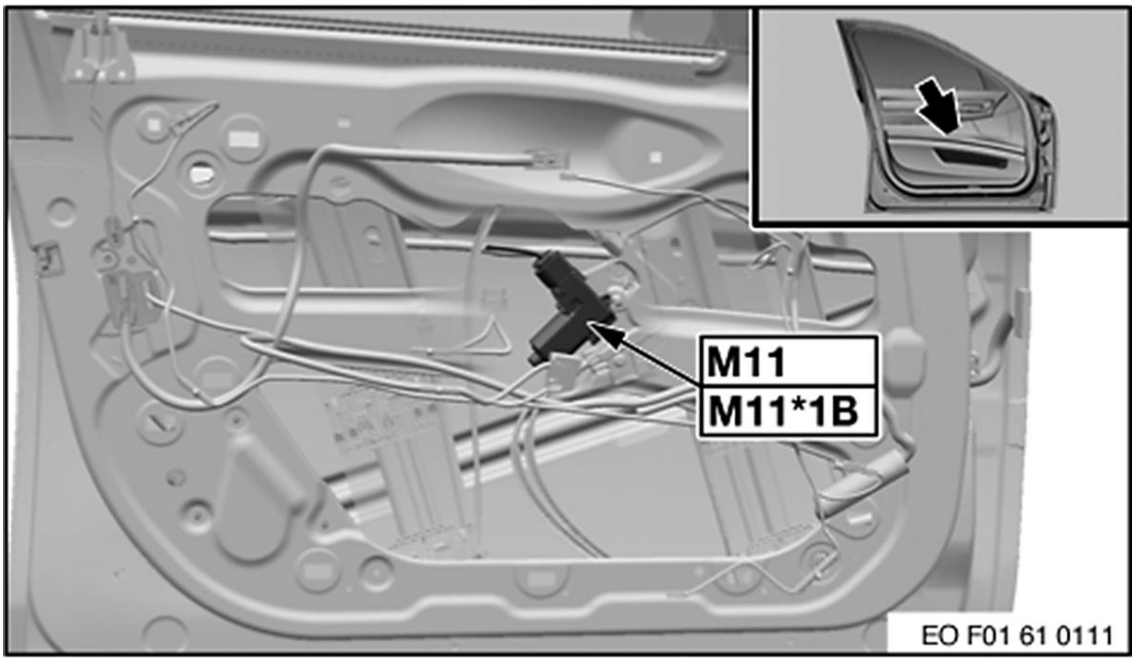


Fig. 179: Driver's Door
Courtesy of BMW OF NORTH AMERICA, INC.

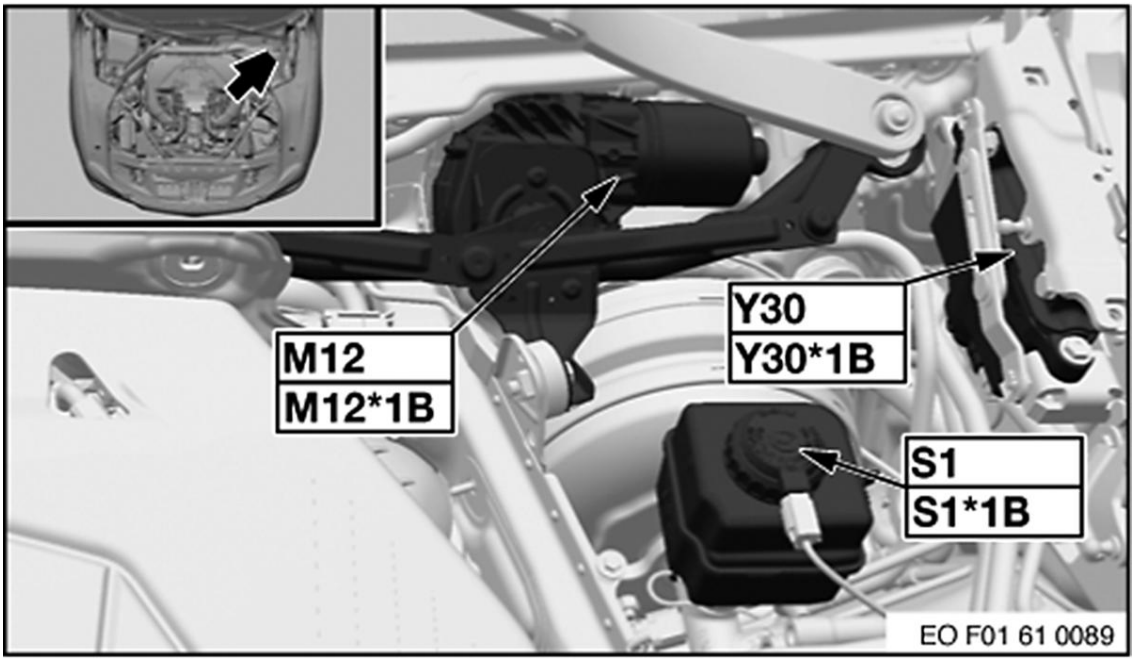


Fig. 180: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

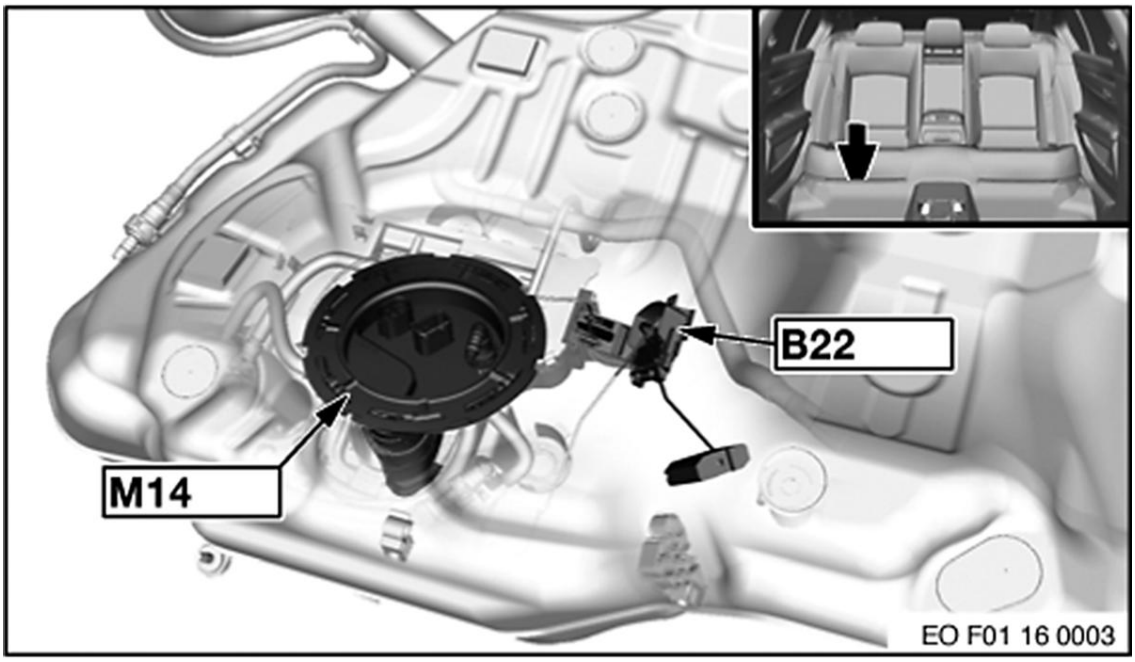


Fig. 181: Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

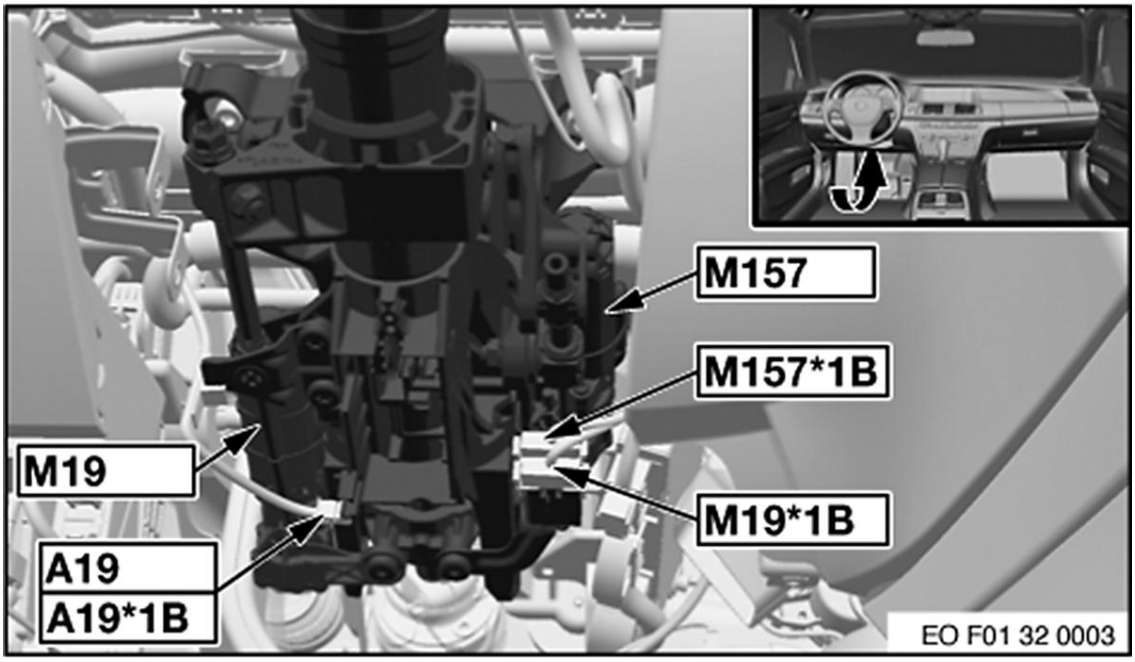


Fig. 182: Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

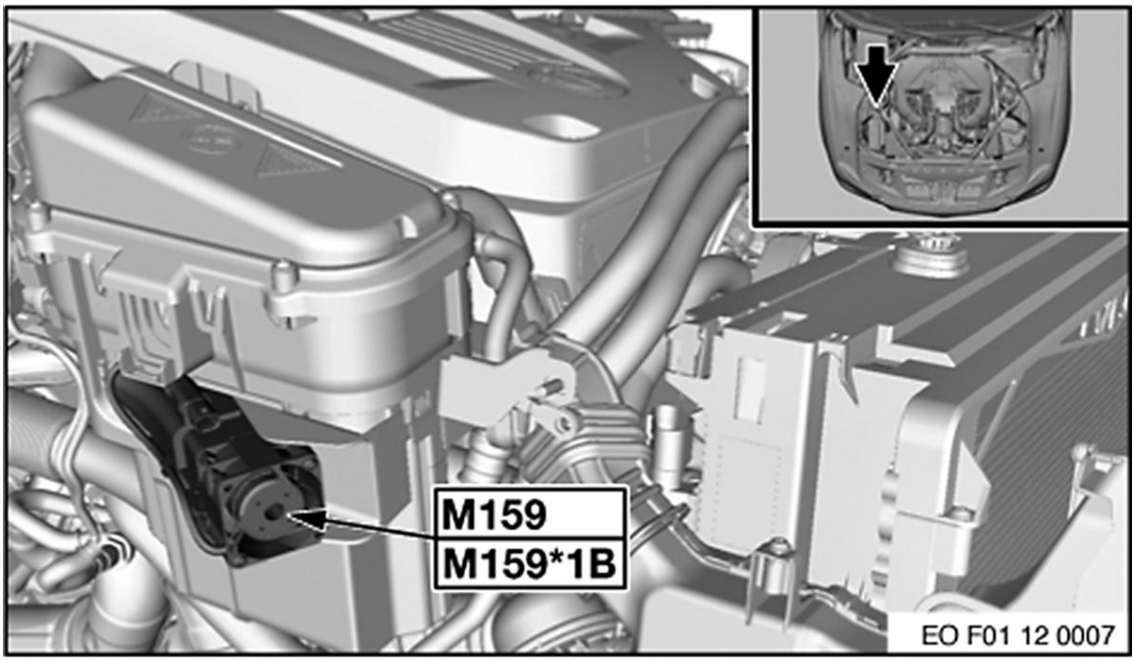


Fig. 183: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

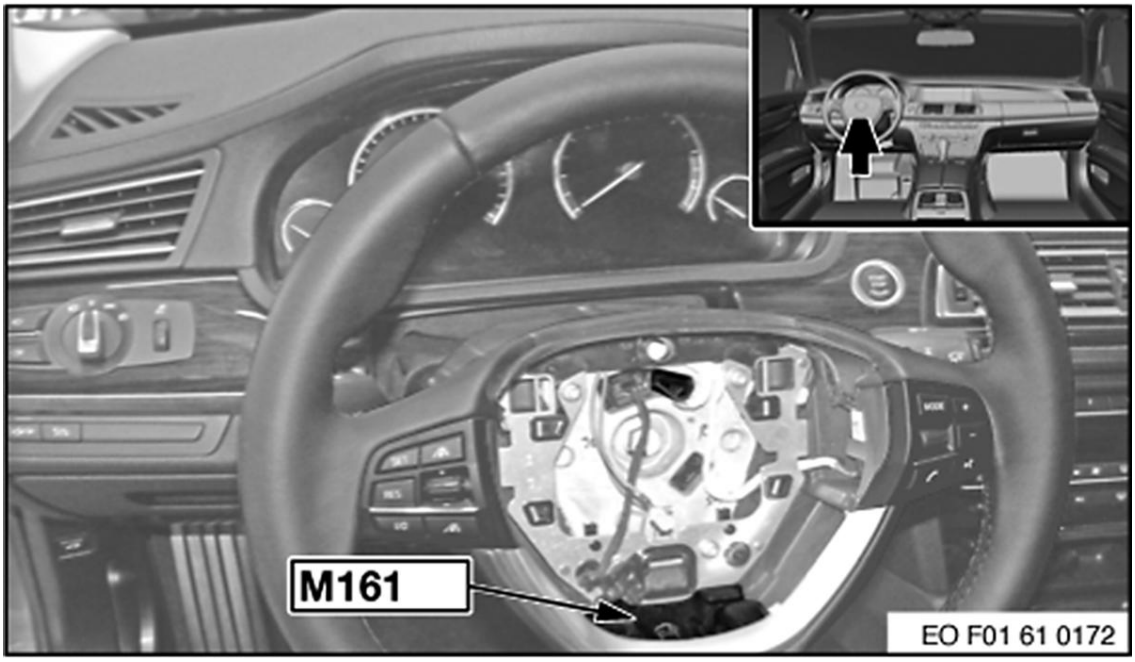


Fig. 184: Steering Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

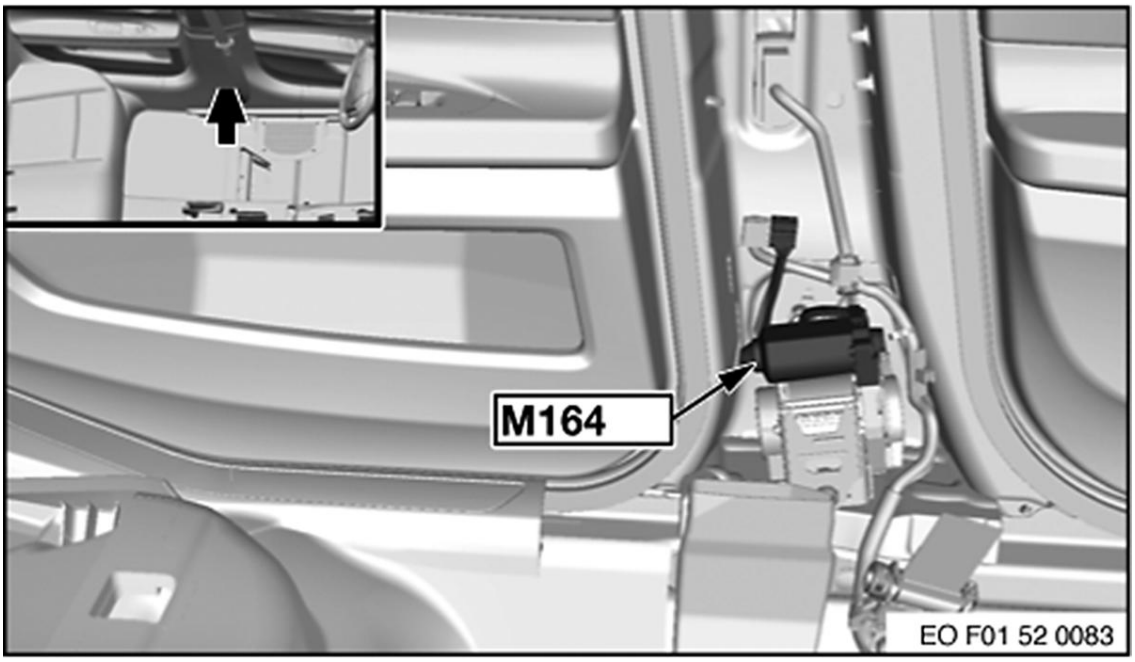


Fig. 185: Left "B" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

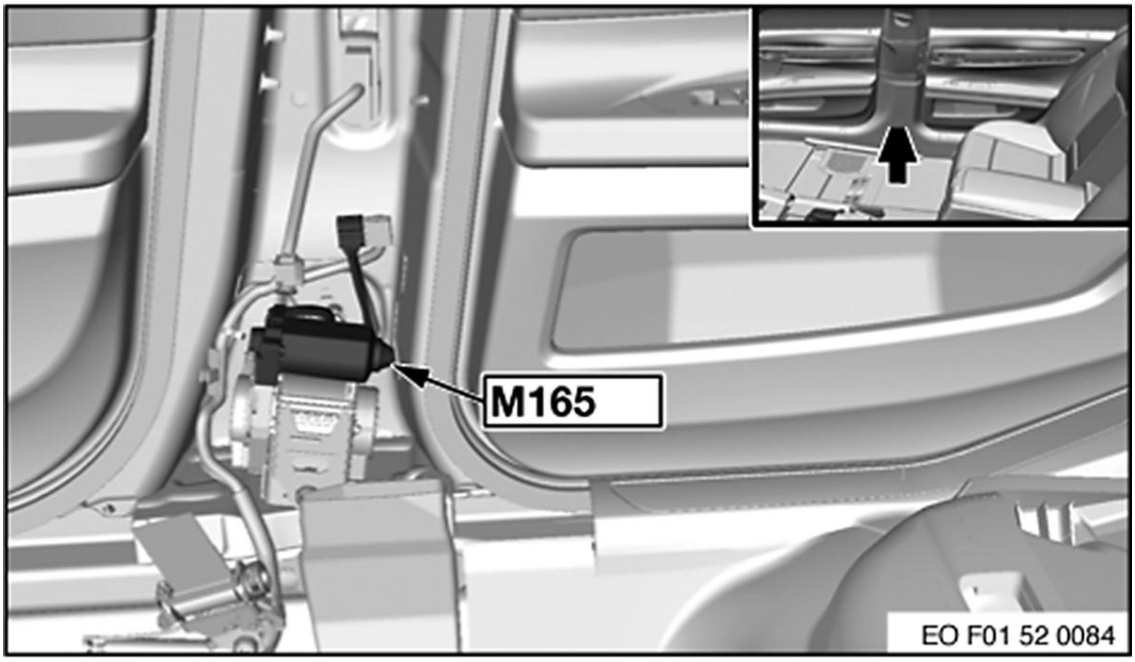


Fig. 186: Right "B" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

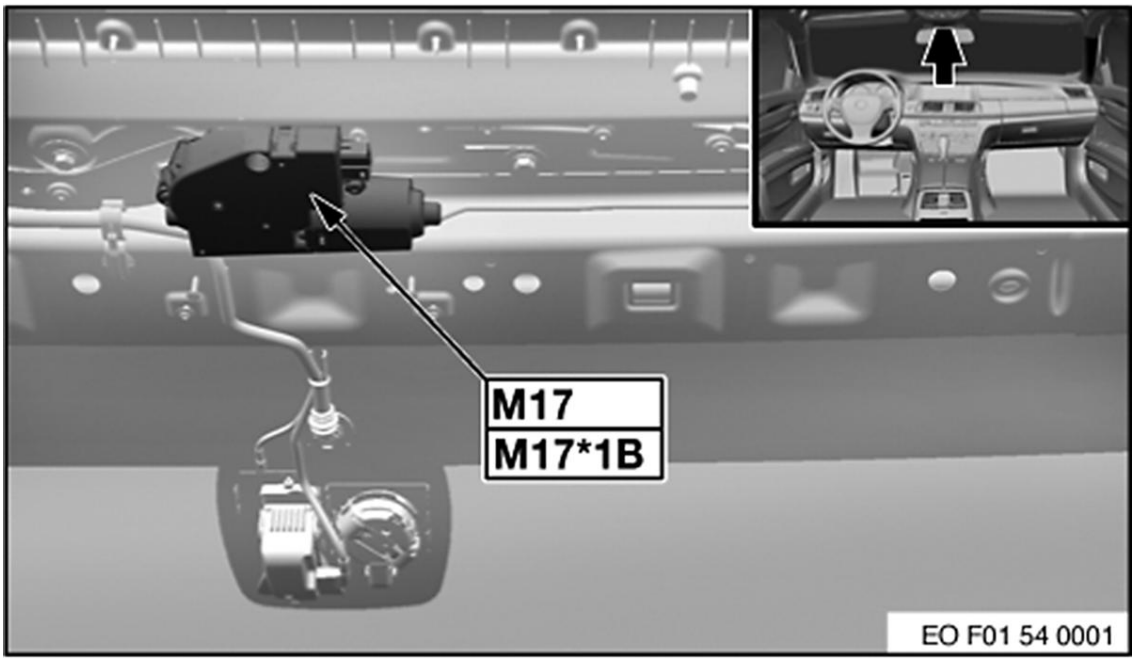


Fig. 187: Center Front Of Roof
Courtesy of BMW OF NORTH AMERICA, INC.

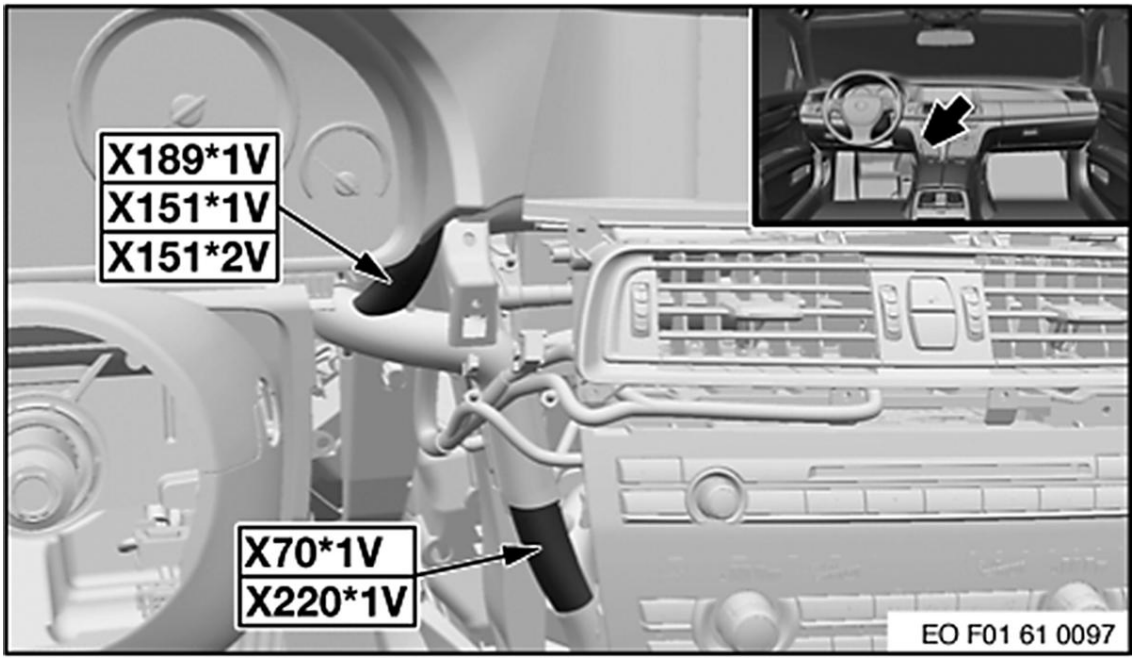


Fig. 188: Center Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

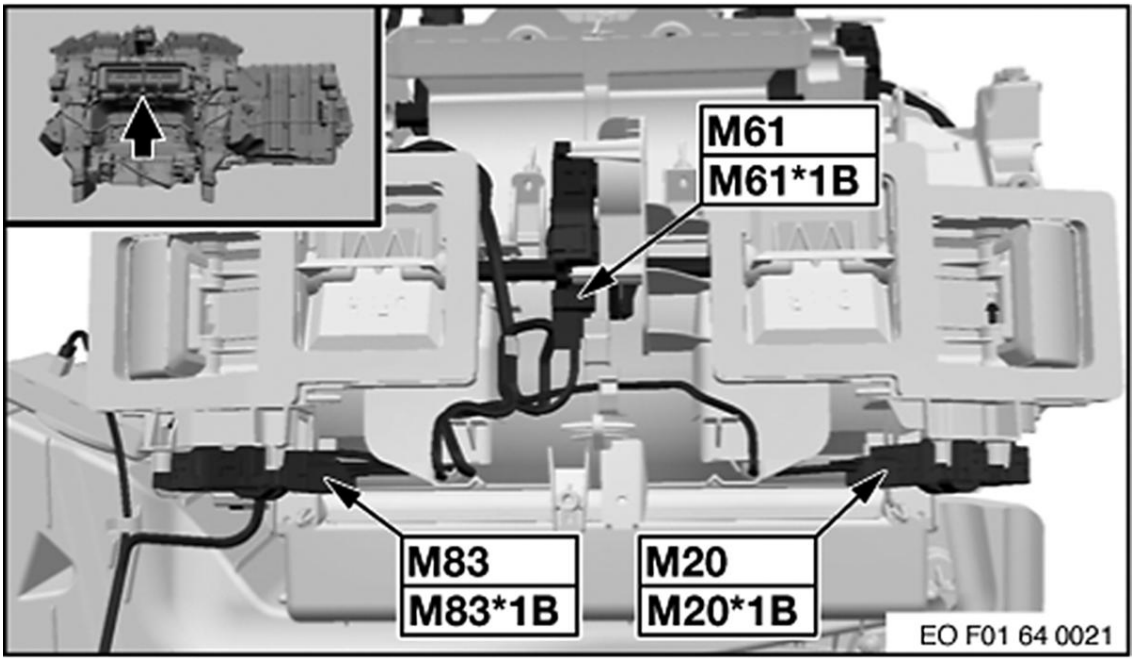


Fig. 189: HVAC Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

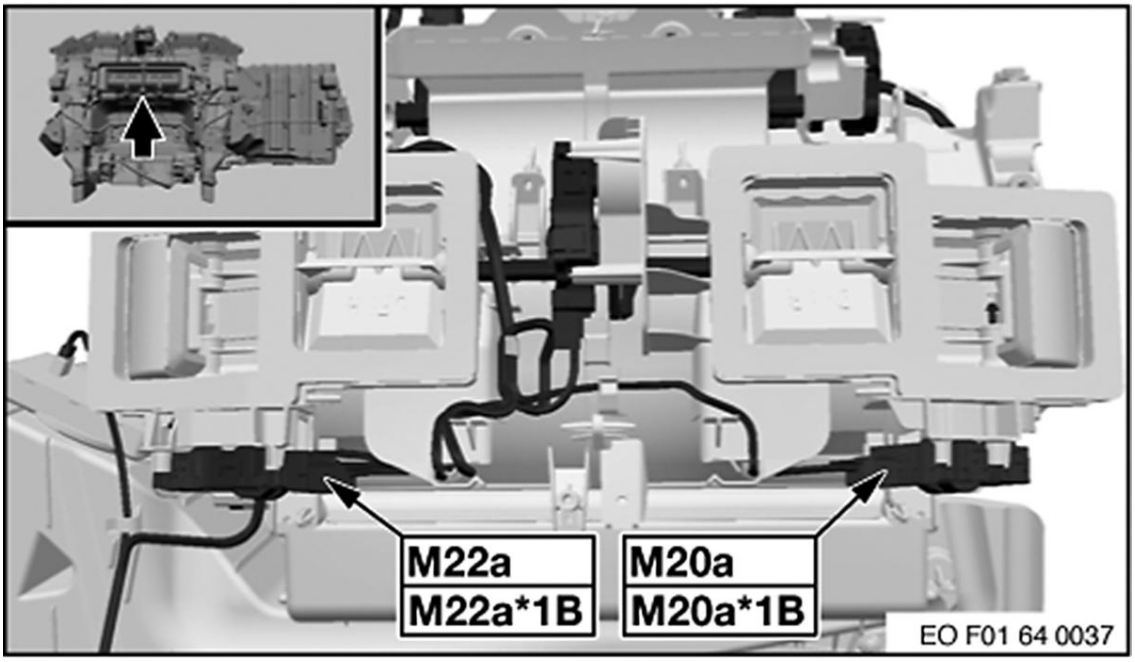


Fig. 190: HVAC Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

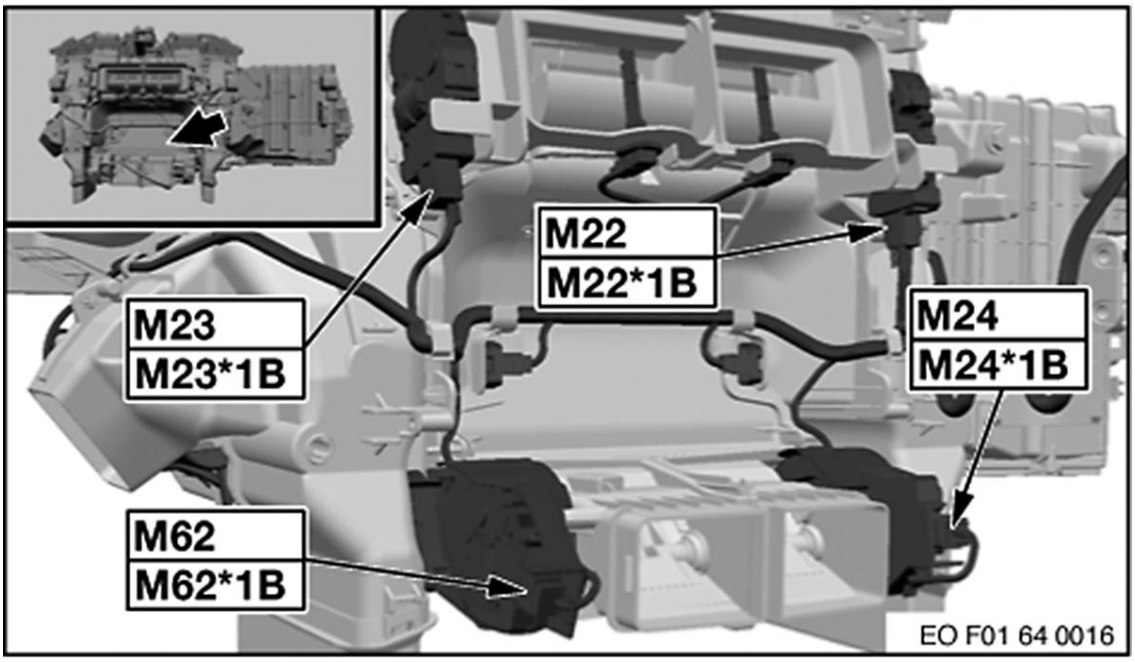


Fig. 191: HVAC Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

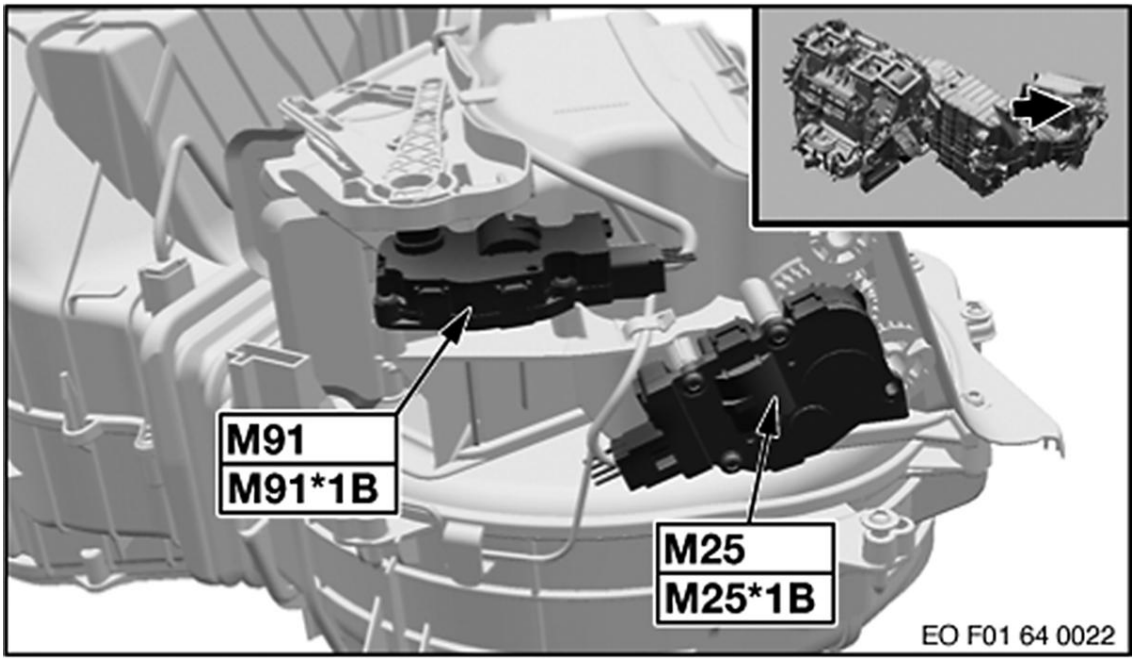


Fig. 192: HVAC Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

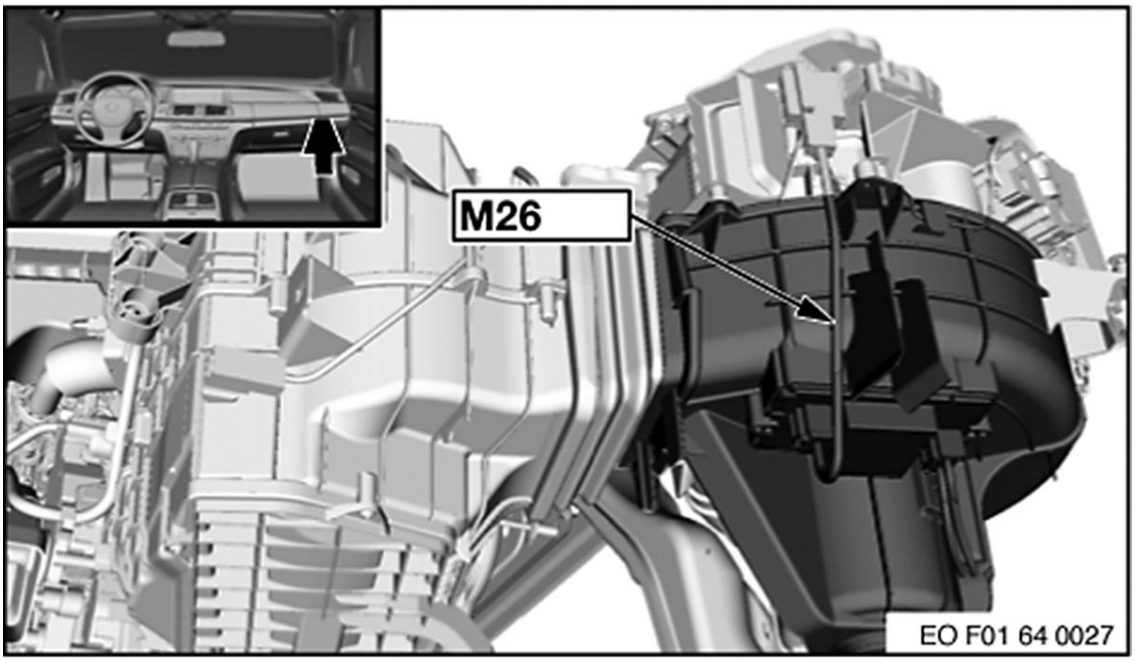


Fig. 193: Dash Panel
Courtesy of BMW OF NORTH AMERICA, INC.

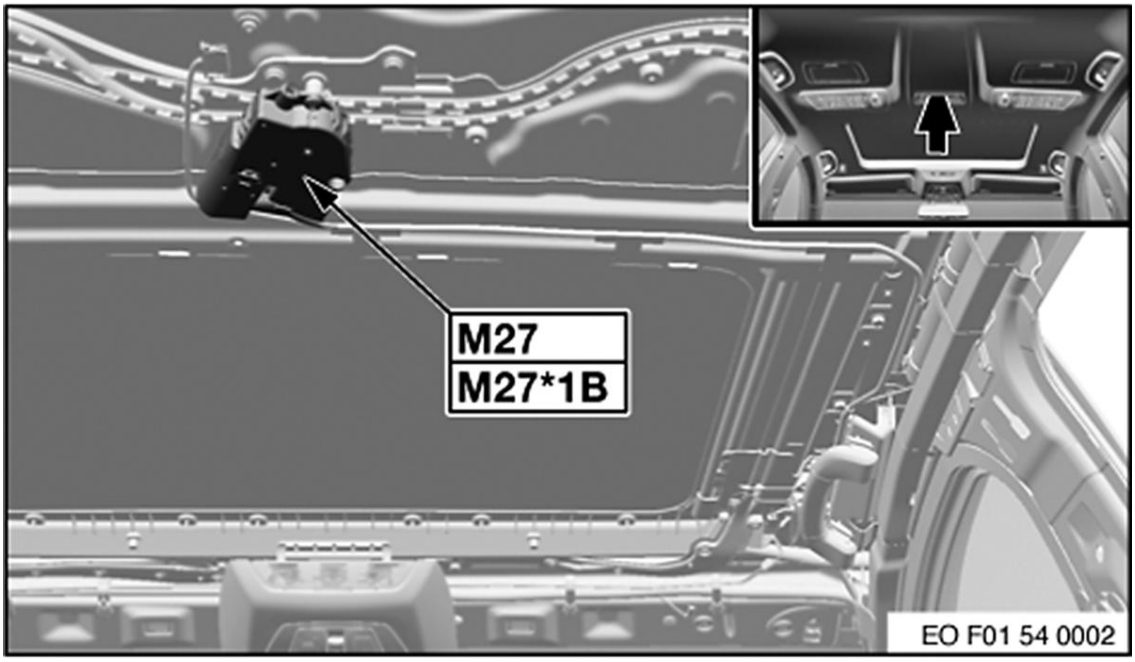


Fig. 194: Roof
Courtesy of BMW OF NORTH AMERICA, INC.

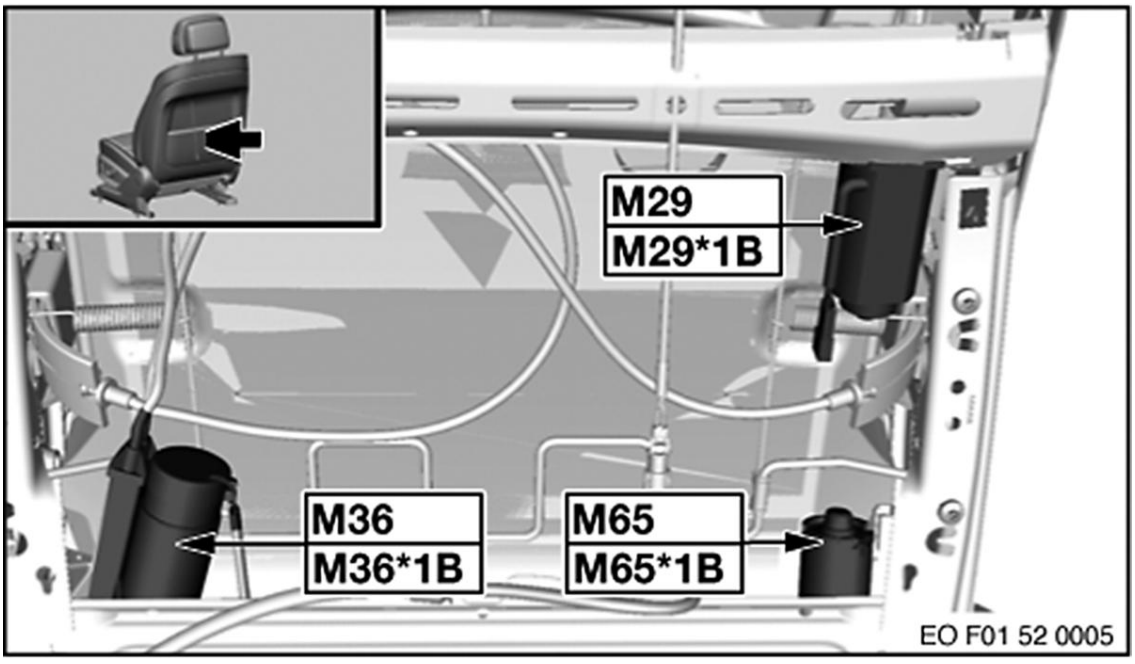


Fig. 195: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

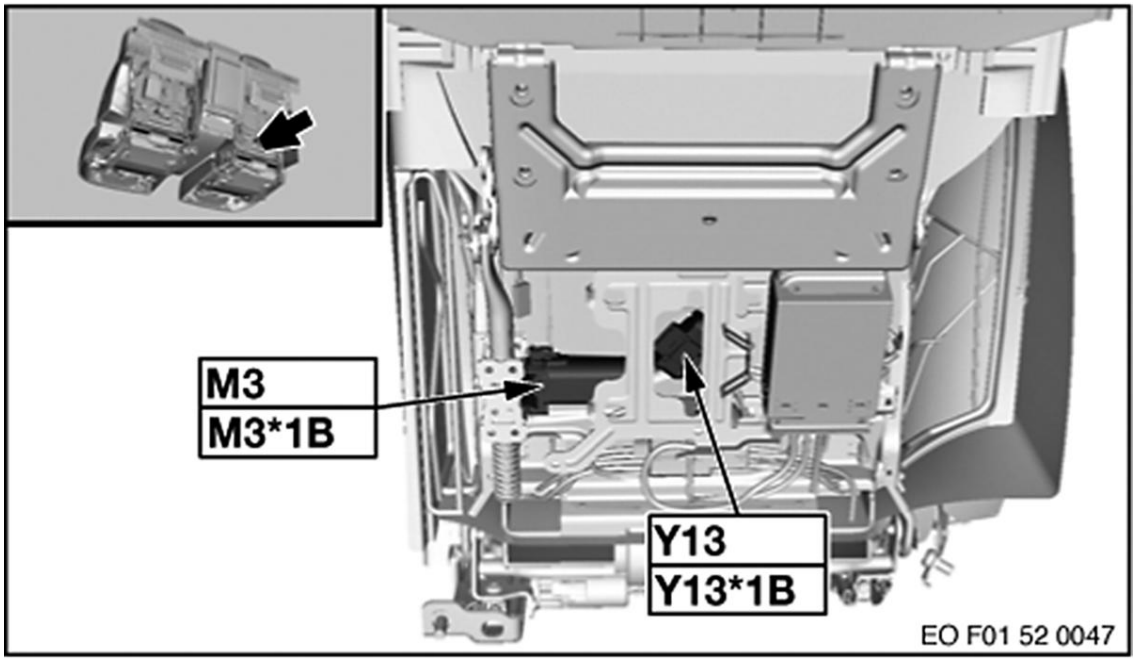


Fig. 196: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

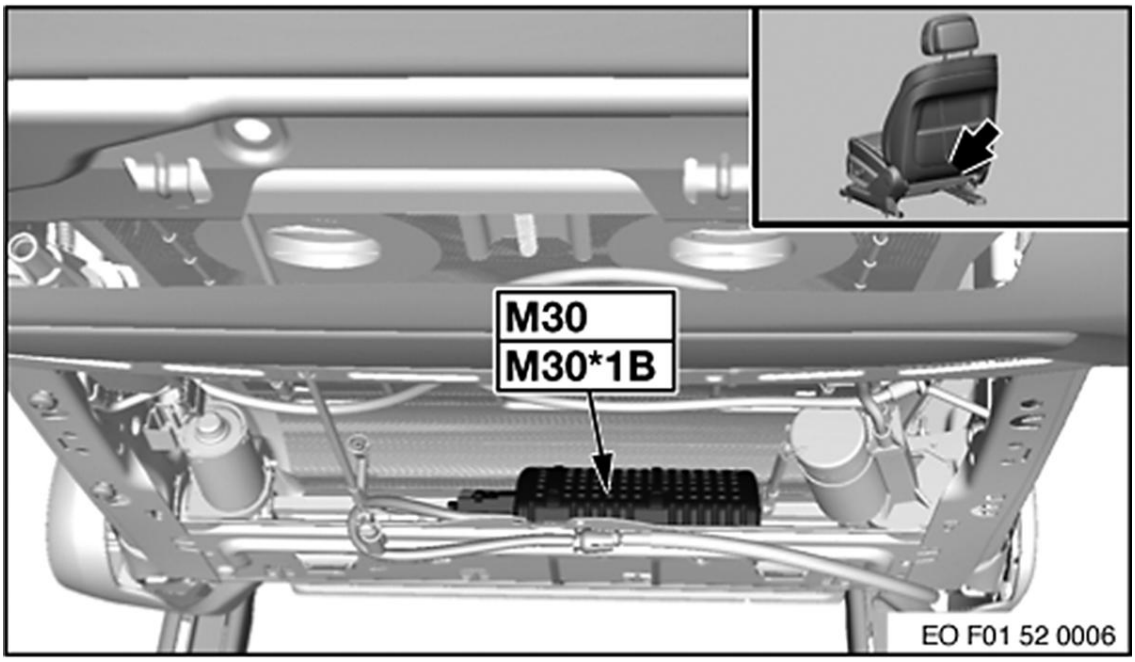


Fig. 197: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

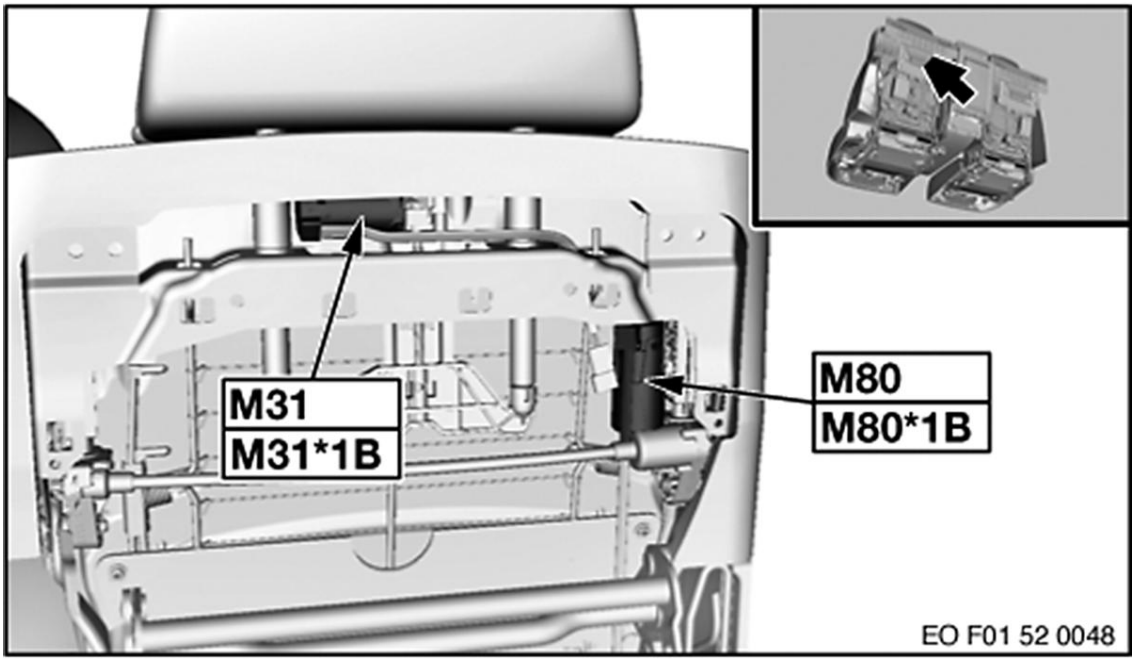


Fig. 198: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

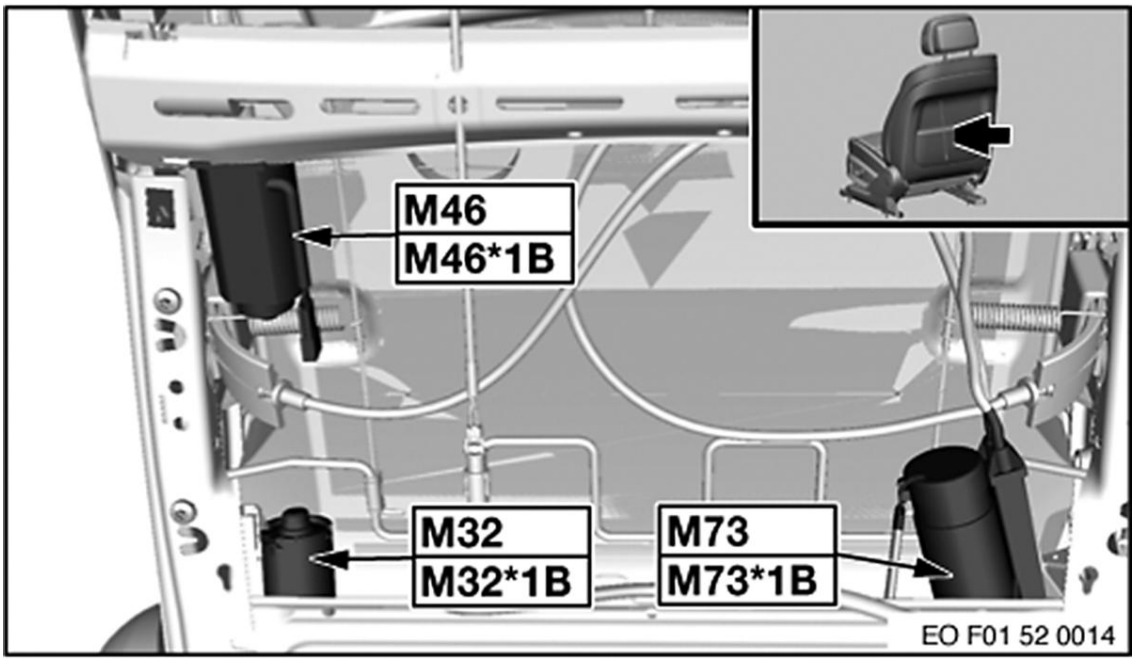


Fig. 199: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

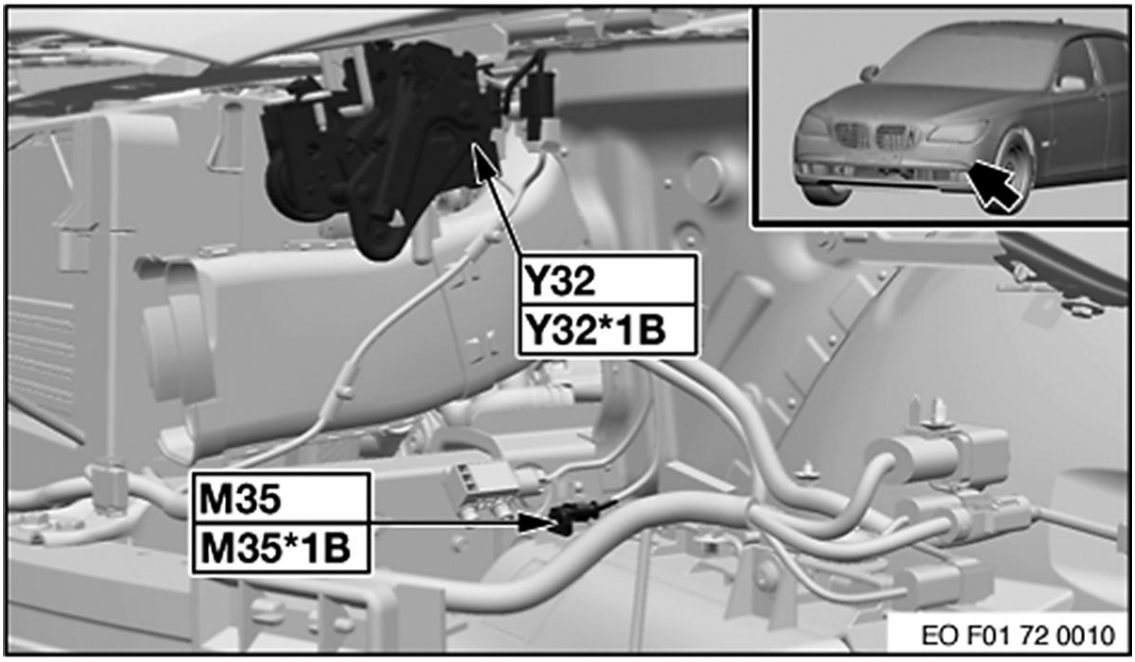


Fig. 200: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

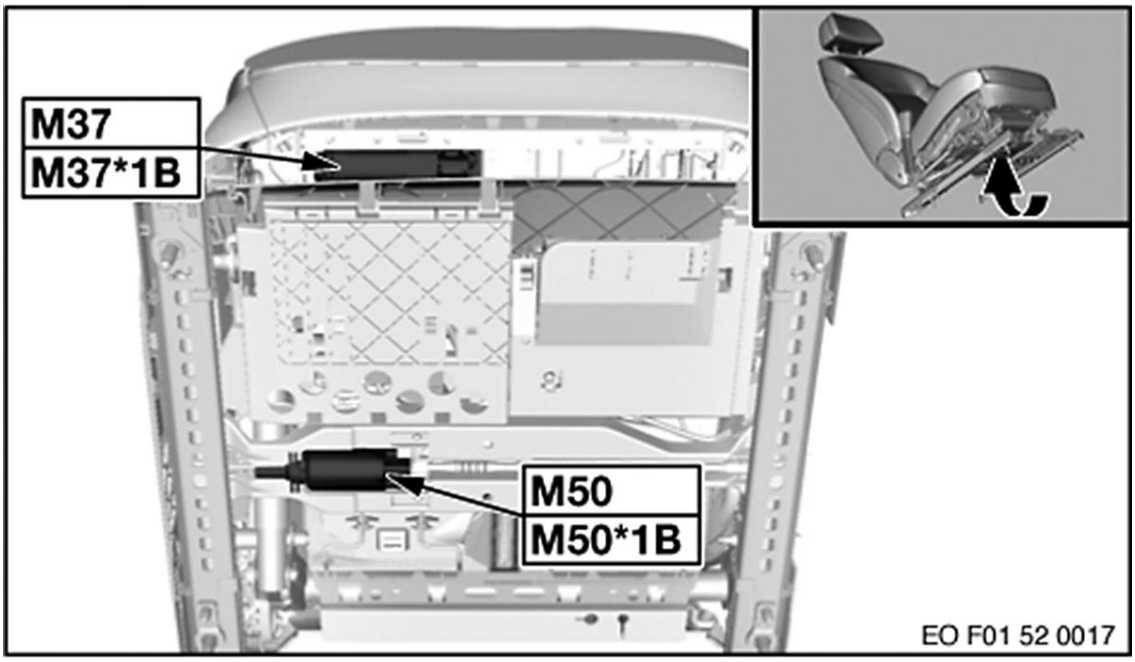


Fig. 201: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

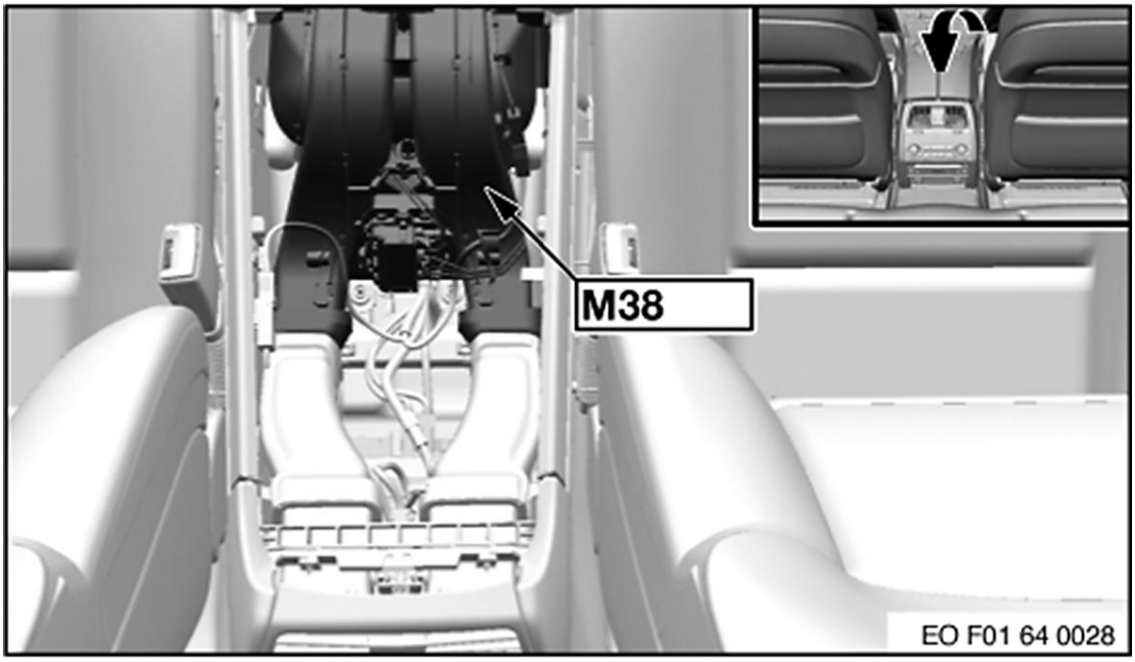


Fig. 202: Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

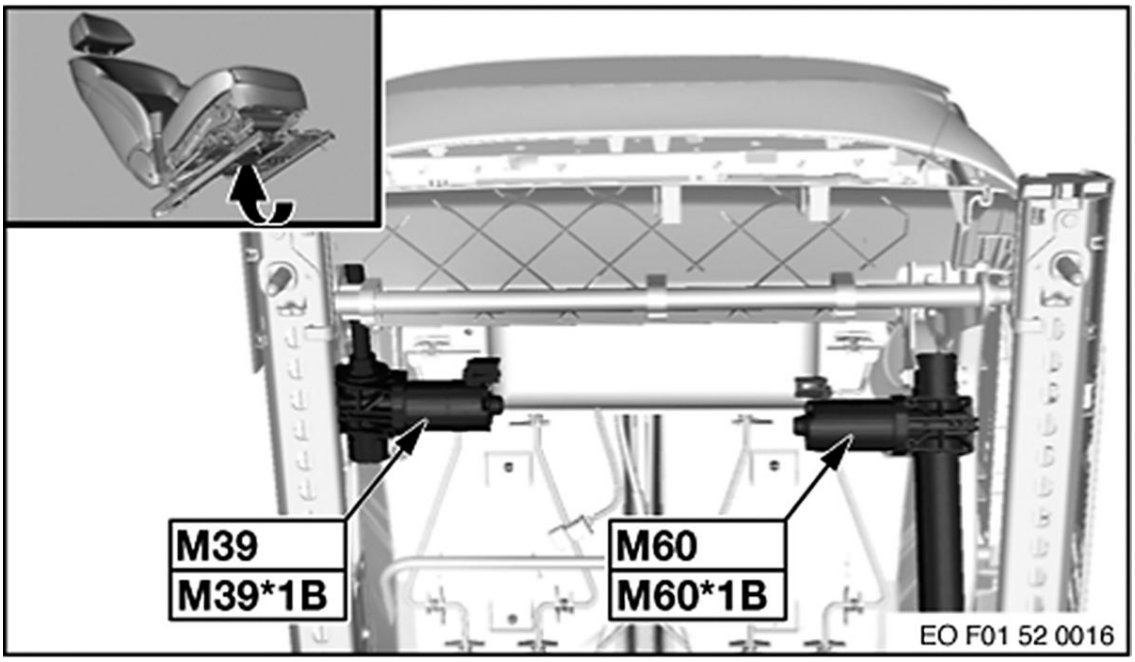


Fig. 203: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

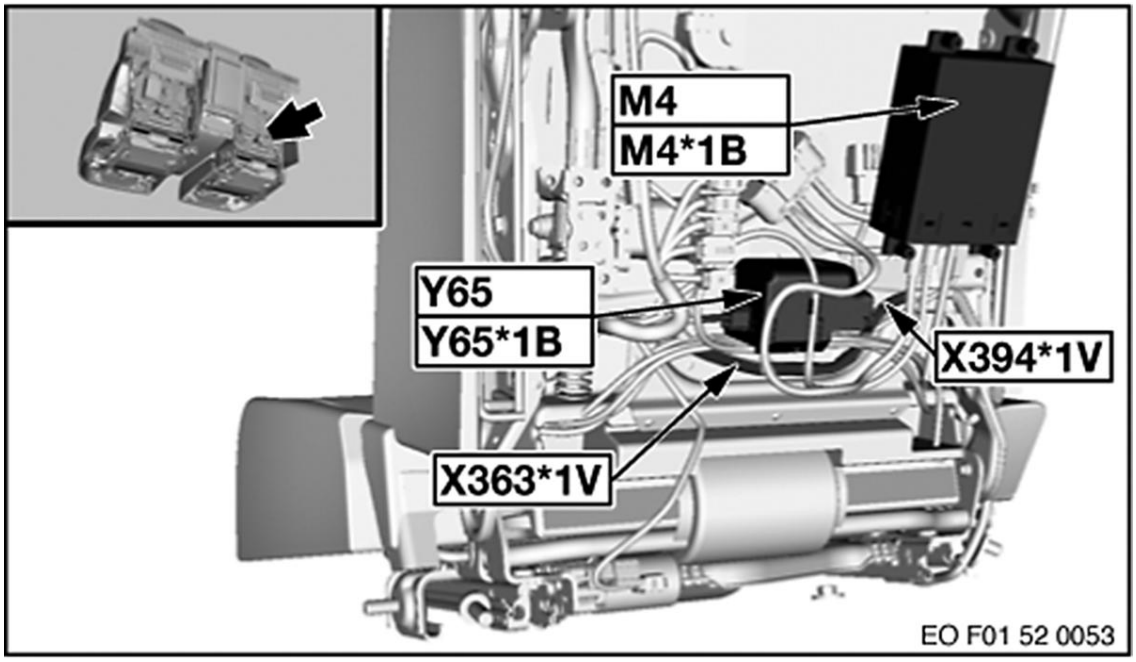


Fig. 204: Right Rear Seat
Courtesy of BMW OF NORTH AMERICA, INC.

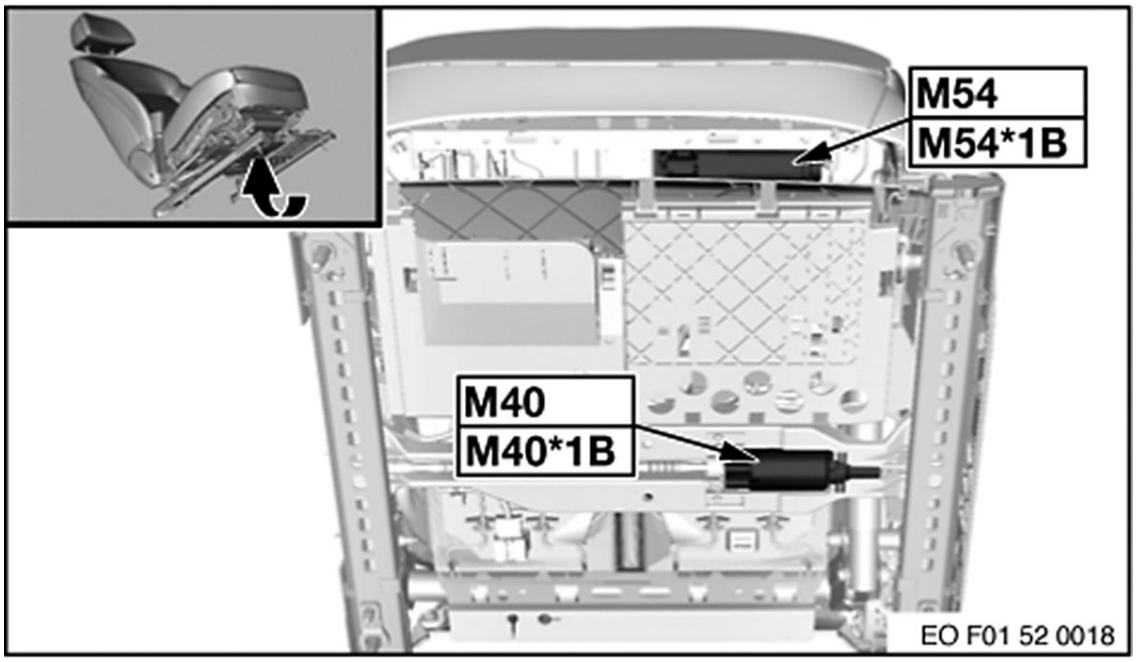


Fig. 205: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

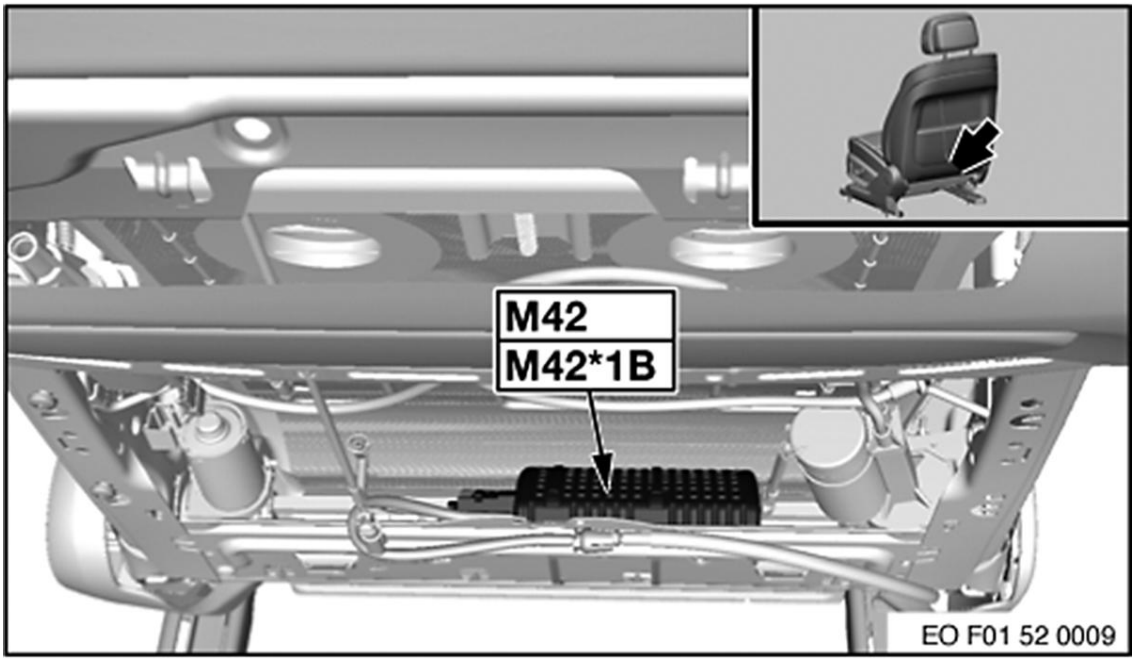


Fig. 206: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

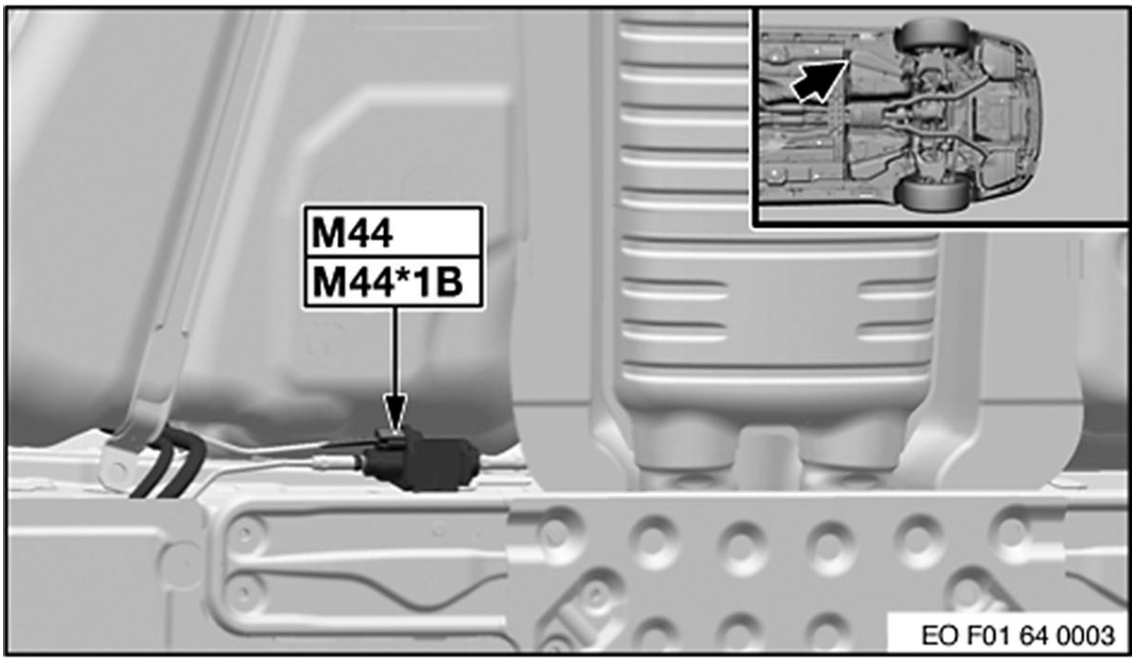


Fig. 207: Under Rear Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

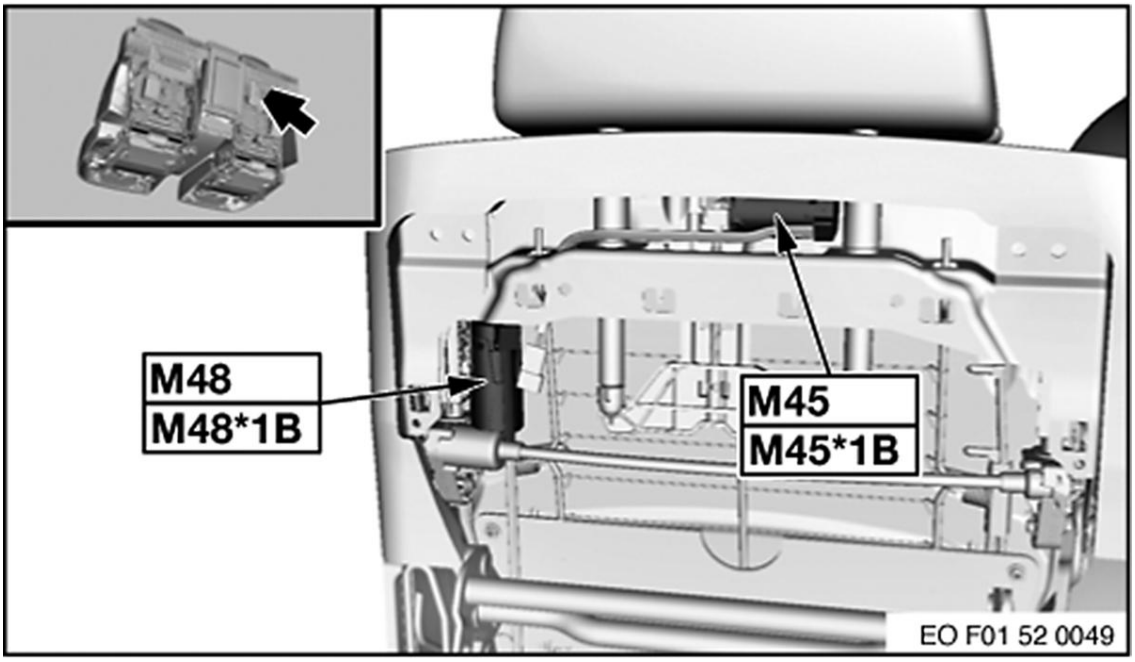


Fig. 208: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

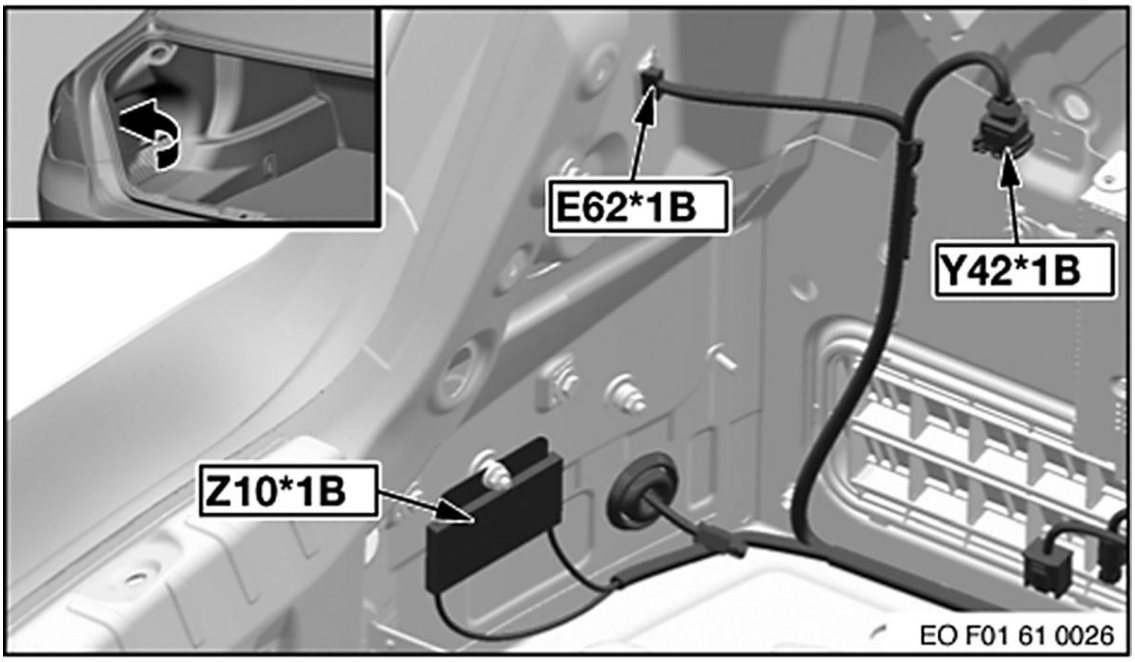


Fig. 209: Left Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

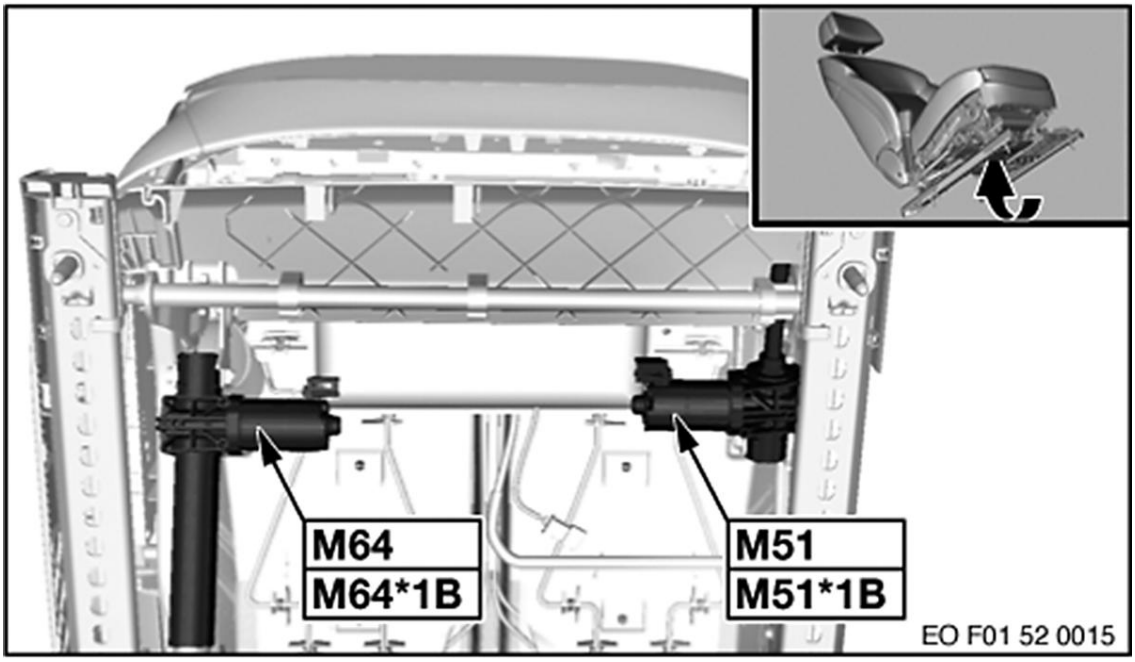


Fig. 210: Right Front Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

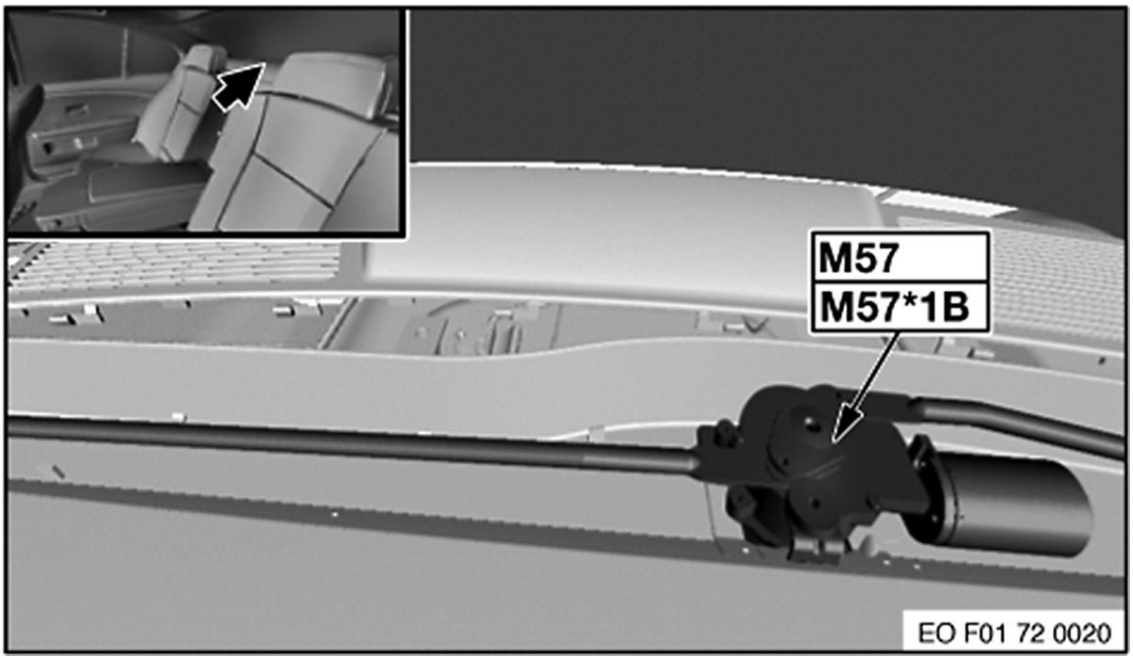


Fig. 211: Rear Package Tray
Courtesy of BMW OF NORTH AMERICA, INC.

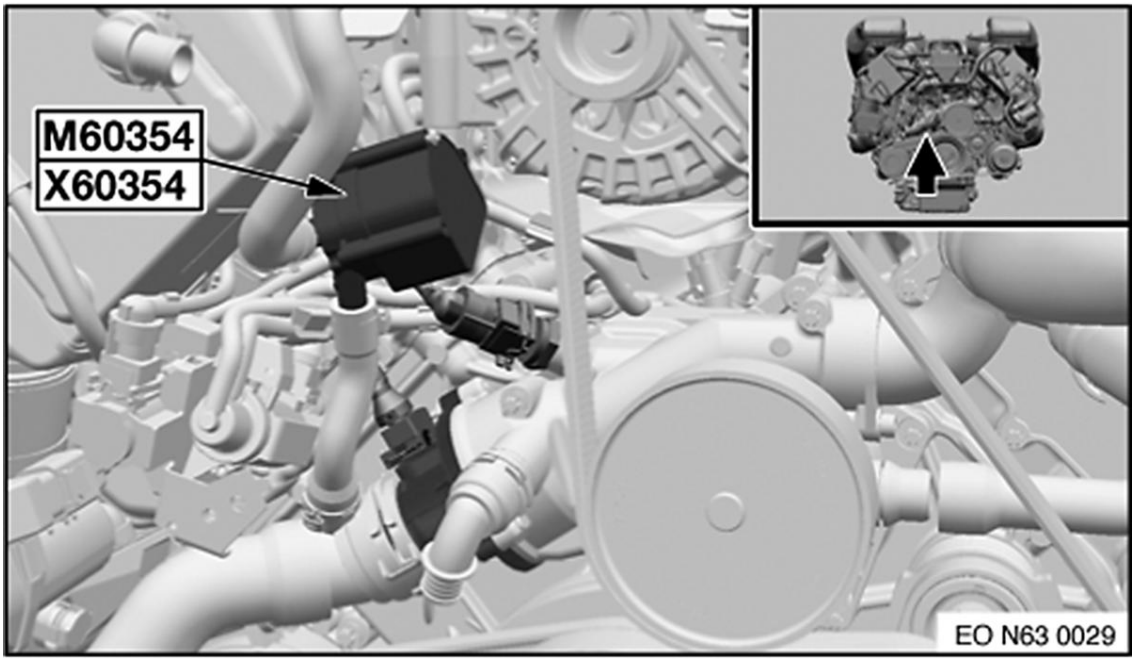


Fig. 212: Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

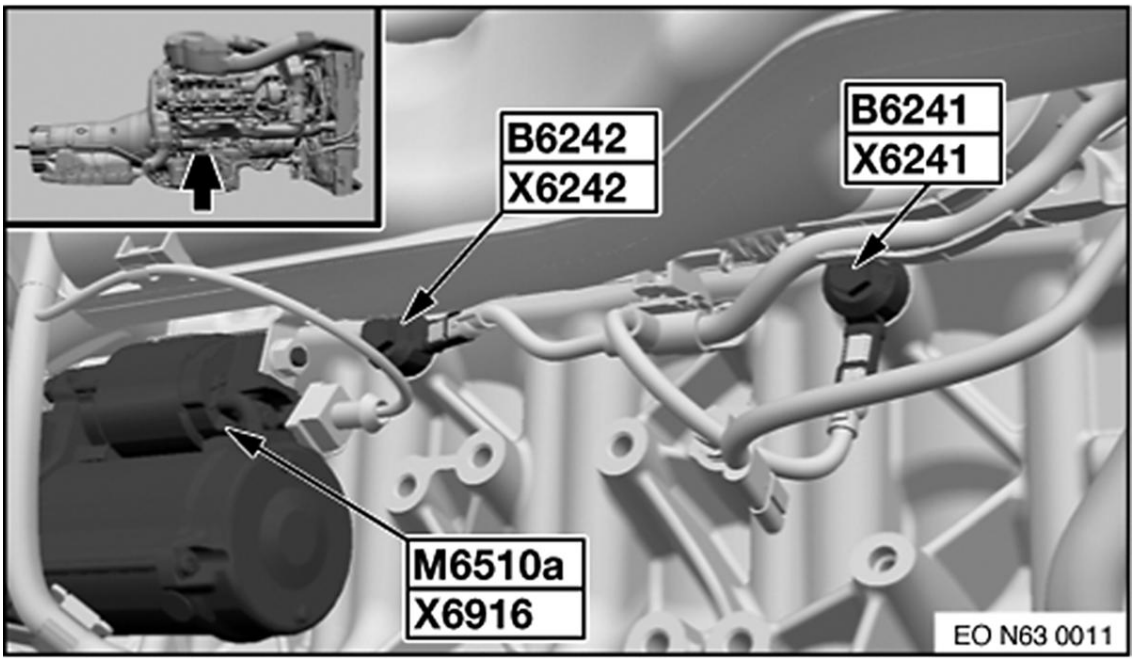


Fig. 213: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

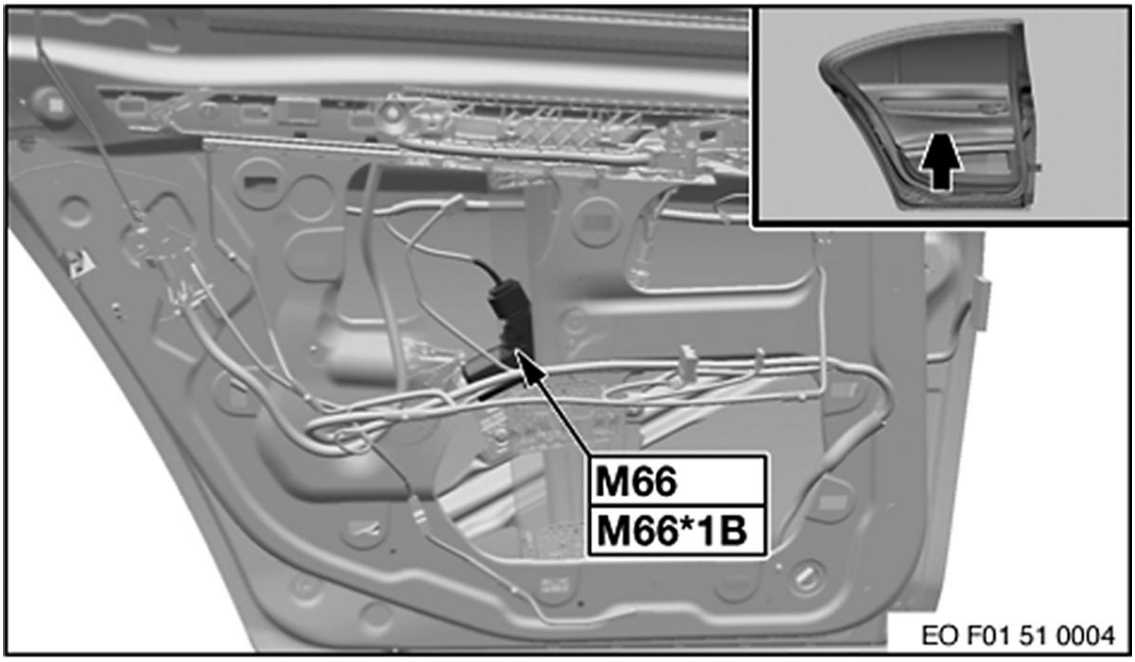


Fig. 214: Left Rear Door
Courtesy of BMW OF NORTH AMERICA, INC.

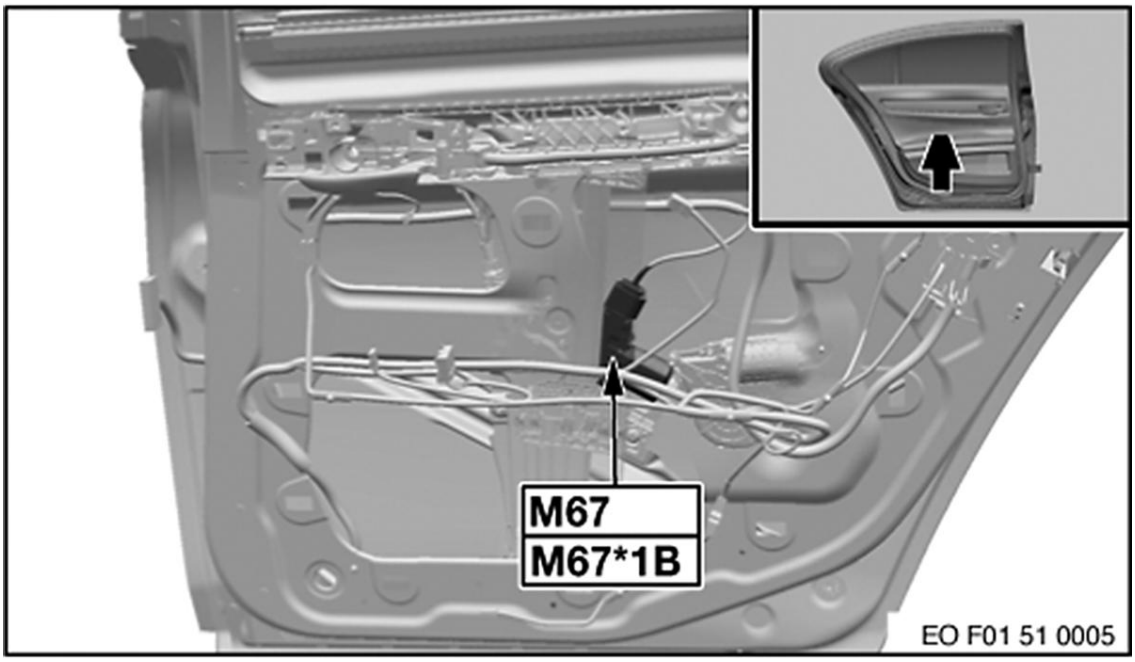


Fig. 215: Right Rear Door
Courtesy of BMW OF NORTH AMERICA, INC.

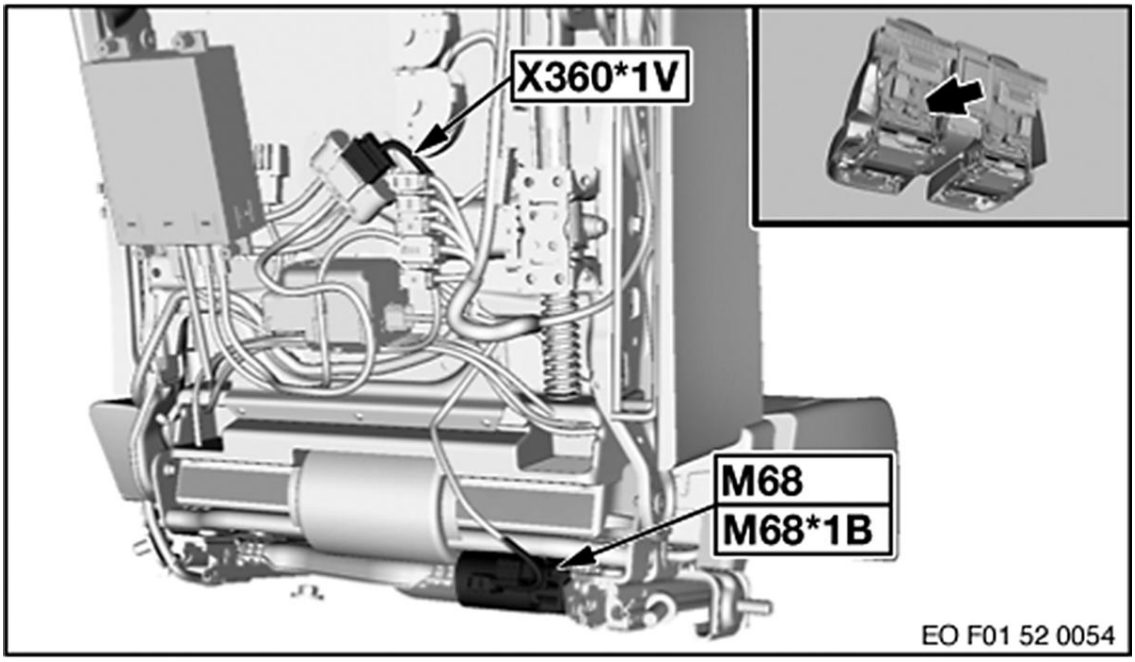


Fig. 216: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

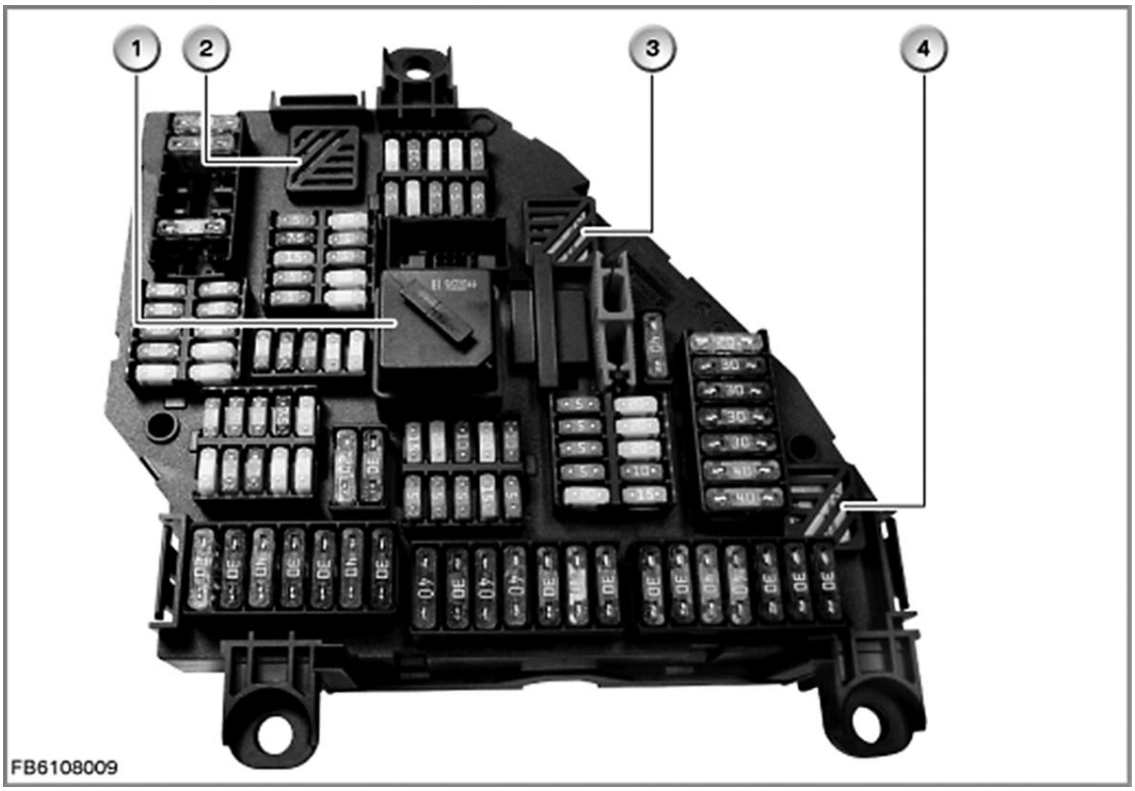


Fig. 217: Rear Distribution Box
Courtesy of BMW OF NORTH AMERICA, INC.

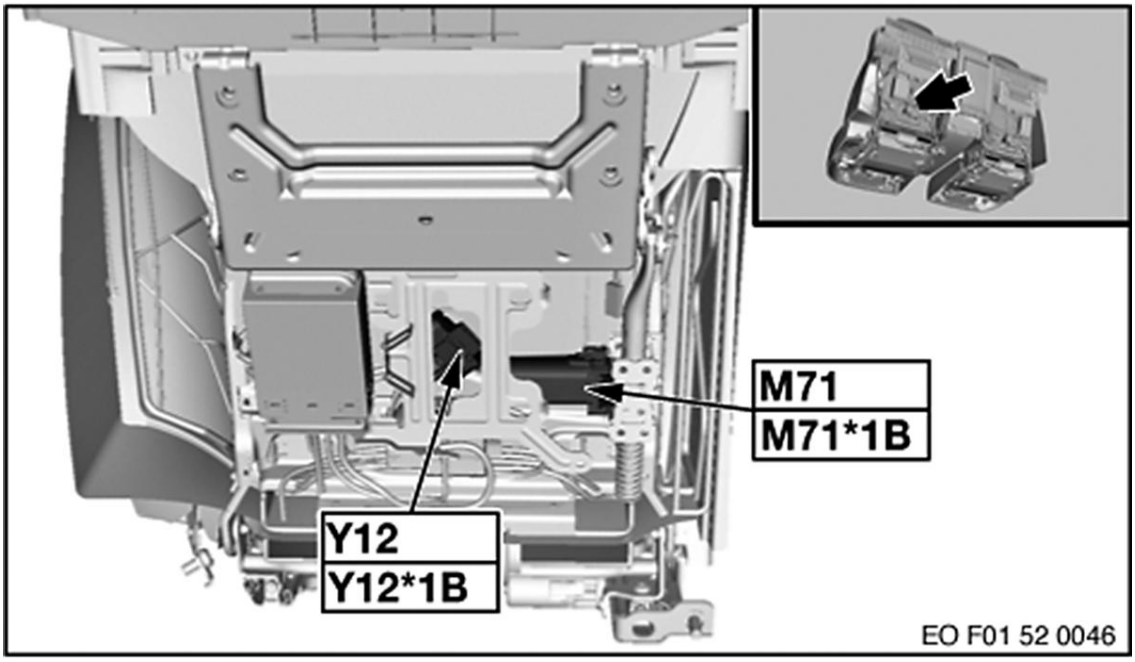


Fig. 218: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

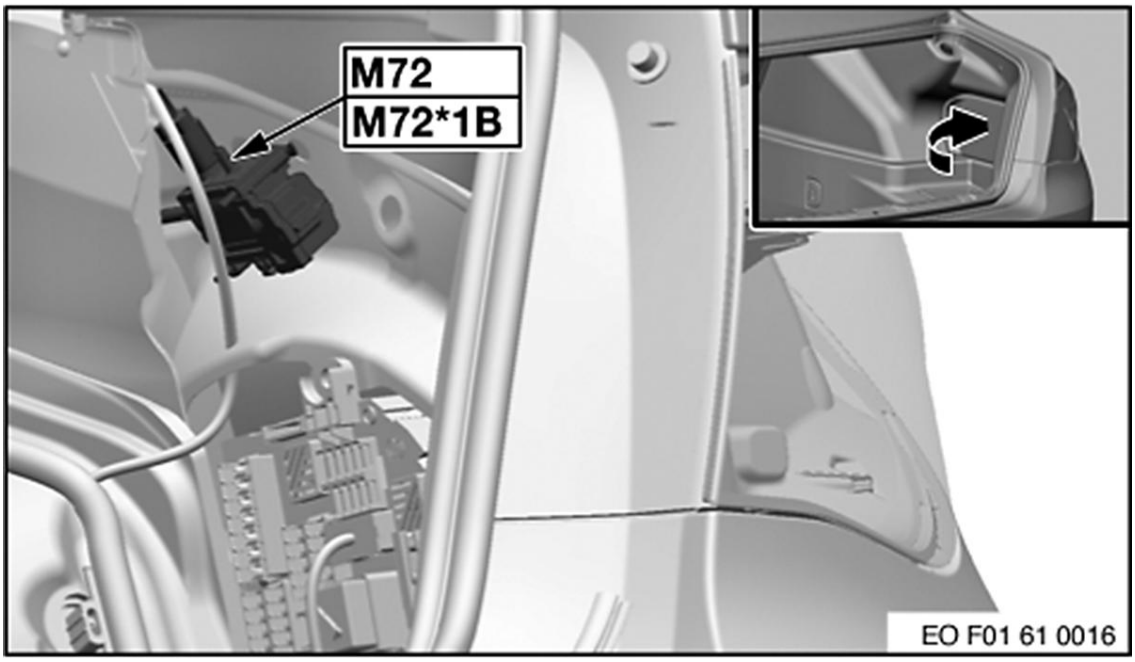


Fig. 219: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

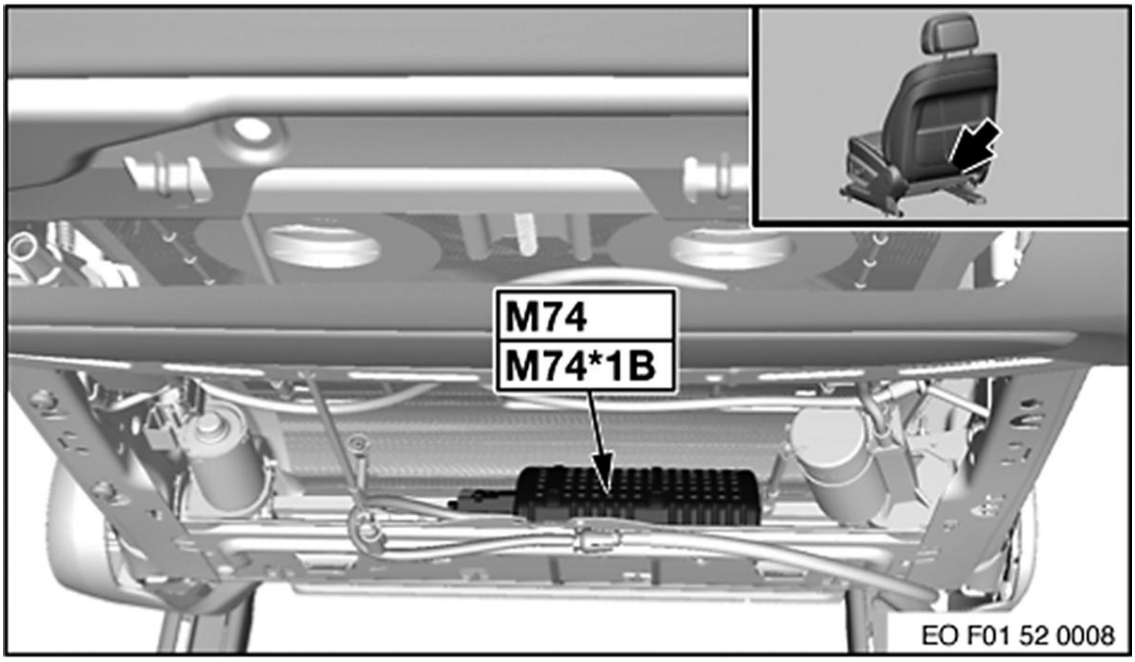


Fig. 220: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

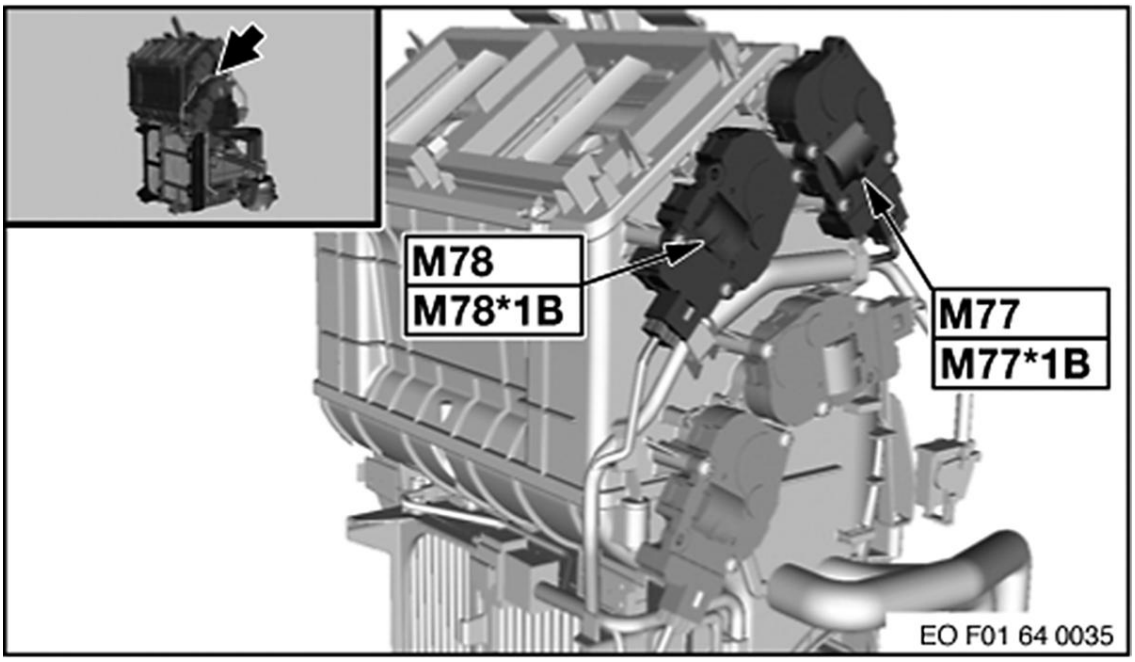


Fig. 221: Rear Climate Control Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

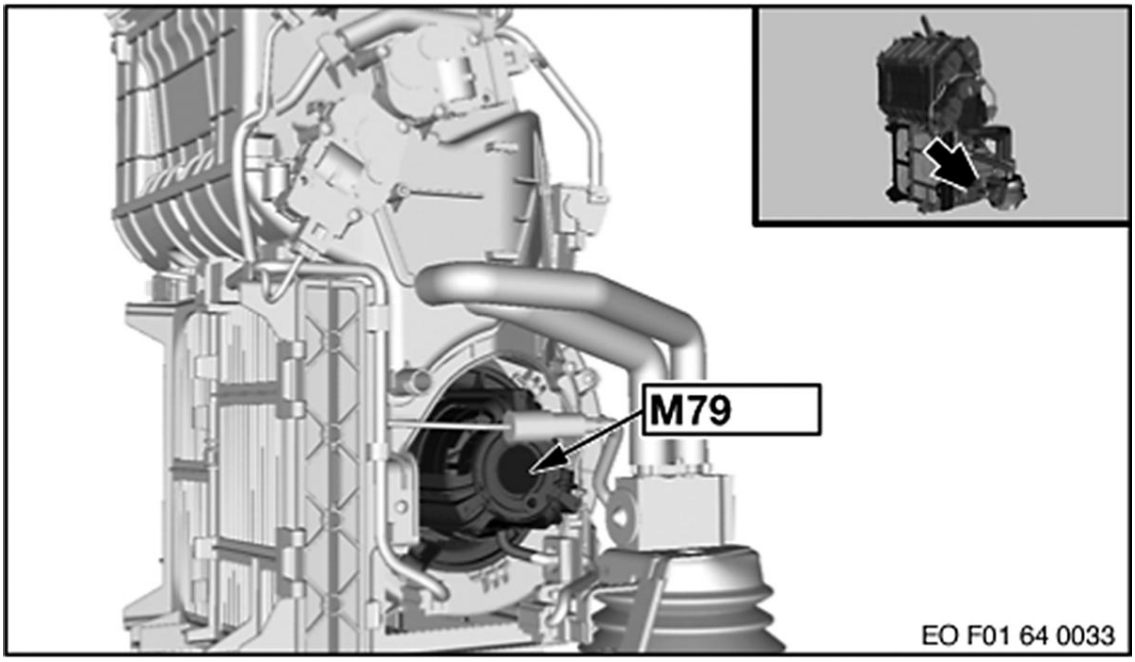


Fig. 222: Rear Climate Control Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

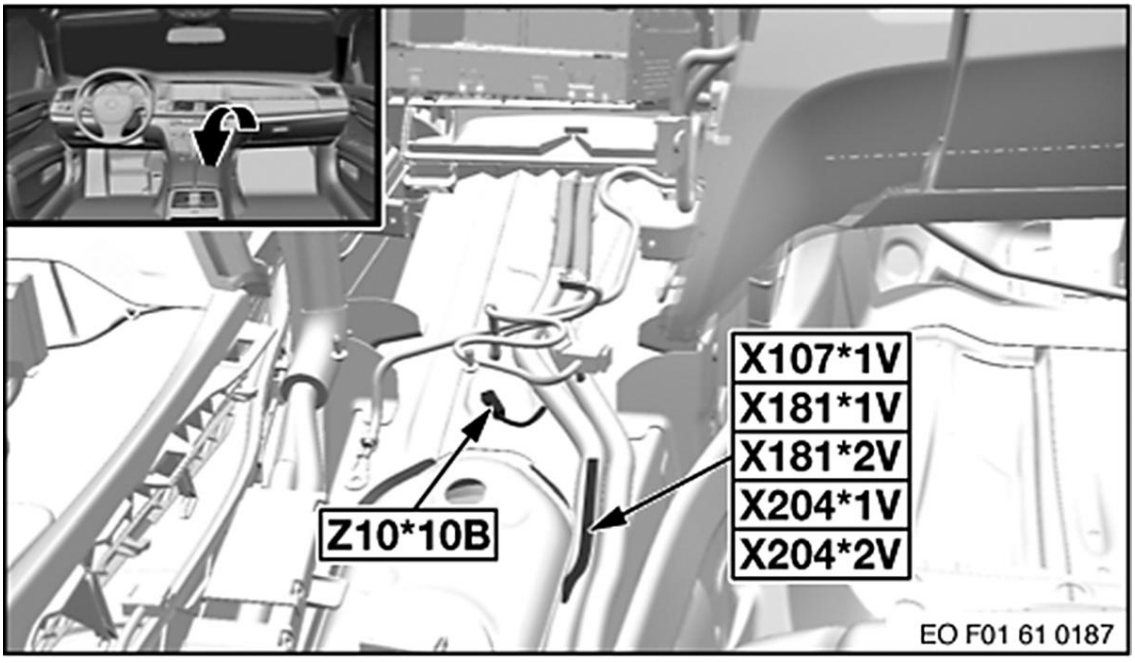


Fig. 223: Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

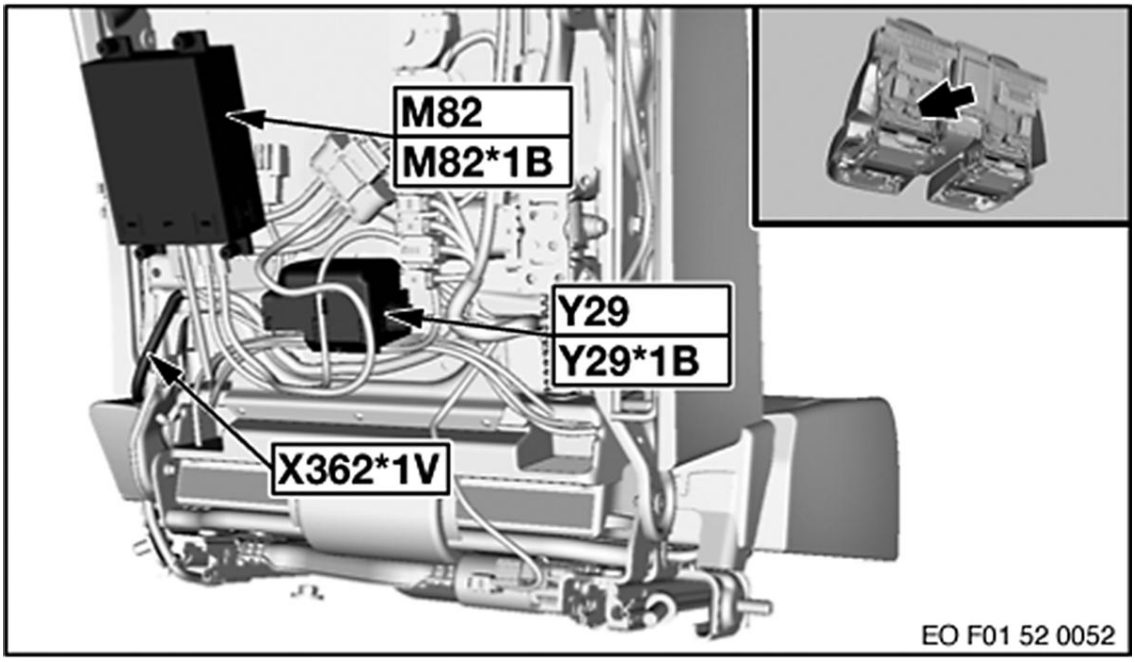


Fig. 224: Left Rear Seat
Courtesy of BMW OF NORTH AMERICA, INC.

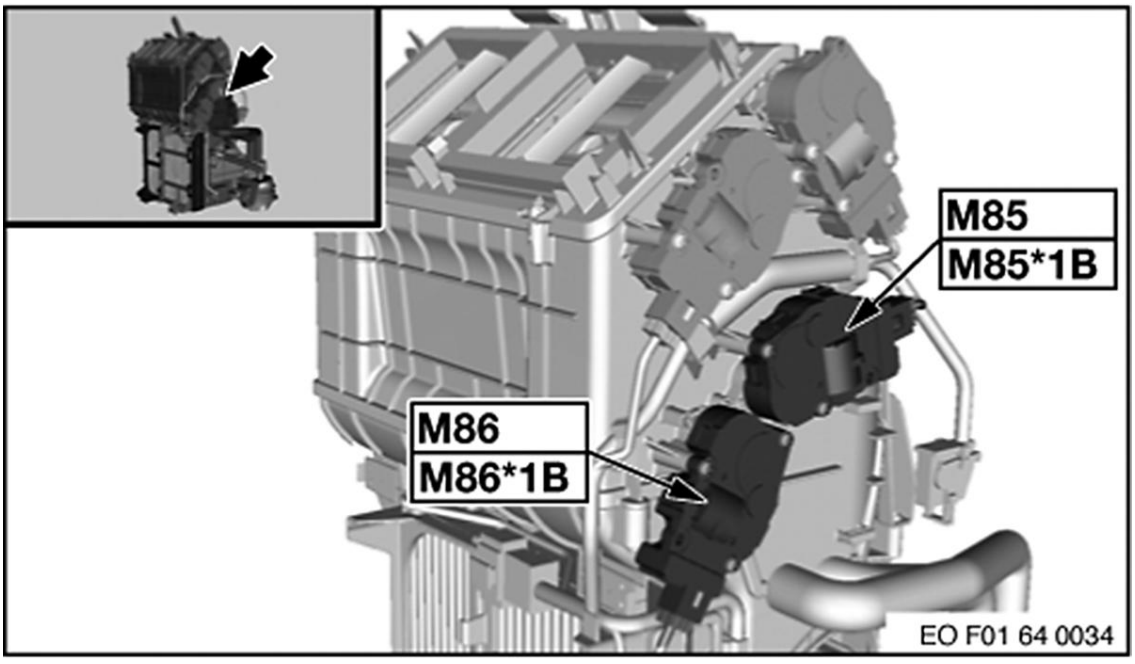


Fig. 225: Rear Climate Control Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

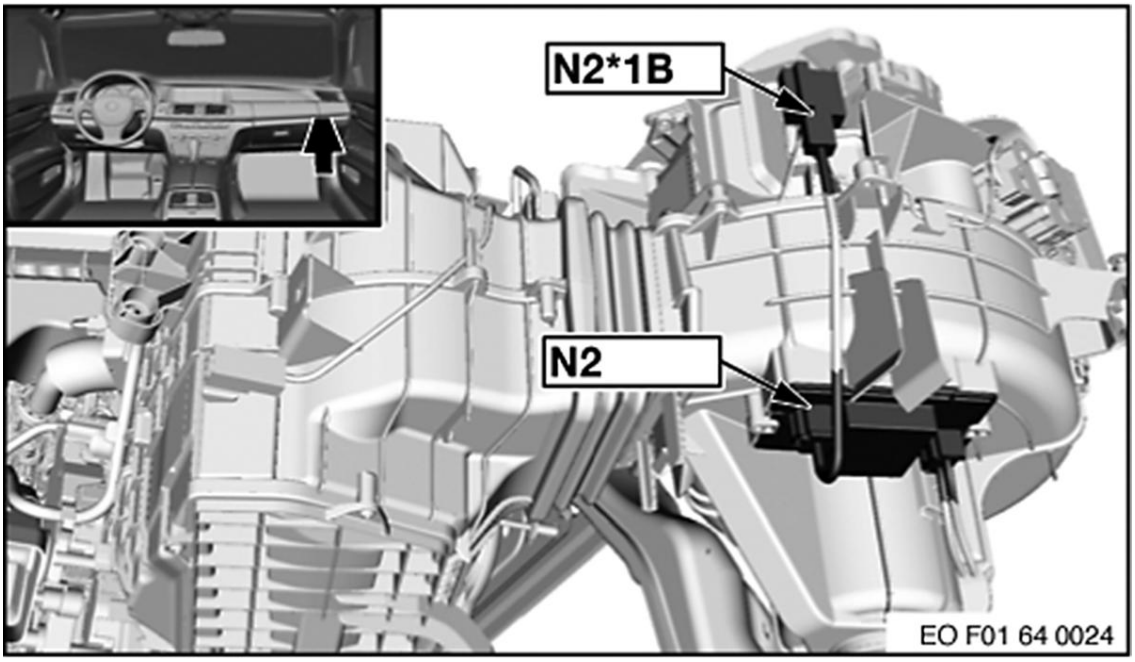


Fig. 226: Right Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

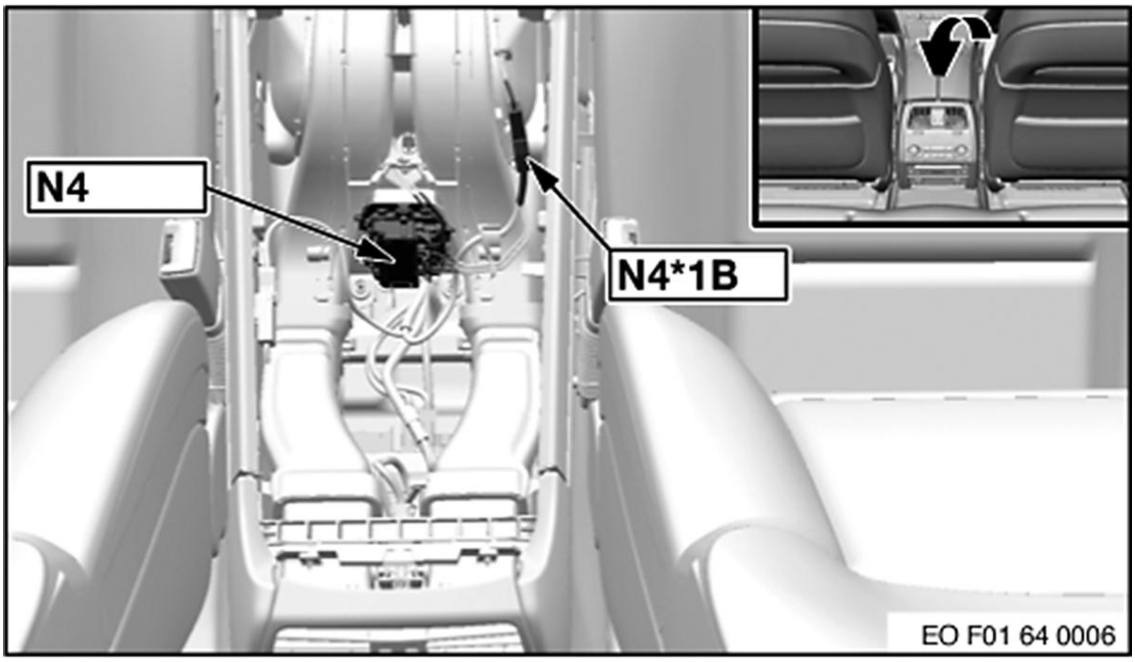


Fig. 227: Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

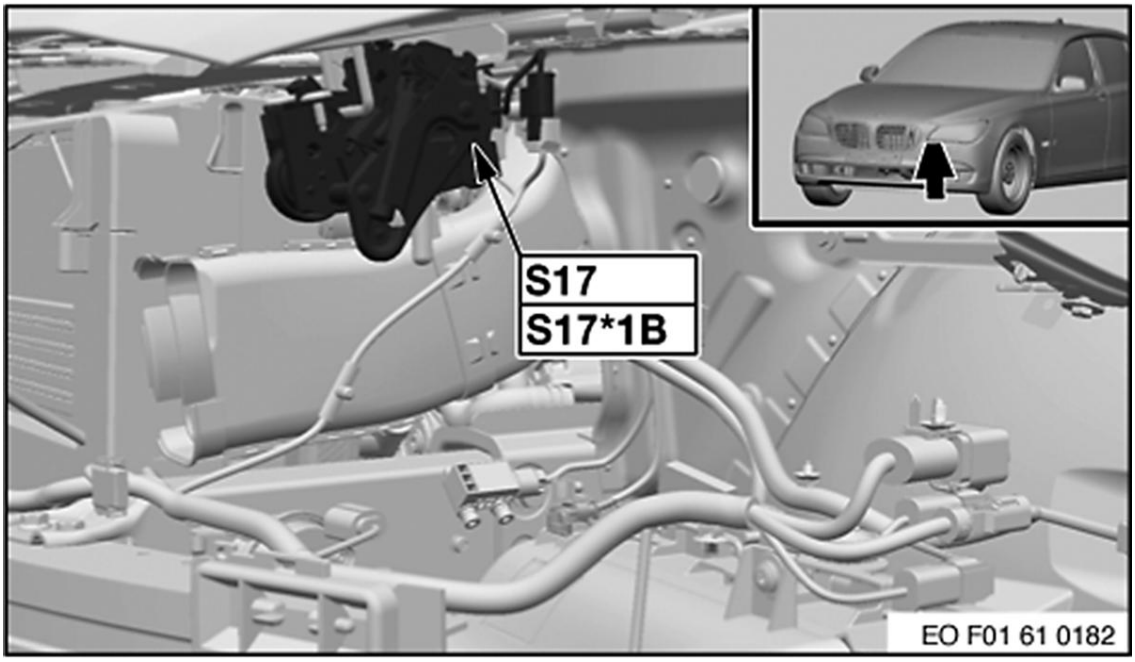


Fig. 228: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

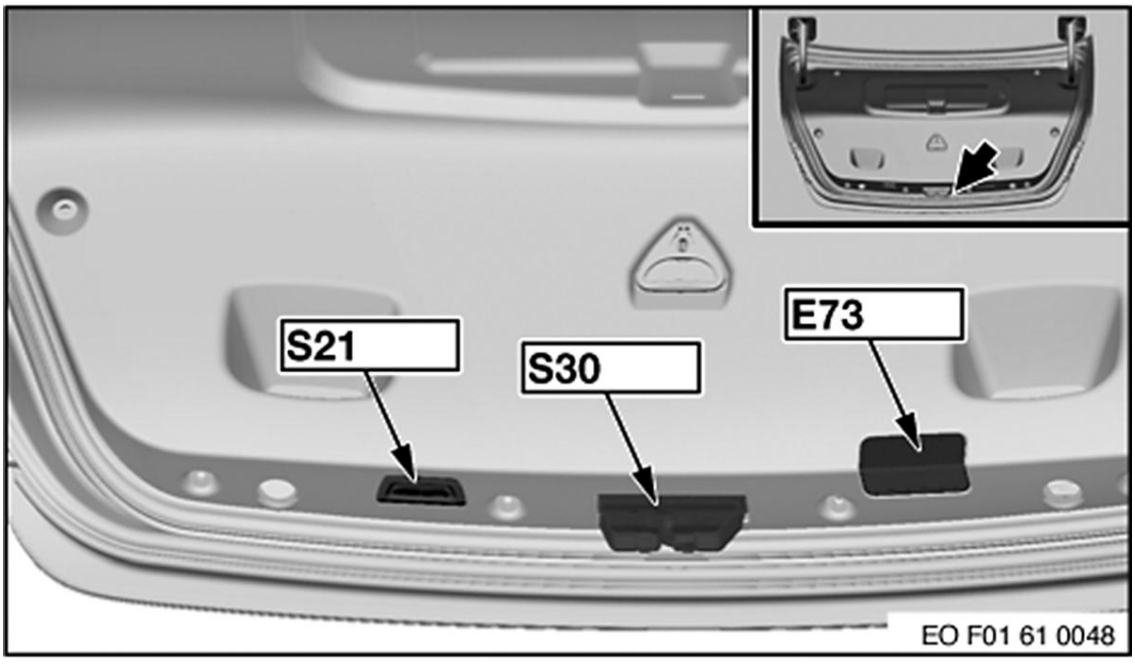


Fig. 229: Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

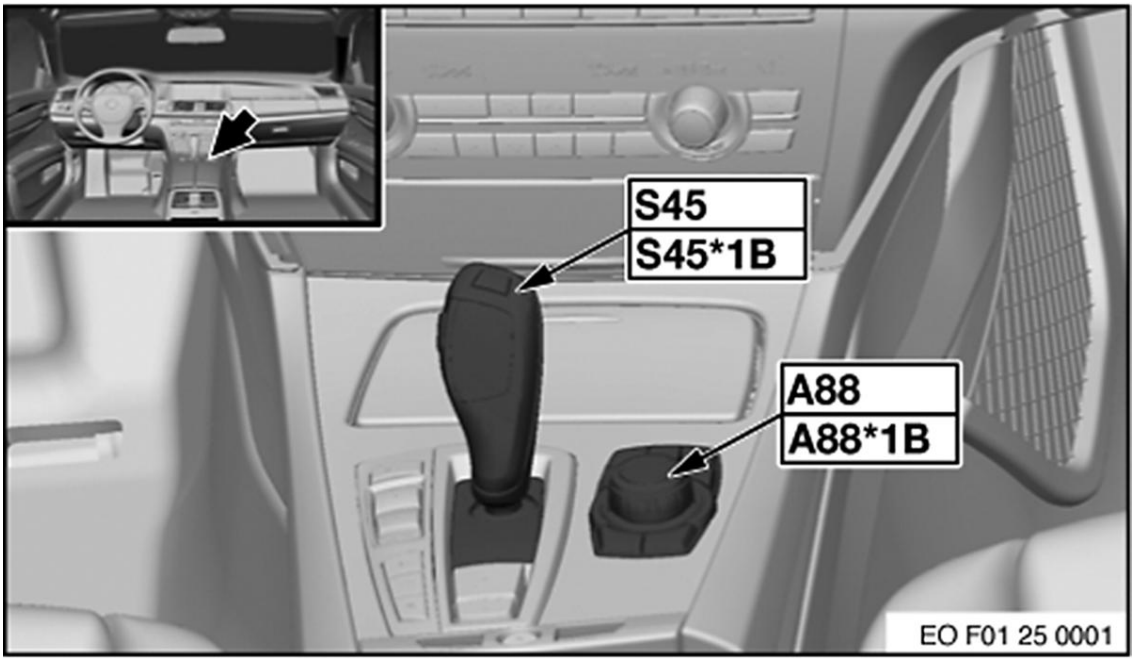


Fig. 230: Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

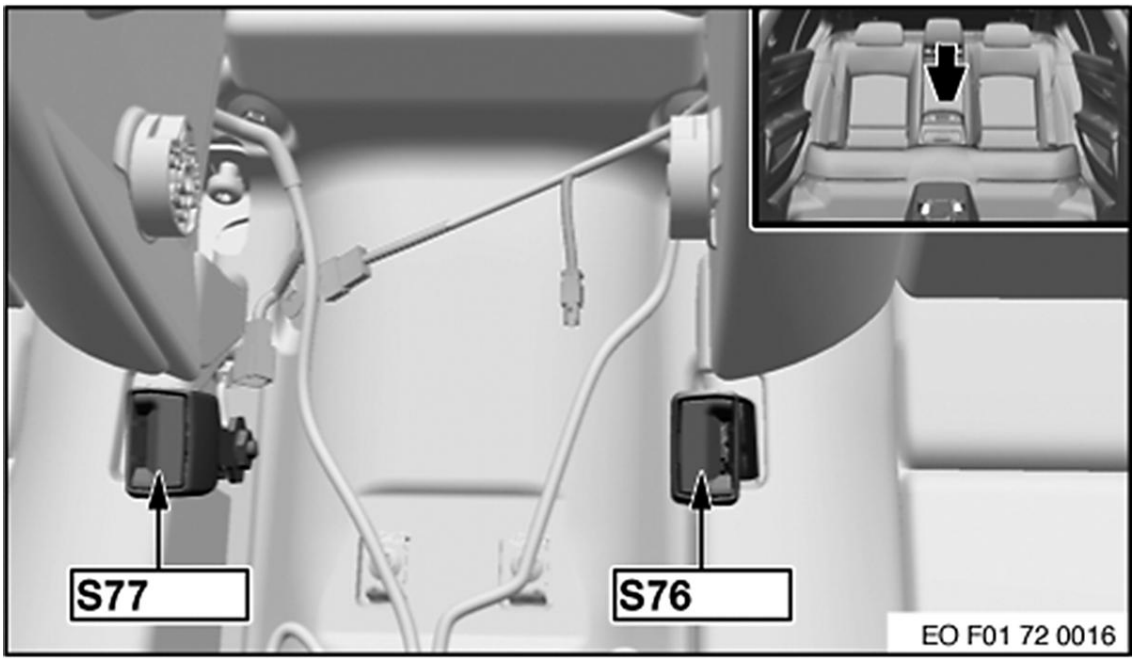


Fig. 231: Rear Seats
Courtesy of BMW OF NORTH AMERICA, INC.

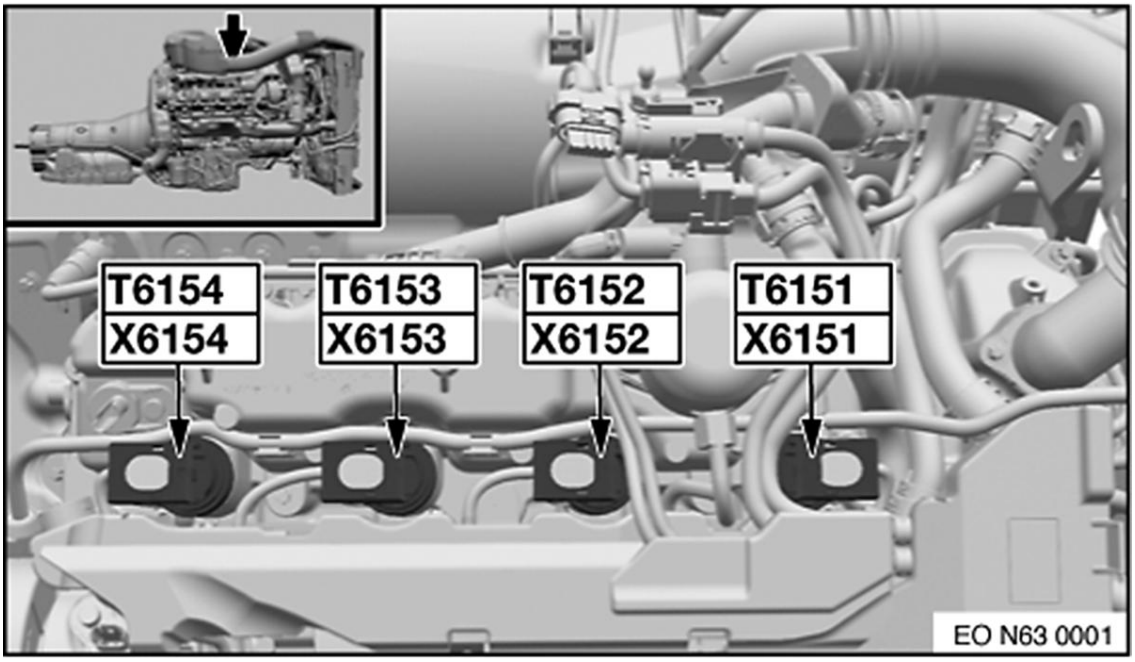


Fig. 232: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

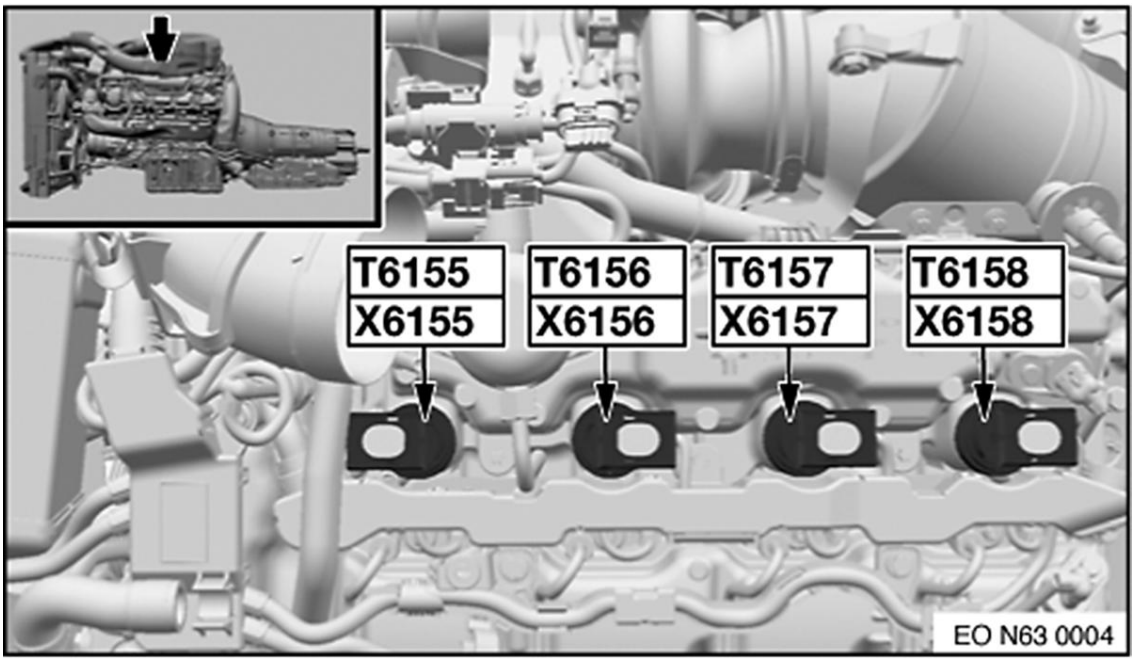


Fig. 233: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

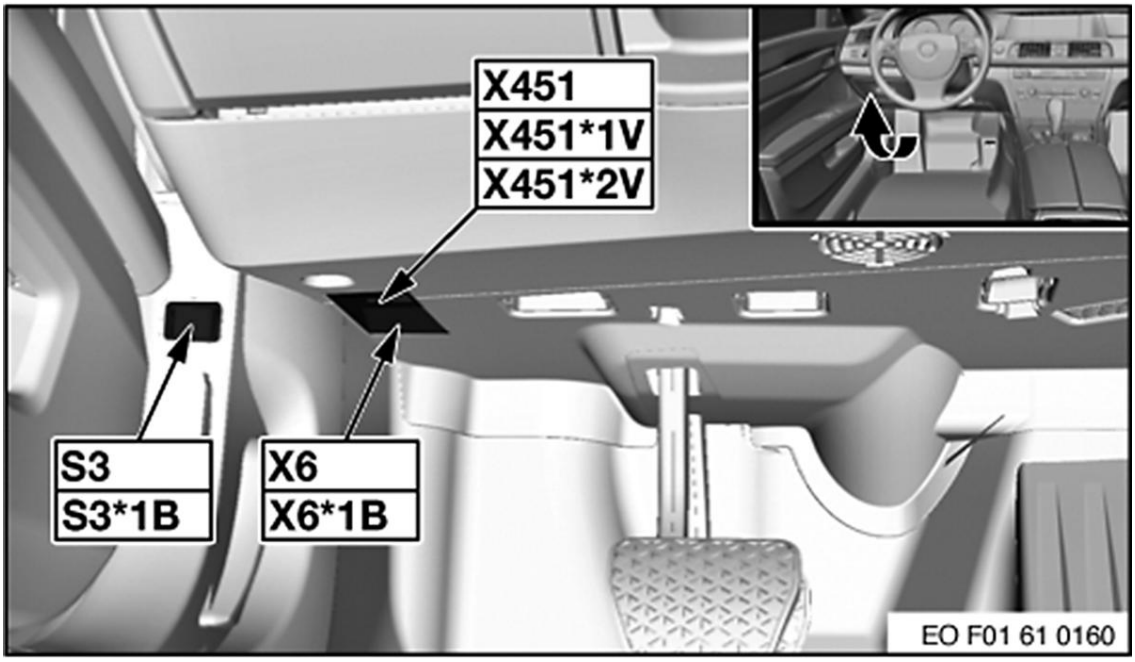


Fig. 234: Left Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

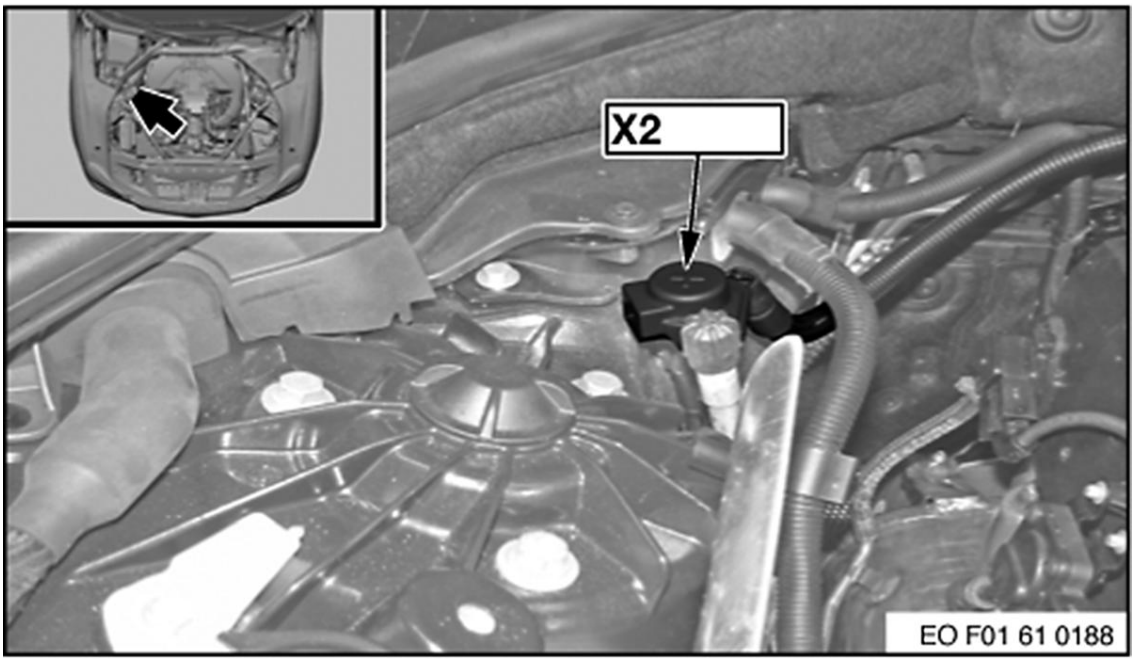


Fig. 235: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

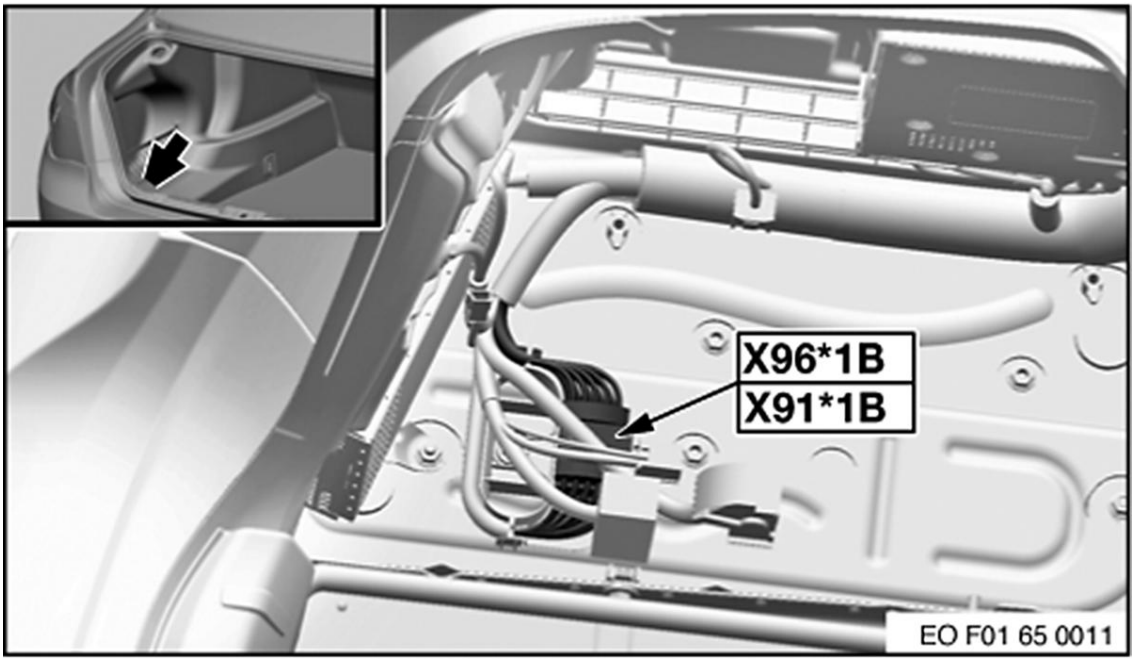


Fig. 236: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

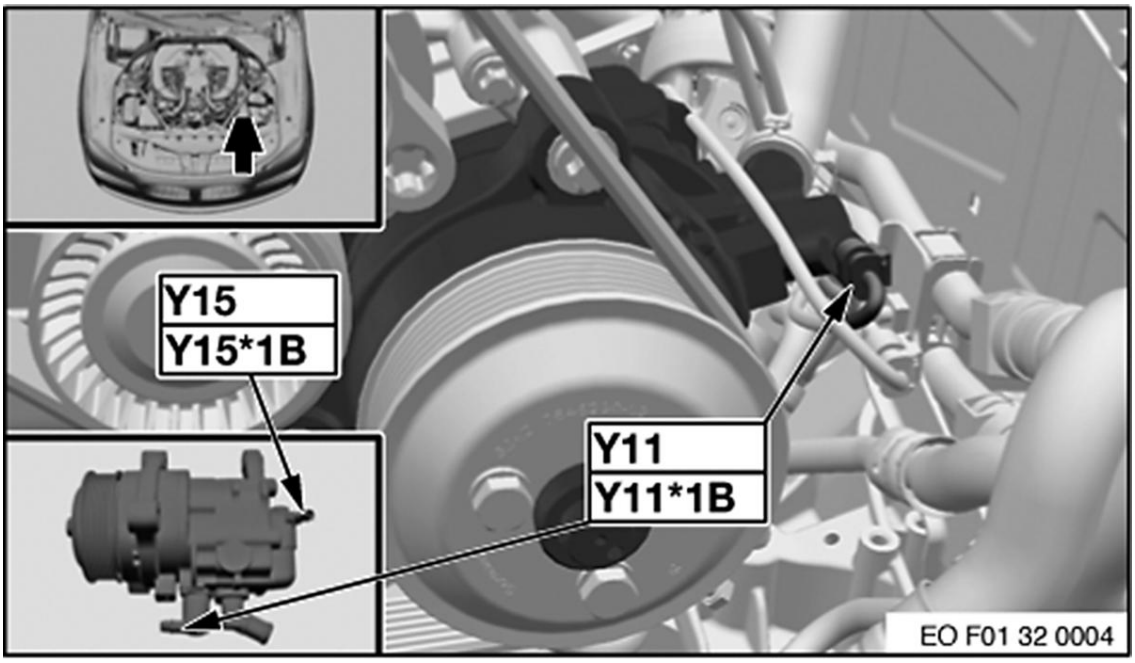


Fig. 237: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

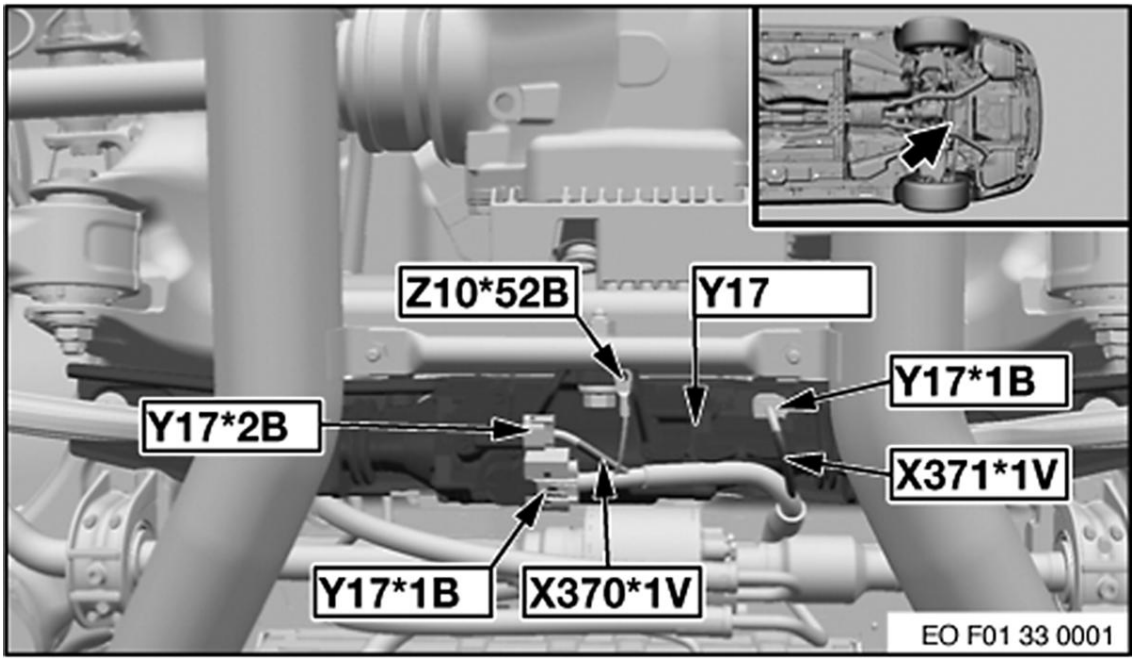


Fig. 238: Under Rear Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

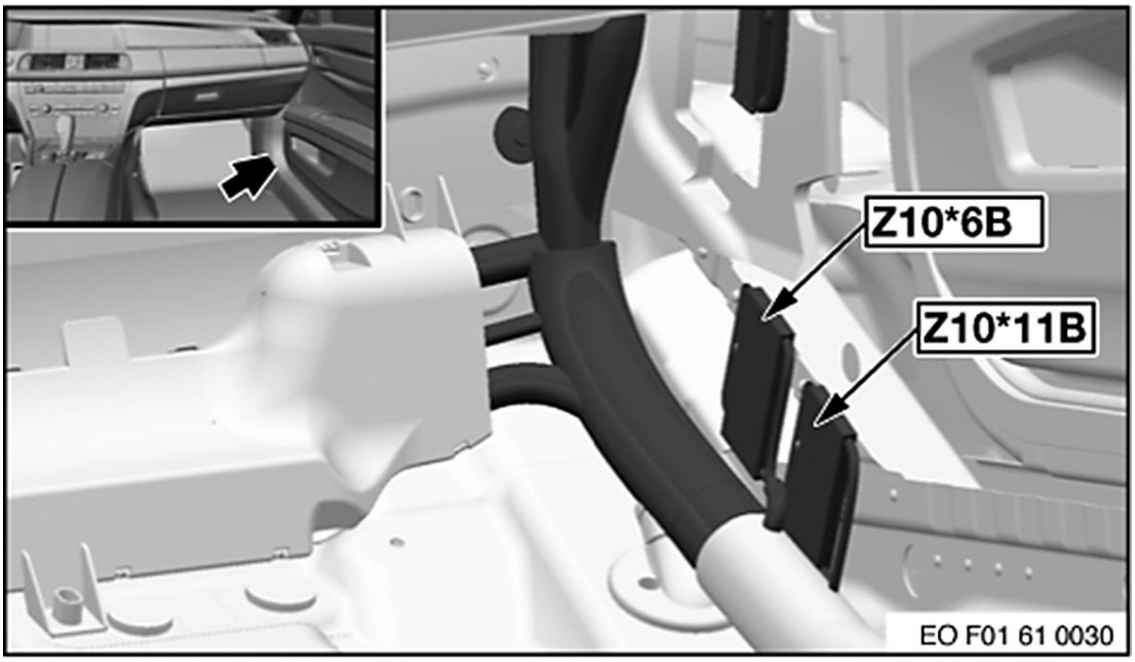


Fig. 239: Right Kick Panel
Courtesy of BMW OF NORTH AMERICA, INC.

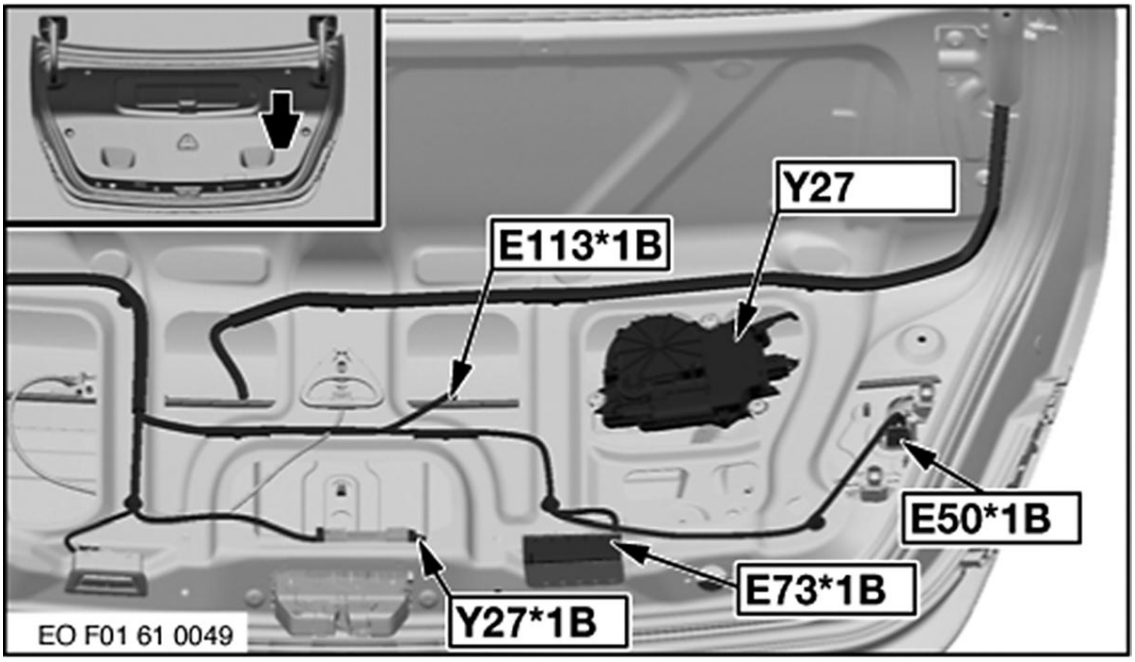


Fig. 240: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

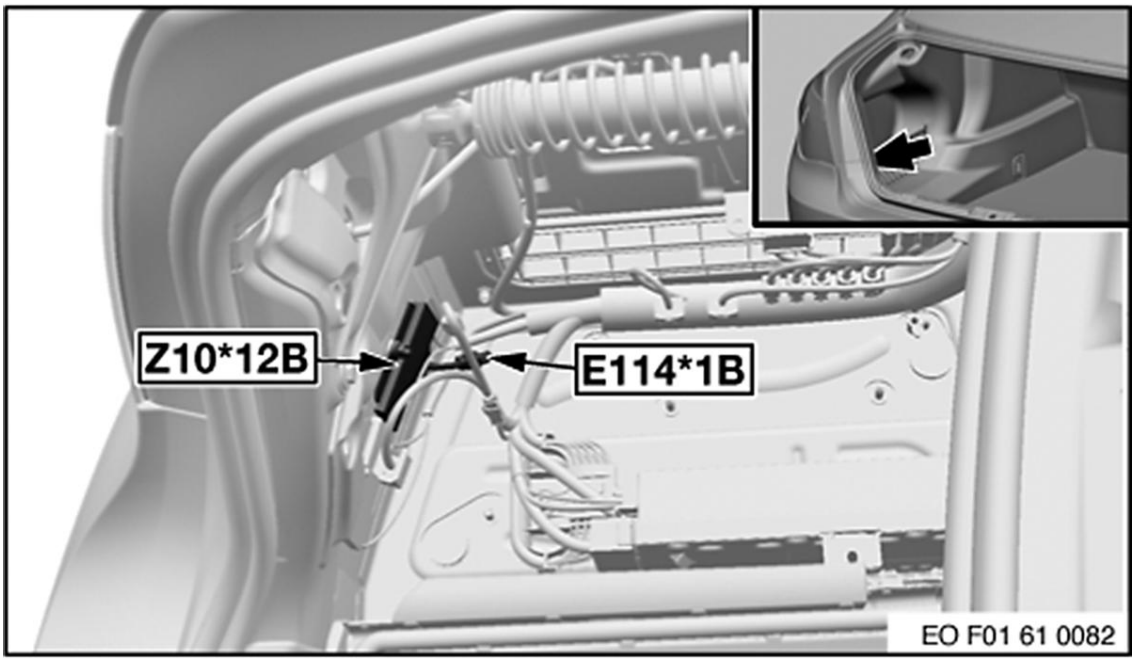


Fig. 241: Left Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

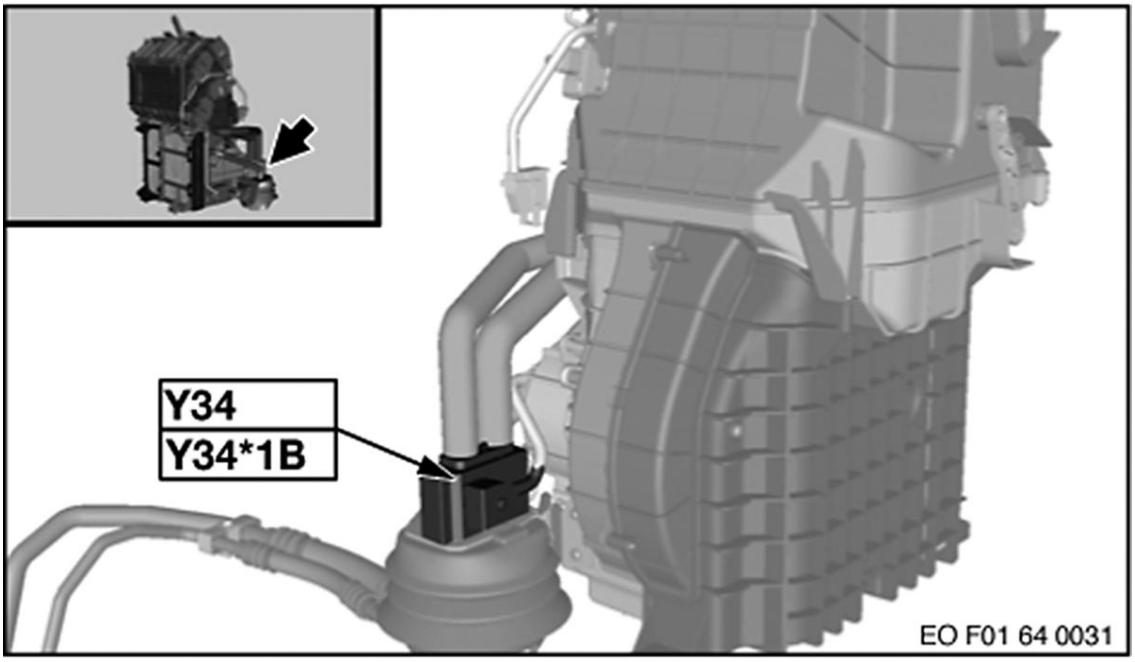


Fig. 242: Rear Climate Control Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

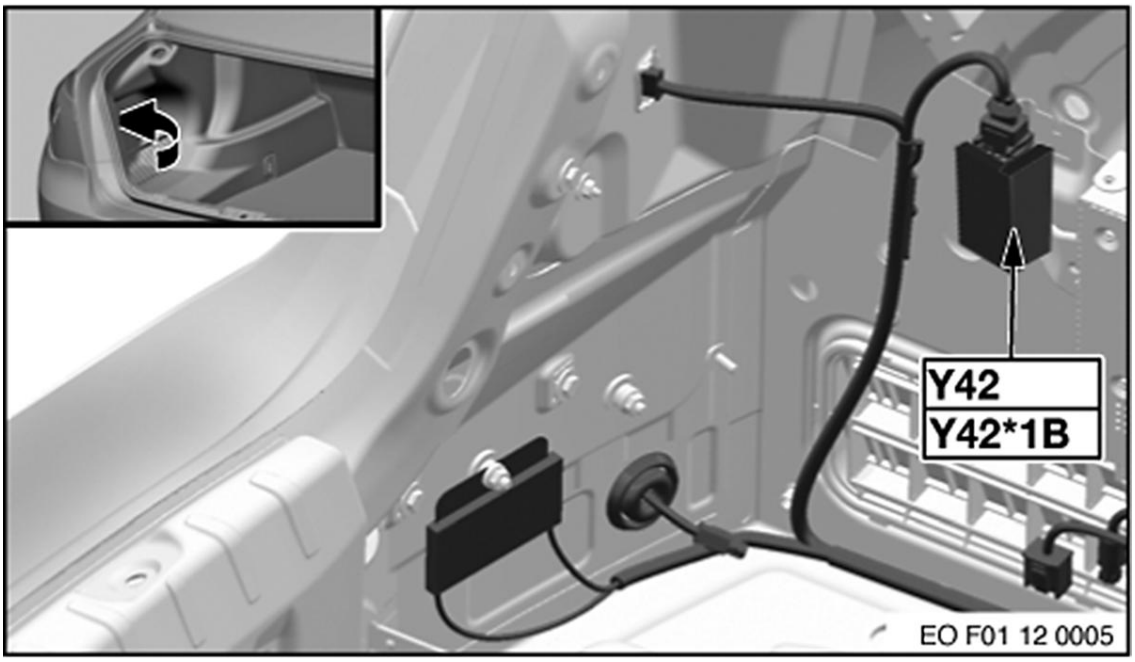


Fig. 243: Left Rear Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

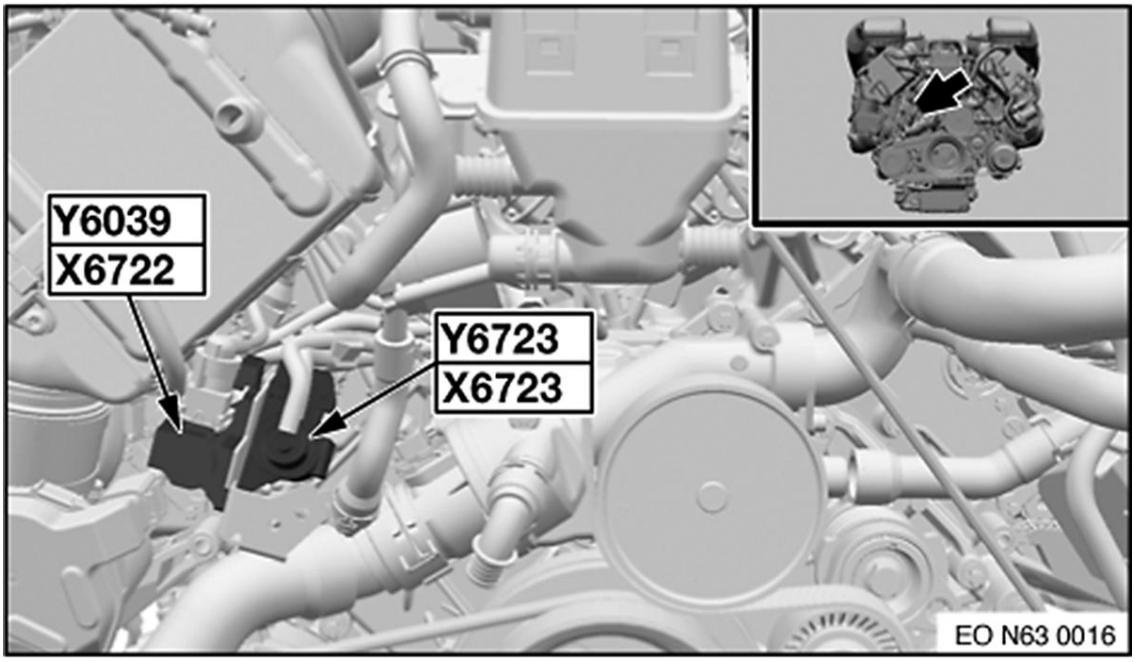


Fig. 244: Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

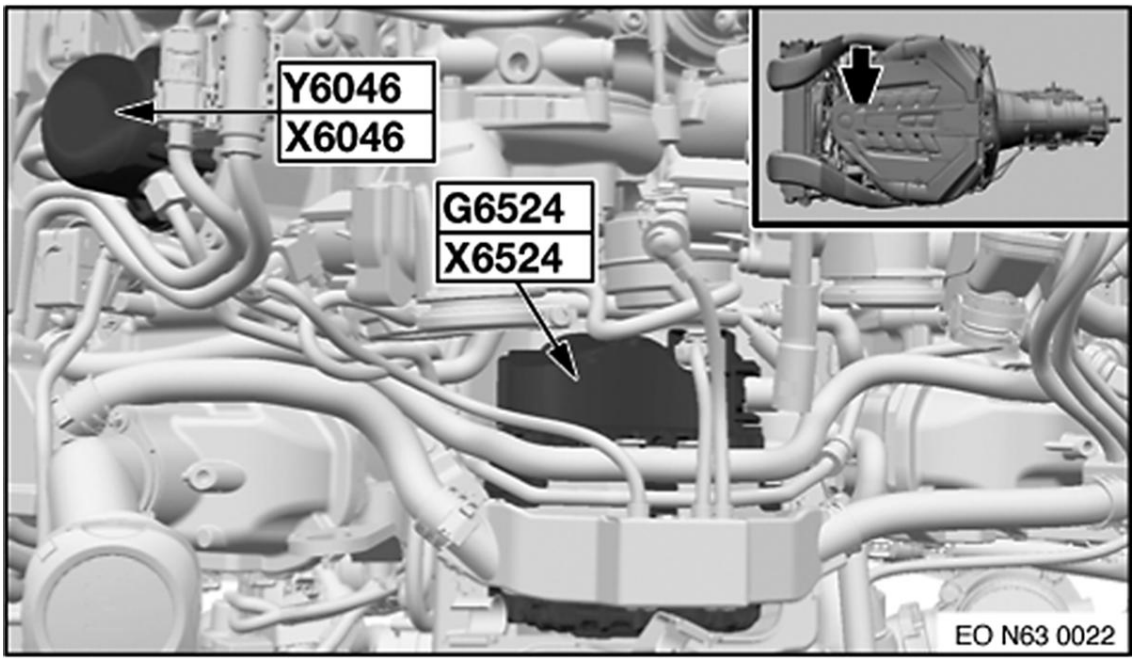


Fig. 245: Top Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

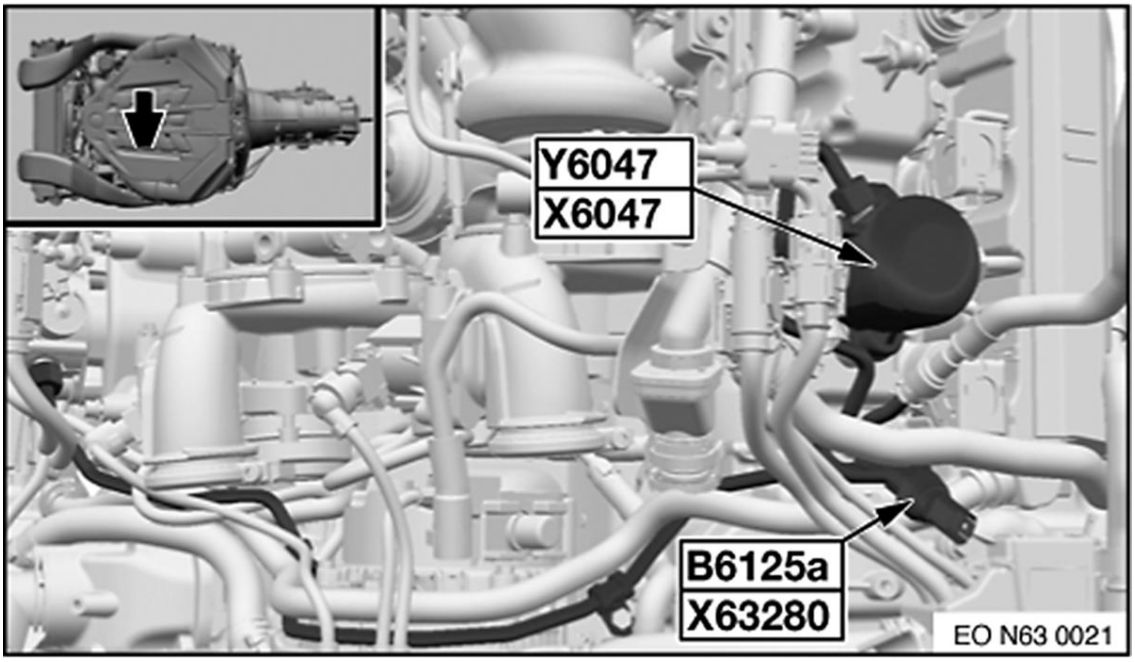


Fig. 246: Top Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

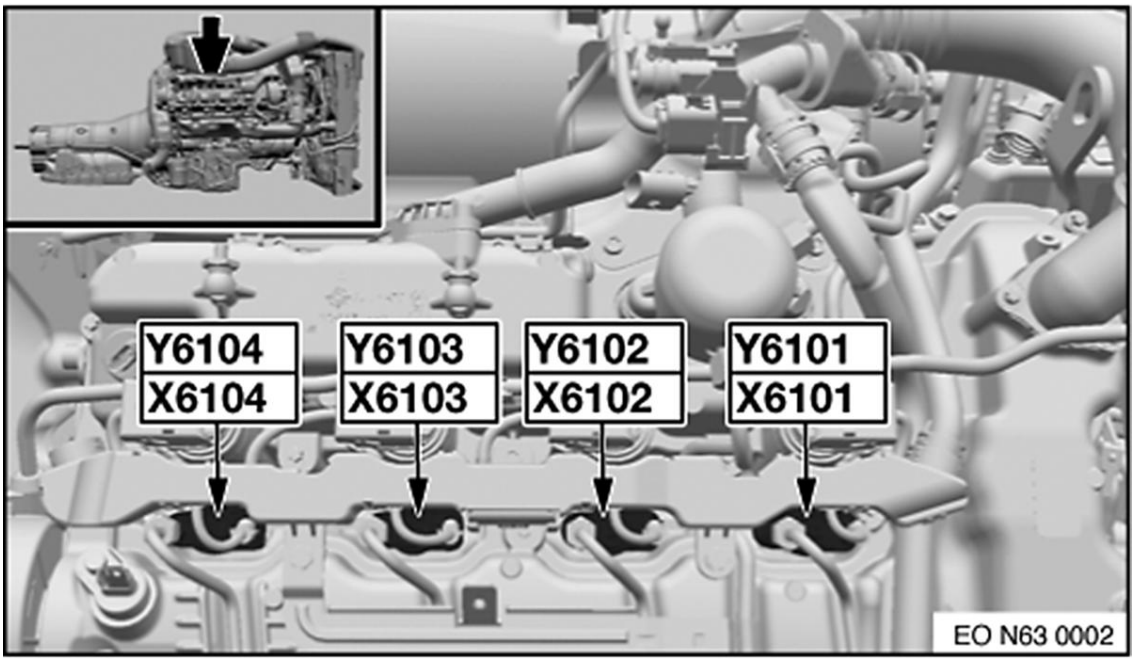


Fig. 247: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

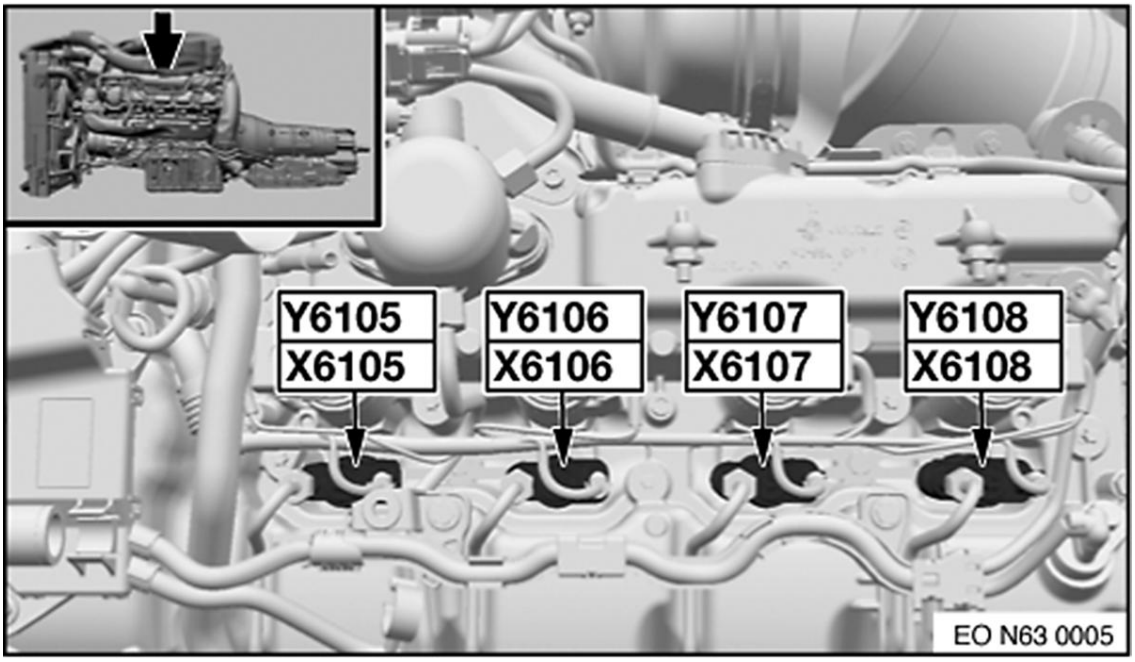


Fig. 248: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

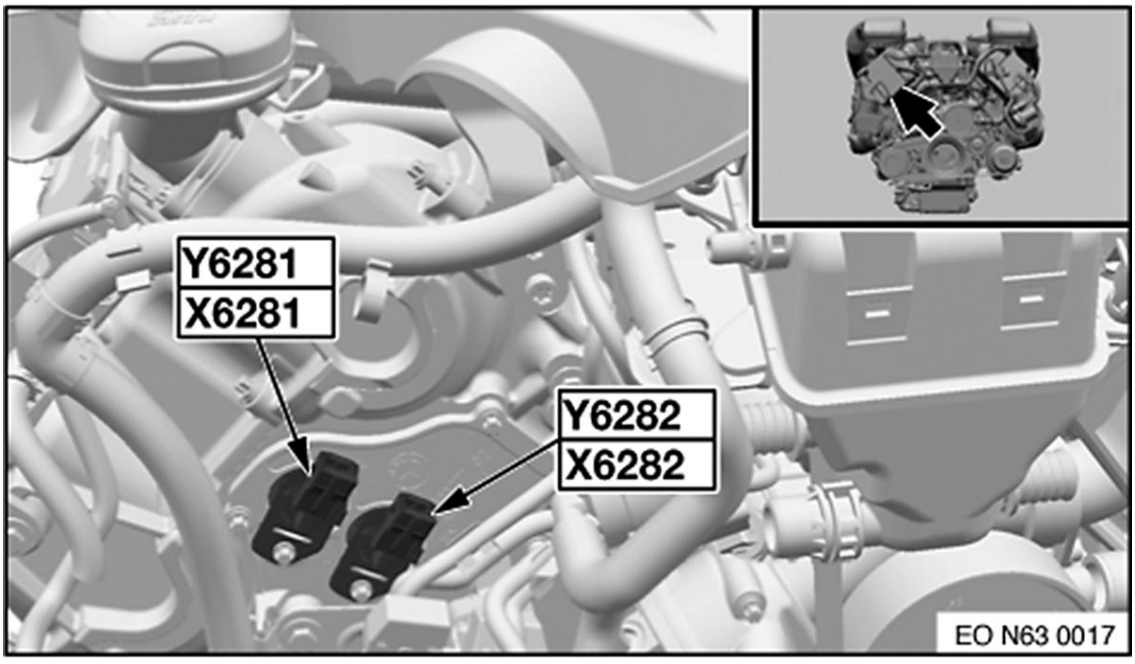


Fig. 249: Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

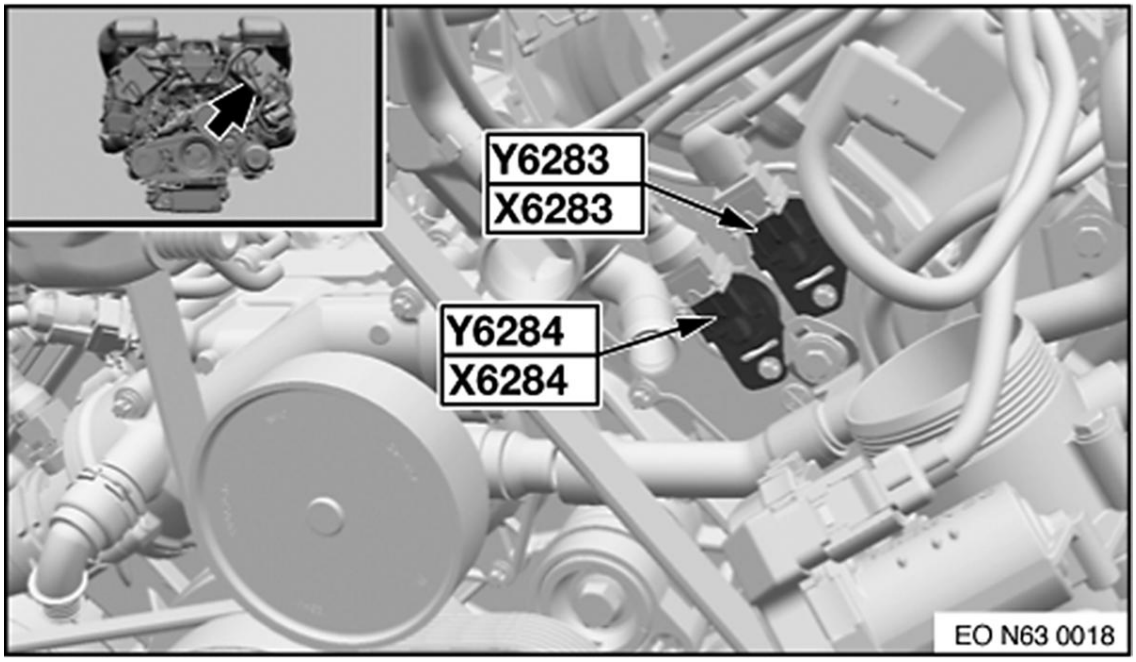


Fig. 250: Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

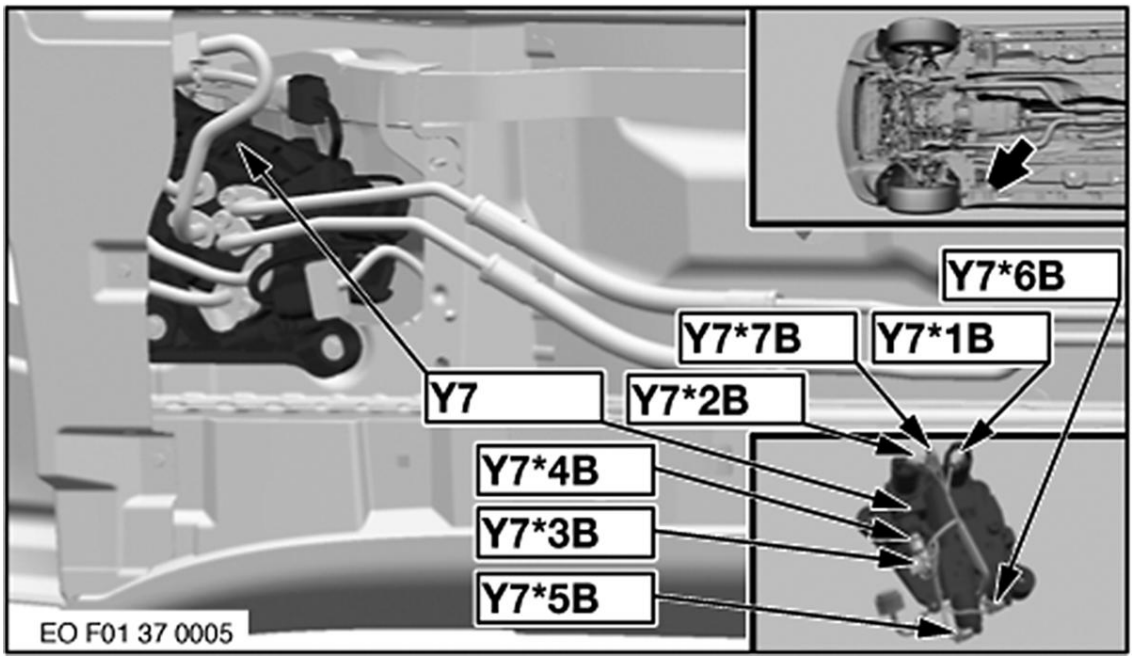


Fig. 251: Under Front Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

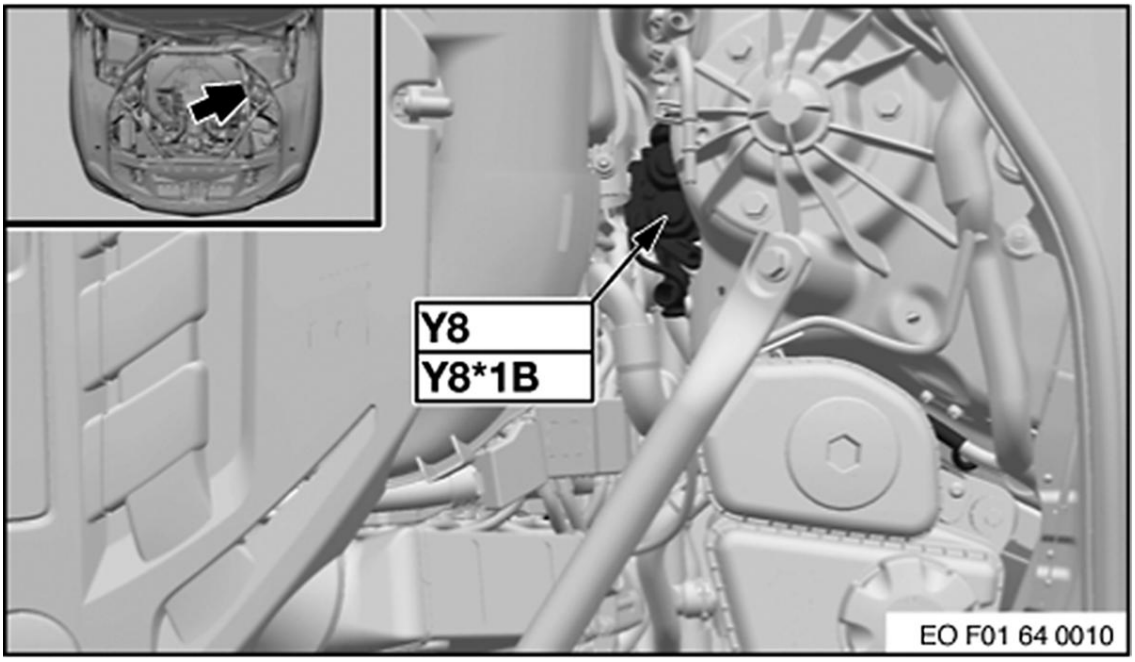


Fig. 252: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

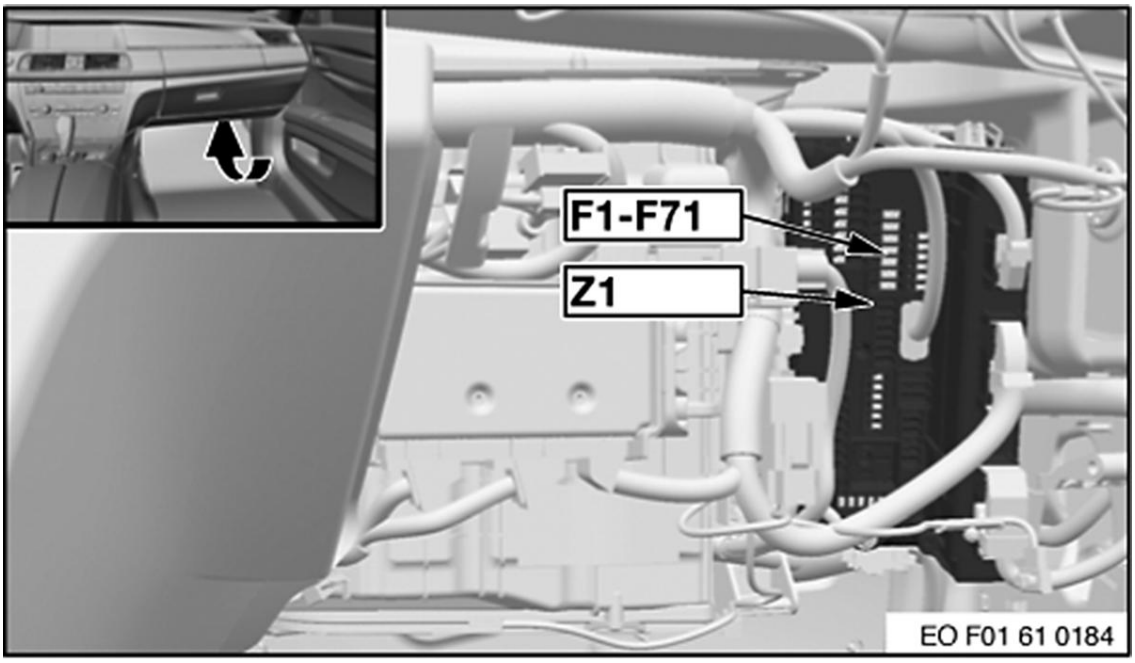


Fig. 253: Right Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

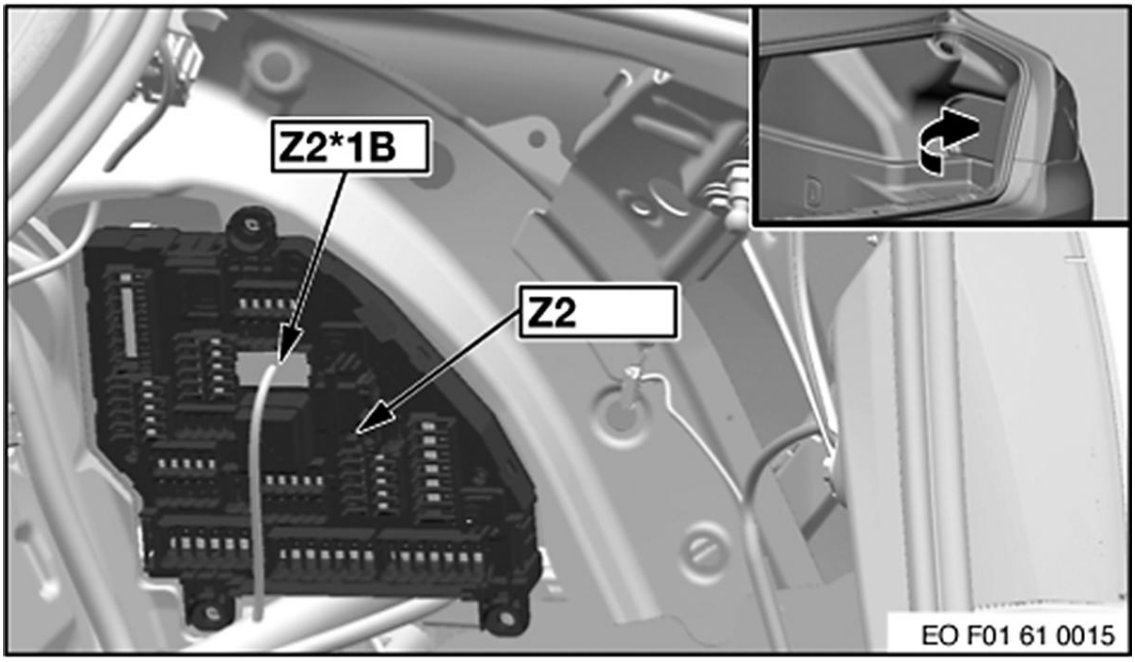


Fig. 254: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

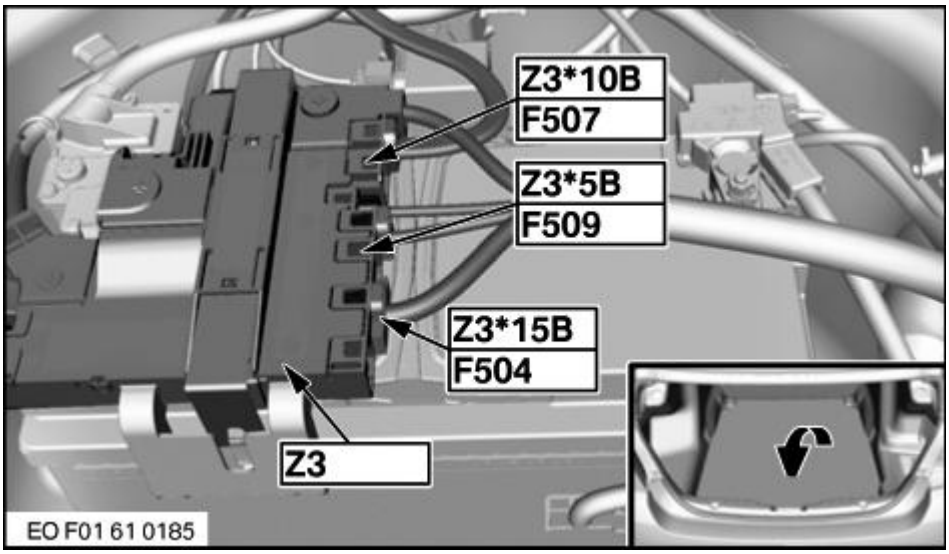


Fig. 255: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

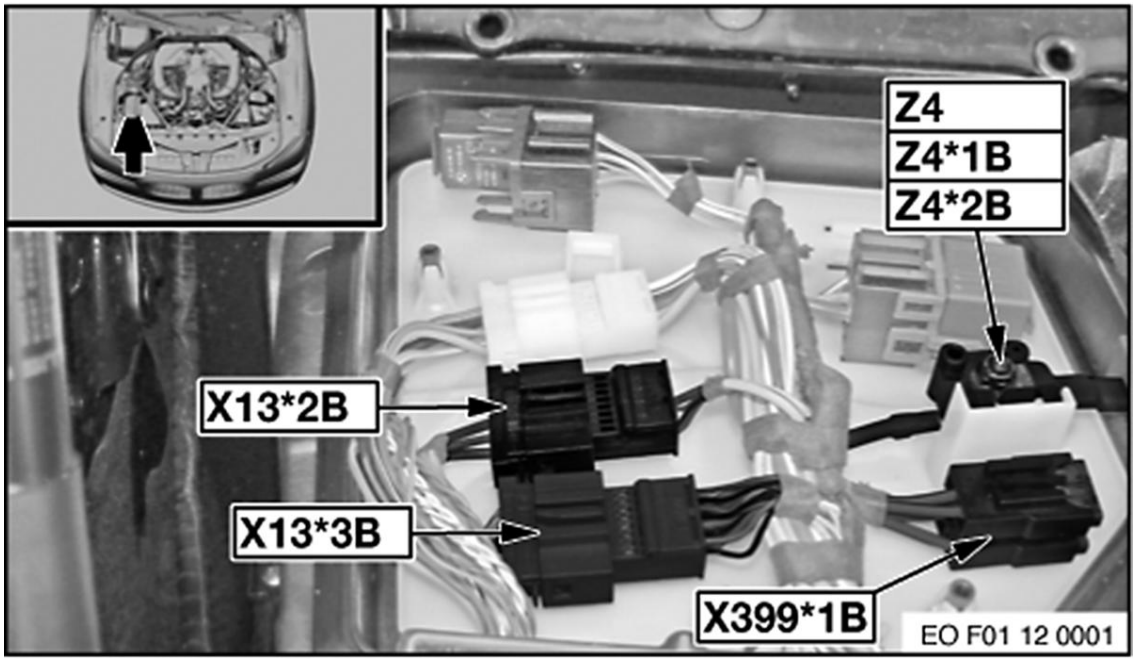


Fig. 256: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

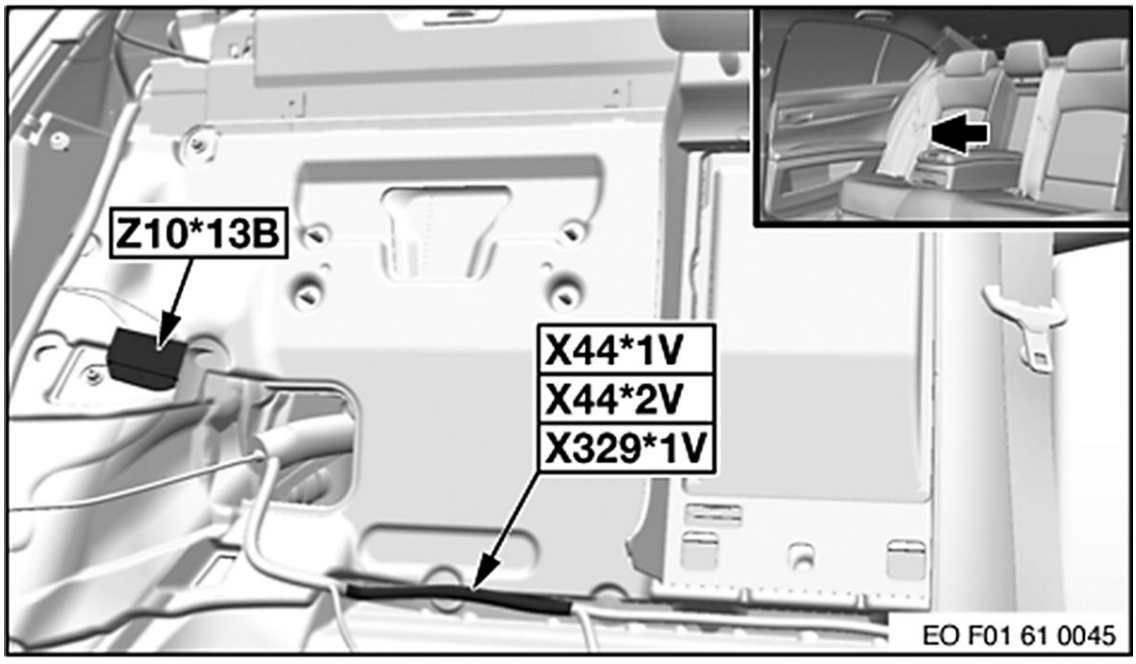


Fig. 257: Right Quarter Panel
Courtesy of BMW OF NORTH AMERICA, INC.

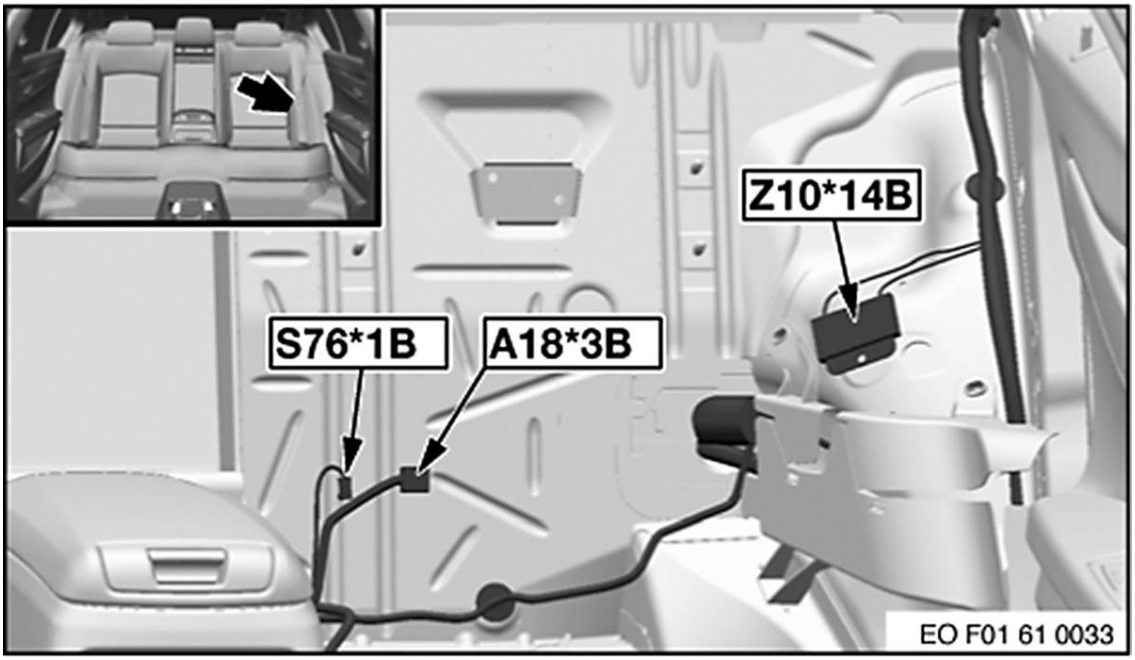


Fig. 258: Front Of Left Quarter Panel
Courtesy of BMW OF NORTH AMERICA, INC.

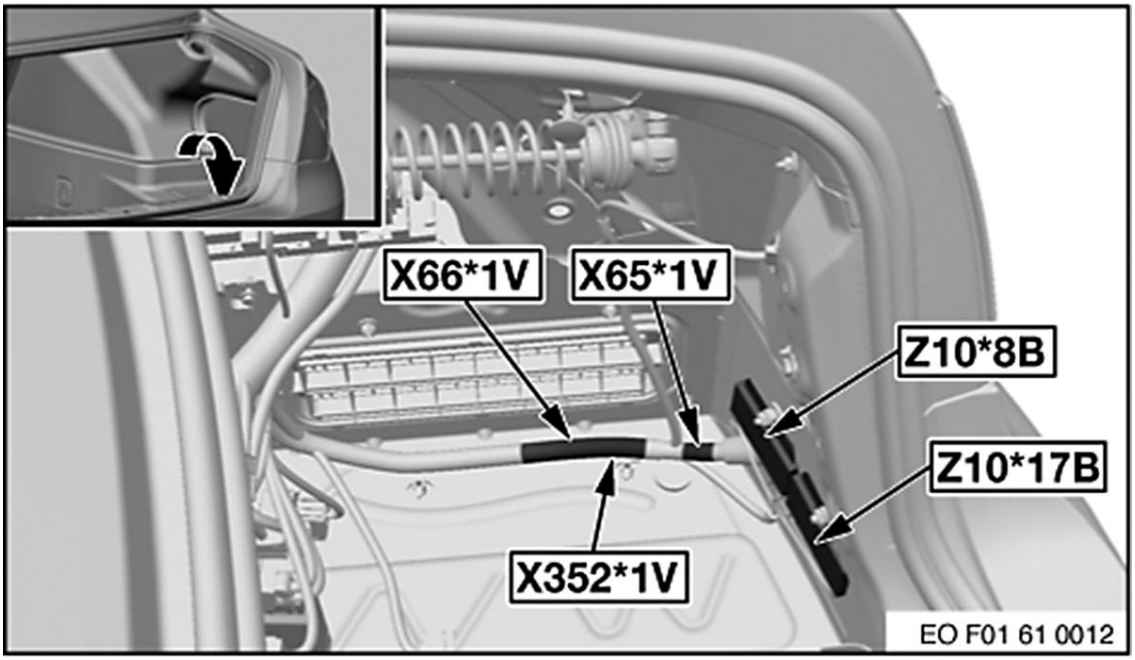


Fig. 259: Right Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

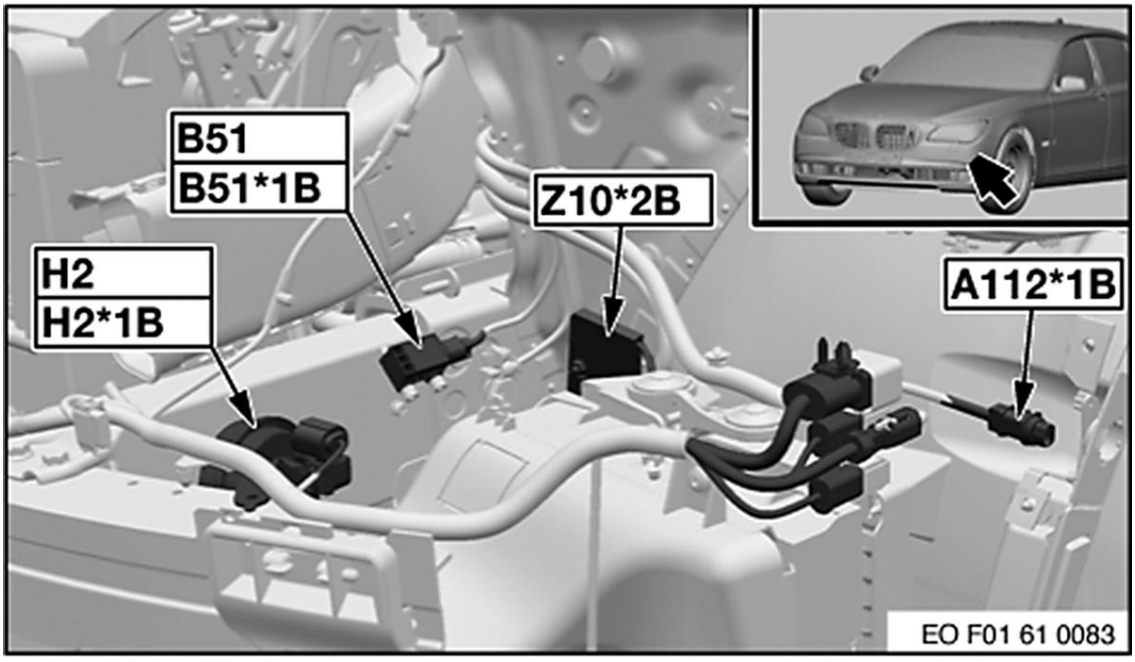


Fig. 260: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

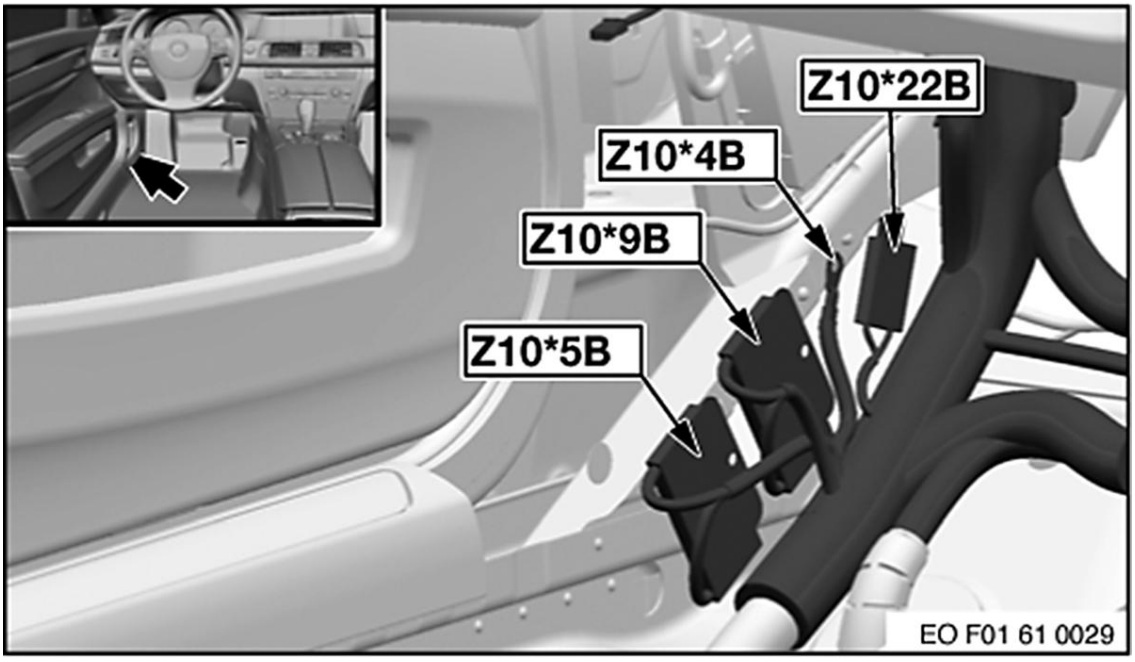


Fig. 261: Left Kick Panel
Courtesy of BMW OF NORTH AMERICA, INC.

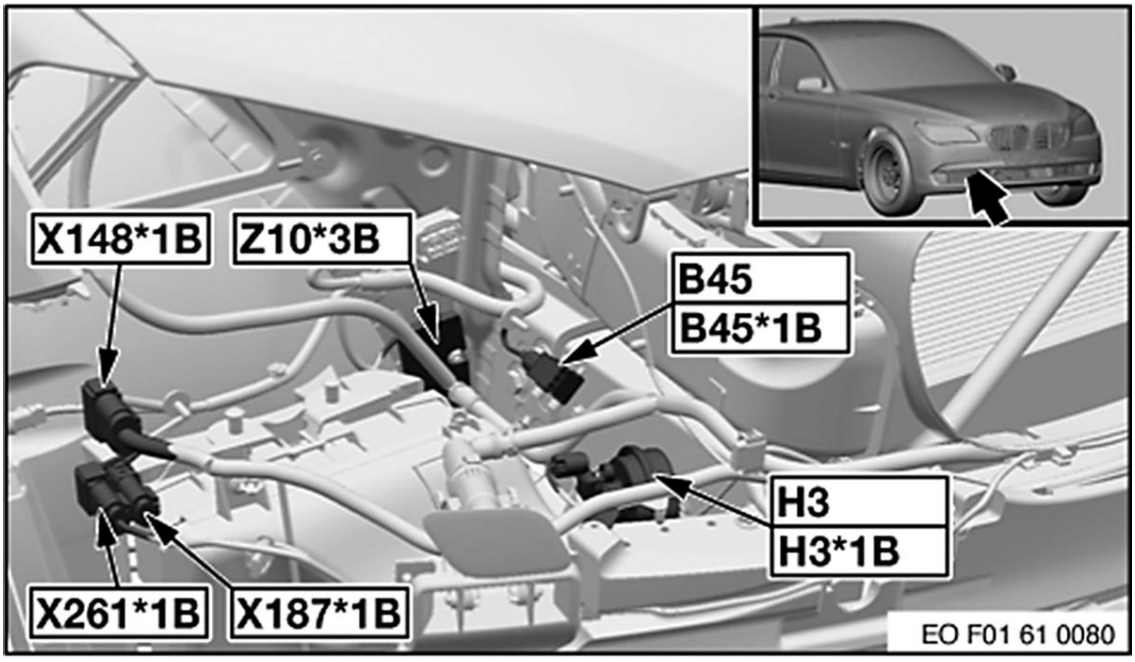


Fig. 262: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

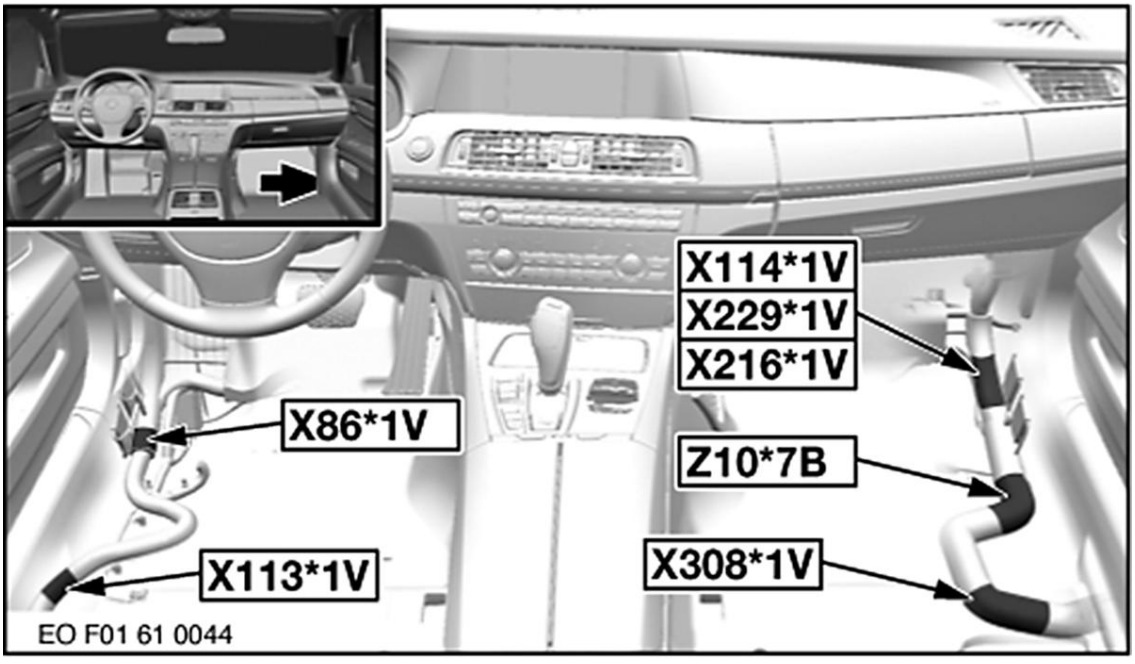


Fig. 263: Right Door Sill Plate
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Electrical Drives - Repair

6700 ELECTRIC DRIVES

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

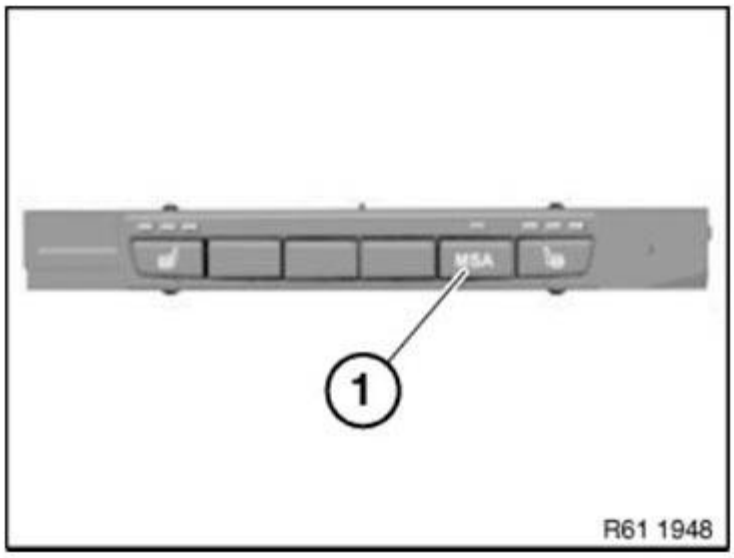


Fig. 1: Identifying Automatic Engine Start/Stop Switch (MSA)
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode

- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

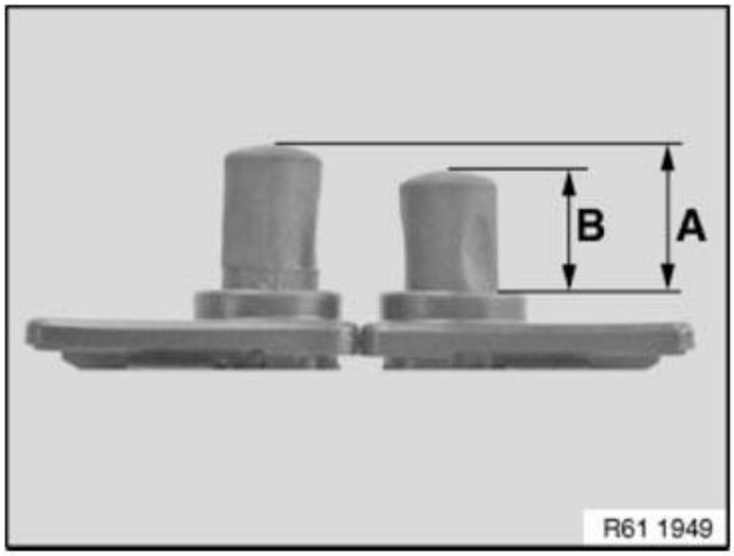


Fig. 2: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

When working with diagnosis tools

- Observe instructions in diagnosis tool

6711 CENTRAL LOCKING UNIT/UNLOCKING UNITS

67 65 010 REMOVING AND INSTALLING OR REPLACING DRIVE UNIT FOR ROLLER SUN BLIND

Necessary preliminary tasks

- Remove **REAR WINDOW ROLLER BLIND**

Release screws (1).

Remove drive linkage (2).

Installation

Drive linkage (2) can only be installed in one position.

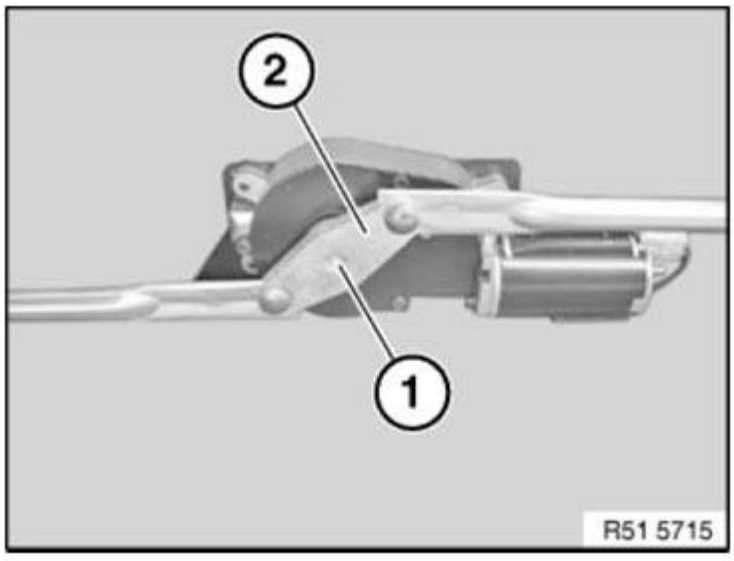


Fig. 3: Identifying Drive Linkage With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove drive.

Installation:

Ensure correct cable routing.

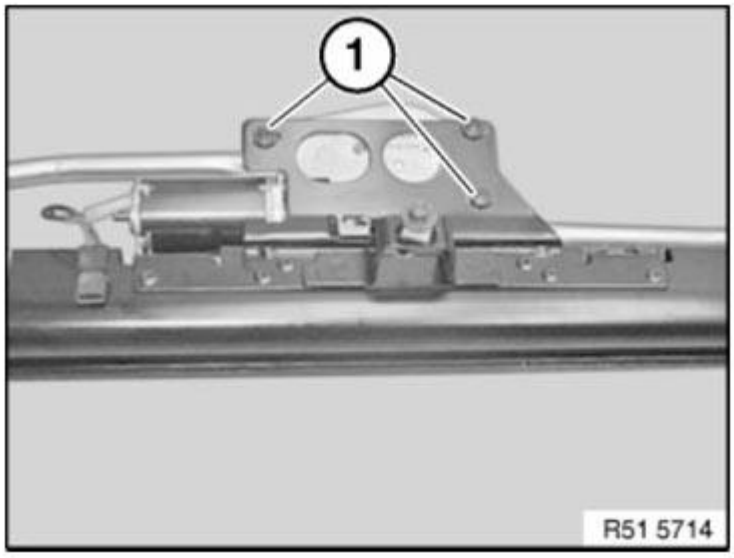


Fig. 4: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

67 11 510 REMOVING AND INSTALLING/REPLACING ACTUATOR DRIVE FOR FRONT LEFT OR RIGHT DOOR CENTRAL LOCKING DRIVE

NOTE: Actuator drive for door locking mechanism is integrated in door lock in front door.

Procedure is described in the document "DOOR LOCK IN FRONT DOOR... ".

67 11 555 REMOVING AND INSTALLING/REPLACING ACTUATOR DRIVE FOR FUEL FILLER FLAP

Necessary preliminary work:

- Remove **RIGHT LUGGAGE COMPARTMENT WHEEL ARCH PANEL**

Unclip cable guide (1) and plastic clip (2).

Partially remove insulating mat (3) in working area.

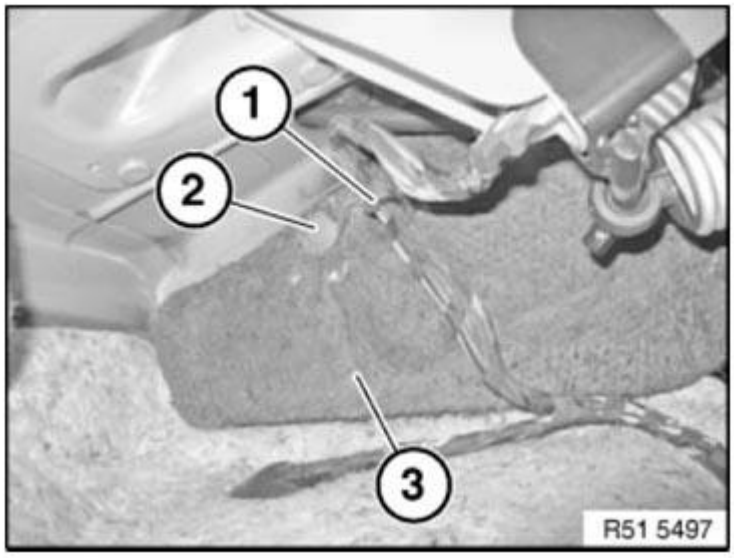


Fig. 5: Identifying Insulating Mat With Cable Guide And Plastic Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1)

Carefully feed actuator drive (3) out of guides (4).

Unlock plug connection (5) and disconnect.

IMPORTANT: Risk of damage:

To prevent damaging locking pin guide (2), do not tilt actuator drive (3).

Installation note:

Make sure actuator drive for fuel filler flap is correctly adjusted. It must be possible to lock or unlock the fuel filler flap completely.

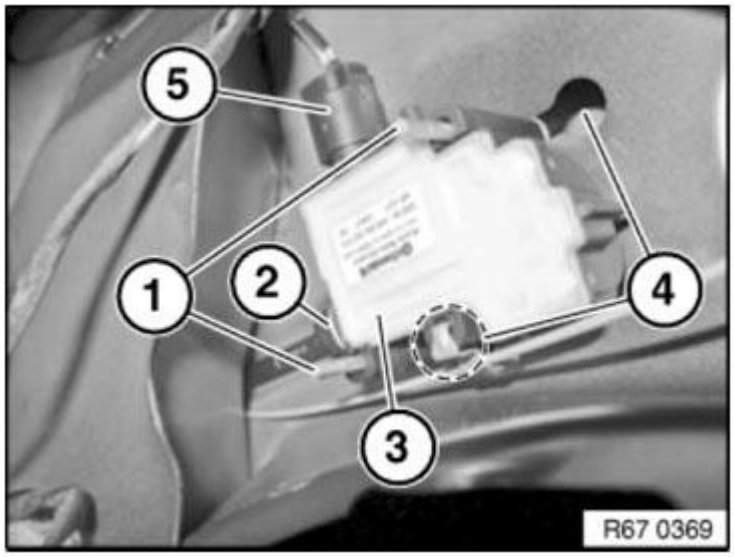


Fig. 6: Identifying Actuator Drive, Guide, Plug Connection, Locking Pin Guide And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Unhook emergency operation tensioning strap (2) from clamp (1) and remove from locking pin (3) of actuator drive (4).

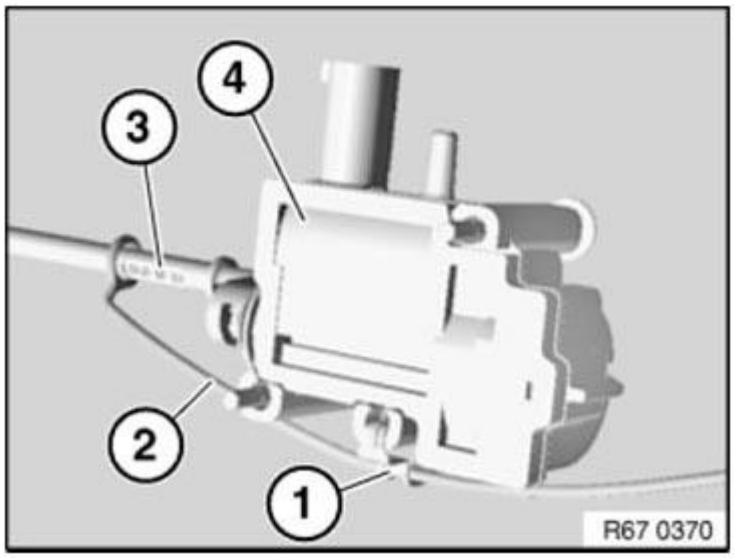


Fig. 7: Identifying Emergency Operation Tensioning Strap, Clamp, Locking Pin And Actuator Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Turn sleeve (1) with a suitable tool (e.g. pointed pliers) approx. 45° in direction of arrow and pull out of receptacle (2).

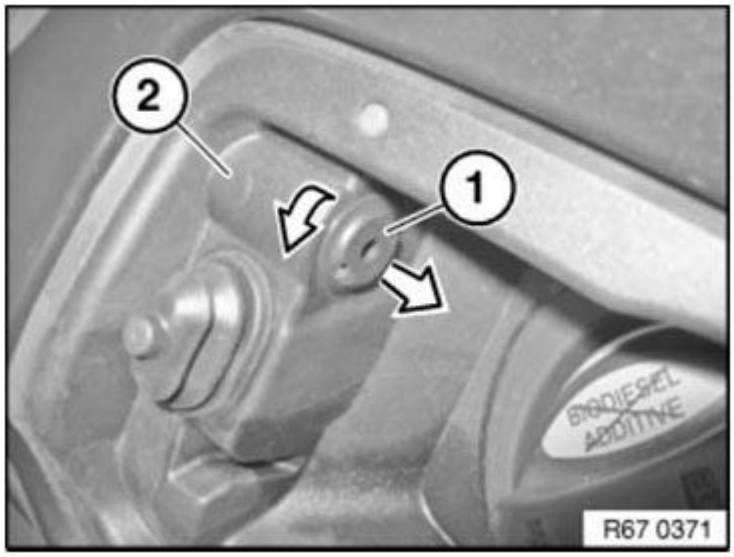


Fig. 8: Pulling Out Receptacle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure sleeve (1) is correctly seated on locking pin for fuel filler flap (2).

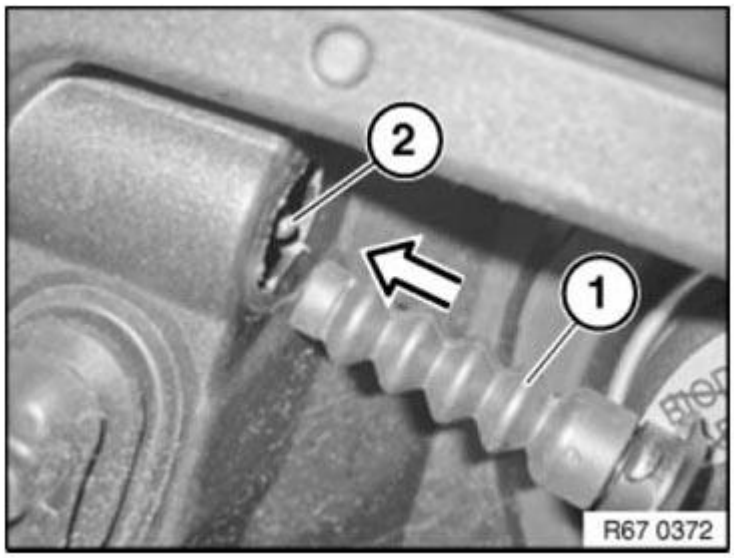


Fig. 9: Identifying Sleeve And Fuel Filler Flap
Courtesy of BMW OF NORTH AMERICA, INC.

67 11 530 REMOVING AND INSTALLING/REPLACING ACTUATOR DRIVE FOR REAR LEFT OR RIGHT DOOR LOCKING DRIVE

NOTE: Actuator drive for door locking drive can only be replaced in conjunction with

door lock.

This operation is described in:

Removing and installing/replacing REAR DOOR LOCK

67 11 560 REPLACING ACTUATOR DRIVE FOR REAR LID LOCKING

This operation is described in: "Removing **REAR LID LOCK** "

6713 MIRROR ADJUSTMENT

67 13 001 REPLACING DRIVE UNIT FOR ELECTRICALLY OPERATED LEFT OR RIGHT EXTERIOR MIRROR

Necessary preliminary work

- Remove **MIRROR GLASS** for inside mirror

NOTE: Picture for example purposes only!

Release screw (1).

Remove drive for electrically operated exterior mirror (2) in direction of arrow from mirror housing (3).

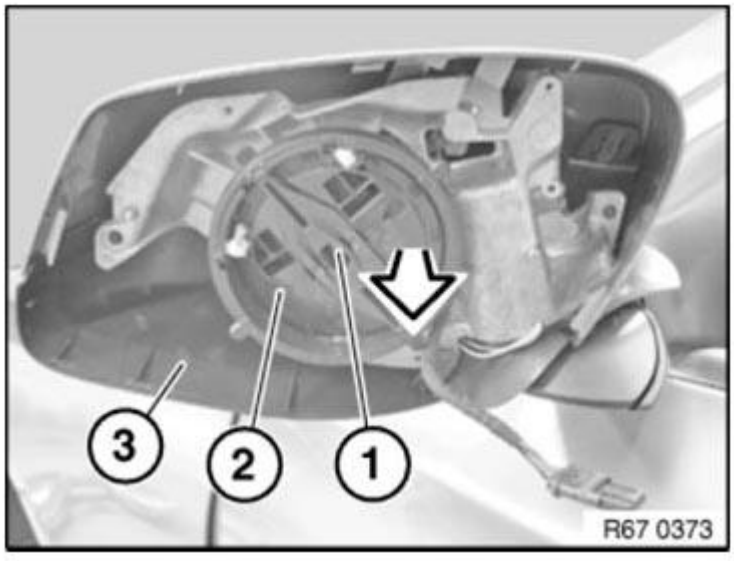


Fig. 10: Removing Electrically Operated Exterior Mirror Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure pin housing (2) is correctly seated in connector housing (3).

Fit drive for electrically operated exterior mirror (1) so that mountings (4) slide in guides (5).

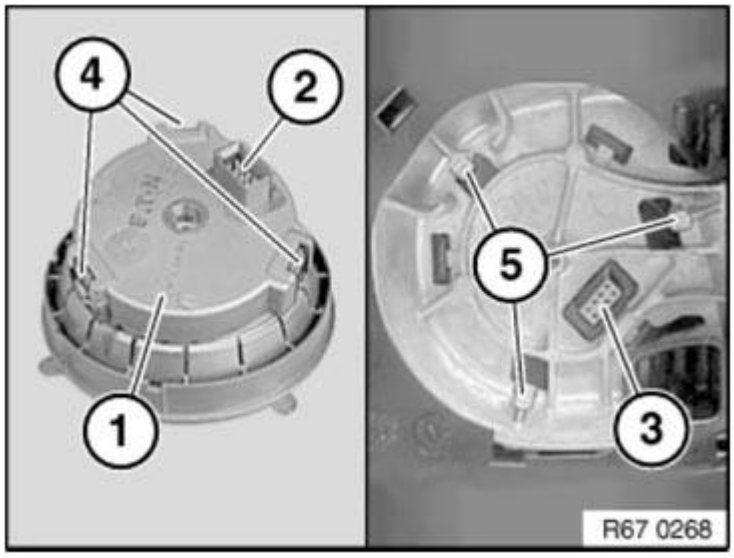


Fig. 11: Identifying Electrically Operated Door Mirror, Pin Housing, Plug Housing And Locators
Courtesy of BMW OF NORTH AMERICA, INC.

6716 SERVO/POSITIONING DRIVES

67 16 011 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT VERTICAL AIM ADJUSTER

WARNING: Version with xenon headlights: Danger to life due to high voltage!

Therefore disconnect all components from voltage supply before removal.

Work on the entire xenon lighting system (control unit, ignition unit with lamp) may only be carried out by specialist personnel.

Necessary preliminary work

- Remove headlight:
  - Xenon headlight, see **6312010 REMOVING AND INSTALLING OR REPLACING LEFT HEADLIGHT (XENON HEADLIGHT)** or **6312012 REMOVING AND INSTALLING RIGHT HEADLIGHT (XENON HEADLIGHT)**
  - Adaptive headlight, see **6312015 REMOVING AND INSTALLING OR REPLACING LEFT HEADLIGHT HEADLIGHT)** or **6312017 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT (ADAPTIVE HEADLIGHT)**

Release screws (1) on cover (2) and remove from headlight (3).

Tightening torque **63 12 4AZ** .

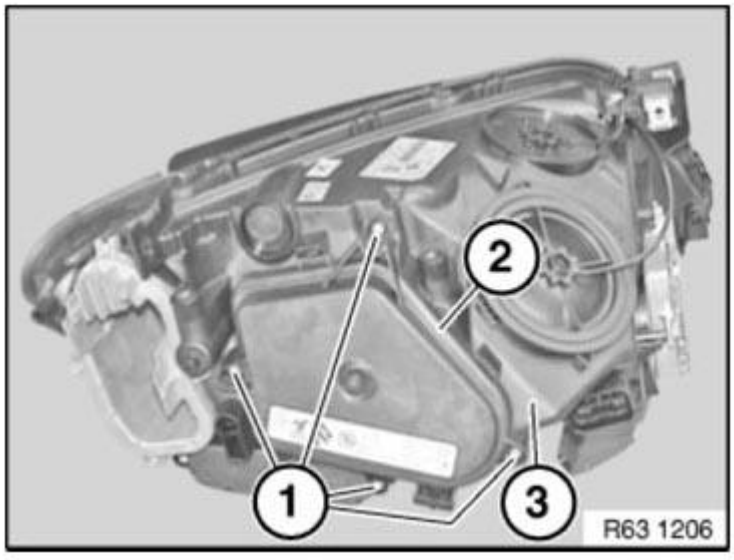


Fig. 12: Identifying Headlight With Cover And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Disconnect plug connection (2).

Snap headlight vertical aim adjuster (3) out of mounting.

NOTE: Opening cover (4) makes it easier to feed in and engage vertical aim adjuster (3).

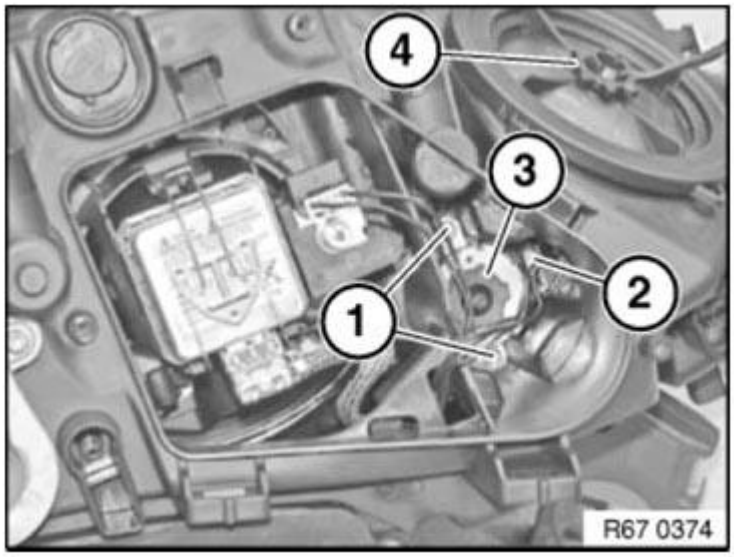


Fig. 13: Identifying Vertical Aim Adjuster, Opening Cover, Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Engage ball head of vertical aim adjuster (1) in mounting (2).

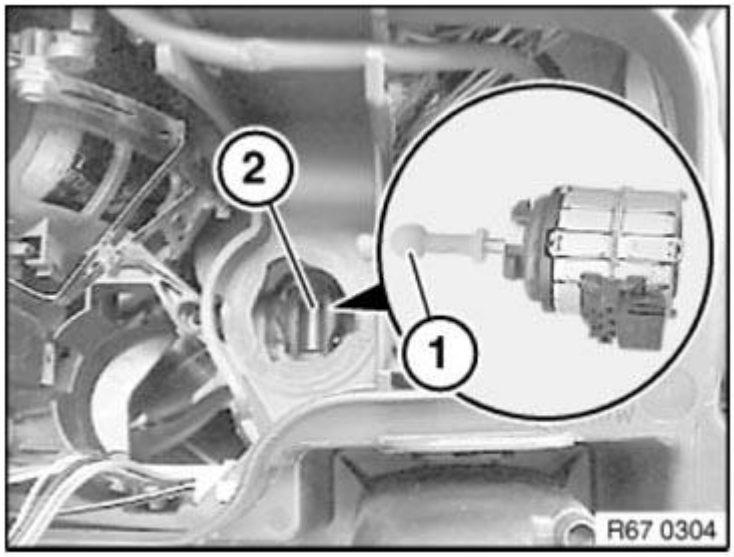


Fig. 14: Feeding Ball Head Of Vertical Aim Adjuster Into Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **ADJUST HEADLIGHTS**

67 16 016 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT VERTICAL AIM ADJUSTER

Operation is described in:

REMOVING AND INSTALLING LEFT HEADLIGHT VERTICAL AIM ADJUSTER

6731 DRIVE, SEAT ADJUSTMENT

67-1 31 DRIVE, SEAT ADJUSTMENT

DRIVE SEAT ADJUSTMENT REFERENCE CHART

	Type	Thread	Tightening specification	Measure
Drives, front seat				
1AZ Drive for seat height adjustment to seat	F01/F02/F03/F04/F07/F10			8 Nm
2AZ Drive for seat tilt adjustment to seat	F01/F02/F03/F04/F07/F10			8 Nm
3AZ Drive for head restraint height adjustment to seat	F01/F02/F03/F04/F07/F10			2.5 Nm
4AZ Drive for backrest head adjustment to seat	F01/F02/F03/F04/F07/F10			10 Nm
Drives, rear seat				
10AZ Drive for longitudinal seat adjustment to seat rail	F01/F02/F03/F04/F07			7 ± 0.5 Nm
11AZ Flex shaft for longitudinal seat adjustment to seat rail	F01/F02/F03/F04/F07			28 ± 3 Nm
12AZ Drive for seat tilt adjustment to seat frame	F01/F02/F03/F04/F07			12 ± 1.2 Nm
13AZ Threaded rod to seat tilt	F01/F02/F03/F04/F07			22 ± 3 Nm

adjustment				
14AZ Drive for head restraint height adjustment	F01/F02/F03/F04/F07			3.1 ± 0.3 Nm
15AZ Drive for backrest angle adjustment	F01/F02/F03/F04/F07			12 ± 1.2 Nm
16AZ Adjusting unit, backrest angle adjustment	F01/F02/F03/F04/F07			20 ± 2 Nm

67 31... Notes on initializing electric seat actuator drives

NOTE: Initialization is carried out at the adjusting switch of the relevant seat.

In this process, the end positions of the relevant electric seat actuator drive are recorded and stored.

An initialization must be performed:

- After replacing a drive unit for seat adjustment.
- After replacing/programming control unit for seat adjustment.

Operating sequence for initialization:

Move corresponding seat actuator drive(s) into both end positions.

67 31 530 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR BACKREST ANGLE ADJUSTMENT

Necessary preliminary tasks:

- Remove **DRIVER'S** or **PASSENGER** seat.
- Remove **REAR PANEL ON FRONT SEAT BACKREST**
- Remove **COVERS ON FRONT SEAT**

If necessary, disengage backrest cover (1) on left and right in lower area and lay outwards slightly.

Release screw (4).

Detach metal retaining ring (2) on left and right from drive rod (3).

Installation:

Always replace metal retaining ring (2).

Make sure metal retaining ring (2) is correctly seated.

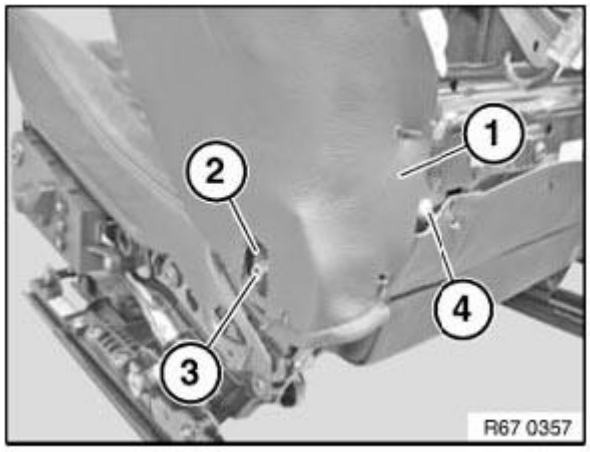


Fig. 15: Identifying Backrest Cover, Metal Retaining Ring And Drive Rod

Pull out drive rod (1) until drive unit for backrest angle adjustment (2) is free.

Installation:

Make sure drive rod (1) is correctly seated in drive unit for backrest angle adjustment (2).

Disconnect plug connection on drive unit for backrest angle adjustment (2).

Feed drive unit for backrest angle adjustment (2) out of backrest frame (3) and remove.

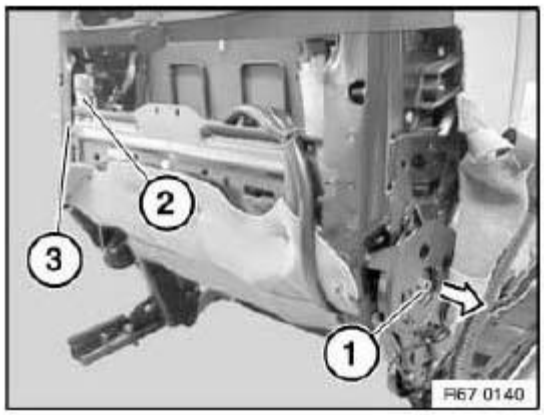


Fig. 16: Pulling Out Drive Rod

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

Replacement:

INITIALIZE backrest adjustment motor.

67 31 540 REMOVING AND INSTALLING/REPLACING DRIVE FOR BACKREST HEAD ADJUSTMENT

Necessary preliminary tasks

- Remove **BOTH REAR PANELS ON FRONT SEAT BACKREST**

Disconnect plug connection (1).

Release screw (2).

Tightening torque **67 31 4AZ** .

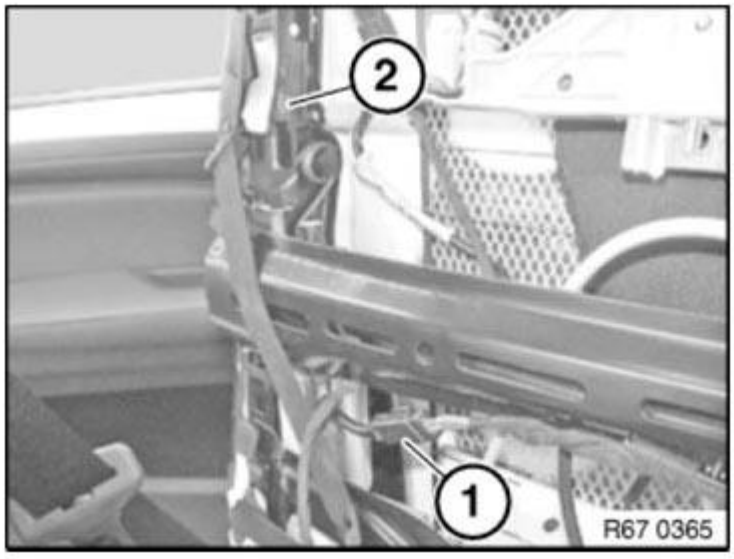


Fig. 17: Identifying Plug Connection With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shaft (1) in direction of arrow out of shaft receptacle (2).

Installation:

Make sure shaft (1) is correctly seated in receptacle (2).

Release retaining ring (3).

Feed out drive unit for backrest head adjustment (4) and remove.

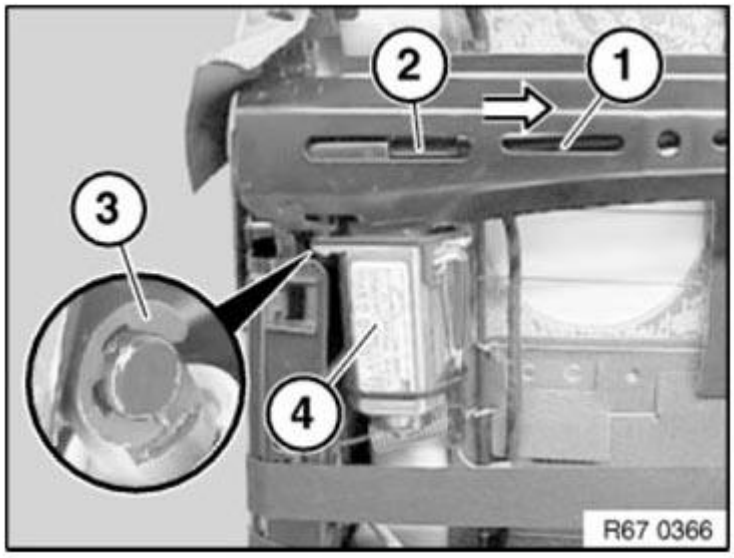


Fig. 18: Pulling Shaft Out Of Shaft Receptacle
Courtesy of BMW OF NORTH AMERICA, INC.

Removal and installation only

Do not turn spindle (1) in order not to change measurement A.

Replacement

Adopt measurement A of removed drive unit for backrest head adjustment (2). If necessary, adjust measurement A by turning spindle (1).

INITIALIZE drive unit for backrest head adjustment.

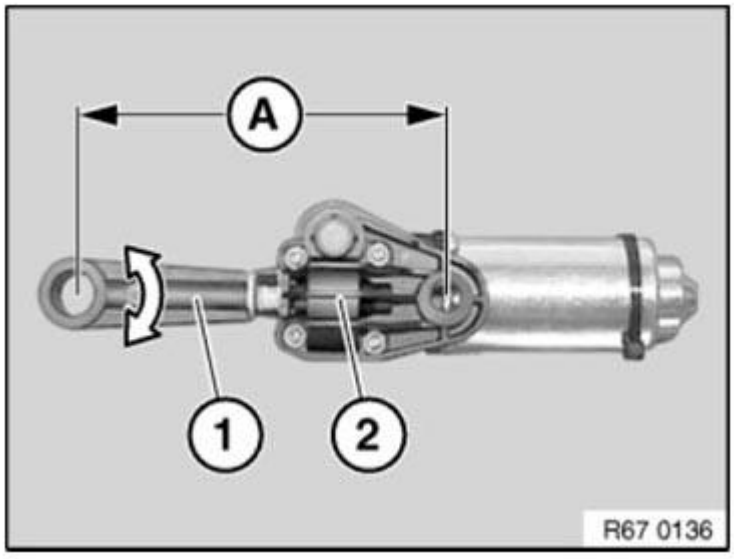


Fig. 19: Adjusting Back Rest Head Measurement By Turning Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

67 31 640 REMOVING AND INSTALLING/REPLACING DRIVE FOR BACKREST HEAD ADJUSTMENT (COMFORT SEATS IN REAR COMPARTMENT)

Necessary preliminary tasks

- Remove **LEFT OR RIGHT REAR SEAT**

Detach backrest cover (1) from metal eyelets.

Unfasten plug connection (2) and disconnect.

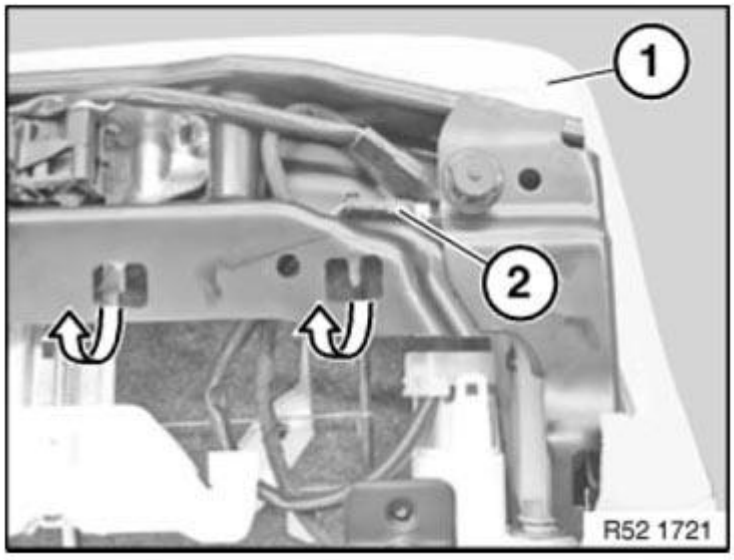


Fig. 20: Identifying Back Rest Cover And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shaft (2) in direction of arrow out of drive.

Installation:

Ensure shaft (2) is correctly seated in drive locator.

Release retaining rings (1).

Remove drive for backrest head adjustment from backrest frame.

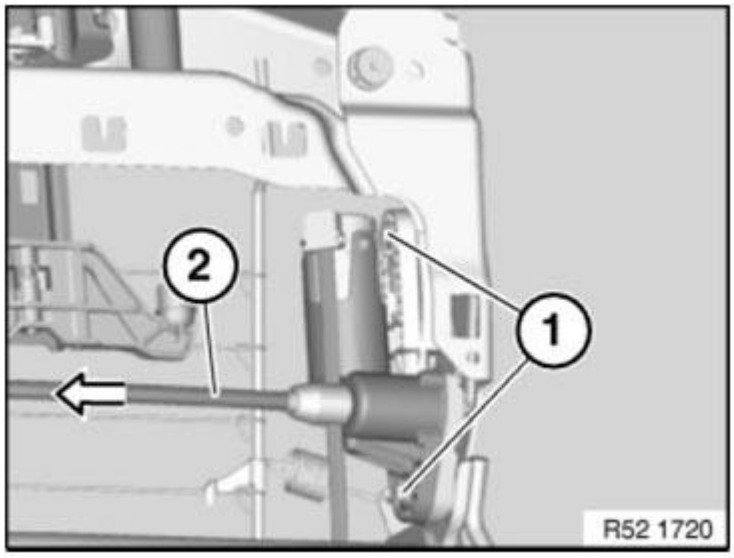


Fig. 21: Pulling Shaft Out Of Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Release retaining rings (1).

Pull shaft (2) in direction of arrow out of drive.

Installation:

Ensure shaft (2) is correctly seated in drive locator.

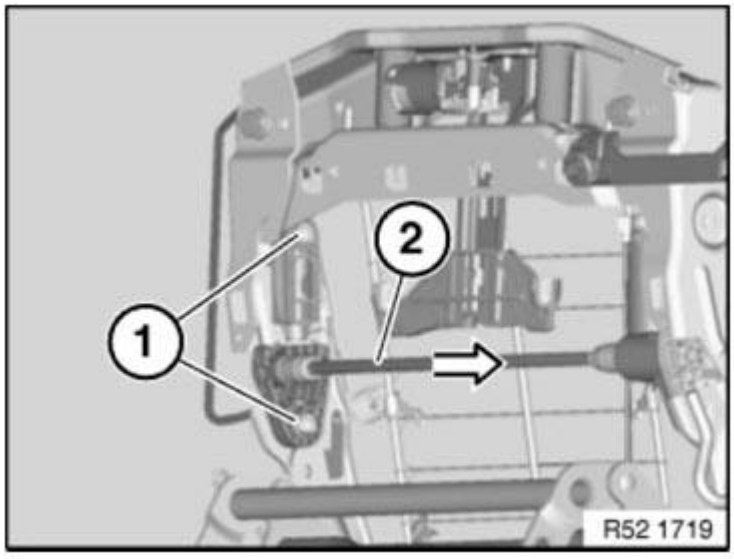


Fig. 22: Pulling Shaft Out Of Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Remove drive for backrest head adjustment from backrest frame.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

Replacement only:

INITIALIZE drive unit for backrest head adjustment.

67 31 630 REMOVING AND INSTALLING/REPLACING DRIVE FOR BACKREST TILT ADJUSTMENT (COMFORT SEATS IN REAR COMPARTMENT)

Necessary preliminary tasks

- Partially remove **LEFT OR RIGHT BACKREST COVER**

Installation

- Powerlok screws must be replaced and must **not** be reused
- Powerlok screws are mechanical screw locks with trilobular threads

Installation

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

Unfasten plug connection (2) and disconnect.

Release screw (1).

Installation:

Replace screw (1).

Tightening torque **67 31 16AZ** .

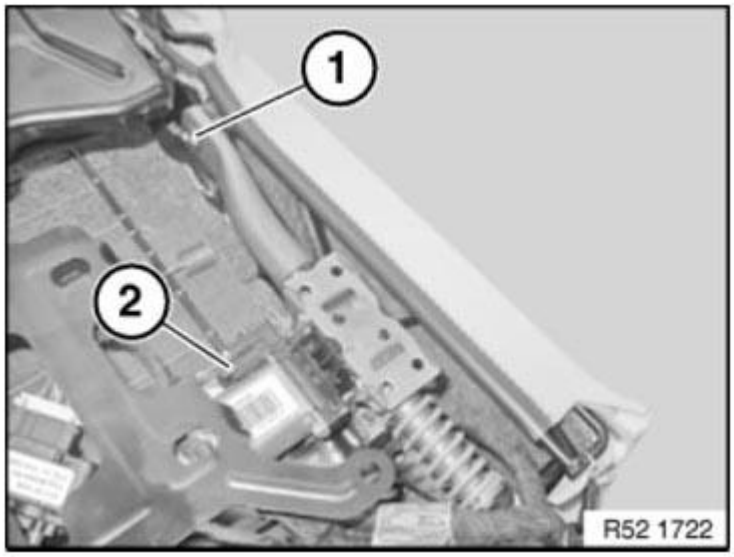


Fig. 23: Identifying Backrest Tilt Adjuster Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Replace screws (1).

Tightening torque **67 31 15AZ** .

Remove drive unit.

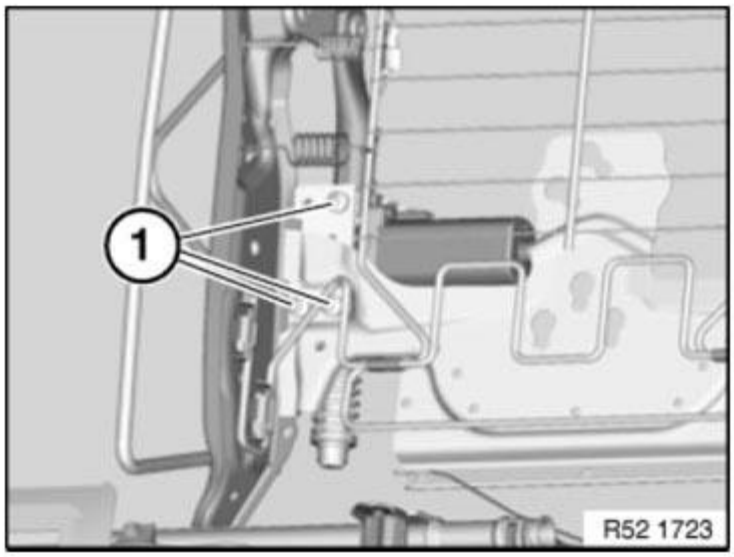


Fig. 24: Identifying Drive Unit Mounting Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

Replacement only:

INITIALIZE backrest adjustment motor.

67 31 700 REMOVING AND INSTALLING/REPLACING DRIVE FOR HEAD RESTRAINT HEIGHT ADJUSTMENT (COMFORT SEATS IN REAR CABIN)

Necessary preliminary tasks

- Remove **REAR HEAD RESTRAINT MOUNTING**

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

Replacement only:

INITIALIZE drive unit for head restraint height adjustment.

67 31 570 REMOVING AND INSTALLING/REPLACING DRIVE FOR HEAD RESTRAINT HEIGHT ADJUSTMENT ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Remove **CRASH-ACTIVE HEADREST**

Pull backrest cover (1) in direction of arrow from metal lugs (2).

Detach backrest cover (1) on both sides from backrest frame.

Lift cover with padding (1) in upper area over backrest frame.

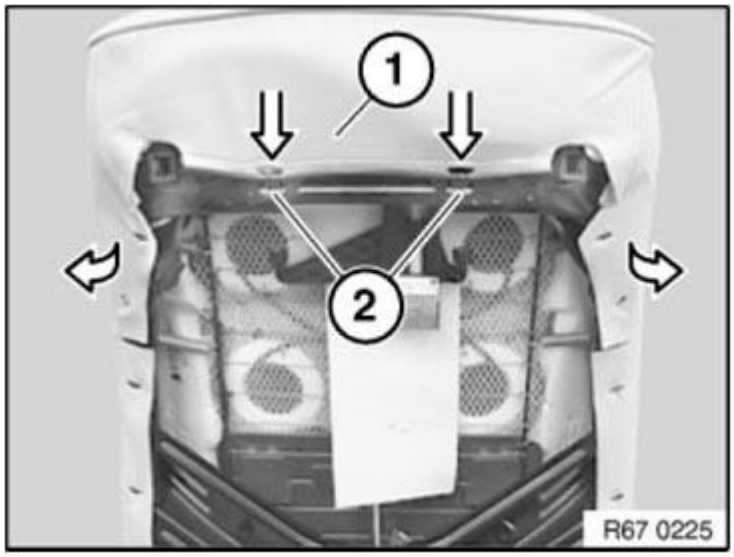


Fig. 25: Lifting Backrest Cover With Padding In Upper Area Over Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unfasten screws (2).

Tightening torque **67 31 3AZ** .

Feed out drive for head restraint height adjustment (3) in direction of arrow and remove.

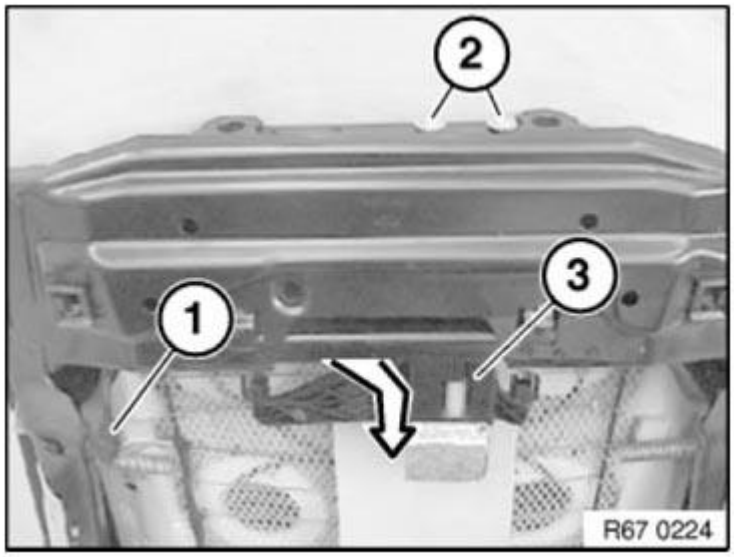


Fig. 26: Feeding Out Drive For Head Restraint Height Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

67 31 600 REMOVING AND INSTALLING/REPLACING DRIVE FOR LONGITUDINAL SEAT ADJUSTMENT (COMFORT SEATS IN REAR CABIN)

Necessary preliminary tasks

- Remove **COMPLETE PADDING FOR REAR SEAT**

Unclip flex shaft cover (1) towards top.

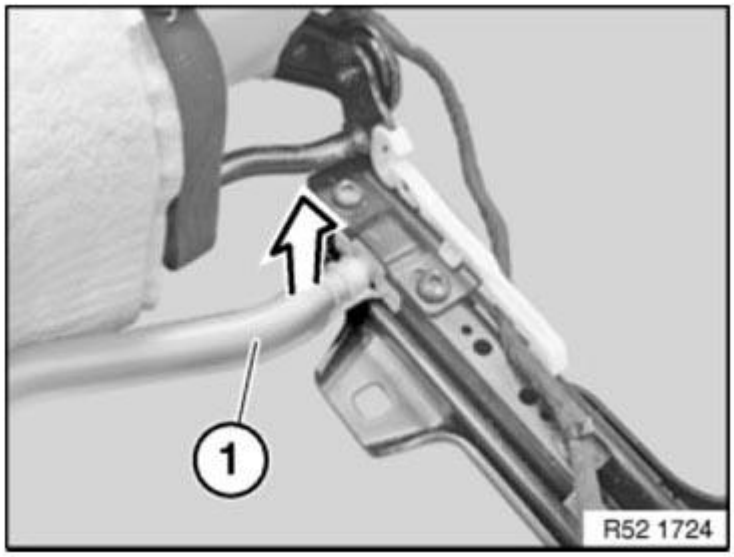


Fig. 27: Unclipping Flex Shaft Cover Towards Top
Courtesy of BMW OF NORTH AMERICA, INC.

Pull long sleeve tube (1) with flex shaft out of gearing.

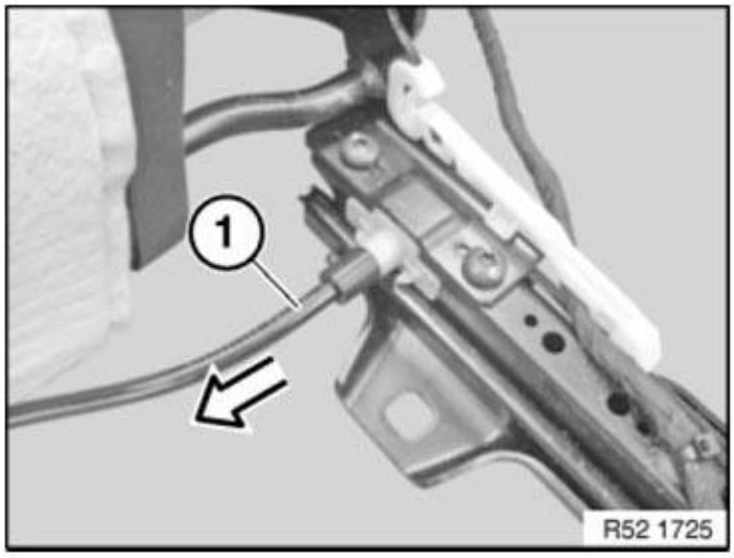


Fig. 28: Pulling Long Sleeve Tube With Flex Shaft From Gearing
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (2).

Release screws (1).

Tightening torque **67 31 10AZ** .

Remove drive for longitudinal seat adjustment.

Detach flex shafts from drive.

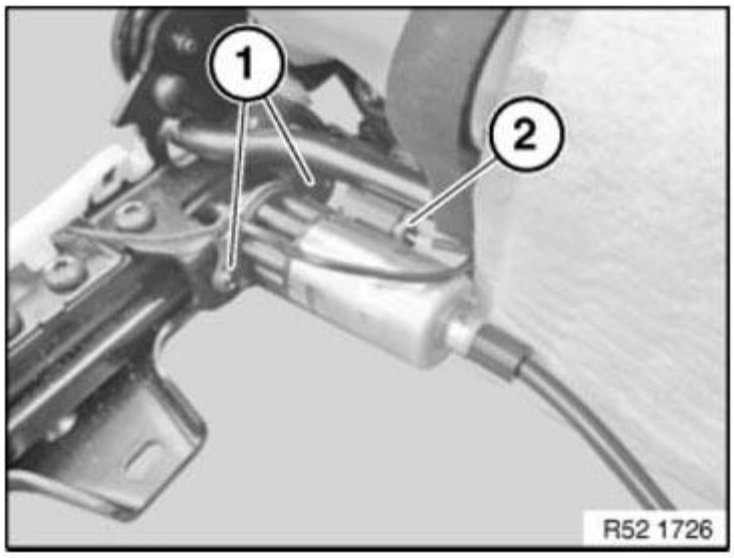


Fig. 29: Identifying Plug Connection With Mounting Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Make sure flex shafts are correctly seated.

Make sure rubber decoupler is correctly seated on drive.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

Replacement only:

INITIALIZE drive unit for longitudinal seat adjustment.

67 31 610 REMOVING AND INSTALLING/REPLACING DRIVE FOR SEAT TILT ADJUSTMENT (COMFORT SEATS IN REAR COMPARTMENT)

Necessary preliminary tasks

- Remove complete **PADDING FOR REAR SEAT**

Installation

- Powerlok screws must be replaced and must **not** be reused
- Powerlok screws are mechanical screw locks with trilobular threads

Installation

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

Unfasten plug connection (1) and disconnect.

Release screw (2).

Installation:

Replace screw (2).

Tightening torque **67 31 13AZ** .

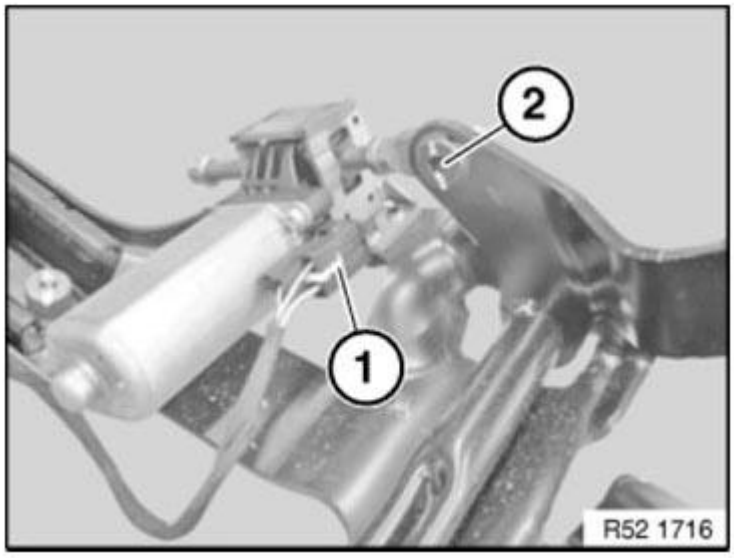


Fig. 30: Identifying Seat Tilt Adjuster Plug Connection With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Replace screws (1).

Tightening torque **67 31 12AZ** .

Remove drive for seat tilt adjustment (2).

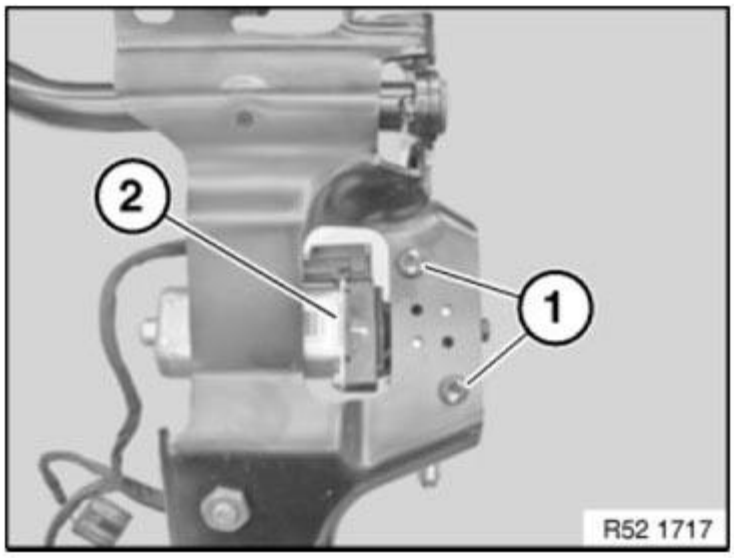


Fig. 31: Identifying Seat Tilt Adjuster Drive With Mounting Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation position for controlled pan installation.

Adjust position (A) of seat tilt adjustment from rear stop.

A. = 29.4 mm

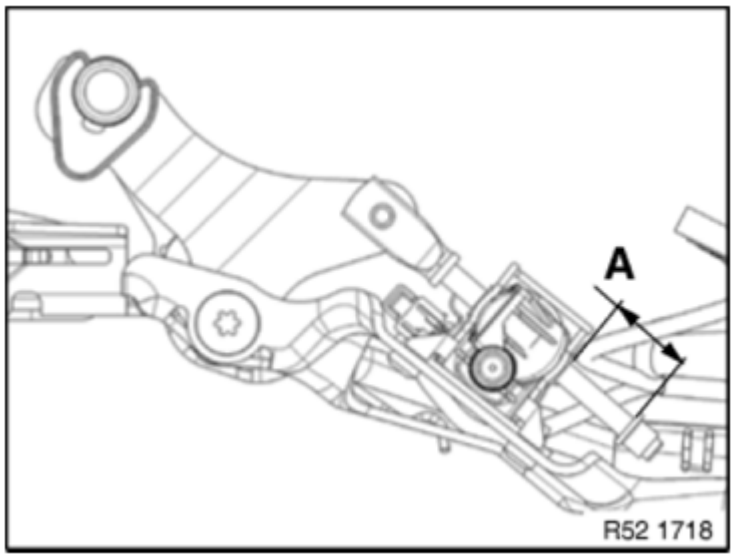


Fig. 32: Identifying Seat Tilt Adjustment Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

Replacement only:

INITIALIZE drive unit for seat tilt adjustment.

67 31 520 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR SEAT HEIGHT ADJUSTMENT

Necessary preliminary tasks

- Remove driver's or passenger seat. See **5214001 REMOVING AND INSTALLING FRONT SEAT, DRIVER'S SIDE** or **5214002 REMOVING AND INSTALLING FRONT SEAT, PASSENGER SIDE**

Set down front seat sideways on a suitable surface.

Disconnect plug connection (1).

Unfasten screws (2).

Tightening torque **67 31 1AZ** .

Feed out drive unit for seat height adjustment (3) and remove.

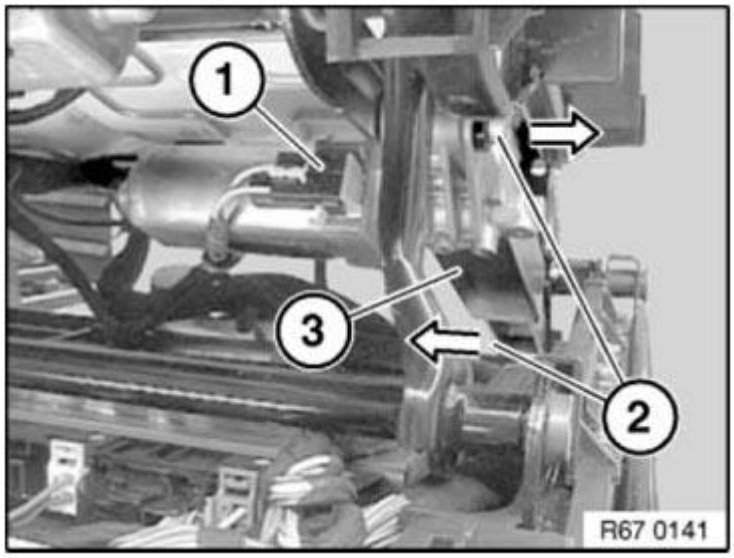


Fig. 33: Unfastening Seat Height Adjuster Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit drive unit for seat height adjustment (1) with plastic clip (2) only.

Make sure plastic clip (2) is correctly seated.

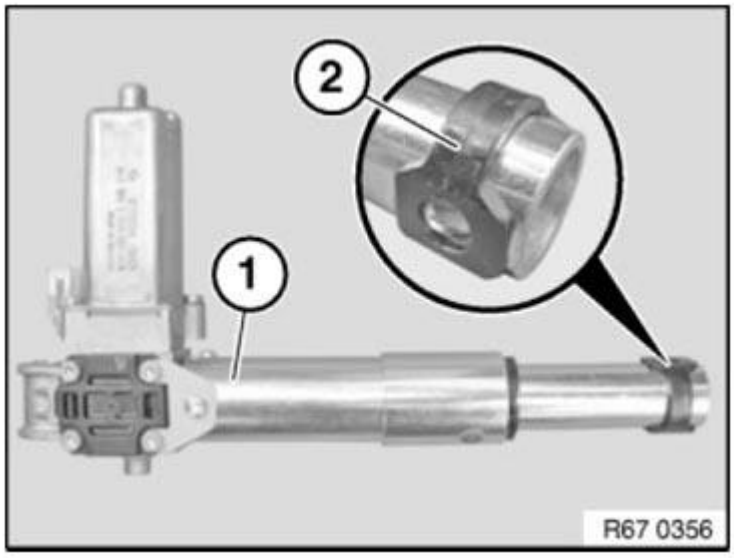


Fig. 34: Identifying Seat Height Adjustment Drive Unit With Plastic Clip
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

Replacement

Initialize drive unit for seat height adjustment.

67 31 520 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR SEAT HEIGHT ADJUSTMENT

Necessary preliminary tasks

- Remove driver's or passenger seat. See **5214001 REMOVING AND INSTALLING FRONT SEAT, DRIVER'S SIDE** or **5214002 REMOVING AND INSTALLING FRONT SEAT, PASSENGER SIDE** .

Set down front seat sideways on a suitable surface.

Disconnect plug connection (1).

Unfasten screws (2).

Tightening torque **67 31 1AZ** .

Feed out drive unit for seat height adjustment (3) and remove.

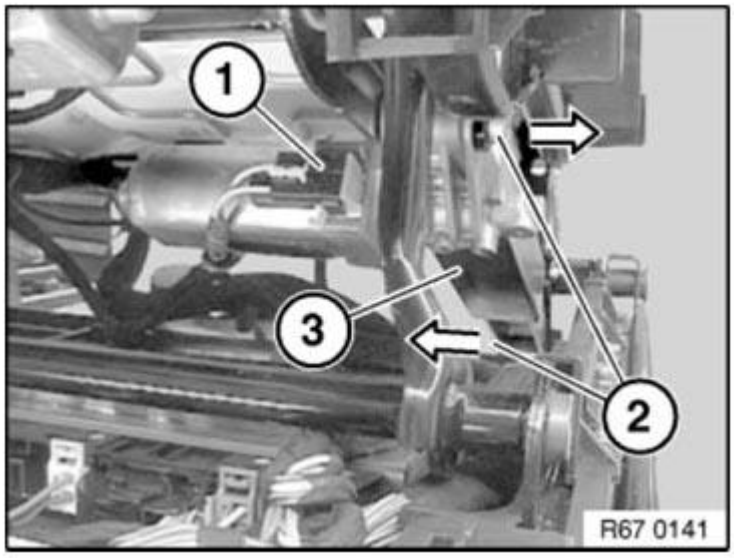


Fig. 35: Removing Seat Height Adjuster Drive Unit Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Fit drive unit for seat height adjustment (1) with plastic clip (2) only.

Make sure plastic clip (2) is correctly seated.

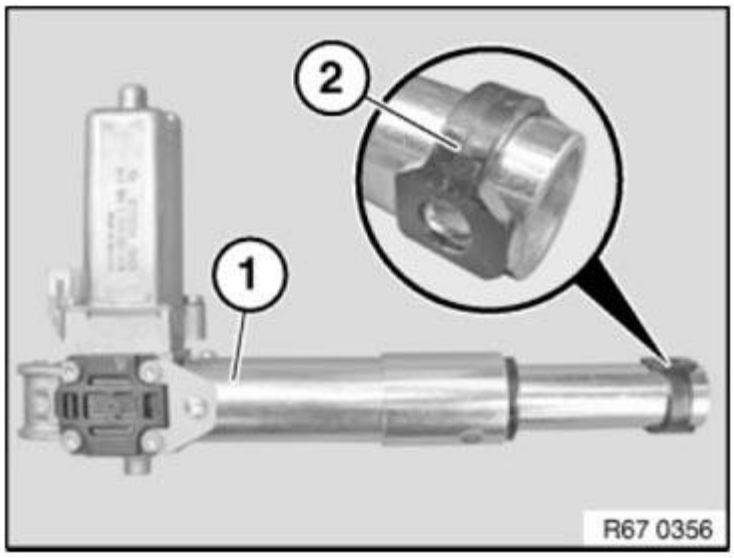


Fig. 36: Identifying Seat Height Adjuster Drive Unit With Plastic Clip
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

Replacement

Initialize drive unit for seat height adjustment.

67 31 510 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR SEAT TILT ADJUSTMENT

Necessary preliminary tasks

- Remove driver's or passenger seat. See **5214001 REMOVING AND INSTALLING FRONT SEAT, DRIVER'S SIDE** or **5214002 REMOVING AND INSTALLING FRONT SEAT, PASSENGER SIDE** .

NOTE: Front left trim shown removed for purposes of clarity.

Release screws (1).

Tightening torque **52 10 6AZ** .

Fold back seat rail (2) slightly from seat frame (3) in direction of arrow.

IMPORTANT: Risk of damage!

Avoid subjecting electric leads to tensile load.

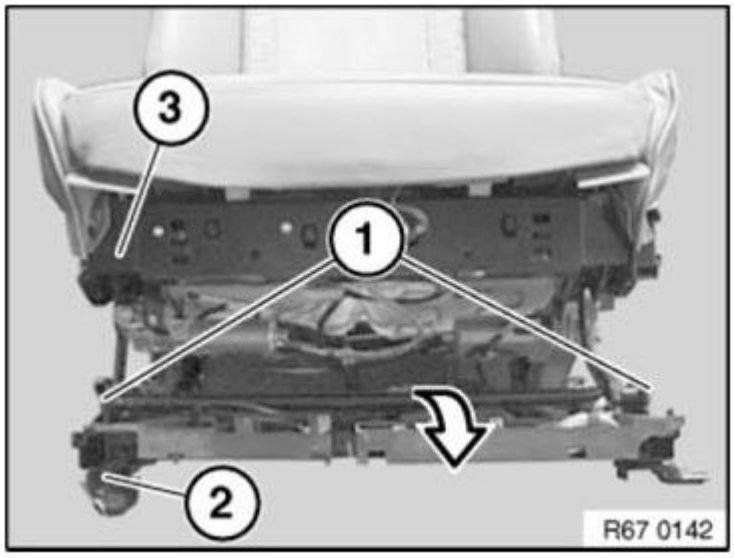


Fig. 37: Folding Back Seat Rail Slightly From Seat Frame
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!

Do not move torsion bar.

Installation:

Make sure plastic bushings (1) are correctly seated in seat rail (2).

Faulty plastic bushings (1) cause noises and must be replaced.

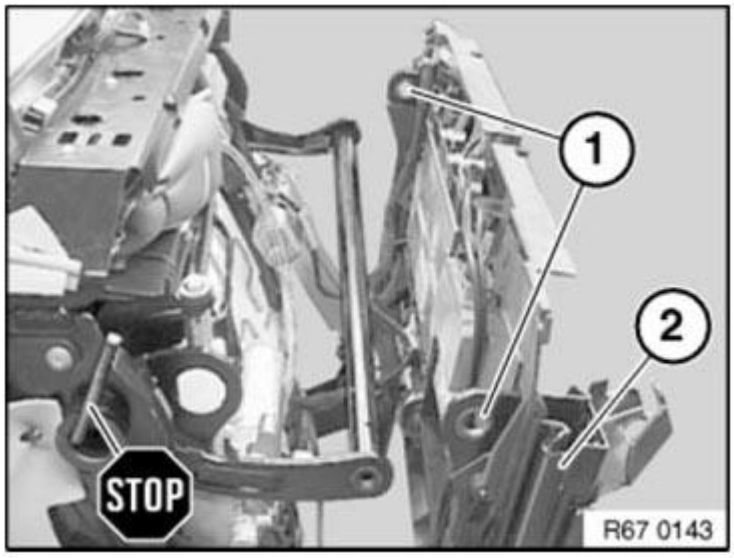


Fig. 38: Identifying Plastic Bushing And Seat Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on drive unit for seat tilt adjustment (2).

NOTE: Relieve load on drive unit for seat tilt adjustment (2).

To do so, insert a suitable screwdriver (3) in receptacle (4).

Press drive for seat tilt adjustment (2) with a levering action downwards slightly and release screw (5).

Tightening torque 67 31 2AZ .

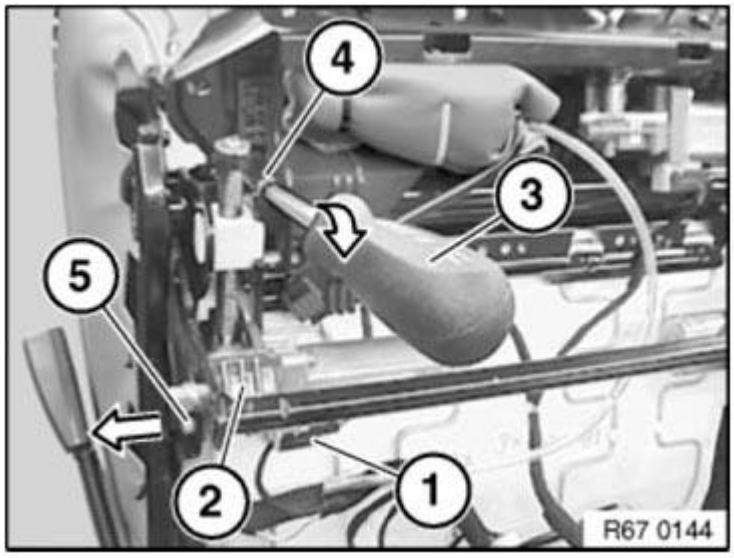


Fig. 39: Inserting Screwdriver In Receptacle
Courtesy of BMW OF NORTH AMERICA, INC.

Then slowly move screwdriver (3) upwards and relieve load on drive unit for seat tilt adjustment (2) completely.

Tilt drive unit for seat tilt adjustment (1) upwards and feed out from receptacle (2).

If necessary, twist out drive unit for seat tilt adjustment (1) at spindle (3) to such an extent that it can be removed.

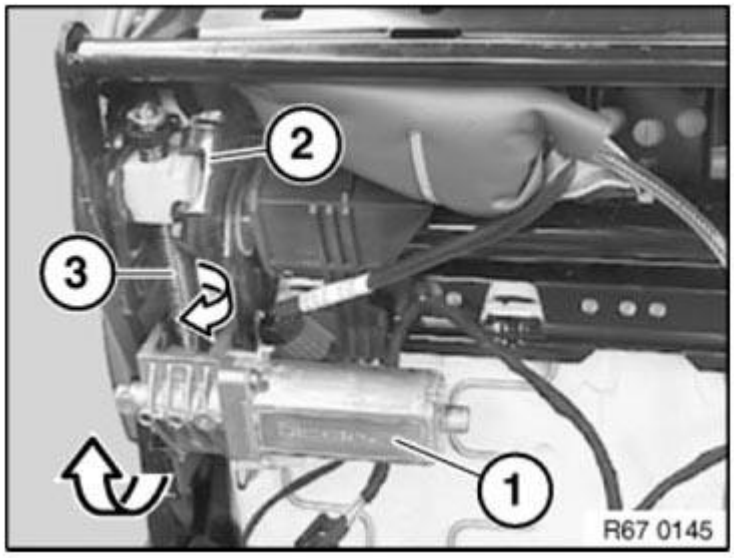


Fig. 40: Twisting Drive Unit For Seat Tilt Adjustment At Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Measure dimension (A) and adjust by turning holder (1) on new drive unit for seat tilt adjustment (2).

INITIALIZE drive unit for seat tilt adjustment.

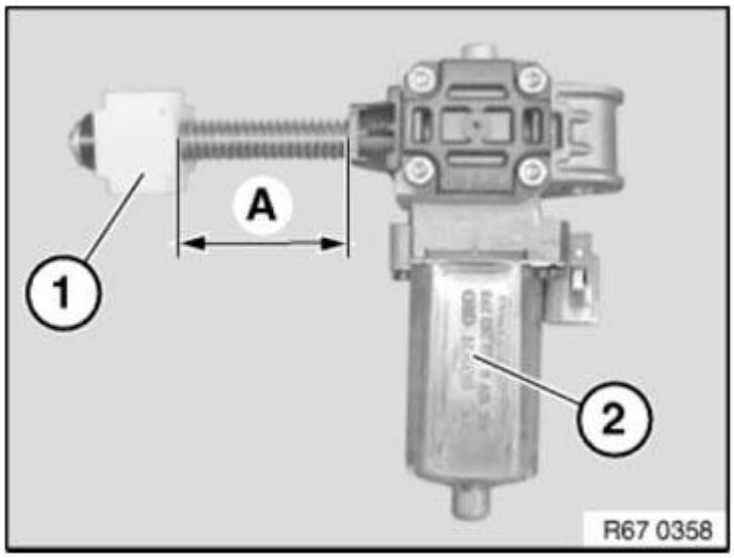


Fig. 41: Identifying Seat Unit Adjuster And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

67 31 560 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR THIGH SUPPORT

This operation is described in:

5216022 REMOVING AND INSTALLING/REPLACING ADJUSTING UNIT FOR THIGH SUPPORT ON FRONT PASSENGER SEAT (Sports, Electric) or **5217022 REMOVING AND INSTALLING/REPLACING ADJUSTING UNIT FOR THIGH SUPPORT ON FRONT PASSENGER SEAT** (Comfort).

67 31 500 REMOVING AND INSTALLING/REPLACING FORWARD/BACK SEAT ADJUSTMENT DRIVE UNIT

Necessary preliminary tasks

- Raise front seat as far up as possible
- Remove **TRIMS ON UPPER RAILS**
- **Procedure in event of faulty drive for forward/back seat adjustment:**

Removing forward/back seat adjustment motor

Unfasten plug connection (1) and disconnect.

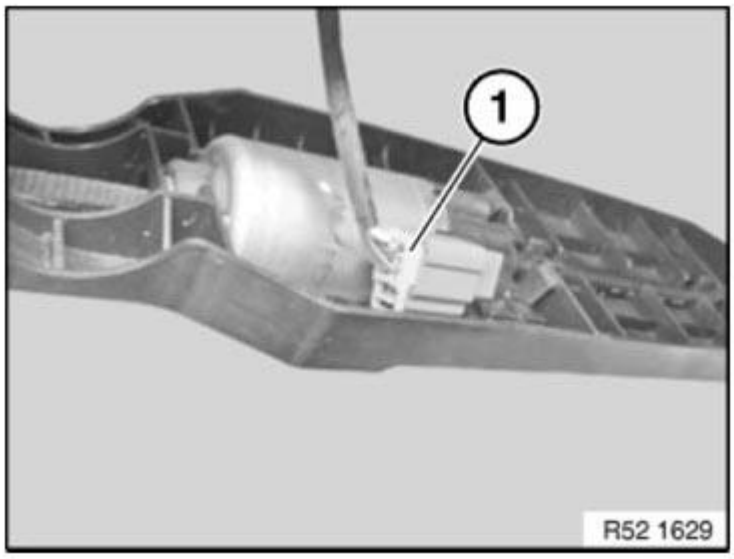


Fig. 42: Identifying Forward/Back Seat Adjustment Motor Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock retaining tabs.

Lift drive (1) with flex shaft out of guide in direction of arrow.

Pull flex shaft on left and right out of gearing.

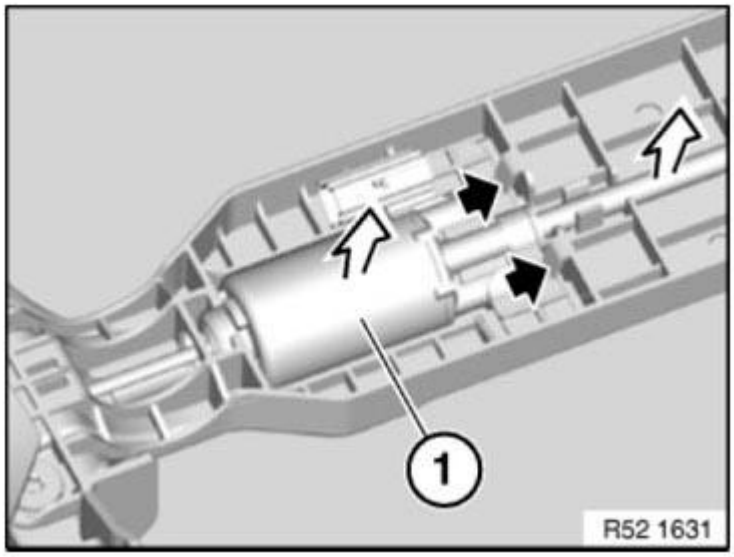


Fig. 43: Pulling Flex Shaft From Gearing

Courtesy of BMW OF NORTH AMERICA, INC.

Installing forward/back seat adjustment motor

Insert short flex shaft (1).

Attach rubber grommet.

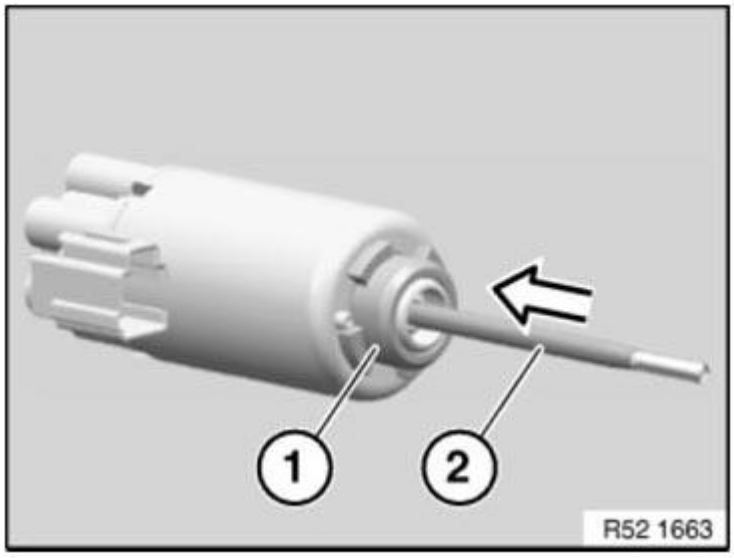


Fig. 44: Inserting Short Flex Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Attach rubber grommet at 60° angle to connector housing.

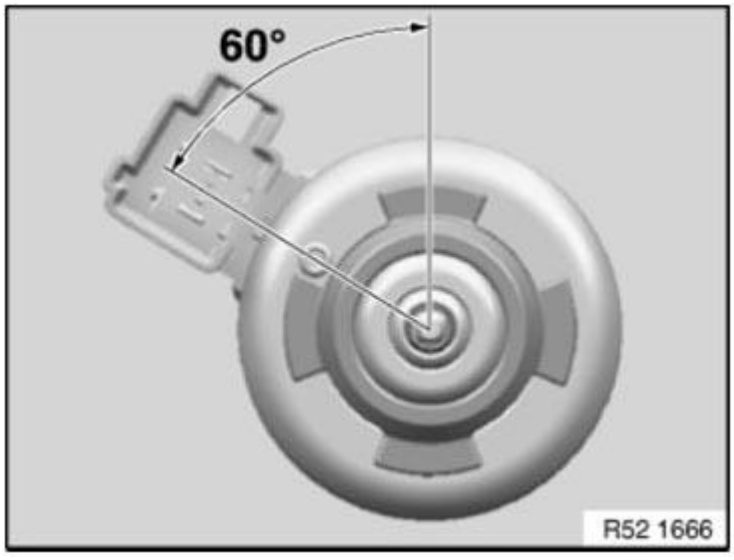


Fig. 45: Connecting Rubber Grommet At 60° Angle To Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Insert long flex shaft (1) with sleeve tube (2) and rubber grommet in plastic part (3).

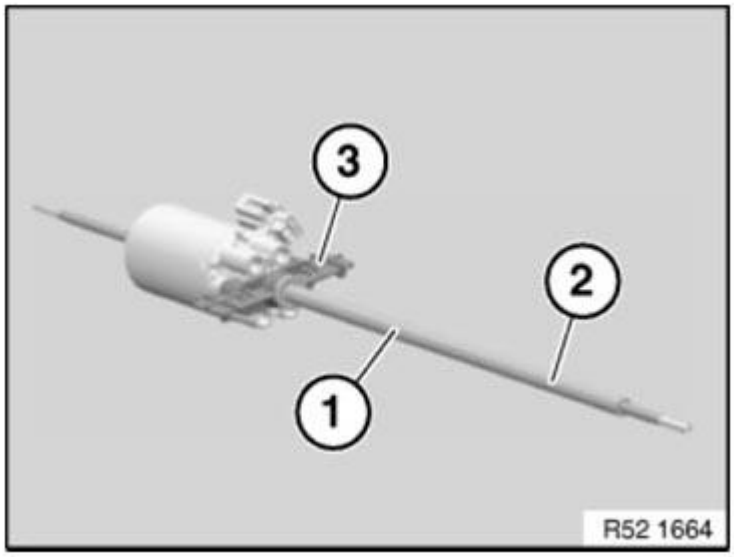


Fig. 46: Identifying Long Flex Shaft With Sleeve Tube And Rubber Grommet In Plastic Part
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Attach assembly to motor at 60° angle to connector housing so that it cannot twist.

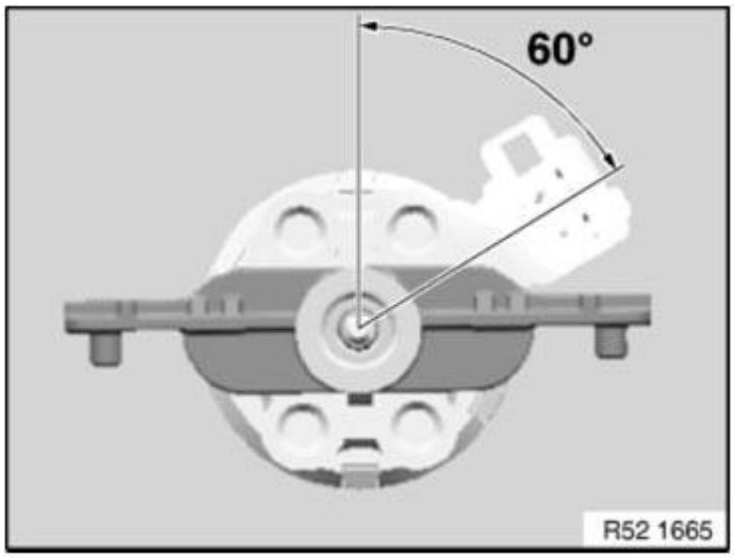


Fig. 47: Connecting Assembly To Motor At 60° Angle To Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Slide seat rail with opening forwards or back until bushing for flex shaft mounting of worm gear is flush.

Insert flex shaft.

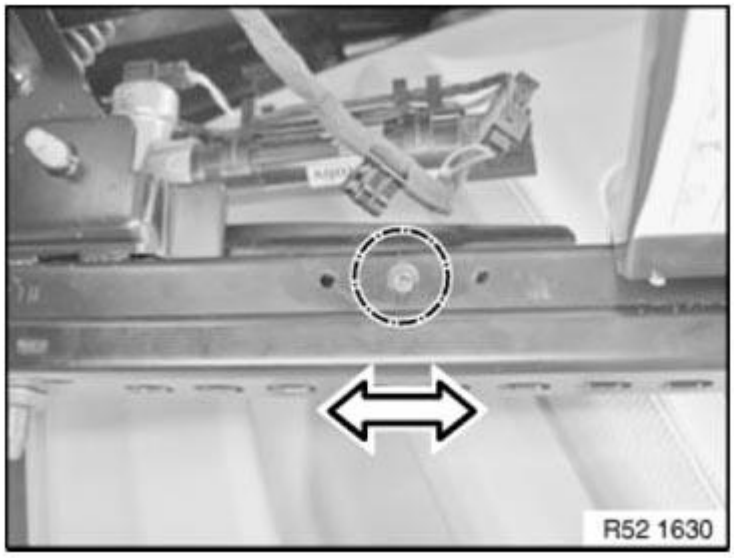


Fig. 48: Sliding Seat Rail Forward/Backward
Courtesy of BMW OF NORTH AMERICA, INC.

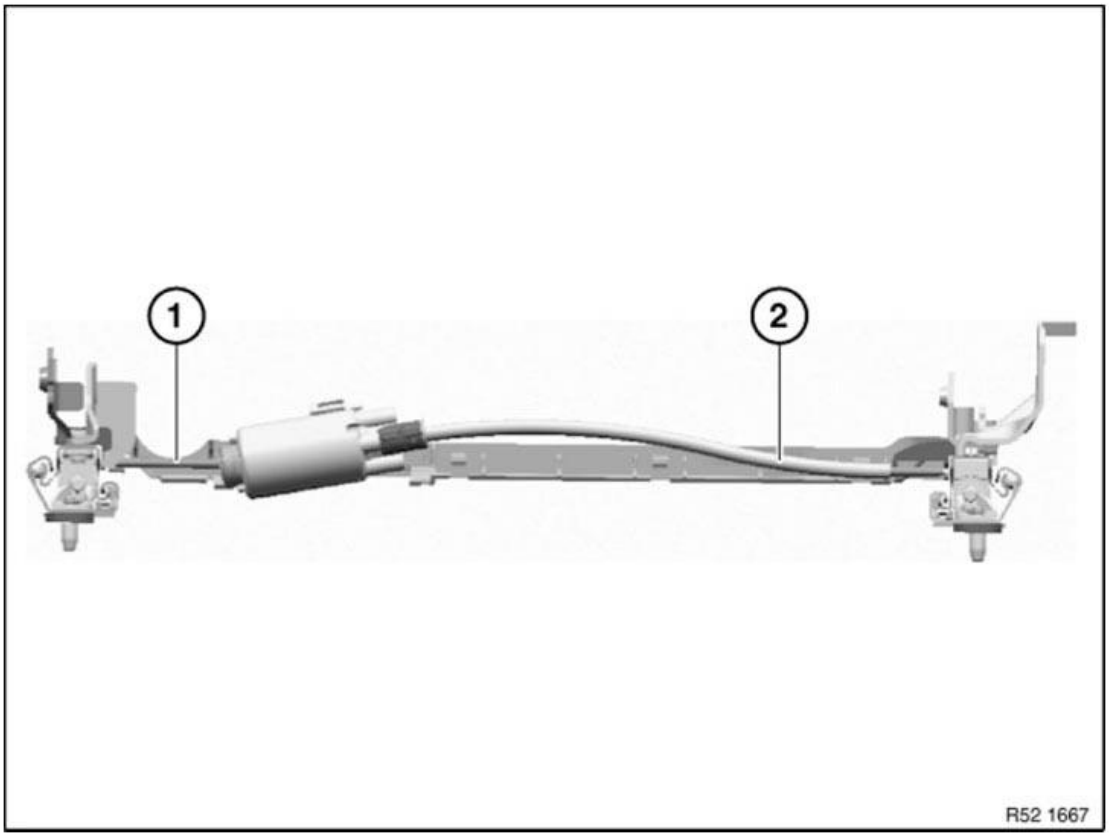


Fig. 49: Identifying Short Flex Shaft And Long Flex Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Slide short flex shaft (1) into forward/back seat adjustment gearing square.

Bend long flex shaft (2) upwards and slide into longitudinal seat adjustment gearing.

Clip motor and flex shafts into carrier plate.

Installation

PTFE hoses are shrink-fitted onto end pieces.

Check that hoses are free from damage.

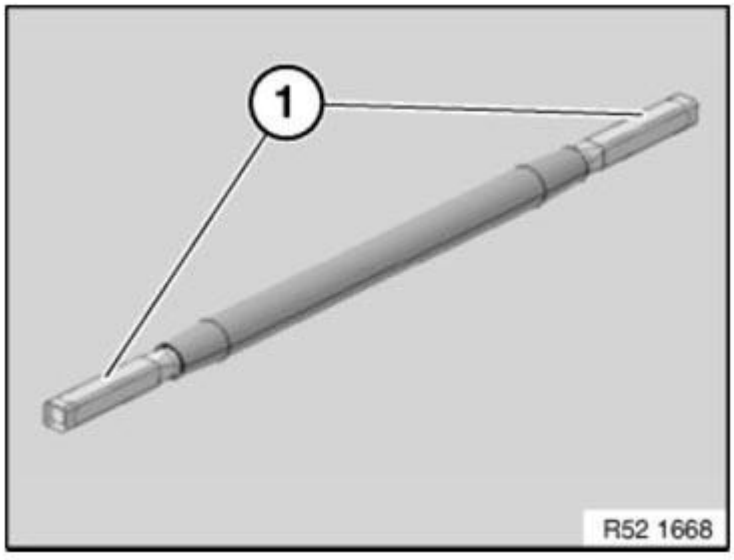


Fig. 50: Identifying PTFE Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

- Make sure flex shaft is correctly fitted on motor
- Carpet must not get between seat rails and floor panel in area of attachment points (squeaking noises)
- Powerlok screws must be replaced and must not be reused
- Powerlok screws are mechanical screw locks with trilobular threads
- Insert all screws loose to avoid twisting
- Tighten down all screws to specified torque

Tightening torque **52 10 1AZ** .

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

Replacement

INITIALIZE backrest adjustment motor.

Replacing in vehicles with production dates up to 09/2009

- Carry out **VEHICLE PROGRAMMING AND ENCODING**

6732 DRIVE, HEATING/VENTILATION/AIR CONDITIONING

67 32 620 REPLACING FAN FOR THIGH SUPPORT ON FRONT SEAT

Necessary preliminary tasks

- Remove padding for thigh support. See **5216... REPLACING UPHOLSTERY FOR FRONT SEAT THIGH SUPPORT** (Sports, Electric) or **5217... REPLACING UPHOLSTERY FOR FRONT SEAT THIGH SUPPORT** (Comfort).

Remove separating net (1).

Lift out fan (2).

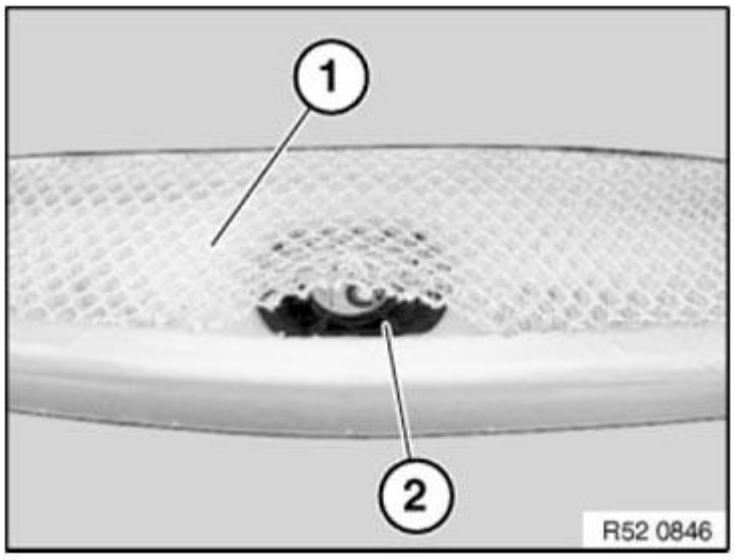


Fig. 51: Identifying Front Seat Thigh Support Fan And Separating Net
Courtesy of BMW OF NORTH AMERICA, INC.

67 32 610 REPLACING FANS FOR BACKREST ON FRONT SEAT

Necessary preliminary tasks

- Partially remove backrest cover:
  - Normal, Electric, see **5214407 REPLACING BACKREST COVER FOR DRIVER'S SEAT** or **5214408 REPLACING BACKREST COVER FOR PASSENGER SEAT**
  - Comfort, see **5217407 REPLACING BACKREST COVER FOR DRIVER'S SEAT** or **5217408 REPLACING BACKREST COVER FOR FRONT PASSENGER SEAT**

NOTE: For purposes of clarity, picture shows backrest padding and backrest cover removed.

Remove dividing net (1) towards top.

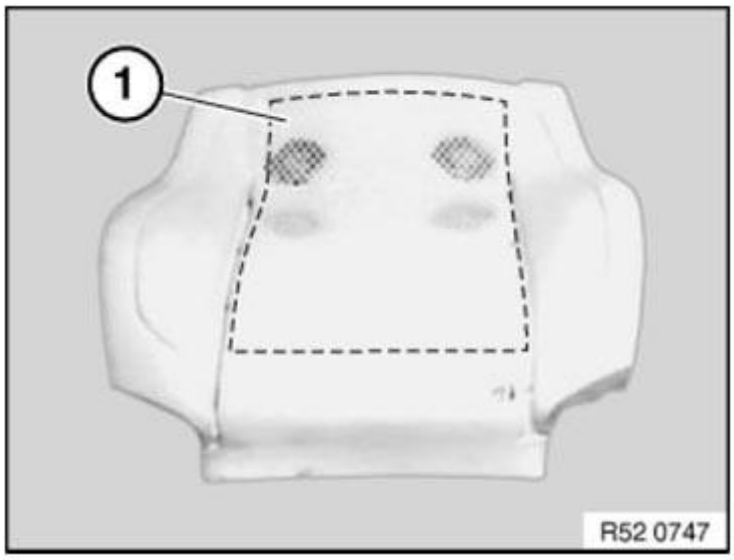


Fig. 52: Identifying Front Seat Backrest Fan Dividing Net
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fans (1) towards top.

Installation:

Make sure fans have correct cable routing (2) (cables point to each other).

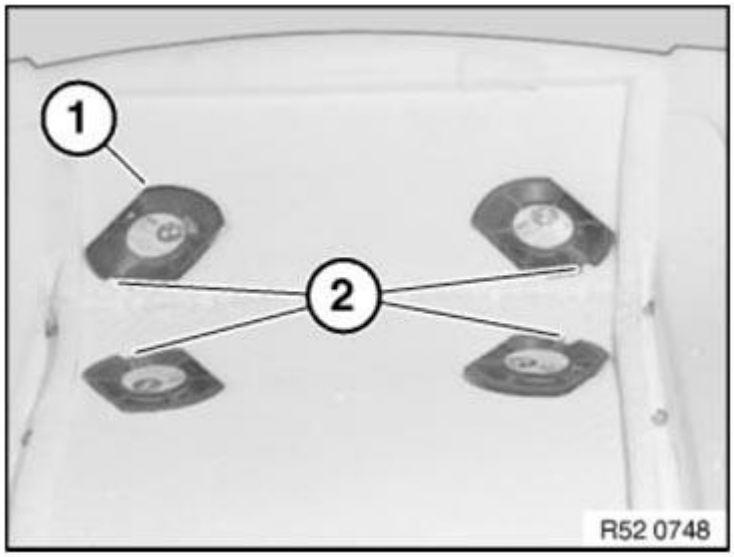


Fig. 53: Identifying Front Seat Backrest Fan With Cable Routings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

67 32 600 REPLACING FANS FOR SEAT CUSHION ON FRONT SEAT

Necessary preliminary tasks

- Partially remove **SEAT COVER FOR DRIVER'S OR PASSENGER SEAT**
- ECE version:

  If necessary, remove **SENSOR MAT (SEAT OCCUPANCY MAT)**

- US version:

If necessary, remove sensor mat (OC3 mat)

NOTE: **For purposes of clarity, picture shows seat padding and seat cover removed.**

Raise separating net (1).

Pull faulty fans (2) out of seat padding slightly and disconnect plug connections behind.

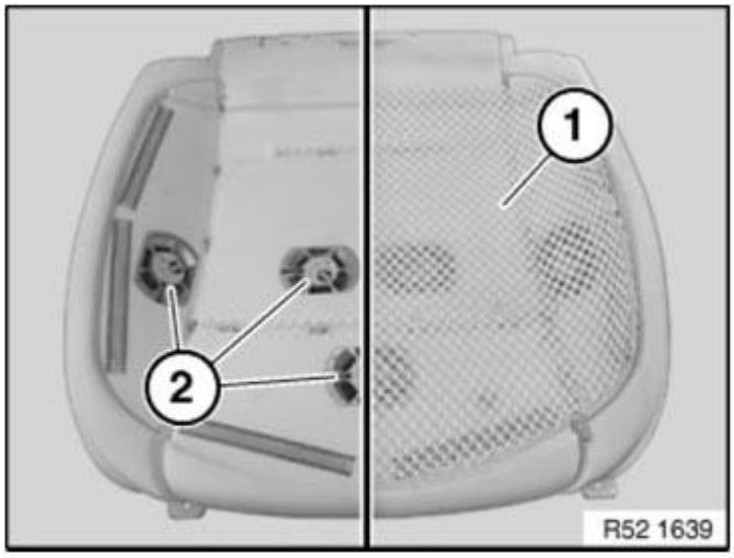


Fig. 54: Identifying Front Seat Cushion Fans With Dividing Net
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Carry out FUNCTION CHECK WITH ADAPTER CABLE**

6761 DRIVE, SLIDE/TILT SUNROOF/CONVERTIBLE TOP

67 61 005 REMOVING AND INSTALLING/RENEWING DRIVE WITH GEARBOX (FRONT) FOR ACTUATING SLIDE/TILT SUNROOF

Necessary preliminary tasks

- Remove **ROOF SWITCH CLUSTER**

NOTE: Secure drive with gearbox for actuating slide/tilt sunroof (3) against falling out.

Unfasten plug connection (1) and disconnect.

Release screws (2), tightening torque **54 13 1AZ** .

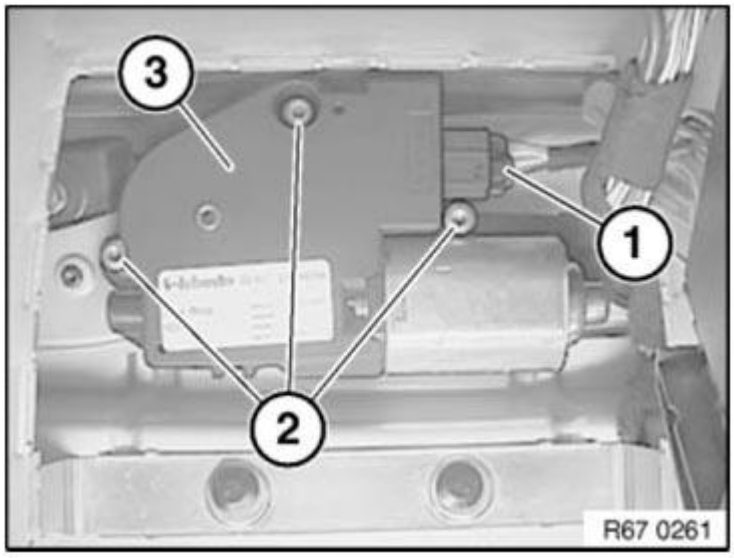


Fig. 55: Identifying Plug Connection, Screws And Actuating Slide/Tilt Sunroof
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Screws (2) are microencapsulated.

Remove drive with gearbox for actuating slide/tilt sunroof (3).

Installation

Insert gear wheel (1) of drive with gearbox for actuating slide/tilt sunroof (2) exactly in gear teeth (3).

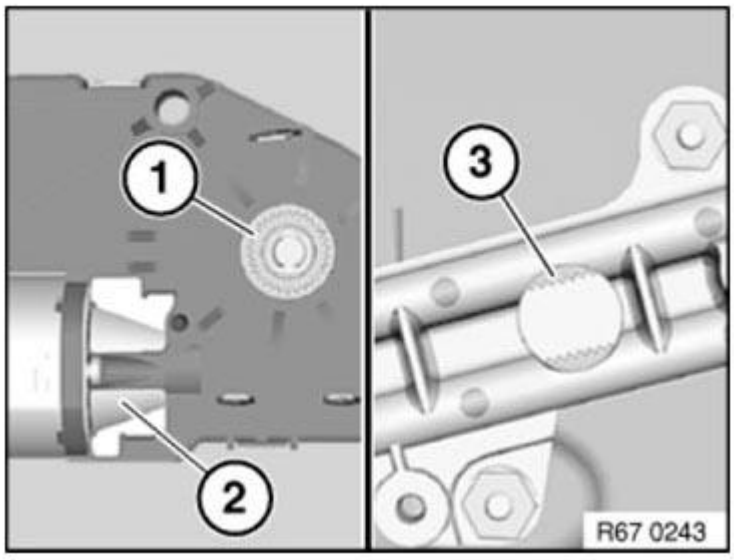


Fig. 56: Identifying Gear Wheel, Actuating Slide/Tilt Sunroof And Gear Teeth
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

- Initialize **SLIDE/TILT SUNROOF** .

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING**

67 61 007 REMOVING AND INSTALLING/REPLACING DRIVE WITH GEARBOX (REAR) FOR ACTUATING SLIDE/TILT SUNROOF (REAR)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary work

- Lower **HEADLINER**

Disconnect plug connection (1) and if necessary expose cable.

Release screws (2) and remove drive (3).

Tightening torque **51 13 1AZ** .

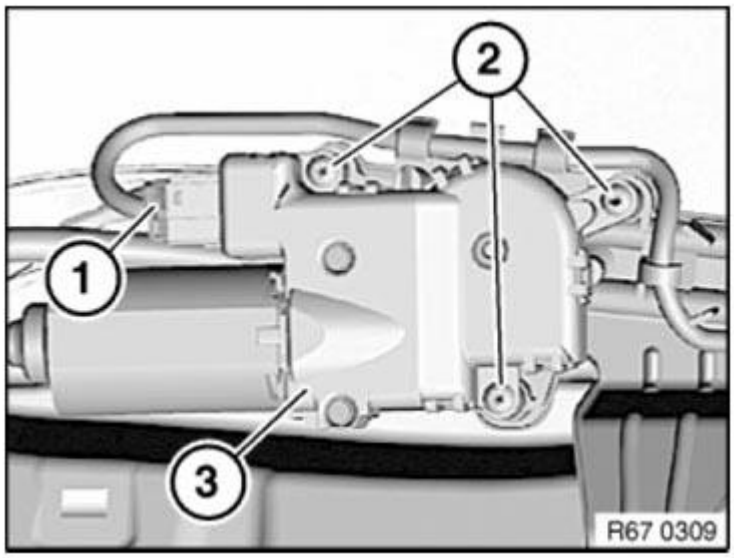


Fig. 57: Identifying Actuating Slid/Tilt Sunroof Drive With Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Insert gear (1) of electric motor with gearbox for operation of slide/tilt sunroof (2) exactly in gearing (3).

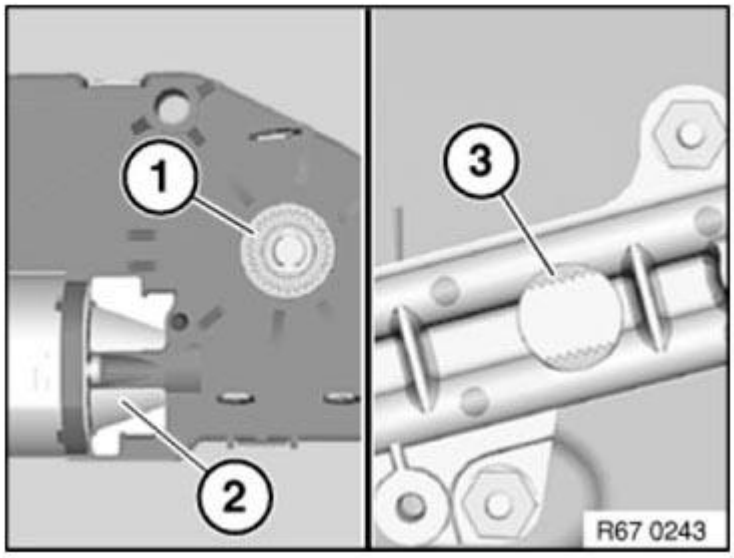


Fig. 58: Identifying Gear Wheel, Actuating Slide/Tilt Sunroof And Gear Teeth
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

- Initialize **SLIDE/TILT SUNROOF** .

6762 DRIVE, POWER WINDOW

67 31... NOTES ON INITIALIZING ELECTRIC SEAT ACTUATOR DRIVES

NOTE: Initialization is carried out at the adjusting switch of the relevant seat.

In this process, the end positions of the relevant electric seat actuator drive are recorded and stored.

An initialization must be performed:

- After replacing a drive unit for seat adjustment.
- After replacing/programming control unit for seat adjustment.

Operating sequence for initialization:

Move corresponding seat actuator drive(s) into both end positions.

67 62... NOTES ON INITIALIZING POWER WINDOW REGULATOR

NOTE: initialization is performed on the power window switch of the relevant door.

Initialization comprises:

- **Normalization**
- **Learning characteristic curve**

With normalization, the mechanical end stops of the power window regulator are recorded and stored.

The characteristic curve is learnt immediately after normalization.

When the characteristic curve is learnt, the mechanical closing forces of the power window are recorded and stored for correct operation of the anti-trapping mechanism.

Initialization, i.e. normalization and learning of characteristic curve, is performed in a continuous operation.

NOTE: An initialization must be performed:

- **In the event of malfunctions, e.g. no one-touch function, no opening or no comfort function possible.**
- **After the power window drive or door module has been replaced.**
- **After work is carried out on the power window mechanism.**

WARNING: There is no anti-trapping protection during initialization.

Necessary preliminary tasks

- Vehicle stationary
- Sufficient battery voltage available/connect charger if necessary
- Terminal "15" switched on
- All doors closed

Operating procedure for initialization (manual):

Erasure of initialization

- Move side window into lower end position.
- Press and hold switch in "Open one-touch operation" position (second switch position) for between 15 and 25 seconds.

NOTE: Deletion of initialization was successful if one-touch control function and anti-trapping protection have been rendered inoperative.

Performing initialization

- Move side window to upper end position

- Pull and hold switch in "Close one-touch operation" (2nd switch position) during the entire process.

NOTE: Re-initialization was successful if one-touch control function and anti-trapping protection function flawlessly.

Alternatively, initialization of the power window regulation can also be carried out via the Service function in ISTA.

Selection via:

- Body
  - Locking and security functions
    - Power windows
      - Initialize power windows

67 62 000 REMOVING AND INSTALLING OR REPLACING FLAT MOTOR FOR FRONT LEFT OR RIGHT POWER WINDOW UNIT

Necessary preliminary tasks

- Remove **SOUND INSULATION IN FRONT DOOR**

NOTE: Position power window unit so that screws of flat motor are freely accessible

- Remove **POWER WINDOW UNIT**

Release screws (1) and detach flat motor (2) from power window unit.

Installation:

Retaining pins (3) must not be released!

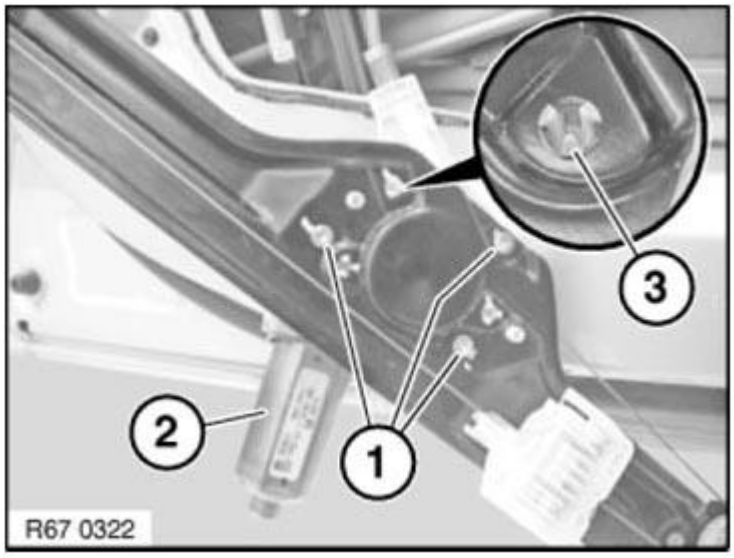


Fig. 59: Identifying Power Window Unit Flat Motor With Mounting Screws And Pins
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To ensure tension-free installation of flat motor, observe the specified screwing sequence without fail.

Tighten first screw (1), then screw (2) and finally screw (3).

Tightening torque **67 62 1AZ** .

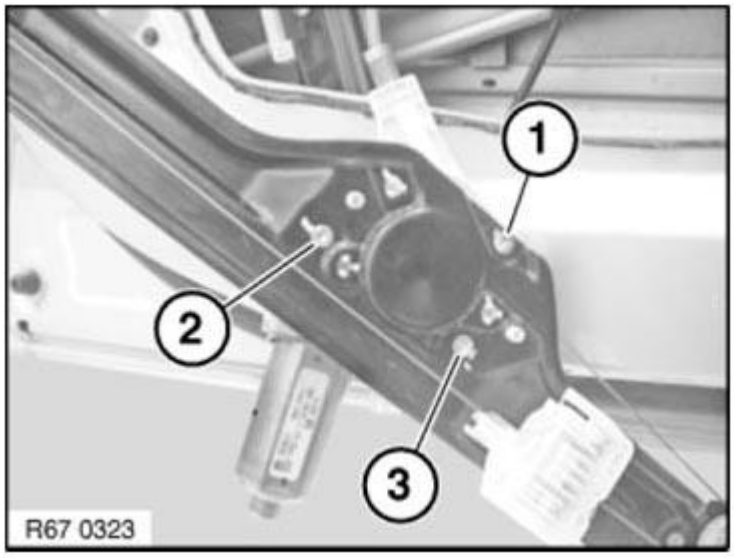


Fig. 60: Identifying Power Window Unit Flat Motor With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

An initialization must be carried out in order to activate anti-trapping protection.

Read and comply with **NOTES** on initializing power windows.

67 62 020 REMOVING AND INSTALLING/REPLACING FLAT MOTOR FOR REAR LEFT OR RIGHT POWER WINDOW UNIT

Necessary preliminary tasks

- Remove **REAR POWER WINDOW UNIT**

Release screws (1) and detach flat motor (2) from power window unit.

Installation:

Retaining pins (3) must not be released!

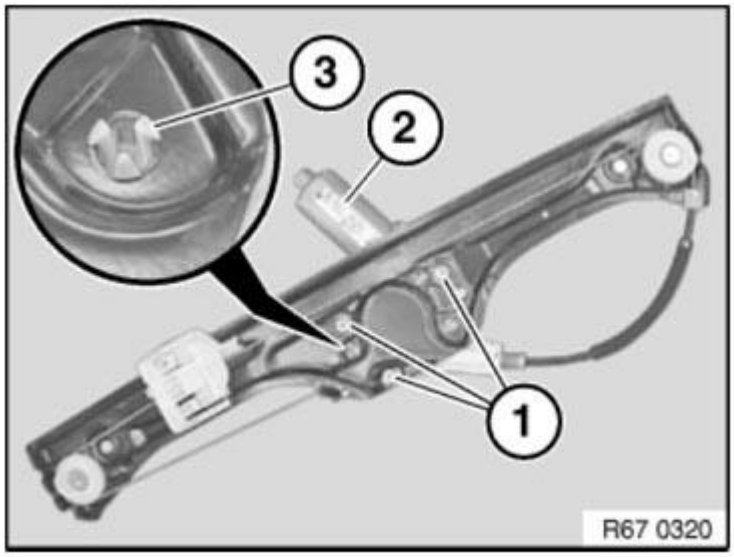


Fig. 61: Identifying Power Window Unit Flat Motor With Mounting Screws And Pins
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To ensure tension-free installation of flat motor, observe the specified screwing sequence.

Tighten first screw (1), then screw (2) and finally screw (3).

Tightening torque **67 62 1AZ** .

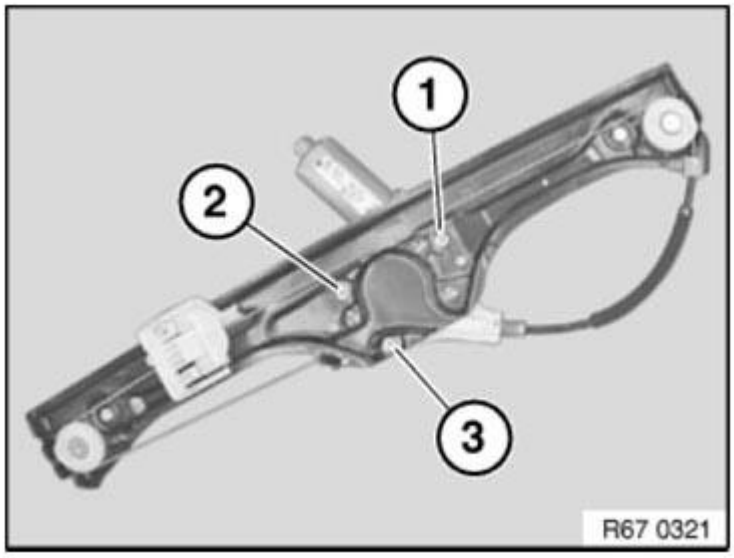


Fig. 62: Identifying Power Window Unit Flat Motor With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

An initialization must be carried out in order to activate anti-trapping protection.

Read and comply with **NOTES** on initializing power windows.

6763 DRIVE, WIPER/HEADLIGHT WASHER SYSTEM

67 63 512 REPLACING WIPER MOTOR

NOTE: Wiper motor can only be replaced in conjunction with wiper console.

Procedure is described in the document "REMOVING AND INSTALLING COMPLETE WIPER CONSOLE ".

6765 DRIVE, ROLLER SUN BLIND/SUN VISOR

67 65 010 REMOVING AND INSTALLING OR REPLACING DRIVE UNIT FOR ROLLER SUN BLIND

Necessary preliminary tasks

- Remove **REAR WINDOW ROLLER BLIND**

Release screws (1).

Remove drive linkage (2).

Installation:

Drive linkage (2) can only be installed in one position.

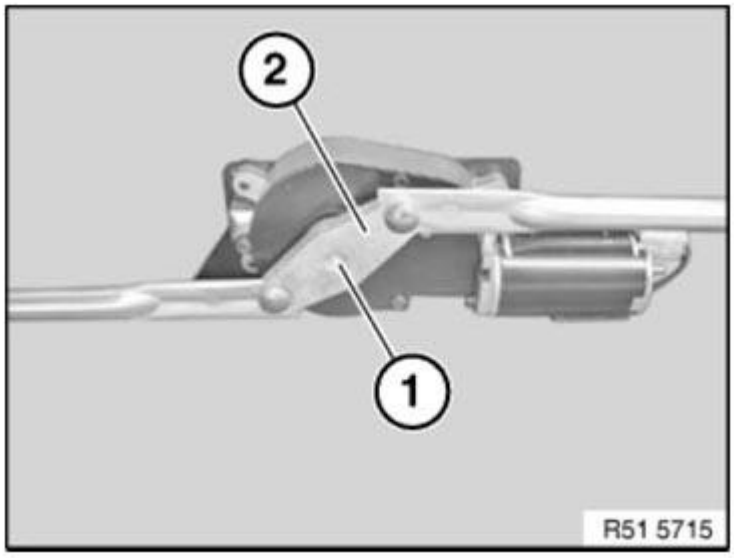


Fig. 63: Identifying Drive Linkage With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove drive.

Installation:

Ensure correct cable routing.

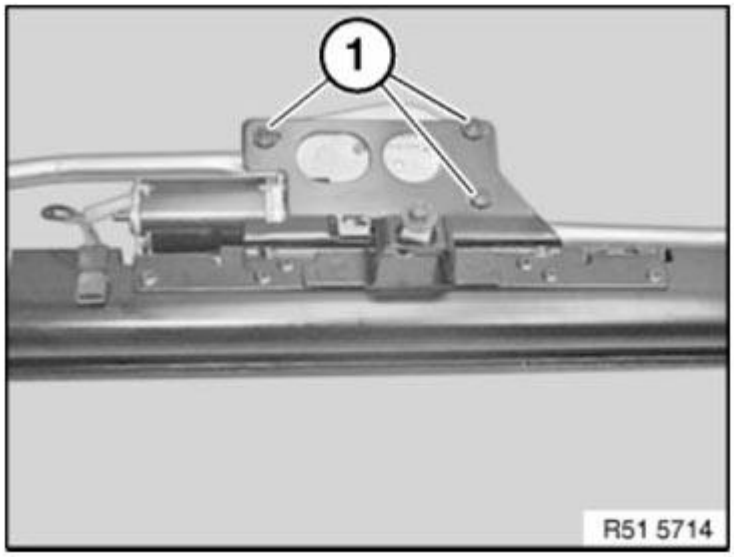


Fig. 64: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

67 65 019 REMOVING AND INSTALLING/REPLACING DRIVE FOR LEFT OR RIGHT ROLLER SUN BLIND

Necessary preliminary tasks

- Remove **DOOR TRIM PANEL**

Release screws (1).

Tightening torque **51 16 20AZ** .

Release screw (2).

Tightening torque **51 16 19AZ** .

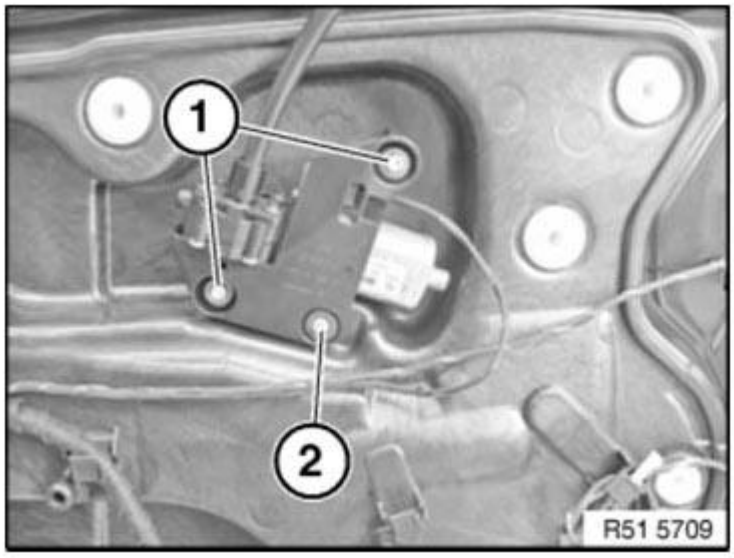


Fig. 65: Identifying Door Trim Panel Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Pull flex shaft out of drive.

Installation:

Make sure flex shaft is correctly seated in drive.

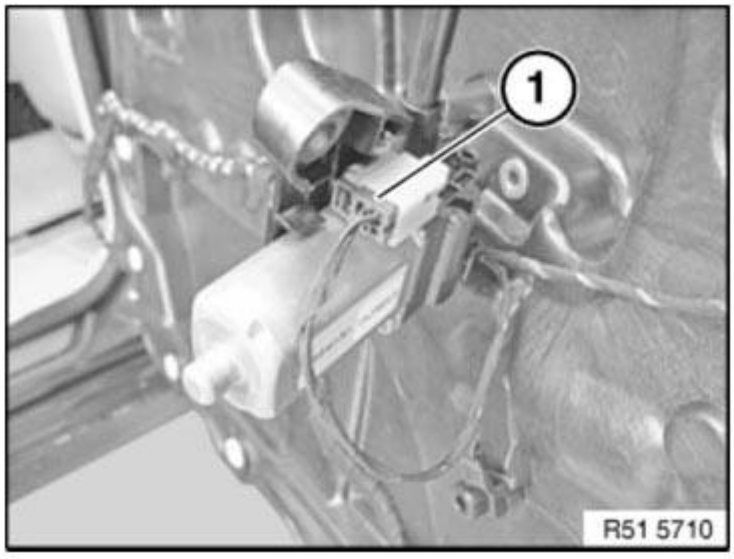


Fig. 66: Identifying Roller Sun Blind Drive Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw flex shaft (1) from gearing (2).

Installation:

Make sure flex shaft (1) is correctly seated in gearing (2).

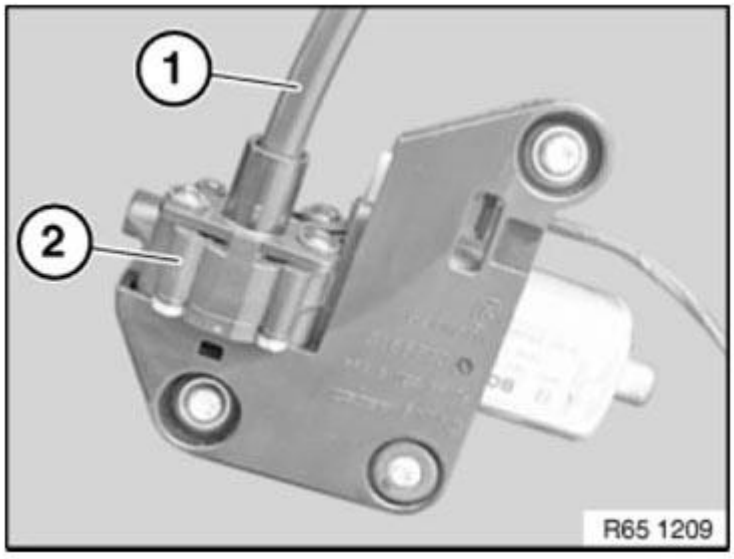


Fig. 67: Identifying Flex Shaft And Gearing
Courtesy of BMW OF NORTH AMERICA, INC.

6766 DRIVE, SEAT ADJUSTMENT

67 66 010 REMOVING AND INSTALLING/REPLACING LUMBAR SUPPORT DRIVE MECHANISM ON FRONT SEAT, LEFT OR RIGHT

Necessary preliminary tasks

- Remove rear panel on front seat backrest. See **5214198 REMOVING AND INSTALLING OR REPLACING REAR PANEL ON LEFT OR RIGHT FRONT SEAT BACKREST** (Normal, Electric) or **5217205 REMOVING AND INSTALLING/REPLACING BOTH REAR PANELS ON LEFT OR RIGHT FRONT SEAT BACKREST** (Comfort).

Unfasten plug connection (1) and disconnect.

Release clips (2).

Feed out drive unit for lumbar support in upward direction.

Installation:

Replace faulty clips (2).

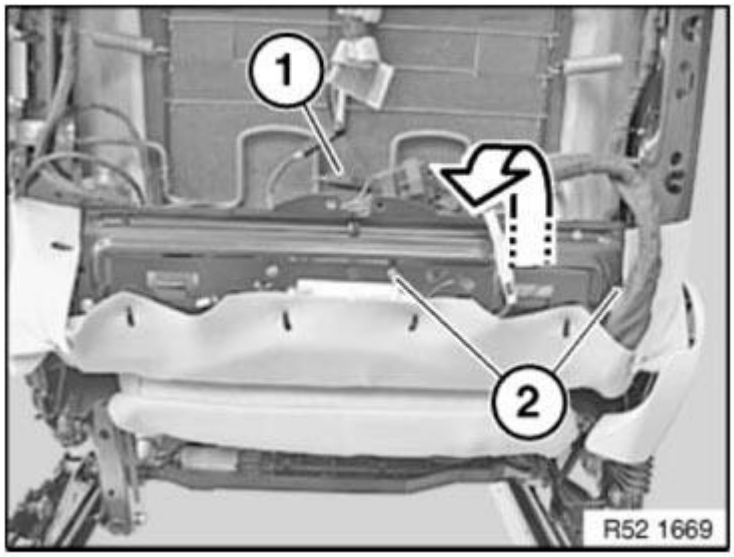


Fig. 68: Removing Lumbar Support Drive Unit In Upward Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable tie (1) from jacket (2).

Feed out drive unit for lumbar support out of jacket (2).

Detach hose (3).

NOTE: Gently heat hose (3) if stuck.

Installation:

Make sure hose (3) is laid without kinks.

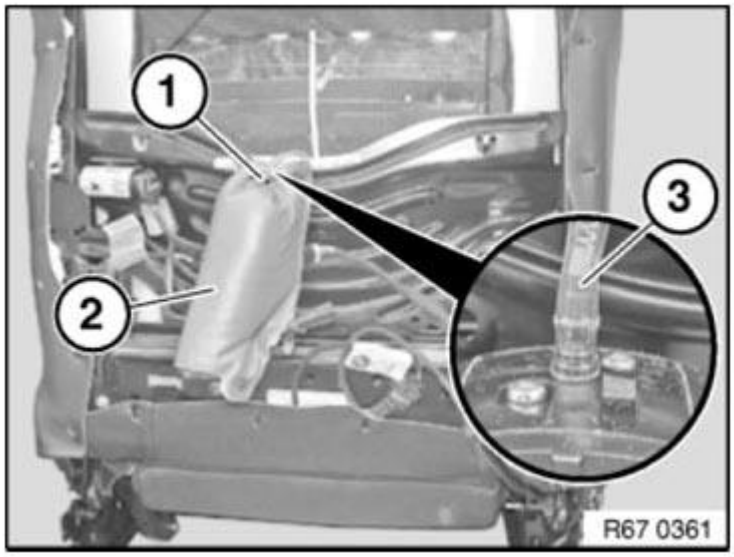


Fig. 69: Identifying Lumbar Support Drive Unit Cable Tie, Jacket And Heat Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Electrical Drives - Tightening Torques

DRIVE, SEAT ADJUSTMENT

67-1 31 DRIVE, SEAT ADJUSTMENT

TIGHTENING TORQUE SPECIFICATION - DRIVE, SEAT ADJUSTMENT

		Type	Thread	Tightening specification	Measure
	Drives, front seat				
1AZ	Drive for seat height adjustment to seat	F01/F02/F03/F04/F07/F10			8 Nm
2AZ	Drive for seat tilt adjustment to seat	F01/F02/F03/F04/F07/F10			8 Nm
3AZ	Drive for head restraint height adjustment to seat	F01/F02/F03/F04/F07/F10			2.5 Nm
4AZ	Drive for backrest head adjustment to seat	F01/F02/F03/F04/F07/F10			10 Nm
	Drives, rear seat				
10AZ	Drive for longitudinal seat adjustment to seat rail	F01/F02/F03/F04/F07			7 ± 0.5 Nm
11AZ	Flex shaft for longitudinal seat adjustment to seat rail	F01/F02/F03/F04/F07			28 ± 3 Nm
12AZ	Drive for seat tilt adjustment to seat frame	F01/F02/F03/F04/F07			12 ± 1.2 Nm
13AZ	Threaded rod to seat tilt adjustment	F01/F02/F03/F04/F07			22 ± 3 Nm
14AZ	Drive for head restraint height adjustment	F01/F02/F03/F04/F07			3.1 ± 0.3 Nm
15AZ	Drive for backrest angle adjustment	F01/F02/F03/F04/F07			12 ± 1.2 Nm
16AZ	Adjusting unit, backrest angle adjustment	F01/F02/F03/F04/F07			20 ± 2 Nm

MOTORS, POWER WINDOW REGULATOR

67 62 MOTORS, POWER WINDOW REGULATOR

TIGHTENING TORQUE SPECIFICATION - MOTORS, POWER WINDOW REGULATOR

	Type	Thread	Tightening specifications	Value
	F01/F02/F04/F07/F10/F11/F18			5.5 Nm

1AZ	Flat motor to power window regulator	F12/F13			3.5 ± 0, 5 Nm
2AZ	Windscreen pin/pin puller	F03			12 Nm
3AZ	Rear windscreen pin	F03			12 Nm

ENGINE

Engine - Repair

1100 ENGINE, GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

ENGINE IDENTIFICATION

Punch engine numbers at marked surface with number punch.

Magnesium crankcase with sticker

M47/M47TU/M47T2

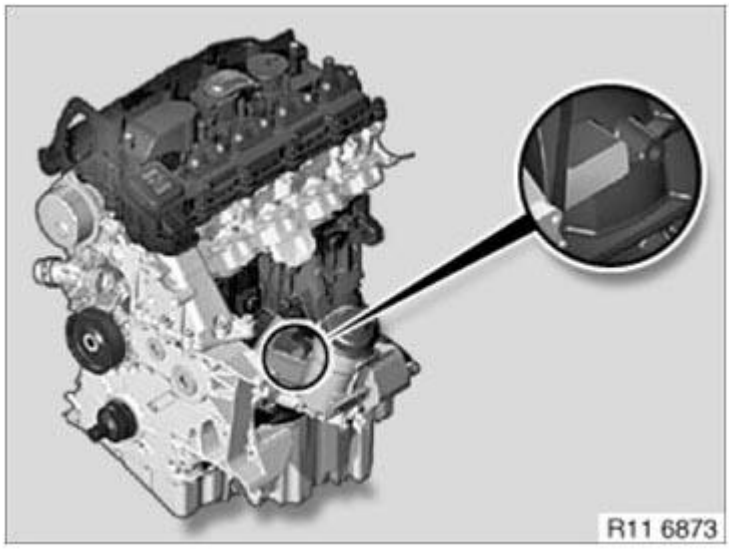


Fig. 1: Identifying Engine Identification Numbers Location (M47/M47TU/M47T2)
Courtesy of BMW OF NORTH AMERICA, INC.

M57/M57TU/M57T2

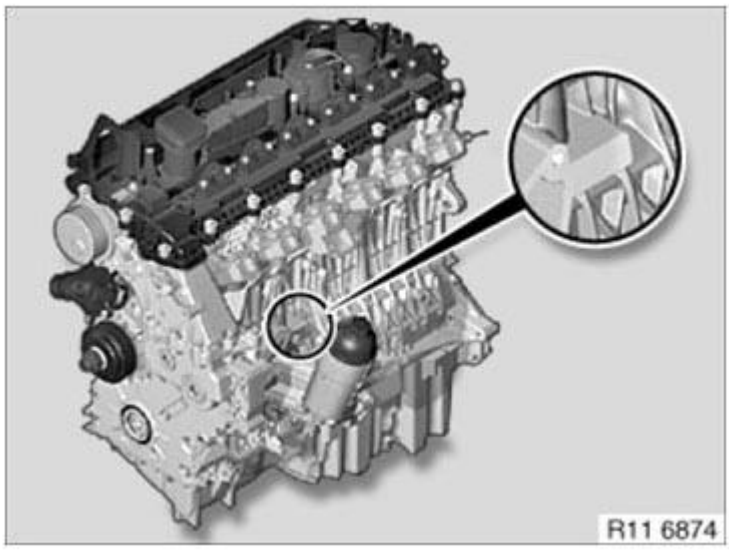


Fig. 2: Identifying Engine Identification Numbers Location - M57/M57TU/M57T2
Courtesy of BMW OF NORTH AMERICA, INC.

M67/M67TU

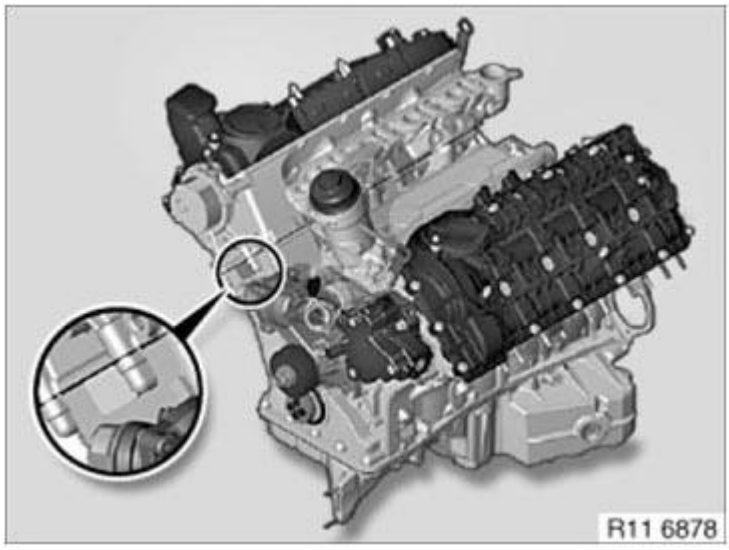


Fig. 3: Identifying Engine Identification Numbers Location - M67/M67TU
Courtesy of BMW OF NORTH AMERICA, INC.

N47/N47S/N47C/N57 N57S

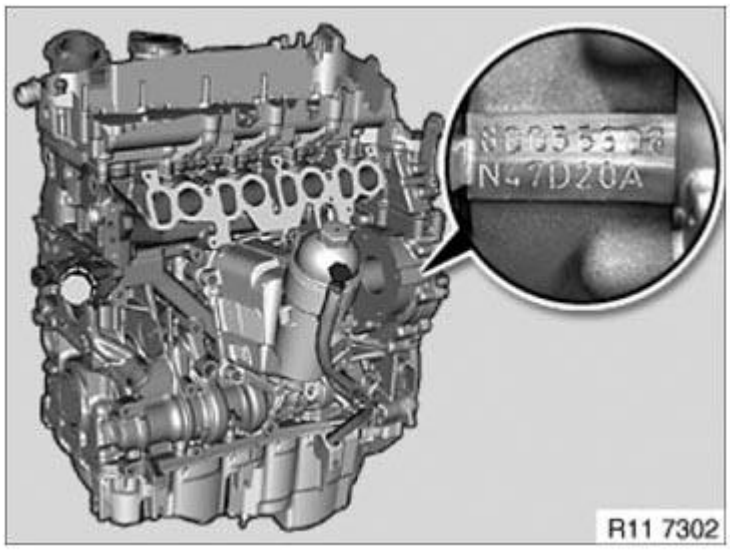


Fig. 4: Identifying Engine Identification Numbers Location - N47/N47S/N47C/N57 N57S
Courtesy of BMW OF NORTH AMERICA, INC.

M52/M52TU

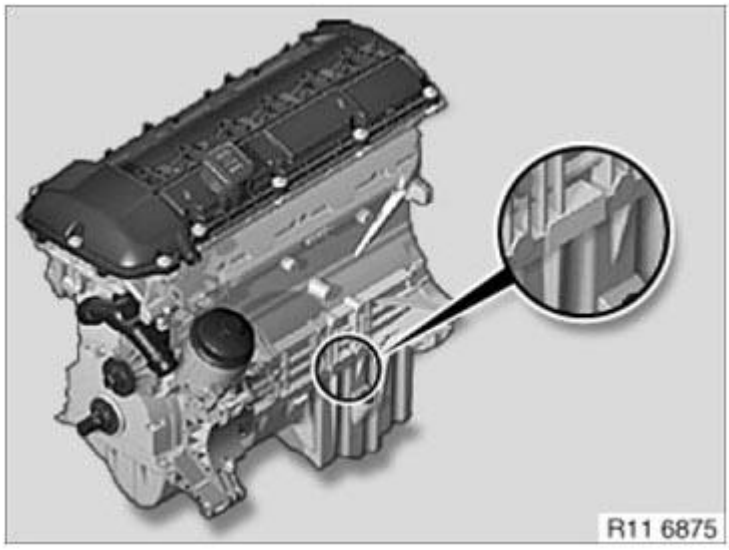


Fig. 5: Identifying Engine Identification Numbers Location (M52 / M52TU)
Courtesy of BMW OF NORTH AMERICA, INC.

M54

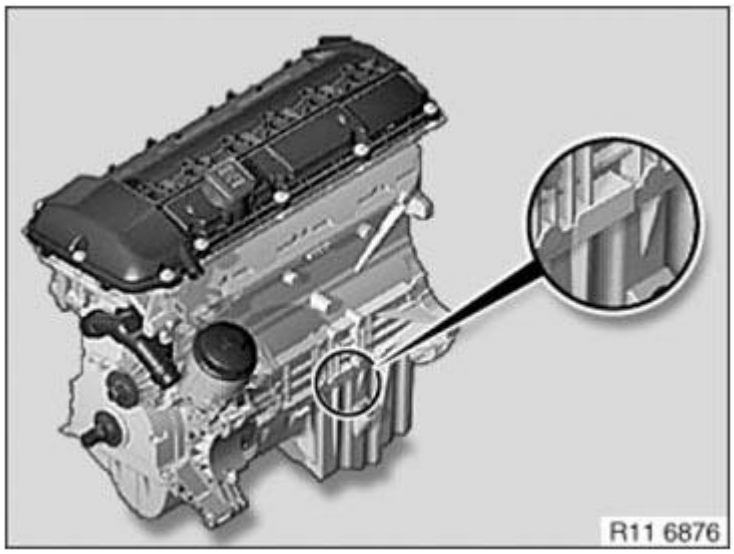


Fig. 6: Identifying Engine Identification Numbers Location (M54)
Courtesy of BMW OF NORTH AMERICA, INC.

M56

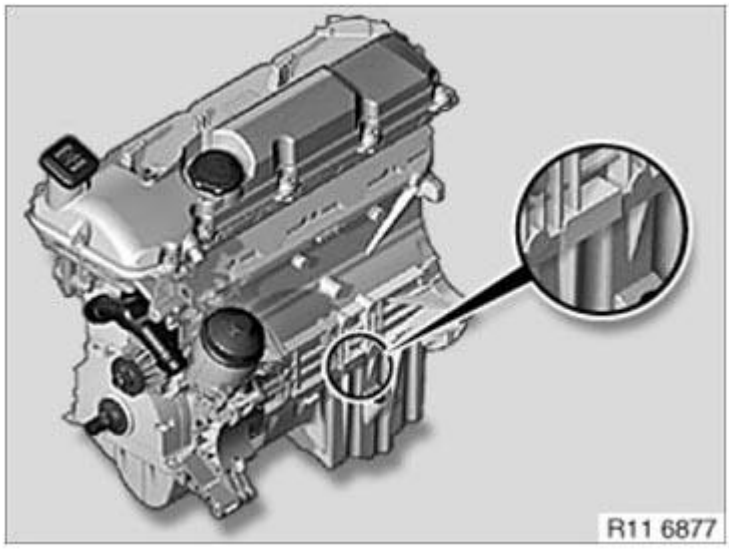


Fig. 7: Identifying Engine Identification Numbers Location - M56
Courtesy of BMW OF NORTH AMERICA, INC.

N40/N45/N45T/N43

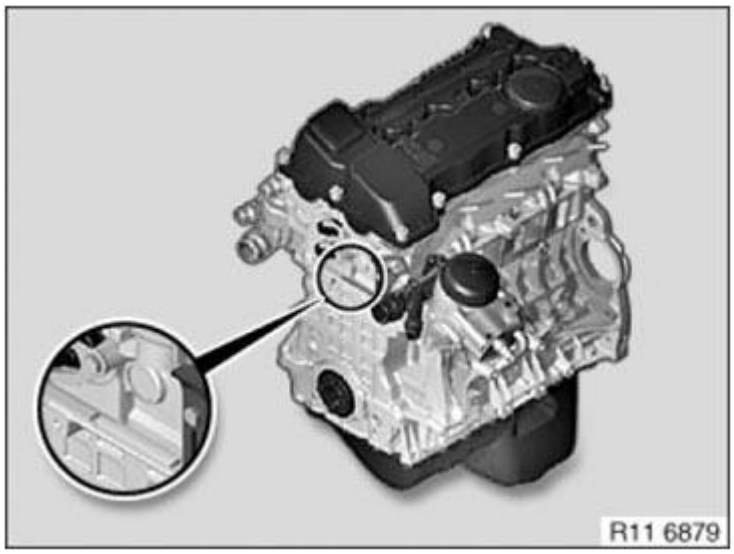


Fig. 8: Identifying Engine Identification Numbers Location - N40/N45/N45T/N43
Courtesy of BMW OF NORTH AMERICA, INC.

N42/N46/N46T

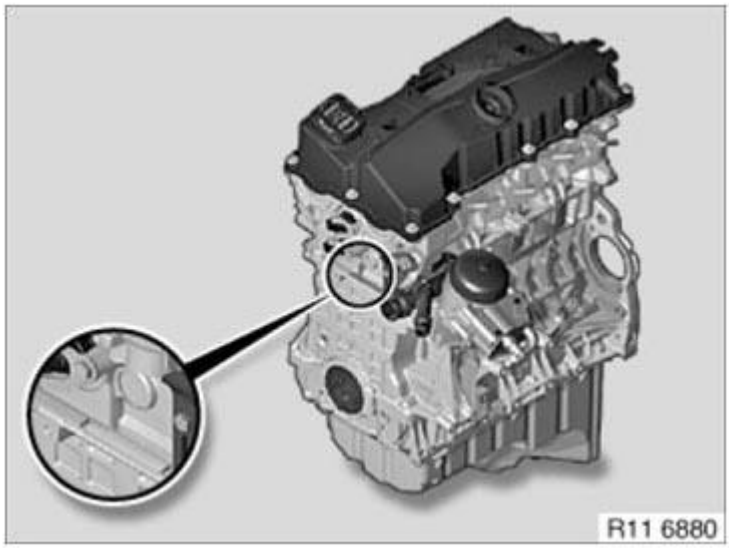


Fig. 9: Identifying Engine Identification Numbers Location - N42/N46/N46T
Courtesy of BMW OF NORTH AMERICA, INC.

N51/N52/N52K/N52T/N53/N54/N55

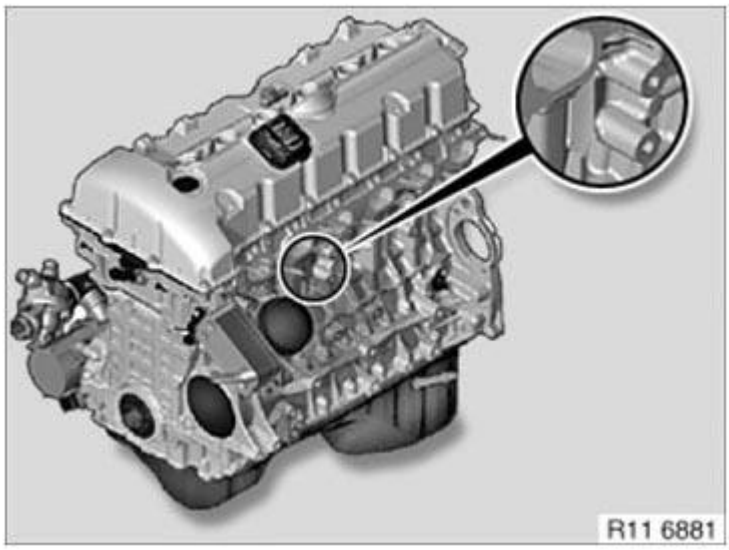


Fig. 10: Identifying Engine Identification Numbers Location - N51/N52/N52K/N52T/N53/N54/N55
Courtesy of BMW OF NORTH AMERICA, INC.

N62/N62TU

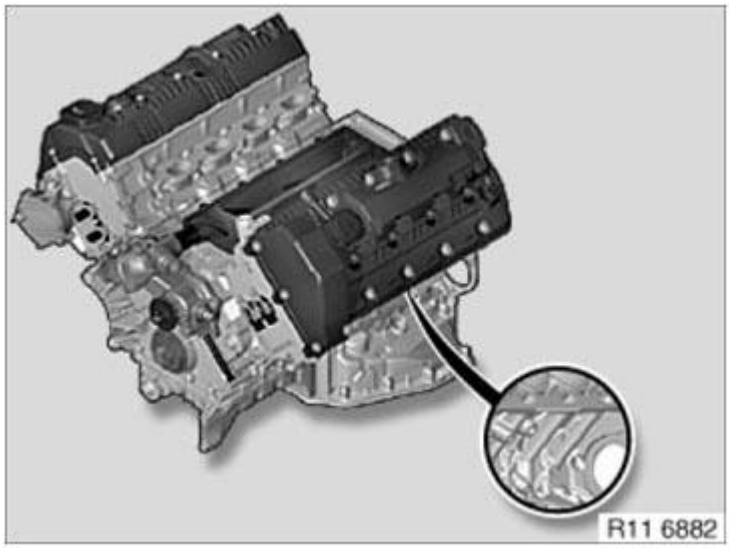


Fig. 11: Identifying Engine Identification Numbers Location - N62/N62TU
Courtesy of BMW OF NORTH AMERICA, INC.

N73

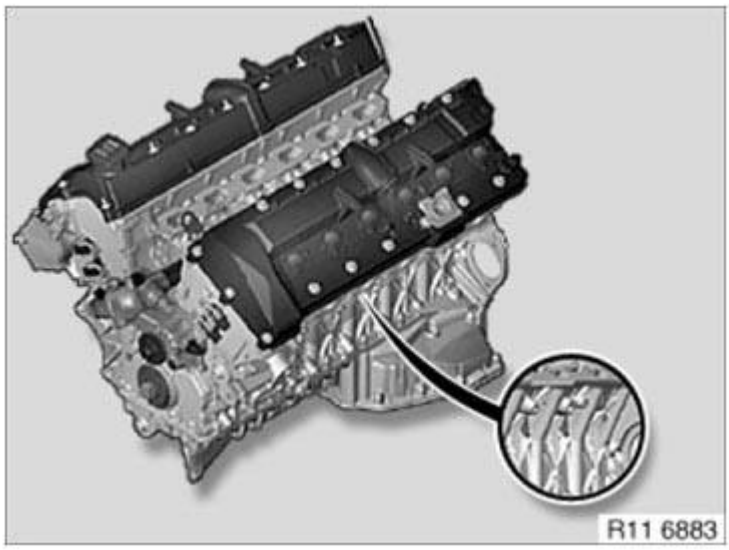


Fig. 12: Identifying Engine Identification Numbers Location - N73
Courtesy of BMW OF NORTH AMERICA, INC.

S54

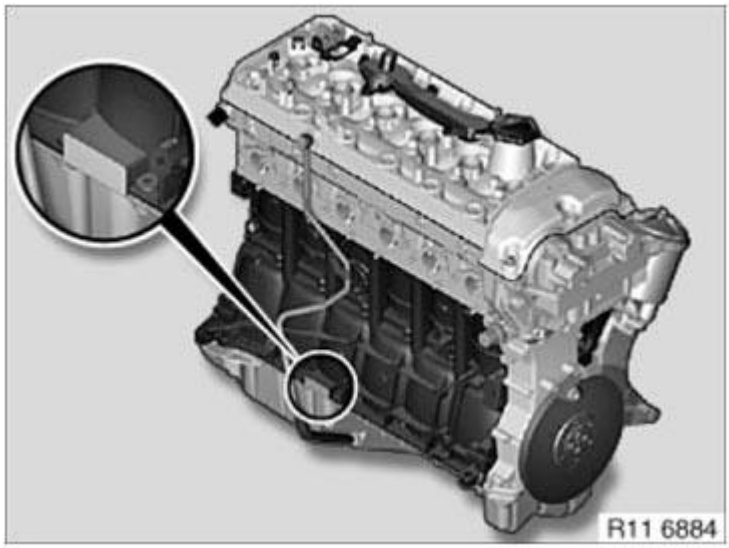


Fig. 13: Identifying Engine Identification Numbers Location - S54
Courtesy of BMW OF NORTH AMERICA, INC.

S85/S65

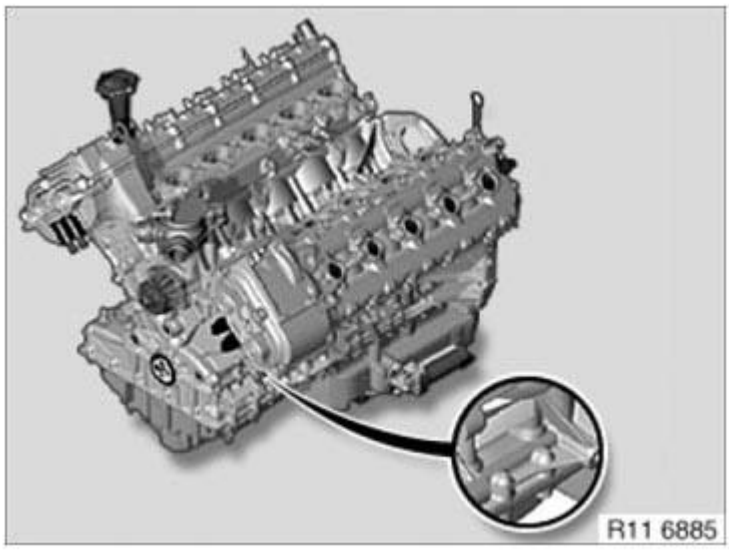


Fig. 14: Identifying Engine Identification Numbers Location - S85/S65
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

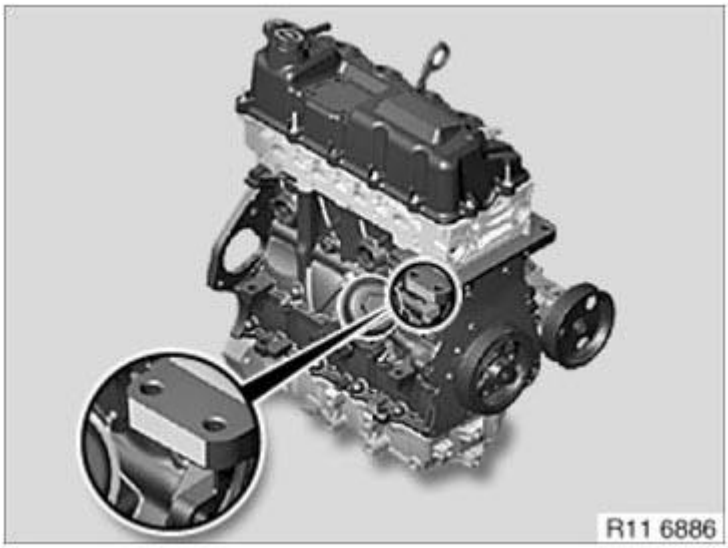


Fig. 15: Identifying Engine Identification Numbers Location - W10/W11
Courtesy of BMW OF NORTH AMERICA, INC.

N12/N14/N16/N18



Fig. 16: Identifying Engine Identification Numbers Location - N12/N14/N16/N18
Courtesy of BMW OF NORTH AMERICA, INC.

W17

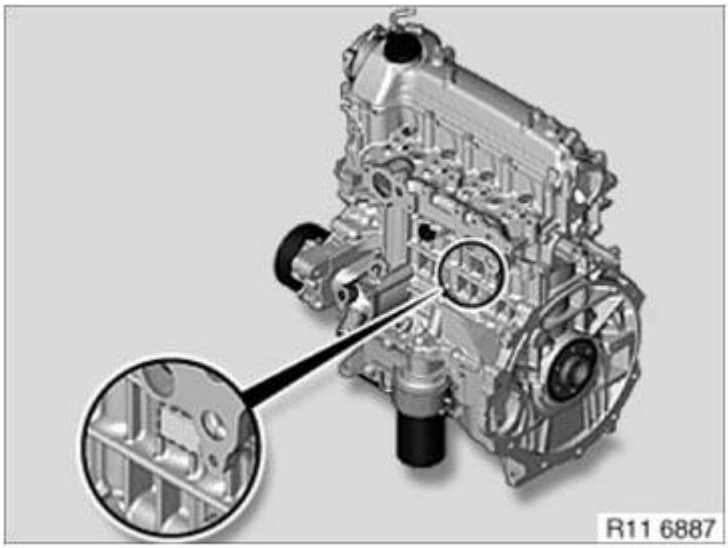


Fig. 17: Identifying Engine Identification Numbers Location - W17
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1100... OVERVIEW OF CONSUMABLE (ELECTRONIC PARTS CATALOGUE)

1.0 Sealing compound for injection

SEALING COMPOUND FOR INJECTION

	Repair instructions (engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	N40, N42, N45, N46, N43, N45N, N46N	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 128367 sealing compound
1.2	N40, N42, N45, N46, N43, N45N, N46N	Loctite 128357 liquid gasket	83 19 7 536 051	Sealing between crankcase upper and lower halves
1.3	N51, N52, N53, N54, N52N, N55	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.4	N51, N52, N53, N54, N52N, N55	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.5	S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.6	S65, S85	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and

				lower halves

2.0 Sealing compound for application

SEALING COMPOUND FOR APPLICATION

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
2.1	M41, M47, M47TU, M47T2, M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62 N40, N42, N45, N45N, N46, N46N, N43, N47, N47top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57S N62, N62TU, N63, N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85 N12, N14, N16, N18	Drei Bond 1209 liquid gasket	07 58 9 062 376	For sealing separation points on crankcase
2.2	N12, N14, N16, N18 W16, N47top, N47D1, N47C1 N57D1,	Loctite 5970 liquid gasket	83 19 0 404 517 83 19 0 404 517	Sealing between crankcase upper and lower sections. Sealing of gear case cover, oil sump, coolant pump, component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid gasket	07 58 9 067 732	Sealing between cover sleeve and crankcase

3.0 Cleaning agent

CLEANING AGENT REFERENCE CHART

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
3.1	N45, N46, N45T, N46T, N43, N51, N52, N52Kp,	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine

	N52TU, N53, N55, N63, N63S, N63Hyprid, N74			

4.0 Lubricant for application

LUBRICANT FOR APPLICATION

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
4.1	N20, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N73	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.
4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High temperature paste	83 19 2 152 323	For greasing the threads on the exhaust turbocharger.
4.3	N12, N14, N16, N18 N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63, N73, N73H, N74. S65, S85.	High temperature paste (NEVER-SEEZ compound)	83 23 0 140 233	For greasing the threads on the oxygen sensors.
4.4	N47, N47O1 N47C1, N47T N47D1 N57 N57D1	Copper paste	81 22 9 400 794	For greasing the double hex head bolt on the exhaust turbocharger.

5.0 Lubricants to loosen locked screw connections

LUBRICANTS TO LOOSEN LOCKED SCREW CONNECTIONS

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
5.1	M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, W16, W17,	Brunox lubricating grease	83 23 0 445 529	For releasing the glow elements

1100 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N63)

Remove acoustic cover (1) in following steps:

- Raise
- Remove in direction of travel

Installation:

Insert acoustic cover (1) into existing rubber guides.

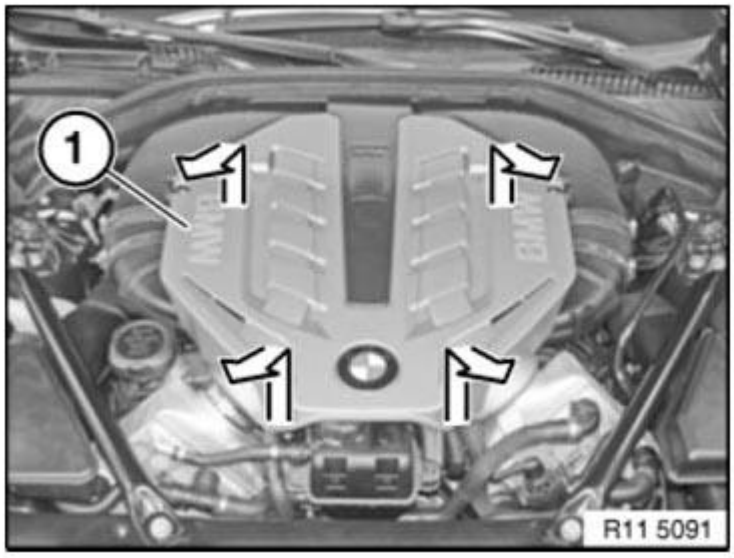


Fig. 18: Identifying Acoustic Cover
Courtesy of BMW OF NORTH AMERICA, INC.

1100050 REMOVING AND INSTALLING/REPLACING ENGINE (N63)

Necessary preliminary work

- Move **ENGINE COMPARTMENT LID** into service position
- Drain **COOLANT**
- Disconnect battery positive lead from terminal
- Drain off **AIR CONDITIONING SYSTEM**
- Remove right **SUSPENSION CROSS-BRACE** .
- Remove **RADIATOR**
- Remove both **INTAKE SILENCER HOUSINGS**
- Disconnect coolant hoses from engine
- Disconnect coolant hoses from charge air cooler
- Disconnect line from tank vent valve

- Detach power steering pump from holder. See **POWER STEERING PUMP FOR HYDRAULIC STEERING GEAR WITH DYNAMIC DRIVE (N63) or POWER STEERING PUMP FOR POWER STEERING GEAR WITH ACTIVE FRONT STEERING (N63)** .
- Remove **UNIVERSAL JOINT**
- Remove **GEARBOX**

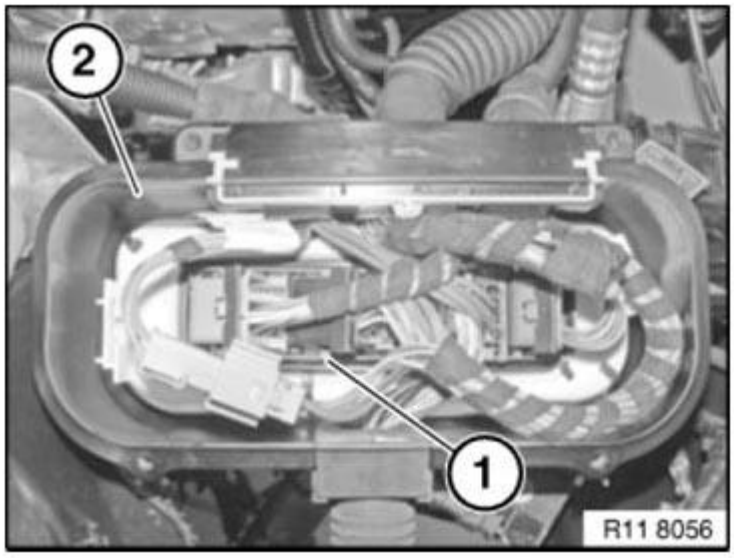


Fig. 19: Identifying Wiring Harness And Electronics Box
Courtesy of BMW OF NORTH AMERICA, INC.

Release wiring harness (1) from electronics box (2) and secure on engine against falling off.

Release wiring harness from supplementary electronics box (1) and secure on engine against falling off.

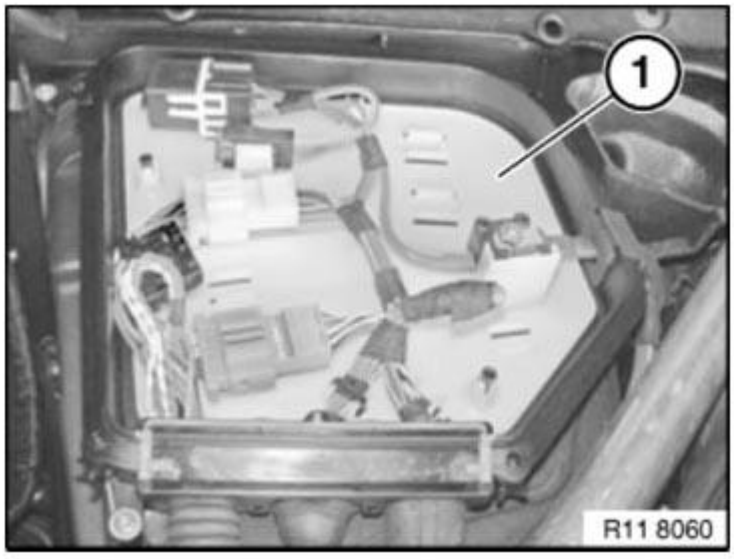


Fig. 20: Identifying Supplementary Electronics Box
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Remove battery earth lead (2).

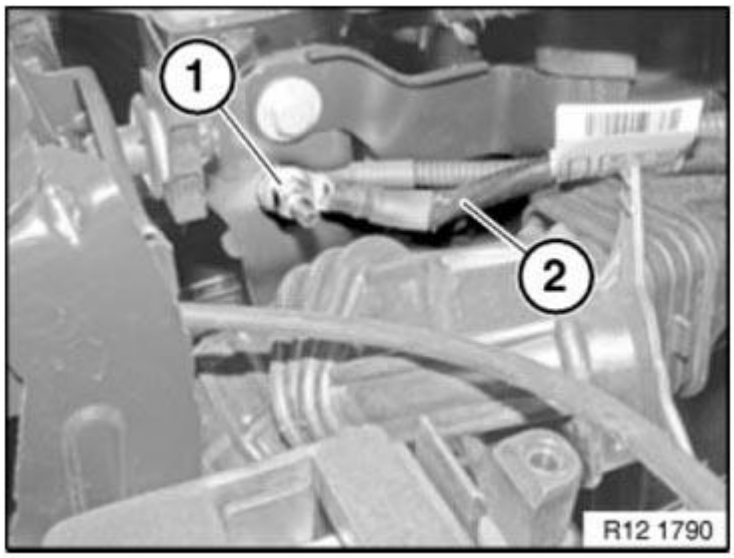


Fig. 21: Identifying Slacken Nut And Battery Earth Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach vacuum line (1) from vacuum pump.

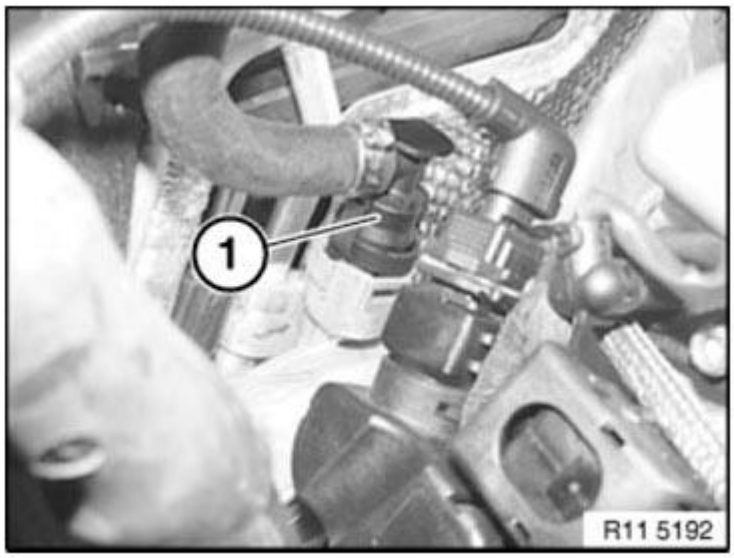


Fig. 22: Identifying Vacuum Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove air conditioning line (2).

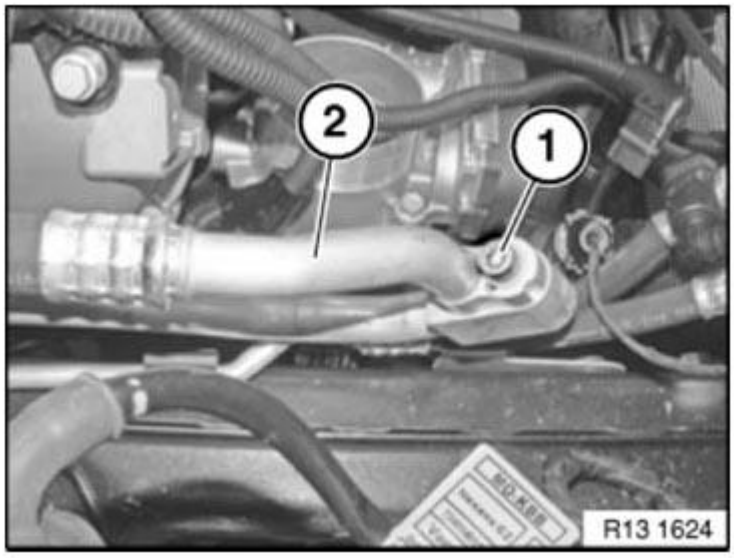


Fig. 23: Identifying Screw And Air Conditioning Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release and disconnect coolant hoses (1).

Illustration shows N57

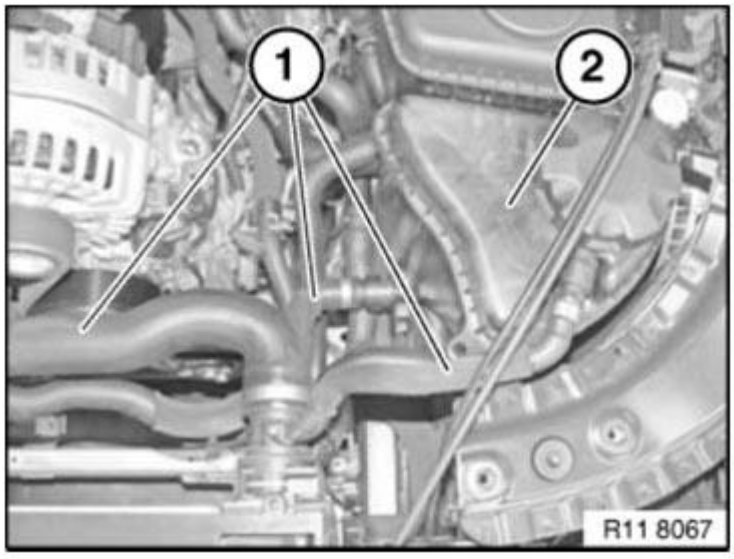


Fig. 24: Identifying Coolant Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Release screw (2).

Press off oil line from oil reservoir to intake pipe section with special tool to prevent oil from escaping.

Installation note:

Replace hose clamp.

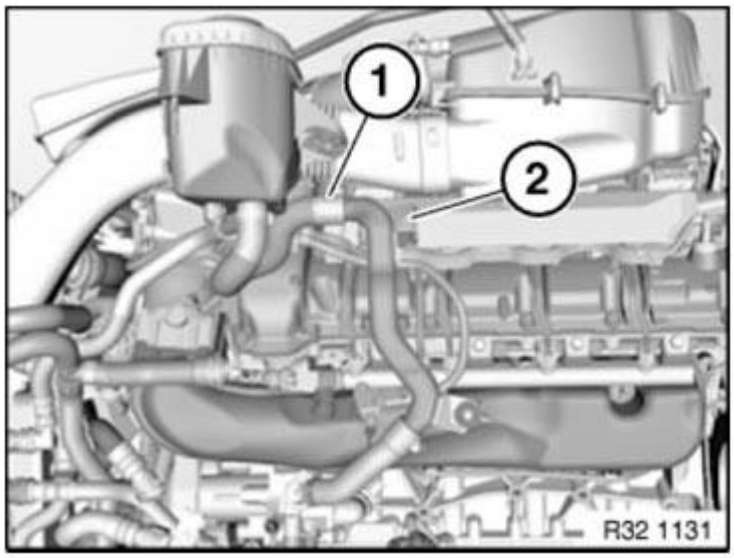


Fig. 25: Identifying Oil Reservoir Hose Clip And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove intake pipe section (1) in direction of arrow from holder (2).

Remove intake pipe in upward direction.

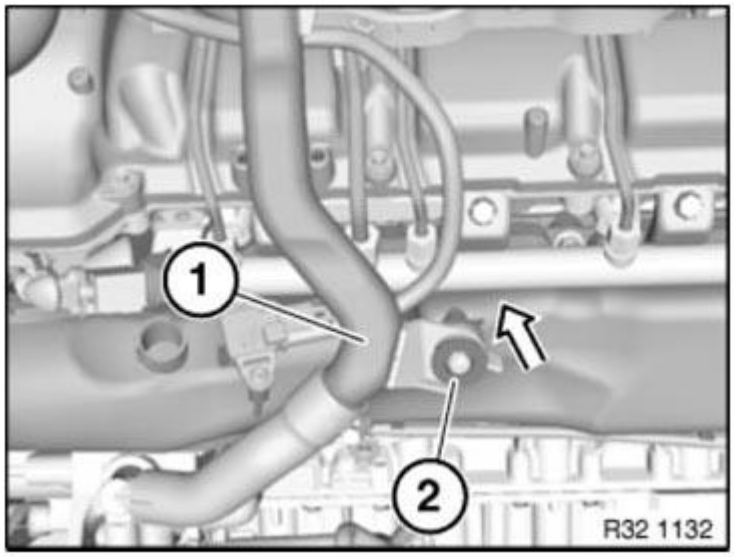


Fig. 26: Removing Intake Pipe Section In Direction Of Arrow From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Detach coolant hose from water valve.

Release hose clamp and detach coolant hose (2).

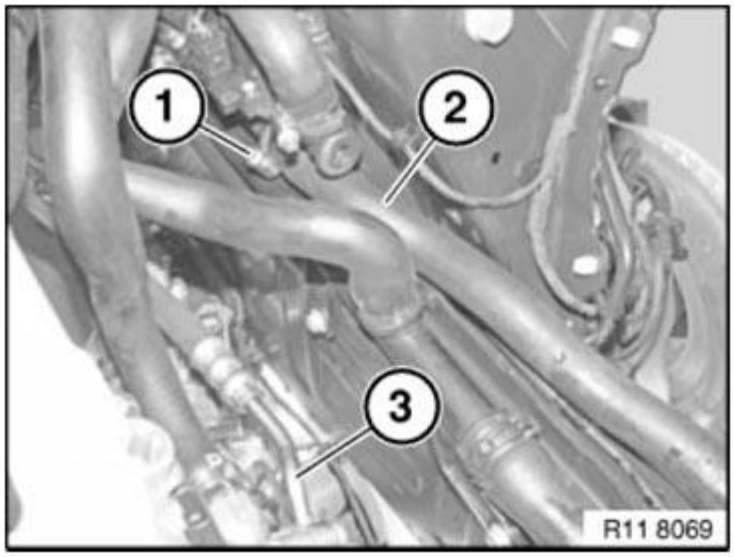


Fig. 27: Identifying Hose Clip And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect fuel delivery line (1), seal off with special tool 13 5 160.

Seal off fuel delivery line (2) with special tool 13 5 162.

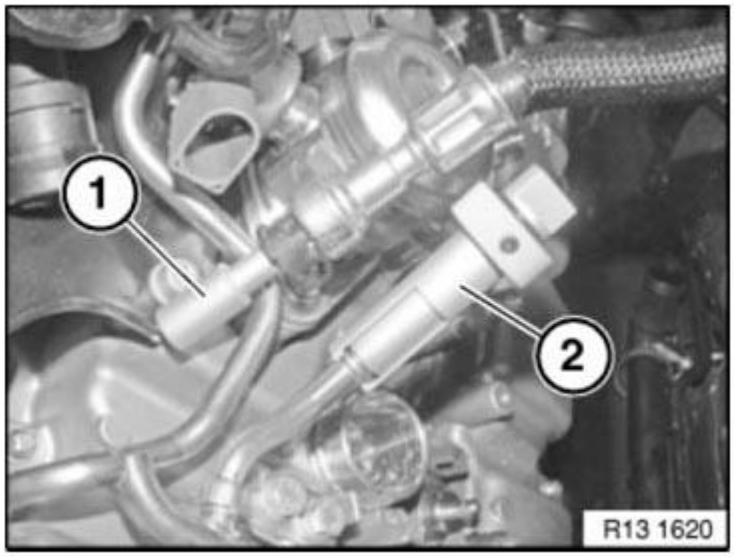


Fig. 28: Identifying Fuel Delivery Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1). Tightening torque **17 22 4AZ** .

Detach oil lines from oil filter housing.

Catch and dispose of emerging oil.

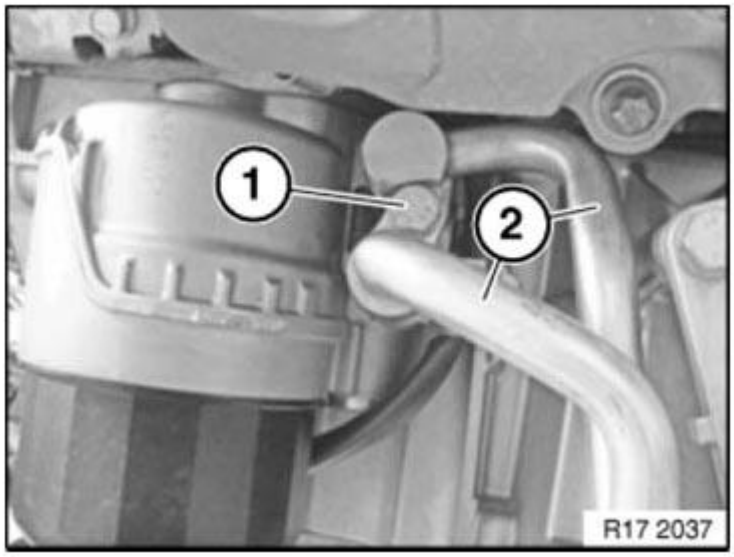


Fig. 29: Identifying Oil Pipes Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on **ENGINE MOUNT** on left and right.

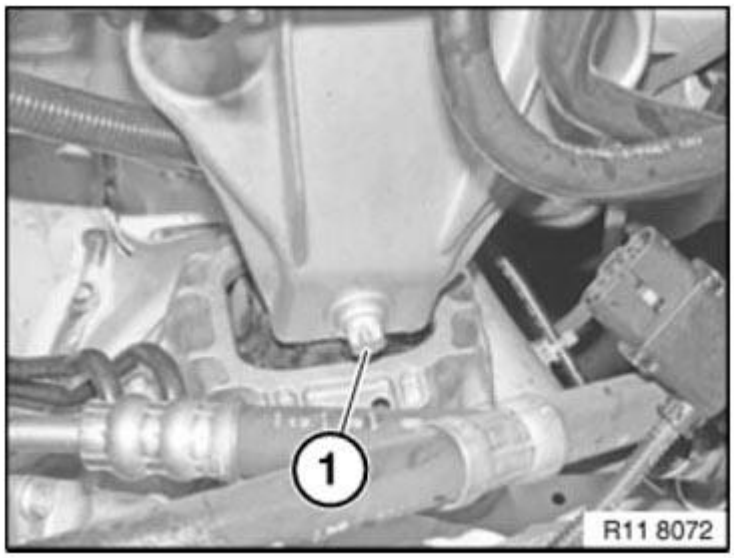


Fig. 30: Identifying Screws On Engine Mount On Left And Right
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before lifting the engine, the lifting lugs must be checked for damage (cracks) and to ensure they are seated securely.

Suspend special tool from lifting eyes (1) at front and rear.

11 0 020 Lift out engine with special tool.

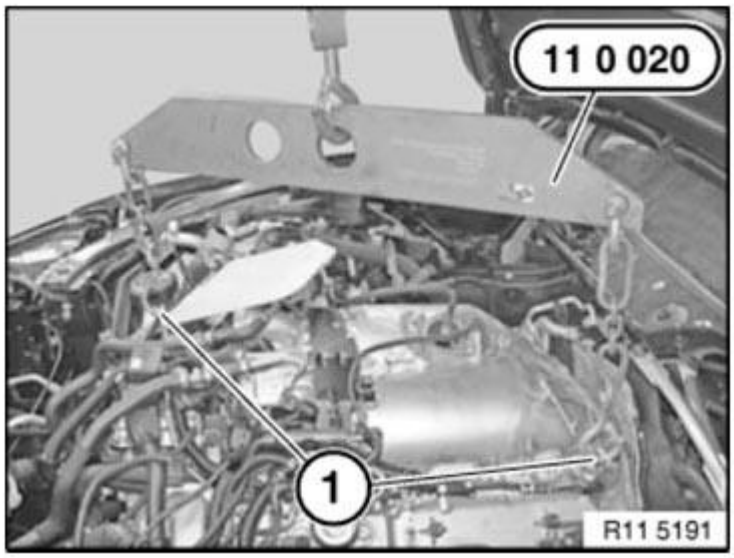


Fig. 31: Lifting Out Engine With Special Tool (11 0 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Mount engine on assembly stand.

Assemble engine.

Top up **COOLANT** and vent cooling system.

Check **COOLING SYSTEM** for leaks.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

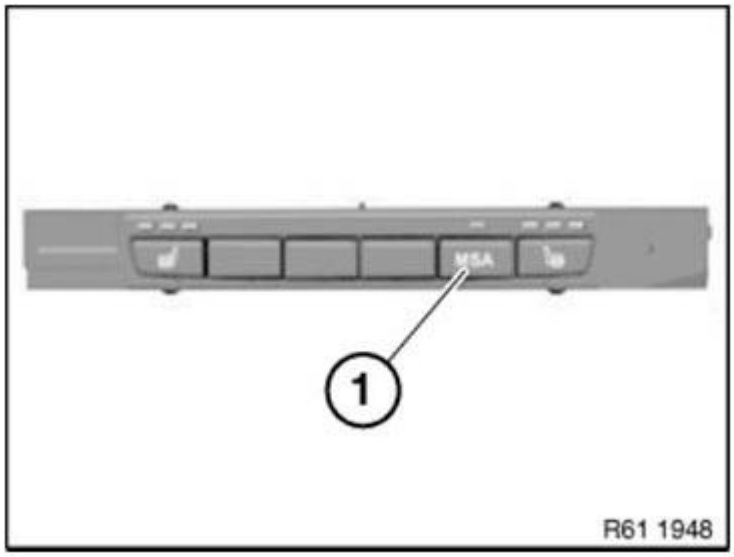


Fig. 32: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

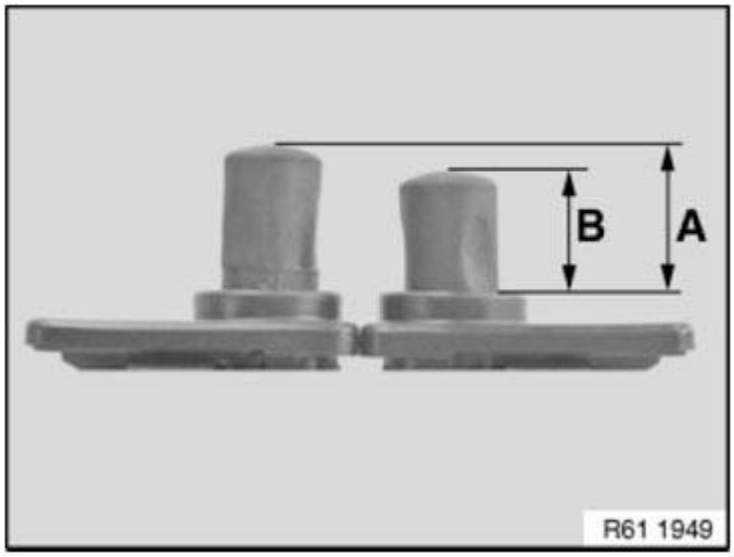


Fig. 33: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

1100670 SECURING ENGINE IN INSTALLATION POSITION (N63)

Notes

WARNING: Danger of injury!
Observe following instructions relating to special tool:

1. **Prior to each use, check the special tools for defects, modifications and operational reliability.**
2. **Damaged/modified special tools must not be used!**
3. **No changes or modifications may be made to the special tools!**
4. **Keep special tools dry, clean and free of grease.**

IMPORTANT: Before lifting the engine, check the lifting lugs for damage (cracks) and to ensure they are seated securely.

NOTE:

- **Numbering system for special tools has been re-encoded.**

IMPORTANT: Special tool 00 6 000 must not be fitted when transverse member (1) is installed!

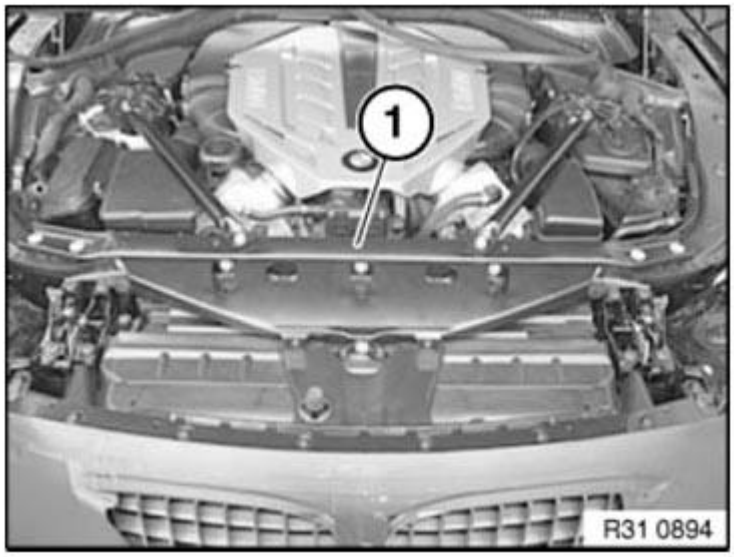


Fig. 34: Identifying Transverse Member
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary work

- Secure **engine compartment lid** in service position. See **5100... SERVICE POSITION OF ENGINE COMPARTMENT LID** or **5100... ENGINE COMPARTMENT LID SERVICE POSITION (ACTIVE)** .
- Remove **PANEL** for engine compartment lid at side

- Remove left **INTAKE SILENCER HOUSING**
- Remove **UNDERBODY PROTECTION** at front and rear

Assemble transverse member 00 6 000 with special tools 00 6 002 00 6 004, 00 6 010, **00 6 050** .

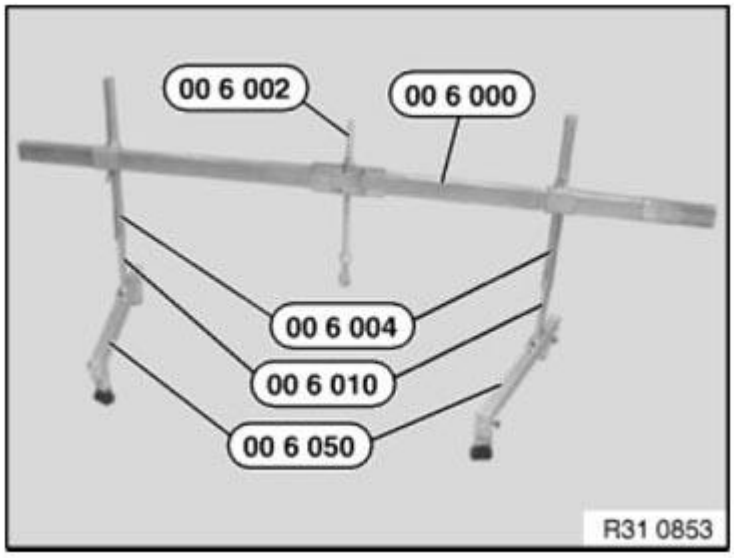


Fig. 35: Identifying Special Tools (00 6 002 00 6 004, 00 6 010)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Contact points (1) for special tool 00 6 050 are pictured.

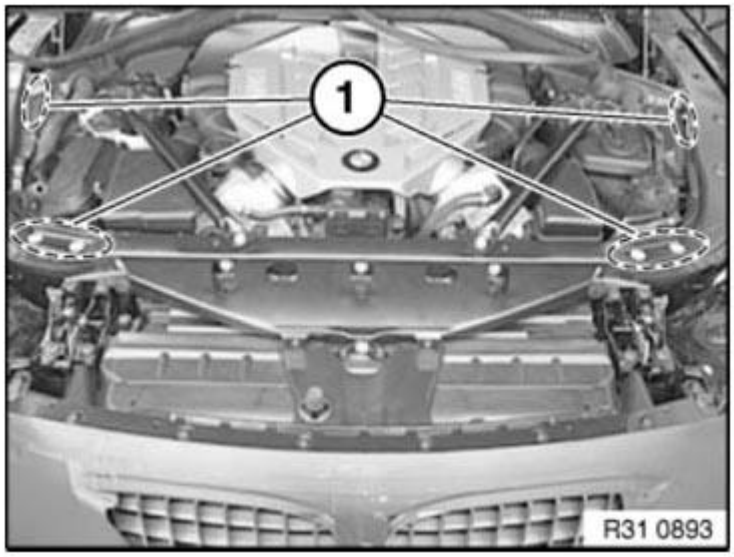


Fig. 36: Identifying Contact Points Of Special Tool 00 6 050
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Position transverse member 00 6 000 with a 2nd person helping on contact points (1).

Secure special tool **11 0 000** to spindle 00 6 002.

Attach suitable chains to special tool **11 0 000** and suspend from both engine suspension lugs.

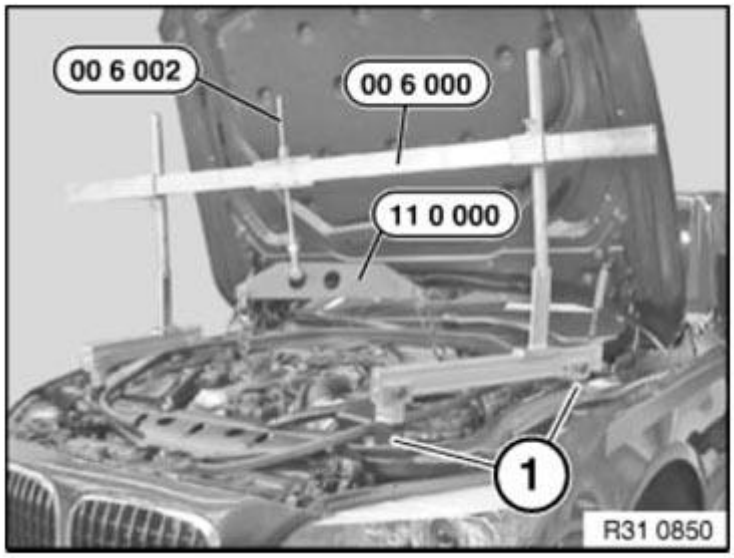


Fig. 37: Identifying Transverse Member 00 6 000 And Contact Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction. Always make sure there is sufficient clearance between the engine (or its add-on parts) and the body.

WARNING: Danger of injury!
Tighten down all screws and nuts on transverse member 00 6 000.

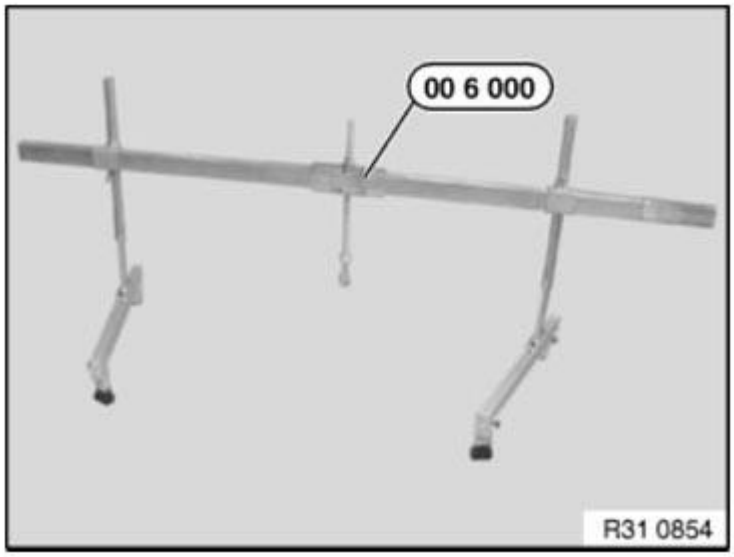


Fig. 38: Identifying Transverse Member 00 6 000
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **22 11 1AZ** .

NOTE: (Four-wheel drive only)
Remove vibration absorber on left front axle support.

Raise engine approx. 10 mm with crossmember.

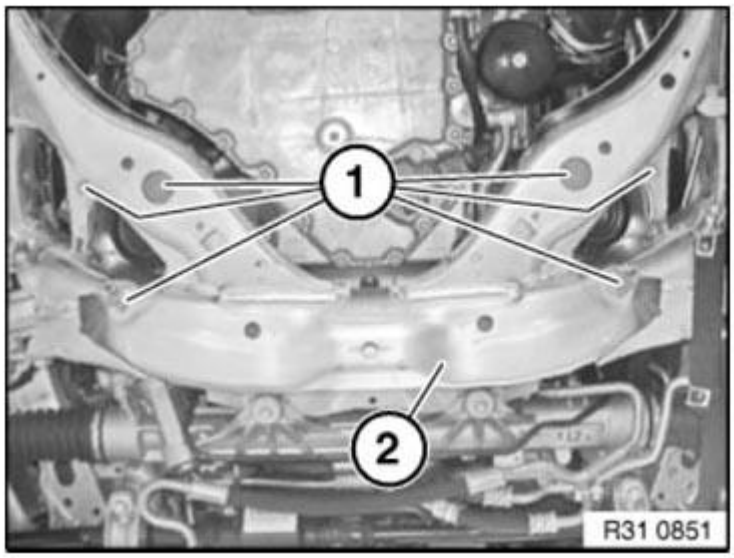


Fig. 39: Identifying Screws And Vibration Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

1100... SERVICE - ENGINE OIL (N63)

WARNING: Risk of scalding!
Carry out work on the vehicle only when wearing oil- and heat-resistant protective gloves incl. forearm protection, face guard and protective apron.

IMPORTANT: Carry out the engine oil service only when the engine is at operating temperature.
Observe the exact engine oil filling capacity.
Overfilling the engine with engine oil will result in engine damage.
Checking and drip-off times (at least 10 minutes) must be observed.

Recycling:

Catch and dispose of drained engine oil in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Release screw plug (1) on oil filter cap.

Remove screw plug (2) from oil sump and drain engine oil.

Graphic E71.

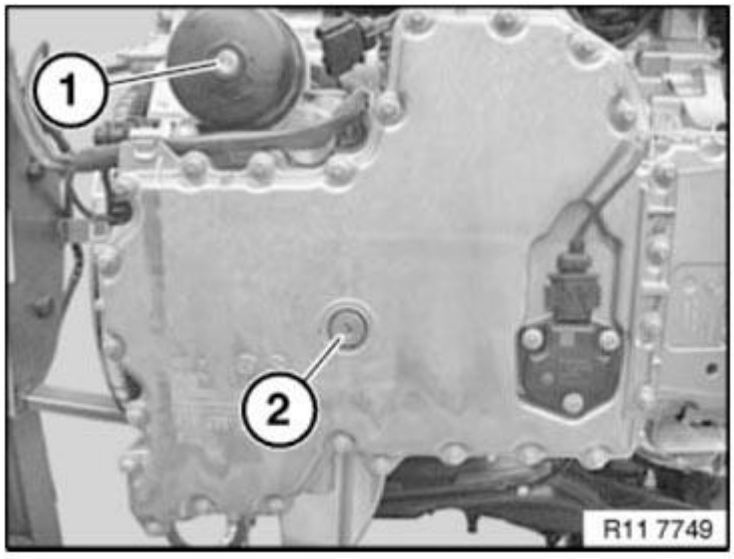


Fig. 40: Identifying Screw Plug Of Oil Filter Cap And Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

Release oil filter cover (1) with special tool **11 9 240** .

Graphic E71.

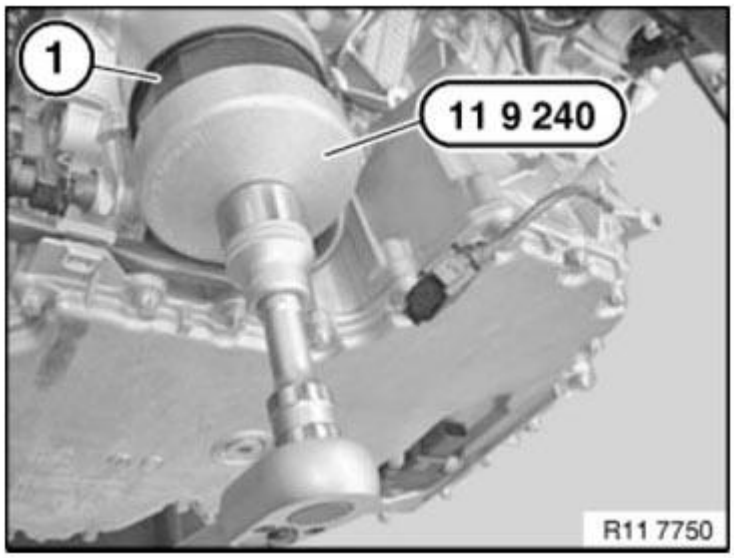


Fig. 41: Removing Oil Filter Cover With Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace oil filter element (3) and sealing rings (1 and 2)

Moisten sealing ring (2) with engine oil.

Insert oil filter element (3) into oil filter cover.

Installation note:

Oil filter element (3) must snap audibly into place.

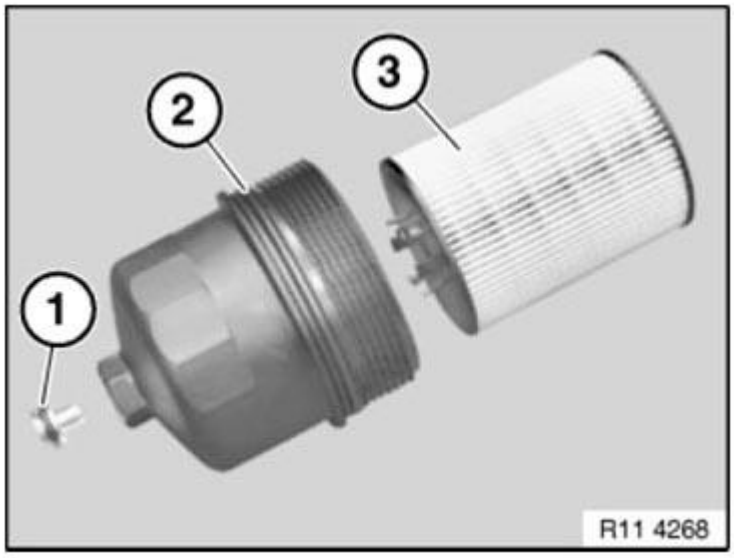


Fig. 42: Identifying Sealing Ring And Oil Filter Element
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Presentation: without underbody protection and reinforcement plate.

Graphic E71.

Installation note:

Replace sealing rings.

Insert screw plug (2) for oil sump and tighten down.

Tightening torque **11 13 1AZ** .

Insert screw plug (1) for oil filter cap and tighten down.

Tightening torque **11 42 2AZ** .

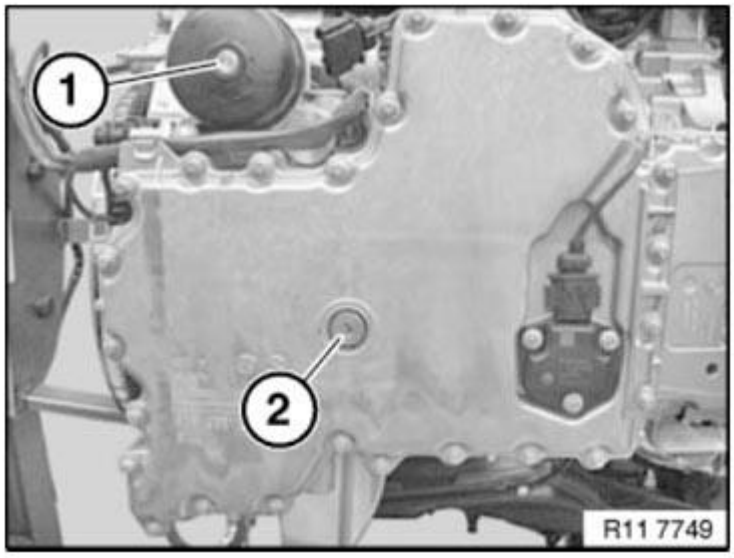


Fig. 43: Identifying Screw Plug Of Oil Filter Cap And Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Pour in ENGINE OIL .**
Start engine and run at idle until oil pressure indicator light goes out.
Switch off engine
Check oil filter cap and screw plugs (1 and 2) for oil filter cap and oil sump for leaks.
Assemble engine.

Checking engine oil level:

- Park vehicle on a horizontal surface
- Allow engine to run at operating temperature for three minutes with increased engine speed (approx. 1100 RPM)
- Read off engine oil level in instrument panel or on Control Display
- Top up engine oil if necessary

1112 CYLINDER HEAD WITH COVER

1112729 CHECKING CYLINDER HEAD FOR WATERTIGHTNESS (N63)

Necessary preliminary work

- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Remove **ALL VALVES**.

NOTE: Set of special tools 11 8 080 can be used for cylinder bank 1 to 4 and cylinder bank 5 to 8.

Position special tool 11 8 081 on cylinder head.

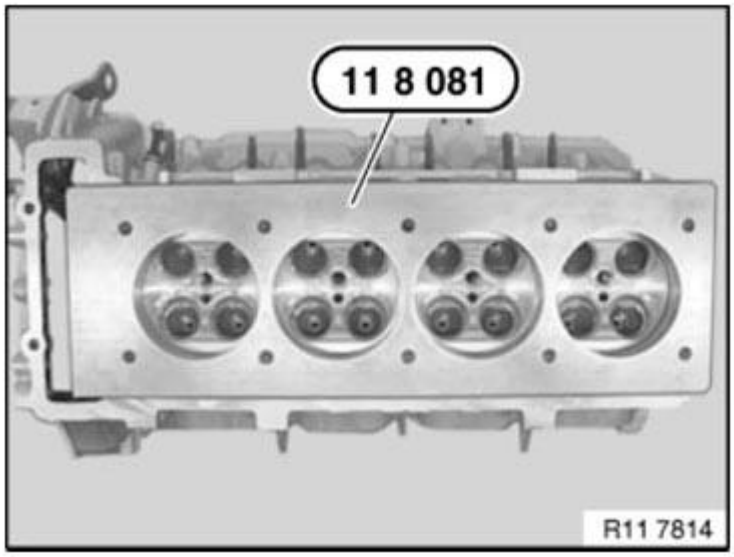


Fig. 44: Positioning Special Tool 11 8 081 On Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 8 083 and tighten in sequence (1 to 10) in several steps.

Tightening torque: **25 Nm**

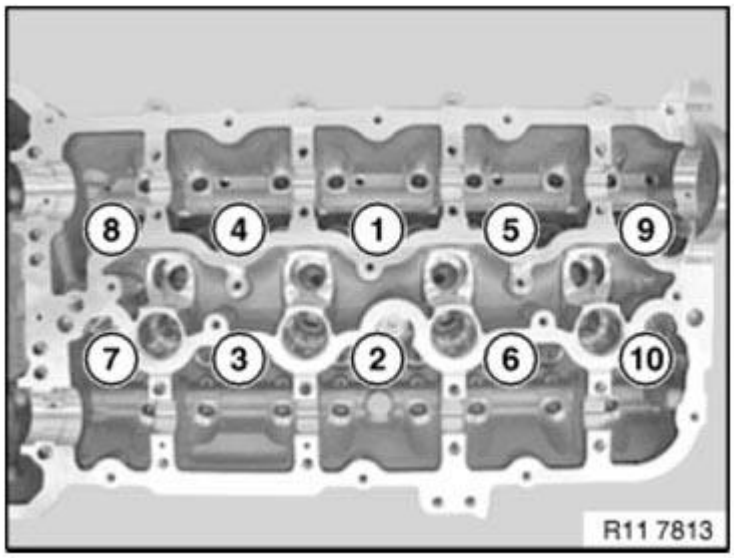


Fig. 45: Identifying Special Tool 11 8 083 Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Remove vent screw (1).

Tightening torque: **11 12 8AZ** .

Installation note:

Replace sealing ring.

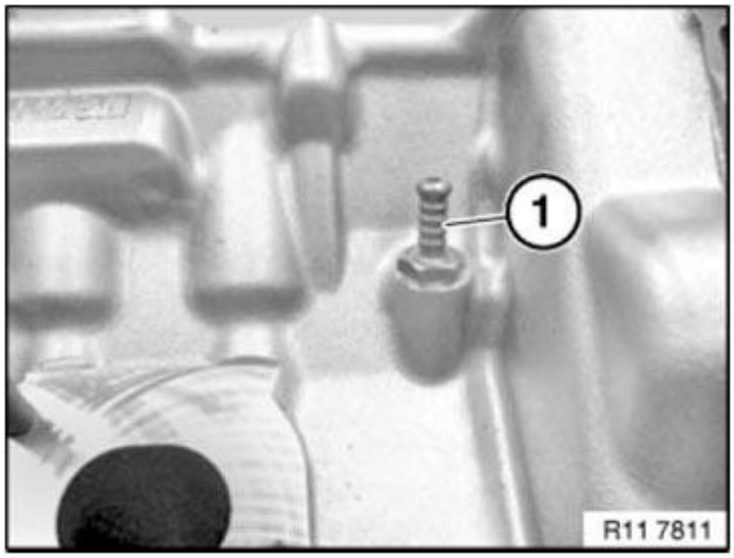


Fig. 46: Identifying Vent Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Max: 0.8 Nm.
Screw in special tool 11 8 082 with suitable tool and special tool 00 9 250 to 0.8 Nm.
Connect compressed air hose with pressure gauge.
Immerse cylinder head in a water bath. Inspection pressure 4.0 bar.
Check cylinder head for escaping air (cracks).

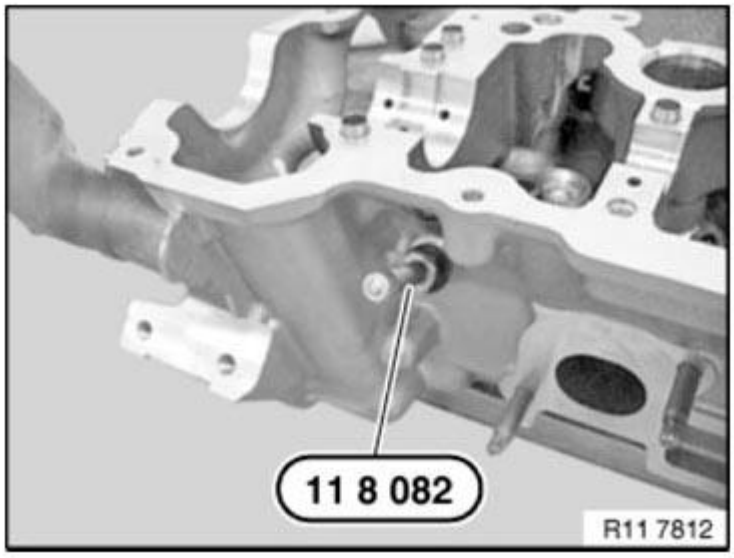


Fig. 47: Identifying Special Tool 11 8 082 Location
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If necessary, add cleaning agent to water bath. Assemble engine.

1112719 GRINDING CYLINDER HEAD SEALING SURFACE (N63)

Necessary preliminary work

- Remove cylinder head. See **LEFT CYLINDER HEAD** and **RIGHT CYLINDER HEAD**.

Cylinder head disassembled

Check evenness of cylinder head lower face with a standard straightedge (1).

NOTE: Maximum deviation from flatness: longitudinal 0.10 mm.

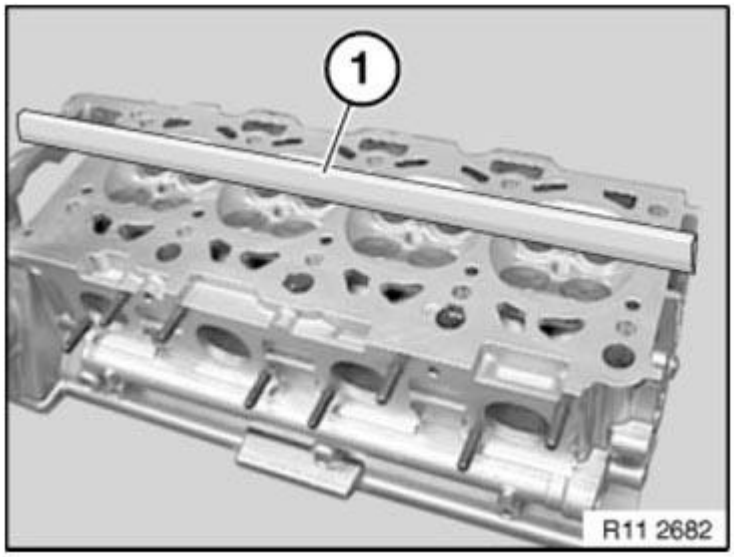


Fig. 48: Checking Evenness Of Cylinder Head Lower Face With Standard Straightedge - Longitudinal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Maximum deviation from flatness: transversal 0.05 mm.

- **Machining limit:** See **CYLINDER HEAD WITH VALVE SEAT COVER** or **CYLINDER HEAD WITH COVER**

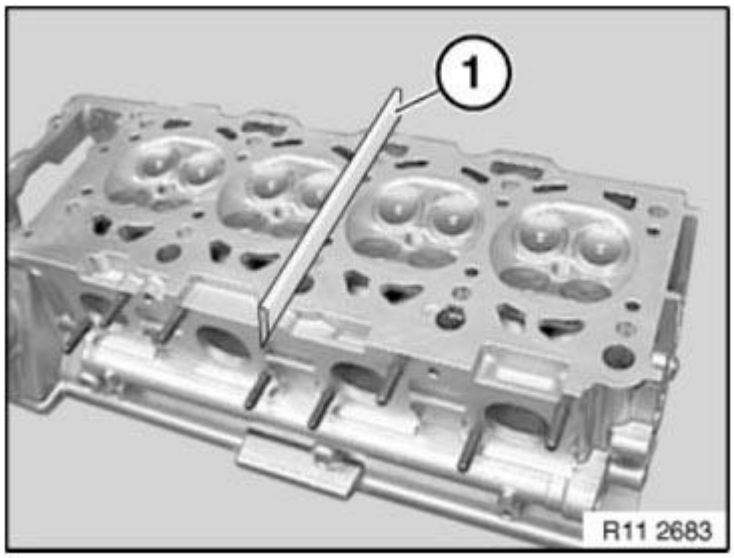


Fig. 49: Checking Evenness Of Cylinder Head Lower Face With Standard Straightedge - Transversal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A cylinder head gasket (+REP) 0.3 mm thicker than usual can be obtained for machined (resurfaced) cylinder heads.

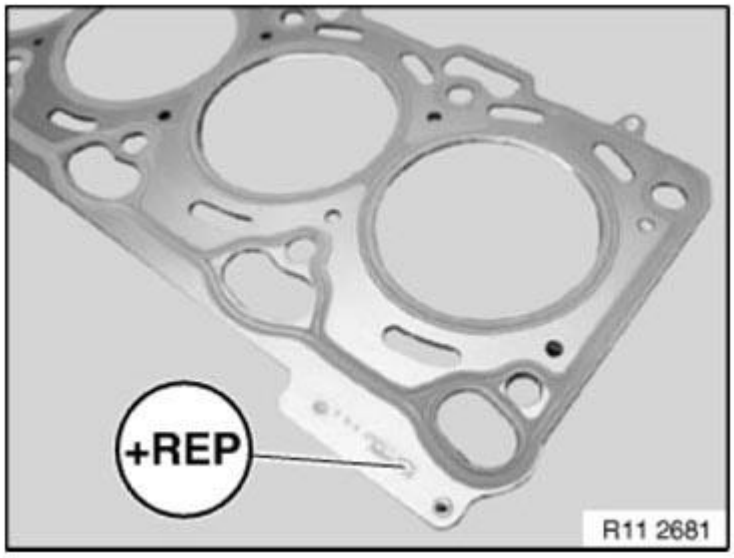


Fig. 50: Identifying Cylinder Head Gasket (+REP)
Courtesy of BMW OF NORTH AMERICA, INC.

1112105 REMOVING AND INSTALLING LEFT CYLINDER HEAD (N63)

Necessary preliminary work

- Check **TIMING**
- Remove left **INLET AND EXHAUST ADJUSTMENT UNIT**

Release screw (1).

NOTE: Guide rail is loose from cylinder head.

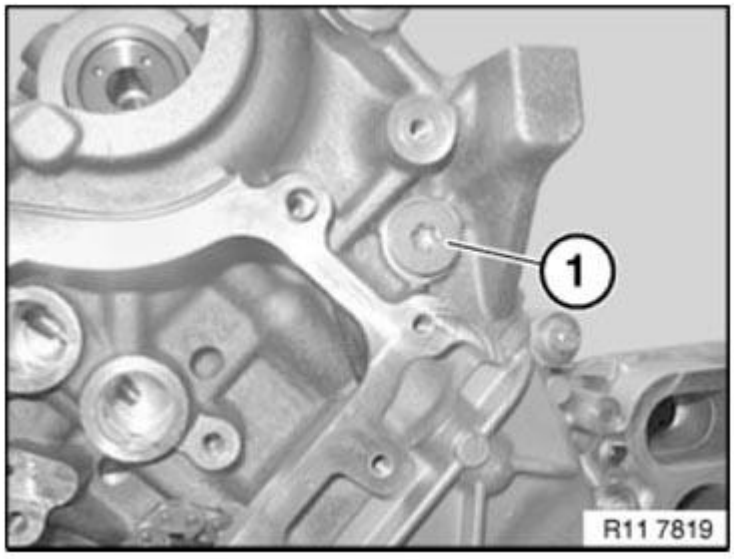


Fig. 51: Identifying Screw Of Guide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) at front from cylinder head.

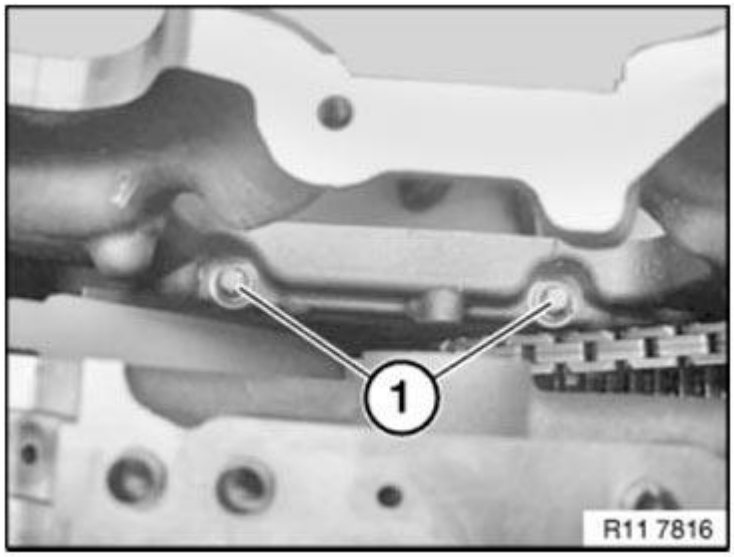


Fig. 52: Identifying Bolt On Front Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts in sequence (10 to 1).

Remove all cylinder head bolts with washers.

NOTE: For purposes of clarity, the graphic shows the camshafts removed.

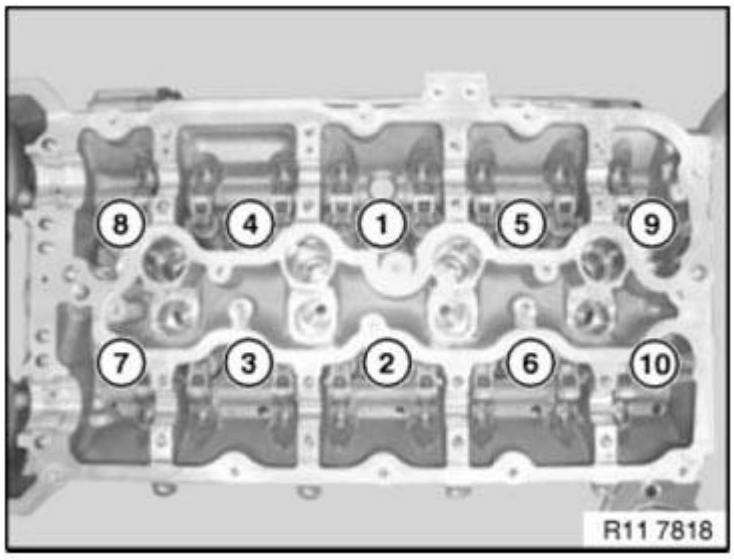


Fig. 53: Identifying Cylinder Head Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing faces of cylinder head and engine block; if necessary, remove gasket debris compound with special tool **11 4 470** . Make sure no gasket remnants drop into oil and cooling channels.

IMPORTANT: Risk of cracking!
Threaded bores in engine block must be free of dirt and oil

Check **CYLINDER HEAD** for leaks.

Check **CYLINDER HEAD SEALING FACE** for surface evenness.

Coat joint between engine block and timing case cover with Drei Bond 1209 (refer to BMW Parts Service).

NOTE: Graphic shows an N62 engine by way of example.

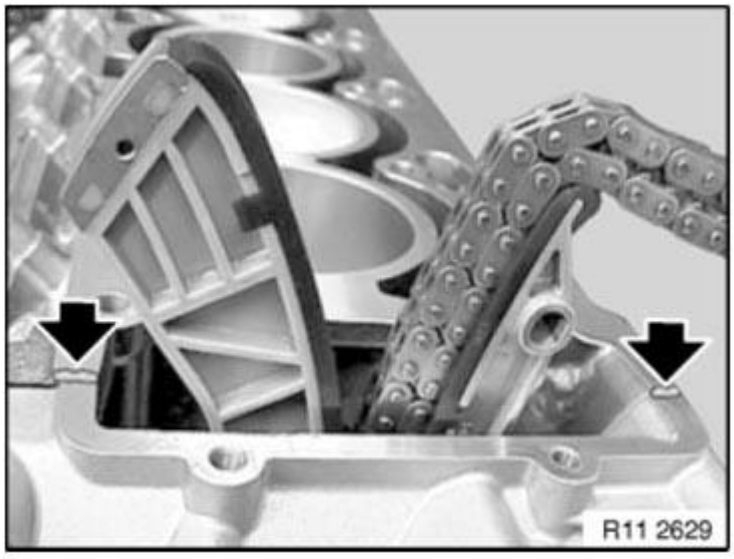


Fig. 54: Locating Drei Bond 1209 At Joint Between Engine Block And Timing Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Check fitting sleeves (1) for damage and correct installation position.

Installation note:

Renew cylinder head gasket (2)

Fit new cylinder head gasket (2).

NOTE: Graphic corresponds to cylinders 1-4.

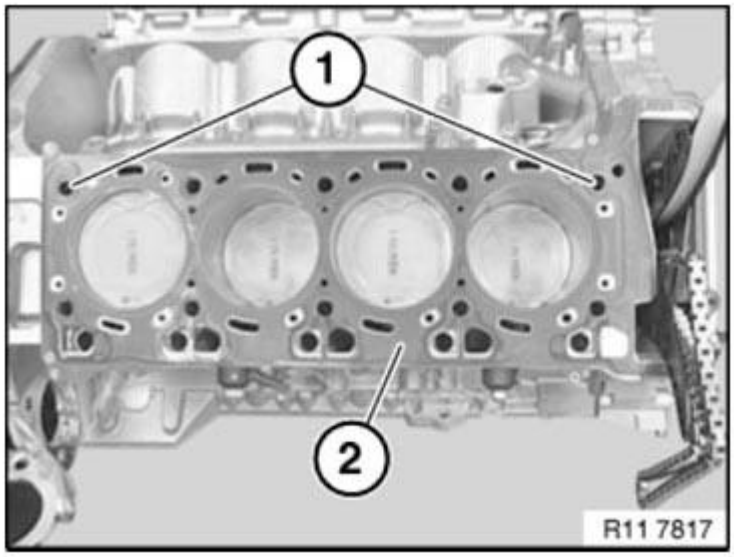


Fig. 55: Identifying Fitting Sleeves And Cylinder Head Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Put the cylinder head on.

Do not wash off bolt coating.

Installation note:

Fit new cylinder head bolts

Insert new cylinder head bolts and initially tighten so that they are free of play.

Tighten down cylinder head bolts in sequence 1 - 10.

Tightening torque **11 12 1AZ** .

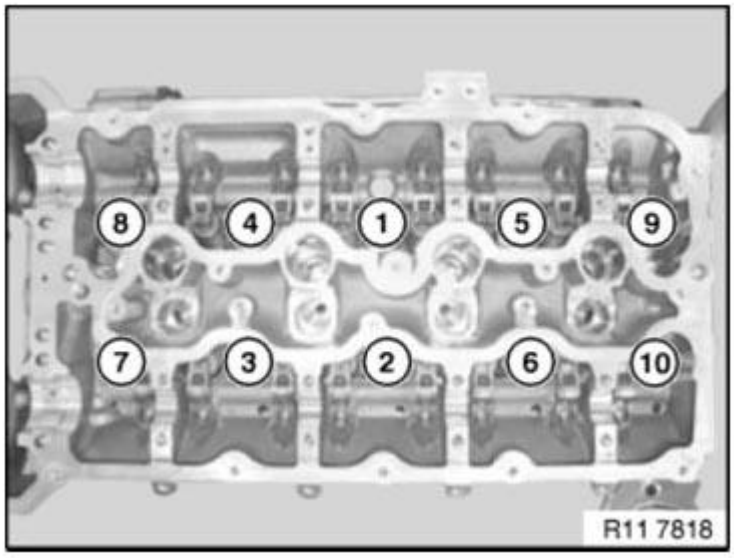


Fig. 56: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down bolts (1) between cylinder head and timing case cover.

Tightening torque **11 12 2AZ** .

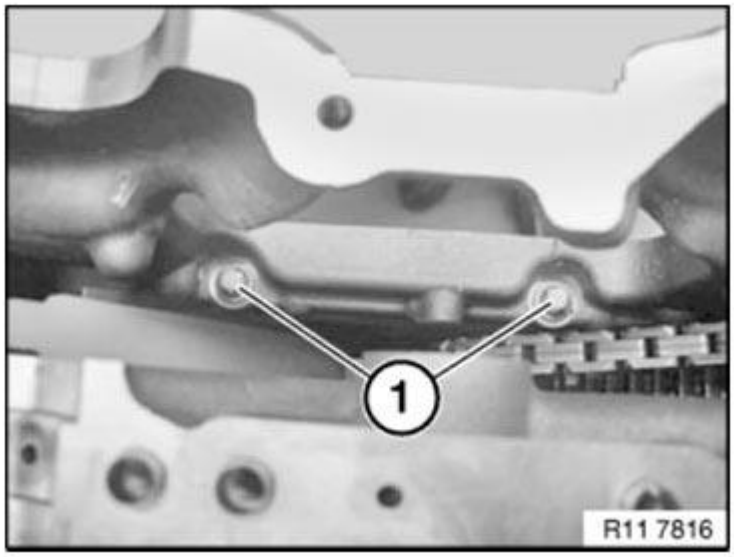


Fig. 57: Identifying Bolts Between Cylinder Head And Timing Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (1) of guide rail and tighten down.

Tightening torque **11 31 3AZ** .

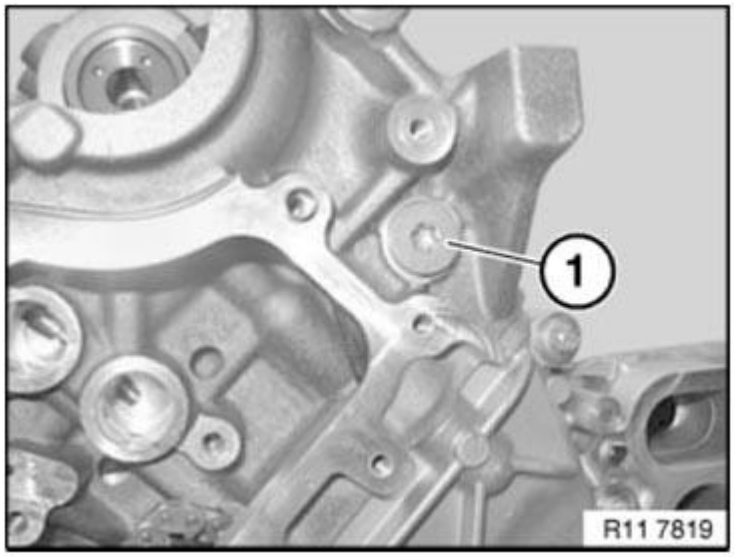


Fig. 58: Identifying Screw Of Guide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, install **camshafts** . See **1131036 REMOVING AND INSTALLING/REPLACING LEFT EXHAUST CAMSHAFT (N63)** and **1131032 REMOVING AND INSTALLING/REPLACING LEFT INLET CAMSHAFT (N63)**.

Install left **INLET AND EXHAUST ADJUSTMENT UNITS** .

Assemble engine.

1112106 REMOVING AND INSTALLING RIGHT CYLINDER HEAD (N63)

Necessary preliminary work

- Check **TIMING** .
- Remove **INLET AND EXHAUST ADJUSTMENT UNIT ON RIGHT SIDE** .

Release screw (1).

NOTE: Guide rail is loose from cylinder head.

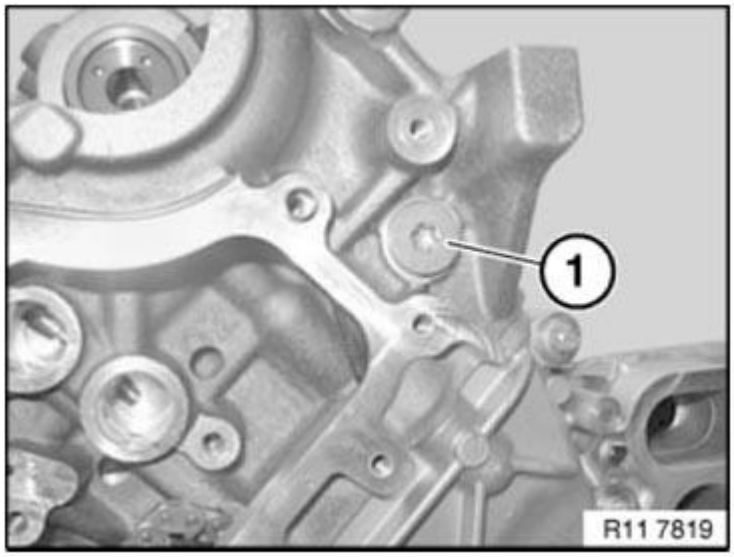


Fig. 59: Identifying Screw Of Guide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) at front from cylinder head.

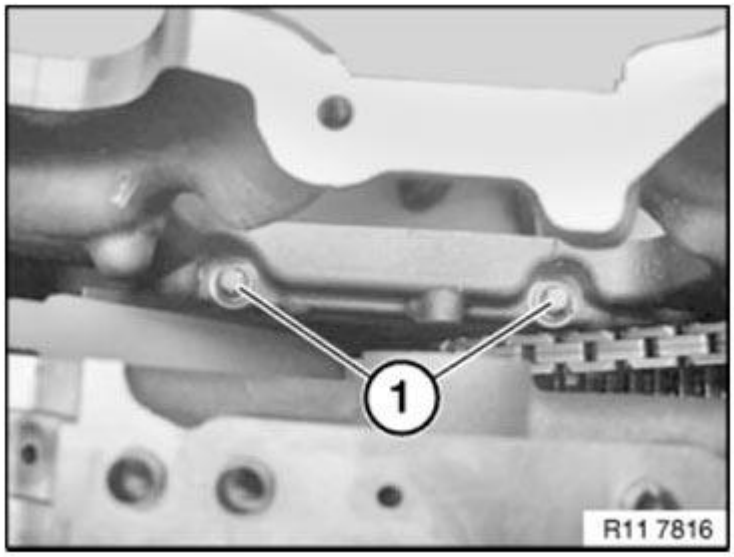


Fig. 60: Identifying Bolts At Front From Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts in sequence (10 to 1).

Remove all cylinder head bolts with washers.

NOTE: Shown without camshafts for purposes of clarity.

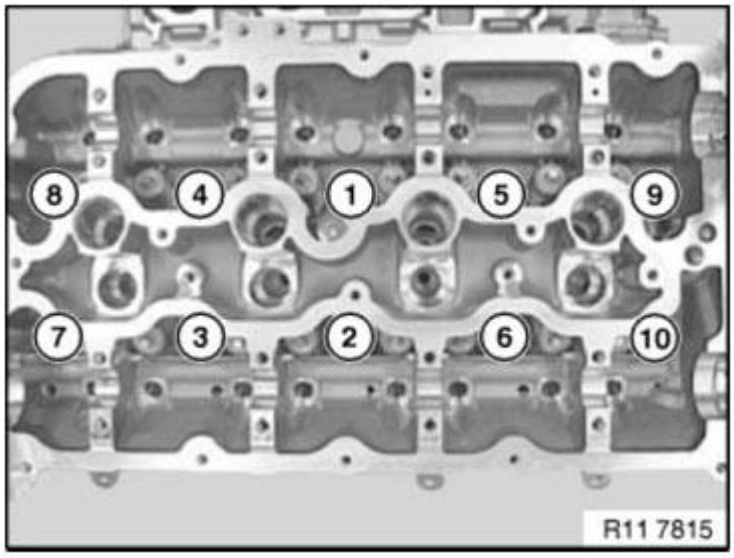


Fig. 61: Identifying Cylinder Head Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing faces of cylinder head and engine block; if necessary, remove gasket debris compound with special tool **11 4 470** . Make sure no gasket debris drops into the oil and coolant ducts.

Threaded bores in engine block must be free of dirt and oil **(risk of cracking).**

Check **CYLINDER HEAD FOR LEAKS** .

Check **CYLINDER HEAD SEALING FACE** for surface evenness.

Coat joint between engine block and timing case cover with Drei Bond 1209 (refer to BMW Parts Service).

NOTE: Illustrations show N62.

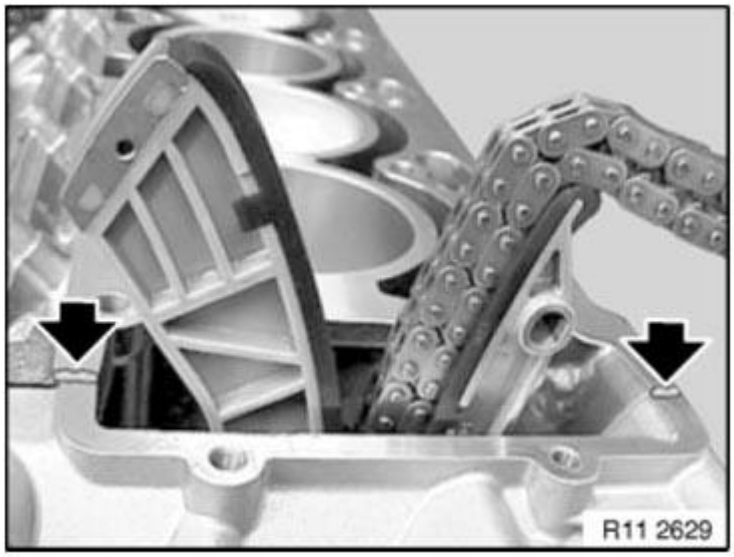


Fig. 62: Locating Drei Bond 1209 At Joint Between Engine Block And Timing Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Check fitting sleeves (1) for damage and correct installation position.

Fit new cylinder head gasket (2).

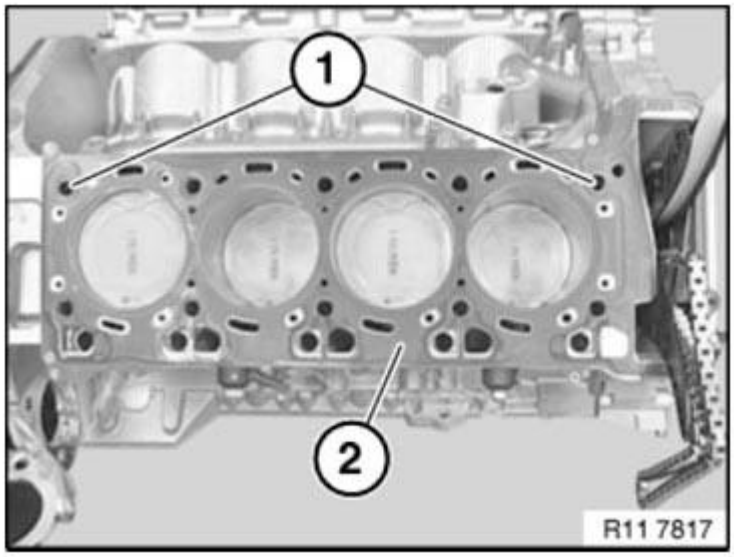


Fig. 63: Identifying Fitting Sleeves And Cylinder Head Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Put the cylinder head on.

Do not wash off bolt coating.

Insert new cylinder head bolts and initially tighten so that they are free of play.

Tighten down the cylinder-head bolts in order 1... 10.

Tightening torque: **11 12 1AZ** .

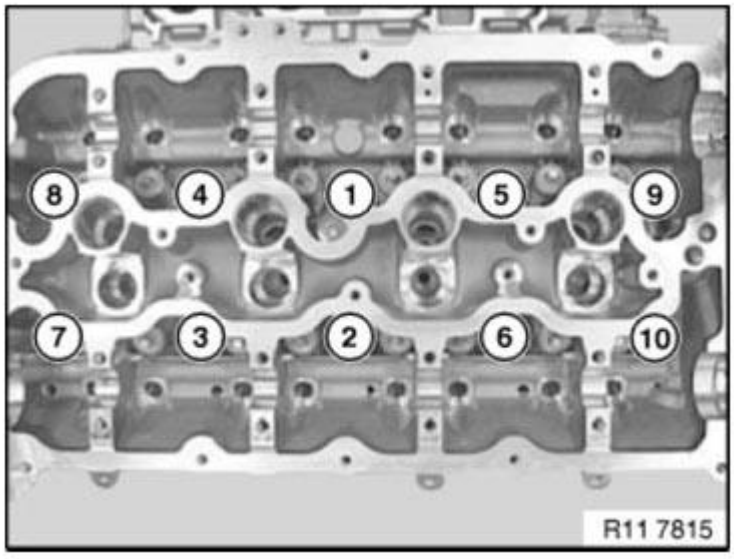


Fig. 64: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down bolts (1) between cylinder head and timing case cover.

Tightening torque: **11 12 2AZ** .

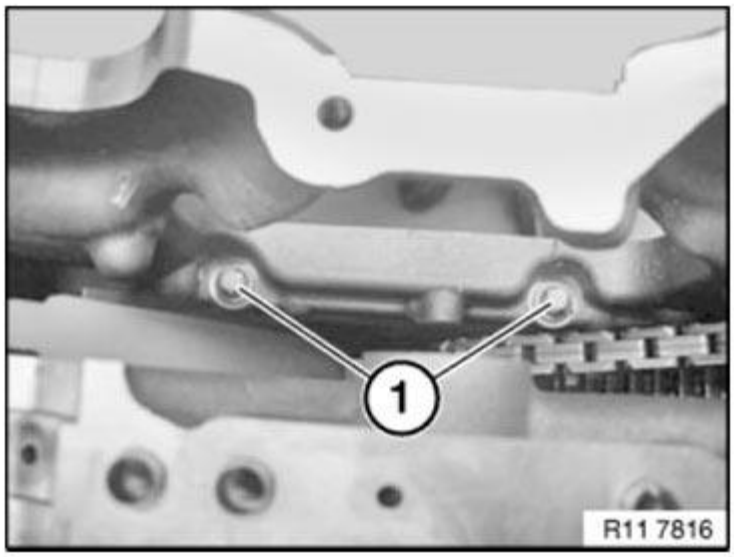


Fig. 65: Identifying Bolts Between Cylinder Head And Timing Case Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (1) of guide rail and tighten down.

Tightening torque: **11 31 3AZ** .

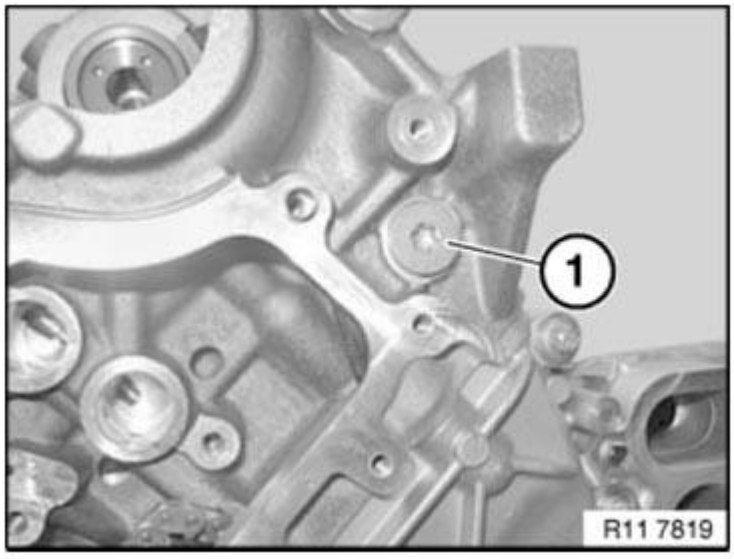


Fig. 66: Identifying Screw Of Guide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, install **camshafts** . See **1131034 REMOVING AND INSTALLING/REPLACING RIGHT INLET CAMSHAFT (N63)** and **1131038 REMOVING AND INSTALLING/RENEWING RIGHT EXHAUST CAMSHAFT (N63)**.

Install **INLET AND EXHAUST ADJUSTMENT UNIT ON LEFT SIDE** .

Assemble engine.

1112005 REMOVING AND INSTALLING/SEALING LEFT CYLINDER HEAD COVER (N63)

Necessary preliminary work

- Remove **ACOUSTIC COVER**
- Disconnect **NEGATIVE BATTERY TERMINAL**
- Remove left **CHARGE AIR COOLER**
- Remove **INTAKE FILTER HOUSING**
- Remove **EXPANSION TANK** .
- Remove coolant pipe from cylinder head cover (E71 only)
- Remove coolant valve for heater feed line
- Disconnect **FUEL FEED LINE**

- Detach wiring harness for injectors and lay to one side
- Remove **IGNITION COILS** , cylinders 5-8
- Remove **INJECTORS** , cylinders 5-8
- Remove **HIGH-PRESSURE PUMP**

Release bolts in sequence (17 to 1).

Remove cylinder head cover.

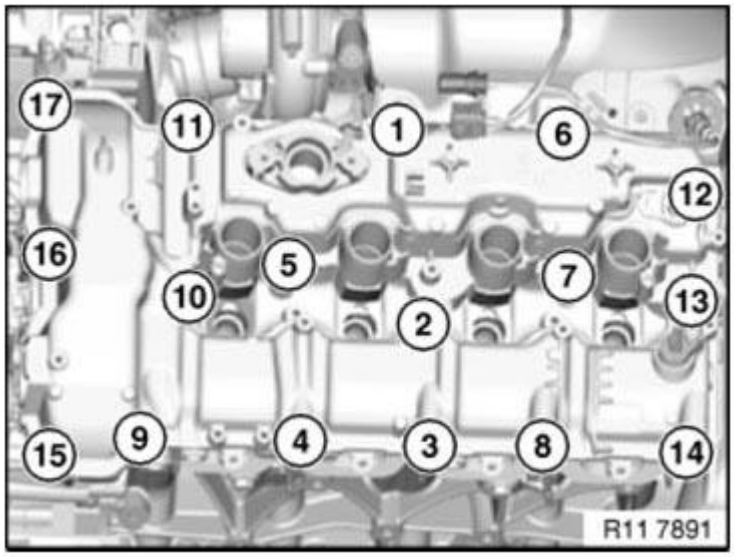


Fig. 67: Identifying Cylinder Head Cover Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing surface (1) with special tool **11 4 470** .

Installation note:

Replace gasket (2)

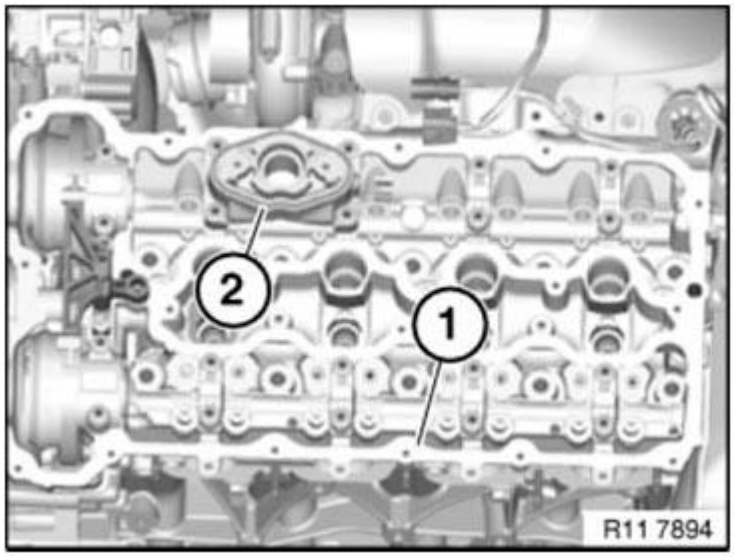


Fig. 68: Identifying Sealing Surface And Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Renew profile seal of cylinder head cover

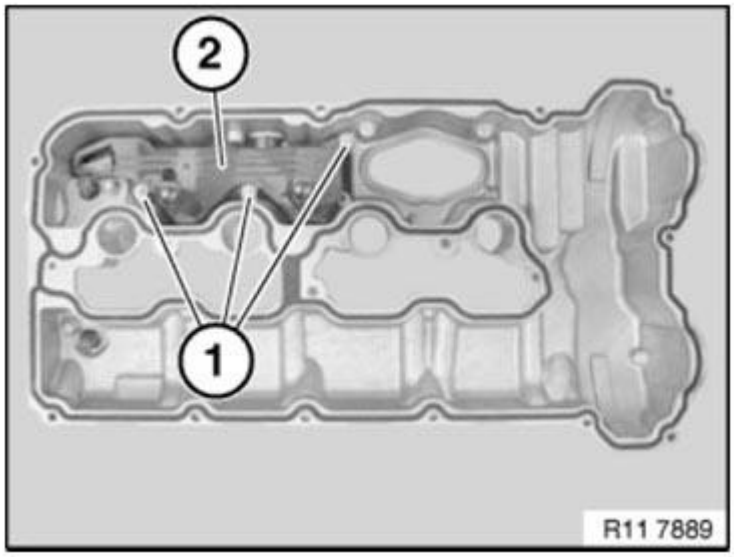


Fig. 69: Identifying Profile Seal Of Cylinder Head Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

It is important to join screw (1) for exact positioning of the camshaft sensors.

Fit cylinder head cover.

Position screw (1).

Release screw (1) by 90°.

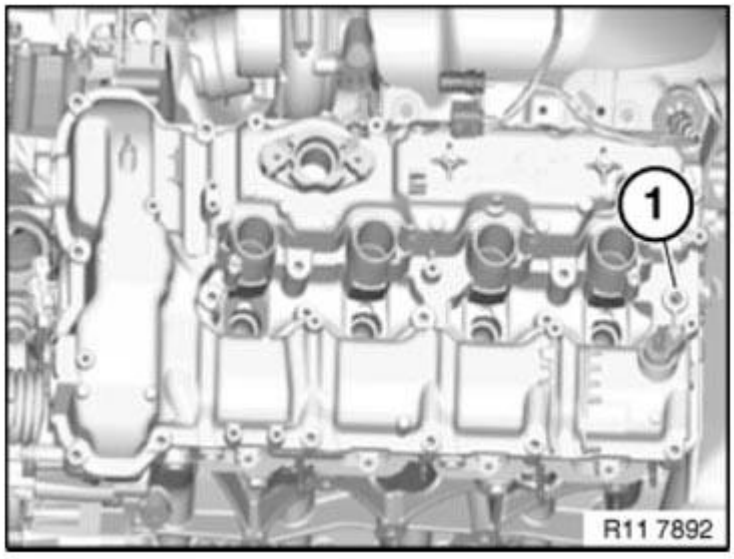


Fig. 70: Identifying Screw Of Camshaft Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Secure cylinder head cover in sequence (1 to 17) in two work steps.

Tightening torque **11 12 3AZ** .

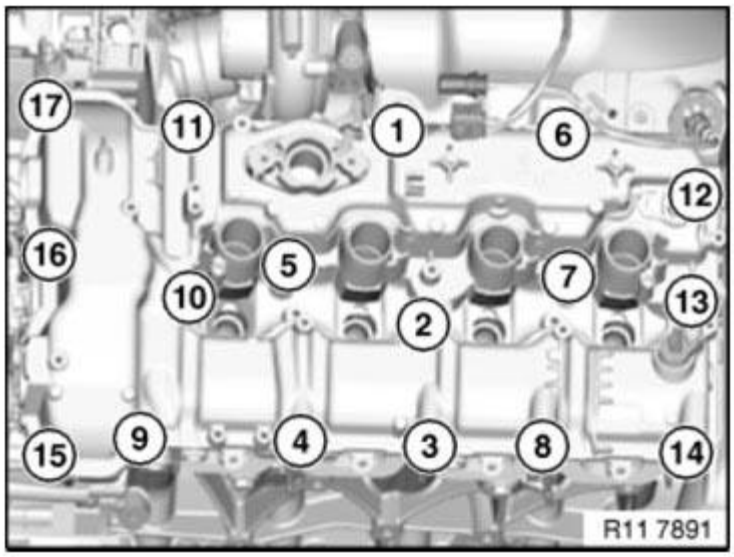


Fig. 71: Identifying Cylinder Head Cover Bolts Releasing Sequence

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1112006 REMOVING AND INSTALLING/SEALING RIGHT CYLINDER HEAD COVER (N63)

Necessary preliminary work

- Remove **ACOUSTIC COVER**
- Disconnect **NEGATIVE BATTERY TERMINAL**
- Release battery positive terminal
- Remove right **INTERCOOLER**
- Remove **INTAKE FILTER HOUSING**
- Disconnect **FUEL FEED LINE**
- Detach wiring harness for injectors and lay to one side
- Remove **IGNITION COILS** , cylinders 1-4
- Remove **INJECTORS** , cylinders 1-4
- Remove **HIGH-PRESSURE PUMP**

Release screws (1).

Tightening torque **11 12 9AZ** .

Remove oil filler neck (2).

Installation note:

Replace sealing ring

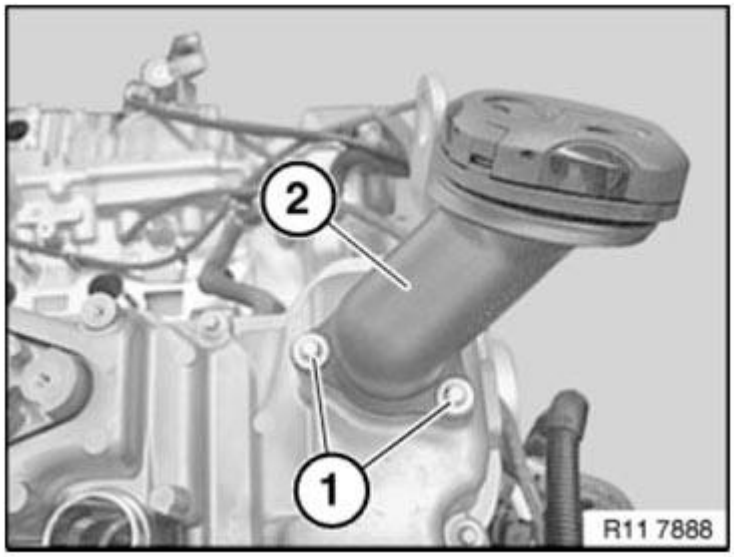


Fig. 72: Identifying Oil Filler Neck And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts in sequence (17 to 1).

Remove cylinder head cover.

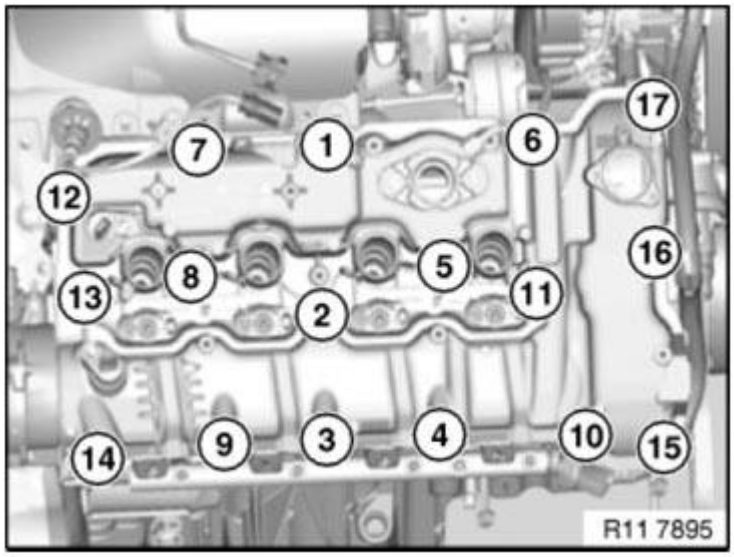


Fig. 73: Identifying Cylinder Head Cover Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing surface (1) with special tool **11 4 470** .

Installation note:

Replace gasket (2)

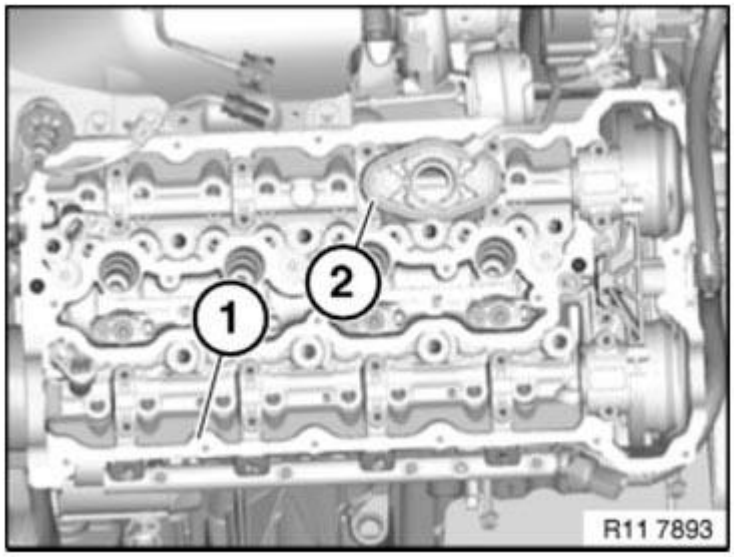


Fig. 74: Identifying Sealing Surface And Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Renew profile seal of cylinder head cover

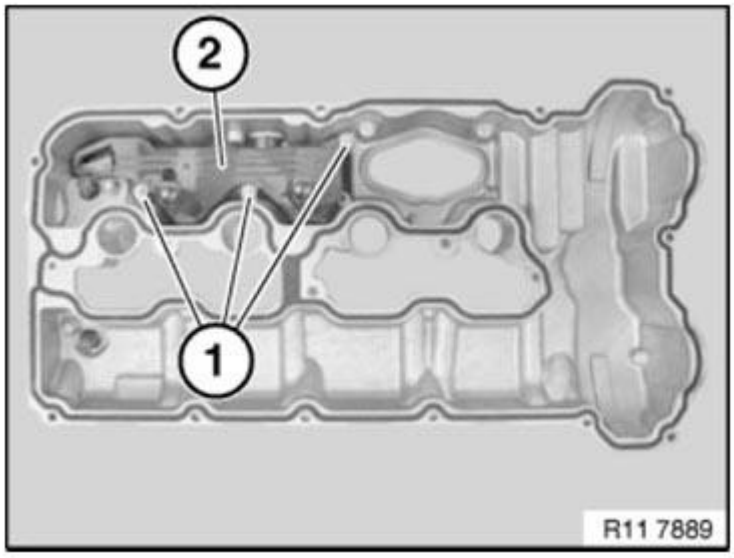


Fig. 75: Identifying Profile Seal Of Cylinder Head Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

It is important to join screw (1) for exact positioning of the camshaft sensors.

Fit cylinder head cover.

Position screw (1).

Release screw (1) by 90°.

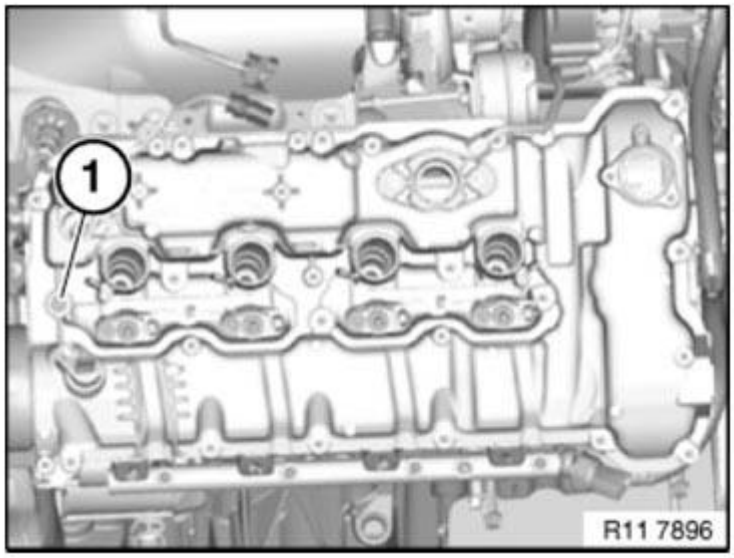


Fig. 76: Identifying Screw Of Camshaft Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Secure cylinder head cover in sequence (1 to 17) in two work steps.

Tightening torque **11 12 3AZ** .

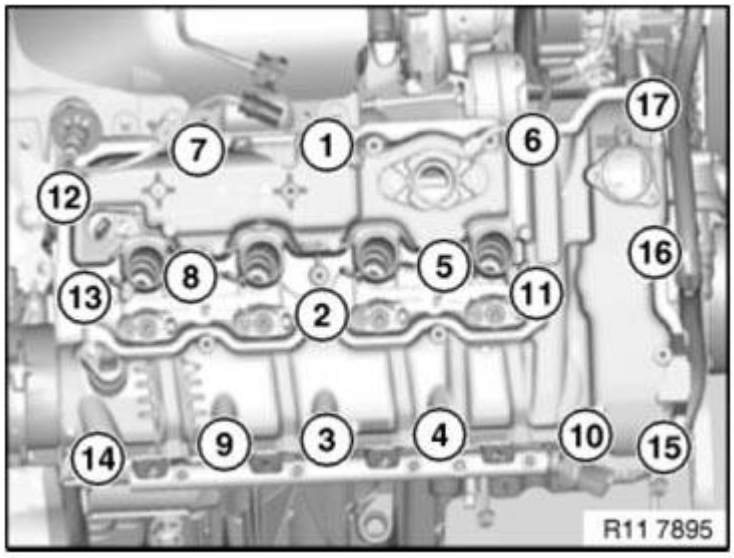


Fig. 77: Identifying Cylinder Head Cover Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1112112 REPLACING BOTH CYLINDER HEAD GASKETS (N63)

Necessary preliminary work

- Remove **LEFT CYLINDER HEAD**
- Remove **RIGHT CYLINDER HEAD**

INSTALLATION NOTE:

The cylinder head gasket (2) for cylinders 1-4 and cylinders 5-8 are identical.

There is no marking (TOP).

Cylinder head gasket (2) must depending on its styling be correctly positioned on the timing chain case.

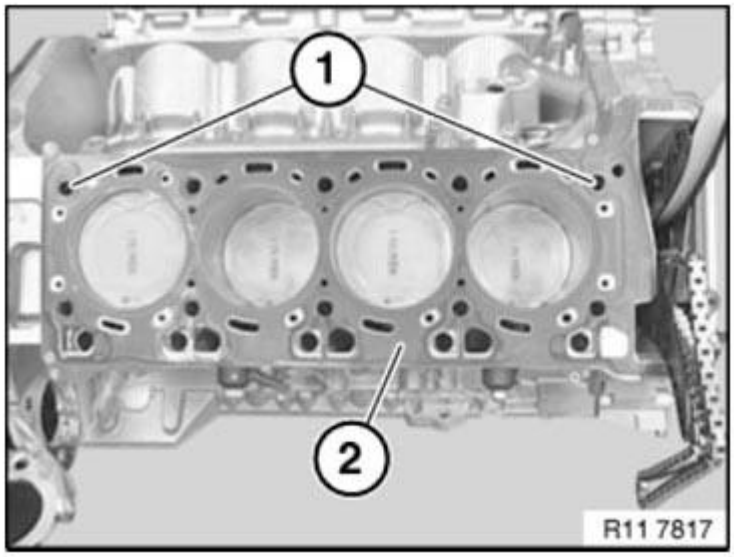


Fig. 78: Identifying Fitting Sleeves And Cylinder Head Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Repair gasket (+REP) is 0.3 mm thicker.

Check **cylinder head** for surface evenness. See **1112719 GRINDING CYLINDER HEAD SEALING SURFACE (N63)**.

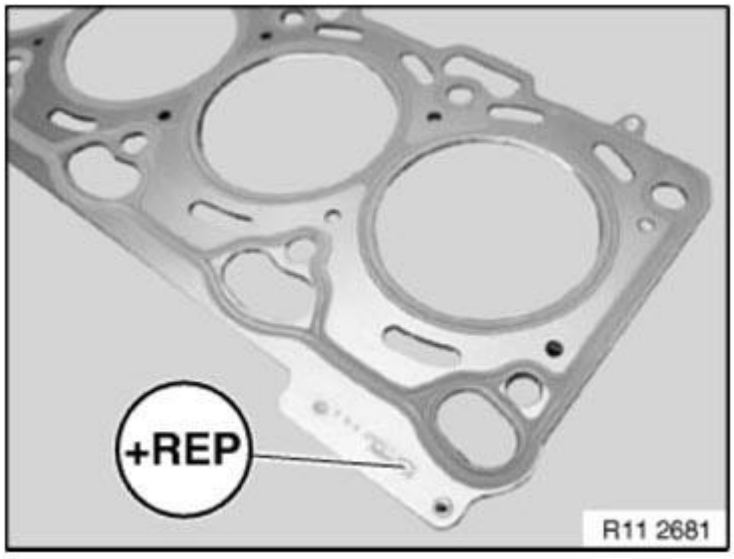


Fig. 79: Identifying Cylinder Head Gasket (+REP)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1113 OIL SUMP

1113020 REMOVING AND INSTALLING/REPLACING LOWER OIL SUMP SECTION (N63)

Necessary preliminary work

- Remove underbody protection at front and rear. See **FRONT UNDERBODY PROTECTION** and **REAR UNDERBODY PROTECTION** .
- Release oil drain plug and drain engine oil. See **SERVICE - ENGINE OIL**.

Unlock plug connection (1) on oil level sensor and disconnect.

Release screws (2) along line.

Tightening torque **11 13 3AZ** .

Remove lower oil sump section (3).

Installation note:

Clean sealing surfaces.

Replace gasket.

Replace screws.

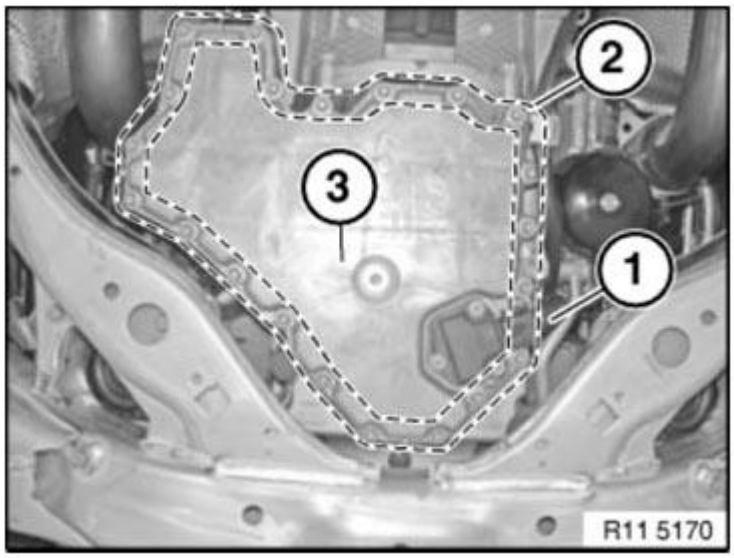


Fig. 80: Identifying Plug Connection On Oil Level Sensor And Lower Oil Sump Section
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing lower oil sump section:

Convert oil level sensor.

Replace sealing ring.

NOTE:

Procedure with four-wheel drive

Unlock plug connection (1) on oil level sensor and disconnect.

Release screws (2) along line.

Tightening torque **11 13 3AZ** .

Remove lower oil sump section (3).

Installation note:

Clean sealing surfaces.

Replace gasket.

Replace screws.

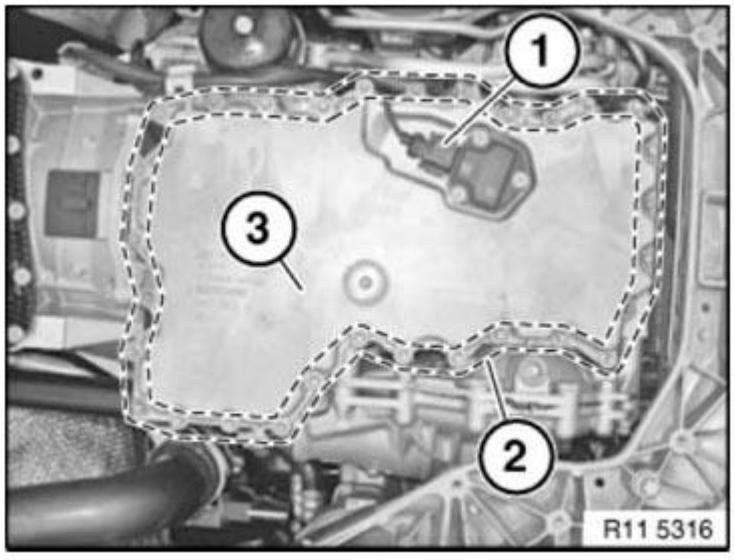


Fig. 81: Identifying Plug Connection On Oil Level Sensor And Lower Oil Sump Section
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing lower oil sump section:

Convert oil level sensor.

Replace sealing ring.

1113010 REMOVING AND INSTALLING/REPLACING UPPER OIL SUMP SECTION (N63)

Necessary preliminary work

- Drain **ENGINE OIL** .
- Secure engine in **INSTALLATION POSITION** .
- Lower **FRONT AXLE** .
- Remove **LOWER OIL SUMP SECTION** .
- Unclip wiring harness on oil sump.

Remove oil filter cover with oil filter (1) with special tool **11 9 240** .

Tightening torque: **11 42 1AZ** .

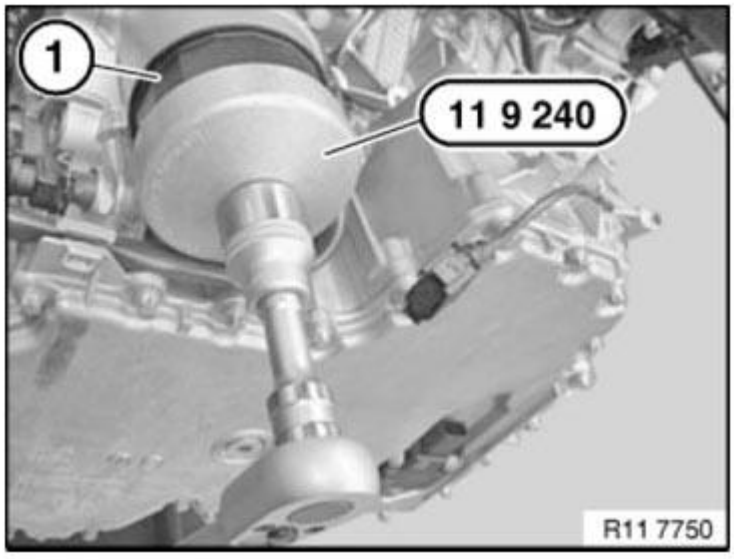


Fig. 82: Removing Oil Filter Cover With Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1). Remove oil pipes (2) from oil filter housing.

Release holders of supply/return lines on oil sump

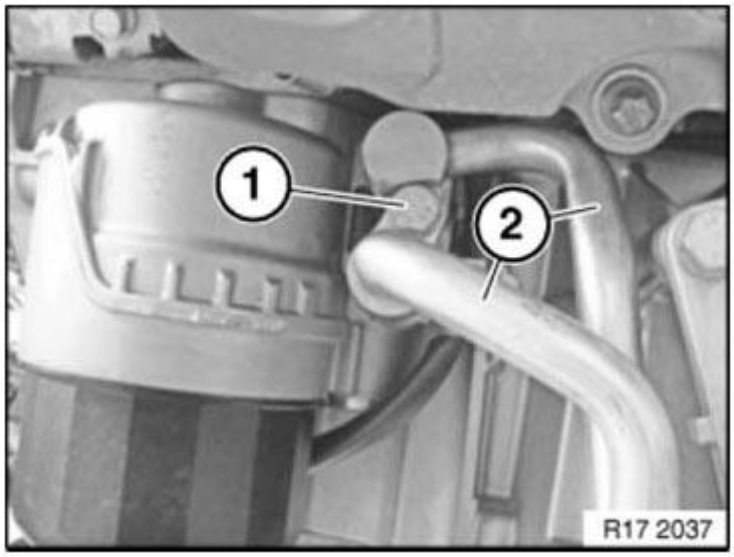


Fig. 83: Identifying Oil Pipes Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque: **11 41 1AZ** .

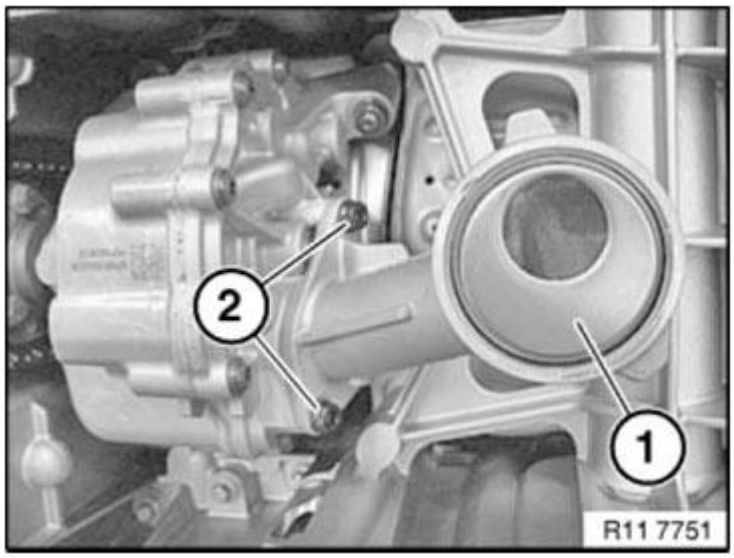


Fig. 84: Identifying Intake Pipe And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

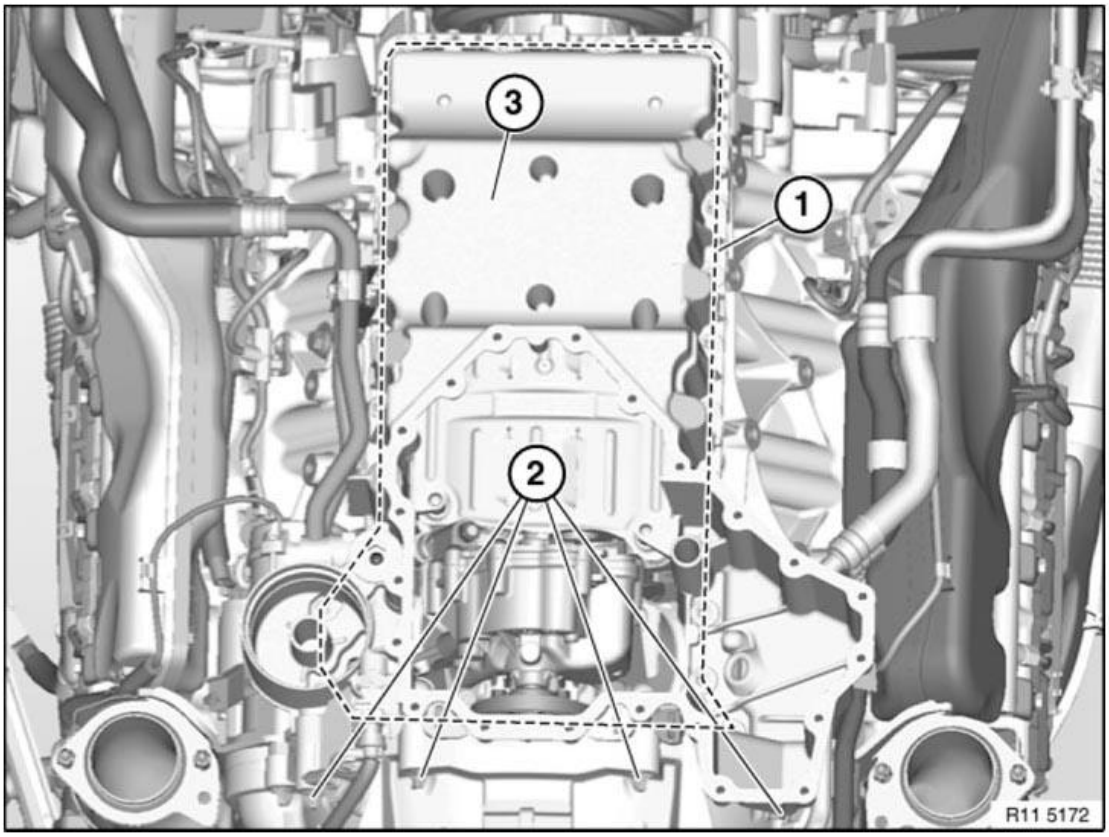


Fig. 85: Identifying Transmission End Screws And Upper Oil Sump Section
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws in area of line (1).

Tightening torque **11 13 2AZ** .

Release screws (2) on transmission end **24 00 1AZ** .

Remove upper oil sump section (3).

Installation note:

Free sealing surfaces of seal debris and clean.

Replace gasket.

Modify oil pressure switch if replacing oil sump.

Assemble engine.

1114 HOUSING COVER

1114110 REMOVING AND INSTALLING LOWER TIMING CASE COVER (N63)

Necessary preliminary work

- Remove **ENGINE**
- Remove both cylinder head covers. See **LEFT CYLINDER HEAD COVER** and **RIGHT CYLINDER HEAD COVER**
- Remove **LOWER OIL SUMP SECTION**
- Remove **UPPER OIL SUMP SECTION**
- Remove alternator **BELT TENSIONER**
- Remove **VIBRATION DAMPER**
- Remove **COOLANT PUMP**
- Remove **ALTERNATOR**
- Remove **A/C COMPRESSOR**
- Remove hub for **VIBRATION DAMPER**

Release screws along lines (1).

Remove timing case cover (2) towards front.

Clean sealing surfaces with special tool **11 4 470** .

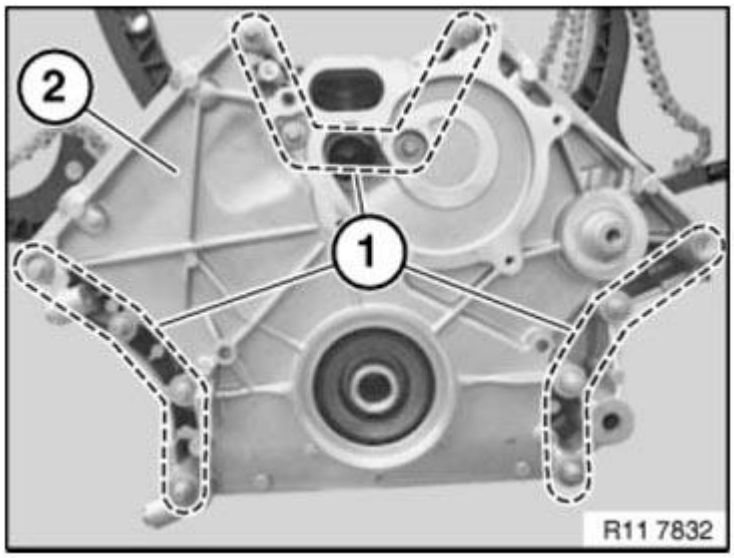


Fig. 86: Identifying Screws Along Lines And Timing Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check jump guard for damage.

Release screw (1).

Tightening torque **11 14 1AZ** .

Remove jump guard (2).

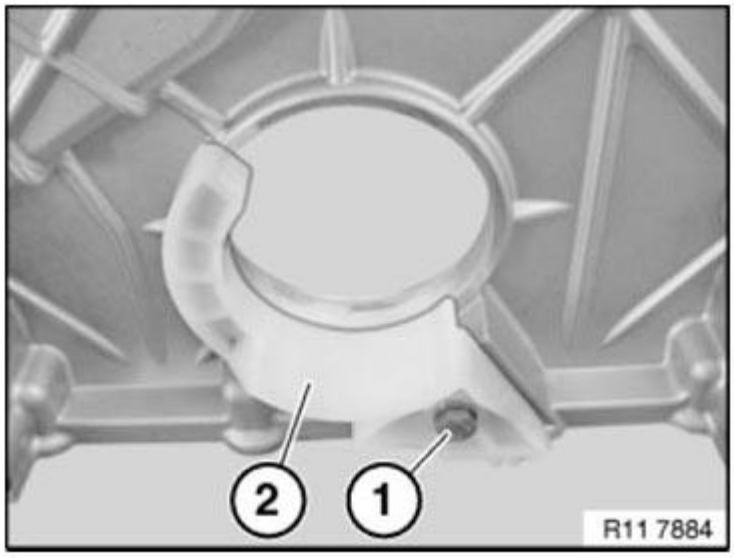


Fig. 87: Identifying Jump Guard And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing surfaces with special tool **11 4 470** .

Installation note:

Preposition all bolts in timing case cover.

Replace beaded metal gaskets (1, 2 and 3)

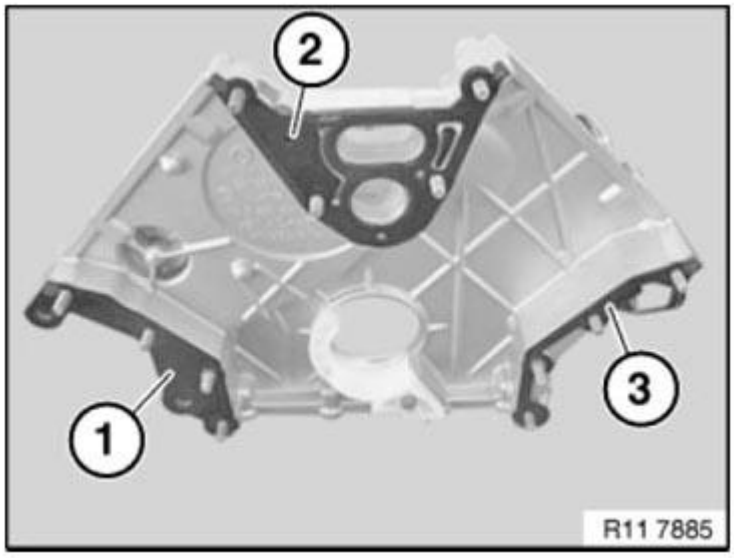


Fig. 88: Identifying Beaded Metal Gaskets
Courtesy of BMW OF NORTH AMERICA, INC.

Fit timing case cover (2).

Initially tighten all bolts to approx. 5 Nm.

Fully tighten all bolts in alternate sequence.

Tightening torque **11 14 2AZ** .

Installation note:

Wait for PU material to emerge at sealing joints.

Carefully wipe off protruding PU material.

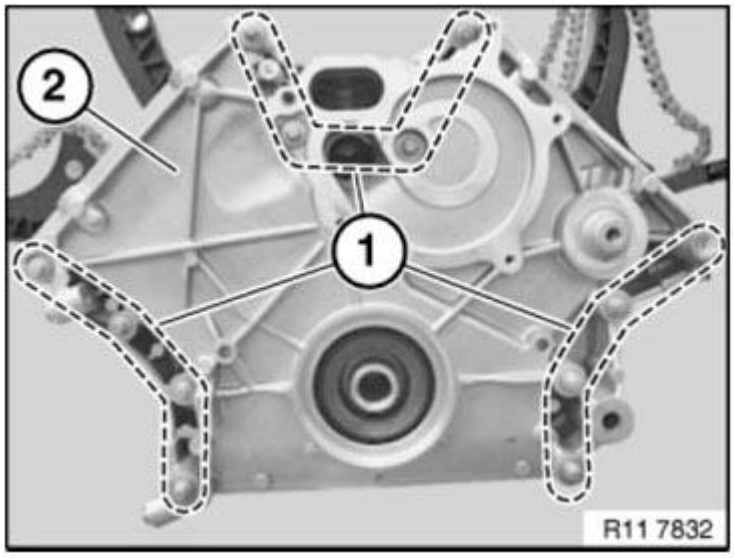


Fig. 89: Identifying Screws Along Lines And Timing Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **RADIAL SHAFT SEAL** **in gear case cover at bottom.**

Assemble engine.

1114080 REMOVING AND INSTALLING TIMING CASE COVER, TOP LEFT (N63)

Timing case cover, cylinders 5-8

Necessary preliminary work

- Remove both **SOLENOID VALVES** on left side

Release screws (1).

Tightening torque **11 14 3AZ** .

Remove timing case cover (2).

Installation note:

Replace gasket

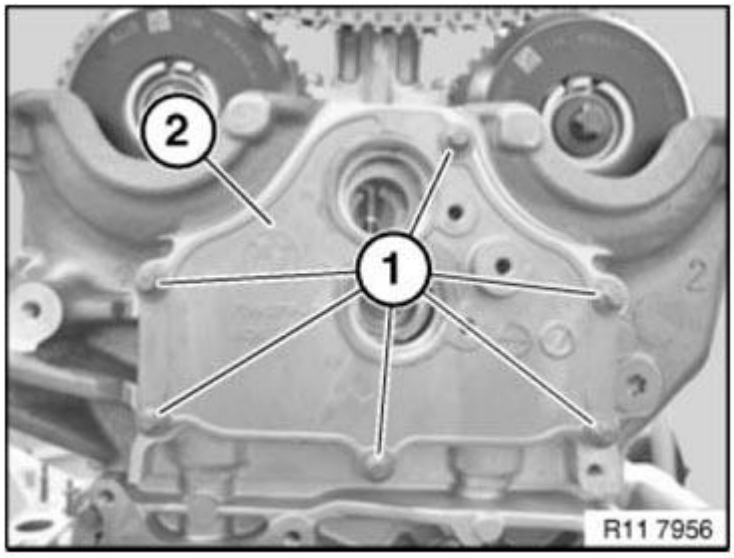


Fig. 90: Identifying Timing Case Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1114085 REMOVING AND INSTALLING TIMING CASE COVER, TOP RIGHT (N63)

Gear case cover, cylinders 1-4

Necessary preliminary work

- Remove both **SOLENOID VALVES** on right side

Release screws (1).

Tightening torque **11 14 3AZ** .

Remove timing case cover (2).

Installation note:

Replace gasket

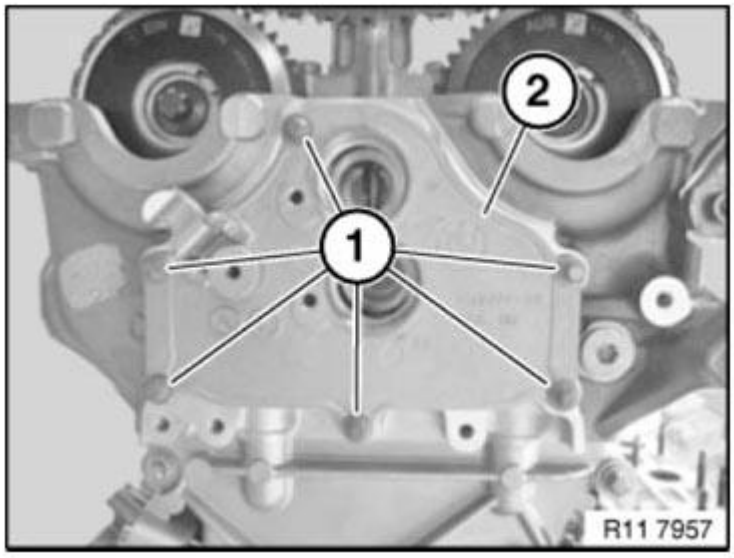


Fig. 91: Identifying Timing Case Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1114250 REMOVING AND INSTALLING/SEALING REAR COOLANT END COVER (N63)

Notes

WARNING: Risk of scalding!
Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Remove **FLYWHEEL**
- Drain **COOLANT**

Release all screws in area (1).

Tightening torque **11 14 5AZ** .

Remove end cover.

NOTE: Clean sealing surfaces with special tool 11 4 470 .

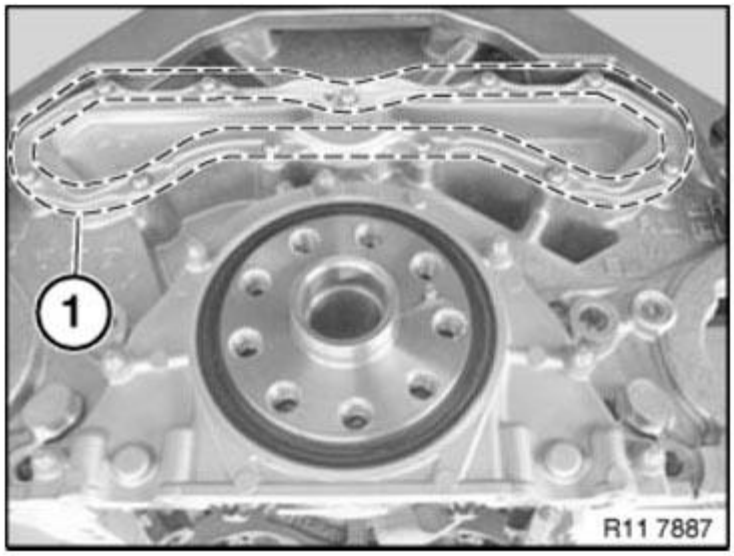


Fig. 92: Identifying End Cover Screws Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace profile seal (1)

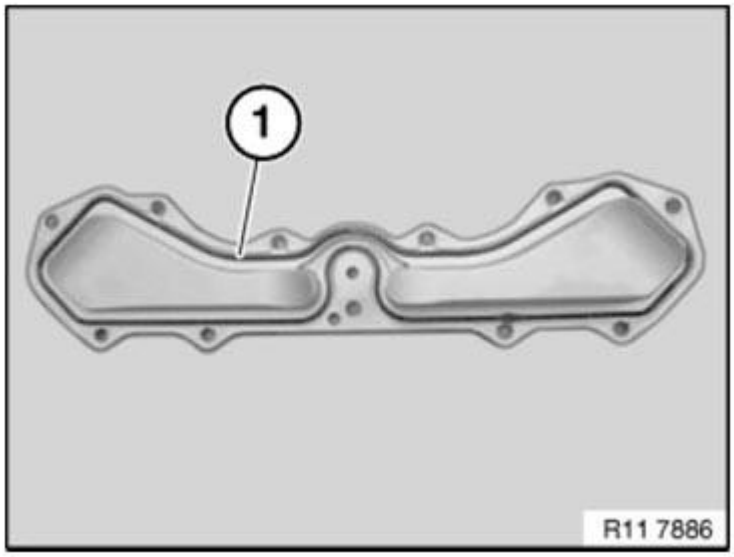


Fig. 93: Identifying Profile Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1114151 REPLACING CRANKSHAFT RADIAL SEAL ON TRANSMISSION SIDE (N63)

IMPORTANT: The radial crankshaft seal can only be replaced completely with the end cover. The radial crankshaft seal is an integral part of the end cover and can not be replaced individually.

Necessary preliminary work

- Drain off engine oil. See **SERVICE - ENGINE OIL**
- Remove **FLYWHEEL**

Release screws (1).

Unfasten screws (2).

Carefully remove end cover with radial crankshaft seal.

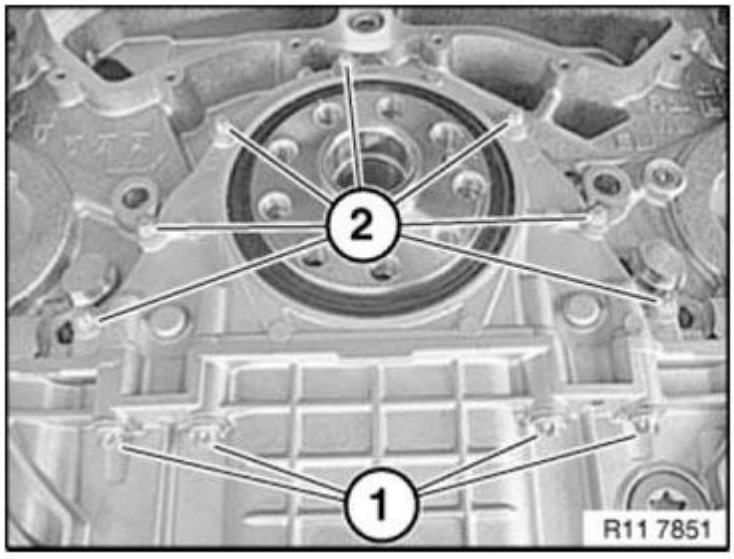


Fig. 94: Identifying Radial Crankshaft Seal End Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support bush (2) is included in delivery specification.
If the radial crankshaft seal (1) is stored for more than six months without the support bush (2), its operational reliability will no longer be guaranteed.
Radial crankshaft seal (1) must not be reused in this eventuality!
Support bush (2) remains in the radial crankshaft seal (1) and is used as a slip bush during described installation described below.

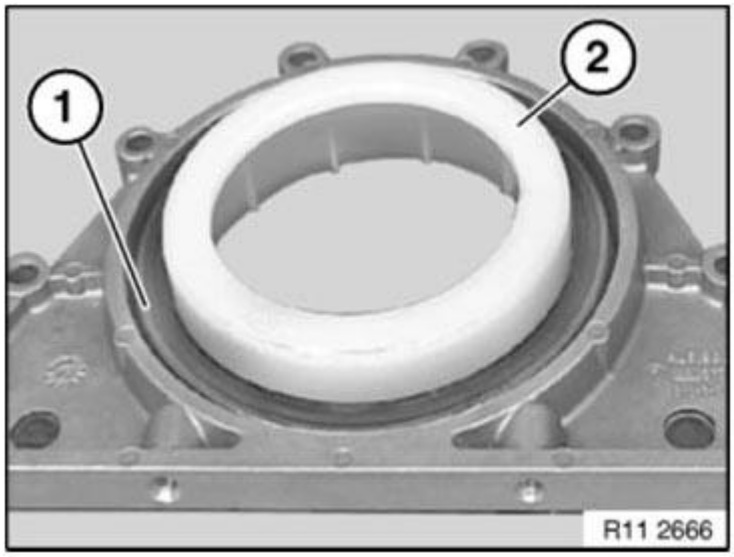


Fig. 95: Identifying Support Bush And Radial Crankshaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The sealing lip of the radial crankshaft seal (1) is highly sensitive and must not be kinked.
Do not touch the sealing lip with your fingers.

IMPORTANT: Special tool 11 2 390 must not be used.

When the radial crankshaft seal is installed, only the support bush included in the delivery specification may be used as a slip bush.

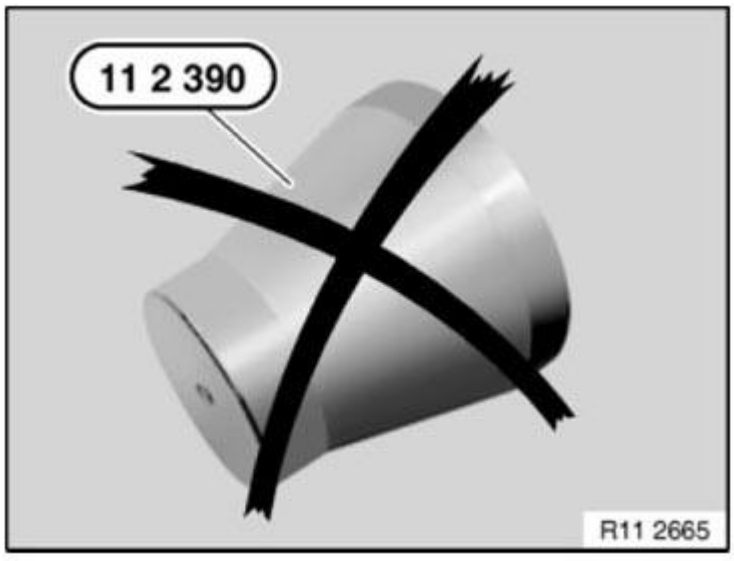


Fig. 96: Precaution - Special Tool 11 2 390 Must Not Be Used

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check fitting sleeves (1) for damage and correct installation position.

Clean sealing surface (2) so that it is free from oil and grease.

Coat contact points on joint along oil sump (see arrows) with Drei Bond 1209.

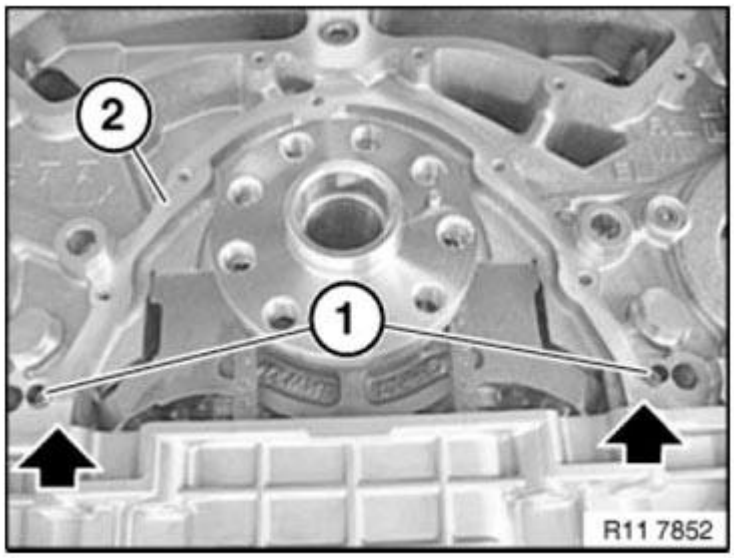


Fig. 97: Identifying Fitting Sleeves And Sealing Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Lightly oil running surface of crankshaft.

Fit end cover (1) with support bush (2) on crankshaft and push on carefully.

NOTE: Illustration shows (N62TU).

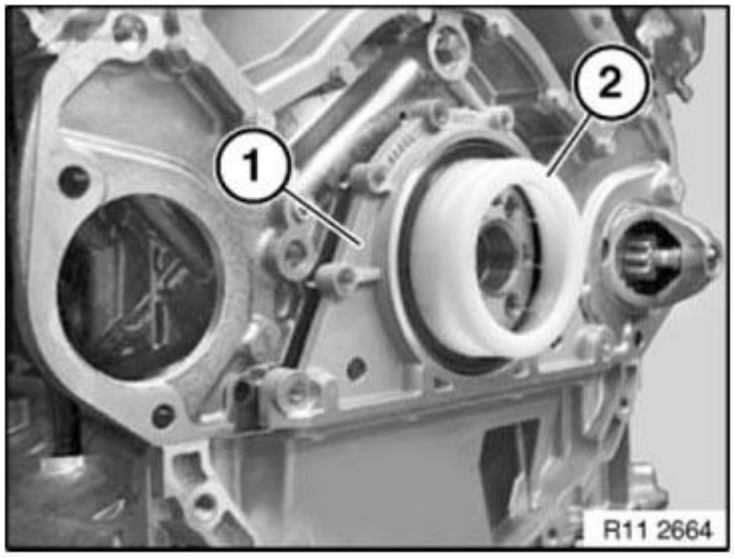


Fig. 98: Identifying End Cover And Support Bush
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (2) and initially tighten without play.

Insert screws (1) and initially tighten without play.

Tighten down bolts (2) from inside outwards.

Tighten down screws (1) from inside outwards.

Tightening torque **11 14 4AZ** .

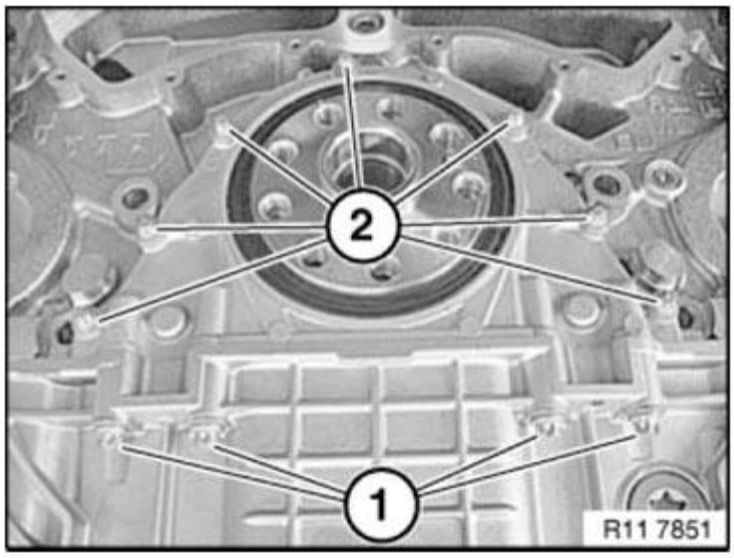


Fig. 99: Identifying Radial Crankshaft Seal End Cover Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1114141 REPLACING RADIAL SHAFT SEAL IN LOWER TIMING CASE COVER (N63)

Necessary preliminary work

- Removing **VIBRATION DAMPER**

Position all levers (2) horizontally to pull off radial shaft seal (1).

Turn back spindle of special tool **11 9 410** until all levers (2) can be positioned on sealing lip.

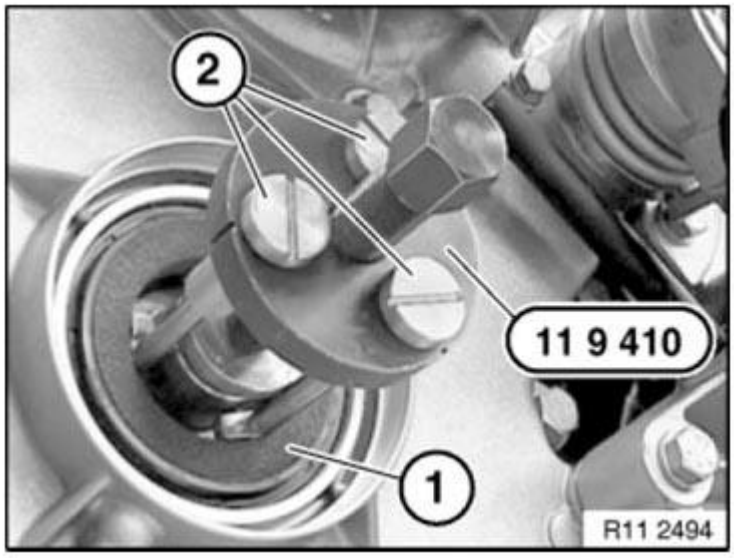


Fig. 100: Positioning All Levers Horizontally To Pull Off Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Turn all levers (2) so that they grip behind radial shaft seal (1).

Turn spindle (3) on special tool **11 9 410** to remove radial shaft seal (1).

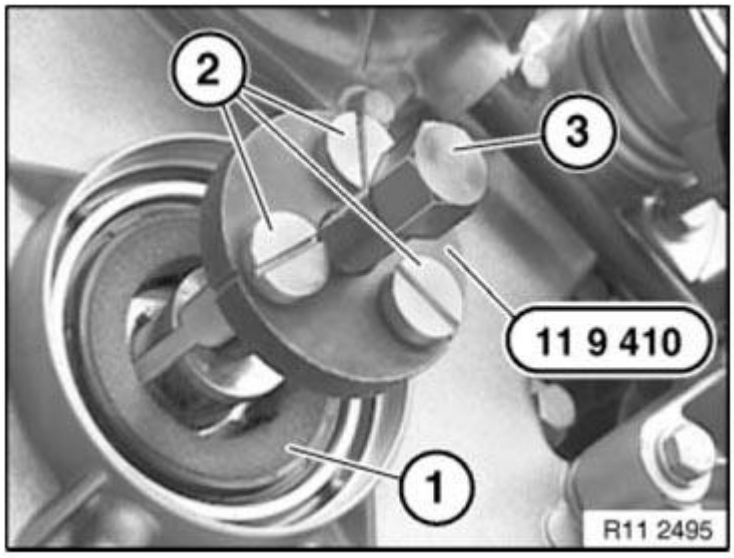


Fig. 101: Turning Spindle On Special Tool 11 9 410 To Remove Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Radial shaft seal (1) may only be supported with "support sleeve" (2).

If the radial shaft seal (1) is stored for more than six months without the support sleeve (2), its operational reliability will no longer be guaranteed.

Radial shaft seal (1) must not be reused in this case!

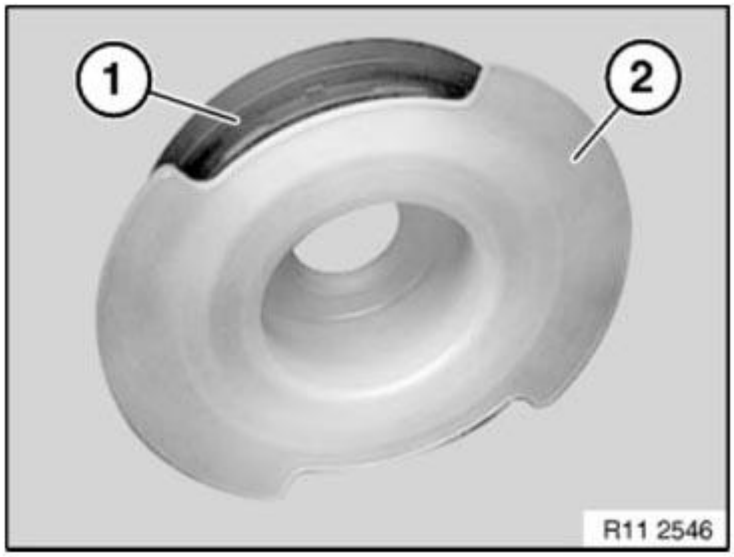


Fig. 102: Identifying Radial Shaft Seal And Support Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The sealing lip of the radial shaft seal (1) is highly sensitive and must not be

kinked under any circumstances.
Do not touch the sealing lip with your fingers.

Remove support sleeve (2) from radial shaft seal (1).

Fit radial shaft seal (1) on lower gear case cover.

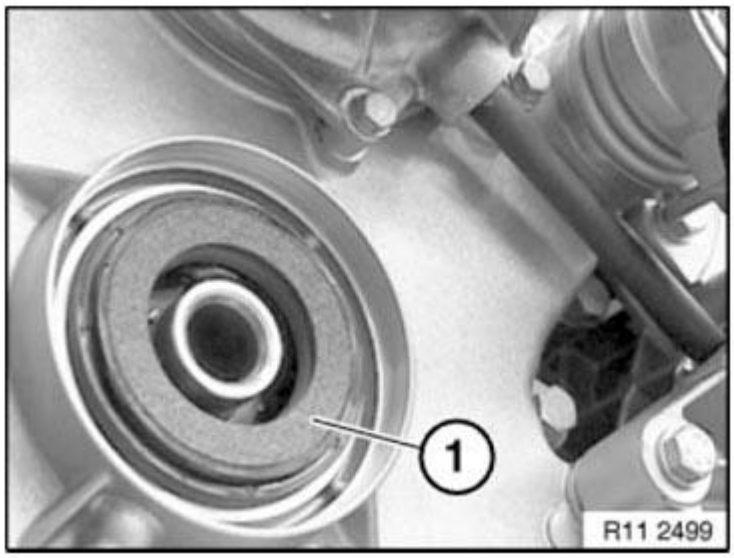


Fig. 103: Identifying Radial Shaft Seal On Lower Gear Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Using special tool **11 9 420** and central bolt (3), screw radial shaft seal into lower gear case cover until flush.

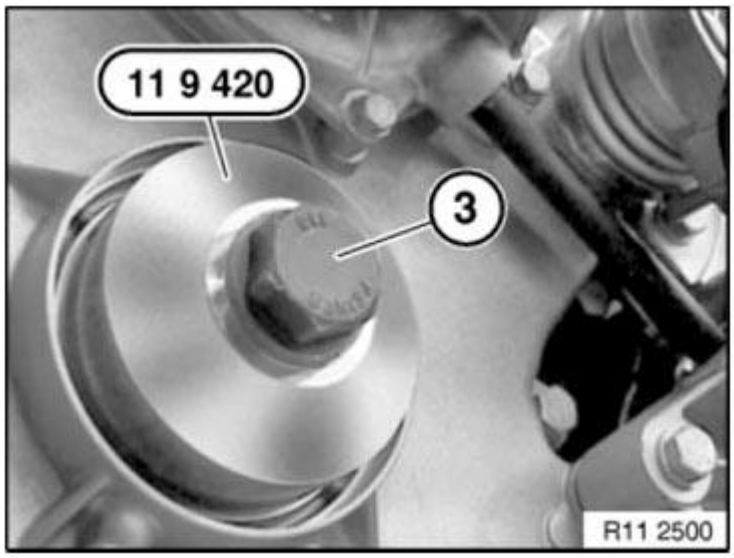


Fig. 104: Identifying Special Tool And Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1121 CRANKSHAFT WITH BEARING

1121531 REPLACING ALL CRANKSHAFT MAIN BEARING SHELLS (N63) WITHOUT HYBRID DRIVE

Notes

IMPORTANT: Risk of injury from sharp edge of housing.

IMPORTANT: If a crankcase or a crankshaft is replaced, old and new identifications can be used.

A mixed installation is permissible.

Example:

An old crankcase with an old crankcase designation and a new crankshaft with a new crankshaft designation.

An old crankshaft with an older crankshaft designation and a new crankcase with a new crankcase designation.

Or a new crankcase with a new crankshaft with new identifications.

Necessary preliminary work

- Remove **CRANKSHAFT**

NOTE: The main bearing caps 1 to 5 are marked with numbers.

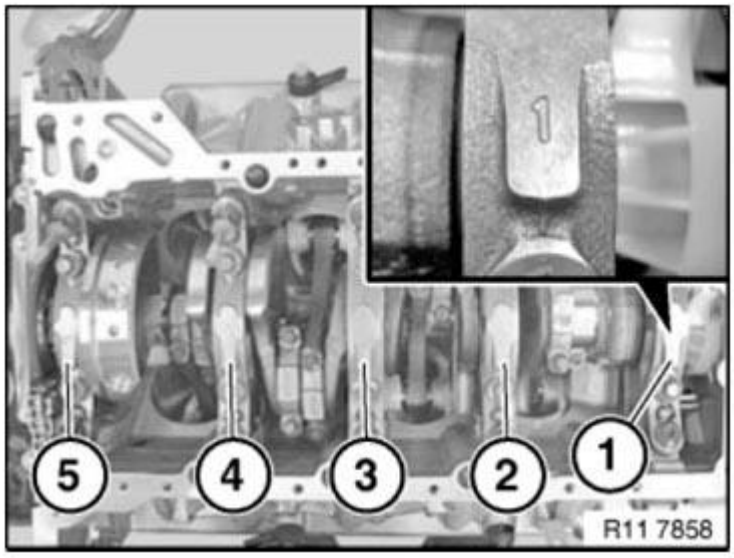


Fig. 105: Identifying Main Bearing Caps Marked Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

Observe crankshaft construction stage:

S: Series

B: Repair stage 1

C: Repair stage 2

The letters denote the bearing shell classification for the relevant bearing position from 1 to 5 (main bearing cap).

The first letter on the left applies to the first bearing position at the front on the timing chain drive.

Color assignment on crankshaft 1 to 5

Y= yellow

G= green

V= violet

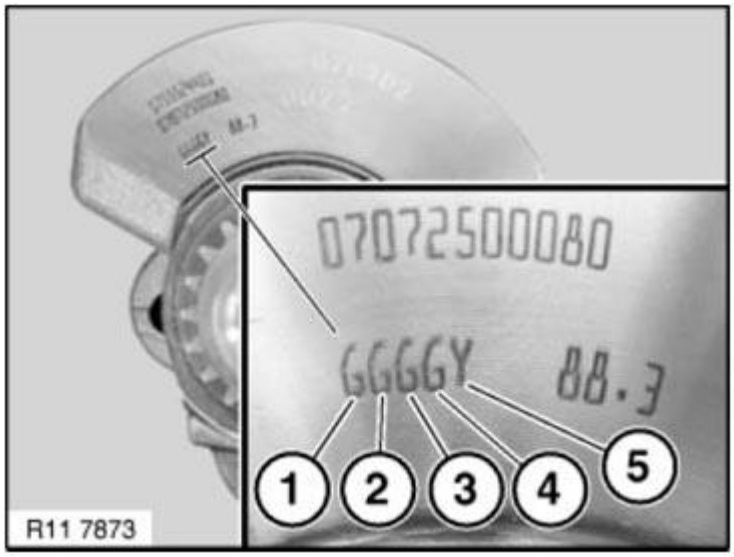


Fig. 106: Identifying Color Assignment On Crankshaft 1 To 5
Courtesy of BMW OF NORTH AMERICA, INC.

The letters denote the bearing shell classification for the relevant bearing position from 1 to 5 in the crankcase and is located on the transmission side in the Vee. The first letter on the left applies to the first bearing position at the front on the timing chain drive.

Color assignment in crankcase 1 to 5.

Y= yellow

G= green

V= violet

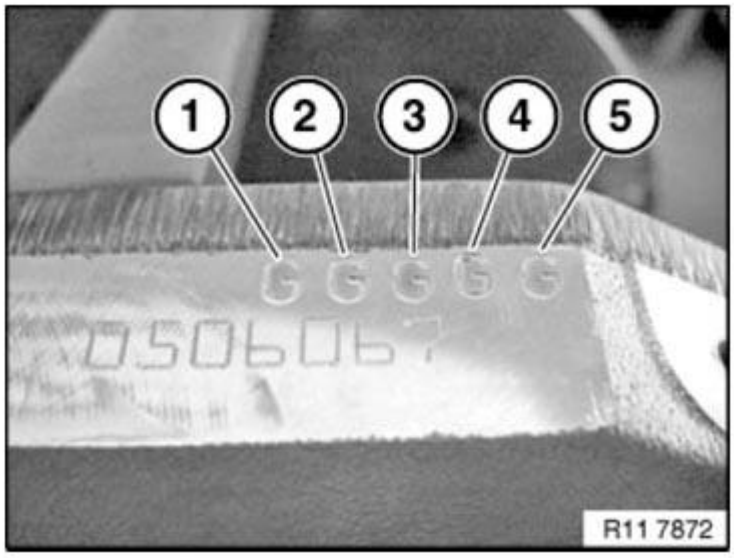


Fig. 107: Identifying Color Assignment In Crankcase 1 To 5
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New bearing shell classification.

The letters denote the bearing shell classification for the relevant bearing position from 1 to 5 (main bearing cap).

The first letter on the left applies to the first bearing position at the front on the timing chain drive.

Color assignment on crankshaft 1 to 5

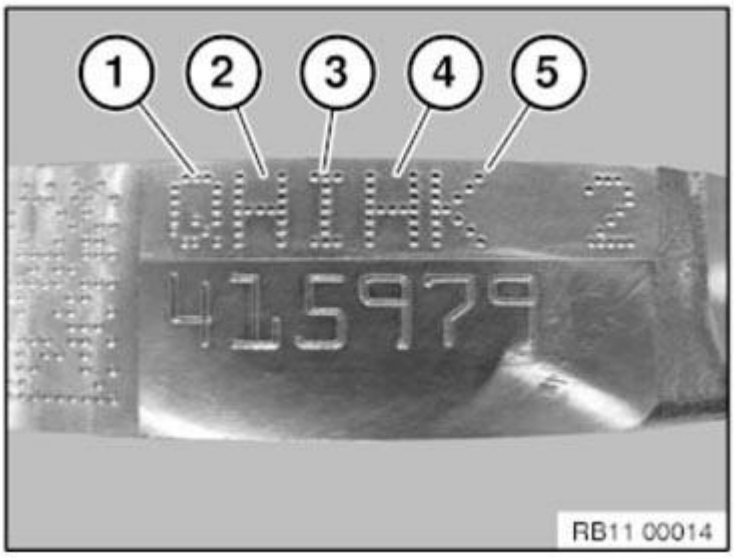


Fig. 108: Identifying Color Assignment On Crankshaft 1 To 5
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Changed bearing classification:
Bearing position 1, 2, 3, 4 and 5

BEARING SHELL CLASSIFICATION LETTER WITH CODE

Code letter	Color code
New (A to H)	Yellow
Old Y	Yellow
New (I to R)	Green
Old G	Green
New (S is Z) Old V	Violet

TOLERANCE CLASSES AND BEARING SHELL COVERS COLOR CODE REFERENCE CHART

	Tolerance classes	Bearing shell covers
Crankcase	A B C D E G H	Yellow Yellow
Crankcase	I C M N P q R	Green Green
Crankcase	S T U W X Z	Violet

Installation note:

Install main bearing shells (1) with lubrication groove in crankcase.

Install main bearing shells (2) without lubrication groove in the main bearing caps.

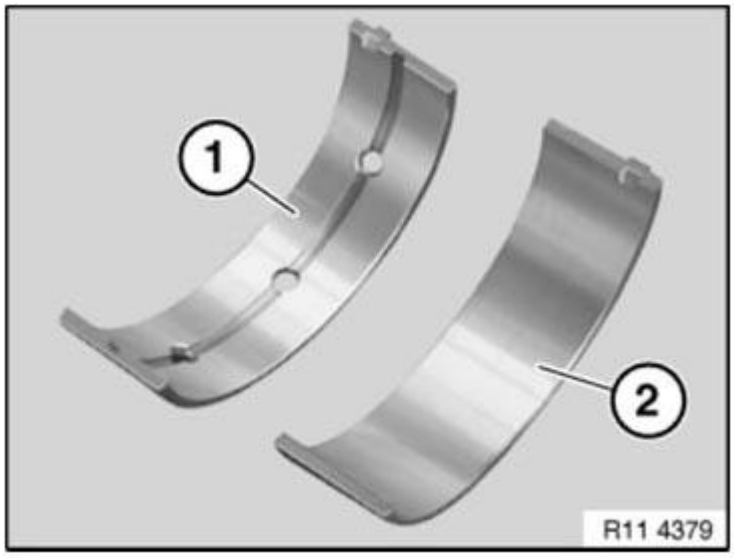


Fig. 109: Identifying Main Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Main bearing cap number 3 can be identified by the surfaces (1) for the thrust washers of the thrust bearing.

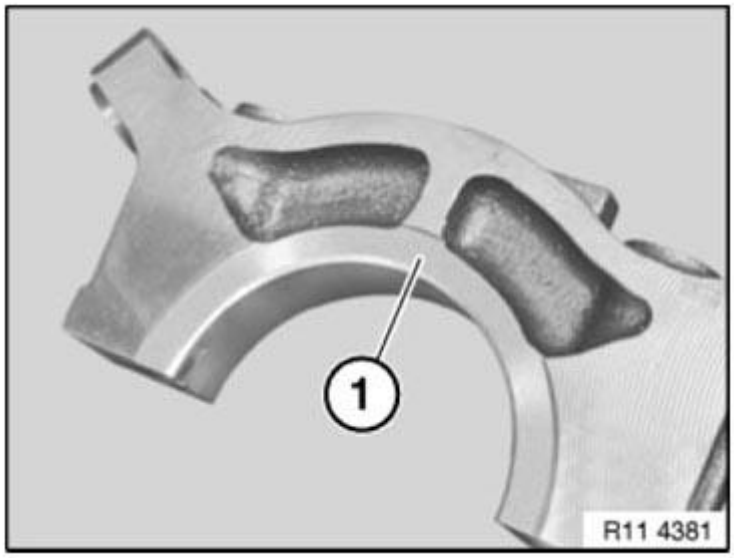


Fig. 110: Identifying Main Bearing Cap Thrust Washers Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Turn back thread support bushing into main bearing cap.

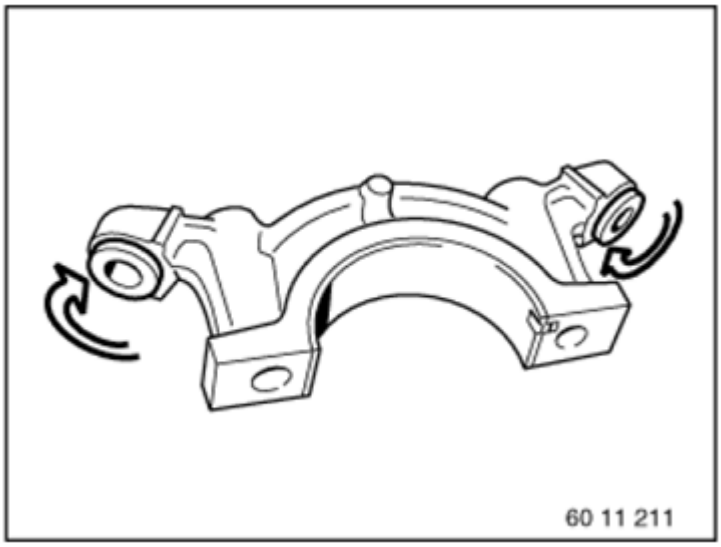


Fig. 111: Turning Back Thread Support Bushing Into Main Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Checking main bearing clearance

To check crankshaft bearing play, use the existing main bearing bolts.

IMPORTANT: Risk of cracking!
No oil is permitted in the blind holes.

Do not twist crankshaft.

Place special tool **00 2 590**

(Plastigage model PG 1) onto the oil-free crankshaft (see arrow).

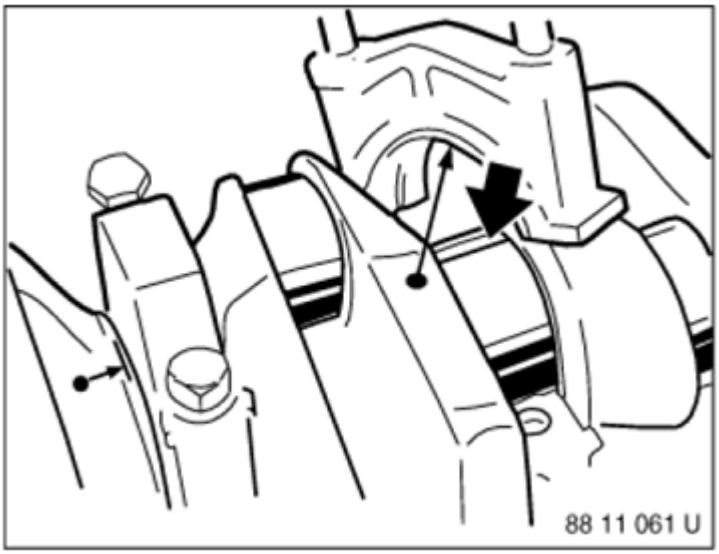


Fig. 112: Identifying Main Bearing Clearance On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down all collar bolts (M11) of main bearing caps in sequence 1 to 5 to jointing torque.

Tightening torque **11 11 1AZ** .

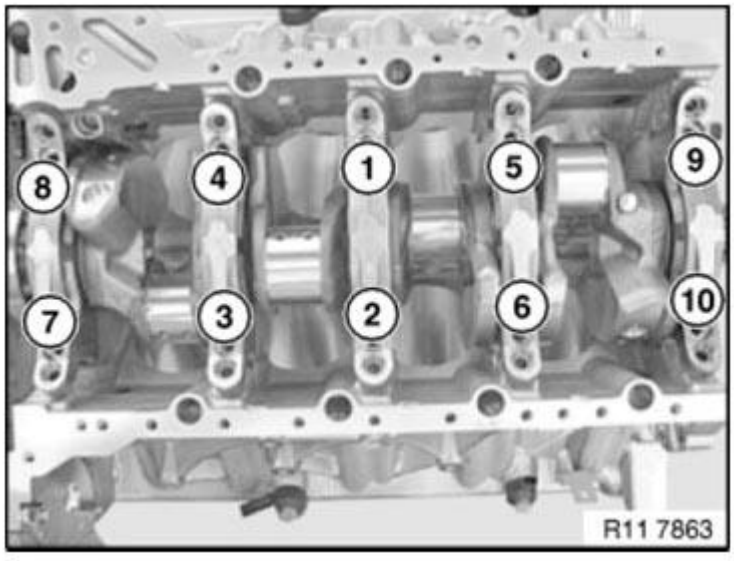


Fig. 113: Identifying Main Bearing Caps Collar Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down all collar bolts (M11) of main bearing caps with special tool **00 9 120** with angle of rotation.

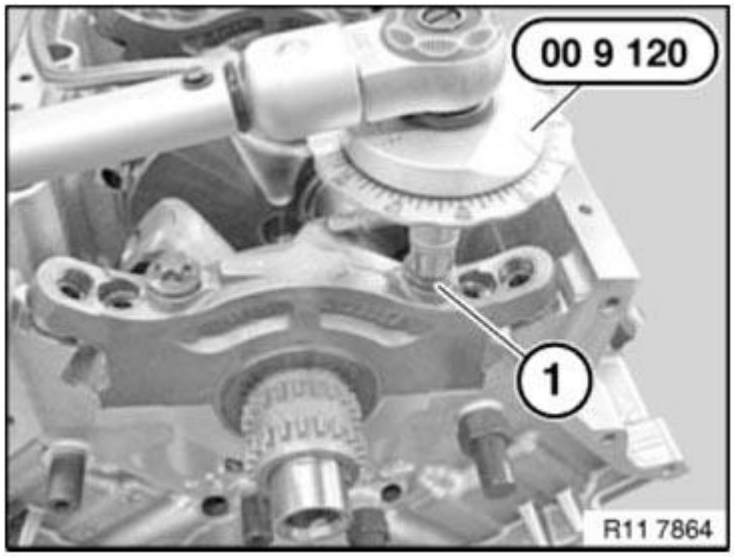


Fig. 114: Tightening Collar Bolts (M11) Of Main Bearing Caps With Special Tool 00 9 120 With Angle Of Rotation
Courtesy of BMW OF NORTH AMERICA, INC.

Remove main bearing cap.

Read off main bearing clearance at width of flattened plastic thread with assistance of measurement scale.

Main bearing clearance: See **CRANKSHAFT AND BEARINGS** or **CRANKSHAFT AND BEARINGS** .

- Remove plastic thread
- Apply a coat of oil to new bearing shells and crankshaft

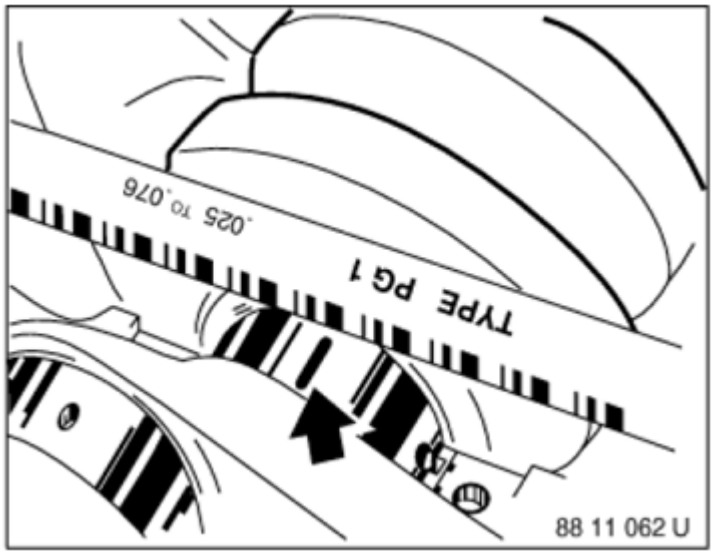


Fig. 115: Measuring Main Bearing Clearance

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Always replace main bearing bolts in main bearing caps with new bolts. Do not wash off bolt coating.

IMPORTANT: Risk of cracking! No oil is permitted in the blind holes.

Install **CRANKSHAFT** .

Carefully strike back and front of crankshaft with a plastic hammer to center guide bearing (do not damage crankshaft).

Secure special tool 11 6 252 with magnetic foot on crankcase.

Position special tool 11 6 251.

Tightening specifications for main bearing:

Check **SIDE CLEARANCE** .

Check guide bearing shell, crankshaft and crankcase if necessary.

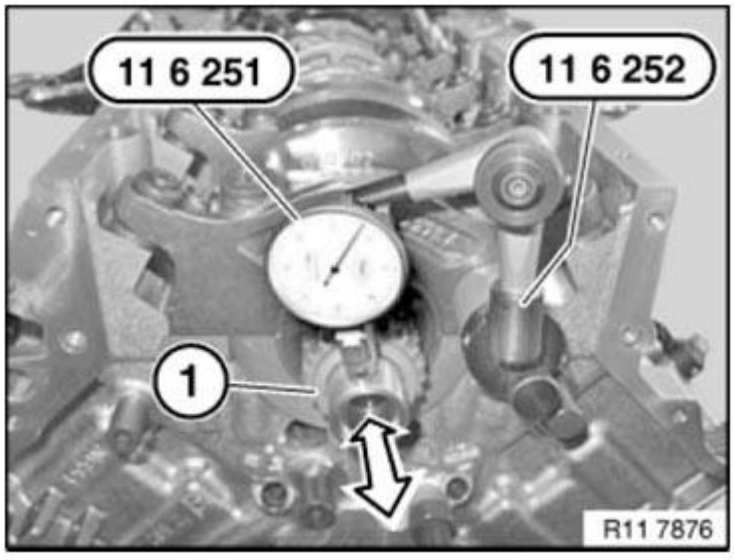


Fig. 116: Checking Side Clearance
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1121500 REPLACING CRANKSHAFT (N63)

Notes

IMPORTANT: Weight of crankshaft is approx. 20 kg.
Risk of injury from sharp edge of housing.

Necessary preliminary work

- Remove **ENGINE**
- Mount engine on assembly stand
- Remove cylinder head. See **LEFT CYLINDER HEAD** and **RIGHT CYLINDER HEAD**.
- Remove **HUB FOR VIBRATION DAMPER**
- Removing **LOWER TIMING CASE COVER**
- **Removing oil pan** See **1113020 REMOVING AND INSTALLING/REPLACING LOWER OIL SUMP SECTION (N63)** and **1113010 REMOVING AND INSTALLING/REPLACING UPPER OIL SUMP SECTION (N63)**
- Remove **OIL PUMP**
- Removing **PISTON**
- Remove **FLYWHEEL**
- Remove radial shaft seals. See **RADIAL SHAFT SEAL IN LOWER TIMING CASE COVER** and **CRANKSHAFT RADIAL SEAL ON TRANSMISSION SIDE**
- Remove **TIMING CHAINS**

Installation note:

Layout of main bearing caps.

All numbers must be read from the cylinder bank (5 to 8) (see arrows).

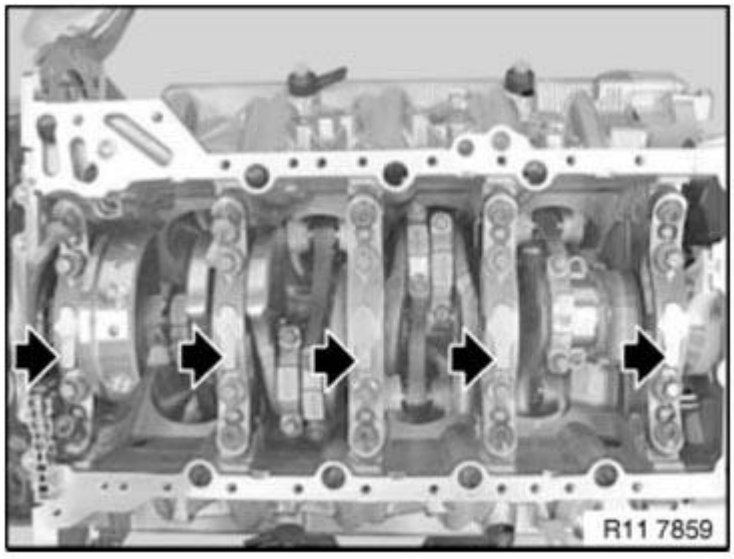


Fig. 117: Locating Main Bearing Caps Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

Main bearing caps (1 to 5) opposite the output end on the timing chain drive.

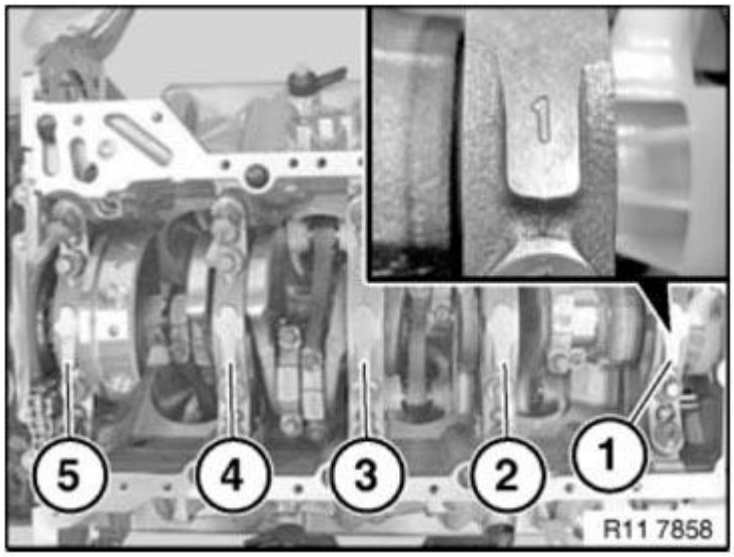


Fig. 118: Identifying Main Bearing Caps Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

Release oil pump spacer bolts (1) with special tool **13 5 020** .

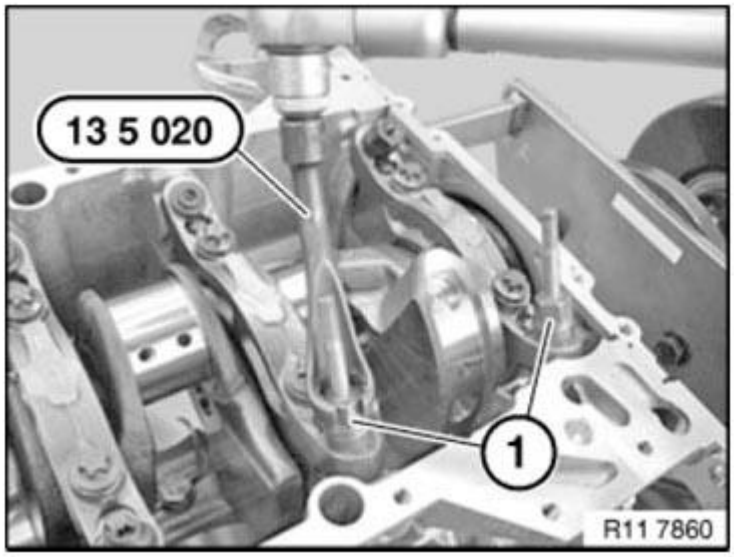


Fig. 119: Removing Oil Pump Spacer Bolts With Special Tool 13 5 020
Courtesy of BMW OF NORTH AMERICA, INC.

Release main bearing taper screw connection (1).

Release oil pump spacer pins (2).

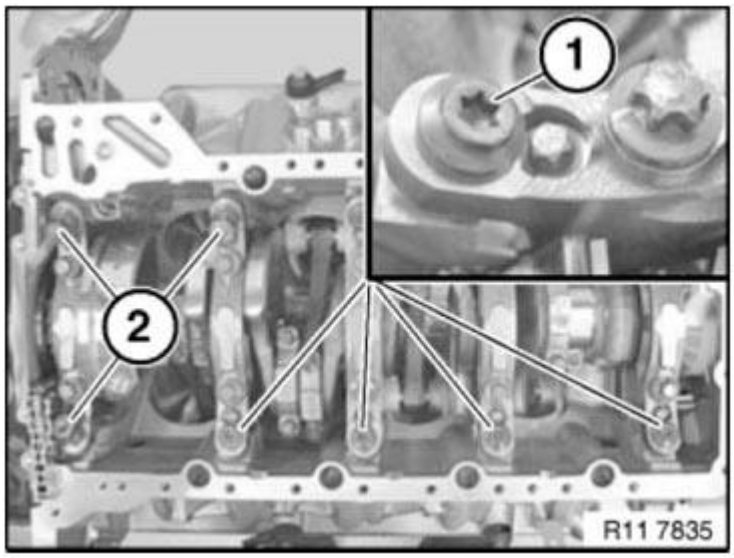


Fig. 120: Identifying Main Bearing Taper Screw Connection And Oil Pump Spacer Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Release all threaded support sleeves (1).

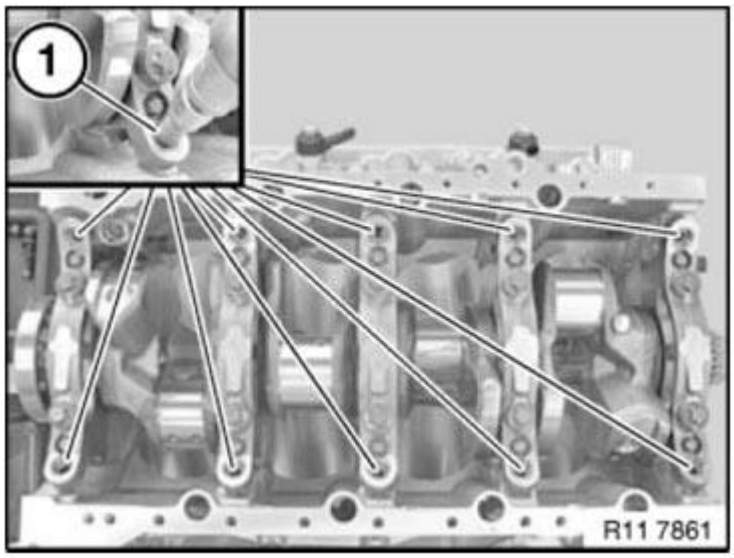


Fig. 121: Removing Threaded Support Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Release collar bolts (M8) in sequence 10 to 1.

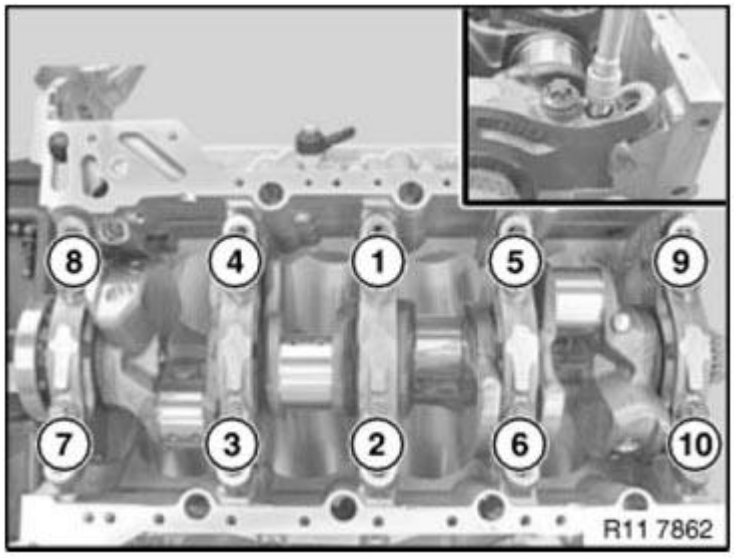


Fig. 122: Identifying Collar Bolts (M8) Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release collar bolts (M11) in sequence 10 to 1.

Remove main bearing caps 1 to 5.

IMPORTANT: Remove crankshaft with a 2nd person, weight approx. 25 kg.

Lift out crankshaft and set down safely (secure against turning).

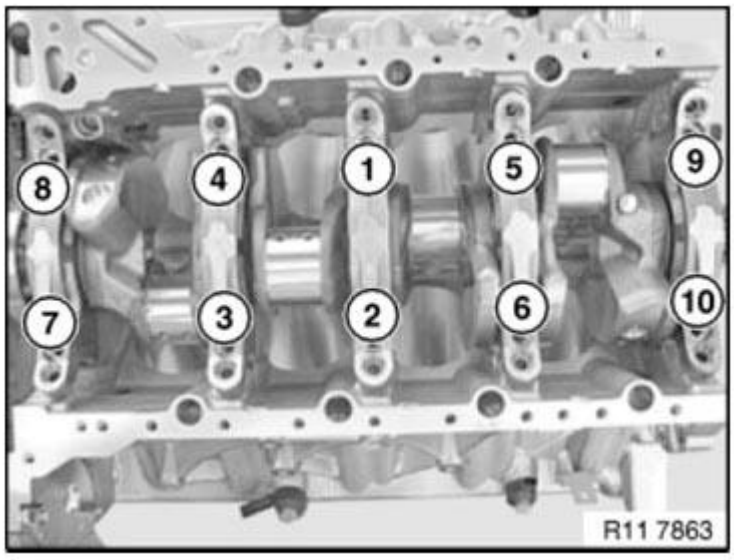


Fig. 123: Identifying Collar Bolts (M11) Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw for oil nozzle (1).

Tightening torque: **11 11 8 AZ** .

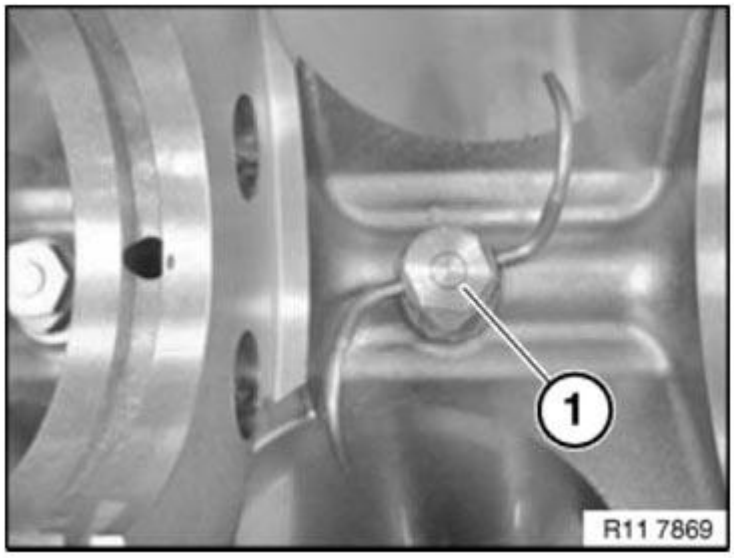


Fig. 124: Identifying Oil Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check oil nozzle (1) for clear passage with compressed air.

Observe fastening on oil nozzle.

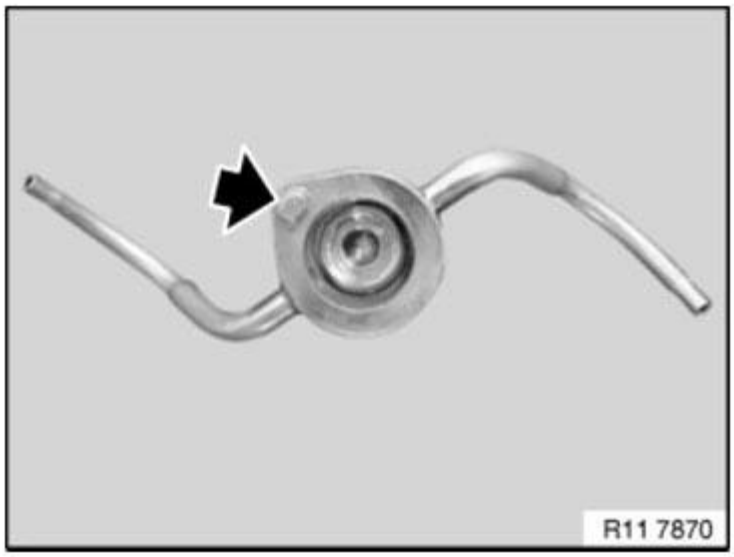


Fig. 125: Locating Fastening On Oil Nozzle

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Observe fastening in crankcase.

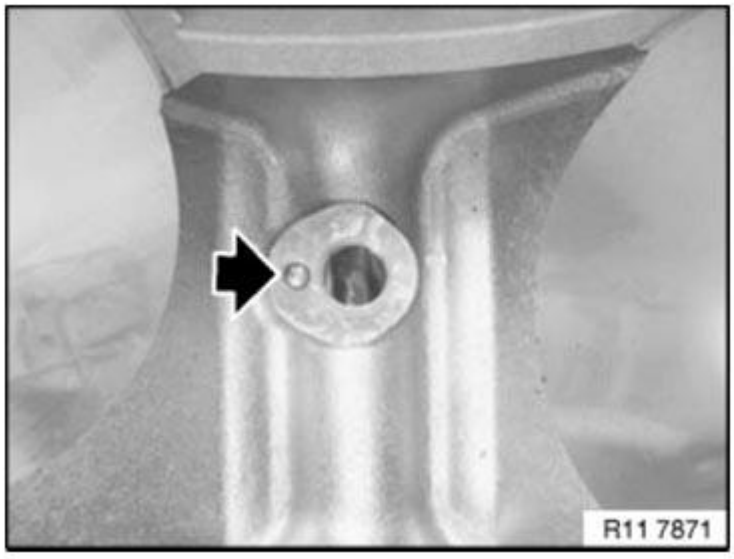


Fig. 126: Locating Fastening In Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **CRANKSHAFT MAIN BEARING SHELLS** .

Installation note:

Observe arrangement of main bearing caps.

All numbers must be read from the cylinder bank (5 to 8) (see arrows).

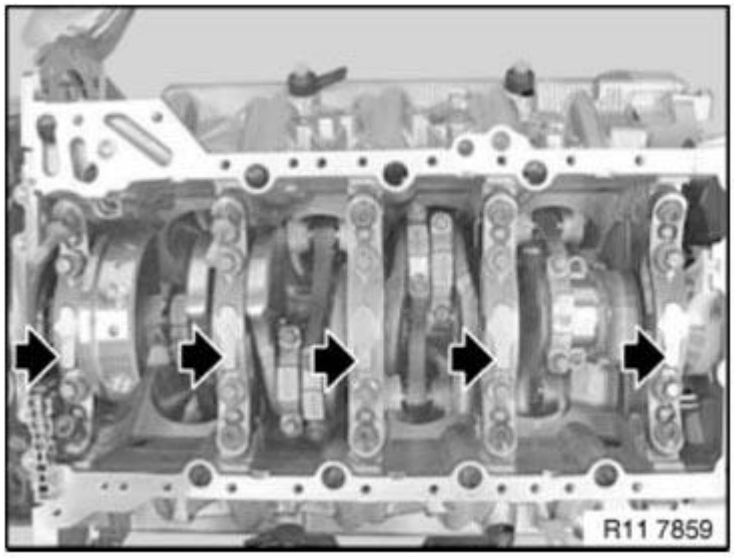


Fig. 127: Locating Main Bearing Caps Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

Main bearing caps (1) is opposite the output end on the timing chain drive.

Turn back all threaded support sleeves hand-tight.

Installation note:

Coat all bearing positions with engine oil.

IMPORTANT: Install crankshaft with a 2nd person, weight approx. 25 kg.

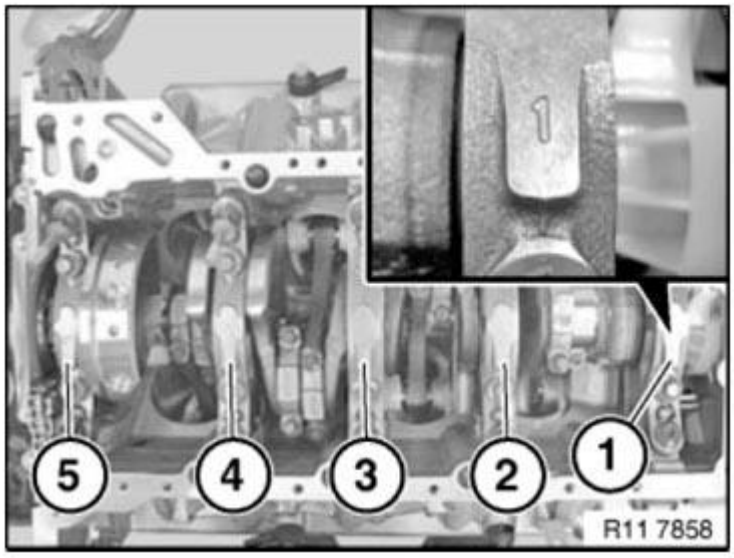


Fig. 128: Identifying Main Bearing Caps Numbers

Courtesy of BMW OF NORTH AMERICA, INC.

Install crankshaft.

Fit bearing caps (1 to 5).

Set down bearing caps positioned from 1 to 5.

Insert all collar bolts (M11) hand-tight.

Secure collar bolts (M11) in sequence (1 to 10).

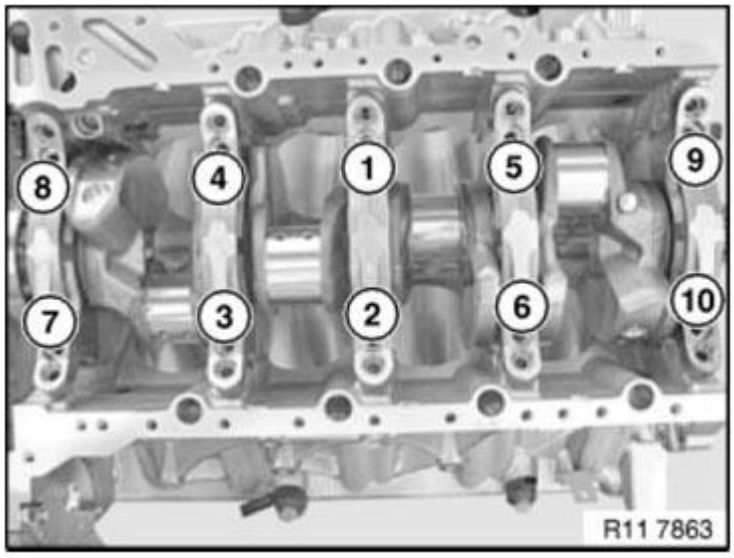


Fig. 129: Identifying Collar Bolts (M11) Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

For a better overview of the screw connection quality, mark the head of all collar bolts after joining with a line (1) using an oil-proof marker pen.

Check angle tightening.

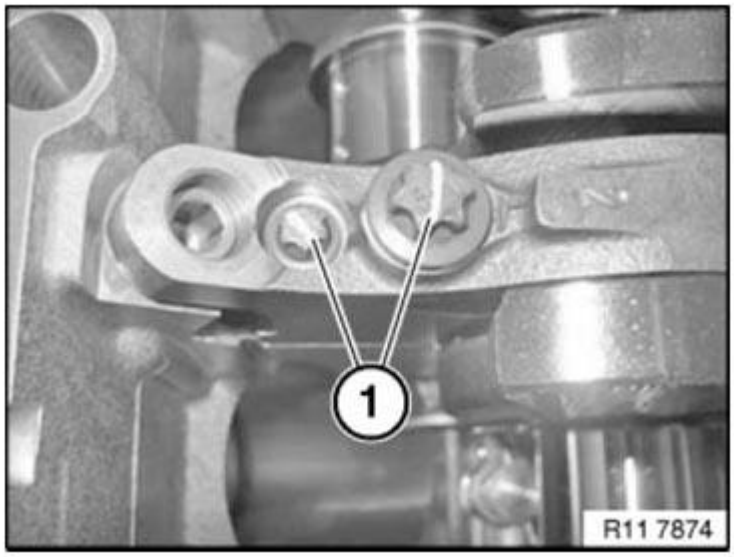


Fig. 130: Identifying Collar Bolts Head Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Secure collar bolt (1) with special tool **00 9 120** .

Tightening torque: **11 11 1AZ** .

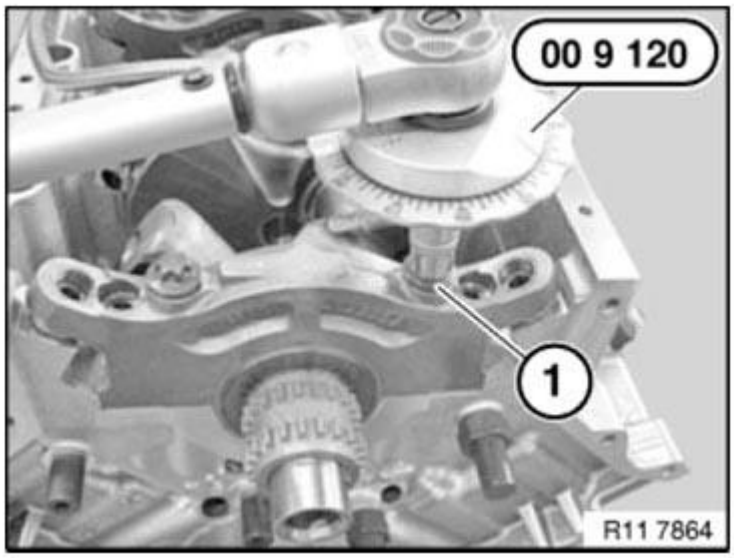


Fig. 131: Securing Collar Bolt With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all collar bolts (M8) hand-tight.

Secure collar bolts (M8) in sequence (1 to 10).

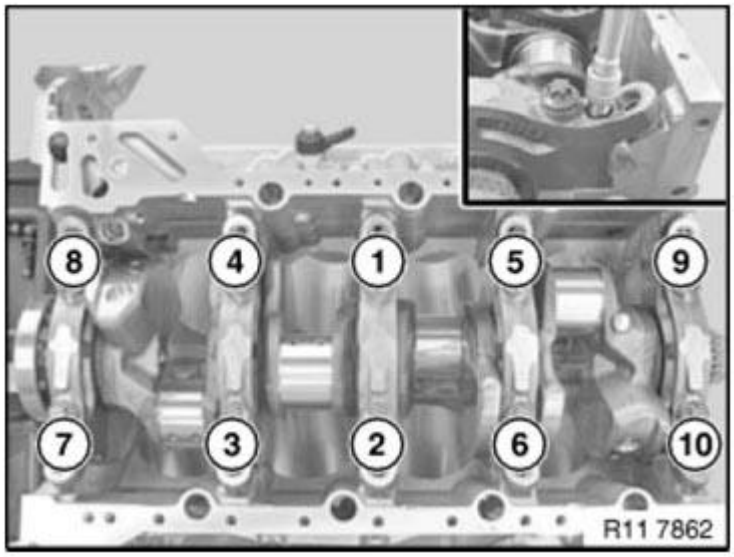


Fig. 132: Identifying Collar Bolts (M8) Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

For a better overview of the screw connection quality, mark the head of all collar bolts after joining with a line (1) using an oil-proof marker pen.

Check angle tightening.

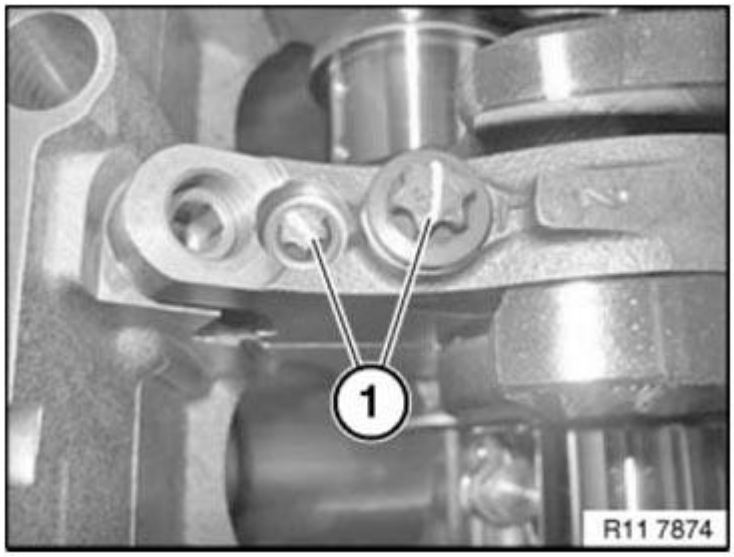


Fig. 133: Identifying Collar Bolts Head Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Secure collar bolt (1) with special tool **00 9 120** .

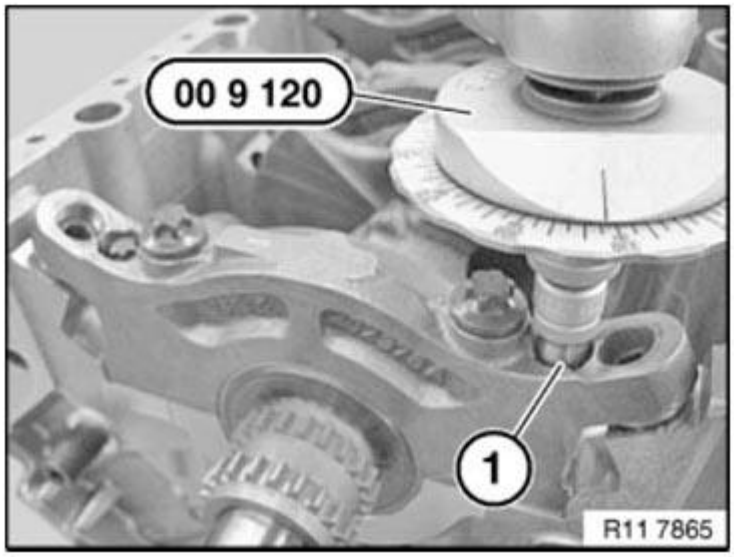


Fig. 134: Securing Collar Bolt With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure all threaded support sleeves (1) with special tool 11 4 350.

Tightening torque: **11 11 3 AZ** .

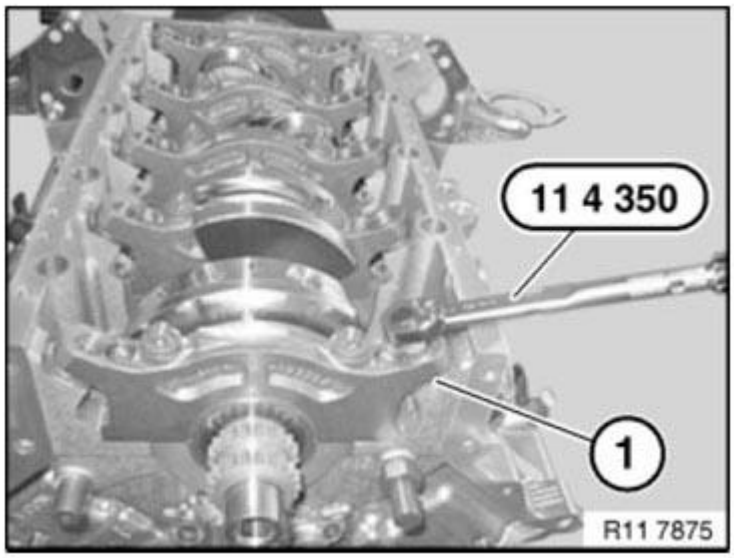


Fig. 135: Securing All Threaded Support Sleeves With Special Tool 11 4 350
Courtesy of BMW OF NORTH AMERICA, INC.

Secure main bearing taper screw connection (1).

Tightening torque: **11 11 4 AZ** .

Secure oil pump spacer pins (2).

Tightening torque: **11 11 5 AZ** .

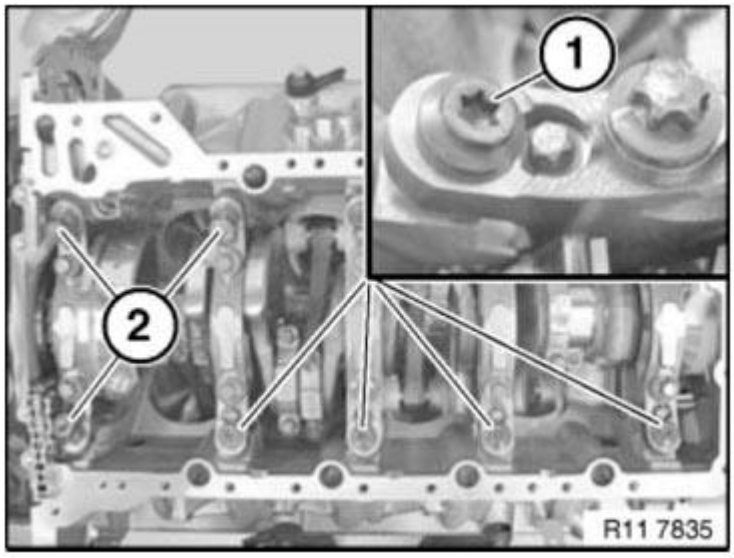


Fig. 136: Identifying Main Bearing Taper Screw Connection And Oil Pump Spacer Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Check crankshaft **COEFFICIENT OF FRICTION** .

Determine crankshaft **breakaway torque** with special tool **00 2 010** .

Rotate crankshaft at central bolt using special tool **00 2 010** .

If the breakaway torque is too high, it will be necessary to correct the **bearing clearance** . See **CRANKSHAFT AND BEARINGS** .

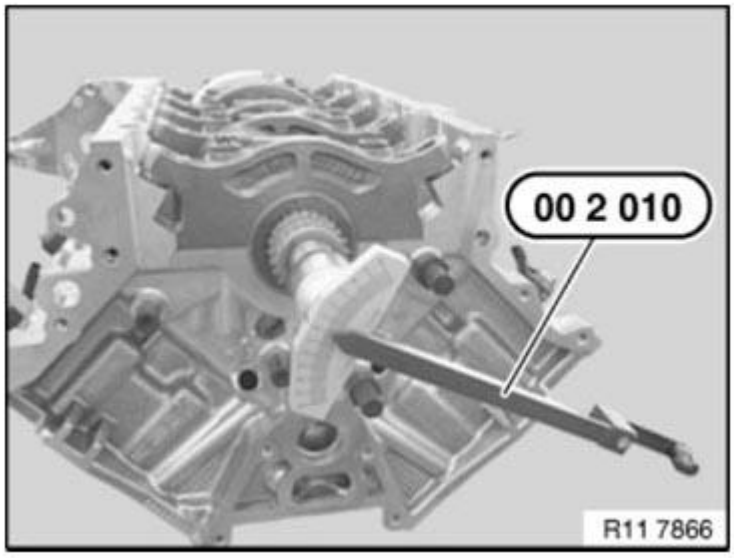


Fig. 137: Checking Crankshaft Breakaway Torque With Special Tool 00 2 010
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 6 252 to crankcase with magnetic base.

Slide crankshaft in direction of arrow forwards as far as it will go.

Set special tool 11 6 251 to zero.

Slide crankshaft (1) in direction of arrow towards rear and determine value.

Check **axial play** . See **ENGINE - TECHNICAL DATA -- 750LI** .

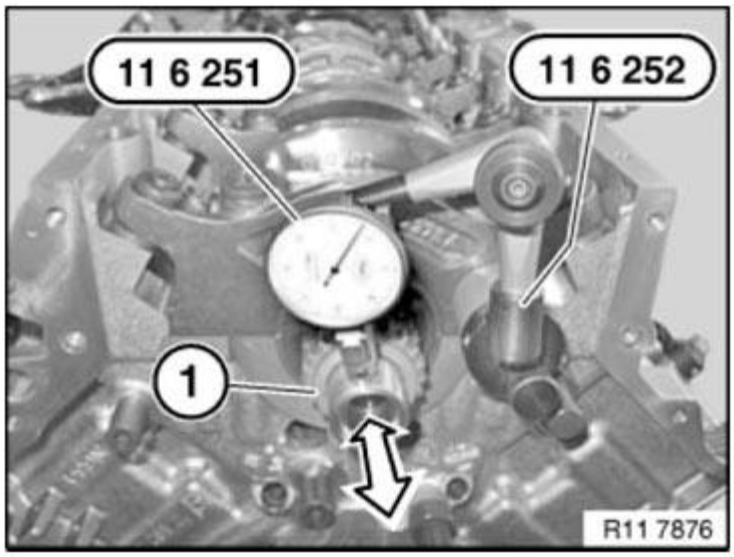


Fig. 138: Checking Axial Play

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1122 FLYWHEEL

1122000 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N63)

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION**
- Remove manual transmission
- Remove clutch

Secure flywheel (1) with special tool **11 9 260** .

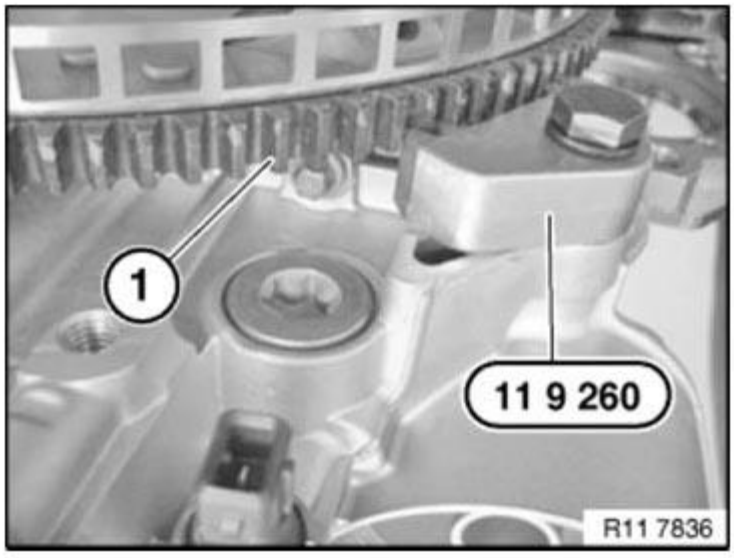


Fig. 139: Securing Flywheel With Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Release flywheel screws in area (1).

Remove flywheel (2).

Installation:

Clean threads on flywheel screws in crankshaft.

Flywheel (2) is secured with an alignment pin.

Fit flywheel (2).

Fit new flywheel screws

Tightening torque **11 22 1AZ** .

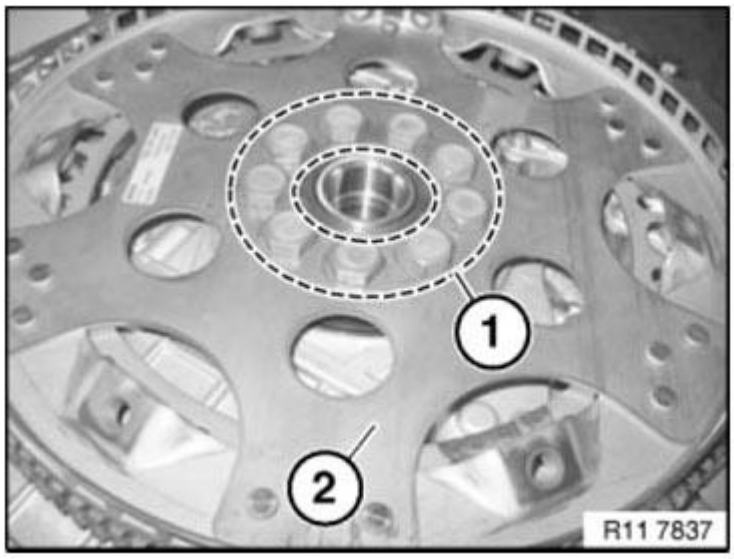


Fig. 140: Identifying Flywheel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

1122510 REMOVING AND INSTALLING/REPLACING FLYWHEEL (TRANSMISSION REMOVED - N63)

Notes

Secure flywheel (1) with special tool **11 9 260** .

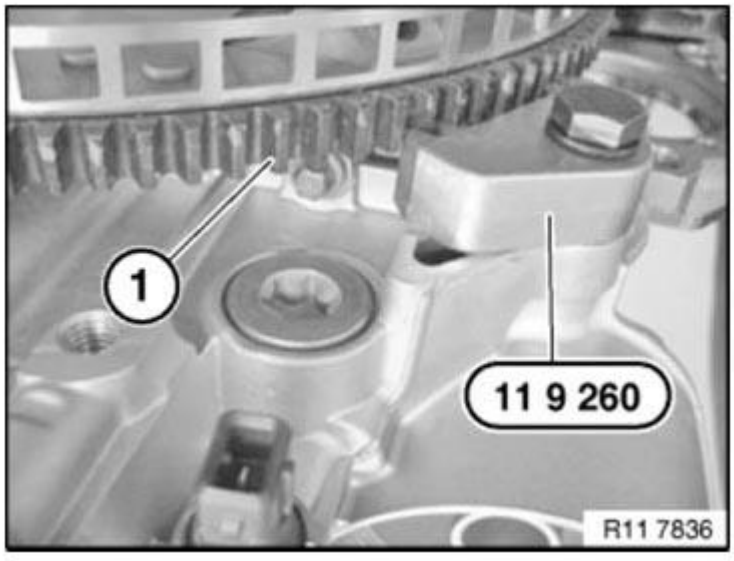


Fig. 141: Securing Flywheel With Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Release flywheel screws in area (1).

Remove flywheel (2).

Installation:

Clean threads on flywheel screws in crankshaft.

Flywheel (2) is secured with an alignment pin.

Fit flywheel (2).

Fit new flywheel screws

Tightening torque **11 22 1AZ** .

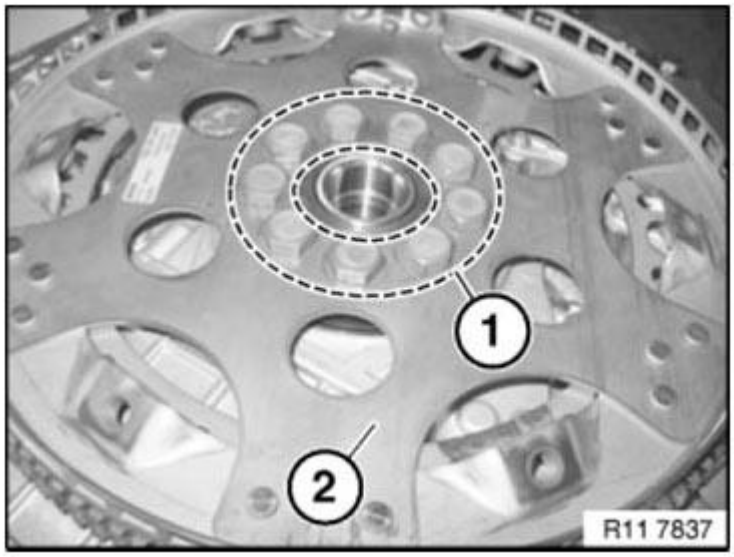


Fig. 142: Identifying Flywheel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

1122513 REPLACING ROLLER BEARING FOR DUAL-MASS FLYWHEEL (N63)

Notes

NOTE: FLYWHEEL removed!

Using hydraulic press (1) and special tool 21 2 051, press roller bearing out of dual-mass flywheel downwards on engine side.

IMPORTANT: Risk of damage:
Roller bearing must not be driven out.

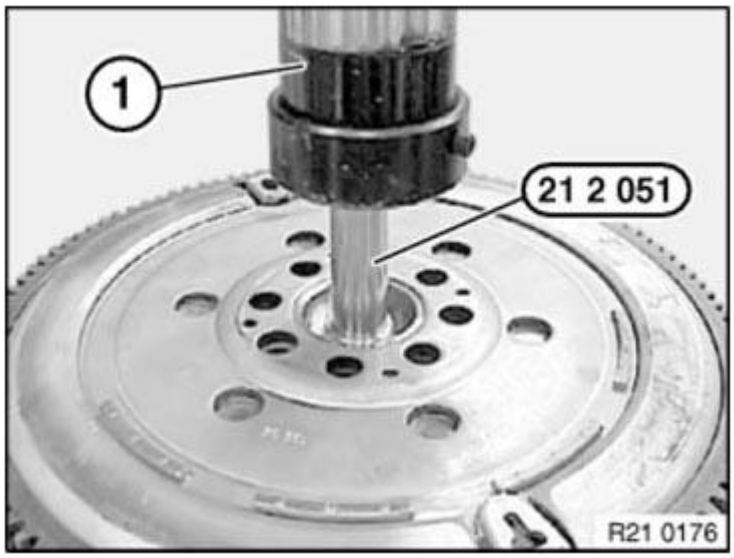


Fig. 143: Pressing Roller Bearing Out Of Dual-Mass Flywheel Downwards On Engine Side
Courtesy of BMW OF NORTH AMERICA, INC.

Push roller bearing (2) onto special tool 21 2 052.

Using hydraulic press (1), press roller bearing into dual-mass flywheel as far as it will go on clutch side.

IMPORTANT: Risk of damage:
Observe press-in instruction:

- **Roller bearing must not be driven in.**
- **Roller bearing mounting force/travel monitored:**

  Min. 2000 N 1 mm before end of pressing in.

  Max. 15, 000 N during entire press-in procedure.

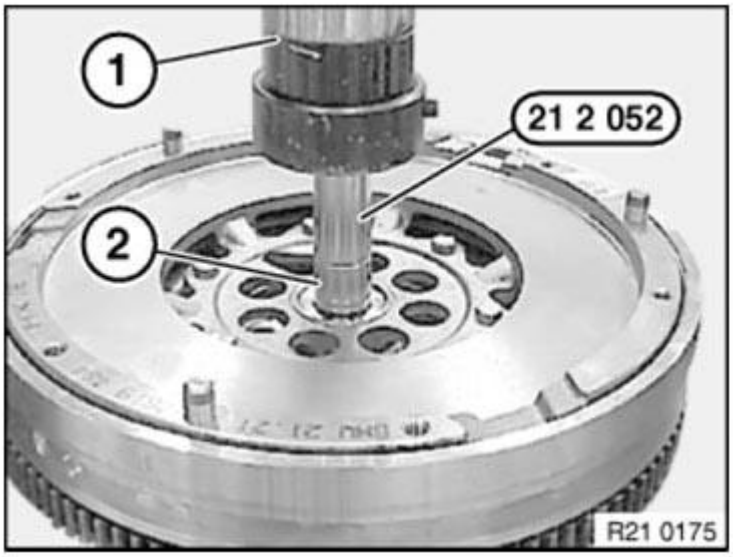


Fig. 144: Pressing Roller Bearing Into Dual-Mass Flywheel
Courtesy of BMW OF NORTH AMERICA, INC.

1123 VIBRATION DAMPER

1123010 REMOVING AND INSTALLING/RENEWING VIBRATION DAMPER (N63)

Necessary preliminary work

- Remove **FAN COWL**
- Remove A/C compressor **DRIVE BELT**
- Remove alternator **DRIVE BELT**
- Remove belt pulley for A/C system

Release screw (1).

Tightening torque **11 28 1AZ** .

Remove belt tensioner with idler pulley (2).

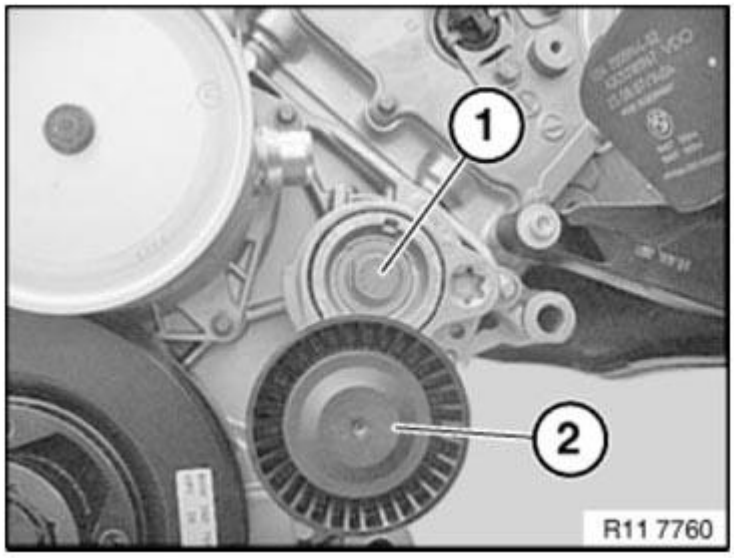


Fig. 145: Identifying Screw And Idler Pulley
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 8 090** with three screws (1) to vibration damper.

Secure special tool **11 8 090** with belt tensioner bolt (2) to timing case cover.

Tightening torque **11 28 1AZ** .

NOTE: A 3/4 inch tool is needed to release the central bolt.

Release central bolt on vibration damper.

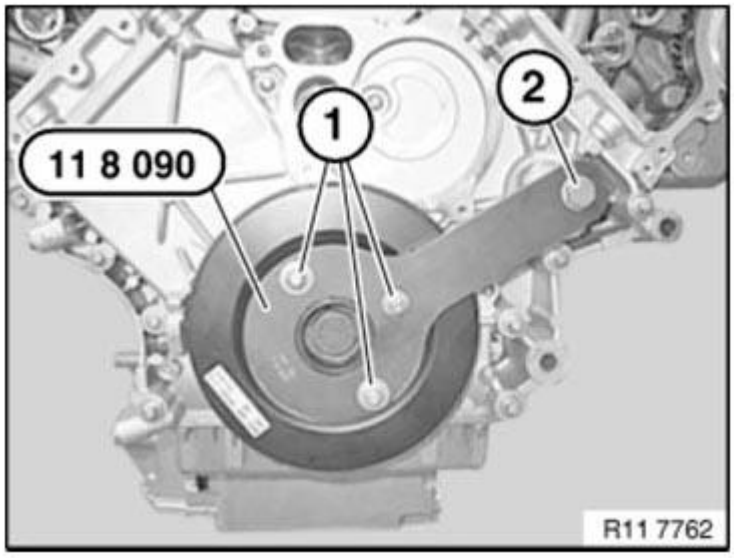


Fig. 146: Securing Special Tool 11 8 090 With Belt Tensioner Bolt To Timing Case Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt with special tool **00 9 140** or **11 3 460** .

Position special tool **11 3 460** on special tool **11 8 090** .

Adjust special tool 11 9 453 on special tool 11 9 454 using clamping screw to 0° on scale.

Tightening torque **11 23 1AZ** .

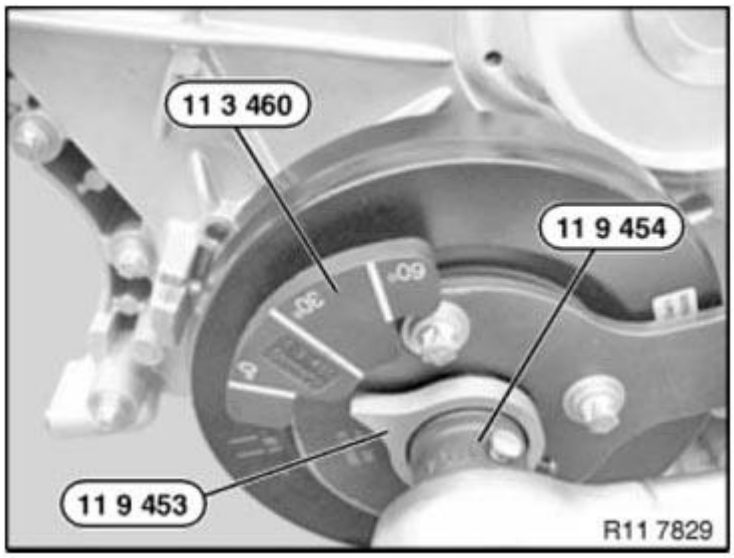


Fig. 147: Adjusting Special Tool 11 9 453 On Special Tool 11 9 454 Using Clamping Screw To 0° On Scale
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1124 CONNECTING ROD WITH BEARING

1124571 REPLACING ALL CONNECTING ROD BEARINGS (N63)

Notes

IMPORTANT: Note grinding stages on crankshaft . See CRANKSHAFT AND BEARINGS .

Necessary preliminary work

- Removing all **PISTONS**

Install new connecting rod bearing shells.

Install one blue bearing shell (1) and one red bearing shell (2) in each connecting rod.

Install **PISTON** .

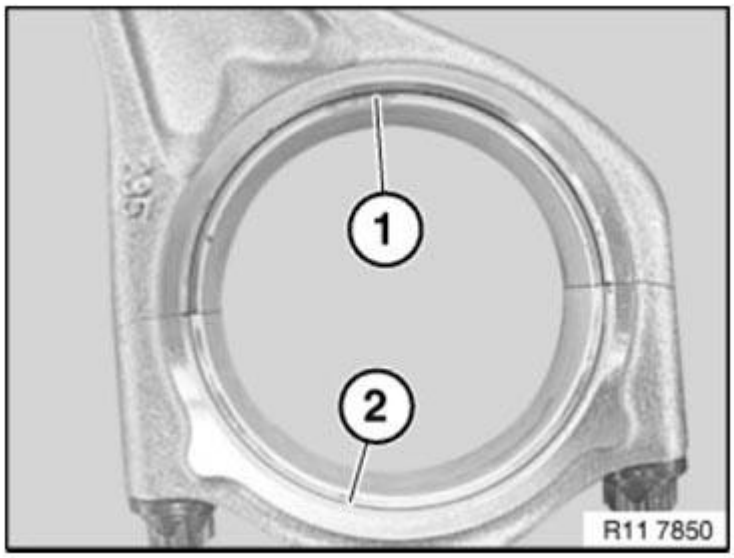


Fig. 148: Identifying Blue Bearing Shell And Red Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The bearing shells on the connecting rod are coded.

Connecting rod bearing cap (1): the red bearing shell is fitted and the fastening notches are on the left and right sides of the bearing shell (see arrows).

Connecting rod (2): the blue bearing shell is fitted and the fastening notches are one side of the bearing shell (see arrows).

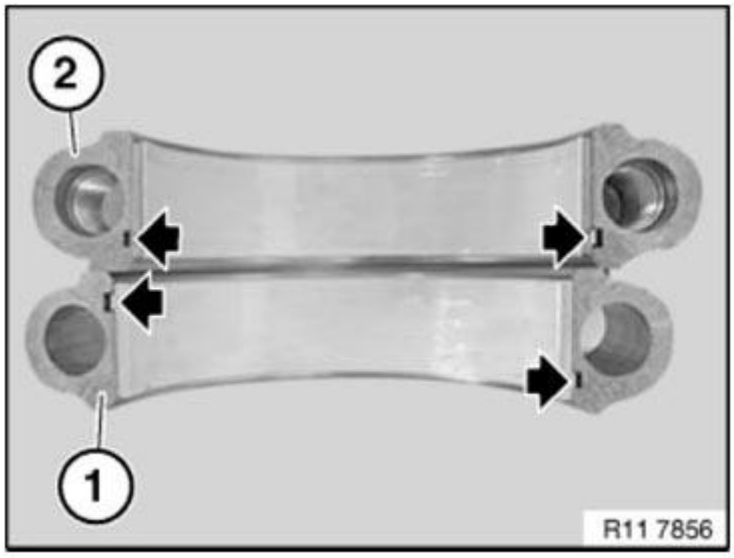


Fig. 149: Locating Red Bearing Shell Fastening Notches And Blue Bearing Shell Fastening Notches
Courtesy of BMW OF NORTH AMERICA, INC.

Check connecting-rod bearing play

Piston in BDC position.

Fit special tool **00 2 590** (Plastigage type PG 1) to oil-free crankshaft.

Fit bearing caps so that matching numbers match up.

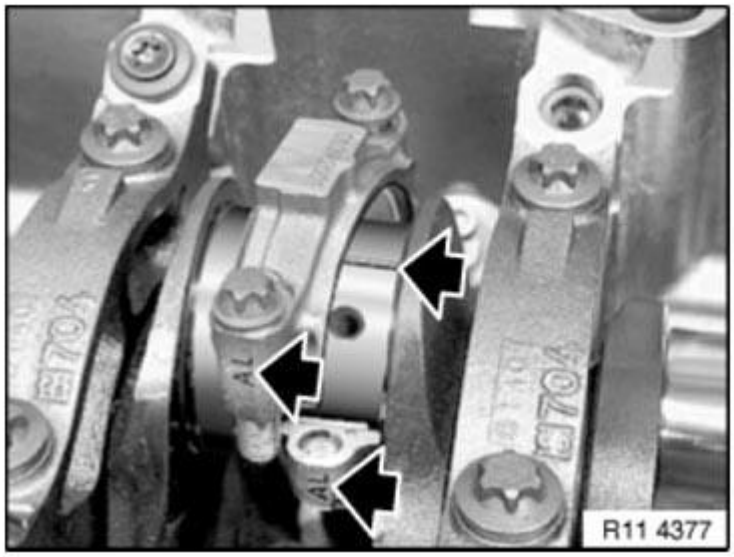


Fig. 150: Locating Special Tool 00 2 590
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not distort connecting rods or crankshaft.

Use connecting rod bolts to check connecting-rod bearing play.

Connecting rod bolts with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

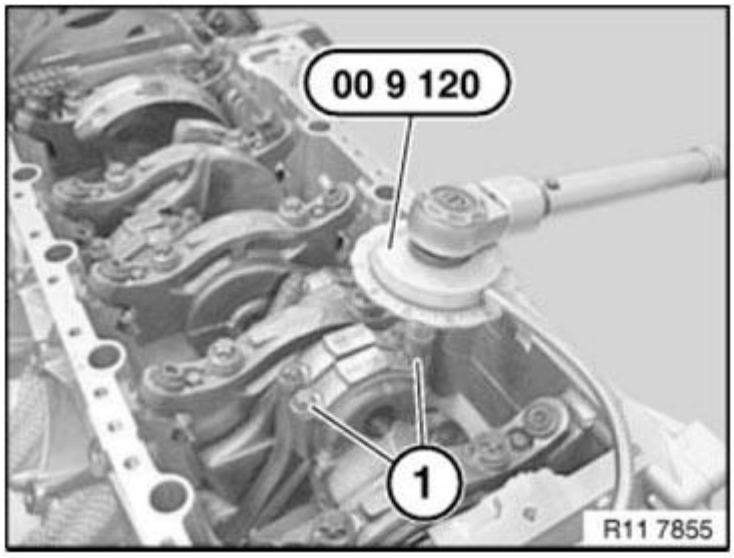


Fig. 151: Checking Connecting-Rod Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing cap and read off bearing play at width of flattened plastic thread with assistance of measuring scale.

CONNECTING-ROD BEARING PLAY .

- Remove plastic thread.
- Lubricate crankshaft and bearing shells.
- Install new connecting rod bolts.

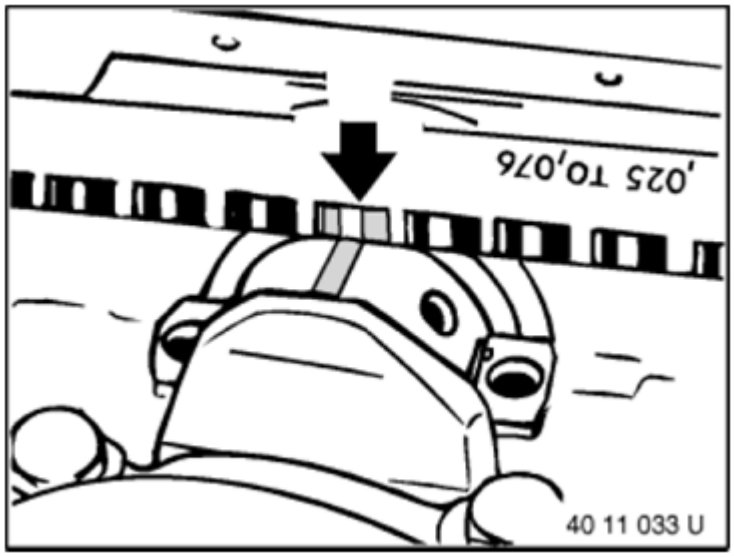


Fig. 152: Checking Connecting-Rod Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Secure connecting rod bolts with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

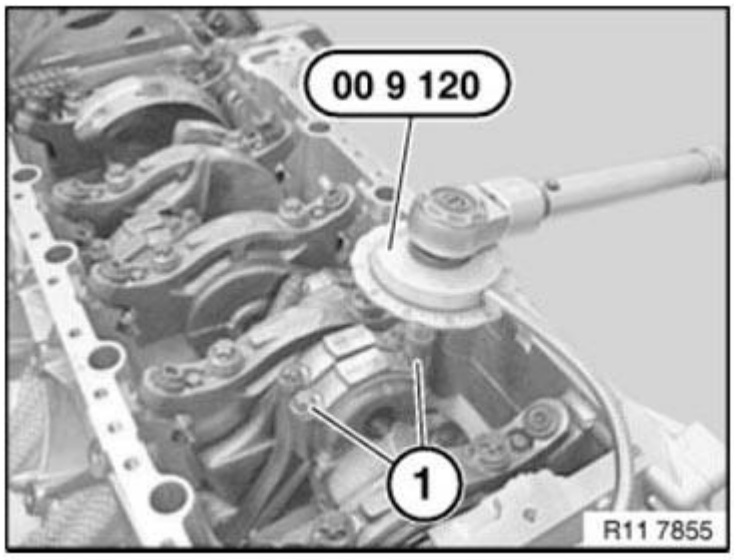


Fig. 153: Securing Connecting Rod Bolts With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1125 PISTON WITH RINGS AND PIN

1125530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N63) UP TO 3/2011

Notes

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons and connecting rods are reused, they must be reinstalled in the same places.
Piston and piston pin are matched to each other and can only be replaced as a pair.
Conrod and conrod bearing cap are cracked.
Identification is effected by means of identical pairing letters on the connecting rod big end.
Mixing up the components will result in engine damage.
Conrod bearings must always be replaced.

Necessary preliminary tasks

- Remove **ENGINE**
- Install engine on assembly stand
- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Removing oil pan. See **LOWER OIL SUMP SECTION** and **UPPER OIL SUMP SECTION**
- Remove **OIL PUMP**

Unscrew connecting rod bearing cap.

NOTE: Connecting rods and connecting rod bearing caps are denoted with the same pairing letters.
The stamped dates are always arranged in opposite directions.
Set down conrod bearing caps in order.

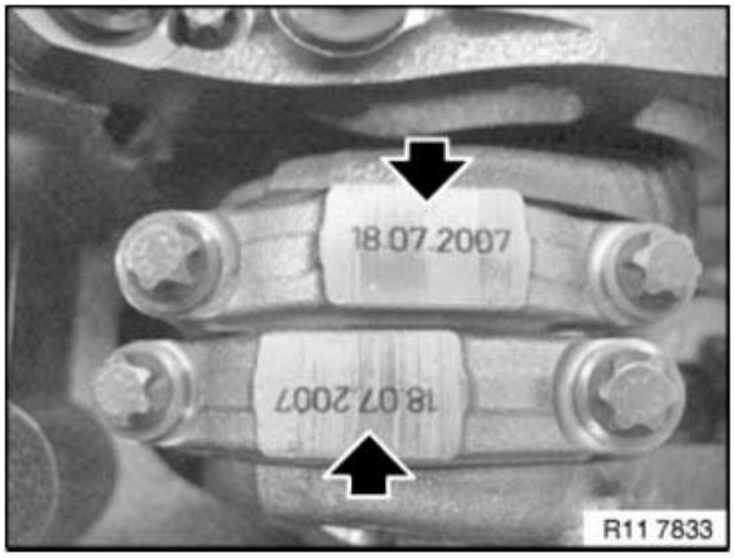


Fig. 154: Locating Connecting Rod Bearing Caps Stamped Dates
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To install and remove the conrods, it is essential for the crankshaft to be exactly in alignment with the cylinder bore (see dashed line).

Position crankshaft at central bolt.

Insert special tool 11 8 152 into conrod.

Screw special tool **11 5 440** into conrod with bolt (1).

Remove conrod with piston from cylinder head side.

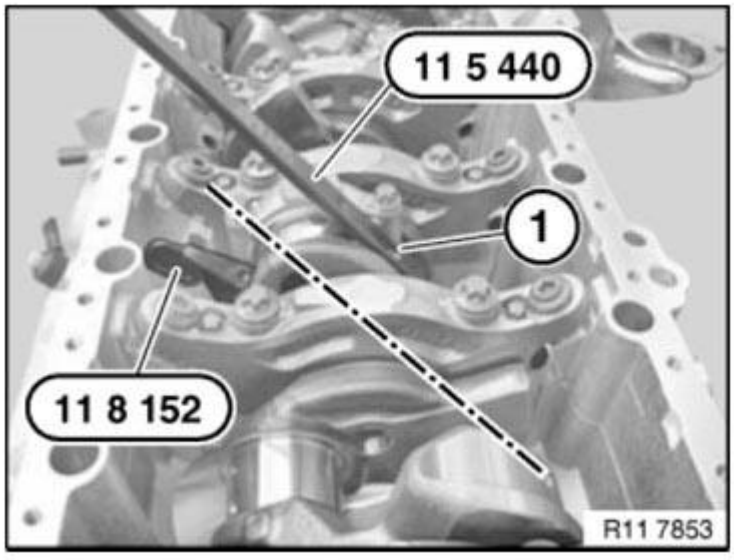


Fig. 155: Removing Conrod With Piston From Cylinder Head Side
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Piston and piston bolts are paired and must not be fitted individually.

Lift out retaining ring and press out piston pin.

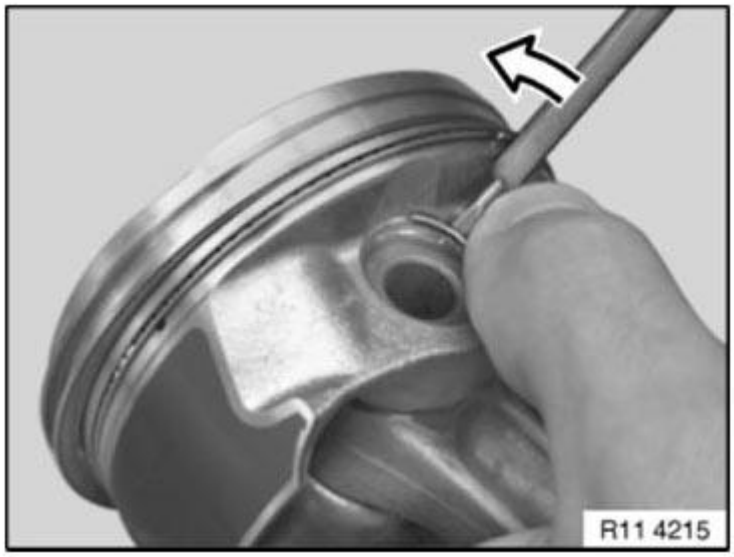


Fig. 156: Removing Retaining Ring From Piston
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

NOTE: The conrods can also be replaced individually.
The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.

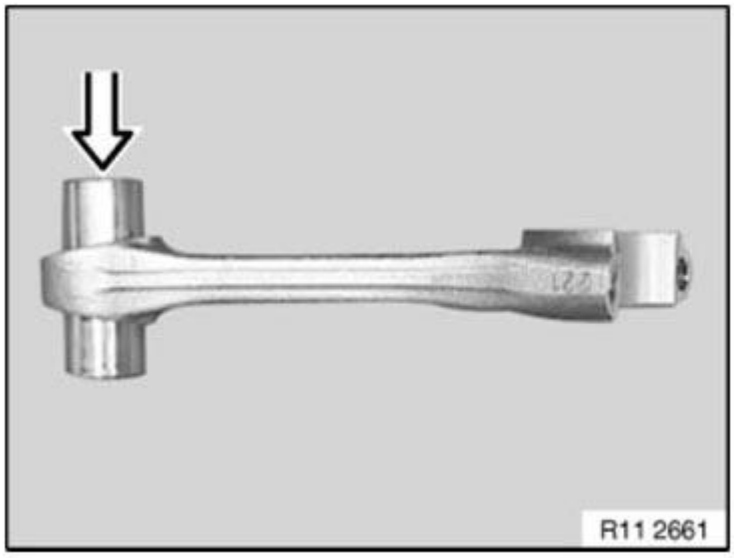


Fig. 157: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Prior to installation, measure piston installation clearance: Measure piston diameter with micrometer at measuring point A from lower edge of piston and offset by 90° to piston pin axis.

Refer to **MEASURING POINT A** .

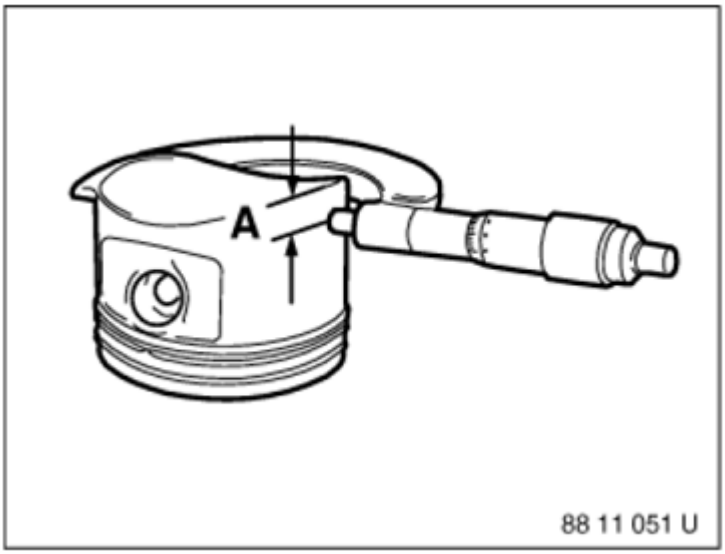


Fig. 158: Measuring Piston Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Refer to:

- **DIAMETER OF CYLINDER BORE**
- **PISTON INSTALLATION CLEARANCE**
- **TOTAL PERMISSIBLE WEAR CLEARANCE**

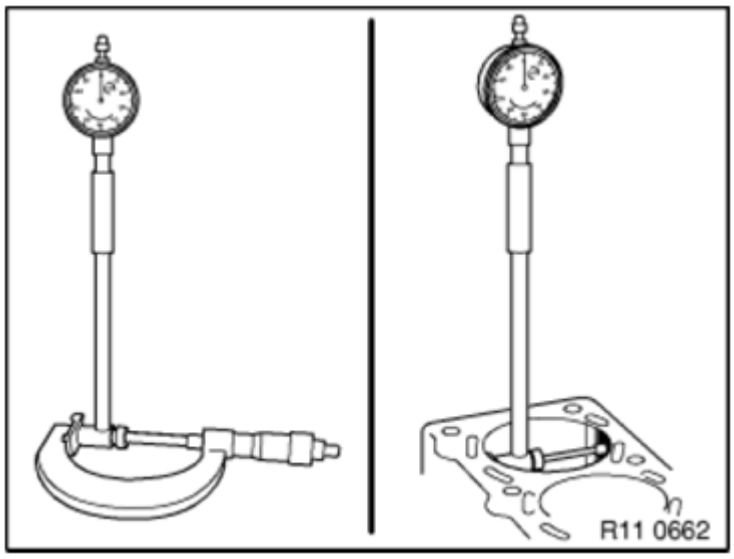


Fig. 159: Checking Diameter Of Cylinder Bore
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The conrods of cylinder banks 1 to 4 and 5 to 8 are mounted to the pistons differently.

NOTE: The pistons and conrods of cylinders 1 to 8 are identical.

Arrow on piston crown (cyl. 1 to 4) points upwards, bolt connection on conrod points at an angle to right.

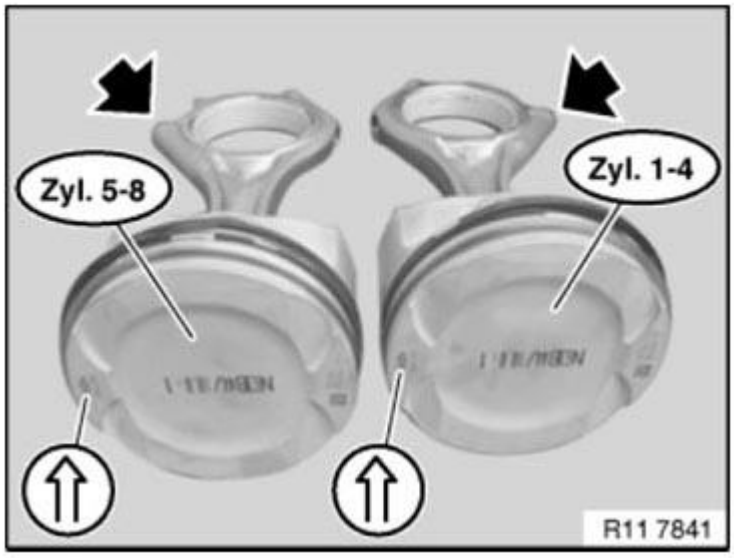


Fig. 160: Identifying Arrow On Piston Crown
Courtesy of BMW OF NORTH AMERICA, INC.

Arrow on piston crown (cyl. 5 to 8) points upwards, bolt connection on conrod points at an angle to left.

NOTE: For purposes of clarity, pistons are shown removed.

The conrods are correctly mounted on the piston when the bolt connections on the conrods are parallel to each other (see arrow).

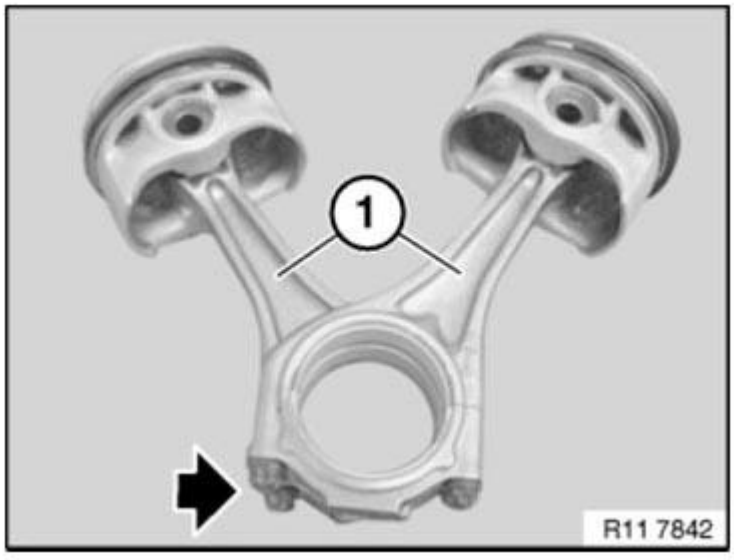


Fig. 161: Identifying Bolt Connections On Conrods Are Parallel To Each Other
Courtesy of BMW OF NORTH AMERICA, INC.

Install retaining ring.

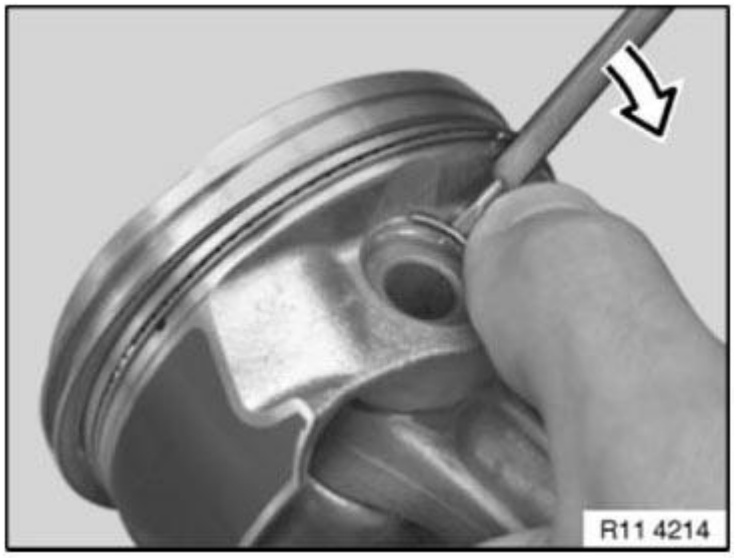


Fig. 162: Installing Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Piston circlip (1) is correctly installed when the opening points upwards.

See illustration.

It must still be possible for the piston pin to moved easily.

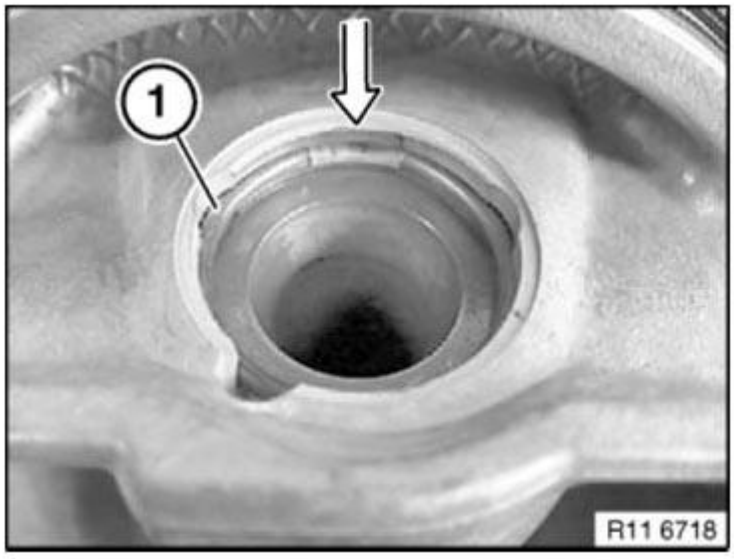


Fig. 163: Locating Piston Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tools 11 8 151 and 11 8 152 into conrod.

INSTALL CONNECTING ROD BEARING .

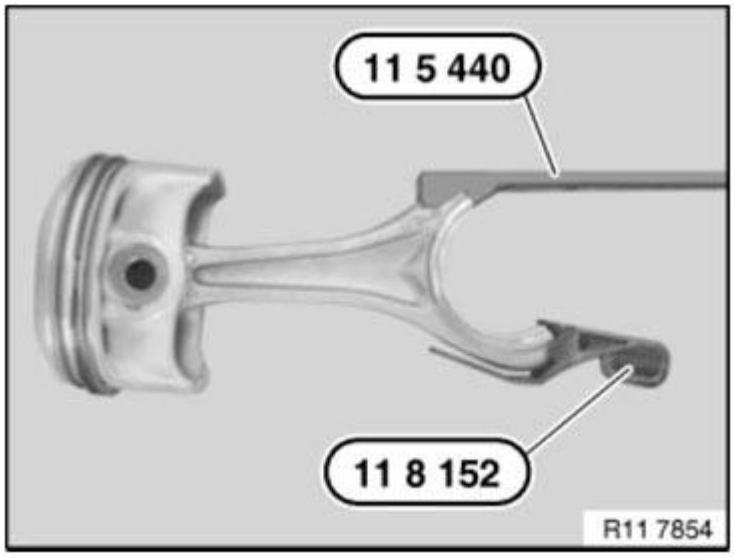


Fig. 164: Inserting Special Tools 11 8 151 And 11 8 152 Into Conrod
Courtesy of BMW OF NORTH AMERICA, INC.

Lightly coat pistons and piston rings with oil.

Offset the contact points of the piston rings by approx. 120° to each other but do not position above the piston pin boss.

NOTE: Illustration shows S85.

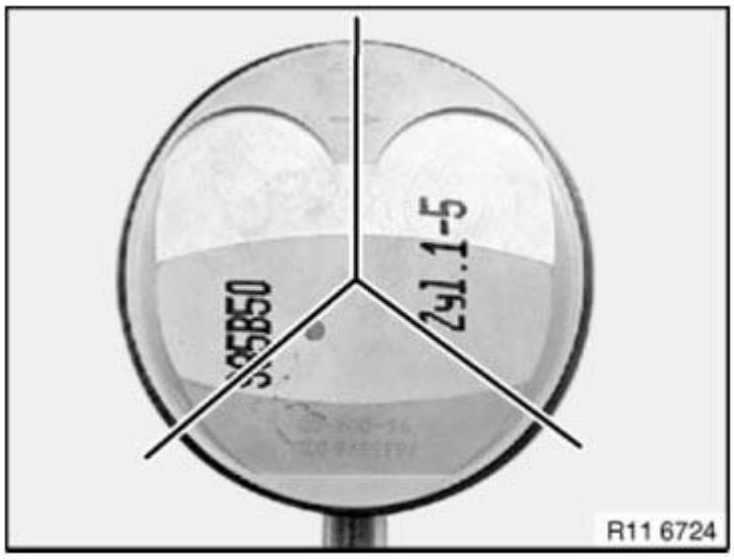


Fig. 165: Identifying Piston Rings Offset Contact Points
Courtesy of BMW OF NORTH AMERICA, INC.

Keep piston rods compressed with special tool **11 7 280** .

Install piston so that arrow points to camshaft drive.

IMPORTANT: Danger of piston ring failure.

Press in piston only with finger force (do not knock in!).

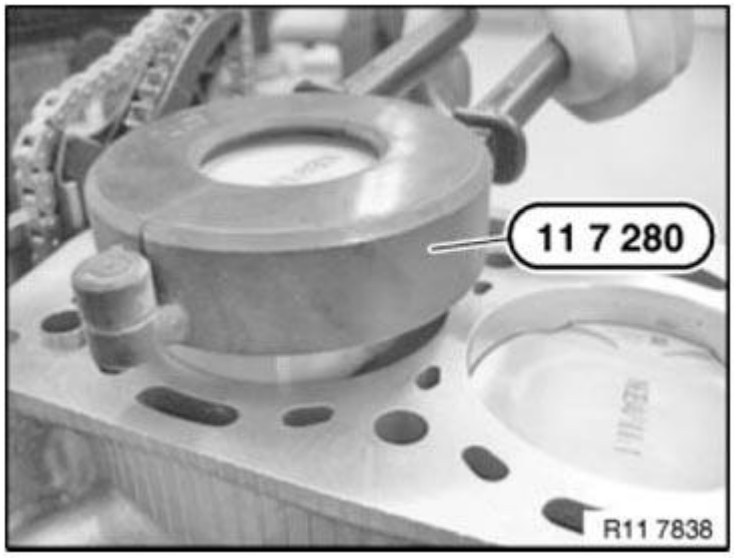


Fig. 166: Compressing Piston Rods With Special Tool 11 7 280
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of piston ring failure.

Press in piston (1) only with finger force (do not knock in!).

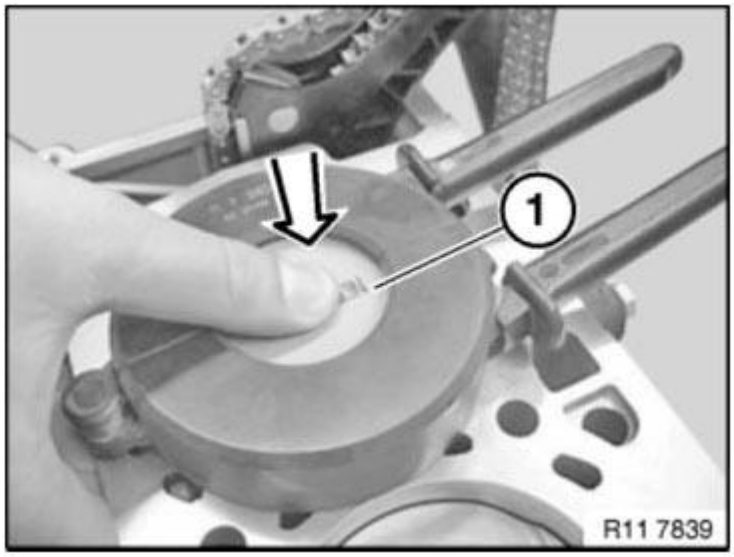


Fig. 167: Pressing In Piston Only With Finger Force
Courtesy of BMW OF NORTH AMERICA, INC.

The direction arrow on the piston crown must point to the camshaft drive (direction of travel towards front).

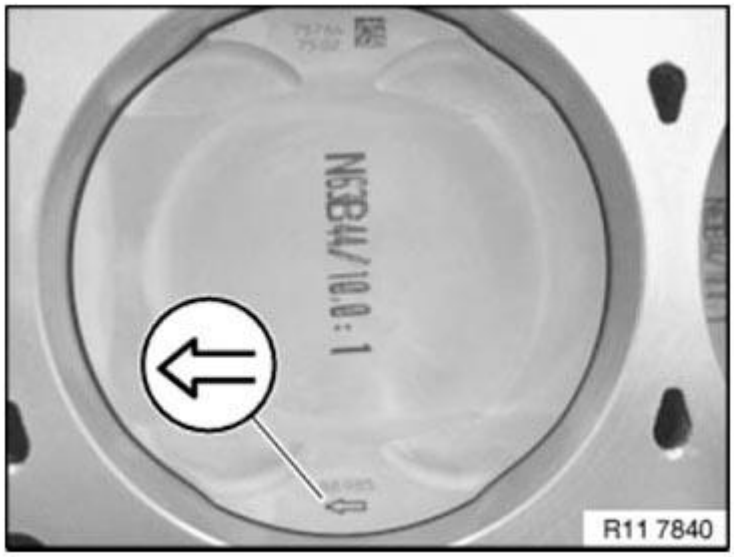


Fig. 168: Identifying Arrow Direction On Piston Crown Must Point To Camshaft Drive (Direction Of Travel Towards Front)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach crankshaft journal to connecting rod.

Remove special tools **11 5 440** and 11 8 152.

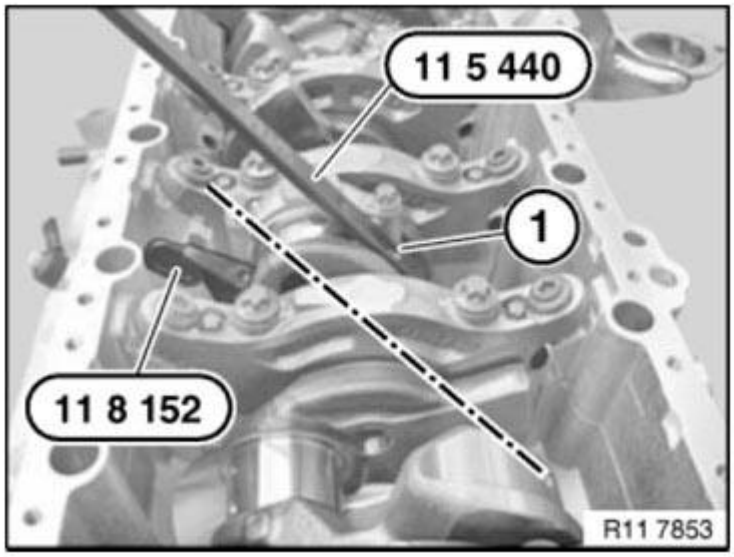


Fig. 169: Attaching Crankshaft Journal To Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **For purposes of clarity, the pairing letters (1) are shown on the removed conrod.**

IMPORTANT: **Conrods and conrod bearing caps are denoted with the same pairing letters (1), do not mix them up.**
Fit bearing cap so that pairing letters match up.

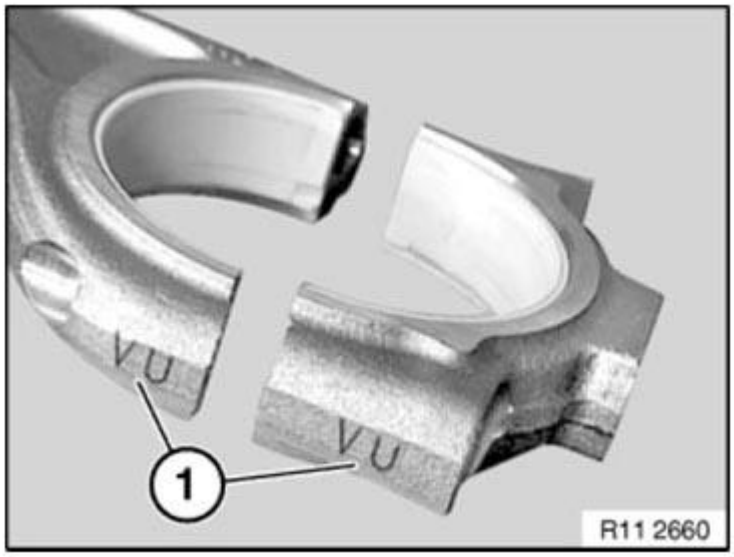


Fig. 170: Identifying Conrods And Conrod Bearing Caps Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

Apply light coat of oil to connecting-rod bearing shells.

Fit bearing cap so that pairing letters match up.

Install new conrod bolts.

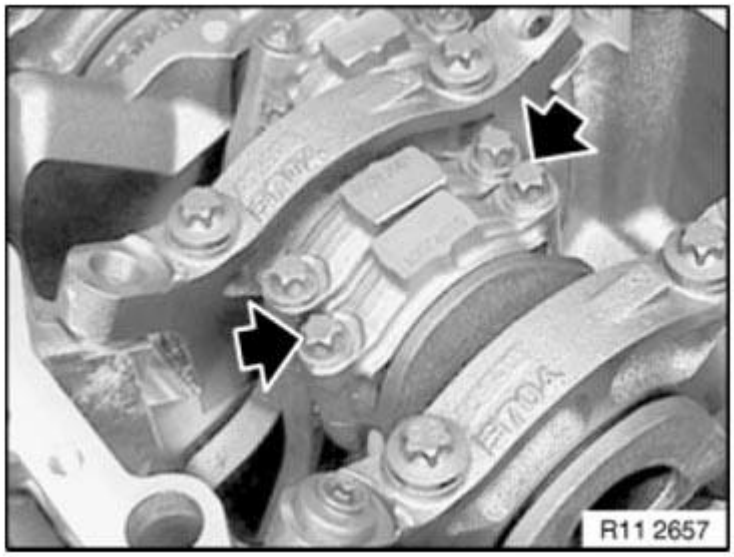


Fig. 171: Locating Conrod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down connecting rod bolts (1) with special tool **00 9 120** .

Tightening torque **11 24 1 AZ** .

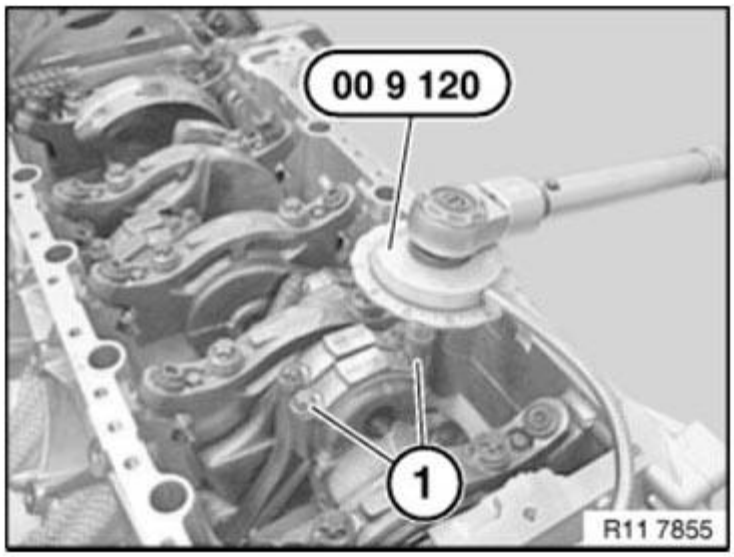


Fig. 172: Tightening Down Connecting Rod Bolts With Special Tool 00 9 120

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N63) FROM 3/2011

Notes

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons and connecting rods are reused, they must be reinstalled in the same places.
Piston and piston pin are matched to each other and can only be replaced as a pair.
Conrod and conrod bearing cap are cracked.
Identification is effected by means of identical pairing letters on the connecting rod big end.
Mixing up the components will result in engine damage.
Conrod bearings must always be replaced.

Necessary preliminary tasks

- Fully remove front axle together with engine.
- Remove **ENGINE** from front axle.
- Install engine on assembly stand.
- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Removing oil sump. See **LOWER OIL SUMP SECTION** and **UPPER OIL SUMP SECTION**.
- Remove **OIL PUMP**.

To release the connecting rod bolts (1), the crankshaft (2) must be moved to a suitable position.

Release connecting rod bolts (1).

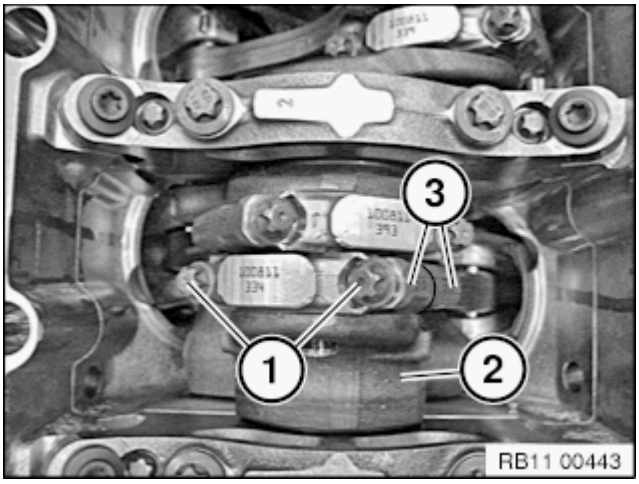


Fig. 173: Identifying Connecting Rod Bolts And Crankshaft

Screw the special tool 2 249 164 (assembly tool) into the connecting rod.

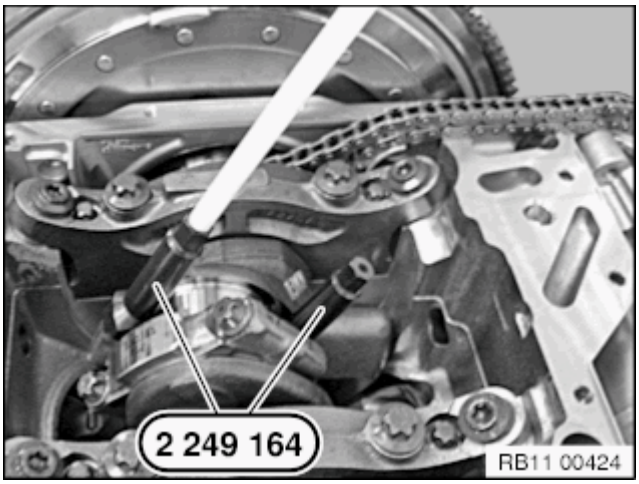


Fig. 174: Identifying Special Tool 2 249 164 Secured To Connecting Rod

NOTE: For installation and dismantling of the connecting rods, it is essential for the crankshaft to be exactly in alignment with the cylinder bore.

Position crankshaft at central bolt.

Insert special tool 11 8 152 into conrod.

Press out the connecting rod and piston with special tool 22 49 164 towards the cylinder head side.

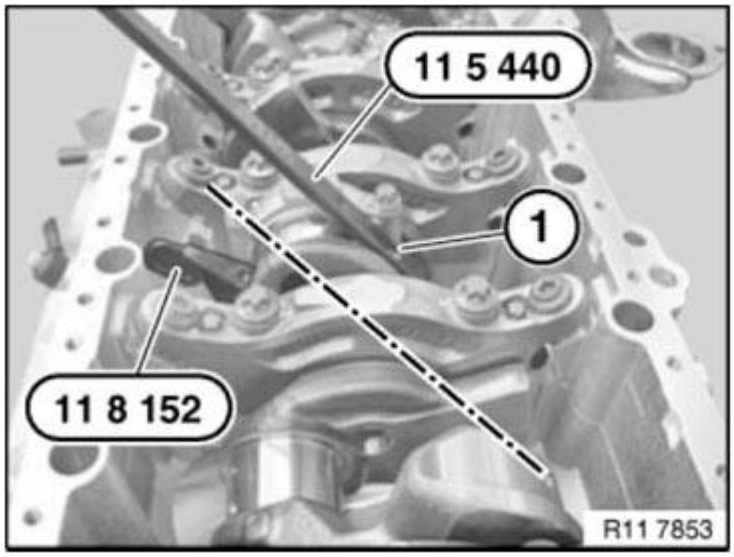


Fig. 175: Removing Conrod With Piston From Cylinder Head Side
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pistons and gudgeon pins are paired and must not be fitted individually.

Lift out circlip and press out piston pin.

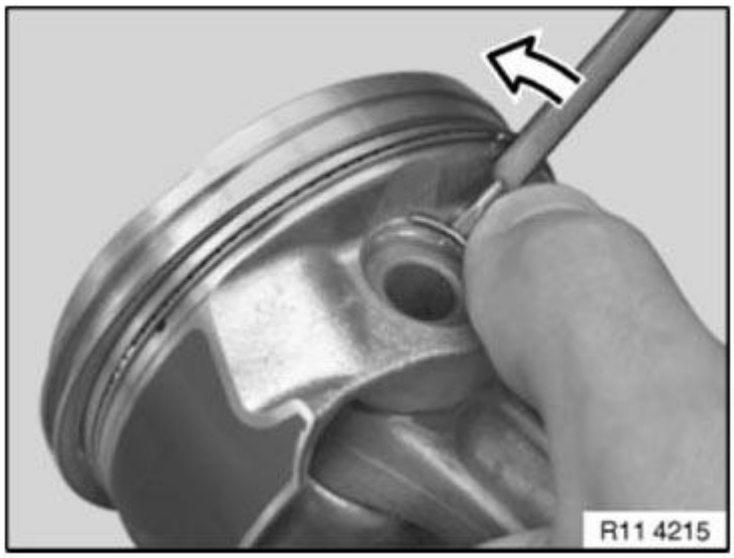


Fig. 176: Removing Retaining Ring From Piston
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

NOTE: The connecting rod can also be replaced individually.

The gudgeon pin must be able to be pressed through the bush by hand with little force and must not display any significant play.

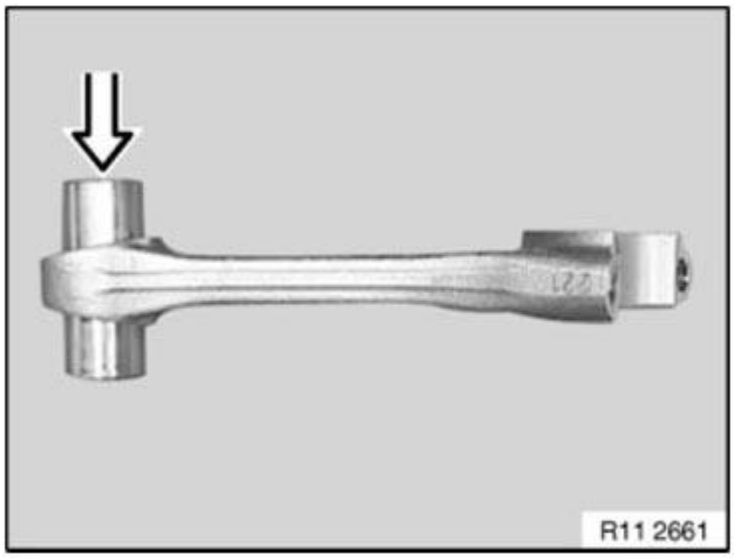


Fig. 177: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Prior to installation, measure piston installation clearance: Measure piston diameter with micrometer at measuring point A from lower edge of piston and offset at 90° to the axis of the gudgeon pin.

Refer to **MEASURING POINT A** .

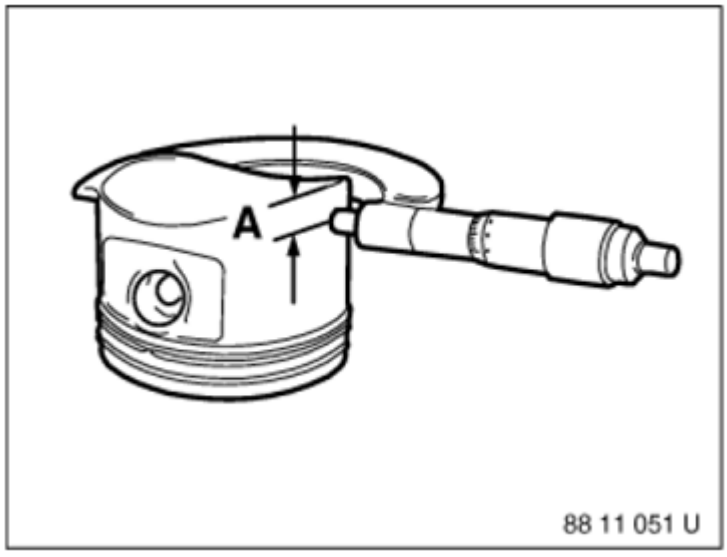


Fig. 178: Measuring Piston Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Refer to:

- **DIAMETER OF CYLINDER BORE**
- **PISTON INSTALLATION CLEARANCE**
- **TOTAL PERMISSIBLE WEAR CLEARANCE**

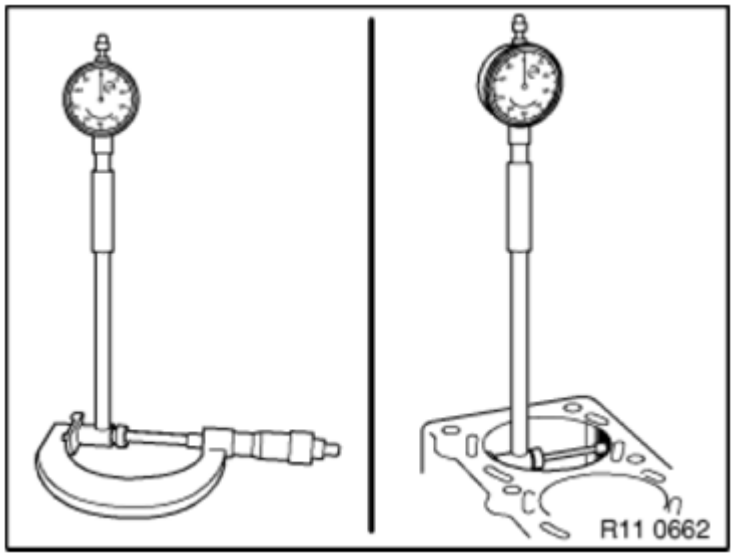


Fig. 179: Checking Diameter Of Cylinder Bore
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Piston circlip (1) is correctly installed when the opening points upwards.

See illustration.

It must still be possible for the gudgeon pin to be moved easily.

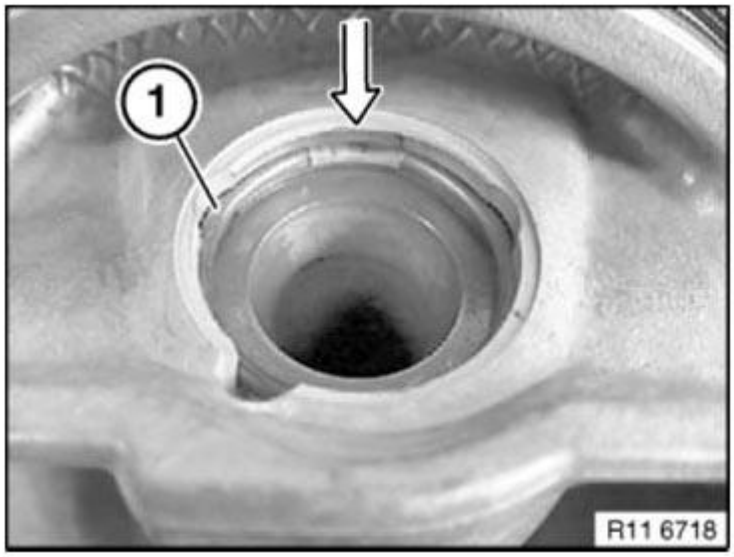


Fig. 180: Locating Piston Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Insert the special tools 22 49 164 (assembly tool) into the connecting rod.

Install **CONNECTING ROD BEARING**.

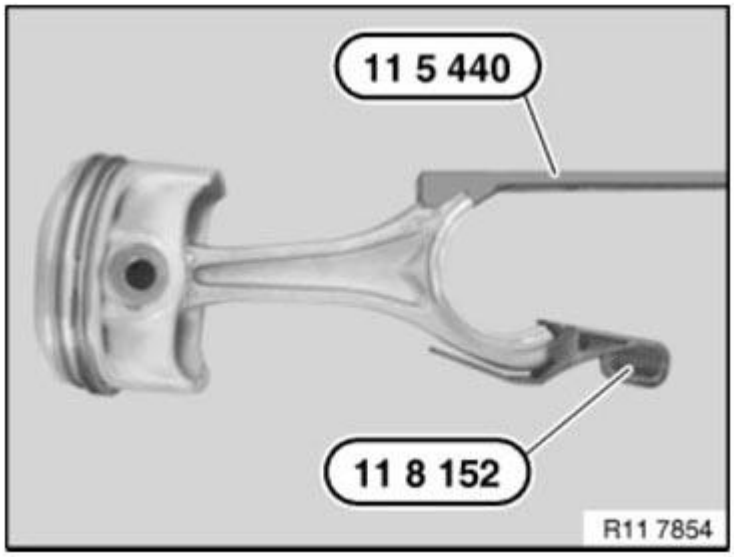


Fig. 181: Inserting Special Tools 11 8 151 And 11 8 152 Into Conrod
Courtesy of BMW OF NORTH AMERICA, INC.

Lightly coat pistons and piston rings with oil.

Offset the contact points of the piston rings by approx. 120° to each other but do not position above the piston pin boss.

NOTE: Illustration shows S85.

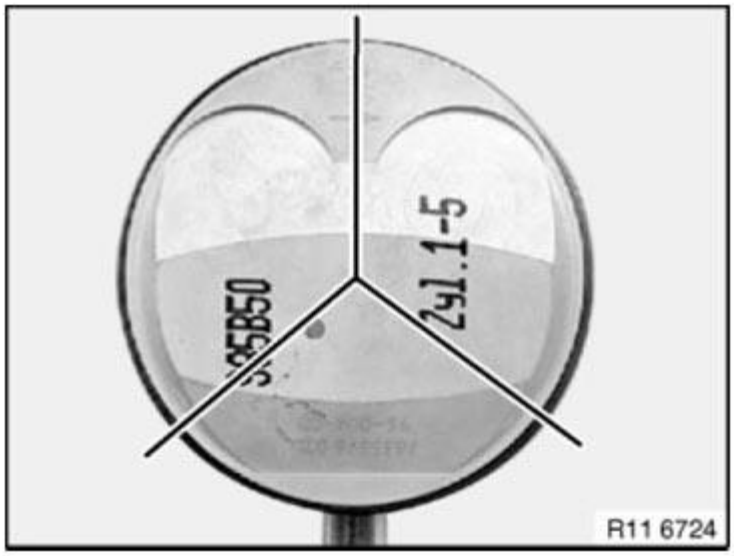


Fig. 182: Identifying Piston Rings Offset Contact Points
Courtesy of BMW OF NORTH AMERICA, INC.

Keep piston rods compressed with special tool **11 7 280** .

Install piston so that arrow points to camshaft drive.

IMPORTANT: Risk of piston ring breakage.

Press in piston only with finger force (do not knock in!).

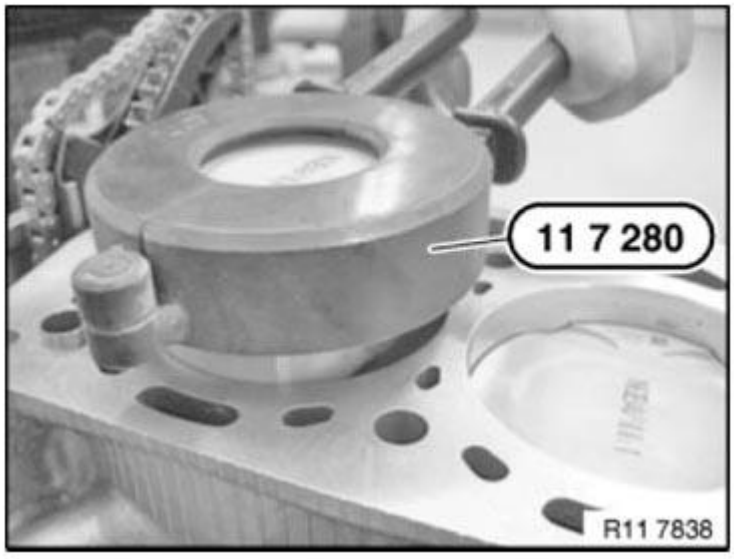


Fig. 183: Compressing Piston Rods With Special Tool 11 7 280
Courtesy of BMW OF NORTH AMERICA, INC.

The direction arrow on the piston crown must point to the camshaft drive (direction of travel towards front).

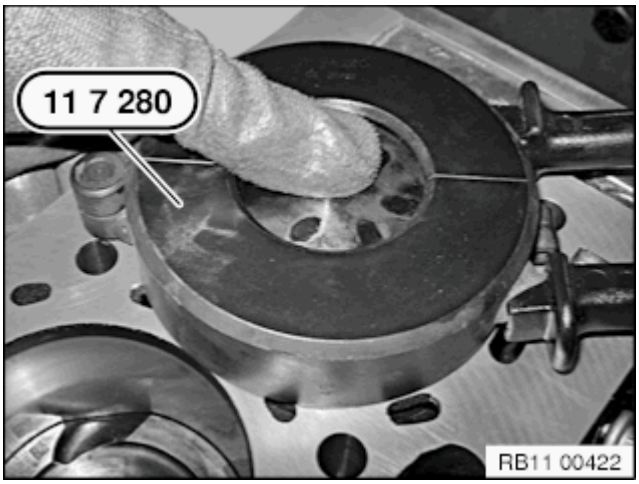


Fig. 184: Identifying Piston Crown Direction

Connect the crankshaft journal to connecting rod.

Remove special tools 22 49 164.

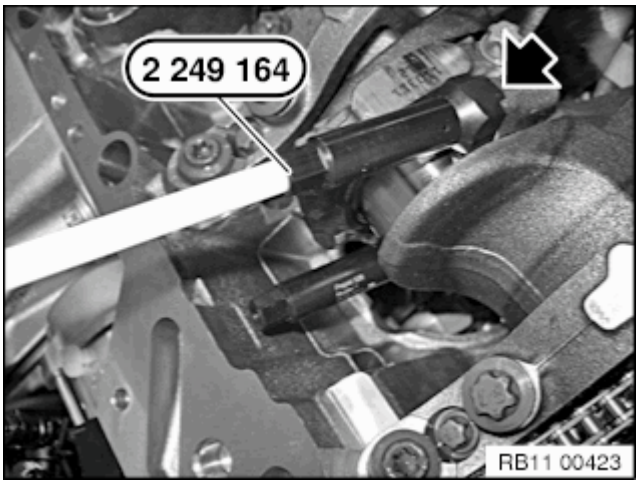


Fig. 185: Connecting Crankshaft Journal And Connecting Rod And Removing Special Tools 22 49 164

NOTE: For purposes of clarity, the pairing letters (1) are shown on the removed connecting rod.

IMPORTANT: Connecting rods and connecting rod bearing caps are denoted with the same pairing letters (1), do not mix them up.
Fit bearing cap so that pairing letters match up.

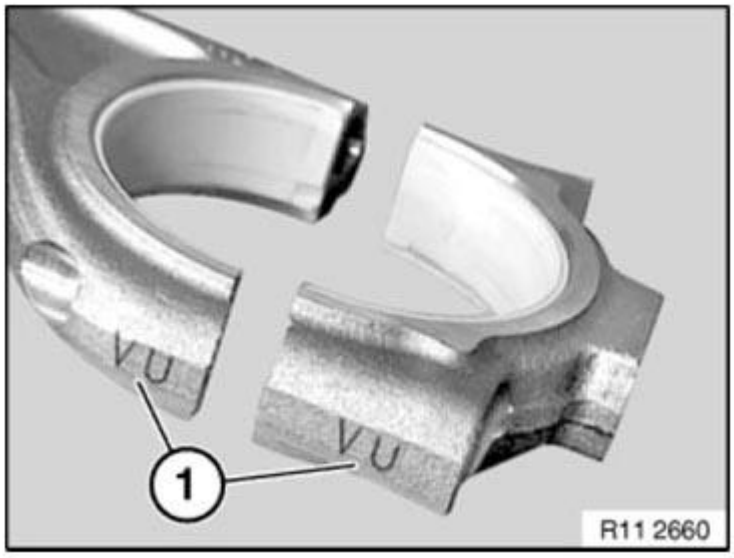


Fig. 186: Identifying Conrods And Conrod Bearing Caps Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

Apply light coat of oil to connecting rod bearing shells.

Fit bearing cap so that pairing letters match up.

Install new connecting rod bolts.

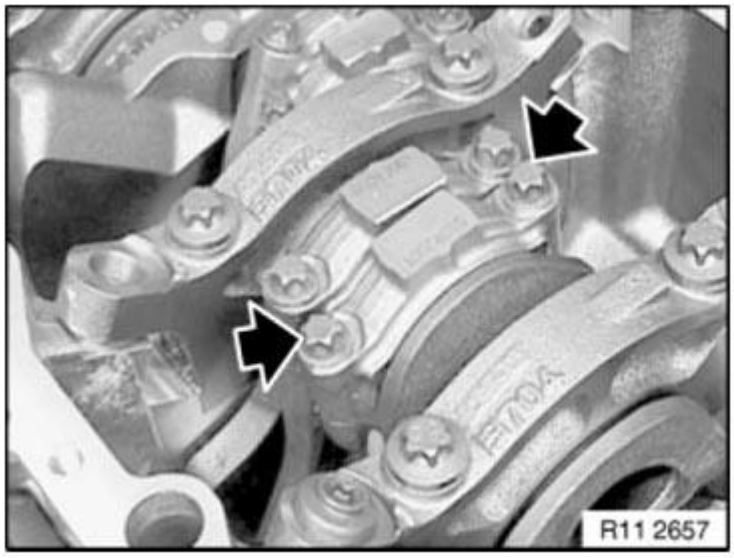


Fig. 187: Locating Conrod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down connecting rod bolts (1) with special tool **00 9 120** .

Tightening torque **11 24 1 AZ** .

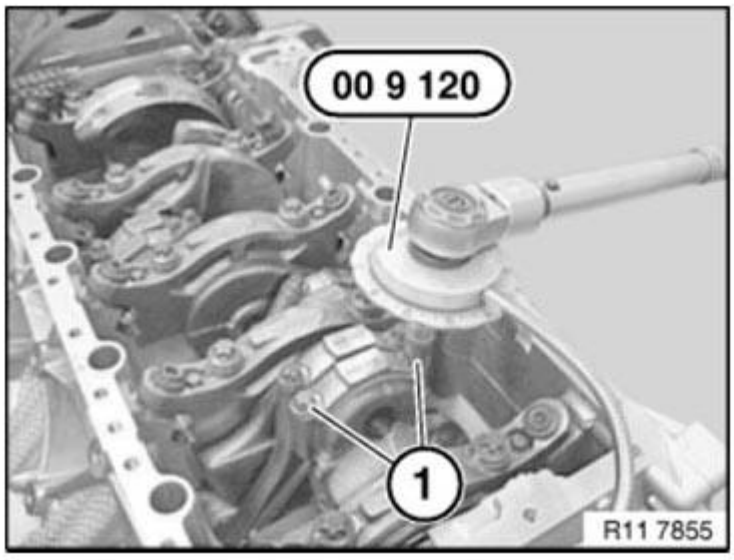


Fig. 188: Tightening Down Connecting Rod Bolts With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

1128 V-RIBBED BELT W.TENS./DEFLECT

1128050 REPLACING A/C COMPRESSOR DRIVE BELT WITH BELT TENSIONER (N63)

IMPORTANT: Risk of damage!
Release screws (1) on vibration absorber only if removal position is adjusted.
If contaminated with hydraulic fluid:
Replace drive belt.
Crank engine at central bolt in direction of engine rotation.

Installation note:

If the drive belt is to be reused, mark direction of travel and reinstall drive belt in same direction of rotation.

Necessary preliminary work

- Remove **DRIVE BELT** for alternator.

NOTE:

Observe direction of engine rotation

Crank engine at central bolt until marking (see arrow) is reached on vibration absorber.

Release screws (1).

Tightening torque **11 28 2AZ** .

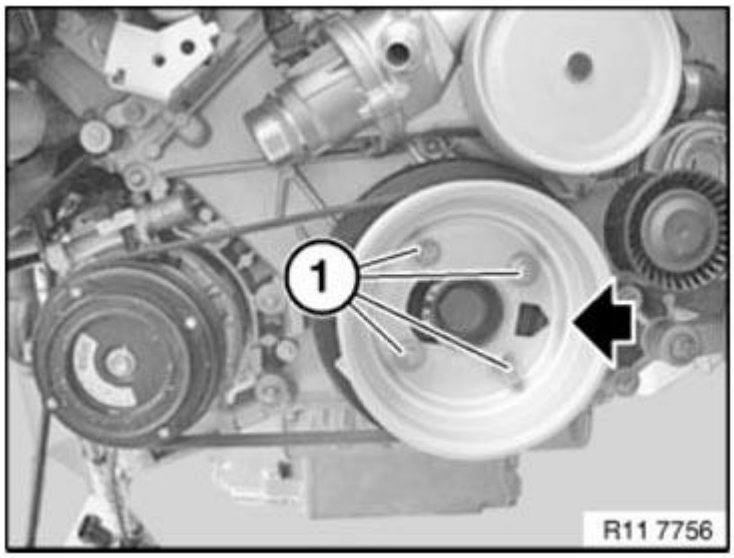


Fig. 189: Identifying Crank Pulley Screws And Marking
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Belt pulley is pretensioned.
Belt pulley tension is relieved abruptly during the cranking process!

NOTE: Crank engine at central bolt until marking (see arrow) is reached on vibration absorber.
Remove elasto-belt.

Observe direction of engine rotation

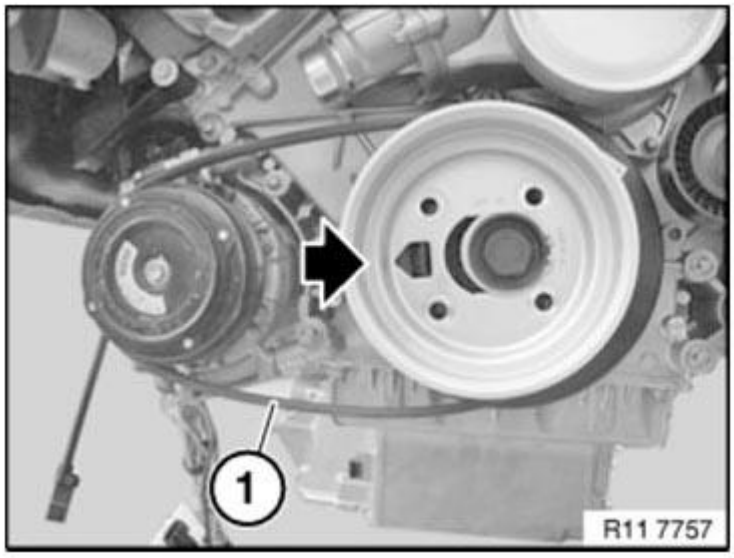


Fig. 190: Identifying Marking Reached On Vibration Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1128010 REPLACING DRIVE BELT FOR ALTERNATOR (N63)

Notes

IMPORTANT: If contaminated with hydraulic fluid:
Replace drive belt.

Installation note:

If the drive belt is to be reused, mark direction of travel and reinstall drive belt in same direction of rotation.

Necessary preliminary work

- Remove **FAN COWL** .
- Release **EXPANSION TANK** for charge air cooler from mounting and press forwards.

Coolant hoses do not need to be released!

IMPORTANT: Belt tensioner is under high initial spring preload.

Slowly and carefully pre-tension belt tensioner (1) in direction of arrow up to stop.

Secure special tool 11 3 340 in dowel hole (2).

Belt tensioner in installation position.

Remove drive belt.

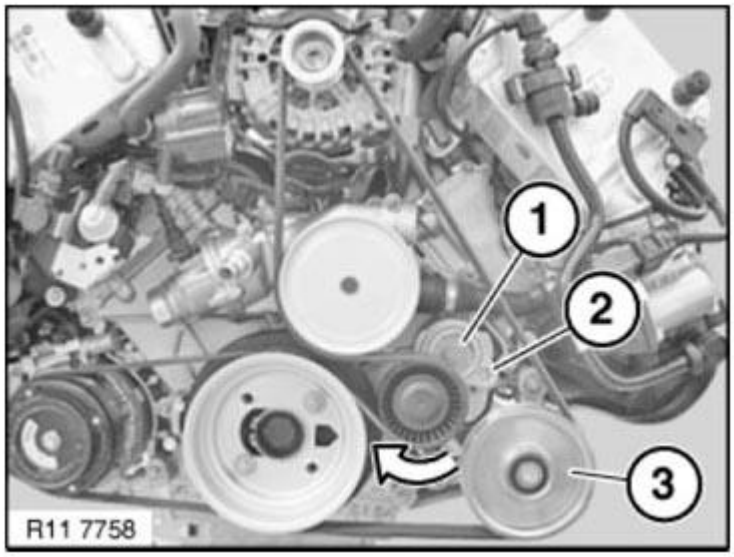


Fig. 191: Identifying Belt Tensioner Tensioning Direction
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: On vehicles which do not have a power steering pump, a deflecting element (3) is fitted in place of the power steering pump.

IMPORTANT: Belt tensioner is under high initial spring preload.

Put on the drive belt.

Remove special tool 11 3 340 from dowel hole (2).

Slowly relieve tension on belt tensioner (1).

Installation note:

Make sure drive belt is in correct installation position.

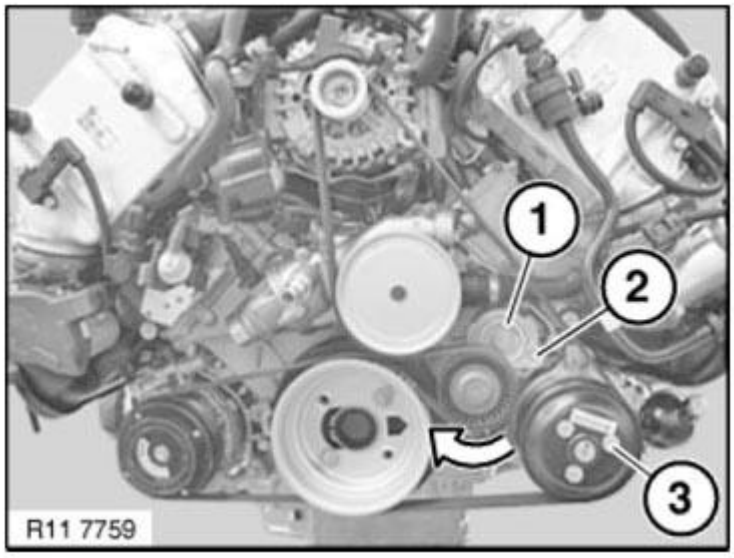


Fig. 192: Identifying Belt Tensioner Tensioning Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1128020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N63)

Necessary preliminary work

- Remove alternator **DRIVE BELT**

If necessary, remove special tool **11 0 390** .

Release screw (1).

Tightening torque **11 28 1AZ** .

Remove belt tensioner with idler pulley (2).

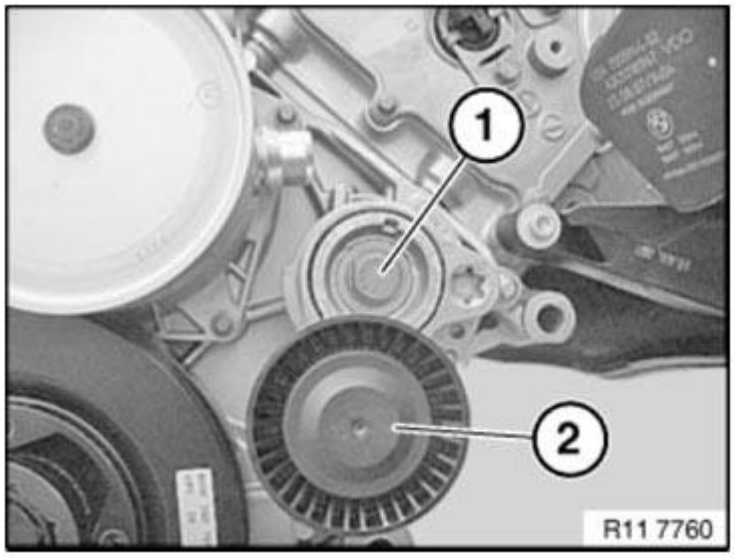


Fig. 193: Identifying Screw And Idler Pulley
Courtesy of BMW OF NORTH AMERICA, INC.

1131 CAMSHAFT

1131573 ADJUSTING CAMSHAFT TIMING ON LEFT SIDE (N63)

Notes

IMPORTANT: Release central bolts on adjuster only with special tool 11 9 890 .
Risk of damage to timing drive.
If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 5 to 8)

Necessary preliminary work

- Remove **LEFT GEAR CASE COVER**
- **CHECK CAMSHAFT TIMING ON LEFT SIDE**

Get set of special tools **11 9 890** ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.
Special tool 11 9 892 Press-down bar.
Special tool 11 9 893 Gap gauge for intake and exhaust camshafts.
Special tool 11 9 894 spacer.

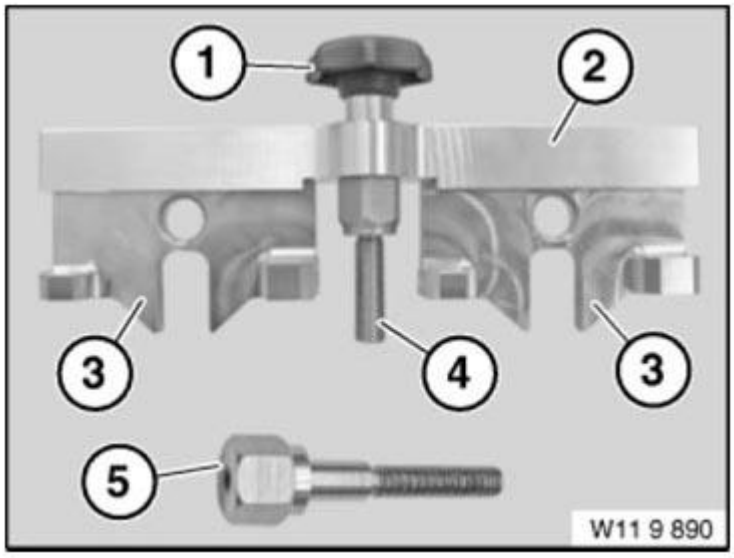


Fig. 194: Identifying Set Of Special Tools 11 9 890
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

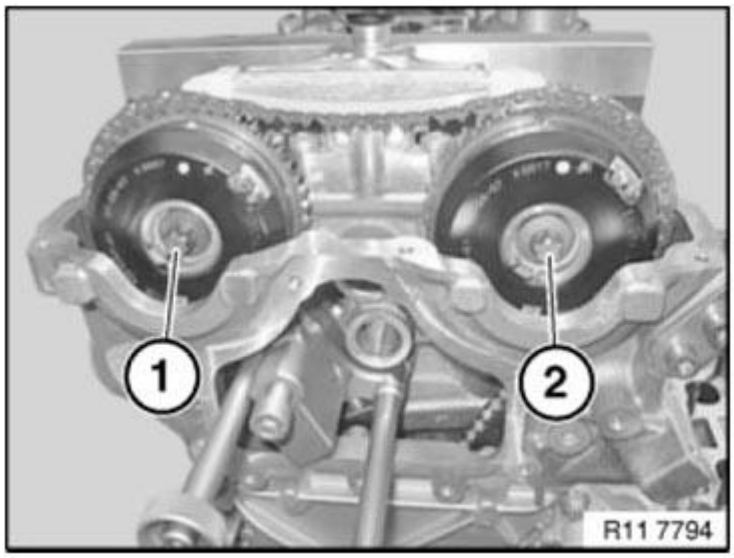


Fig. 195: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow). If no grease can be seen on the bolt head of central bolt (1), the ADJUSTER must be replaced for safety reasons.

Installation note:

Coat contact surface of new central bolt (1) with copper paste.

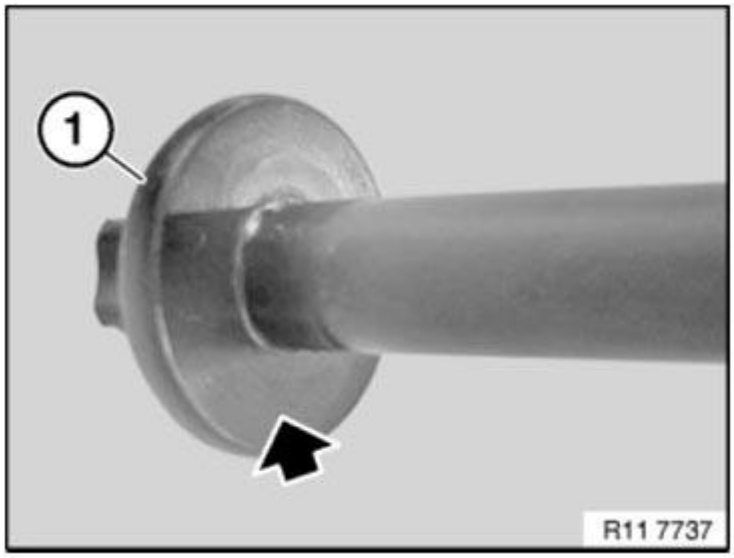


Fig. 196: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 on intake camshaft and exhaust camshaft.

The special tool 11 9 893 must rest **without a gap** on cylinder head; if necessary, adjust camshaft at hexagon heads.

Screw special tool 11 9 894 into cylinder head.

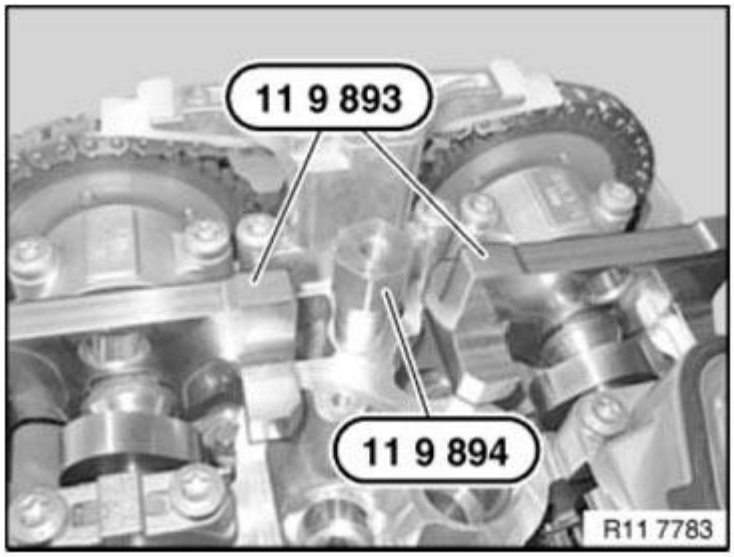


Fig. 197: Positioning Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 892 on special tool 11 9 893.

Both special tools11 9 891 are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

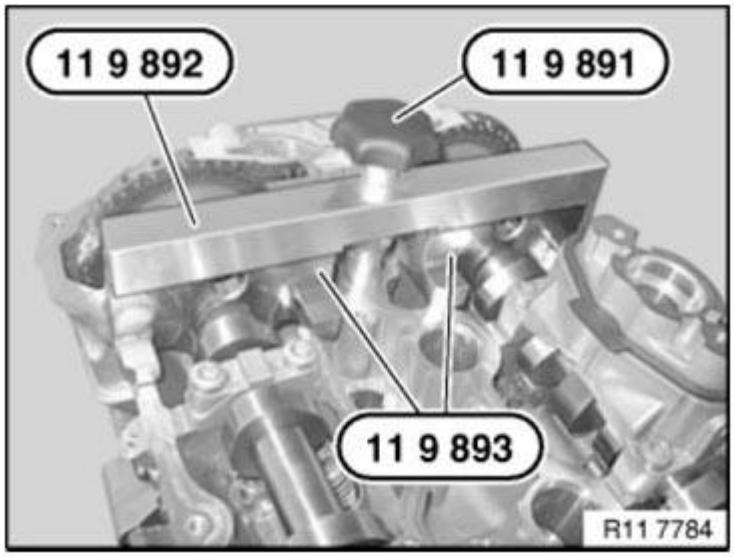


Fig. 198: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of intake camshaft adjuster with special tool **00 9 120** .

Secure central bolt (2) of exhaust camshaft adjuster with special tool **00 9 120** .

Tightening torque: **11 36 1AZ** .

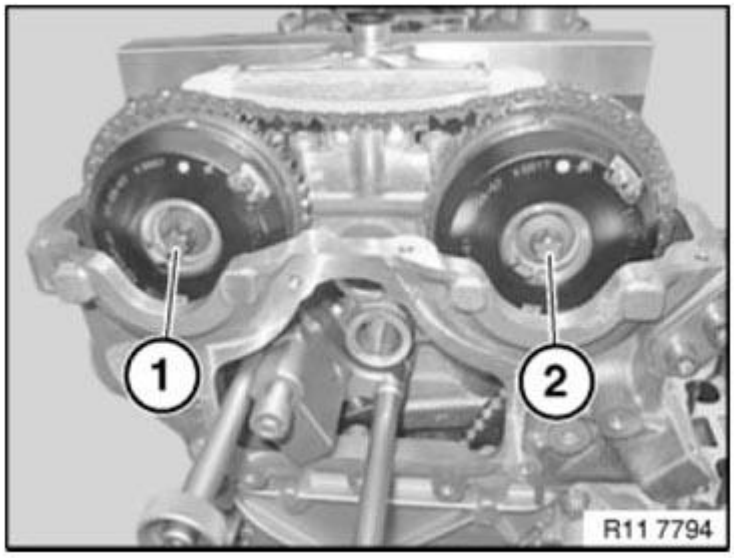


Fig. 199: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **150° before cylinder no. 1 firing TDC position.**

Secure vibration damper with special tool **11 9 190** at **150° before cylinder no. 1 firing TDC position 1.**

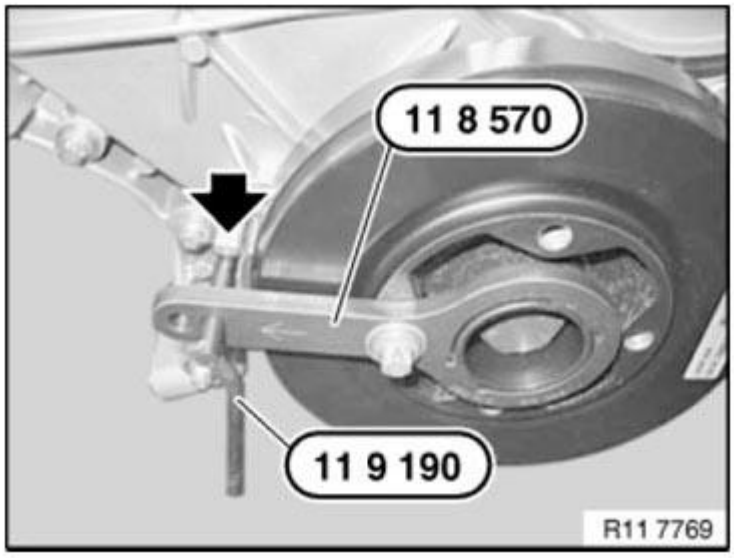


Fig. 200: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

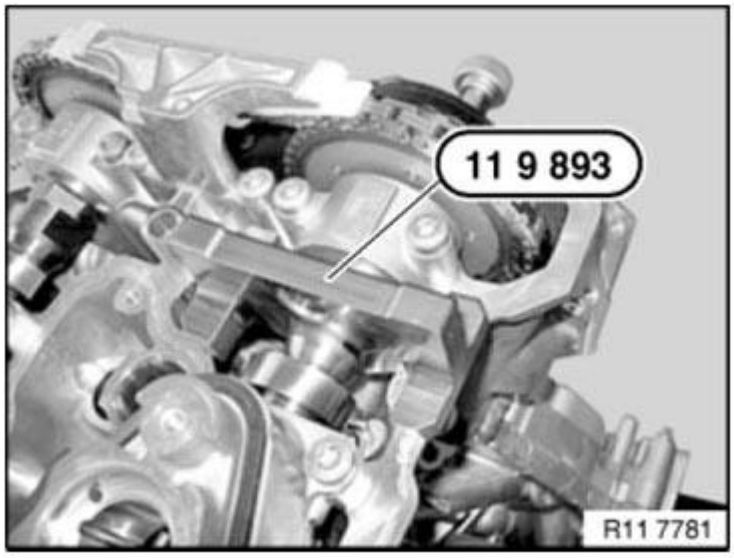


Fig. 201: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

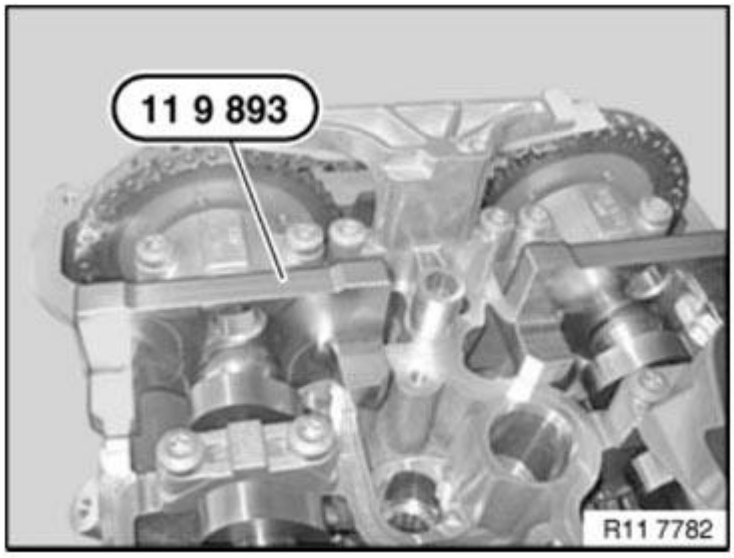


Fig. 202: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131574 ADJUSTING CAMSHAFT TIMING ON RIGHT SIDE (N63)

Notes

IMPORTANT: Release central bolts on adjuster only with special tool 11 9 890 .
Risk of damage to timing drive.
If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 1 to 4)

Necessary preliminary work

- Remove **RIGHT-HAND GEAR CASE COVER**
- **CHECK CAMSHAFT TIMING ON RIGHT SIDE** .

Get set of special tools **11 9 890** ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.
Special tool 11 9 892 Press-down bar.
Special tool 11 9 893 Gap gauge for intake and exhaust camshafts.
Special tool 11 9 894 spacer.

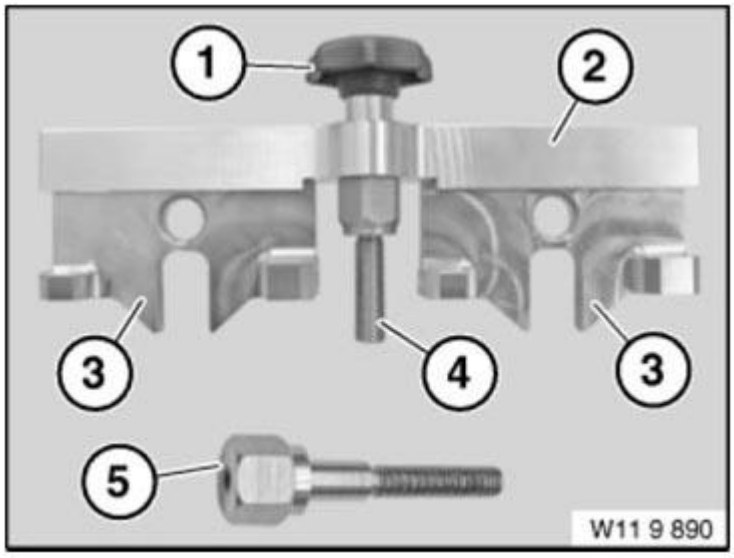


Fig. 203: Identifying Set Of Special Tools 11 9 890
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

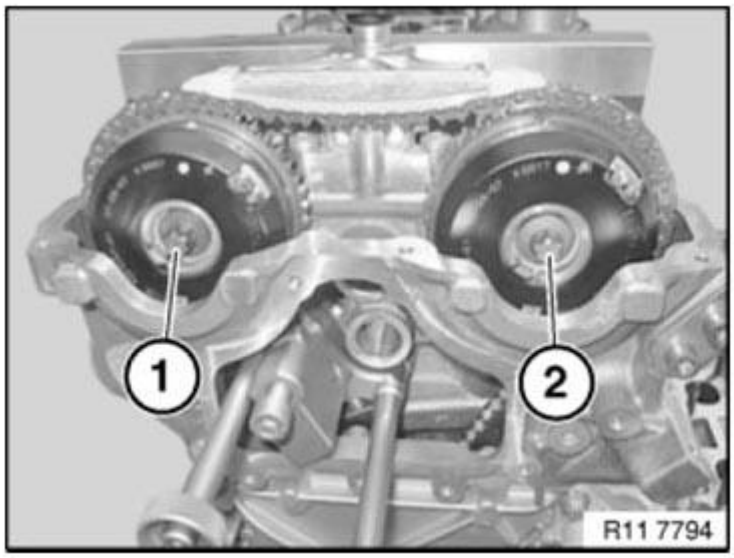


Fig. 204: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow). If no grease can be seen on the bolt head of central bolt (1), the ADJUSTER must be replaced for safety reasons.

Installation note:

Coat contact surface of new central bolt (1) with copper paste.

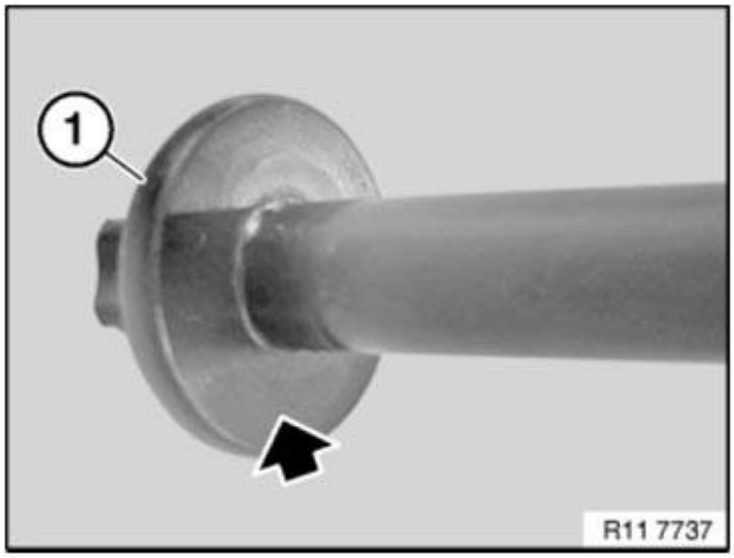


Fig. 205: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 on intake camshaft and exhaust camshaft.

The special tool 11 9 893 must rest **without a gap** on cylinder head; if necessary, adjust camshaft at hexagon heads.

Screw special tool 11 9 894 into cylinder head.

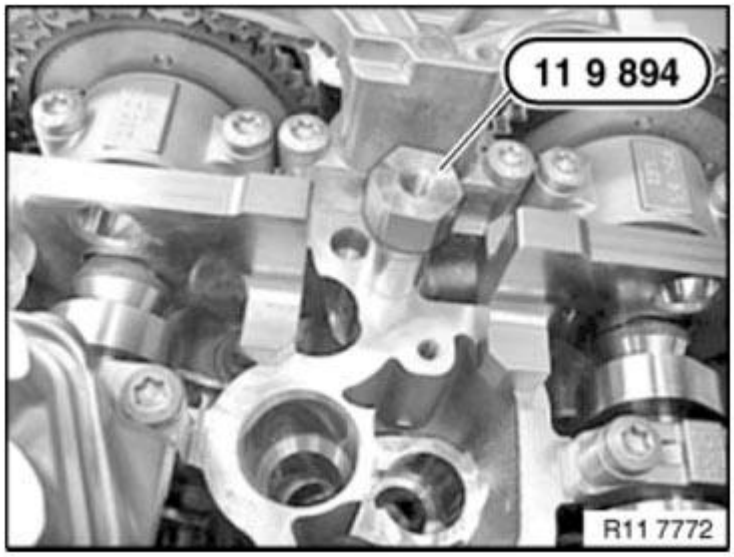


Fig. 206: Identifying Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 892 on special tool 11 9 893.

Both special tools11 9 891 are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

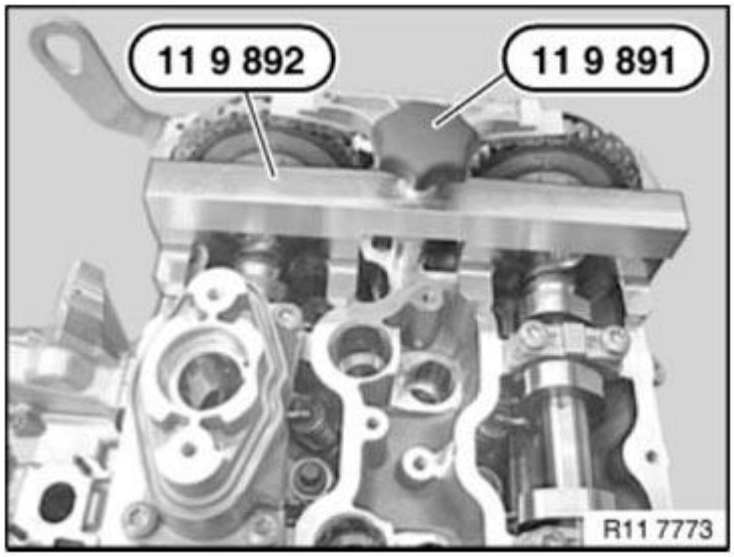


Fig. 207: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of intake camshaft adjuster with special tool **00 9 120** .

Secure central bolt (2) of exhaust camshaft adjuster with special tool **00 9 120** .

Tightening torque: **11 36 1AZ** .

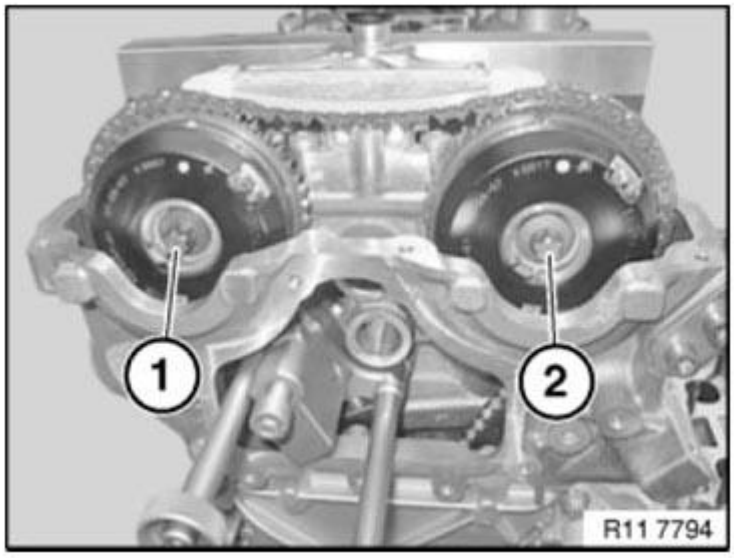


Fig. 208: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **150° before cylinder no. 1 firing TDC position.**

Secure vibration damper with special tool **11 9 190** at **150° before cylinder no. 1 firing TDC position 1.**

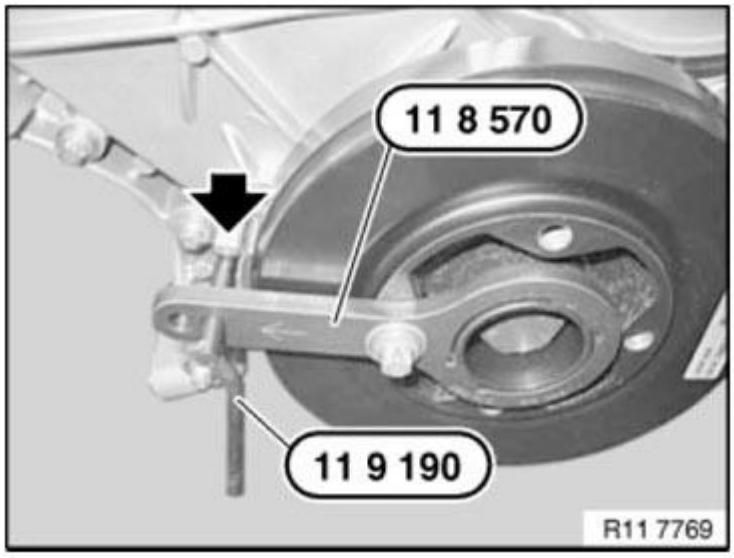


Fig. 209: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

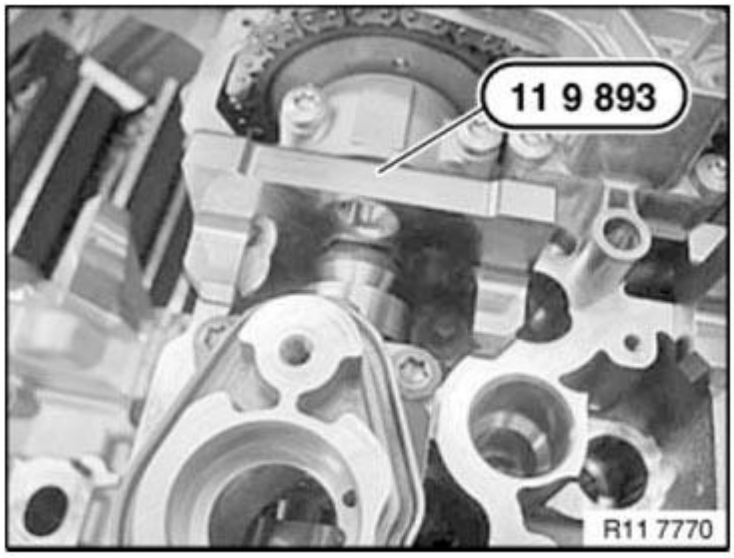


Fig. 210: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

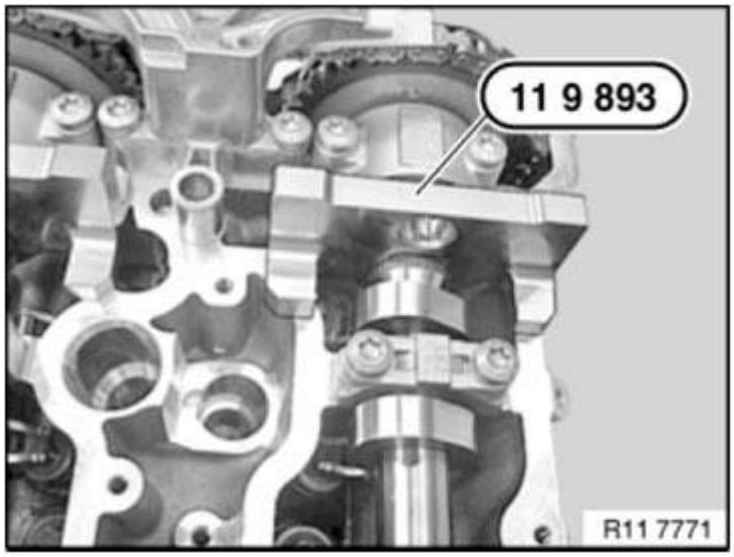


Fig. 211: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N63)

Notes

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 5-8:

Necessary preliminary work

- Remove left **CYLINDER HEAD COVER**
- Remove **FAN COWL** with electric fan
- Remove **BELT PULLEY** for air conditioning system
- Remove left **CHAIN TENSIONER**

Mount special tool **11 9 900** at position of chain tensioner.

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm.**

NOTE: Graphic corresponds to cylinders 1-4.

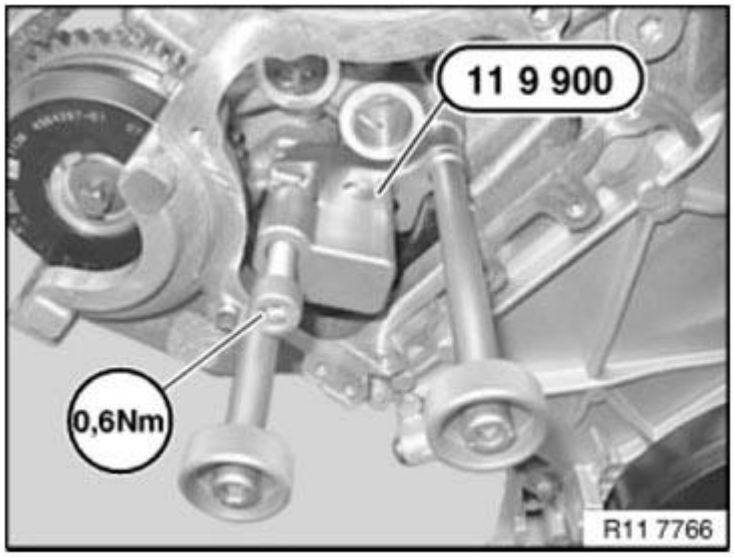


Fig. 212: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Marking (MP = Mounting Position) is important for installing special tool 11 8 570 .

MP = 150° before cylinder no. 1 firing TDC position

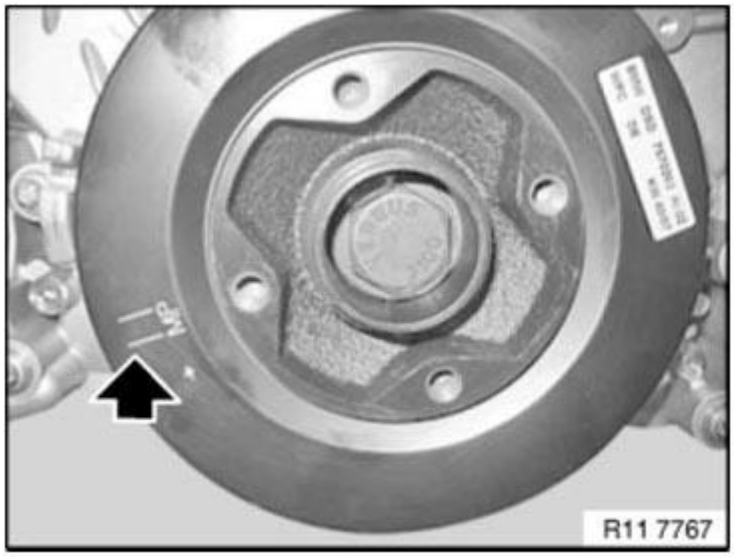


Fig. 213: Identifying Mounting Position Of Special Tool 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with dihedron on vibration damper in such a way that it can be secured with bolt (1) at the MP marking.

NOTE: Setting groove on crankcase, see arrow.

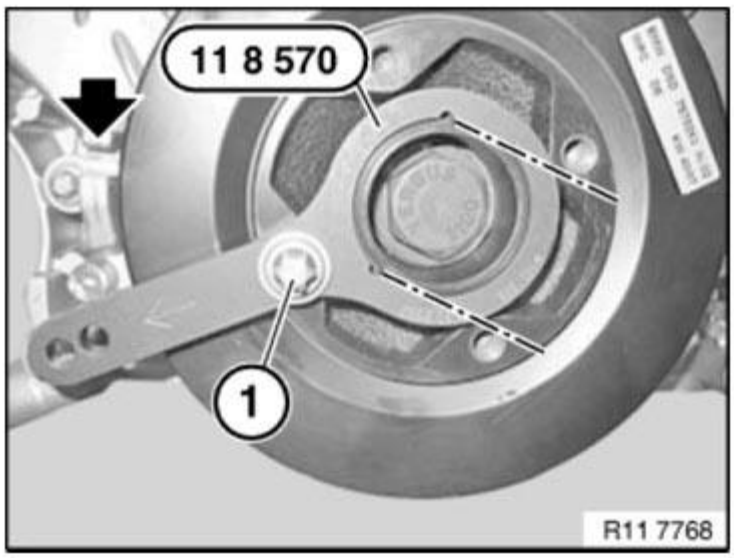


Fig. 214: Positioning Special Tool 11 8 570 With Dihedron On Vibration Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt.

Secure vibration damper with special tools **11 8 570** and **11 9 190** at **150° before cylinder no. 1 firing TDC position.**

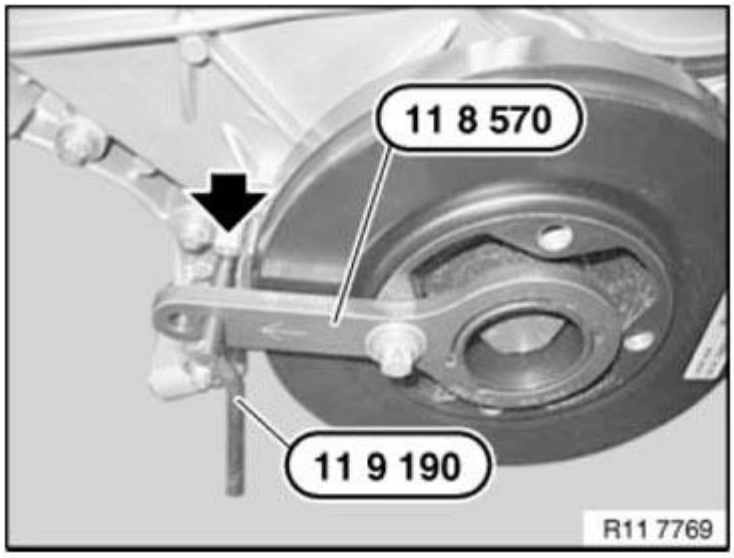


Fig. 215: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder no. 1 at 150° before firing TDC position, cams on exhaust camshaft (A) at cylinder no. 5 point at

an angle to the left.

Cams on inlet camshaft (E) point at an angle downwards.

NOTE: For purposes of clarity, the graphic shows the inlet and exhaust adjustment units removed.

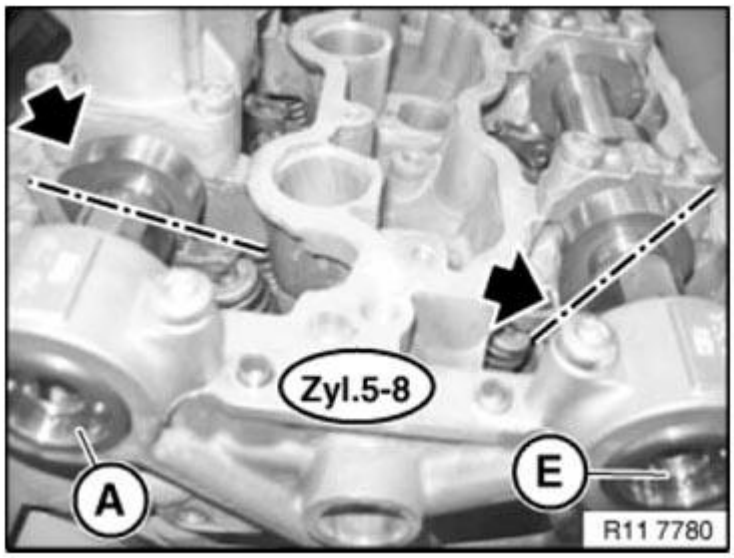


Fig. 216: Identifying Cams On Inlet Camshaft Point At An Angle Downwards
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the inlet and exhaust adjustment units are normally locked in their initial position.
The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster.
In order to avoid incorrect timing adjustment, it is essential to check the locking of the camshaft adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of intake and exhaust camshaft adjusters in initial setting:

Gripping hexagon head (2) of camshafts with a fork wrench (1), carefully try to rotate camshafts against direction of rotation.

The intake and exhaust camshaft adjusters are locked in the initial setting when the camshafts are non-positively connected to the adjusters.

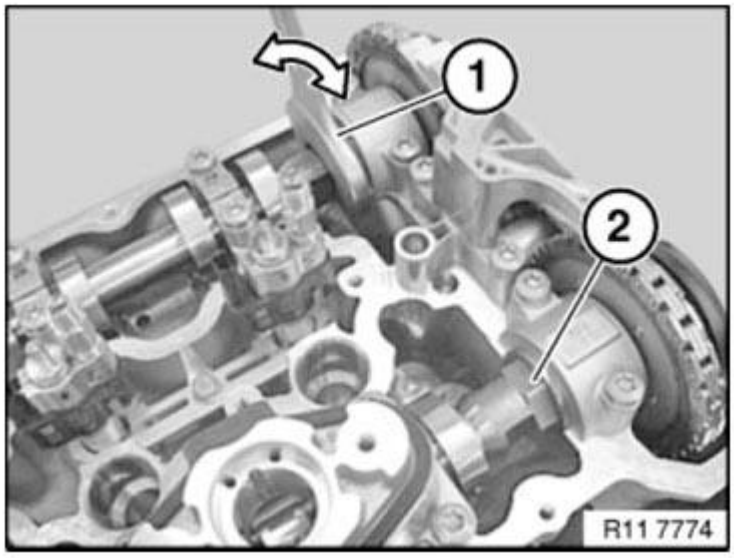


Fig. 217: Gripping Hexagon Head Of Camshafts With Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the intake or exhaust camshaft adjusters of the camshafts "cannot" be locked as described, the adjuster is faulty and must be replaced.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

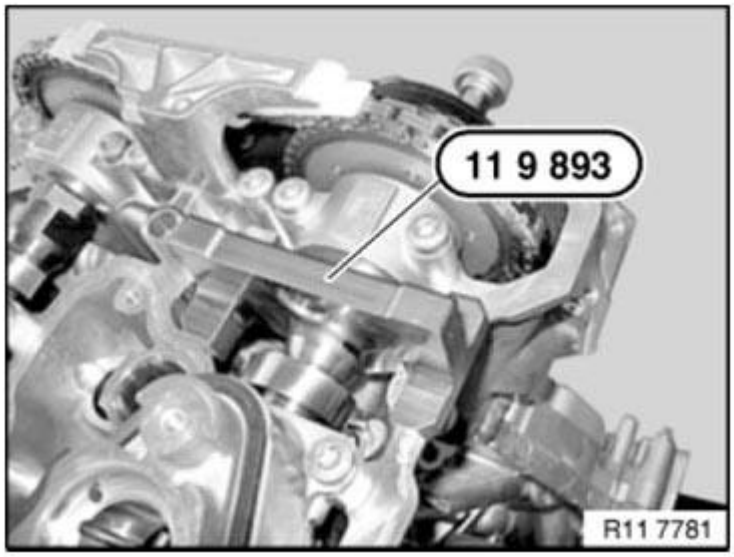


Fig. 218: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

If necessary, adjust camshaft **TIMING** on left side.

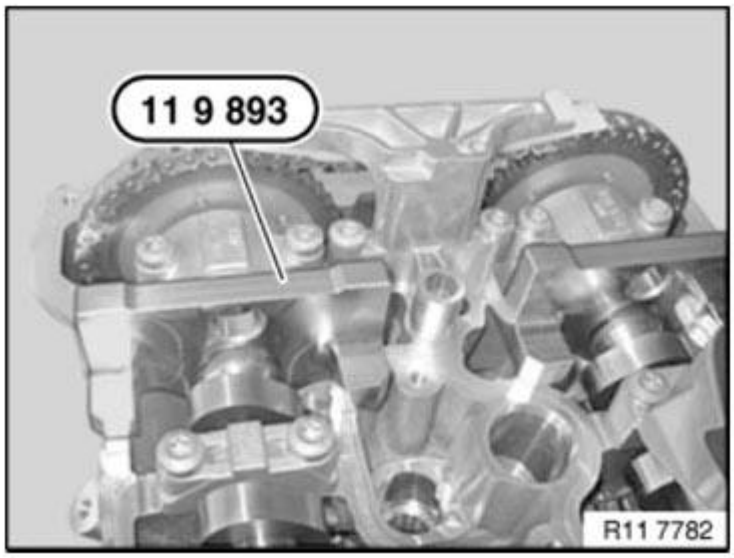


Fig. 219: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N63)

Notes

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 1-4:

Necessary preliminary work

- Remove right **CYLINDER HEAD COVER**
- Remove **FAN COWL** with electric fan
- Remove **BELT PULLEY** for air conditioning system
- Remove right **CHAIN TENSIONER**

Mount special tool **11 9 900** at position of chain tensioner.

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm.**

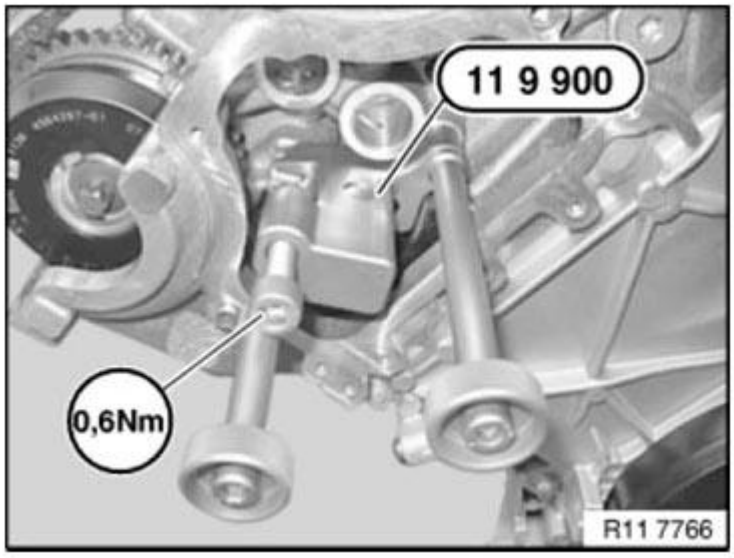


Fig. 220: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Marking (MP = Mounting Position) is important for installing special tool 11 8 570 .

MP = 150° before cylinder no. 1 firing TDC position

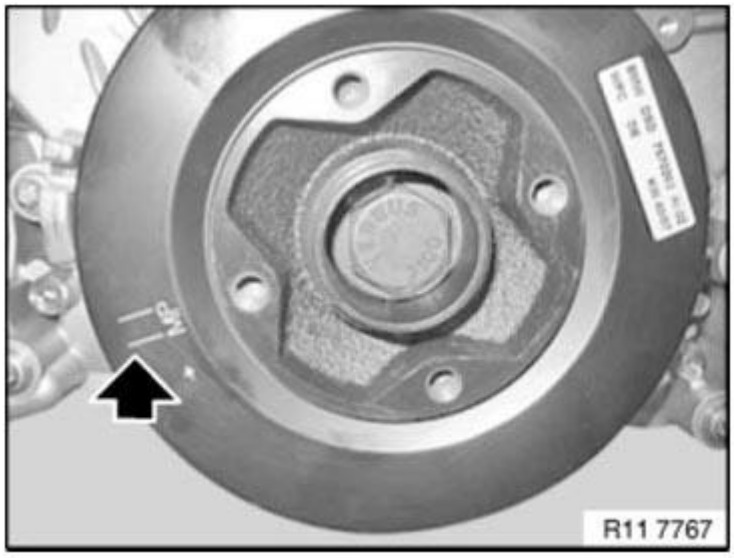


Fig. 221: Identifying Mounting Position Of Special Tool 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with dihedron on vibration damper in such a way that it can be secured with bolt (1) at the MP marking.

NOTE: Setting groove on crankcase, see arrow.

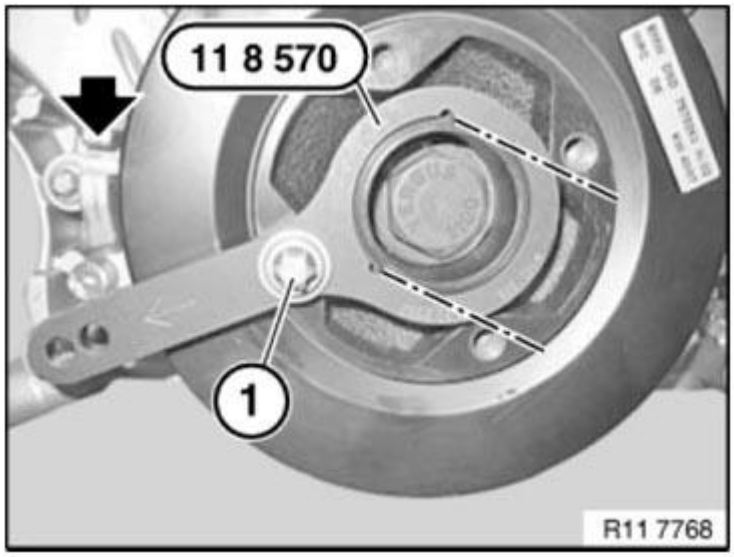


Fig. 222: Positioning Special Tool 11 8 570 With Dihedron On Vibration Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt.

Secure vibration damper with special tools **11 8 570** and **11 9 190** at **150° before cylinder no. 1 firing TDC position.**

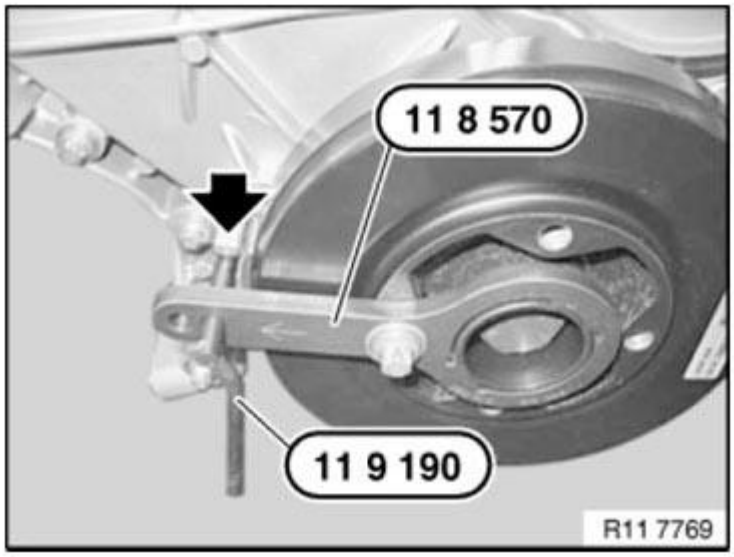


Fig. 223: Securing Vibration Damper With Special Tool 11 9 190

Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder no. 1 at 150° before firing TDC position, cams on exhaust camshaft (A) at cylinder no. 1 point at an angle upwards.

Cams on inlet camshaft (E) point at an angle downwards.

NOTE: For purposes of clarity, the graphic shows the inlet and exhaust adjustment units removed.

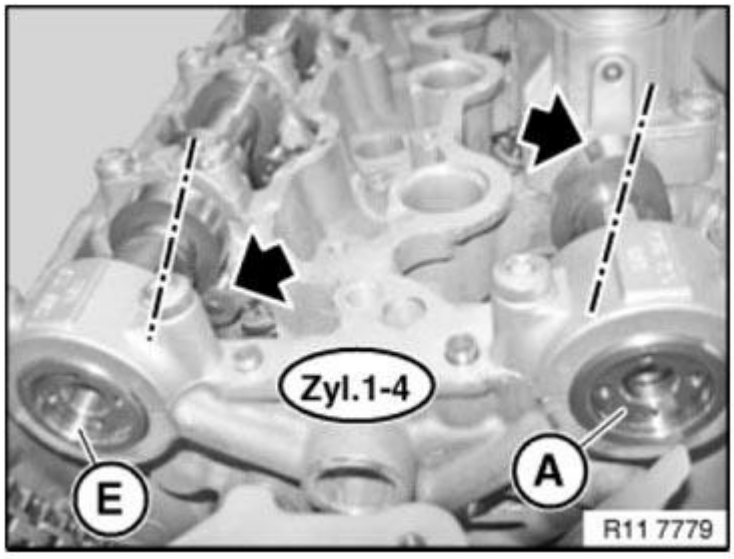


Fig. 224: Identifying Cams On Inlet Camshaft Point At An Angle Downwards
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the intake and exhaust camshaft adjusters are normally locked in their initial position.
The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster.
In order to avoid incorrect timing adjustment, it is essential to check the locking of the camshaft adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of intake and exhaust camshaft adjusters in initial setting:

Gripping hexagon head (2) of camshafts with an open-end spanner (1), carefully try to rotate camshafts against direction of rotation.

The intake and exhaust camshaft adjusters are locked in the initial setting when the camshafts are non-positively connected to the adjusters.

NOTE: Graphic corresponds to cylinders 5-8.

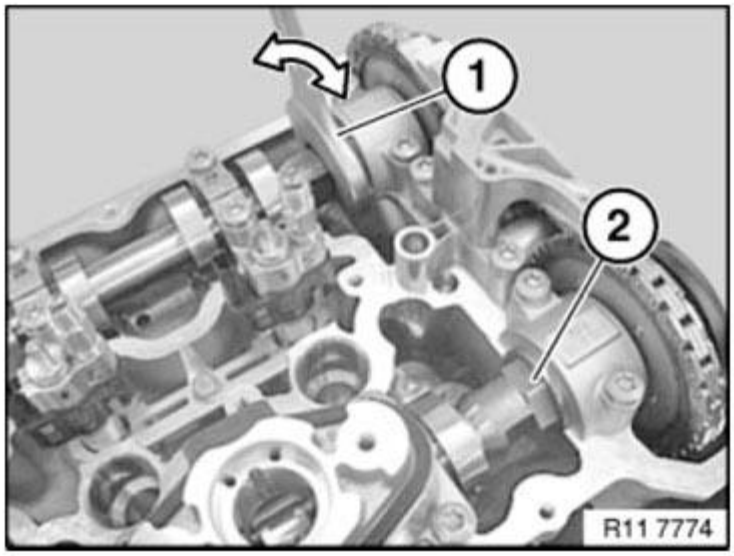


Fig. 225: Gripping Hexagon Head Of Camshafts With Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the intake or exhaust camshaft adjusters of the camshafts "cannot" be locked as described, the adjuster is faulty and must be replaced.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

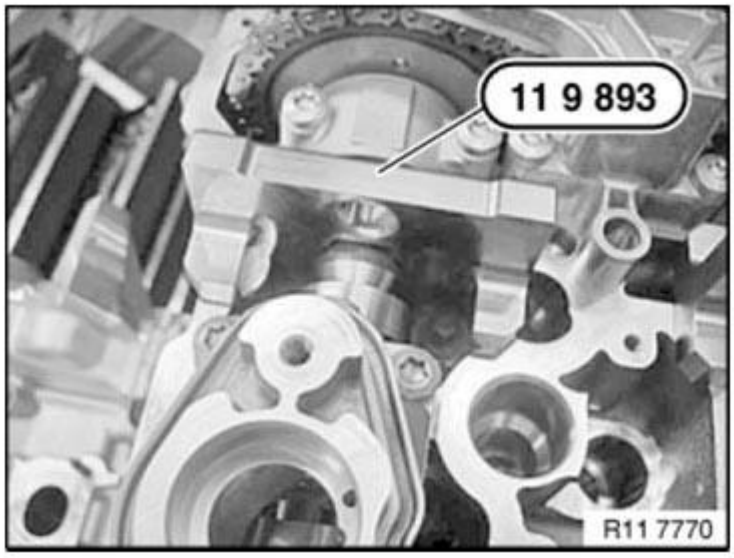


Fig. 226: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

If necessary, adjust camshaft **TIMING** on right side.

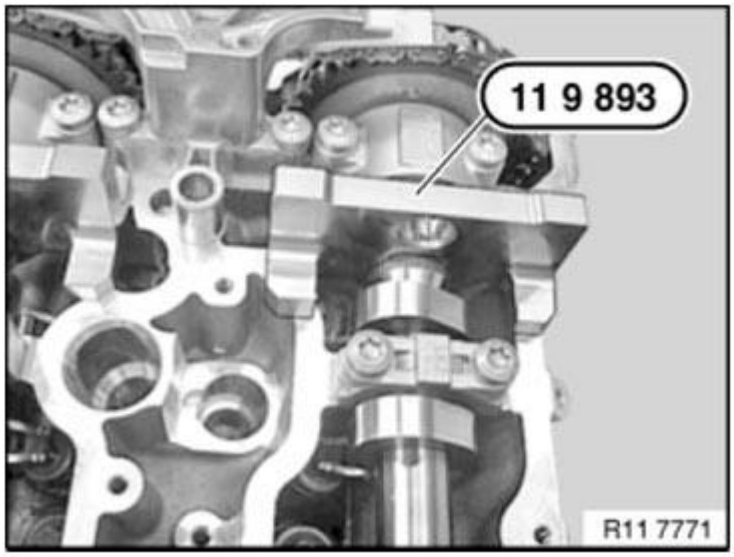


Fig. 227: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131038 REMOVING AND INSTALLING/RENEWING RIGHT EXHAUST CAMSHAFT (N63)

Notes

Cylinders 1-4:

IMPORTANT: Risk of damage!
The exhaust camshaft must first be rotated in such a way that the camshaft is free from tension when the bearing caps are released.

Necessary preliminary work

- Remove right **HIGH-PRESSURE PUMP**

- Remove right **CYLINDER HEAD COVER**
- Remove right **EXHAUST CAMSHAFT ADJUSTER**

IMPORTANT: No cam on the exhaust camshaft is permitted to press directly onto a roller cam follower.
With cylinder no. 1 at 150° before TDC firing position there is no piston in the TDC position.

Rotate exhaust camshaft (2) at dihedron with a fork wrench into a suitable position.

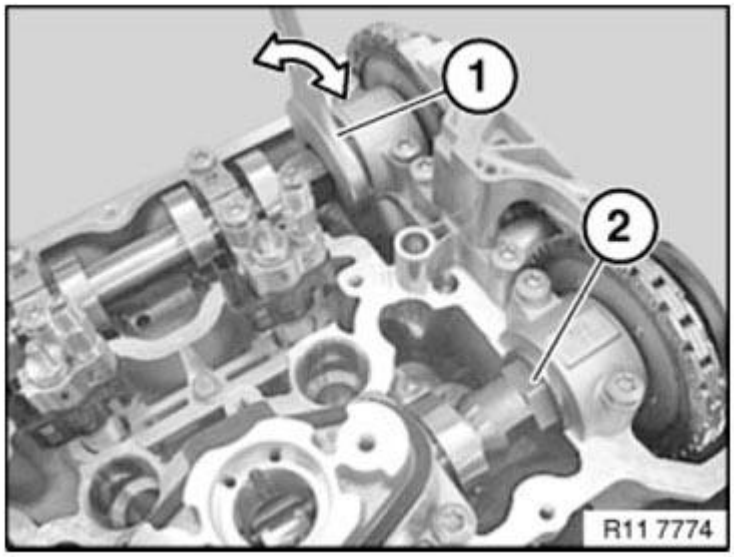


Fig. 228: Rotating Exhaust Camshaft At Dihedron With Fork Wrench Into Suitable Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The intake camshaft of cylinder bank 5-8 is marked "E 5-8".

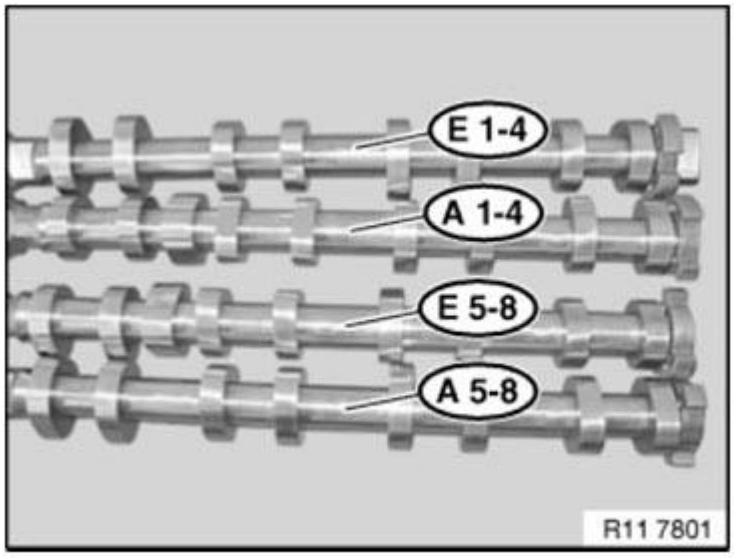


Fig. 229: Identifying Camshaft Of Cylinder Bank Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (10 to 1) in 1/2 turns.

Set all bearing caps down in special tool **11 4 480** in a neat and orderly fashion.

Remove roller tappet from bearing caps (2 and 3) of high pressure pump and lay down in special tool **11 4 480** .

Remove left exhaust camshaft and lay down in special tool **11 4 480** .

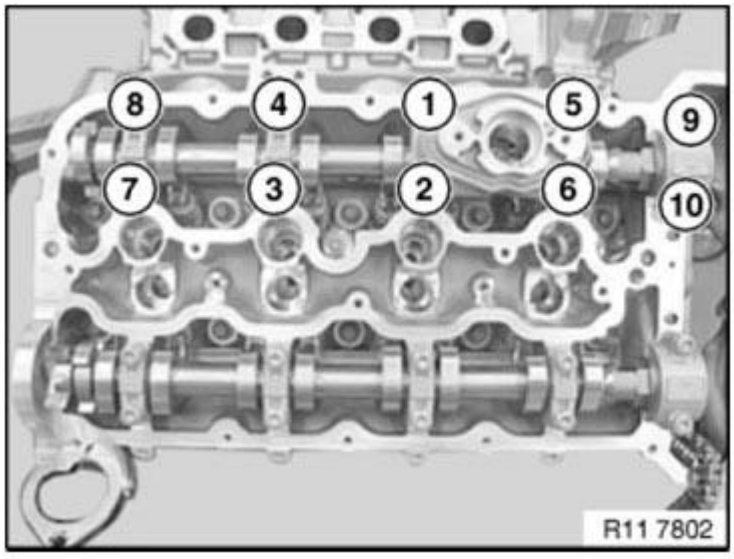


Fig. 230: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) of can slip slightly when inlet camshaft is fitted. Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

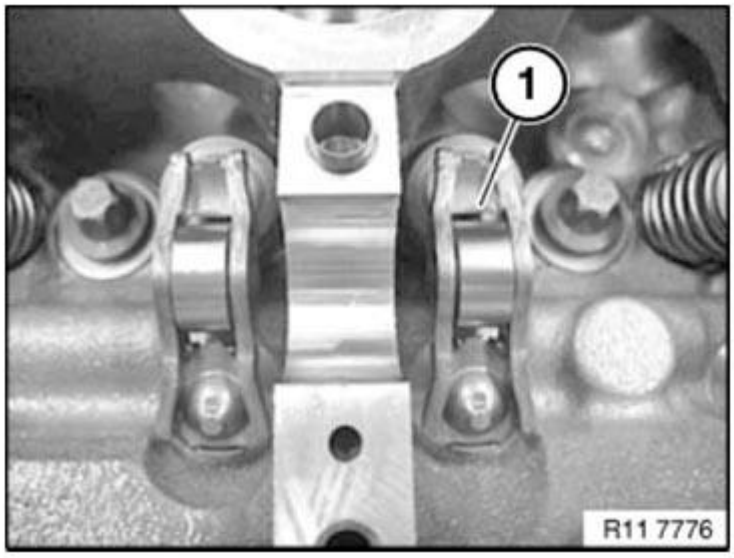


Fig. 231: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

If necessary, replace plain compression rings (1).

Press compression ring (1) on one side into groove, pull up on other side and remove latch mechanism.

Carefully pull compression ring (1) apart and remove towards front.

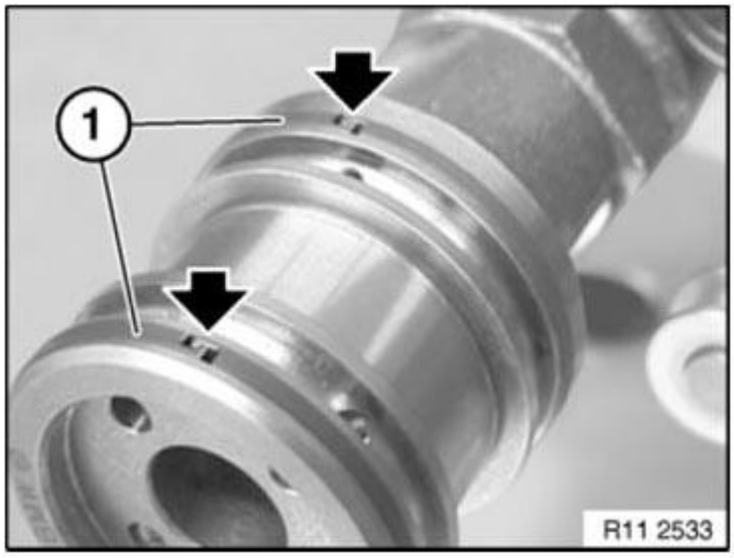


Fig. 232: Locating Compression Ring End
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

Make sure compression rings (1) are engaged at ends.

Coat all bearing positions with engine oil.

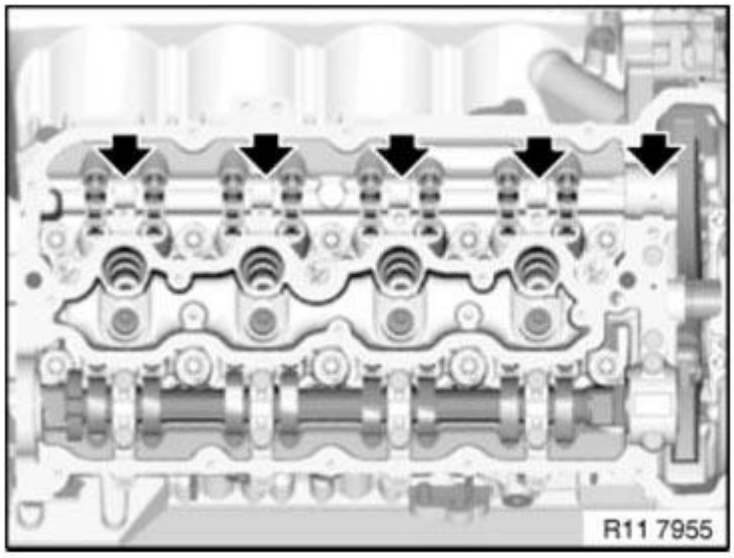


Fig. 233: Locating Bearing Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Install exhaust camshaft (1).

Turn exhaust camshaft (1) until cams point to side at cylinder no. 1 as shown in graphic.

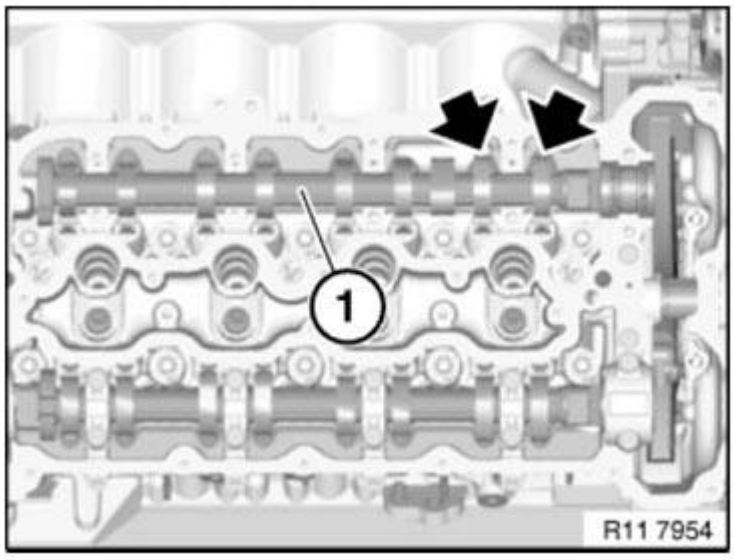


Fig. 234: Identifying Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Bearing caps of cylinders 1-4 and cylinders 5-8 must not be interchanged. All bearing caps are coded and can only be installed in one position.

All bearing caps are marked with letters and numbers:

L= Cylinder bank 1-4.

R= Cylinder bank 5-8.

E= Intake side

A= Exhaust side

1= Marking, bearing point, from 1 to 5

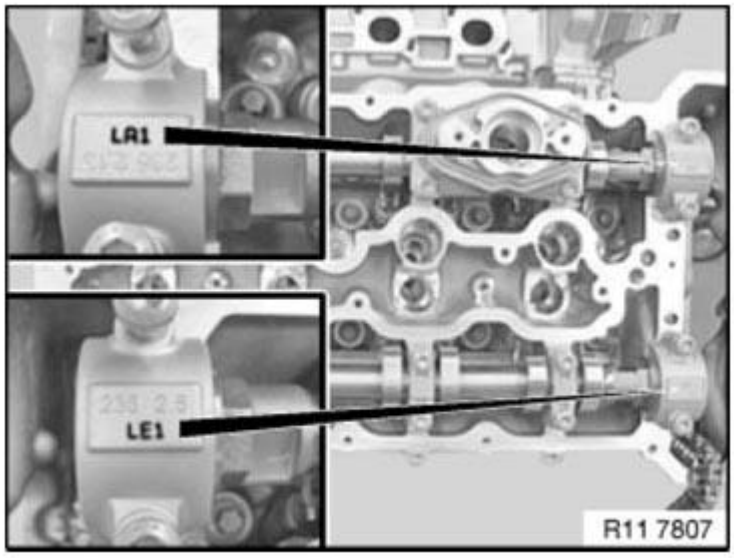


Fig. 235: Identifying Bearing Caps Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all bolts.

Tighten down bolts in sequence (1 to 10) in 1/2 turns.

Tightening torque **11 31 6AZ** .

Tightening torque **11 31 7AZ** .

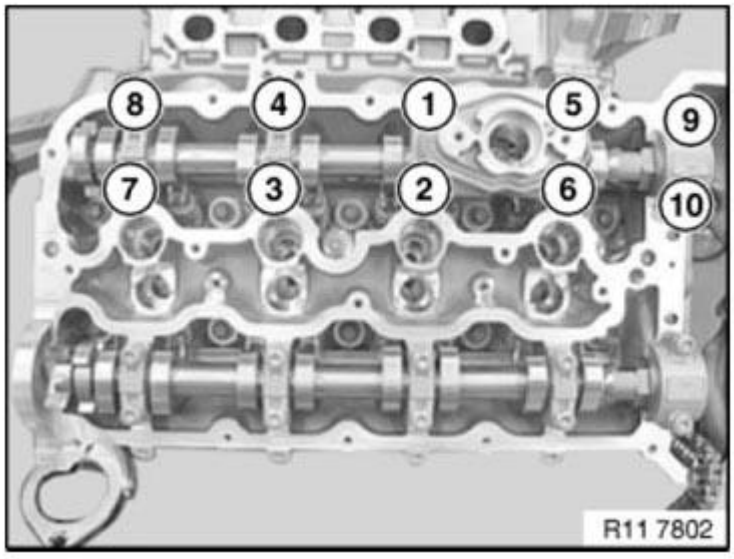


Fig. 236: Identifying Camshaft Bearings Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Install right **INLET AND EXHAUST CAMSHAFT ADJUSTERS** .

Adjust **VALVE TIMING** .

Assemble engine.

1133054 REMOVING AND INSTALLING/RENEWING ROCKER ARMS ON RIGHT SIDE (N63)

Necessary preliminary work

(cylinder bank 1 to 4)

- Remove **INLET AND EXHAUST ADJUSTMENT UNIT** on right side.
- Remove right **INLET CAMSHAFT** .
- Remove right **EXHAUST CAMSHAFT** .

IMPORTANT: Used rocker arms (1) may only be reused in the same position. Tolerance classes are not required.

Remove rocker arm (1) and set down in neat order in special tool **11 4 480** .

Install rocker arm (1).

Align all rocker arms (1) straight.

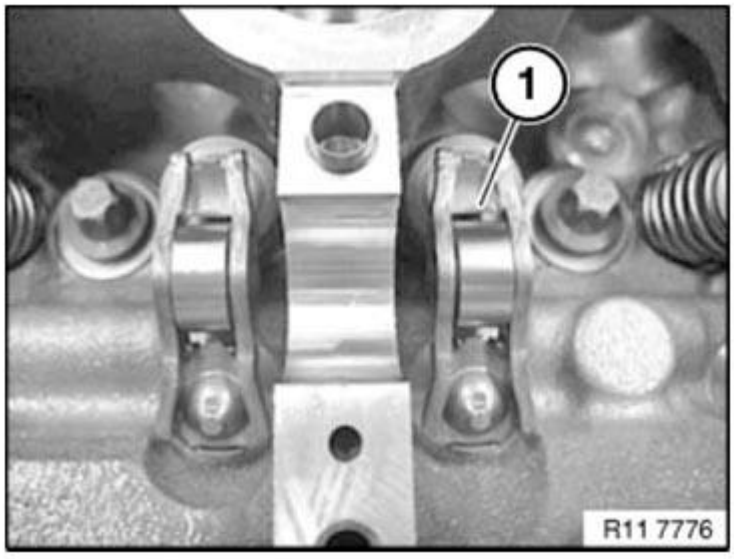


Fig. 237: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1133052 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS ON LEFT SIDE (N63)

Necessary preliminary work

(cylinder bank 5 to 8)

- Remove **LEFT INLET CAMSHAFT** .
- Remove left **EXHAUST CAMSHAFT** .

IMPORTANT: Used rocker arms (1) may only be reused in the same position. Tolerance classes are not required.

Remove rocker arm (1) and set down in neat order in special tool **11 4 480** .

Install rocker arm (1).

Align all rocker arms (1) straight.

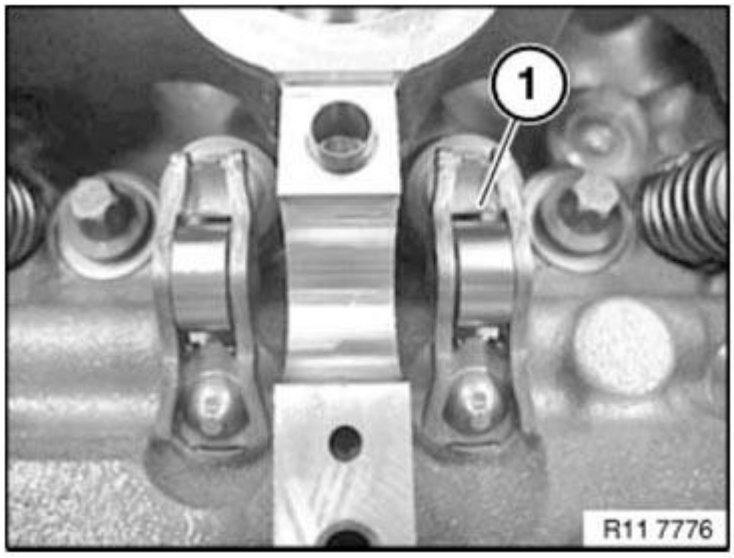


Fig. 238: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1131036 REMOVING AND INSTALLING/REPLACING LEFT EXHAUST CAMSHAFT (N63)

Necessary preliminary work

(cylinder bank 5 to 8)

IMPORTANT: The exhaust camshaft must first be rotated in such a way that the camshaft is

free from tension when the bearing caps are released risk of damage.

- Remove **LEFT CYLINDER HEAD COVER** .
- Check **TIMING** .
- Remove **LEFT INLET ADJUSTMENT UNIT** .

IMPORTANT: No cam on the exhaust camshaft is permitted to press directly onto a roller cam follower.
With cylinder no. 1 at 150° before firing TDC there is no piston in the TDC position.

Rotate exhaust camshaft (2) at dihedron with a fork wrench into a suitable position.

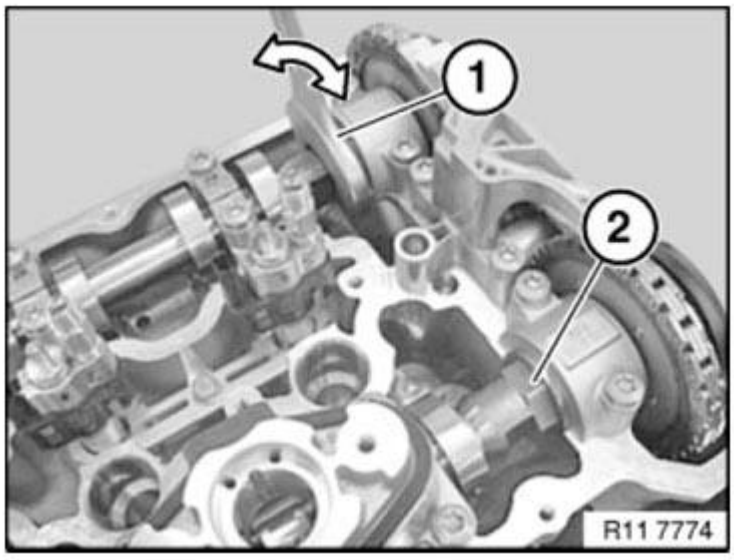


Fig. 239: Rotating Exhaust Camshaft At Dihedron With Fork Wrench Into Suitable Position
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (10 to 1) in 1/2 turns.

Set down all bearing caps in a tidy and orderly fashion on special tool **11 4 480** .

Remove roller tappet from bearing cap (2 and 3) of high pressure pump and set down on special tool **11 4 480** .

Remove left exhaust camshaft and set down on special tool **11 4 480** .

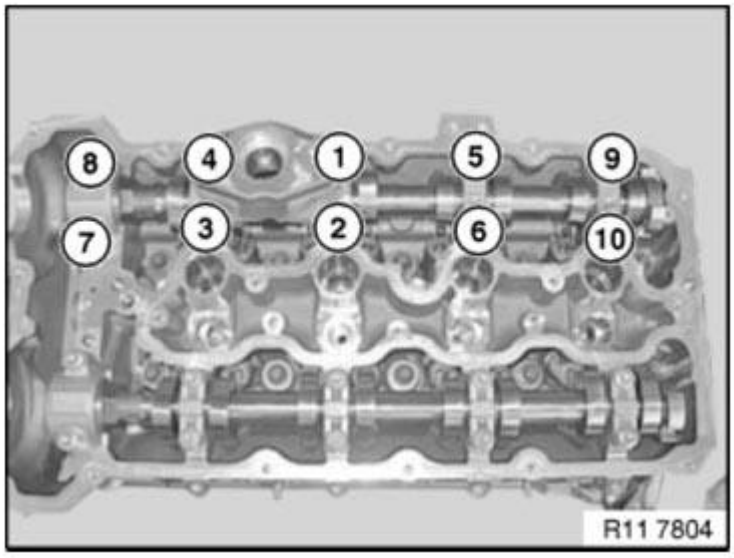


Fig. 240: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after exhaust camshaft has been removed. Do "not" remove rocker arms (1) on exhaust side.

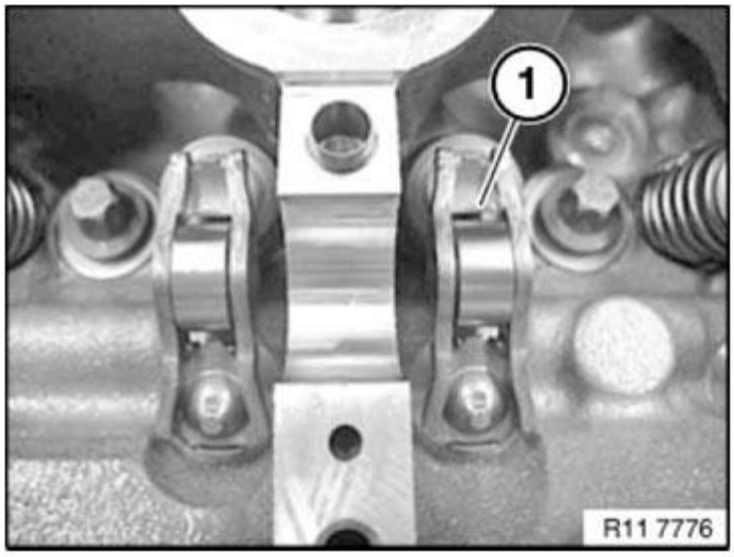


Fig. 241: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

If necessary, replace plain compression rings (1).

Press compression ring (1) on one side into groove, pull up on other side and remove catch.

Carefully pull compression ring (1) apart and remove towards front.

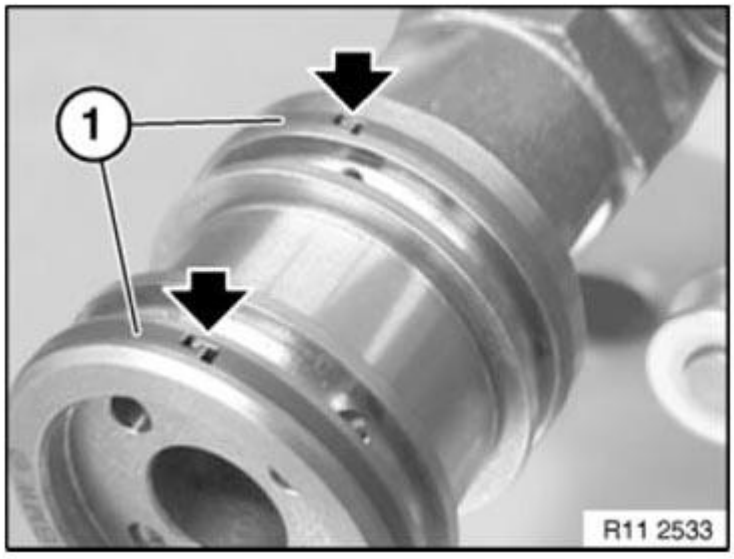


Fig. 242: Locating Compression Ring End
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

Make sure compression rings (1) are engaged at ends.

NOTE: Exhaust camshaft of cylinder bank 5 to 8 is marked with "A 5-8".

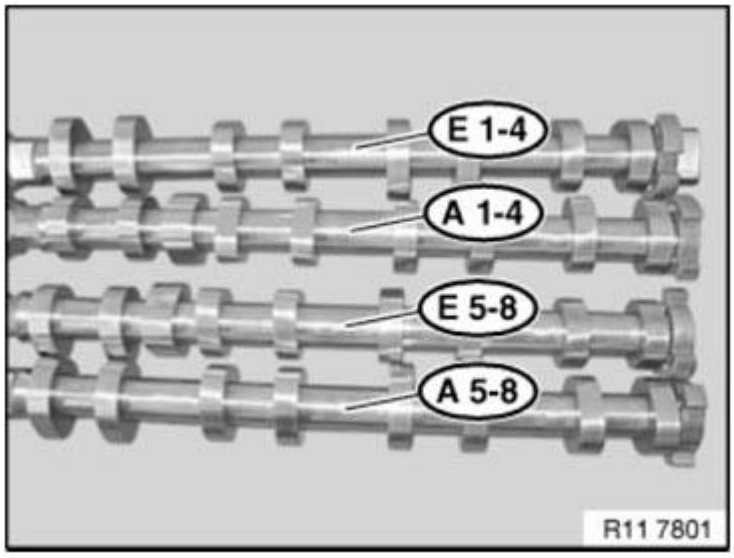


Fig. 243: Identifying Camshaft Of Cylinder Bank Mark
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when exhaust camshaft is fitted. Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

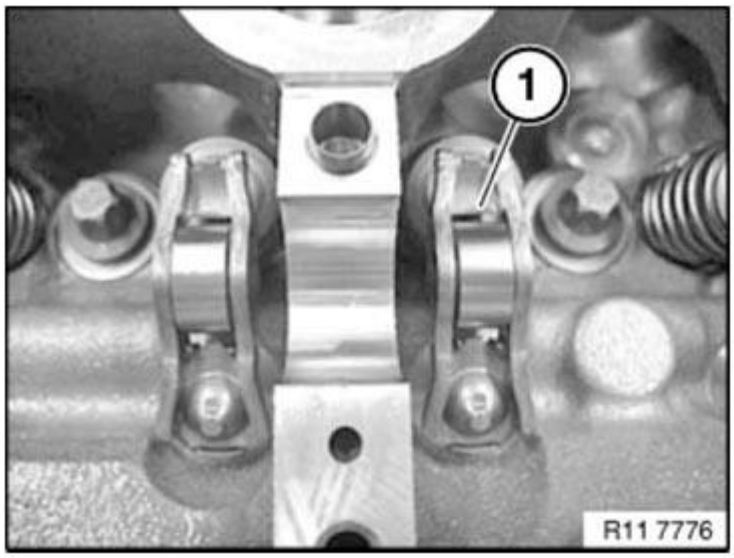


Fig. 244: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Coat all bearing positions with engine oil.

Install exhaust camshaft (1).

Insert exhaust camshaft (1) so that cams point to side at cylinder 5 as shown in picture.

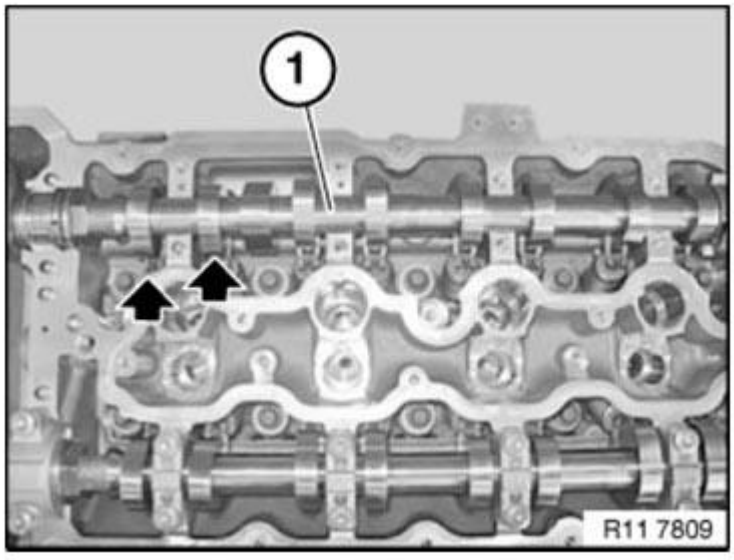


Fig. 245: Identifying Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 4 and 5 to 8. All bearing caps are coded and can only be installed in one position.

All bearing caps are marked:

L= Cylinders 1 - 4.

R= Cylinders 5 - -8.

E= Intake side

A= Exhaust side

1= designation from 1 to 5

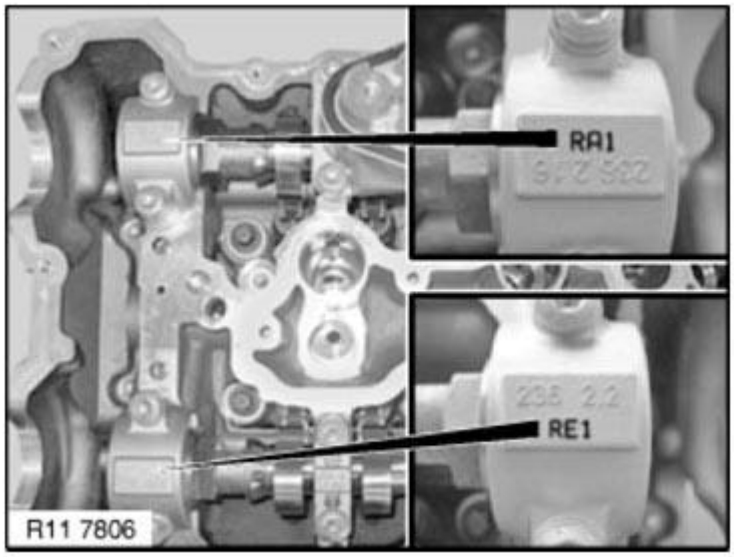


Fig. 246: Identifying Bearing Caps Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all bolts.

Tighten down bolts in sequence (1 to 10) in 1/2 turns.

Tightening torque: **11 31 6AZ** .

Tightening torque: **11 31 7AZ** .

Insert tappets for high-pressure pump.

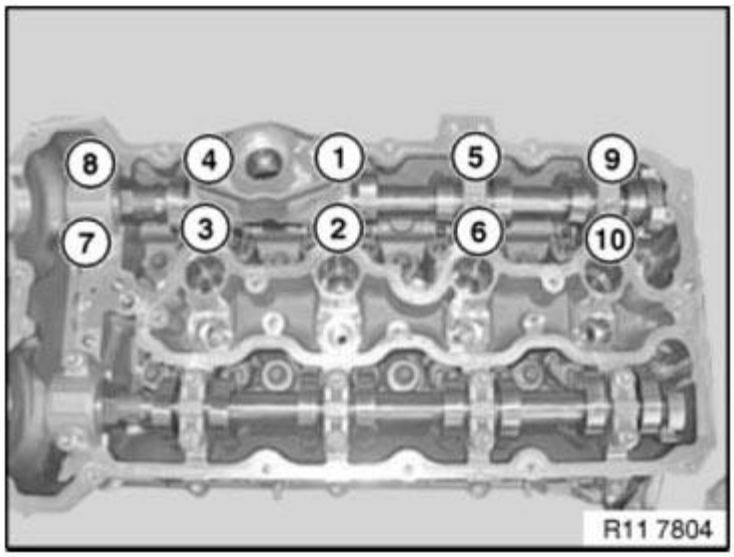


Fig. 247: Identifying Camshaft Bearings Bolts Tightening Sequence

Courtesy of BMW OF NORTH AMERICA, INC.

Install **INLET ADJUSTMENT UNITS** .

Adjust **VALVE TIMING** .

Assemble engine.

1131032 REMOVING AND INSTALLING/REPLACING LEFT INLET CAMSHAFT (N63)

Necessary preliminary work

(cylinder bank 5 to 8)

IMPORTANT: The intake camshaft must first be rotated in such a way that the camshaft is free from tension when the bearing caps are released (risk of damage).

- Remove **LEFT CYLINDER HEAD COVER** .
- Check **TIMING** .
- Remove **LEFT INLET ADJUSTMENT UNIT** .

IMPORTANT: No cam on the inlet camshaft is permitted to press directly onto a roller cam follower.
With cylinder no. 1 at 150° before firing TDC there is no piston in the TDC position.

Rotate left inlet camshaft at dihedron with a fork wrench (1) into a suitable position.

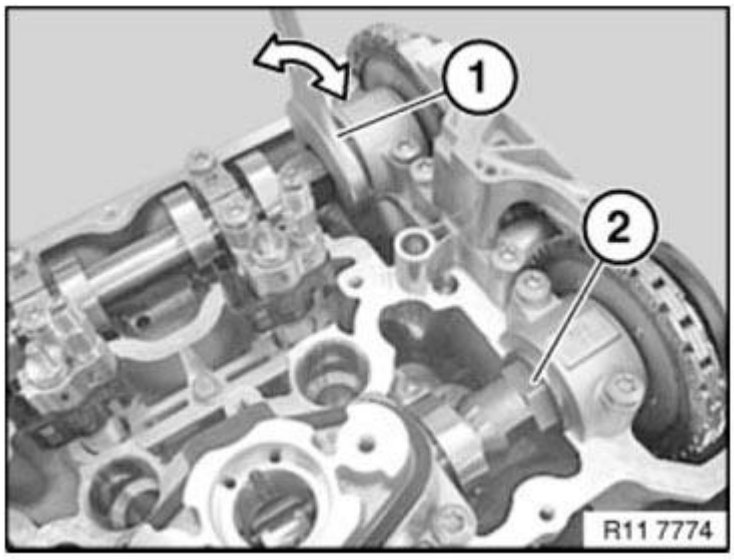


Fig. 248: Rotating Left Inlet Camshaft At Dihedron With Fork Wrench

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (10 to 1) in 1/2 turns.

Set down all bearing caps in a tidy and orderly fashion on special tool **11 4 480** .

Intake camshaft

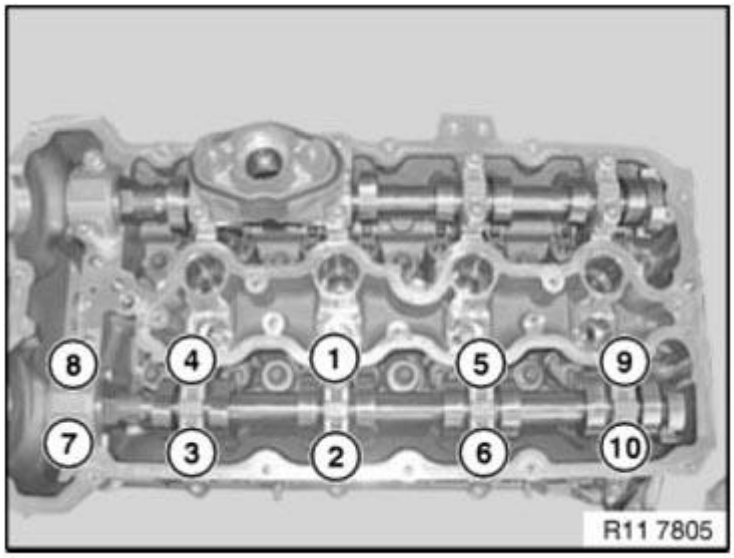


Fig. 249: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after inlet camshaft has been removed. Do "not" remove rocker arm (1) on intake side.

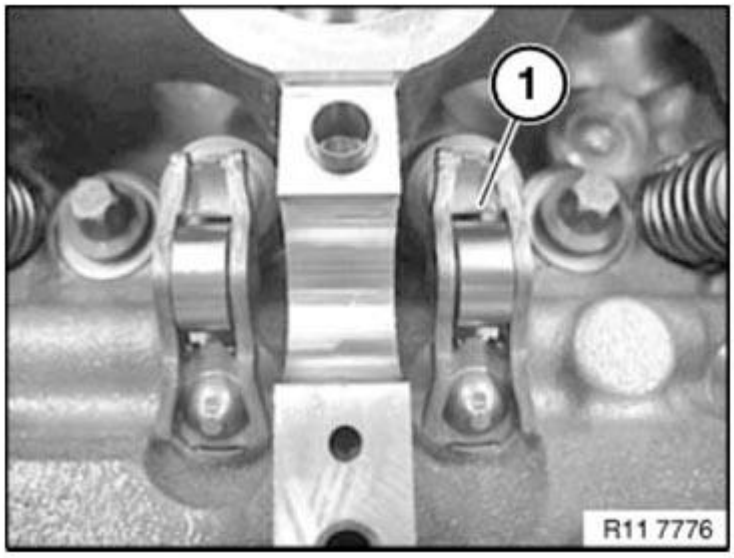


Fig. 250: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

If necessary, replace plain compression rings (1).

Press compression ring (1) on one side into groove, pull up on other side and remove catch.

Carefully pull compression ring (1) apart and remove towards front.

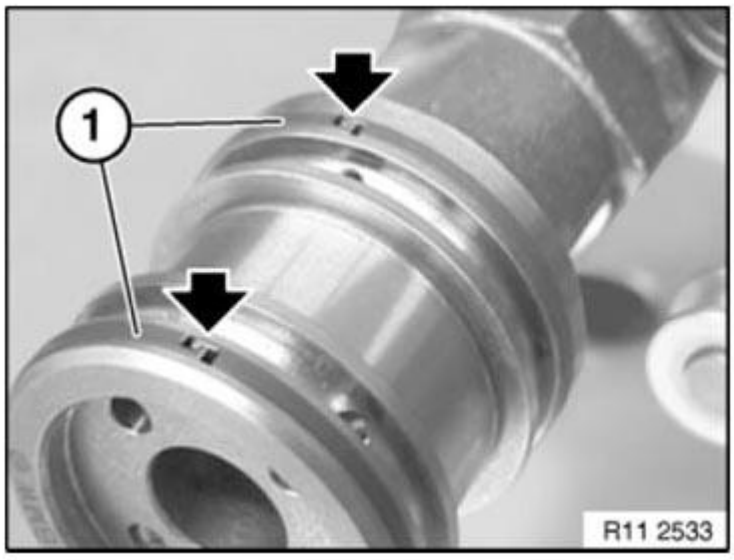


Fig. 251: Locating Compression Ring End
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

Make sure compression rings (1) are engaged at ends.

NOTE: The intake camshaft of cylinder bank 5 to 8 is marked with "E 5-8".

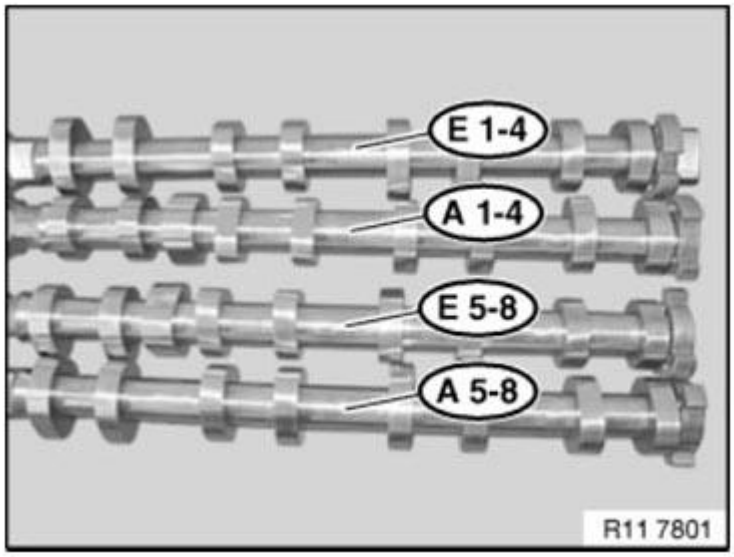


Fig. 252: Identifying Camshaft Of Cylinder Bank Mark
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when inlet camshaft is fitted. Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

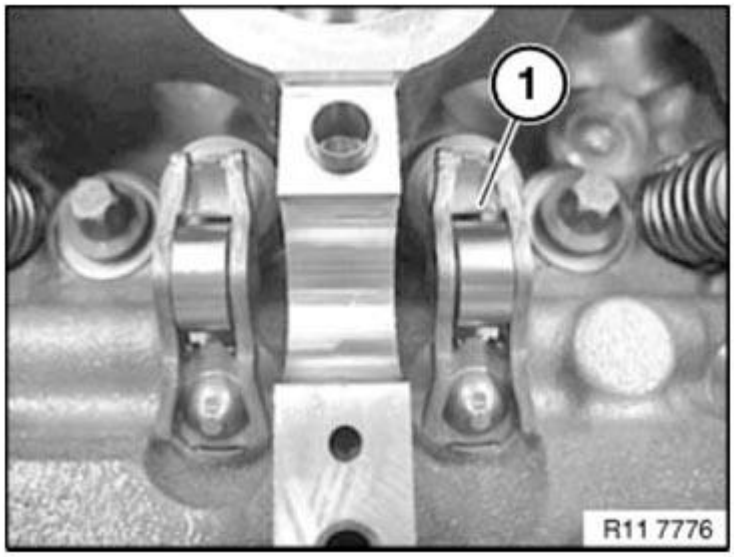


Fig. 253: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Coat all bearing positions with engine oil.

Insert intake camshaft.

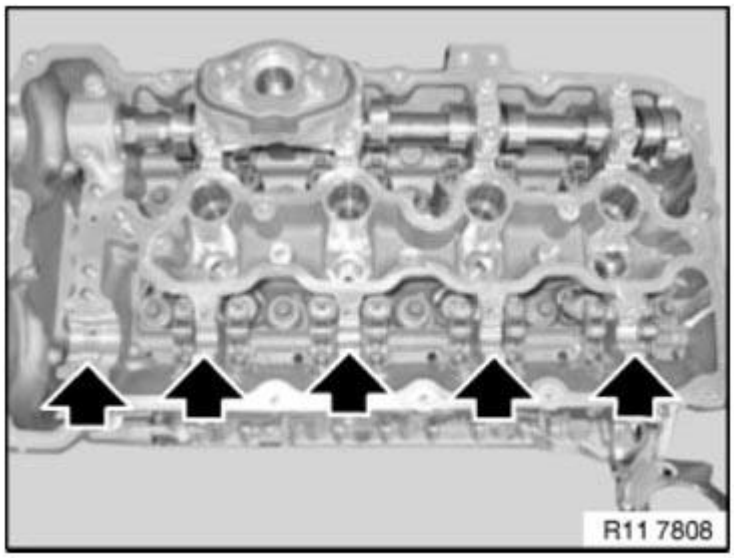


Fig. 254: Locating Bearing Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Insert inlet camshaft (1) so that cams point to side at cylinder 5 as shown in picture.

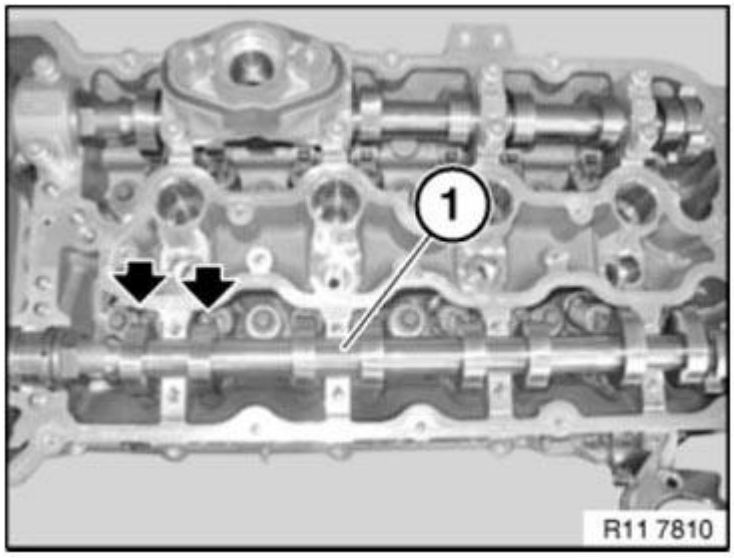


Fig. 255: Positioning Inlet Camshaft So That Cams Point To Side At Cylinder 5
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 4 and 5 to 8.

All bearing caps are coded and can only be installed in one position.

All bearing caps are marked:

L= Cylinders 1 - 4.

R= Cylinders 5 - 8.

E= Intake side

A= Exhaust side

1= designation from 1 to 5

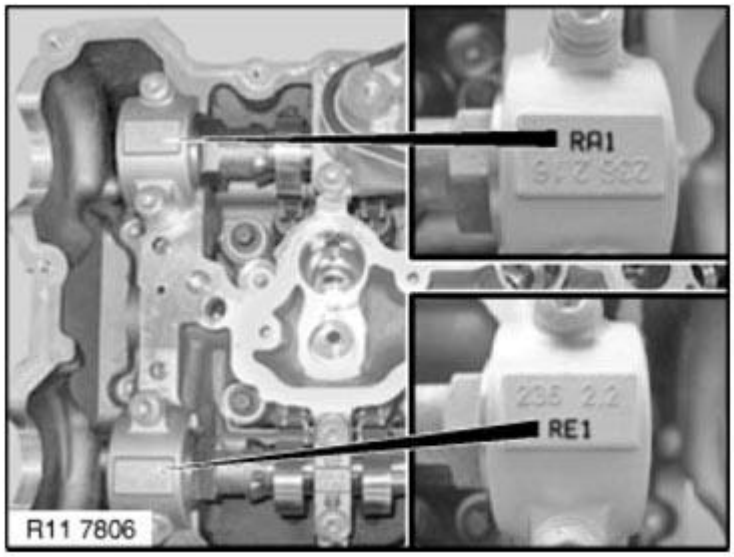


Fig. 256: Identifying Bearing Caps Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all bolts.

Tighten down bolts in sequence (1 to 10) in 1/2 turns.

Tightening torque: **11 31 6AZ** .

Tightening torque: **11 31 7AZ** .

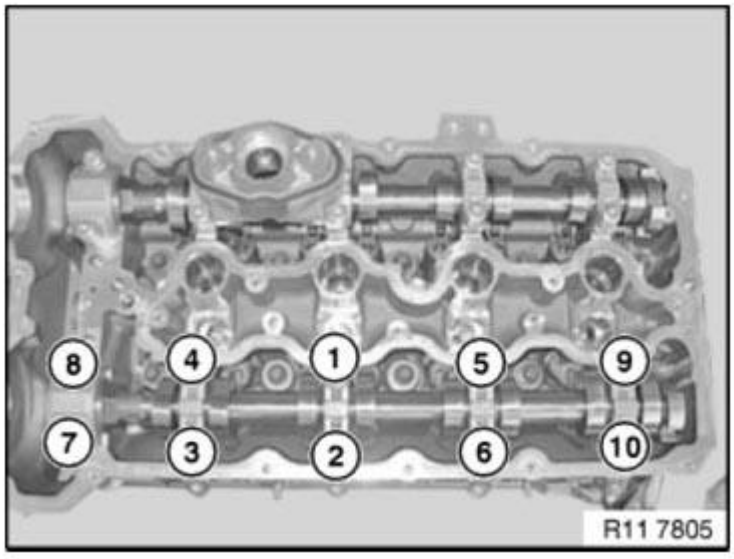


Fig. 257: Identifying Camshaft Bearings Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Install **INLET ADJUSTMENT UNITS** .

Adjust **VALVE TIMING** .

Assemble engine.

1131034 REMOVING AND INSTALLING/REPLACING RIGHT INLET CAMSHAFT (N63)

Necessary preliminary work

(cylinder bank 1 to 4)

IMPORTANT: The intake camshaft must first be rotated in such a way that the camshaft is free from tension when the bearing caps are released (risk of damage).

- Remove right **CYLINDER HEAD COVER** .
- Check **TIMING** .
- Remove **RIGHT INLET ADJUSTMENT UNIT** .

IMPORTANT: No cam on the inlet camshaft is permitted to press directly onto a roller cam follower.
With cylinder no. 1 at 150° before firing TDC there is no piston in the TDC position.

Rotate right inlet camshaft (2) at dihedron with a fork wrench (1) into a suitable position.

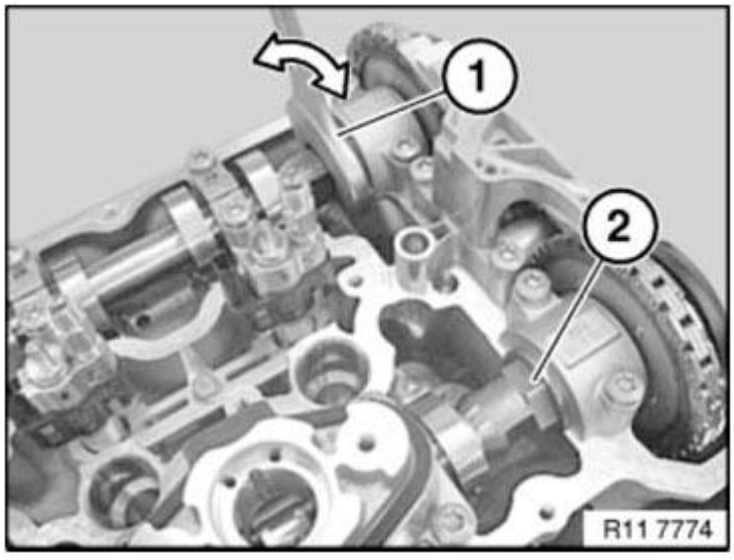


Fig. 258: Rotating Exhaust Camshaft At Dihedron With Fork Wrench Into Suitable Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration shows cyl. 5 to 8.

Release bolts of camshaft bearings in sequence (10 to 1) in 1/2 turns.

Set down all bearing caps in a tidy and orderly fashion on special tool **11 4 480** .

Intake camshaft

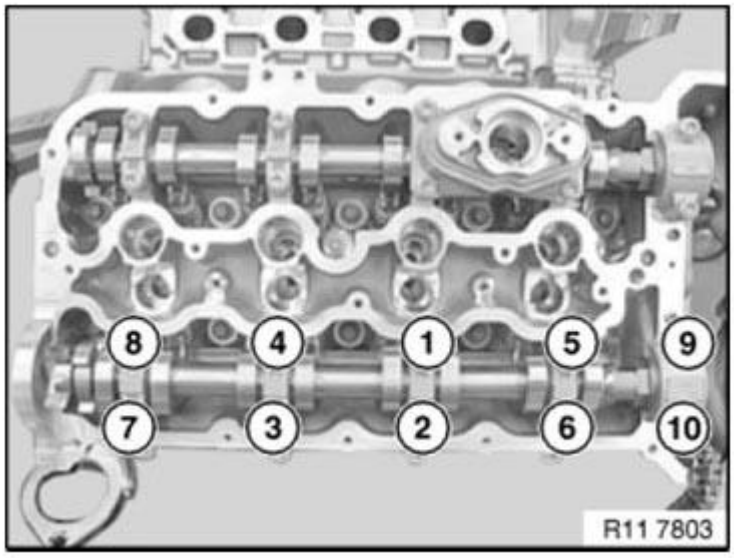


Fig. 259: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after inlet camshaft has been removed. Do "not" remove rocker arm (1) on intake side.

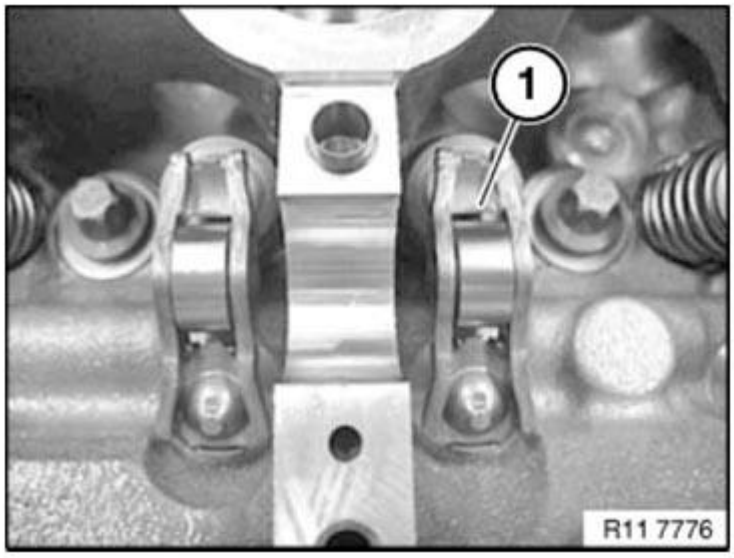


Fig. 260: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

If necessary, replace plain compression rings (1).

Press compression ring (1) on one side into groove, pull up on other side and remove catch.

Carefully pull compression ring (1) apart and remove towards front.

Ends of compression rings (1) point upwards.

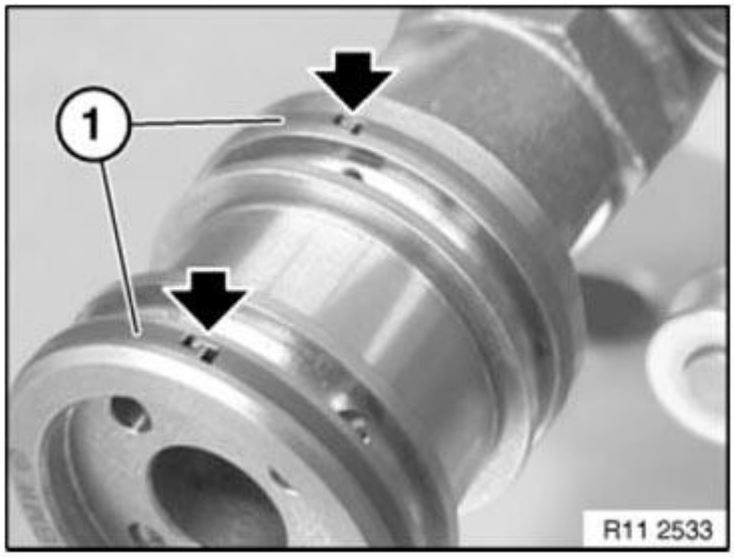


Fig. 261: Locating Compression Ring End

Courtesy of BMW OF NORTH AMERICA, INC.

Make sure compression rings (1) are engaged at ends.

NOTE: The intake camshaft of cylinder bank 5 to 8 is marked with "E 5-8".

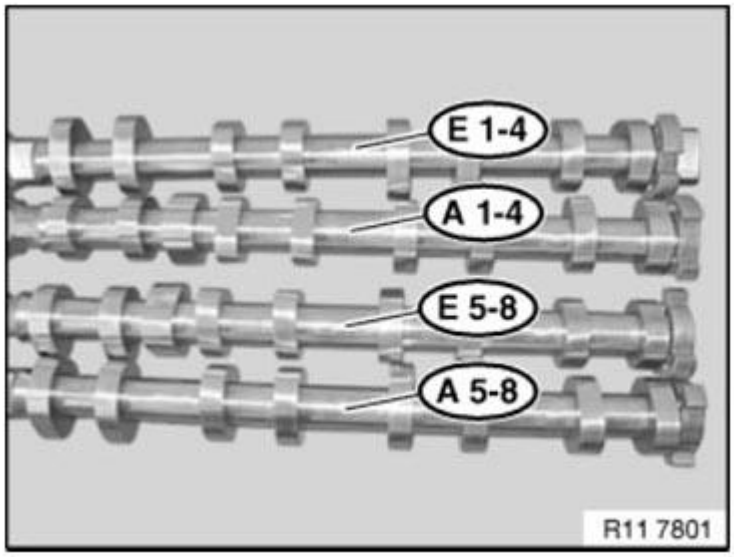


Fig. 262: Identifying Camshaft Of Cylinder Bank Mark
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Rocker arms (1) slip slightly when inlet camshaft is fitted.
Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.**

Align all rocker arms (1) straight.

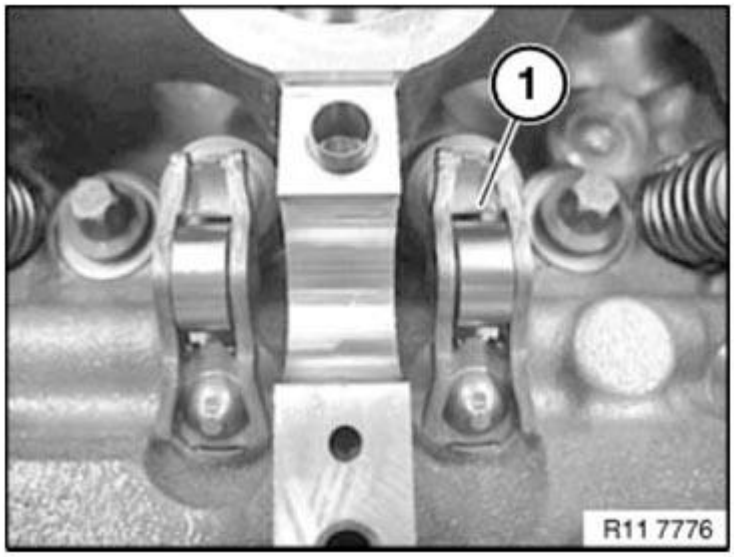


Fig. 263: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Coat all bearing positions with engine oil.

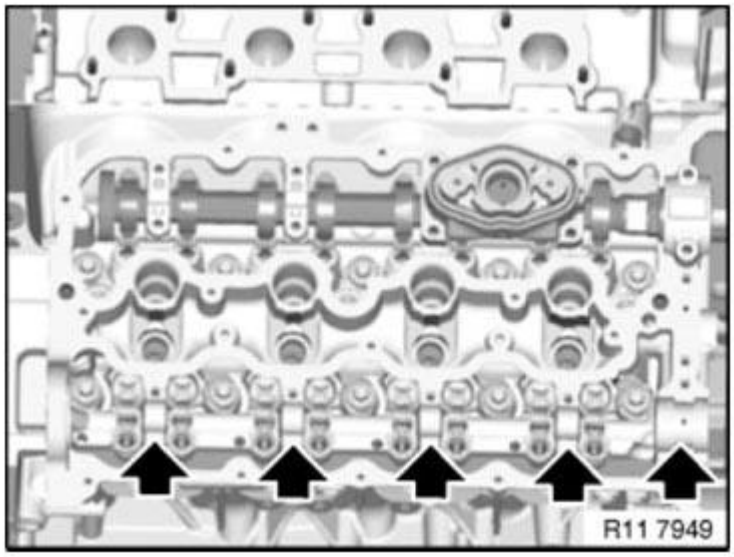


Fig. 264: Locating Bearing Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Insert intake camshaft.

Insert inlet camshaft (1) so that cams point to side at cylinder 1 as shown in picture.

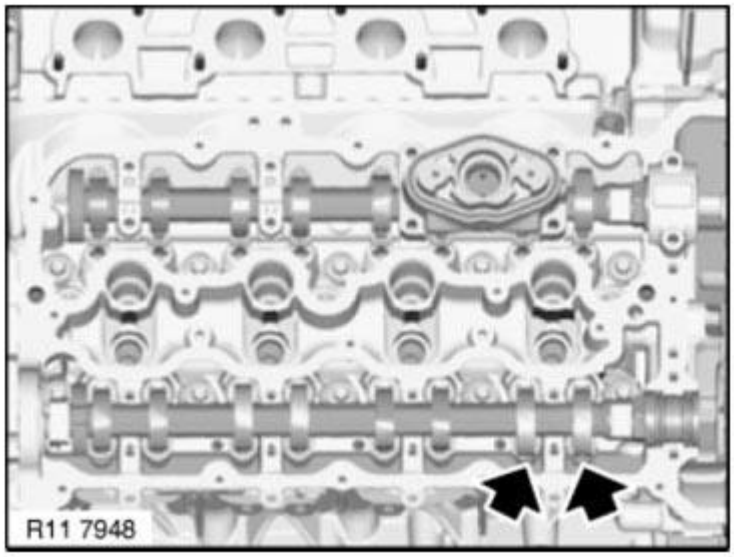


Fig. 265: Positioning Inlet Camshaft So That Cams Point To Side At Cylinder 1
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 4 and 5 to 8. All bearing caps are coded and can only be installed in one position.

All bearing caps are marked with letters and numbers:

L= Cylinder bank 1-4.

R= Cylinder bank 5-8.

E= Intake side

A= Exhaust side

1= designation, bearing point, from 1 to 5

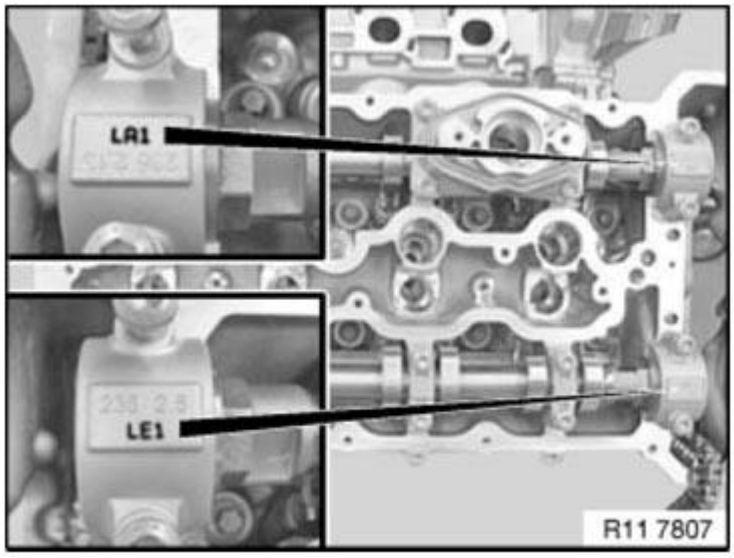


Fig. 266: Identifying Bearing Caps Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all bolts.

Tighten down bolts in sequence (1 to 10) in 1/2 turns.

Tightening torque: **11 31 6 AZ** .

Tightening torque: **11 31 7 AZ** .

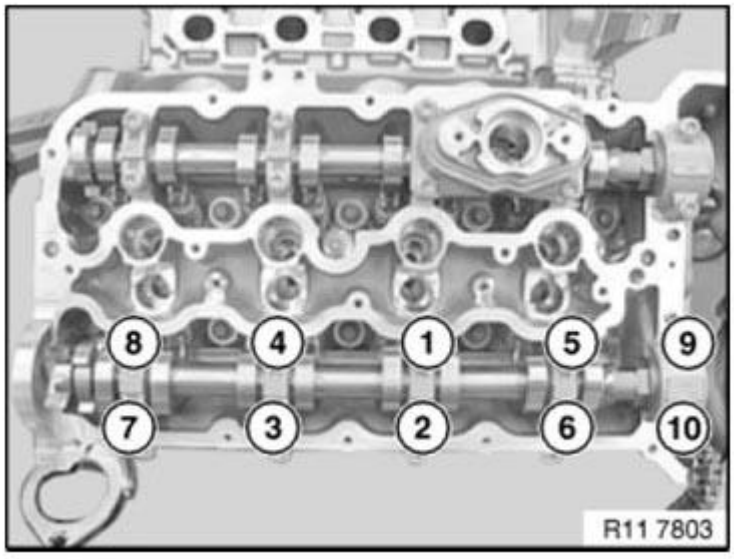


Fig. 267: Identifying Camshaft Bearings Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Install **INLET ADJUSTMENT UNITS** .

Adjust **VALVE TIMING** .

Assemble engine.

1131094 REMOVING HYDRAULIC CHAIN TENSIONER FOR TIMING CHAINS ON LEFT SIDE (N63)

Notes

WARNING: Chain tensioner is pre-tensioned.
Release lock pin only in installed state.
Danger of injury!

IMPORTANT: Risk of damage!
The engine must not be cranked when the chain tensioner is removed.
The timing chain may jump.

Necessary preliminary work

- Remove **TIMING CASE COVER** at top left

Crank engine back at central bolt (1) against direction of engine rotation by approx. 90°.

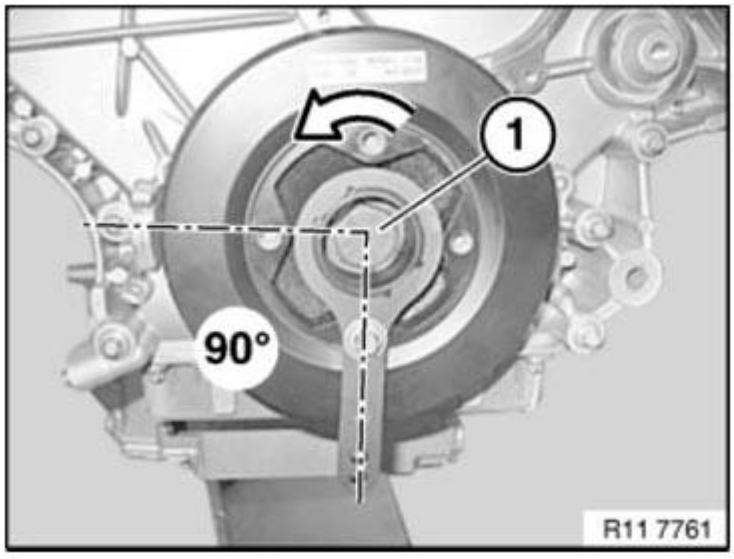


Fig. 268: Cranking Engine Back At Central Bolt Against Direction Of Engine Rotation By Approx. 90°
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The timing chain on the chain tensioner becomes the tight end on cranking back.

Do not crank engine without chain tensioner or special tool 11 9 900 .

Piston (1) of chain tensioner must be pressed in against oil pressure in housing (see arrow).

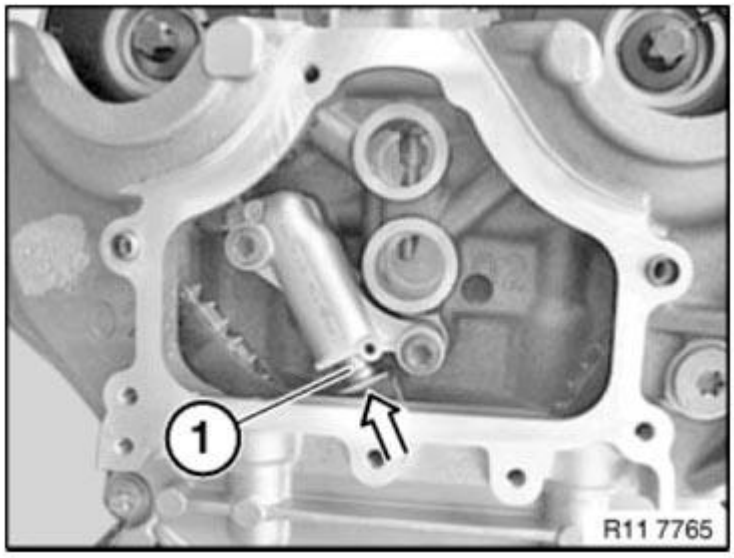


Fig. 269: Identifying Piston Of Chain Tensioner Pressed In Against Oil Pressure In Housing
Courtesy of BMW OF NORTH AMERICA, INC.

If the chain tensioner piston is retracted over its full length, a 3.5 mm drill bit or a suitable lock pin must be positioned.

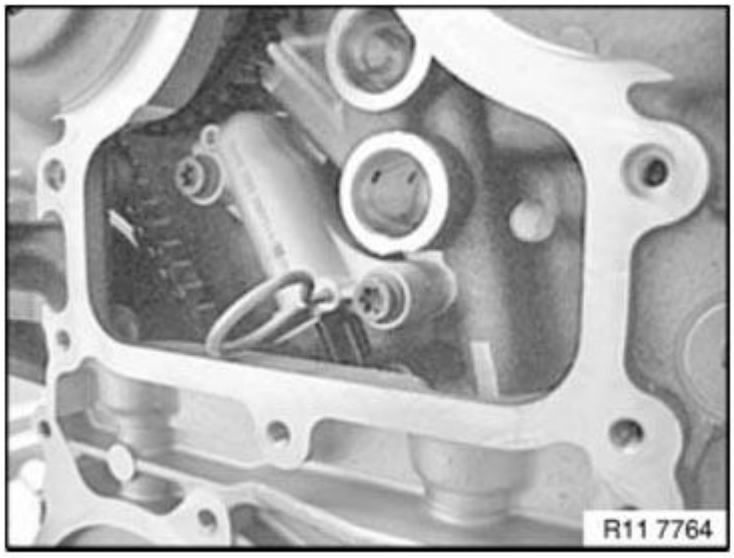


Fig. 270: Identifying Chain Tensioner Piston Retracted Over Its Full Length
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 31 5AZ** .

Remove chain tensioner (2).

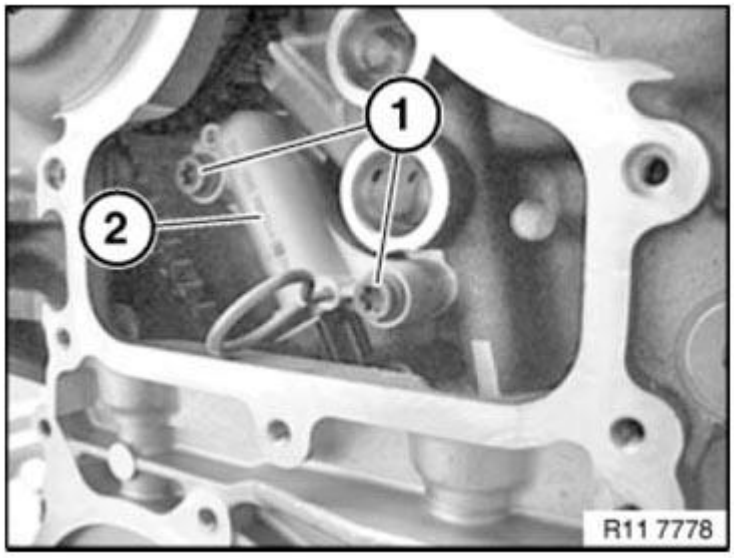


Fig. 271: Identifying Chain Tensioner And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of injury!
Chain tensioner is under high preload force.

Chain tensioner arrangement:

- Piston
- Expansion element
- Compression spring
- Housing

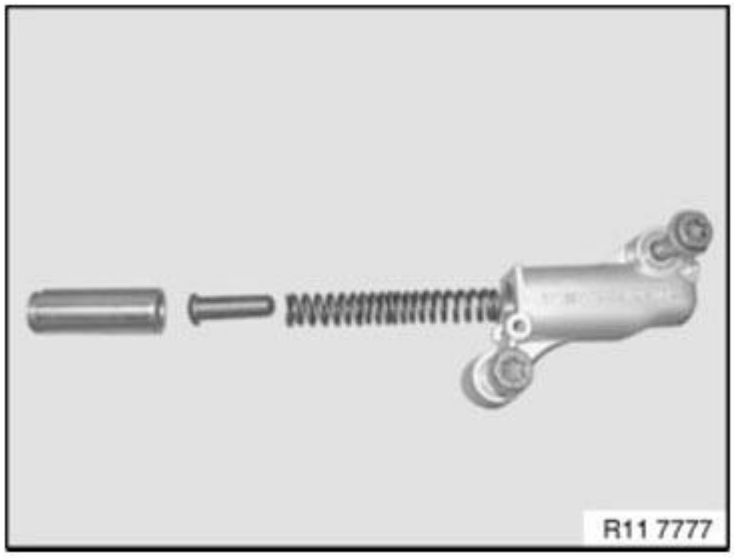


Fig. 272: Identifying Chain Tensioner Arrangement
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace all gaskets and sealing rings

Assemble engine.

1131095 REMOVING HYDRAULIC CHAIN TENSIONER FOR TIMING CHAINS ON RIGHT SIDE (N63)

Notes

WARNING: Chain tensioner is pre-tensioned.
Release lock pin only in installed state.
Danger of injury!

IMPORTANT: Risk of damage!
The engine must not be cranked when the chain tensioner is removed.
The timing chain may jump.

Necessary preliminary work

- Remove **TIMING CASE COVER** at top right

Crank engine back at central bolt (1) against direction of engine rotation by approx. 180°.

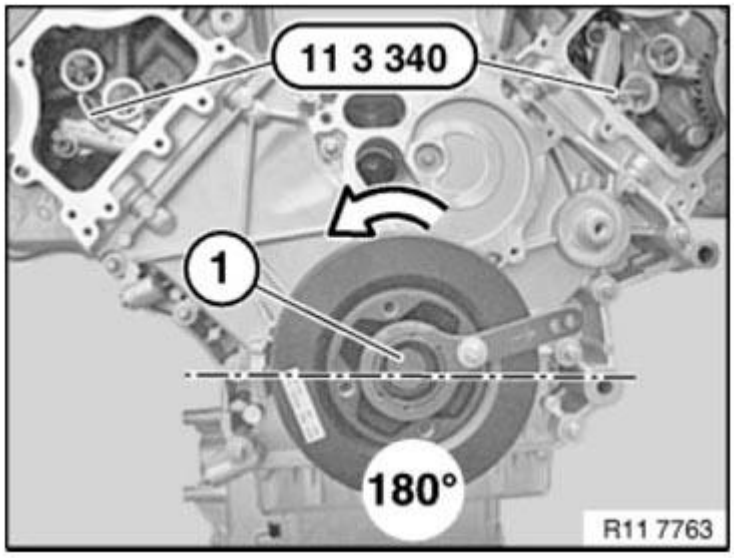


Fig. 273: Cranking Engine Back At Central Bolt Against Direction Of Engine Rotation By Approx. 180°
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The timing chain on the chain tensioner becomes the tight end on cranking back.
Do not crank engine without chain tensioner or special tool 11 9 900 .

Piston (1) of chain tensioner must be pressed in against oil pressure in housing (see arrow).

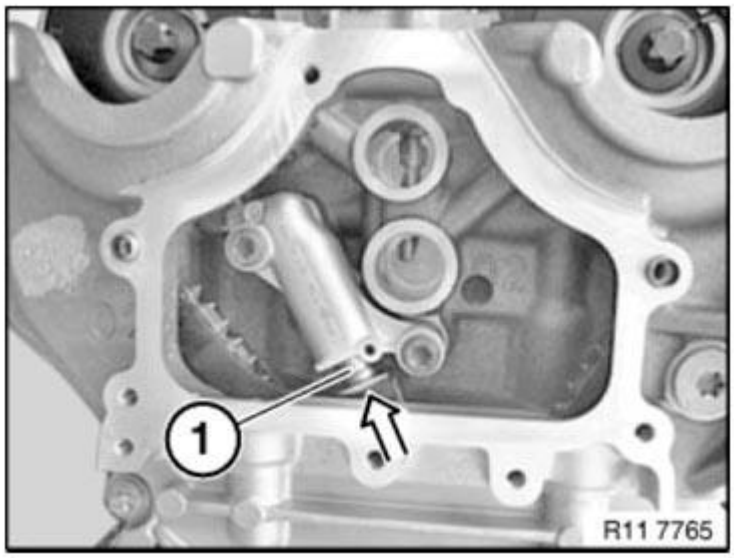


Fig. 274: Identifying Piston Of Chain Tensioner Pressed In Against Oil Pressure In Housing
Courtesy of BMW OF NORTH AMERICA, INC.

If the chain tensioner piston is retracted over its full length, a 3.5 mm drill bit or a suitable lock pin must be positioned.

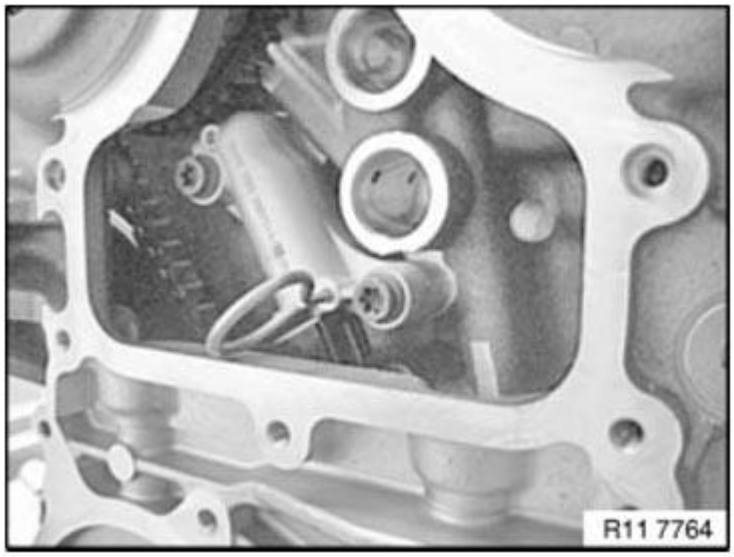


Fig. 275: Identifying Chain Tensioner Piston Retracted Over Its Full Length
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 31 5AZ** .

Remove chain tensioner (2).

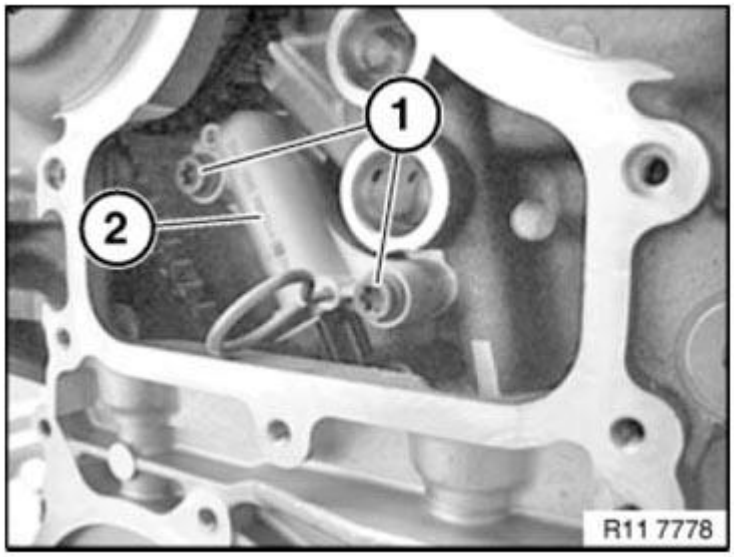


Fig. 276: Identifying Chain Tensioner And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of injury!
Chain tensioner is under high preload force.

Chain tensioner arrangement:

- Piston
- Expansion element
- Compression spring
- Housing

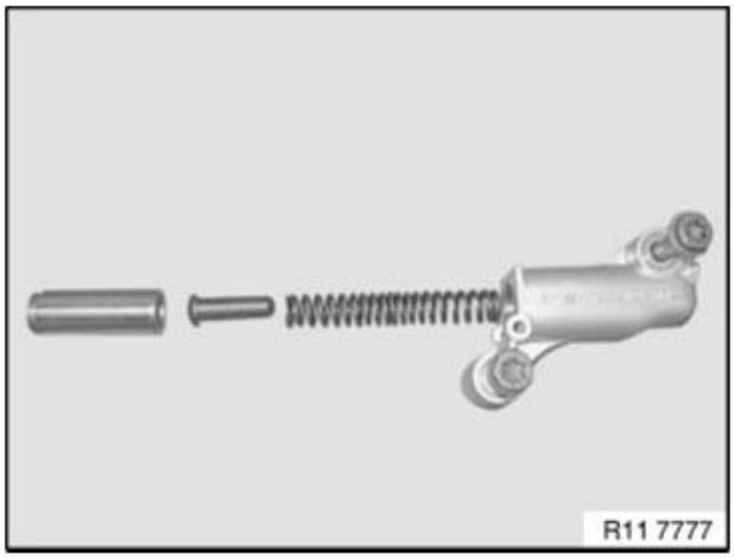


Fig. 277: Identifying Chain Tensioner Arrangement
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace all gaskets and sealing rings

Assemble engine.

1131052 REPLACING BOTH TIMING CHAINS (N63)

Notes

WARNING: **Burning hazard! Wear gloves.**

Necessary preliminary work

- Remove lower **TIMING CASE COVER**
- To facilitate removal and installation of timing chains, turn engine over with special tool **00 2 300** .

Timing drive, cylinders 1 to 4

Remove guide rail (5) from bearing bolt.

Remove timing chain (3) with tensioning rail (4) from bearing bolt.

Timing drive, cylinders 5 to 8

Remove guide rail (1) from bearing bolt.

Remove timing chain (2) with tensioning rail (6) from bearing bolt.

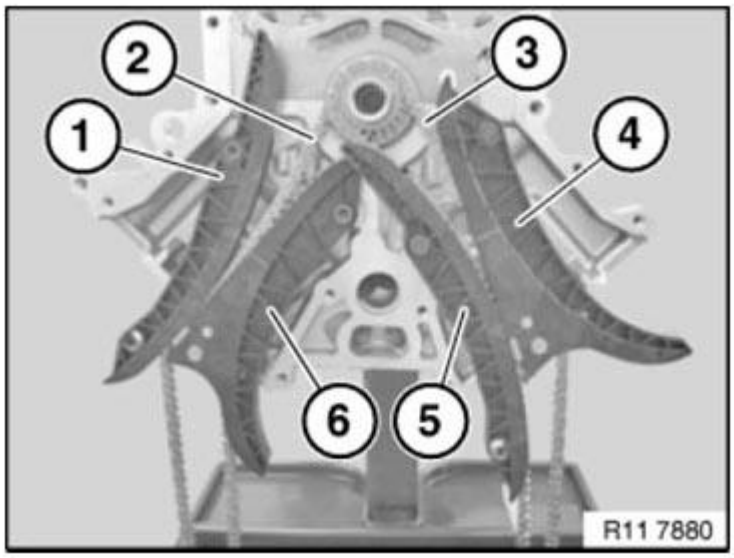


Fig. 278: Identifying Guide Rail, Timing Chain And Tensioning Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Timing drive, cylinders 1 to 4

Release bearing bolts (2) with a suitable tool.

Tightening torque: **11 31 1AZ** .

Timing drive, cylinders 5 to 8

Release bearing bolts (1).

Tightening torque: **11 31 2AZ** .

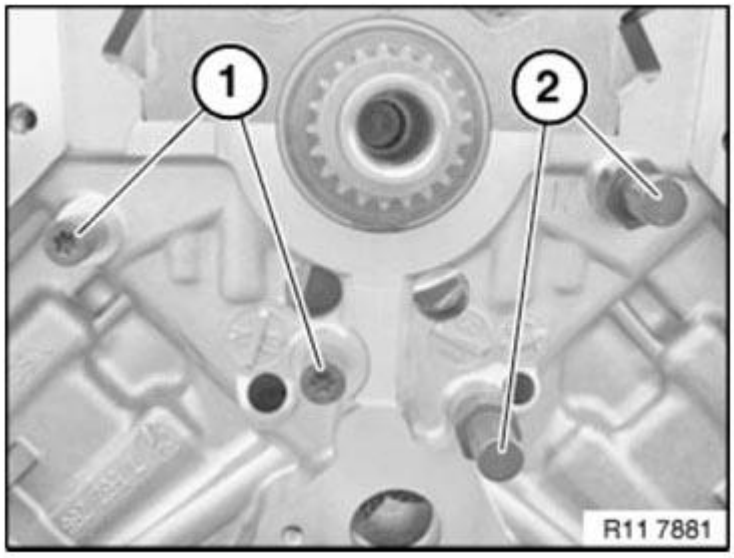


Fig. 279: Identifying Bearing Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tools 11 2 001 and 11 2 002 to the crankshaft.

Insert special tool 11 2 007 and remove sprocket wheel with special tool 11 2 003.

Installation note:

Check sprocket wheels for wear, replace if necessary.

Heat sprocket wheel to **60°C.**

WARNING: Burning hazard! Wear gloves.

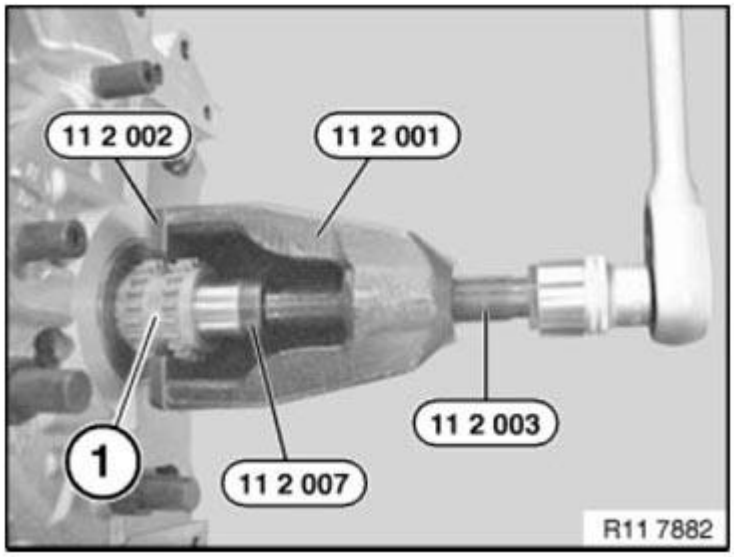


Fig. 280: Removing Sprocket Wheel With Special Tool 11 2 003
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure Woodruff key (1) is installed in correct position in crankshaft (2).

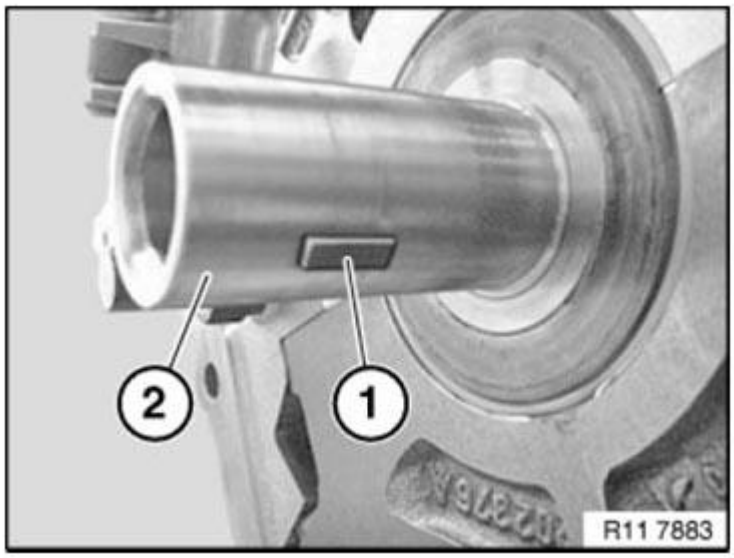


Fig. 281: Identifying Woodruff Key Installed In Correct Position In Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Maintain tension of timing chains when installing timing case cover.

Observe sparking protection on timing case cover.

Make sure timing chain (1) is correctly installed when placing it in guide rail (3).

Assemble engine.

1133 ROCKER ARM WITH BEARING MOUNT

1133054 REMOVING AND INSTALLING/RENEWING ROCKER ARMS ON RIGHT SIDE (N63)

Necessary preliminary work

(cylinder bank 1 to 4)

- Remove **INLET AND EXHAUST ADJUSTMENT UNIT** on right side.
- Remove right **INLET CAMSHAFT** .
- Remove right **EXHAUST CAMSHAFT** .

IMPORTANT: Used rocker arms (1) may only be reused in the same position. Tolerance classes are not required.

Remove rocker arm (1) and set down in neat order in special tool **11 4 480** .

Install rocker arm (1).

Align all rocker arms (1) straight.

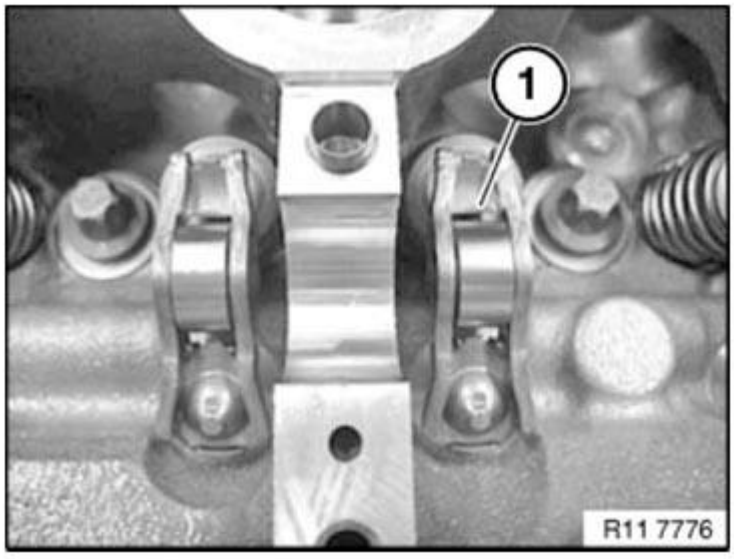


Fig. 282: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1133052 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS ON LEFT SIDE (N63)

Necessary preliminary work

(cylinder bank 5 to 8)

- Remove **LEFT INLET CAMSHAFT** .
- Remove left **EXHAUST CAMSHAFT** .

IMPORTANT: Used rocker arms (1) may only be reused in the same position. Tolerance classes are not required.

Remove rocker arm (1) and set down in neat order in special tool **11 4 480** .

Install rocker arm (1).

Align all rocker arms (1) straight.

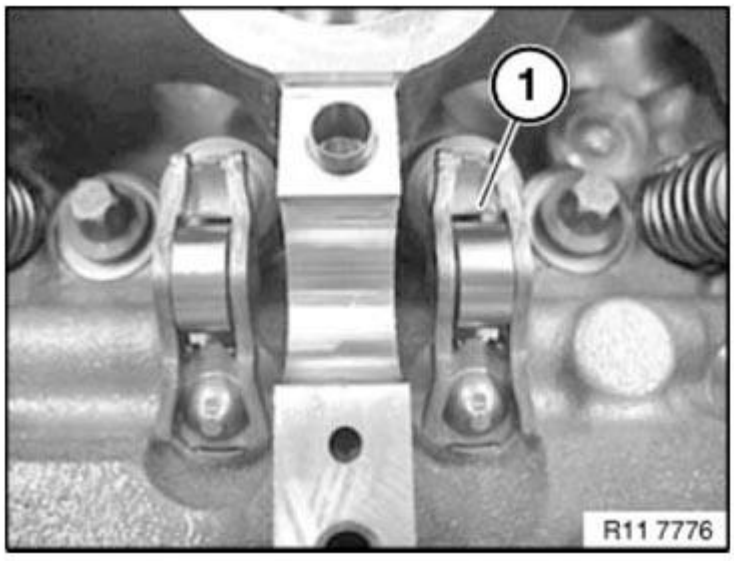


Fig. 283: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1134 VALVES WITH SPRINGS

1134552 REMOVING AND INSTALLING/REPLACING ALL VALVES (N63)

Necessary preliminary work

- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Remove camshafts. See **LEFT INLET CAMSHAFT**; **RIGHT INLET CAMSHAFT**; **LEFT EXHAUST CAMSHAFT**; and **RIGHT EXHAUST CAMSHAFT**.

Mount cylinder head (1) on special tool **11 9 000** .

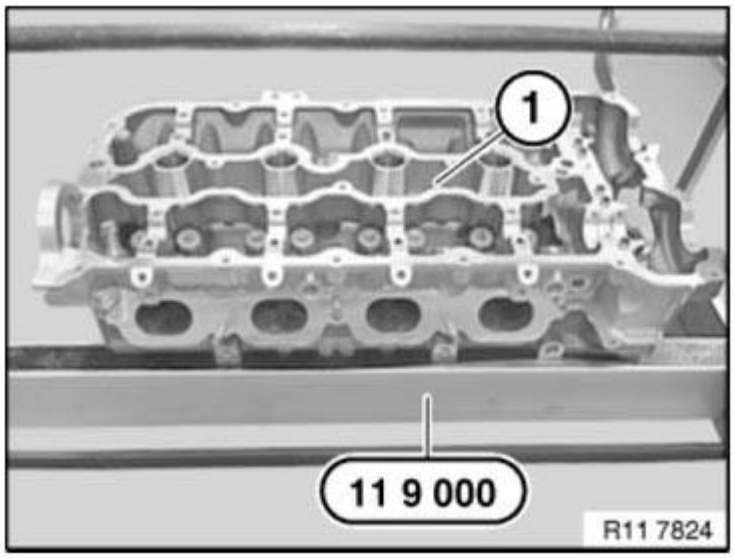


Fig. 284: Mounting Cylinder Head On Special Tool 11 9 000
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool 11 9 008 on special tool 11 9 006.

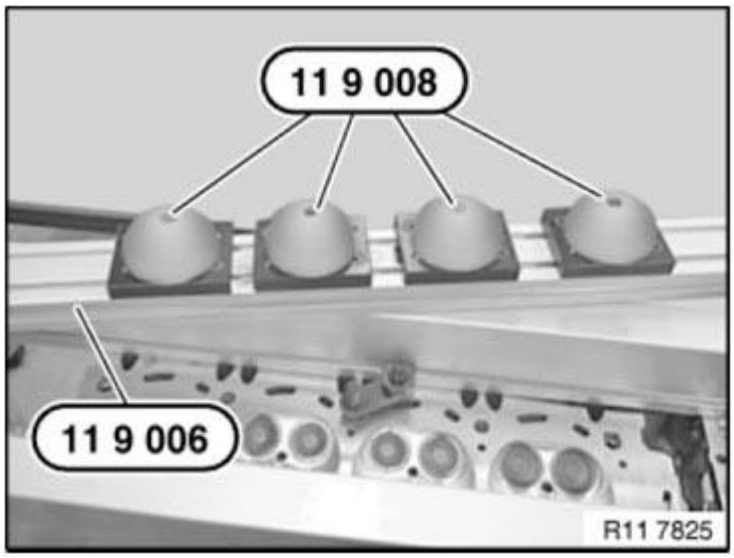


Fig. 285: Preparing Special Tool 11 9 008 On Special Tool 11 9 006

Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 006 with silicone cushion on cylinder head.

Slide locks (1) in direction of arrow and pretension with eccentric shaft.

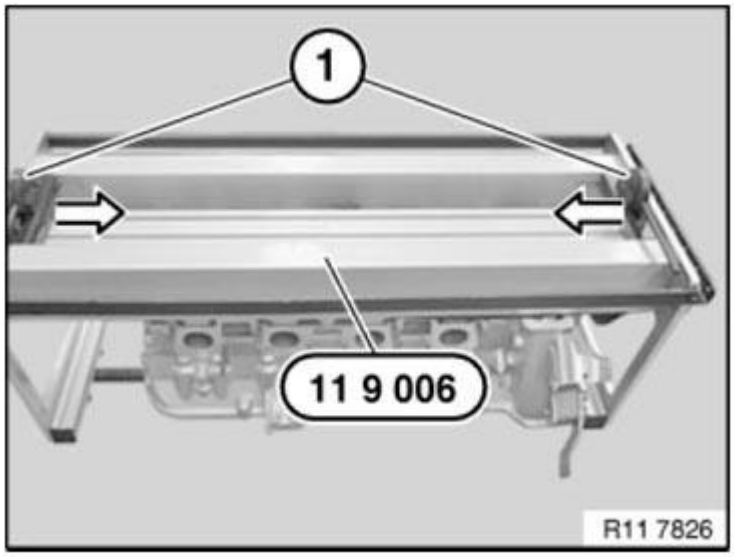


Fig. 286: Sliding Locks In Direction Of Arrow And Pretension With Eccentric Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring with special tool **11 8 840** .

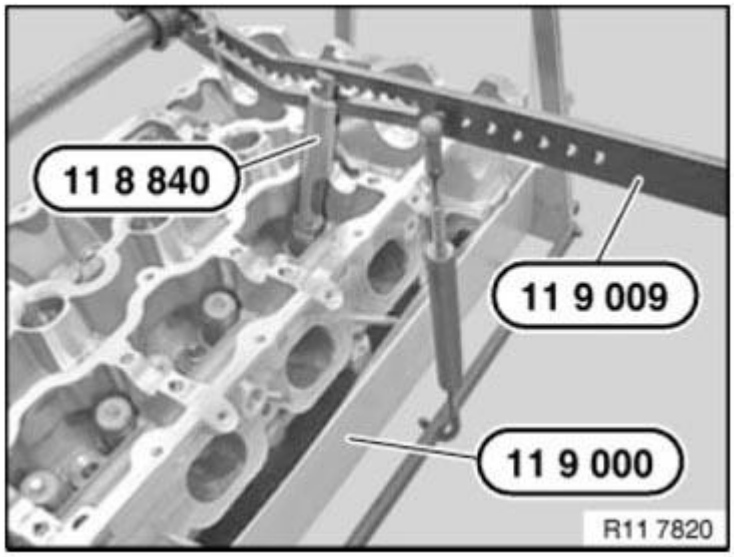


Fig. 287: Pressing Down Valve Spring With Special Tool 11 8 840
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters (1) with a magnet.

Place valve springs and valve keys on special tool **11 4 480** in an orderly manner.

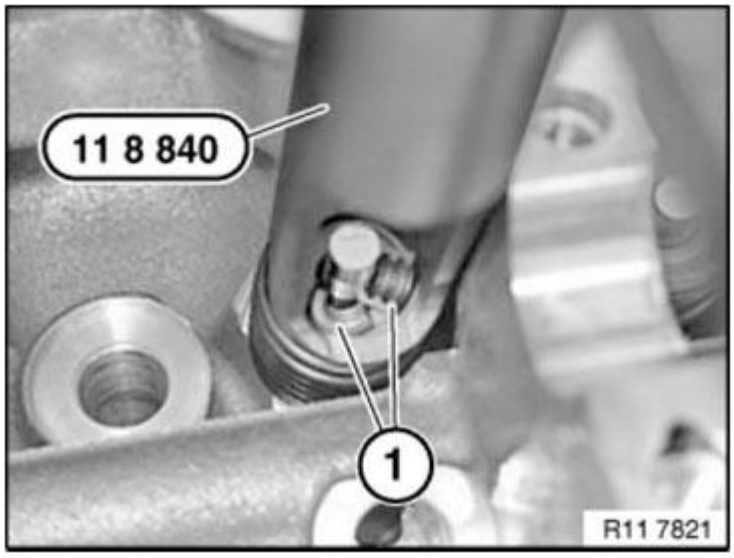


Fig. 288: Identifying Valve Cotters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect assembly possible.
Incorrect assembly will result in valve spring breakage.
Color marking (1) is normally on lower end of valve spring.
Only the diameter is decisive for the correct installation of the valve springs.
Install valve spring so that larger diameter points to spring plate at bottom.

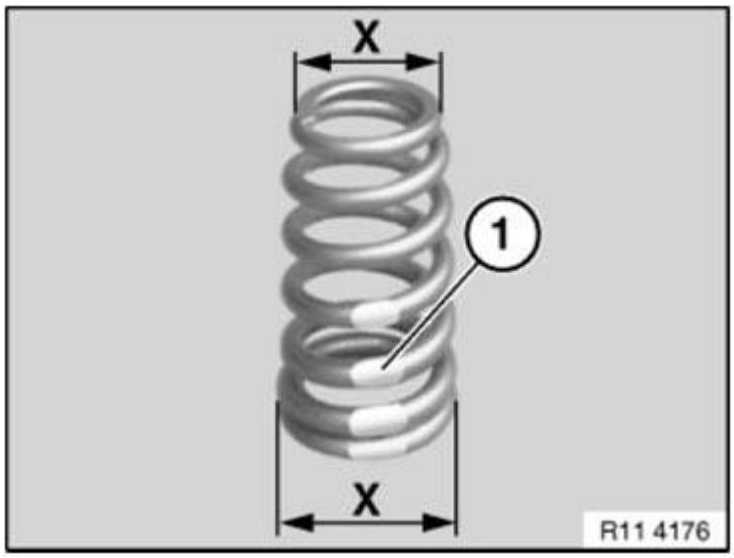
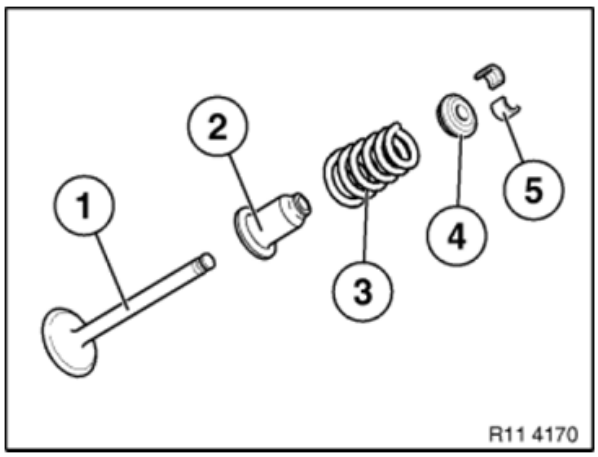


Fig. 289: Dimensions Of Valve Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:



(1) Valve
(2) Valve stem seal with spring cup, bottom
(3) Valve spring
(4) Top spring cup
(5) Valve keys

Fig. 290: Exploded View Of Valve Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Release special tool 11 9 006 from cylinder head.

Remove all valves and place on special tool **11 4 480** in an orderly manner.

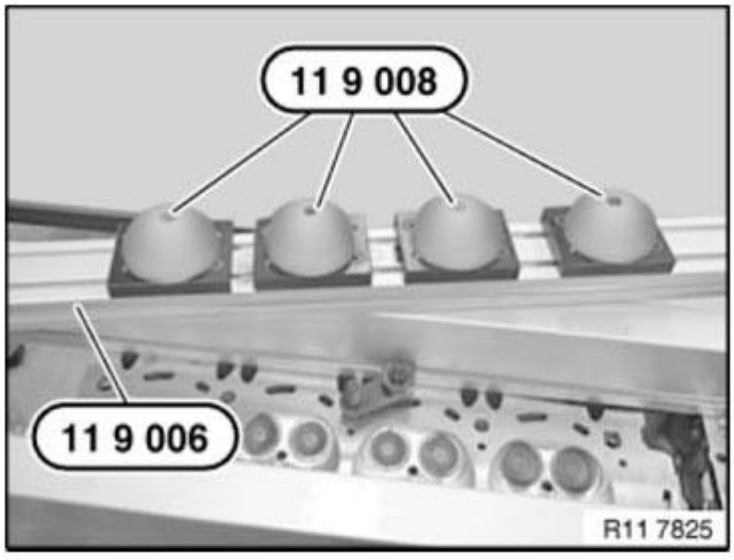


Fig. 291: Preparing Special Tool 11 9 008 On Special Tool 11 9 006
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1134715 REPLACING ALL VALVE SPRINGS (N63)

Necessary preliminary work

- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Remove camshafts. See **LEFT INLET CAMSHAFT**; **RIGHT INLET CAMSHAFT**; **LEFT EXHAUST CAMSHAFT**; and **RIGHT EXHAUST CAMSHAFT**.

Mount cylinder head (1) on special tool **11 9 000** .

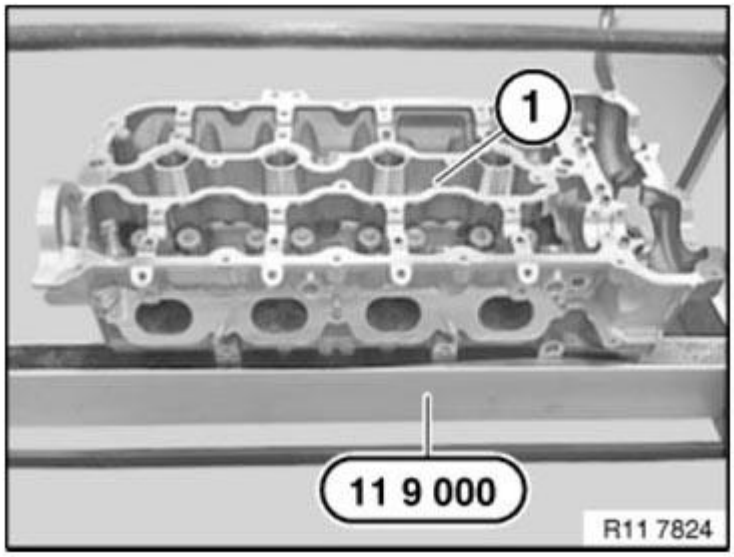


Fig. 292: Mounting Cylinder Head On Special Tool 11 9 000
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool 11 9 008 on special tool 11 9 006.

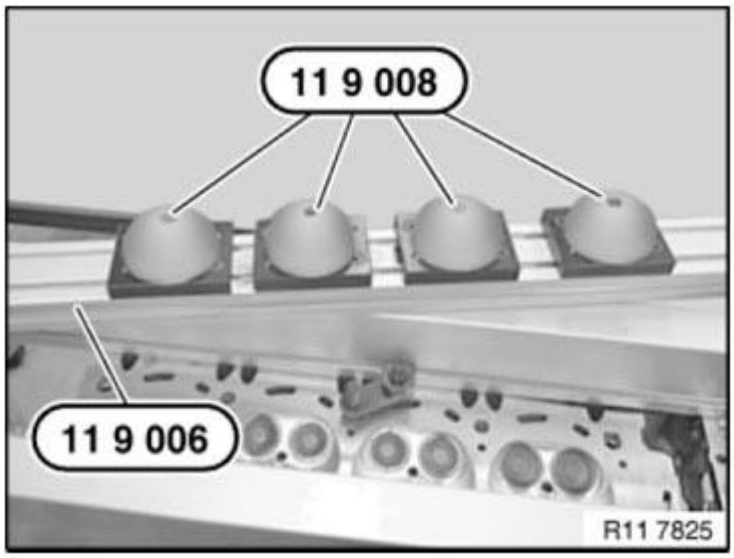


Fig. 293: Preparing Special Tool 11 9 008 On Special Tool 11 9 006
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 006 with silicone cushion on cylinder head.

Slide locks (1) in direction of arrow and pretension with eccentric shaft.

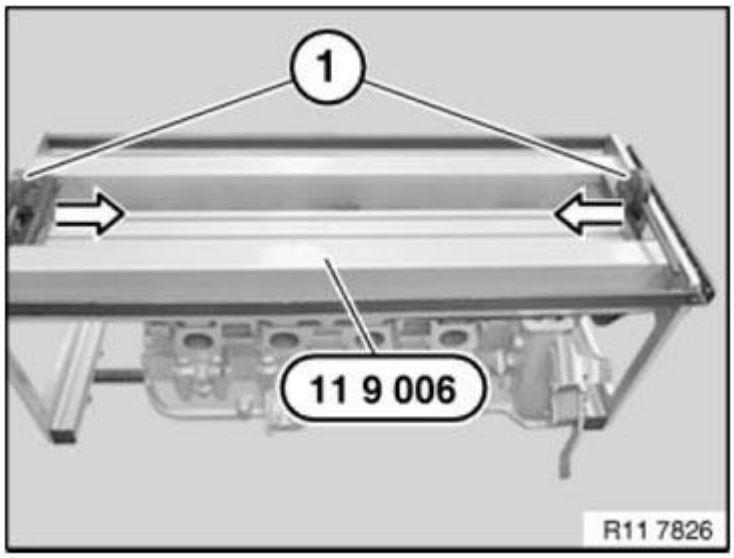


Fig. 294: Sliding Locks In Direction Of Arrow And Pretension With Eccentric Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring with special tool **11 8 840** .

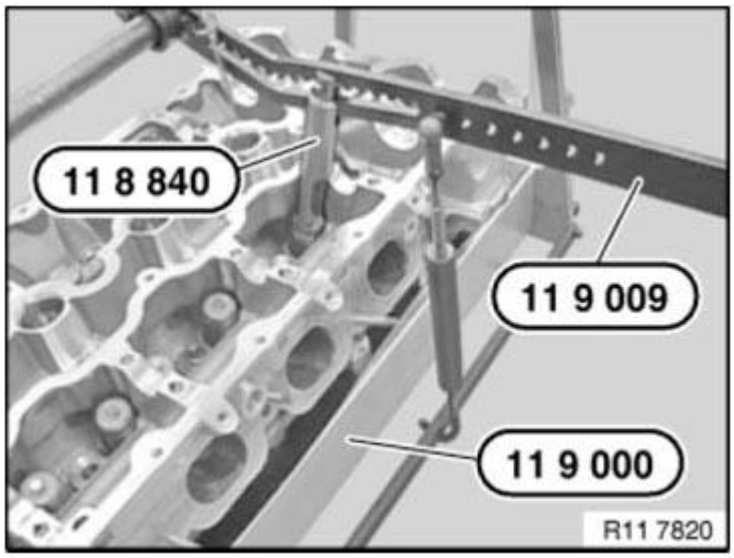


Fig. 295: Pressing Down Valve Spring With Special Tool 11 8 840
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters (1) with a magnet.

Place valve springs and valve keys on special tool **11 4 480** in an orderly manner.

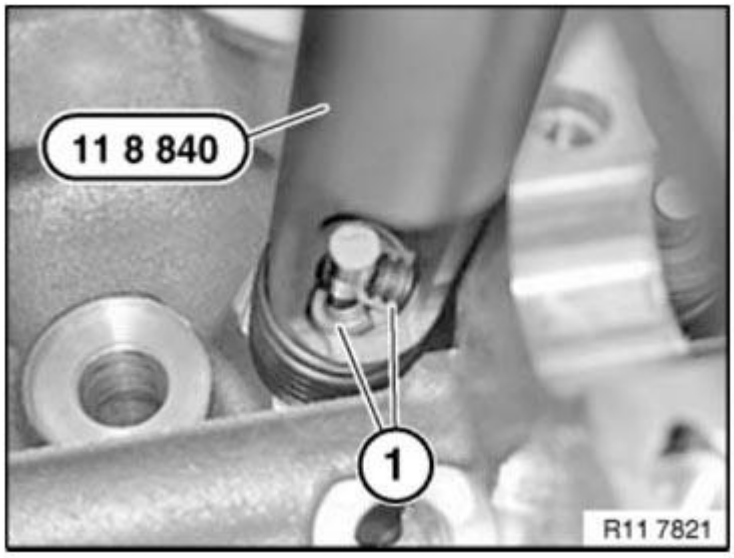


Fig. 296: Identifying Valve Cotters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect assembly possible.
Incorrect assembly will result in valve spring breakage.
Color marking (1) is normally on lower end of valve spring.
Only the diameter is decisive for the correct installation of the valve springs.
Install valve spring so that larger diameter points to spring plate at bottom.

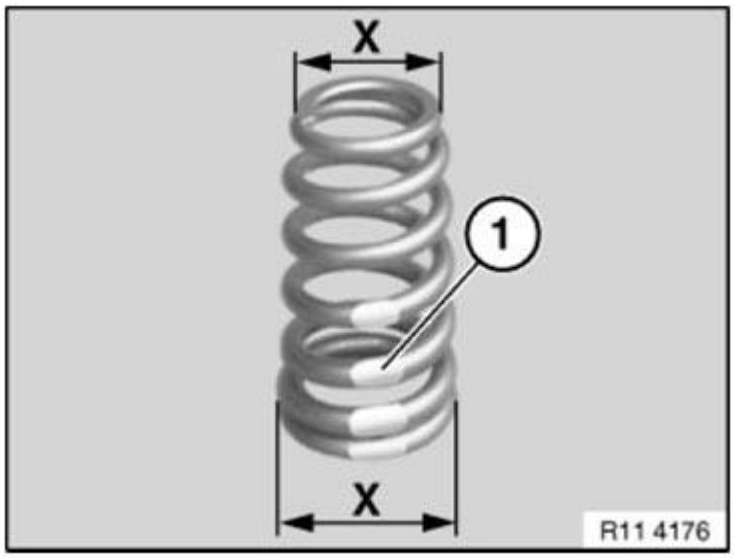
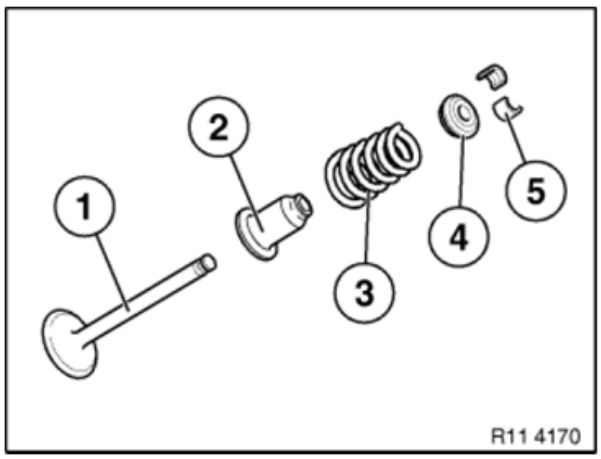


Fig. 297: Dimensions Of Valve Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:



(1) Valve
(2) Valve stem seal with spring cup, bottom
(3) Valve spring
(4) Top spring cup
(5) Valve keys

Fig. 298: Exploded View Of Valve Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1134560 REPLACING ALL VALVE STEM SEALS (N63)

Notes

IMPORTANT: Risk of damage to sealing lip on valve stem seal.
Fit new valve stem seals only when all valves have been installed.

Necessary preliminary work

- Remove all **VALVE SPRINGS** .

Press special tool **11 6 370** onto the valve stem seal.

Withdraw valve stem seal by turning and simultaneously unscrewing special tool **11 6 370** .

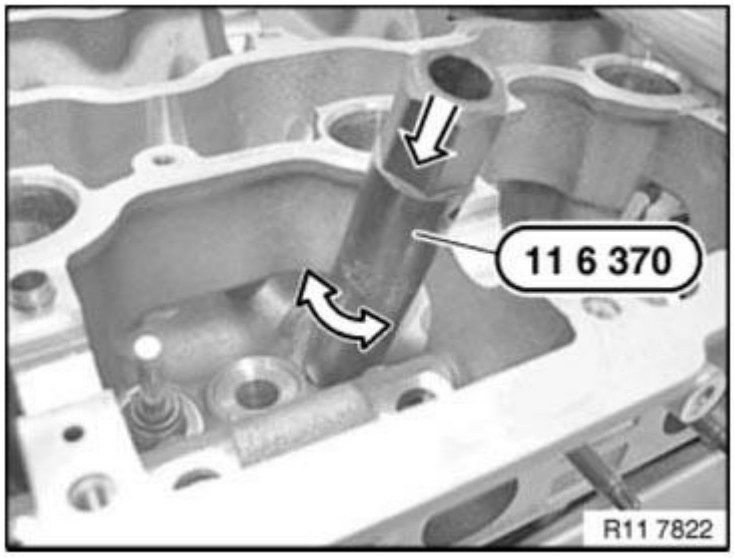


Fig. 299: Pressing Special Tool 11 6 370 Onto Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Lubricate valve stem with oil and insert valve.

Installation sleeve **116380** is included in the delivery specification for the valve stem seals.

Fit special tool **116380** .

Coat new valve stem seal (1) with oil and install.

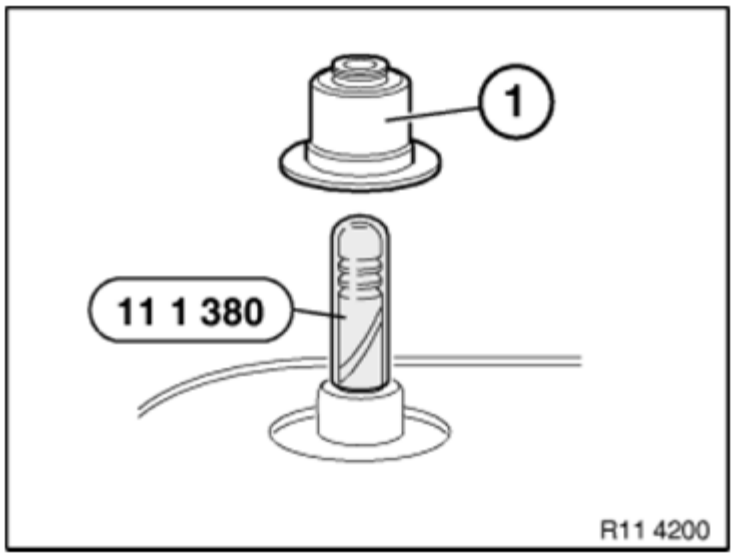


Fig. 300: Identifying Valve Stem Seal And Special Tool 11 6 380

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N63 engine, the special tool 11 6 380 must be remachined according to the sketch with a 6.2 mm drill bit dia. to a depth of A = approx. 45 mm.
This modification has already been taken into account for reordering.

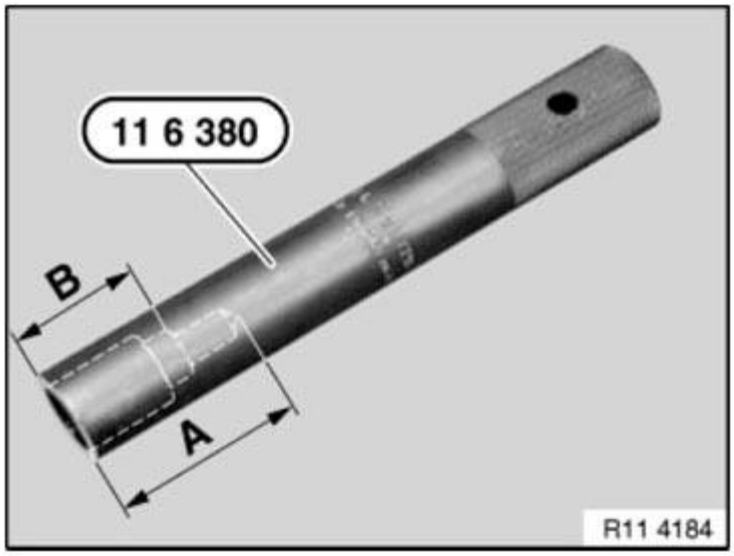


Fig. 301: Identifying Special Tool (11 6 380)
Courtesy of BMW OF NORTH AMERICA, INC.

Manually press on valve stem seal as far as it will go with special tool **11 6 380** .

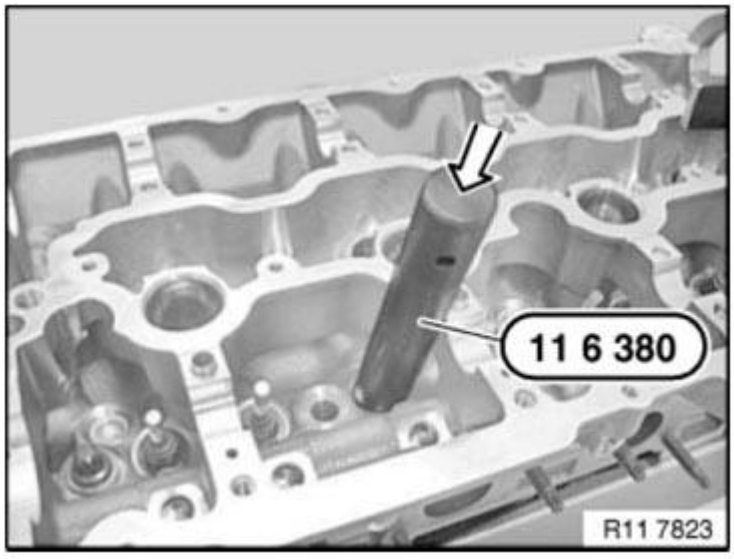


Fig. 302: Pressing On Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1136 VARIABLE CAMSHAFT TIMING

1131573 ADJUSTING CAMSHAFT TIMING ON LEFT SIDE (N63)

Notes

IMPORTANT: Release central bolts on adjuster only with special tool 11 9 890 .
Risk of damage to timing drive.
If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 5 to 8)

Necessary preliminary work

- Remove **LEFT GEAR CASE COVER**
- **CHECK CAMSHAFT TIMING ON LEFT SIDE**

Get set of special tools **11 9 890** ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.
Special tool 11 9 892 Press-down bar.
Special tool 11 9 893 Gap gauge for intake and exhaust camshafts.
Special tool 11 9 894 spacer.

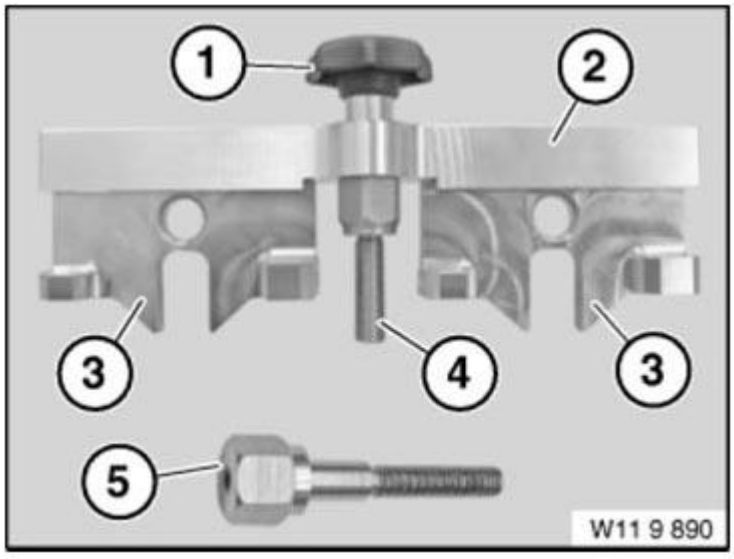


Fig. 303: Identifying Set Of Special Tools 11 9 890
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

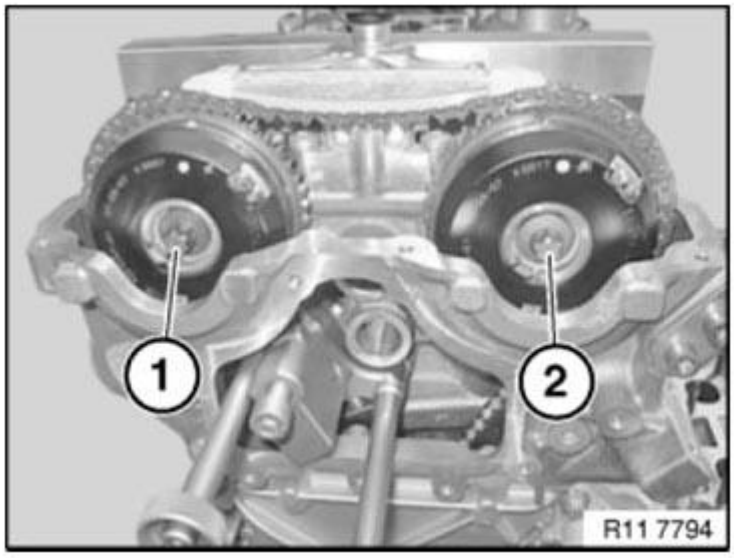


Fig. 304: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Check whether head of central bolt (1) is greased (see arrow).
If no grease can be seen on the bolt head of central bolt (1), the ADJUSTER must be replaced for safety reasons.**

Installation note:

Coat contact surface of new central bolt (1) with copper paste.

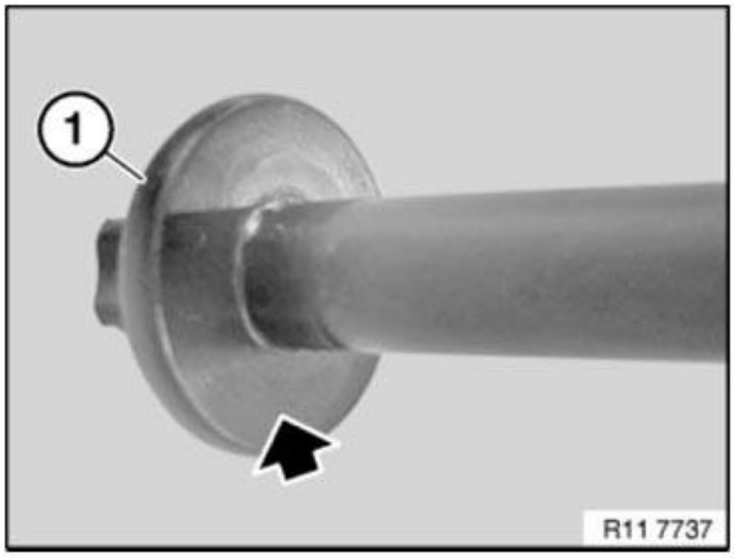


Fig. 305: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 on intake camshaft and exhaust camshaft.

The special tool 11 9 893 must rest **without a gap** on cylinder head; if necessary, adjust camshaft at hexagon heads.

Screw special tool 11 9 894 into cylinder head.

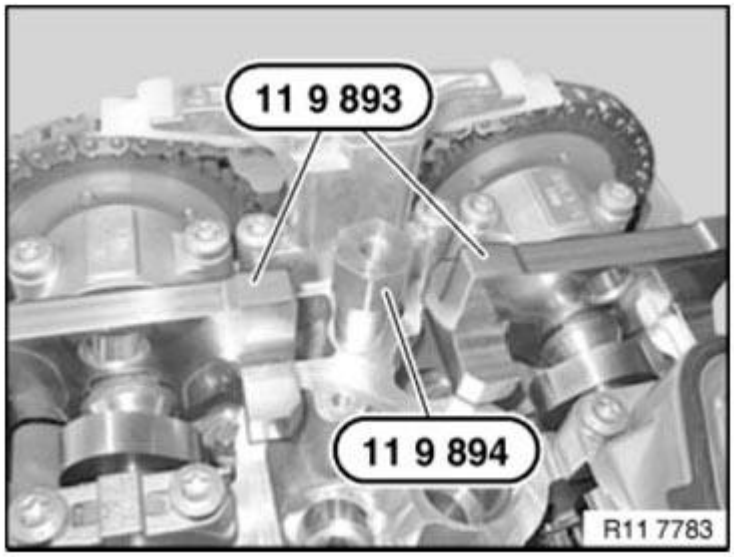


Fig. 306: Positioning Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 892 on special tool 11 9 893.

Both special tools11 9 891 are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

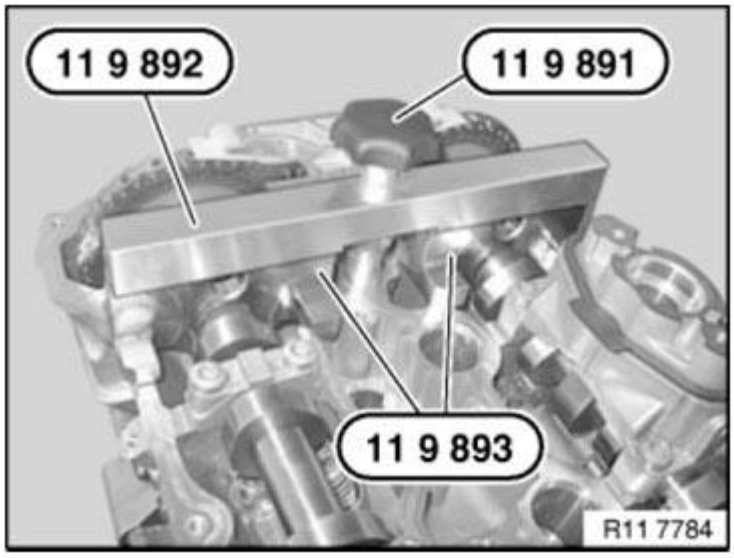


Fig. 307: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of intake camshaft adjuster with special tool **00 9 120** .

Secure central bolt (2) of exhaust camshaft adjuster with special tool **00 9 120** .

Tightening torque: **11 36 1AZ** .

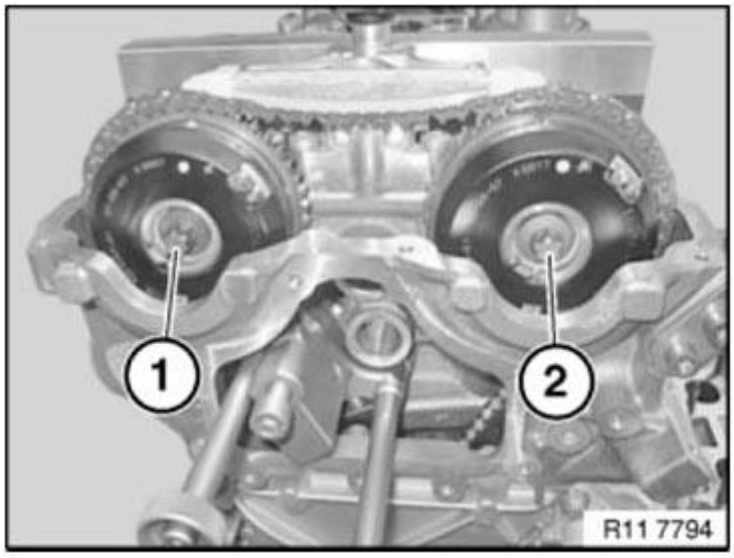


Fig. 308: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **150° before cylinder no. 1 firing TDC position.**

Secure vibration damper with special tool **11 9 190** at **150° before cylinder no. 1 firing TDC position 1.**

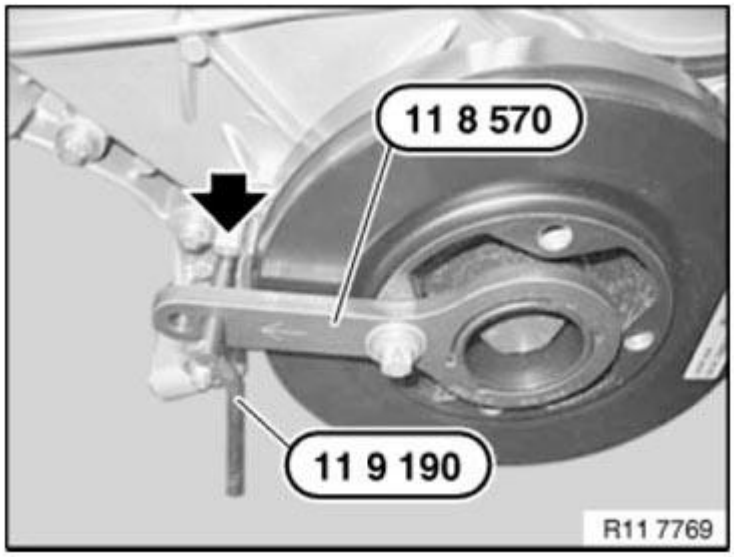


Fig. 309: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

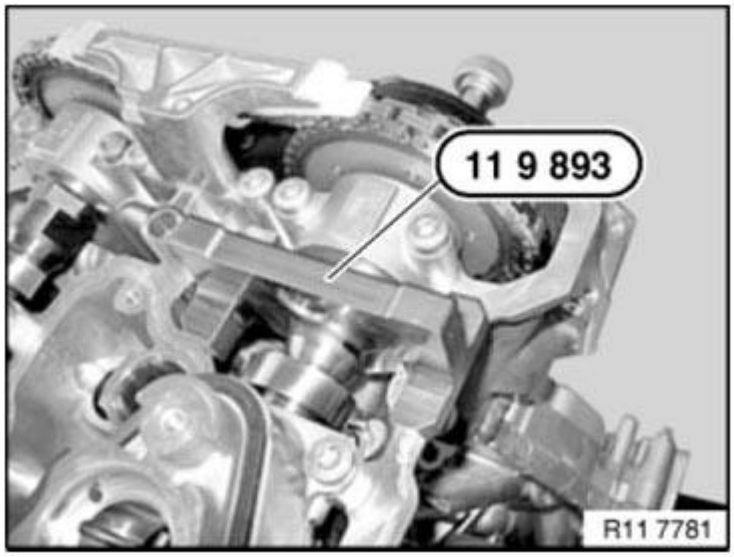


Fig. 310: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

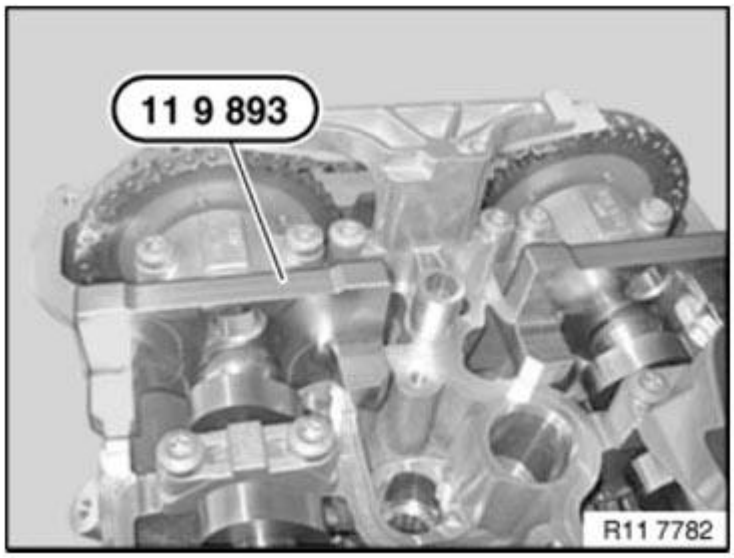


Fig. 311: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131574 ADJUSTING CAMSHAFT TIMING ON RIGHT SIDE (N63)

Notes

IMPORTANT: Release central bolts on adjuster only with special tool 11 9 890 .
Risk of damage to timing drive.
If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 1 to 4)

Necessary preliminary work

- Remove **RIGHT-HAND GEAR CASE COVER**
- **CHECK CAMSHAFT TIMING ON RIGHT SIDE** .

Get set of special tools **11 9 890** ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.
Special tool 11 9 892 Press-down bar.
Special tool 11 9 893 Gap gauge for intake and exhaust camshafts.
Special tool 11 9 894 spacer.

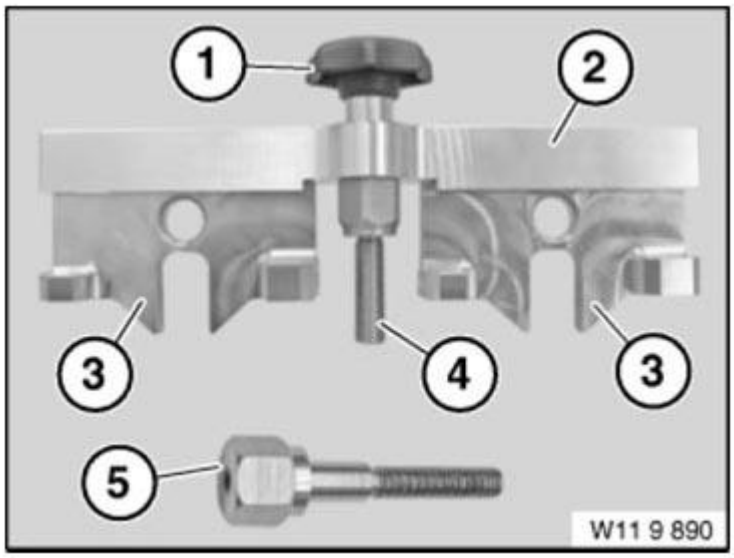


Fig. 312: Identifying Set Of Special Tools 11 9 890
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

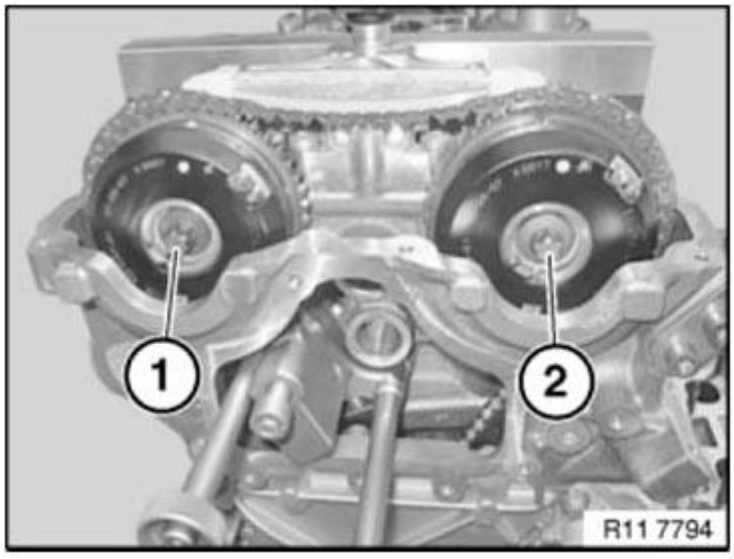


Fig. 313: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow).

If no grease can be seen on the bolt head of central bolt (1), the **ADJUSTER** must be replaced for safety reasons.

Installation note:

Coat contact surface of new central bolt (1) with copper paste.

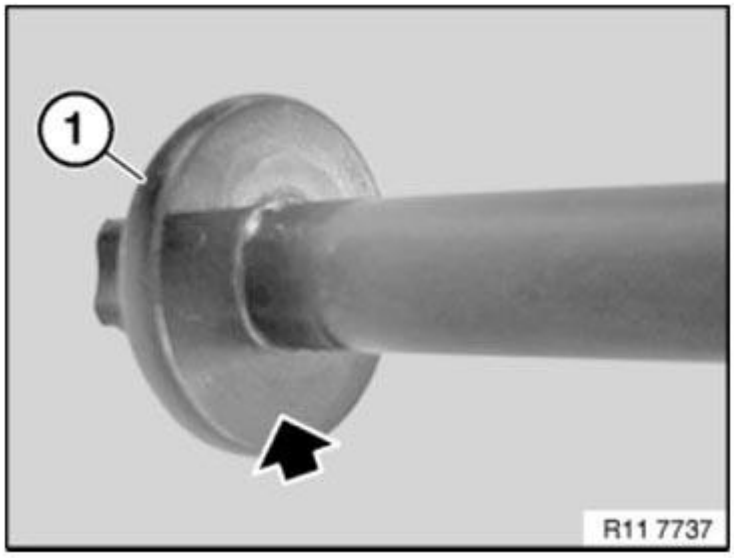


Fig. 314: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 on intake camshaft and exhaust camshaft.

The special tool 11 9 893 must rest **without a gap** on cylinder head; if necessary, adjust camshaft at hexagon heads.

Screw special tool 11 9 894 into cylinder head.

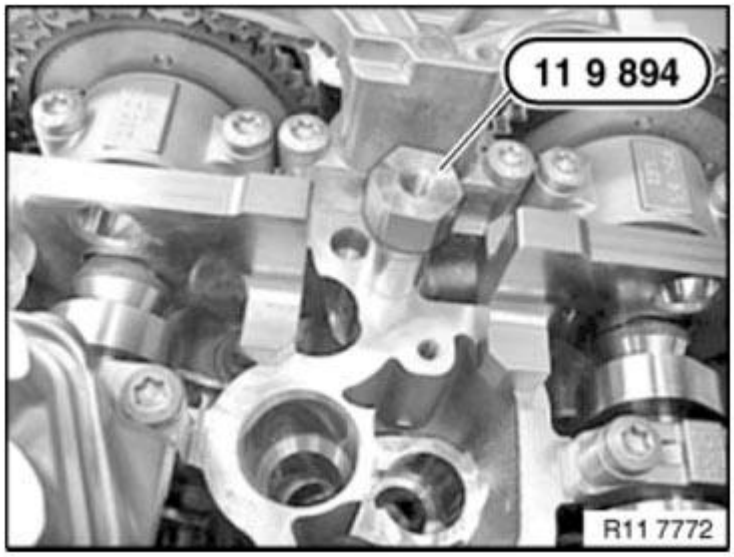


Fig. 315: Identifying Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 892 on special tool 11 9 893.

Both special tools11 9 891 are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

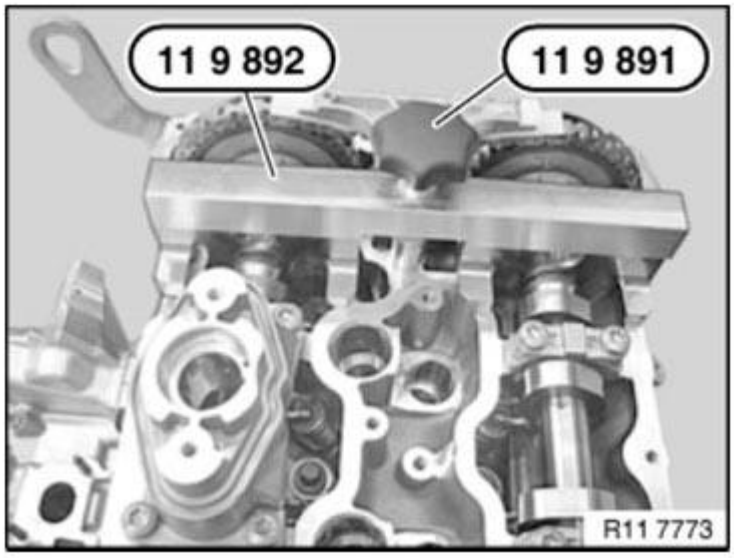


Fig. 316: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of intake camshaft adjuster with special tool **00 9 120** .

Secure central bolt (2) of exhaust camshaft adjuster with special tool **00 9 120** .

Tightening torque: **11 36 1AZ** .

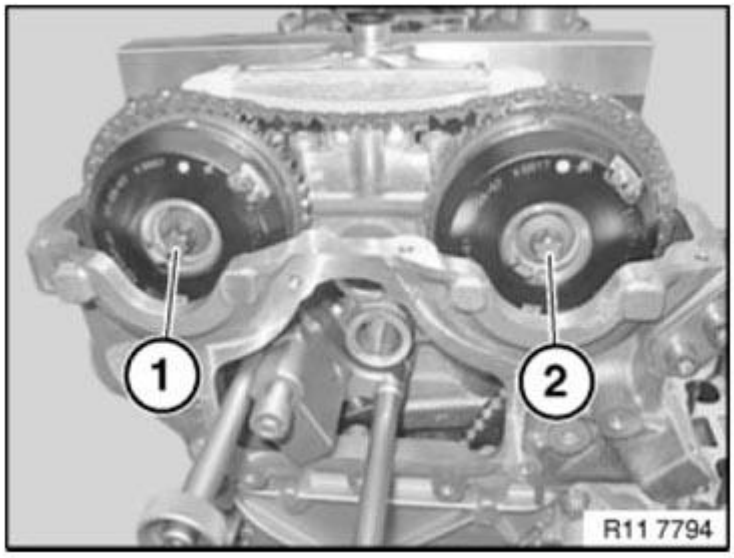


Fig. 317: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **150° before cylinder no. 1 firing TDC position.**

Secure vibration damper with special tool **11 9 190** at **150° before cylinder no. 1 firing TDC position 1.**

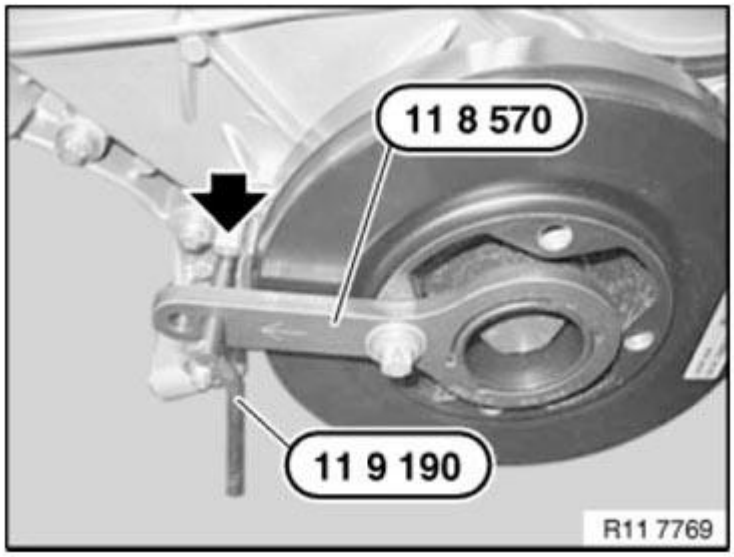


Fig. 318: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

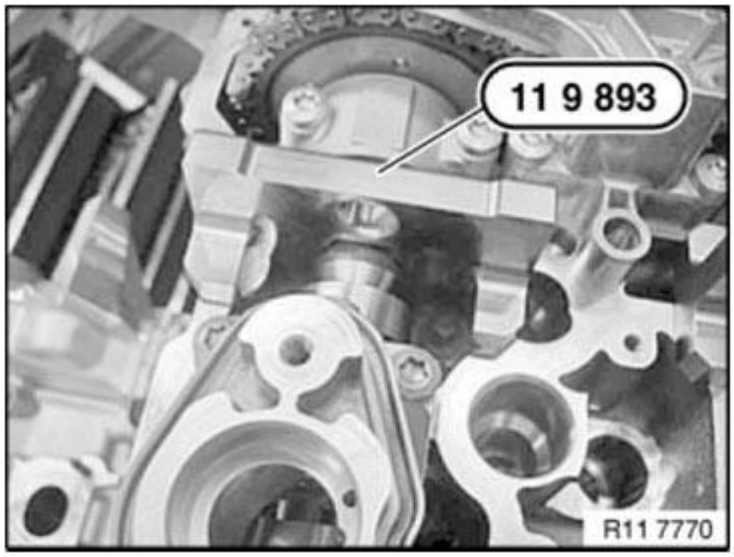


Fig. 319: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

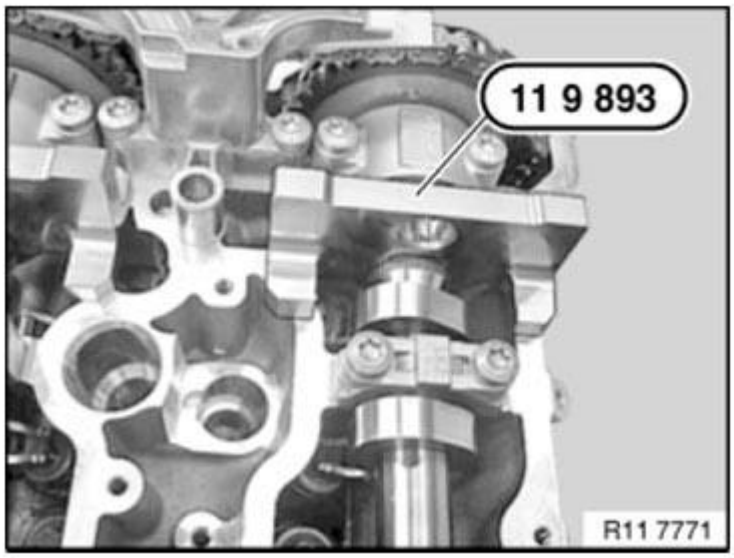


Fig. 320: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N63)

Notes

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 5-8:

Necessary preliminary work

- Remove left **CYLINDER HEAD COVER**
- Remove **FAN COWL** with electric fan
- Remove **BELT PULLEY** for air conditioning system
- Remove left **CHAIN TENSIONER**

Mount special tool **11 9 900** at position of chain tensioner.

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm.**

NOTE: Graphic corresponds to cylinders 1-4.

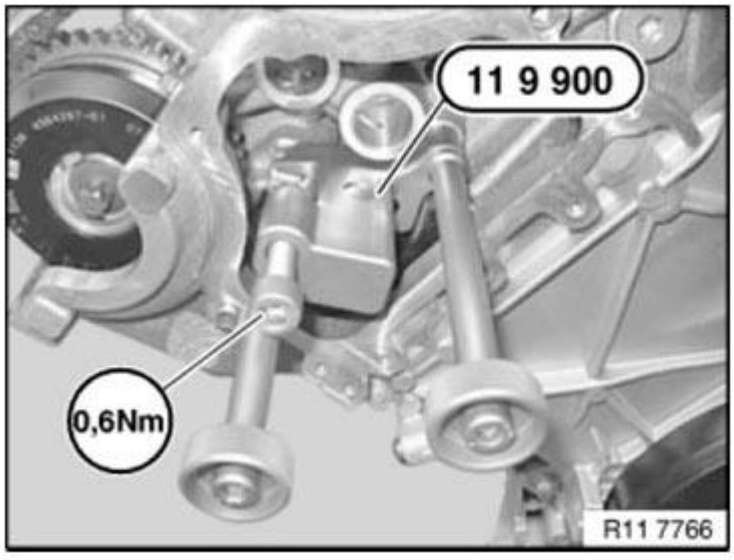


Fig. 321: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Marking (MP = Mounting Position) is important for installing special tool 11 8 570 .

MP = 150° before cylinder no. 1 firing TDC position

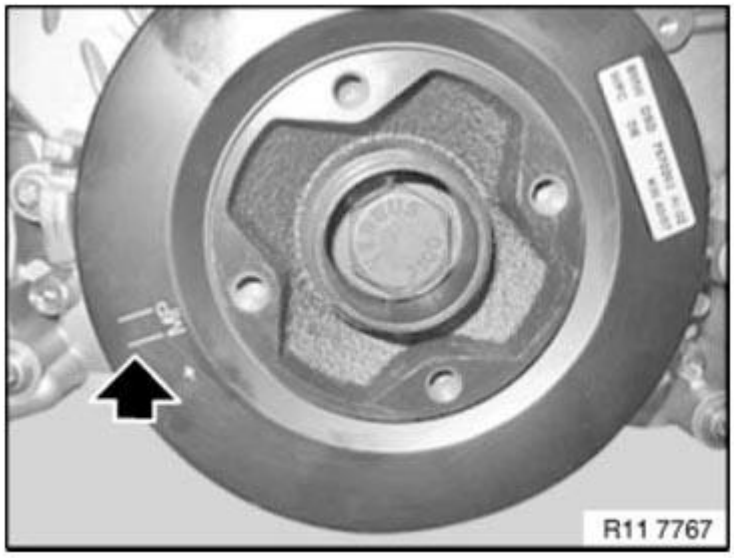


Fig. 322: Identifying Mounting Position Of Special Tool 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with dihedron on vibration damper in such a way that it can be secured with bolt (1) at the MP marking.

NOTE: Setting groove on crankcase, see arrow.

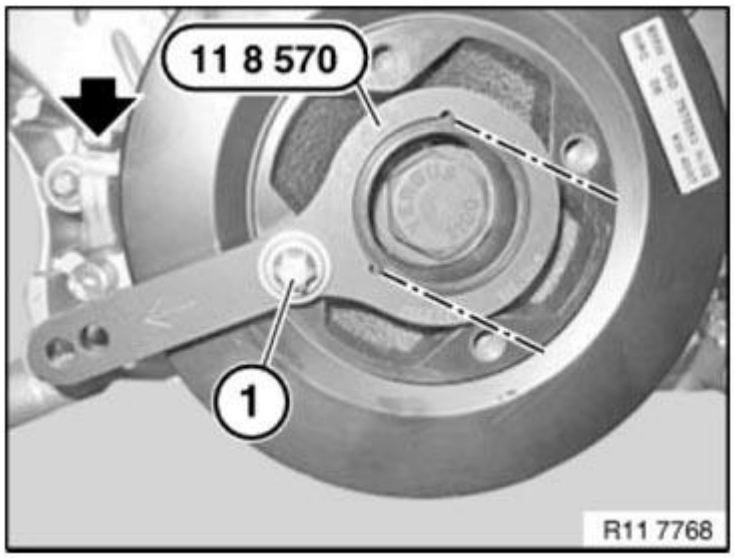


Fig. 323: Positioning Special Tool 11 8 570 With Dihedron On Vibration Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt.

Secure vibration damper with special tools **11 8 570** and **11 9 190** at **150° before cylinder no. 1 firing TDC**

position.

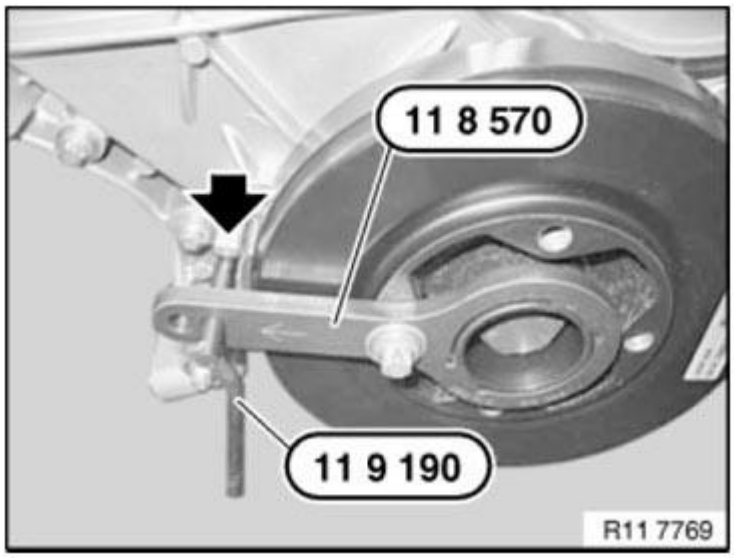


Fig. 324: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder no. 1 at 150° before firing TDC position, cams on exhaust camshaft (A) at cylinder no. 5 point at an angle to the left.

Cams on inlet camshaft (E) point at an angle downwards.

NOTE: For purposes of clarity, the graphic shows the inlet and exhaust adjustment units removed.

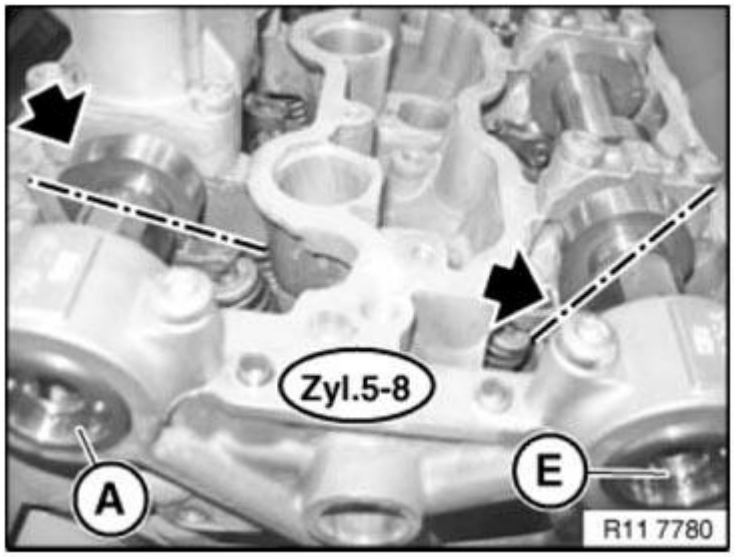


Fig. 325: Identifying Cams On Inlet Camshaft Point At An Angle Downwards

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the inlet and exhaust adjustment units are normally locked in their initial position.
The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster.
In order to avoid incorrect timing adjustment, it is essential to check the locking of the camshaft adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of intake and exhaust camshaft adjusters in initial setting:

Gripping hexagon head (2) of camshafts with a fork wrench (1), carefully try to rotate camshafts against direction of rotation.

The intake and exhaust camshaft adjusters are locked in the initial setting when the camshafts are non-positively connected to the adjusters.

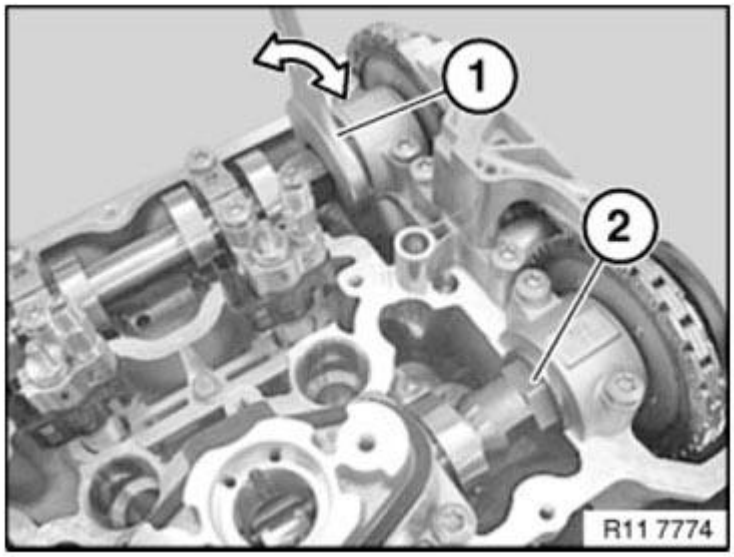


Fig. 326: Gripping Hexagon Head Of Camshafts With Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the intake or exhaust camshaft adjusters of the camshafts "cannot" be locked as described, the adjuster is faulty and must be replaced.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

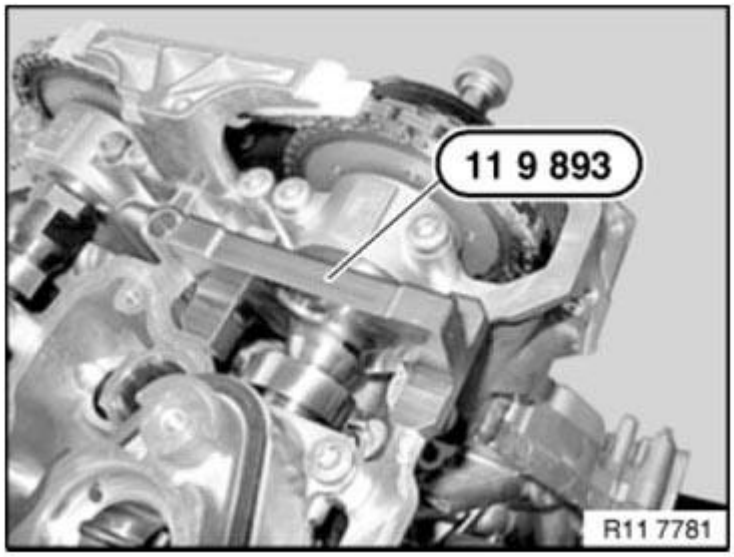


Fig. 327: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

If necessary, adjust camshaft **TIMING** on left side.

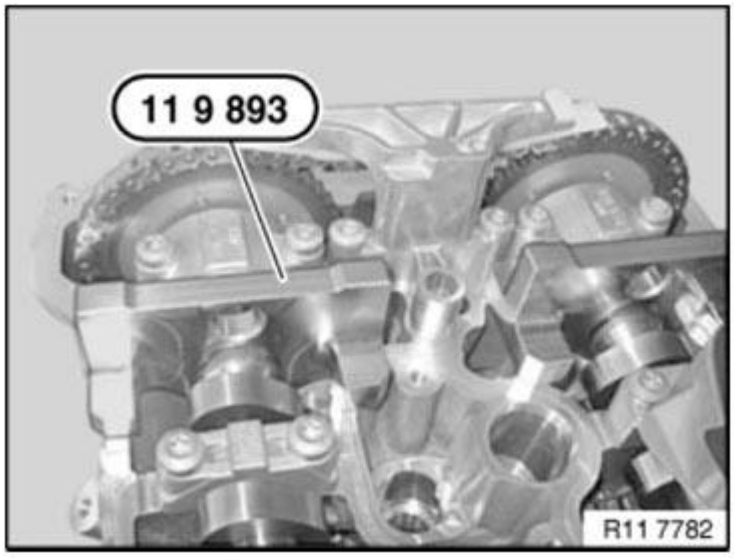


Fig. 328: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1131071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N63)

Notes

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 1-4:

Necessary preliminary work

- Remove right **CYLINDER HEAD COVER**
- Remove **FAN COWL** with electric fan
- Remove **BELT PULLEY** for air conditioning system
- Remove right **CHAIN TENSIONER**

Mount special tool **11 9 900** at position of chain tensioner.

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm.**

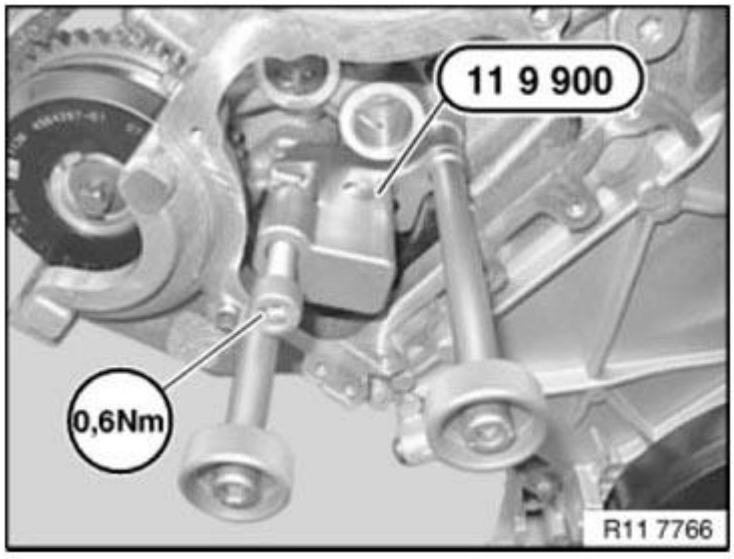


Fig. 329: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Marking (MP = Mounting Position) is important for installing special tool 11 8 570 .

MP = 150° before cylinder no. 1 firing TDC position

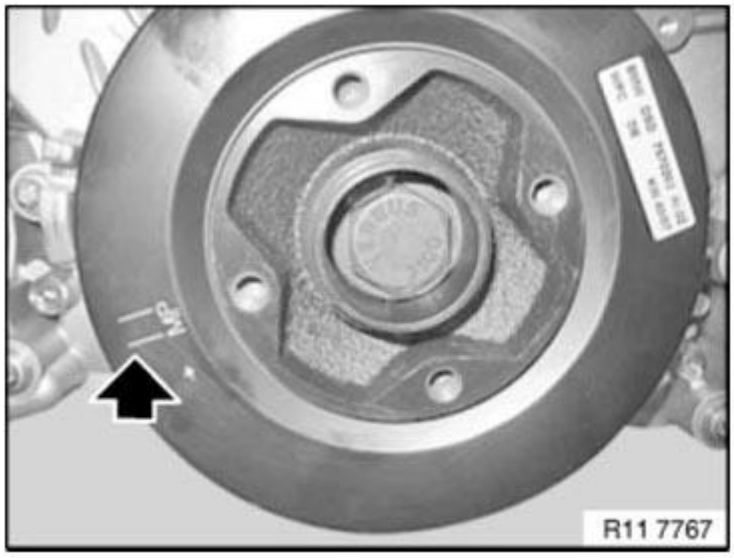


Fig. 330: Identifying Mounting Position Of Special Tool 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with dihedron on vibration damper in such a way that it can be secured with bolt (1) at the MP marking.

NOTE: Setting groove on crankcase, see arrow.

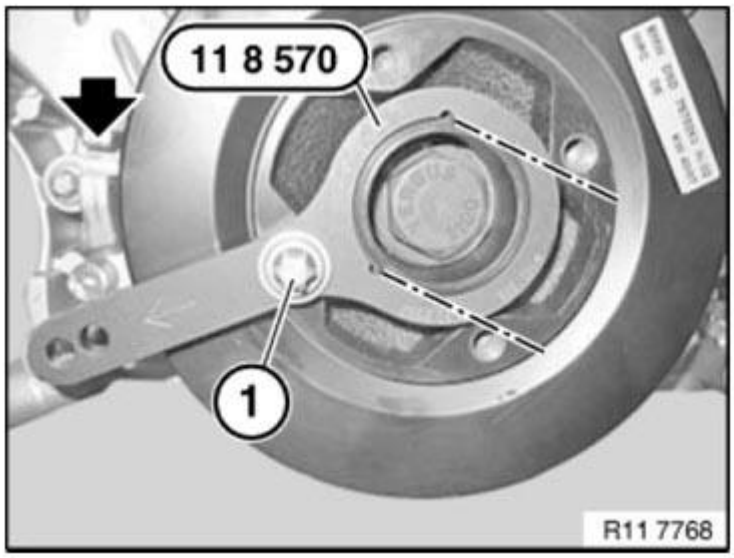


Fig. 331: Positioning Special Tool 11 8 570 With Dihedron On Vibration Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt.

Secure vibration damper with special tools **11 8 570** and **11 9 190** at **150° before cylinder no. 1 firing TDC**

position.

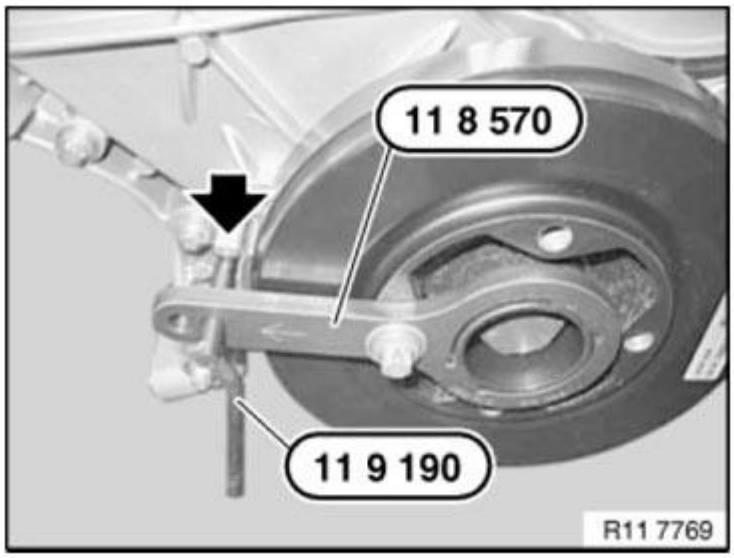


Fig. 332: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder no. 1 at 150° before firing TDC position, cams on exhaust camshaft (A) at cylinder no. 1 point at an angle upwards.

Cams on inlet camshaft (E) point at an angle downwards.

NOTE: For purposes of clarity, the graphic shows the inlet and exhaust adjustment units removed.

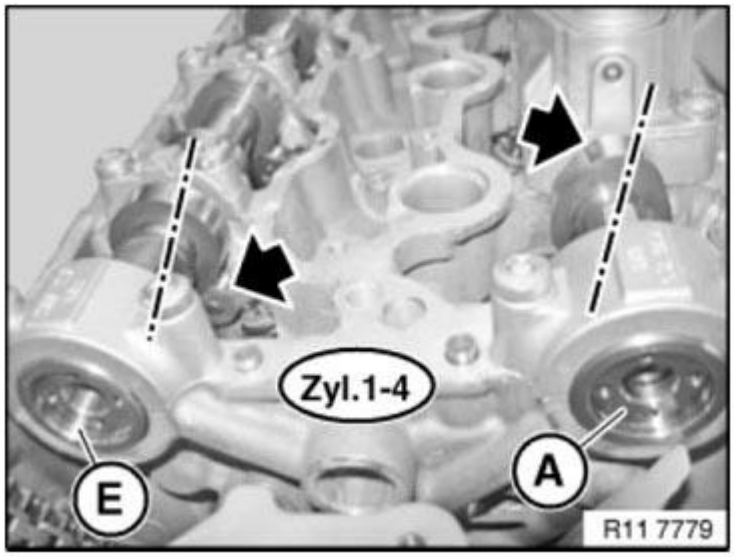


Fig. 333: Identifying Cams On Inlet Camshaft Point At An Angle Downwards

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the intake and exhaust camshaft adjusters are normally locked in their initial position.
The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster.
In order to avoid incorrect timing adjustment, it is essential to check the locking of the camshaft adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of intake and exhaust camshaft adjusters in initial setting:

Gripping hexagon head (2) of camshafts with an open-end spanner (1), carefully try to rotate camshafts against direction of rotation.

The intake and exhaust camshaft adjusters are locked in the initial setting when the camshafts are non-positively connected to the adjusters.

NOTE: Graphic corresponds to cylinders 5-8.

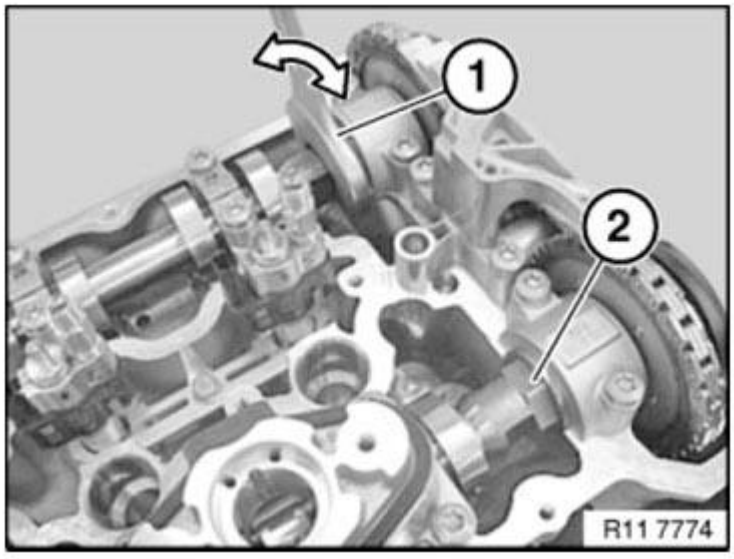


Fig. 334: Gripping Hexagon Head Of Camshafts With Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the intake or exhaust camshaft adjusters of the camshafts "cannot" be locked as described, the adjuster is faulty and must be replaced.

Place special tool 11 9 893 on the exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

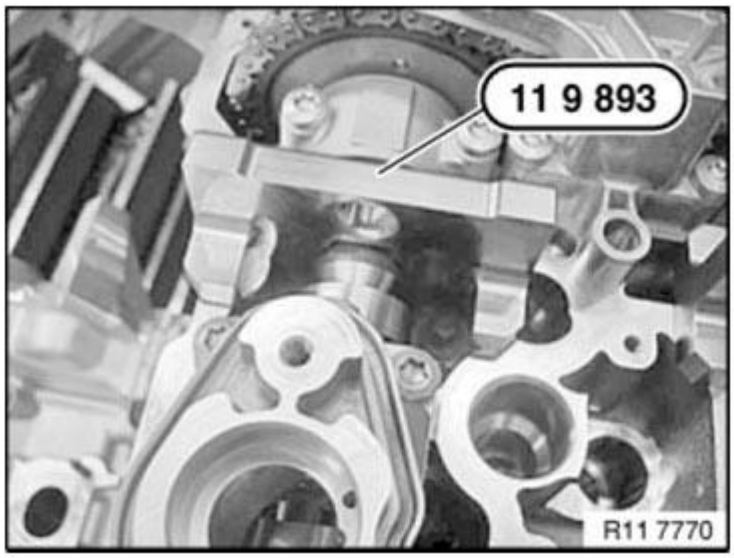


Fig. 335: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.
If necessary, adjust camshaft TIMING on right side.

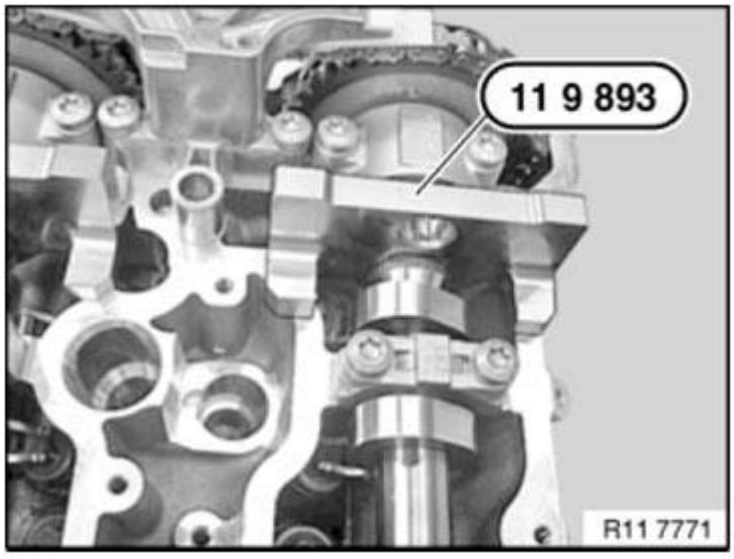


Fig. 336: Identifying Special Tool 11 9 893 On Intake Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1136720 REMOVING AND INSTALLING/RENEWING BOTH SOLENOID VALVES ON RIGHT SIDE (N63)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.
Possible malfunctions if valves are contaminated:

- **Irregular operation**
- **OBD incorrect entry**
- **Poor exhaust gas values**
- **Low engine performance**

IMPORTANT: Risk of damage!
Do not clean solenoid valves with compressed air.

Solenoid valves, cylinders 1-4:

Necessary preliminary work

- Read out fault memory in DME control unit
- Switch off ignition
- Remove right **INTERCOOLER**
- Release holder for electropneumatic pressure converter (EPPC) and carefully press to one side

NOTE: Solenoid valve (4) controls the inlet adjustment unit.
Solenoid valve (2) controls the exhaust adjustment unit.

Unlock plug connections of solenoid valves (2 and 4) and disconnect.

Installation note:

Plug connections must snap audibly into place!

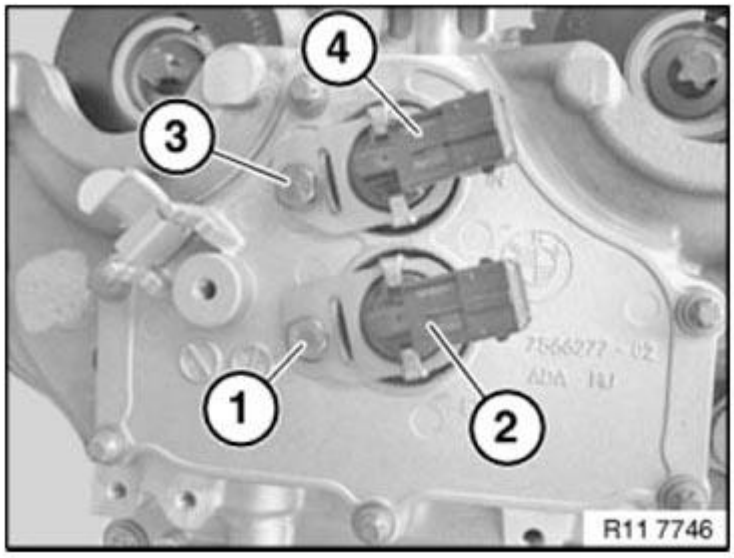


Fig. 337: Identifying Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque **11 36 3AZ** .

Pull out solenoid valves (2 and 4).

Installation note:

Replace O-rings (1 and 2) on solenoid valve

Installation note:

To install solenoid valves, coat both O - rings with engine oil.

If the solenoid valve is to be reused, the filter strainer (see arrow) must be cleaned.

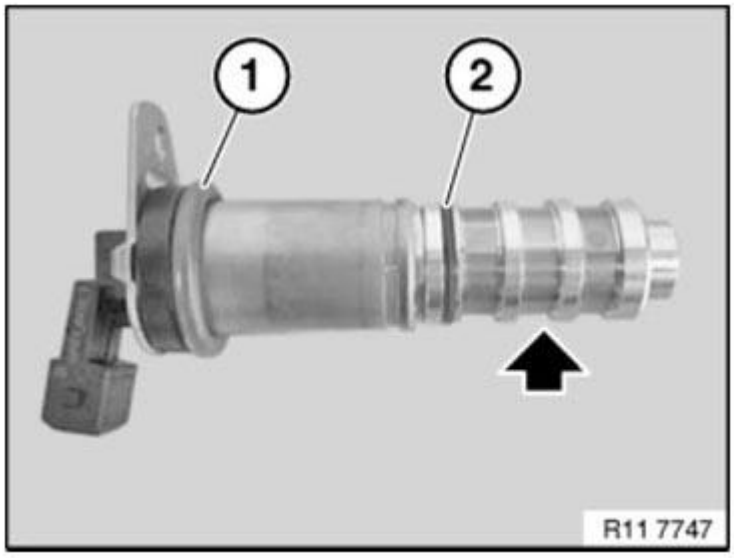


Fig. 338: Identifying O-Rings On Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If a filter element is clogged with dirt, the filter element (filter strainer) may be removed.

Release filter elements (1) at contact edges.

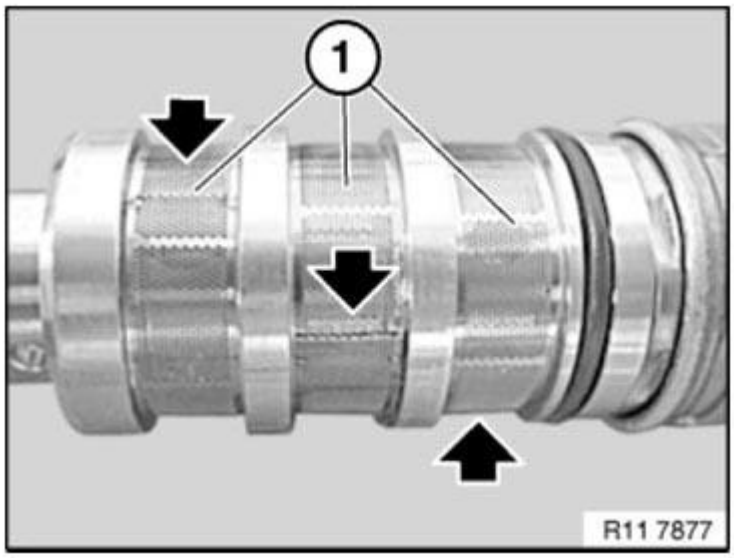


Fig. 339: Identifying Filter Elements At Contact Edges
Courtesy of BMW OF NORTH AMERICA, INC.

Bend open welding spots on filter element (1) with a screwdriver (2) in direction of arrow until welding spots are opened.

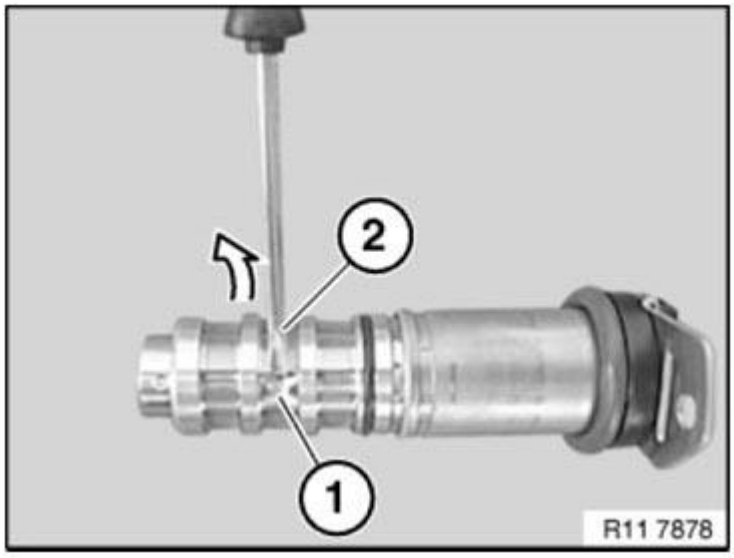


Fig. 340: Bending Open Welding Spots On Filter Element With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Avoid damaging, e.g. notches or scratches, the solenoid valve housing (see arrows).

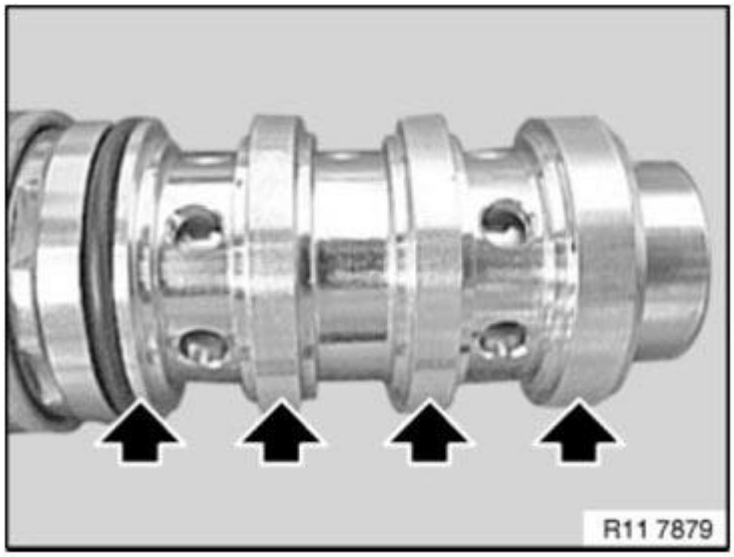


Fig. 341: Inspecting Notches Or Scratches For Solenoid Valve Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully insert solenoid valves (2 and 4) up to stop.

Ensure correct installation position.

Insert screws (1 and 3) and tighten down.

Tightening torque **11 36 3AZ** .

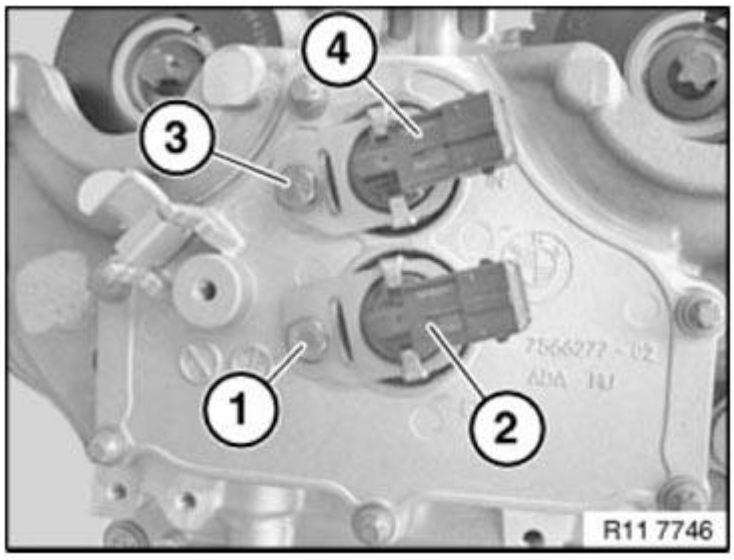


Fig. 342: Identifying Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Delete fault memory.

Check function of DME control unit.

1136047 REMOVING AND INSTALLING/RENEWING INLET AND EXHAUST ADJUSTMENT UNITS ON LEFT SIDE (N63)

Notes

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjuster is normally locked in its initial position.
The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster.
Where central bolts are not greased at the bolt contact points up to engine number 20024295 , the camshaft adjuster must be renewed due to safety reasons.
The central bolts is greased from engine number 20024296.

(cylinder bank 5 to 8)

Necessary preliminary work

- **Read fault memory and make a documentary record**
- Remove **LEFT CYLINDER HEAD COVER**
- Remove **LEFT TIMING CASE COVER**
- Check **timing** See **1131070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N63)** or **1131071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N63)**.

To release central bolts, use special tool **11 9 890** or grip at hexagon head of camshaft.

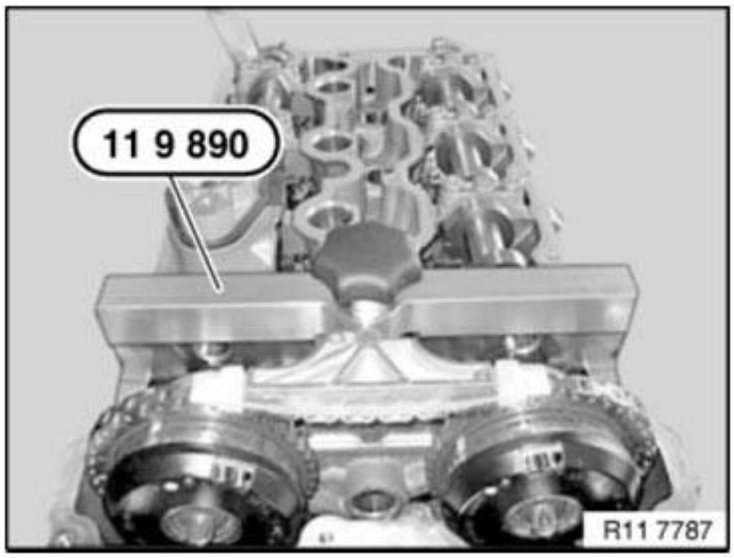


Fig. 343: Identifying Special Tool 11 9 890
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshafts.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

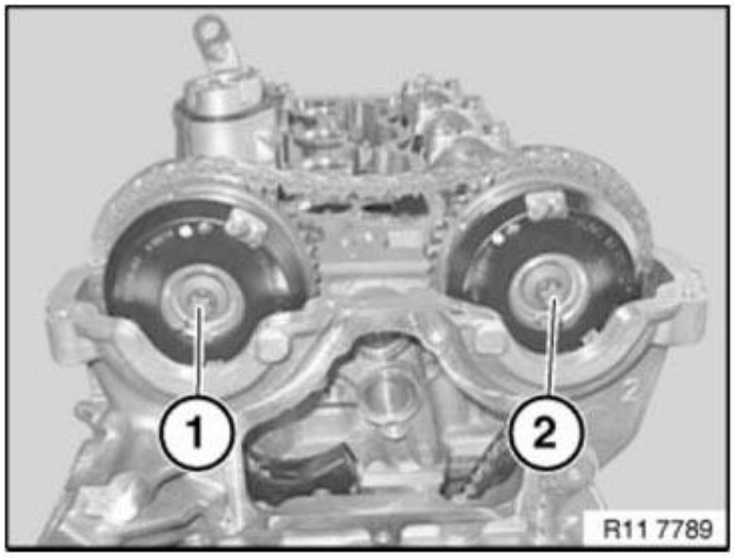


Fig. 344: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow). If no grease can be seen on the bolt head of central bolt (1), the intake and exhaust camshaft adjuster must be renewed due to safety reasons.

Installation note:

Coat contact face of central bolt (1) with copper paste.

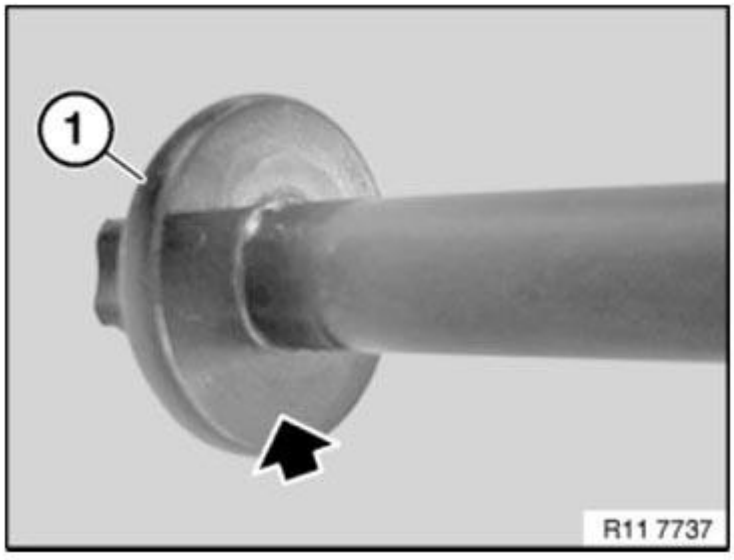


Fig. 345: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket screw.

Release special tool **11 9 900** at knurled screws and remove.

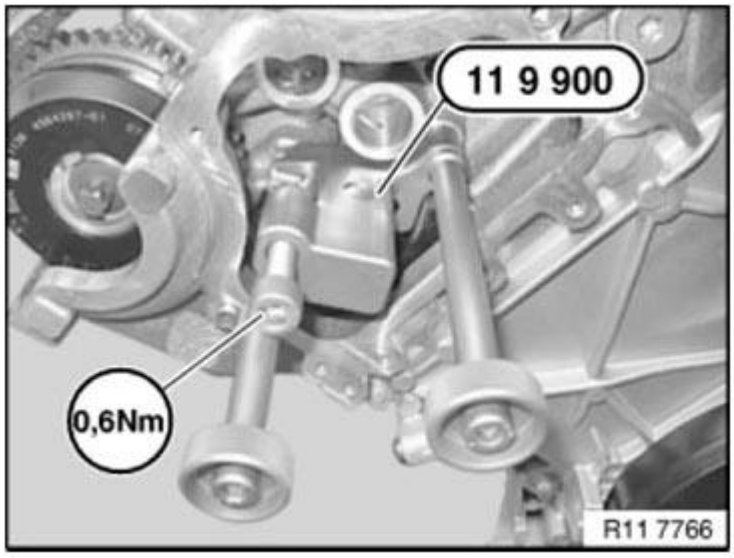


Fig. 346: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove upper tensioning rail (2).

NOTE: Shown without special tools for purposes of clarity.

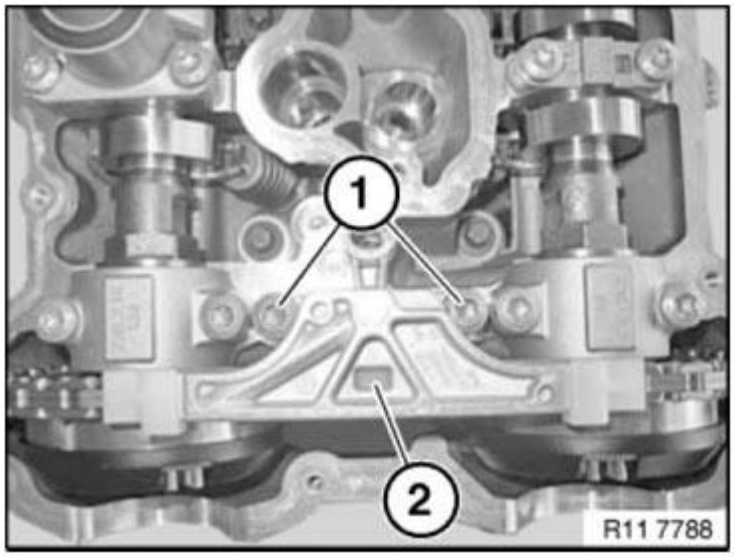


Fig. 347: Identifying Upper Tensioning Rail And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Remove central bolt (2) of inlet adjustment unit.

Installation note:

Replace central bolts after releasing.

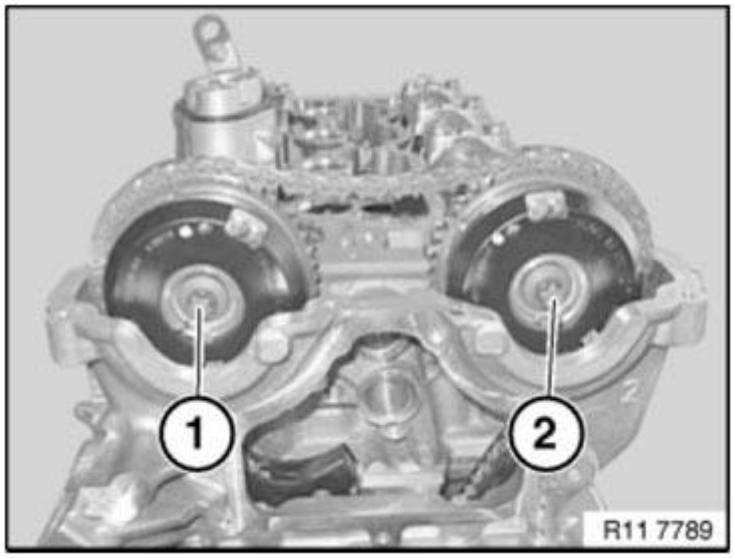


Fig. 348: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Detach inlet adjustment unit (1) in direction of arrow from inlet camshaft.

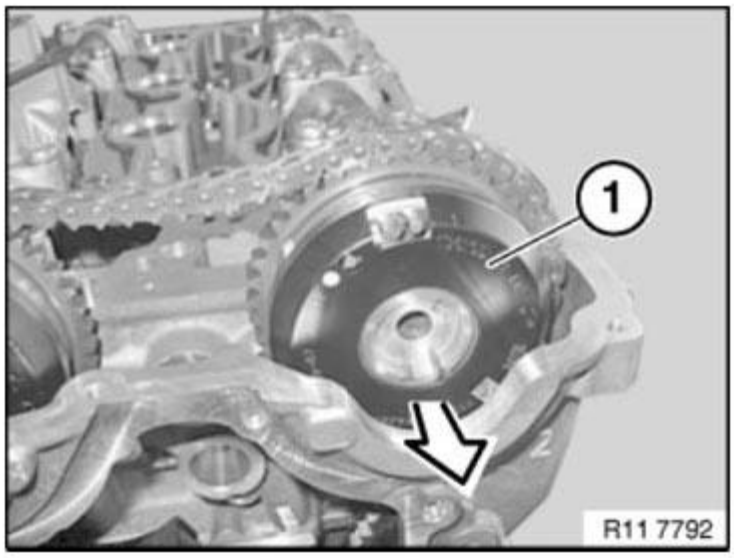


Fig. 349: Identifying Inlet Adjustment Unit

Courtesy of BMW OF NORTH AMERICA, INC.

Feed out inlet adjustment unit (2) from timing chain (1).

Lift out inlet adjustment unit (2).

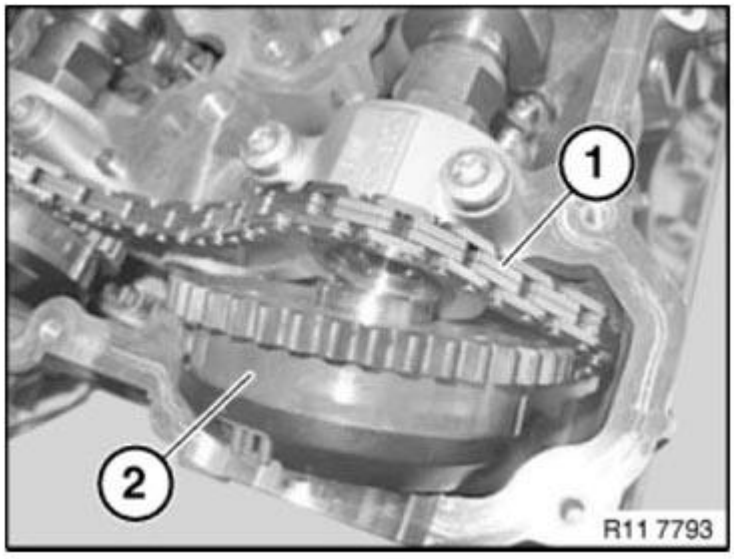


Fig. 350: Identifying Inlet Adjustment Unit And Timing Chain
Courtesy of BMW OF NORTH AMERICA, INC.

Remove central bolt (1) of exhaust adjustment unit.

Installation note:

Replace central bolts after releasing.

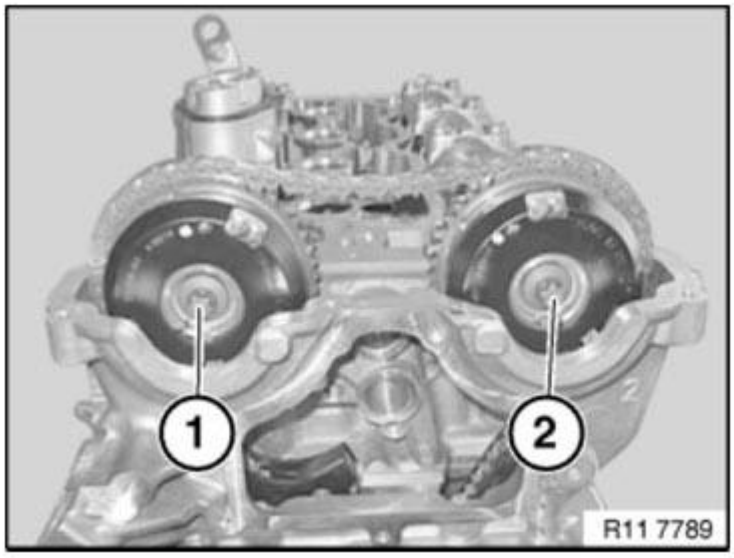


Fig. 351: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Detach exhaust adjustment unit (1) in direction of arrow from exhaust camshaft.

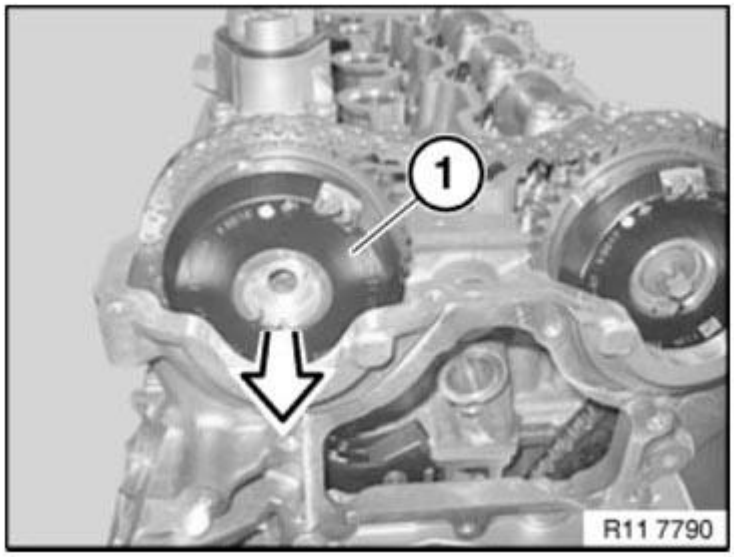


Fig. 352: Identifying Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out exhaust adjustment unit (2) from timing chain (1).

Lift out exhaust adjustment unit (2).

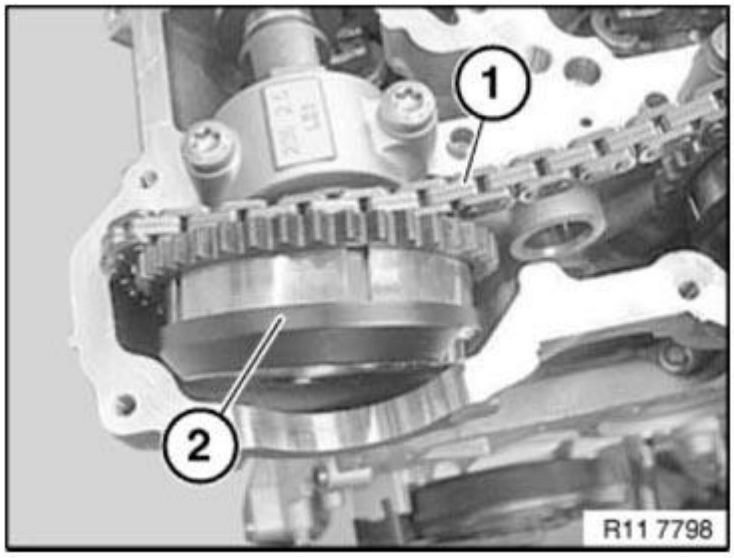


Fig. 353: Identifying Exhaust Adjustment Unit And Timing Chain
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up:

Intake and exhaust camshaft adjusters are different.

Mixing up the inlet and exhaust adjustment units will cause damage to the engine.

1. Intake camshaft adjuster (1) is marked **IN**
2. Exhaust camshaft adjuster (2) is marked **OUT**

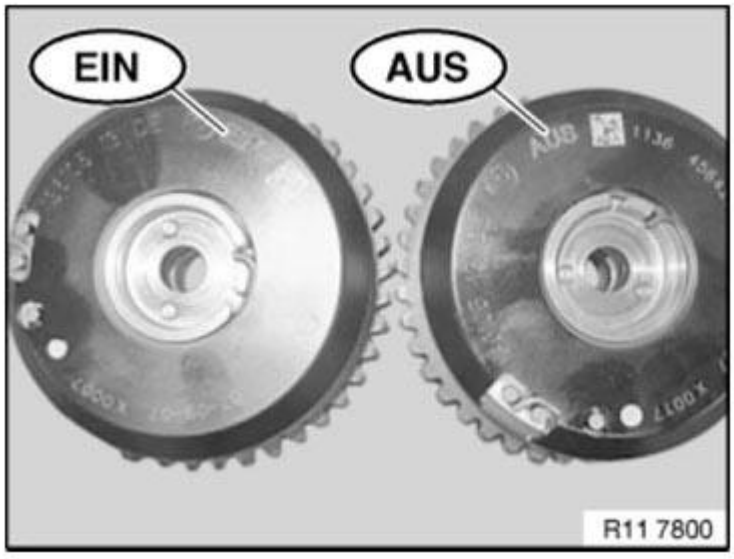


Fig. 354: Identifying Intake And Exhaust Camshaft Adjusters Mark

Installation note:

Coat contact face of central bolt (1) with copper paste.

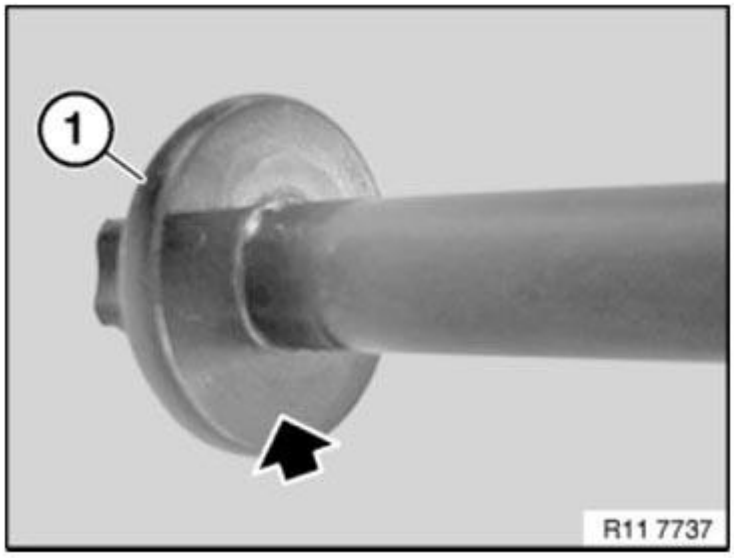


Fig. 355: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of adjustment units in relation to timing chain can be freely selected.

Feed adjuster into timing chain and position on camshafts.

Insert central bolts (1 and 2) on adjustment units without gaps.

Release central bolts (1 and 2) by **90°.**

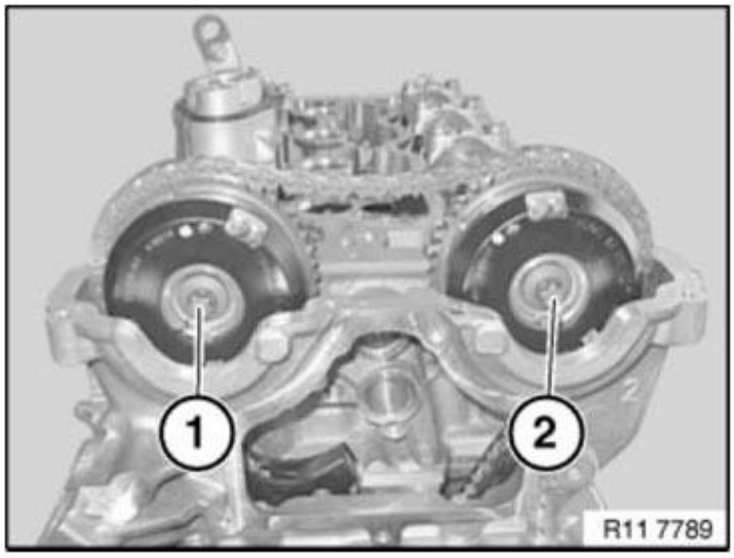


Fig. 356: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sliding rail (2) and secure with screws (1).

Tightening torque: **11 31 4AZ** .

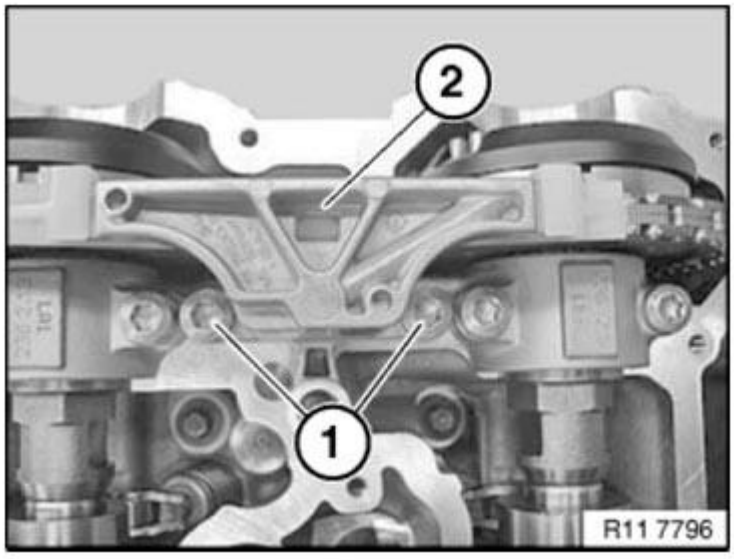


Fig. 357: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Get set of special tools **11 9 890** ready for securing camshafts.

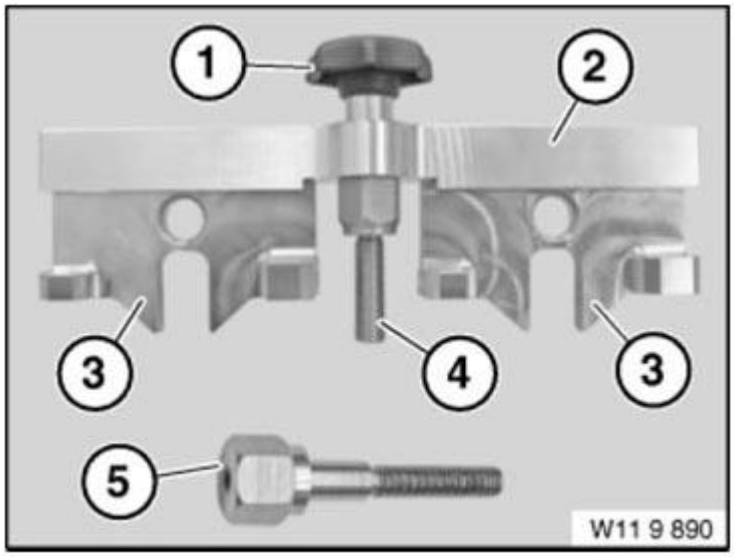


Fig. 358: Identifying Set Of Special Tools 11 9 890
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on exhaust camshaft.

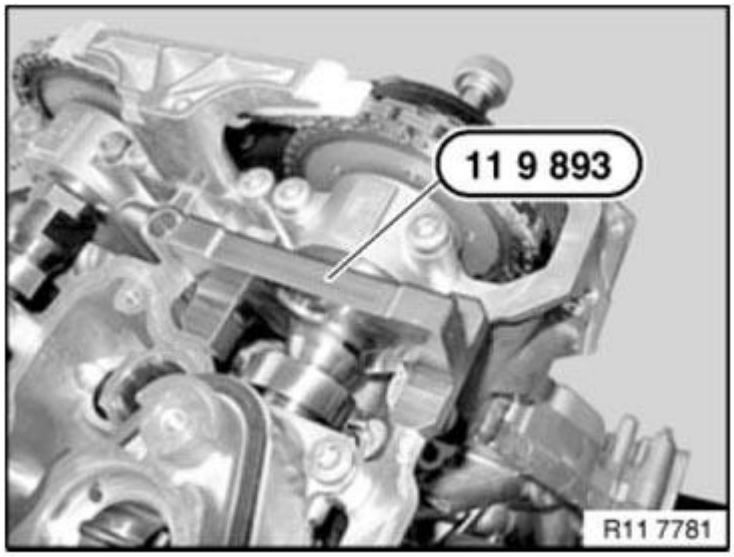


Fig. 359: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft.

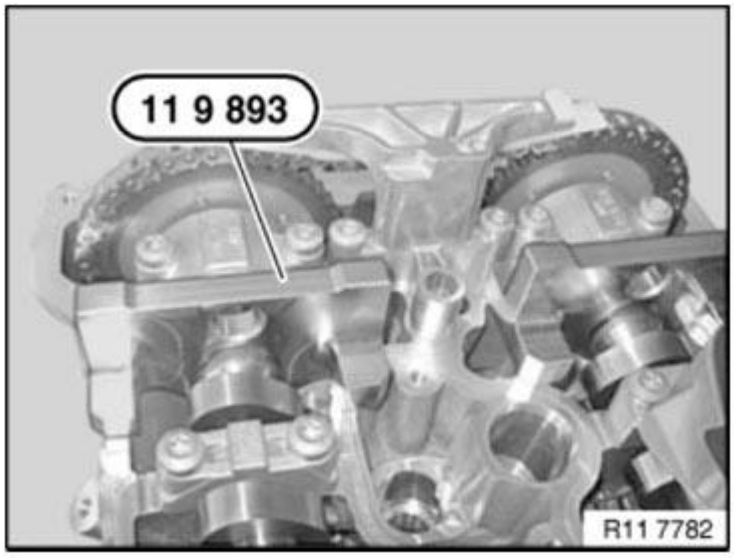


Fig. 360: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Align exhaust and intake camshafts so that special tools 11 9 893 lie on the cylinder head without any gap.

Screw special tool 11 9 894 into cylinder head.

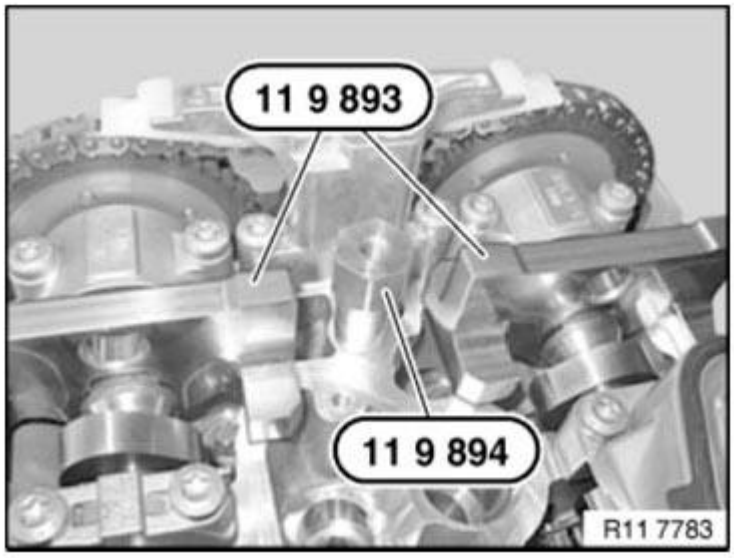


Fig. 361: Positioning Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 11 9 892 down with special tool 11 9 891.

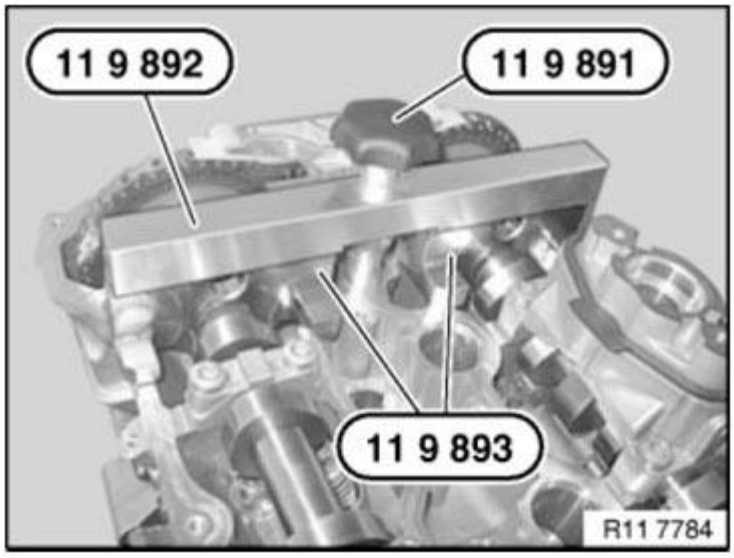


Fig. 362: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 9 900** .

Pretension timing chain with special tool **11 9 900** .

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm.**

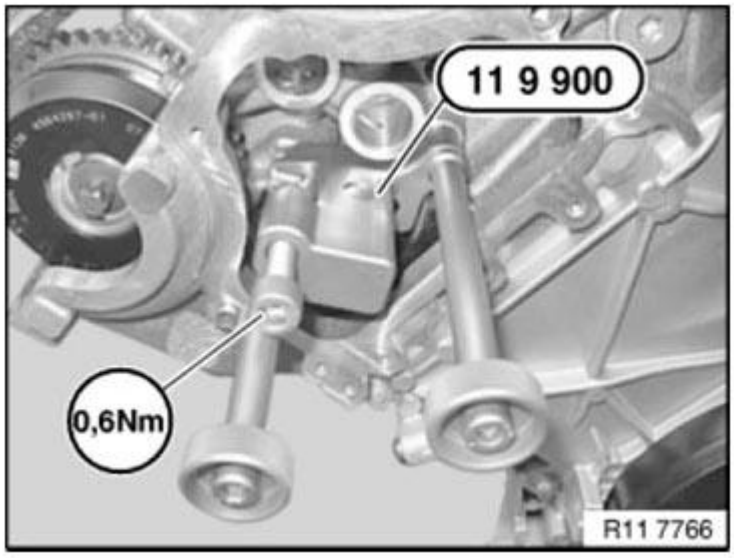


Fig. 363: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

Check special tools **11 9 190** for correct seating.

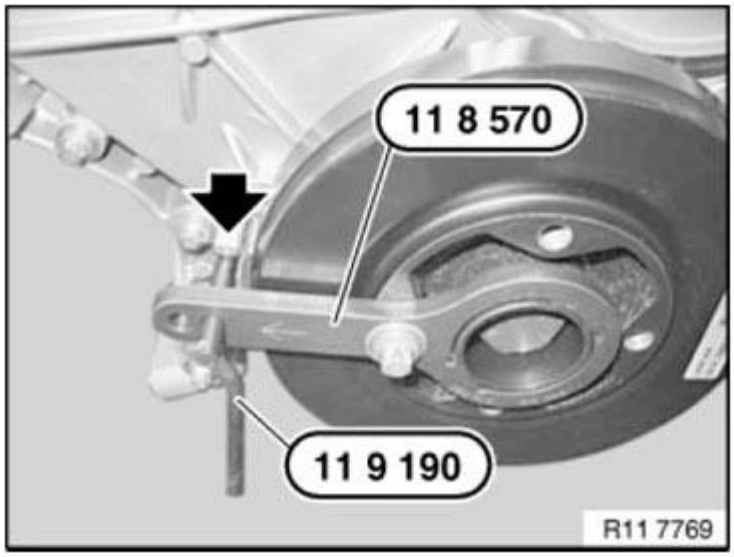


Fig. 364: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down central screw (1 and 2) of the adjustment units with special tool **00 9 120** .

Tightening torque **11 36 1AZ** .

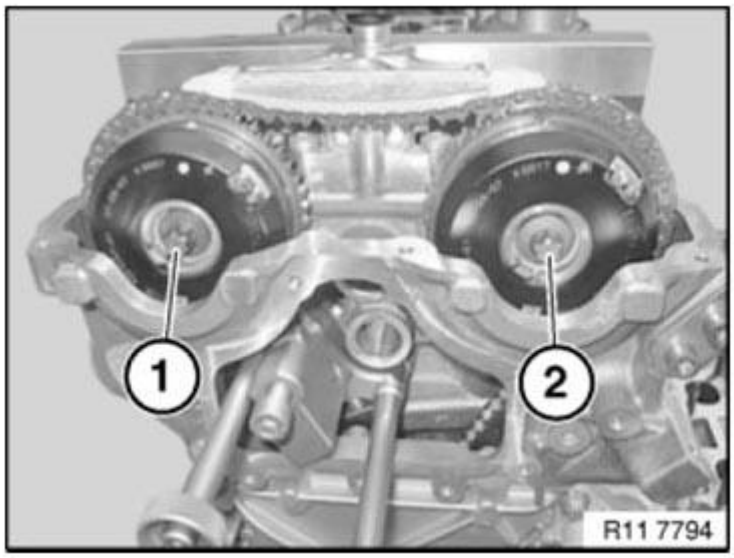


Fig. 365: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of rotation until engine is in the **150° firing TDC position cylinder 1** again.

Mount special tool **11 8 570** on vibration damper with a bolt.

Secure special tool **11 9 190** in **150° firing TDC position cylinder 1.**

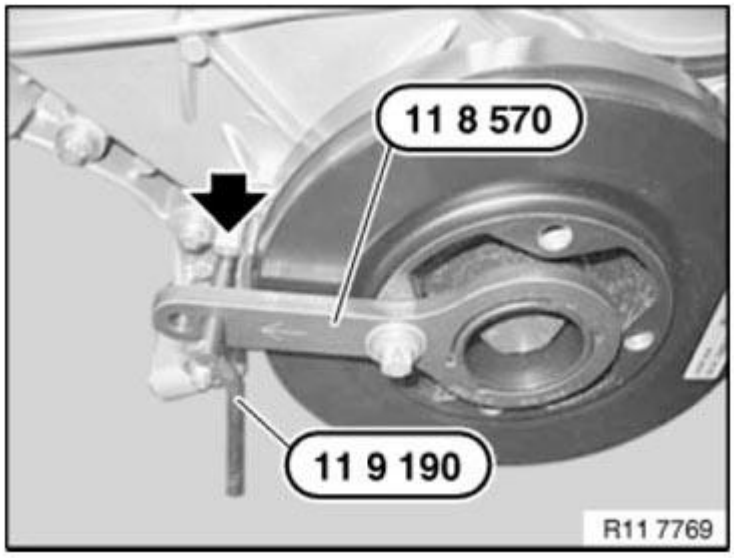


Fig. 366: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Check timing again. See **1131070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N63)**.

Remove all special tools.

1136715 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES ON LEFT SIDE (N63)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.
Possible malfunctions if valves are contaminated:

- **Irregular operation**
- **OBD incorrect entry**
- **Poor exhaust gas values**
- **Low engine performance**

IMPORTANT: Risk of damage!
Do not clean solenoid valves with compressed air.

Solenoid valves, cylinders 5-8:

Necessary preliminary work

- Read out fault memory in DME control unit
- Switch off ignition
- Unlock hose on tank venting valve and disconnect
- Remove left **CHARGE AIR COOLER**
- Carefully press pipe to one side

NOTE: Solenoid valve (2) controls the intake adjuster.
Solenoid valve (4) controls the exhaust adjustment unit.

Unlock plug connections of solenoid valves (2 and 4) and disconnect.

Installation note:

Plug connections must snap audibly into place!

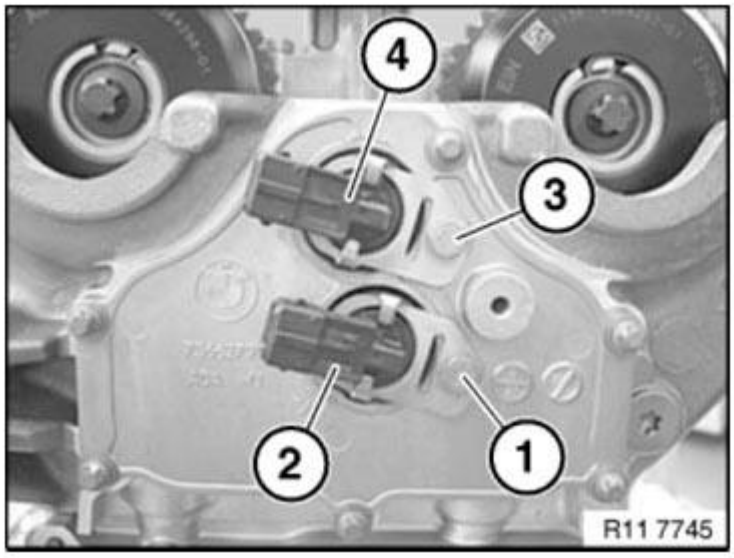


Fig. 367: Identifying Solenoid Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque **11 36 3AZ** .

Pull out solenoid valves (2 and 4).

Installation note:

Replace O-rings (1 and 2) on solenoid valve

Installation note:

To install solenoid valves, coat both O - rings with engine oil.

If the solenoid valve is to be reused, the filter strainer (see arrow) must be cleaned.

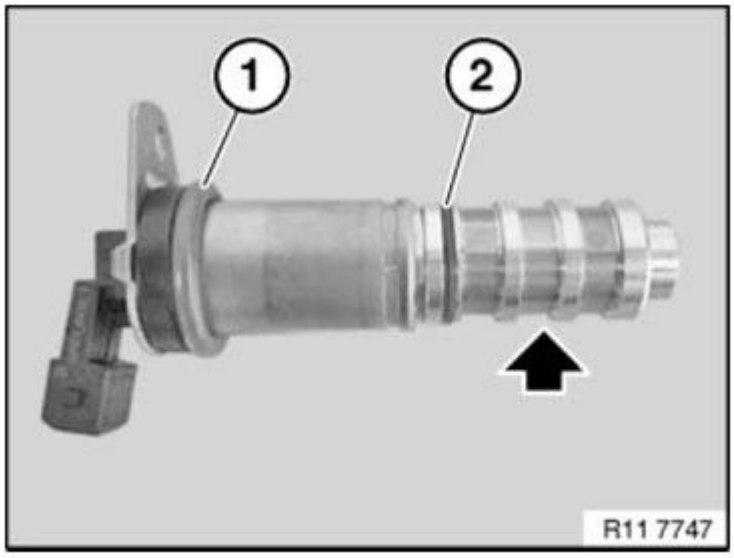


Fig. 368: Identifying O-Rings On Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If a filter element is clogged with dirt, the filter element (filter strainer) may be removed.

Release filter elements (1) at contact edges.

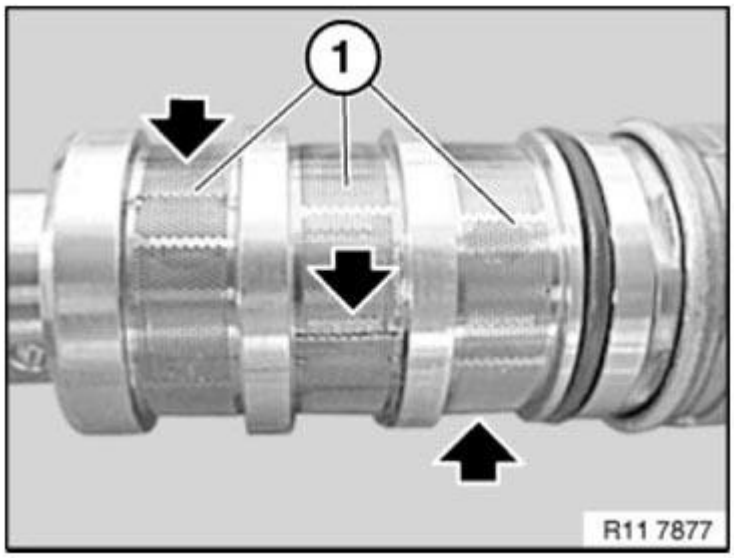


Fig. 369: Identifying Filter Elements At Contact Edges
Courtesy of BMW OF NORTH AMERICA, INC.

Bend open welding spots on filter element (1) with a screwdriver (2) in direction of arrow until welding spots are opened.

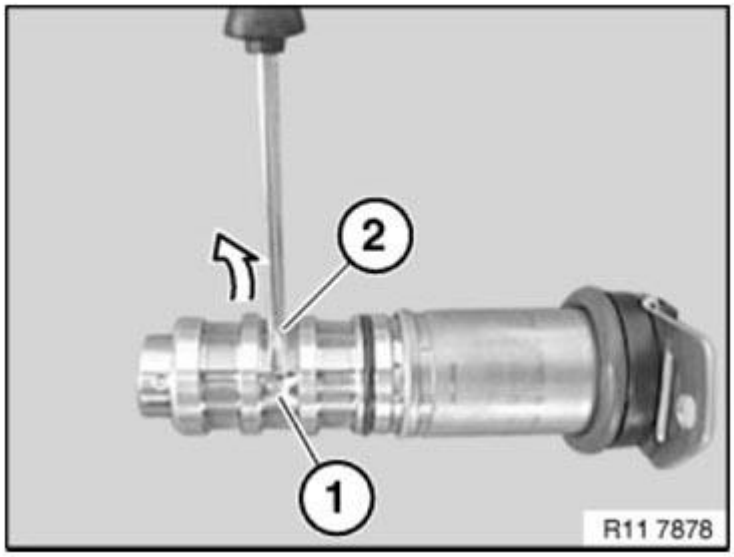


Fig. 370: Bending Open Welding Spots On Filter Element With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Avoid damaging, e.g. notches or scratches, the solenoid valve housing (see arrows).

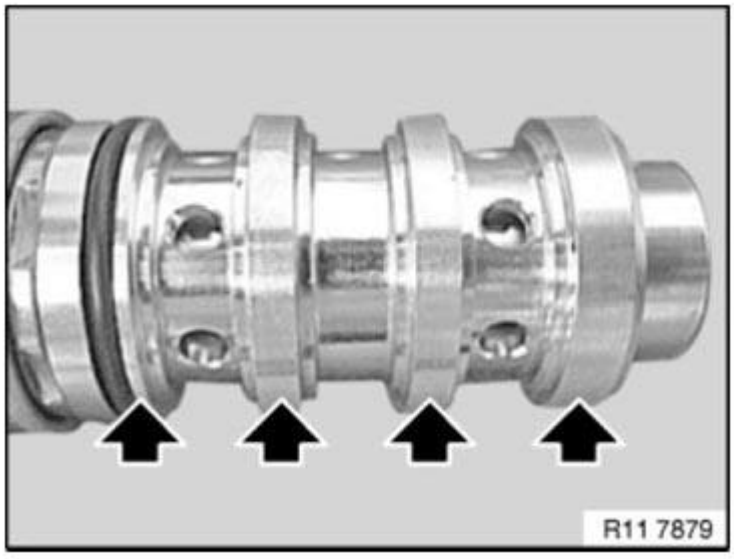


Fig. 371: Inspecting Notches Or Scratches For Solenoid Valve Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully insert solenoid valves (2 and 4) up to stop.

Ensure correct installation position.

Insert screws (1 and 3) and tighten down.

Tightening torque **11 36 3AZ** .

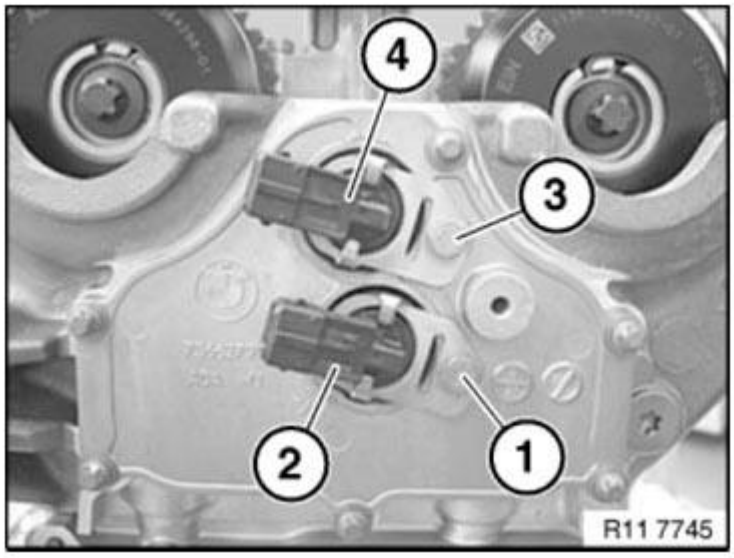


Fig. 372: Identifying Solenoid Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Delete fault memory.

Check function of DME control unit.

1136048 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS ON RIGHT SIDE (N63)

Notes

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjuster is normally locked in its initial position.
The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster.
Where central bolts are not greased at the bolt contact points up to engine number 20024295 , the adjustment gear must be replaced for safety reasons.
The central bolts is greased from engine number 20024296.

(cylinder bank 1 to 4)

Necessary preliminary work

- **Read fault memory and make a documentary record**
- Remove **RIGHT CYLINDER HEAD COVER**
- Remove **RIGHT GEAR CASE COVER**
- Check **TIMING** .

To release central bolts, use special tool **11 9 890** or grip at hexagon head of camshaft.

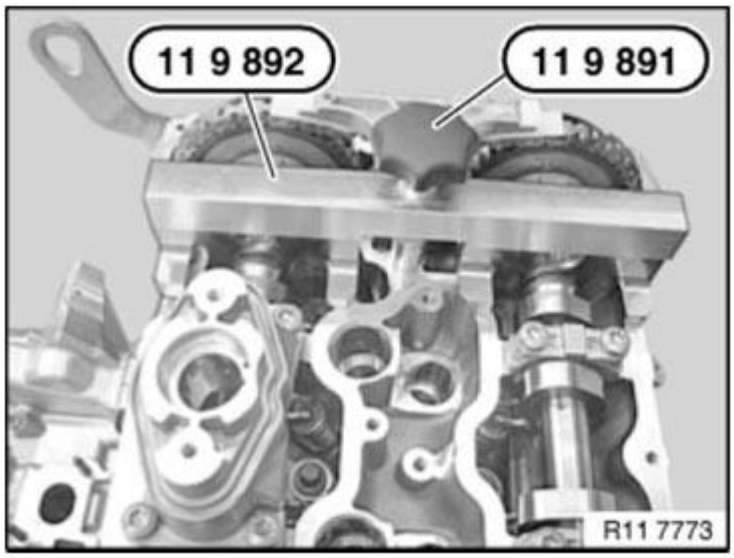


Fig. 373: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshafts.

Release central bolts (1 and 2) of intake and exhaust camshaft adjusters.

Installation note:

Replace central bolts after releasing.

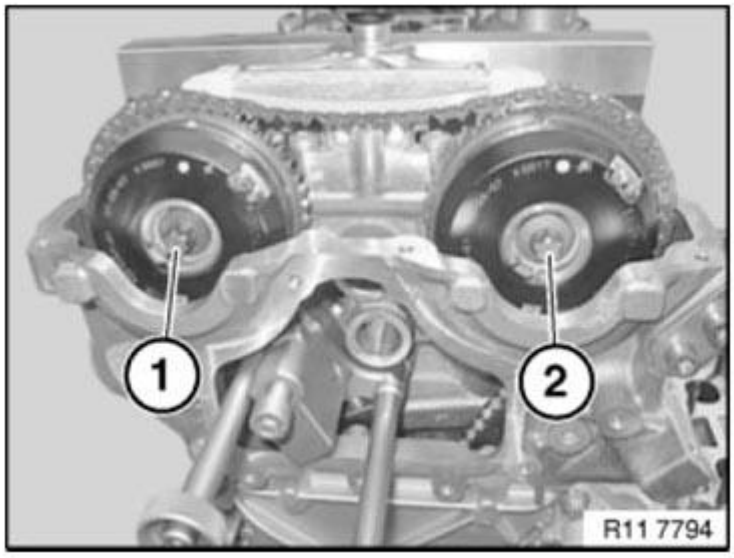


Fig. 374: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow). If no grease can be seen on the bolt head of central bolt (1), the inlet and exhaust adjustment unit must be replaced for safety reasons.

Installation note:

Coat contact face of central bolt (1) with copper paste.

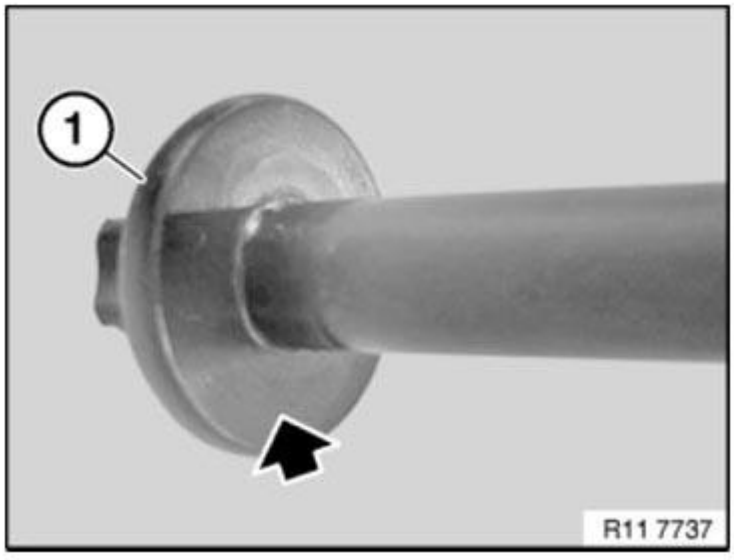


Fig. 375: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket screw.

Release special tool **11 9 900** at knurled screws and remove.

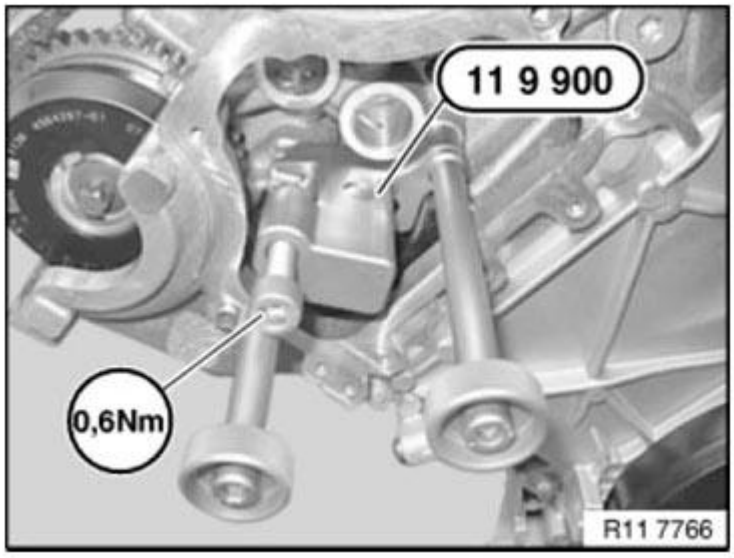


Fig. 376: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove upper tensioning rail (2).

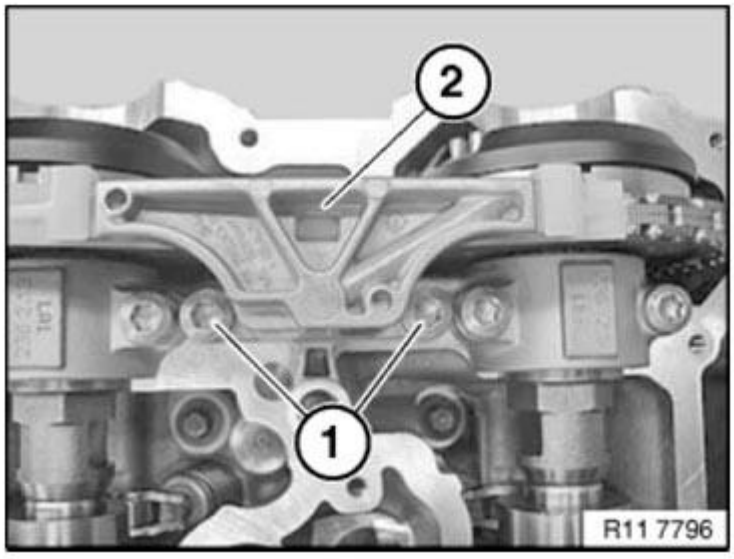


Fig. 377: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove central bolt (1) of exhaust adjustment unit.

Installation note:

Replace central bolts after releasing.

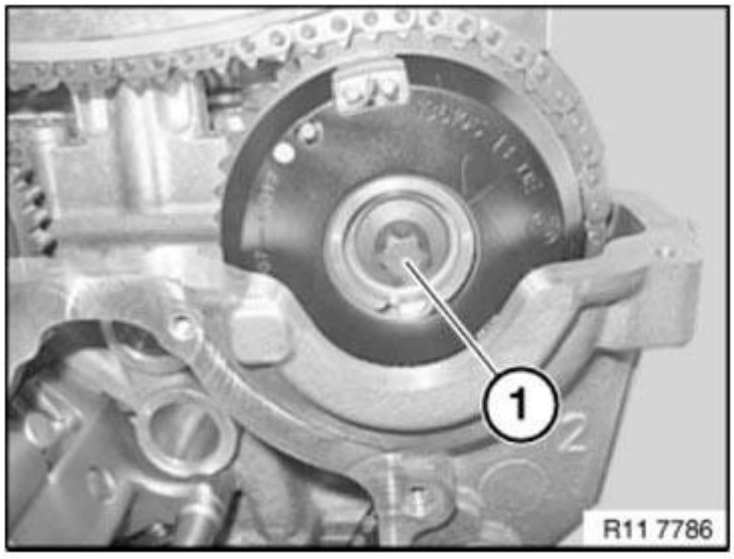


Fig. 378: Identifying Central Bolt Of Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Detach exhaust adjustment unit (1) in direction of arrow from exhaust camshaft.

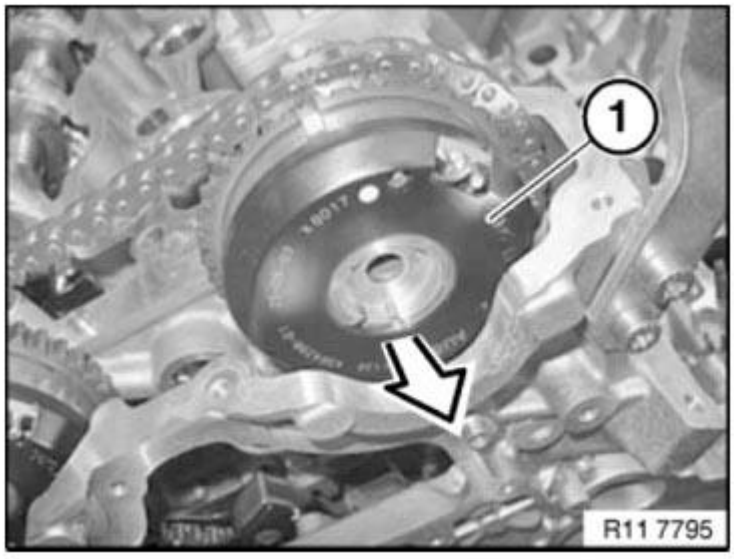


Fig. 379: Identifying Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out exhaust adjustment unit (2) from timing chain (1).

Lift out exhaust adjustment unit (2).

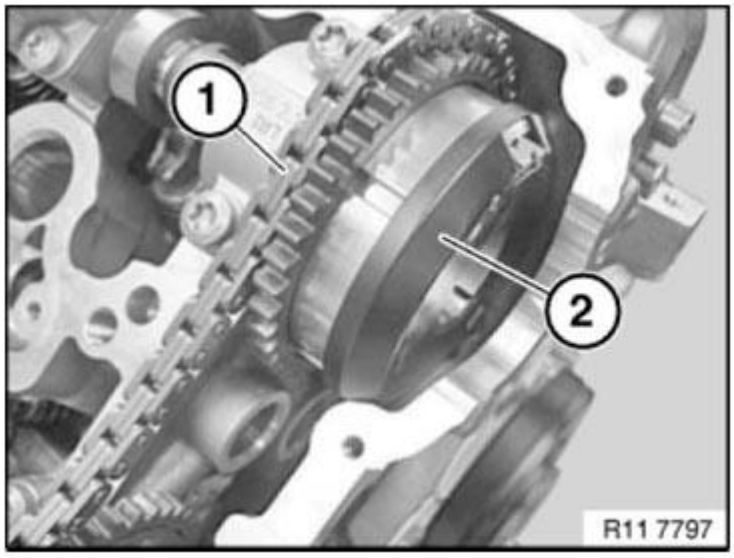


Fig. 380: Identifying Exhaust Adjustment Unit And Timing Chain
Courtesy of BMW OF NORTH AMERICA, INC.

Remove central bolt (1) of inlet adjustment unit.

Installation note:

Replace central bolts after releasing.

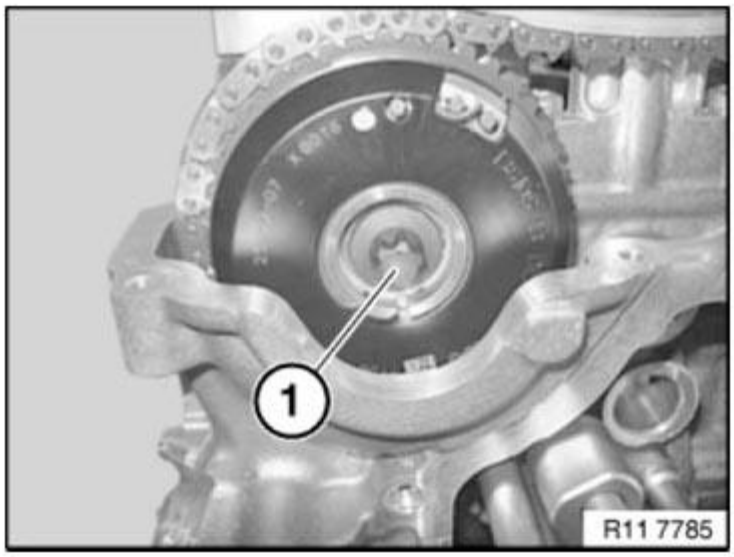


Fig. 381: Identifying Central Bolt Of Inlet Adjustment Unit

Courtesy of BMW OF NORTH AMERICA, INC.

Detach inlet adjustment unit (1) in direction of arrow from inlet camshaft.

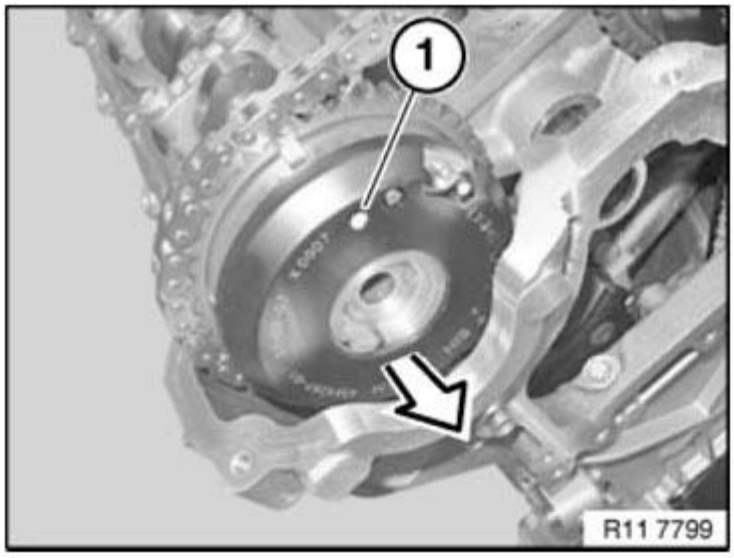


Fig. 382: Identifying Inlet Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out inlet adjustment unit (2) from timing chain (1).

Lift out inlet adjustment unit (2).

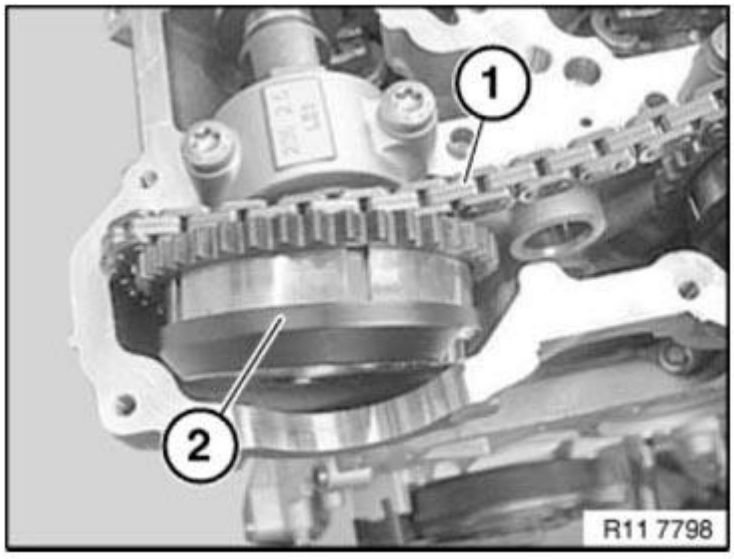


Fig. 383: Identifying Exhaust Adjustment Unit And Timing Chain
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up:

Intake and exhaust camshaft adjusters are different.

Mixing up the inlet and exhaust adjustment units will cause damage to the engine.

1. Intake camshaft adjuster (1) is marked **IN**
2. Exhaust camshaft adjuster (2) is marked **OUT**

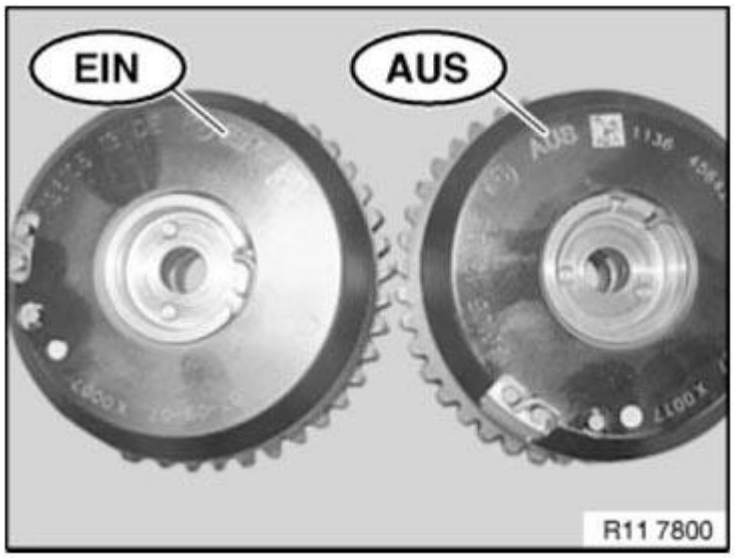


Fig. 384: Identifying Intake And Exhaust Camshaft Adjusters Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Coat contact face of central bolt (1) with copper paste.

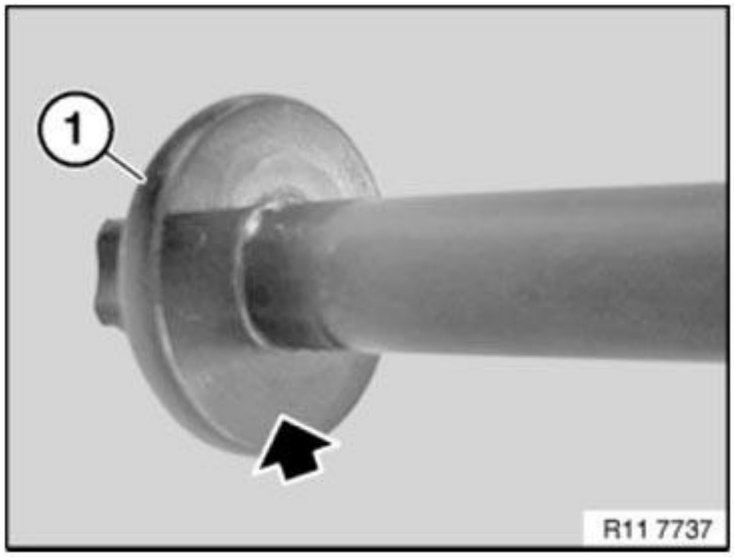


Fig. 385: Checking Head Of Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of adjustment units in relation to timing chain can be freely selected.

Feed adjuster into timing chain and position on camshafts.

Insert central bolts (1 and 2) on adjustment units without gaps.

Release central bolts (1 and 2) by **90°.**

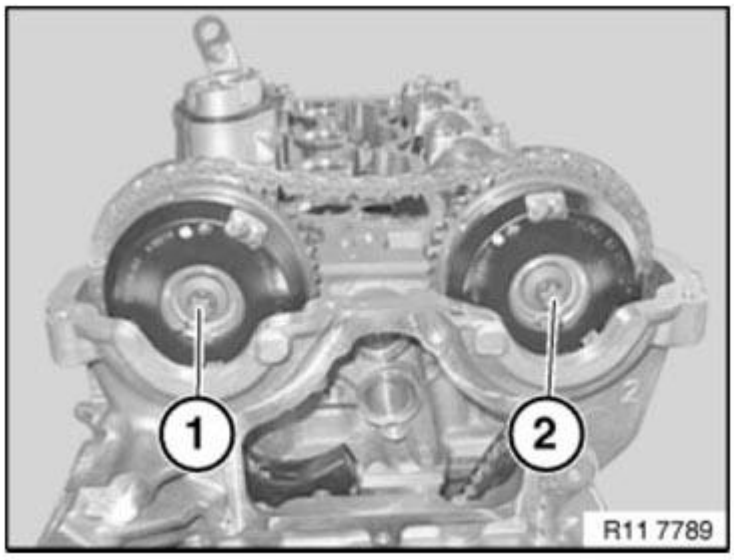


Fig. 386: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sliding rail (2) and secure with screws (1).

Tightening torque: **11 31 4AZ** .

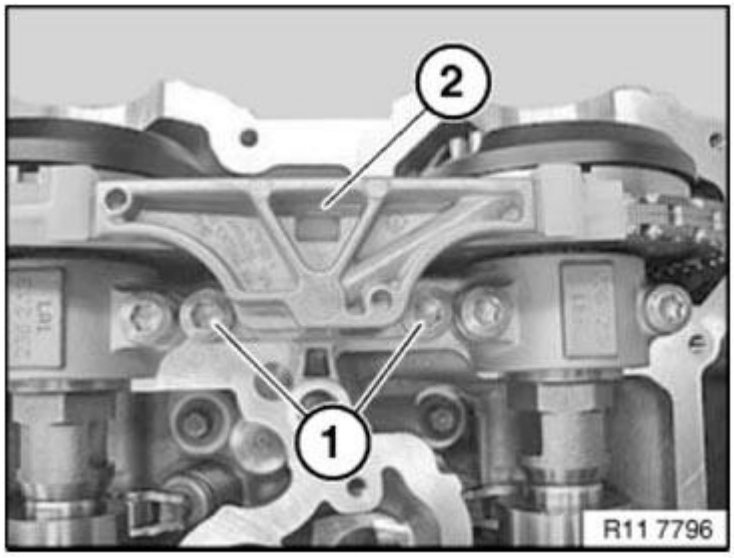


Fig. 387: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Get set of special tools **11 9 890** ready for securing camshafts.

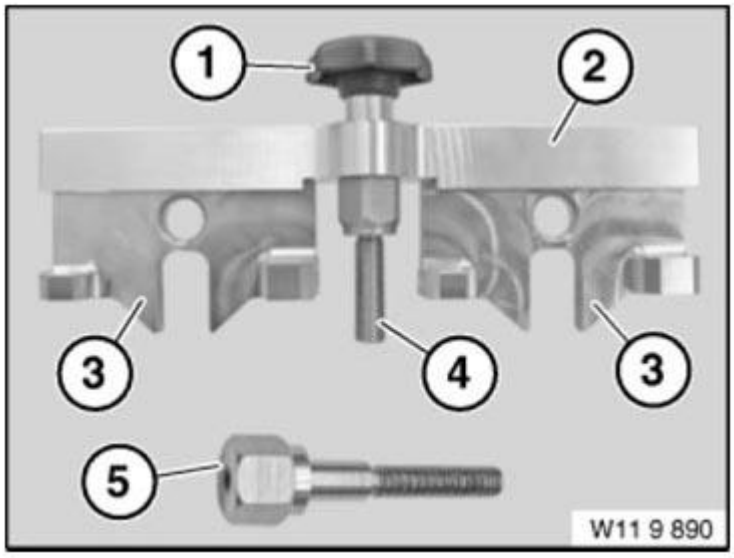


Fig. 388: Identifying Set Of Special Tools 11 9 890
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on exhaust camshaft.

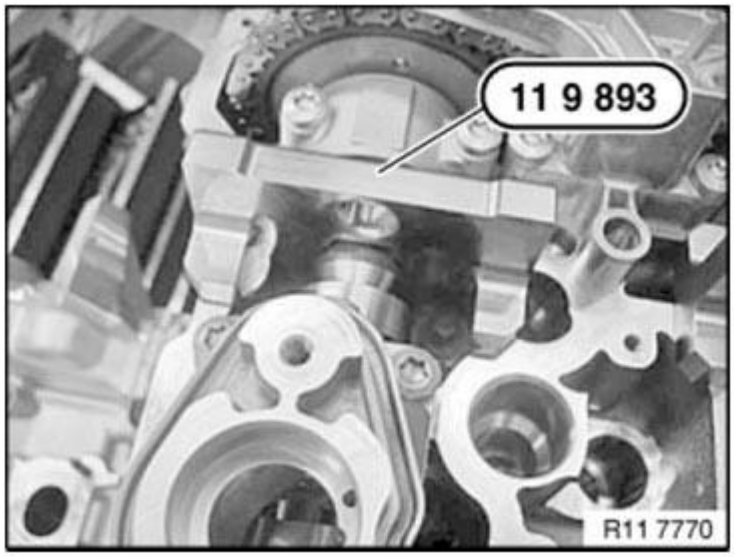


Fig. 389: Identifying Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft.

Installation note:

Align exhaust and intake camshafts so that special tools 11 9 893 lie on the cylinder head without any gap.

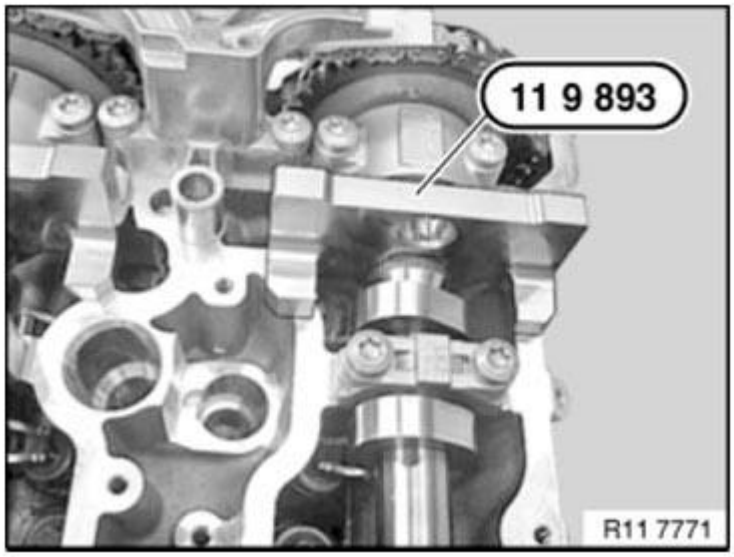


Fig. 390: Identifying Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 894 into cylinder head.

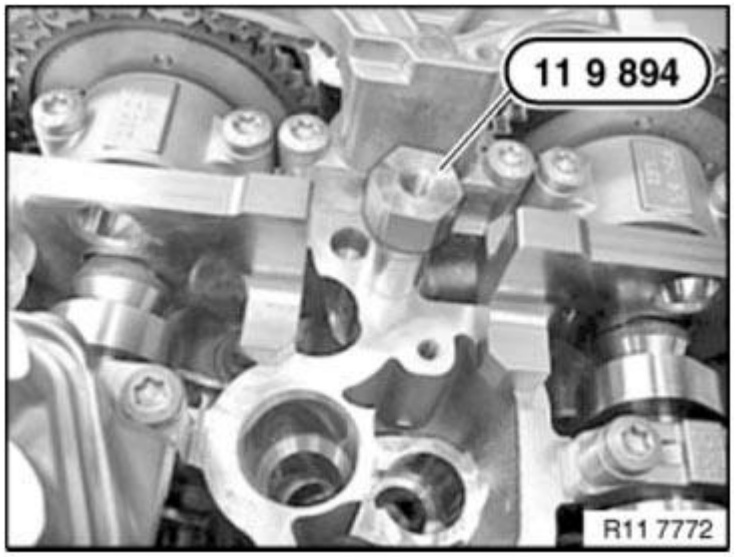


Fig. 391: Identifying Special Tool 11 9 893 On Intake Camshaft And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 11 9 892 down with special tool 11 9 891.

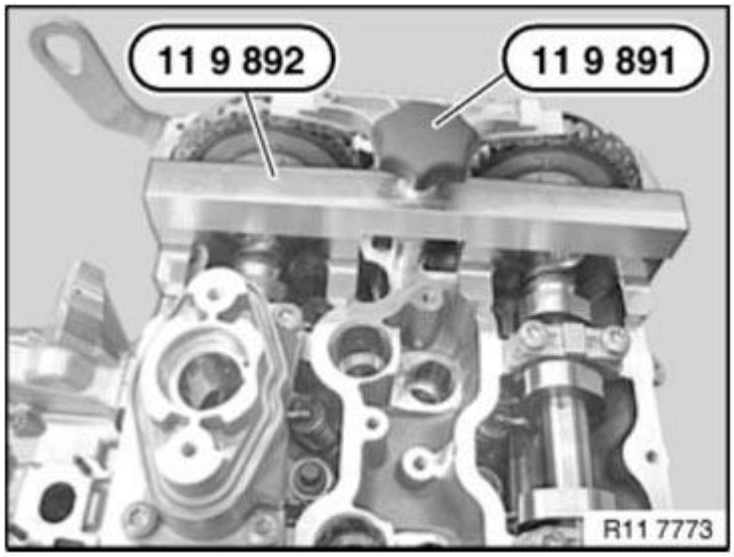


Fig. 392: Positioning Special Tool 11 9 892 On Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 9 900** .

Pretension timing chain with special tool **11 9 900** .

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm.**

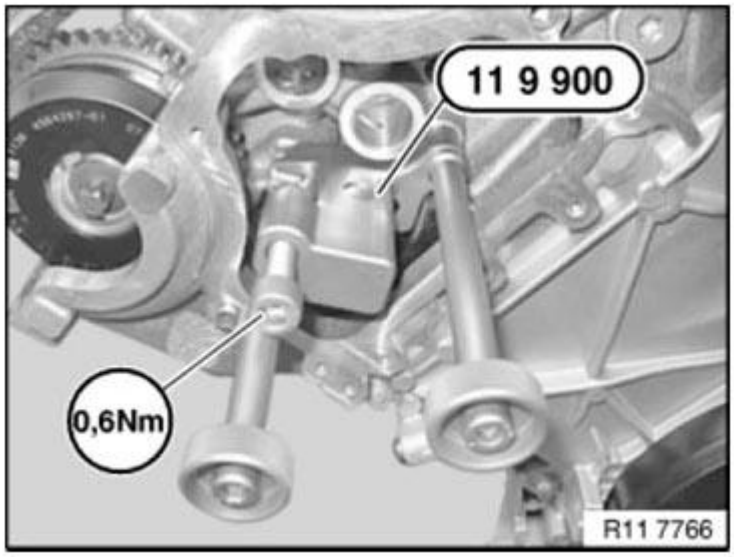


Fig. 393: Preloading Hexagon Socket Screw With Special Tool 00 9 250 To 0.6 Nm
Courtesy of BMW OF NORTH AMERICA, INC.

Check special tools **11 9 190** for correct seating.

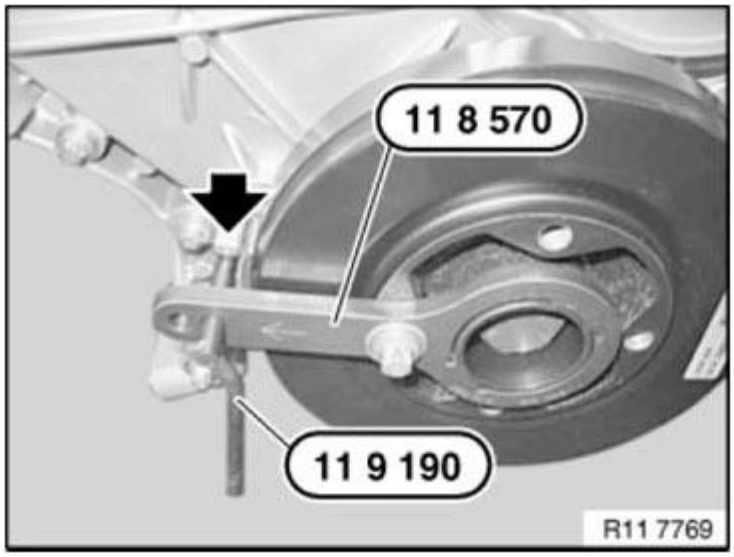


Fig. 394: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down central screw (1 and 2) of the adjustment units with special tool **00 9 120** .

Tightening torque **11 36 1AZ** .

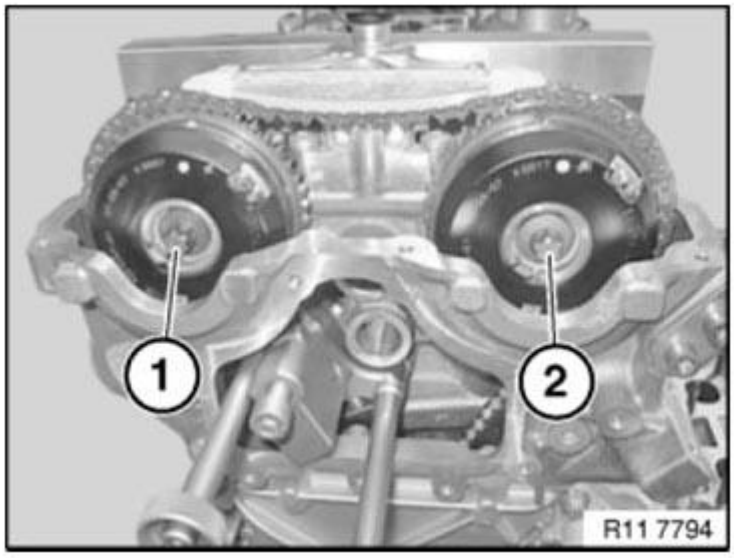


Fig. 395: Identifying Central Bolts Of Intake And Exhaust Camshaft Adjusters
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of rotation until engine is in the **150° firing TDC position cylinder 1** again.

Mount special tool **11 8 570** on vibration damper with a bolt.

Secure special tool **11 9 190** at **150° before cylinder no. 1 firing TDC position.**

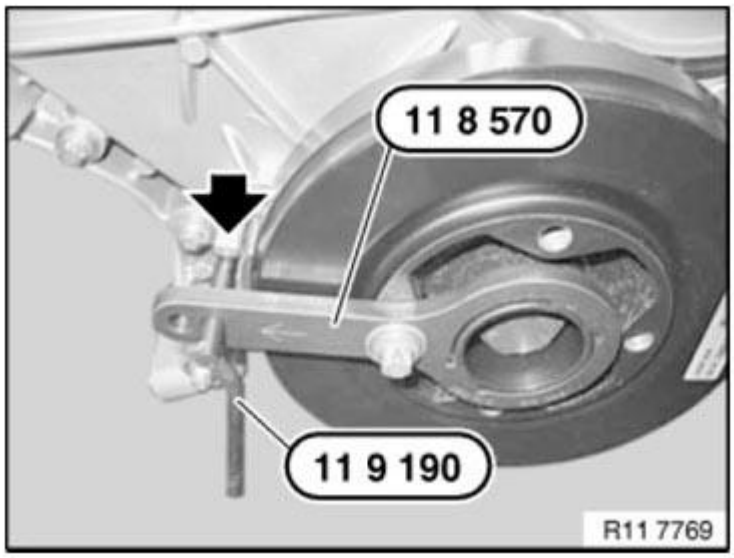


Fig. 396: Securing Vibration Damper With Special Tool 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Check timing again. See **1131071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N63)**.

Remove all special tools.

1140 OIL SUPPLY

1140000 CHECKING ENGINE OIL PRESSURE

Notes

WARNING: Risk of scalding!

NOTE: To check the engine oil pressure, remove the oil pressure switch and install and connect the special tool.

NOTE: A small amount of engine oil emerges when the oil pressure switch is removed.

Have a cleaning cloth ready.

Necessary preliminary work

- Follow BMW diagnosis instruction
- Remove **OIL PRESSURE SWITCH**

Special tool **11 4 050** is equipped with a sealing ring (1).

IMPORTANT: Tightening torque of special tool 11 4 050 max. 20 Nm.

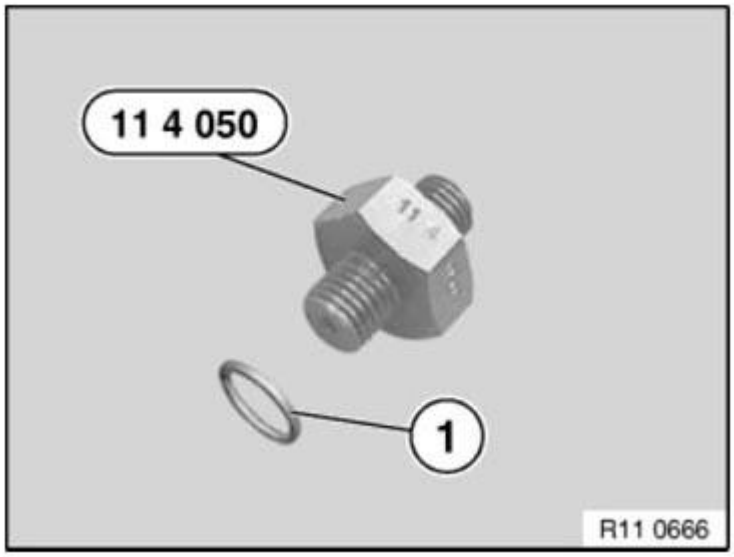


Fig. 397: Identifying Special Tool (11 4 050) And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool **11 4 050** into crankcase to max. 20 Nm.

Secure union nut (1) of special tool 13 3 063 to max. 15 Nm.

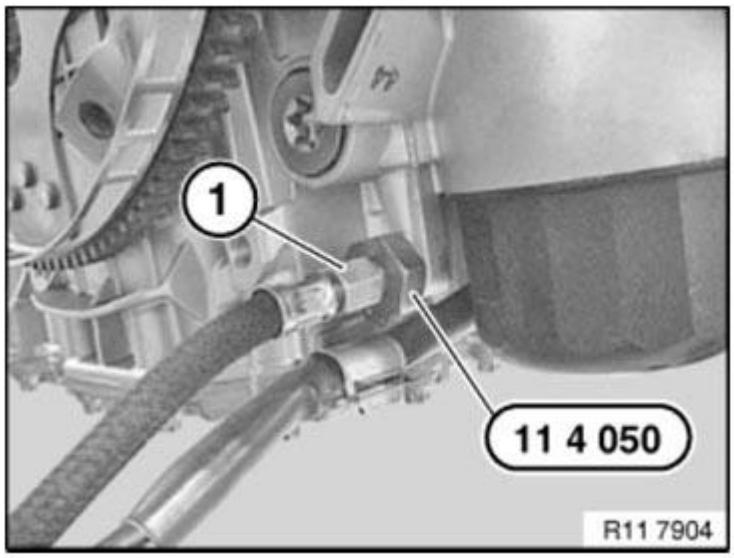


Fig. 398: Identifying Union Nut And Special Tool 11 4 050
Courtesy of BMW OF NORTH AMERICA, INC.

Checking engine oil pressure with DIS Tester

Screw special tool 13 6 054 with sealing ring (1) into special tool 13 6 051 and connect to DIS tester.

Checking engine oil pressure with pressure gauge

Connect special tool 13 3 063 with special tool 13 3 061 (pressure gauge).

Start engine and check engine oil pressure.

SPECIFIED VALUE .

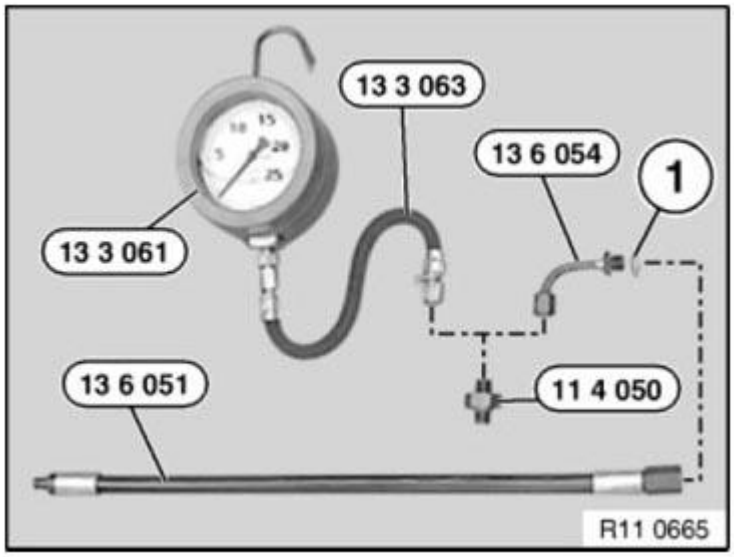


Fig. 399: Checking Engine Oil Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

1141 OIL PUMP WITH FILTER AND DRIVE

1141000 REMOVING AND INSTALLING/REPLACING OIL PUMP (N63)

Notes

IMPORTANT: All adjusting procedures on the chain drive must be observed.
A timing chain which is tensioned too tautly can cause noises in the chain drive.
A timing chain that is too slack can cause the timing chain to jump.
Risk of damage in oil pump drive.

Necessary preliminary work

- **DRAIN ENGINE OIL** .
- **REMOVE UPPER OIL SUMP SECTION** .

Unscrew nuts (2).

Tightening torque: **11 41 1AZ** .

Remove intake pipe (1).

Installation note:

Replace O-ring.

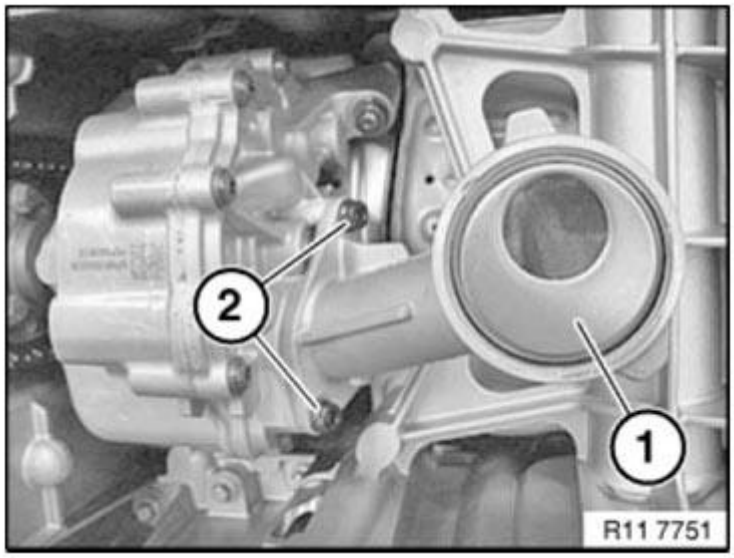


Fig. 400: Identifying Intake Pipe And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release all nuts (1) using special tool 11 7 201.

Tightening torque **11 41 5 AZ** .

Remove oil pump drive gear.

NOTE: Illustration shows engine removed.

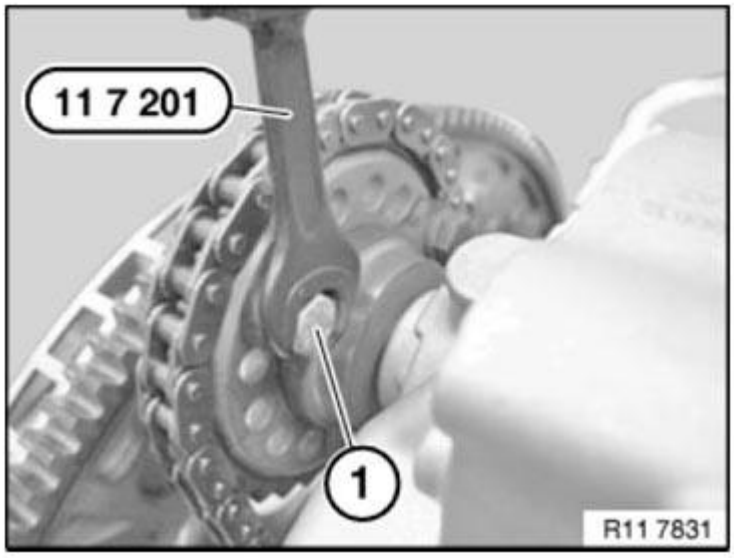


Fig. 401: Removing Nuts Using Special Tool 11 7 201
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Release screws, remove oil pump (1) with aid of a second person.

Installation note:

Replace screws.

Tightening torque **11 41 2AZ** .

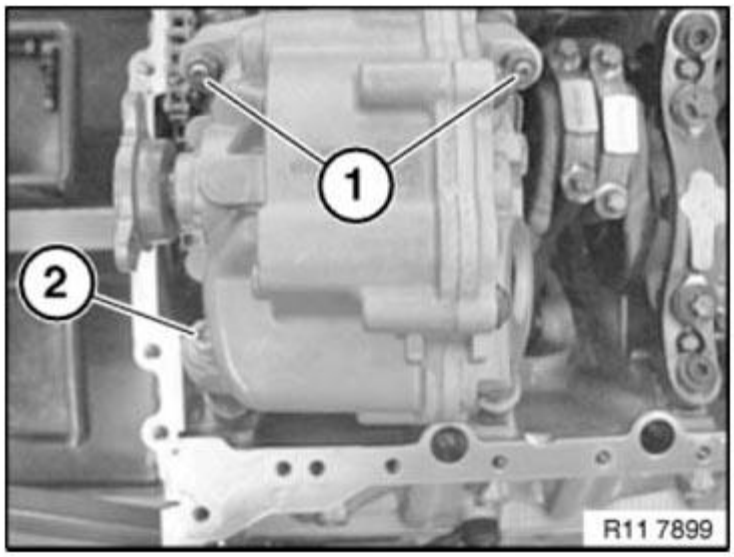


Fig. 402: Identifying Oil Pump And Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Detach oil lines (1) upwards in direction of arrow.

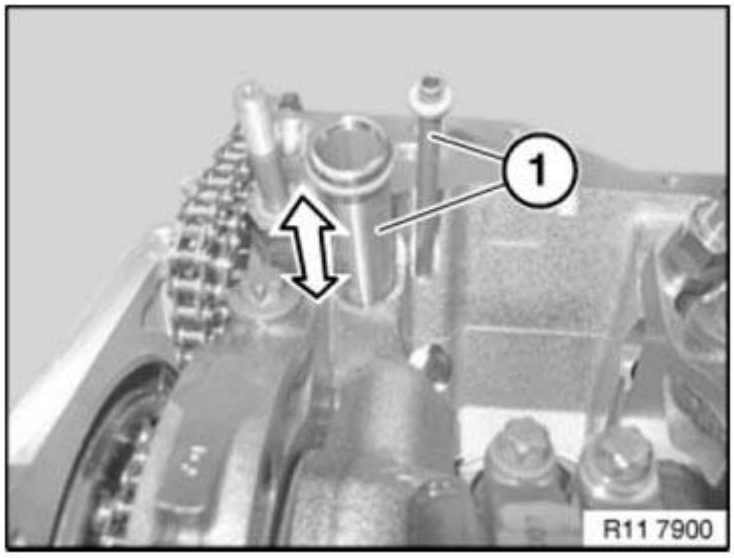


Fig. 403: Detaching Oil Lines Upwards In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing rings (1).

Apply light coat of oil to sealing ring (1).

Coat sealing ring (2) with suitable lubricant.

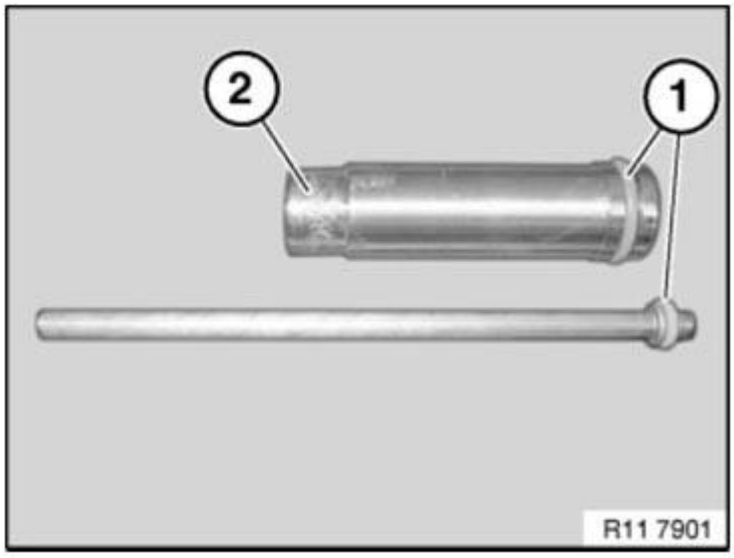


Fig. 404: Identifying Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace O-ring (1) for oil feed line.

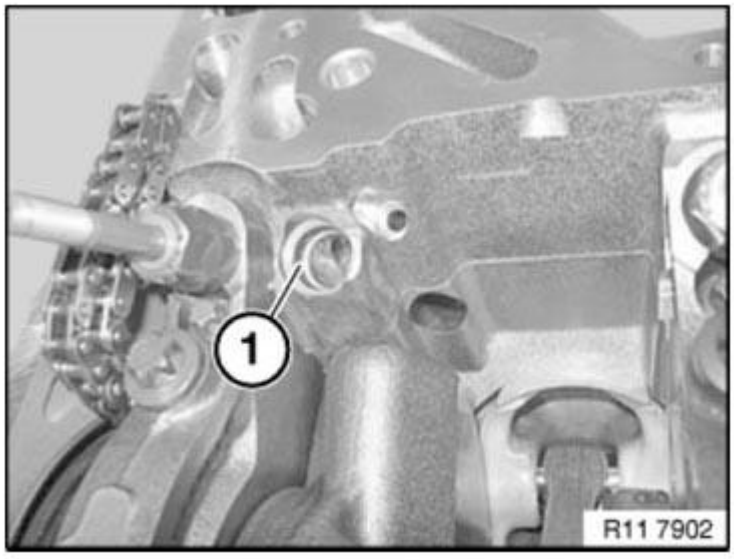


Fig. 405: Identifying O-Ring Of Oil Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Fit oil lines (1) in direction of arrow.

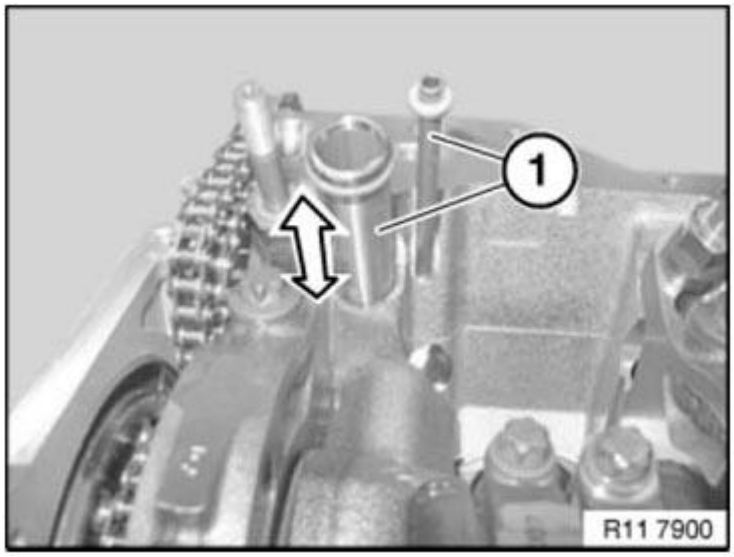


Fig. 406: Fitting Oil Lines In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If the oil pump is renewed, the oil deflector must be converted.

Release screws (1).

Tightening torque: **11 41 6 AZ** .

Modify oil deflector (2).

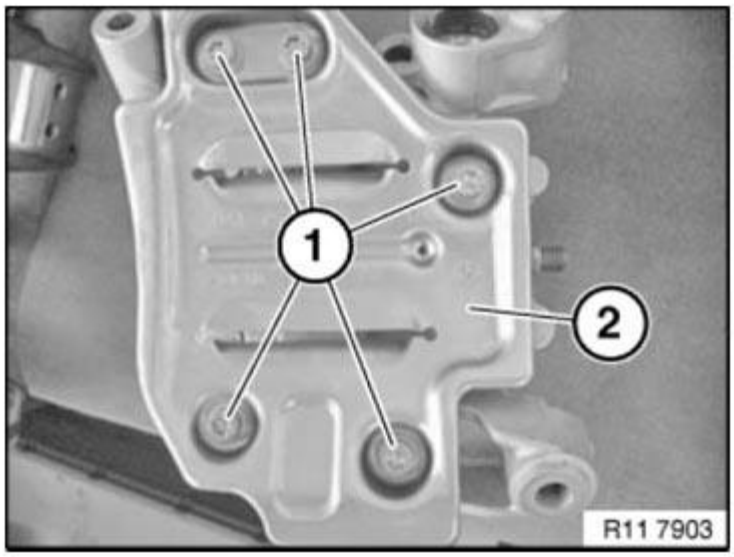


Fig. 407: Identifying Oil Deflector And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **11 8 920** on special tool **11 9 280** .

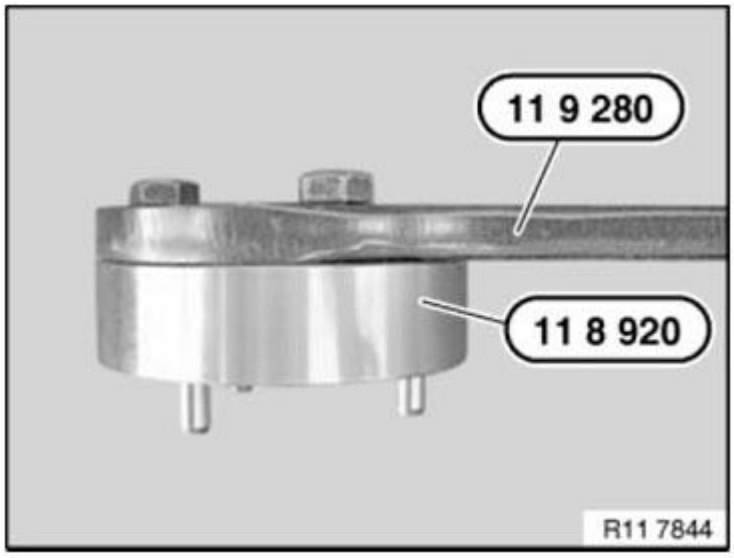


Fig. 408: Fitting Special Tool 11 8 920 On Special Tool 11 9 280
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Left-hand thread on oil pump screw connection.
Do not grip oil pump drive with a pair of pliers risk of damage.

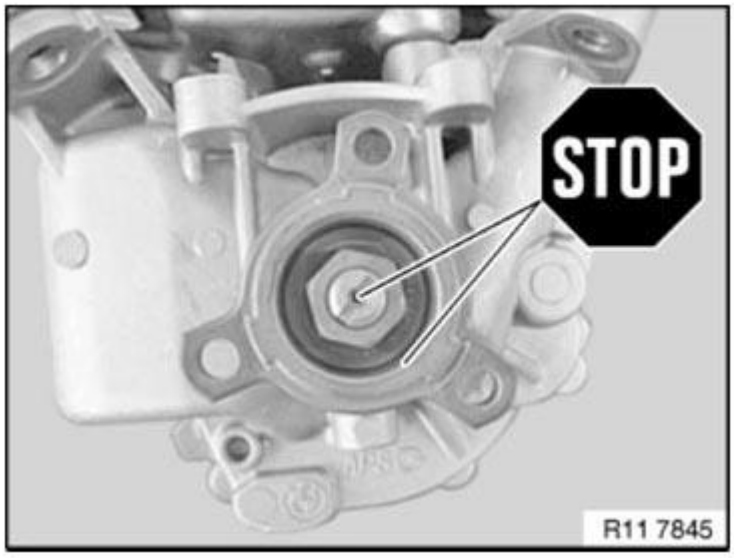


Fig. 409: [Caution - Do Not Grip Oil Pump Drive With Pair Of Pliers Risk Of Damage]
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Nut (1) has left-hand thread.

Position special tool **11 8 920** on sprocket.

Slacken nut (1).

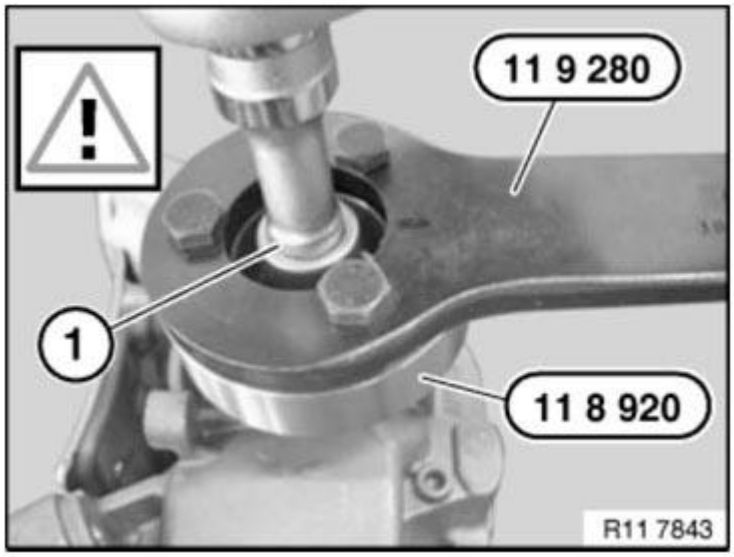


Fig. 410: Positioning Special Tool 11 8 920 On Sprocket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check mounting flats on pump shaft (1) for damage.

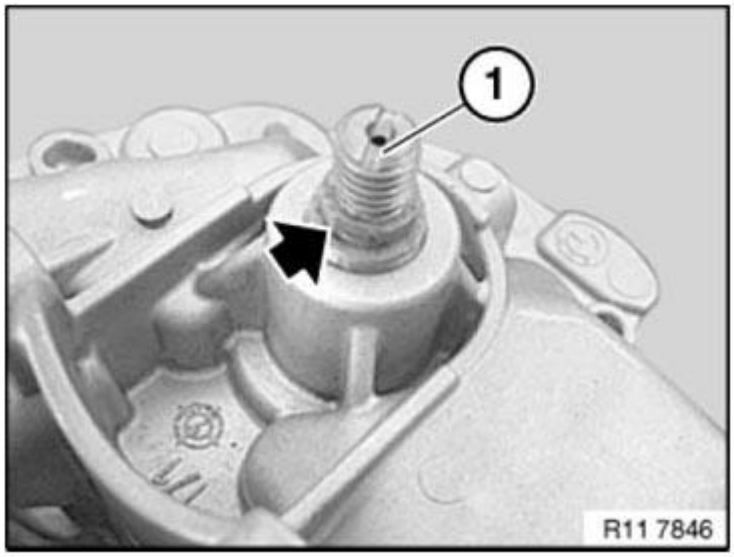


Fig. 411: Checking Mounting Flats On Pump Shaft For Damage

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Nut (1) has left-hand thread.

Grip pump with assistance of a second person.

Secure nut (1) with special tool **00 9 120** .

Tightening torque: **11 41 4**

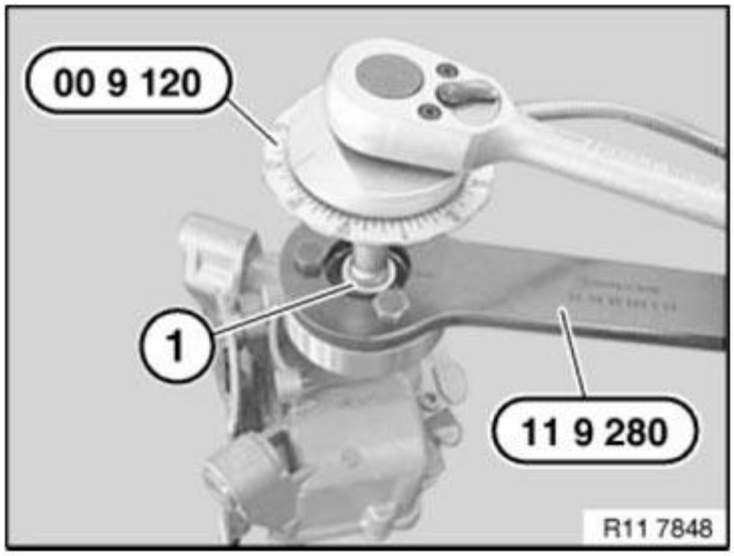


Fig. 412: Securing Nut With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Join and secure nuts (1).

Tightening torque **11 41 2 AZ** .

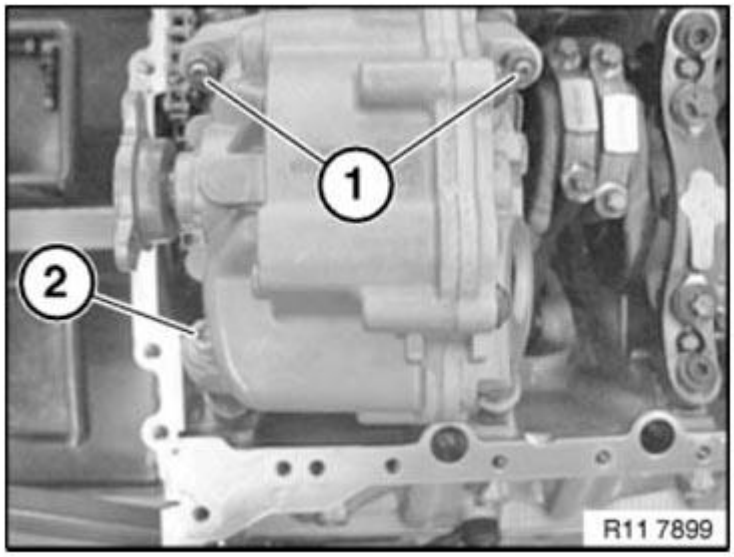


Fig. 413: Identifying Oil Pump And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Install oil pump drive gear.

Secure all nuts (1) with special tool 11 7 201.

Tightening torque **11 41 5 AZ** .

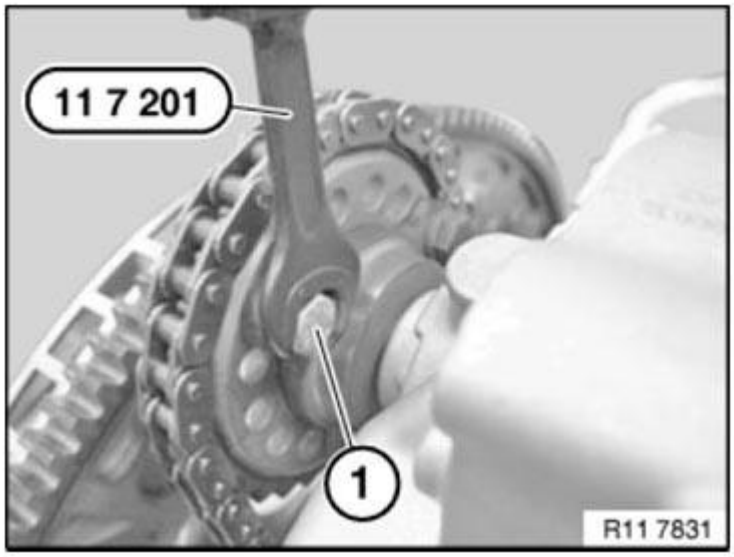


Fig. 414: Tightening Nuts Using Special Tool 11 7 201
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust oil pump timing chain

Pretension oil pump adjusting sleeve (1) with a hexagon socket wrench.

Adjustment value **10 mm +2.**

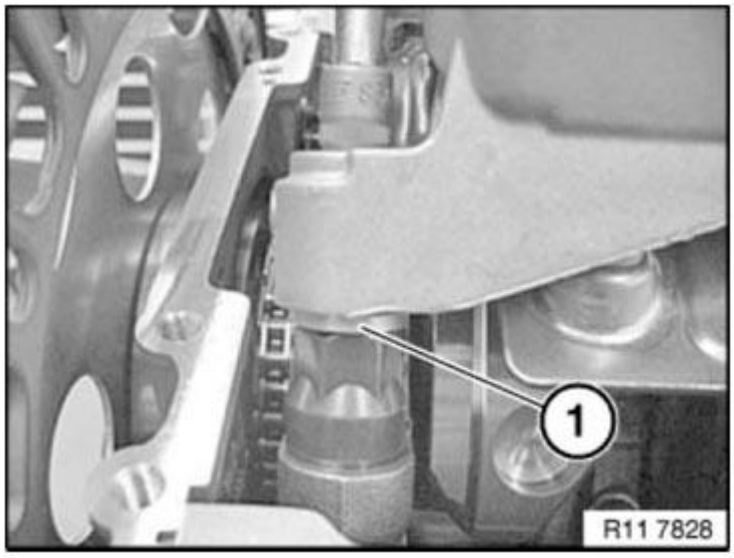


Fig. 415: Pretensioning Oil Pump Adjusting Sleeve With Hexagon Socket Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Minimally preload timing chain (1) with special tool 51 0 342.

Read off measured value A on special tool 51 0 342 and note down.

IMPORTANT: Do not use force to preload timing chain (1).

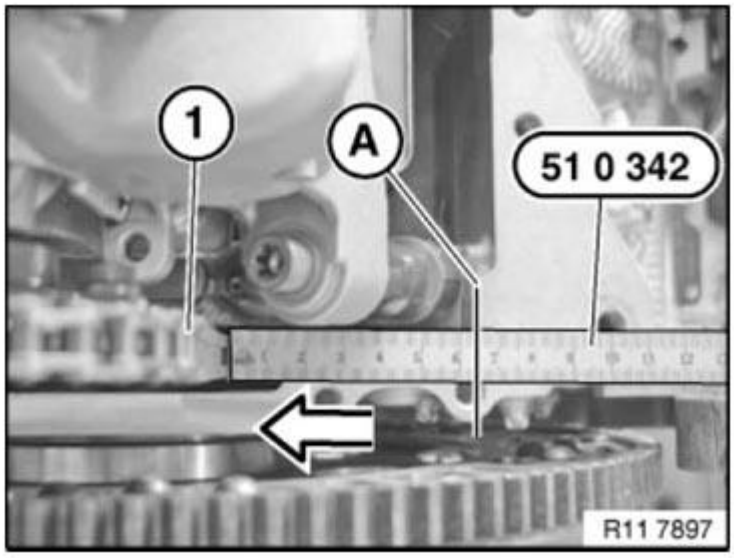


Fig. 416: Measuring Value A On Special Tool 51 0 342

Courtesy of BMW OF NORTH AMERICA, INC.

Using a screwdriver (1), preload timing chain to minimal extent in direction of arrow.

Read off measured value B on special tool 51 0 342 and note down.

IMPORTANT: Do not use force preload timing chain.

Measured value **A** minus measured value **B** results in the adjustment value.

Adjustment value **10 mm +2.**

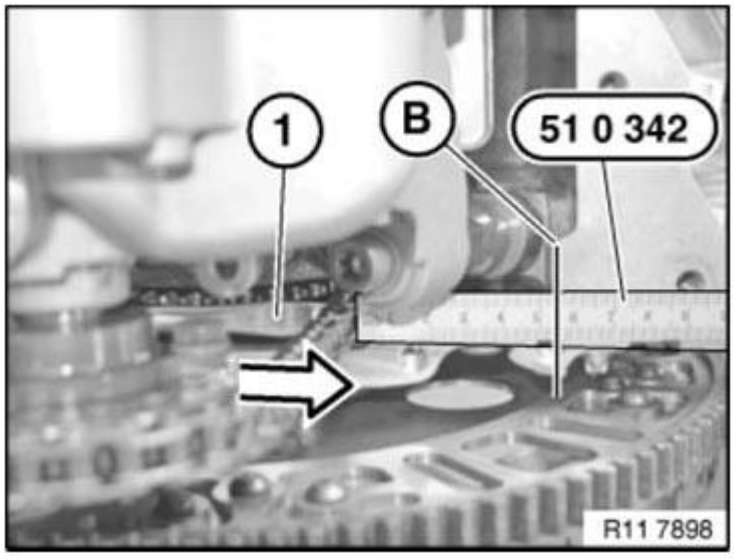


Fig. 417: Measuring Value B On Special Tool 51 0 342
Courtesy of BMW OF NORTH AMERICA, INC.

Join and secure screw (2).

Tightening torque **11 41 2 AZ** .

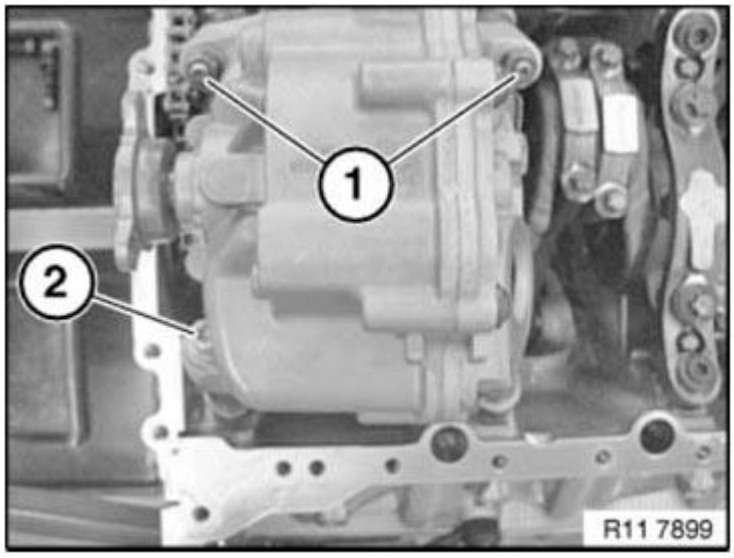


Fig. 418: Identifying Oil Pump And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 41 150 REMOVING AND INSTALLING/REPLACING ROLLER CHAIN FOR OIL PUMP DRIVE (N63)

Special tools required:

- **11 7 201**
- **22 13 485**

See **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

See **ENGINE AND GEARBOX SUSPENSION - SPECIAL TOOLS** .

Necessary preliminary tasks:

- Drain **engine oil**.
- Remove **flywheel**.
- Remove **bottom of oil sump**.

NOTE: Support bush (2) is included in delivery specification.

If the crankshaft seal (1) is stored for more than six months without the support sleeve (2), its operational reliability will no longer be guaranteed. **Crankshaft seal (1) must not be reused in this case!** Support bush (2) remains in the crankshaft seal (1) and is used as a slip bush during described installation described below.

IMPORTANT: The sealing lip of the crankshaft seal (1) is very sensitive and must not be kinked.

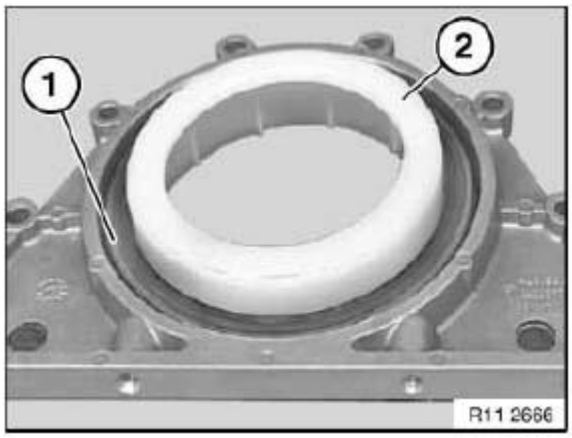


Fig. 419: Identifying Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (2). Tightening torque: 10 Nm. Remove intake pipe (1).

Installation note: Replace O-ring.

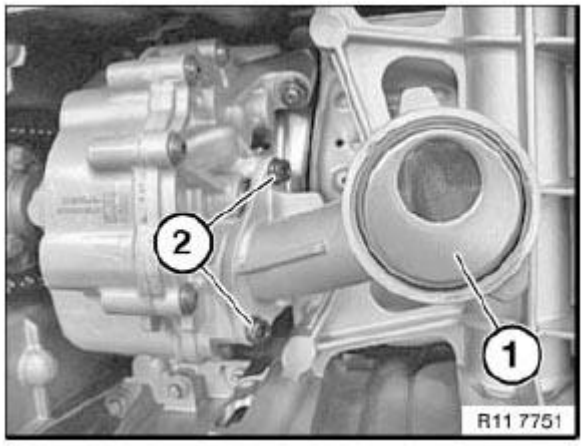


Fig. 420: Identifying Intake Pipe Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release all nuts (1) using special tool 11 7 201. Tightening torque: 10 Nm. Remove oil pump drive gear.

NOTE: Graphic shows engine removed

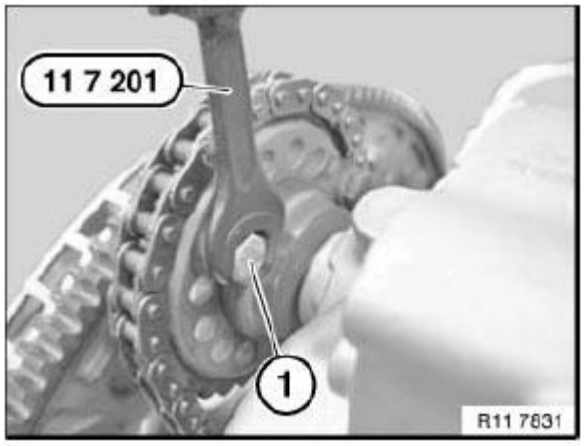


Fig. 421: Removing Oil Pump Sprocket Wheel Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1). Release screws, remove oil pump (1) with aid of a second person.

Installation note: Replace screws. Tightening torque: 24 Nm

NOTE: Graphic without top oil sump

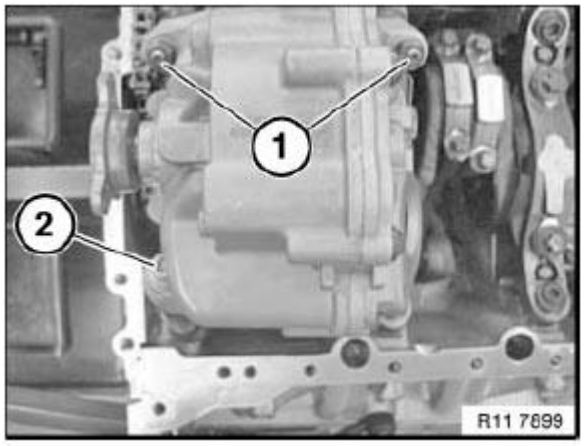


Fig. 422: Identifying Oil Pump With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off engine oil line (1) upwards in direction of arrow.

NOTE: Graphic without top oil sump

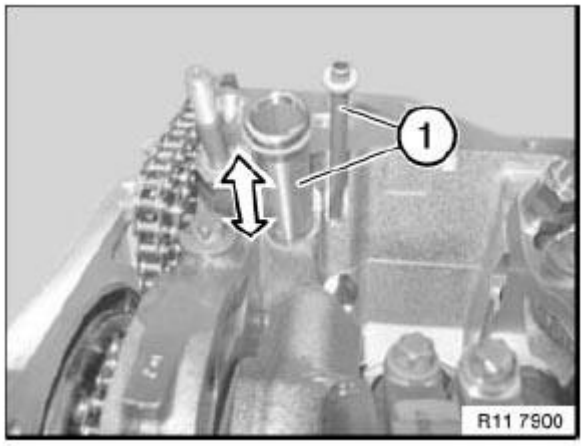


Fig. 423: Detaching Oil Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Replace sealing rings (1). Lightly oil sealing ring 1 (1). Coat engine oil pipe (2) with suitable lubricant.

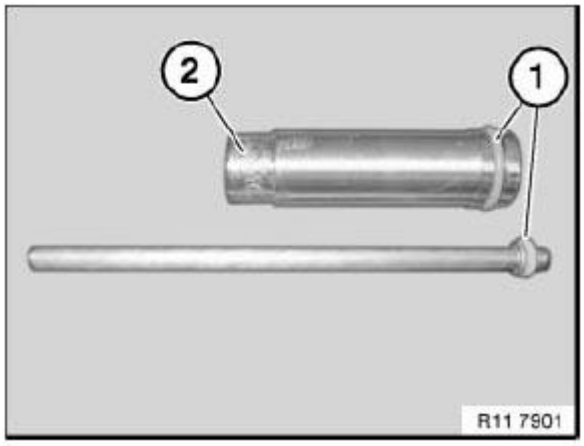


Fig. 424: Identifying Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Replace O-ring (1) for oil feed line.

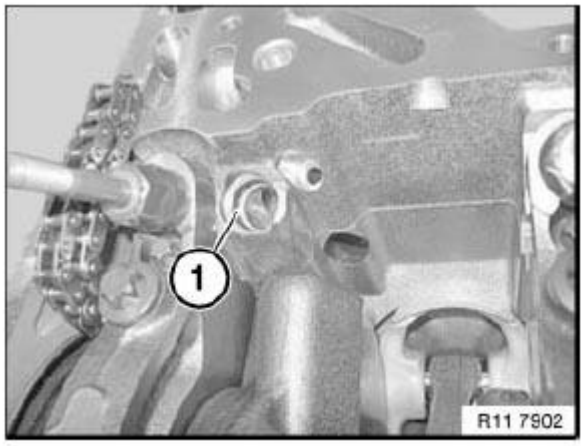


Fig. 425: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Fit engine oil pipe (1) in direction of arrow.

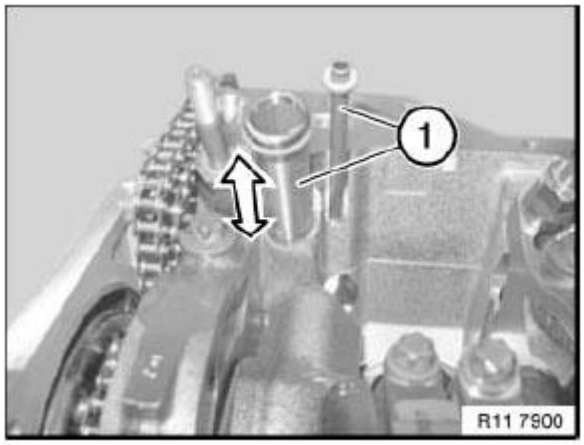


Fig. 426: Detaching Oil Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out roller chain (1) via the crankshaft (2).

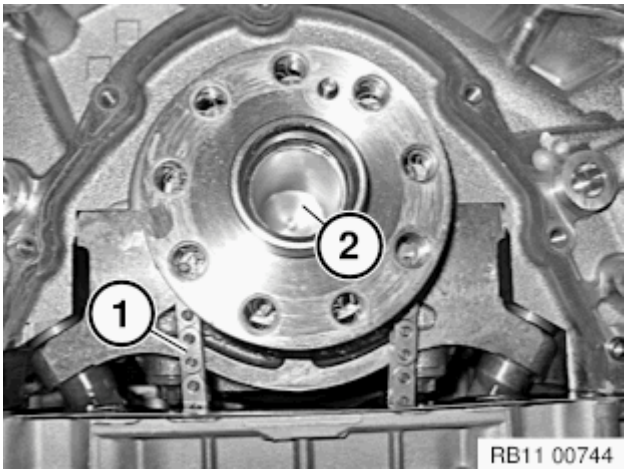


Fig. 427: Feeding Out Roller Chain
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Mount new roller chain (1). Install oil pump and adjust.

Procedure on installed engine:

Upper oil sump has been installed.

Position drag pointer (1) of special tool 2 213 485 on oil pump chain.

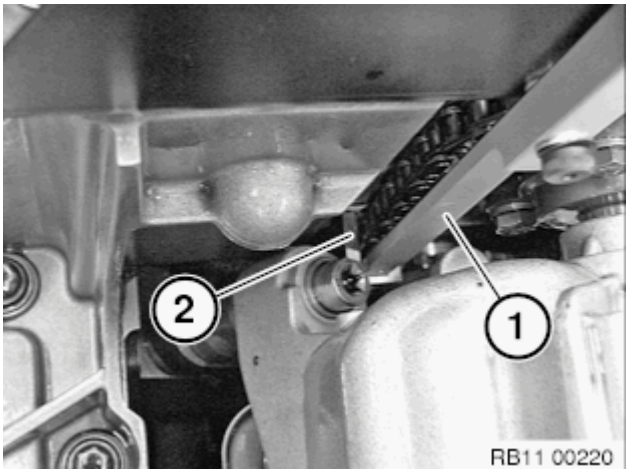


Fig. 428: Positioning Drag Pointer Of Special Tool (2 213 485)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Attachment point (1) N63O0 / N63O1/S63O0. Attachment point (2) N74.

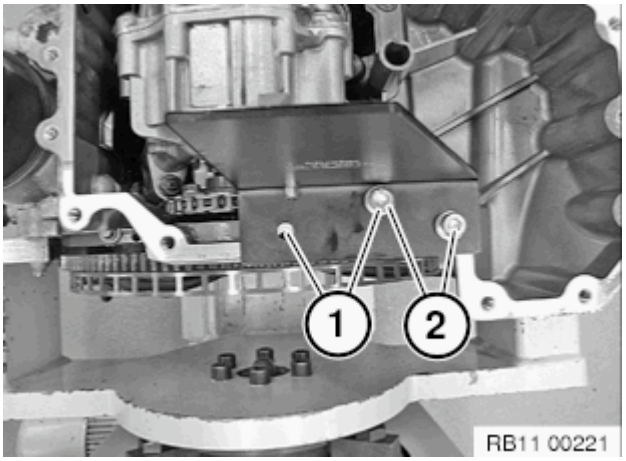


Fig. 429: Identifying Attachment Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not use force preload timing chain.

Push drag pointer (1) to the left and right until value has been determined. Adjustment value **10 mm +2** .

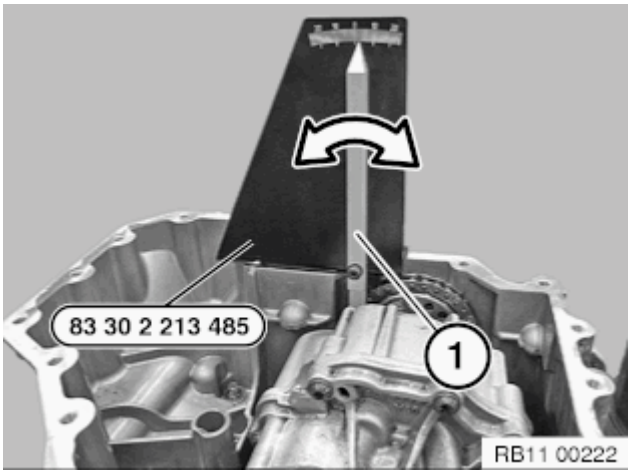


Fig. 430: Pushing Drag Pointer To Left
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust oil pump timing chain.

Pretension oil pump adjusting sleeve (1) with a hexagon socket wrench. Adjustment value **10 mm +2** .

NOTE: Graphic without top oil sump

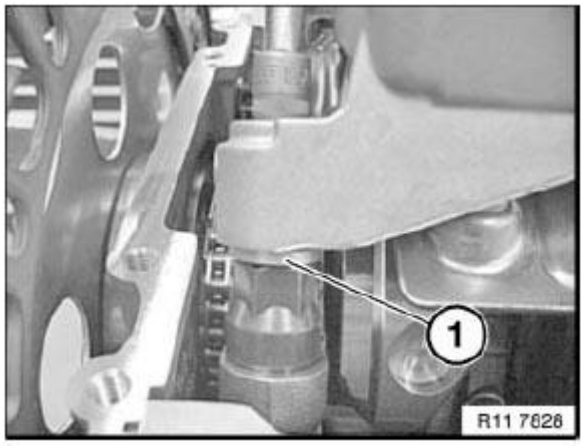


Fig. 431: Identifying Oil Pump Adjusting Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Join and secure screw (2). Tightening torque: 24 Nm

NOTE: Graphic without top oil sump

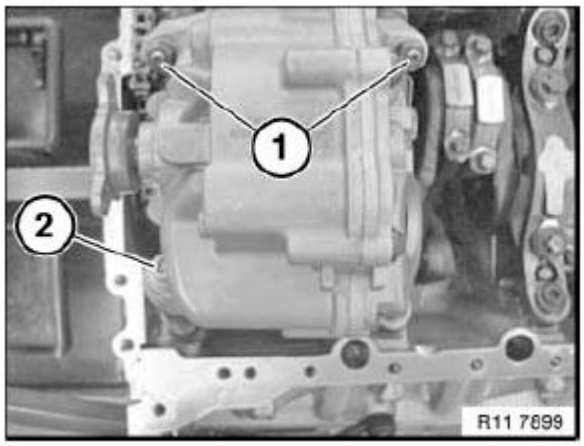


Fig. 432: Identifying Oil Pump With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Check fitting sleeves (1) for damage and correct installation position. Clean sealing surface (2) so that it is free from oil and grease. Coat contact edges on separating face along oil sump (see arrows) with Drei Bond 1209 2.1.

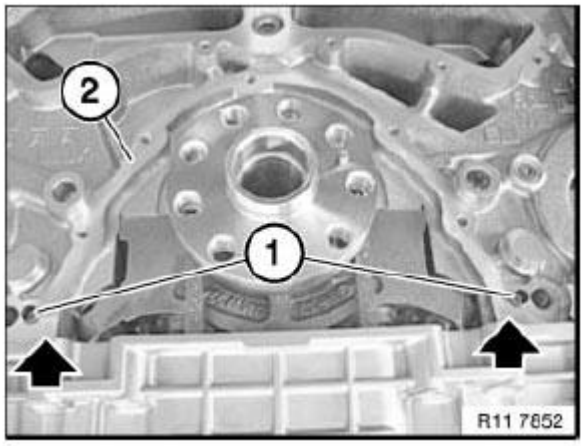


Fig. 433: Identifying dowel sleeves and sealing facex
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note: Lightly oil running surface of crankshaft.

Fit end cover (1) with support bush (2) on crankshaft and push on carefully.

NOTE: Graphic shows (N62TU).

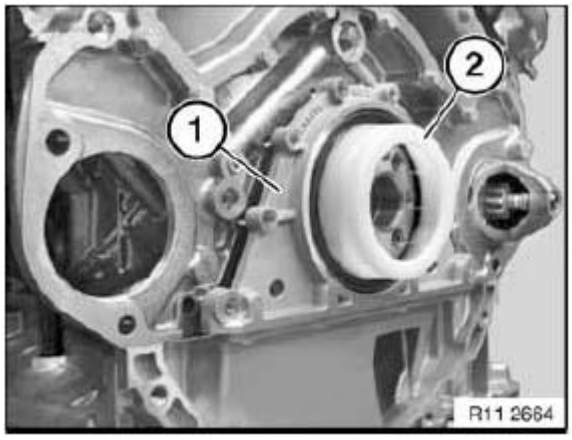


Fig. 434: Identifying Support Sleeve And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (2) and initially tighten without play. Insert screws (1) and initially tighten without play. Tighten down bolts (2) from inside outwards.

Tightening torque: 10 Nm

Tighten down screws (1) from inside outwards.

Tightening torque: 25 Nm.

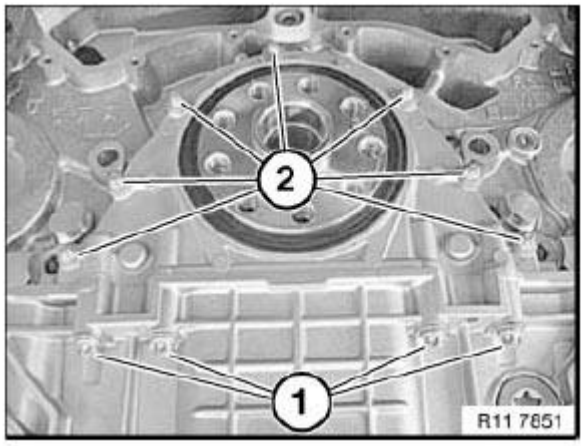


Fig. 435: Identifying Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1142 OIL FILTER AND LINES

1142260 OIL RETURN COVER

IMPORTANT: Risk of fire.
In the event of oil leakage in the Vee, the leakage oil may be ignited on hot components.

Necessary preliminary work

- Remove both exhaust turbochargers. See **EXHAUST TURBOCHARGER, RIGHT, CYLINDERS 1-4** and **EXHAUST TURBOCHARGER, LEFT, CYLINDERS 5-8**
- Remove **HEAT SHIELD** at bottom.

Release banjo bolt (1).

Tightening torque: **11 42 10AZ** .

Release screws (3).

Tightening torque: **11 65 6AZ** .

Place vacuum reservoir (4) to one side.

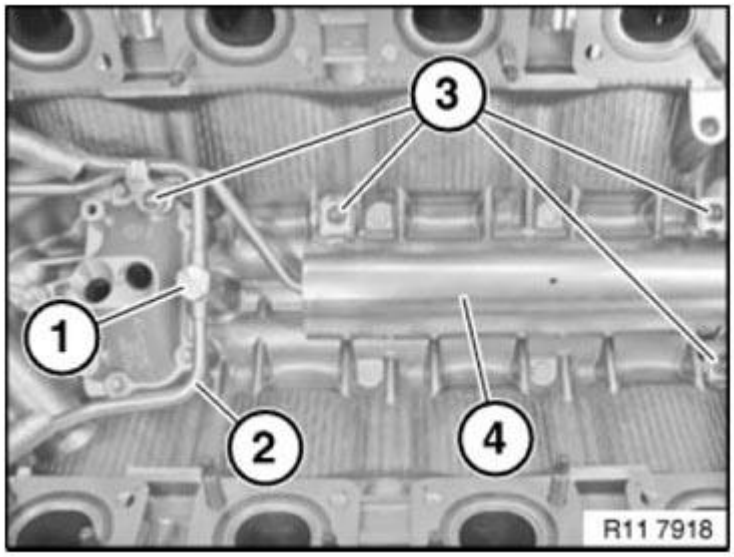


Fig. 436: Identifying Banjo Bolt, Screws And Vacuum Reservoir
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: **11 42 8AZ** .

Remove oil return cover (2).

Installation note:

Replace oil return cover.

Replace both O-rings.

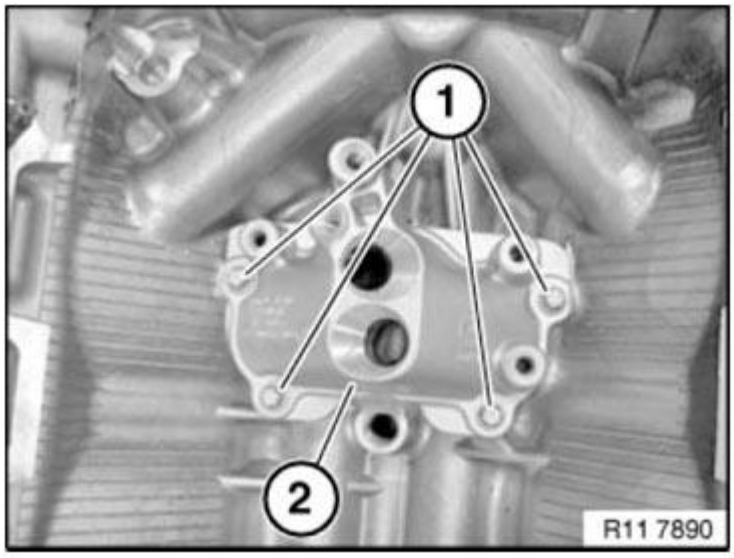


Fig. 437: Identifying Oil Return Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1151 WATER PUMP WITH DRIVE

1151000 REMOVING AND INSTALLING/RENEWING COOLANT PUMP (N63)

WARNING: Risk of scalding!
Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

IMPORTANT: If a coolant pump which has already been operated is reused, it must be filled immediately after being removed with coolant (mixture ratio 1:1/water: coolant).

Necessary preliminary work

- Drain **COOLANT**
- Remove intercooler **EXPANSION TANK**
- Remove alternator drive belt. See **REPLACING DRIVE BELT FOR ALTERNATOR**.

IMPORTANT: Risk of damage!

Coolant emerges when the coolant hoses are detached from the coolant thermostat and coolant pump.
Cover surrounding components and plug connections with suitable apparatus

NOTE: For purposes of clarity, the graphic shows the auxiliary water pump removed.

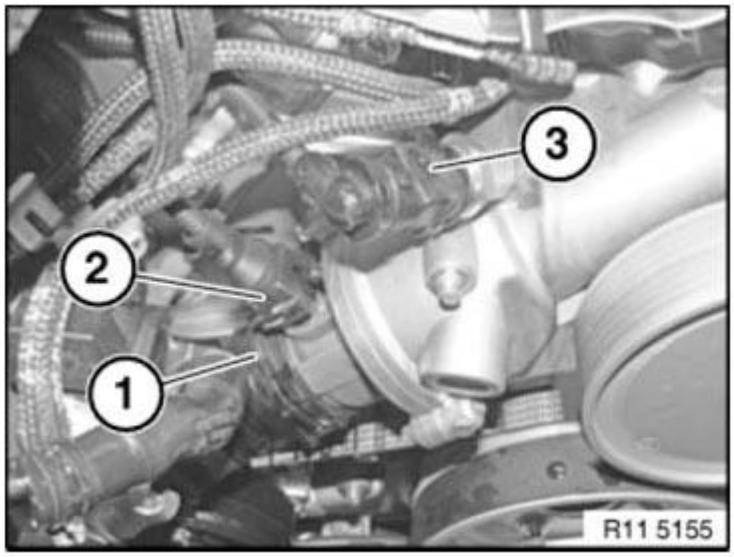


Fig. 438: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plug connections (2 and 3).

Installation note:

Plug connections (2 and 3) must snap audibly into place!

Unlock snap fastener on coolant hose (1).

Detach coolant hose (1) and lay to one side.

Release screw (4).

Tightening torque **11 51 3AZ** .

Detach pipe (3) and lay to one side.

Installation note:

Replace sealing ring

Unlock quick-release coupling on coolant hose (5).

Detach coolant hose (5) and lay to one side.

Unfasten screws (2).

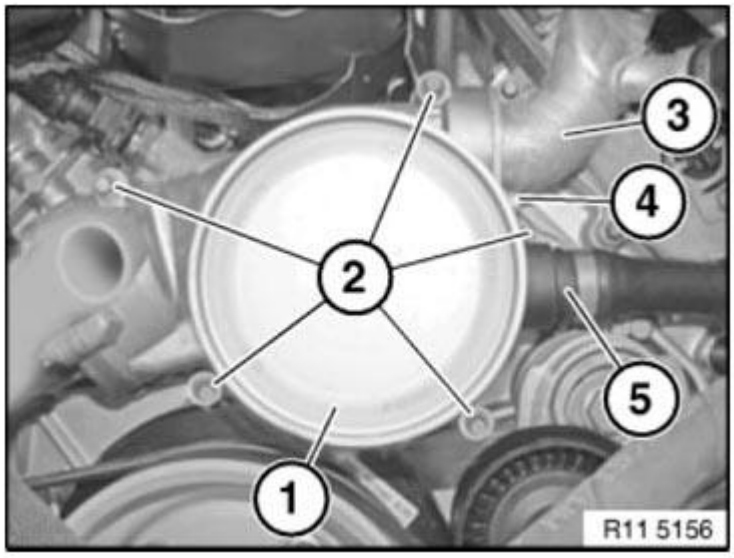


Fig. 439: Identifying Pipe, Screws And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 51 1AZ** .

Remove coolant pump (1) in upward direction with a tilting motion.

Installation note:

Replace gasket

If reusing the coolant pump:

If a coolant pump is reused, it must be mechanically rotated once (breakaway torque at pump impellers).

One coolant pump rotation will be sufficient.

If replacing the coolant pump:

Release screws on coolant thermostat.

Tightening torque **11 53 1AZ** .

Remove coolant thermostat.

Installation note:

Replace sealing ring

Assemble engine.

Top up **COOLANT** .

BLEEDING INSTRUCTIONS must be observed **without fail.**

1153 THERMOSTAT AND CONNECTIONS

1153000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N63)

WARNING: Risk of scalding!
Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Drain **COOLANT** .
- Remove **COOLANT PUMP** .
- Remove charge air cooler **EXPANSION TANK** .
- **REMOVE** fan cowl with electric fan.

IMPORTANT: Risk of damage!
Coolant emerges when the coolant hoses are detached from the coolant thermostat.
Cover surrounding components and plug connections with suitable apparatus

NOTE: For purposes of clarity, the graphic shows the auxiliary water pump removed.

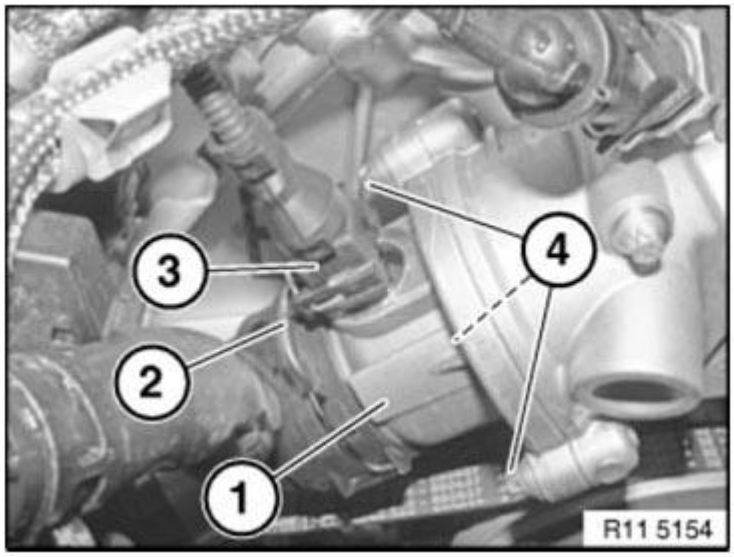


Fig. 440: Identifying Plug Connection, Coolant Hose And Coolant Thermostat
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (3).

Installation note:

Plug connection (3) must snap audibly into place!

Unlock snap fastener on coolant hose (2).

Detach coolant hose (2) and lay to one side.

NOTE: One of the screws is not shown and is located at the rear under the coolant thermostat (1).

Release screws (4).

Tightening torque **11 53 1AZ** .

Lift out coolant thermostat (1).

NOTE: The coolant thermostat is integrated in the housing cover. It can only be replaced as a complete unit!

Clean sealing surface.

Installation note:

Replace sealing ring (1)

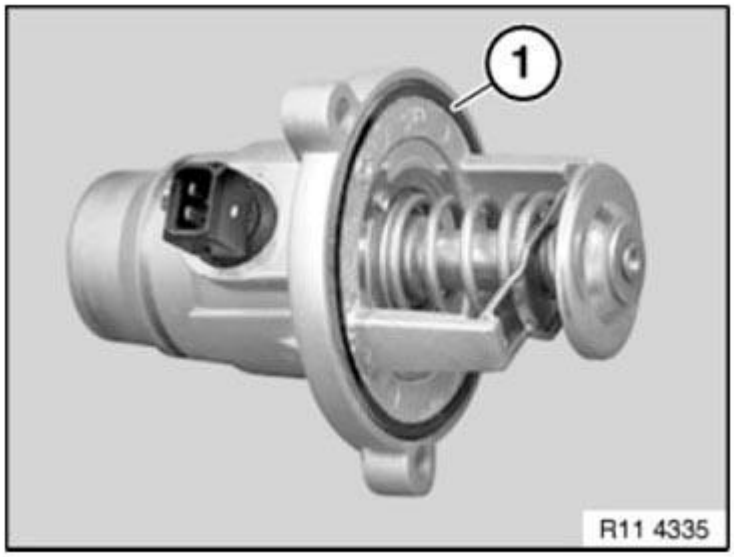


Fig. 441: Identifying Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

BLEEDING INSTRUCTIONS must be observed **without fail.**

1153000 REMOVING AND INSTALLING/REPLACING SUPPLEMENTARY COOLANT PUMP FOR EXHAUST TURBOCHARGER (N63)

WARNING: Risk of scalding!
Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Remove charge air cooler **EXPANSION TANK**

Unclip coolant hose (1) from bracket (3) and lay in direction of arrow to one side.

Unfasten screws (2).

Tightening torque **11 51 4AZ** .

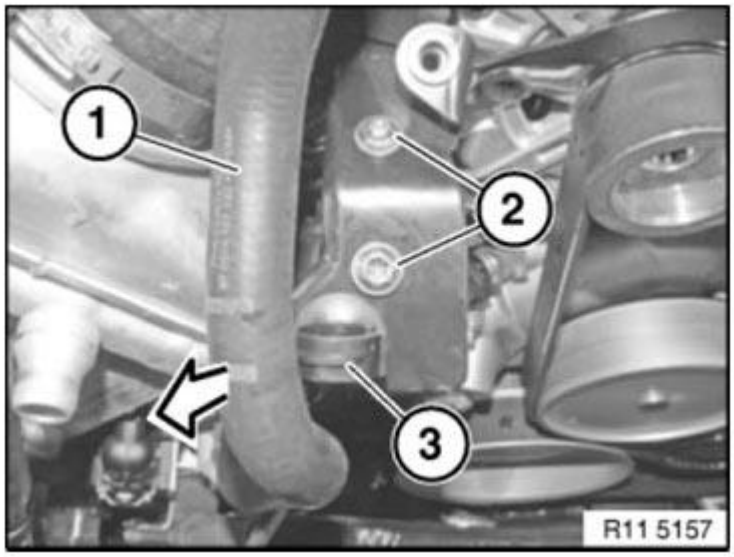


Fig. 442: Identifying Coolant Hose And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Coolant emerges when the coolant hoses are detached from the auxiliary water pump (3).
Cover surrounding components and plug connections with suitable apparatus

Release hose clamp (5) with a suitable tool.

Installation note:

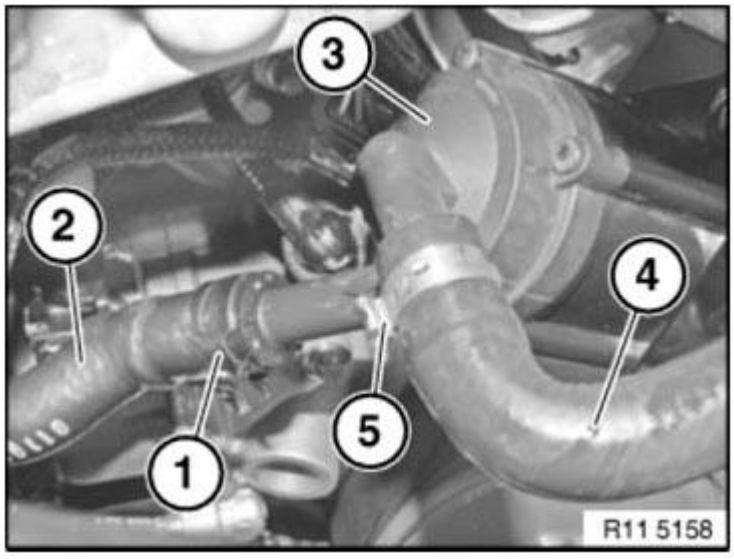


Fig. 443: Identifying Auxiliary Water Pump, Coolant Hose And Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Replace hose clamp (5)

Detach coolant hose (4) and lay to one side.

Release hose clamp (1) with a suitable tool.

Detach coolant hose (2) and lay to one side.

Disconnect plug connection (2).

Installation note:

Plug connection (2) must snap audibly into place!

Lift out auxiliary water pump (1).

Release holder (3) from auxiliary water pump (1).

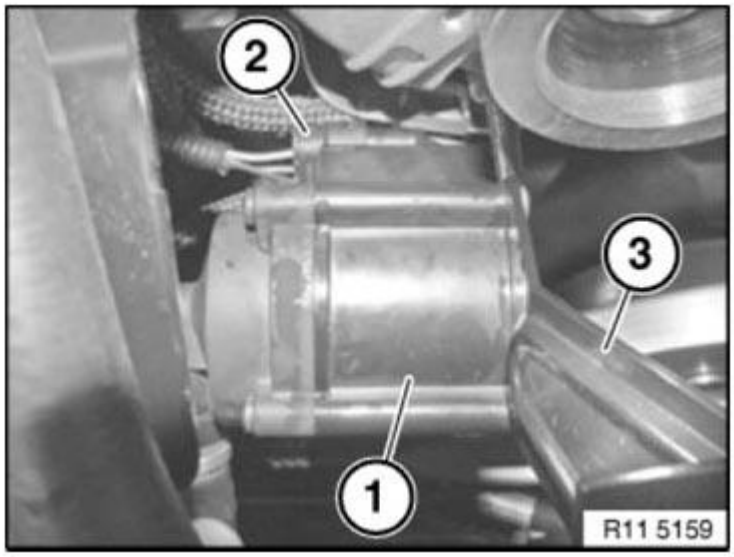


Fig. 444: Identifying Plug Connection, Holder And Auxiliary Water Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

VENTING INSTRUCTIONS must be observed **without fail.**

1161 INTAKE MANIFOLD

1161730 CHECK BMW DIAGNOSIS SYSTEM FOR EXCESS PRESSURE AND VACUUM (N63)

IMPORTANT: Excess pressure and vacuum lines are identified by the size of the connection fittings and color-coded red and blue and must not be mixed up with each other.
Build up pressure with Blue color.
Generate vacuum pressure with Red color.
Mixing up the functions will result in damage to the engine.

Necessary preliminary work

- Release upper section of intake air filter.
- Prepare BMW diagnosis system.
- Start diagnostic program.
    1. Power train
    2. Engine electronics
    3. Air supply
    4. Charging pressure control Oder Perception

  Lack of power

Note on ordering:

- Workshop equipment.
- Workshop planning.
- Workshop equipment catalogue.
- Measuring and test equipment.
- No. 81 29 0 426 464

Pressure measurement

Prepare BMW diagnosis system on excess pressure diagnosis unit.

1. Screw in pressure sensor.
2. Overpressure connection (Blue).
3. Connect stimuli cables (3) to positive and negative.
4. Connect 12V battery cables (4) to vehicle battery positive and negative.

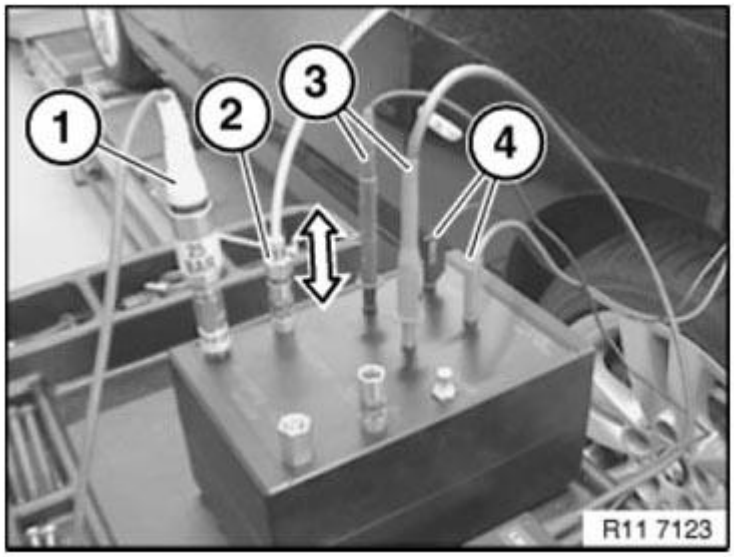


Fig. 445: Measuring Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Secure seal plug (1) with union nut (2) in intake port and seal.

NOTE: Twin-Turbo: both intake ports must be sealed.

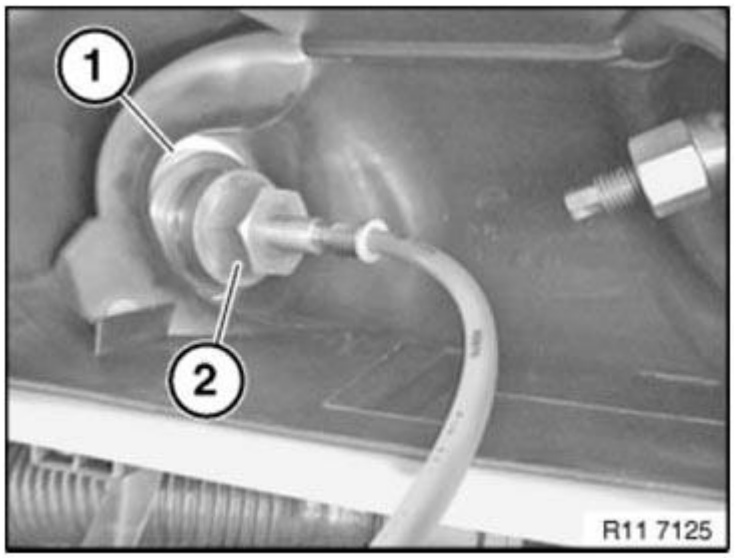


Fig. 446: Identifying Seal Plug And Union Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Insert Blue pneumatic hose (4) in pneumatic coupling (2) of sealing plug (1).

Seal plug (3) has no pneumatic coupling.

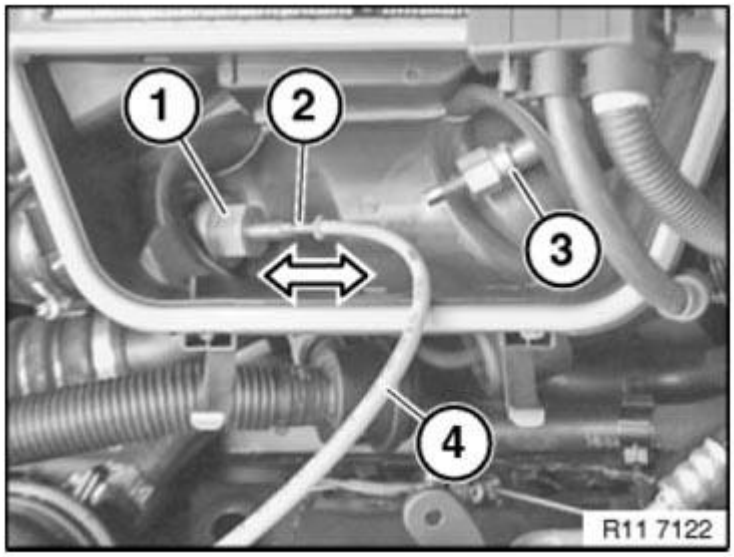


Fig. 447: Inserting Blue Pneumatic Hose In Pneumatic Coupling Of Sealing Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Vacuum pressure measurement

Prepare diagnosis tester on vacuum diagnosis unit.

1. Screw in pressure sensor.
2. Connect stimuli cables (2) to positive and negative.
3. Connect 12V battery cables (3) to vehicle battery positive and negative.
4. Controller for vacuum connection.
5. Vacuum connection (Red).

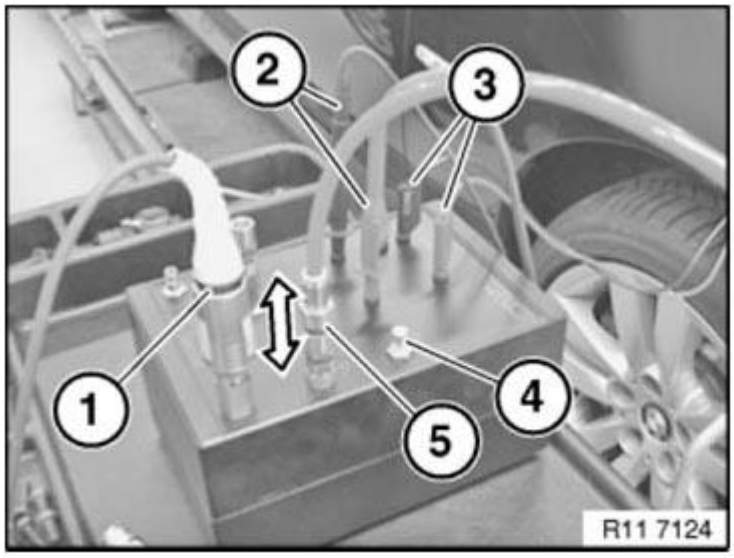


Fig. 448: Measuring Vacuum Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Calibration for vacuum pressure measurement

Seal shutoff tap (2) in direction of arrow.

Release lock nut on controller (1).

Carry out pressure adjustment in accordance with BMW diagnosis instruction.

Secure controller (1) hand-tight against turning.

Open shutoff tap (2) again.

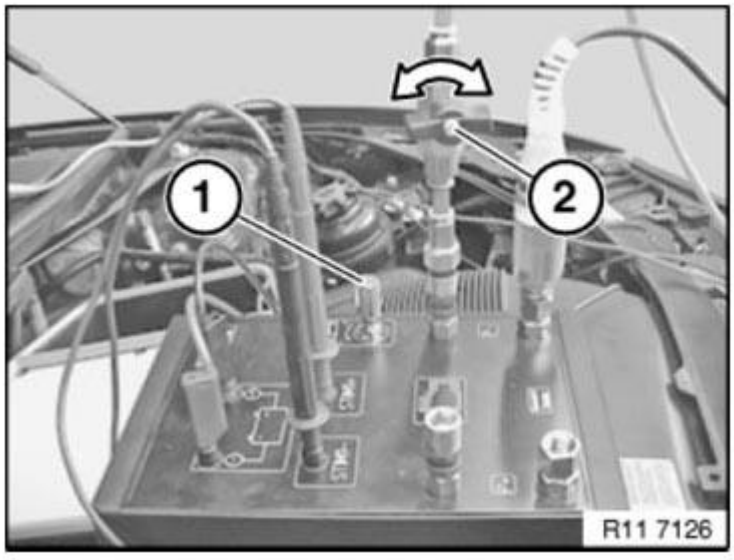


Fig. 449: Releasing Lock Nut On Controller
Courtesy of BMW OF NORTH AMERICA, INC.

Connections on EPPC

1. Connection (VAC) to vacuum reservoir.
2. Connection (OUT) with ring to exhaust turbocharger.

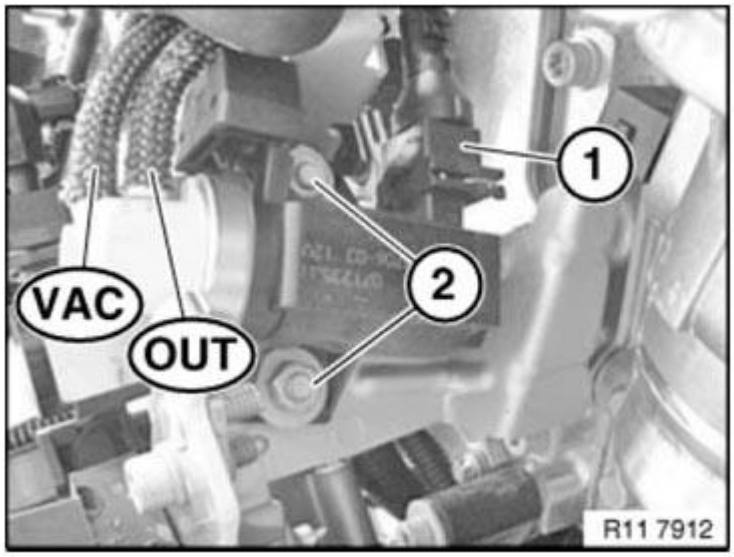


Fig. 450: Identifying Vacuum Reservoir Connection (VAC)
Courtesy of BMW OF NORTH AMERICA, INC.

Vacuum activation, cylinders 1-4

Detach red vacuum line from vacuum unit.

Prepare T-piece (5) with vacuum lines for measurement.

Connect red vacuum line (1) with vacuum unit (2) and quick-release coupling (3).

Open shutoff tap (4).

NOTE: Observe diagnosis instructions.

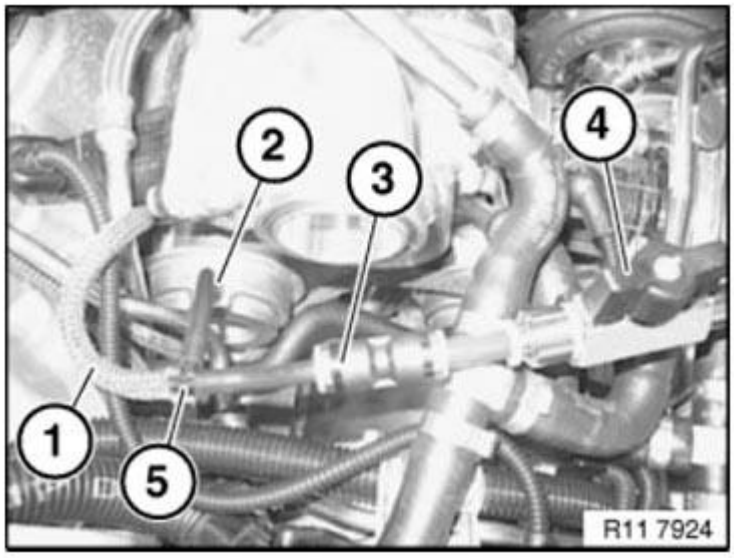


Fig. 451: Identifying Red Vacuum Line, Vacuum Unit And Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Vacuum activation, cylinders 5-8

Detach blue vacuum line from vacuum unit.

Prepare T-piece (5) with vacuum lines for measurement.

Connect blue vacuum line (1) with vacuum unit (2) and quick-release coupling (3).

Open shutoff tap (4).

NOTE: Observe diagnosis instructions.

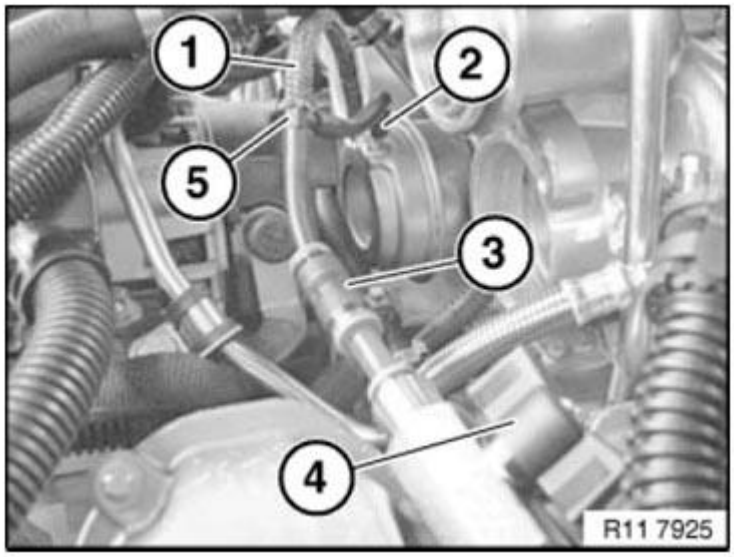


Fig. 452: Identifying Blue Vacuum Line, Vacuum Unit And Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Exhaust turbocharger, cylinders 1-4

Initial position (1) of wastegate linkage depressurized.

Wastegate valve opened.

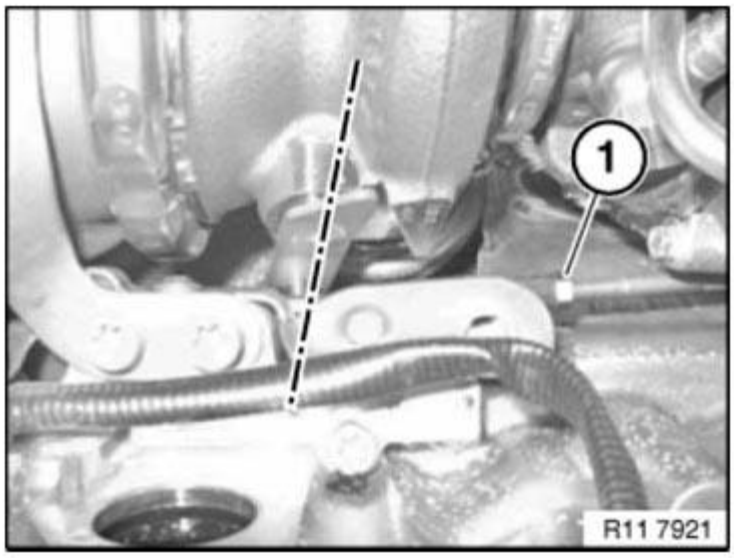


Fig. 453: Identifying Initial Position Of Wastegate Linkage Depressurized
Courtesy of BMW OF NORTH AMERICA, INC.

Initial position (1) of wastegate linkage with vacuum pressure.

Wastegate valve closed.

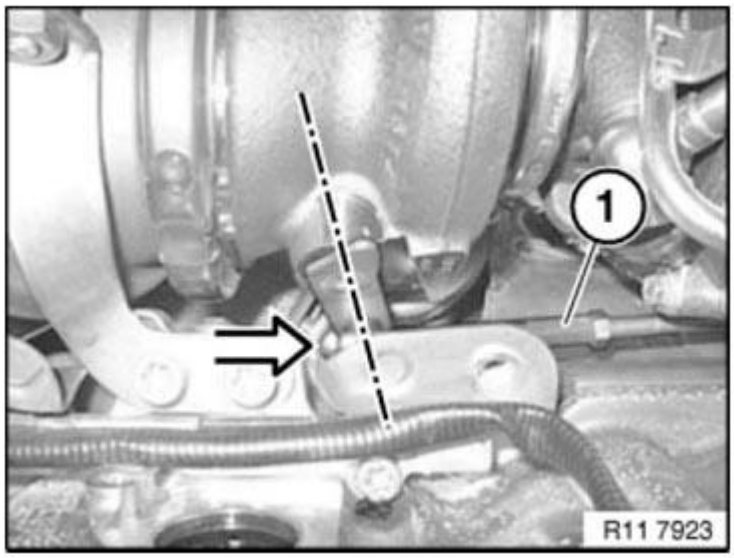


Fig. 454: Identifying Initial Position Of Wastegate Linkage With Vacuum Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Exhaust turbocharger, cylinders 5-8

Initial position (1) of wastegate linkage depressurized.

Wastegate valve opened.

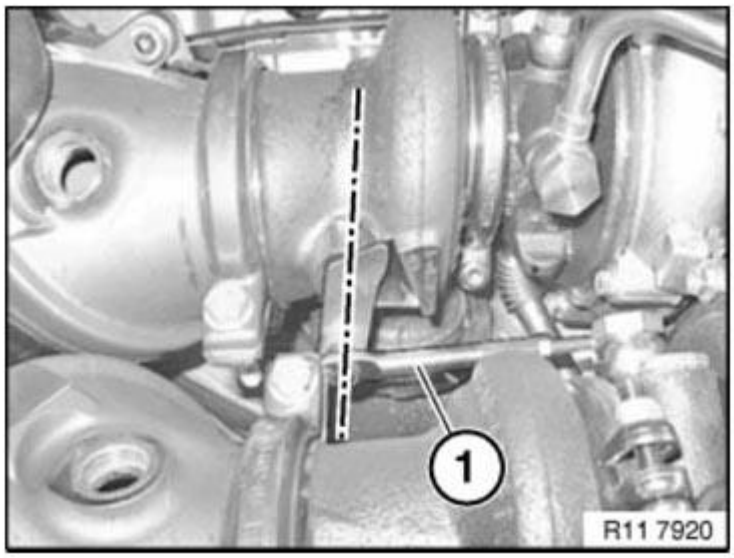


Fig. 455: Identifying Initial Position Of Wastegate Linkage Depressurized
Courtesy of BMW OF NORTH AMERICA, INC.

Initial position (1) of wastegate linkage with vacuum pressure.

Wastegate valve closed.

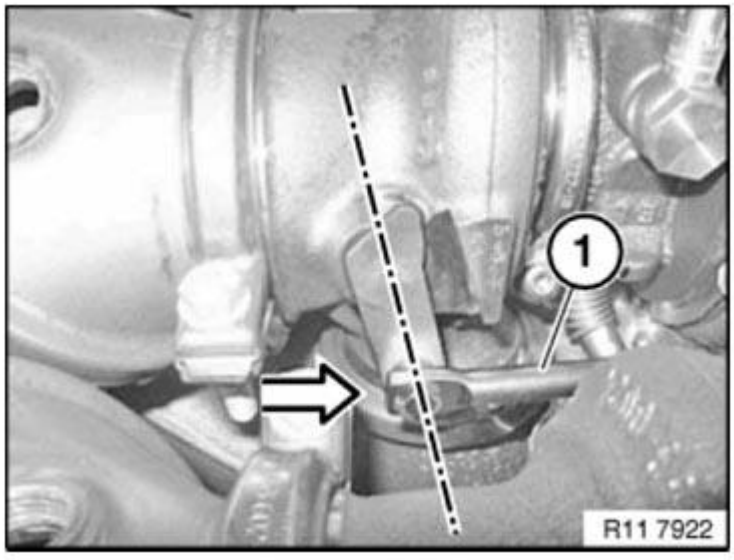


Fig. 456: Identifying Initial Position Of Wastegate Linkage With Vacuum Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Check wastegate valve with vacuum

Wastegate valves must be opened without vacuum.

The wastegate valves must close if a vacuum pressure is applied at the wastegate sockets (see BMW diagnosis system).

Check shaft on turbine wheel for rotatability.

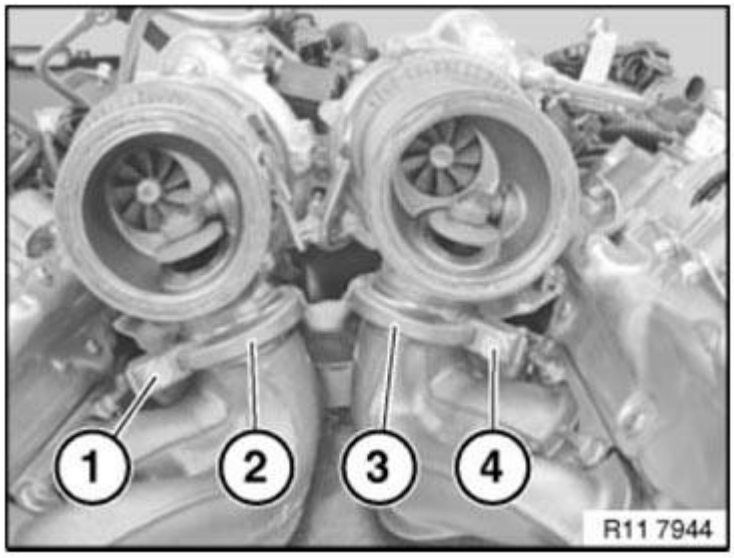


Fig. 457: Checking Wastegate Valve With Vacuum
Courtesy of BMW OF NORTH AMERICA, INC.

Follow diagnosis instructions.

1161065 REMOVING AND INSTALLING/REPLACING LEFT INTAKE PLENUM (N63)

Necessary preliminary work

- Remove left **INJECTION PIPE** .
- Remove **THROTTLE VALVE**
- Release screws on intake plenum from above without fail before lowering front axle.
- Secure **ENGINE** in installation position.
- Lower front axle, releasing screws on engine mount first. See **LOWERING/RAISING FRONT AXLE SUPPORT (UNIVERSAL LIFTER)** .
- Release power steering pump, if installed, and set aside. See **POWER STEERING PUMP FOR HYDRAULIC STEERING GEAR WITH DYNAMIC DRIVE (N63) or POWER STEERING PUMP FOR POWER STEERING GEAR WITH ACTIVE FRONT STEERING (N63)** .
- Remove **UNIVERSAL JOINT** with corrugated tubing.

Detach engine ventilation hose (1).

Disconnect connector.

Unscrew nuts (2).

Tightening torque: **11 61 1 AZ** .

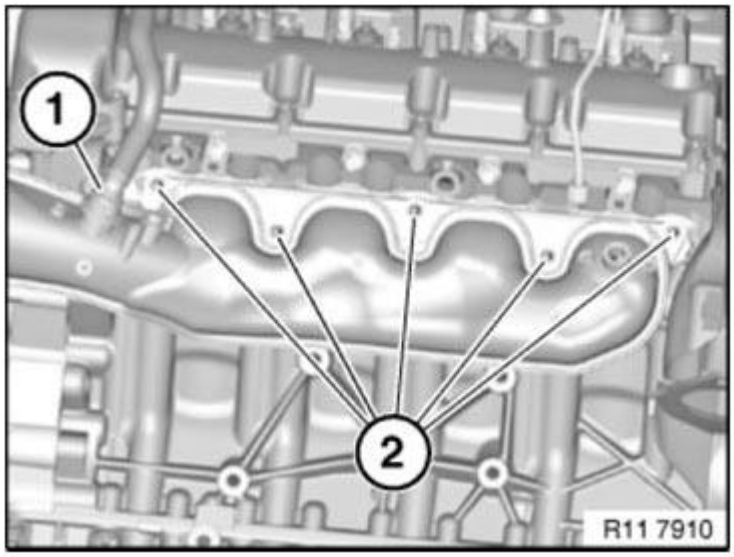


Fig. 458: Identifying Engine Ventilation Hose And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release **THROTTLE VALVE** (1).

Release holder screw (2) on intake plenum.

Tightening torque: **11 61 2AZ** .

Feed out intake plenum towards rear.

Installation note:

Replace all profile seals.

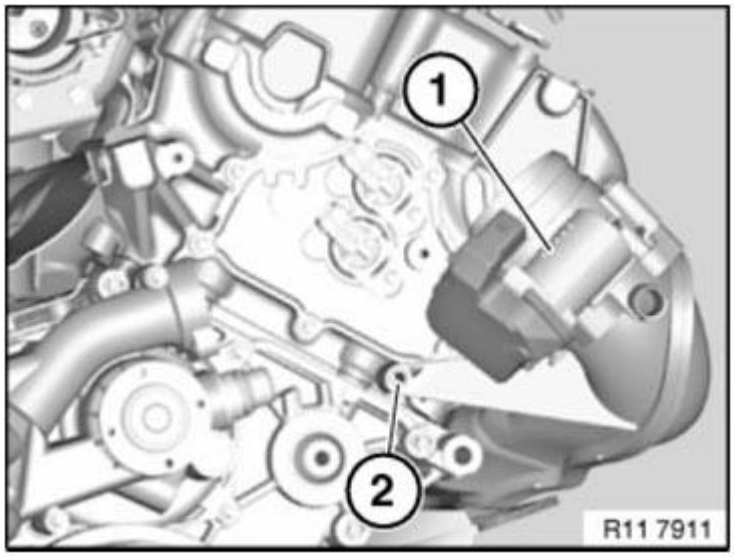


Fig. 459: Identifying Throttle Valve And Holder Screw On Intake Plenum
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle and

Check air intake system for leaks.

1161068 REMOVING AND INSTALLING/REPLACING RIGHT INTAKE PLENUM (N63)

Necessary preliminary work

- Remove right **INJECTION PIPE** .
- Remove **THROTTLE VALVE**
- Release screws on intake plenum from above without fail before lowering front axle.
- Secure **ENGINE** in installation position.
- Lower **FRONT AXLE** , releasing screws on engine mount first
- Release A/C compressor and place to one side. See **REMOVING AND INSTALLING/REPLACING HEATING AND AIR CONDITIONING SYSTEM COMPRESSOR (N63, WITH DYNAMIC DRIVE)** .

Detach engine ventilation hose (1).

Disconnect connector.

Unscrew nuts (2).

Tightening torque: **11 61 1 AZ** .

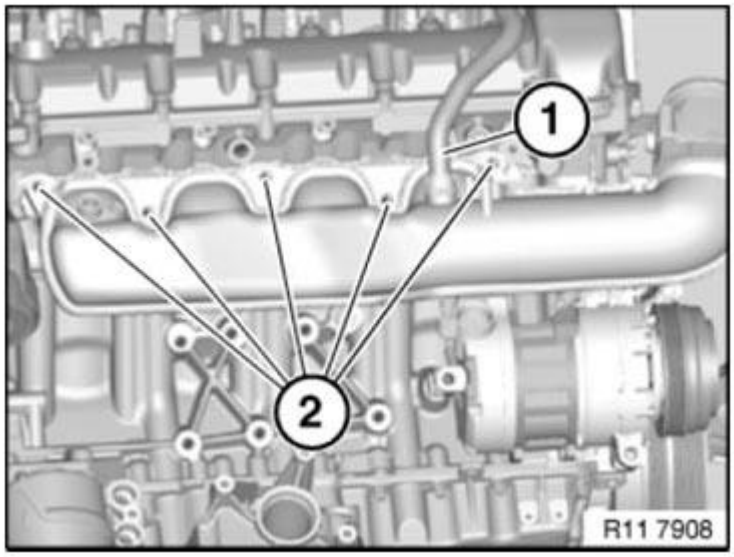


Fig. 460: Identifying Engine Ventilation Hose And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **THROTTLE VALVE** (2).

Release screw (1).

Tightening torque: **11 61 2 AZ** .

Feed out intake plenum towards rear.

Installation note:

Replace all profile seals.

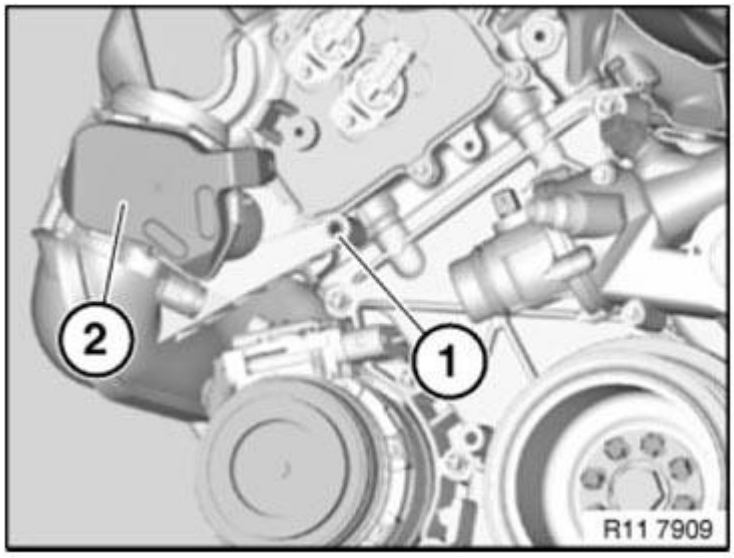


Fig. 461: Identifying Screw And Throttle Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle.

Check air intake system for leaks.

1165 SUPERCHARGER WITH CONTROL

1165 CONNECTION DIAGRAM, VACUUM ACTIVATION (N63)

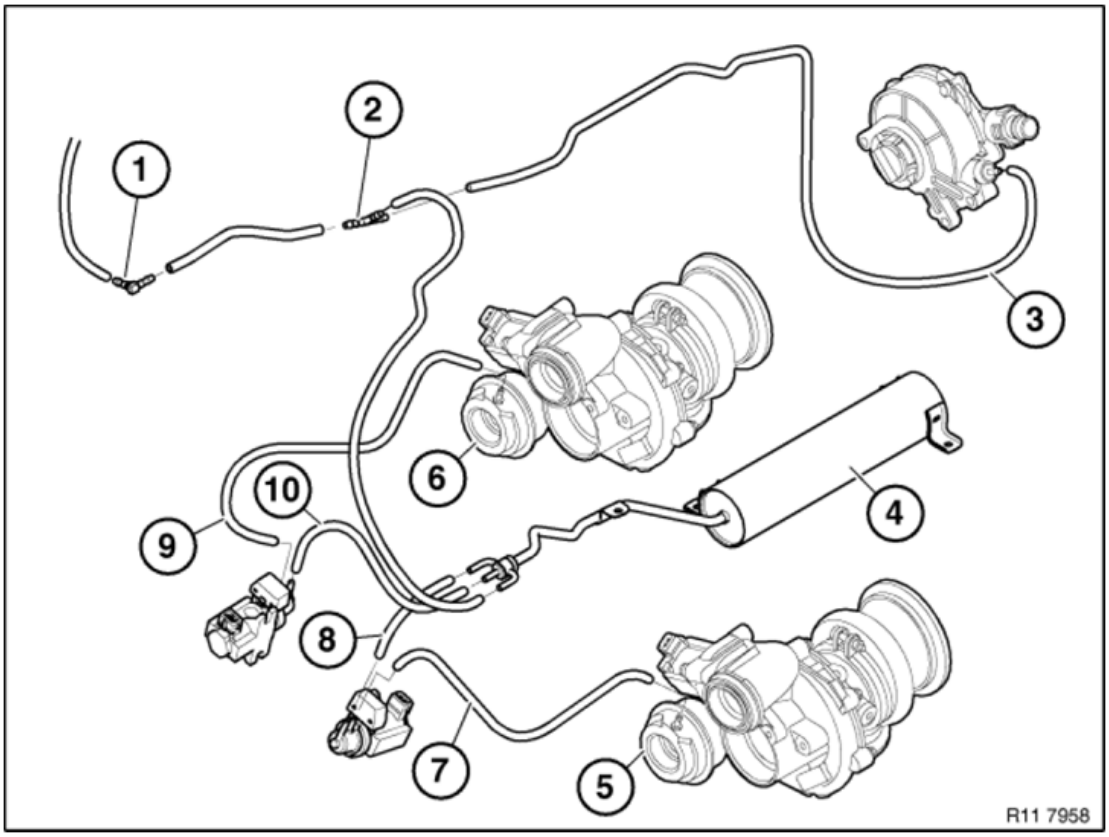


Fig. 462: Connection Diagram, Vacuum Activation (N63)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Connection (1) Black to exhaust flaps.
2. Distribute element (2), vacuum pump/vacuum reservoir (4).
3. Vacuum line (3) black to vacuum pump.
4. Vacuum reservoir (4) with three connections.
5. Connection, vacuum unit (wastegate), bank 2, cylinders 5 to 8.
6. Connection, vacuum unit (wastegate), bank 1, cylinders 1 to 4.
7. Vacuum hose (7) black/blue to vacuum unit (5) connection to pressure converter (OUT) bank 2 cylinders 5 to 8.
8. Vacuum hose black to vacuum reservoir connection to pressure converter (VAC) bank 2 cylinders 5 to 8.
9. Vacuum hose (9) black/red to vacuum unit (6) to pressure convert (OUT) bank 1 cylinder 1 to 4.
10. Vacuum hose black to vacuum reservoir connection to pressure converter (VAC) bank 1 cylinders 1 to 4.

1165714 REMOVING AND INSTALLING/RENEWING ELECTRIC CHANGEOVER VALVE ON EXHAUST TURBOCHARGER, RIGHT (N63)

Necessary preliminary work

- Remove right **TURBOCHARGER** .

Release screws (1).

Remove electric changeover valve (2).

Installation note:

Replace O-ring.

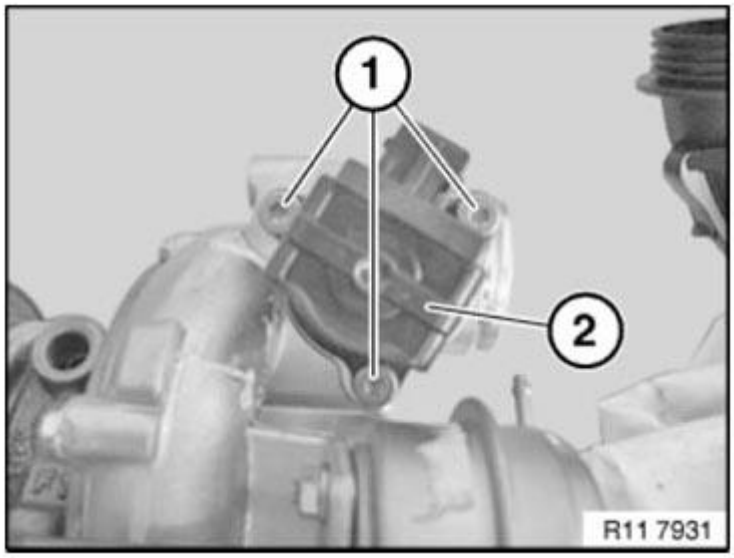


Fig. 463: Identifying Electric Changeover Valve And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Follow diagnosis instruction.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

1165185 REMOVING AND INSTALLING/RENEWING HEAT SHIELD AT BOTTOM (N63)

Necessary preliminary work

- Disconnect the **BATTERY CABLE FROM THE NEGATIVE TERMINAL** .
- Remove **FAN COWL** with electric fan.
- Remove the **ALTERNATOR** (not F04).
- Remove both exhaust turbochargers. See **EXHAUST TURBOCHARGER, RIGHT, CYLINDERS 1-4**

and **EXHAUST TURBOCHARGER, LEFT, CYLINDERS 5-8**.

- Remove both exhaust manifolds. See **LEFT EXHAUST MANIFOLD** and **RIGHT EXHAUST MANIFOLD** .

Release screws (1).

Tightening torque **11 65 3AZ** .

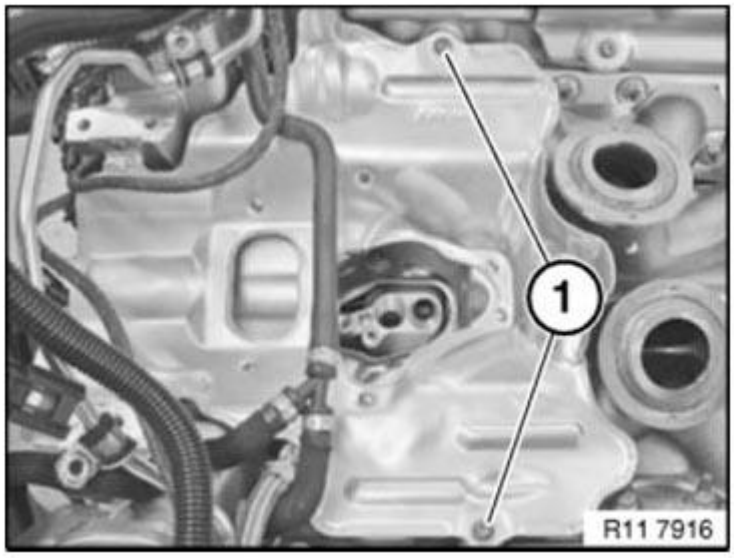


Fig. 464: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

Remove heat shield (2) towards top.

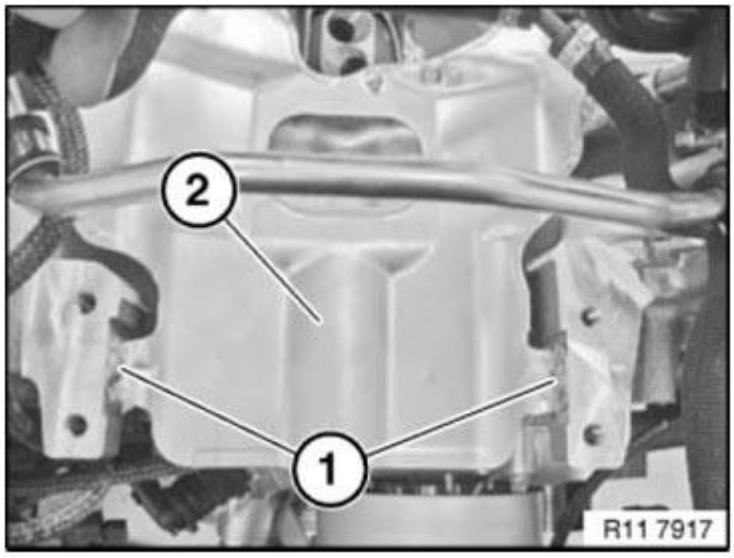


Fig. 465: Identifying Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

IMPORTANT: Risk of interchange on replacement of the heat shield. Other shields are installed in the N63H and S63 engines.

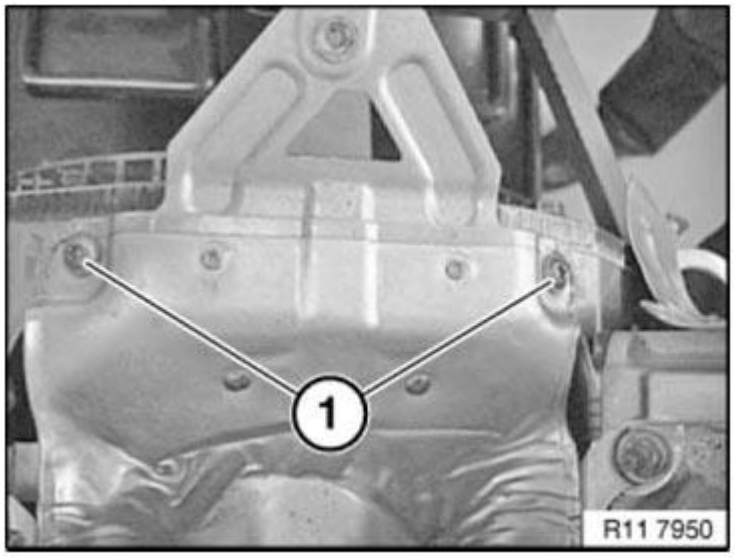


Fig. 466: Identifying Heat Shield Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release front screws on heat shield (1).

Tightening torque **11 65 3AZ** .

Remove heat shield (1) towards top.

**IMPORTANT: Risk of interchange on replacement of the heat shield.
Other shields are installed in the N63H and S63 engines.**

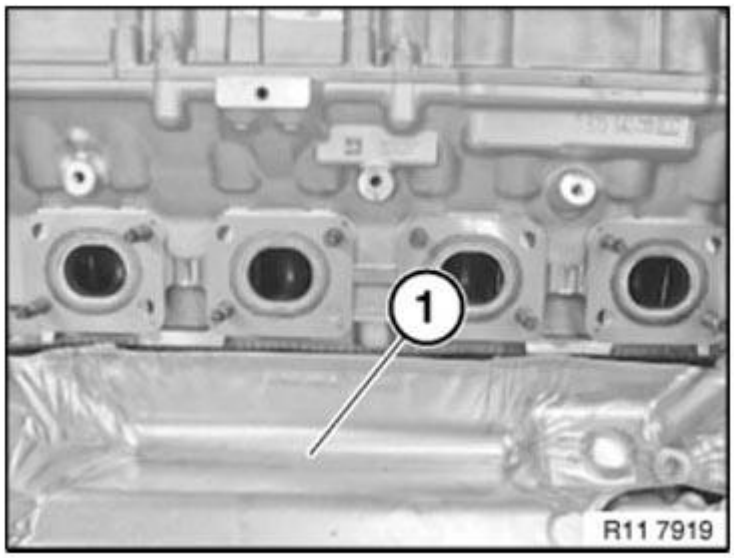


Fig. 467: Identifying Front Screws On Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1165180 REMOVING AND INSTALLING/RENEWING HEAT SHIELD AT TOP (N63)

Necessary preliminary work

- Remove both **INTAKE FILTER HOUSINGS** .
- Remove both control sensors. See **LEFT CONTROL SENSOR** and **RIGHT CONTROL SENSOR**.

Release screws (1).

Lift out holder.

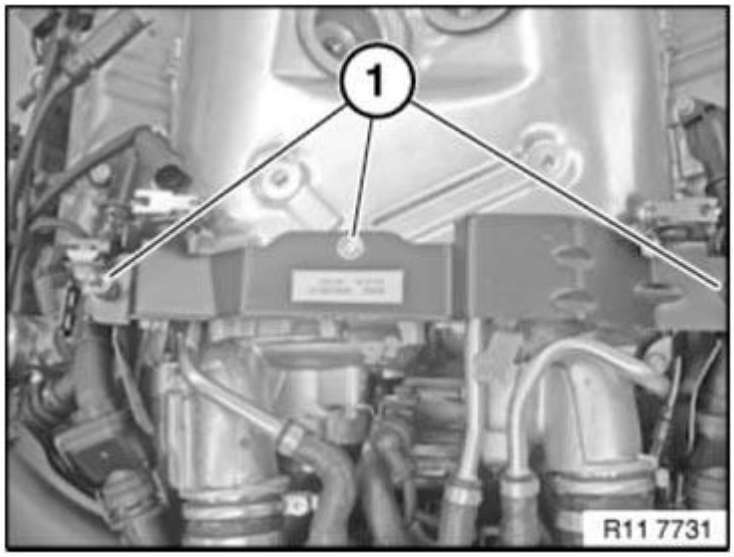


Fig. 468: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Tightening torque **11 65 3AZ** .

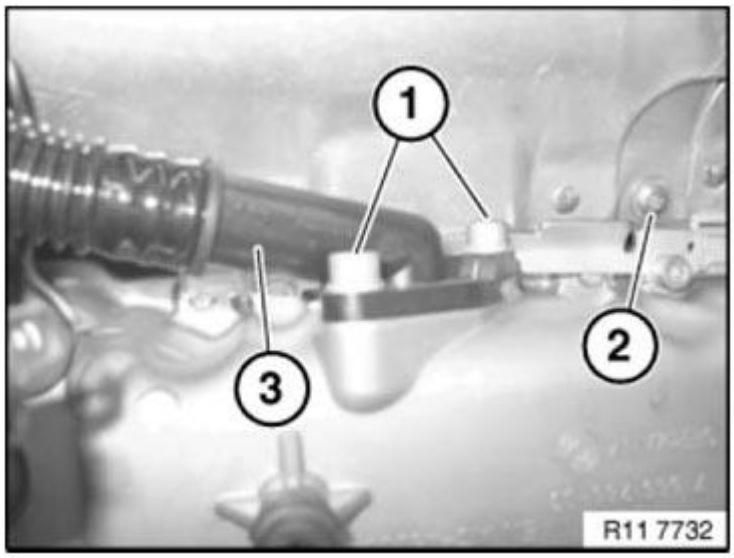


Fig. 469: Identifying Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Tightening torque **11 65 3AZ** .

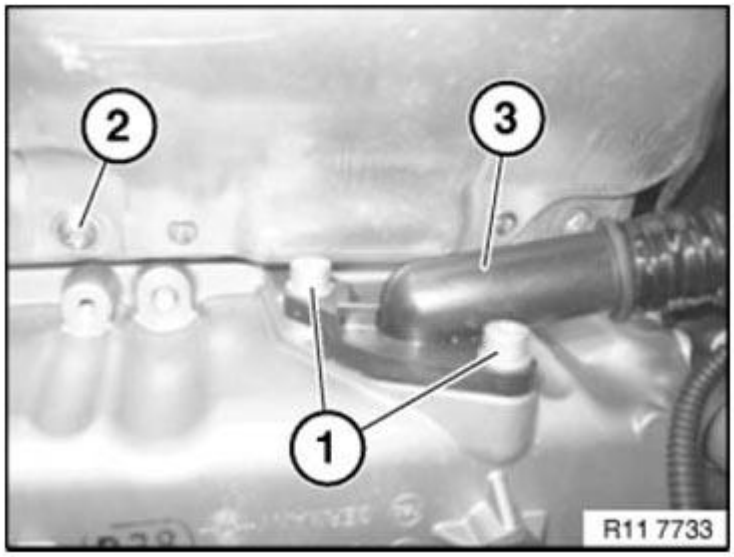


Fig. 470: Identifying Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release retaining clip (1).

Detach wire ring (2) and set down behind oxygen sensor.

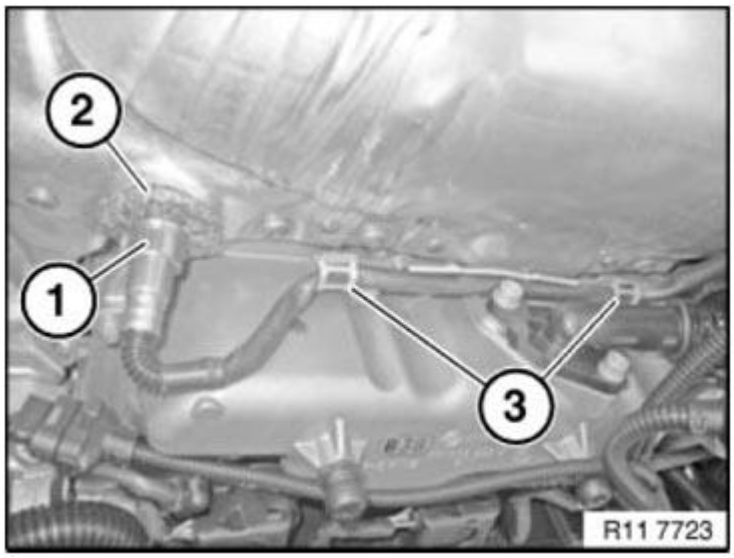


Fig. 471: Identifying Retaining Clip And Wire Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release retaining clip (1).

Detach wire ring (2) and set down behind oxygen sensor.

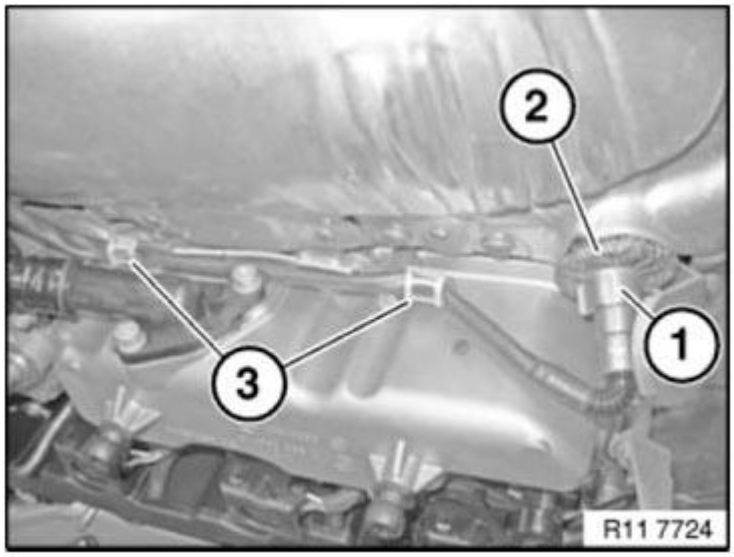


Fig. 472: Identifying Oxygen Sensor With Wire Ring And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

NOTE: For purposes of clarity, the graphic shows the oxygen sensor removed.

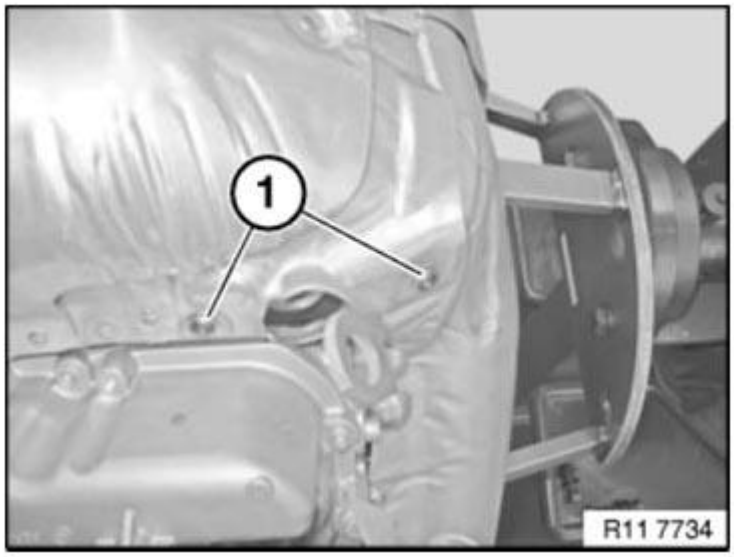


Fig. 473: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

Lift out heat shield.

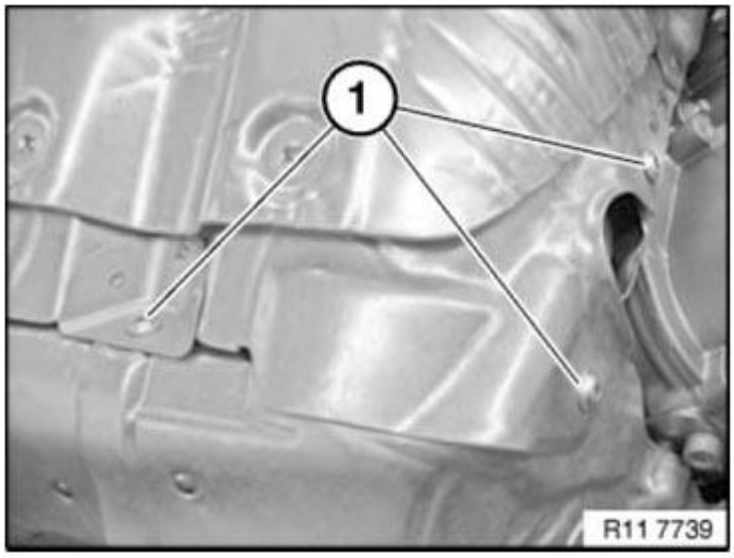


Fig. 474: Identifying Heat Shield Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1165712 REMOVING AND INSTALLING/REPLACING ELECTRIC CHANGEOVER VALVE ON EXHAUST TURBOCHARGER, LEFT (N63)

Necessary preliminary work

- Remove left **TURBOCHARGER** .

Release screws (1).

Remove electric changeover valve.

Installation note:

Replace O-ring.

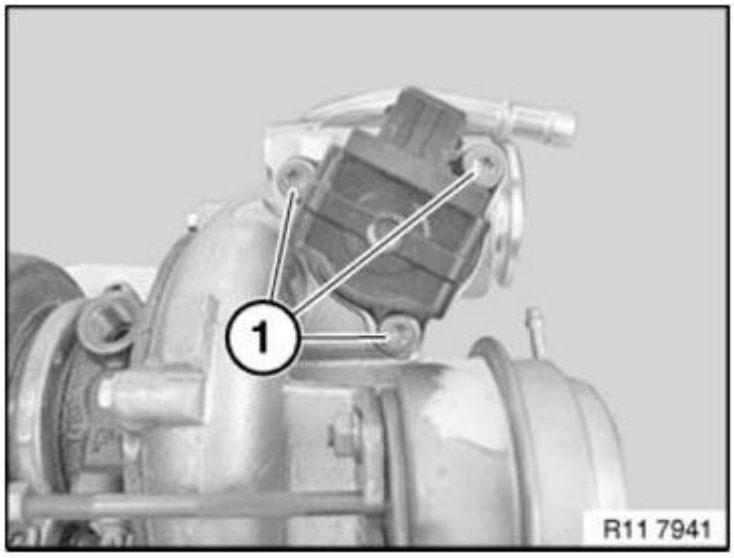


Fig. 475: Identifying Electric Changeover Valve Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Follow diagnosis instruction.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

1165030 REMOVING AND INSTALLING/REPLACING EXHAUST TURBOCHARGER, LEFT, CYLINDERS 5-8 (N63)

Notes

IMPORTANT: Risk of fire if oil lines are leaking.
Risk of mixing up vacuum hoses.

Necessary preliminary work

- Remove **CATALYTIC CONVERTER** , cylinders 5 - -8.

Disconnect plug connection (1) on electric changeover valve (2).

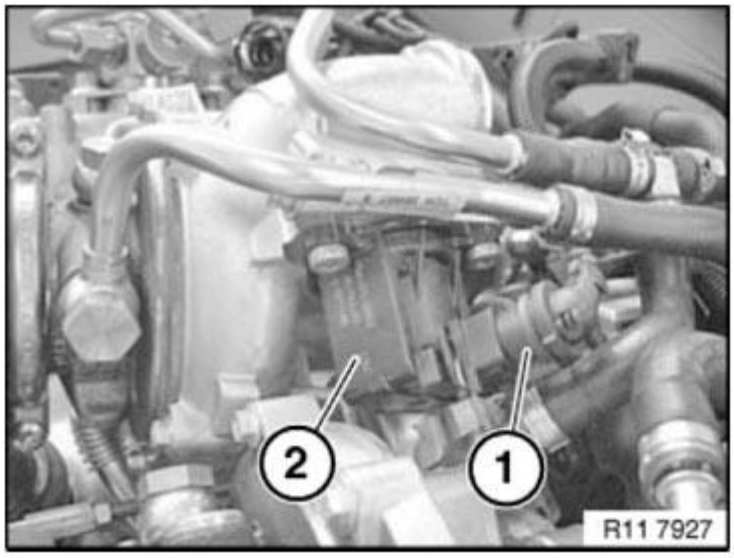


Fig. 476: Identifying Plug Connection On Electric Changeover Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 42 7AZ** .

Unfasten banjo bolt (2).

Tightening torque **11 42 4AZ** .

Lay oil line from turbocharger to side.

Installation note:

Replace all sealing rings

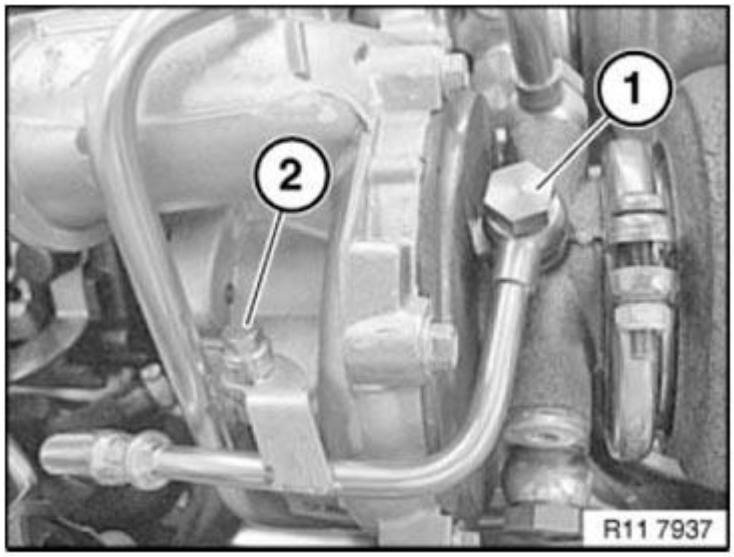


Fig. 477: Identifying Banjo Bolt With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 53 3AZ** .

Release banjo bolt (2).

Tightening torque **11 53 2AZ** .

Lay coolant return line to one side.

Installation note:

Replace all sealing rings

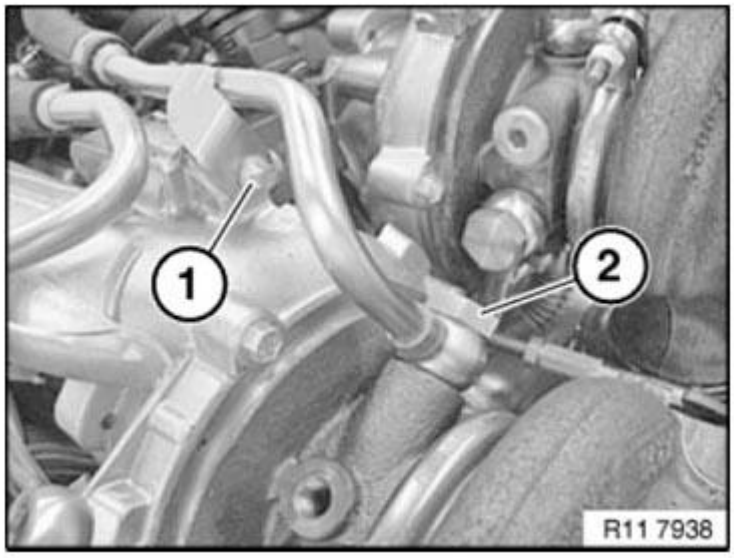


Fig. 478: Identifying Banjo Bolt And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Open hose clamp (1).

Detach coolant feed line (2).

Installation note:

Replace hose clamp (1)

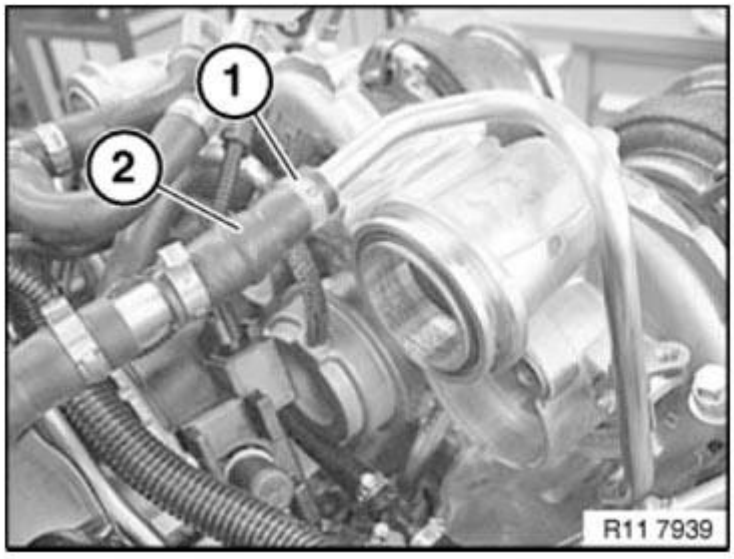


Fig. 479: Identifying Coolant Feed Line And Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (4) with a suitable tool.

NOTE: Oil return pipe (3) can only be removed with turbocharger.

Tightening torque **11 42 10AZ** .

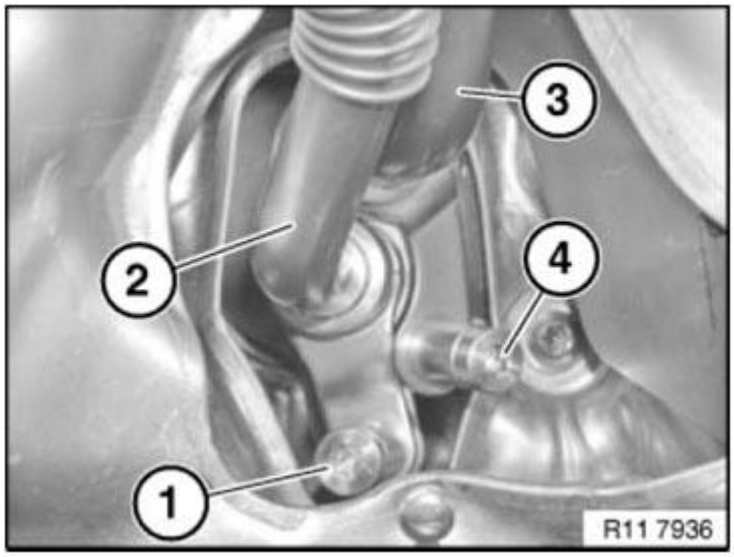


Fig. 480: Identifying Oil Return Pipe With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Open V-band clamp (2).

IMPORTANT: Do not mechanically deform oil return line.

Remove turbocharger with oil return line in upward direction.

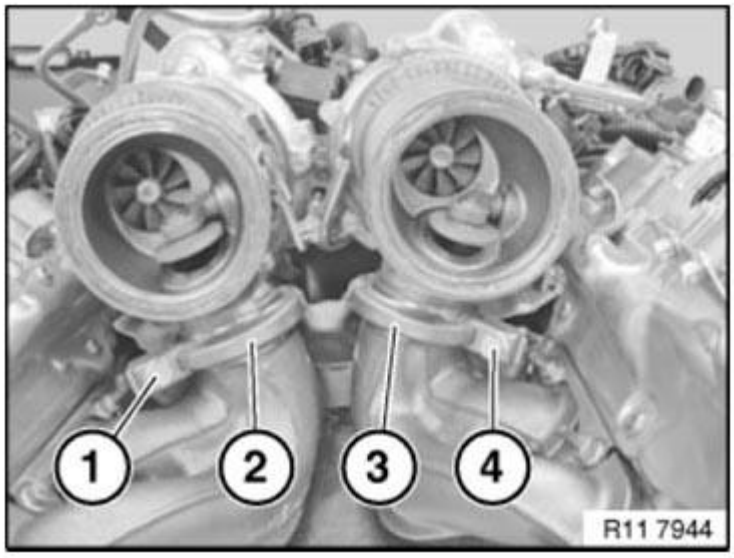


Fig. 481: Identifying V-Band Clamp With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, convert coolant feed line to new turbocharger.

Release banjo bolt (1).

Tightening torque **11 53 2AZ** .

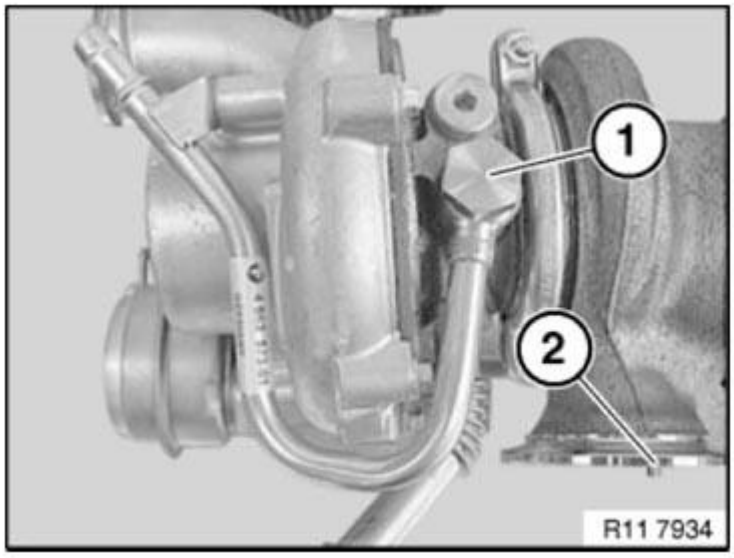


Fig. 482: Identifying Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 53 3AZ** .

Modify coolant feed line (2).

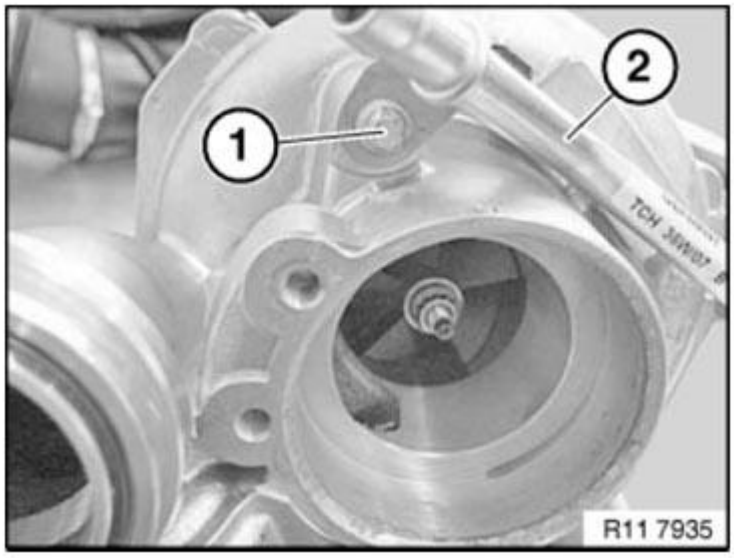


Fig. 483: Identifying Coolant Feed Line With Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 42 9AZ** .

Remove oil return pipe (2).

Installation note:

A new oil return pipe must always be fitted

Replace gasket.

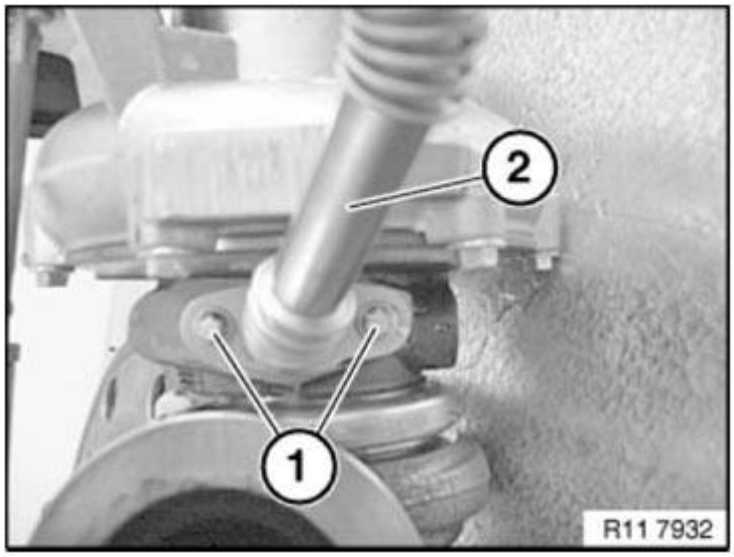


Fig. 484: Identifying Oil Return Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: A deformed oil return pipe can result in leaks. Risk of fire if oil line is leaking.

The thermal linear compensators (see arrows) on the oil return pipe (1) must not be mechanically deformed.

Installation note:

Moisten oil return pipe at end with engine oil.

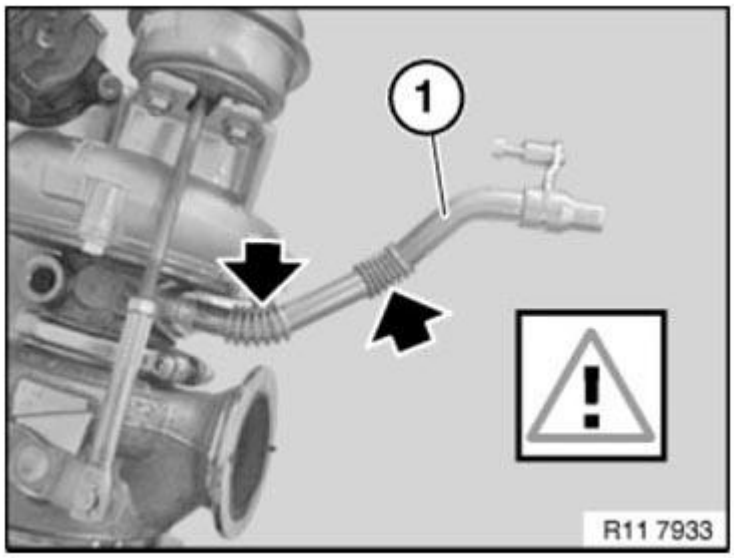


Fig. 485: Identifying Thermal Linear Compensators On Oil Return Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Illustration shows special tools.

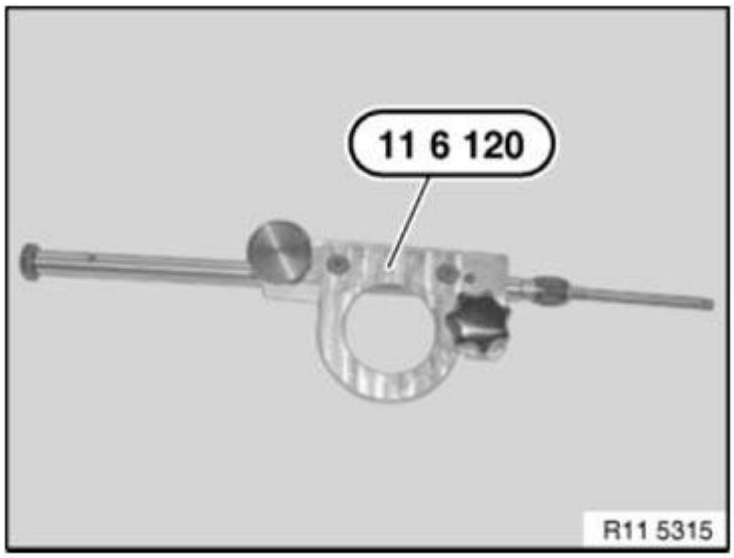


Fig. 486: Identifying Special Tool (11 6 120)
Courtesy of BMW OF NORTH AMERICA, INC.

To install the exhaust turbocharger, special tool 11 6 120, consisting of 11 6 121 and 11 6 123, can be used.

Place special tool (1) on turbocharger and secure with screw (2).

Slide in screw shaft (3) up to mounting bolt (4).

Secure screw shaft (3) with knurled screw (5).

NOTE: Oil return pipe must not be deformed.

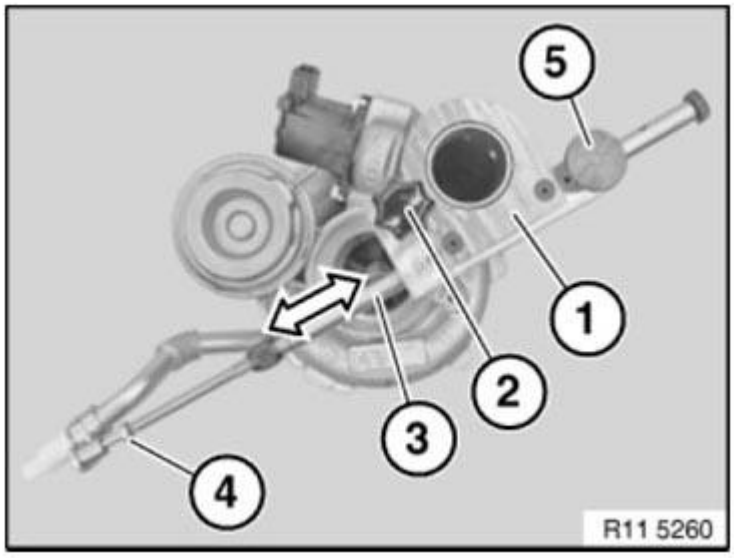


Fig. 487: Sliding Screw Shaft Up To Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release knurled screw (5).

Screw oil return pipe to screw shaft (3).

Tightening torque **11 42 10AZ** .

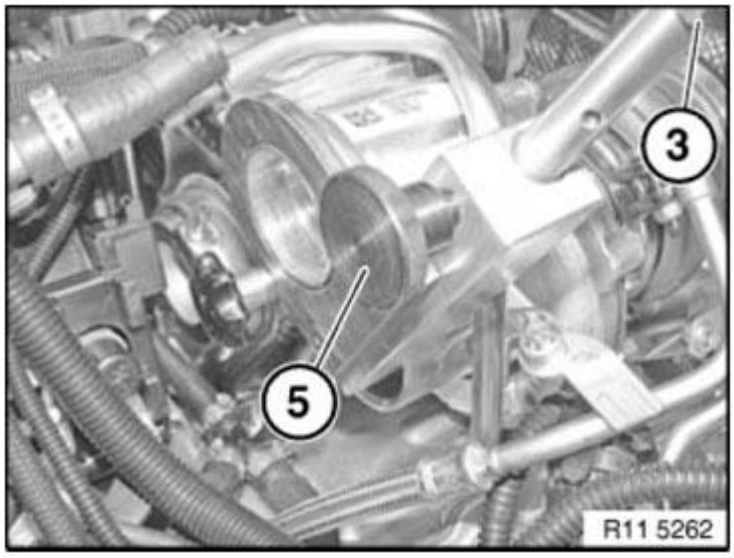


Fig. 488: Identifying Knurled Screw And Screw Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The O - rings can easily fall into the oil duct.

Installation note:

Replace O-rings on oil return cover (2)

NOTE: Illustration shows turbocharger removed.

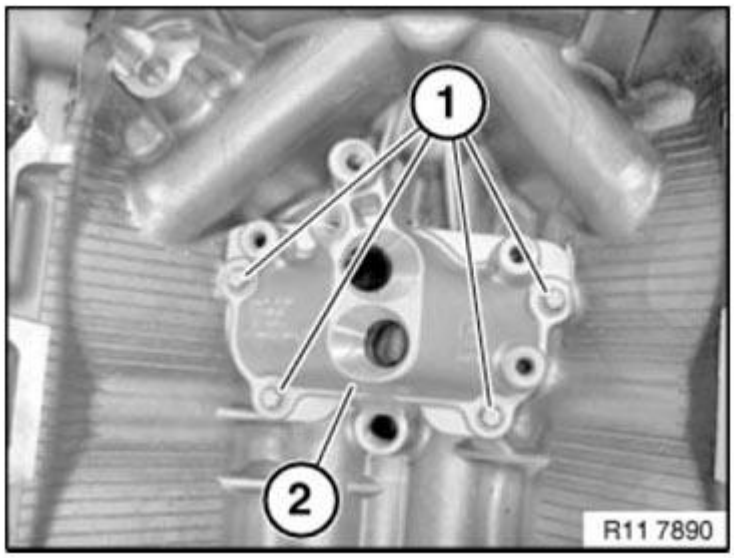


Fig. 489: Identifying Oil Return Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replace gasket (1) on exhaust manifold.

Installation note:

Check locating apparatus on exhaust manifold.

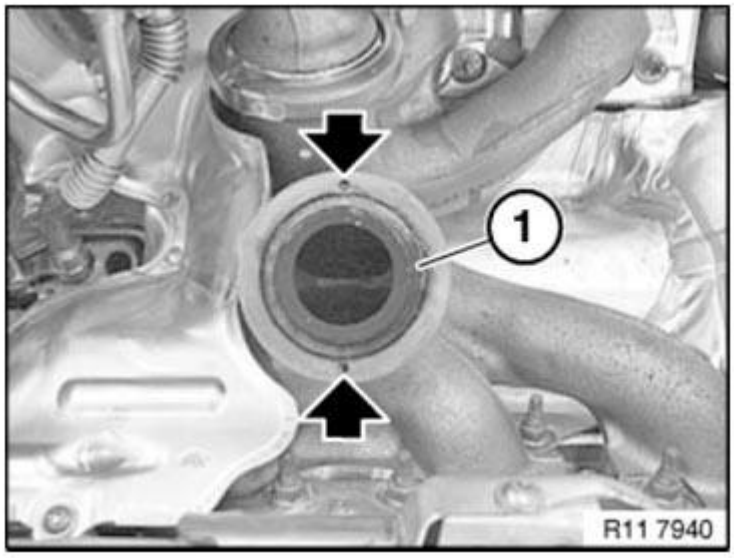


Fig. 490: Locating Apparatus On Exhaust Manifold
Courtesy of BMW OF NORTH AMERICA, INC.

Position turbocharger with oil return line on exhaust manifold.

Position V-band clamp (2).

Insert screw (1).

Tightening torque **11 65 1AZ** .

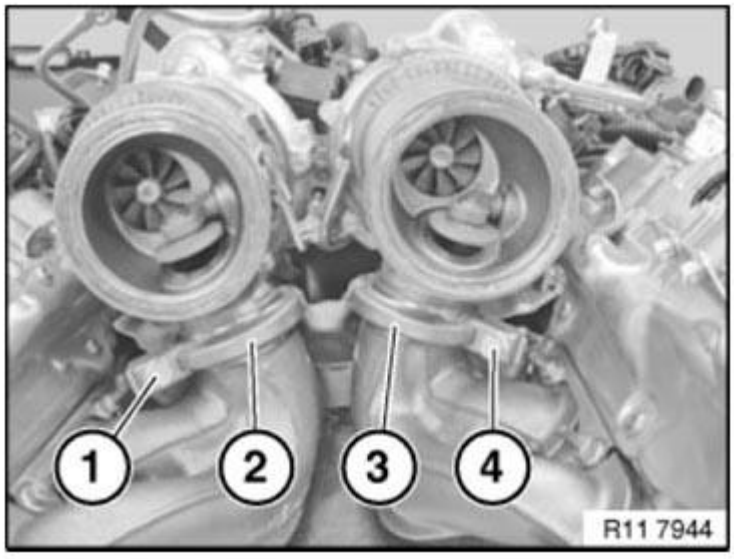


Fig. 491: Identifying V-Band Clamp With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The ends of the V - band clamp must rest parallel to each other.

Tightening torque **11 65 1AZ** .

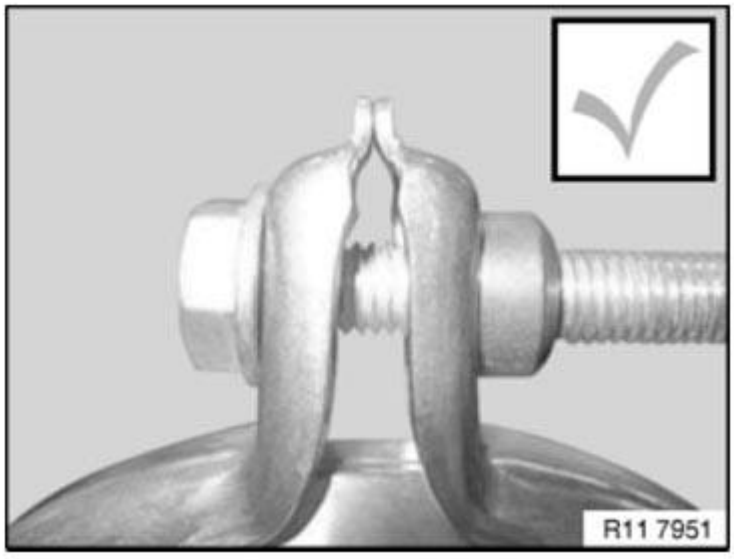


Fig. 492: Identifying V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Screw connection of V-band clamp is too loose:

If you can see a gap between the ends of the V-band clamps, release and then repeat the screw connection.

Tightening torque **11 65 1AZ** .

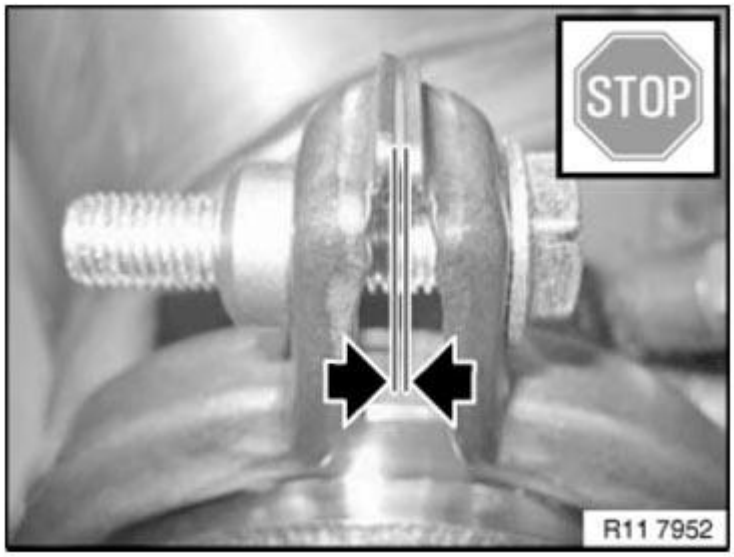


Fig. 493: Locating V-Band Clamp Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Screw connection of V-band clamp is too tight:

If the ends of the V-band clamp are positioned under each other, release and then repeat the screw connection.

Tightening torque **11 65 1AZ** .

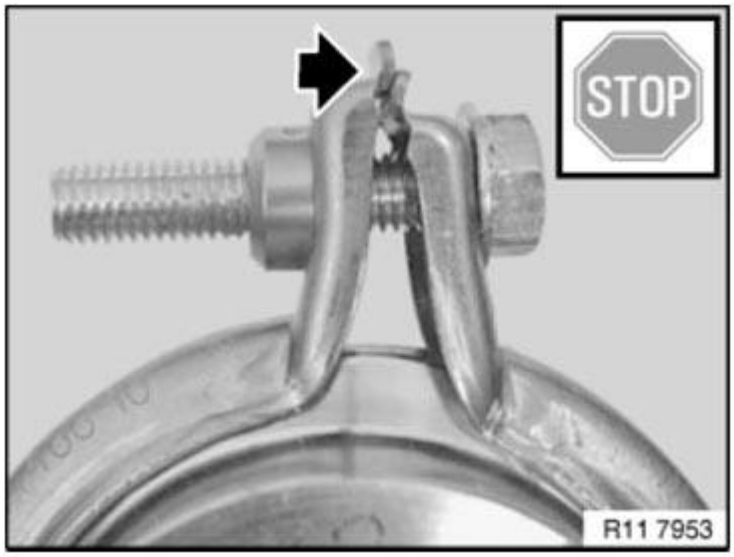


Fig. 494: Locating V-Band Clamps Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of mixing up vacuum hoses.

Vacuum hose (1) for cylinders 5-8

Old version: black/blue

New version: black/yellow

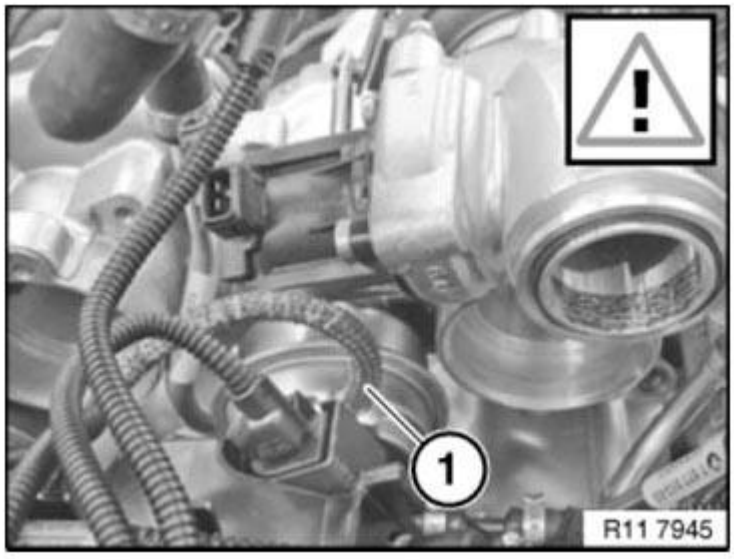


Fig. 495: Identifying Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check **VACUUM CONNECTIONS** .

Observe BMW diagnosis instructions.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

1165025 REMOVING AND INSTALLING/REPLACING EXHAUST TURBOCHARGER, RIGHT, CYLINDERS 1-4 (N63)

Notes

IMPORTANT: Risk of fire if oil lines are leaking.
Risk of mixing up vacuum hoses.

Necessary preliminary work

- Remove **CATALYTIC CONVERTER** , cylinders 1-4

Disconnect plug connection (1) on electric changeover valve (2).

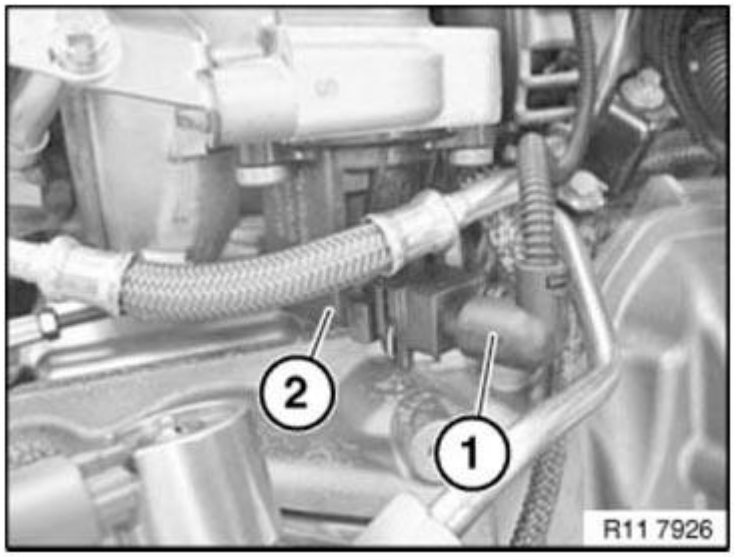


Fig. 496: Identifying Plug Connection On Electric Changeover Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 42 7AZ** .

Unfasten banjo bolt (2).

Tightening torque **11 42 4AZ** .

Lay oil line (3) from turbocharger to side.

Installation note:

Replace all sealing rings

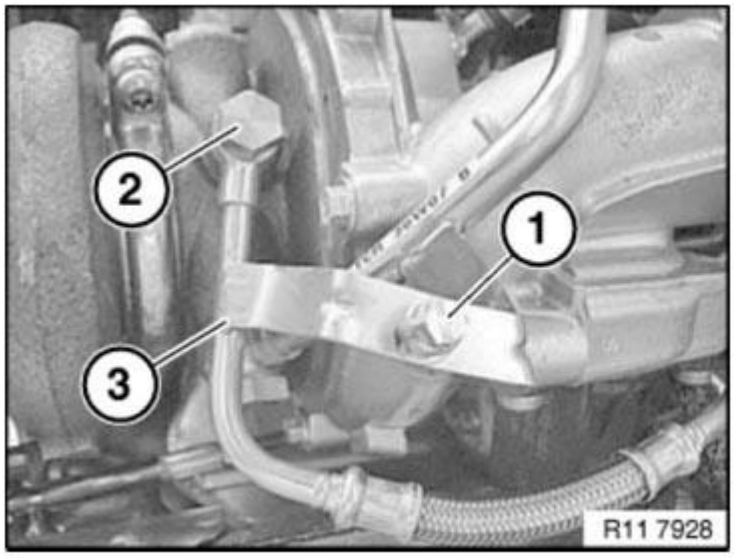


Fig. 497: Identifying Oil Line With Banjo Bolt And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 53 3AZ** .

Release banjo bolt (2).

Tightening torque **11 53 2AZ** .

Lay coolant return line (3) to one side.

Installation note:

Replace all sealing rings

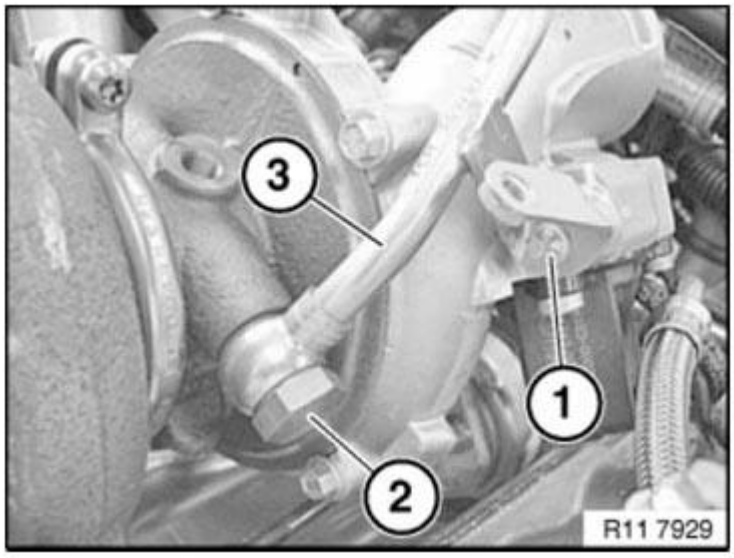


Fig. 498: Identifying Coolant Return Line With Banjo Bolt And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Open hose clamp (1).

Detach coolant feed line (2).

Installation note:

Replace hose clamp (1)

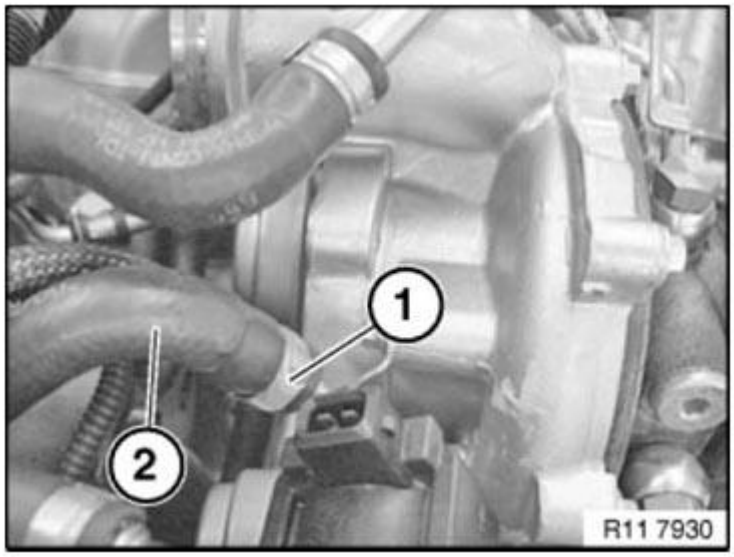


Fig. 499: Identifying Coolant Feed Line And Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) with a suitable tool.

NOTE: Oil return pipe (2) can only be removed with turbocharger.

Tightening torque **11 42 10AZ** .

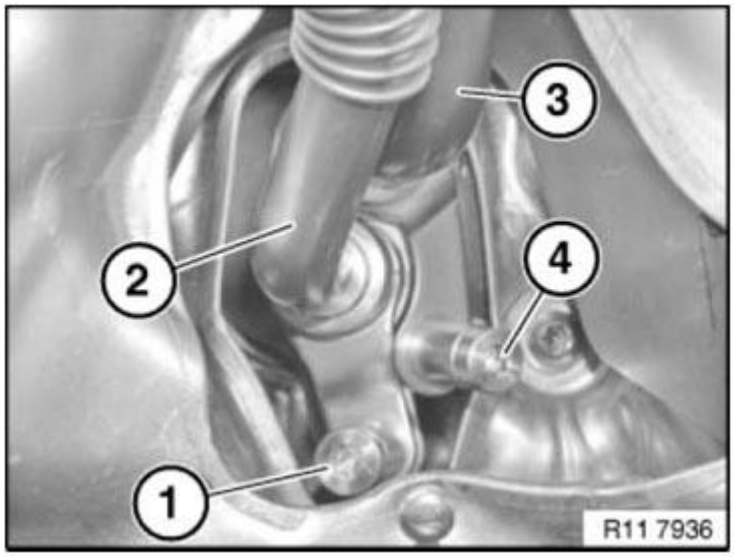


Fig. 500: Identifying Oil Return Pipe With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (4).

Open V-band clamp (3).

IMPORTANT: Do not mechanically deform oil return line.

Remove turbocharger with oil return line in upward direction.

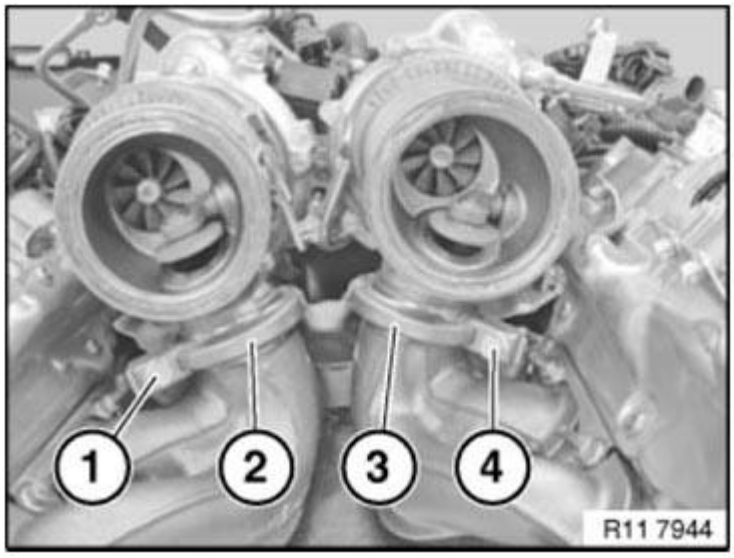


Fig. 501: Identifying V-Band Clamp With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, convert coolant feed line to new turbocharger.

Release banjo bolt (1).

Tightening torque **11 53 2AZ** .

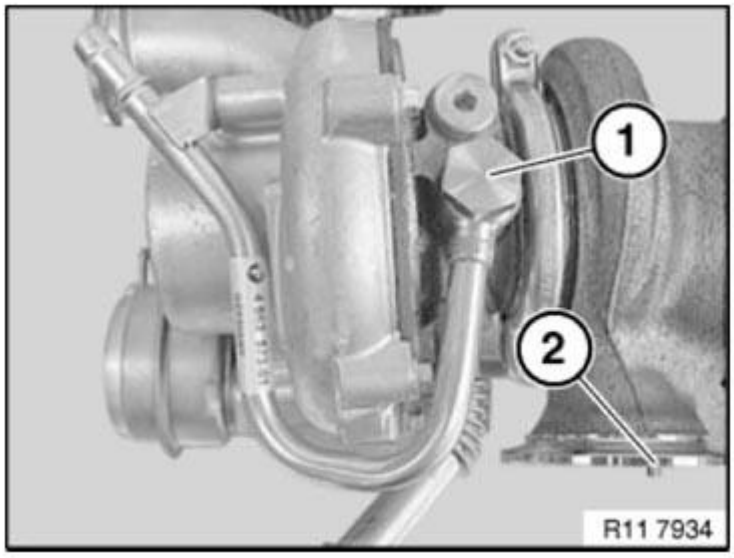


Fig. 502: Identifying Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 53 3AZ** .

Modify coolant feed line (2).

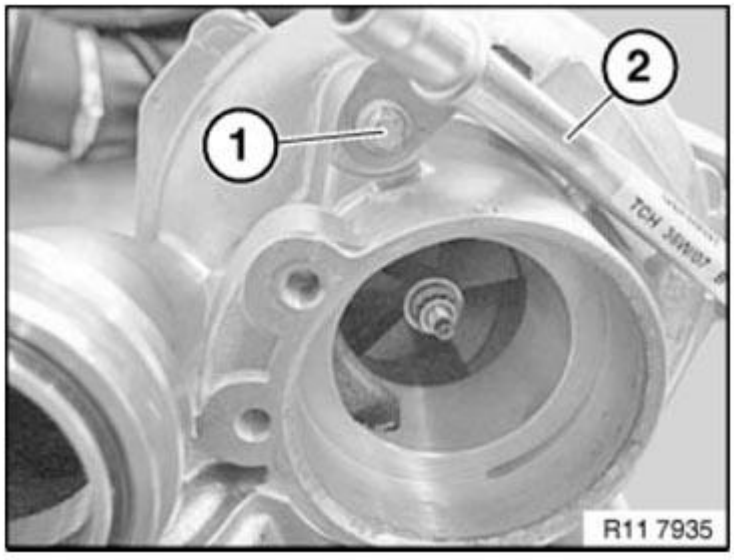


Fig. 503: Identifying Coolant Feed Line With Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 42 9AZ** .

Remove oil return pipe (2).

Installation note:

A new oil return pipe must always be fitted

Replace gasket.

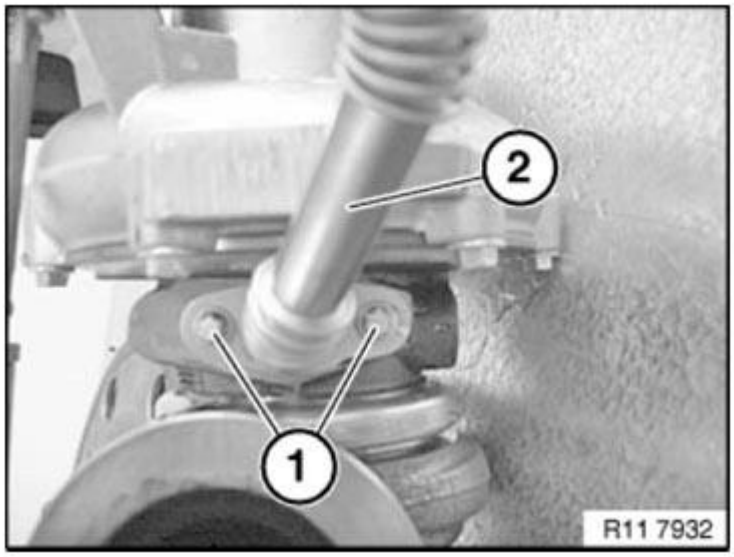


Fig. 504: Identifying Oil Return Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: A deformed oil return pipe can result in leaks.
Risk of fire if oil line is leaking.

The thermal linear compensators (see arrows) on the oil return pipe (1) must not be mechanically deformed.

Installation note:

Moisten oil return pipe at end with engine oil.

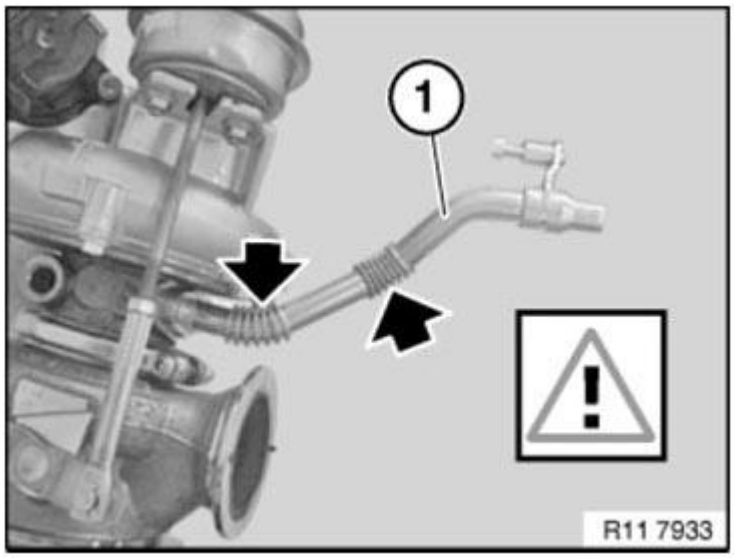


Fig. 505: Identifying Thermal Linear Compensators On Oil Return Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Illustration shows special tools.

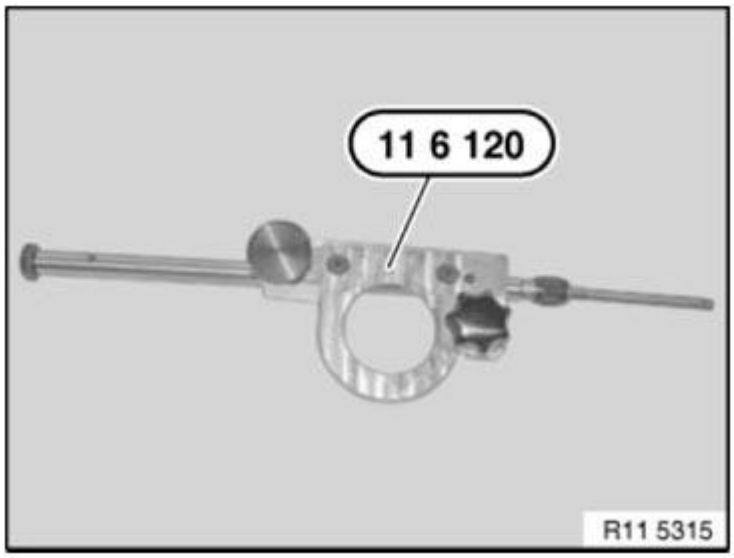


Fig. 506: Identifying Special Tool (11 6 120)
Courtesy of BMW OF NORTH AMERICA, INC.

To install the exhaust turbocharger, special tool 11 6 120, consisting of 11 6 122 and 11 6 123, can be used.

Place special tool (1) on turbocharger and secure with screw (2).

Slide in screw shaft (3) up to mounting bolt (4).

Secure screw shaft (3) with knurled screw (5).

NOTE: Pipe must not be deformed.

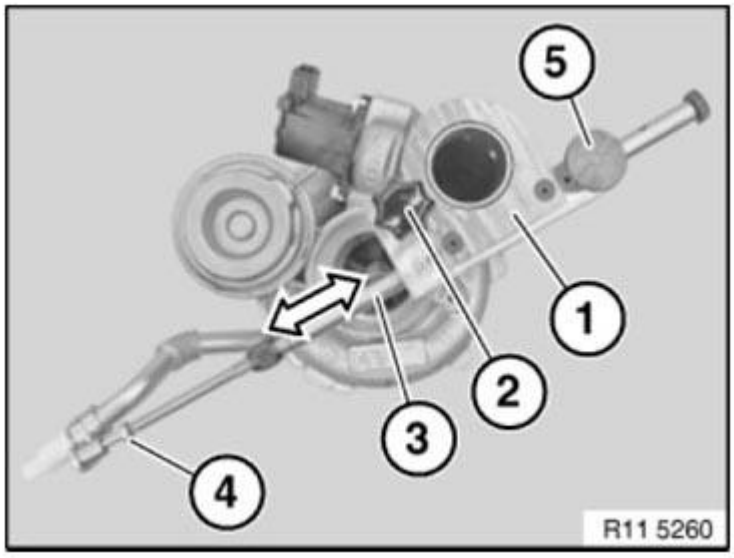


Fig. 507: Sliding Screw Shaft Up To Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

To screw the oil return pipe, it is necessary to release knurled screw (5) again.

Screw oil return pipe to screw shaft (3).

Tightening torque **11 42 10AZ** .

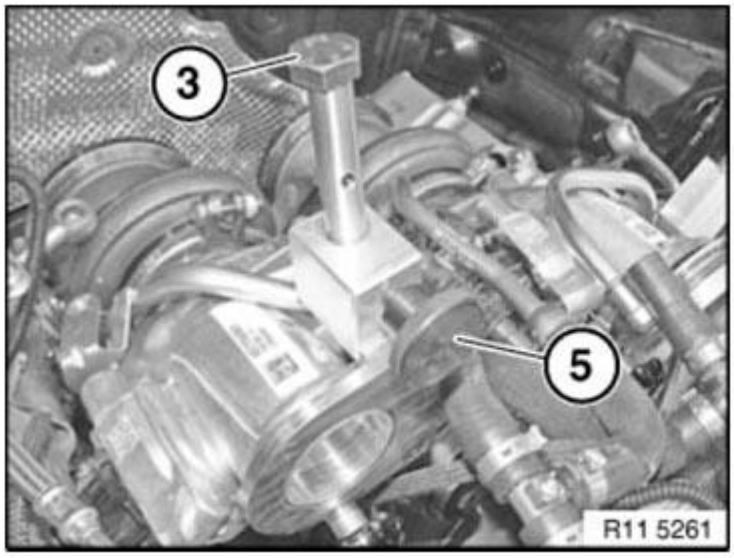


Fig. 508: Identifying Knurled Screw And Screw Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The O-rings can easily fall into the oil duct.

Installation note:

Replace O-rings on oil return cover (2)

NOTE: Illustration shows turbocharger removed.

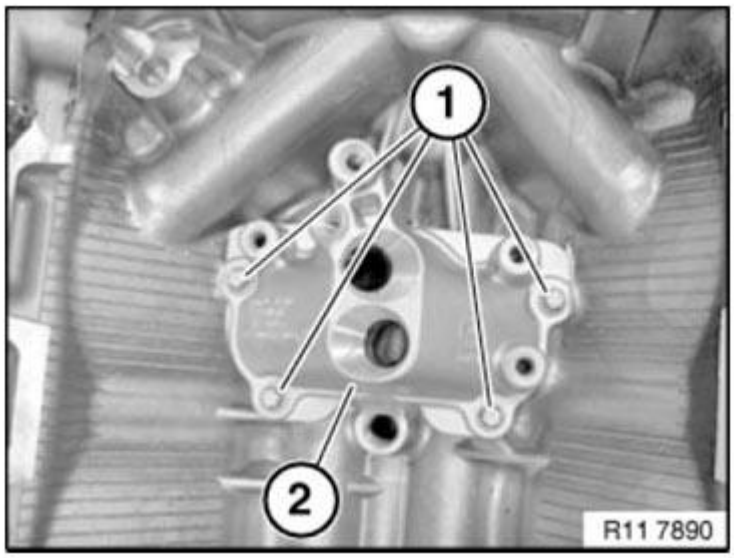


Fig. 509: Identifying Oil Return Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace gasket on exhaust manifold

Installation note:

Check locating apparatus on exhaust manifold.

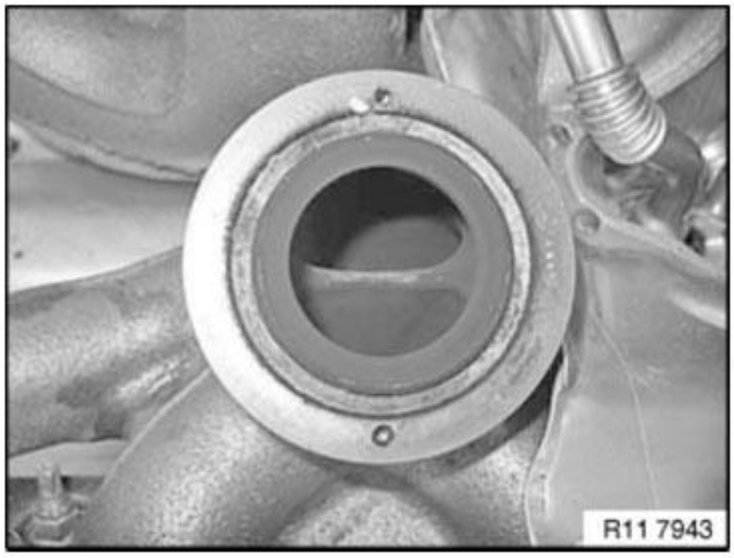


Fig. 510: Identifying Apparatus On Exhaust Manifold
Courtesy of BMW OF NORTH AMERICA, INC.

Position turbocharger with oil return line on exhaust manifold.

Position V-band clamp (3).

Insert bolt (4).

Tightening torque **11 65 1AZ** .

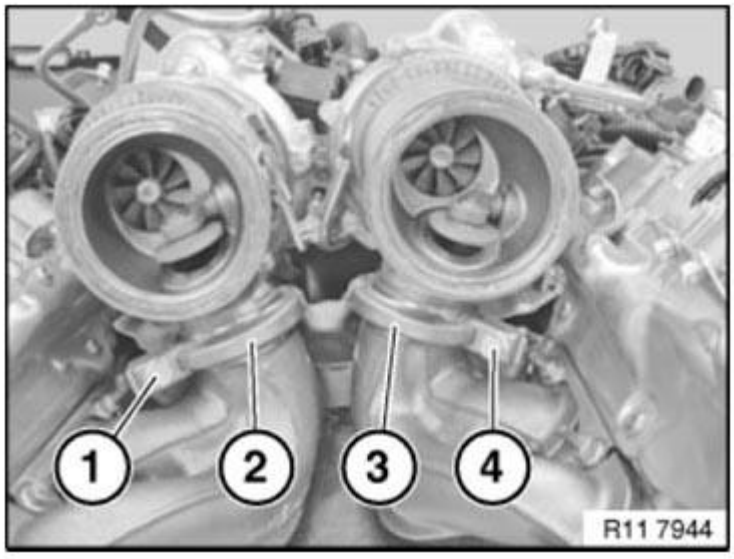


Fig. 511: Identifying V-Band Clamp With Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The ends of the V-band clamp must rest parallel to each other.

Tightening torque **11 65 1AZ** .

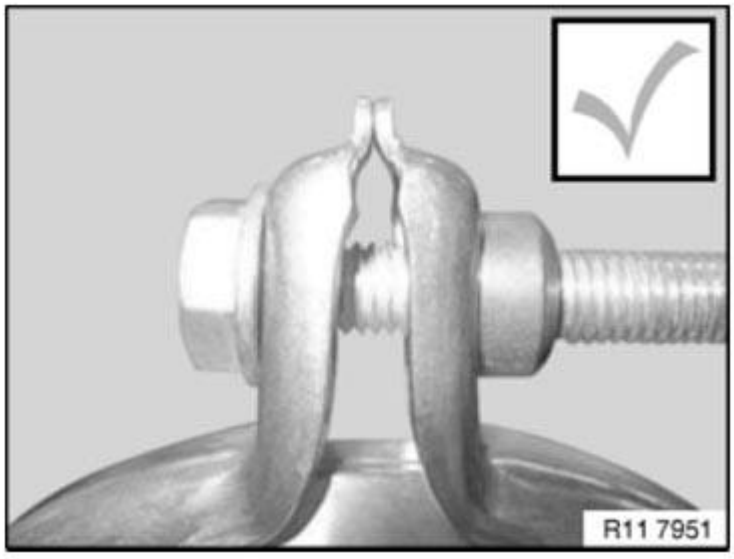


Fig. 512: Identifying V-Band Clamp Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Screw connection of V-band clamp is too loose:

If you can see a gap between the ends of the V-band clamps, release and then repeat the screw connection.

Tightening torque **11 65 1AZ** .

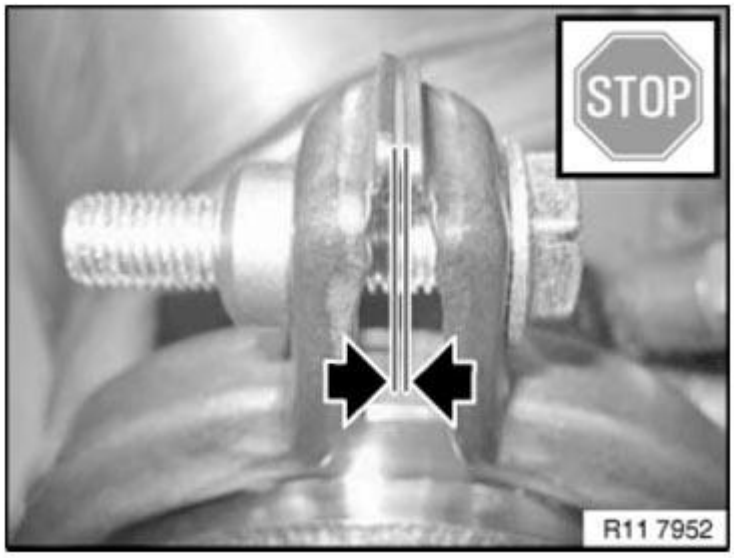


Fig. 513: Locating V-Band Clamp Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Screw connection of V-band clamp is too tight:

If the ends of the V-band clamp are positioned under each other, release and then repeat the screw connection.

Tightening torque **11 65 1AZ** .

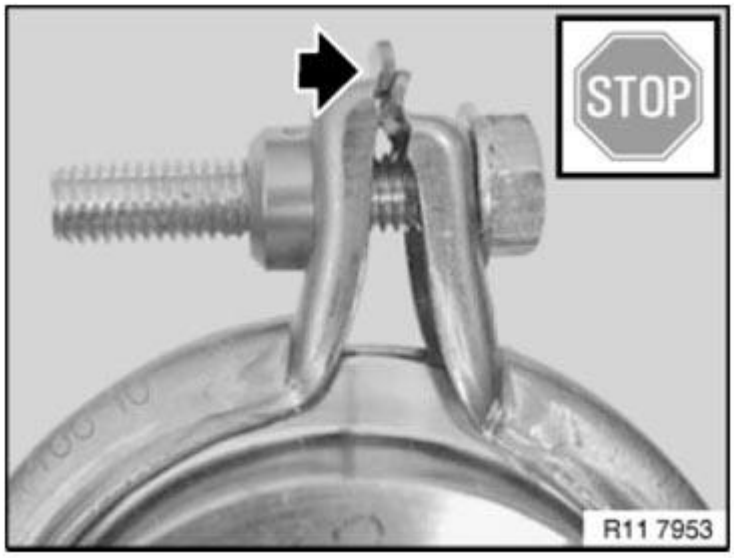


Fig. 514: Locating V-Band Clamp Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of mixing up vacuum hoses.

Vacuum hose (1) black/red for cylinders 1-4.

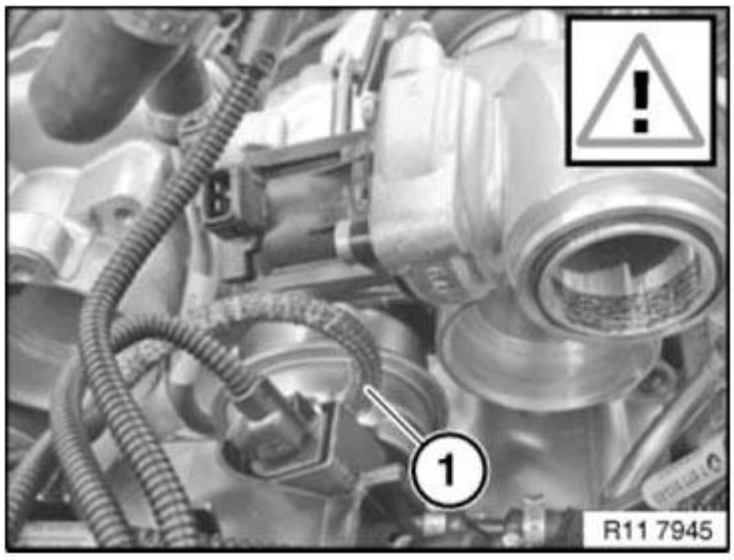


Fig. 515: Identifying Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check **VACUUM CONNECTIONS** .

Observe BMW diagnosis instructions.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

1161065 REMOVING AND INSTALLING/REPLACING LEFT INTAKE PLENUM (N63)

Necessary preliminary work

- Remove left **INJECTION PIPE** .
- Remove **THROTTLE VALVE**
- Release screws on intake plenum from above without fail before lowering front axle.
- Secure **ENGINE** in installation position.
- Lower front axle, releasing screws on engine mount first. See **LOWERING/RAISING FRONT AXLE SUPPORT (UNIVERSAL LIFTER)** .
- Release power steering pump, if installed, and set aside. See **POWER STEERING PUMP FOR**

HYDRAULIC STEERING GEAR WITH DYNAMIC DRIVE (N63) or POWER STEERING PUMP FOR POWER STEERING GEAR WITH ACTIVE FRONT STEERING (N63) .

- **UNIVERSAL JOINT** with corrugated tubing.

Detach engine ventilation hose (1).

Disconnect connector.

Unscrew nuts (2).

Tightening torque: **11 61 1 AZ** .

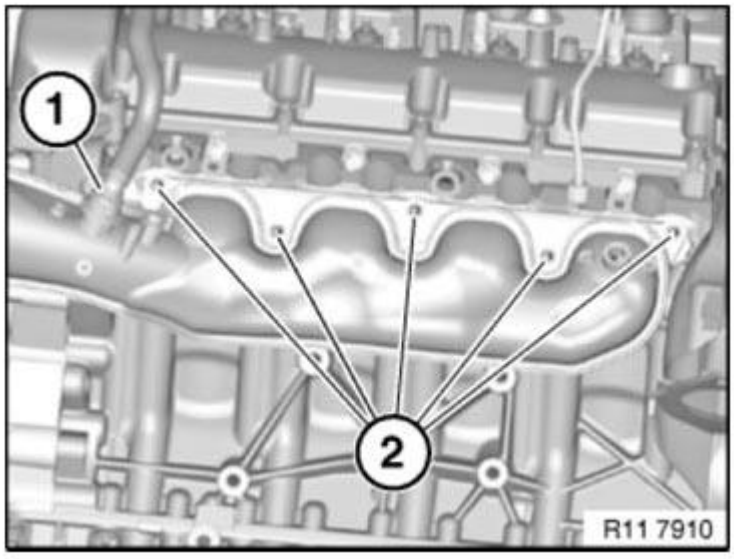


Fig. 516: Identifying Engine Ventilation Hose And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release **THROTTLE VALVE** (1).

Release holder screw (2) on intake plenum.

Tightening torque: **11 61 2AZ** .

Feed out intake plenum towards rear.

Installation note:

Replace all profile seals.

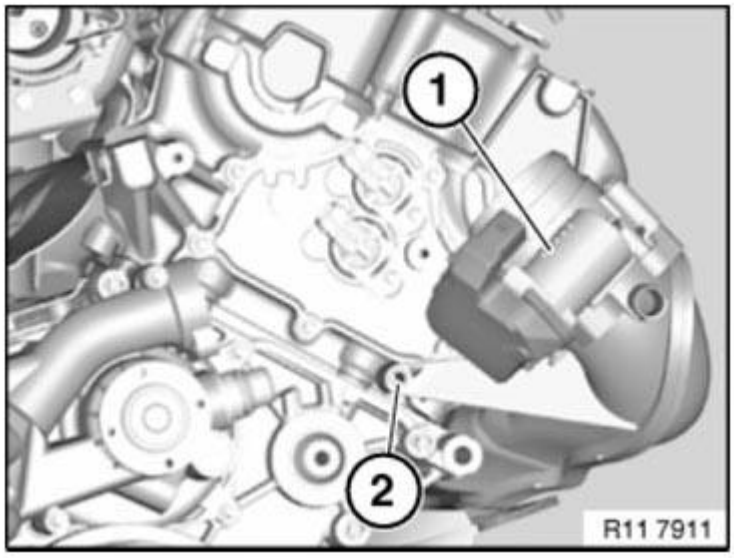


Fig. 517: Identifying Throttle Valve Assembly (N63) And Holder Screw On Intake Plenum
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle and

Check air intake system for leaks.

1165010 REMOVING AND INSTALLING/REPLACING PRESSURE ACCUMULATOR (N63)

Necessary preliminary work

- Remove both exhaust turbochargers. See **EXHAUST TURBOCHARGER, RIGHT, CYLINDERS 1-4** and **EXHAUST TURBOCHARGER, LEFT, CYLINDERS 5-8**.
- Remove both exhaust manifolds. See **LEFT EXHAUST MANIFOLD** and **RIGHT EXHAUST MANIFOLD** .
- Remove **HEAT SHIELD** at bottom

Release banjo bolt (1).

Tightening torque **11 42 3AZ** .

Installation note:

Replace sealing ring

Release screw (3) on engine oil line.

Remove engine oil line (2).

Release screws (3) on vacuum reservoir (4).

Tightening torque **11 65 6AZ** .

Remove vacuum reservoir (4).

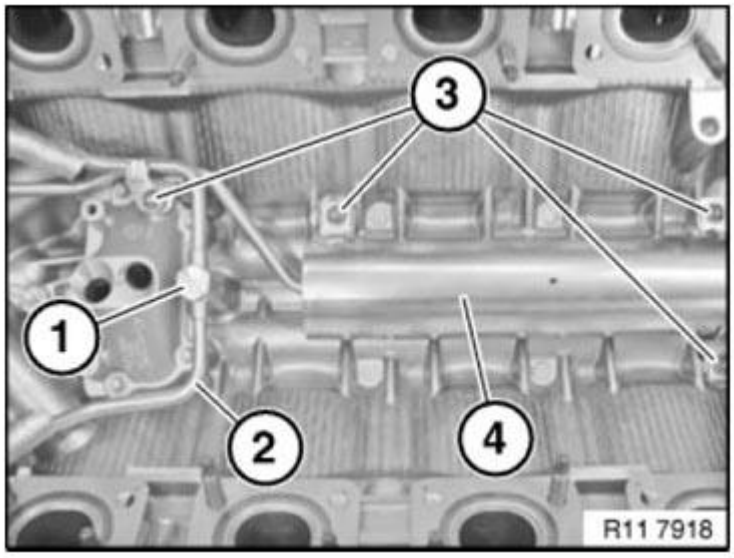


Fig. 518: Identifying Banjo Bolt, Screws And Vacuum Reservoir
Courtesy of BMW OF NORTH AMERICA, INC.

Check **VACUUM CONNECTIONS** for correct routing.

Check **VACUUM SYSTEM FOR LEAKS** .

Assemble engine.

1161068 REMOVING AND INSTALLING/REPLACING RIGHT INTAKE PLENUM (N63)

Necessary preliminary work

- Remove right **INJECTION PIPE** .
- Remove **THROTTLE VALVE**
- Release screws on intake plenum from above without fail before lowering front axle.
- Secure **ENGINE** in installation position.
- Lower **FRONT AXLE** , releasing screws on engine mount first
- Release A/C compressor and place to one side. See **REMOVING AND INSTALLING/REPLACING HEATING AND AIR CONDITIONING SYSTEM COMPRESSOR (N63, WITH DYNAMIC DRIVE)** .

Detach engine ventilation hose (1).

Disconnect connector.

Unscrew nuts (2).

Tightening torque: **11 61 1 AZ** .

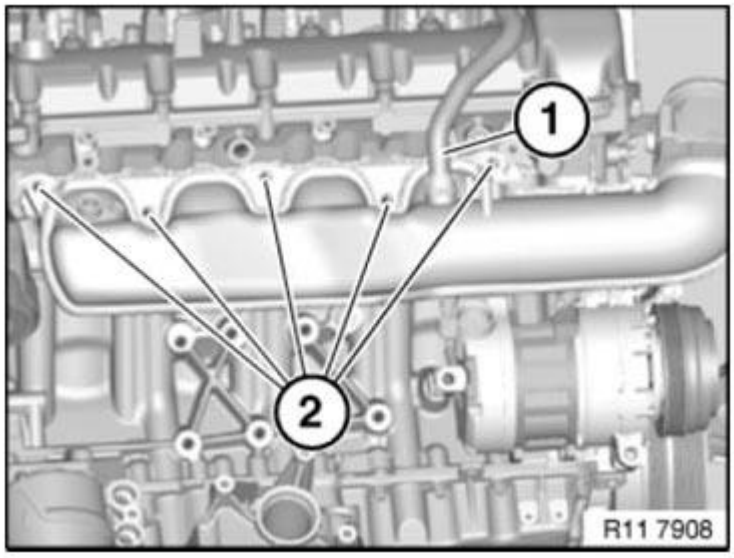


Fig. 519: Identifying Engine Ventilation Hose And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **THROTTLE VALVE** (2).

Release screw (1).

Tightening torque: **11 61 2 AZ** .

Feed out intake plenum towards rear.

Installation note:

Replace all profile seals.

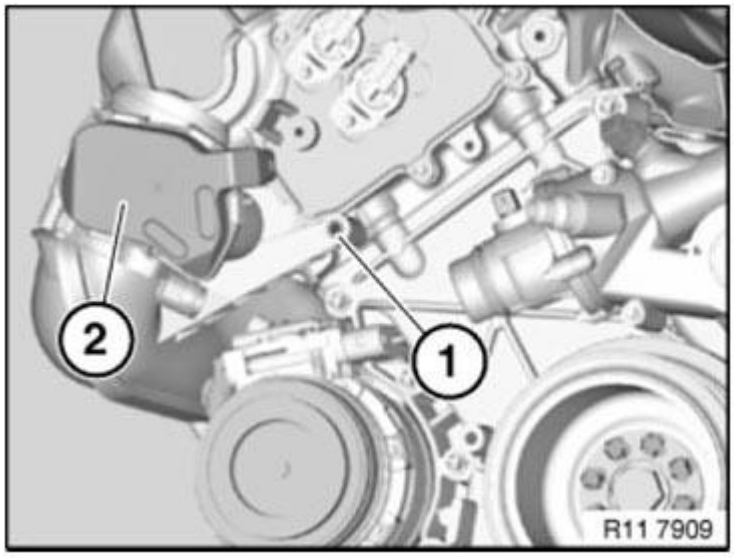


Fig. 520: Identifying Screw And Throttle Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle.

Check air intake system for leaks.

1166 VACUUM PUMP

1166000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N63)

IMPORTANT: Installation note:
Due to the risk of damage to the engine gaskets/seals and the lack of brake boosting, make sure before starting the engine that all the vacuum lines are connected.

Vacuum pump is fitted on cylinder head 1 to 4 at rear on intake camshaft.

Necessary preliminary work

- Press brake pedal several times in order to reduce vacuum pressure in brake booster.
- Remove right **CATALYTIC CONVERTER** .
- Remove right heat shield.
- Detach vacuum line from vacuum pump.

Release screws (1).

Remove heat shield (2).

Remove vacuum hose.

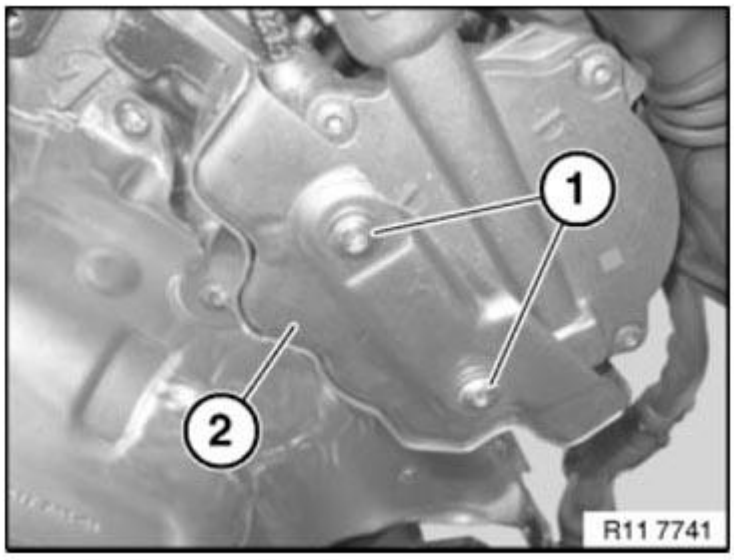


Fig. 521: Identifying Heat Shield With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

NOTE: Bolts (1) are secured against falling out.

Release screw (2).

Remove vacuum pump (3).

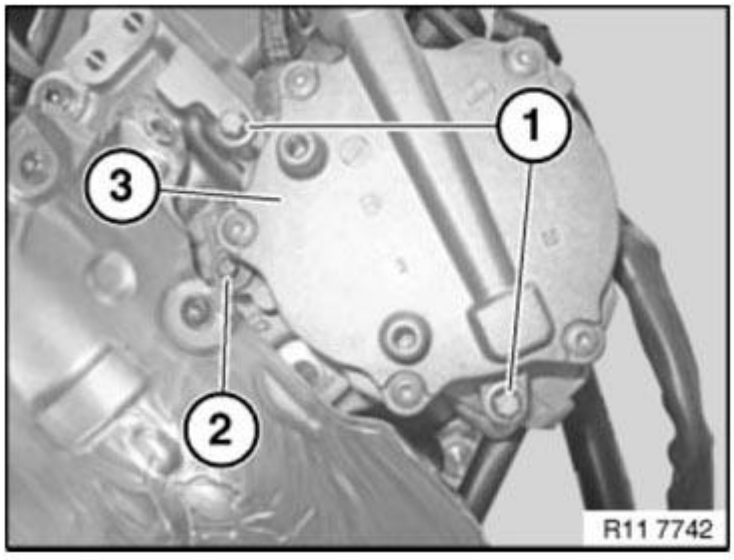


Fig. 522: Identifying Vacuum Pump With Mounting Bolts And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Drive (1) must be rotated into correct position prior to installation.

Installation note:

Replace sealing ring (2) and coat with grease to facilitate fitting.

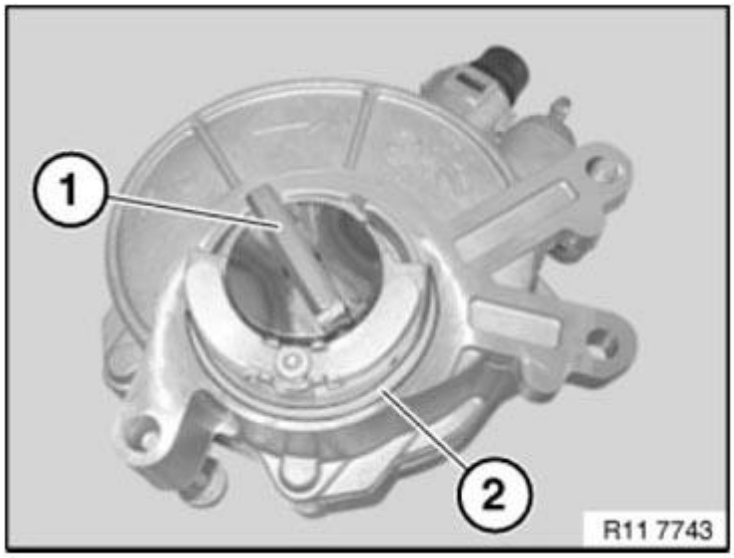


Fig. 523: Identifying Sealing Ring And Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Align vacuum pump drive to groove (1) of intake camshaft.

Vacuum pump can best be installed when groove (1) is vertically aligned.

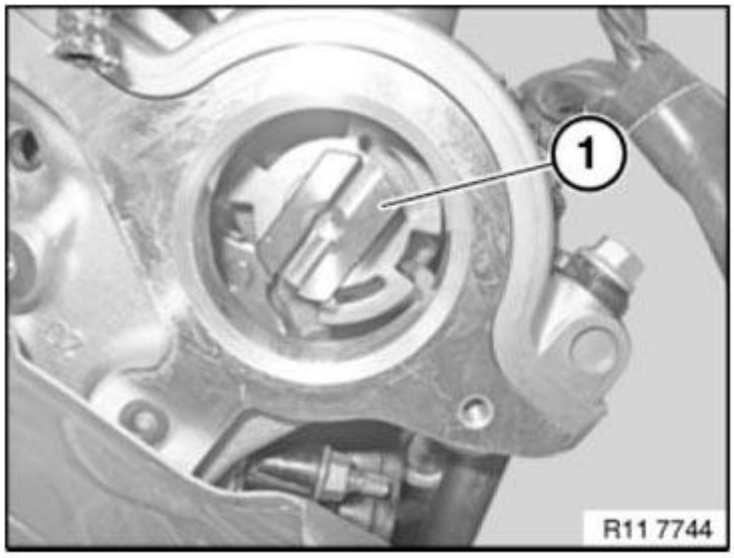


Fig. 524: Identifying Intake Camshaft Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of DME.

Check vacuum pump for leaks and correct operation.

1174 EL.VALVE FOR EXH. GAS RECIRCULATION

1174509 REPLACING BOTH PRESSURE CONVERTERS FOR TURBOCHARGER (N63)

Necessary preliminary work

- Partially release charge air cooler **EXPANSION TANK** .
- Partially release **AUXILIARY WATER PUMP** for exhaust turbocharger (not F04).
- Disconnect plug connection at **COOLANT THERMOSTAT** .

Pressure converter, cylinders 1-4

Disconnect plug connection (1) on pressure converter.

Installation note:

Plug connection (1) must snap audibly into place!

Disconnect black vacuum hose at connection (VAC = vacuum reservoir).

Disconnect black/red vacuum hose at connection (OUT= turbocharger vacuum unit).

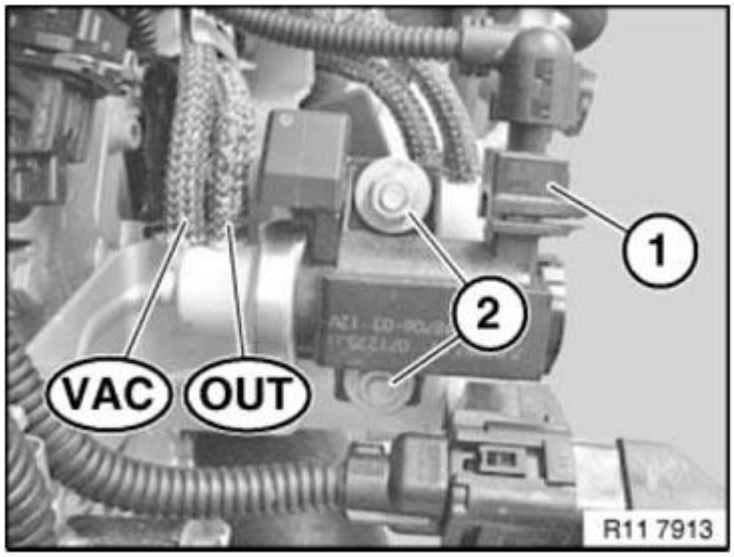


Fig. 525: Identifying Black/Red Vacuum Hose And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (2).

Tightening torque **11 65 8AZ** .

Remove pressure converter.

Pressure converter, cylinders 5-8

Disconnect plug connection (1) on pressure converter.

Installation note:

Plug connection (1) must snap audibly into place!

Disconnect black vacuum hose at connection (VAC = vacuum reservoir).

Disconnect black/blue vacuum hose at connection (OUT= turbocharger vacuum unit).

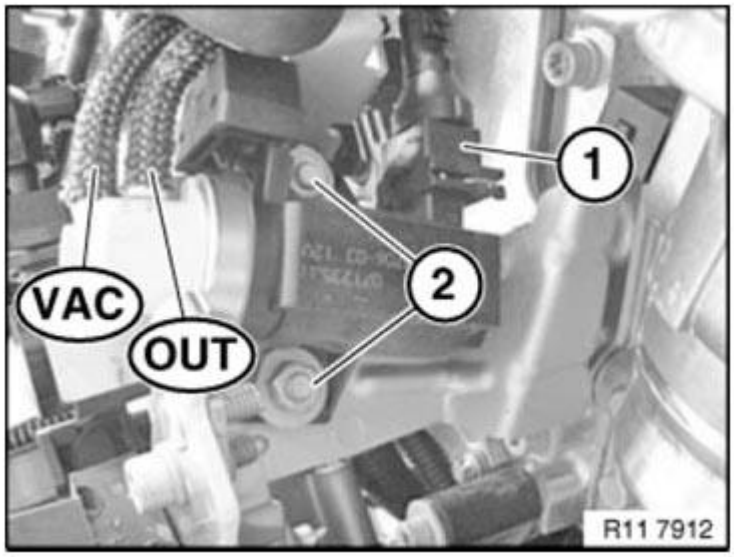


Fig. 526: Identifying Black/Blue Vacuum Hose Connection With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (2).

Tightening torque **11 65 8AZ** .

Remove pressure converter.

Check activation via BMW diagnosis system.

1178 EMISSION CONTROL, OXYGEN SENSOR

1178530 REPLACING LEFT CONTROL SENSOR (N63)

Notes

WARNING: Risk of burning!
Only perform this work after engine has cooled down.

Necessary preliminary work

- Check function of DME control unit
- Switch off ignition
- Remove **AIR FILTER HOUSING**

Unlock plug connection and detach.

Unclip control sensor cable at retaining clips.

Release control sensor with special tool **11 7 020** .

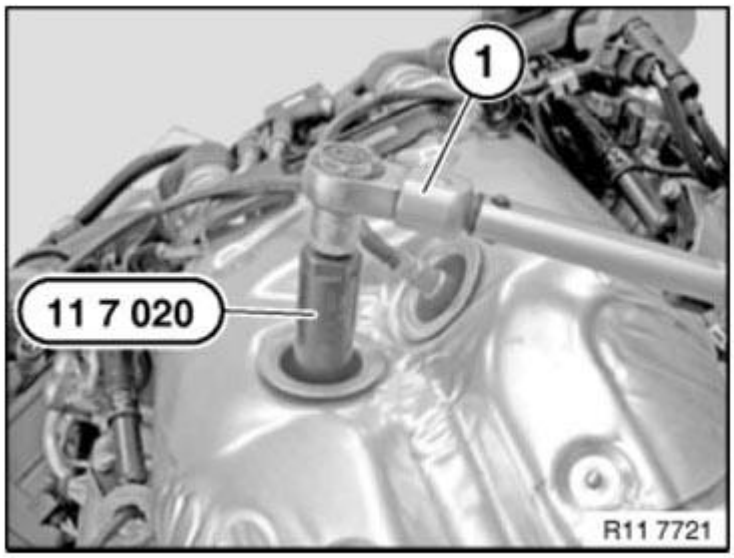


Fig. 527: Releasing Control Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Secure control sensor with special tool **11 7 020** and a torque wrench (1).

Tightening torque **11 78 1AZ** .

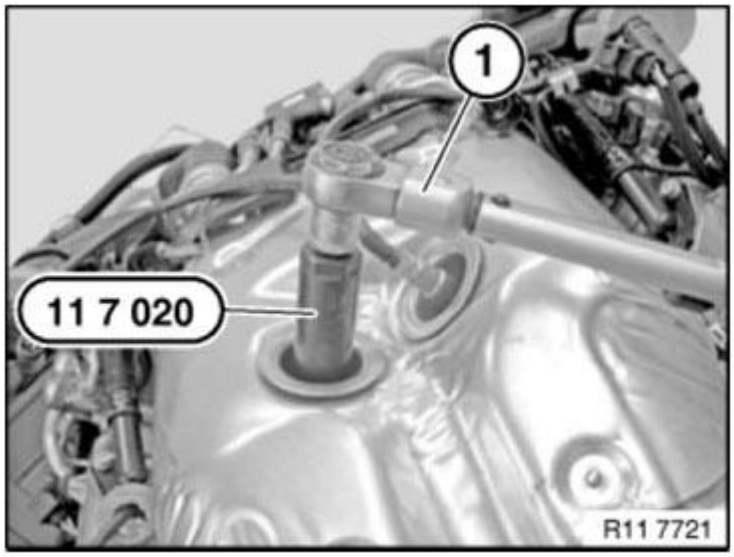


Fig. 528: Securing Control Sensor Using Special Tool 11 7 020 And Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check function of DME control unit.

Pay attention to cable routing of control sensor.

1178540 REPLACING LEFT MONITOR SENSOR (N63)

Notes

WARNING: Risk of burning!
Only perform this work after engine has cooled down.

Necessary preliminary work

- Check function of DME control unit
- Switch off ignition
- Remove **AIR FILTER HOUSING**

Release retaining clip (1).

Remove heat shield wire ring (2) over oxygen sensor.

Detach oxygen sensor cable from retaining clips (3).

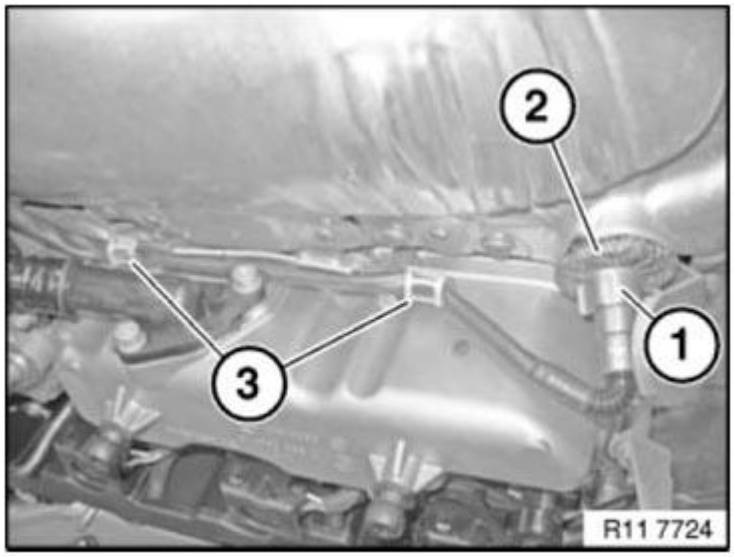


Fig. 529: Identifying Heat Shield Wire Ring And Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Release monitoring sensor (1) with special tool **11 7 020** .

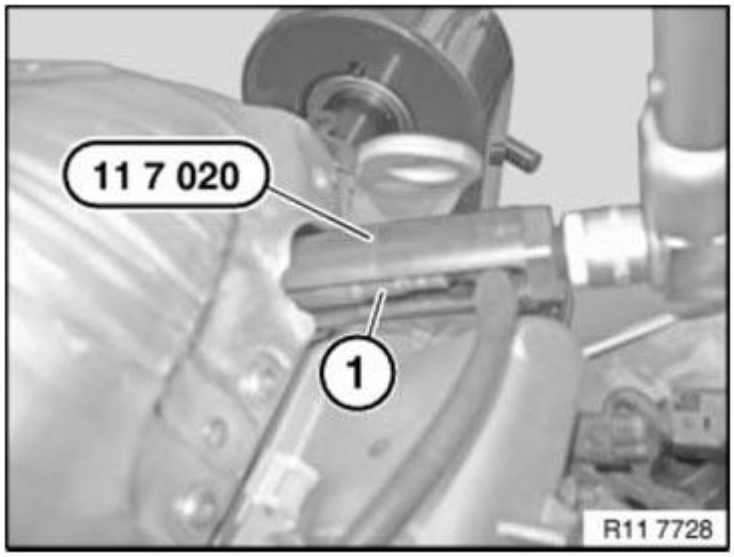


Fig. 530: Releasing Monitoring Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound

to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Fasten monitoring sensor (1) with special tool **11 7 020** .

Tightening torque **11 78 1AZ** .

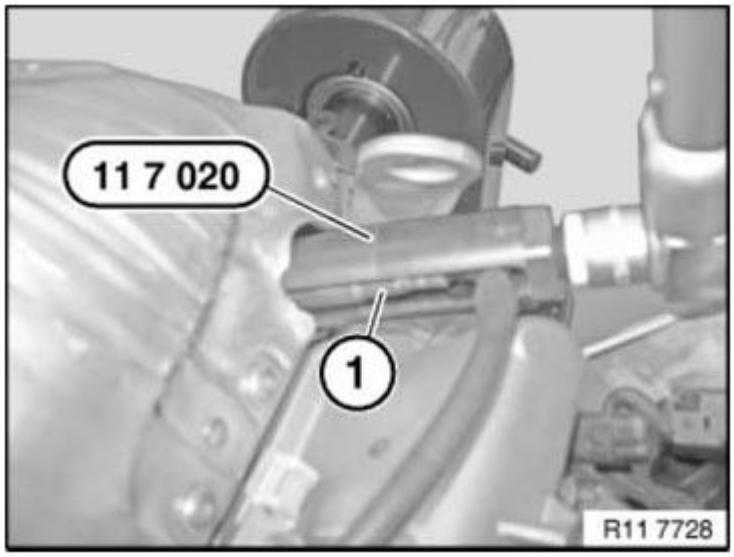


Fig. 531: Tightening Monitoring Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check function of DME control unit.

Pay attention to cable routing of monitor sensor.

1178533 REPLACING RIGHT CONTROL SENSOR (N63)

Notes

WARNING: Risk of burning!
Only perform this work after engine has cooled down.

Necessary preliminary work

- Check function of DME control unit
- Switch off ignition

- Remove **AIR FILTER HOUSING**

Unlock plug connection and detach.

Unclip control sensor cable from holder.

Release control sensor with special tool **11 7 020** .

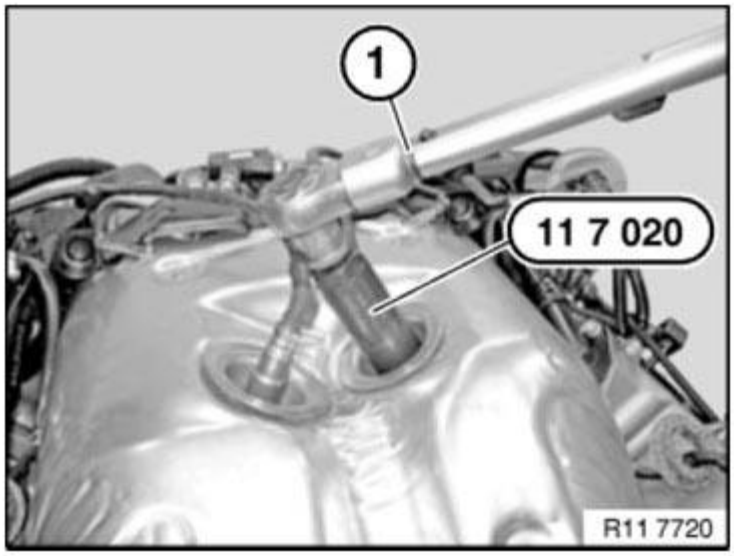


Fig. 532: Releasing Control Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Secure control sensor with special tool **11 7 020** and a torque wrench (1).

Tightening torque **11 78 1AZ** .

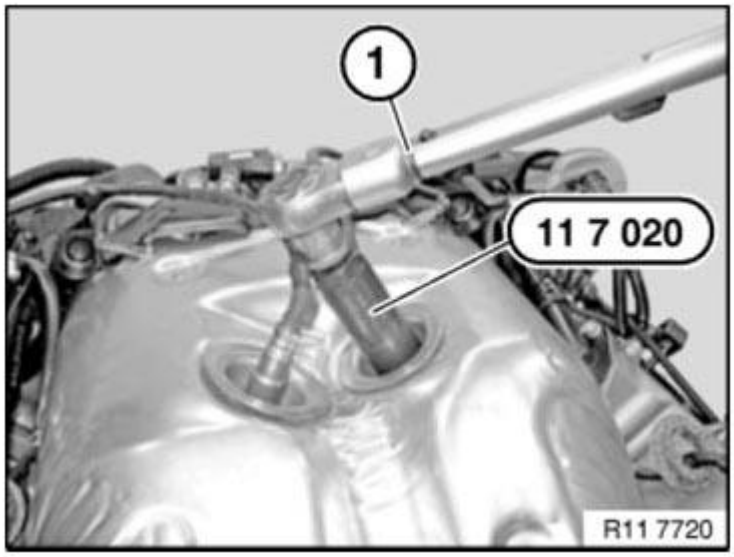


Fig. 533: Securing Control Sensor Using Special Tool 11 7 020 And Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check function of DME control unit.

Pay attention to cable routing of control sensor.

1178543 REPLACING RIGHT MONITOR SENSOR (N63)

Notes

WARNING: Risk of burning!
Only perform this work after engine has cooled down.

Necessary preliminary work

- Check function of DME control unit
- Switch off ignition
- Remove **AIR FILTER HOUSING**

Release retaining clip (1).

Remove heat shield (2) over oxygen sensor.

Detach oxygen sensor cable from retaining clips (3).

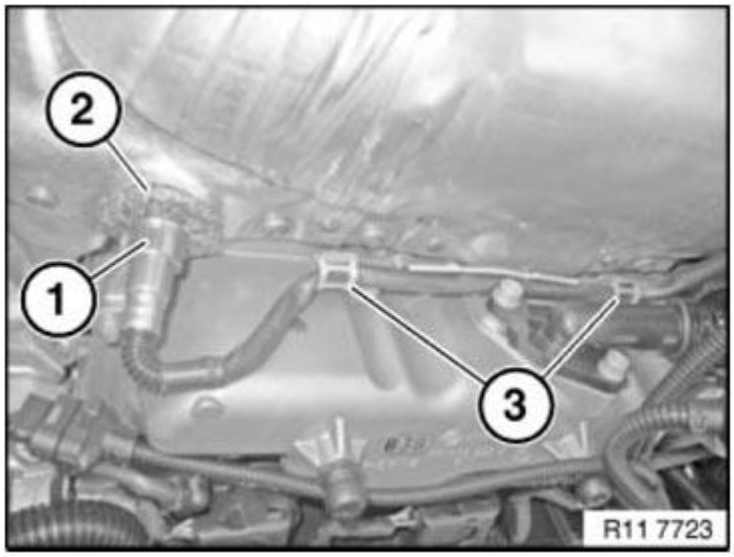


Fig. 534: Identifying Heat Shield And Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Release monitoring sensor (1) with special tool **11 7 020** .

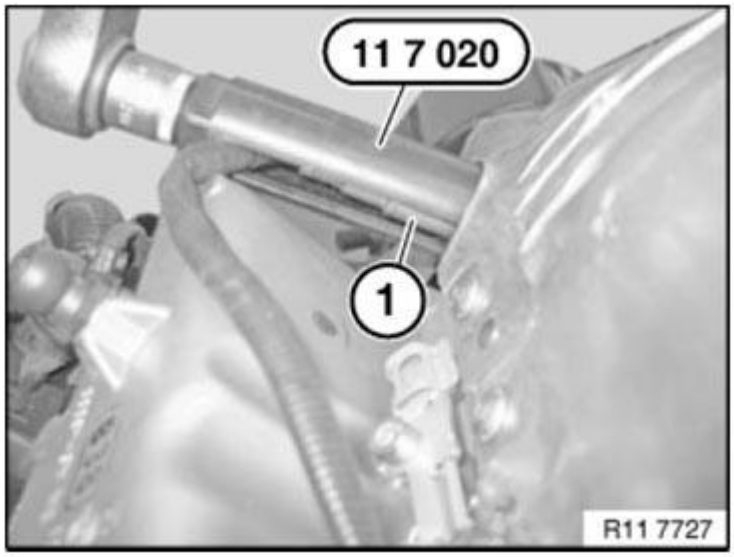


Fig. 535: Releasing Monitoring Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound

to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Fasten monitoring sensor (1) with special tool **11 7 020** .

Tightening torque **11 78 1AZ** .

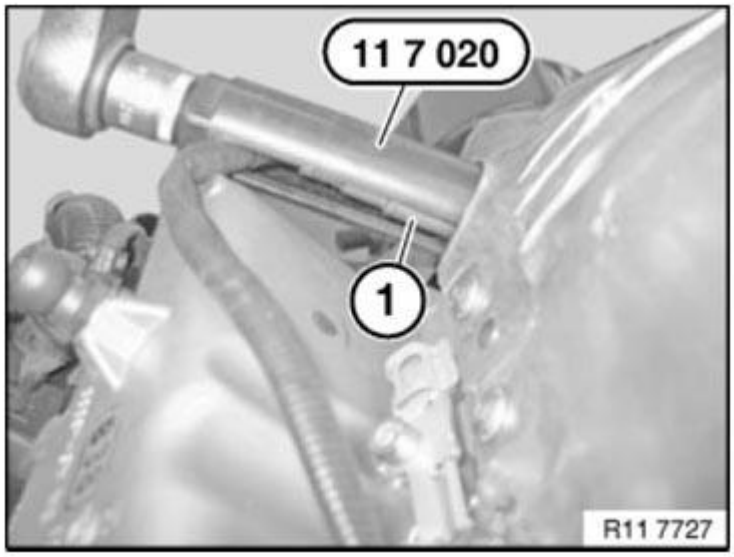


Fig. 536: Installing Monitoring Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check function of DME control unit.

Pay attention to cable routing of monitor sensor.

ENGINE

Engine and Gearbox Suspension - Repair

2211 ENGINE MOUNTING

2211011 REPLACING LEFT ENGINE MOUNT (N63)

Necessary preliminary work

- Secure engine in **INSTALLATION POSITION** .
- Remove rear **UNDERBODY PROTECTION** .
- Lower **FRONT AXLE SUPPORT** .

Release bolt (1) and remove engine mount.

IMPORTANT: Installation note:
To ensure play between engine mount and engine support arm, lower the engine completely before tightening the screw connection (engine mount/engine support arm).
Tightening torque 22 11 2AZ .

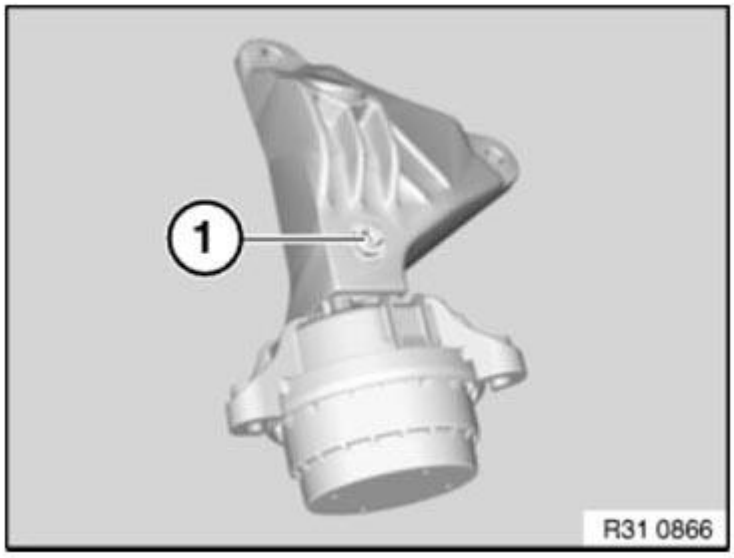


Fig. 1: Identifying Engine Mount Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Rubber part (1) of engine mount must point to center of vehicle.

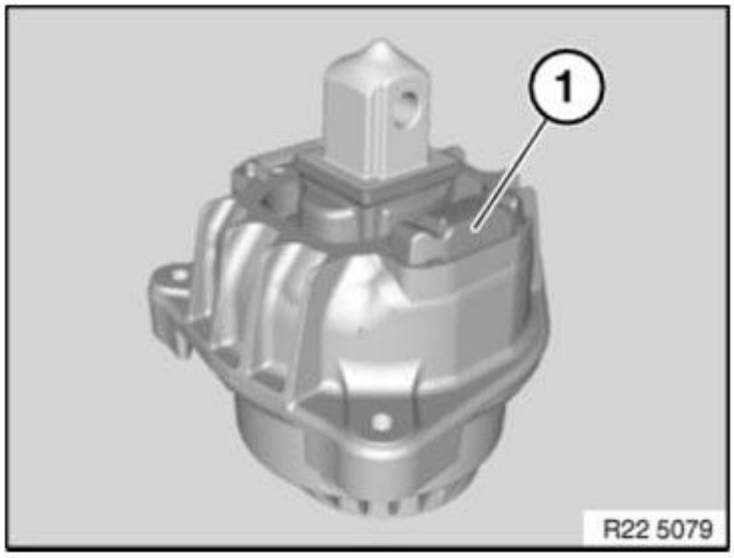


Fig. 2: Identifying Engine Mount Rubber
Courtesy of BMW OF NORTH AMERICA, INC.

2211110 REPLACING LEFT ENGINE SUPPORT ARM (N63)

Necessary preliminary work

- Secure engine in **INSTALLATION POSITION** .
- Lower **FRONT AXLE SUPPORT** (left-hand drive models only)

Release screw (1).

IMPORTANT: Installation note:
To ensure play between engine mount and engine support arm, lower the engine completely before tightening the screw connection (engine mount/engine support arm).
Tightening torque 22 11 2AZ .

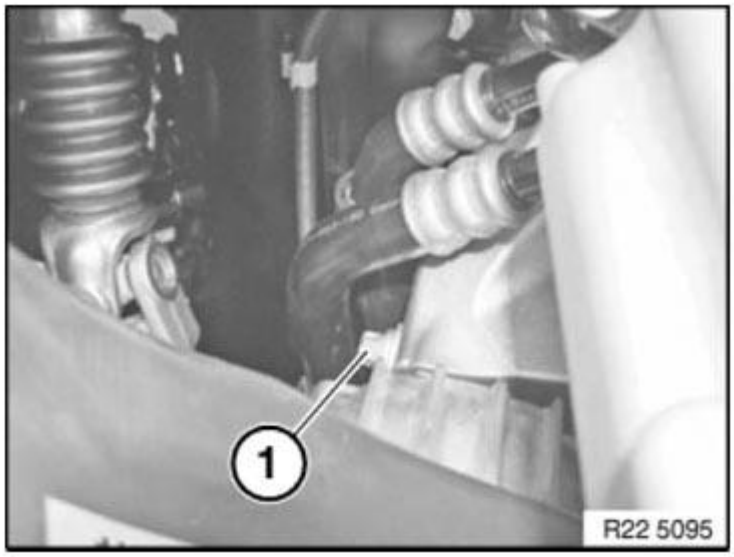


Fig. 3: Identifying Engine Mount Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove engine support arm.

Tightening torque **22 11 3AZ** .

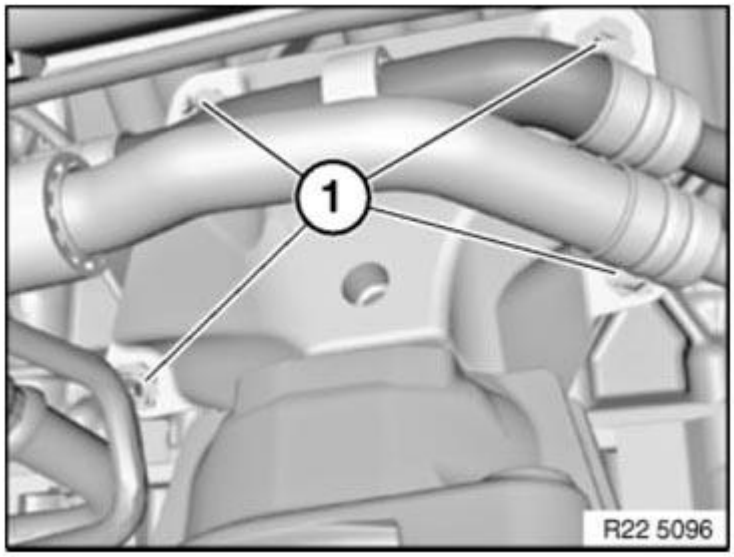


Fig. 4: Identifying Engine Support Arm Screws
Courtesy of BMW OF NORTH AMERICA, INC.

2211001 REPLACING RIGHT ENGINE MOUNT (N63)

Necessary preliminary work

- Secure engine in **INSTALLATION POSITION** .
- Remove rear **UNDERBODY PROTECTION** .
- Release **ENGINE SUPPORT ARM** (left-hand drive models only)
- Lower **FRONT AXLE SUPPORT** (right-hand drive models only)

Release bolt (1) and remove engine mount.

IMPORTANT: Installation note:
To ensure play between engine mount and engine support arm, lower the engine completely before tightening the screw connection (engine mount/engine support arm).
Tightening torque 22 11 2AZ .

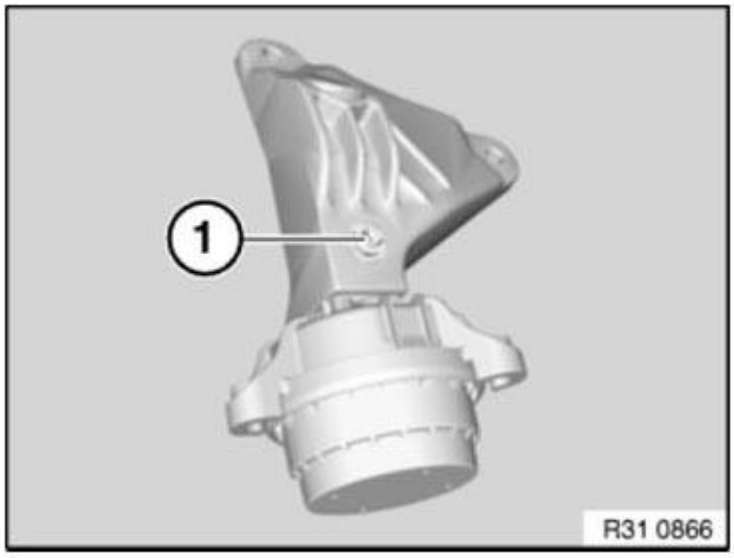


Fig. 5: Identifying Engine Mount Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Rubber part (1) of engine mount must point to center of vehicle.

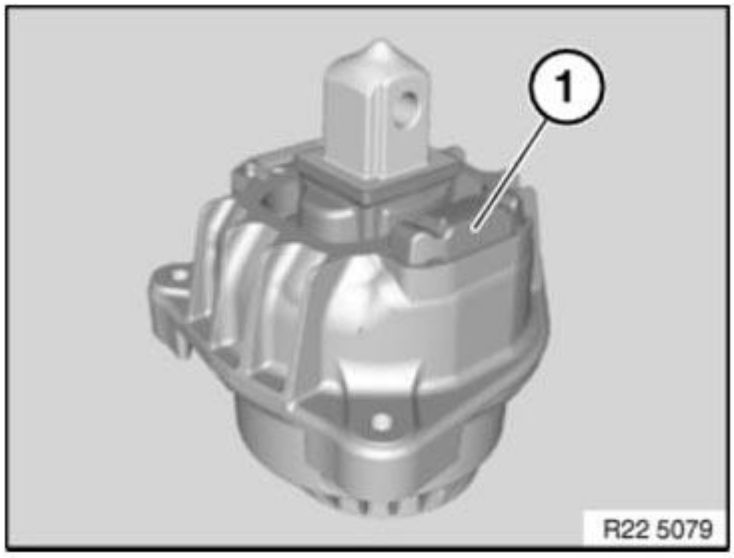


Fig. 6: Identifying Engine Mount Rubber
Courtesy of BMW OF NORTH AMERICA, INC.

2211100 REPLACING RIGHT ENGINE SUPPORT ARM (N63)

Necessary preliminary work

- Secure engine in **INSTALLATION POSITION** .
- Remove rear **UNDERBODY PROTECTION** .
- Lower **FRONT AXLE SUPPORT** (right-hand drive models only)

Release screw (1).

IMPORTANT: Installation note:
To ensure play between engine mount and engine support arm, lower the engine completely before tightening the screw connection (engine mount/engine support arm).
Tightening torque 22 11 2AZ .

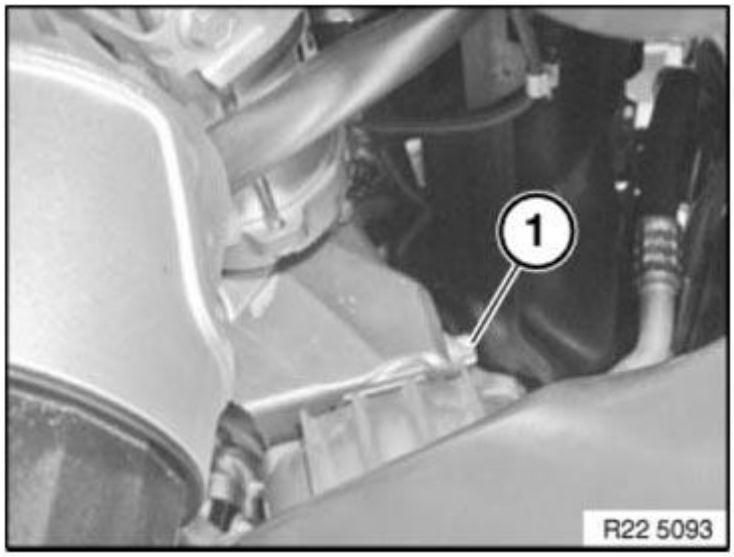


Fig. 7: Identifying Engine Mount Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove engine support arm.

Tightening torque 22 11 3AZ.

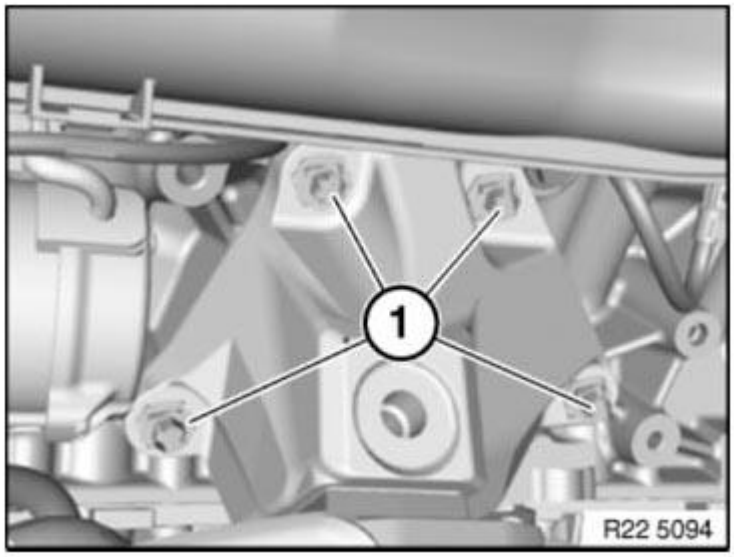


Fig. 8: Identifying Engine Support Arm Screws
Courtesy of BMW OF NORTH AMERICA, INC.

2231 TRANSMISSION SUSPENSION, MANUAL TRANSMISSION

2232050 REPLACING CROSS-MEMBER FOR TRANSMISSION MOUNTING (N63)

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION** .
- Support transmission with lifter.

Release screws (1) and (2).

Remove transmission cross member.

Tightening torque **22 32 3/4AZ** .

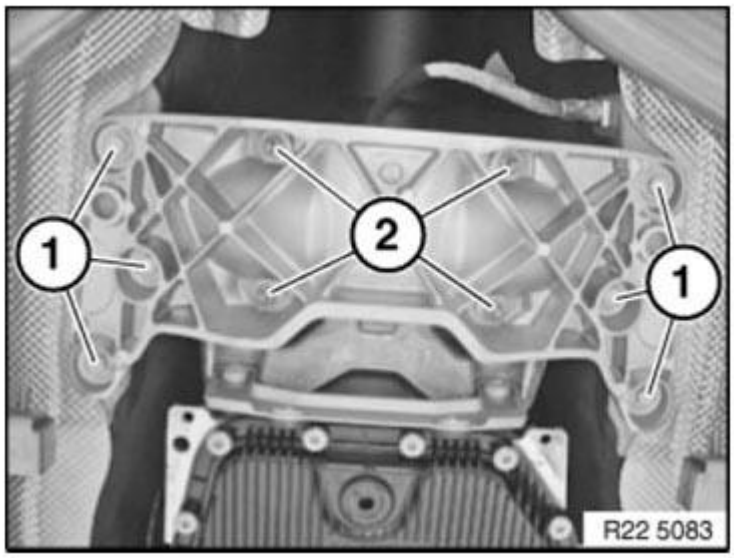


Fig. 9: Identifying Transmission Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

2232001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (N63)

Necessary preliminary tasks

- Remove **GEARBOX CROSS MEMBER** .

Release screws (1).

Remove rubber mount.

Tightening torque **22 32 2AZ** .

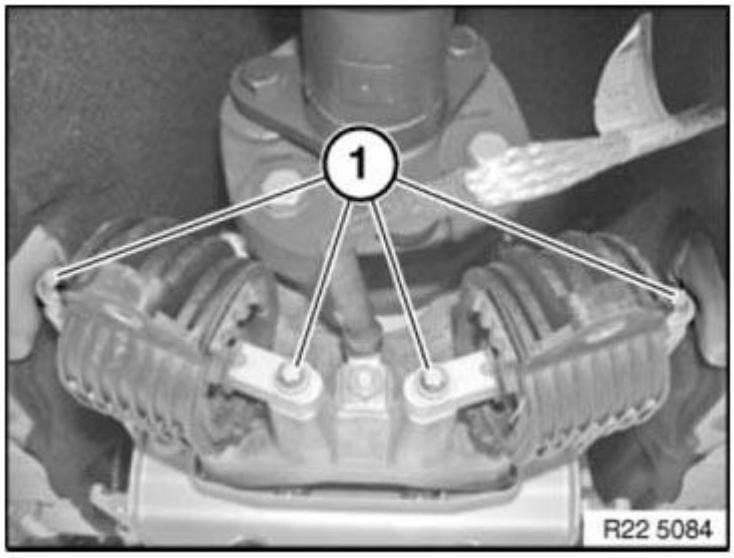


Fig. 10: Identifying Rubber Mount Screws
Courtesy of BMW OF NORTH AMERICA, INC.

2232 TRANSMISSION SUSPENSION, AUTOM. TRANSMISSION

2232050 REPLACING CROSS-MEMBER FOR TRANSMISSION MOUNTING (N63)

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION** .
- Support transmission with lifter.

Release screws (1) and (2).

Remove transmission cross member.

Tightening torque **22 32 3/4AZ** .

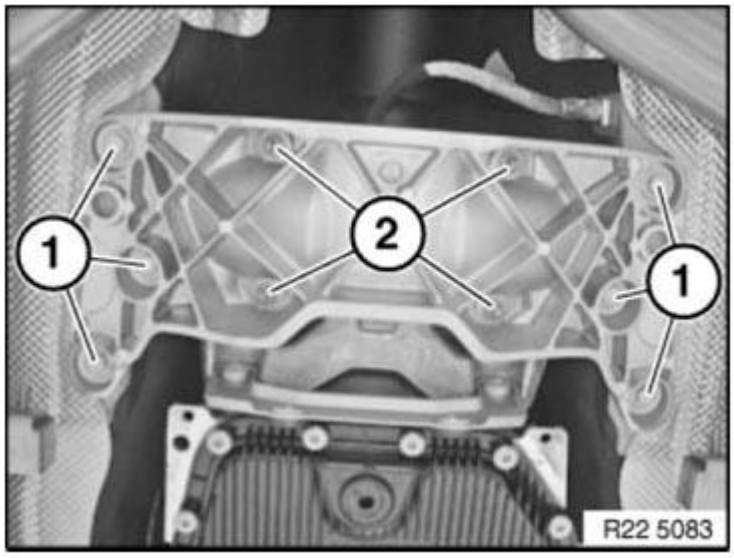


Fig. 11: Identifying Transmission Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

2232001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (N63)

Necessary preliminary tasks

- Remove **GEARBOX CROSS MEMBER** .

Release screws (1).

Remove rubber mount.

Tightening torque **22 32 2AZ** .

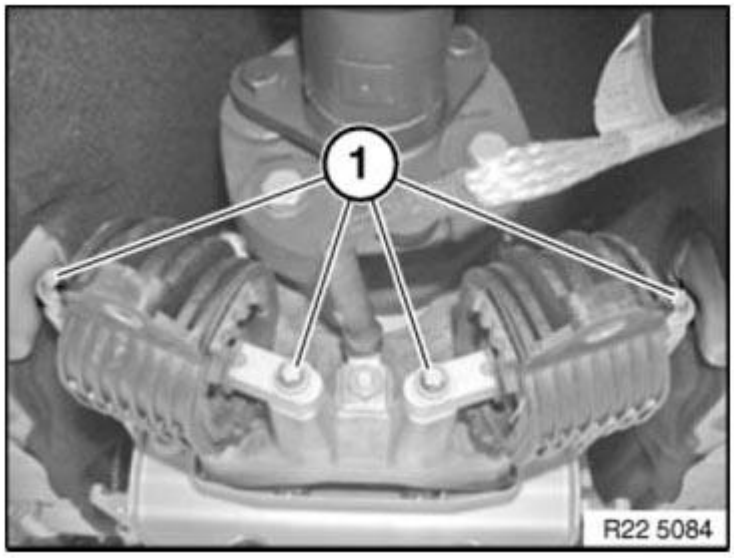


Fig. 12: Identifying Rubber Mount Screws
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE

Engine Electrical System - Repair

1200 TROUBLESHOOTING

61 20... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular engine types and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents a possible short circuit.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery replacement

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, there will always be only one work scope provided that is permitted by the current status of information.

If the performance readiness drops below a defined minimum, a Check Control message will be generated to advise the driver that the battery must be replaced.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

NOTE: Only this registration/logon will ensure that the corresponding Check Control message will go out again.

system:

Register battery replacement

- Service functions
- Body

- Voltage supply
- Register battery replacement
- Test plan

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting

61 13... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

Notes

IMPORTANT:

1. **Identify cause of damage (e.g. sharp-edged body parts, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).**
2. **Read out fault memory**
3. **Eliminate cause of damage.**
4. **Disconnect battery negative terminal**
5. **Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Service)**
6. **Carry out function test and read out fault memories again**
7. **Eliminate new faults if applicable and clear fault memories**

NOTE: **The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.**

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Service.

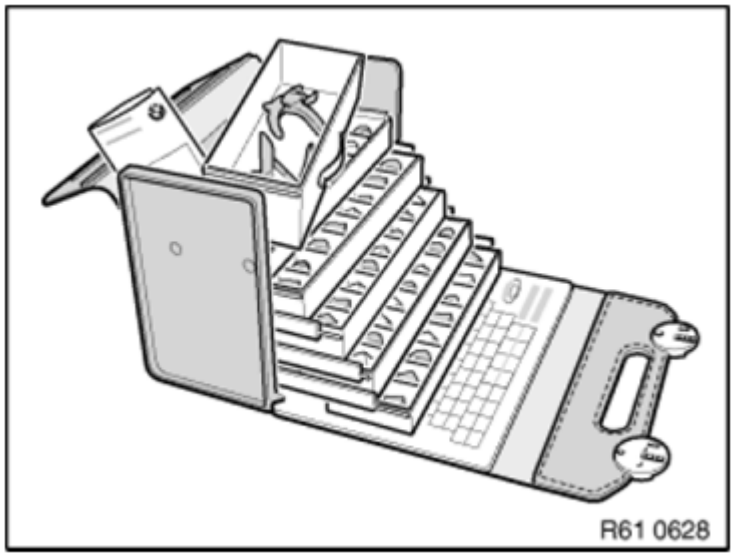


Fig. 1: Identifying Wiring Harness Repair Kit
Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular plug system D 2.5.

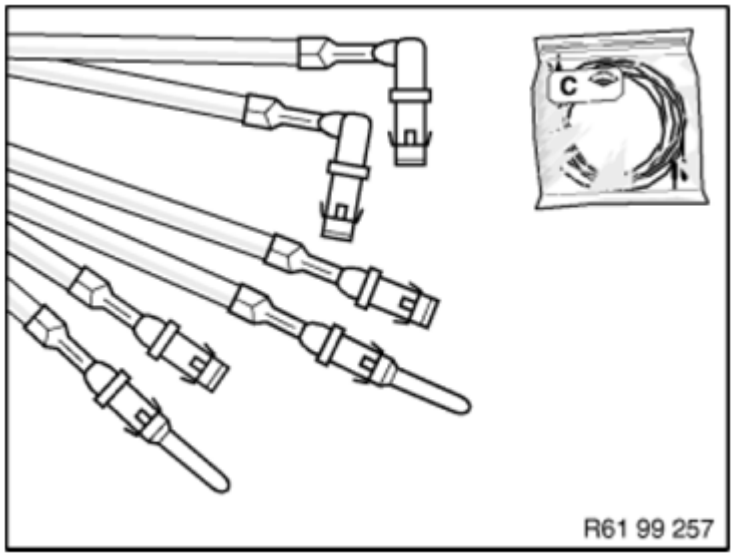


Fig. 2: Identifying Repair Kit, Circular Plug System D 2.5
Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts:

1. Pre-packaged end of cable with requisite wire cross-section
2. Crimp connector for selected wire cross-section

3. Shrink-fit hose

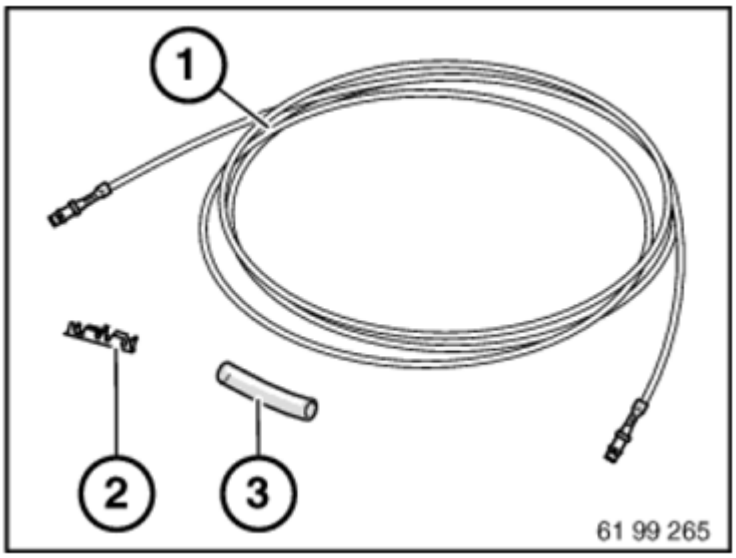


Fig. 3: Identifying Cable With Requisite Wire Cross-Section, Crimp Connector And Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool kit **61 0 300**).

See repair instructions

INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS of different plug contact systems.

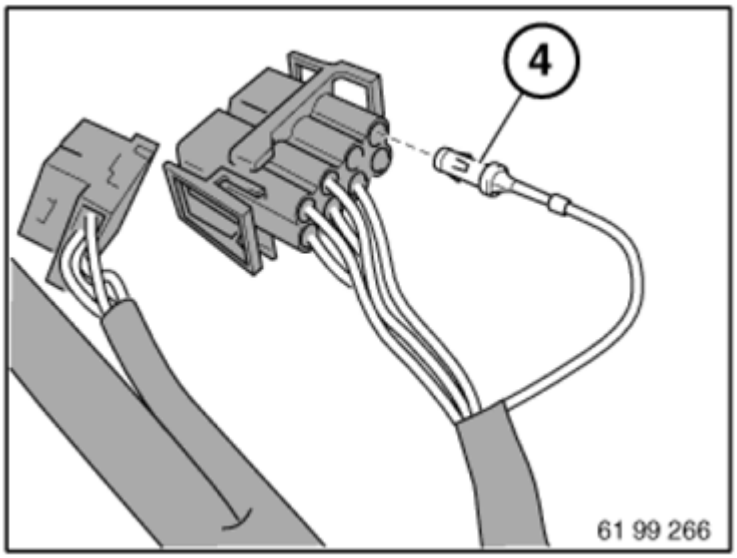


Fig. 4: Identifying Damaged Contact Of Housing
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Check maximum length of repair cable**
- **If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.**

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end

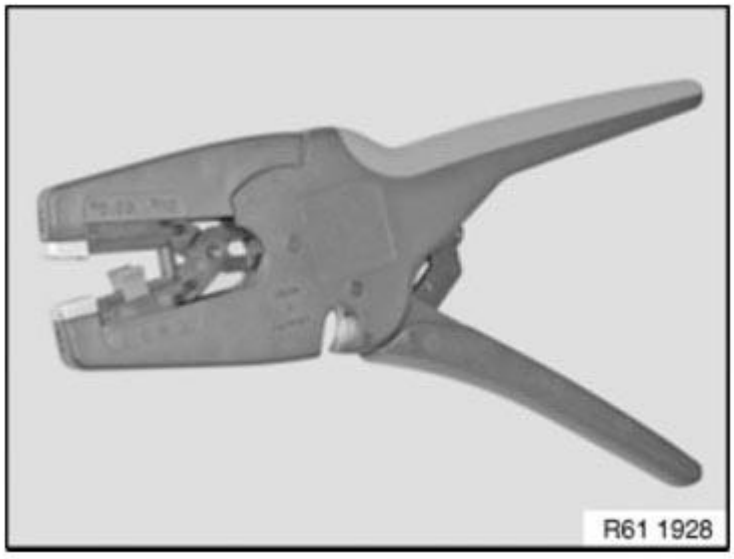


Fig. 5: Identifying Crimp Tool

Courtesy of BMW OF NORTH AMERICA, INC.

- Cut pre-assembled wire end to length and strip insulation

Refer also to repair instruction:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

Crimp butt connector on pre-assembled wire end.

Special tools:

- 61 4 328 (0.35 - 2.5 mm^2
- **61 0 240** (4.0 - 6.0 mm^2

See repair instructions

CRIMPING ON STOP PARTS

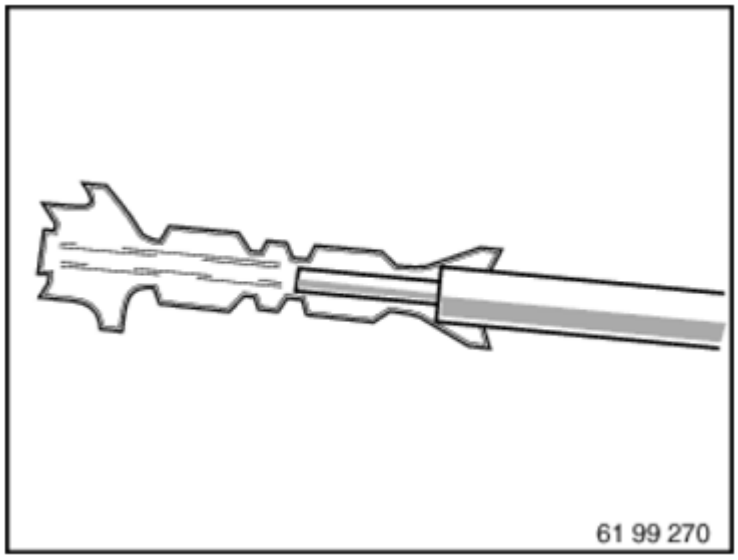


Fig. 6: Identifying Crimp Butt Connector On Pre-assembled Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (8) onto free wire end.

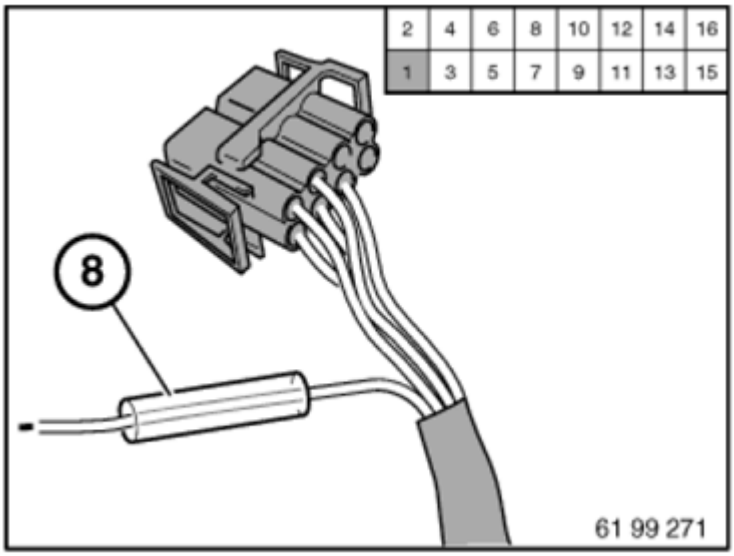


Fig. 7: Identifying Shrink-Fit Hose On Free Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.

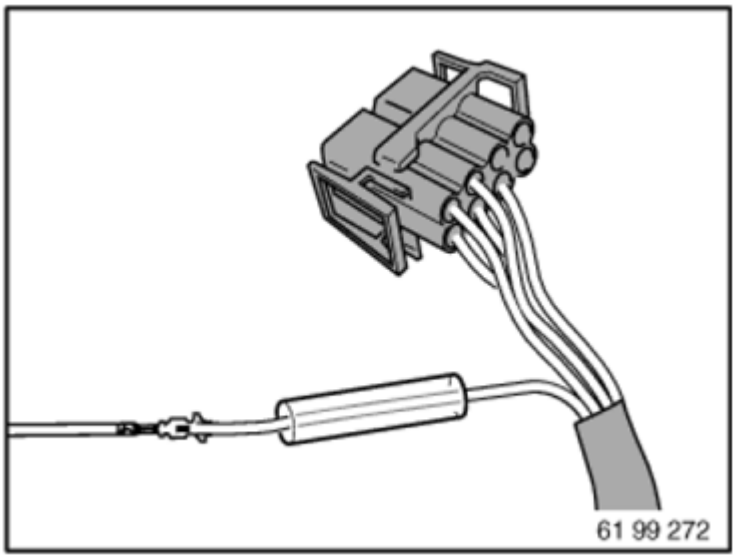


Fig. 8: Crimping Unused Wire End To Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

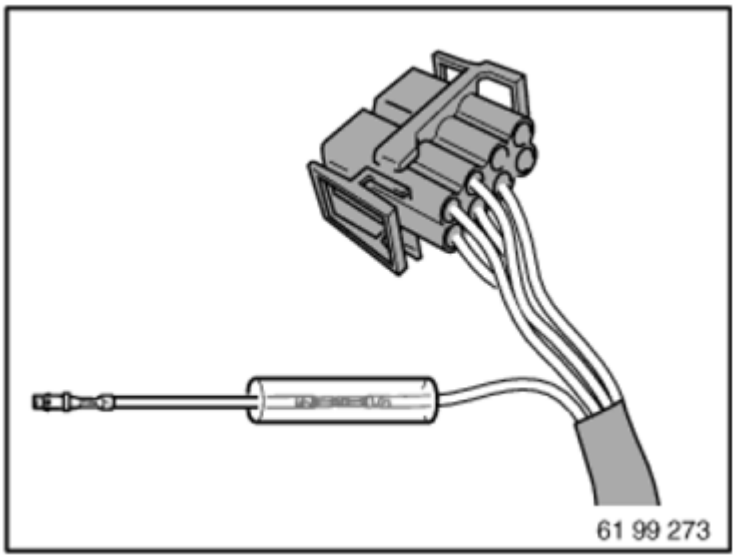


Fig. 9: Pulling Shrink-On Sleeve Over Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

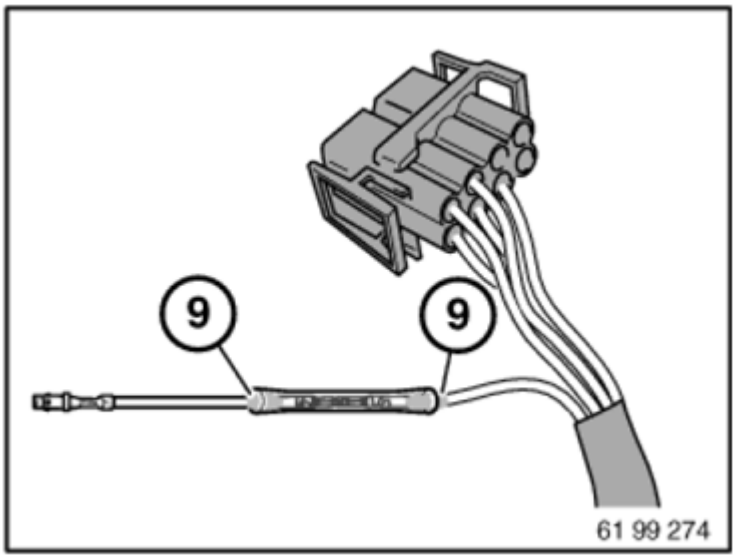


Fig. 10: Shrinking Shrink-On Sleeve On Both Sides Of Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

61 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe **SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY** .

Before disconnecting battery

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

IMPORTANT:

- **There is a danger of mixing up battery leads: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.**
- **The on-board computer and clock may lose your data.**

General notes on disconnecting battery

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

  Do not under any circumstances pull/lever off pole shoes by force.

  Do not under any circumstances release socket-head cap screw of IBS.

- Disconnect terminal of **BATTERY NEGATIVE LEAD** from vehicle battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque **61 21 1AZ** .

After connecting battery

IMPORTANT: The scope of application of some systems may be restricted after a power supply interruption.
Likewise, individual settings may be lost.
Settings or activations must be carried out, depending on the equipment specification.

For example:

- If necessary, carry out **ADJUSTMENT OF ACTIVE STEERING**
- If necessary, activate **SLIDE/TILT SUNROOF**
- If necessary, activate power windows. See **NOTES ON INITIALIZING POWER WINDOW**

REGULATOR .

Refer to the diagnosis system for further vehicle-specific information.

61 13... INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

Notes

ABBREVIATIONS REFERENCE CHART

Abbreviations of contacts and what they mean:	
ELA	**Strand seal**
D 1.5/2.5/3.5	**Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter**
MDK	**Miniature double flat spring contact**
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo	Power Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact

IMPORTANT: The contacts can be changed on ultrasonically welded plugs (1). Ultrasonically welded plugs (1) must be replaced completely. Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

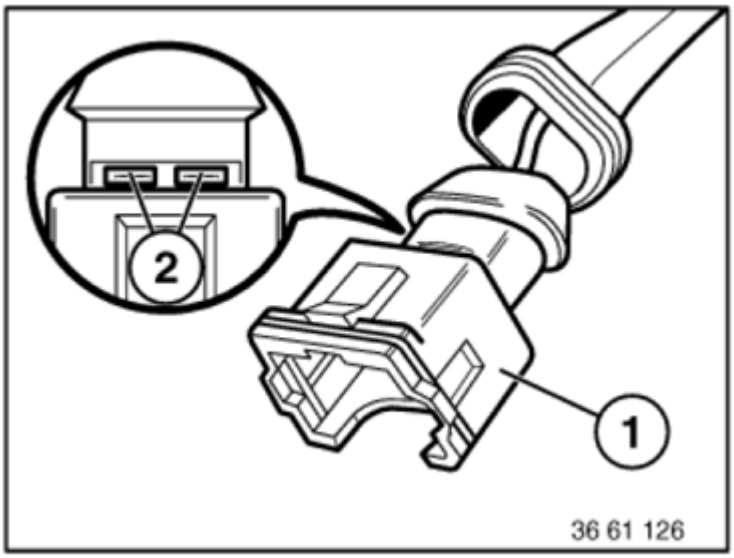


Fig. 11: Identifying Ultrasonic-Welded Connectors And Welds
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Special tools referred to in the repair instructions below are contained in the following special tool kits:**

- **Release and pressing-off tool61 1 150**
- **will be replaced on 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)**
- **Release and pressing-off tool 61 1 100 (engine)**

Repair instructions for opening plug housings and removing contacts of different plug systems

Plug system D 1.5/D 2.5

- **CIRCULAR PLUGS, 7-, 8-PIN, SYSTEM D 2.5**
- **CIRCULAR CONNECTOR, 13-PIN, SYSTEM D2.5**
- **CIRCULAR CONNECTOR, 20-PIN, SYSTEM D2.5**
- **CIRCULAR CONNECTORS, 4-, 7-, 10- 12-, 25-PIN, SYSTEM D1.5/D2.5**
- **INLINE CONNECTORS, 15-PIN, SYSTEM D2.5**
- **INLINE PLUGS, 8-, 12-PIN, SYSTEM D2.5**
- **IN-LINE CONNECTORS, 30-PIN, SYSTEM D2.5**
- **IN-LINE PLUGS, 20-PIN, SYSTEM D2.5**

Plug system JPT/MDK/DFK

- **IN-LINE PLUGS, 2-PIN, SYSTEM JPT ELA**
- **IN-LINE CONNECTORS, 2-PIN, SYSTEM MDK 3PLUS 2.8**
- **IN-LINE PLUGS, 4-PIN, SYSTEM DFK ELA**

Plug system Elo/Elo Power

- **INLINE PLUGS, 4-, 10-PIN, SYSTEM ELO**
- **IN-LINE PLUGS, 6- TO 50-PIN, SYSTEM ELO**
- **IN-LINE CONNECTORS, 3-, 6-PIN, SYSTEM ELO-POWER 2.8**

Plug system LSK

- **CONNECTOR HOUSING, LCC CONTACT (LOAD CURRENT CONTACT)**

Plug system MQS/MPQ

- **INLINE CONNECTORS, 6-, 8-PIN, SYSTEM MQS**
- **INLINE PLUGS, 2-PIN, SYSTEM MPQ 2.8**
- **CONTROL UNIT CONNECTORS, 25-, 35-, 55-, 83-, 88-PIN**
- **SOCKET HOUSING (RADIO CONNECTOR), HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSING 42-, 43-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSINGS, 2X21-, 2X27-PIN, HYBRID SYSTEMS MQS/MPQ, ELO/ELO POWER**
- **IN-LINE CONNECTORS, 30-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSINGS, 5-PIN, 8-PIN, SYSTEM MQS/MPQ**

12 00... INSTRUCTIONS FOR WORKING ON THE IGNITION SYSTEM

CAUTION: Always switch off ignition before working on ignition system.
Use only test leads which have been approved and belong to these testing instruments (e.g. DIS Tester).
Comply with operating instructions of the respective testing instrument used.
Comply with the country-specific safety regulations.
Never touch components under current with engine running!
Comply with instructions of DIS tester.
Do not connect any suppression capacitors or inspection lamps to terminal 1 on the ignition coil.
Terminal 1 of ignition coil must not be connected to ground or battery positive lead.
If an alarm system is subsequently installed, lead of terminal 1 must not be used for start prevention.
When working on ignition system, always disconnect supply leads to ignition coils.

High tension! - High tension!

IMPORTANT: Hazardous voltages occur at:

- Ignition lead
- spark-plug connectors
- spark plugs
- Ignition coil (high voltage at terminal 4 is approx. 40 kV)
- Lead of terminal 1 from ignition coil to DME control unit (high voltage approx. 350 V)

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting

- Fault in fuel injection system
- Spark plug faults
- Ignition coil faults
- Further fault patterns with evaluation
- Additional fault notes for troubleshooting

Oscillograms

- Normal oscillogram
- Oscillograms of ignition coils from different manufacturers

Check

- Secondary signal for stationary ignition distribution

61 00... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body components; use edge protection if necessary
- Secure additionally laid cables/lines with cable straps

The following additionally applies

Shielded lines

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

- Shielded RTK031 coaxial lines may only be repaired with special crimping tool for repairing the coaxial line RTK031.

CVBS lines

- CVBS lines may not be repaired.
- CVBS lines must be replaced in their entirety.

HSD lines

- HSD lines may not be repaired.
- HSD lines must be replaced in their entirety.

Optical fibre cable :

NOTE: **Optical fibre cables are colored differently as follows:**

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange = repair optical fibre cables**

IMPORTANT:

- **Optical fibre cables are permitted to show only one separation point (bridge), replace optical fibre cables if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid influence of heat = 85°**

Treating cables and optical fibre cables

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

NOTE:

- **The line is a twisted cable. If possible, maintain twist in line after repair.**

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables Z

61 00... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- This may lead to indifferences in noise radiation and interference immunity at contact points in the shield
- To satisfy the requirements of the type approval, it is essential to replace shielded cables completely

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange=repair fibre-optic cables**

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat = 85°**

Treating cables and fibre-optic cables: See **TREATING CABLES AND FIBRE-OPTIC CABLES** .

FlexRay

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew**

complete line if necessary

- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

12 00... NOTES/INFORMATION ON REMOVING AND INSTALLING CONTROL UNITS

IMPORTANT:

- **Disconnecting the vehicle battery will cancel the fault memories of control units. Consequently, before disconnecting the car's battery, always interrogate the fault memories. Investigate stored faults and, once any faults have been remedied, cancel the fault memory.**
- **Control unit plugs should only ever be connected and disconnected while the ignition is turned off.**
- **The removal and installation of components, relays, fuses etc. can cause faults to be stored in fault memories capable of self diagnosis. Always interrogate the fault memories after completing work on the electrical system.**
- **Investigate stored faults and, once any faults have been remedied, cancel the fault memory.**
- **If necessary, initialize power window units**

When replacing the DME/DDE control unit, observe the following:

- **In each case read out the hardware/software status of the relevant control unit using the BMW diagnosis system.**

Comply with the instructions of the DIS diagnosis system on the steps pertaining to coding and programming.

On vehicles with electronic vehicle immobilization, comply with the instructions of the BMW diagnosis system.

- **Each control unit is programmed with certain basic values, which serve as mean values. The control unit receives different input values, depending on engine condition, which are compared with the stored values. The adaptive system compares the input values with the stored map values. The control commands are routed to the relevant actuators.**
- **If the DME control unit is without current for a long time (more than one hour), its adaptive system loses the stored values. When a cleared control unit is restarted or a new control unit is installed, the adaptive system must read in and store the input values of the associated engine as new basic values itself.**

- **This procedure could lead to erratic idling and disturbed overrunning of the engine after starting. Depending on the engine it could require some time before all values are adapted to the engine condition.**
- **Therefore observe the following procedure before replacing or reinstalling a DME/DDE control unit:**

1. If possible before exchanging control unit, run engine up to operating temperature.
2. Exchange control units and run the vehicle at alternating engine speeds.

12 00... NOTES/INFORMATION ON START ASSISTANCE (JUMP STARTING)

Do not start the engine with help of starting sprays.

Preparation

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.
- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

IMPORTANT: Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

IMPORTANT: Do not connect the second jump starting cable (black) with the negative

pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

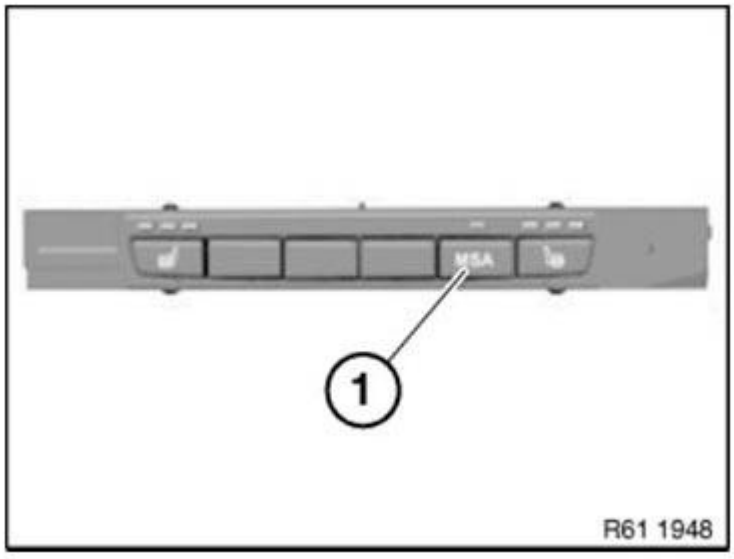


Fig. 12: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode

- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

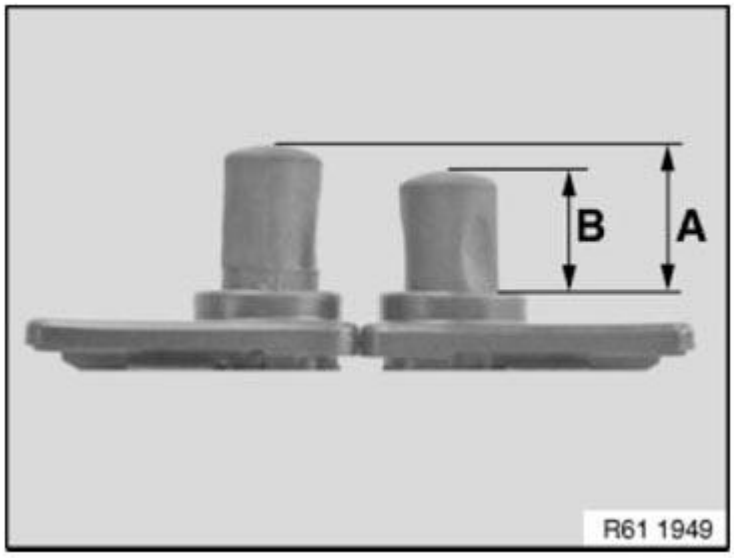


Fig. 13: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

1212 IGNITION WIRES, SPARK PLUGS

12 12 011 REPLACING ALL SPARK PLUGS (N54, N63, N74)

Necessary preliminary tasks

- Switch off ignition.
- Remove **IGNITION COILS** .

IMPORTANT: Wear safety goggles.
Oil and dirt particles may get into your eyes!

Clean spark plug slot with compressed air.

Unscrew spark plugs with special tool **12 1 220** and extension with min. 8° bend.

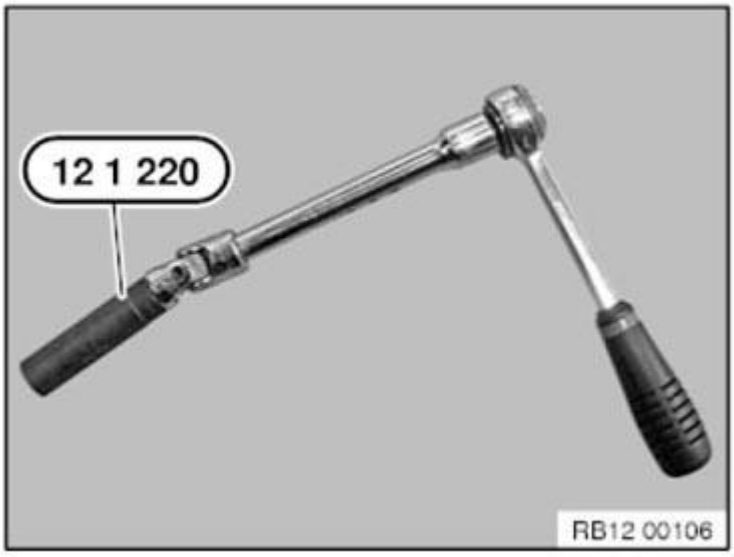


Fig. 14: Unscrewing Spark Plugs With Special Tool (12 1 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach new spark plug (1) to special tool **12 1 230** .

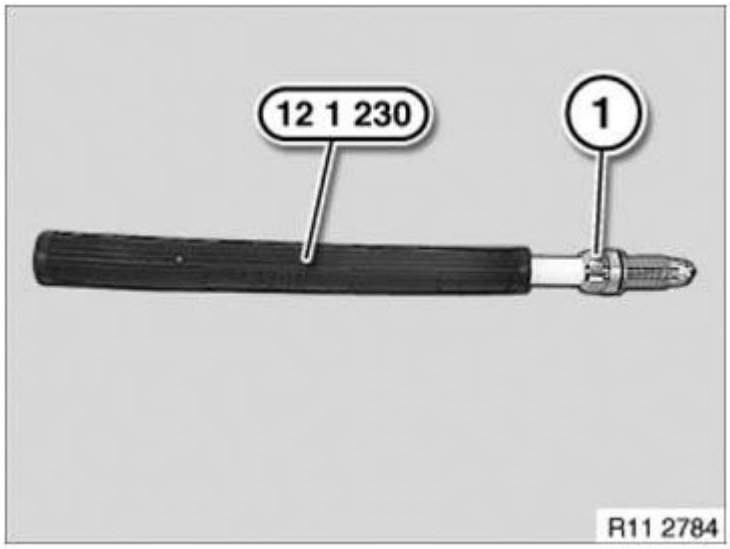


Fig. 15: Attaching Spark Plug To Special Tool (12 1 230)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw spark plug with special tool **12 1 230** hand-tight into cylinder head plug thread as far as it will go.

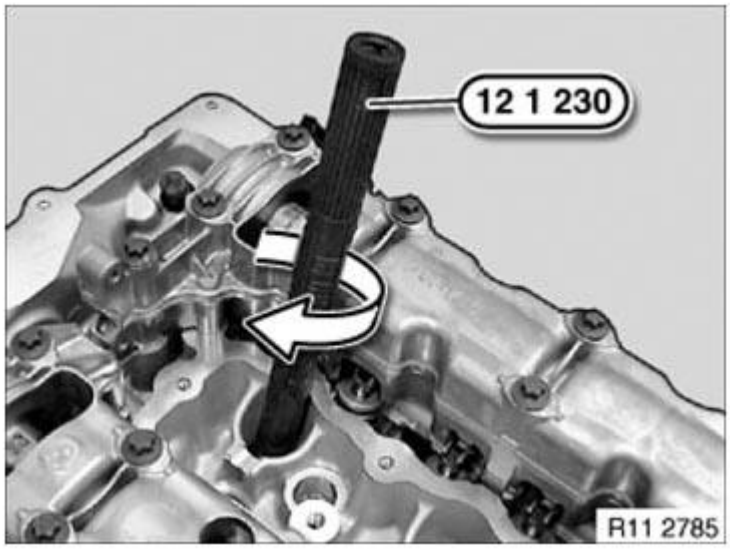


Fig. 16: Screwing Spark Plug With Special Tool (12 1 230)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten spark plugs with torque wrench, special tool **12 1 220** and extension with min. 8° bend.

Observe tightening torque.

Tightening torque **12 12 2AZ** .

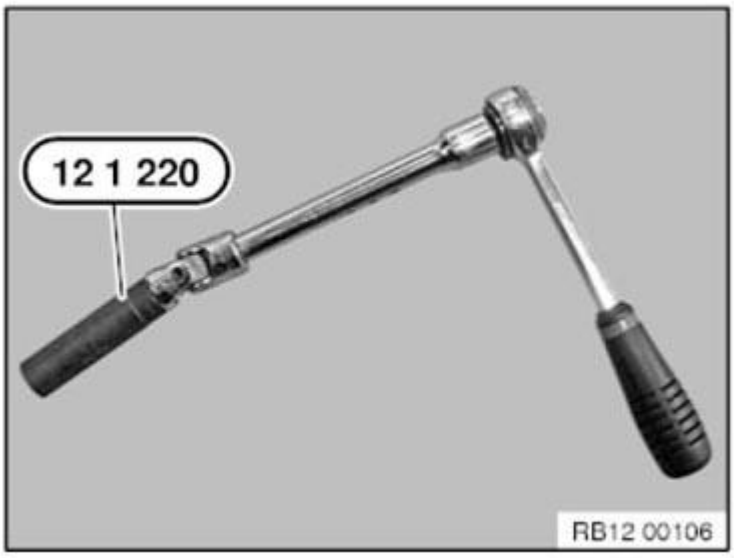


Fig. 17: Tightening Spark Plugs With Torque Wrench, Special Tool (12 1 220)
Courtesy of BMW OF NORTH AMERICA, INC.

1213 IGNITION COIL

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting

- Fault in fuel injection system
- Spark plug faults
- Ignition coil faults
- Further fault patterns with evaluation
- Additional fault notes for troubleshooting

Oscillograms

- Normal oscillogram
- Oscillograms of ignition coils from different manufacturers

Check

- Secondary signal for stationary ignition distribution

12 13 511 REPLACING IGNITION COILS (N63)

Necessary preliminary tasks

- Read out fault memory of DME control unit.
- Check stored error/fault messages.
- Switch off ignition.
- Remove left and right **INTAKE FILTER HOUSINGS** .

IMPORTANT: Ignition coils must not be fouled by fuel.
The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Unlock plug catch (1) on ignition coil (2) and disconnect plug.

Pull ignition coil (2) up and out.

This procedure is applicable to all ignition coils.

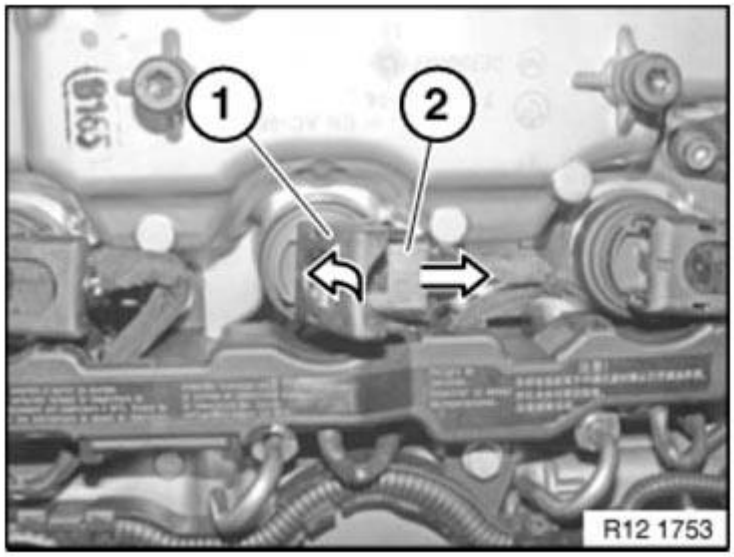


Fig. 18: Pulling Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check that rubber seal of ignition coil (1) is correctly seated.

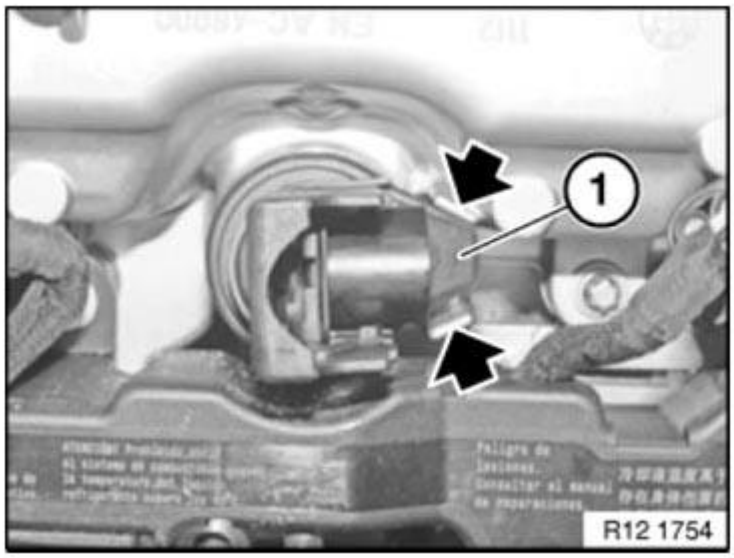


Fig. 19: Installing Rubber Seal Of Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Push plug (1) with plug catch (2) open onto ignition coil.

Carefully close plug catch (2) in direction of arrow.

The plug catch must snap into place without great effort.

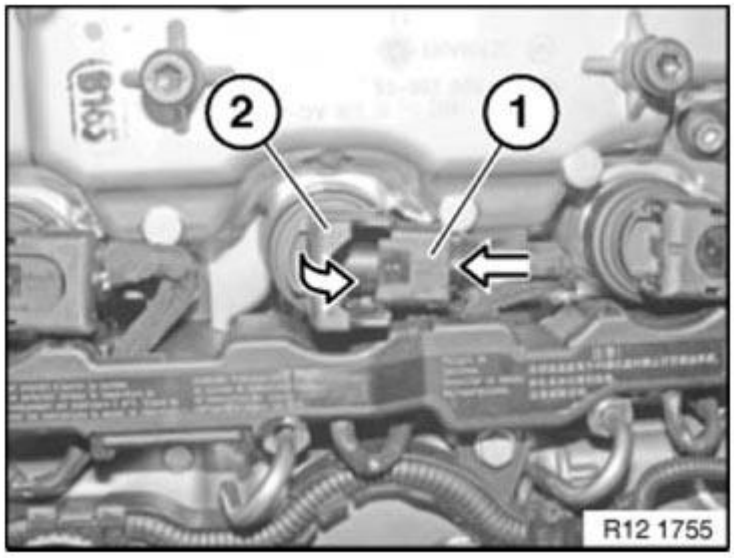


Fig. 20: Pushing Plug With Plug Catch Onto Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

1214 ELECTRONIC SWITCHING OR CONTROL UNITS

12 14 700 CODING CONTROL MODULE (DME/DDE)

Switch off ignition.

Connect MoDiC or DIS/GT1 Tester.

Switch on ignition.

Select "Coding" program.

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

Refer to "Diagnosis and Coding" service information bulletins on subject of coding.

12 14 705 PROGRAMMING CONTROL UNIT (DME/DDE)

Switch off ignition.

Connect MoDiC or DIS/GT1 Tester.

Switch on ignition.

Select "Programming".

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

Refer to "Diagnosis and Coding" service information bulletins on subject of programming.

12 90... REMOVING AND INSTALLING/REPLACING ELECTRONICS BOX

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

NOTE: Follow instructions for removing and installing CONTROL UNITS !

Necessary preliminary work

- Read fault memory.
- Disconnect **BATTERY EARTH LEAD** .
- Remove **DME CONTROL UNIT** .

Release screws (1).

Tightening torque **12 90 1AZ** .

Unclip coolant lines at clamp (2) from electronics box.

Feed electronics box (3) out upward and remove.

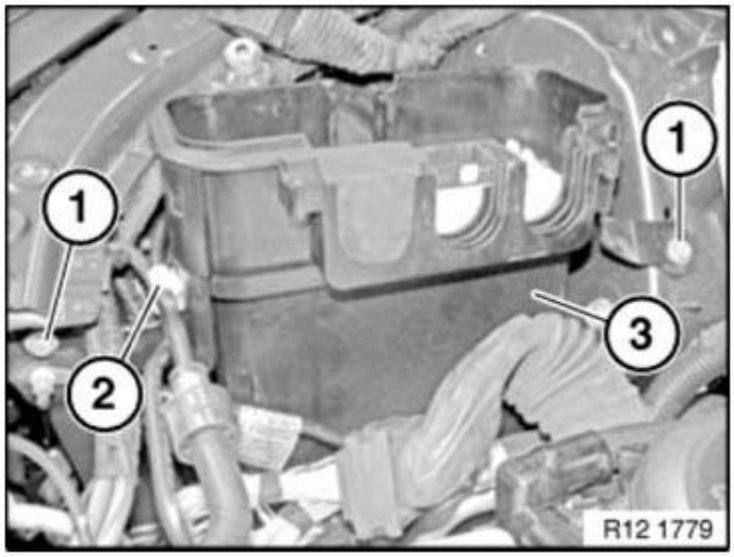


Fig. 21: Identifying Electronics Box, Clamp And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

When installing the electronics box, insert guide (1) on engine support.

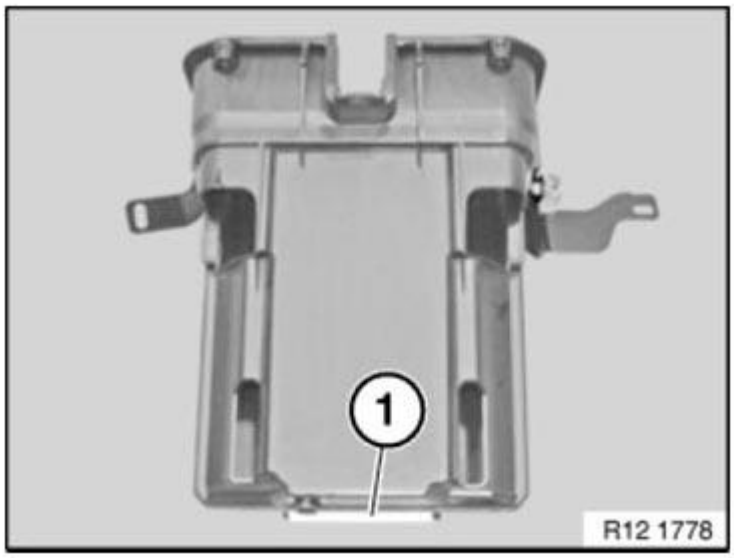


Fig. 22: Identifying Engine Support Guide
Courtesy of BMW OF NORTH AMERICA, INC.

12 90... REMOVING AND INSTALLING/REPLACING ELECTRONICS BOX ADD-ON

IMPORTANT: Comply with NOTES ON PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection)!

NOTE: Follow instructions for removing and installing control units.

Necessary preliminary work

- Read fault memory.
- Disconnect **BATTERY EARTH LEAD** .

Remove right cowl panel cover.

Picture shows the left side, the procedure for the right side is identical.

Lever expander rivets (1) out of cover (2).

Installation note:

If necessary, replace damaged expanding rivets.

Make sure holders (3) are correctly seated.

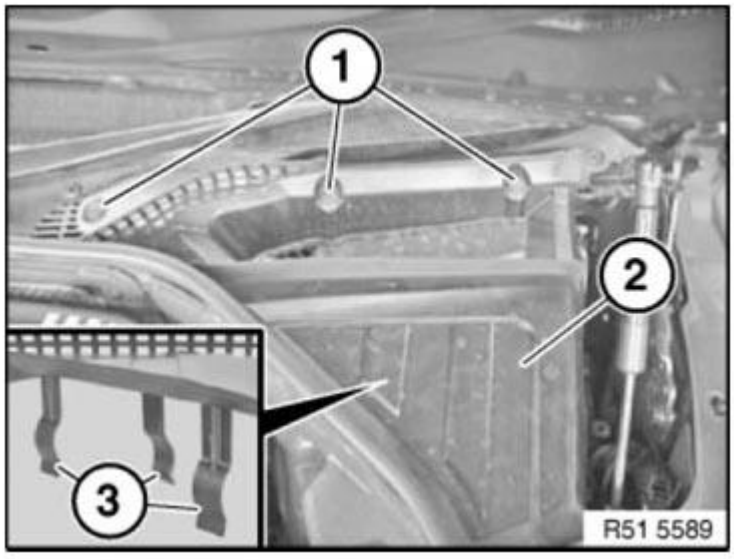


Fig. 23: Identifying Rivets, Cover And Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 90 4AZ** .

Release retainer (2).

Remove cover (3) from supplementary electronics box.

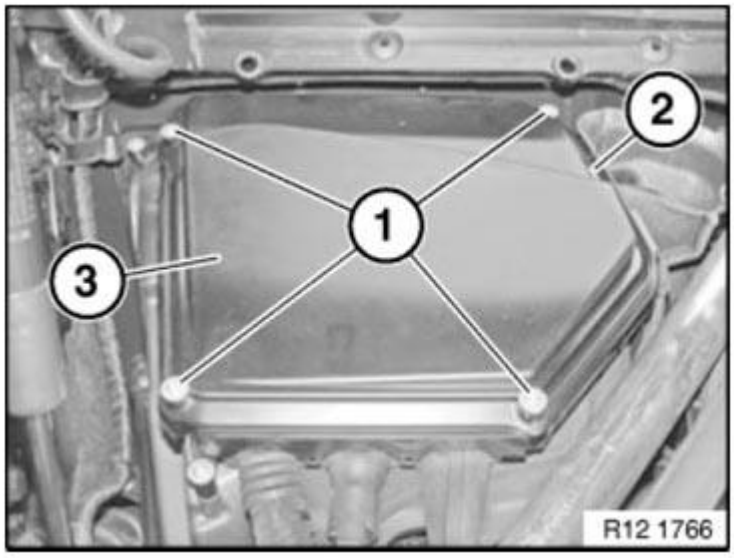


Fig. 24: Identifying Supplementary Electronics Box Cover, Retainer And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip grommet hold-down device (1).

Detach rubber grommets (2) from electronics box add-on.

Installation note:

Make sure grommets are correctly seated (watertightness).

Release carrier plate (3) from lower section of supplementary electronics box (5) and set aside.

Release screw (4).

Tightening torque **12 90 2AZ** .

Remove the lower section of the supplementary electronics box (5).

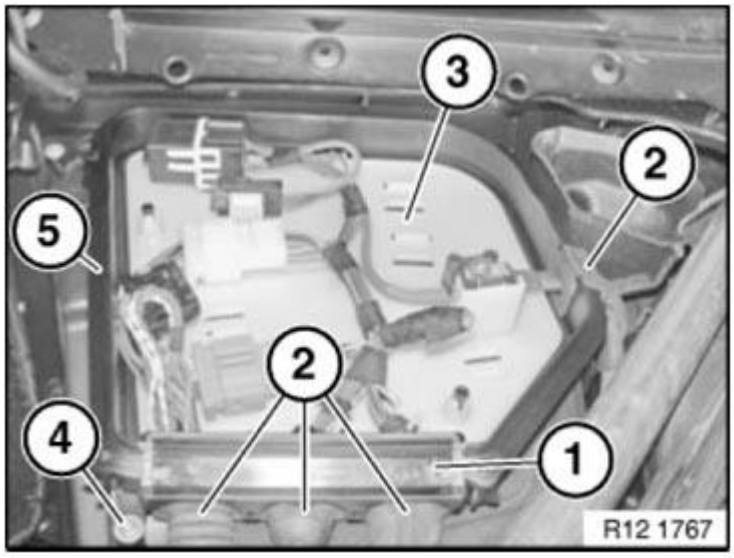


Fig. 25: Identifying Grommet Hold-Down Device, Electronics Box Rubber Grommets, Carrier Plate And Supplementary Electronics Box
Courtesy of BMW OF NORTH AMERICA, INC.

12 14 611 REMOVING/REPLACING LEFT KNOCK SENSORS (N63)

Necessary preliminary work

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove **LEFT INTAKE PLENUM** .

Unlock and disconnect connector (1) on both knock sensors.

Release screws on both knock sensors (2).

Tightening torque **13 62 5AZ** .

Remove knock sensors (3).

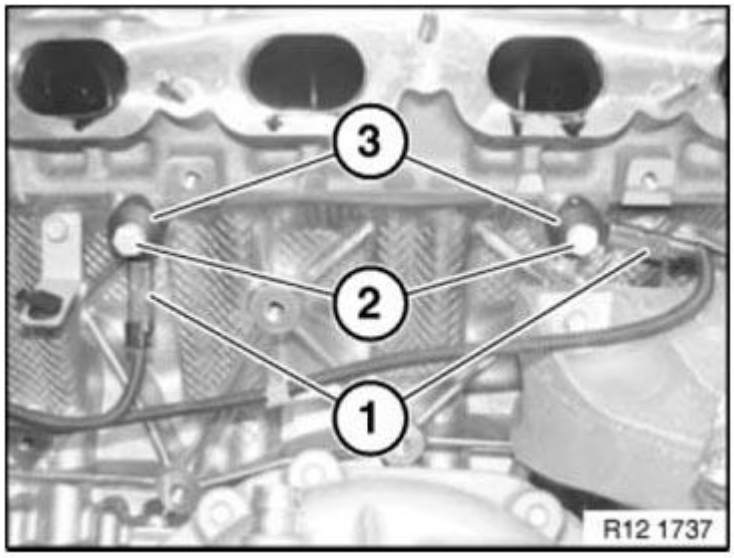


Fig. 26: Identifying Knock Sensors, Connector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean contact surface of knock sensors on engine block.

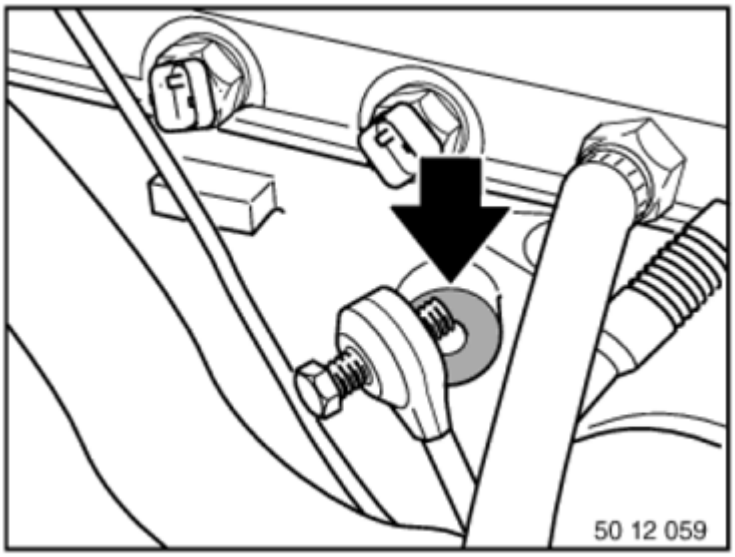


Fig. 27: Locating Contact Surface Of Knock Sensors On Engine Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 14 610 REMOVING/REPLACING RIGHT KNOCK SENSORS (N63)

Necessary preliminary work

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove **RIGHT INTAKE PLENUM** .

Picture shows left side. Procedure on right side identical.

Unlock and disconnect plugs (1) on both knock sensors.

Release screws on both knock sensors (2).

Tightening torque **13 62 5AZ** .

Remove knock sensors (3).

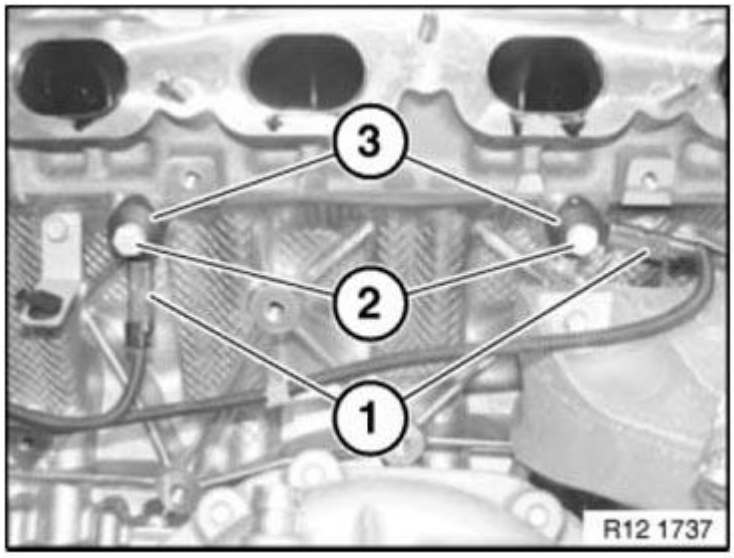


Fig. 28: Identifying Knock Sensors, Connector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean support face of knock sensors on engine block.

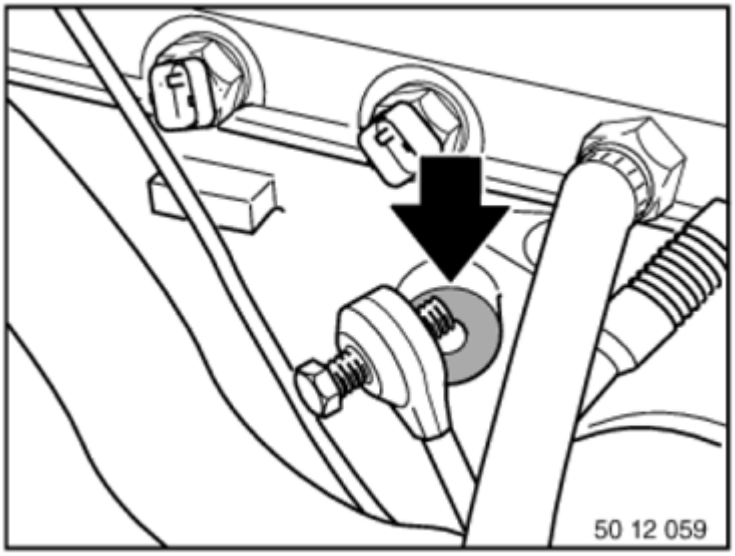


Fig. 29: Locating Contact Surface Of Knock Sensors On Engine Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 14 550 REPLACING CONTROL UNIT (DME) (N63)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection)

Necessary preliminary work

- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Drain coolant for charge air cooler.
- Remove right intake duct.
- Remove **RIGHT TENSION STRUT** .

IMPORTANT: Follow INSTRUCTIONS for removing and installing control units

Replacement

- Carry out programming/encoding
- If no data can be read out from the previous control unit, carry out injection quantity compensation (description at end of instructions).

IMPORTANT: It is absolutely essential to read out the fault memory with the BMW diagnosis

system and to create a fault memory printout.

Switch off ignition.

Release screw (1).

Lay filler neck (2) for windscreen washer fluid to one side.

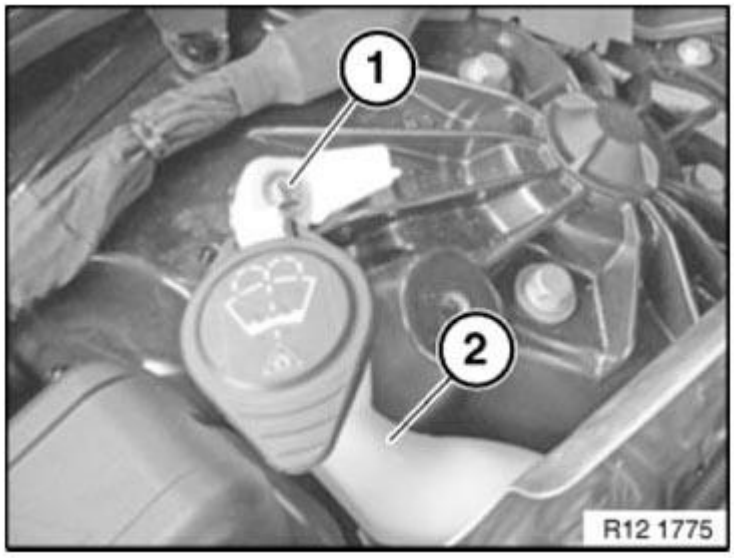


Fig. 30: Identifying Screw And Filler Neck
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 90 2AZ** .

Remove electronics box cover (2).

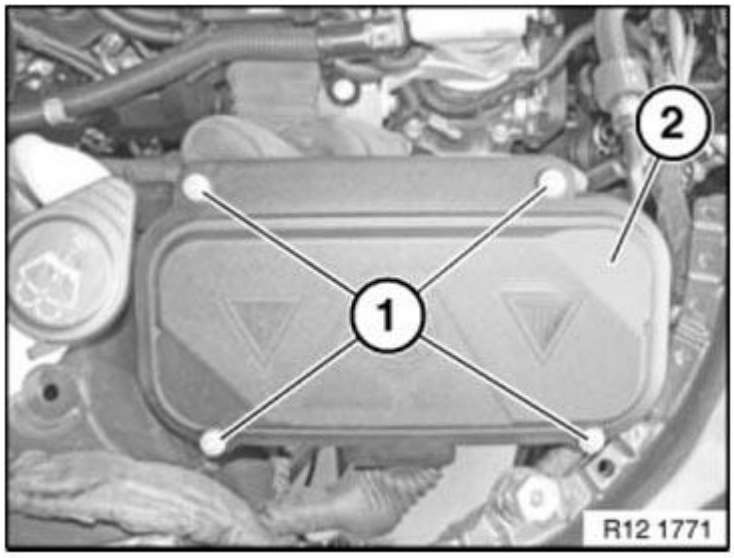


Fig. 31: Identifying Electronics Box Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all connectors (1) from control unit and disconnect.

Unclip grommet hold-down device (2) and remove.

Detach rubber grommets (3) from electronics box. Place wiring harnesses to the side.

Installation note:

Make sure grommets are correctly seated (watertightness).

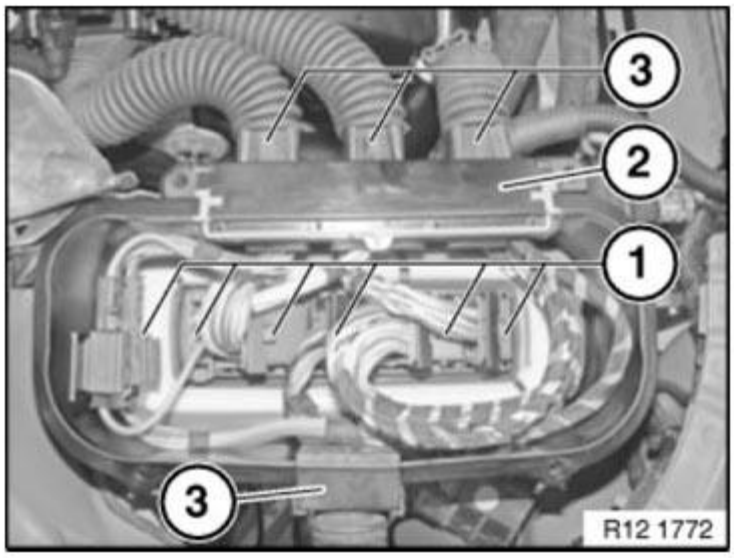


Fig. 32: Identifying Control Unit Connectors, Grommet Hold-Down Device And Electronics Box Rubber

Grommets
Courtesy of BMW OF NORTH AMERICA, INC.

Release outer locks on electronics box at front and rear.

Remove cover (1) from control unit.

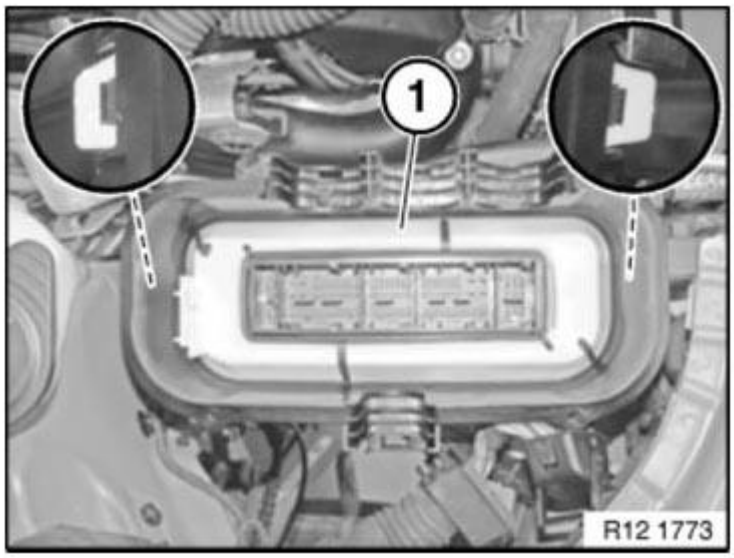


Fig. 33: Identifying Control Unit Cover And Electronics Box Outer Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 90 1AZ** .

Unclip coolant lines at clamp (2) from electronics box.

Release the electronics box (3) from the spring strut but do not remove.

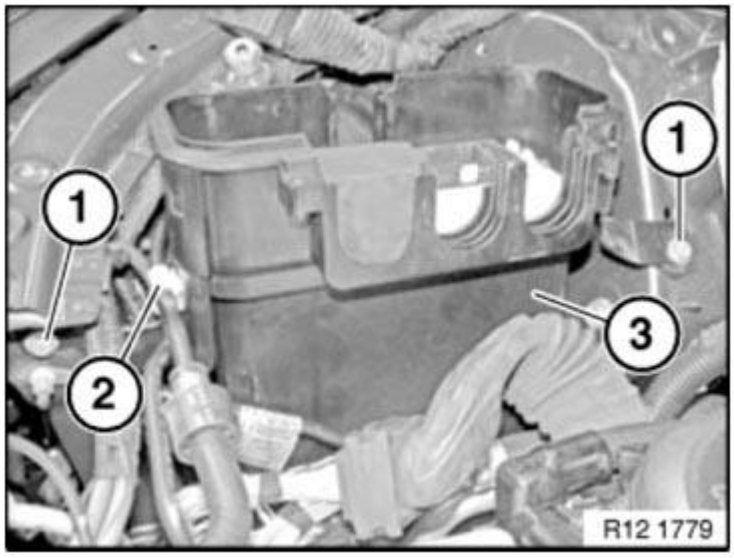


Fig. 34: Identifying Electronics Box, Clamp And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows rear coolant line on control unit, procedure for front is identical.

Press in lock (2) and detach coolant line (1) from control unit.

Catch and dispose of escaping coolant.

Lift out control unit.

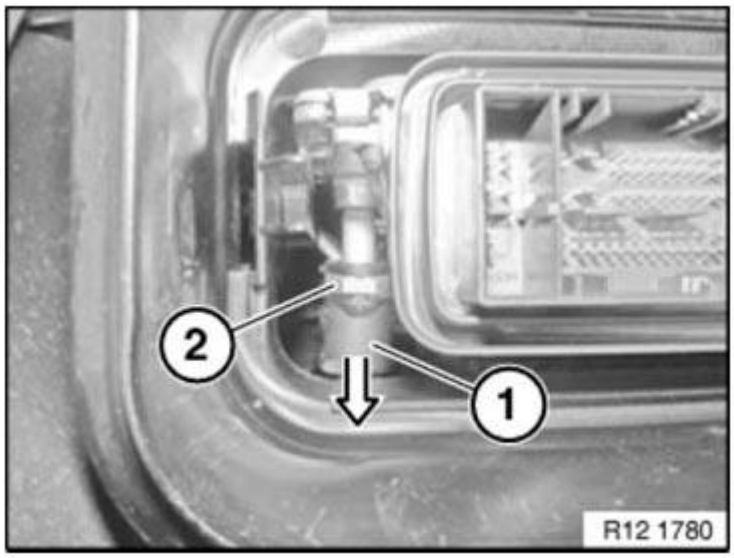


Fig. 35: Detaching Coolant Line From Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Injector adjustment

If the DME control unit has been replaced, it will also be necessary to carry out adjustment of the injectors!

Injector adjustment is carried out with the aid of so-called adjustment values.

The adjustment values are printed in two blocks of three digits on each injector.

The adjustment values must be stored in the new control unit!

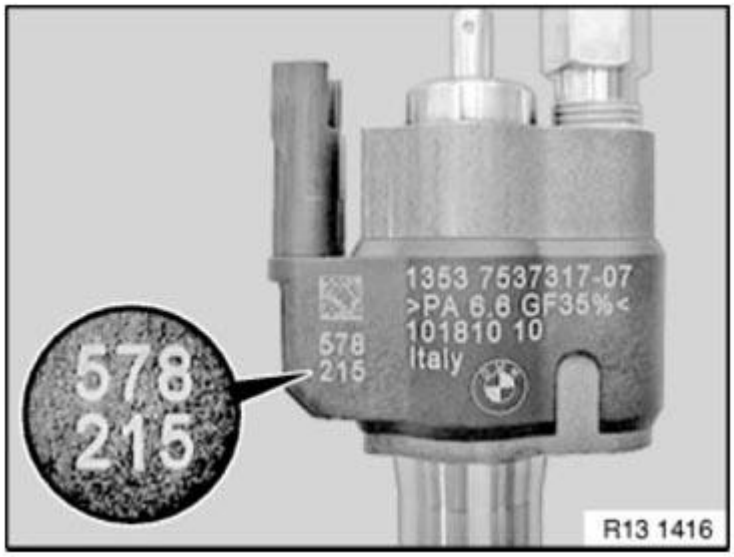


Fig. 36: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

If injector adjustment is not carried out, the engine may run roughly or fail to start.

Read off the adjustment values and enter according to the installation location (cylinder) of the injectors:

- Connect BMW diagnosis system
- Identify vehicle
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment function"
- Select "Adjust injectors"
- Select "Test plan"
- The adjustment value must be entered for each cylinder.



Fig. 37: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.
Vent COOLING SYSTEM for intercooler.

12 14 521 REPLACING CRANKSHAFT PULSE GENERATOR (N63)

Necessary preliminary work

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove rear **UNDERBODY PROTECTION** .

Installation location

On transmission housing at bottom right.

Release connector (1) and remove.

Release screw (2).

Tightening torque **13 62 4AZ** .

Withdraw pulse generator (3) from transmission housing.

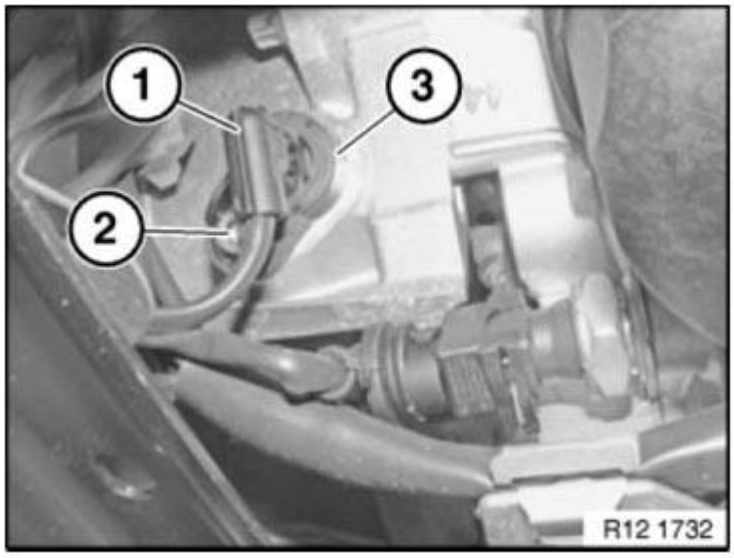


Fig. 38: Identifying Pulse Generator Connector And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Delete fault memory.

12 14 512 REPLACING PULSE GENERATOR ON LEFT EXHAUST CAMSHAFT (N63)

(cylinder bank 5 to 8)

Necessary preliminary tasks

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Switch off ignition.
- Remove left **INTAKE FILTER HOUSING**

Unlock connector (1) and remove.

Release screw (2).

Tightening torque **13 62 3AZ** .

Remove pulse generator (3).

Installation note:

Replace sealing ring and coat with anti-seize agent.

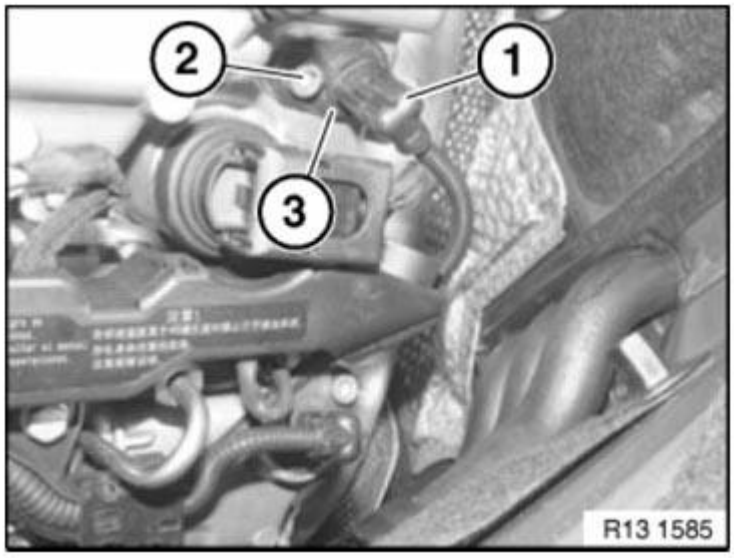


Fig. 39: Identifying Pulse Generator, Connector And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.
Delete fault memory.

12 14 522 REPLACING PULSE GENERATOR ON LEFT INLET CAMSHAFT (N63)

(cylinder bank 5 to 8)

Necessary preliminary tasks

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Switch off ignition
- Remove left **INTAKE FILTER HOUSING**

Unlock plug (1) and remove.

Release screw (2).

Tightening torque **13 62 3AZ** .

Remove pulse generator (3).

Installation

Replace sealing ring and coat with anti-seize agent.

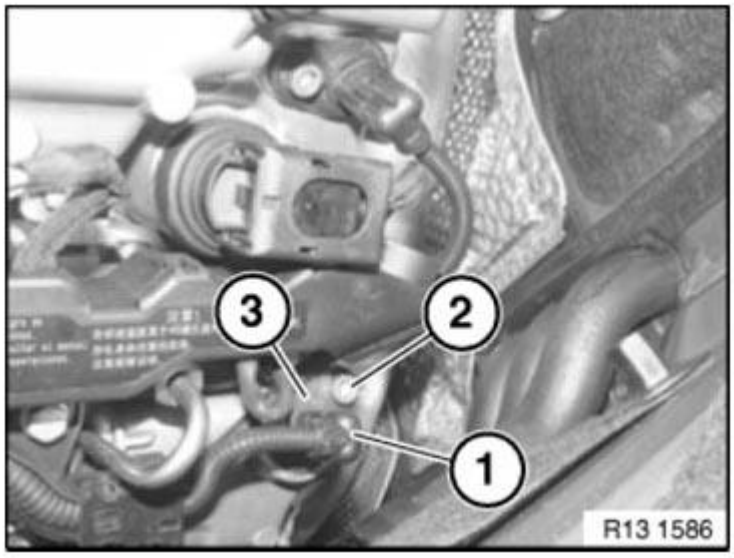


Fig. 40: Identifying Pulse Generator, Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.
Now clear the fault memory.

12 14 513 REPLACING PULSE GENERATOR ON RIGHT EXHAUST CAMSHAFT (N63)

(cylinder bank 1 to 4)

Necessary preliminary tasks

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Switch off ignition
- Remove right **INTAKE FILTER HOUSING**

Unlock plug (1) and remove.

Release screw (2).

Tightening torque **13 62 3AZ** .

Remove pulse generator (3).

Installation

Replace sealing ring and coat with anti-seize agent.

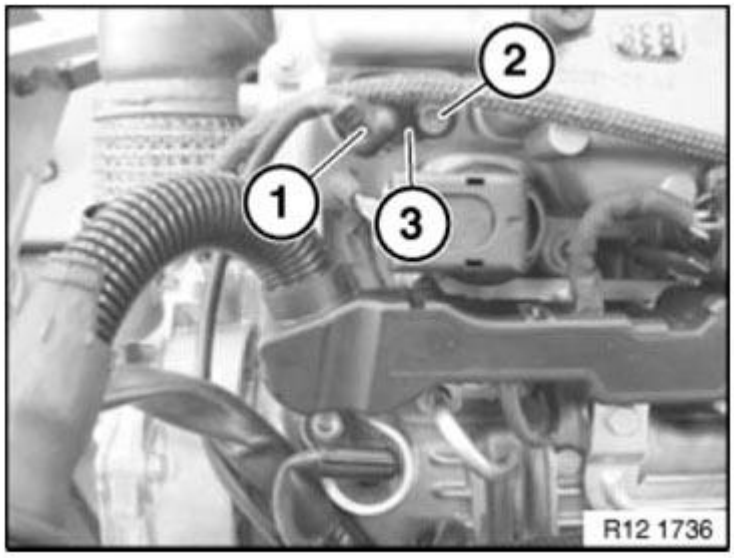


Fig. 41: Identifying Pulse Generator, Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

12 14 526 REPLACING PULSE GENERATOR ON RIGHT INLET CAMSHAFT (N63)

(cylinder bank 1 to 4)

Necessary preliminary tasks

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Switch off ignition
- Remove right **INTAKE FILTER HOUSING**

Unlock plug (1) and remove.

Release screw (2).

Tightening torque **13 62 3AZ** .

Remove pulse generator (3).

Installation:

Replace sealing ring and coat with anti-seize agent.

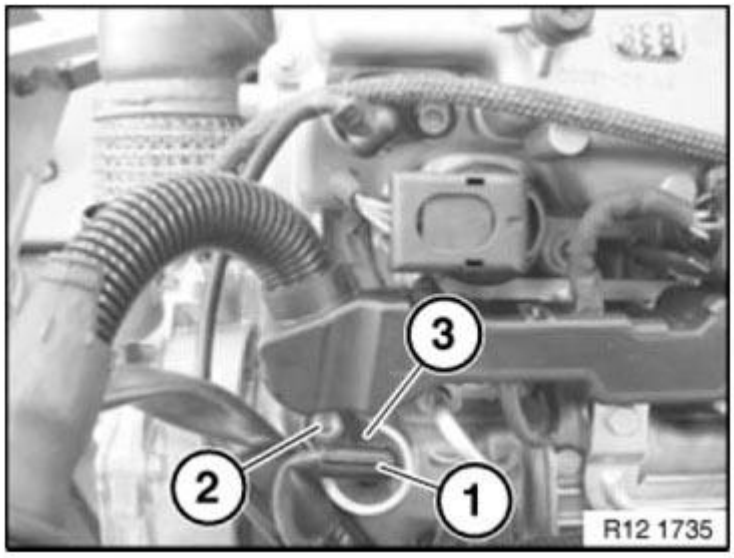


Fig. 42: Identifying Pulse Generator, Screw And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

1231 ALTERNATOR WITH DRIVE AND MOUNTING

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N63)

Necessary preliminary tasks

- Switch off ignition.
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **ACOUSTIC COVER**
- Remove left and right **INTAKE FILTER HOUSINGS**
- Remove alternator **DRIVE BELT**
- Remove intercooler **EXPANSION TANK** .
- Remove **FUEL FEED LINE**

IMPORTANT: Risk of damage!
Cover radiator.

Release clamps (1).

Tightening torque **13 71 8AZ** .

Release clamps (2).

Replace clamps (2).

Detach both charge-air ducts (3) and remove.

Check gaskets on turbocharger, replacing if necessary.

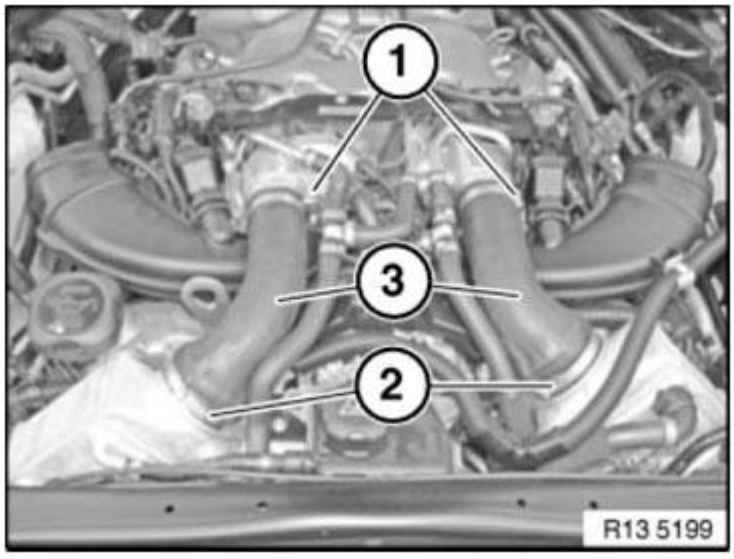


Fig. 43: Identifying Charge-Air Ducts And Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Detach hoses (1) from clean-air pipe.

Release screw (2).

Tightening torque **13 71 1AZ** .

Detach clean-air pipe (3) in direction of travel from turbocharger.

Check seals on clean-air pipe, replacing if necessary.

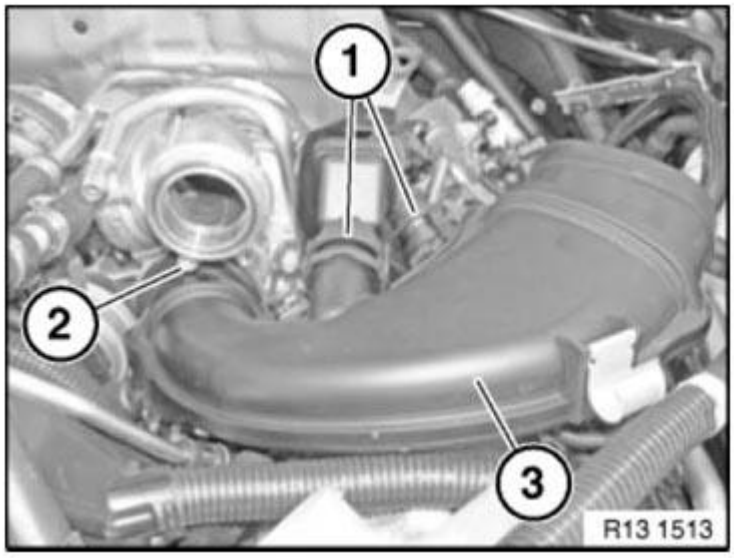


Fig. 44: Identifying Clean-Air Pipe, Hoses And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off cable duct (1) from cable holder (2) in upward direction.

Release cable (3) from holder.

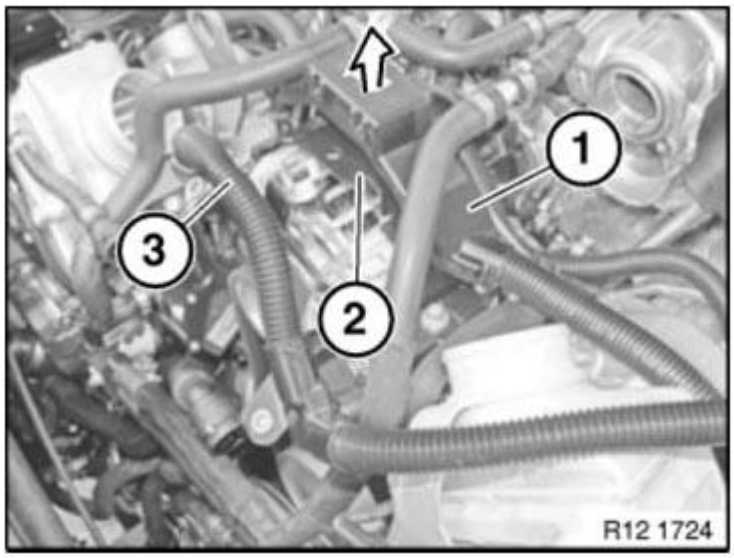


Fig. 45: Identifying Cable Duct, Cable Holder And Holder Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off plug (1).

Detach cover (2) and release nut underneath.

Tightening torque **12 42 1AZ** .

Installation:

Reinstall cover (2) without fail **risk of short circulating!**

Disconnect battery positive lead (3) from alternator.

Remove **FUEL FEED LINE** (4).

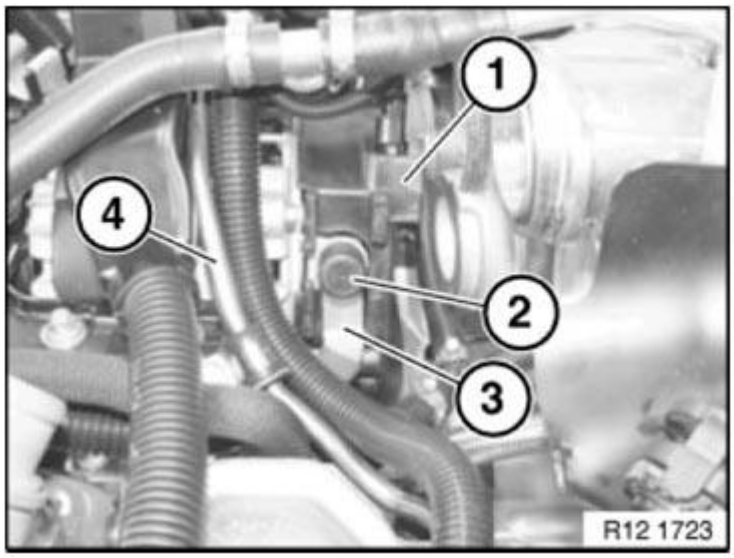


Fig. 46: Identifying Plug, Cover, Battery Positive Lead And Fuel Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on turbocharger coolant pump (2).

Place turbocharger coolant pump to one side. Do not remove turbocharger coolant pump.

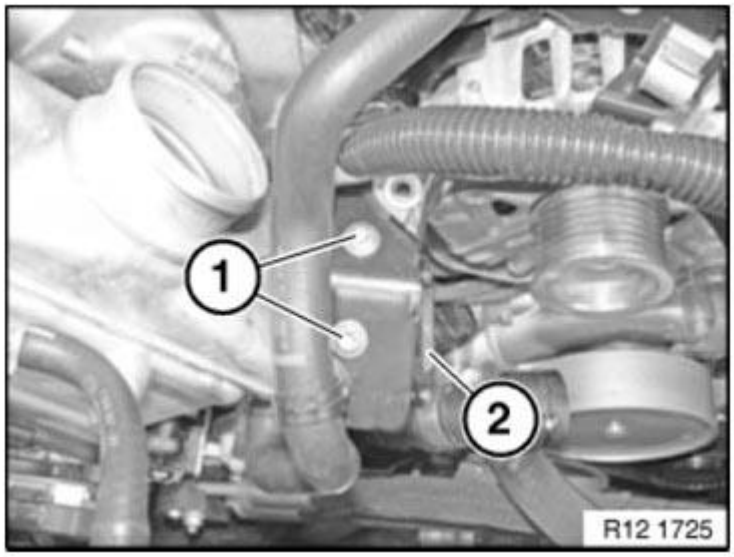


Fig. 47: Identifying Turbocharger Coolant Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Release screws (1).

Tightening torque **12 31 1AZ** .

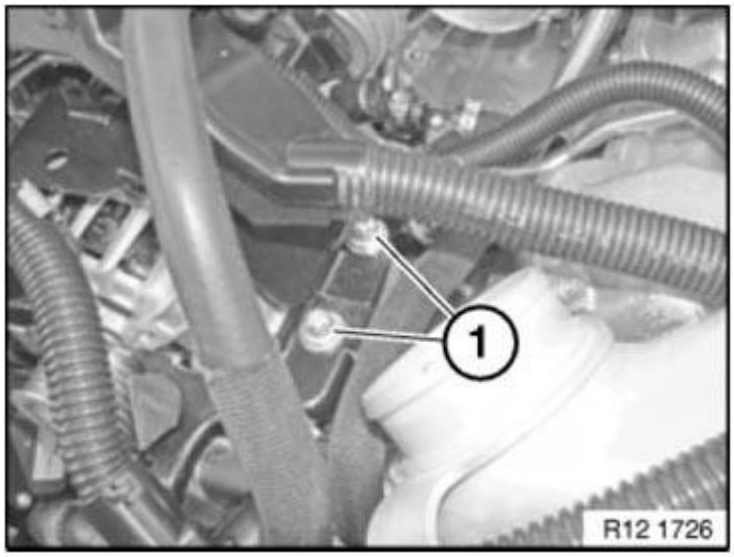


Fig. 48: Identifying Turbocharger Coolant Pump Screws (Left Side)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove alternator (1) together with bracket (2) in direction of travel.

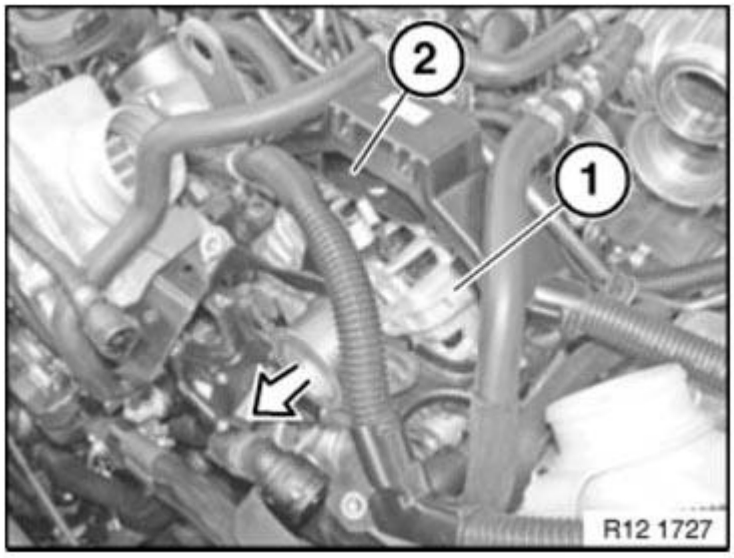


Fig. 49: Identifying Alternator And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Add final details to vehicle.
Now clear the fault memory.

12 31... REPLACING ALTERNATOR BELT PULLEY

Notes

Remove and install alternator drive belt.

Depending on alternator type, grip shaft with:

- hexagon socket
- multi-tooth socket or
- Torx socket wrench

Release nut with special tool 12 7 110.

Installation:

Tightening torque **12 31 2AZ/3AZ** .

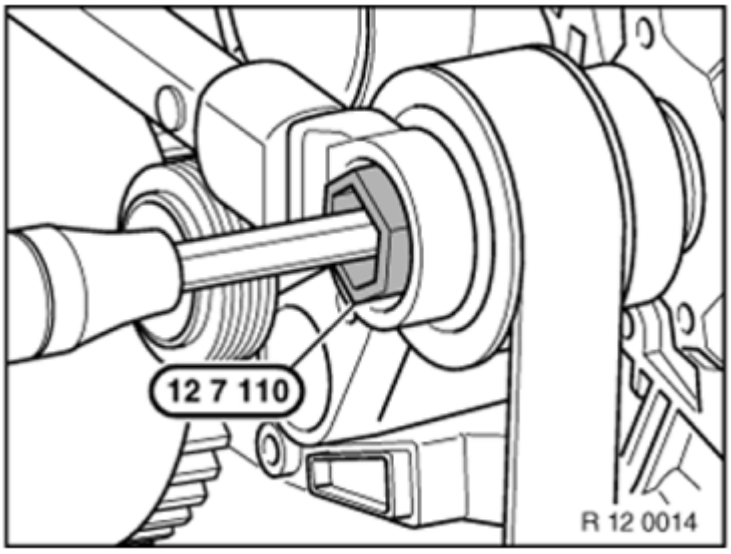


Fig. 50: Releasing Nut With Special Tool (12 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

12 31... REPLACING ALTERNATOR BELT PULLEY (WITH OVERRUNNING CLUTCH)

Notes

Remove and install alternator drive belt.

Grip alternator shaft with:

- internal serration

Release nut with special tools 12 7 120.

Installation:

Tightening torque **12 31 3AZ** .

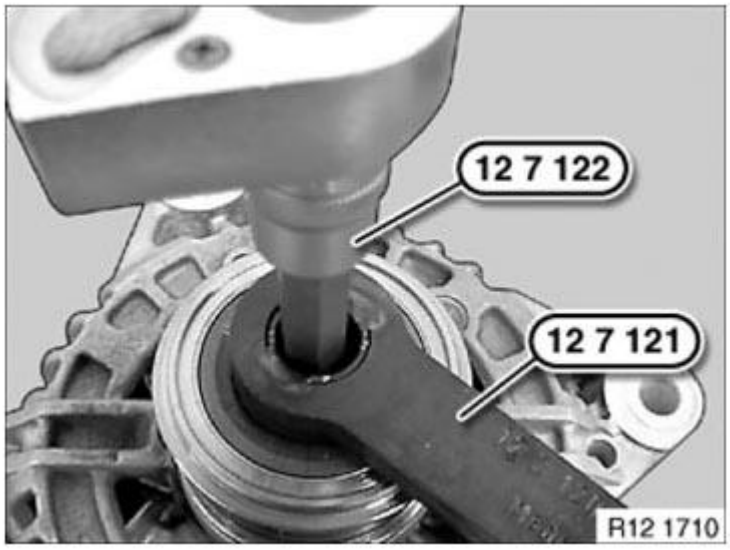


Fig. 51: Releasing Nut With Special Tools (12 7 120)
Courtesy of BMW OF NORTH AMERICA, INC.

1232 REGULATOR

12 32 501 REPLACING VOLTAGE REGULATOR

Necessary preliminary tasks

- Switch off ignition
- Disconnect battery negative lead
- See **NOTES/INFORMATION ON REMOVING AND INSTALLING CONTROL UNITS**
- Remove alternator

Bosch

Release protective caps (1).

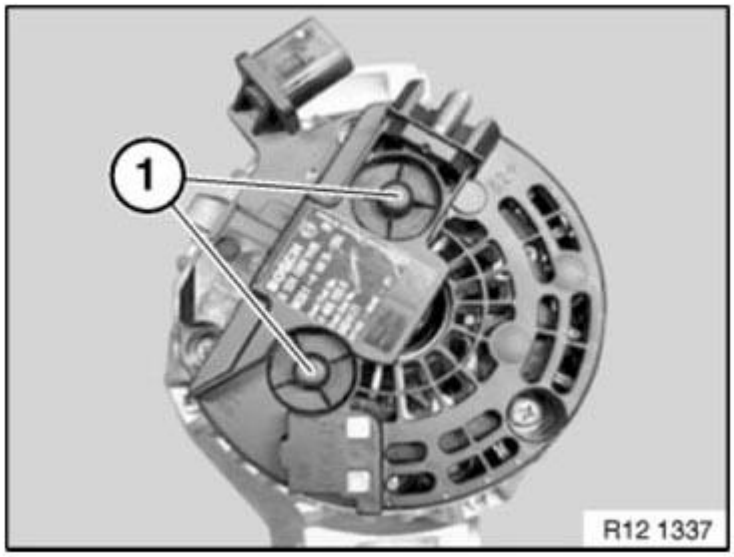


Fig. 52: Identifying Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Release screw (1) and nuts (2), remove cover.

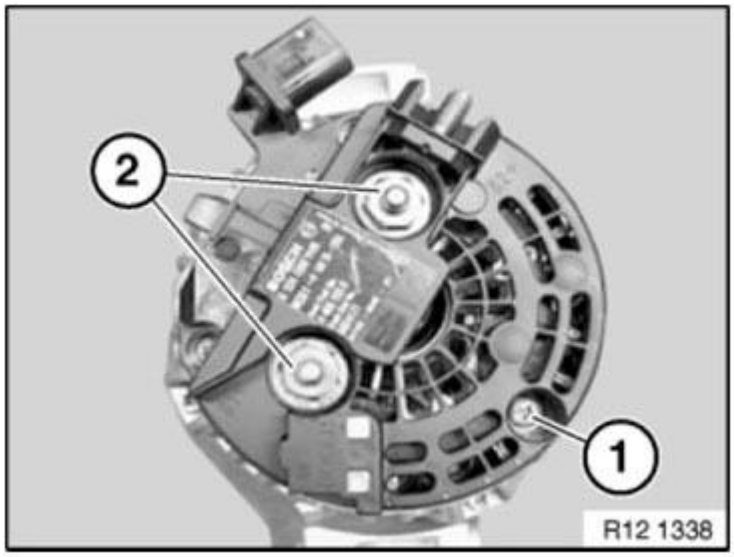


Fig. 53: Identifying Screw And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Release screws and remove regulator switch (1) in direction of arrow.

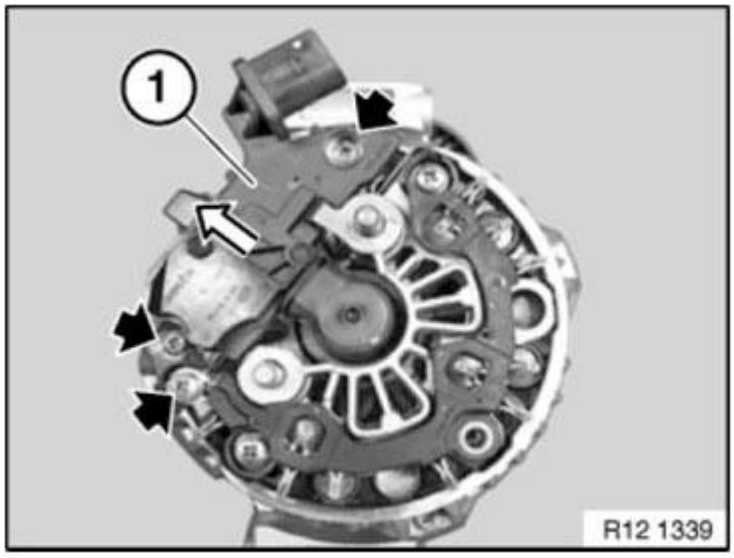


Fig. 54: Removing Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

Installation

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

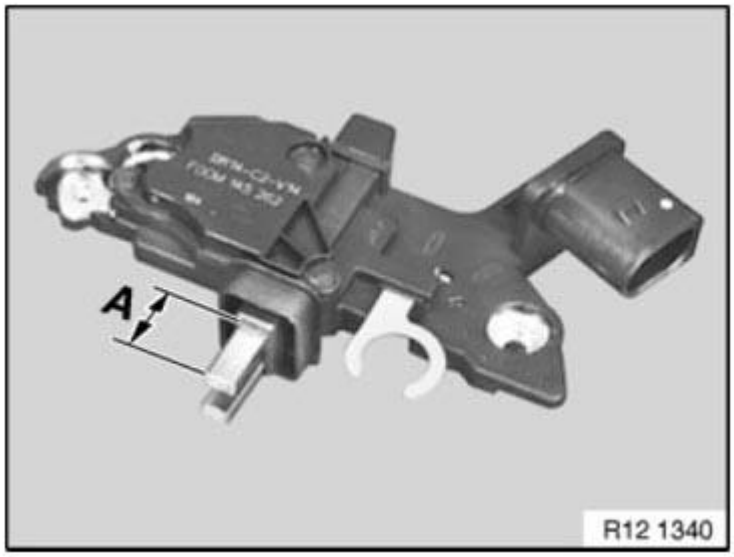


Fig. 55: Identifying Regulator Switch Dimensions

Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Slacken nut (1).

Slacken nut (2).

Release screws (3).

Release cover (4).

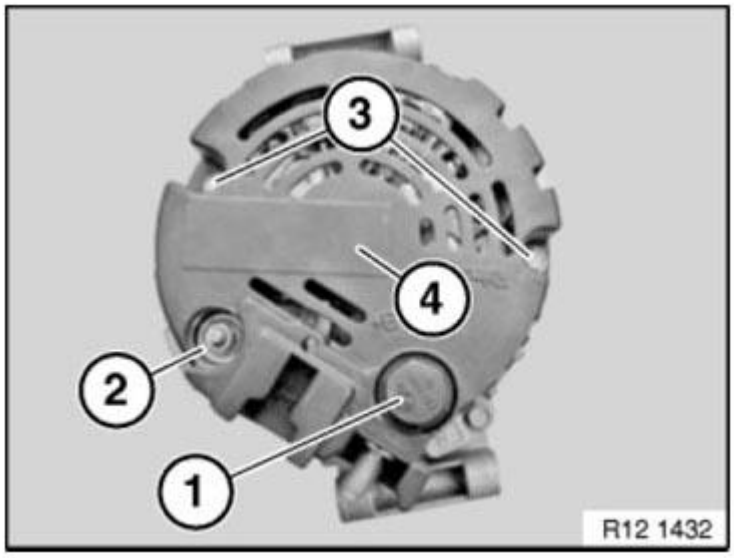


Fig. 56: Identifying Nut, Screw And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Release screws.

Remove regulator switch (1) towards top.

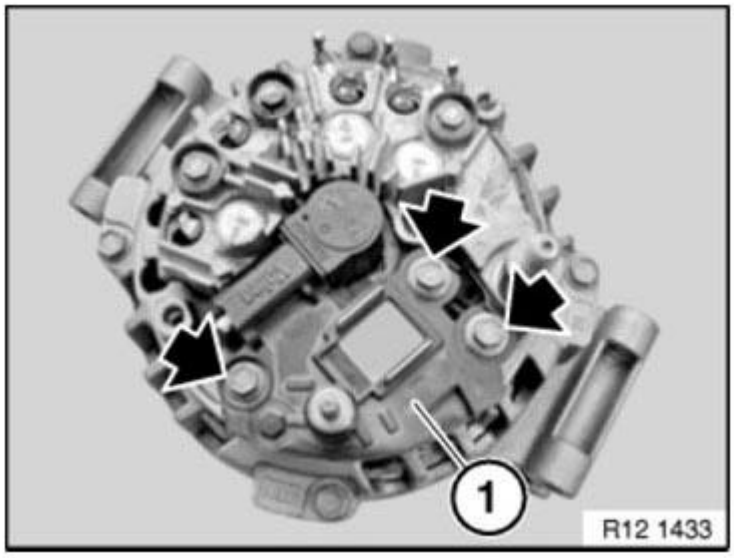


Fig. 57: Locating Regulator Switch Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

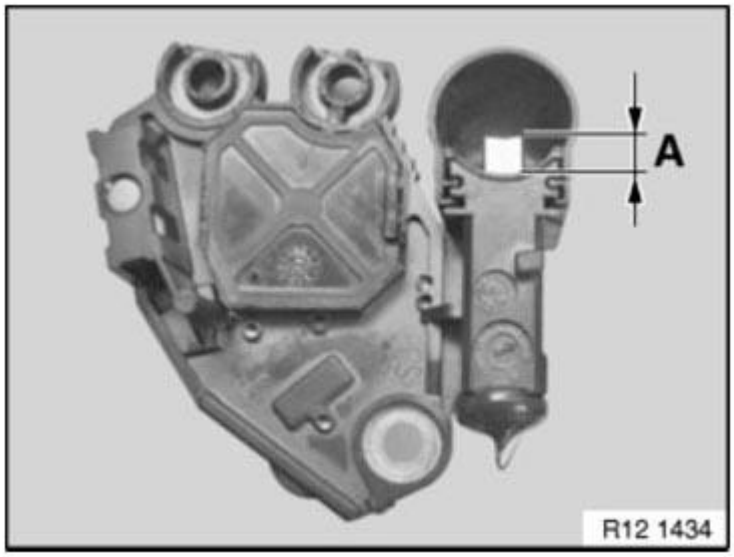


Fig. 58: Identifying Measurement A

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit new regulator (1) with attached mounting sleeve (2) or locked carbon brush.

Pull off mounting sleeve (2) and replace with cover (3).

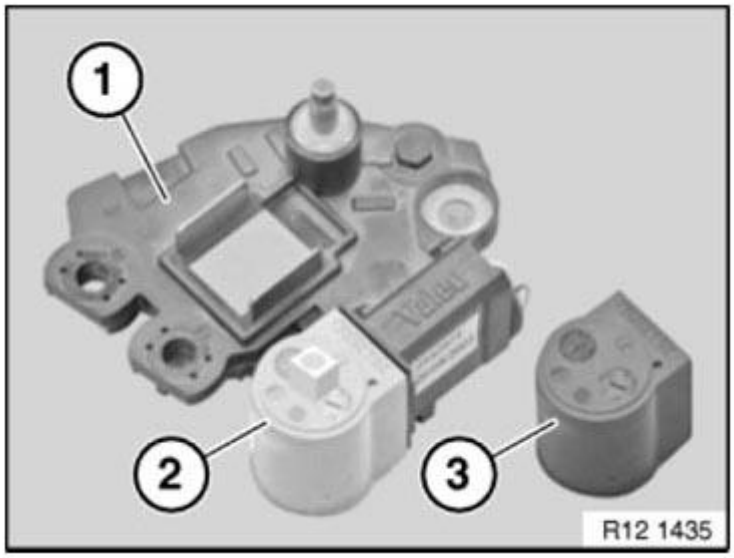


Fig. 59: Identifying Regulator, Mounting Sleeve And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

1241 STARTER WITH MOUNTING

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER (N63)

Necessary preliminary work

- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove right **ENGINE SUPPORT ARM** .

Release connector (1) and remove.

Slacken nut (2).

Tightening torque **12 42 2AZ** .

Detach starter positive cable.

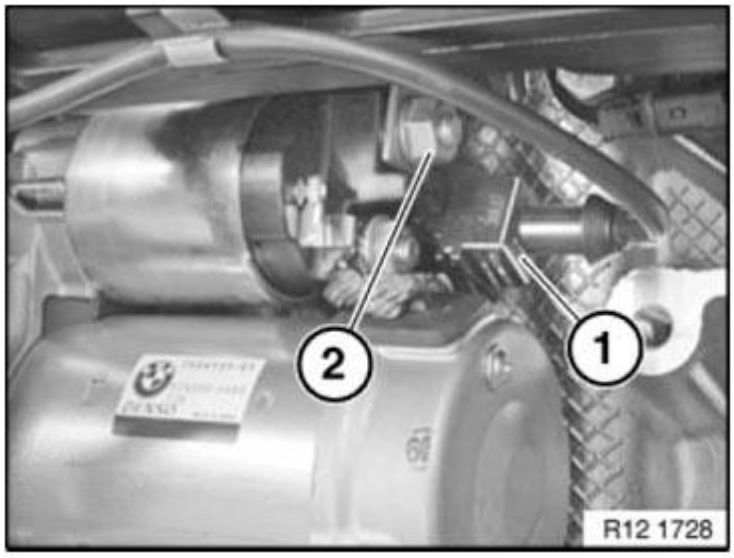


Fig. 60: Identifying Starter Connector And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 41 1AZ** .

Disengage cable (2) from holder.

Pull out starter in direction of travel, feed out and remove.

Installation note:

When replacing the starter, convert cable holder for cable (2).

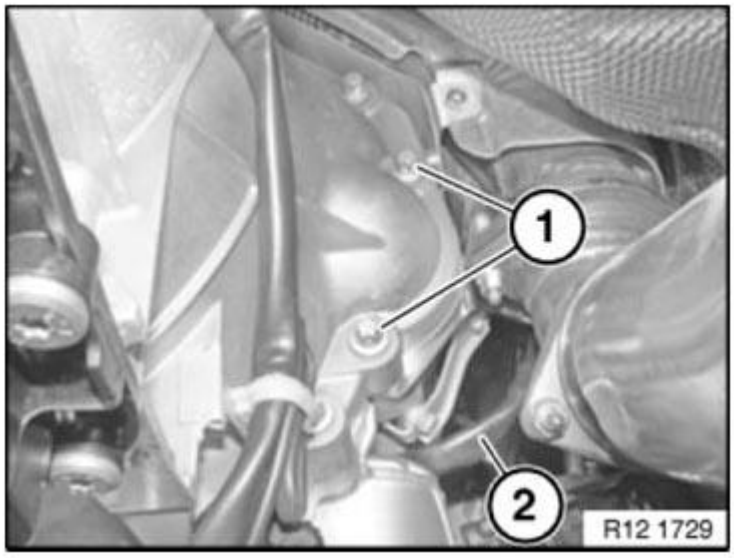


Fig. 61: Identifying Starter Screws And Holder Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check starter pinion and starter ring gear for damage. If necessary, replace damaged components.

Reassemble the vehicle.

12 41 041 REPLACING SOLENOID SWITCH

Turn off ignition

Remove starter motor.

Release nut (1).

Remove cable lug (2).

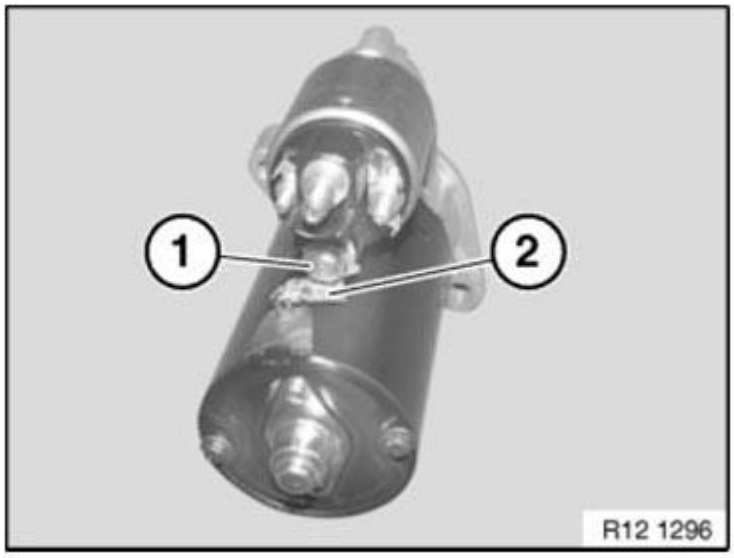


Fig. 62: Identifying Starter Motor Nut And Cable Lug
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not turn cable lug (2) while tightening down - risk of short circuit to starter motor housing.

TIGHTENING TORQUE, 12 41 4AZ .

Release screws (1).

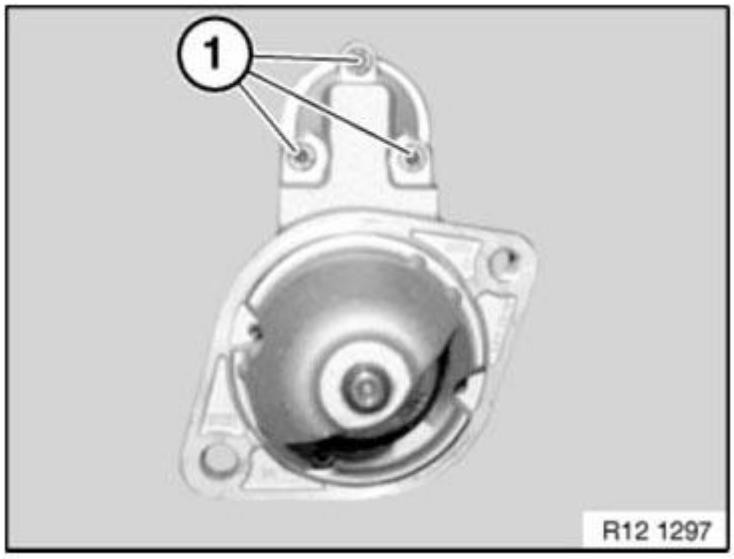


Fig. 63: Identifying Starter Motor Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove solenoid switch (1) and spring (2).

Unhook pin (3).

Installation:

Check pin (3) for wear and apply grease.

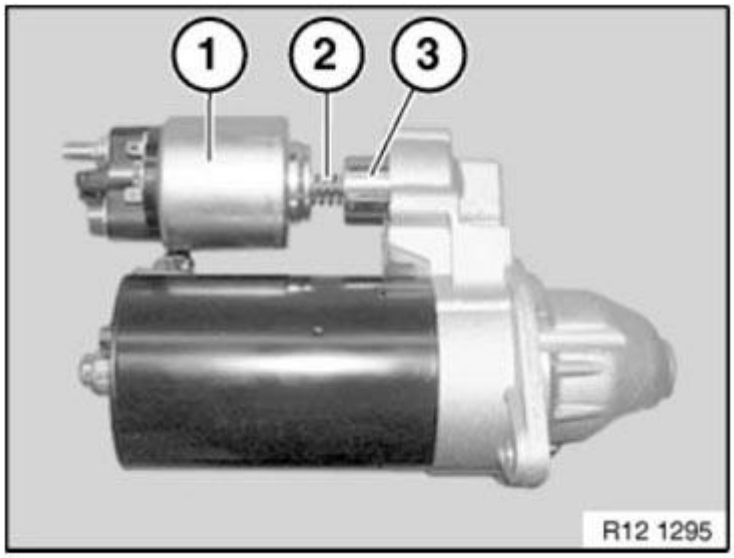


Fig. 64: Identifying Solenoid Switch, Spring And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

1242 STARTER LEAD

12 42 550 REPLACING BATTERY POSITIVE LEAD BETWEEN STARTER, ALTERNATOR AND BATTERY POSITIVE TERMINAL (N63)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **RIGHT INTERCOOLER**
- Remove **RIGHT INTAKE MANIFOLD**

Open cover.

Release screw (1).

Tightening torque **12 42 3AZ** .

Remove battery positive lead (2) from battery positive terminal.

Release battery positive lead (2) from retainers (3).

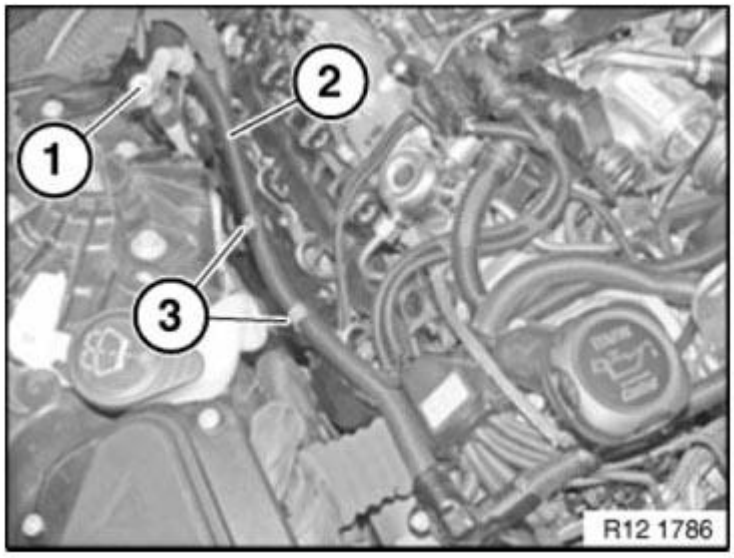


Fig. 65: Identifying Screw, Battery Positive Lead And Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp (1).

Tightening torque **13 71 8AZ** .

Release clamp (2).

Replace clamp (2).

Remove left charge-air duct (3).

Check gasket on turbocharger. Replace damaged gasket.

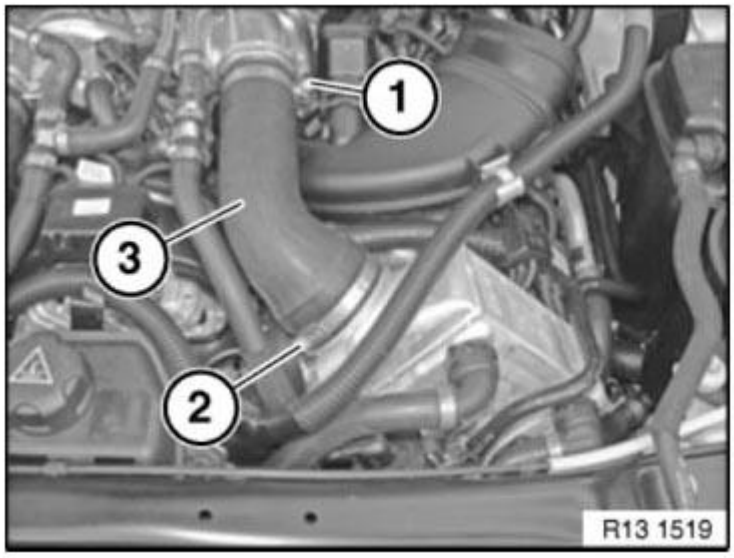


Fig. 66: Identifying Left Charge-Air Duct And Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Detach hose (1) from clean-air pipe.

Release screw (2).

Tightening torque **13 71 1AZ** .

Detach clean-air pipe (3) in direction of travel from turbocharger.

Check gasket on clean-air pipe. Replace damaged gasket.

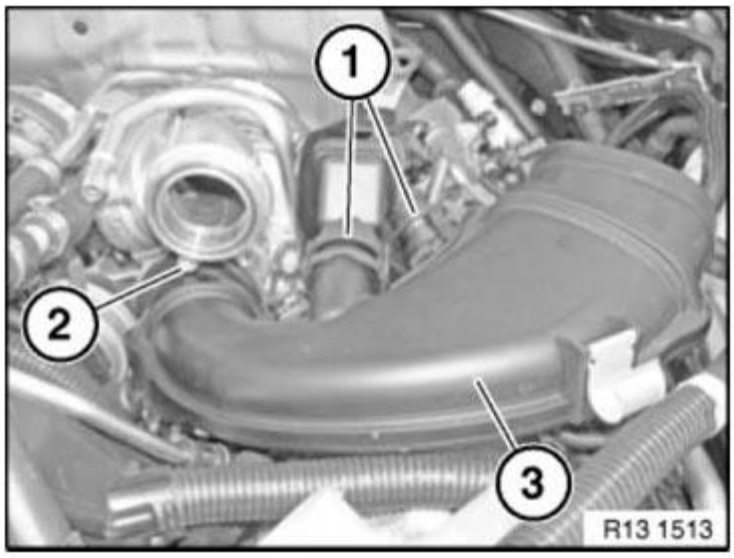


Fig. 67: Identifying Clean-Air Pipe, Hoses And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Detach cover (1) and release nut underneath.

Tightening torque **12 42 1AZ** .

Installation:

Reinstall cover (1) without fail.

Risk of short circuits!

Disconnect battery positive lead (2) from alternator.

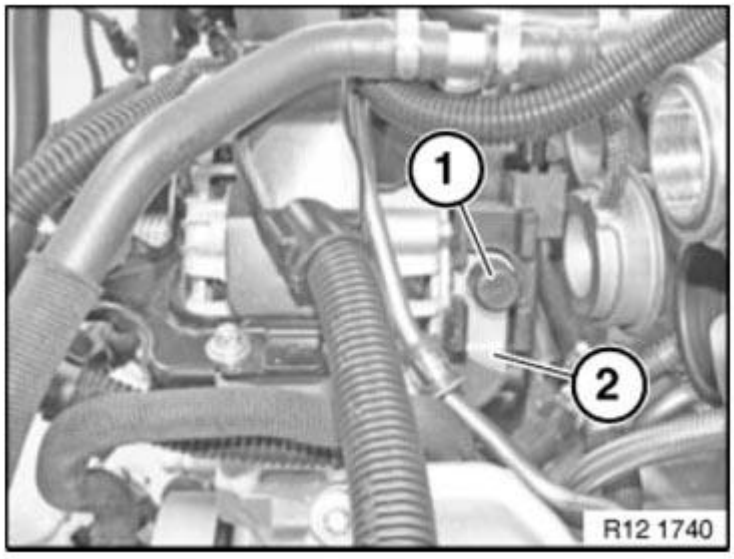


Fig. 68: Identifying Battery Positive Lead And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release battery positive lead (1) from retainers (2).

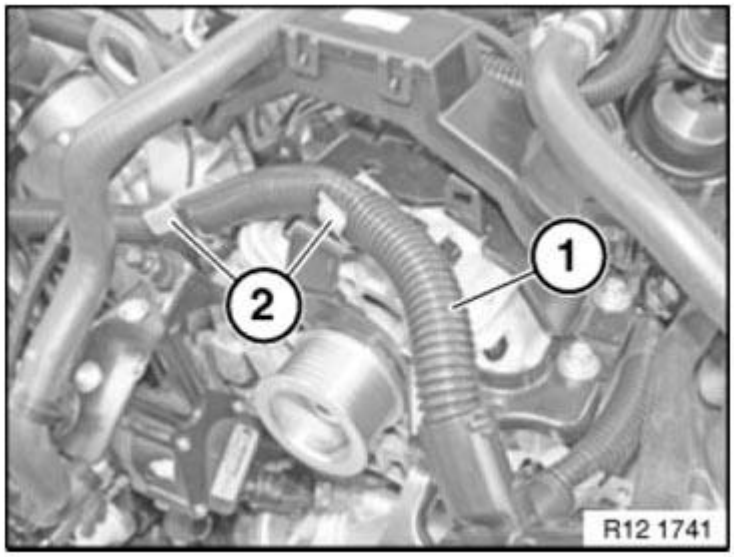


Fig. 69: Identifying Battery Positive Lead And Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Release battery positive lead (1) from retainer (2).

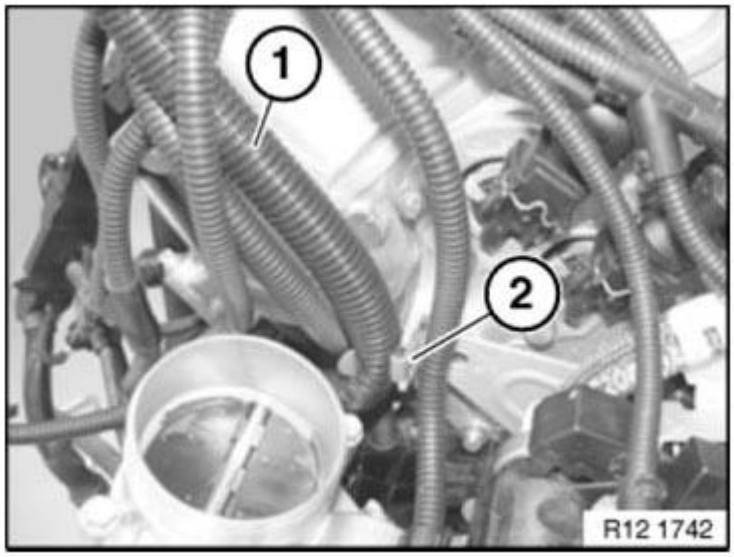


Fig. 70: Identifying Battery Positive Lead And Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 42 7AZ** .

Release nut (2) on starter.

Tightening torque **12 42 2AZ** .

Feed out battery positive lead (3) and remove.

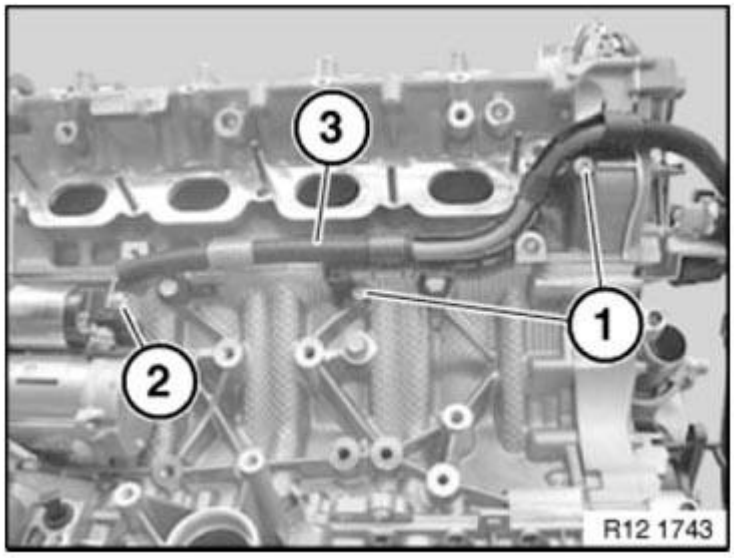


Fig. 71: Identifying Screws, Nut And Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.
Check stored fault message.
Delete fault memory.

12 42 540 REPLACING SAFETY BATTERY TERMINAL (SBK)

CAUTION: Observe safety regulations.
Investigate cause of triggering of safety battery terminal.
To do so, read out fault memory of airbag control unit. Note fault messages stored in memory. Rectify faults. Then clear fault memory.

Use of safety battery terminal:

- From model year 1998 in Series E38, E39, E46
- From 4/99 in E36/Z3
- in each of following new Series

The different models have different installation locations:

Battery in engine compartment

Safety battery terminal is replaced with cable up to battery positive support point.

Safety battery terminal is omitted as from 03/2002 from all E46 LHD models with 4- cylinder engines.

Battery in luggage compartment behind side trim panel

Remove side trim panel.

Follow instructions for disconnecting and connecting battery.

Disconnect and cover battery negative lead.

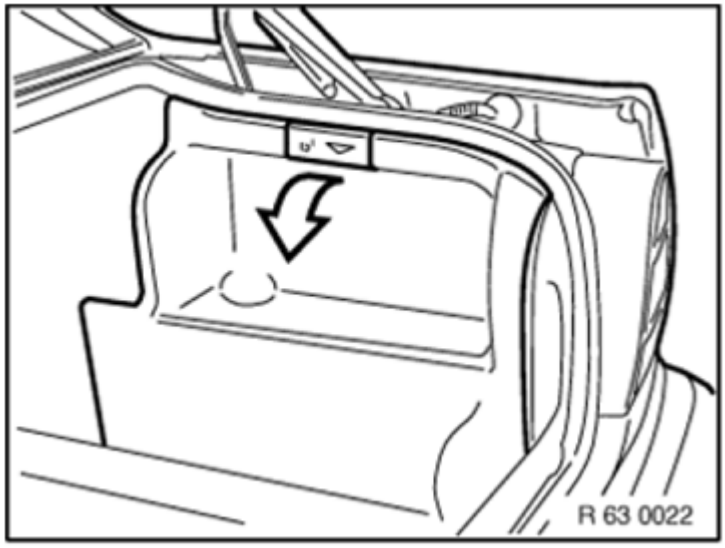


Fig. 72: Removing Side Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Release front side trim panel partly and fold forward.

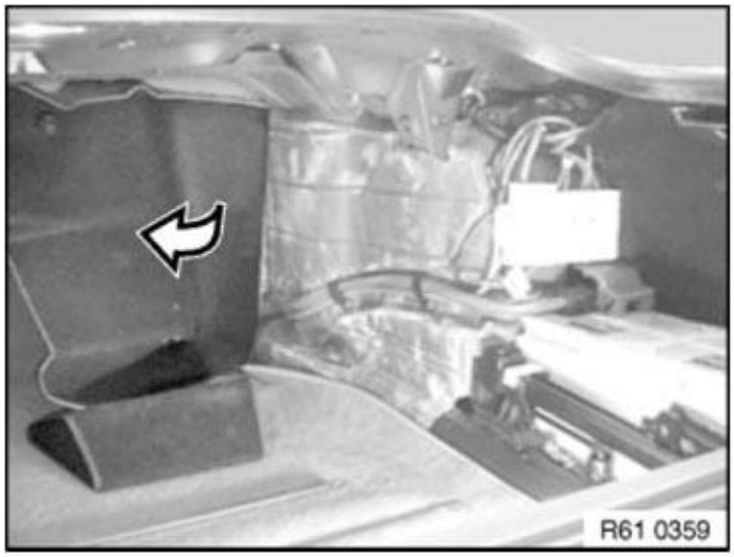


Fig. 73: Releasing Front Side Trim Panel Partly
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under floor trim panel

Follow instructions for disconnecting and connecting battery.

Fold back floor trim panel (1).

Lift cover (2) on battery negative lead.

Disconnect and cover battery negative lead (3).

Release nuts (4).

Remove battery cover.

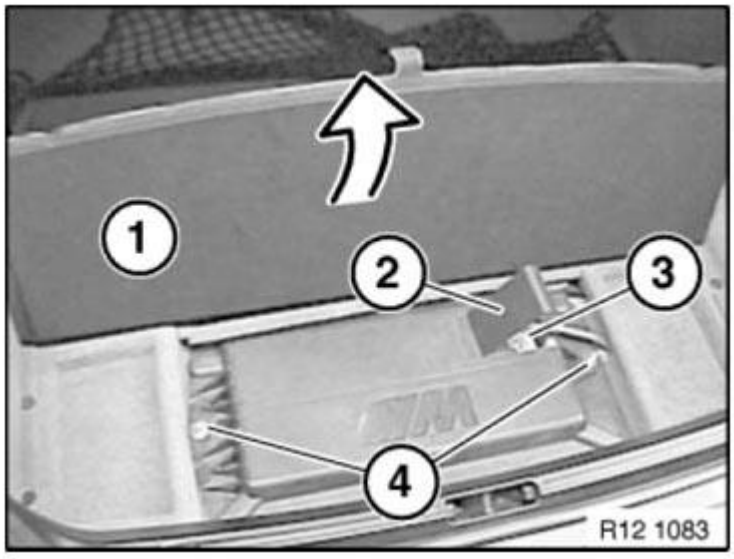


Fig. 74: Folding Back Floor Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under spare wheel

Remove spare wheel.

Release screws.

CAUTION: Do not kink air pipes.

Set air supply system (1) to one side.

Follow instructions for disconnecting and connecting battery.

Disconnect battery negative lead.

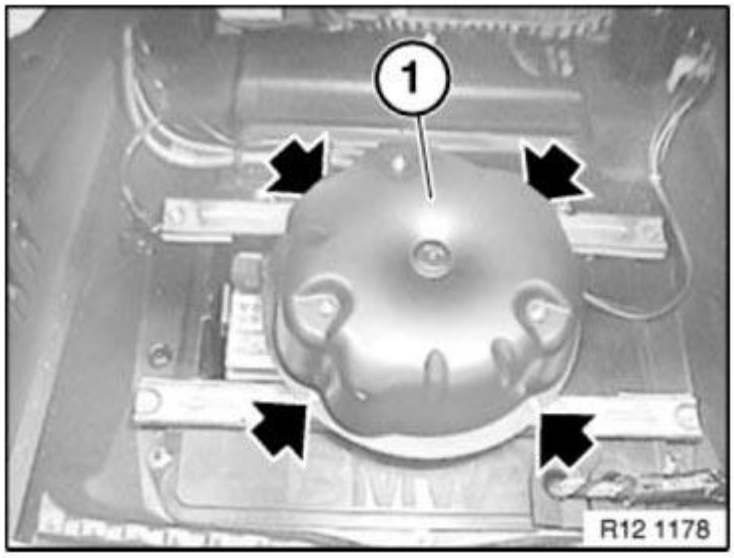


Fig. 75: Locating Air Supply System Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect supply cable (1) for vehicle electrical system.

Installation

Remove faulty fuses and carry out troubleshooting.

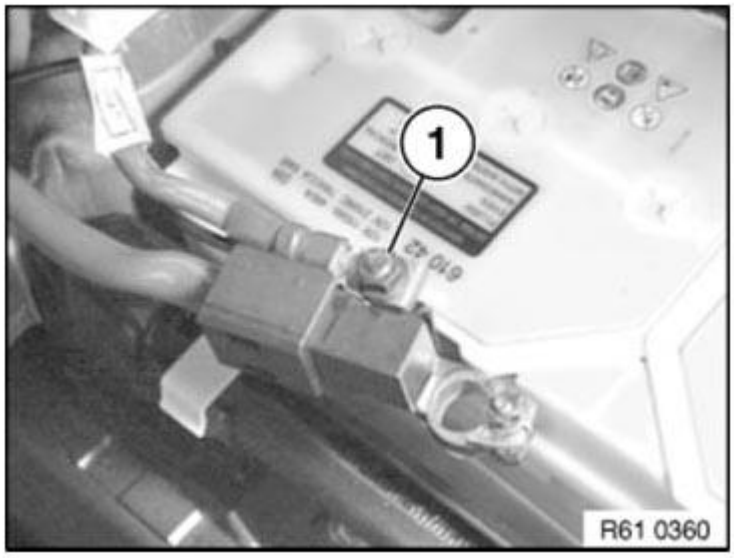


Fig. 76: Identifying Vehicle Electrical System Supply Cable

Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Pay attention to interface.
The repair cable is always a standard length.

The heavy-current connector of the repair cable has a larger diameter than the battery positive lead.

In some Series (e.g. E46 touring), the heavy-current connector of the repair cable can lead to installation problems.

This is the case when the interface is in the area of the close-fitting trim panels.

Find matching interface (e.g. approx. 10 cm behind rear seat backrest in E46 touring).

Lay repair cable parallel to battery positive lead.

Mark interface of battery positive lead at end of repair cable.

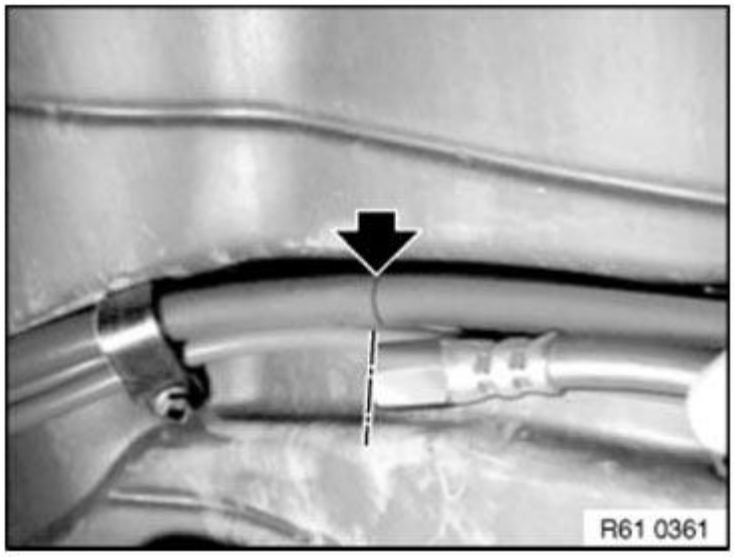


Fig. 77: Locating Interface Mark On Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable ties (1).

Disconnect plug connection (2).

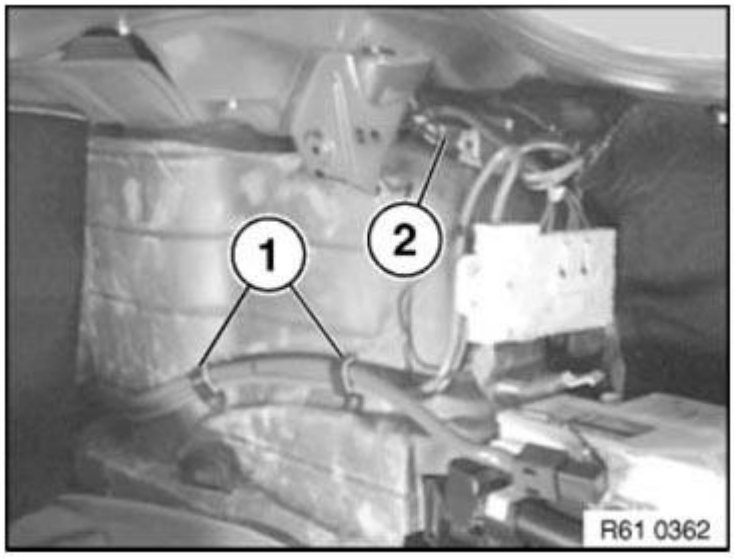


Fig. 78: Identifying Cable Ties And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not use bolt cutters or similar tools to cut through the cable. A cable end that has been squashed flat will no longer fit into the clamping sleeve.

Saw through battery positive cable at marked point with an iron saw.

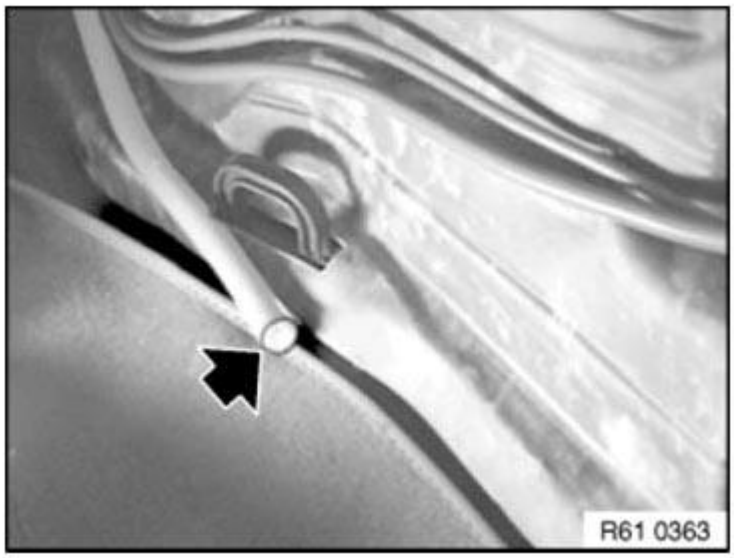


Fig. 79: Locating Cable End
Courtesy of BMW OF NORTH AMERICA, INC.

Strip insulation - length (A) - from cable end.

Distance (A) = 15 mm.

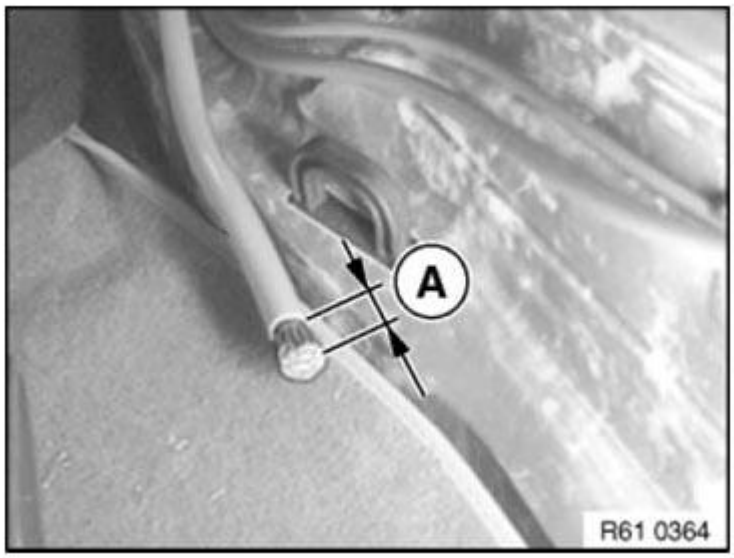


Fig. 80: Identifying Cable End Distance
Courtesy of BMW OF NORTH AMERICA, INC.

Push heavy-current connector (1) over stripped cable end and screw into position.

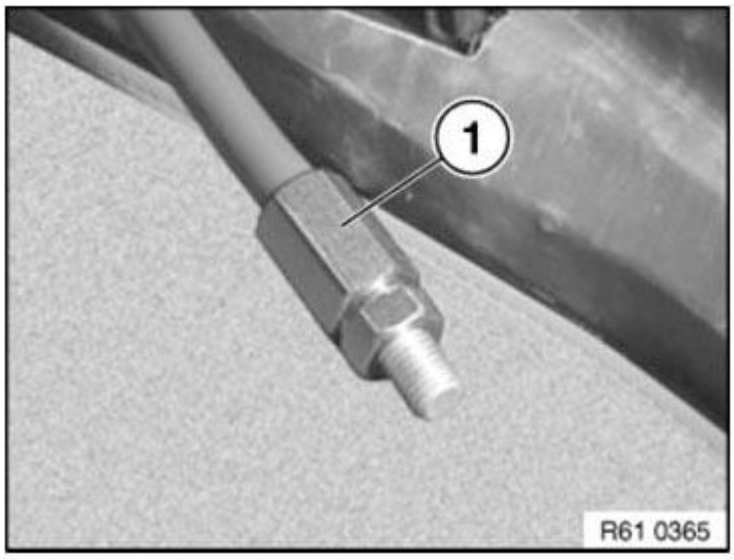


Fig. 81: Identifying Heavy-Current Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (3) over repair cable.

Screw threaded sleeve (1) of repair cable (2) to heavy-current connector.

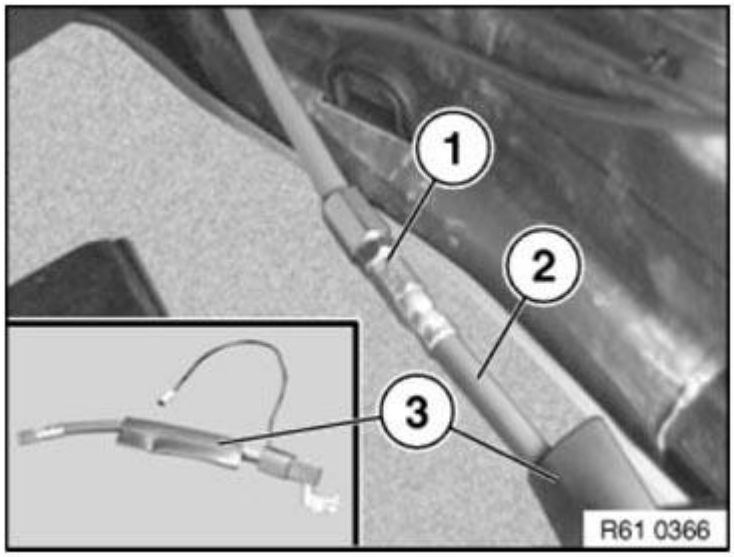


Fig. 82: Identifying Shrink-Fit Hose And Threaded Sleeve Of Repair Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (1) over connecting point and shrink on with a hot-air blower (2).

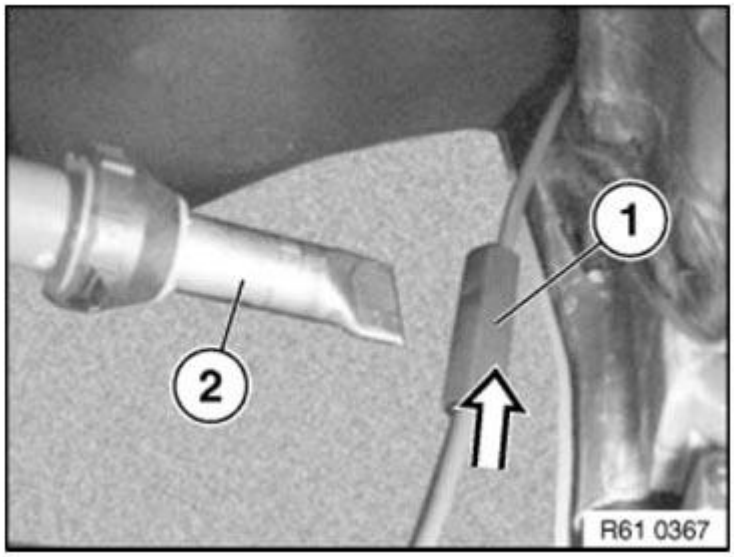


Fig. 83: Pushing Shrink-Fit Hose Over Connecting Point
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Heat up shrink-fit hose until it has settled completely around the connection point.

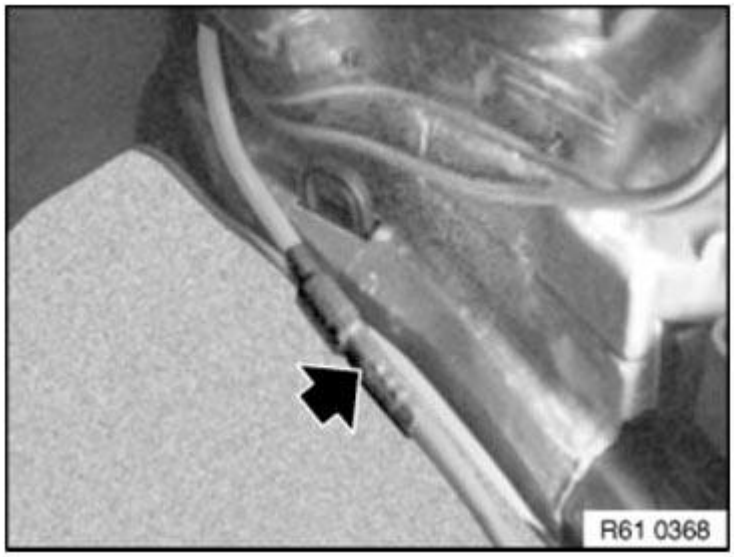


Fig. 84: Locating Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

When laying the repaired battery positive cable, observe the following:

- The shrink-fit hose must not be scuffed during any movement.
- The repair cable must not cause any disturbing noises during driving operation.

NOTE: Offsetting cutting line by approx. 10 cm produces excess length of battery positive lead (1).
Lay battery positive lead (1) without kinks or abrasions.
(Shown on E46 touring.)

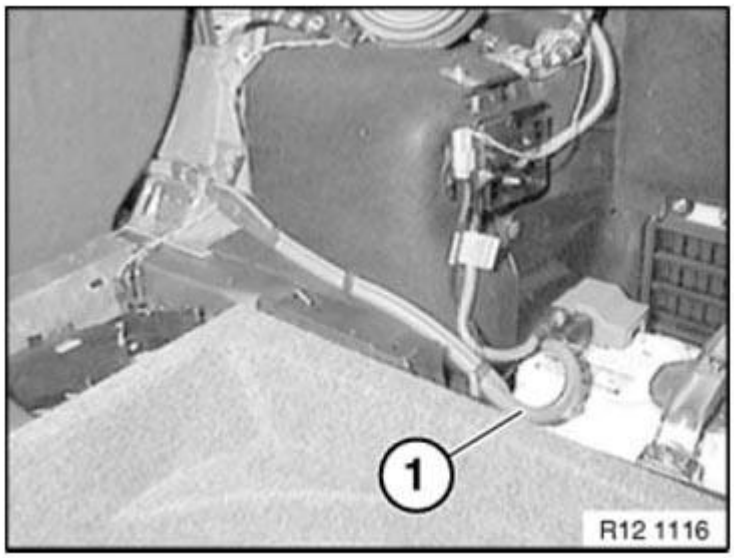


Fig. 85: Identifying Battery Positive Lead

Courtesy of BMW OF NORTH AMERICA, INC.

1251 ENGINE WIRING LOOM

12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (N63)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary work

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove right **SUSPENSION CROSS-BRACE** .
- Remove **SOUND INSULATION** for bulkhead on left
- Remove left and right **INTAKE FILTER HOUSINGS** .
- Remove charge air cooler on left and right. See **REMOVING AND INSTALLING/REPLACING RIGHT CHARGE AIR COOLER (N63)** and **REMOVING AND INSTALLING/REPLACING LEFT CHARGE AIR COOLER (N63)** .
- Remove intake manifold on left and right. See **REMOVING AND INSTALLING/REPLACING LEFT INTAKE PLENUM (N63)** and **REMOVING AND INSTALLING/REPLACING RIGHT INTAKE PLENUM (N63)** .
- Partially remove **WIRING HARNESS** for ignition and injectors.
- Detach **ENGINE OIL PIPE** from oil sump

Picture shows the left side, the procedure for the right side is identical.

Lever expander rivets (1) out of cover (2).

Installation note:

If necessary, replace damaged expanding rivets.

Make sure holders (3) are correctly seated.

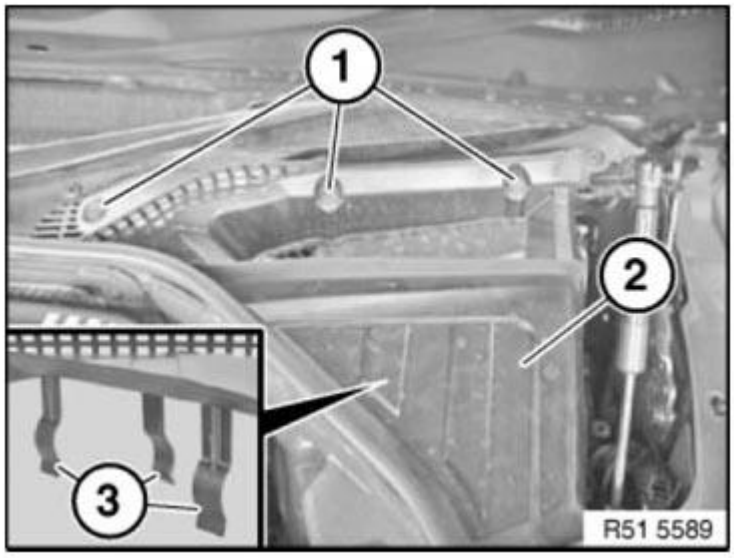


Fig. 86: Identifying Rivets, Cover And Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 90 4AZ** .

Release retainer (2).

Remove cover (3) from supplementary box.

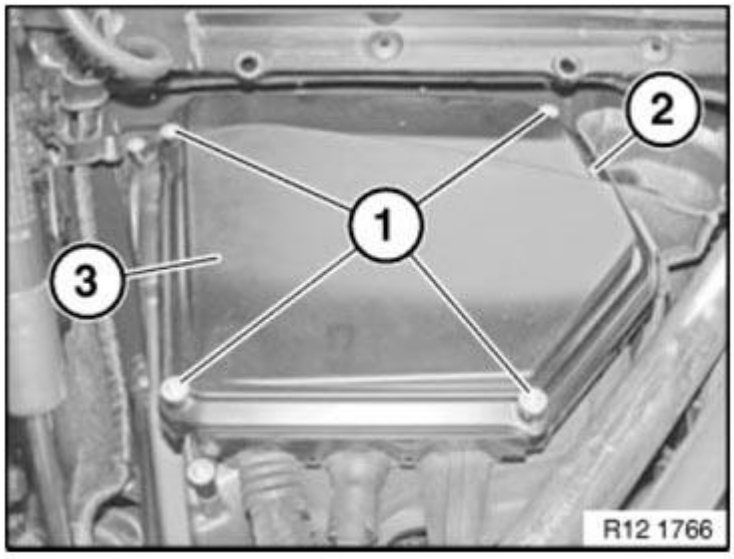


Fig. 87: Identifying Supplementary Electronics Box Cover, Retainer And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect all plugs from carrier plate (1) and release from supplementary electronics box.

Installation note:

Make sure rubber grommets are correctly fitted (watertightness).

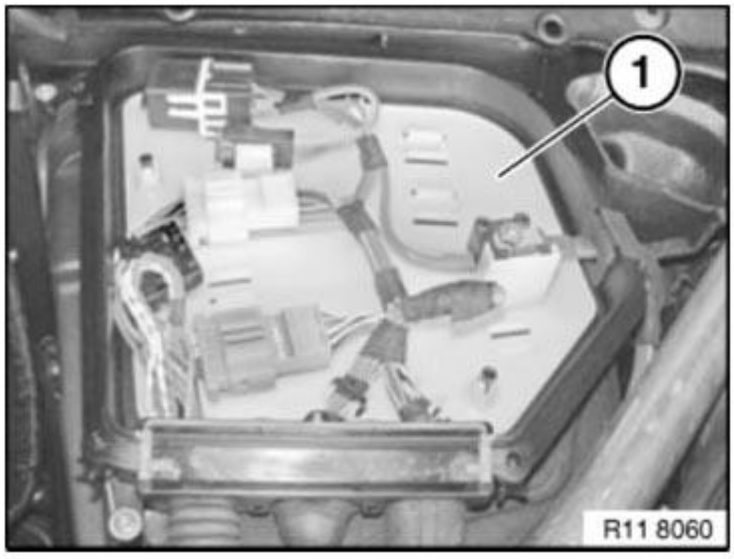


Fig. 88: Identifying Carrier Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip grommet hold-down device (1).

Release wiring harness (2) from bulkhead.

Unlock connector (3) and remove.

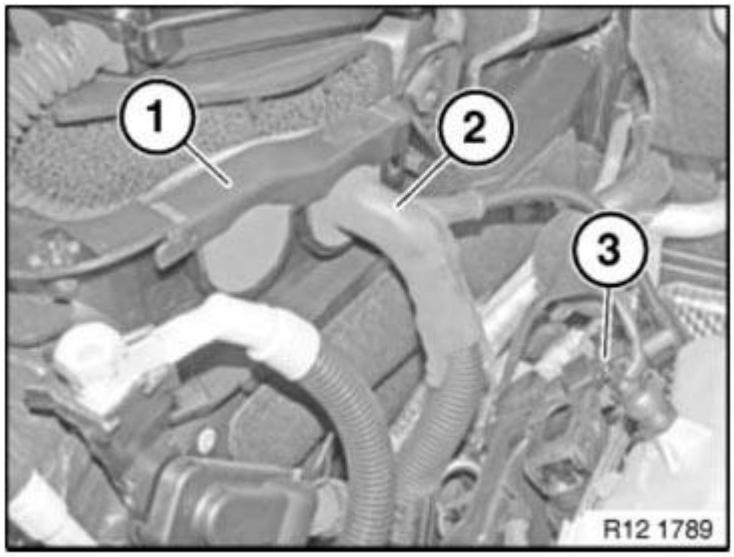


Fig. 89: Identifying Grommet Hold-Down Device, Bulkhead Wiring Harness And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 90 2AZ** .

Remove electronics box cover (2).

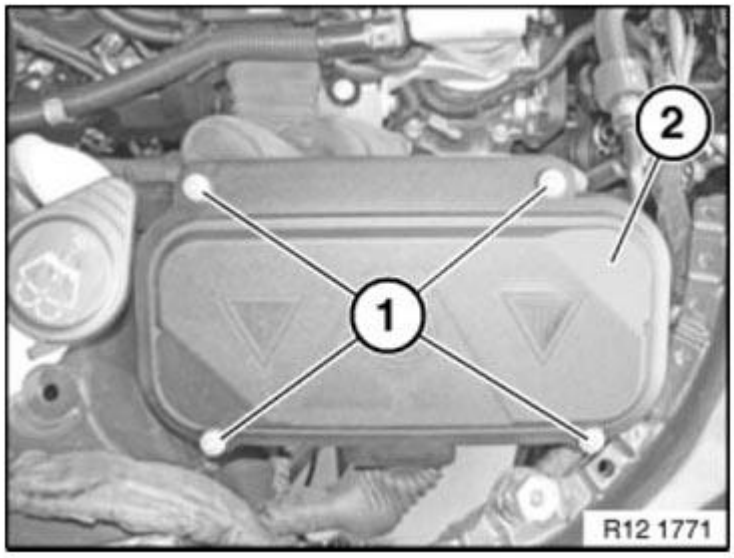


Fig. 90: Identifying Electronics Box Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all connectors (1) from control unit and disconnect.

Unclip grommet hold-down device (2) and remove.

Detach rubber grommets (3) from electronics box. Place wiring harnesses to the side.

Installation note:

Make sure grommets are correctly seated (watertightness).

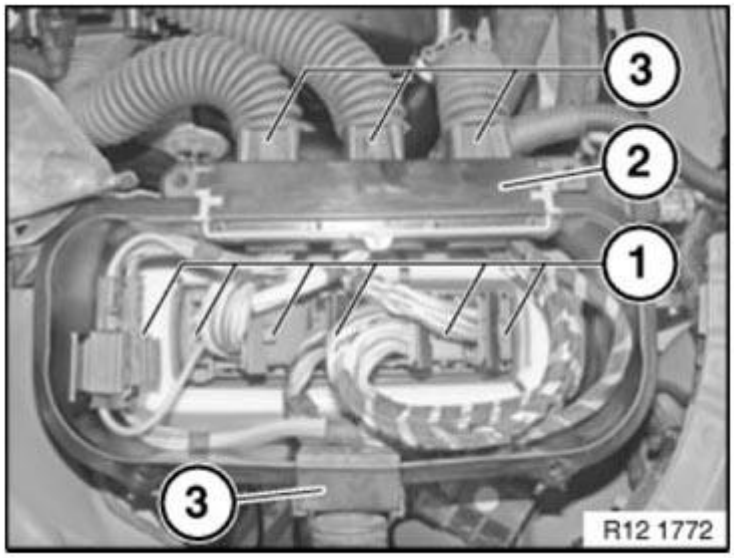


Fig. 91: Identifying Control Unit Connectors, Grommet Hold-Down Device And Electronics Box Rubber Grommets
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **12 51 1AZ** .

Detach earthing cable (2).

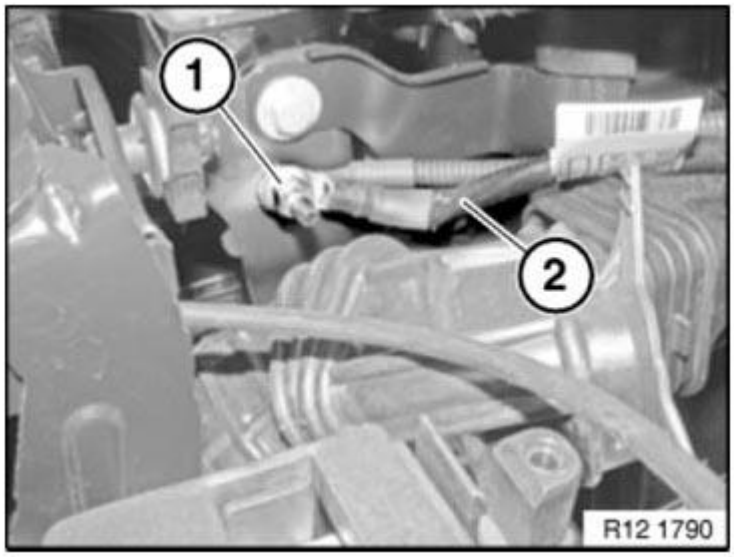


Fig. 92: Identifying Nut And Earthing Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **12 51 2AZ** .

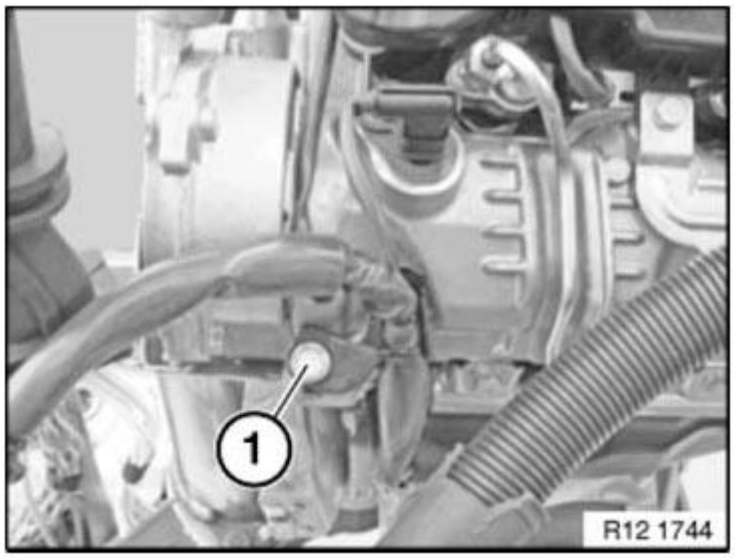


Fig. 93: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 51 2AZ** .

Release wiring harness (2).

Release wiring loom (3) and lay to one side.

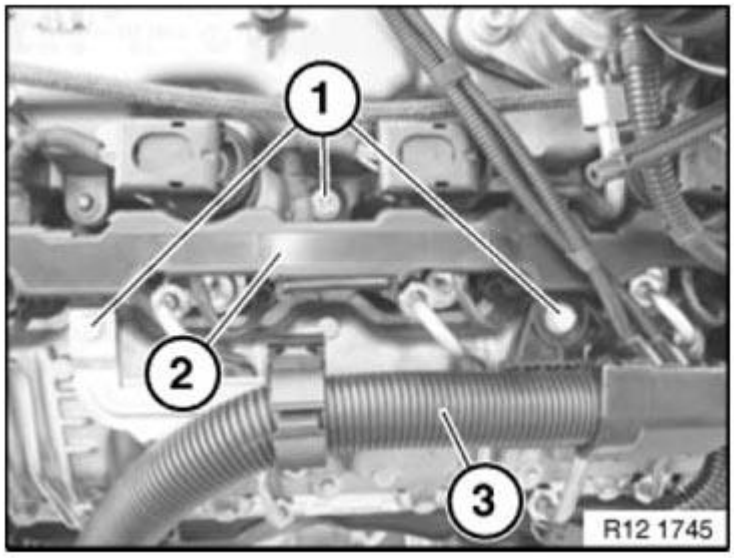


Fig. 94: Identifying Screws, Wiring Harness And Wiring Loom
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **12 51 2AZ** .

Raise cable duct (2).

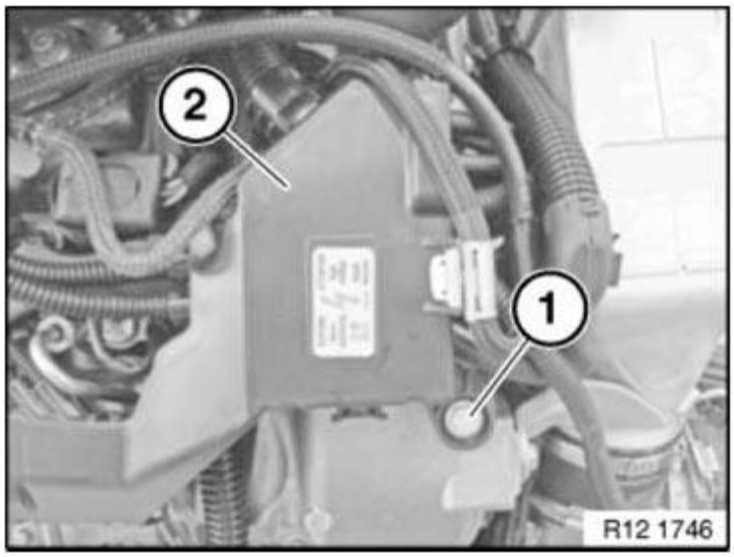


Fig. 95: Identifying Cable Duct And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Pull off cable duct (1) from cable holder (2) in upward direction.

Cable (3) does not have to be released.

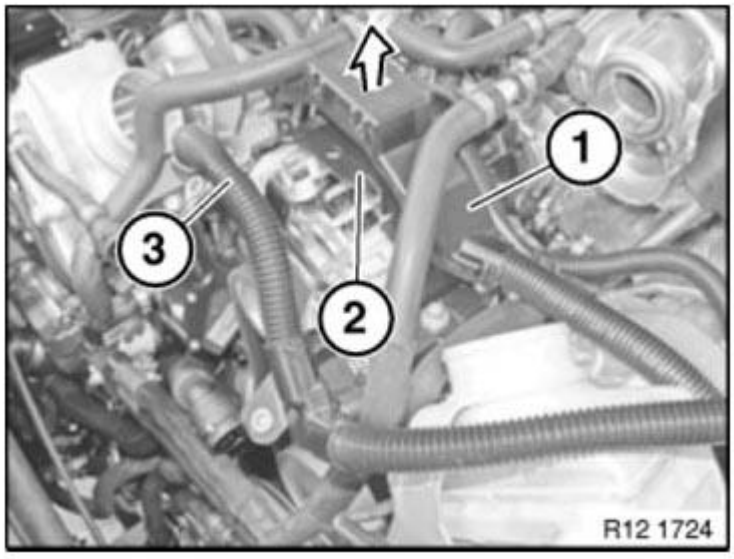


Fig. 96: Identifying Cable Duct, Cable Holder And Holder Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 51 2AZ** .

Raise cable duct (2).

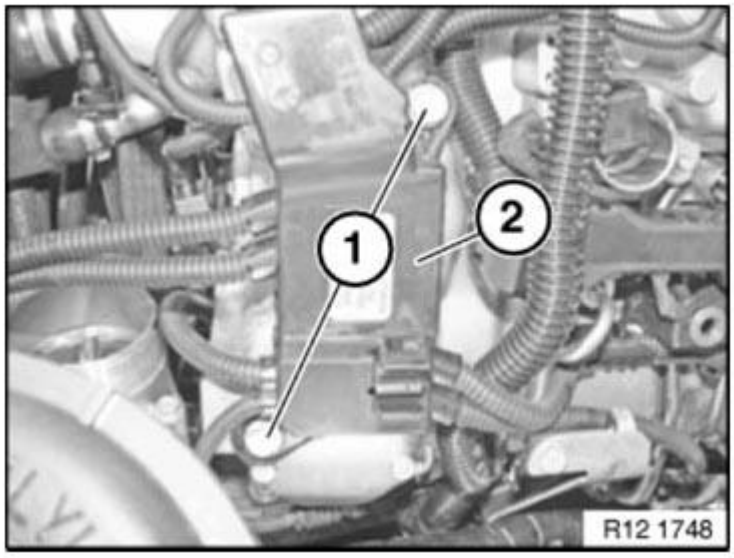


Fig. 97: Identifying Cable Duct And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 51 2AZ** .

Release screw (2).

Lay wiring loom (4) to one side.

Release wiring harness (3) and lay to one side.

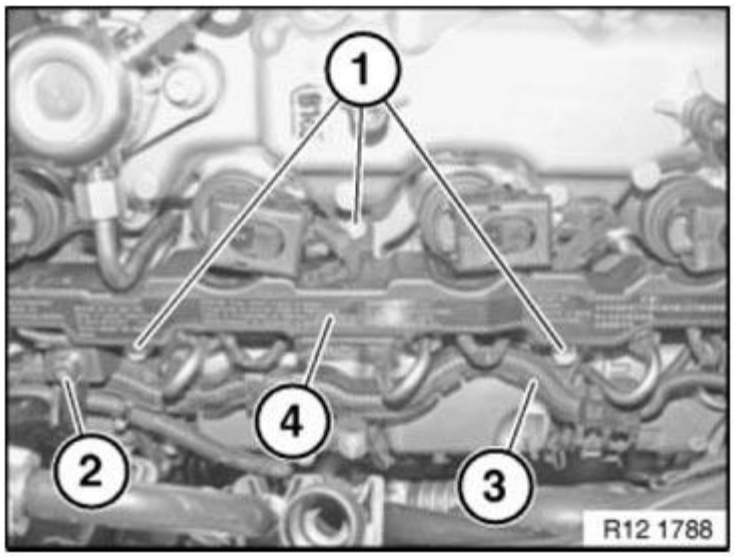


Fig. 98: Identifying Screw, Wiring Harness And Wiring Loom

Courtesy of BMW OF NORTH AMERICA, INC.

CONNECTORS AND LINES REFERENCE CHART

Unlock and disconnect following connectors and lines	
Unlock connector on crankshaft sensor and disconnect	
Release connector on transmission and disconnect	
Release connector on oil pressure sensor and disconnect	
Unlock plug on right inlet camshaft pulse generator and disconnect	
Unlock plug on right exhaust camshaft pulse generator and disconnect	
Unlock connector on starter motor and disconnect	
Unlock connector on oil level sensor and disconnect	
Unlock connector on left and right hot film air mass meter and remove	
Unlock connector on left and right high pressure pumps and disconnect	
Unlock connector on left and right control sensors and disconnect	
Unlock plug on left and right monitor sensors and disconnect	
Unlock plug on left and right high-pressure fuel sensors and disconnect	
Unlock plug on left and right intake air pressure sensors and disconnect	
Release connector on air conditioning compressor and disconnect	
Unlock plug on left and right knock sensors and disconnect	
Unlock plug on left and right charge-air pressure sensors and disconnect	
Unlock plug on coolant temperature sensor to coolant pump and disconnect	
Unlock connector on coolant thermostat and disconnect	
Unlock plug on pressure transducers and disconnect	
Unlock plug on left and right throttle valve assemblies and disconnect	
Unlock plugs on solenoid valves for camshaft adjustment on left and right and disconnect	
Unlock plug on turbocharger coolant pump and	

disconnect	
Unlock connector on the exhaust turbochargers and disconnect	
Release connector on alternator and disconnect	
Unlock plug on left inlet camshaft pulse generator and disconnect	
Unlock plug on left exhaust camshaft pulse generator and disconnect	
Unlock plug on low-pressure fuel sensor and disconnect	
Unlock plug on coolant pump for charge air cooler and disconnect	

Release wiring harness if necessary from existing clips and clamps.

Feed out wiring harness and remove.

Installation note:

Check wiring harness installation arrangement.

Check plug connections for correct fit.

Check stored fault message.

Delete fault memory.

12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION AND INJECTORS (N63)

IMPORTANT: Read and comply with notes on protection against damage from electrostatic damage (ESD protection).

Necessary preliminary work

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD** .
- Remove left and right **INTAKE SILENCER HOUSINGS** .
- Remove intake duct on left and right.
- Partially release **WIRING HARNESS** for engine.

Release screws (1).

Tightening torque **12 90 2AZ** .

Remove electronics box cover (2).

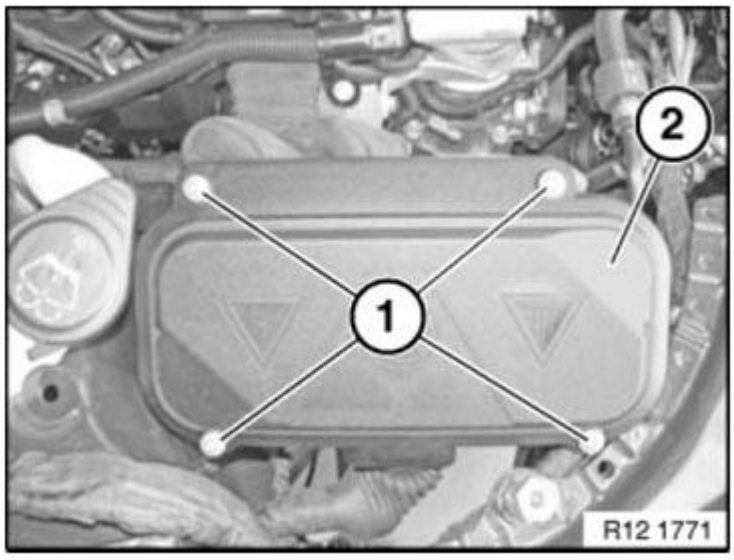


Fig. 99: Identifying Electronics Box Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all connectors (1) from control unit and disconnect.

Unclip grommet hold-down device (2) and remove.

Detach rubber grommets (3) from electronics box. Place wiring harnesses to the side.

Installation note:

Make sure grommets are correctly fitted (watertightness).

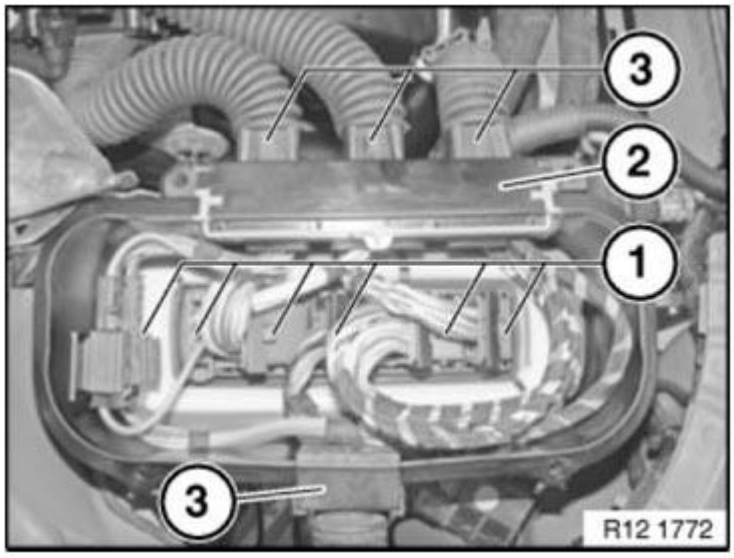


Fig. 100: Identifying Control Unit Connectors, Grommet Hold-Down Device And Electronics Box Rubber Grommets
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamps (1) and (2).

Replace clamps (2).

Detach both charge-air ducts (3) and remove.

Check the gaskets on the exhaust turbocharger. replacing if necessary.

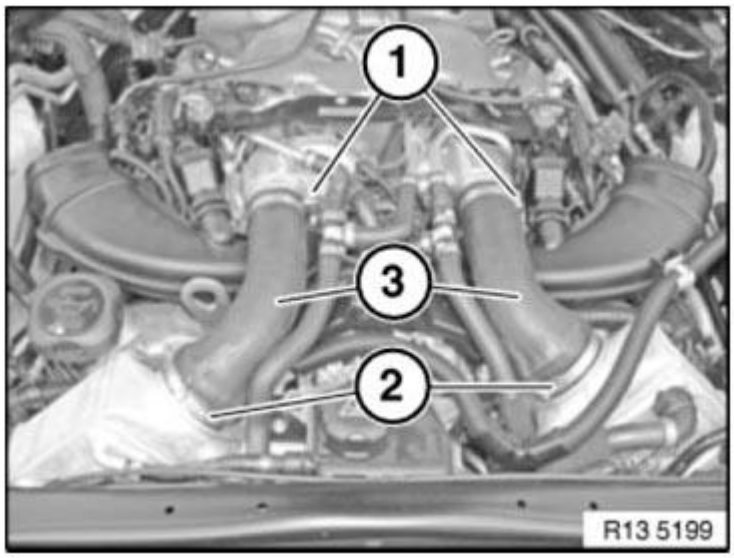


Fig. 101: Identifying Charge-Air Ducts And Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Detach hoses (1) from clean-air pipe.

Release screw (2).

Tightening torque **13 71 1AZ** .

Detach clean-air pipe (3) in direction of travel from exhaust turbocharger.

Check the gasket on the clean air pipe. replacing if necessary.

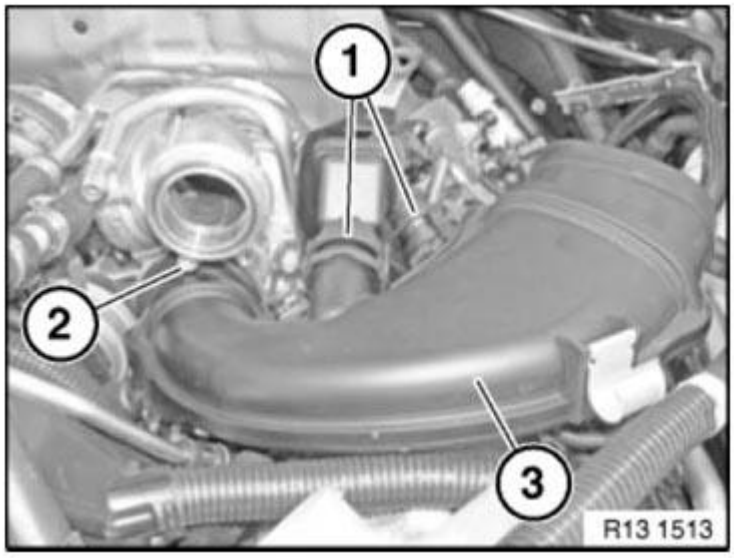


Fig. 102: Identifying Clean-Air Pipe, Hoses And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 51 2AZ** .

Unlock plugs on injectors and ignition coils and detach.

Release wiring harness (2).

Release wiring harness (3) and lay to one side.

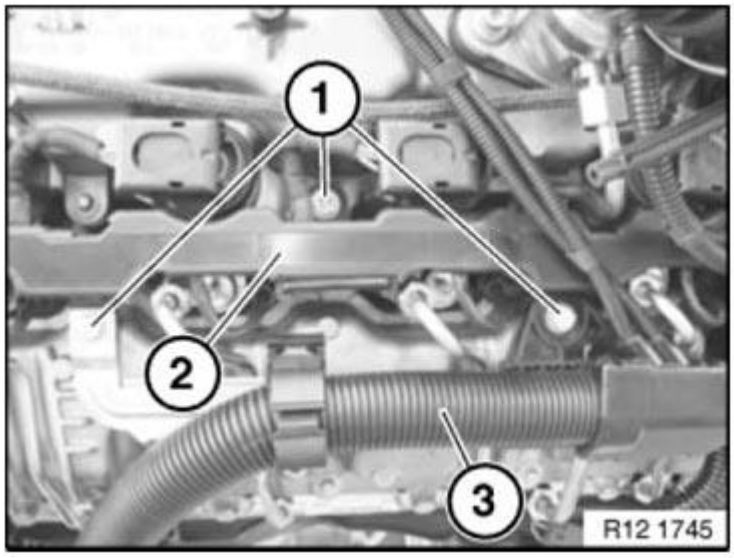


Fig. 103: Identifying Screws, Wiring Harness And Wiring Loom
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **12 51 2AZ** .

Raise cable duct (2).

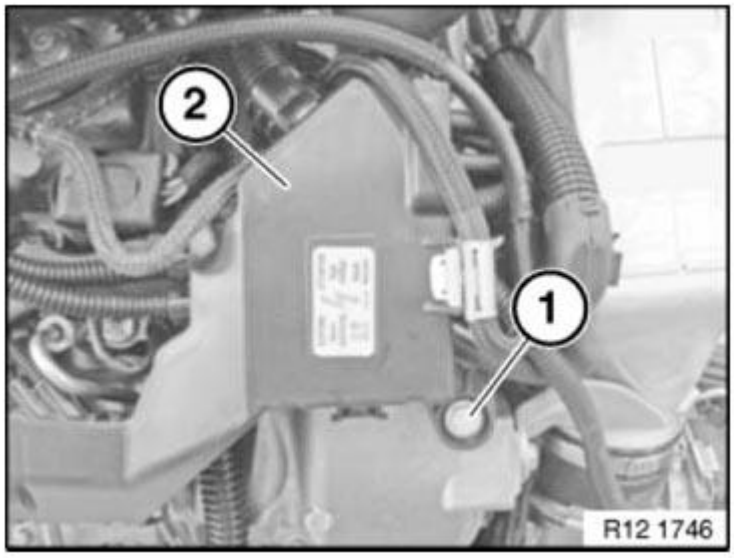


Fig. 104: Identifying Cable Duct And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off cable duct (1) from cable clip (2) in upward direction.

Cable (3) does not have to be released.

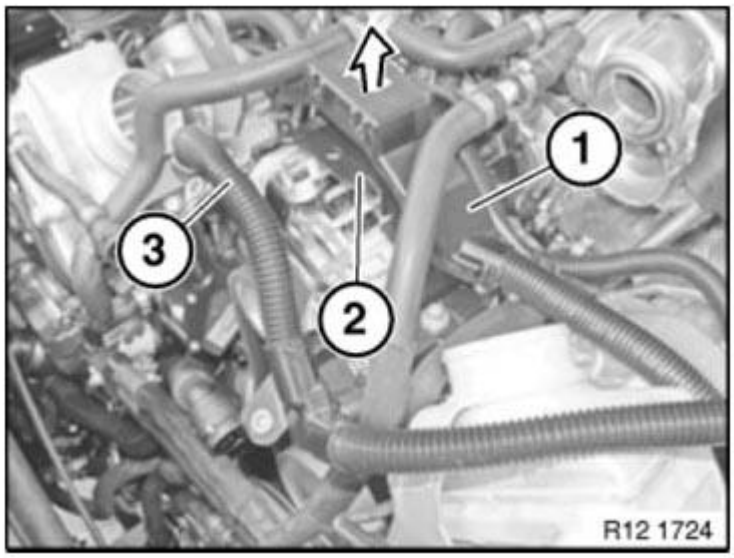


Fig. 105: Identifying Cable Duct, Cable Holder And Holder Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 51 2AZ** .

Raise cable duct (2).

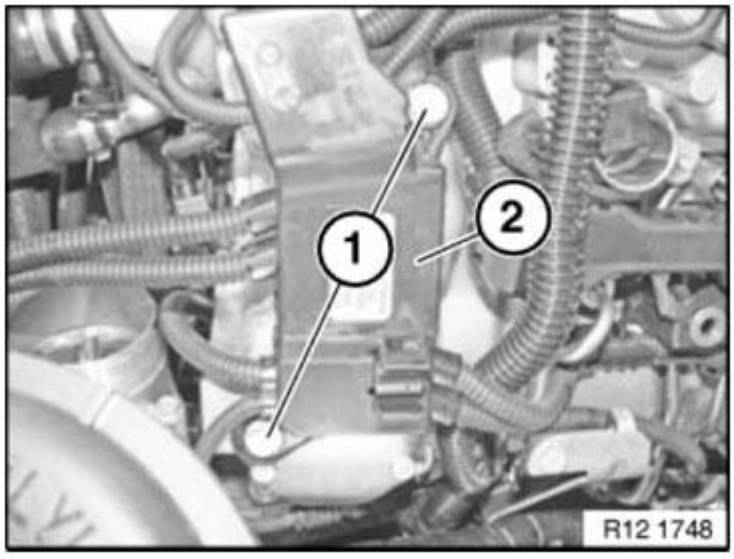


Fig. 106: Identifying Cable Duct And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 51 2AZ** .

Release screw (2).

Unlock plugs on injectors and ignition coils and detach.

Lay wiring harness (3) to one side.

Feed out air wiring harness (4) and remove.

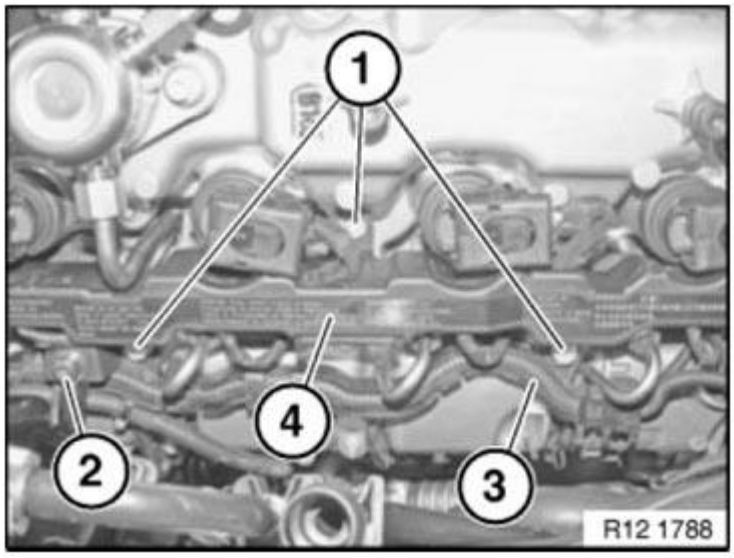


Fig. 107: Identifying Screw, Wiring Harness And Wiring Loom
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check wiring harness installation arrangement.
Check plug connections for correct fit.
Check stored fault message.
Delete fault memory.

1261 OIL PRESSURE/OIL TEMPERATURE/OIL GAUGE

12 61 285 REMOVING AND INSTALLING/REPLACING OIL LEVEL SENSOR FOR ENGINE OIL (N63)

IMPORTANT: Read and comply with notes on protection against damage from electrostatic discharge (ESD protection).

Necessary preliminary work

- Switch off ignition
- Remove rear **UNDERBODY PROTECTION**
- Drain off **ENGINE OIL**

Release connector (1) and remove.

Unscrew nuts (2).

Tightening torque **12 61 2AZ** .

Remove oil level sensor (3).

Installation note:

Clean sealing surface on oil sump.

Replace gasket on oil level sensor.

An excessively low torque value will result in oil leaks.

An excessively high torque value will result in damage to the oil level sensor.

Top up engine oil.

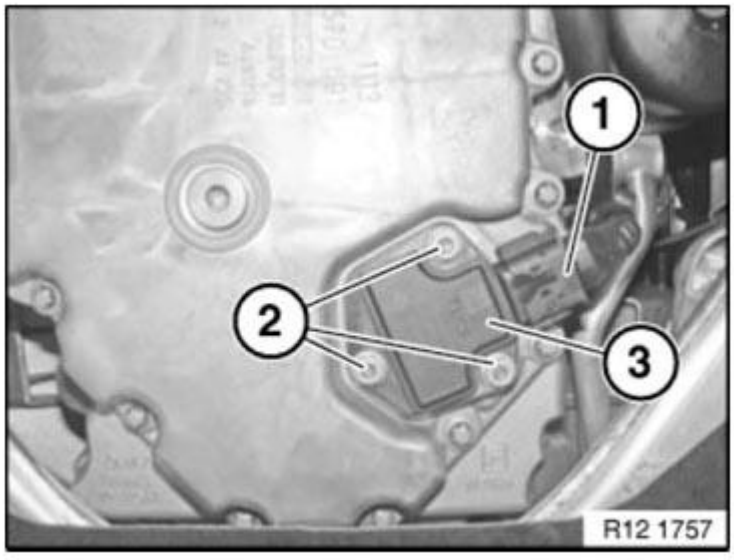


Fig. 108: Identifying Oil Level Sensor, Connector And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N63)

Necessary preliminary tasks

- Turn off ignition
- Remove rear **UNDERBODY PROTECTION**

WARNING: Scalding hazard!
Only perform this task on an engine that has cooled down.

Installation location

Oil pressure sensor is located next to the oil filter housing.

Engine oil may emerge when oil pressure sensor is replaced; have a cleaning cloth ready.

Unlock plug (1) and remove.

Release oil pressure sensor (2).

Tightening torque **12 61 1AZ** .

Installation:

Check engine oil level. Top up engine oil if level is too low.

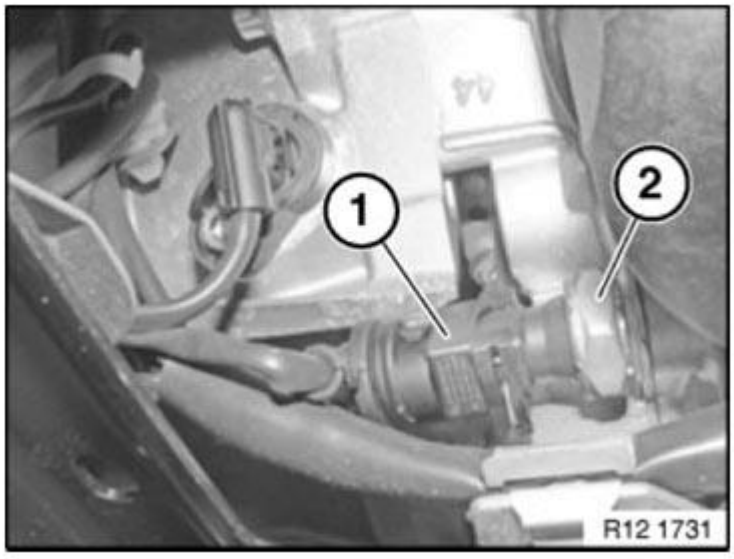


Fig. 109: Identifying Oil Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

1290 CONTROL UNIT BOX

12 90... REMOVING AND INSTALLING/REPLACING ELECTRONICS BOX

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

NOTE: Follow instructions for removing and installing CONTROL UNITS !

Necessary preliminary work

- Read fault memory.
- Disconnect **BATTERY EARTH LEAD** .
- Remove **DME CONTROL UNIT** .

Release screws (1).

Tightening torque **12 90 1AZ** .

Unclip coolant lines at clamp (2) from electronics box.

Feed electronics box (3) out upward and remove.

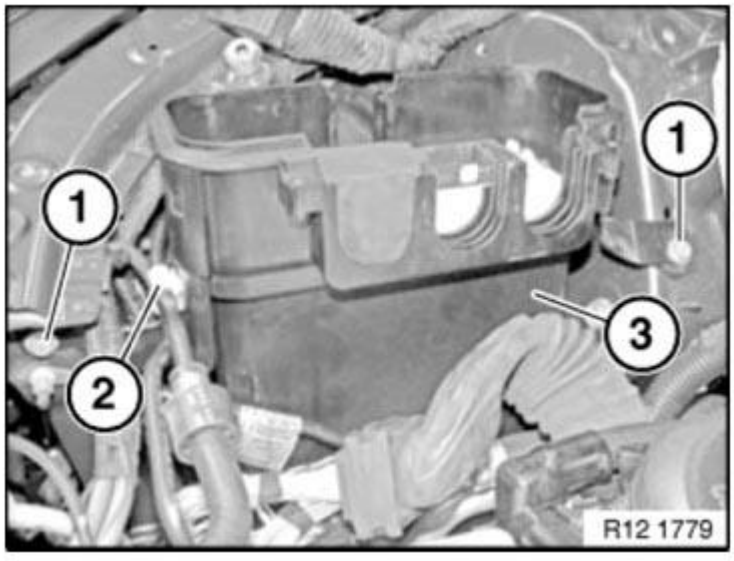


Fig. 110: Identifying Electronics Box, Clamp And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

When installing the electronics box, insert guide (1) on engine support.

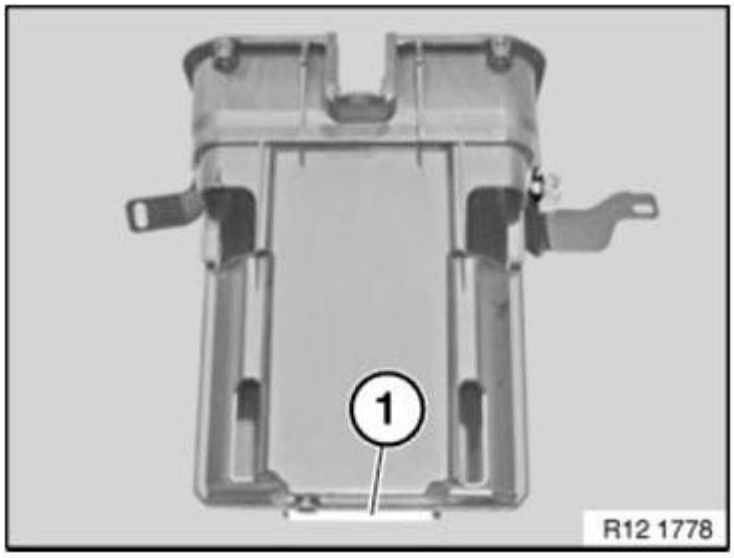


Fig. 111: Identifying Engine Support Guide
Courtesy of BMW OF NORTH AMERICA, INC.

12 90... REMOVING AND INSTALLING/REPLACING ELECTRONICS BOX ADD-ON

IMPORTANT: Comply with NOTES ON PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection)!

NOTE: Follow instructions for removing and installing control units.

Necessary preliminary work

- Read fault memory.
- Disconnect **BATTERY EARTH LEAD** .

Remove right cowl panel cover.

Picture shows the left side, the procedure for the right side is identical.

Lever expander rivets (1) out of cover (2).

Installation note:

If necessary, replace damaged expanding rivets.

Make sure holders (3) are correctly seated.

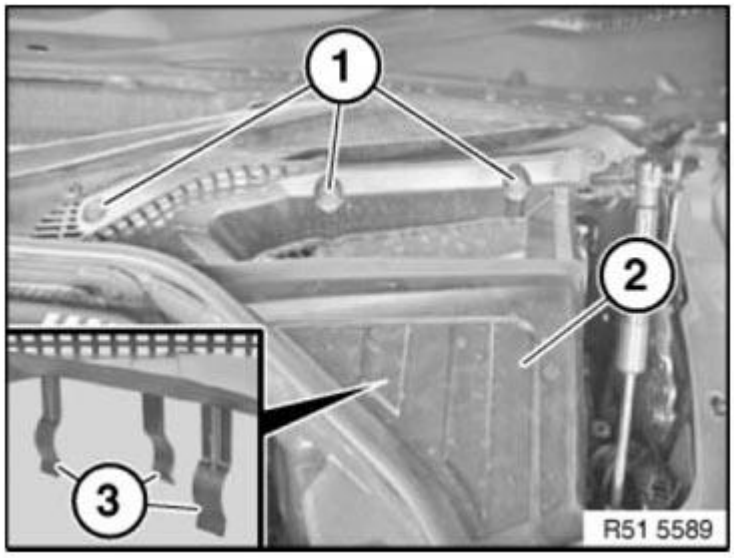


Fig. 112: Identifying Rivets, Cover And Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **12 90 4AZ** .

Release retainer (2).

Remove cover (3) from supplementary electronics box.

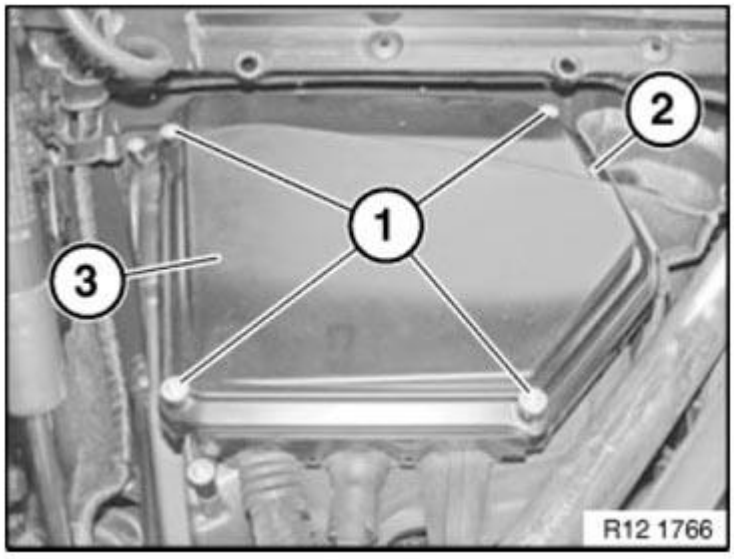


Fig. 113: Identifying Supplementary Electronics Box Cover, Retainer And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip grommet hold-down device (1).

Detach rubber grommets (2) from electronics box add-on.

Installation note:

Make sure grommets are correctly seated (watertightness).

Release carrier plate (3) from lower section of supplementary electronics box (5) and set aside.

Release screw (4).

Tightening torque **12 90 2AZ** .

Remove the lower section of the supplementary electronics box (5).

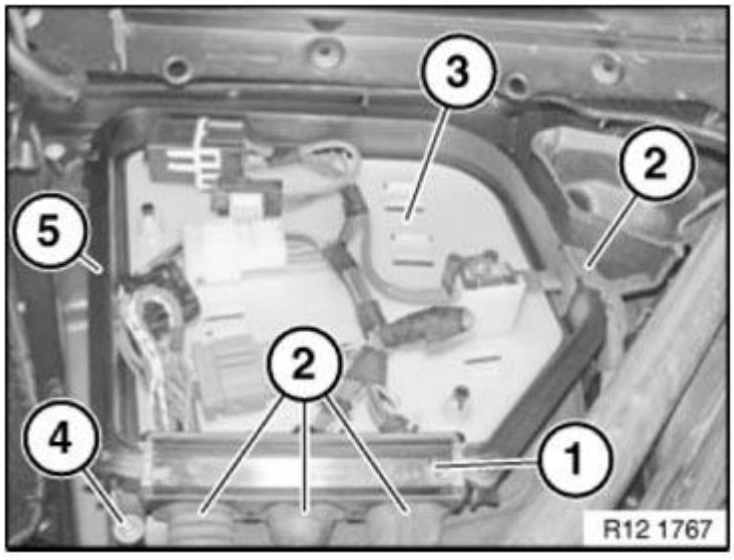


Fig. 114: Identifying Grommet Hold-Down Device, Electronics Box Rubber Grommets, Carrier Plate And Supplementary Electronics Box
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Information & Communications - Overview

F01 REAR SEAT ENTERTAINMENT SYSTEM

INTRODUCTION

History

Rear Seat Entertainment - E65

The rear seat entertainment system in the E65/E66 featured a folding rear display with a screen diagonal of 6.5" and a resolution of 400 x 240 pixels. The display was driven by the MOST control unit -rear display SG-FD. It converted the analog RGB signals into a digital LVDS signal.

In the E65/E66 it was already possible to listen to several audio sources simultaneously. For instance, while the driver listened to the radio through the speakers, the rear passenger could enjoy a CD through hard-wired headphones. The analog signals made available by the audio devices were placed on the MOST-bus. The headphone interface KHI prepared the signals separately for each headphone socket.

Hard-wired headphones could be connected to the headphone connection module.

Rear Seat Entertainment - E70

A larger rear display with a screen diagonal of 8" and a distinctly higher resolution of 800 x 480 pixels is fitted in the E70 with rear seat entertainment. The folding display is installed between the seats.

The rear display control unit and rear seat entertainment RSE are connected to the K-CAN. Picture transmission takes place directly via LVDS and the signal no longer needs to be converted. The RSE control unit features its own DVD player making it possible to conveniently change DVDs while driving.

External devices such as game consoles, video cameras and hard-wired headphones can be connected directly to the RSE control unit. A headphone interface KHI for signal processing is not required.

An infrared transmitter is integrated in the base of the rear display to allow operation of wireless infrared headphones.

The rear seat entertainment system is remote-controlled. All audio settings made with the remote control relate only to the hard-wired headphones.

Rear Seat Entertainment - F01/F02

Rear seat entertainment option (6FG) is part of the ZRP Rear entertainment Package available on the F01/F02 and is refered to as the "Mid version" in the ISTA Diagnostic Equipment.

The rear seat entertainment system F01/F02 features several innovations in terms of equipment and operation.

Two folding 800 x 480 pixel displays with an infrared transmitter are integrated into the backrests of the front seats. For the first time in a BMW vehicle, the RSE control units are integrated in the MOST-bus.

The rear seat entertainment system features:

- Two displays with a screen diagonal of 8" are fitted.
- The same program can be viewed on both screens.
- An external device (e.g. game console) may be connected to the right or left side of the RSE and the feed from the external device shown on the selected side.
- The system is controlled by remote control.

SYSTEM OVERVIEW

Audio playback takes place either through the vehicle's speakers or via headphones. The volume of the speakers can be adjusted via the multifunction steering wheel, the head unit or with the remote control. The volume is controlled speed-dependent during playback through the speakers. The driving speed is registered by the wheel speed sensors.

The sound settings can be configured on the CIC or with the remote control. If audio is played back via the headphones, the volume can be adjusted either on the headphones (infrared headphones) or using the remote control (hard-wired headphones). The infrared headphones receive their signals from the infrared transmitter.



Fig. 1: Identifying Rear Seat Entertainment System (RSE)
Courtesy of BMW OF NORTH AMERICA, INC.

External devices can be connected via the two AV inputs directly to the RSE control unit or via the AUX-In connection or the USB-audio interface in the center console. The USB-audio interface provides an additional jack and a USB connection for a type A USB connector.

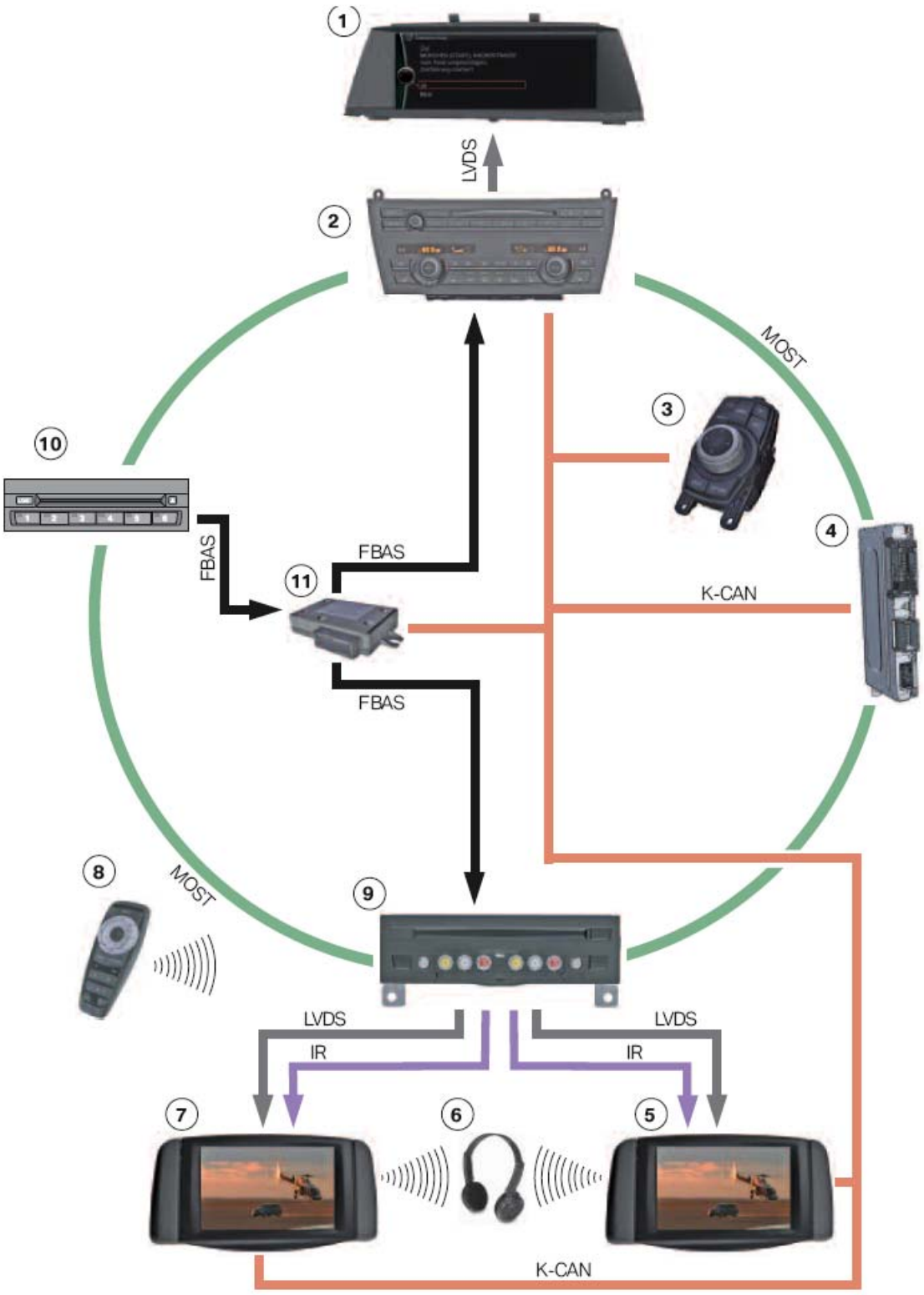


Fig. 2: Rear Seat Entertainment System Function Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

REAR SEAT ENTERTAINMENT SYSTEM COMPONENTS REFERENCE CHART

Index	Explanation
1	Central information display (CID)
2	Head unit, Car Information Computer (CIC)
3	iDrive controller
4	Central gateway module (ZGM)
5	Rear display FD2 with rear display control unit and infrared transmitter
6	Infrared headphones
7	Rear display FD with rear display control unit and infrared transmitter
8	Remote control
9	Rear seat entertainment control unit (RSE MID)
10	DVD changer (DVD)
11	Video switch (VSW)
12	Not for US

When playing a DVD in the CIC, the picture cannot be transmitted to the rear seat entertainment system. When playing a DVD in the RSE control unit the picture is not transmitted to the CIC. However audio playback is possible in both cases.

During playback via the DVD changer, picture and sound are transmitted to the CIC and the rear seat entertainment system.

For safety reasons, no picture is shown in the CID while the vehicle is being driven, although audio playback is still possible.

When an external device (e.g. game console) is connected to one of the AV inputs of the RSE control unit, the video signal is output on the right or left display depending on where the source is connected. A selected DVD can still be viewed on the other display.

The RSE control unit features a FBAS or CVBS (composite video baseland signal) video signal input.

The RSE control unit has a CVBS video signal input connected to the DVD Changer through the video switch to display of media played in the DVD Changer on the rear screens. In this case the video switch is needed because a source with a CVBS output (e.g. DVD changer) is connected to the CIC and the RSE.

The CIC has only three CVBS inputs, If there are more than three video sources to be connected to the CIC a video switch has to be included to comply with the equipment configuration.

NOTE: (FBAS) Farb-Bild-Austast-Synchron is CVBS (Composite Video Baseband Signal) in which just the video signal is transmitted through a single wire with the audio signal handled separately.

RSE Circuit Diagram

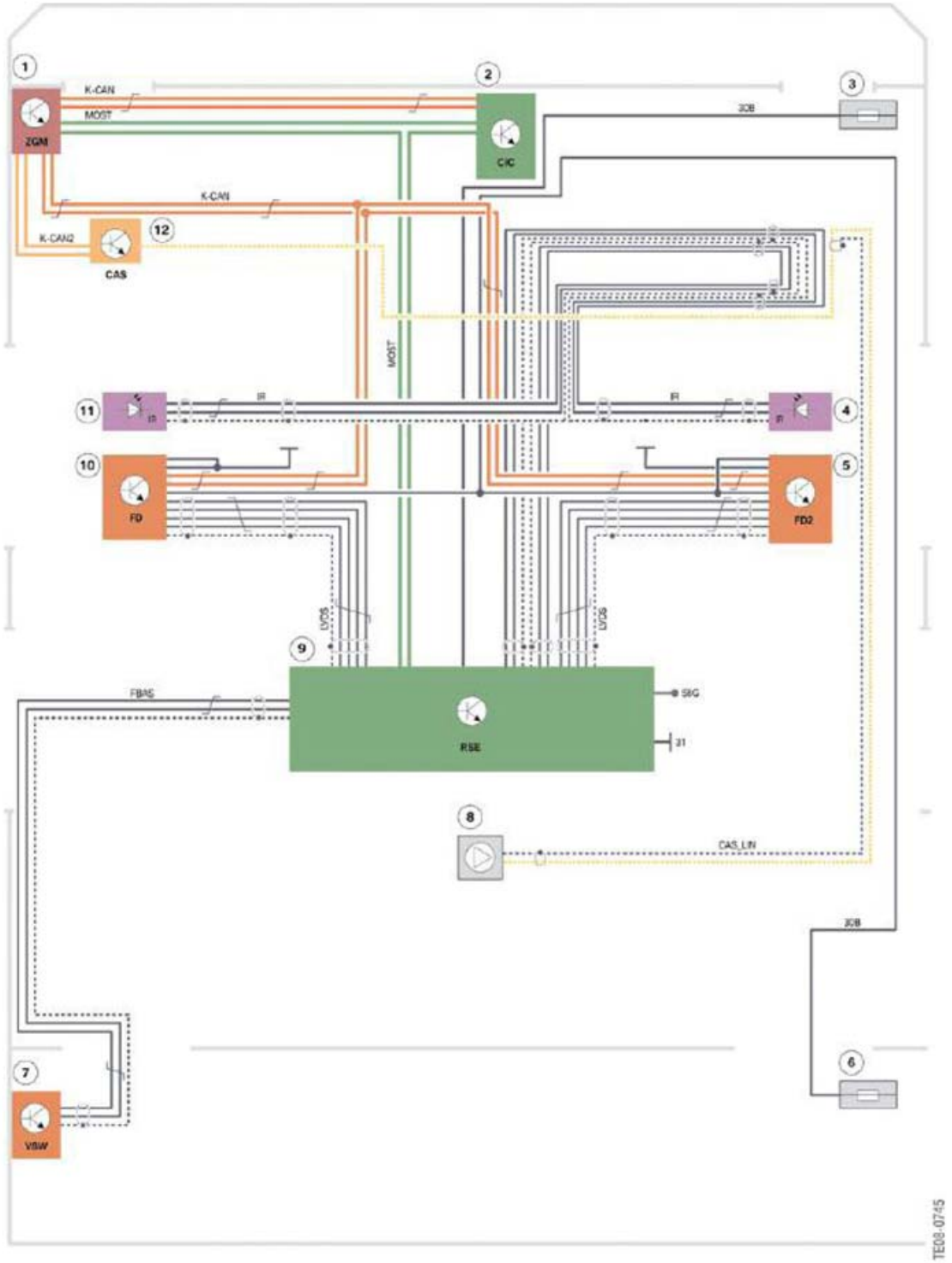


Fig. 3: RSE Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Central gateway module (ZGM)
2	Car Information Computer (CIC)
4	Infrared transmitter, right
5	Rear display (FD2) with rear display control unit (SG-FD2)
6	Fuse
7	Video switch (VSW)
8	Aerial diversity module with aerial amplifier
9	Rear seat entertainment control unit (RSE)
10	Rear display (FD) with rear display control unit (SG-FD)
11	Infrared transmitter, left
12	Car Access System 4 (CAS4)
KL.30B	Terminal 30 basic operation
KL.58G	Signal, footwell module light (FRM 3)
FBAS	FBAS signal
IR	Infrared signal
K-CAN	Body CAN
K-CAN2	Body CAN2
LVDS	Low voltage differential signal
MOST	Media Oriented System Transport

MOST Signals at RSE Control Unit

MOST SIGNAL REFERENCE CHART

In/Out	Signal	Source/sink	Function
In	Control signals	FBD antenna > Antenna diversity module > CAS4 > ZGM >	RSE control (entertainment source, track selection, etc.)
In	Date, time	Instrument cluster>	Display in FD and FD2
In	RSE release	iDrive controller > CIC >	Access rights
In	Terminal status	> CAS4 > ZGM >	Activation conditions
Out	Control signals	> FD and FD2 > Display	ON/OFF, setting

K-CAN Signals at SG-FD and SG-FD2

K-CAN SIGNAL REFERENCE CHART

In/Out	Signal	Source/sink	Function
In	RSE status	RSE > ZGM >	RSE standby

In	FD and FD2 status	ZGM > RSE >	FD and FD2 standby

The FD and FD2 rear displays each have their own control unit. The SG-FD and SG-FD2 control units are connected to the K-CAN. The rear displays are connected via LVDS to the RSE control unit. All video information is transmitted via the LVDS link. The rear displays receive the ON/OFF signal from the RSE control unit. The ZGM places the MOST signal on the K-CAN and is sent to the rear displays.

During audio playback through the vehicle's speaker system, the RSE control unit routes the audio signal via the MOST to the head unit CIC or the Top-HiFi amplifier.

Programming, coding and diagnosis of the rear seat entertainment system (6FG) take place via MOST.

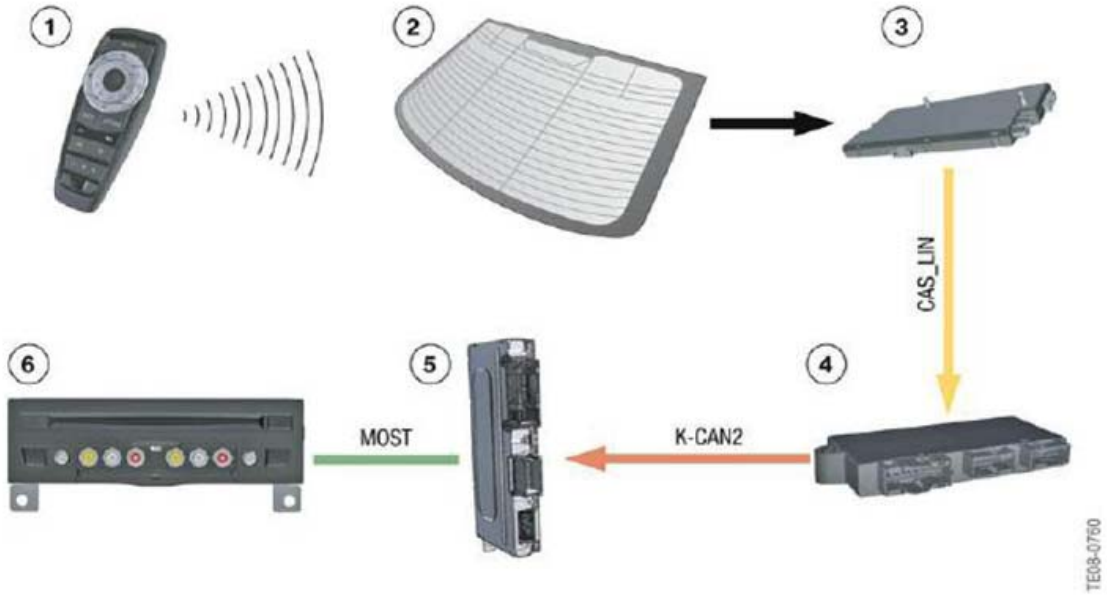


Fig. 4: Rear Seat Entertainment System Remote Control Function Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Remote control
2	Rear window with antenna, remote control services (FBD)
3	Antenna diversity module with antenna amplifier
4	Car access module 4 (CAS4)
5	Central gateway module (ZGM)
6	Rear seat entertainment control unit (RSE)

The commands entered by means of the remote control are transmitted by radio waves.

The same frequency is also used for the radio remote control key. The frequency used is dependent on the national variant and therefore relevant for coding. The commands are received by the FBD antenna and routed

via the antenna diversity module to the CAS4.

The CAS4 converts the signals into K-CAN2 messages and routes the signals to the ZGM. The ZGM places the signals on the MOST-bus. The RSE control unit receives the signals via the MOST.

SYSTEM FUNCTIONS

The rear seat entertainment system must be switched on to execute all its functions.

The driver can use the iDrive to select the access rights for the rear seat entertainment system.



Fig. 5: Selecting CID Main Menu Settings
Courtesy of BMW OF NORTH AMERICA, INC.

Select submenu "Settings" (2) in Main menu (1) with the iDrive.

Select the submenu "Rear system enable" in the "Settings" menu.



Fig. 6: Selecting Driver Control

Courtesy of BMW OF NORTH AMERICA, INC.

Four different functions can be selected in the "Rear control" menu (1):

- **"Driver control" (2):**

  Everything that does not disturb the driver can be controlled in the rear compartment.

- **"Equal control" (3):**

  The driver and the rear passengers can execute all functions with equal authorization.

- **"Rear control" (4):**

  The driver can control everything that does not disturb the rear passengers.

- **"Switch off rear DVD system" (5):**

Switch off rear seat entertainment system. The rear seat entertainment system cannot be switched on again before any other priority is selected.

NOTE: The driver can control the volume of the speakers in all four settings. Audio playback is muted by pressing the (ON/OFF) rotary pushbutton on the CIC.

Speaker Control

Speaker control must be switched on to facilitate audio playback through the speakers. The hard-wired headphones are muted when speaker control is activated.

The rear displays adopt the feed from the currently active source.

The speakers can then be controlled from the rear seat entertainment system.



Fig. 7: Selecting Loudspeakers
Courtesy of BMW OF NORTH AMERICA, INC.

To switch on speaker control, select "Rear operated speakers" (2) in the "Options" menu (1).

Connecting External AV Devices

External devices can be connected to the RSE control unit via the AV inputs. External devices can also be connected via the AUX-In connection or the USB-audio interface (6FL) in the center console. Connected video devices are recognized automatically.

NOTE: The connection is automatically deactivated after unplugging the external video device. A blue image may be shown on the rear screen if the connection is not deactivated automatically.

The corresponding input must be activated when a pure audio device is connected.

Follow the following steps to connect an external device:

- Switch on the rear seat entertainment system.
- Open the flap on the RSE control unit when connecting to the AV inputs.
- Fold open the center armrest when connecting to the AUX-In connection or USB-audio interface (6FL).
- Connect the external audio device to the corresponding input and switch on.
- Select the "CD/Multimedia" menu item (1) in the Main Menu.
- Then select the "External devices" menu item (2) in the "CD/Multimedia" menu (1).



Fig. 8: Selecting External Devices
Courtesy of BMW OF NORTH AMERICA, INC.

The available connections and their status are now shown:

- USB-audio interface (1)
- AUX-In connection, Center console (2)
- RSE control unit, AV input, left (3)
- RSE control unit, AV input, right (4).

NOTE: Once an external device has been connected to the RSE it remains connected until it is turned off or disconnected.



Fig. 9: Activating External Devices
Courtesy of BMW OF NORTH AMERICA, INC.

Digital and Satellite Tuners

The digital tuner and the satellite tuner can also be controlled from the rear seat entertainment system. Various satellite and digital radios are available corresponding to the national market specification.

- In Band On Channel (IBOC) is the digital tuner in the USA
- Satellite Digital Audio Radio Service (SDARS), is the satellite supported subscription radio in North America.

In the F01/F02, the digital tuners are integrated in the CIC and no longer installed externally.

The SDARS satellite tuner is installed in the luggage compartment and connected to the MOST-bus.

Proceed as described in the following to select a digital or satellite tuner.

Digital Tuner

Select the HD Radio "IBOC" menu item (2) in the "Radio" menu (1).



Fig. 10: Selecting HD Radio
Courtesy of BMW OF NORTH AMERICA, INC.

Satellite Tuner

Select the "Satellite radio" menu item (2) in the "Radio" menu (1). The stations can be scanned and selected in the same way as terrestrial stations.



Fig. 11: Selecting Satellite Radio
Courtesy of BMW OF NORTH AMERICA, INC.

Language

The selected language always applies to the complete vehicle. When the language is changed in the CIC, this language will also be adopted by the rear seat entertainment system. After changing the language in the rear seat entertainment system, the change will also be adopted in the CIC.

SYSTEM COMPONENTS

The rear seat entertainment system consists of the following components:

- RSE control unit with DVD player
- One FBAS/CVBS (composite video baseland signal) video signal input
- Two separate AV (audio video) inputs
- Headphone connections in the rear center console
- Two 8" rear displays (built into the backrests of the front seats) with incorporated rear display control units and infrared transmitters.
- Remote control

Component Location



Fig. 12: Identifying Rear Entertainment Components
Courtesy of BMW OF NORTH AMERICA, INC.

REAR ENTERTAINMENT COMPONENTS REFERENCE CHART

Index	Explanation
1	Central information display (CID)
2	Head unit (CIC)
3	Rear display FD2 8"
4	Remote control
5	RSE control unit
6	Rear display FD 8"

RSE System

The rear seat entertainment system offers the following equipment:

- Radio tuner with RDS
- Audio playback through
  - Infrared headphones

  - Hard-wired headphones
  - Audio speakers in the vehicle
- AUX-In connection in center console (analog jack)
- Connection to external equipment via AV input, e.g. video camera, games console or portable playback equipment
- Operation through remote control.

Optional extras:

- DVD changer (above glove compartment)
- USB/audio interface in center console (for connecting media USB sticks or mp3 players e.g. Apple iPod®)
- Digital and satellite radio tuners
  - In Band On Channel IBOC
  - Satellite Digital Audio Radio Services, SDARS (with subscription)

Rear Displays

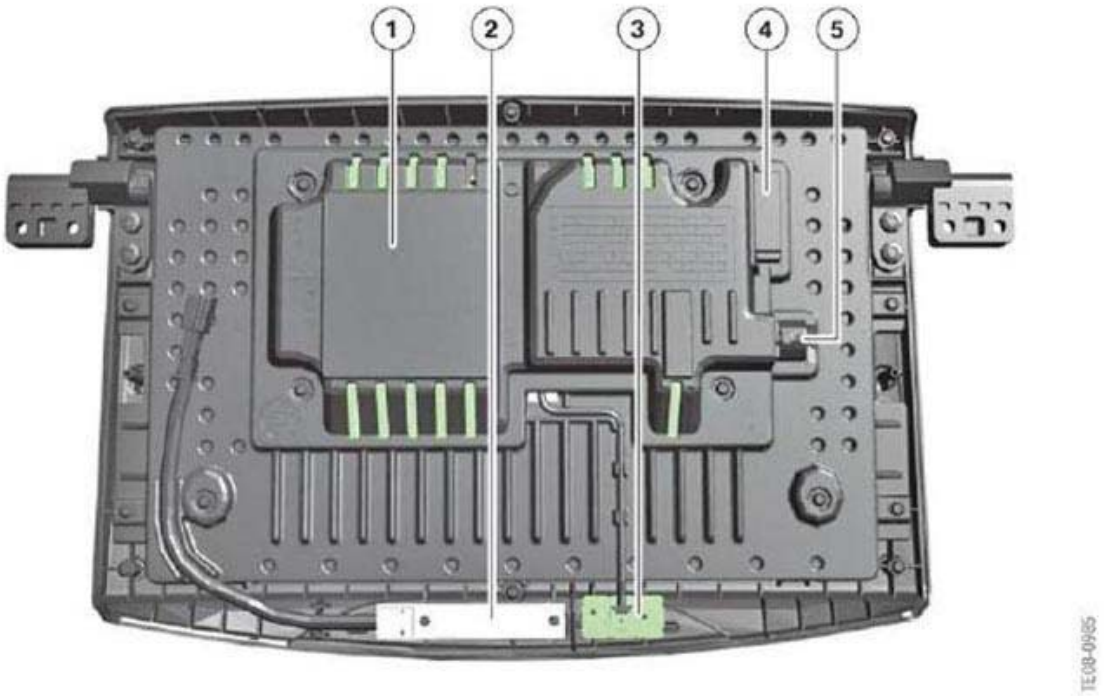


Fig. 13: Identifying Rear Display Rear View
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENT REFERENCE CHART

Index	Explanation
1	Rear display control unit SG-FD

2	Infrared transmitter
3	Photodiode
4	K-CAN and power supply connection
5	Rear display connection

Both the FD and FD2 rear displays have their own control unit SG-FD. The control units are connected to the K-CAN.

The rear displays are connected via LVDS to the RSE control unit and are switched on and off by the RSE control unit via MOST > ZGM > KCAN.

In comparison to earlier systems with 8-wire LVDS cable, the signals in the F01/F02 are sent via a 2-wire LVDS cable.

Signal transmission via this 2-wire LVDS line offers four distinct advantages:

- Higher data transfer rate
- Simplified wiring
- Runtime differences between the individual lines are avoided
- Serial 2-wire LVDS data transmission is now much more cost-effective

The photodiode is used to automatically control the brightness of the rear display.

TFT-LCD DISPLAY TECHNICAL DATA REFERENCE CHART

Technical data TFT-LCD Displays	Rear seat entertainment
Visible screen diagonal	8"
Resolution in pixels	800 x 480
Luminous intensity in Candela	625 Cd/m2
Colors	WVGA 262144 (18-bit colors)
Switching time at 25°C	20-25 ms
Format	15:9

Infrared Transmitters

The infrared transmitters consist of six infrared diodes. They are located behind a plastic cover in the housing of the rear display.

The RSE control unit powers the infrared transmitters which use infrared light to transmit the audio signals to the headphones. The infrared diodes begin to light as soon as the RSE control unit is switched on.

The infrared diodes then stay on for as long as at least one side of the RSE is still active. The diodes go out 5 seconds after switching off the last rear display.

The infrared transmitters use the following frequencies to send the audio signals:

INFRARED TRANSMITTERS FREQUENCY REFERENCE CHART

Left channel	Right channel
2.3 MHz	3.2 MHz
2.8 MHz	3.8 MHz

To ensure trouble-free operation of the infrared headphones, note the following:

- An unimpeded line of sight between the receiver on the headphones and the infrared transmitter is essential.
- The cover on the infrared transmitter is clean and free from scratches.

Headphones

Headphones are not included on delivery of the F01/F02. BMW recommends the use of headphones that have been specifically designed for the rear seat entertainment system and are available to order from BMW Parts.

Infrared Headphones

The infrared headphones used must comply with IEC DIN 61603-2.

If infrared headphone accessories are used, they must match the frequencies of the infrared transmitter.

There is no restriction regarding the maximum number of infrared headphones that can be used.

Hard-wired Headphones

All commercially available hard-wired headphones with a minimum impedance of 8ohms can be connected.

The connection jacks have a diameter of 3.5mm. These connection jacks must be used for headphones only.

RSE Control Unit

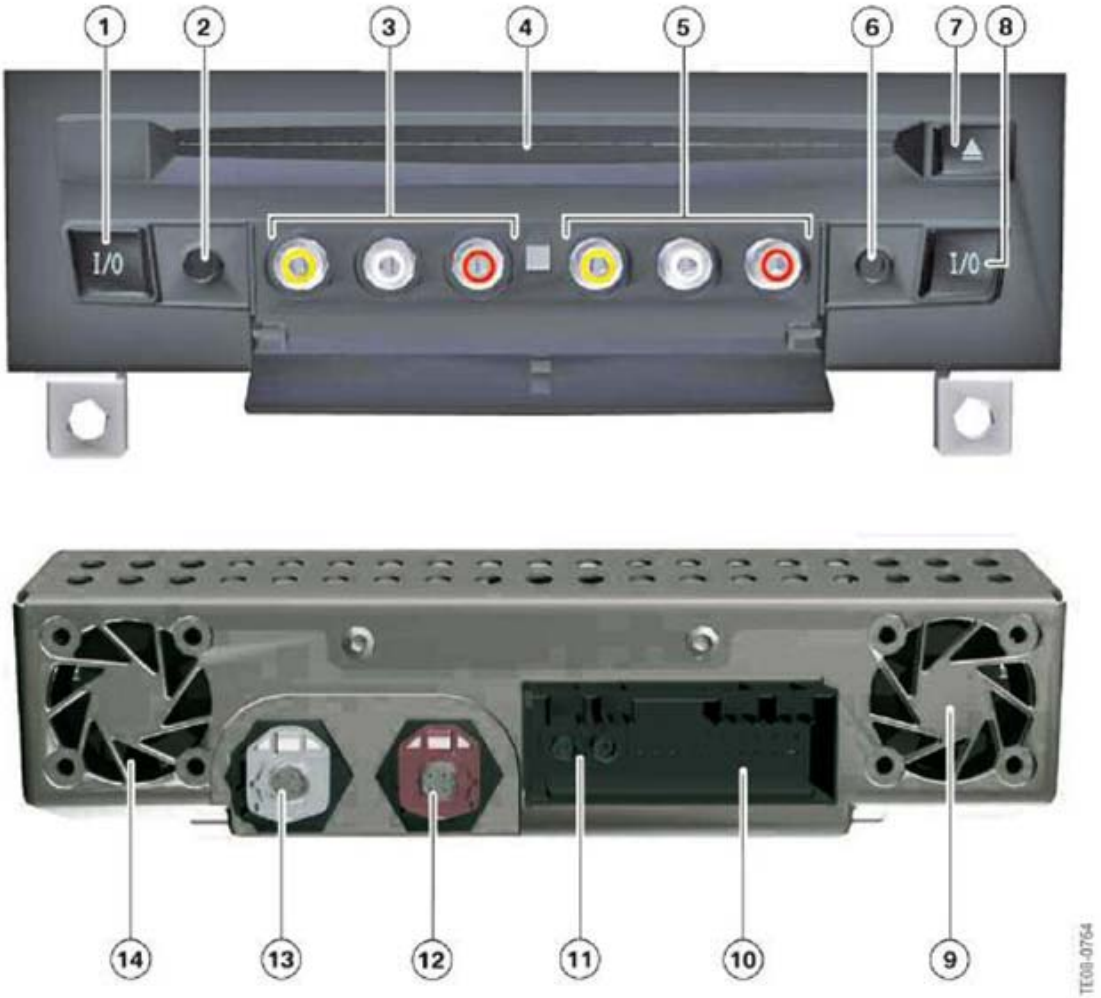


Fig. 14: Identifying Front And Rear View Of RSE Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	ON/OFF switch, left
2	Jack plug for hard-wired headphone, left
3	AV input, left (yellow: video, white:audio signal, left, red: audio signal, right)
4	Slot in DVD player
5	AV input, right
6	Jack plug for hard-wired headphone, right
7	DVD drive Eject button
8	ON/OFF switch, right
9	Fan, left
10	Power supply, connection for infrared transmitters, one CVBS video input
11	MOST connection

12	FD connection
13	FD2 connection
14	Fan, right

Switch-on Conditions

The two ON/OFF switches are used to switch the rear seat entertainment system on/off. They switch the RSE control unit and the rear display on/off on the selected side.

The infrared diodes begin to light as soon as the RSE control unit is switched on.

The infrared diodes then stay on for as long as at least one side of the RSE is still active.

The diodes go out 5 seconds after switching off the last rear display.

The RSE control unit can be switched on as of terminal 30B. After "terminal R OFF", the RSE control unit can be switched on within the run-on time of 30 minutes. After the control unit has been switched on, it remains active until the energy management detects the start capability limit.

Further information on terminal control and the new terminal designations can be found in the F01/F02 Energy Management training material.

The RSE control unit supports following media:

- Video DVD
- Video CD
- Super Video CD
- Audio CD
- DVD or CD with compressed data formats

The following compressed data formats are supported:

- Video
  - MPEG-1 video
  - MPEG-2 video
- Audio
  - MPEG-1 Layer 2 Audio
  - MPEG-1 Layer 3 Audio MP3 with ID3-Tags
  - MPEG-2 Layer 2 Audio
  - Windows Media Audio WMA with WMA-Tags
  - Advanced Audio Coding AAC

The DVD audio format is not supported by the RSE control units.

However, if the DVD contains a video track, it is usually played.

NOTE: Data that is protected with Digital Rights Management DRUM cannot be reproduced.

RSE Remote Control



Fig. 15: Identifying RSE Remote Control Buttons
Courtesy of BMW OF NORTH AMERICA, INC.

RSE REMOTE CONTROL BUTTONS REFERENCE CHART

Index	Explanation
1	Menu
2	Thumbwheel
3	Confirmation button
4	Option
5	Battery symbol
6	Selector slide, left/right
7	Volume

8	Track search/track skip
9	Wireless symbol
10	Back
11	Four-way directional controller (four buttons)

RSE Remote Control Function

The remote control features two LED for checking operation and battery voltage.

Transmission of a wireless signal is acknowledged by the green send signal lighting.

The remote control signals are only sent if the rear seat entertainment system is switched on.

If the battery voltage reaches a critical level, the red battery symbol will light instead of the green send symbol each time a button is pressed. The battery in the remote control must be replaced to ensure continued operation.

The thumbwheel, the confirmation button and the four-way directional controller mimic the iDrive controller functions:

- Turning the thumbwheel corresponds to turning the iDrive controller.
- Pressing the corresponding button on the four-way directional has the same effect as operating the iDrive controller to the left, right, forwards or back.
- Pressing the confirmation button corresponds to pressing down on the iDrive controller.

The entire remote control changes over to the selected side by operating the selector slide.

The remote control is available in a frequency of 315 MHz for the US version.

SERVICE INFORMATION

Diagnosis

The BMW diagnostic system contains the diagnostics for the rear seat entertainment systems under "Rear seat entertainment". The RSE, the two rear display SG-FD and SG-FD2 are defined as the control units.

Fault code memory checks, testing schedules and test modules are available for following components:

- Rear seat entertainment control unit
- Rear displays
- Remote control

Component activation is also possible for the control unit:

- General
  - Reset of RSE control unit

- Display
  - Test card, test of video inputs and video outputs
- Audio
  - Sine generator (test noise)
- Drive
  - DVD emergency eject

Teaching-in the Remote Control

There is a Service Function for teaching-in the remote control in the diagnostics under Rear Seat Entertainment.

The testing schedule works through the following steps:

- The entry of the currently assigned remote control for the rear seat entertainment system is deleted in CAS4.
- The remote control for the rear seat entertainment system is taught in.
- Successful teaching-in of the remote control is acknowledged by automatic closing and opening of the central locking.

It is not possible to exchange the remote control. Only the taught-in remote control is functional in the vehicle.

Programming and Coding

DVD Area Code

The RSE control unit can be programmed and coded. The DVD area code can be changed during coding.

DVD area codes were introduced to restrict playback of DVDs to particular markets. DVDs are generally released earlier in one region than in another region. The earth has been divided into different regions and an area code has been assigned to each region:

DVD AREA CODE REFERENCE CHART

Area Code	Region
1	Canada, USA and US Territories
2	Europe, Japan, Middle East, Egypt, South Africa, Greenland
3	South east Asia including Hong-Kong and South Korea
4	Australia, New Zealand, Caribbean, Central and South America, Pacific Islands
5	Former CIS States, Indian subcontinent, Mongolia, North Korea, Africa (except Egypt and South Africa)
6	China

So that the area code functions, each DVD player is equipped with its own area code, determining for which market the device is intended.

European devices are preset with area code 2, whereas American devices have area code 1. Each DVD can have one or more area codes, depending on the region(s) for which it is intended.

Area code 0 identifies DVDs that are released for all regions. A DVD may also be released for certain regions, e.g. 2, 3, 4, 5 and 6, i.e. all countries except the USA.

When inserting a DVD, the RSE control unit checks whether the region defined in the control unit matches the DVD country code. As a result, only DVDs with the area code defined in the RSE control unit can be played.

The area codes are changed by coding the RSE control unit. During the first 100km, the area code can be changed as often as desired. After the first 100km, the RSE control unit permits the area code to be changed a maximum of five times. If changes are no longer possible, the RSE control unit must be replaced when a DVD with a different area code is to be played.

Audio Test CD

A new audio test CD has been released for testing the drive in the RSE control unit in the F01/F02.

The audio test CD can be used to check following problems:

- Drive test
- Problems during medium playback
- Permanent or sporadic interruption in CD/DVD operation
- Disc cannot be read by drive.

NOTE: Only the current version of the audio test CD must be used for testing purposes. The audio test CD can be ordered through BMW Parts.

F01 TELEPHONE SYSTEM

SYSTEM OVERVIEW

The Telematics Control Unit (TCU) and the interface box 'High' (ULF-SBX-H) control units are connected to the MOST bus. TCU and interface box 'High' may both be fitted in the vehicle for certain equipment options. In this case, the telephone function is always implemented in the TCU.

The head unit transmits the audio signal in analog form to the HiFi amplifier and the amplifier distributes the audio output to the loudspeakers in the car.

The HiFi system is fitted as standard in the F01/F02.

If the "Top HiFi system" is installed in the car, the audio signal is transmitted digitally on the MOST bus to the HiFi amplifier and the amplifier distributes this signal to all the loudspeakers.

Audio playback of the call recipient is via the front right, front left and center loudspeakers.

For the sake of clarity the various individual loudspeakers are not shown in the schematic circuit diagrams.

The Telematics Control Unit (TCU) used in the F01/F02 is similar to one used in the E70.

The pairing wizard is again integrated in the F01/F02 to assist the customer in pairing the mobile phone.



Fig. 16: Identifying Vehicle Bluetooth Menu With Bluetooth Enabled Mobile Phones
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The specified range of functions will only be achieved with Bluetooth-enabled mobile phones recommended by BMW. See a list of compatible phones at www.wireless4bmw.com.

Inputs/outputs, ULF- SBX High Interface Box

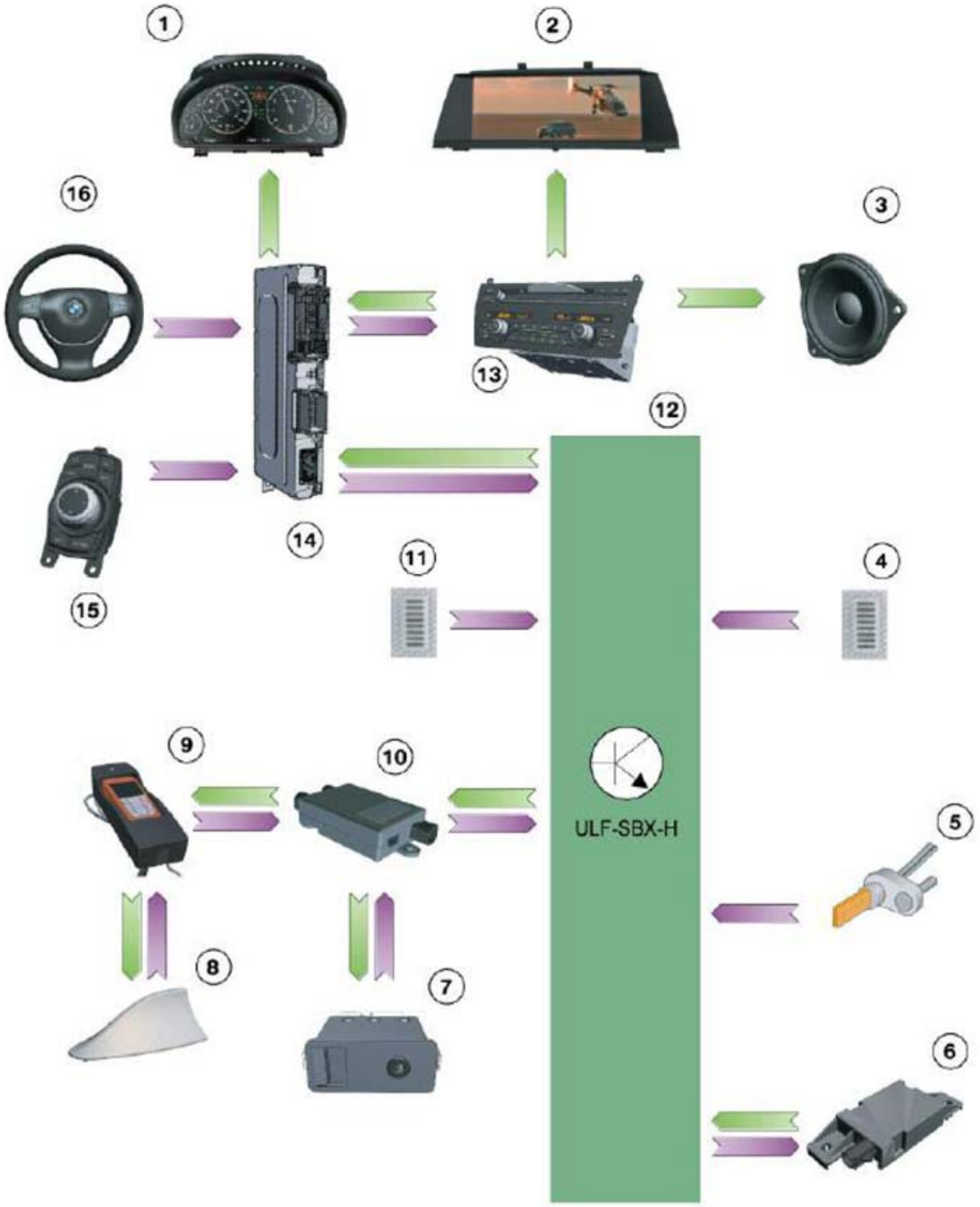


Fig. 17: ULF-SBX High Interface Box Input/Output Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Instrument cluster
2	Central Information Display (CID)

3	Speaker
4	Microphone (passenger's side)
5	Wheel speed sensor
6	Bluetooth antenna (Connectors to TCU in US cars)
7	USB audio interface; if no USB hub is installed the connection is to the ULF-SBX-H
8	Roof antenna (for snap-in adapters mobile phone
9	Snap-in adapter with mobile phone or Smartphone Integration
10	USB hub
11	Microphone (driver's side)
12	Interface box 'High' (ULF-SBX-H)
13	Car Information Computer (CIC)
14	Central gateway module (ZGM)
15	Controller (CON)
16	Multifunction steering wheel (MFL)

Optional extras "USB/Audio interface" and "Smartphone Integration" require the installation of the ULF-SBX-High Interface box.

The USB hub is installed only if the car is ordered with the "Smartphone Integration" optional extra.

The mobile phone and the interface communicate via the Bluetooth antenna.

Voice output by the telephone system is via the vehicle's front right, front left and center loudspeakers. Volume can be adjusted by means of the multifunction steering wheel and the CIC. Speed-related volume control is also active.

Although both the ULF-SBX-H and the TCU may be fitted in a vehicle at the same time, the TCU always provides the telephone functions. In this case the telephone functions are not available in the ULF-SBX High and the module is only installed to provide the "USB audio interface" option.

ULF- SBX High Interface Box Circuit Diagram

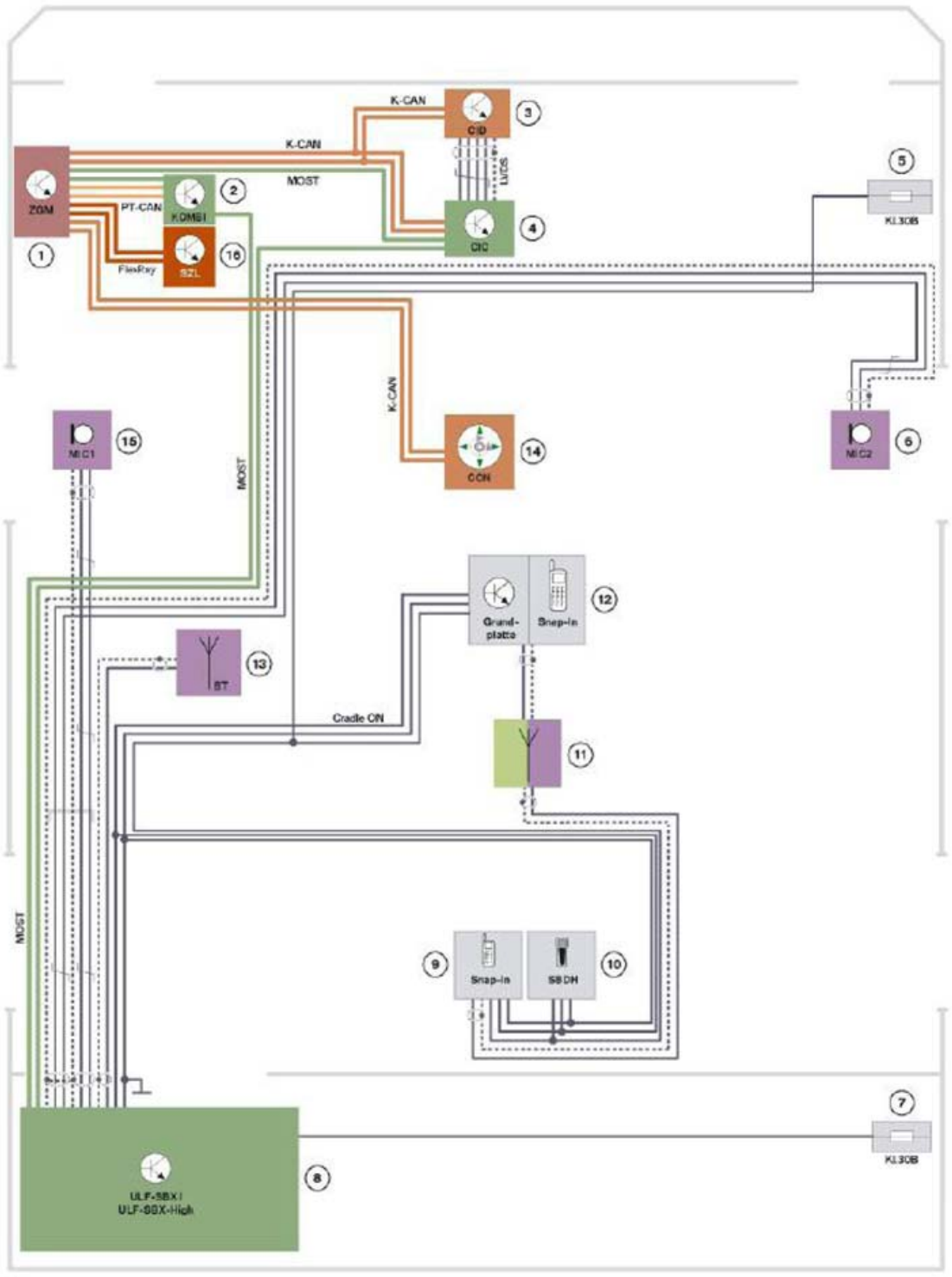


Fig. 18: ULF-SBX High Interface Box Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Central gateway module (ZGM)
2	Instrument cluster
3	Central Information Display (CID)
4	Car Information Computer (CIC)
5	Fuse in the junction box
6	Microphone (passenger's side)
7	Power distributor, rear
8	Interface box 'High' (ULF-SBX-H)
9	Not for US
10	Not for US
11	Roof antenna
12	Base plate with snap-in adapter
13	Bluetooth antenna
14	Controller (CON)
15	Microphone (driver's side)
16	Steering column switch cluster (SZL)

Smartphone Integration Option Circuit Diagram

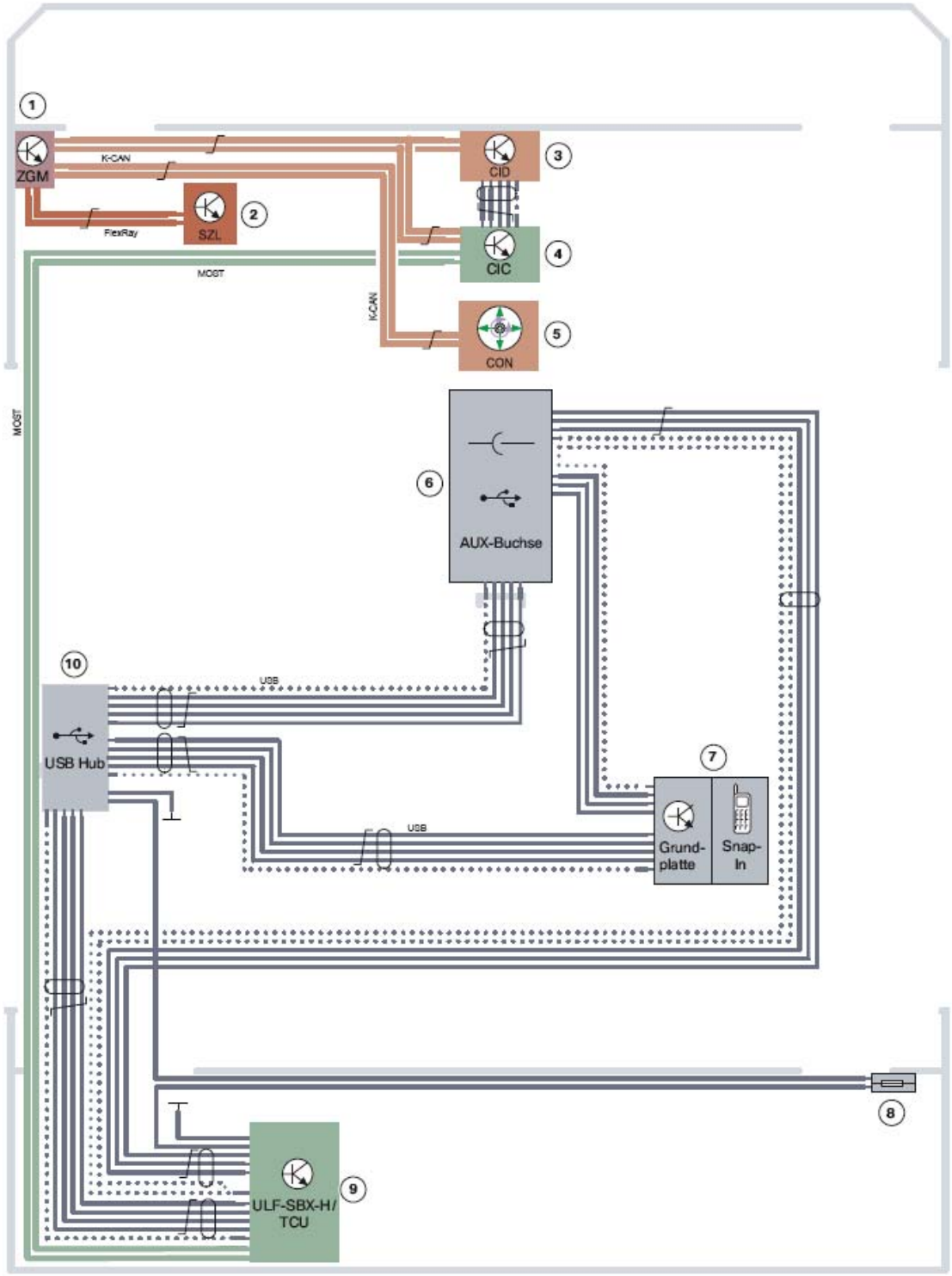


Fig. 19: Smartphone Integration Option Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Central gateway module (ZGM)
2	Steering column switch cluster (SZL)
3	Central Information Display (CID)
4	Car Information Computer (CIC)
5	Controller (CON)
6	USB audio interface (AUX)
7	Base plate with snap-in adapter
8	Fuse in fuse carrier at rear right
9	Interface box (ULF-SBX-H)
10	USB hub

MOST signals to the ULF-SBX/ULF-SBX-H control units

MOST SIGNAL DESCRIPTION CHART

In/Out	Signal	Source/sink	Function
In	Control signals	CIC	Phone book connection set-up, incoming-call acceptance
In	Control signals	CAS	Terminal control
Out	Control signals	CIC	Audio signals, call recipient, mobile phone

NOTE: For detailed information on the Smartphone Integration optional extra (option 6NF), refer to the F01/F02 AUDIO SYSTEMS training material.

Input/outputs, Telematics Control Unit

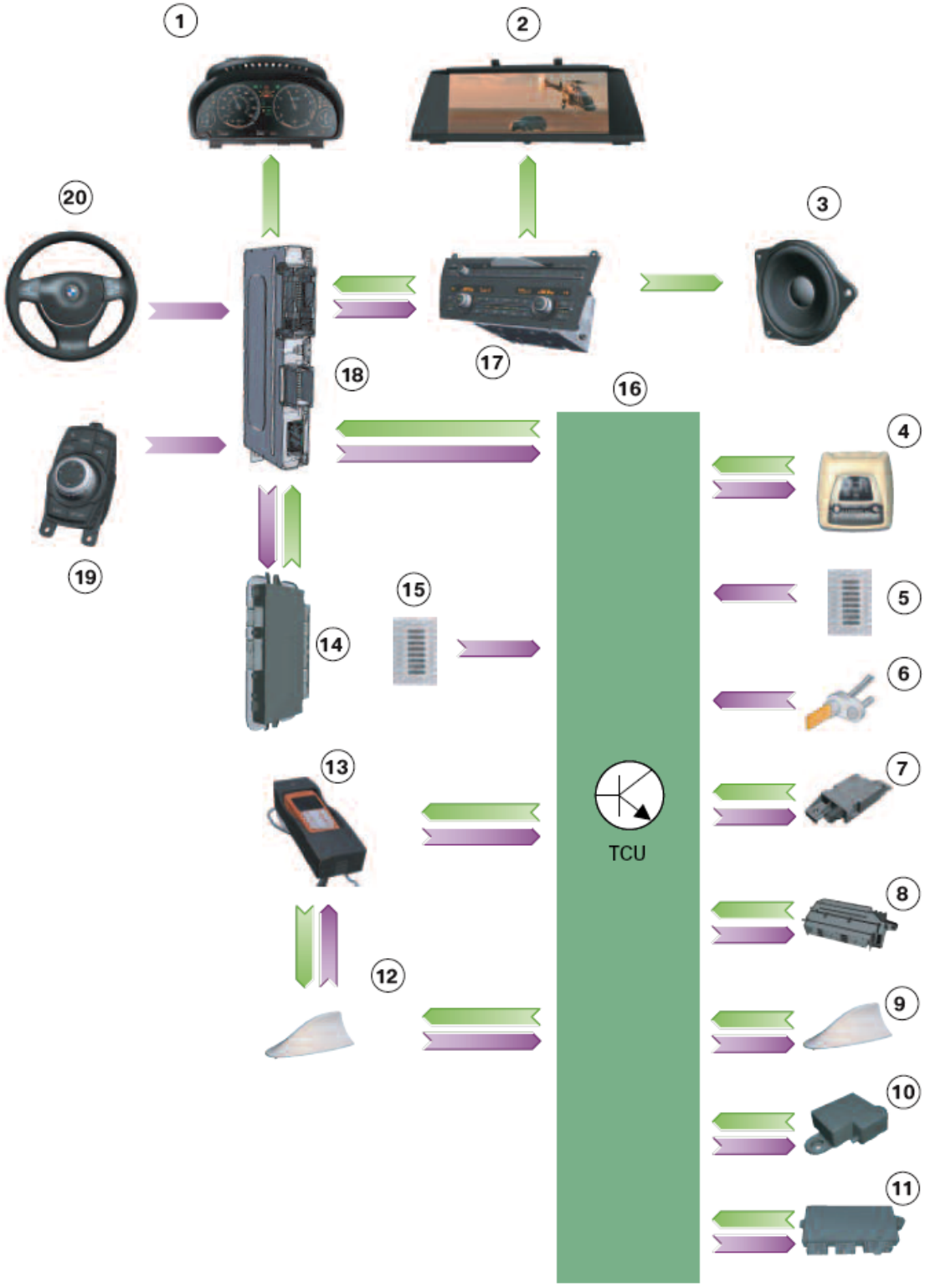


Fig. 20: Telematics Control Unit Input/Outputs Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Index	Explanation
1	Instrument cluster
2	Central Information Display (CID)
3	Speaker
4	Roof function module (FZD)
5	Microphone (passenger's side)
6	Wheel speed sensor
7	Bluetooth antenna
8	Crash safety module (ACSM)
9	GPS antenna
10	Emergency-call GSM antenna (back-up)
11	Car Access System (CAS)
12	Roof antennal for TCU and snap-in cradle adapter and internal telephone module of the TCU
13	Snap-in adapter cradle with mobile phone
14	Footwell module (FRM) for remote door unlocking and remote door locking
15	Microphone (driver's side)
16	Telematics Control Unit (TCU)
17	Car Information Computer (CIC)
18	Central gateway module (ZGM)
19	Controller (CON)
20	Multifunction steering wheel (MFL)

Voice output by the telephone system is via the vehicle's front right, front left and center speakers.

Volume can be adjusted by means of the multifunction steering wheel and the IHKA/audio control unit.

Telematics Control Unit (TCU) Circuit Diagram

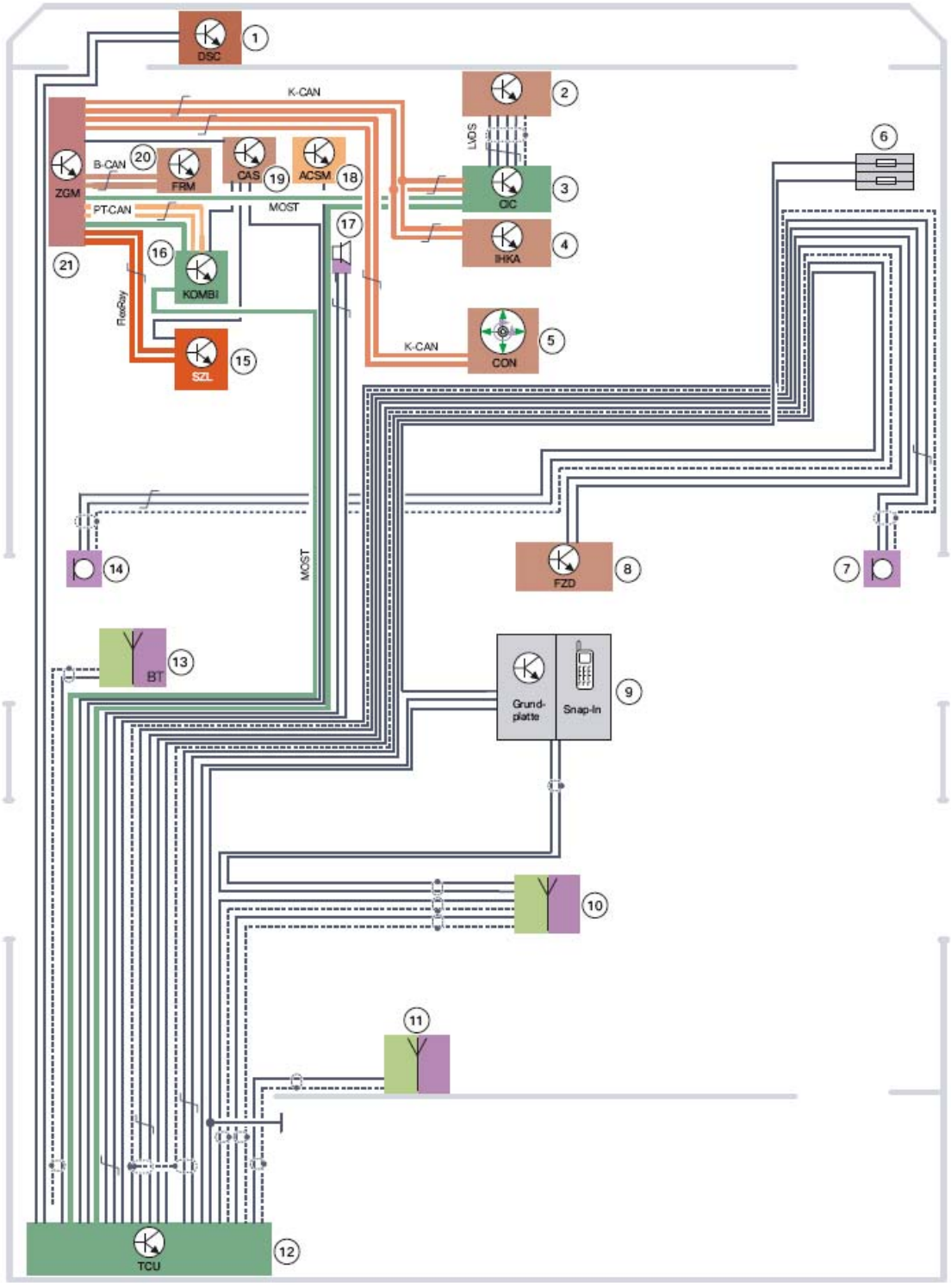


Fig. 21: Telematics Control Unit (TCU) Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Dynamic Stability Control (DSC)
2	Central Information Display (CID)
3	Head unit (CIC)
4	Integrated automatic heater and A/C control (IHKA)
5	Controller (CON)
6	Fuse in the junction box
7	Microphone (passenger's side)
8	Roof function module (FZD)
9	Base plate phone snap-in adapter
10	Roof antenna
11	Emergency-call GSM antennal (back-up)
12	Telematics Control Unit (TCU)
13	Bluetooth antenna
14	Microphone (driver's side)
15	Steering column switch cluster (SZL)
16	Instrument cluster
17	SOS speaker
18	Crash safety module (ACSM)
19	Car Access System (CAS)
20	Footwell module (FRM)
21	Central gateway module (ZGM)

MOST signals on the control unit TCU

MOST SIGNAL FUNCTIONAL CHART

In/Out	Signal	Source/sink	Function
In	GPS signals	GPS antenna to CIC	Position data
In	Control signals	CIC	Phone book, connection set-up, incoming-call acceptance, terminal control, etc.
Out	Audio signals	CIC	Audio signals, call recipient BMW ASSIST
Out	Audio signals	CIC	Audio signals, call recipient mobile phone

The TCU receives its power supply via terminal 30F. The power supply via terminal 30F is necessary for the provision of the BMW ASSIST services, including for example:

- Remote Door Unlock
- Vehicle Finder/Stolen Vehicle Recovery
- Remote Climate Control.

These services are implemented via the MOST bus. The TCU reacts to a call from the provider, placed at the customer's request. The TCU sends a signal via the MOST bus to the Car Access System (CAS). The CAS then wakes up the vehicle.

FUNCTIONS

Bluetooth Pairing (pairing wizard)

The pairing wizard presents the step-by-step instructions for the entire pairing process via the Central Information Display (CID). Detailed help texts and instructions for further assistance are available in case pairing is not successful.

This pairing wizard for Bluetooth is found by selecting the "Telephone" menu and then selecting "Bluetooth".

Pairing process:

- Once "Add new device" has been selected, the in-car display shows the Vehicle Identification Number (VIN). At the same time, the pairing wizard issues a message to the effect that from this point on the mobile phone has to be used in the process.
- The mobile phone should now be used to search for new Bluetooth devices.
- If the search is successful, the VIN appears in the display of the mobile phone.
- The next step is to key a freely selectable PIN code into the mobile phone, and then key the same PIN code into the vehicle.
- If pairing is successful the data of the newly paired mobile wireless device appear in the vehicle's phonebook.
- This can take from a few seconds to several minutes to complete, depending on how many entries there are in the phonebook.
- The telephone entries for the entries from the "Contacts" menu are also shown.

Up to four mobile phones can be paired with the car. Before a fifth mobile phone can be paired, one of the other four entries must be removed from the list.

NOTE: Not all system compatible phones are capable of these features. For more information see a list of compatible phones at www.wireless4bmw.com

Calls with Multiple Users

This function can be used to conduct two phone conversations at the same time. Services such as call waiting, toggle calls and teleconferencing are possible in this way.

Call Waiting

If a second call is incoming while a call is in progress this is indicated by a call waiting tone and also by an accept/reject prompt in the display. The user can now reject the second call and continue the active call or accept the second call. In which case the first caller will hear a call waiting melody and is placed on hold.

Toggle Calls

When calls with multiple users are in progress, one call can be "active" and one "on hold".

The "toggle calls" function can be used to toggle these calls between the "active" status and the "on hold" status.



Fig. 22: Display - Active Call Status
Courtesy of BMW OF NORTH AMERICA, INC.

Teleconference

If the user has an active call and a call on hold, the "Conference" menu item can be selected to place all phone users in a shared conference call.



Fig. 23: Display - Teleconference Status
Courtesy of BMW OF NORTH AMERICA, INC.

Phonebook Contacts

Contacts

All contact information can be viewed and saved under 'Contacts'. Contacts transferred from the user's mobile

phone to the car are also listed here. A symbol after the contact shows where the information for this contact is saved. When the mobile phone is removed from the car the contacts from the phone/Bluetooth pairing can no longer be selected in the vehicle.



Fig. 24: Display - My Contacts
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Contacts from phone/Bluetooth pairing
4	Contact on the hard disc of the CIC

Other information, including e-mail addresses and postal addresses can be saved and administrated along with the phone numbers on the CIC contacts. This information can only be transferred from the mobile phone to the car if the former supports the PBAP (Phone Book Access Profile) function.

NOTE: Not all system compatible phones are capable of these features. For more information see a list of compatible phones at www.wireless4bmw.com.

Phonebook

The entries in the phonebook show only contacts for which a phone number has been saved. These can be either entries from mobile phones or contacts saved in the car. Up to four telephone numbers can be saved for each contact and the individual numbers retrieved using the phonebook functionality.



Fig. 25: Display - Phone Numbers For Contact
Courtesy of BMW OF NORTH AMERICA, INC.

Call Register (Dialled numbers, missed calls)

All dialled numbers and missed calls in the car are listed clearly in the call register under "Dialled numbers" and "Missed calls". The entries are sorted by date and time.

The driver uses the controls on the multifunction steering wheel to select from the dialled numbers list shown in the instrument panel.



Fig. 26: Display - Missed Call List
Courtesy of BMW OF NORTH AMERICA, INC.

The graphic below shows Bluetooth connections between the Mobile phone in the center console and TCU are through the Bluetooth antenna.

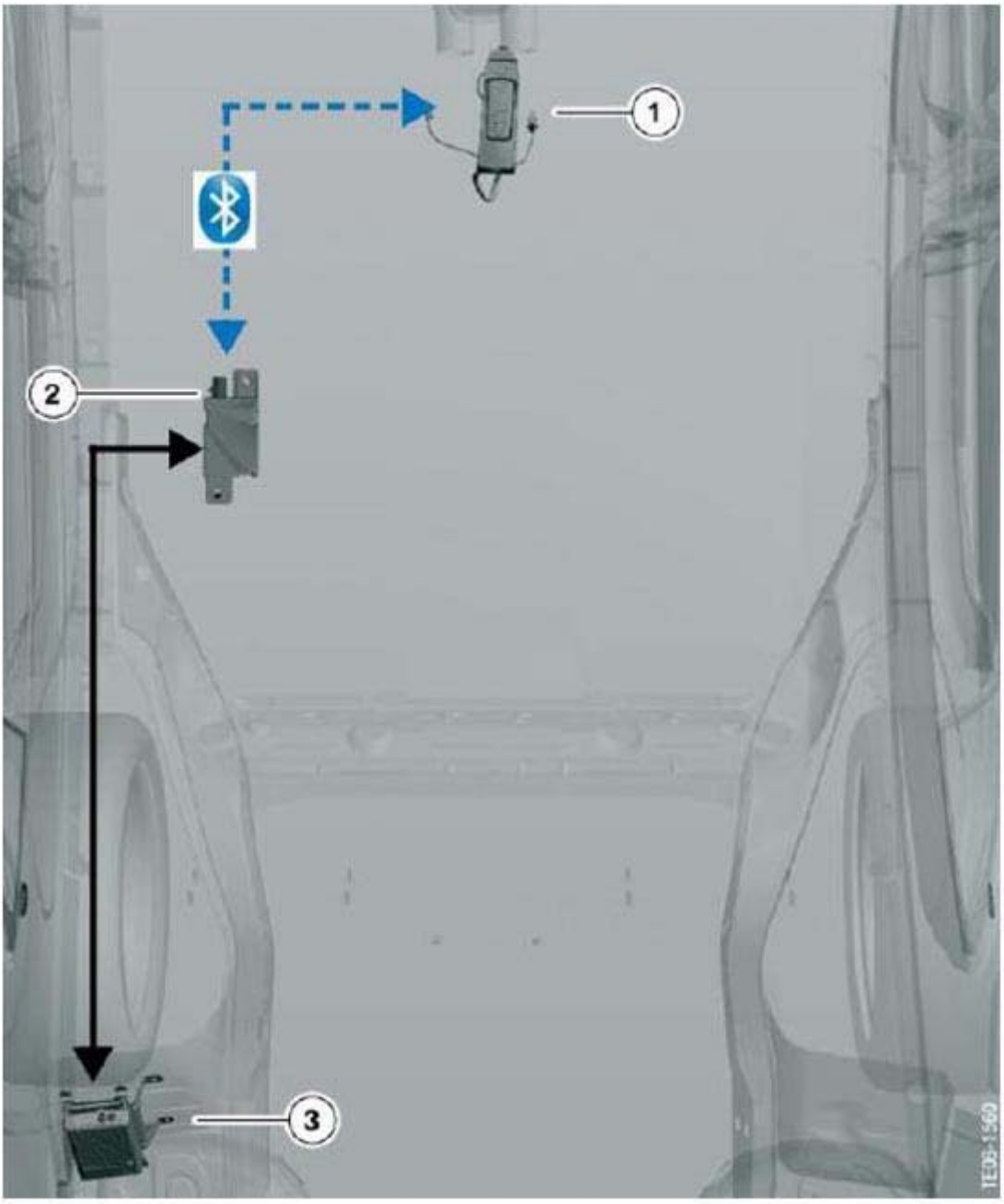


Fig. 27: Identifying Bluetooth Connections In Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Front center console with mobile phone
2	Bluetooth antenna
3	Telematics Control Unit (TCU)

NOTE: Although up to four phone may be paired to the vehicle, only one device can be active at any given time.

BMW Services

These services are offered to customers under the generic term "BMW Assist".

From the customer's point of view, "BMW Assist" is a convenient service guaranteeing more safety, more mobility and comprehensive information.

In an emergency or a breakdown, "BMW Assist" helps save crucial time in might well be a life-or-death situation, and it also helps the driver in day-to-day situations, such as searching for a parking space in congested urban areas.

"BMW Assist" is split into two services:

- Safety Plan (Standard)
- Convenience Plan (Optional)

Safety Plan

- Automatic Collision Notification:

  Is an emergency calling Service which, in the event of an accident, forwards the relevant GPS data to a rescue-services command post to ensure optimum deployment of rescue and recovery facilities. If airbags deploy this is fully automatic.

- Emergency Request (SOS):

  Pushing the SOS button in an emergency will transmit the vehicle location and information. A response specialist will contact the driver to aid in the situation.

- Enhanced Roadside Assistance:

  Is used when stranded on the road, to request a tow truck, fuel or a flat tire replacement.

- Stolen Vehicle Recovery:

  This service makes it simple to track a stolen vehicle via GPS. The GPS data are forwarded to the police.

- Remote Door Unlock:

  New service enabling the customer to have the doors of the car opened by remote control in the event of the identification transmitter being locked inside.

- TeleService:

With TeleService the vehicle's operating status and upcoming service needs are transmitted to the BMW center automatically or manually with the push of the "Service Request" menu option in the iDrive display.

- Customer Relations:

  This service can be used to request day-to-day information about the locality. Pressing the SOS button or the Customer Relations menu option will contact the Customer Relations staff.

- My Info:

  This enables the customer search Google Maps from a home PC and to send business listings, street addresses and phone numbers as well as messages to the vehicle. This information appears on the "My Info" menu and can be exported to the Navigation system as a new destination.

Convenience Plan (Optional)

- Critical Calling:

  This service allows up to four operator assisted calls per year just by pressing the SOS button. This is useful when the customer is with out a working mobile phone and need the assistance of a relative or colleague.

- Concierge:

  This service accessed through the "Concierge" option in the iDrive. It can be used to request day-today information about the locality, for example locations of restaurants, hotels (including reservation service), addresses, etc.

- Directions:

  To receive the shortest route or directions to the nearest gas station, ATM or a point of interest. Select "Concierge" from the iDrive menu or press the SOS button to speak to a response specialist

- Traffic Information:

  To receive up to date traffic reports along a traveled route, select "Concierge" from the iDrive menu or press the SOS button to speak to a response specialist.

- Weather Information:

  Select "Concierge" from the iDrive menu or press the SOS button to speak to a response specialist to receive the latest weather forecast, locally or at your destination.

- BMW Search:

  Available only with the Navigation option, BMW Search allows online access to the Google Maps

database from the iDrive. The desired business information (address and phone number) can then be sent to the navigation system or to the phone system.

Smartphone Integration

The "Smartphone Integration" optional extra enables the customer to play back audio files saved on a mobile phone. The option adds a USB port to the telephone base plate snap in cradle. The mobile phone can be connected to the car with a compatible snap-in cradle adapter, with all telephone functions remaining fully available.

Simultaneous use of the mobile phone in the snap-in adapter and the USB port in the center console is possible. However, the audio files on the mobile phone cannot be accessed while a device is connected to the USB port.

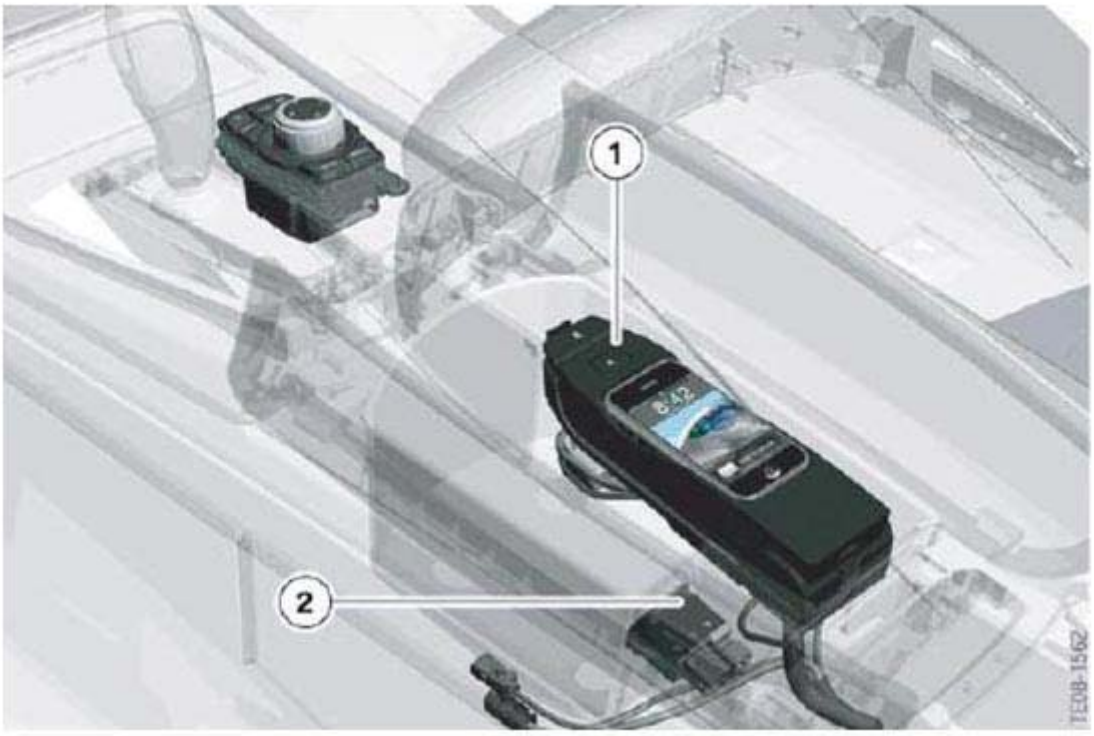


Fig. 28: Identifying USB Audio Interface, Base Plate With Snap In Adapter And Mobile Phone
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Base plate with snap-in adapter and mobile phone
2	USB audio interface

The audio files can be selected in the 'CD/Multimedia' menu, where they are in the "External devices" submenu.

Smartphone Integration is offered only in combination with "USB audio interface" option and is currently only available with the iPhone.

NOTE: For detailed information about these systems, see the F01/F02 "AUDIO SYSTEMS" training material.

SYSTEM COMPONENTS

Components and Installation Locations

The following control units act as the interface between the mobile phone and the vehicle:

- ULF-SBX-High Interface box (Only for USB/Audio Interface)
- Telematics Control Unit (TCU)

The preconditions under which TCU or TCU and interface box together are installed are listed below:

TCU INSTALLATION REFERENCE CHART

Optional extra	Telephone control units installed
Option 639 "BMW Assist"	TCU
Option 639 "BMW Assist" + option 6FL "USB audio interface"	TCU ULF-SBX-H
Option 639 "BMW Assist" + option 6NF "Smartphone Integration" + option 6FL "USB audio interface"	TCU, ULF-SBX-H base plate/cradle adapter

NOTE: Although both the ULF-SBX-H and the TCU may be fitted in a vehicle at the same time, the TCU always provides the telephone functions. The ULF-SBX High is only installed to provide the "USB audio interface".

ULF-SBX-H Interface Box

The ULF-SBX High interface box has been used in BMW vehicles since the introduction of E93.

The (SBX High) interface box is capable of performing the following tasks:

- USB connection for USB/audio interface
- Bluetooth interface with hands-free mode and phone book
- Basic voice input and activation system through the telephone

Interface box and interface box 'High' support various techniques for downloading phone book entries from Bluetooth-enabled mobile phones. One of these techniques is Phonebook Access Profile (PBAP). The number of compatible mobile phones increases with the support of several downloading techniques. In addition, it is possible to download all the phone numbers attached to a name entry.

Although both the ULF-SBX-H and the TCU may be fitted in a vehicle at the same time, the TCU always provides the telephone functions. In this case the telephone functions are not available in the ULF-SBX High and the module is only installed to provide the "USB audio interface" option.

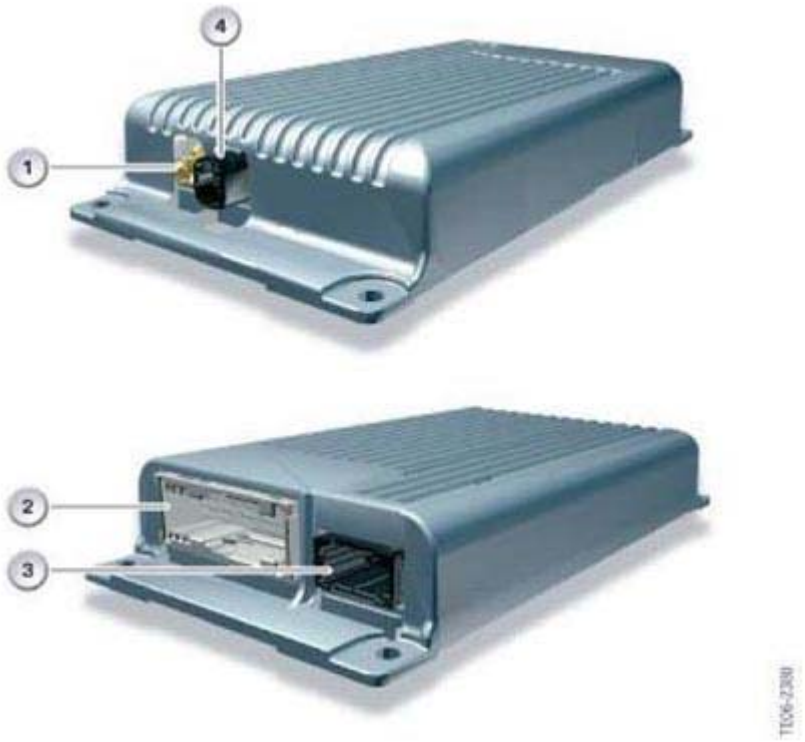


Fig. 29: Identifying ULF-SBX High Interface Box Connector And Connections
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Bluetooth connection (Not for US)
2	54-pin connector
3	MOST connection
4	USB connection

Telematics Control Unit (TCU)

The Telematics Control Unit used on the F01/F02 evolved from the E70 TCU.

The TCU always incorporates a GPS receiver and a GPS connection. In the F01/F02, however, this connection is not used because the GPS signals are processed by the CIC.

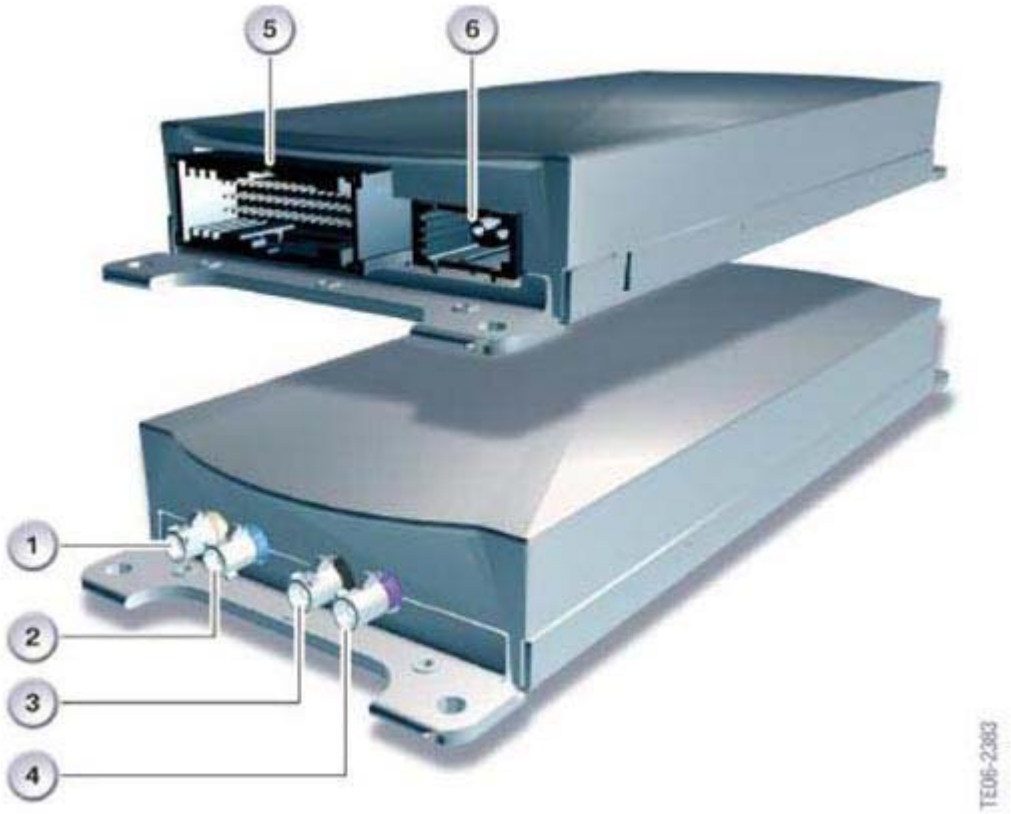


Fig. 30: Identifying Telematics Control Unit (TCU) Connector And Connections
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Bluetooth antenna connection, transparent connector
2	GPS antenna connection blue connector
3	Roof antenna connection black connector
4	Emergency antenna connection purple connector
5	54-pin connector
6	MOST connection

Location of ULF-SBX/ULF-SBX-H and TCU

Interface box or interface box 'High' and the TCU are seated in the luggage compartment on the left.

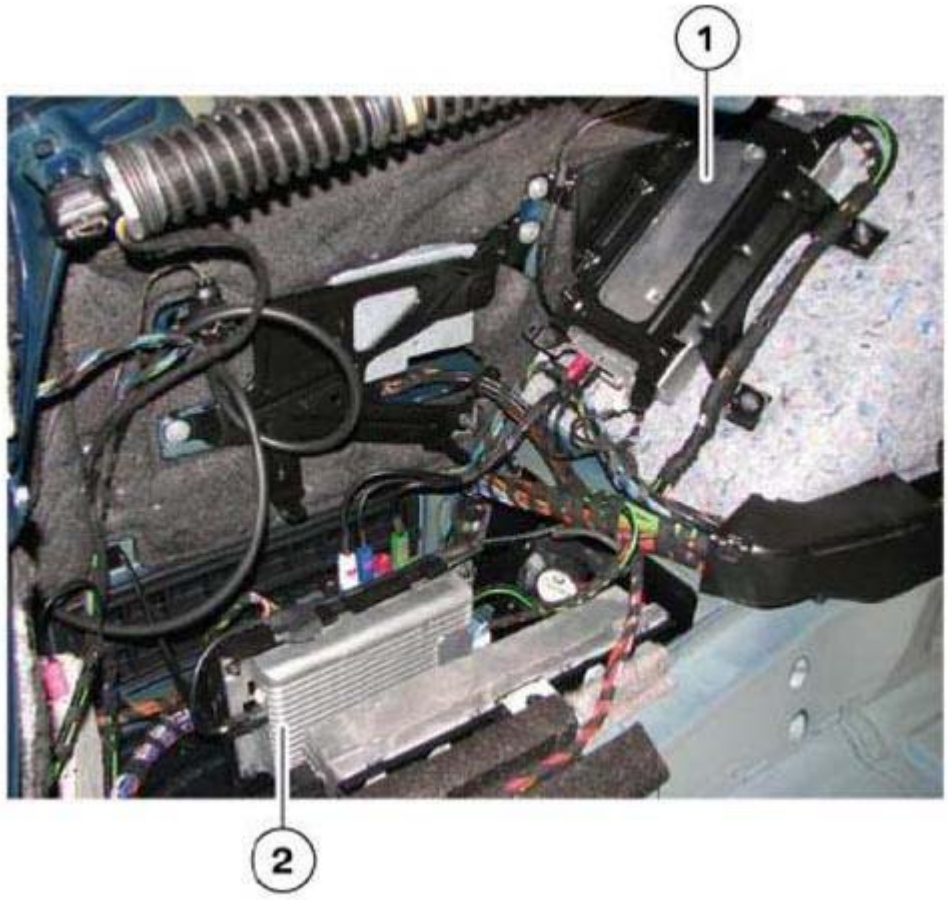


Fig. 31: Identifying ULF-SBX/ULF-SBX-H And TCU
Courtesy of BMW OF NORTH AMERICA, INC.

PARTS REFERENCE CHART

Index	Explanation
1	Telematics control unit (TCU)
2	Interface box (ULF-SBX-High)

USB Hub

The USB hub is for connecting multiple USB interfaces to the interface box 'High'. The USB hub incorporates an active USB signal amplifier and has two USB inputs and one USB output.

The USB hub is installed only if the car is ordered with the "Smartphone Integration".



Fig. 32: Identifying USB Hubs
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	USB connection to AUX-in connection (blue connector)
2	USB connection for base plate of the Smartphone audio link (neutral color connector)
3	USB connection to (ULF-SBX-High) interface box (black connector)
4	Power supply for the USB hub (black connector)

Location of USB Hub

The USB hub is installed at the left B pillar. This applies to both RHD and LHD cars.



Fig. 33: Location Of USB Hub
Courtesy of BMW OF NORTH AMERICA, INC.

USB Base Plate/snap-in Adapter

The base plate with snap-in adapter and USB AUX-IN connection are installed in the front center console, underneath the armrest.

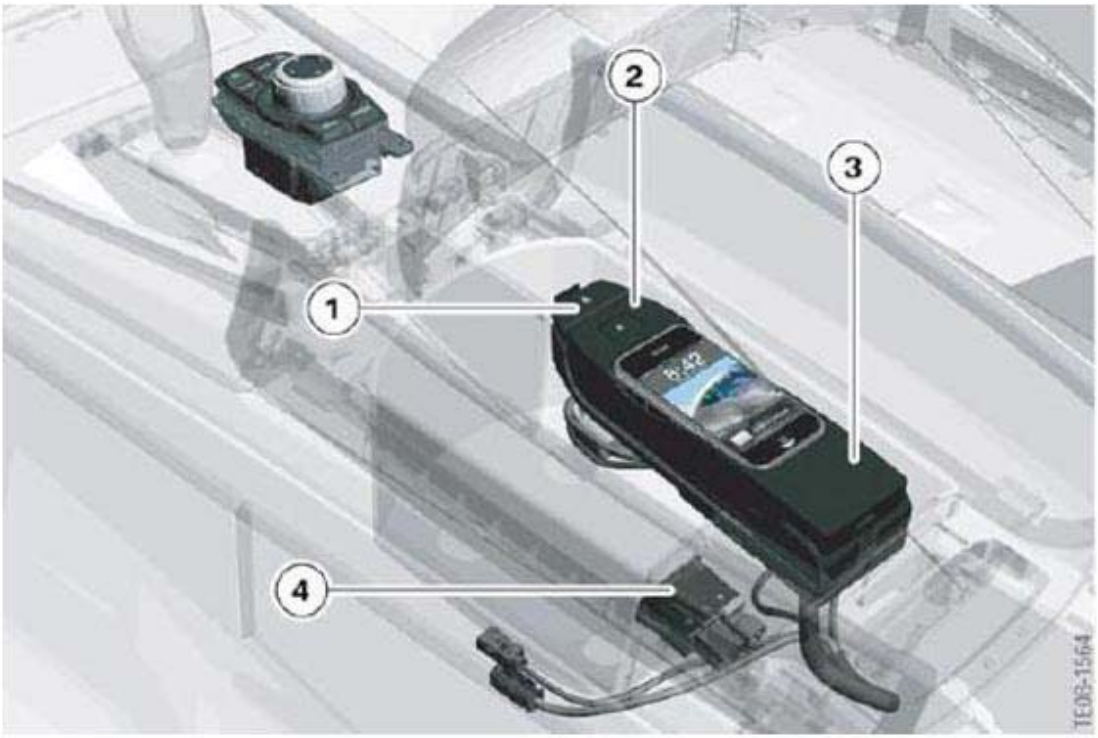


Fig. 34: Identifying USB Base Plate/Snap-In Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Button for removal of the snap-in adapter
2	Button for removal of the mobile phone
3	Snap-in adapter
4	USB connection and AUX-IN

Telephone Antenna System

In order to meet the high quality requirements that apply to the telephone system of the F01/F02, several antennas are installed in the vehicle, with the configuration depending on equipment trim level.

The following antennas are used for this purpose:

- Roof antenna
- Bluetooth antenna
- Emergency-call GSM antenna

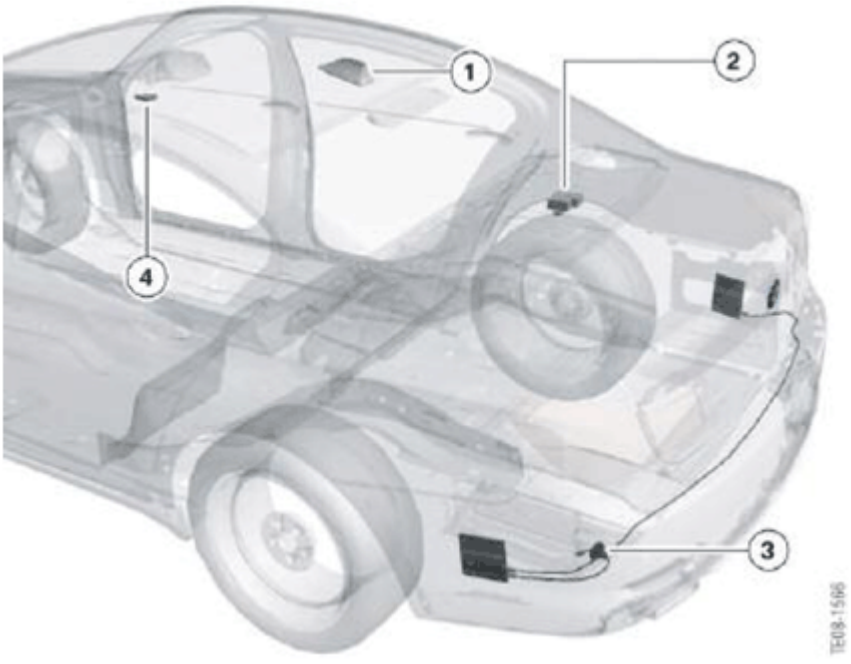


Fig. 35: Identifying Telephone Antenna System
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Roof Antenna
2	Emergency-call GSM (back-up) antenna
3	Not for US
4	Bluetooth antenna

Emergency-call GSM antenna

The emergency-call GSM antenna is needed for the ASSIST service so it is installed in combination with the Telematics Control Unit. "Preparation for mobile phone with Bluetooth interface".

Bluetooth antenna

The Bluetooth antenna is a newly designed component. It is smaller than the predecessor model, which means that it can be accommodated in the roof.

INDEX REFERENCE CHART

Index	Explanation
1	Connection to the TCU

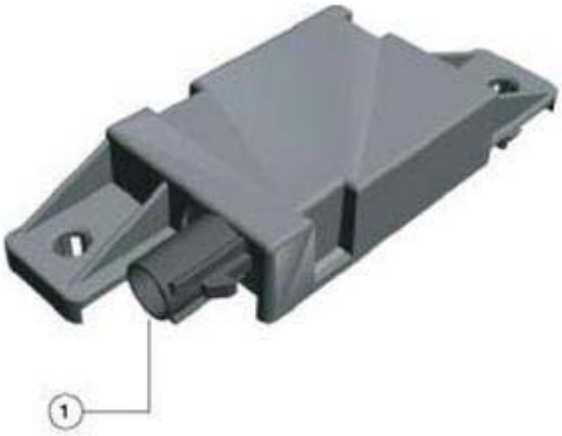


Fig. 36: Identifying Bluetooth Antenna Connection To TCU
Courtesy of BMW OF NORTH AMERICA, INC.

There are two different locations for the Bluetooth antenna. The position actually occupied depends on whether or not the car is fitted with the slide/tilt sunroof option.

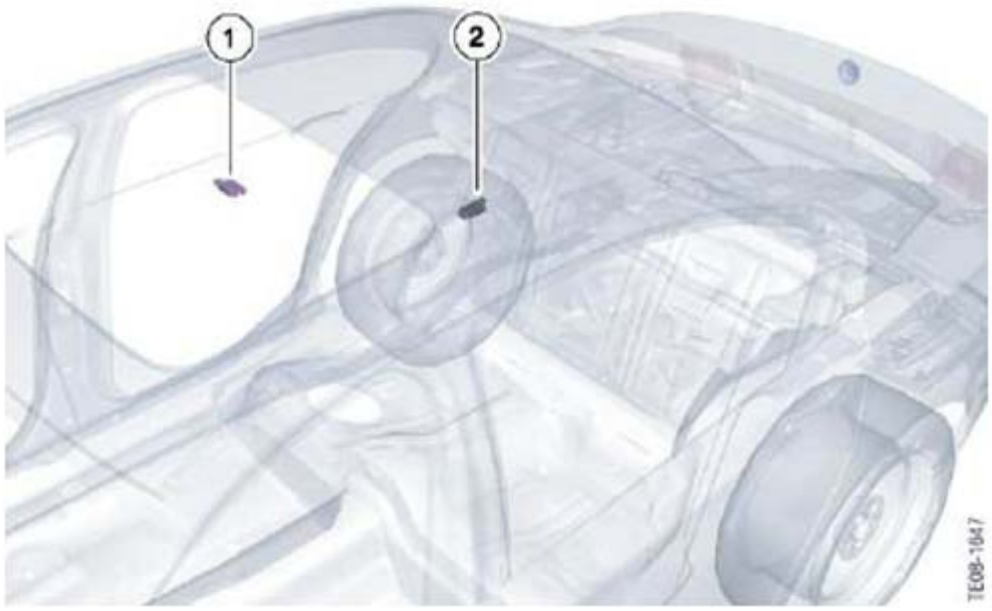


Fig. 37: Identifying Bluetooth Antenna
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Bluetooth antenna without slide/tilt sunroof (in middle of roof)
2	Bluetooth antenna with slide/tilt sunroof (on B pillar)

Roof antenna

The roof antenna is in the middle of the roof, toward the trailing edge. Depending on the equipment installed, the car might have two GSM antennas (roof 1 and roof 2). Both are inside the housing of the roof antenna.

Overview of the GSM antennas installed and relationship to optional extras:

INDEX REFERENCE CHART

Optional extra	GSM 1 (roof antenna)	GSM 2 (roof antenna)	Emergency-call GSM antenna	Bumper antenna
BMW Assist	X	X	X	O

F01 VOICE ACTIVATION SYSTEM

INTRODUCTION

History

Voice-activated control was offered for the first time as an option for the E38. The system enabled the driver to operate the telephone and the navigation system without taking his or her eyes off the road and the traffic

situation.

As the voice recognition system evolved, the number of spoken command the system could recognize increased by leaps and bounds from the initial 30 to the current figure of about 470 (CCC with the "Voice Activation" option in the E60, E90). This means that in the current models, voice control can be used not only for the telephone and the navigation system, but also for entertainment, the address book, the air-conditioning functions and vehicle individualization settings.

Voice Activation is standard equipment on the F01/F02 and it is always combined with the "Navigation System".

NOTE: The Voice Activation System and the "Navigation System" are both standard on the F01/F02.

The Voice Activation system has been further enhanced.

There is now an even larger range of spoken commands and for the first time the user has the option of individualizing the voice recognition system in accordance with specific needs and preferences. For example, users can match the voice recognition system to their own knowledge base and use the controller to change the spoken-language setting.

Other innovations of the voice activation system include:

- Visual feedback in the instrument panel.
- No audible beep signal during a dialog with the system.
- Combined mode with both voice inputs and controller inputs.
- Intersections and zip codes can be entered as destinations.
- Voice control of contacts, phone book and address book with up to 3000 entries.

SYSTEM OVERVIEW

The following pages show the input/outputs and the schematic circuit diagrams of the F01/F02 voice input and activation systems.

The driver's side microphone is the only device used for voice input.

Voice input is always activated by pressing the PTT button (push-to-talk button) on the steering wheel.

The control units, sensors, control elements and components involved in the system are shown in the input/output diagrams. A block diagram representation of a specific control unit is additionally shown.

The input/output diagram provides an overview of the system in the form of a signal flow diagram. It does not indicate whether the signals are sent via busses, other control units, hard wiring or by wireless means. This detailed information can be found in the schematic circuit diagram.

The graphic representation is always followed by the corresponding legend which can be found either under the graphic or on the next page.

For the sake of clarity the various individual speakers are not shown in the schematic circuit diagrams.

Inputs/outputs, Voice Activation System

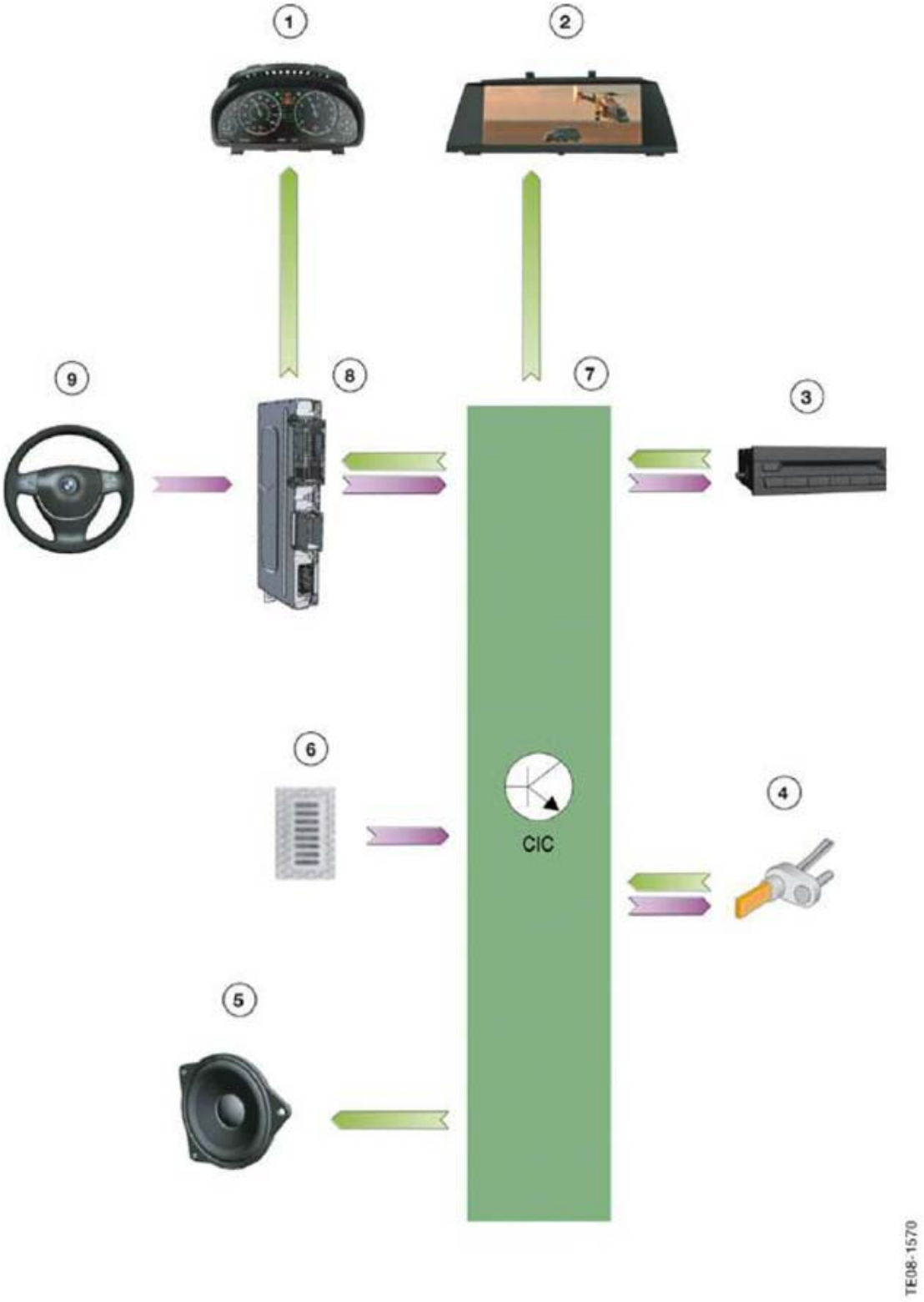


Fig. 38: Voice Activation System Inputs/Outputs System Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Instrument cluster
2	Central information display (CID)
3	Other controlled systems such as DVD changer
4	Wheel speed sensor
5	Speaker
6	Microphone (driver's side)
7	Car Information Computer (CIC)
8	Central gateway module (ZGM)
9	Multifunction steering wheel (MFL)

The voice input function is always implemented in the CIC.

The DVD changer serves as an example of the other voice-activated systems that can be controlled.

The wheel speed signals are used for speed- dependent volume control.

Volume can be adjusted by means of the multifunction steering wheel and the IHKA/audio control unit. Speed-related volume control is also active.

The microphone is connected to the TCU and the telephone commands are processed by the telephone control unit and made available on the MOST bus.

VOICE CONTROL UNIT REFERENCE CHART

Optional extra	Control unit installed
Voice Activation	TCU CIC
Voice Activation + "USB/audio interface" (option 6FL)	TCU CIC ULF-SBX H
Voice Activation (option 620) + "Smartphone Integration" (option 6NF)	TCU CIC ULF-SBX H

Schematic Circuit Diagram for the Voice Activation System with TCU

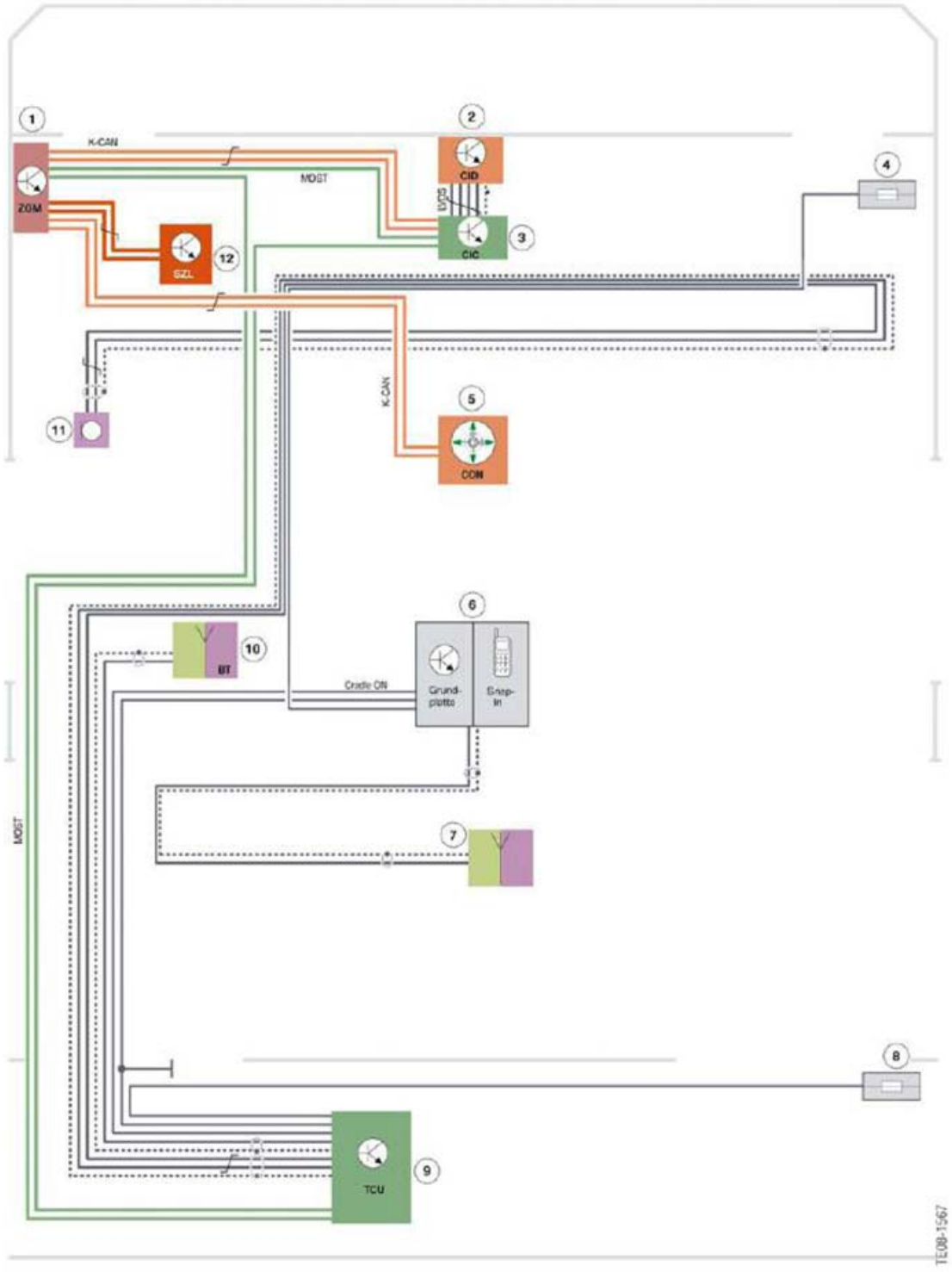


Fig. 39: Circuit Diagram For Voice Activation System With TCU
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Central gateway module (ZGM)
2	Central information display (CID)
3	Car Information Computer (CIC)
4	Fuse in the junction box
5	Controller (CON)
6	Baseplate with snap-in adapter
7	Roof antenna
8	Fuse in fuse carrier at rear
9	Telematics control unit (TCU)
10	Bluetooth antenna
11	Microphone (driver's side)
12	Steering column switch cluster (SZL)

MOST signals at TCU

MOST SIGNAL FUNCTIONAL CHART

In/Out	Signal	Source/sink	Function
Out	Control signals	MOST control units	Controlled systems
Out	Control signals	CIC	Display control of the CIC
Out	Audio signals	CIC	Answer, voice input

SYSTEM FUNCTIONS

What can be operated by voice input?

In the F01/F02, broadly speaking all the menus that can be viewed in the CID can be voice-controlled to the second level of a menu.

The graphic below shows the first level of the "Navigation" menu on the left, and the second level on the right.

Direct entry to the first level of the menu is a possibility for reducing the length of operating time needed to activate a particular function. This is done by saying aloud a term from the menu in question. Instead of having to say first "Navigation" and then "Destination entry", the user can simply say "Destination entry" to go directly to this function. The command is executed regardless of which menu is currently open.

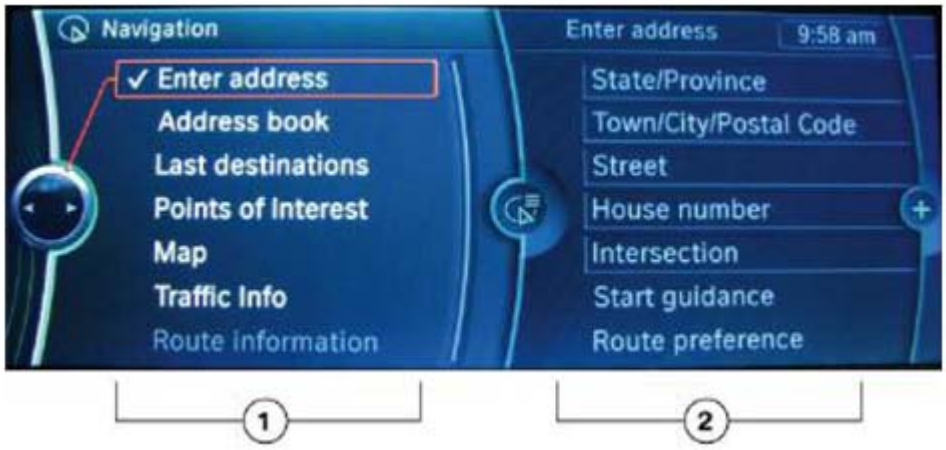


Fig. 40: Selecting Address Menu
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	First level of "Navigation" menu
2	Second level of "Navigation" menu

Standard and Short Dialogs

Until now, all voice recognition systems have suffered from the drawback of appearing complicated to inexperienced users (beginners). The difficulties were due to the fact that the user was unaware of how many voice commands were available, or failed to enunciate the commands correctly and completely.

Experienced users (experts) on the other hand, had the advantage of knowing how to use the system quickly by using short commands.

In order to ensure that users in both these groups can use the system to their satisfaction, in the F01/F02 it is possible to select a "Standard" dialog for inexperienced users or a "Short" dialog for experts.

The "Standard" dialog provides detailed information while operation is in progress, but the "Short" dialog dispenses with this information for the sake of rapidity.

Example:

Standard dialog:

SYSTEM: "Say the name of a place"

USER: "Munich"- shows up on the display

SYSTEM: "Did you mean "Munich"?"

USER: "Yes"

Short dialog:

SYSTEM: "Place"

USER: "Munich"- shows up on the display

SYSTEM: "Did you mean "Munich"?"

USER: "Yes"

The dialog setting can be toggled between standard and short by selecting "Settings" "Language/units".



Fig. 41: Selecting Speech Mode
Courtesy of BMW OF NORTH AMERICA, INC.

Language Setting

The current voice recognition systems do not offer the customer the option of changing the input language without expert assistance. The car has to be brought to the workshop, where BMW Service can change the language setting. The language is changed either by recoding or by replacing the appropriate control unit.

The new 7 Series BMW enables the customer to change not only the display language but also the input and output language of the voice activation system by means of iDrive.

The full range consists of eight languages:

- English (UK)
- French
- German
- English (US)
- Italian

- Spanish
- Dutch
- Japanese

All eight languages are saved on the hard disc.

Depending on the national-market specification, however, only three different languages are selectable with iDrive. The other languages can be activated by coding.

The menu item for changing the language setting is:

"Setting" - "Language/units".

No beep after each step in a dialog sequence

Until now, before enunciating a command the user always had to wait for a confirmation beep marking the conclusion of a system message. This does not conform to the natural flow of speech, and often results in errors because the user speaks too soon.

In the F01/F02 there is no beep between the individual steps in a dialog sequence. There are now only two audio signals: One signal confirms the start of a dialog sequence and sounds immediately after the user presses the PTT (push-to-talk) button on the steering wheel. A second signal sounds to mark the end of the dialog.

Visual feedback in the instrument panel

In addition to the acoustic feedback issued by the voice input and activation system, the user also receives visual confirmation of the result (e.g. after enunciating the command "New number" via the instrument panel. The system's input prompt "e.g. Enter digits" appears at the same time in the instrument panel.

Consequently, the user has improved orientation and can more easily follow the sequence of functions and the changes from menu to menu in the CID.



Fig. 42: Identifying PTT Button

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	PTT



Fig. 43: Identifying Display On Instrument Panel
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Readout showing result of interaction with the voice input and activation system
2	Input prompt issued by the voice input and activation system

Combined mode with voice and iDrive inputs

This new function enables the user to operate the system by a combination of spoken commands and iDrive actions.

Until now, voice input has always aborted as soon as the controller was used to select an entry. This meant that the user had to press the PTT button again in order to resume voice input to complete the sequence.

In the F01/F02 the voice-input dialog remains open even if the controller is moved, so the user can immediately resume voice input to continue interacting with the system. This makes it much easier, for example, to enter a destination for the navigation system by selecting a street name from a list.

Extended destination entry in navigation

Voice-assisted destination entry has been extended in the following ways:

- Entry of intersections spoken command
- Entry of Zip codes

Voice control with up to 3000 entries

Until now, the phone book was the only administration function for which voice input could be used. In the F01/F02 it is now possible to use spoken commands to administrate the contacts, phone book and the address list. This means that three lists with up to 3000 entries can be operated by voice control.

SYSTEM COMPONENTS

The voice input and activation system is implemented in the following control units:

- Telematics Control Unit (TCU)
- Voice input and activation system
  - CIC

The voice-input commands are transmitted via MOST or the central gateway module (ZGM) to the receiving control unit.

Voice output consists of recorded audio signals stored in the control unit for the voice input and activation system. The audio signals are then made available on the MOST bus in the form of digital signals.

TCU

The TCU used on the F01/F02 is an evolved unit based on the TCU from the E70.

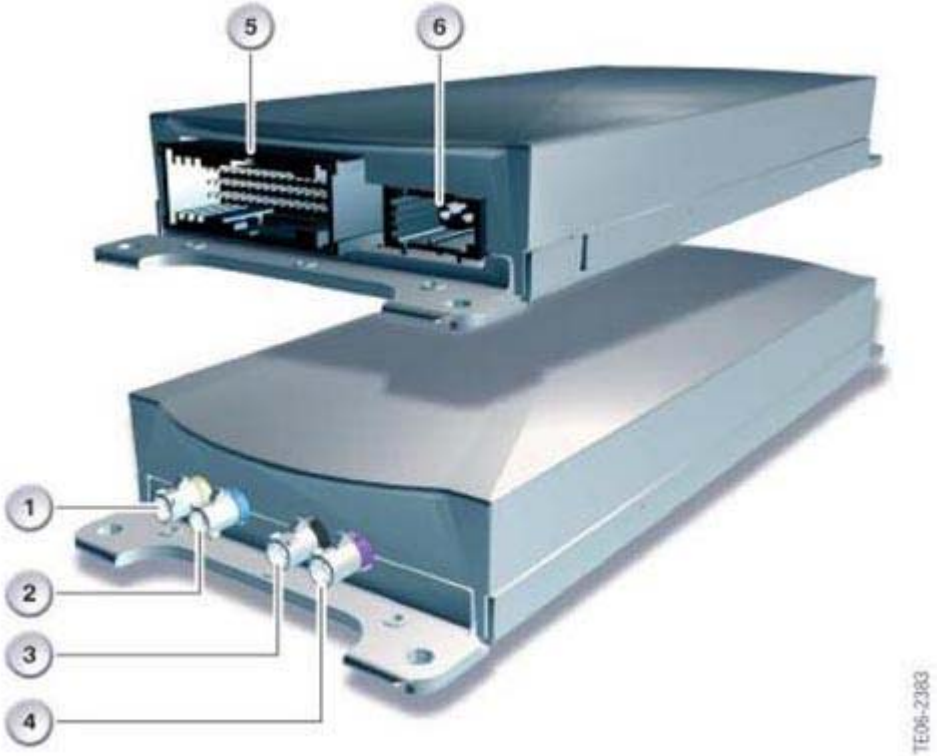


Fig. 44: Identifying Telematics Control Unit Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Bluetooth antenna connection, transparent connector
2	GPS antenna connection blue connector
3	Roof antenna connection black connector
4	Emergency antenna connection purple connector
5	54-pin connector
6	MOST connection

TCU Location

ULF-SBX "High" and the TCU are located on the left side of luggage compartment

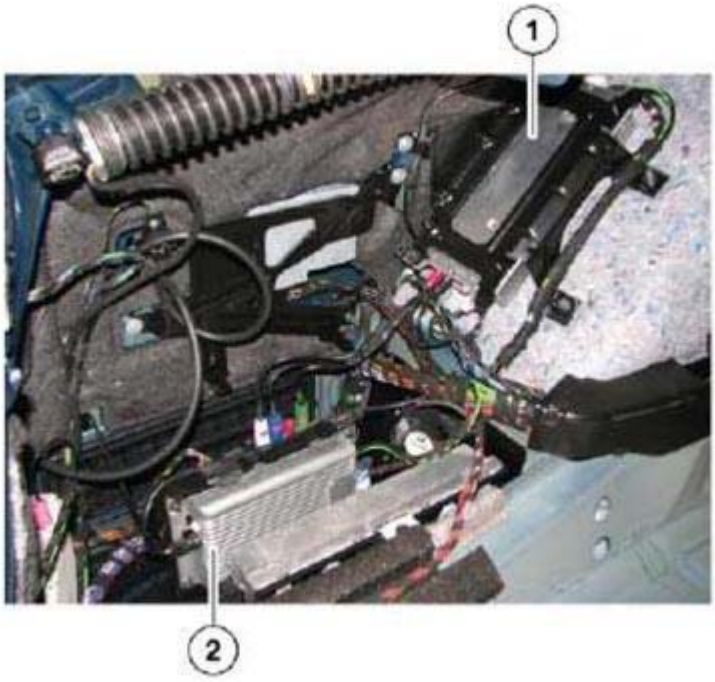


Fig. 45: Identifying TCU And ULF-SBX-H
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	TCU
2	ULF-SBX High

Voice Activation System



Fig. 46: Identifying IHKA/Audio Control Panel
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Turn/push button for volume control of the audio system (ON/OFF)
2	Favorite buttons
3	Slot in DVD player
4	Eject button for the DVD player

The Voice Activation system supports all the menus viewable on the CID. Voice control also extends to the second level of the menu tree.

The CIC has eight languages, all saved on the internal hard disc. Three of these languages are user-selectable by iDrive. The other languages can be activated by coding.

The volume of voice output can be adjusted by means of the multifunction steering wheel and the IHKA/audio control unit.

The CIC is mounted behind the IHKA/audio control panel in the instrument panel.

Hard Disc

For the first time, a hard disc for storing applications (programs) and data is used in a head unit. It is a 2.5" hard disc with a capacity of 80GB.

0.5 GB of storage space is reserved on the hard disc for the data of the voice recognition system (iSpeech).



Fig. 47: Identifying CIC With Hard Disc
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	CIC
2	Hard disc (slide-in tray)

F01 AUDIO SYSTEMS

INTRODUCTION

HISTORY

With the launch of the E65, an optical bus (MOST) was used for the first time in a series production vehicle for the purpose of transmitting digitized audio signals.

With the introduction of the E93 in 2007 a USB interface for external audio devices was offered for the first time in BMW vehicles. The media can be accessed from the iDrive and the audio data played through the vehicle speakers.

NEW FEATURES

The CIC system is a further development of the previous CCC system. The CIC head unit was installed for the first time on the BMW 1 Series and 3 Series in 2008. The New BMW 7 Series, the F01/F02 is equipped with an enhanced version of the CIC system.

By storing data on a 80 GB hard disk, the new head unit provides many new functions and options.

In the audio systems, this development is reflected by the new music collection function. Music files can be converted (ripped) or copied for the music collection onto the hard disk.

Storing the music on the CIC-dedicated hard disk allows fast access to these music files at all times.

A selection of up to 3700 music files (12 GB) is possible.

A USB interface is provided in the glove compartment for import/export purposes (data copy or data backup).

The digital radio systems IBOC tuner/decoder is now integrated in the CIC.

A common station list together with the analog systems provides added convenience.

An improved antenna system makes reception of the radio stations even more stable and less prone to interference. An additional interference suppression filter enhances the reception over long distances, particularly in the AM range.

A modified base plate makes it possible to connect to and play back music tracks stored in the mobile phone with the Smartphone Integration option (6NF). This option is currently available only with the iPhone®.

Music tracks stored in the mobile phone can now be easily accessed. Simple menu navigation and playback of these music tracks can now be controlled via the iDrive.

SYSTEM OVERVIEW

GENERAL INFORMATION

The system overview of the F01/F02 audio system begins with a general bus overview. It shows the interconnection of all IKT components in the bus system network.

A block diagram of the Car Information Computer is also provided.

Particular reference is made to the individual levels within the CIC head unit:

- User interface
- Application software
- Hardware components

Detailed information can be found in the following pages on the individual circuit diagrams:

- CIC Head unit circuit diagram
- HiFi speaker system circuit diagram
- TOP-HiFi speaker system circuit diagram

- Antenna system circuit diagram
- USB/audio interface circuit diagram
- Smartphone Integration circuit diagram
- DVD changer circuit diagram

NOTE: The Top HiFi System refers to the Premium-HiFi System.

F01/F02 Audio/Bus System Overview

2009 BMW 750Li

ACCESSORIES AND BODY, CAB Information & Communications - Overview

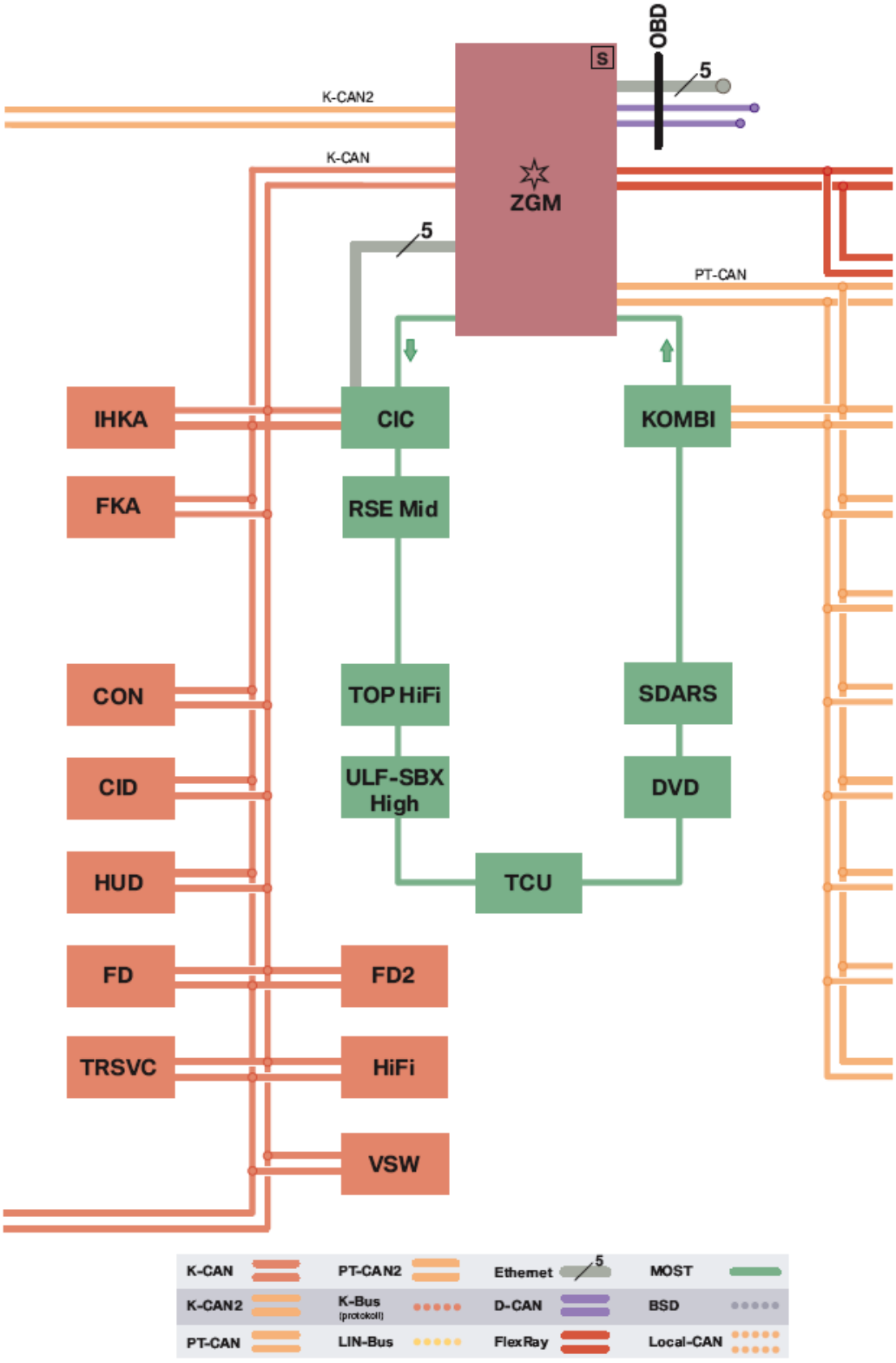


Fig. 48: Overview Of F01/F02 Audio/Bus System
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
CAS	Car Access System
CIC	Car Information Computer
CID	Central information display
CON	Controller
DVD	DVD changer
FD	Rear-seat display
FD2	Rear seat area display 2
HiFi	HiFi amplifier
HKA	Automatic A/C, rear seat compartment
HUD	Head-Up Display
IHKA	Automatic climate control
KOMBI	Instrument cluster
OBD	Diagnosis socket
RSE	Rear Seat Entertainment
SDARS	Satellite tuner
TCU	Telematics control unit
TOP HIFI	Top-HiFi system
SBX High	ULF Interface box "High" (Bluetooth telephone, voice input and USB audio interface)
VSW	Video switch
ZGM	Central gateway module

Key to abbreviations - bus overview

ABBREVIATIONS REFERENCE CHART

Index	Explanation
D-CAN	Diagnosis CAN
K-CAN	Body CAN
K-CAN 2	Fast body CAN
MOST	Media Orientated System Transport
PT-CAN	Powertrain CAN
PT-CAN 2	Powertrain CAN 2

Block Diagram of Head Unit CIC

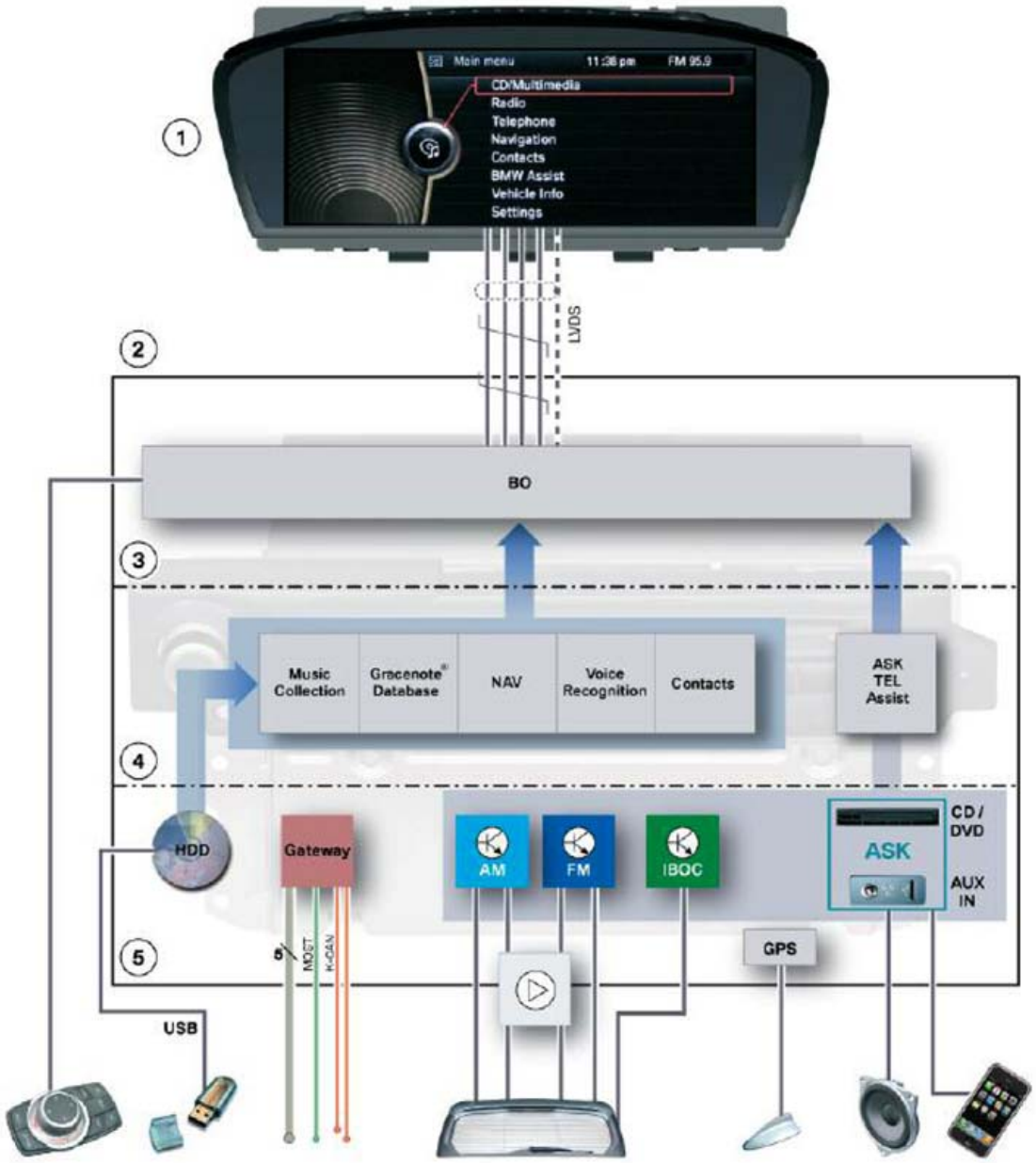


Fig. 49: Block Diagram Of Head Unit CIC
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Central Information Display (CID)
2	Car Information Computer
3	User interface application
4	Application software
5	Hardware and interfaces

CIC Head Unit Circuit Diagram

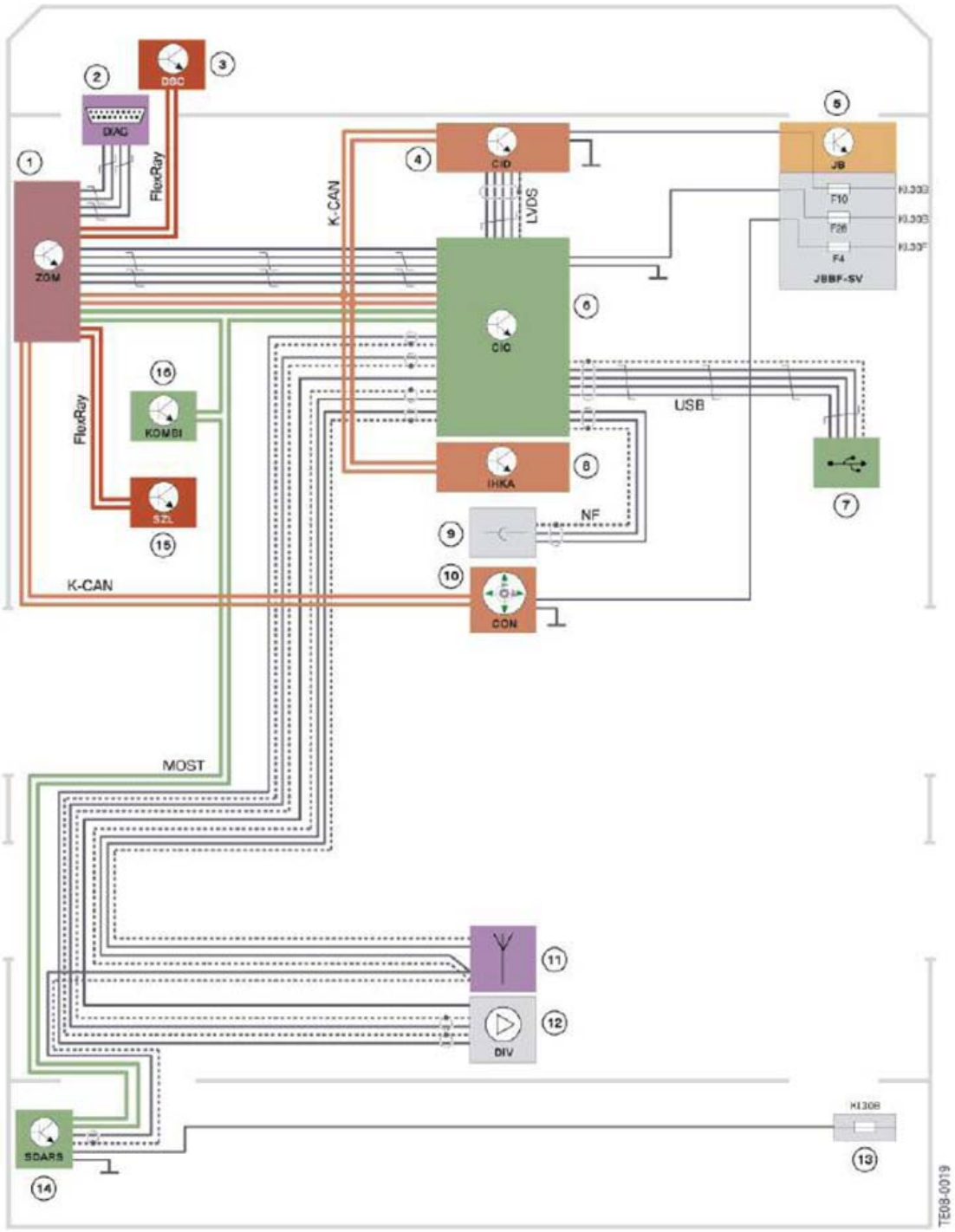


Fig. 50: CIC Head Unit Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Central gateway module
2	Diagnosis interface
3	Dynamic stability control
4	Central information display
5	Junction box electronics module with power distribution box
6	Car Information Computer
7	USB port in glove compartment
8	Automatic climate control
9	AUX-In connection in center console (jack plug)
10	Controller
11	Roof antenna
12	Antenna amplifier with diversity
13	Rear power distribution box
14	SDARS satellite radio tuner
15	Steering column switch cluster
16	Instrument cluster
LVDS	Low voltage differential signalling
MOST	Media Orientated System Transport
USB	Universal serial bus
FlexRay	FlexRay bus system
K-CAN	Body CAN

K-CAN signals at the CIC control unit, that are not defined in the system circuit diagram:

K-CAN SIGNAL FUNCTIONAL CHART

In/Out	Signal	Source/sink	Function
In	Speed signal	Wheel speed sensor > DSC > ICM > ZGM >	Speed-dependent volume control
In	Terminal status	CAS > ZGM >	Terminal control
In	Timer bus signal	Instrument cluster > ZGM >	Transfer of ambient conditions
In	Control	CON > ZGM >	User interface control
In	KI. 58g	Light switch > FRM > ZGM	Button lighting/instrument lighting
Out	Rad_on signal	> ZGM > HiFi amplifier	Rad_on signal for HiFi amplifier

MOST signals at the CIC control unit, that are not defined in the system circuit diagram:

MOST SIGNALS FUNCTIONAL CHART

In/Out	Signal	Source/sink	Function
In	Decoded audio signals	DVD changer >	Speed-dependent volume control
In	Information	DVD changer >	Metadata (ID3 tags)

In	Date, time, language	Instrument cluster > ZGM >	Transfer of ambient conditions
In	KI. 58g	Light switch > FRM > ZGM >	Button lighting/instrument lighting
In	Data, audio signal	ULB-SBX >	Data, audio signal, USB interface, Center console
In	Data, audio signal	ULB-SBX >	Data, audio signal, mobile phone in snap-in adapter
Out	Rad_on signal	> Top-HiFi amplifier	Rad_on activation signal for Top-HiFi amplifier
Out	Audio signals	>Top-HiFi	Audio signals (subsequently converted in Top-HiFi amplifier and output to individual speakers)

HiFi Speaker System Circuit Diagram

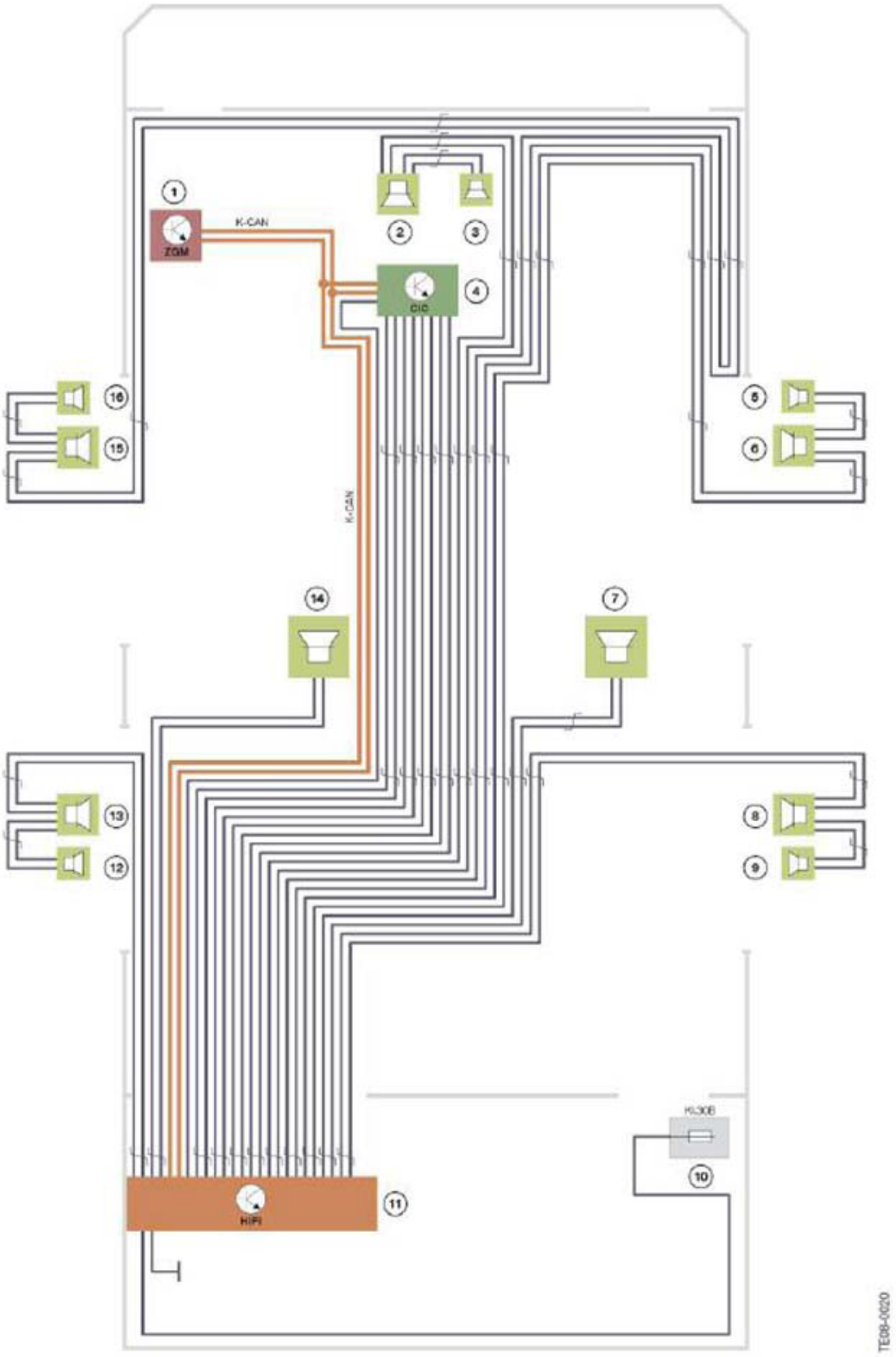

1
ZGM
K-CAN
2
3
4
CIC
16
15
5
6
K-CAN
14
7
13
12
8
9
KL.30B
10
11
HiFi
TE08-0020

Fig. 51: HiFi Speaker System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Central gateway module
2	Mid-range speaker, front center
3	Tweeter, front center
4	Car Information Computer
5	Tweeter, front right door
6	Mid-range speaker, front right door
7	Woofer, under right front seat
8	Mid-range speaker, rear window shelf, right
9	Tweeter, rear window shelf, right
10	Rear power distribution box
11	HiFi amplifier
12	Tweeter, rear window shelf, left
13	Mid-range speaker, rear window shelf, left
14	Woofer, under left front seat
15	Mid-range speaker, front left door
16	Tweeter, front left door
K-CAN	Body CAN

TOP-HiFi Speaker System Circuit Diagram

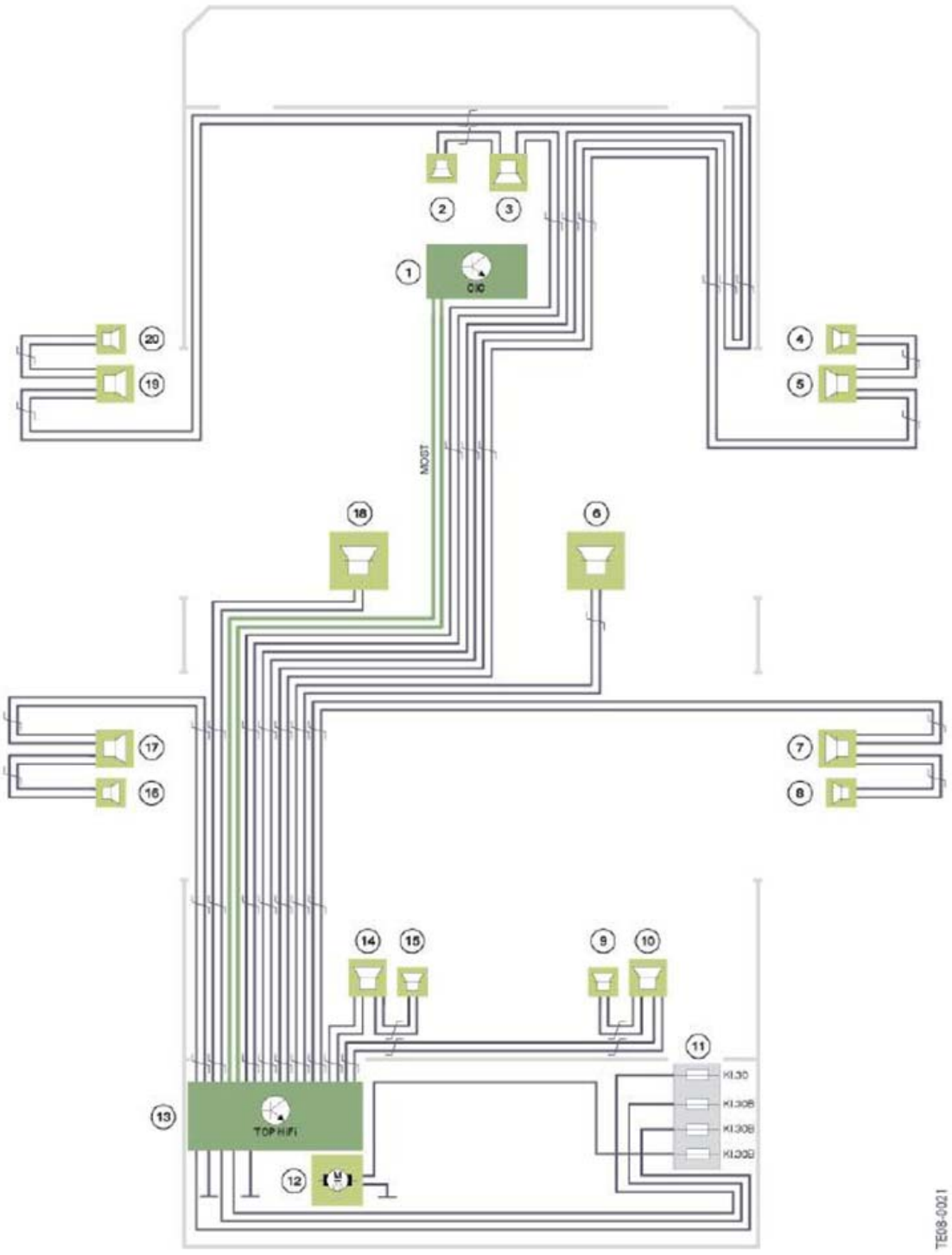


Fig. 52: TOP-HiFi Speaker System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Car Information Computer
2	Tweeter, front center
3	Mid-range speaker, front center
4	Tweeter, front right door
5	Mid-range speaker, front right door
6	Woofer, under right front seat
7	Mid-range speaker, rear right door
8	Tweeter, rear right door
9	Tweeter, rear window shelf, right
10	Mid-range speaker, rear window shelf, right
11	Rear power distribution box
12	Axial-flow fan, TOP-HiFi amplifier
13	Top-HiFi amplifier
14	Mid-range speaker, rear window shelf, left
15	Tweeter, rear window shelf, left
16	Tweeter, rear left door
17	Mid-range speaker, rear left door
18	Woofer, under left front seat
19	Mid-range speaker, front left door
20	Tweeter, front left door
MOST	Media Orientated System Transport

Antenna System Circuit Diagram

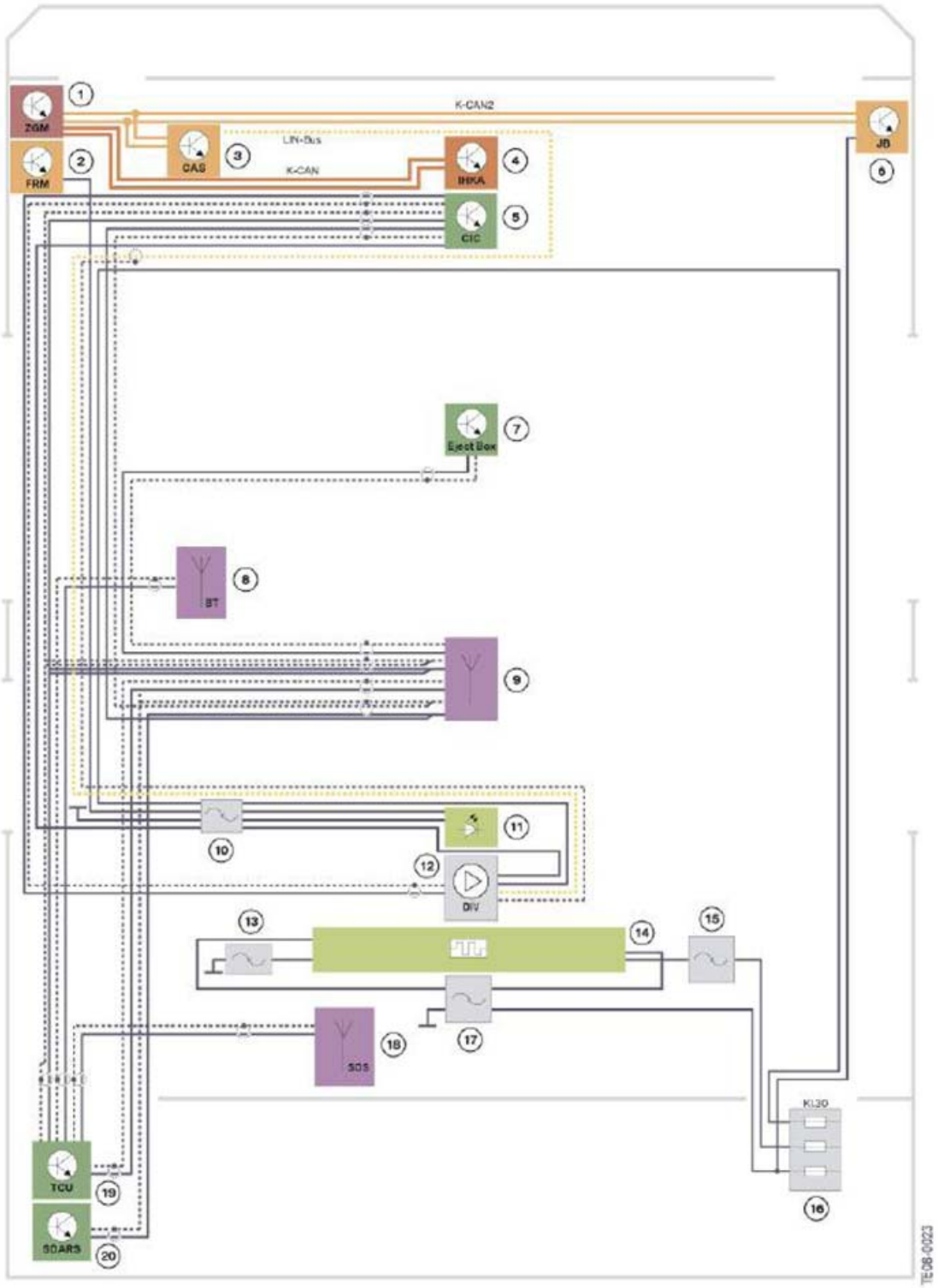


Fig. 53: Antenna System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Central gateway module
2	Footwell module
3	Car Access System
4	Automatic climate control
5	Car Information Computer
6	Junction box electronics
7	Base plate of universal charging and hands-free (Not for US)
8	Bluetooth antenna
9	Roof antenna
10	Interference suppressor filter, rear brake light
11	Rear brake light
12	Antenna diversity
13	Rejector circuit, rear window defogger_1
14	Rear window with individual FM/AM antenna
15	Rejector circuit, rear window defogger_2
16	Rear power distribution box
17	Rejector circuit, rear window defogger for AM range
18	Emergency call antenna (backup)
19	Telematics control unit
20	SDARS satellite tuner
K-CAN	Body CAN
K-CAN 2	Fast body CAN
LIN	Local Interconnect Network

USB/audio Interface Option Circuit Diagram

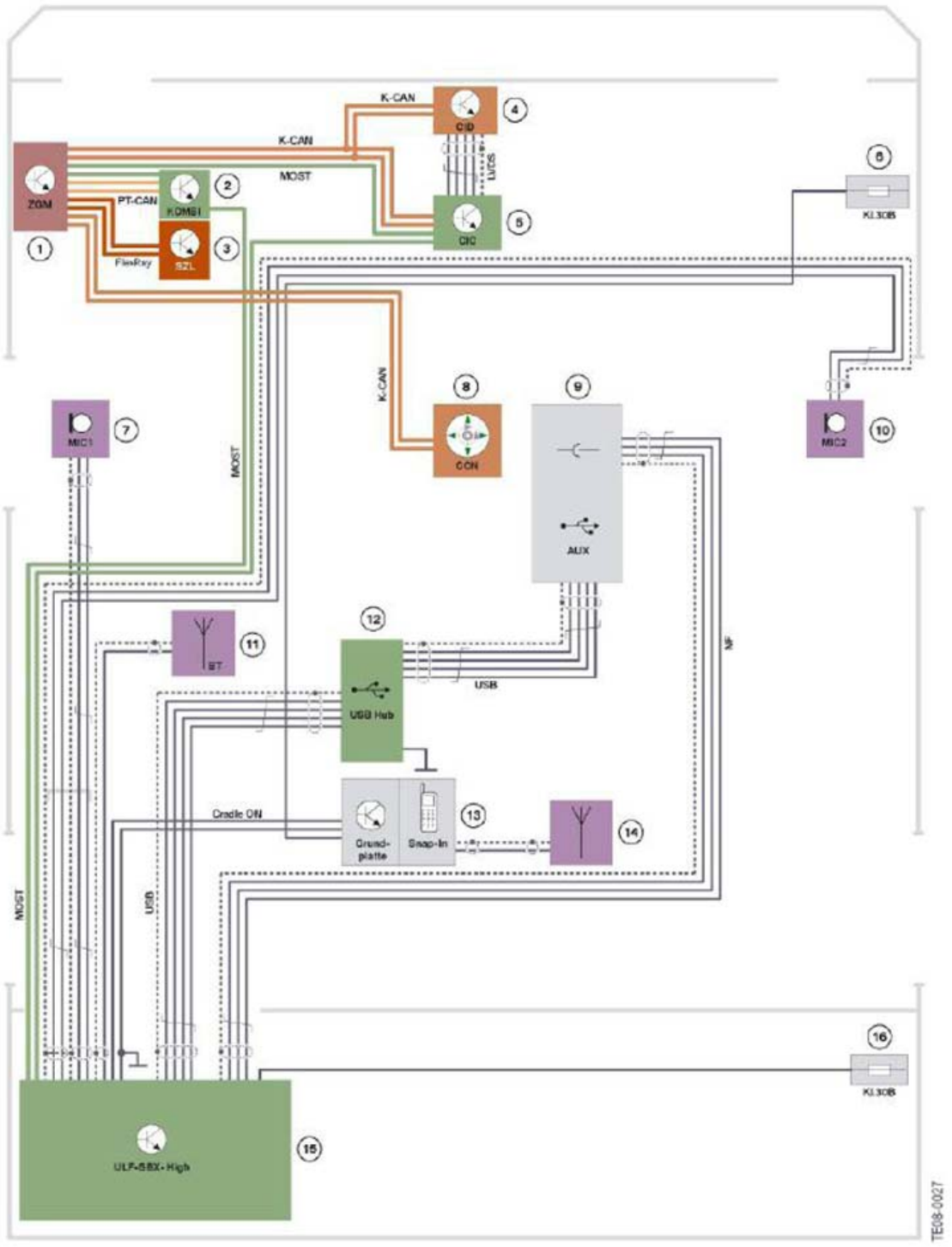


Fig. 54: USB/Audio Interface Option Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Central gateway module
2	Instrument cluster
3	Steering column switch cluster
4	Central information display
5	Car Information Computer
6	Junction box
7	Microphone, left side of vehicle
8	Controller
9	AUX-In connection combined for USB connection + jack plug
10	Microphone, right side of vehicle
11	Bluetooth antenna
12	Antenna diversity
12	USB hub
13	Not for US
14	Roof antenna
15	ULF-SBX-High (6FL)
16	Rear power distribution box
K-CAN	Body CAN
PT-CAN	Powertrain CAN
FlexRay	FlexRay bus system
MOST	Media Orientated System Transport
LVDS	Low voltage differential signal

Smartphone Integration Option Circuit Diagram

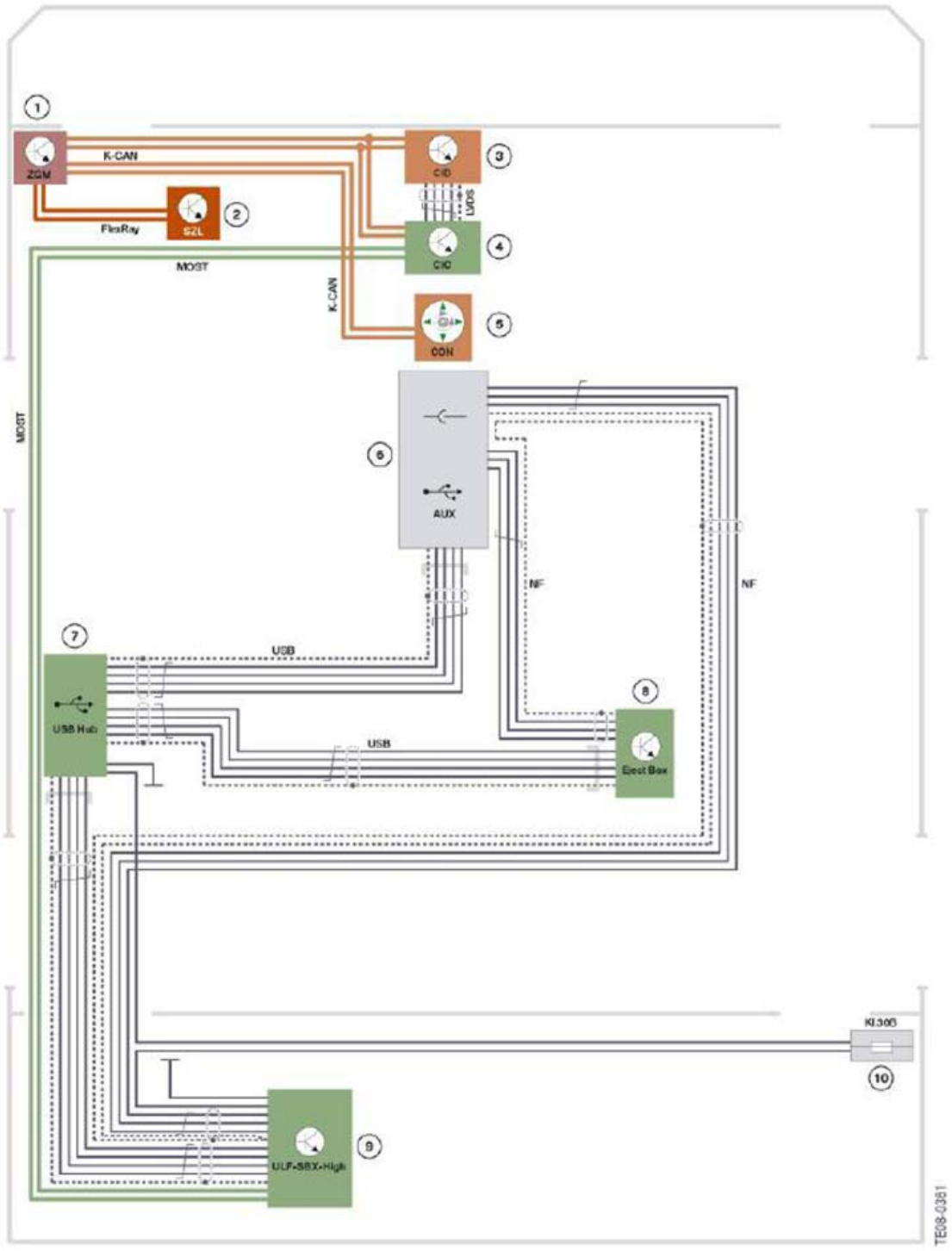


Fig. 55: Smartphone Integration Option Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Central Gateway Module
2	Steering column switch cluster
3	Central Information Display
4	Car Information Computer
5	Controller
6	AUX-In connection combined for USB connection + jack plug
7	USB hub
8	Base plate of universal charging and hands-free (Not for US)
9	ULF-SBX-High (6FL)
10	Rear power distribution box
K-CAN	Body CAN
K-CAN 2	Fast body CAN
FlexRay	FlexRay bus system
MOST	Media Orientated System Transport
LVDS	Low voltage differential signal

NOTE: Smartphone Integration uses a cradle to connect and play music stored in a mobile phone. Currently this feature is only available with the Apple iPhone®.

DVD Changer Circuit Diagram

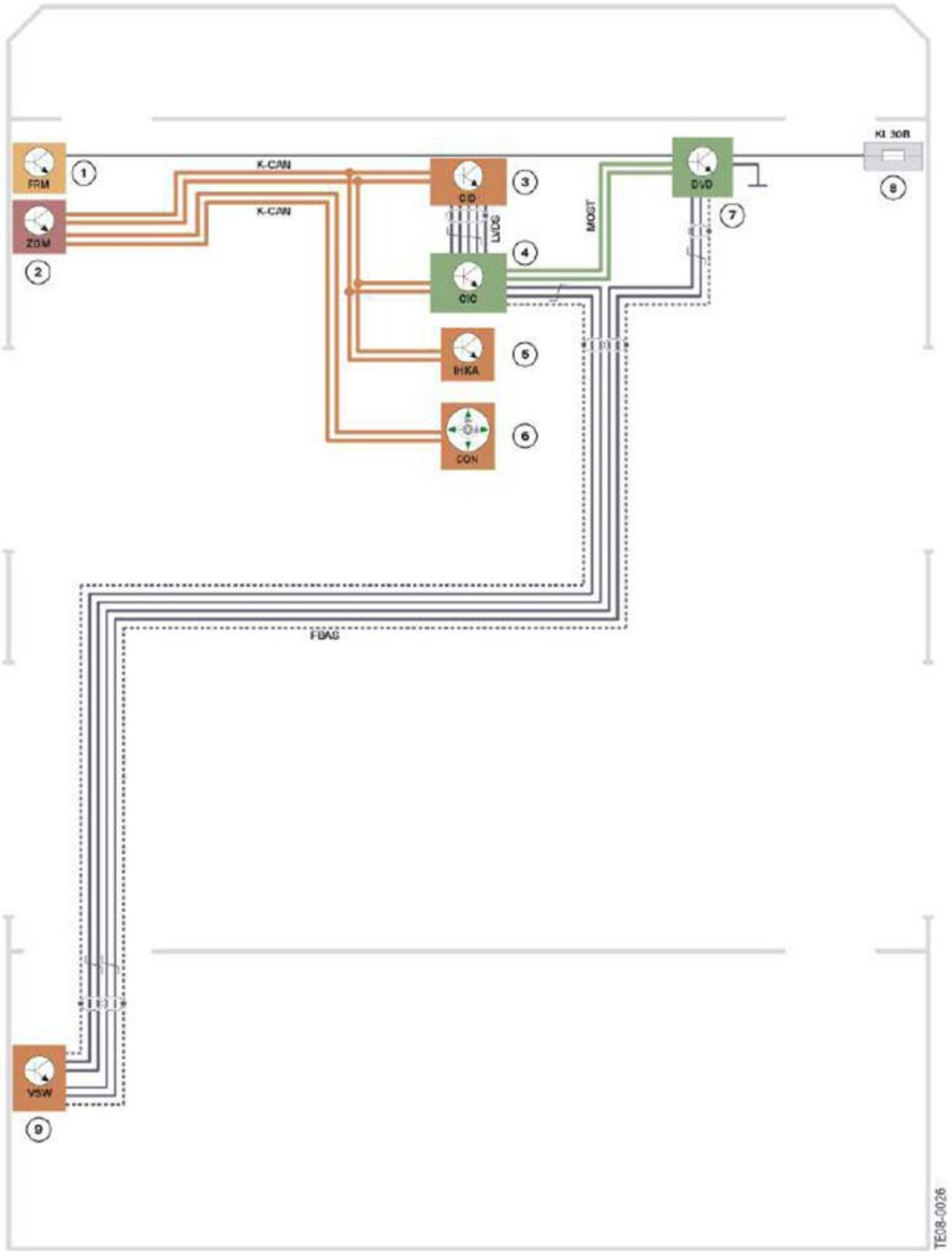


Fig. 56: DVD Changer Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation

1	Footwell Module
2	Central Gateway Module
3	Central Information Display
4	Car Information Computer
5	Automatic climate control
6	Controller
7	DVD changer
8	Junction box
9	Video switch
K-CAN	Body CAN
K-CAN 2	Fast body CAN
FlexRay	FlexRay bus system
MOST	Media Orientated System Transport
LVDS	Low voltage differential signal

PRINCIPALS OF OPERATION

Comparison of CIC with CCC

The ASK system was installed in E65/E66. With the E60, ASK developed into M-ASK and the further developed CCC which was available as an option.

The multi-audio system controller M-ASK is the central control unit of the information and communications systems. The M-ASK combines up to four control units in one.

The M-ASK combines the following control units in one housing:

- ASK
- Antennal amplifier/tuner
- MOST CAN gateway, interface to control display

In the E65, these modules were separate control units.

The car communication computer CCC is the central control unit which combines the functions of the M-ASK, plus some additional functions.

Voice control of the systems and the navigation system with map presentation were made possible with the CCC.

The CCC also contains the driver for the rear passenger compartment display.

The CCC performs all the functions of the M-ASK as well as offering Navigation and additional programming possibilities.

As part of this development from the ASK to the CCC system, the radio tuner, navigation, voice recognition and actuation as well as video signal processing were integrated in the CCC.

A comparison is repeatedly made in this training information between the predecessor, Car Communication Computer head unit and the new CIC head unit.

The following table shows a comparison between the previous menu items of the CCC (bold print) and the menu items of the CIC (bold print).

CCC AND CIC MENU COMPARISON CHART

CCC main menu		**CIC main menu**
		
Communication	=	**Telephone**
Telephone		Telephone
A-Z		Telephone/Phonebook
Telephone => Phonebook Navigation => Address Book	=	**Contacts** (imported/self-entered contacts)
Communication	=	**BMW Services**
Assist services		BMW Services
Navigation	=	**Navigation**
Navigation, onboard information, BC	=	**Vehicle information** , onboard computer
Air conditioning (climate control)	=	Settings (limited)
Entertainment	=	**CD/Multimedia**
CD, DVD, CDC		CD/DVD
Radio (FM, AM, IBOC)	=	**Radio** (FM, AM, IBOC)
Not available		Music collection (on hard disk)
Settings (5th menu)	=	**Settings**
Audio		Sound
Display screen		Central screen
Time/Date		Time/Date
Language		Language/Units
Vehicle/Tires	=	**Vehicle information** /Vehicle status

Service	=	**Vehicle information** /Vehicle status
Vehicle Owner's Manual only paper form	=	**Vehicle Owner's Manual (Dital Form)**

The star-shaped operating concept of **"Turn-Press-Push"** of the CCC has been further developed in the CIC.

The sub-menus in the main menu now are arranged in lists.

All listed sub-menus can be accessed in the start menu by **"turning"** and **"pressing"** the controller.

Several sub-menus can now also be selected by means of the direct access buttons on the controller.

The windows of the selected submenus are placed horizontally one over the other.

Display

The display used for the Car Information Computer is the same CID (Central Information Display) known from the CCC.

In the F01/F02, the screen size has increased to a diagonal of 10.2" (26cm).

The number of pixels has doubled in the CID from 640x240 pixels for the CCC display to 1280x480 pixels in the CIC central display.

The new display delivers a crisp and improved picture quality compared to the previous system.

The graphic layout of the user interface has been totally redesigned.

The rear view of the F01/F02 control display is shown in the following with the two connections.



Fig. 57: Front View Of Control Display F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 58: Rear View Of Control Display F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Connection 2-wire LVDS input signal, connector color: Bordeaux red
2	Connector power supply, K-CAN connector color: Black

Controller

The second most important hardware component of the BMW iDrive system is the controller.

The new controller has been completely redesigned compared to the CCC controller.

The most noticeable new feature of the CIC controller are the seven direct access buttons.

It is now possible to access the following menus directly:

- Main menu
- CD/Multimedia
- Radio
- Navigation
- Telephone

The following menus can still only be selected from the main menu, i.e. with no direct access:

- Contacts
- BMW Services
- Vehicle information
- Settings

The "Back" button is pressed to go back to the last display view. Up to 30 "back" steps are possible with this button.

The option button makes it possible to make fine adjustments or carry out special functions in the sub-menu last selected.

The direct access buttons replace the "long push" function. With this function is was possible to change from a sub-menu directly to another sub-menu in the CCC by pushing the controller in the corresponding direction for at least two seconds.

The respective sub-menus are now selected directly by pressing the CD/multimedia, radio, navigation or telephone buttons twice.



Fig. 59: Identifying CIC Controller Buttons
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Direct access button for Main menu
2	Direct access button for CD/Multimedia
3	Direct access button for Radio
4	Direct access button to go Back
5	Direct access button for Options sub-menu
6	Direct access button for Navigation
7	Direct access button for Telephone

CD/Multimedia

In terms of their functionality, the CD/DVD, external devices and sound submenus located under CD/Multimedia are similarly configured as the iDrive "Entertainment" menu of the CCC.

This training material mainly deals with the **Music collection** selection menu. The other selection menus are described in detail in the Vehicle Owner's Manual.

With the music collection, it is possible to store music data within the CIC on an 80GB hard disk. A total of 12 GB is reserved for the music collection, corresponding to about 3700 music tracks.

A **music search** function has been implemented, which searches for information (metadata) on the individual music tracks (artist, album, etc.).

A music track database (Gracenote®) provides further information to the music track (metadata). This takes place as a supplementary function to the conversion process from Digital Audio CD to a WMA file. A storage space of 4 GB is reserved for this purpose on the CIC-internal hard disk.



Fig. 60: Selecting CD/Multimedia Sub-Menu
Courtesy of BMW OF NORTH AMERICA, INC.

Storing Music Data on the HDD

The music collection is stored in a partition on the internal hard disk drive (HDD) of the CIC. This device makes it possible to store a large selection of music data in the vehicle, while allowing the option to retrieve it when necessary.

Up to 12GB of the total 80 GB hard drive is set aside for the music collection.

The following three options can be used to store music data on the hard disk:

- Rip function from Compact Disk Audio format
- Copying data via the CD/DVD drive
- Copying data from the USB

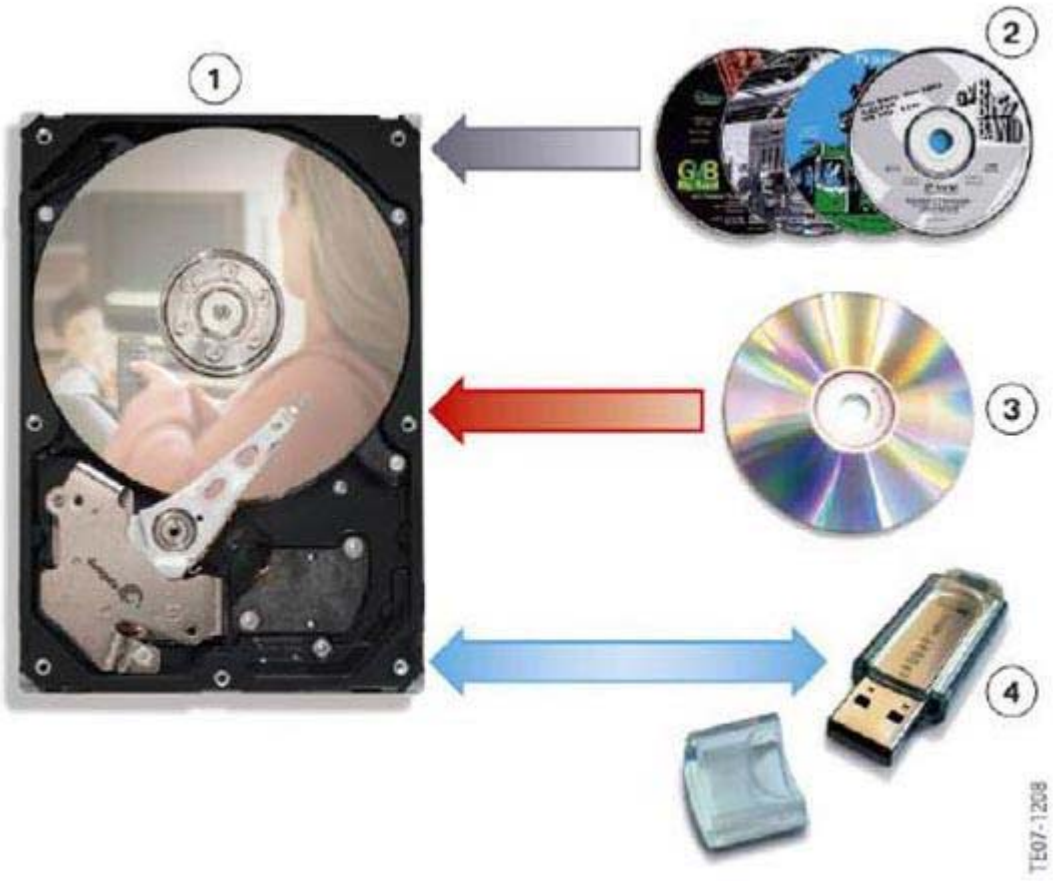


Fig. 61: Identifying HDD With Audio/Video CD And USB Stick
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Hard disk (HDD)
2	Commercially available audio CDs (Compact Disk Digital Audio CDA)
3	DVD/CD ROM with compressed audio data (WMA, CDA, MP3, AAC)
4	USB stick

COMPACT disc DIGITAL AUDIO

Rip Function

This function rips commercially available audio CDs (marked with the Compact Disk Digital Audio logo) and converts them to compressed music files.



Fig. 62: Identifying Compact Disc Digital Audio Logo
Courtesy of BMW OF NORTH AMERICA, INC.

This function can be performed when the vehicle is stationary or while driving.

The music on the CD can also be played back during the conversion and storage process of the rip function.

The music data is converted at a speed between 3 and 12 times the playback speed. Following the conversion the music data is stored on the hard disk in WMA file format.

The data is then displayed in the form of file folders in the music collection menu. These folders are identified with the corresponding title and with a round CD icon.

After the conversion process the files will be displayed and can now be selected individually by using the music search function.



Fig. 63: Display - Music Store Menu
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 64: Selecting Continue
Courtesy of BMW OF NORTH AMERICA, INC.

Copying Data via the CD/DVD Drive

Self-recorded CD/DVD ROMs with audio files in MP3, WMA or AAC (M4A) format can be read, copied and stored using the DVD player (drive).

All CD/DVD formats (from CD-R to DVD Double Layer) are supported, except for CD-RAM and DVD-RAM.

The audio data is then stored in the form of file folders in the music collection together with the title of the respective CD/DVD ROM.

If the CD/DVD ROMs are untitled, they will be stored as "Audio-CD 1", "Audio-CD 2", etc. To facilitate identification, a folder icon is shown next to the file folder.



Fig. 65: Selecting Audio CD 1
Courtesy of BMW OF NORTH AMERICA, INC.

Copying Data from the USB

Data contained on a USB stick (music files in MP3, WMA or AAC format) can be imported via the

import/export USB port located in the glove compartment.

Copying music data from audio devices such as an MP3 players or iPods using the USB connection is possible although not advisable.

The folder and file structure of the player are also copied when copying music files from an audio player (MP3 player, iPod®). In this case, the copied folder names are represented by means of cryptic characters instead of album title. This makes a subsequent search for a music file virtually impossible.



Fig. 66: Importing Music File From USB
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 67: Identifying USB Import/Export Interface In Glove Compartment (F01/F02)
Courtesy of BMW OF NORTH AMERICA, INC.

folders are also shown together with a folder icon as the files copied through the DVD drive.



Fig. 68: Selecting USB 1
Courtesy of BMW OF NORTH AMERICA, INC.

Compatible USB sticks must be FAT formatted and must support the Mass Storage Class USB protocol. The format can be easily checked on any PC running the Windows operating system.

The file system (FAT 16, FAT 32 or NTFS) is shown under properties of the USB stick in the Windows Explorer. The protocol which is used is shown by clicking the hardware icon in the windows information area.

When using a USB stick device with several partitions, the music data files must be located in the first partition in order to be recognized and processed.

USB hard drives, USB hubs and USB memory card readers with several slots cannot be read when connected to the USB jack in the glove compartment and therefore can not be used.

Depending on the USB lead used, the mass storage device may be able to be charged through the USB interface. However, the power consumption of the mass storage device must not exceed the maximum level of 500 mA permitted.

It is recommended that when charging a storage device, only the USB audio interface in the center console be used and not the USB in the glove compartment.

NOTE: The USB interface in the glove compartment is only intended for the import and export of data (music or personal profiles) to and from the vehicle.

File System

The folders of the converted or copied music files can subsequently be renamed in the "Options" menu.

For this purpose, the corresponding album entry must be marked in the music collection and then the "Options" menu selected.

It is important to note the following when coping music files with Digital Rights Management (DRUM) protection to the music collection:

- AAC music data in the M4P format (P = Protected) cannot be copied to the hard disk.
- Only music data in WMA format with copy protection can be copied.

This data will be shown in the music collection and in the music search. However, these protected tracks **cannot** be played. The track will be "skipped" or ignored and a different non-protected music track will be played.

The reason for this is that it is not possible to provide purchaser authentication in the CIC because a link to the online provider cannot be established. It is suggested that the customer import the audio files using a self recorded Digital Audio CD.

All music download portals allow the creation of a Digital Audio CD for the downloaded music track. However, the number of copies that can be created is limited by licensing legislation.

Data Saving (Backup)

The customer has the option of saving his/her complete music collection under the "Options" sub-menu. This is achieved by copying it back to a USB stick installed in the glove box port. It is necessary to ensure that the USB stick has sufficient storage capacity. A maximum storage capacity of 12 GB is required for saving the music collection data.



Fig. 69: Display - Storing Music On USB Device
Courtesy of BMW OF NORTH AMERICA, INC.

The process is similar to the data saving procedure on a PC. This function makes it possible to import data when changing vehicles or when replacing a head unit or hard disk.

Data saving will only be possible if the hard disk of the CIC has not been damaged and the interfaces to the CIC are still fully operational.

Data back up should be done prior to programming the vehicle after replacing control units. Without data saving (backup), all of the music data could be lost. However, this can only be done by the customer prior to bringing

the vehicle in for service. Detailed instructions on how and where the data backup can be performed are provided in the Vehicle Owner's Manual.

WARNING: For copyright reasons, the service personnel are not permitted to perform the data backup for the customer. The service personnel, can, however, instruct the customer on how to perform the backup procedure.

Music Search

The "Music search" sub-menu is provided in the music collection for the purpose of managing a large quantity of music files.

The music search takes place in accordance with a special filtering process. The search can be started at any menu item in the music search. For example, if the menu item "Genre" is selected as the starting point, all albums of all artists together with all the tracks in this music direction will be made available for selection.

In the next step, only the artist is selected and all his/her albums are displayed.

The search is now filtered further with each step until at the end, only the required entry remains.

The information for the music search is stored in the form of a metafile, similar to the ID3 tags of an MP3 file.

An example of how these metafile or meta information could appear is shown below:

MUSIC SEARCH SUB MENU DESCRIPTION CHART

Music search	Search for:	Example
1	Genre	Rock
2	Artist	Queen
3	Album	Greatest Hits II
4	Track	A Kind Of Magic



Fig. 70: Selecting Stored Album
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 71: Selecting Genre In Music Search Sub Menu
Courtesy of BMW OF NORTH AMERICA, INC.

Data management is achieved with the aid of a music track database.

The music track database information is stored on the hard disk of the CIC for the purpose of managing the music file's metadata. A 4 GB partition is allocated to the music search function.

The CIC is equipped with special software provided by Gracenote® for the purpose of identifying the complete albums of ripped Digital Audio CDs. It provides additional information about the music track on the respective Digital Audio CD converted to WMA files.

This music track database (Gracenote®) uses TOC (Table of Contents) as the identification pattern. This means, complete albums on Digital Audio CDs are identified based on the number of tracks and the track length.

The corresponding data (track, artist, etc.) is then accordingly assigned to the music files in the music search database.

On conclusion of the conversion procedure to WMA files, the new metadata is automatically added to the directory structure in the music search. It is not possible to rename or edit this metadata after it is in the hard disk.

NOTE: Albums with newly released metadata at the time of vehicle delivery will no longer be identified. The music track database would require a permanent link with the server in order to keep this data up to date and this is not possible.

Unrecognized metadata of Digital Audio CDs is stored in the music collection as "Audio-CD 1", "Audio-CD 2", etc., together with the CD icon.

The metadata for the music track database from copied CD/DVD-ROMs or USB sticks is adopted identically in the music search function. This metadata does not stem from the music track database but rather from the user/customer himself.

The metadata, copied from a USB stick or CD/DVD ROM, cannot be renamed in the CIC.

In order to correct the faulty metadata on a track or file, the file must first be deleted from the hard disk in the CIC.

The user can then rename or add to these metadata files corresponding to the music track database structure (genre, artist, album and track) by using software on a personal computer.

When the file is imported back into the CIC hard disk, the correct metafiles will be displayed. This procedure also ensures that the music search will also find the copied music data with the music track, artist, etc.

Updating unknown music tracks is only possible with WMA files from ripped Digital Audio CD. If the user/customer does not follow this procedure, in time the music search will become unusable.

A "current" version of the music track database is stored in the vehicle on delivery. The information about music CDs (Digital Audio CDs) released after the vehicle delivery will not be found in the vehicle's music track database.

NOTE: If the metadata is not found because the Gracenote database in the CIC is outdated, the tracks will not be recognized.

Updating the (Gracenote®) Database

To keep the entire contents of the music track database (Gracenote®) up to date, BMW Service is equipped with the latest CD of the music track database (Gracenote®).

This update takes place in connection with the media package, which also contains the Gracenote Update CD.

The CD can be loaded directly in the CIC drive and updated via the Service menu of the CIC (See **SERVICE INFORMATION**).

The update of the music track database (Gracenote®) will become effective in the WMA music files only after subsequent conversions (rip function) of Digital Audio CD.

Metadata will no longer be added to files that were ripped before the update of the music track database (Gracenote®).

The reason for this is that the music track database is only accessed when a Digital Audio CD is loaded and subsequently ripped.



Fig. 72: Identifying Gracenote Update CD
Courtesy of BMW OF NORTH AMERICA, INC.

Radio

FM Stations

The layout of the "FM stations" in the Radio menu has been adapted to the new operating concept.

The former layout of the "All stations" list in the form displayed by the CCC has been replaced in the CIC by a list layout.



Fig. 73: Display - FM Menu

Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 74: Selecting FM Station
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 75: Display - Manual Station Search In CCC System
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 76: Display - Manual Station Search In CIC System
Courtesy of BMW OF NORTH AMERICA, INC.

AM Stations

A double tuner has now made it possible to receive the "All stations" list in the AM range. However, no station information can be displayed because the RDS data is not transmitted for AM.

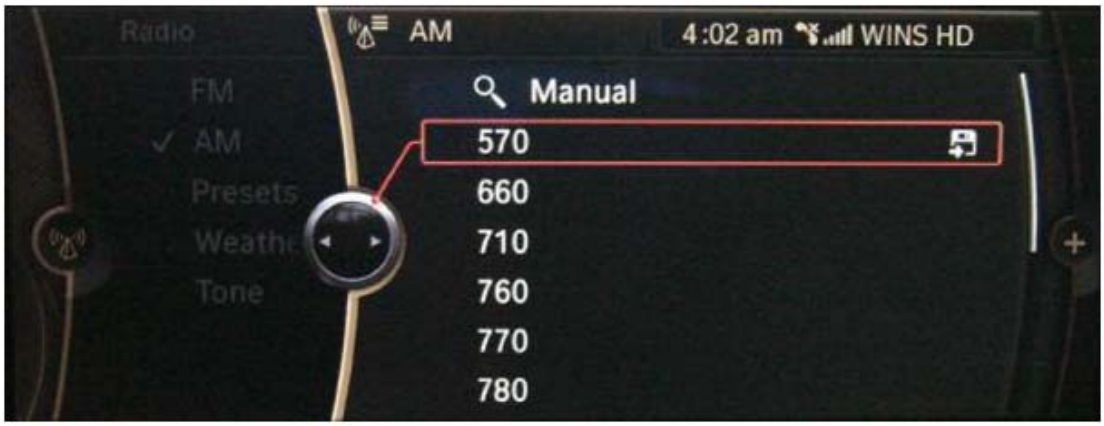


Fig. 77: Display - AM Stations List
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 78: Display - AM Stations Manual Setting
Courtesy of BMW OF NORTH AMERICA, INC.

IBOC

The IBOC functions in connection with the IBOC decoder which is now installed inside the CIC. IBOC makes it possible to receive digital radio signals. The IBOC components are described in detail in the "System Components" section of this training material.

SDARS

The Satellite radio service is available with a subscription to Sirius satellite radio. An example of how a station list would look like in the CIC with channels that have not yet been subscribed to is shown in the illustration below.



Fig. 79: Display - Station List With SDARS Channels Still Disabled
Courtesy of BMW OF NORTH AMERICA, INC.

Stored Stations

Under the menu item "Stored stations", the required stations from all frequency ranges can be stored in a common menu and then selected at a later time.

The following frequency bands are available for storage:

- FM
- AM (SW, MW, LW)
- IBOC



Fig. 80: Display - Stored Stations
Courtesy of BMW OF NORTH AMERICA, INC.

Settings Menu

The following settings options can be edited under the Settings submenu:

Head-up display	**Brightness, picture position**
Central screen	Brightness
Time/Date	Time, date, format
Language/Units	Languages
	Voice dialog: Standard/Short
	Fuel consumption: l/km, km/l, mpg
	Distance: km, mls
	Temperature: °C, F
Sound	Trebles, basses etc.
	Volume adjustment: Speed Volume
	Volume adjustment: Navigation
	Volume adjustment: PDC
	Volume adjustment: Gong
Limit	Setting limit, acceptance limit
Air conditioning (climate control)	Auxiliary heating, auxiliary ventilation
Lights	Home lights
	One-touch indicators
	Daytime driving light
	Welcome light
	High beam assistant
Door locking	Remote control key, lock automatically etc.
Luggage compartment lid	Adjust opening angle



Fig. 81: Selecting Rear Control
Courtesy of BMW OF NORTH AMERICA, INC.

Favorite Buttons

CIC controller has eight favorite buttons.

The buttons have two operating modes:

- Short press : Activation of button assignments
- Long press: Storage of function currently shown in the CID

The long press function stores:

- The required audio media: Radio stations, CD, DVD player or DVD changer access
- Navigation destinations: However, they must already be stored under "Contacts" or entered from "Last destinations"
- Phone numbers

A new feature is that it is possible to assign all submenus such as "CD/multimedia" or selection menus such as "Music collection" or "External devices" to the favorite.

SYSTEM COMPONENTS

This section describes the audio systems in F01/F02 vehicles.

It is subdivided into the following subsections:

- Head unit, Car Information Computer CIC
- Amplifiers and speakers
- Antennas
- Digital tuners
- Peripherals
    - DVD changer
    - USB/audio interface
    - Smartphone integration option

The new head unit (CIC) replaces the CCC head unit and is standard equipment on the F01/F02.

The IBOC digital tuner is now integrated into the CIC.

The navigation system is also integrated into the CIC. The navigation software and navigation map material are stored on the CIC internal hard disk.

The Car Information Computer can be combined with the following speaker and amplifier systems:

- HiFi system (676)
- TOP-Hifi system (677)

With the F01/F02 the antenna reception has been enhanced.

The satellite tuner "SIRIUS satellite radio" and IBOC digital radio for HD radio reception are optionally available.

A CD changer is no longer offered for the F01/F02.

The single-slot DVD changer is offered on the F01 and F02. The DVD changer can accept up to six disks. The disks are inserted in the unit without the use of a magazine.

A USB/audio interface is also available as an optional extra. External audio and storage media are incorporated in the vehicle entertainment system via this USB/audio interface.

Devices such as the iPhone® can now be integrated in the vehicle network by means of the Smartphone Integration Option. With the mobile phone cradle it possible to navigate in the device menu and play back selected audio files. Although the device can also be connected with the USB Y-cable it is no longer necessary for this function.

Car Information Computer (CIC)

The IHKA control unit is integrated into the IHKA/audio control panel.

The faceplate of the CIC is the common control panel for the main entertainment functions as well as for the heating and air conditioning functions.

The CIC and the IHKA/audio control panel are connected to the center console unit carrier.

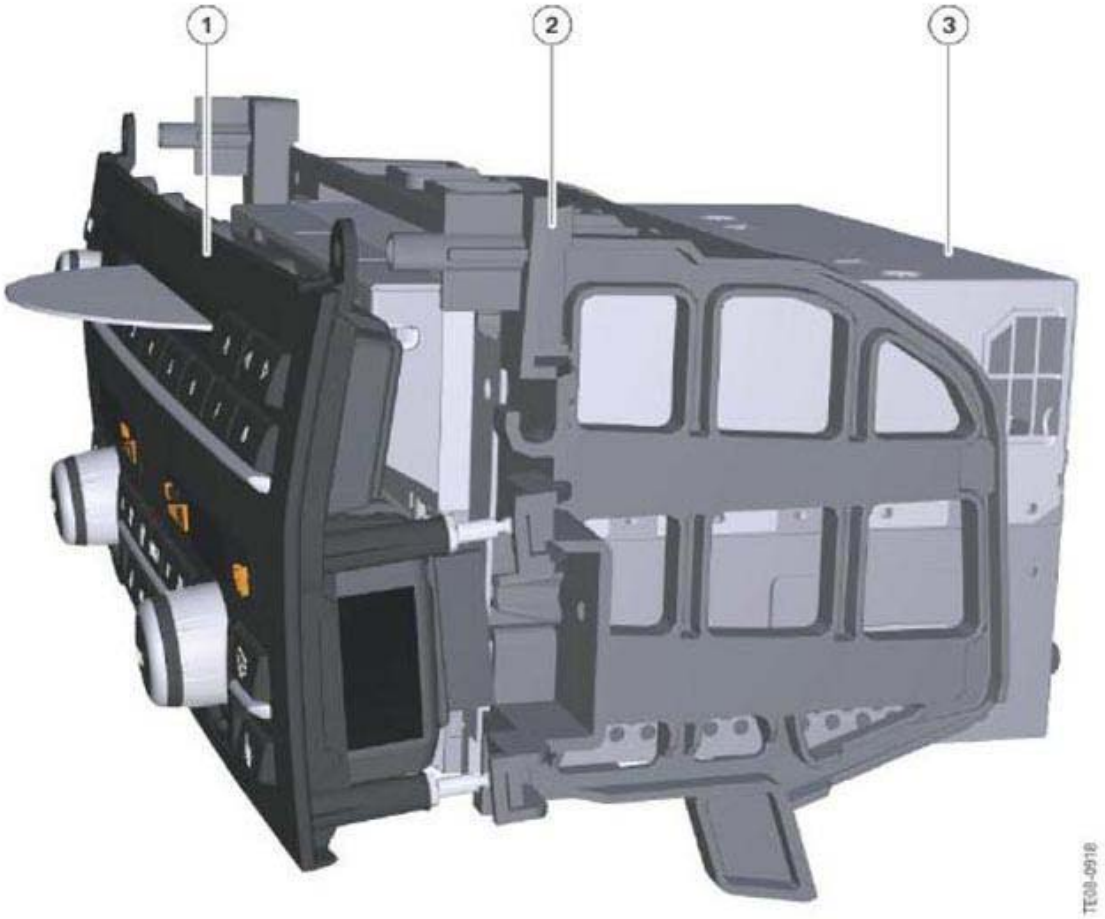


Fig. 82: Side View Of IHKA/Audio Control Panel
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	IHKA/audio control panel
2	Center console unit carrier
3	Car Information Computer



Fig. 83: Front View Of IHKA/Audio Control Panel (F01/F02)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Selector button for FM and AM
2	MODE button for selecting audio sources
3	CD/DVD slot
4	Eject button for DVD/CD player
5	Station search/track "forward and back"
6	Eight freely selectable Favorites buttons

Similar to a personal computer, the Car Information Computer contains a processor, RAM modules (= main memory) and extra peripheral components.

The following applications of the CIC are stored on the integrated hard disk:

- Music collection
- Music track database (Gracenote®)
- Navigation software (application)
- Navigation map material
- iSpeech (voice recognition system)
- Contacts (database with address book data)

The CIC is the central control unit for the listed applications. It is linked to the central information display (CID) for the purpose of transmitting and displaying information.

The Car Information Computer is also connected to the controller. The controller serves as a selection and input device for the user interface.

The CIC is based on a modular design. The most important systems of the communication network are integrated in the CIC board as solid state components.

The CIC combines the following control units in one enclosure:

- Navigation computer, HIP module and yaw rate sensor
- Tuner (FM)
- Tuner (AM)
- Tuner (FM-RTTI)
- IBOC decoder
- Audio system controller, and music search database
- MOST-CAN gateway
- Interface to control display (LVDS)

The upper half of the CIC consists of the optical drive player where CDs and DVDs of digital audio media can be played. The player also has ability to playback video DVDs on the front CID. The video signal is only displayed when the vehicle is stationary with the gear selection in the "Park" position.

For the navigation system, the optical drive can be used for updating the map material stored on the hard disk.

The processors for the main board and application board are located in the lower half of the CIC. This section also contains the main memory, the individual modules as well as the hard disk drive. The CIC together with the controller and CID, make up the iDrive system.

Advantages of the Car Information Computer

Combining several modules in one enclosure provides the following advantages:

- The combination of several systems enhances the functionality
- Outstanding software expansion options through suitable software interfaces
- Fewer plug connections increases reliability
- Less overall package space required for control units



Fig. 84: Front View Of IHKA/Audio Control Panel (F01/F02)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	LVDS signal for the CID; violet connector
2	USB connection for glove compartment beige connector
3	Ethernet connection (future expansion for rear seat entertainment) orange connector
4	MOST connection
5	12-pin connector; right-hand chamber (Ethernet, TEL_AF, AUX-In)
6	12-pin connector; left-hand chamber (video input signals - CVBS)
7	16-pin connector (K-CAN, audio output AF; power supply, Rad-on signal)
8	GPS antenna signal Blue connector
9	Not for US
10	Not for US
11	AM/FM tuner signal black connector

LVDS Technology

The transmission of picture data from the CCC to the CID was performed by means of an 8-wire LVDS (low voltage differential signaling) line. With the introduction of the Car Information Computer, the video signal is now transmitted through a 2-wire LVDS line.

The change in picture data transmission in the vehicle reflect the changes made in PC technology. While the printer was formerly connected to the PC via a parallel cable, data transmission now takes place using serial USB technology.

In the following graphics, 8-wire LVDS technology is compared to the new 2-wire LVDS technology:

8-wire LVDS

Transmission of video signals via 8-wire LVDS technology with CCC and CID.

(LVDS+ and LVDS- for each of the four signal lines and an additional synchronization line)

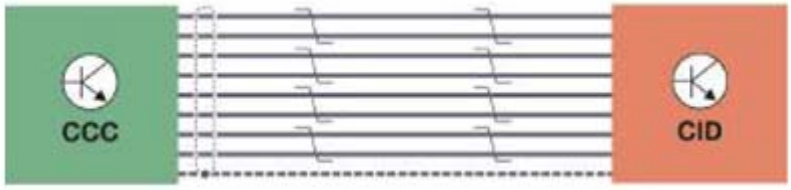


Fig. 85: Identifying 8-Wire LVDS
Courtesy of BMW OF NORTH AMERICA, INC.

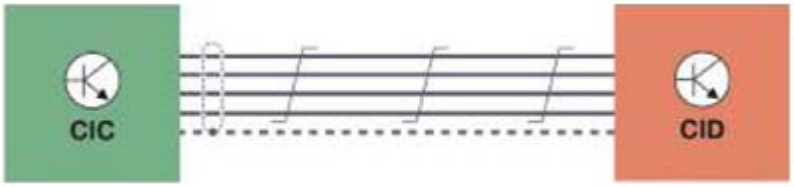


Fig. 86: Identifying 2-Wire LVDS
Courtesy of BMW OF NORTH AMERICA, INC.

2-wire LVDS

Transmission of video signals via 2-wire LVDS technology with CIC and CID.

Signal transmission through this 2-wire LVDS line offers four distinct advantages:

- Higher data transfer rate
- Simplified wiring
- Runtime differences between the individual lines are avoided
- Serial 2-wire LVDS data transmission is now much more cost-effective than 8-wire LVDS technology

The main advantage of using serial 2-wire LVDS is the resulting high picture resolution.

A 4-core, shielded cable is used for the 2-wire LVDS technology. The cable consists of the four cores, LVDS+, LVDS-, 2x ground and shielding.

For Electromagnetic compatibility (EMC) reasons, the unused wire is also connected to ground.

In the illustration to the right, the advantages of both cores connected to ground are shown with the aid of field lines.

The capacitive interference of the signals is deflected to ground. The wires connected to ground form a defined potential and cannot act as antennas.

This ensures that additional interference is avoided.

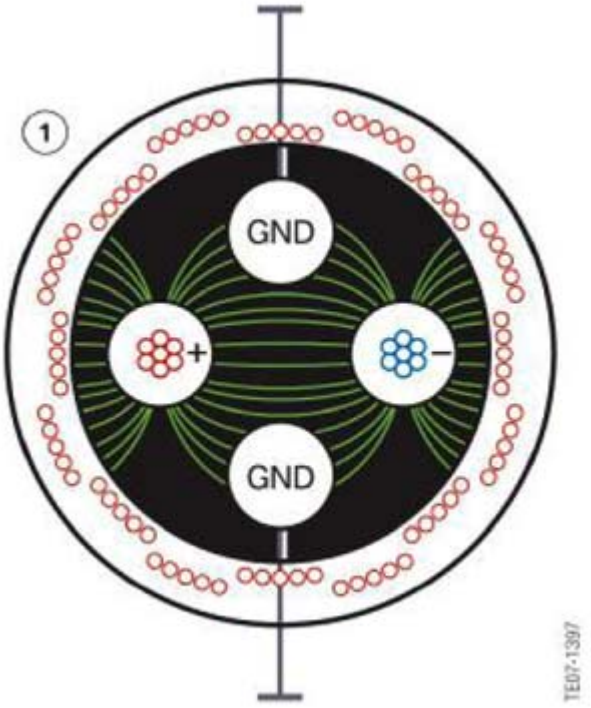


Fig. 87: Graphical Illustration Of EMC Protection Using 2-Wire LVDS Technology
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Two signal-carrying cores, two cores connected to ground

Electrostatic Discharge (ESD)

It is essential to follow ESD (Electrostatic Discharge) guidelines when replacing individual components in order to avoid damage to internal components of the CIC. These requirements also apply when storing or sending back components.

Special packaging (ESD bags, ESD boxes with film or foam material cladding) is available for this purpose and should be used instead of conventional packaging materials.

The following picture illustrates the effects of electrostatic discharge (ESD) on electronic components.

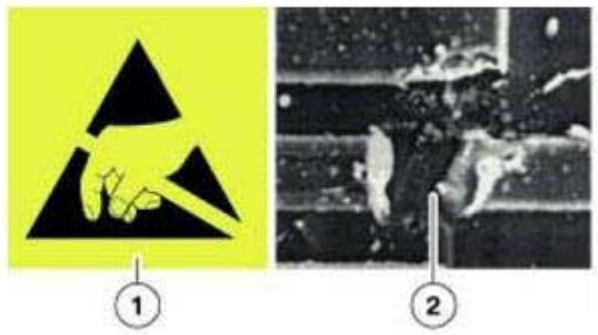


Fig. 88: Effects Of ESD (Electrostatic Discharge) On Electronic Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	ESD symbol (protection measures necessary)
2	ESD damage to a conductor (magnified 5000 times)

Working on Electronic Components

The following requirements must be observed when working on electronic components on the Car Information Computer.

- The work must be performed on a conductive and grounded workbench (special tool 12 7 192 is used for this purpose).
- The grounding cable must be connected to a secure grounding point (water pipe, heating pipe, electric socket ground).
- The person carrying out the work must first put on the grounding cuff in order to ground himself before removing the components from the packaging.
- The electronic components are placed on the anti-static mat which is also connected to a grounding cable.

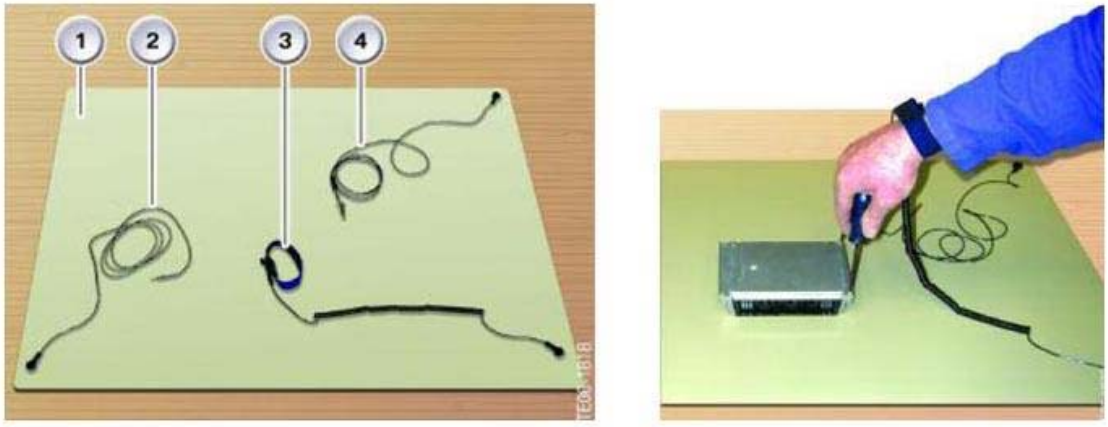


Fig. 89: Identifying Anti-static Mat Special Tool (12 7 192)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Anti-static mat
2	Grounding cable for the mat
3	Anti-static cuff
4	Grounding cable for the component

CIC Components

The components listed above are defined as separate or modular. These components are attached to the main/complete head unit.

Of these components, only the faceplate remains a serviceable and replaceable component. Failure of any other internal component will necessitate the replacement of the entire CIC unit once proper authorization has been obtained through PuMA.

The functions of the individual components are briefly described in the following pages.

The installation and removal instructions for the individual components and the complete CIC control unit are available in TIS (Technical Information System) or the workshop system ISTA.



Fig. 90: Identifying CIC Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	DVD/CD player including CIC housing cover
2	Car Information Computer
3	Hard Drive Disk

Optical Drive (CD/DVD Player)

The Car Information Computer is equipped with a DVD-ROM player.

The optical drive is used for playing audio and video media.

This drive makes it possible to play the following media file formats:

- Audio CDs (CD Digital Audio)
- Audio CD-ROM with MP3, WMA or AAC files
- DVD Audio (only stereo track if contained on the data medium)
- Audio DVD-ROM with MP3, WMA or AAC files
- Video DVD

Playing video on the (front) CID display is only possible when the vehicle is stationary with the gear selector in the "Park" position. When the vehicle is moving or in gear, only the audio track of the video will be played.

Although the CD/DVD drive is no longer used for the navigation system (as in CCC), it may be used to update navigation map data from a navigation DVD.

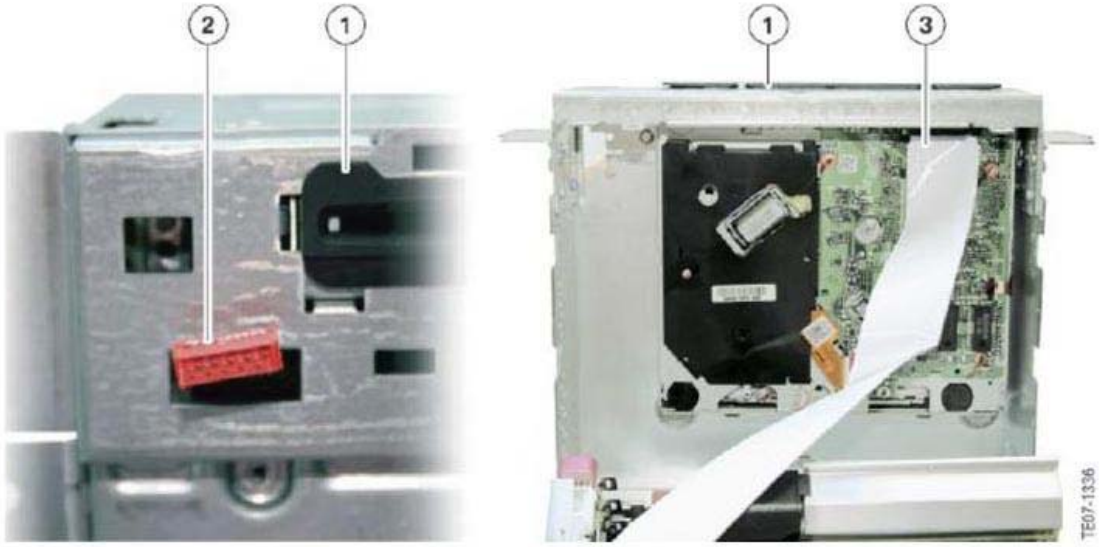


Fig. 91: Identifying DVD Player With Front Panel Connection And Ribbon Cable Connection
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	DVD player
2	Front panel connection
3	Ribbon cable connection, DVD player to CIC head unit

Hard Disk Drive

With the development CIC, a hard disk for storing applications (programs) and data is used in a head unit of a BMW vehicle for the first time.

A 2.5" hard disk drive with a storage a capacity of 80 GB is installed.

This makes it possible to display complex graphics like 3D models in the perspective view of the navigation system.

This system provides the option of converting, storing and playing music tracks.

The hard disk makes it possible to maintain a music collection with a music track database (Gracenote®).

The HDD (hard disk drive) also provides a data storage option for the three languages of the voice recognition system.

The hard disk drive is a replaceable component of the CIC. Proper repair instructions and ESD guidelines must

be followed when replacing the unit.

The following illustrations show the hard disk location and the individual partitions.

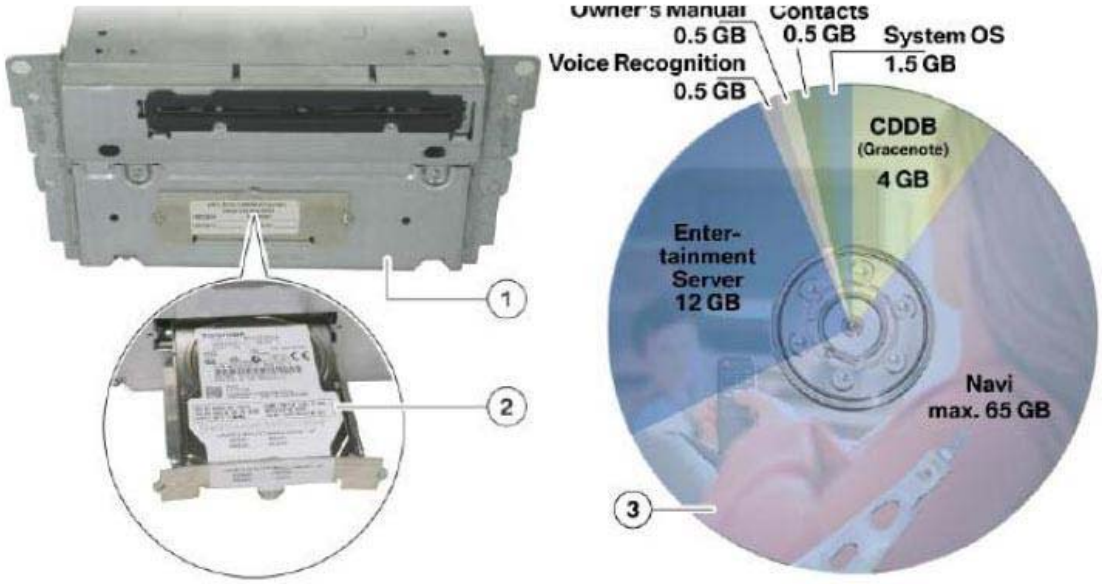


Fig. 92: Identifying CIC And Hard Disk
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Car Information Computer
2	Hard disk (slide-in tray)
3	Pie diagram with individual storage units on the hard disk (partition)

Fixed Components

Some of the components that were modular in the Car Communication Computer are now integrated into the CIC as solid state components.

In the event of defects to some of the components, it may be necessary to replace the entire head unit after submitting a PuMA case.

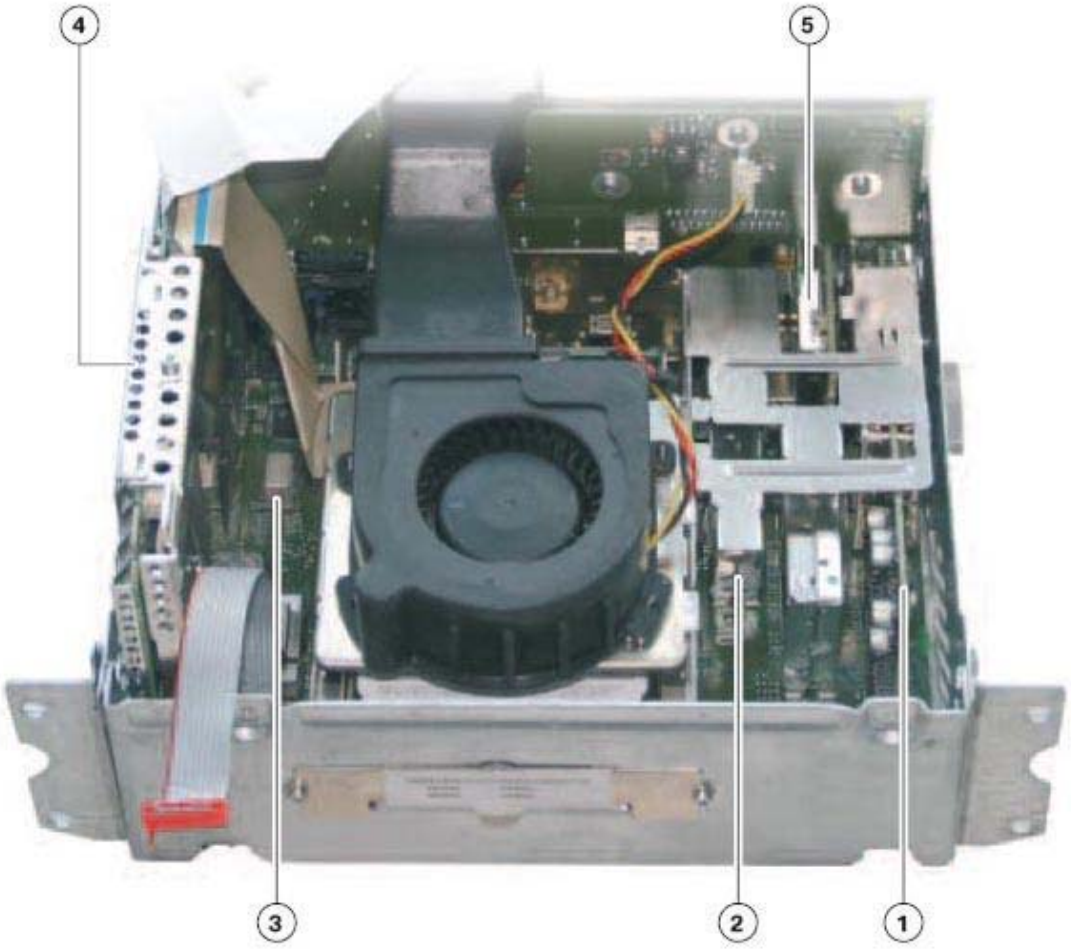


Fig. 93: Bottom Open View Of CIC Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	FM/AM double tuner module
2	IBOC decoder
3	Yaw rate sensor
4	Application board
5	FM - RTTI module

Fan

Unlike with CCC, it is not possible to replace the fan of the Car Information Computer separately as part of a service procedure.

The fan provides cooling for the entire hardware assembly, including the hard disk drive and the gateway processor (located directly below it). The exhaust air cools the cooling fins of the HiFi output stage in the power board as it is routed through a cooling channel out of the unit.

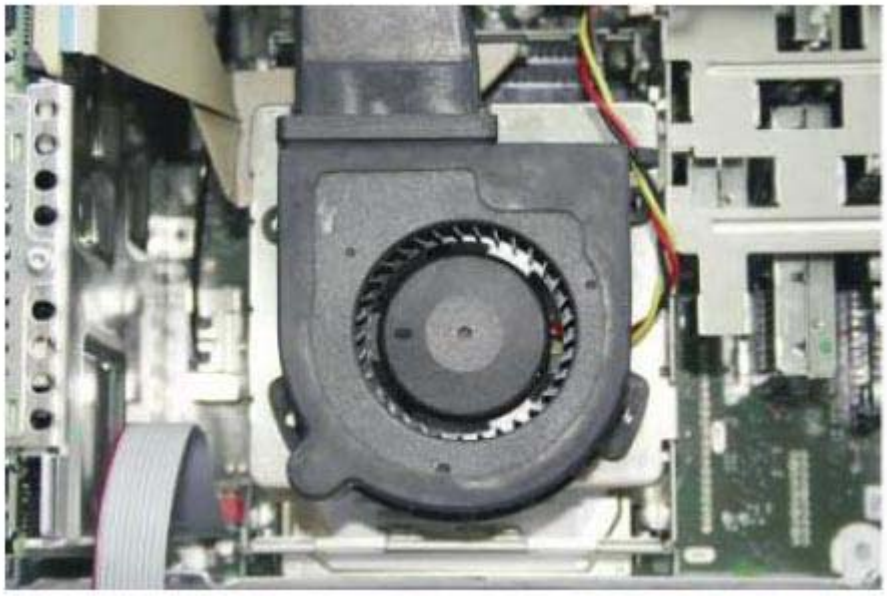


Fig. 94: Identifying CIC System's Cooling Fan
Courtesy of BMW OF NORTH AMERICA, INC.

GPS Receiver Module

The GPS receiver module is also known as the HIP module (Host Independence Positioning).

Location and route of the vehicle are calculated in the navigation system with the data from the GPS receiver module.

This module was already integrated in the head unit with the CCC system. It has the task of converting the signals received from the GPS antenna together with the data from the DSC control unit and yaw rate sensor.

The following information is calculated in the GPS receiver module:

- Longitude
- Latitude
- Altitude above sea level
- Direction (bearing)
- Speed

This information is known as Almanac data and it is transferred to the navigation system for further processing. The Almanac data must be permanently stored for future reference. One of the reasons for this is that it takes a long time for data to be received again from satellites after switching to terminal 15 from terminal status ignition "OFF".

This Almanac data ensures the position of the vehicle is recognized immediately after starting the vehicle. Therefore the navigation system can also be used immediately.

Compared to the GPS receiver module of the Car Communication Computer the GPS receiver module in the CIC has been greatly reduced in size while maintaining the same functionality.

The graphic shows the size of the GPS receiver module compared to the main connection plug of the head unit.

INDEX REFERENCE CHART

Index	Explanation
1	GPS receiver module
2	CIC main connection plug

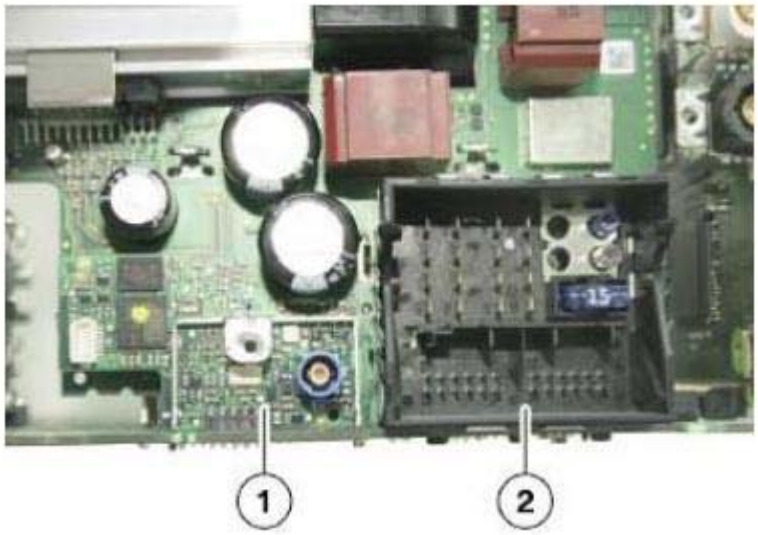


Fig. 95: Identifying GPS Receiver Module And CIC Main Connection Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Yaw Rate Sensor

The Car Information Computer features a yaw rate sensor. It supplies the data relating to changes in driving direction for the navigation system.

This data is required for the purpose of determining the exact position as satellite signals cannot be received everywhere (tunnels, underground parking lot etc.).

The yaw rate sensor is a separate module soldered on the main board. It has been greatly reduced in size compared to the yaw rate sensor in the Car Communication Computer.

Unlike with CCC, it is no longer possible to replace the yaw rate sensor separately from the entire unit.

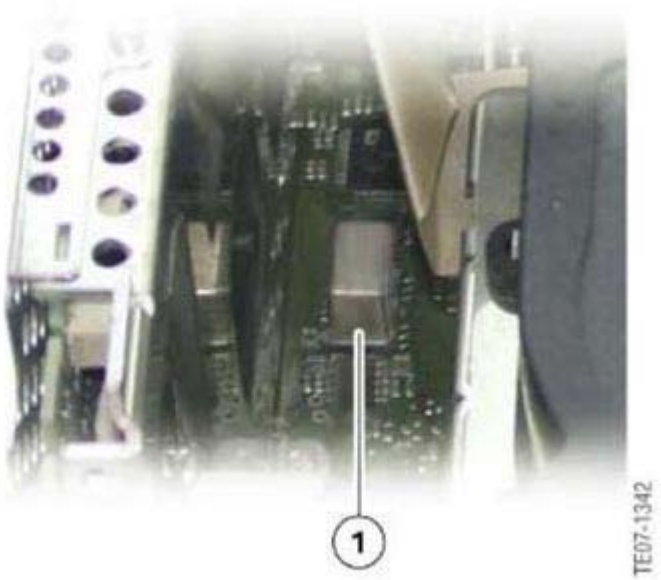


Fig. 96: Identifying Yaw Rate Sensor Soldered To CIC Main Board
Courtesy of BMW OF NORTH AMERICA, INC.

Gateway Processor

The gateway processor converts all relevant data of the K-CAN system into MOST-bus telegrams and vice versa.

The electronic module is soldered into the board directly under the hard disk drive and cannot be replaced separately.

The gateway processor has its own control unit address in the BMW diagnosis system.

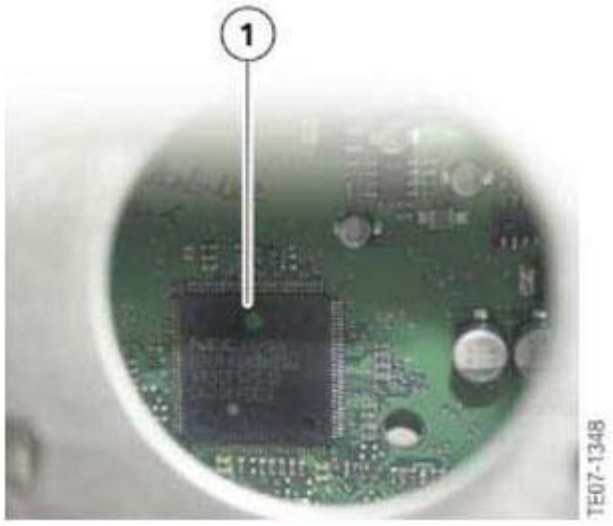


Fig. 97: Identifying CIC System's Gateway Processor

Courtesy of BMW OF NORTH AMERICA, INC.

Analog Tuner Modules

The tuner modules in the Car Information Computer have enhanced functions compared to the tuners used in the CCC system. The FM/AM and the traffic information (RTTI) range have been expanded.

FM and AM Station List

A double tuner module (see item 1) is installed in the CIC for the FM/AM range.

While one tuner in the network receives the required station and outputs the music signal, the other tuner works in the background searching the station landscape for additional signals and shows them on the display. ("All stations" menu item).

This function in the FM range is already known from the CCC and is now available in the AM range.

The third module in the tuner network enables expansion of the FM-RTTI (Real Time Traffic Information) functions. The FM/AM double tuner module and the FM-RTTI module combine to form the triple tuner.

The RTTI messages are used by the navigation system for displaying congestion and traffic information in the form of pictograms.

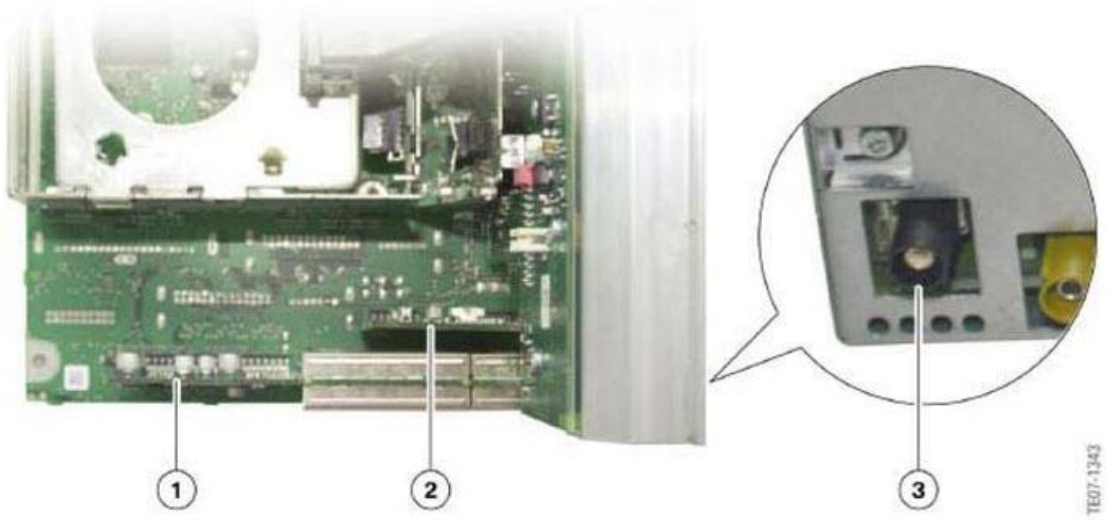


Fig. 98: Identifying FM Tuner Module Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	FM/AM double tuner module
2	FM-RTTI module
3	Black FAKRA connector below the CIC heat sink

IBOC System/HD Radio

The IBOC (In-Band- On-Channel) system is offered as the digital radio. With the introduction of the CIC, the control unit of the IBOC system has been integrated in the head unit as the IBOC decoder.

The IBOC system enables the reception of HD (High Definition) radio through the FM/AM double tuner.

This system simultaneously broadcasts an analog and digital signal.

A special oscilloscope (spectrum analyzer) would show the digital components at both sides of the analog wave of the FM frequency (step shape).

The IBOC system receives the signals with the aid of the FM double tuner module.

These signals are then routed to the IBOC decoder which adds the digital data stream to the audible music signals.

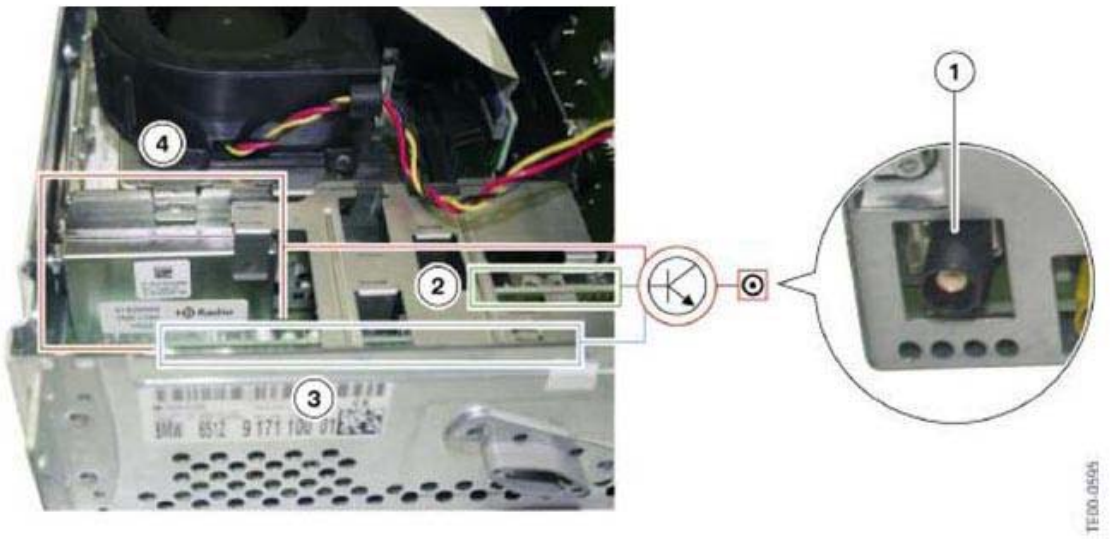


Fig. 99: Identifying IBOC Decoder
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	FM/AM antenna connection
2	FM-RTTI module
3	FM/AM double tuner module
4	IBOC decoder

There are two types of broadcast services:

- MPS = Main Program Service

- SPS = Secondary Program Service



Fig. 100: Display - IBOC Station List Menu
Courtesy of BMW OF NORTH AMERICA, INC.

Both services differ to the effect that the signal previously broadcast analog in the MPS is now used in digital form.

The decoder delays digital reception for several seconds until it is synchronous again with the analog signal previously heard.

SPS offers additional radio stations that are only broadcast in digital form. Using the multicast method, it is possible to accommodate up to seven digital stations in the submenu of the SPS main station. Normally, however, a maximum of 3 sub-menu are offered in the SPS.



Fig. 101: Display - IBOC Main Station Sub-Menu
Courtesy of BMW OF NORTH AMERICA, INC.

The system automatically switches over to analog FM reception if the digital signal is no longer available.

HD radio is also available in the AM frequency range. In this case, the digital signals are transmitted on directly adjacent frequencies of the analog station. Multicast is not supported on AM. The content of the digitally broadcast station is the same as that of the analog station.

HD radio plays AM radio stations in near-FM quality and FM radio stations in near-CD quality.

CIC Application Board with Processors

The application board accommodates the main processor (Central Processing Unit) and the main memory modules (Random Access Memory) for the CIC. These components are soldered into the board and cannot be replaced.

INDEX REFERENCE CHART

Index	Explanation
1	CPU - Central processing unit
2	Main memory (RAM) of the CIC

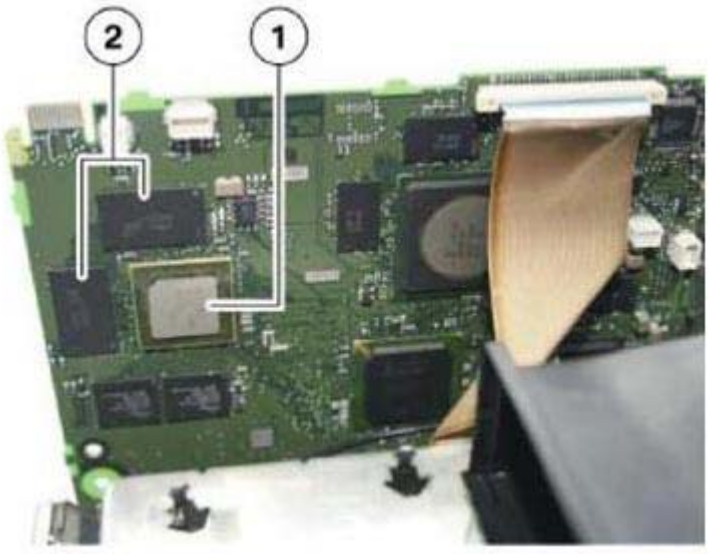


Fig. 102: Identifying CPU And Main Memory (RAM)
Courtesy of BMW OF NORTH AMERICA, INC.

Power Board

The power board is located beneath the CIC heat sink and on the left next to the CIC main connector. It contains both the audio output stages for the speakers of the stereo system as well as the power supply unit for the CIC.

The heat sinks and CIC fan cool the system by dissipating the heat from the power supply unit and amplifier.

The unit interfaces with the vehicle's electrical system (power supply, MOST link, etc.) through the main connector.

INDEX REFERENCE CHART

Index	Explanation
1	Heat sink
2	Power board

3	Main connector of the CIC

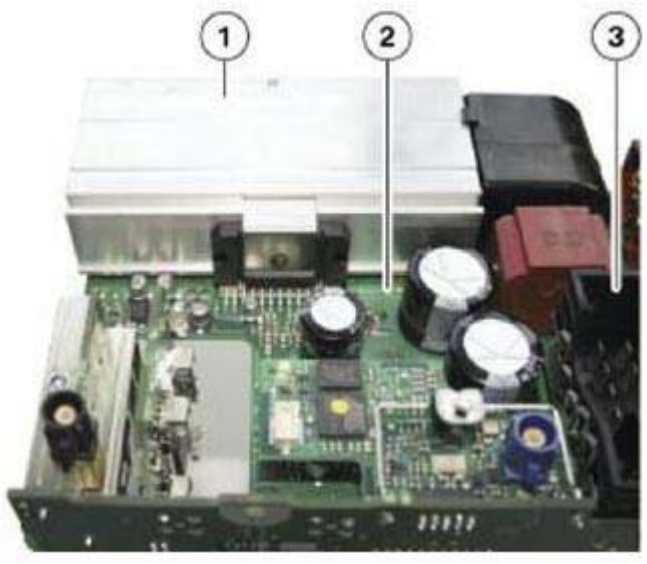


Fig. 103: Identifying CIC Main Board, Heat Sink And CIC Main Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Amplifiers and Speakers

The speaker systems on the F01/F02 are available in two versions:

- HiFi system (Standard)
- Top-HiFi system. (Option)

The HiFi system is the standard audio equipment for the F01/F02. The HiFi system is equipped with a 8-channel amplifier with digital equalizer. However only 7 of the 8 channels are used in the HiFi system.

The central bass speakers are located under the front seats. They are coupled to the side sills (rocker panels). That increases the resonance volume necessary for bass reproduction.

The head unit CIC can be combined with any of the two amplifier/speaker systems.

The HiFi and Top-HiFi systems feature separate speakers for the treble and midrange frequencies.

Even though the diameters of the speakers in the HiFi and Top-HiFi systems are the same, there are differences in the power output of the speakers. This is achieved by the use of different materials for the diaphragms, coils and magnets. The designations HiFi and Top-HiFi are used in the table in the next page to distinguish the systems.

The Top-HiFi system achieves double the sound level of the HiFi system.

A digital 10-channel amplifier is used in the Top-HiFi system. However only 9 of the 10 channels are used in

the Top-HiFi system.

The Top-HiFi system supports playback of multichannel formats. Multichannel audio formats can be played back with the player in the CIC or with the 6 DVD changer.

Optimum audio reproduction in the vehicle is achieved by way of complex digital signal processing.

The HiFi system has 12 speakers while the Top-HiFi system has 16 speakers each with different auxiliary amplifiers.

The following chart explains the two available sound systems for the F01/F02:

SOUND SYSTEM DESCRIPTION CHART

	HiFi system	Top-HiFi system
Number of speakers	**12** 2 - woofers (2 Ohm) 5 - mid-range speakers (4) 5 - tweeters (4 Ohm)	**16** 2 - woofers (2) 7 - mid-range speakers (4) 7 - tweeters (4)
Output of 7-channel HiFi amplifier:	**205W** 2 - 40 W (2.) Bass 5 - 25 W (4.) Mid-range/treble	
Output of 9-channel Top-HiFi amplifier:		**600W** 2 - 125 W (8.) Bass 7 - 50 W (4.) Mid-range/treble
Sound pressure	>104 dB as from 50 Hz	>110 dB as from 40 Hz
Bandwidth	30 Hz up to 20 kHz	20 Hz up to 20 kHz
Linearity	+/-4.5 dB	+/-3 dB
Tweeter Manufacturer	26 mm (Medium) Denon&Marantz PSS	26 mm (High) Denon&Marantz PSS
Mid-range speaker Manufacturer	100 mm (Medium) Denon&Marantz PSS	100 mm (High) Denon&Marantz PSS
Woofer Manufacturer	217 mm Denon&Marantz PSS	217 mm Denon&Marantz PSS

HiFi Speaker System

The digital 7-channel HiFi amplifier is supplied by Lear. The HiFi system consists of a HiFi amplifier with the 12 speakers. This system is fitted as standard on the F01/F02.

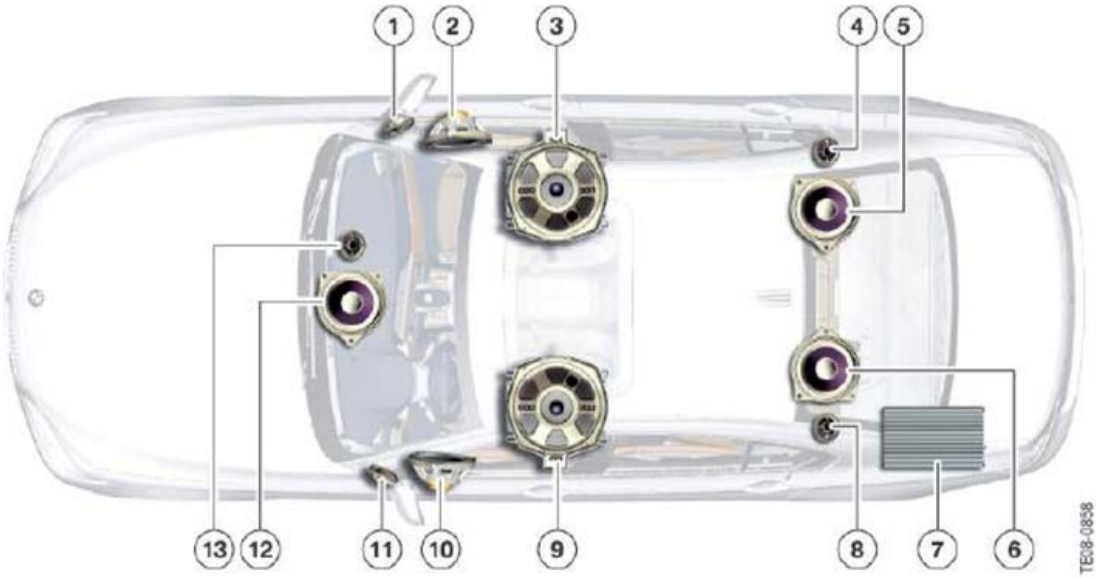


Fig. 104: Identifying HiFi Speaker System Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Tweeter, front right door
2	Mid-range speaker, front right door
3	Woofer, under right front seat
4	Tweeter, rear window shelf, right
5	Mid-range speaker, rear window shelf, right
6	Mid-range speaker, rear window shelf, left
7	HiFi amplifier
8	Tweeter, rear window shelf, left
9	Woofer, under left front seat
10	Mid-range speaker, front left door
11	Tweeter, front left door
12	Mid-range speaker, front center
13	Tweeter, front center

HiFi Amplifier

The HiFi amplifier is connected to the K-CAN for coding and diagnostics. The HiFi amplifier can be programmed but it is supplied by the manufacturer already preprogrammed at the factory.

The Audio signals are transmitted in analog form from the head unit to the HiFi amplifier. The internal digital equalizer adapts the audio signals specifically to the vehicle, as determined by the coding. The iDrive does not equalize any signals.

The adapted and amplified signals of HiFi quality are distributed through seven audio channels to a total of twelve speakers:

- One tweeter and one mid-range speaker in each of the front doors.
- One tweeter and mid-range speaker in the dashboard (center).
- One tweeter and one mid-range speaker on the rear shelf.
- One central bass speaker under each of the front seats.

The HiFi amplifier is located at the rear left of the luggage compartment behind the side panel trim.

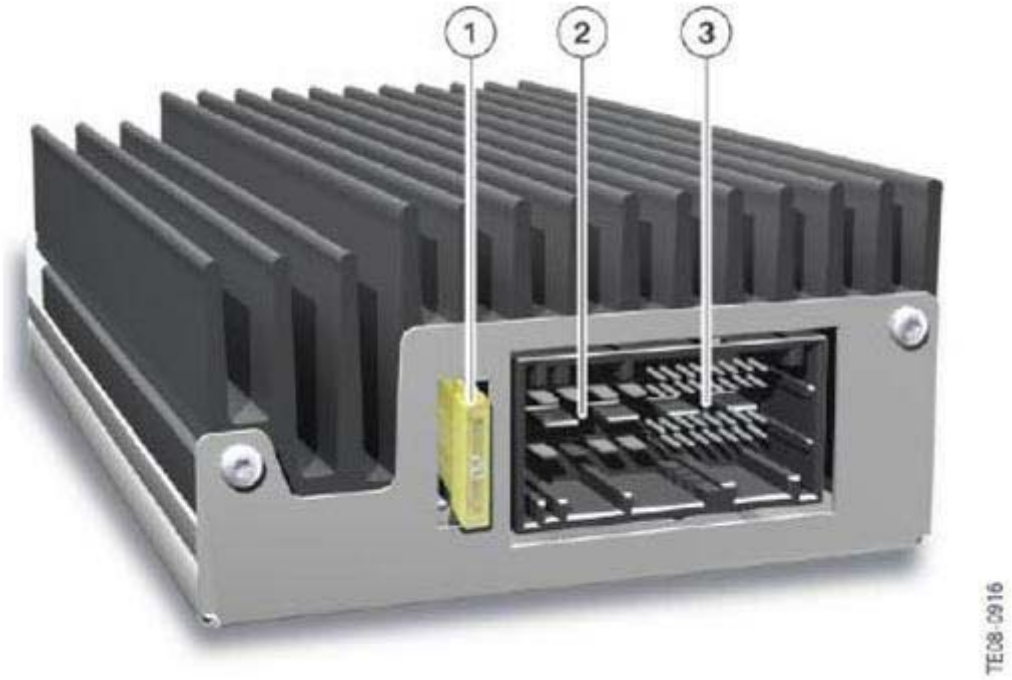


Fig. 105: Identifying HiFi Amplifier With Safety Fuse And Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Safety fuse
2	Connection for central bass speakers and power supply
3	Connection for audio signals, K-CAN and control signals

Top-HiFi Speaker System

The digital 10-channel Top-HiFi amplifier is also supplied by Lear. The 16 speaker Top-HiFi system is available as the premium option.

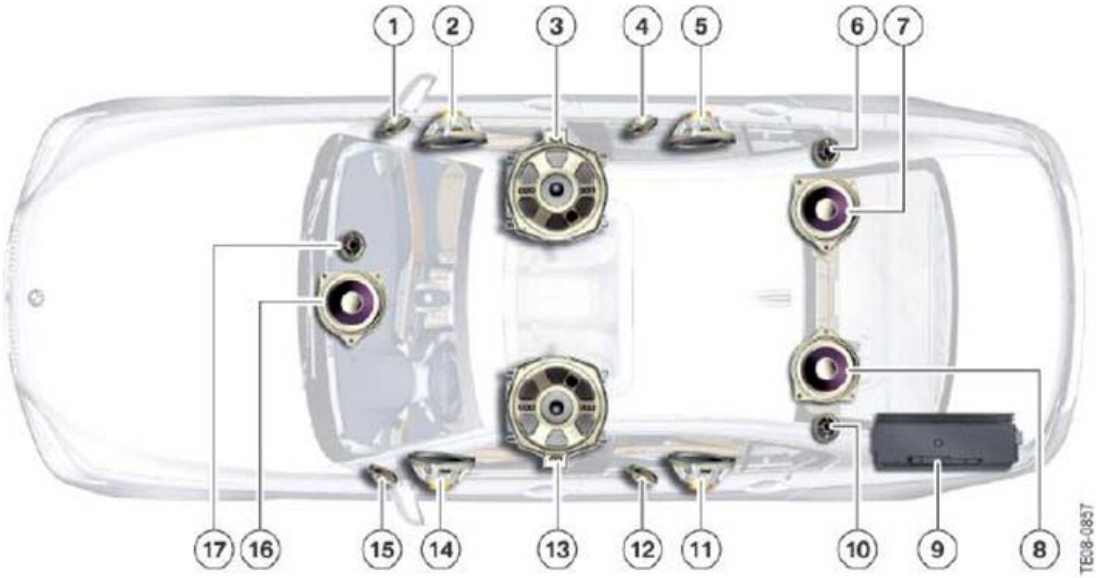


Fig. 106: Identifying Top-HiFi Speaker System Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Tweeter, front right door
2	Mid-range speaker, front right door
3	Woofer, under right front seat
4	Tweeter, rear right door
5	Mid-range speaker, rear right door
6	Tweeter, rear window shelf, right
7	Mid-range speaker, rear window shelf, right
8	Mid-range speaker, rear window shelf, left
9	Top-HiFi amplifier
10	Tweeter, rear window shelf, left
11	Mid-range speaker, rear left door
12	Tweeter, rear left door
13	Woofer, under left front seat
14	Mid-range speaker, front left door
15	Tweeter, front left door
16	Mid-range speaker, front center
17	Tweeter, front center

Top-HiFi Amplifier

The features of the Top-HiFi amplifier are:

- MOST control unit
- Graphic 7-channel equalizer controlled by iDrive
- Playback of multichannel audio formats
- Higher output power in the low frequency range
- 15 V output voltage for each mid-range speaker/tweeter
- 30 V output voltage for each central bass speaker

The audio signals and the control signals are sent in digital form to the Top-HiFi amplifier through the fiber-optic cable (MOST).

Programming, coding and diagnostics are carried out via the MOST.

The Top-HiFi amplifier supports playback of multichannel signals in 5.1 format.

The signals are output in 7.2 format (seven mid-range/treble channels and two central bass channels).

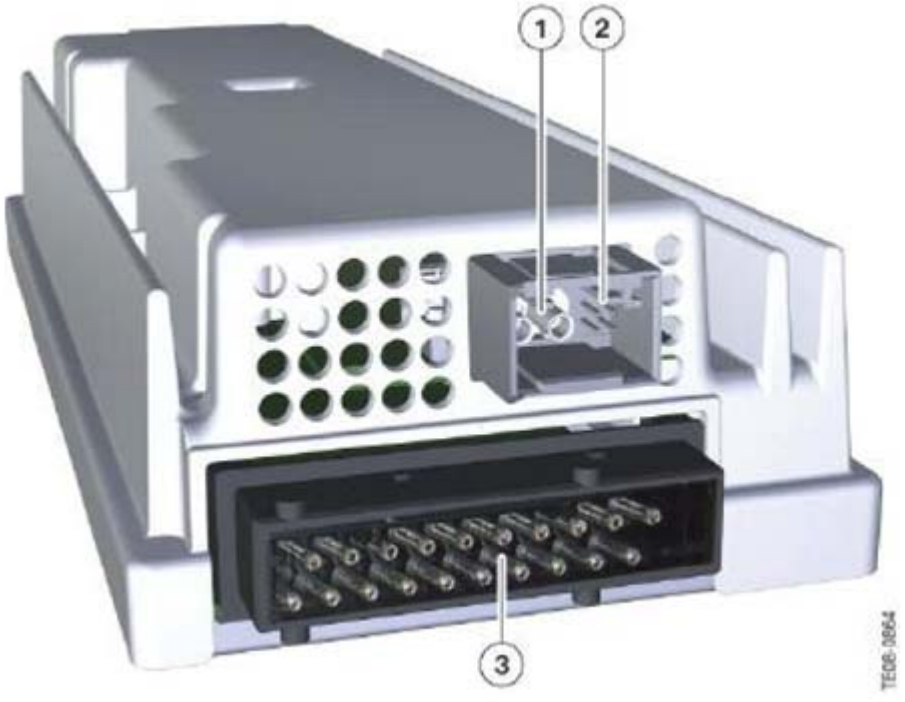


Fig. 107: Identifying Top-HiFi Amplifier With Power Supply And MOST Connection
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	MOST connection
2	Reserved for load/logic separation, 10th channel preparation
3	Power supply, audio signals to speakers

Using those channels, the sound tracks on a DVD can be played directly and entirely independently on each individual channel. In combination, those sound tracks produce a surround sound effect. For that reason, the process is described as discrete multichannel playback.

There are normally two sound tracks recorded on a CD to reproduce the stereo signal, the usual practice on a DVD is to use the 5.1 format with 6 sound tracks.

To adapt that format best to the vehicle environment (two rows of seats), it is converted into 7.2 format and reproduced through seven mid-range/tweeter and two central bass channels.

For multichannel playback, the Top-HiFi amplifier decodes the digital data from the data source.

Multichannel audio formats can be played back both with the CIC player as well as the DVD changer.

The following multichannel audio formats are supported:

- Dolby Digital Surround
- Dolby Digital Surround Ex
- DTS (Digital Theater System)
- DTS-ES (Digital Theater System-Extended Surround)

The multichannel audio format is indicated on the DVD case.

The Top-HiFi amplifier supports **Dolby Pro Logic II** for calculating the spatial sound information from an existing stereo signal.

This process replaces Logic 7 known from other BMW vehicles. A surround sound effect can be computed from the stereo signal, which consists only of a left and right channel.

The signals of the individual channels are output with time correction from the 16 available speakers of the Top-HiFi system in the F01/F02. This produces a homogeneous sound effect for the listener in 7.2 format.

Audio playback can also be adjusted by the customer through the iDrive with the aid of the 7 channel equalizer integrated in the Top-HiFi amplifier.

After signals have been processed, the audio signals are forwarded as analog low frequency signals to the speakers.

The Top-HiFi amplifier supports speed-dependent equalization in addition to speed-dependent volume control. The effect is that the frequency response is adjusted in relation to the speed of the vehicle.

A total of 16 speakers are controlled through nine amplifier channels with Top-HiFi quality:

- one tweeter and one mid-range speaker in each of the front doors.
- one tweeter and one mid-range speaker in the dashboard (center).

- one tweeter and one mid-range speaker on rear shelf.
- one central bass speaker under each of the front seats.

The Top-HiFi amplifier is located in the rear left of the luggage compartment behind the side panel trim. It is cooled by it's own cooling fan.



Fig. 108: Identifying Top-HiFi Amplifier With Additional Fan
Courtesy of BMW OF NORTH AMERICA, INC.

Antenna System Overview

Depending on the optional equipment, F01/F02 vehicles are equipped with different antennal systems:

- FM/AM radio with IBOC system (rear window antennas)
- Roof antenna for SDARS satellite radio
- Navigation system (roof antenna)
- Remote control services (rear window antenna)
- Telephone (roof antenna)

The vehicles are also equipped with the following telephone system antenna:

- Bluetooth antenna in area of sunroof; for connecting a mobile phone with Bluetooth capabilities.
- Emergency call GSM antenna (with telematics control unit (TCU) and BMW Assist.

A description of the individual antenna and rejection filters for the antenna diversity module with antenna

amplifier for outstanding radio reception.

Reference is also made to the antenna for the telephone systems, navigation and remote control services (FBD). These antenna are described in detail in the respective training material.

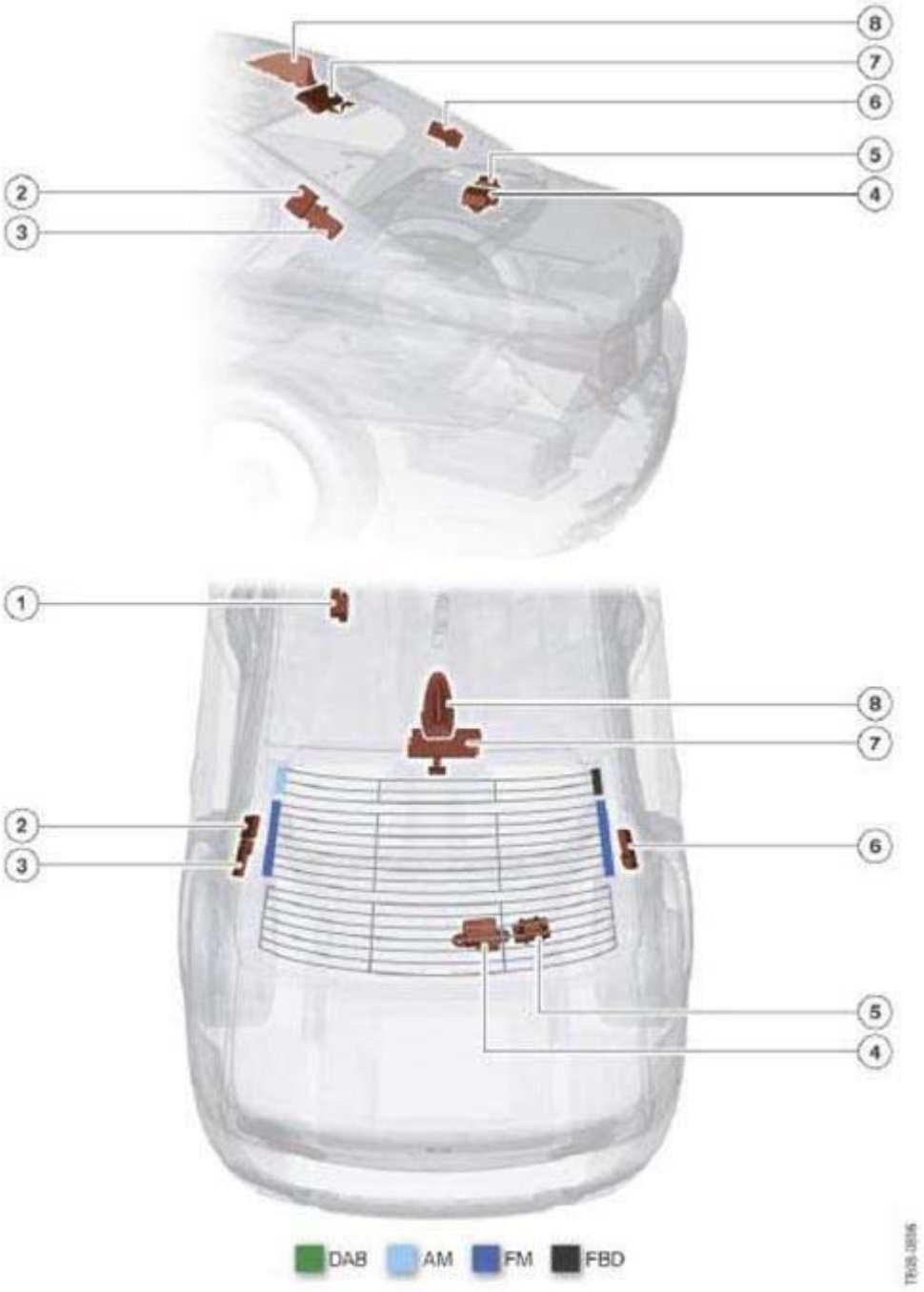


Fig. 109: Identifying F01/F02 Antenna System Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Bluetooth antenna
2	HBL filter (HBL = additional brake light)
3	FM rejector circuit, left
4	Emergency call GSM antenna
5	AM restrictor
6	FM rejector circuit, right
7	Antenna amplifier with diversity module and remote control service (FBD)
8	Roof antenna (GPS receiver for navigation, telephone antenna, digital tuners)

Antenna Diversity Module with Amplifier

The high frequency signals broadcast by the radio stations are received via the rear window antennas (FM1, FM2, FM3 and AM)

The antenna amplifiers are in the antenna diversity module. There are separate amplifiers for AM and FM. The antenna amplifier (of the antenna diversity module) is located between the 3rd brake light and roof antenna.

When the CIC is switched on, the antenna diversity/amplifier is activated and powered by the Rad_On signal. The remote control service part of the antenna diversity module is powered via terminal 30.

The high frequency signals from the AM and FM antennas as well as from the is amplified. These signals are routed via a ribbon cable from the rear window to the antenna diversity module.

The antennal amplifier also supports the frequencies of the weatherband.

Weatherband is transmitted over seven channels in the frequency range from 162.400 MHz to 162.550 MHz. The weatherband tuner is incorporated in the FM module of the head unit.

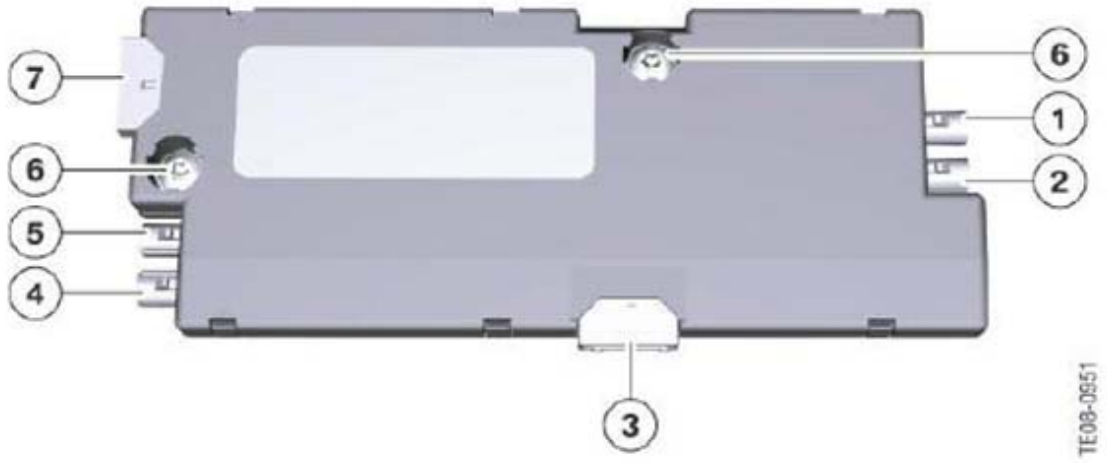


Fig. 110: Identifying F01/F02 Antenna Diversity Module With Antenna Amplifier
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Not for US
2	Not for US
3	Ribbon cable from rear window to antenna diversity module with antenna amplifier
4	Not for US
5	AM/FM RF signal, IF for diversity, Radio diagnosis (black connector)
6	Threaded ground connection to vehicle body
7	Power supply of antenna diversity module with antenna amplifier; Rad_on, KI. 30, CAS-LIN, shielding

FM Antenna Diversity

In the F01/F02, an FM antenna diversity is standard equipment.

The FM antenna diversity comprises:

- FM1, FM2 and FM3 antennas
- FM antenna amplifier with diversity module

The FM1 to FM3 antennas route their RF signal to the antenna amplifier in the antenna diversity module.

The signal quality of the currently selected FM antenna (FM1 to FM3) is now evaluated in the antenna diversity module.

The high-frequency signal from the active FM antenna at any particular time is fed by the antenna amplifier and antenna diversity module via a coaxial cable to the tuner module in the head unit.

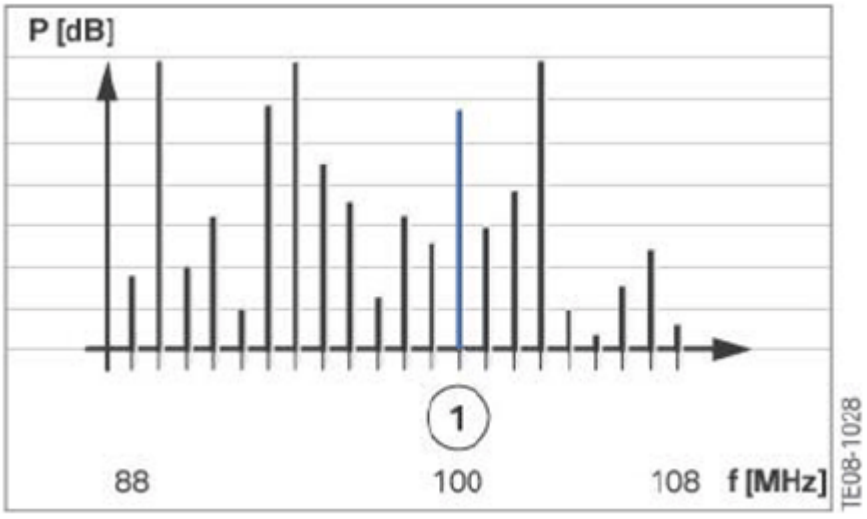


Fig. 111: Tuner Module Input Frequency Graph
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Station frequency prior to selection by customer

The tuner module in the CIC is now informed of the station selected by the customer using iDrive. As a result, the tuner module in the CIC selects the matching frequency. This is done by setting a bandpass filter. The bandpass filter suppresses all frequencies above and below the selected station frequencies.

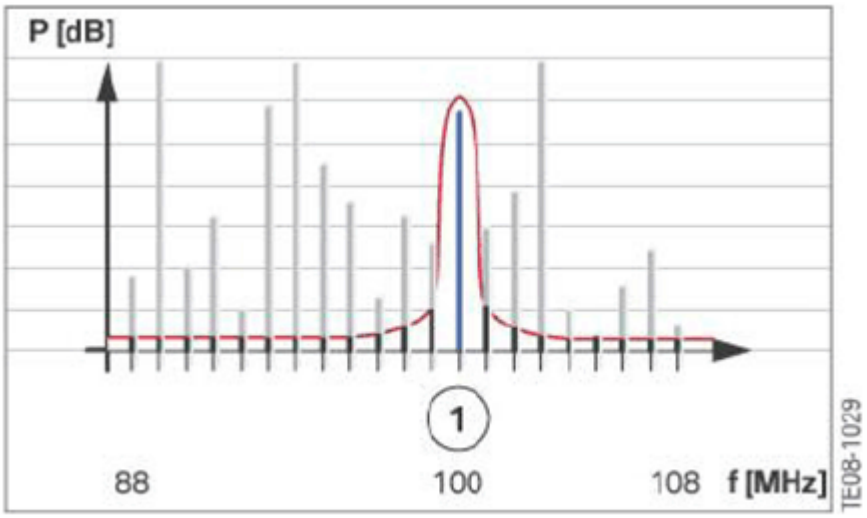


Fig. 112: Frequency Graph After Station Selection
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Station frequency after selection by customer

The remaining RF signal is then demodulated in the tuner and output in the form of an audio signal through the speakers.

The tuner module in the CIC detects that an antenna diversity module is installed and generates the changeover voltage (Us) and the signal of the intermediate frequency (IF) necessary for diversity operation.

Selection of the individual antennas (diversity function)

The intermediate frequency is an RF signal (10.7 MHz) and is evaluated by the electronic circuitry inside the diversity module. The antenna diversity module will switch to the next FM antenna if the signal quality of the current radio station on the active antenna deteriorates to a certain level in terms of quality and field strength.

The changeover takes place in a way that no interruption can be heard.

Selection of the various reception modes of the antenna diversity module

The changeover between AM reception, FM diversity operation and diagnostic mode occurs in response to the DC voltage Us.

This is performed in the head unit and analyzed in the diversity module with the following criteria:

- Diversity mode is active when Us = 2.5 V.
- AM mode is active, or the FM1 antenna is selected, when Us = 0 V.
- Diversity mode is active at Us = 5 V.
- The changeover in diagnosis mode to the next antenna takes place by 8 V pulses.

AM Diversity

For AM services (SW, MW and LW) no antenna diversity system is provided as there is only one AM antenna.

Remote Control Services (FBD)

In addition to the antennas listed above there are the antennas for the remote control services (FBD) and the nine antennas for comfort access (four antennas on the outside and five in the interior).

FM Rejector Circuit

The two rejector circuit modules for FM are located on the left and right of the rear window.

One rejector circuit is intended for the power supply of the lower section of the rear window.

The second circuit is for the upper section of the rear window defogger which is powered by the AM restrictor described in the following pages.

INDEX REFERENCE CHART

Index	Explanation
1	Rejector circuit on left side Terminal 31, rear window: lower section of rear window
2	Threaded ground connection to vehicle body
3	Rejector circuit on left-side Terminal 31, connection, vehicle wiring harness



Fig. 113: Identifying Left Side Antenna Amplifier
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Rejector circuit on right side Terminal 30, rear window: lower section of rear window
2	Threaded ground connection to vehicle body
3	Rejector circuit on right side Terminal 30, connection, vehicle wiring harness



Fig. 114: Identifying Right Side Antenna Amplifier
Courtesy of BMW OF NORTH AMERICA, INC.

HBL Filter

The HBL filter is fitted to suppress interference pulses from the additional brake light during radio reception. HBL stands for high-level brake light (third brake light).

A pulse-modulated signal (PWM) activates the third brake light. This kind of activation (PWM rectangular signal) can cause high-frequency interference. This is especially common with AM reception. The reason for this is that the audio information is contained in the amplitudes in the AM signal.

INDEX REFERENCE CHART

Index	Explanation
1	HBL filter - connection to additional brake light and for powering the diversity module with antenna amplifier
2	Securing screw with ground connection
3	HBL filter, connection to vehicle wiring harness



Fig. 115: Identifying HBL (High Level Brake Light) Filter
Courtesy of BMW OF NORTH AMERICA, INC.

AM Restrictor

AM reception has been improved on the F01/F02.

Due to the great distances with relatively few radio broadcasting towers, in less populated areas of the US AM radio is more accessible than FM radio.

Interference frequencies from the vehicle electrical system pose reception problems in terms of the quality of AM radio. In an unrestricted antenna system, these interference frequencies spread from the vehicle electrical system through the power supply to the rear window defogger into the antenna system.

The AM restrictor was specially developed to address this issue.

The AM restrictor supplies voltage to the upper section of the rear window. In addition, the rejector circuit components provide sound quality filtering.

The main component is a coil which acts as an extremely high resistance to RF signal, resulting in significantly improved AM reception.

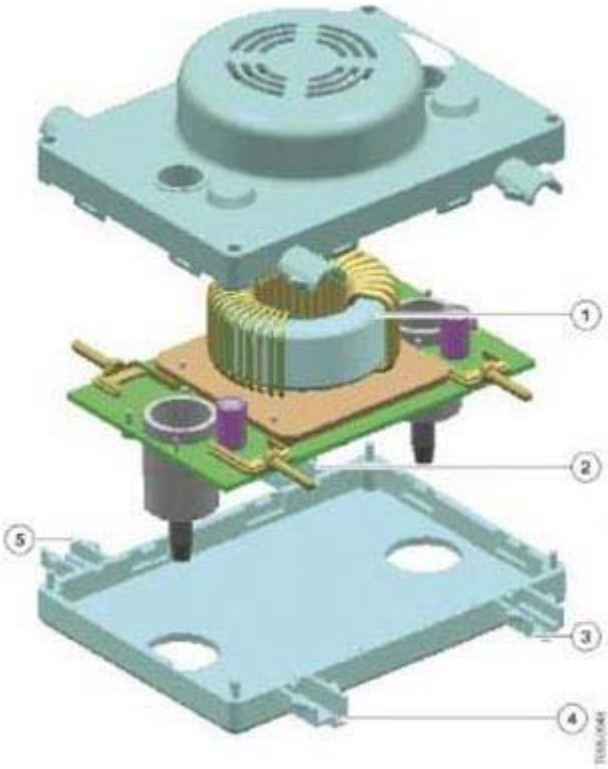


Fig. 116: Identifying AM Restrictor Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Interference suppression coil for AM range
2	Positive supply to rear window
3	Positive supply from vehicle wiring harness
4	Ground supply from vehicle wiring harness
5	Ground supply to rear window

Roof Antenna

The roof antenna housing is always fitted regardless of the equipment options on the vehicle.

The roof antenna includes the following components:

- Mobile phone antenna
- Telematics Control Unit (TCU) telephone antenna
- GPS antenna
- SDARS satellite radio reception antenna

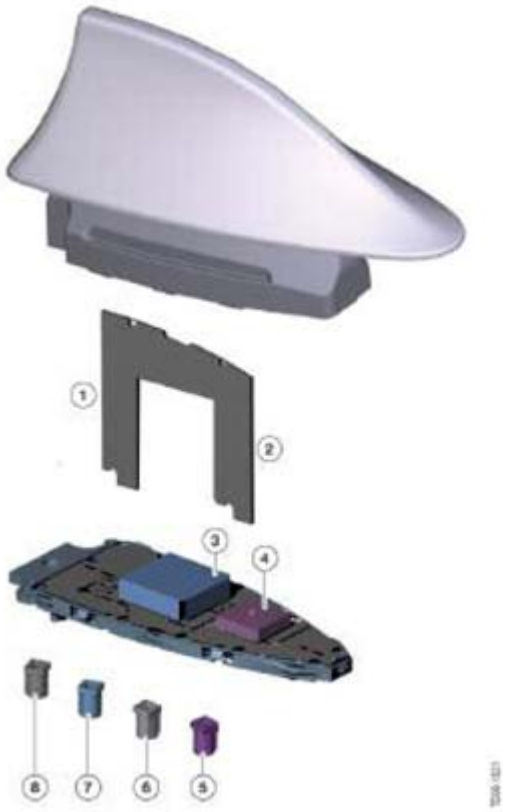


Fig. 117: Identifying F01/F02 Roof Antenna Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Telephone antennas for telematics control unit (TCU)
2	Telephone antennas for mobile phone
3	GPS antenna
4	SDARS antenna for satellite reception
5	SDARS signal, satellite and terrestrial (violet connection)
6	Telephone signal: mobile phone; metal color connector; Bordeaux violet coding connector
7	GPS signal (blue color connector)
8	Telephone signal: TCU; metal color connector; grey color coding connector

SDARS Satellite Tuner

The SDARS (Satellite Digital Audio Radio Service) control unit enables reception of digital radio signals.

Digital transmissions are superior in quality to analog transmissions. The radio stations of the satellite tuner can be selected under the "Satellite radio" submenu.

Advantages of digital satellite radio:

- Reception of same radio station across the entire US mainland (excluding Alaska).
- Digital reception of music, news and talk stations.
- Wide choice of available music genres.
- No commercial breaks.
- Digital signal transmission provides greater immunity to external interference.



Fig. 118: Identifying SDARS Control Unit With MOST And Power Supply Terminals
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	MOST
2	Power supply
3	SDARS signal (pink connector)

The satellite tuner is designed for the Sirius Satellite Radio subscription service. The SDARS signals are transmitted by three satellites. In areas without coverage, the SDARS signals are beamed terrestrially.

Both SDARS signals (satellite and terrestrial) are received by a single antenna in the roof antenna assembly and supplied to the SDARS control unit.

The SDARS satellite tuner is located in the luggage compartment on the left-hand side.

When the system is activated for the first time, the weather channel (channel 184) is available for 360 days free of charge for test purposes.

The other channels are blocked by the provider Sirius (not yet subscribed) and therefore still show a credit card symbol.



Fig. 119: Display - Blocked SDARS Channels
Courtesy of BMW OF NORTH AMERICA, INC.

If a channel that is not yet subscribed is selected, the request to register with the provider Sirius with the ESN number of the SDARS module will be shown.



Fig. 120: Display - Request To Contact Service Provider
Courtesy of BMW OF NORTH AMERICA, INC.

Important information for enabling SDARS:

- Park vehicle with clear view of the sky; tune in to weather channel on channel 184 (The weather channel is enabled for 360 days)
- Call SIRIUS and apply to enable the SDARS module
- The radio is muted and the "Updating list..." information appears during activation



Fig. 121: Display - Searching SDARS Station List
Courtesy of BMW OF NORTH AMERICA, INC.

- Wait until the pop-up disappears and the radio can be heard again
- Check that a credit card symbol no longer appears next to the enabled channels (see picture below). Otherwise, repeat the previous steps.

After successfully enabling the channels, on selection, the diskette symbol appears to the right next to the station. It indicates that the station can now be stored in the "All channels" list.



Fig. 122: Display - Stored Station
Courtesy of BMW OF NORTH AMERICA, INC.

The ESN number is always shown in the "Options menu" of the satellite radio.



Fig. 123: Display - ESN Number
Courtesy of BMW OF NORTH AMERICA, INC.

External Audio Sources

DVD Changer

The 6-DVD changer is offered as part of the ZPS Premium Sound Package on the F01/F02 and it is located above the glove compartment behind the dashboard trim panel. A CD Changer is no longer offered.

The DVD changer forms part of the MOST network.

A single-slot changer means that the DVDs or CDs are loaded in the unit individually without a magazine.

A DVD can be loaded by pressing the Load button, followed by the button for the DVD tray into which the DVD is to be inserted.

If no button is pressed after the Load button has been tapped, the LED in the tray button for the first empty tray flashes. The tray moves into position during this time. Once tray positioning is completed, the status display begins to flash and the DVD can be loaded.



Fig. 124: Identifying DVD Changer Buttons And MOST
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Buttons for DVD trays with status indicator
2	Load button for DVD drive
3	Slot lighting
4	Slot for DVD player
5	DVD drive eject button
6	MOST
7	Power supply

The DVD directory is read directly after loading. The contents of the DVD have to be read before the next DVD can be inserted by pressing the Load button again followed by the button for the DVD tray.

The quick-load function must be activated in order to load all DVDs one after the other.

The Load button must be pressed for approximately 2 seconds for this purpose. The LEDs in the tray buttons for trays that are empty begin to flash.

Up to six DVDs can be inserted one after the other, depending on the number of empty trays. The contents of the DVDs inserted are read either once the final empty tray is occupied, after a timeout period or if the Load or Eject button is pressed.

The shutter must be open in order to insert the DVDs. The slot lighting flashes when it is possible to insert a disk. Operation is described in detail in the Owner's Handbook for the vehicle.

An individual DVD can be ejected by pressing the Eject button followed by the operating button concerned. Pressing and holding the Eject button ejects all the DVDs immediately one after the other.

Supported compressed audio formats:

- MPEG-1 Layer 3 Audio (MP3) with ID3 tag version 1 and version 2
- Windows Media Audio (WMA) up to version 9 with WMA tags
- Advanced Audio Coding (AAC)

Audio formats that are protected by Digital Rights Management (DRUM) cannot be played.

The data on the DVDs is decoded by the DVD changer and converted into digital MOST signals (audio) or analog CVBS picture signals (video).

If the vehicle is equipped with the HiFi speaker system, the digital data on the DVD is sent to the head unit through the MOST. Here it is converted to analog data and output through the HiFi amplifier and the speakers.

If the Top-HiFi system option is installed, the decoded audio data is sent directly to the Top-HiFi amplifier through the MOST.

This direct transmission bypassing the head unit is made possible because data conversion and sound adjustment take place exclusively in the Top-HiFi amplifier.

The analog CVBS (Composite Video Baseland Signal) video signals are sent directly through the CVBS link to the CIC.

The DVD changer is located above the glove compartment, concealed behind the interior trim equipped with a flap mechanism.

The following picture shows the location of the DVD changer with the interior trim open.



Fig. 125: Identifying Single-Slot DVD Changer
Courtesy of BMW OF NORTH AMERICA, INC.

USB/Audio Interface

The "USB/audio interface" supports the playback of audio files stored on mass storage devices with USB connections such as USB sticks, MP3 players etc.

USB is a serial bus system that allows fast and simple connection of terminal devices to computer systems.

The mass storage medium can be found under the "External devices" submenu in the "CD/Multimedia" menu of the iDrive.



Fig. 126: Display - USB/Audio Interface

Courtesy of BMW OF NORTH AMERICA, INC.

All USB mass storage devices that support the "USB Mass Storage Class" standard can be connected. This includes mass storage media for the playback of compressed audio files with a USB interface such as MP3 players, USB memory sticks, etc. The Apple iPod® is also supported as from the 4th generation version.

Due to the large number of devices on the market, no guarantee can be given that every available "USB Mass Storage Class" device will function through the USB interface. If a device of a different device class is connected, the message "Incompatible device" will appear.

When a USB mass storage device is connected, the contents of the device are read and the folder structure is processed for display on the CID. A plausibility check is performed as to whether the tracks can be played by the vehicle's sound system.

Only those tracks that can be played are displayed.

While the database of the content (details of the music tracks is constructed, the music files can only be selected by navigating through the folder structure. On completion of the database, music tracks can also be selected by genre, artist and album.

Media Transfer Protocol (MTP) is currently not supported. MP3 players that use MTP are therefore not supported. More information on the protocols used can be obtained from the operating instructions of the mass storage device.

WARNING: With certain mobile phones, Bluetooth is deactivated if they are connected to the vehicle through the USB interface.

NOTE: It is not recommended to use mobile phones via the USB interface in the center console (Option 6FL). The Smartphone Integration Option 6NF is better suited for this purpose and is described in the following pages.

The following compressed file formats are normally supported with fixed and variable bit rates:

- MP3 (MPEG-1 Audio Layer 3) with ID3 tags Version 2
- Windows Media Audio (WMA) with WMA tags
- Advanced Audio Coding (AAC)

The WAV file format is also supported. USB mass storage devices must be formatted using the FAT file system. If more than one partition (logical drive) has been set up on the device, only the first partition is supported.

The USB mass storage device cannot be accessed if the files are password-protected or are subject to Digital Rights Management (DRUM).

iPod® Connection

When music tracks are to be played back using the Apple iPod® the iPod must be connected through an adaptor cable that simultaneously uses the auxiliary jack socket and the USB.

The y-cable (cable adapter for iPod®; BMW part number 61 12 0 429 645) included with the vehicle.

With the adaptor cable, the USB connection is used to control the iPod® and the jack socket for audio playback.

The reason for this method of connection is that music tracks obtained from iTunes® (Apple music portal) are subject to DRUM and can only be played on the device to which they were downloaded. The copyright protection prevents digital transmission of the music track via USB.

If a video file is selected on the iPod®, only the sound track is played. If other supported USB mass storage devices are used, video files are not displayed.

It is only possible to access the files on the mass storage device using the iDrive when the USB mass storage device is connected to the USB interface. If the mass storage device is connected using the Audio jack plug, the iDrive cannot be used to operate the device.



Fig. 127: Identifying AUX-In Connection (USB/Jack 3.5 mm) Of Option 6FL In Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: USB hard drives must not be connected to the USB interface due to their high power draw. It is not permissible for hard disks to draw their power supply from the vehicle's electrical system (e.g. from the cigarette lighter socket) and can cause faults.

"USB/audio interface" Components

"USB/audio interface" consists of the following components:

- Interface box High (ULF-SBX-High)
- USB hub
- Audio socket with USB interface
- Application software in the head unit

The USB interface is on the center console and is protected by a sliding cover.

Simultaneous use of the USB interface and the 12 V socket for charging the mass storage device is not recommended.

Depending on the USB lead used, the mass storage device may be able to be charged through the USB interface. However, the power consumption of the mass storage device must not exceed the maximum level of 500 mA permitted by the SBX High.

The (SBX High) interface box is capable of performing the following tasks:

- USB connection for USB/audio interface
- Bluetooth interface with hands-free mode and phone book
- Basic voice input and activation system through the telephone

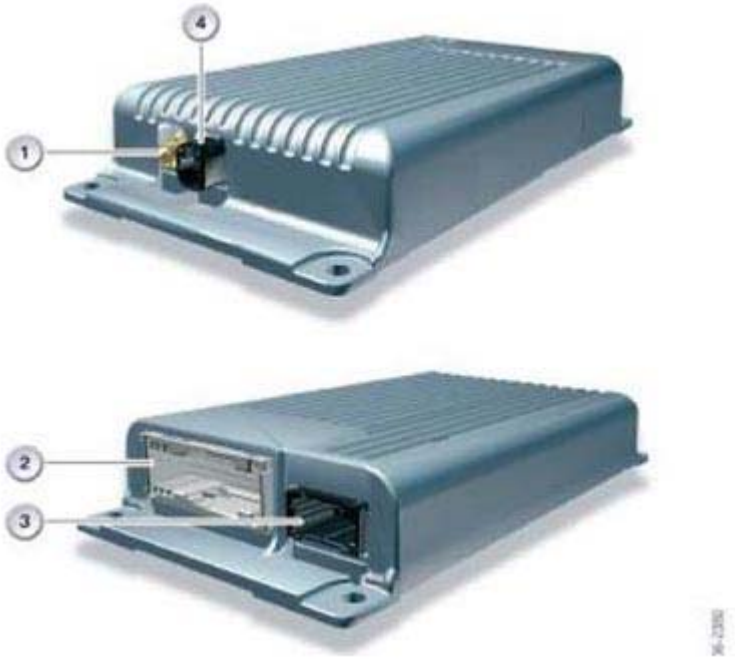


Fig. 128: Identifying ULF-SBX High Connector Terminals
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Bluetooth connection (Not in US)
2	54-pin connector
3	MOST connection
4	USB connection

The ULF-SBX High interface box is always fitted if the "USB/audio interface" is fitted to the vehicle.

Although both the ULF-SBX-H and the TCU may be fitted in a vehicle at the same time, the TCU always provides the telephone functions. The telephone functions are not available in the ULF-SBX High and the module is only installed to provide the "USB audio interface" option.

The (TCU) and the (ULF-SBX-H) interface box control units are connected to the MOST bus.

The ULF-SBX-H decodes the digital audio signals collected through the USB interface.

The audio files are then broadcast through the MOST.

The analog LF (low frequency) signals from the audio socket are also broadcast on the MOST.

The audio signal is transmitted digitally on the MOST bus to the HiFi amplifier and the amplifier distributes this signal to all the vehicle's speakers.

The ULF-SBX High supports USB 1.1 with the following technical data:

- Maximum data rate: 12 Mbit/s
- Voltage: 5 V
- Current: 500 mA

The ULF-SBX High is located in the luggage compartment on the left-hand side.

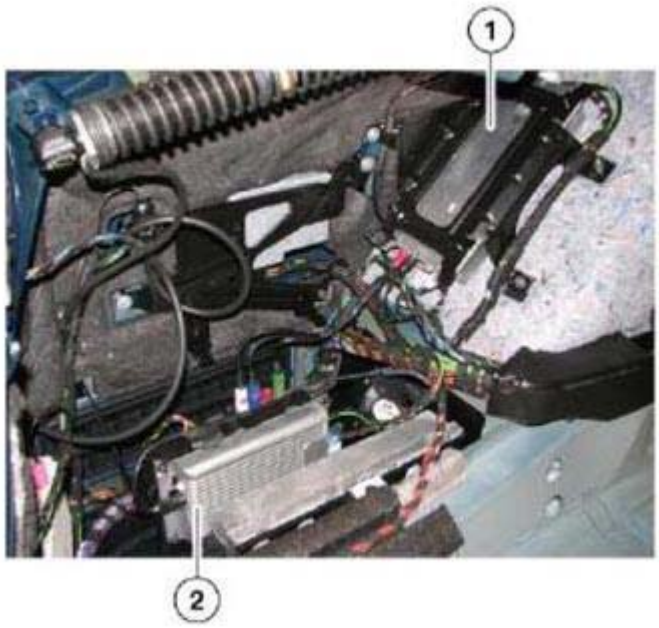


Fig. 129: Identifying Interface Box (ULF-SBX-High)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	Telematics control unit (TCU)
2	Interface box (ULF-SBX-High)

USB Hub

The USB hub allows multiple USB interfaces to be connected to the ULF-SBX High.

The USB hub incorporates an active USB signal amplifier and is equipped with two USB inputs and one USB output.

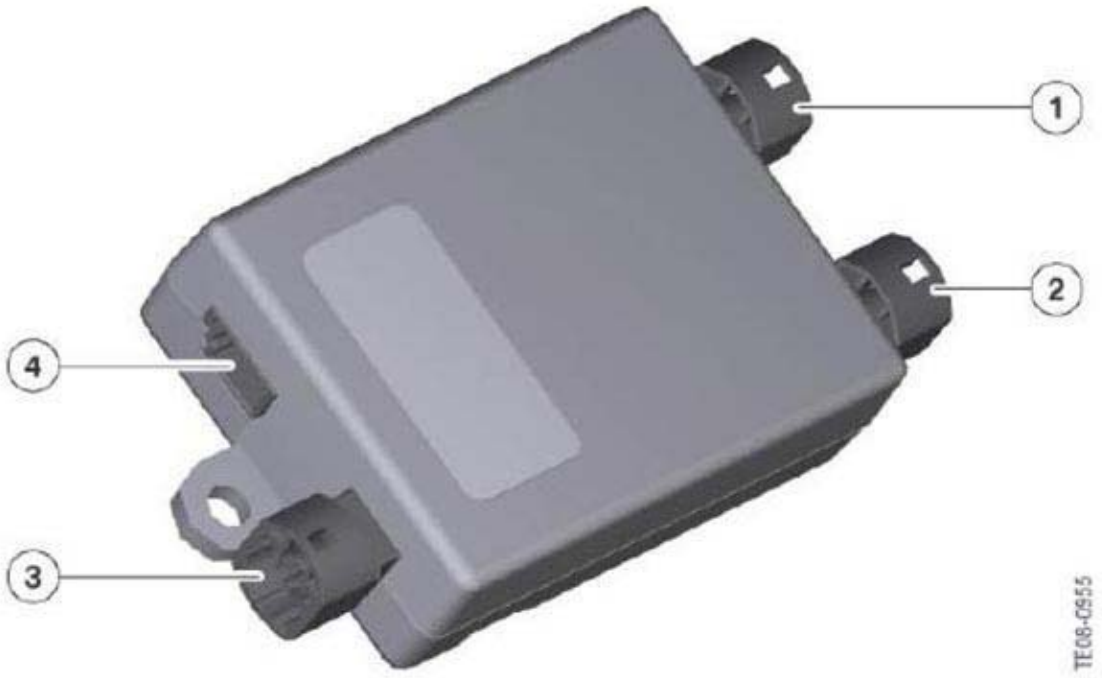


Fig. 130: Identifying USB Hub Input/Output
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	USB connection to AUX-in connection (blue connector)
2	USB connection for base plate of the Smartphone audio line (neutral color connector)
3	USB connection to (ULF-SBX-High) interface box (black connector)
4	Power supply for the USB hub (black connector)

NOTE: The USB hub is only used if the vehicle has the Smartphone Integration option.

The USB hub on the F01/F02 is installed behind the trim panel for the left-hand B-pillar. It is installed in the same place on both right-hand drive and left-hand drive vehicles.



Fig. 131: Identifying USB Hub At Left-Hand B-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

Audio Jack

The audio jack is used for connecting an external audio source such as an MP3, cassette or CD player using a 3.5 mm jack plug.

The AUX-In connection without USB interface is standard equipment on the F01/F02. It is located below the Center armrest. A plug. 12 V power socket is located in the immediate vicinity of the audio socket.

Smartphone Integration

It is now possible to connect to and play back (through the iDrive system) music tracks stored in a mobile phone. Currently, only the iPhone may be integrated in the vehicle network by means of the Smartphone Integration audio link.

Smartphones may be connected through the USB Y cable or through the installation of a Smartphone integration snap in cradle adapter, available as option 6NF.

The audio files can be selected and played from the submenu "External devices" in the "CD/Multimedia" iDrive menu

This feature works independently from the iPod/USB interface.

The new AUX-In connection features an internal switch function to accommodate both the USB interface and the Smartphone integration options.

It is possible to select audio from the snap in cradle or, switch to an external audio device connected to the (AUX) audio jack or Y-cable to the ULF-SBX-High. The second switch position is triggered by inserting a plug in the (AUX) jack.

The electronic control module is installed in the base plate of the phone cradle. The link to the USB hub and AUX-In connection are already integrated in the vehicle wiring harness.



Fig. 132: Identifying Smartphone - iPhone With Matching Snap-In Adapter
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 133: Identifying iPhone With Snap-In Cradle Adapter On Base Plate For Smartphone Integration
Courtesy of BMW OF NORTH AMERICA, INC.

The following illustration shows the arrangement of the individual components on the base plate for the Smartphone Integration.

INDEX REFERENCE CHART

Index	Explanation
1	Base plate connection to roof antenna (black connection)
2	USB connection from base plate to USB hub (blue connector)
3	18-pin plug connector: (power supply, cradle-on, AUX-AF signals)

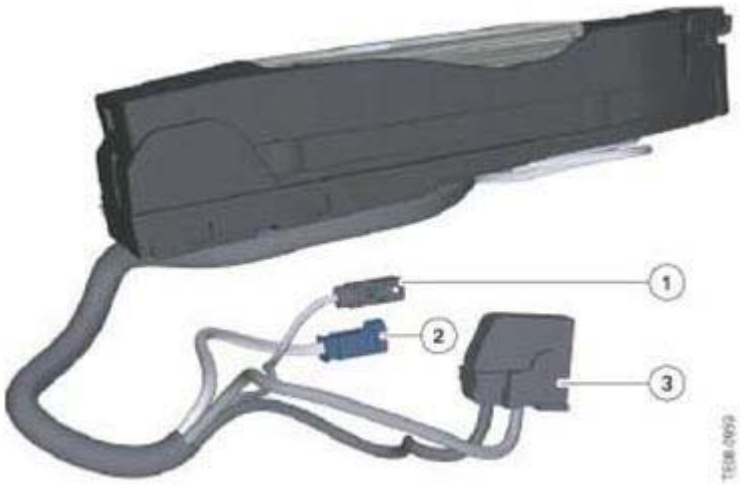


Fig. 134: Identifying Base Plate Connections To Roof Antenna, USB Hub And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Audio Data Control Line

The audio data of the snapped in cradle adapter for the mobile phone is controlled by a four-core USB data cable.

The base plate and cradle specifically developed for the Smartphone Integration option (6NF) is immediately recognizable by the two gold-plated pin connectors.

These two gold-plated pin connectors are also used as lock pins for the snap-in cradle adapter.

Plastic pins are used in the same position in the standard snap-in telephone cradle adapters.

In this way it is possible to distinguish at a glance whether the correct base plate is installed for the Smartphone Integration option.

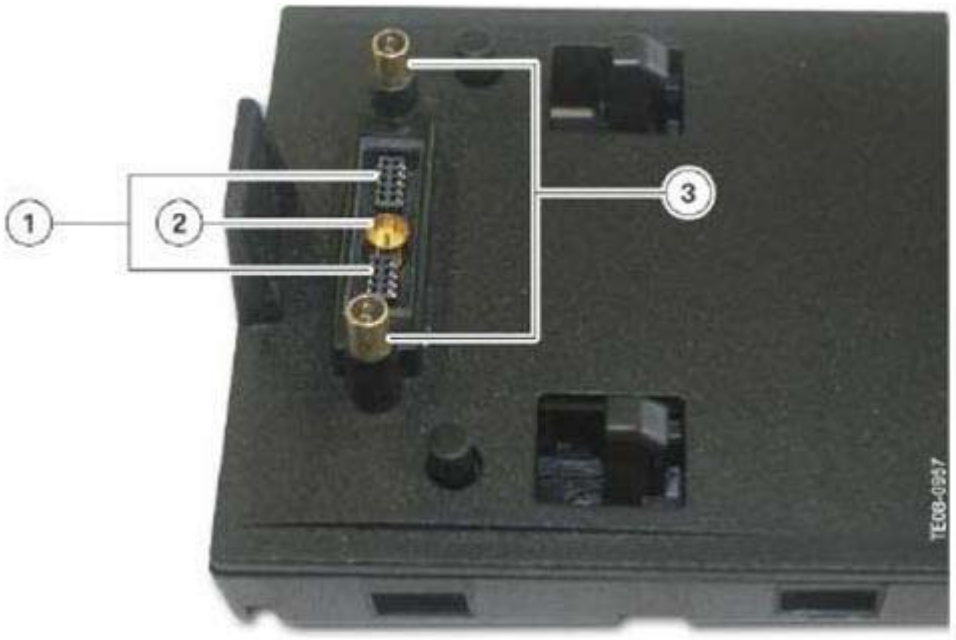


Fig. 135: Identifying Base Plate For Smartphone Integration
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX REFERENCE CHART

Index	Explanation
1	18-pin plug connector of base plate (power supply, cradle-on, AUX-AF signals)
2	Antennal connection to roof antenna
3	USB connection: Distribution of the USB supply voltage and data lines over two gold-plated pin housings with shielding

SERVICE INFORMATION

Unlocking the Service Menu Option

Several important functions can be checked directly at the CIC with the aid of the Service menu. This menu can be used to select and adjust settings that are not visible for the customer.

The procedure for starting the Service menu with the "safe grip" has changed compared to the CCC system:

- Call up Start menu
- Push controller in forward direction for at least 10 s
- Controller 3 notches to the right
- Controller 3 notches to the left
- Controller 1 notch to the right
- Controller 1 notch to the left
- Controller 1 notch to the right

- Press controller once
- The "Service menu" is now added as the last submenu to Settings

Four selection menus are available in the Service menu of the CIC:

- Navigation
- Telephone and BMW Service
- TV (Not for US)
- Gracenote®



Fig. 136: Display - Service Menu Hidden
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 137: Display - Service Menu Unlocked
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Although it appears in the Service menu, TV is not available on US vehicles.

Navigation



Fig. 138: Selecting Navigation Service
Courtesy of BMW OF NORTH AMERICA, INC.

NAVIGATION MENU DESCRIPTION CHART

Navigation	Screen content (example)	Explanation
GPS		
GPS	Status Latitude: 12°34'56" N	GPS position data
GPS	Tracking 01: 03 14, 3, 02 xx, yy, z	GPS satellites
GPS	Version Receiver SW Version/Date	Software version and date of manufacture of GPS receiver
Sensor test	Wheel sensors, GPS satellites, Gyro	Check of input signals
Map version	Map Database: 1.067	Map version number Database: 1.067
Location entry	Location Entry: Entry	Loop same as destination entry
Voice output test		

NOTE: Although it appears in the Service menu, TV is not available on US vehicles.

Telephone and BMW Service



Fig. 139: Selecting Telephone Service
Courtesy of BMW OF NORTH AMERICA, INC.

CIC SERVICE MENU DESCRIPTION CHART

Telephone	Screen content (example)	Explanation
BT Name	BMW 57502	Bluetooth name of BMW vehicle for pairing
NAD	51 dBm	GSM signal level of built-in telephone module
MCC/MNC	262 01	Mobile Country Code + Mobile Network Code; unique code for country and network provider with which the phone is currently registered.
ICC ID	89490200000537151529	Integrated Circuit identifier = Identifier of SIM card
IMEI	351231004373763	International Mobile Equipment Identity (IMEI) is a unique 15-digit serial number of the telephone transceiver
Registration status	Registered	Registered = SIM card enabled and logged into network; Not registered = SIM card enabled but currently no
Reception		
Signal strength	20/100	Relative signal strength of the built-in telephone module in percent (max 100 %)
GPS T/D	14:41:57 27.05.2008	Assist cannot be enabled if time and date are incorrect

NOTE: Although it appears in the Service menu, TV is not available on US vehicles.

TV



Fig. 140: Selecting TV Sub-Menu
Courtesy of BMW OF NORTH AMERICA, INC.

There are five sub-menus which can be selected under the TV sub-menu:

- Ch = channel currently tuned in
- Frequency in MHz
- Channel information (transmission standard, bandwidth and program name)
- DVB-T parameter (modulation type, analog, digital TV distinction)
- Antenna information (field strength in **dBµV** (Decibel micro Volt)

NOTE: Although it appears in the Service menu, TV is not available on US vehicles.

Gracenote®



Fig. 141: Selecting Gracenote Sub-Menu Under Service Menu
Courtesy of BMW OF NORTH AMERICA, INC.

The music track database can be updated under the menu item Gracenote.

status with the data status of the CD in the Service menu selection (See illustration below).

If the CD corresponds to the current status, the latest version of the Gracenote® music track database is downloaded after selecting "Start installation". The previous version is overwritten.



Fig. 142: Identifying Gracenote Installation CD
Courtesy of BMW OF NORTH AMERICA, INC.

No data is added to unrecognized music tracks. The update only serves the purpose of identifying music tracks in connection with future music data storage converted with the aid of the rip function.



Fig. 143: Selecting Gracenote/Start Installation Sub-Menu Under Service Menu
Courtesy of BMW OF NORTH AMERICA, INC.

Resetting the CIC

The Car Information Computer can be reset by pressing the rotary push button (ON button) for 25 seconds. After 25 seconds, the control display becomes blank as a confirmation that the CIC is being restarted.



Fig. 144: Display - CIC Start Screen After Successful Reset
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When resetting the MOST control unit, the MOST gateway is muted for 2 seconds.

Programming

Programming the CIC is done with the use of the respective optical testing and programming interface modules.

The interface modules OP(P)S or ICOM (A+B) are simultaneously connected to the OBD interface and to the MOST interface of the vehicle.

ENGINE

Exhaust System - Repair

1800 EXHAUST SYSTEM, COMPLETE

1800020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (N63)

Notes

WARNING: Scalding hazard!
Only perform this work after engine has cooled down.
Risk of injury!
Removal of the exhaust system must be carried out with the assistance of a second person.

Necessary preliminary tasks

- Remove rear **UNDERBODY PROTECTION**
- **F03 Only:**

  Remove underbody protection on left and right

Support exhaust system with special tool 31 2 220.

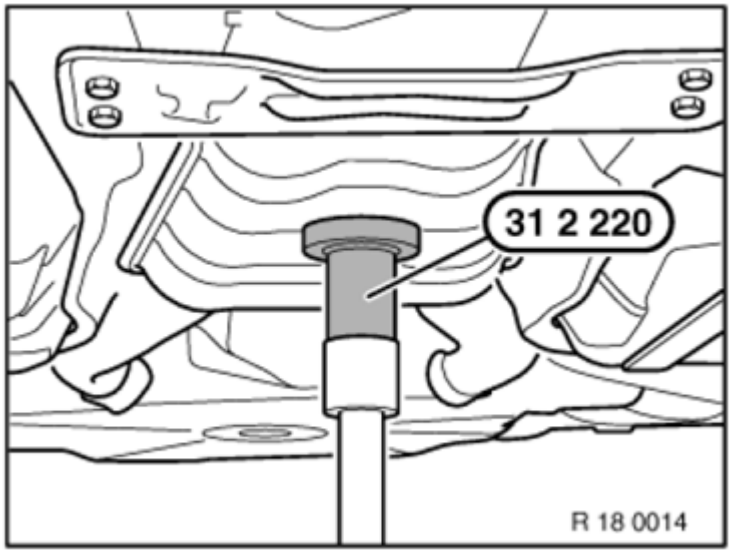


Fig. 1: Supporting Exhaust System Using Special Tool 31 2 220
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Replace self-locking nuts.

Replace seals.

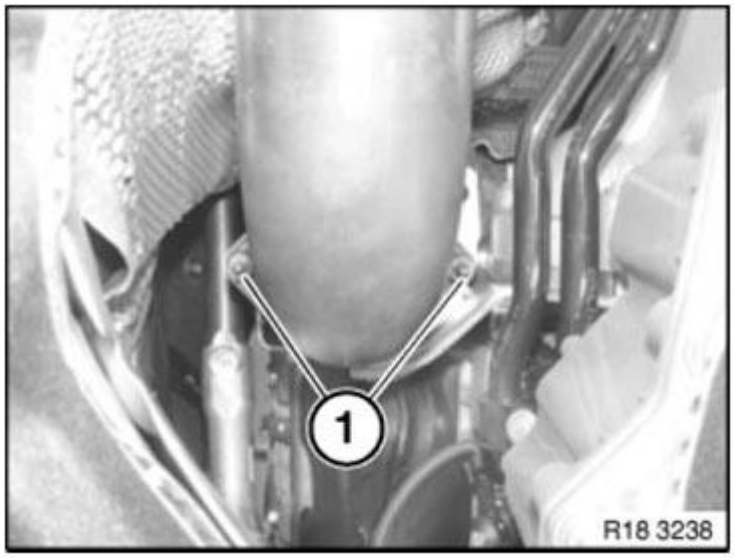


Fig. 2: Identifying Nuts Of Exhaust System
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Unscrew nuts (1).

Tightening torque **18 20 1AZ** .

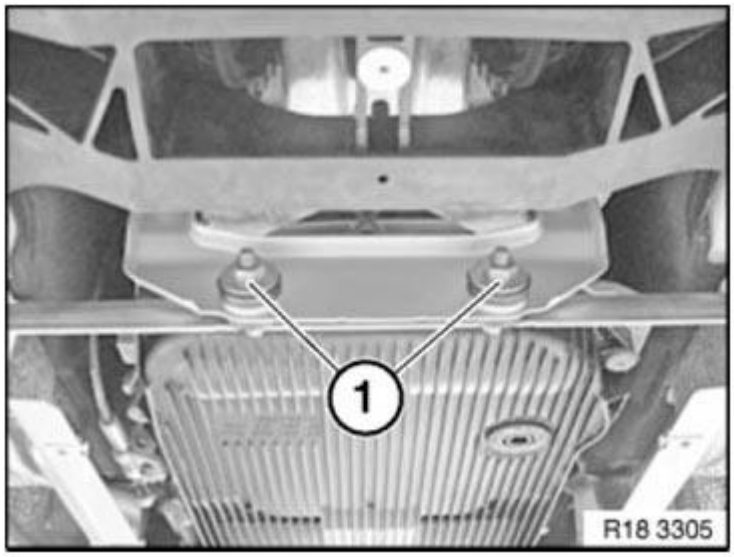


Fig. 3: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **18 20 6AZ** .

Only when independent heating is fitted: release screw (2) on metering pump.

Tightening torque **18 20 7AZ** .

Release screws (3) on underbody panels.

Remove reinforcement plate (4).

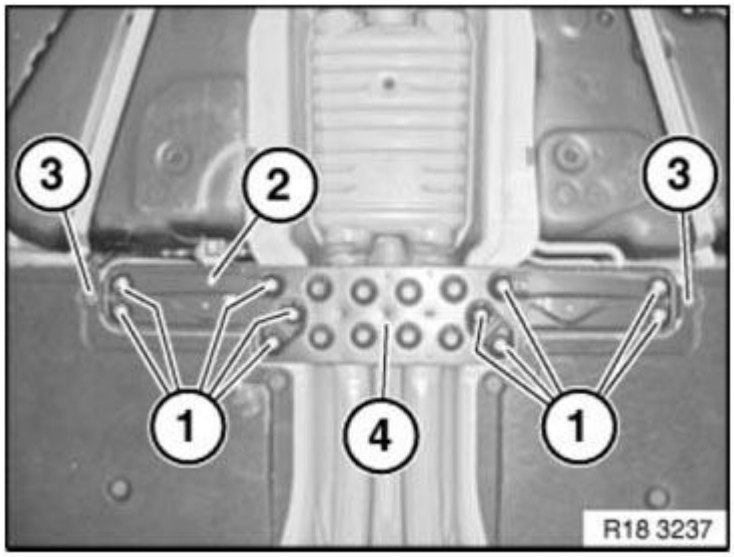


Fig. 4: Identifying Screw On Metering Pump, Screw On Underbody Panels And Reinforcement Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Slacken nut (1).

Tightening torque **18 20 4AZ** .

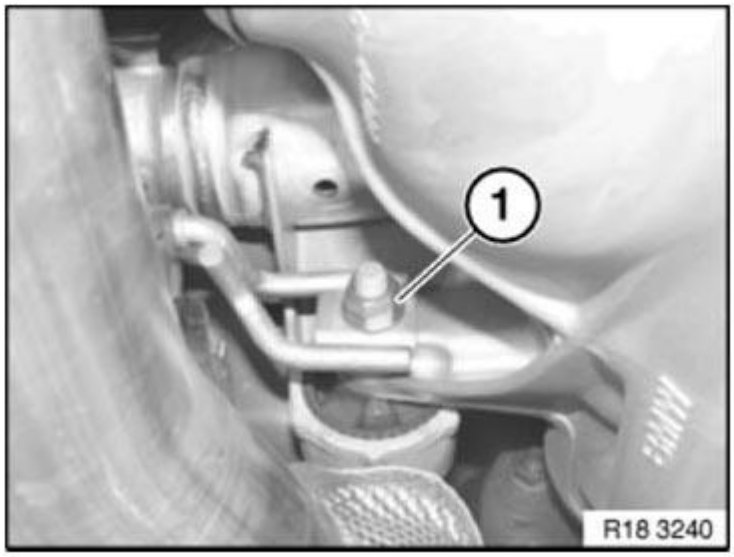


Fig. 5: Identifying Exhaust System Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Unscrew nuts (1).

Tightening torque **18 20 5AZ** .

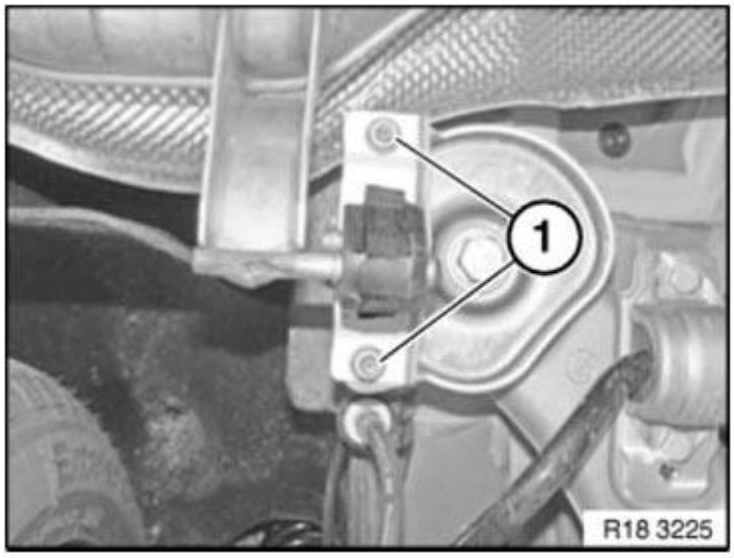


Fig. 6: Identifying Unscrew Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Slacken nut (1).

Tightening torque **18 20 5AZ** .

Detach hose (2) on vacuum unit.

Lower and remove exhaust system with assistance of a second person.

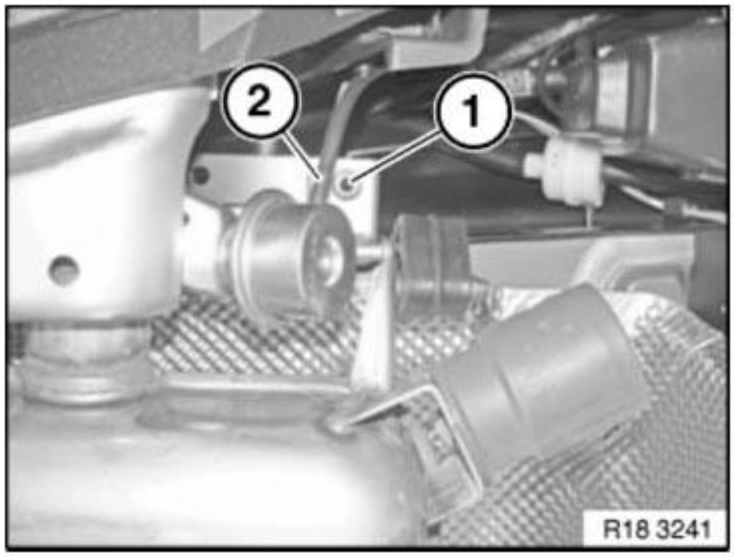


Fig. 7: Identifying Nut And Hose On Vacuum Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

Check exhaust system for leaks.

5147390 REMOVING AND INSTALLING/REPLACING EXHAUST PIPE TRIM IN BUMPER COVER ON LEFT OR RIGHT

Necessary preliminary work

- Remove **COVER ON REAR BUMPER TRIM**

The following graphic may differ, depending on the engine specification.

Release screws (1).

Remove exhaust pipe cover (2).

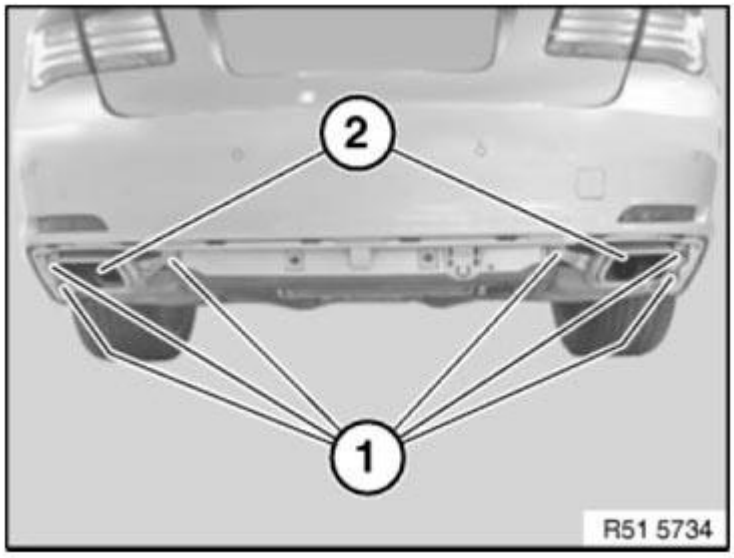


Fig. 8: Identifying Exhaust Pipe Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

1812 MUFFLERS

1812050 REPLACING CENTER MUFFLER (N63)

Notes

WARNING: Scalding hazard!
Only perform these tasks after exhaust system has cooled down.

Support center silencer with special tool 31 2 220 and a suitable universal lifter.

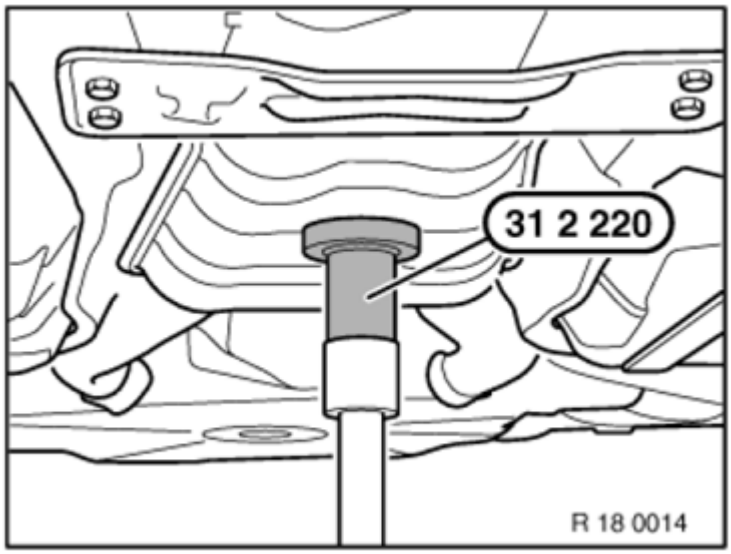


Fig. 9: Identifying Centre Silencer With Special Tool 31 2 220
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **18 20 6AZ** .

Only when independent heating is fitted: release screw (2) on metering pump.

Tightening torque **18 20 7AZ** .

Release screws (3) on underbody panels.

Remove reinforcement plate (4).

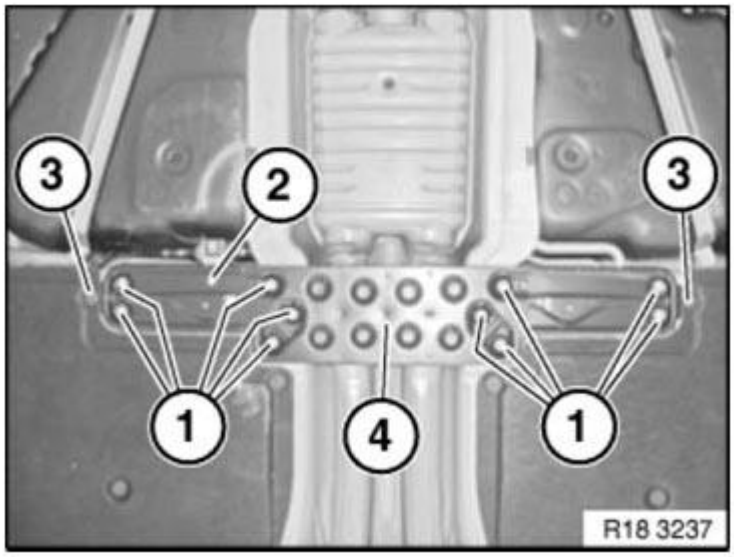


Fig. 10: Identifying Screw On Metering Pump, Screws On Underbody Panels And Reinforcement Plate
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new center muffler.**
Carry over cutting line to faulty center muffler and mark.
Secure center muffler against falling off.
Cut through exhaust pipes at marked point with a suitable tool.

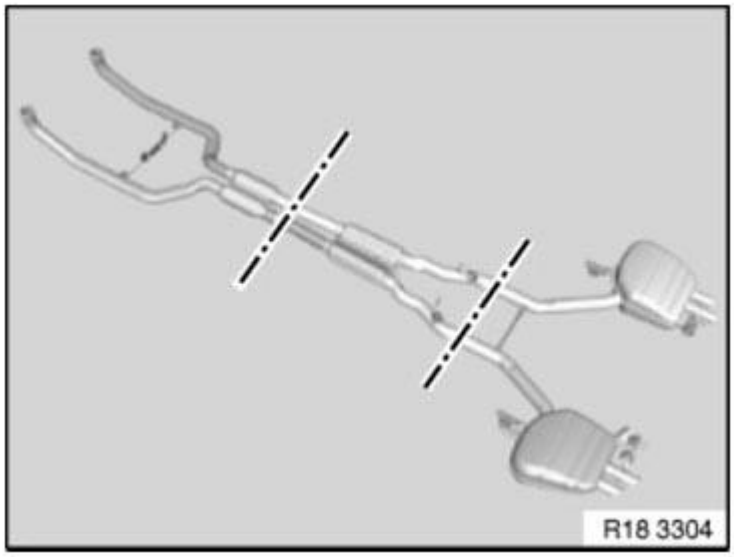


Fig. 11: Identifying Cutting Line On Centre Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Slacken nut (1).

Tightening torque **18 20 4AZ** .

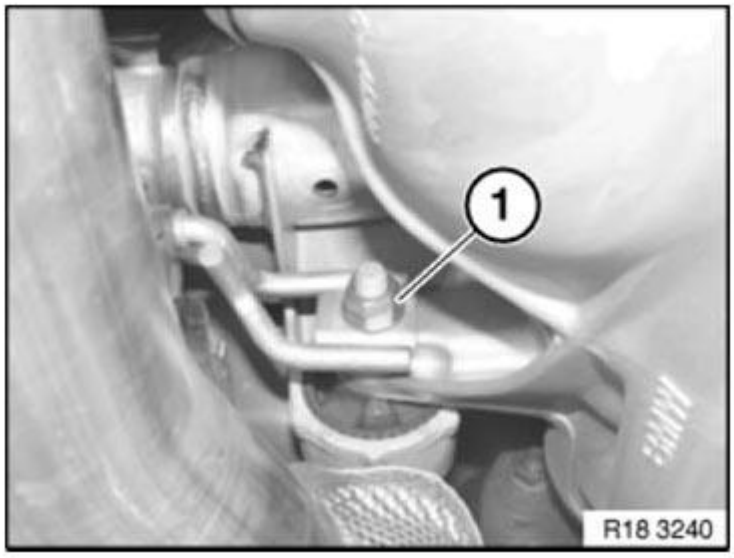


Fig. 12: Identifying Exhaust System Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Adjust center muffler to fit and connect with clamps.

Centre clamp and tighten down.

Tightening torque **18 31 4AZ** .

The procedure is identical on both sides.

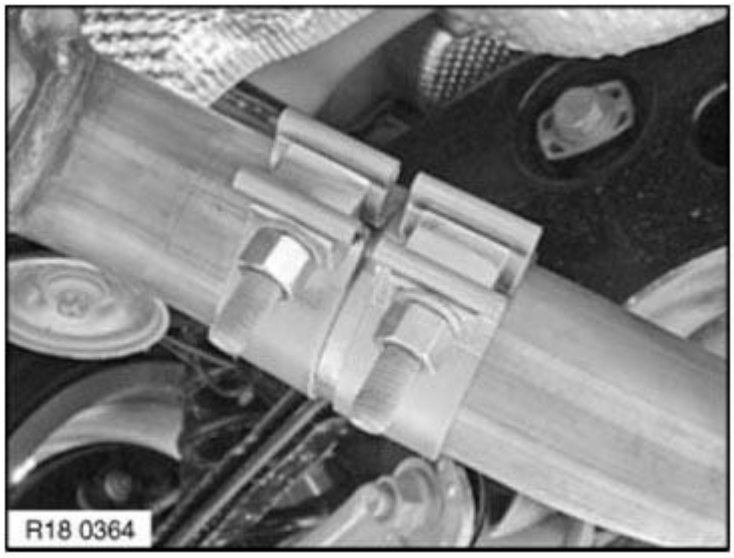


Fig. 13: Identifying Centre Muffler With Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

1812046 REPLACING FRONT SILENCER (N63)

Notes

WARNING: Risk of burns!
Only perform these tasks after exhaust system has cooled down.

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION**
- **F03 Only:**

  Remove underbody protection on left and right

Support front silencer with special tool 31 2 220 and a suitable universal lifter.

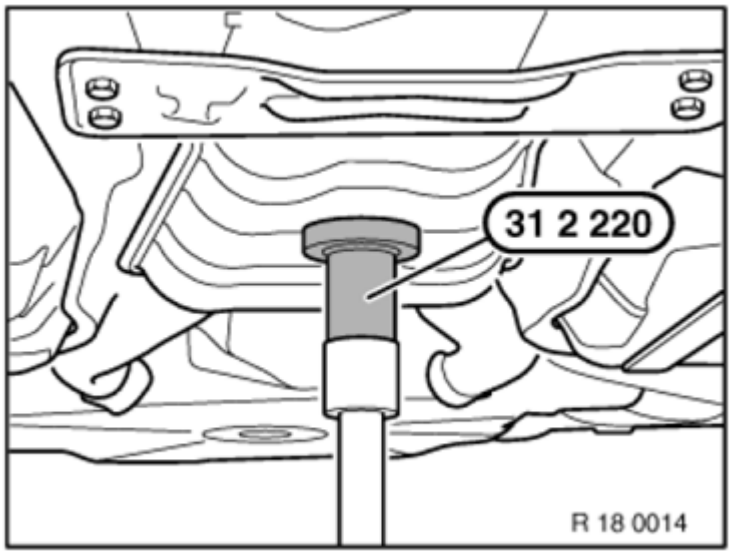


Fig. 14: Supporting Front Silencer With Special Tool 31 2 220
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the separation point is not marked by a punch mark in the pipe, determine the separation point by means of the pipe length on the new front silencer.
Carry over separation point to faulty front silencer and mark.
Secure front silencer against falling out.
Cut through exhaust pipes at marked point with a suitable tool.

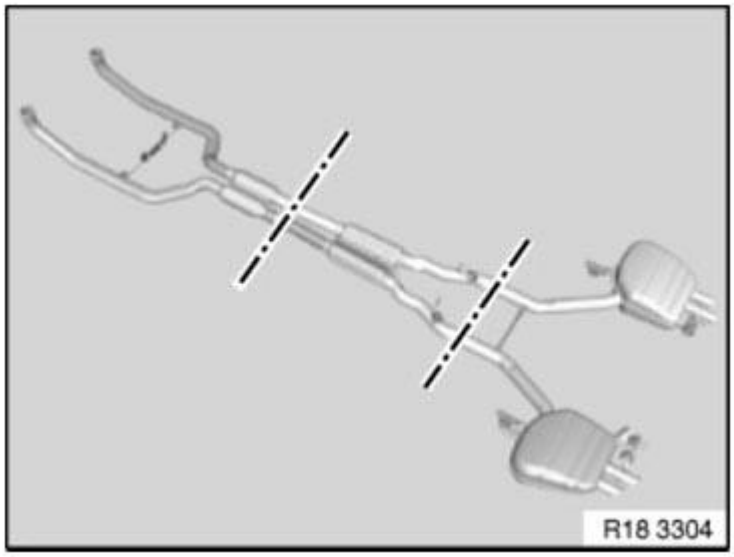


Fig. 15: Identifying Cutting Line Front Silencer
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Slacken nut (1).

Tightening torque **18 31 1AZ** .

Replace self-locking nuts.

Replace seals.

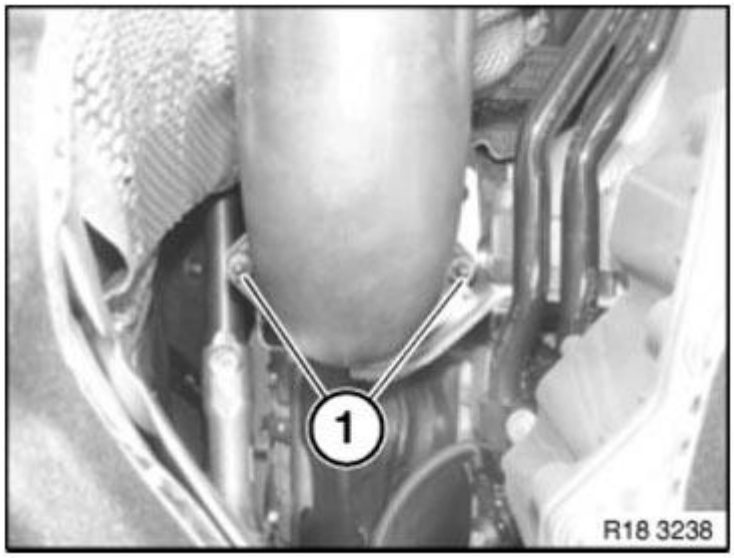


Fig. 16: Identifying Exhaust System Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 20 1AZ** .

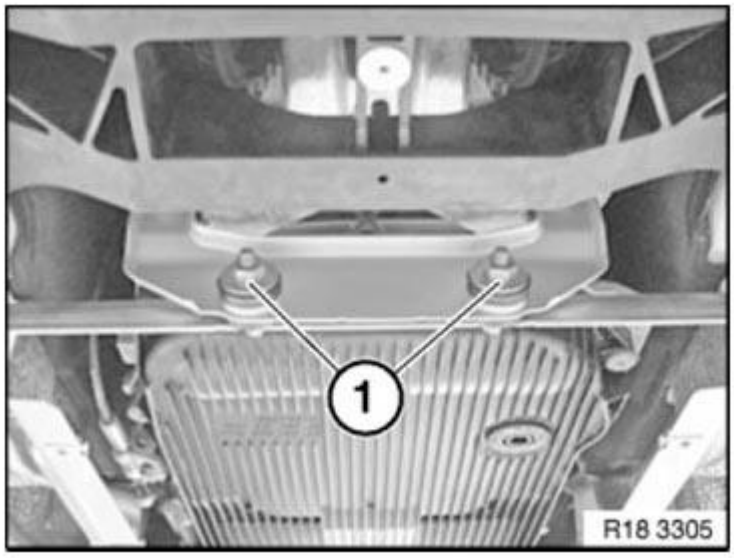


Fig. 17: Identifying Unscrew Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Install front silencer, adjust, and connect with clamps.

Centre clamps and tighten down.

Tightening torque **18 31 4AZ** .

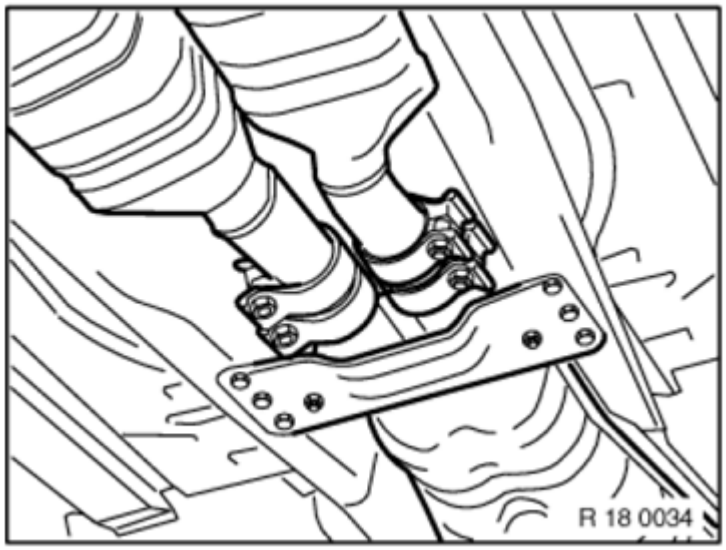


Fig. 18: Identifying Front Silence With Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

1812031 REPLACING LEFT OR RIGHT REAR SILENCER (N63)

Notes

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Support rear silencer with special tool 31 2 220 and a suitable universal lifter.

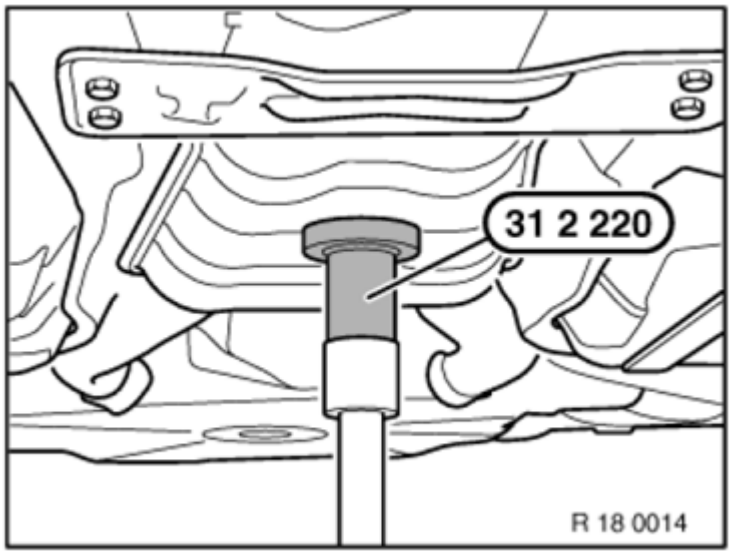


Fig. 19: Supporting Rear Silencer With Special Tool 31 2 220
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new rear muffler.
Carry over cutting line to faulty rear muffler and mark.
Secure rear silencer against falling off.
Cut through exhaust pipes at marked point with a suitable tool.

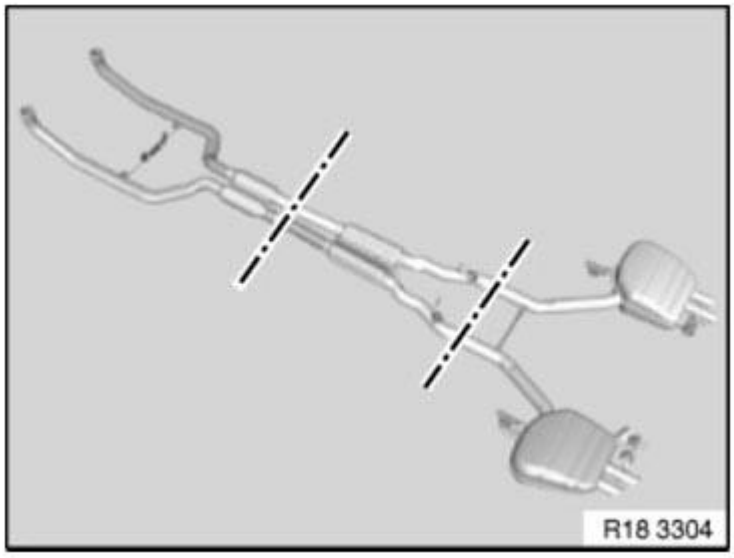


Fig. 20: Identifying Cutting Line On Rear Muffler
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Slacken nut (1).

Tightening torque **18 20 5AZ** .

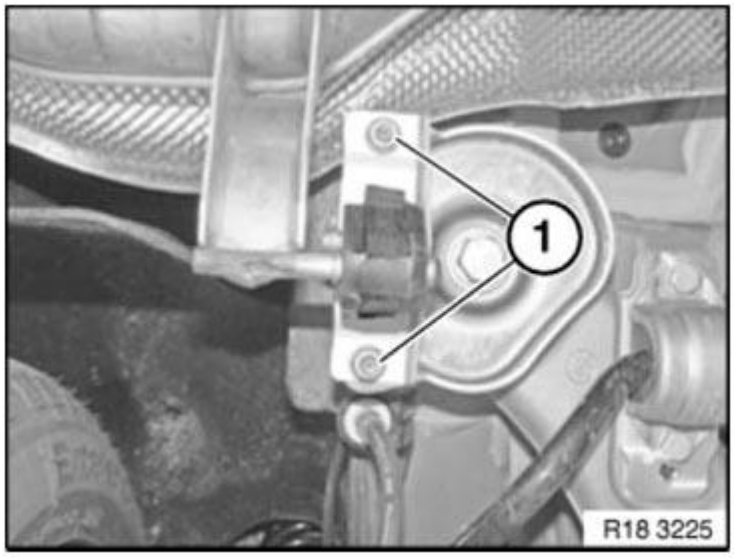


Fig. 21: Identifying Exhaust System Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Slacken nut (1).

Tightening torque **18 20 5AZ** .

Detach hose (2) on vacuum unit.

Lower and remove rear muffler with assistance of a second person.

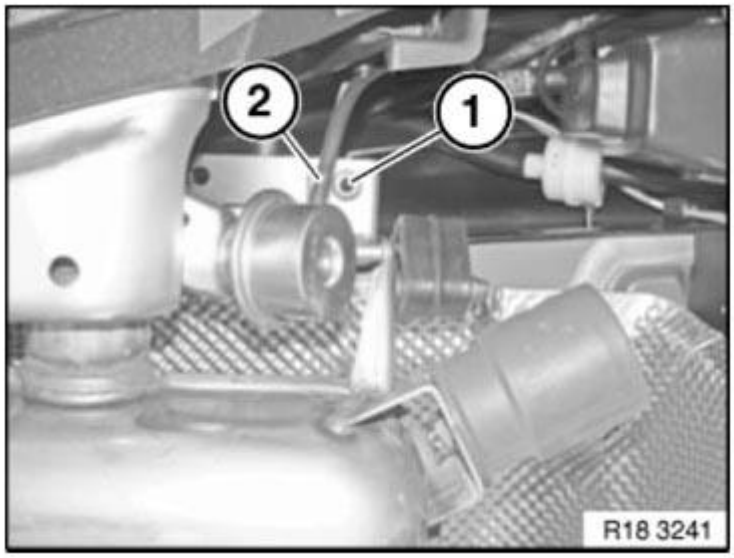


Fig. 22: Identifying Nut And Hose On Vaccum Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install, fit new rear silencer and connect with hose clamp.

Centre clamp and tighten down.

Tightening torque **18 31 4AZ** .

The procedure is identical on both sides.

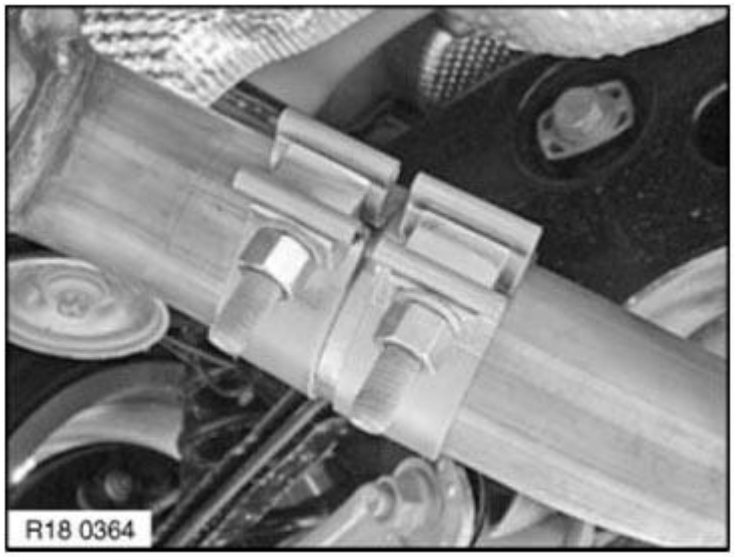


Fig. 23: Identifying Rear Silencer With Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check rubber mount for damage.
Replace damaged rubber mount.
Check exhaust system for leaks.

1832 EXHAUST CATALYTIC CONVERTER

1832050 REMOVING AND INSTALLING/RENEWING CATALYTIC CONVERTER CYLINDER 5-8 (N63)

WARNING: Risk of burning!
Only perform this repair work on an engine that has cooled down.

Necessary preliminary work

- Remove **ACOUSTIC COVER**
- **REMOVE BOTH INTAKE SILENCER HOUSINGS** .
- Remove **EXHAUST SYSTEM** .
- Remove both control sensors. See **REPLACING LEFT CONTROL SENSOR (N63)** and **REPLACING RIGHT CONTROL SENSOR (N63)** .
- Remove both monitoring sensors. See **REPLACING LEFT MONITOR SENSOR (N63)** and **REPLACING RIGHT MONITOR SENSOR (N63)** .

Picture shows the left side, carry out the operation for the right side in an identical way.

Release screws (1).

Remove cable clips on left and right.

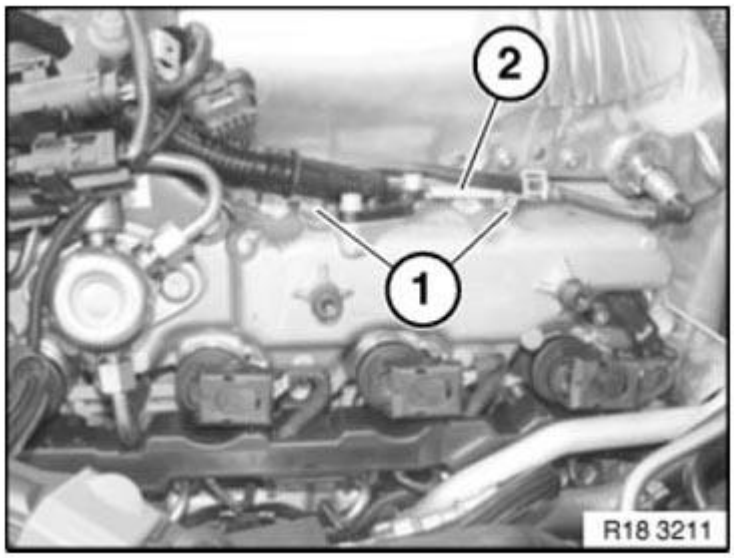


Fig. 24: Identifying Screws And Cable Clips On Left And Right
Courtesy of BMW OF NORTH AMERICA, INC.

Remove rubber mounts (1) and release screws underneath.

Tightening torque **13 71 5AZ** .

Remove cable clip (2).

Remove the **HEAT SHIELD** (3) at top.

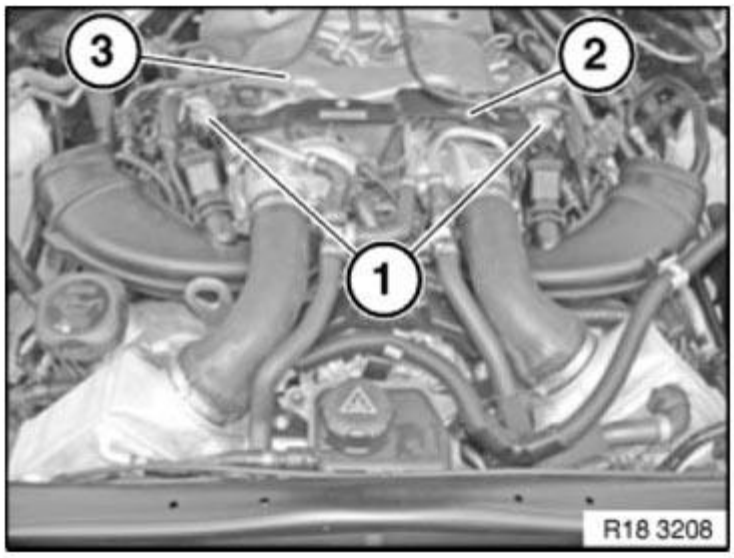


Fig. 25: Identifying Rubber Mounts, Cable Clip And Heat Shield At Top

Courtesy of BMW OF NORTH AMERICA, INC.

Remove heat shield (1) at rear left and right.

This is described further below in the instructions.

Release screw (2) on catalytic converter.

Tightening torque **18 32 4AZ** .

Release clamp (3) on catalytic converter.

Replace clamp (3).

Tightening torque **18 32 1AZ** .

Installation note:

The clamp (3) must be installed with the screw toward the inside (illustration). Otherwise, the heat shield can no longer be installed on top.

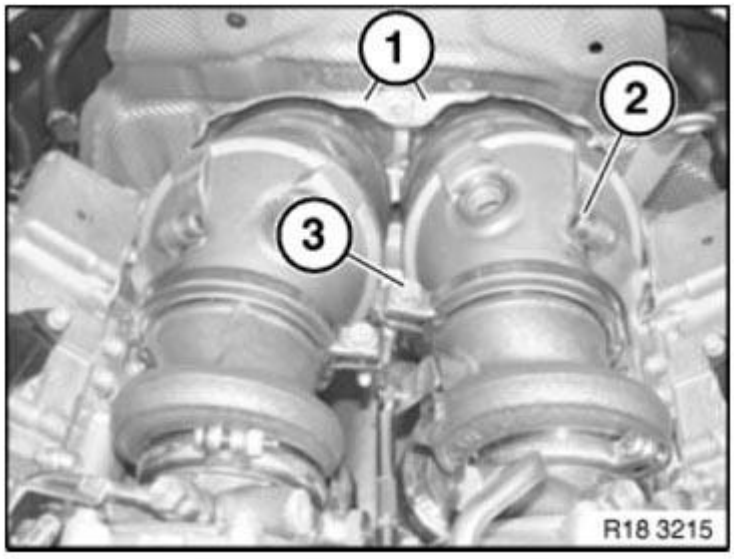


Fig. 26: Identifying Heat Shield At Rear Left And Right, Clamp With Screw On Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The ends of the V-band clamps must rest parallel to each other.

Tightening torque **18 32 1AZ** .

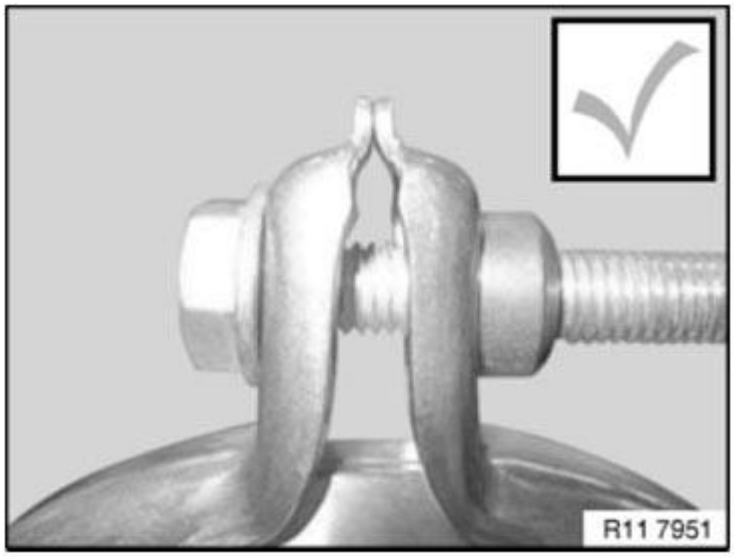


Fig. 27: Identifying V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If you can see a gap between the ends of the V - band clamps, release and then repeat the screw connection.

Tightening torque **18 32 1AZ** .

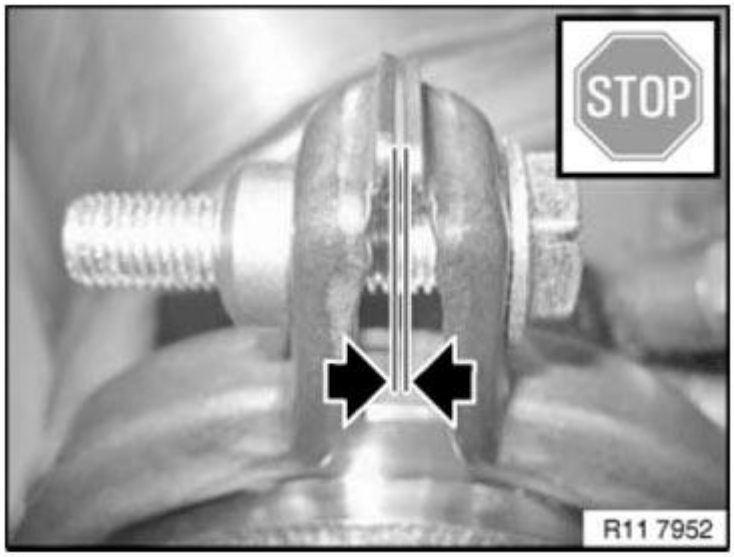


Fig. 28: Locating V - Band Clamps Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If the ends of the V-band clamps are positioned under each other, release and then repeat the screw connection.

Tightening torque **18 32 1AZ** .

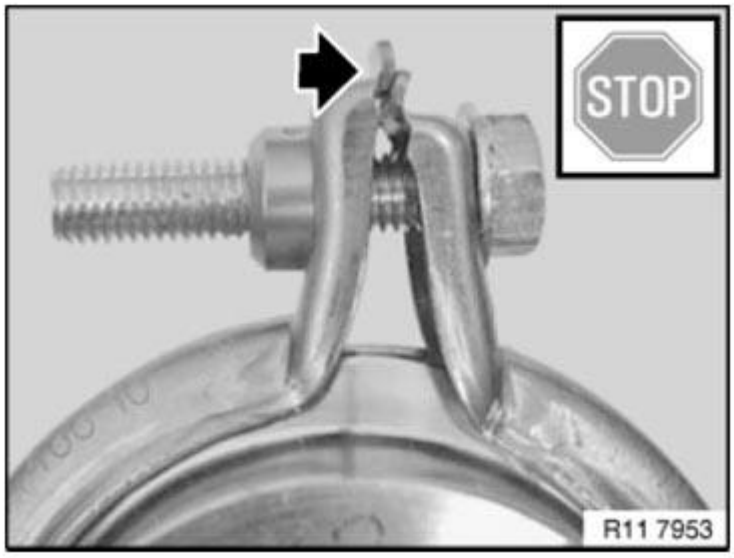


Fig. 29: Locating V - Band Clamps Position
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) from heat shields (2) and (3).

Screw (1) is located between the catalytic converters.

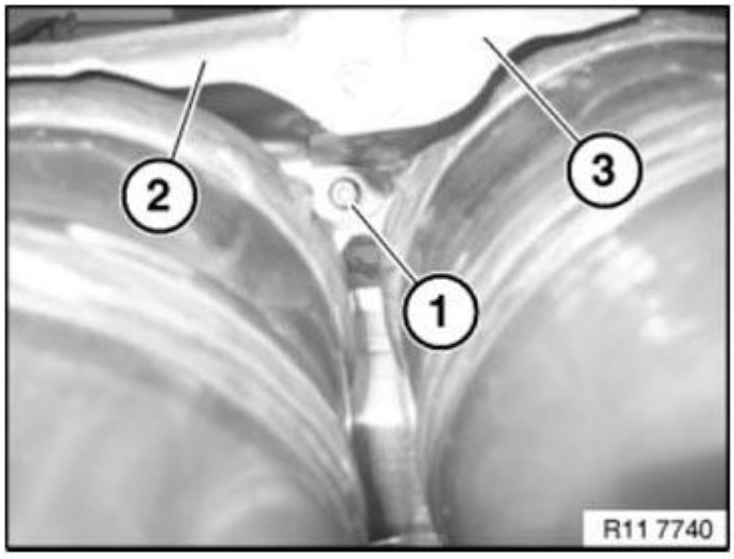


Fig. 30: Identifying Screws On Heat Shields And Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screws (1) on left heat shield.

Unclip left heat shield and remove.

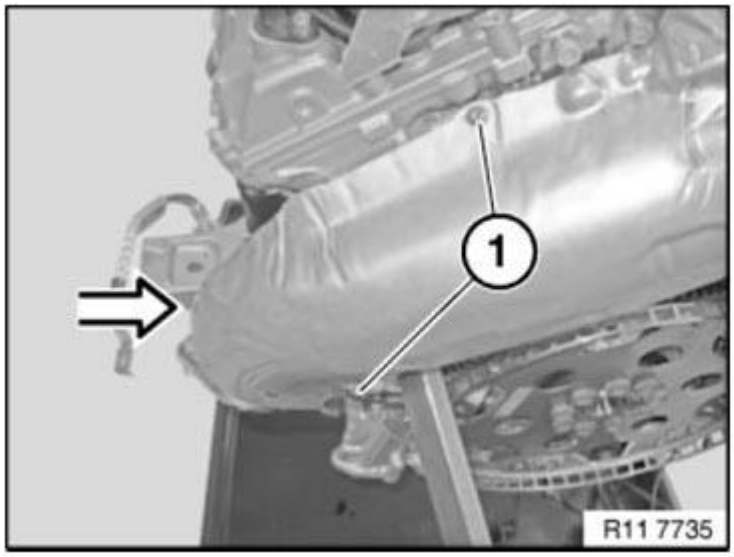


Fig. 31: Removing Screws Of Left Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screw (1) on right heat shield.

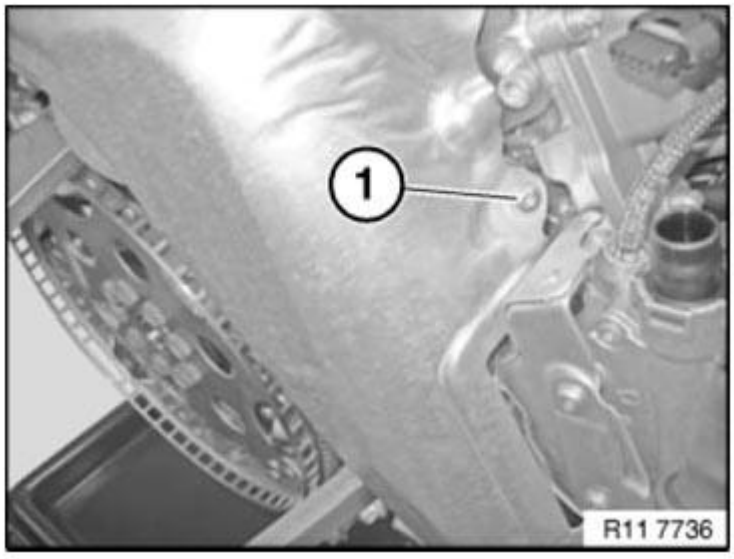


Fig. 32: Identifying Screw Of Right Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screw (1) on heat shield at bottom right.

Unclip heat shield and remove.

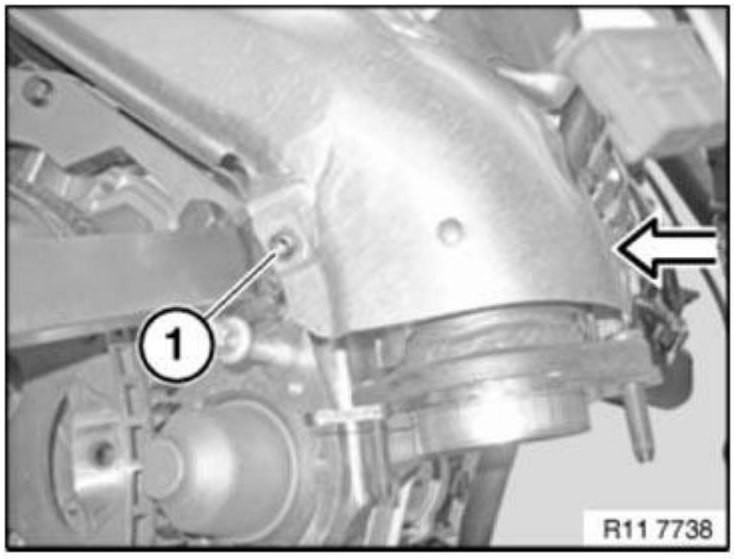


Fig. 33: Identifying Screw Of Heat Shield At Bottom Right
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Detach hose (2) from cylinder head cover.

Release screws (3) on holder.

Tightening torque **18 32 2AZ** .

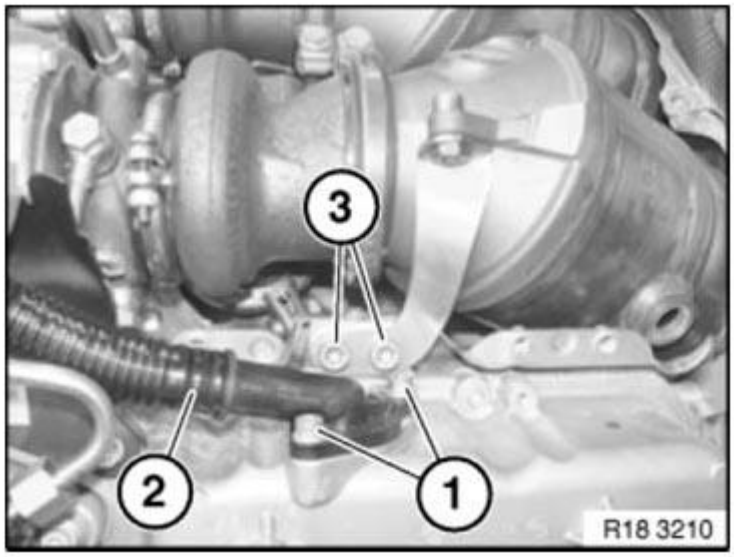


Fig. 34: Identifying Hose Of Cylinder Head Cover And Screws On Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screws (1) on catalytic converter, cylinders 5 - 8, rear, at cylinder head.

Tightening torque **18 32 3AZ** .

Remove catalytic converter for cylinders 5-8.

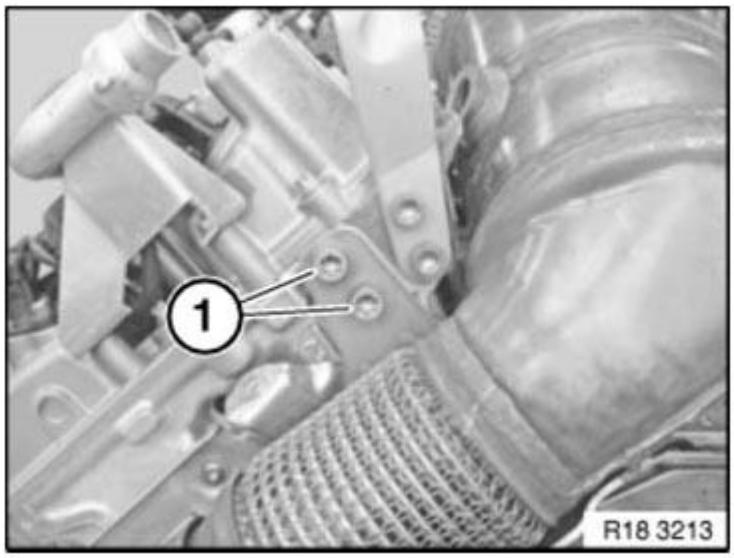


Fig. 35: Identifying Screws On Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Picture shows the engine removed.

Replace gasket (1) on left exhaust turbocharger.

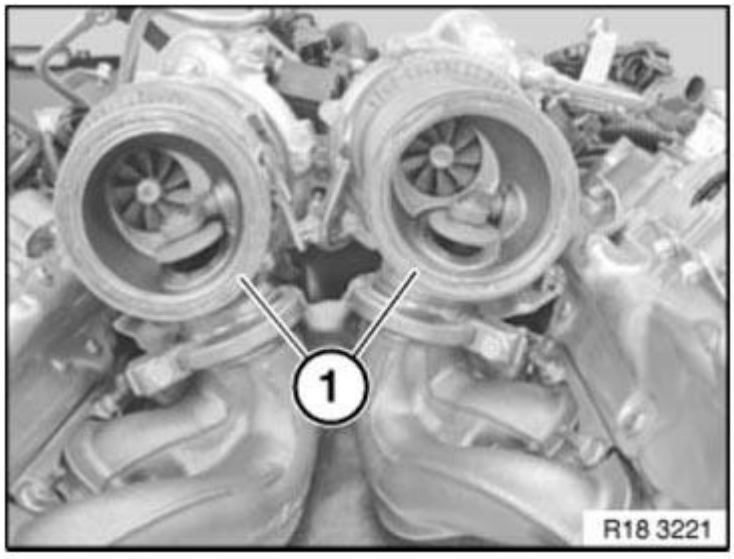


Fig. 36: Identifying Gasket On Left Exhaust Turbocharger
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean sealing surfaces.

Replace gasket (1).

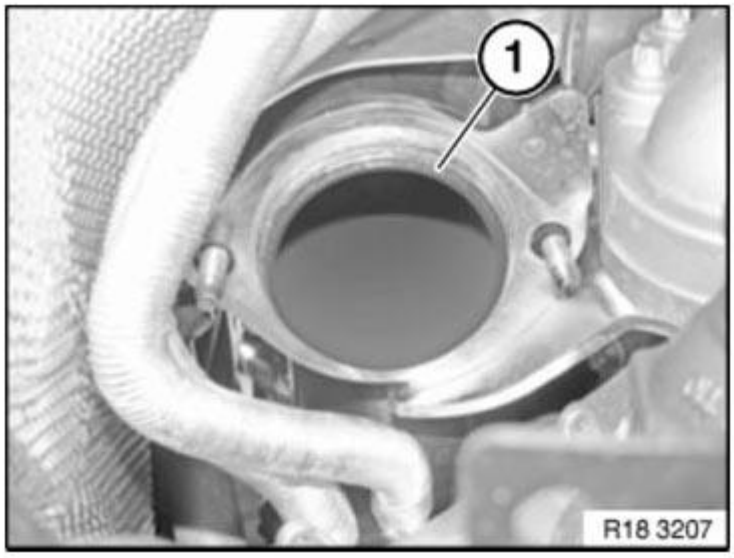


Fig. 37: Identifying Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leak tightness.

1832050 REMOVING AND REPLACING THE CATALYTIC CONVERTER CYLINDER 1-4 (N63)

WARNING: Risk of burning!
Only perform this repair work on an engine that has cooled down.

Necessary preliminary work

- Remove **ACOUSTIC COVER**
- **REMOVE BOTH INTAKE SILENCER HOUSINGS** .
- Remove **EXHAUST SYSTEM** .
- Remove both control sensors. See **REPLACING LEFT CONTROL SENSOR (N63)** and **REPLACING RIGHT CONTROL SENSOR (N63)** .
- Remove both monitoring sensors. See **REPLACING LEFT MONITOR SENSOR (N63)** and **REPLACING RIGHT MONITOR SENSOR (N63)** .

Picture shows the left side, carry out the operation for the right side in an identical way.

Release screws (1).

Remove cable clips on left and right.

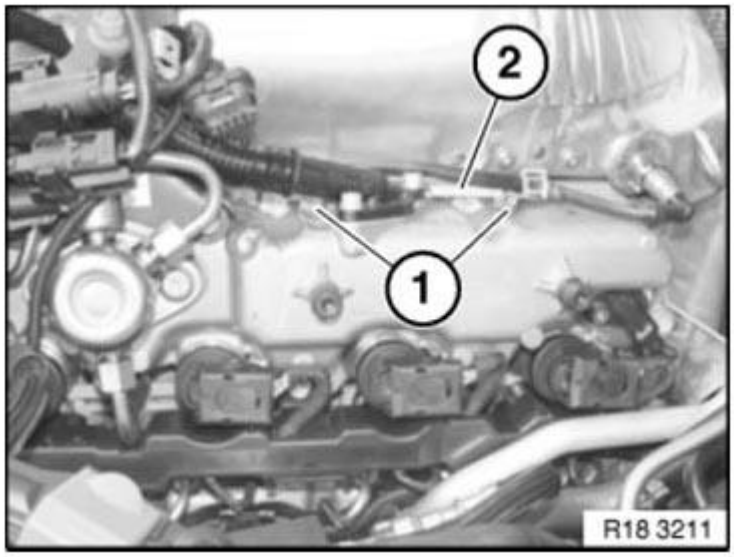


Fig. 38: Identifying Cable Clips On Left And Right With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove rubber mounts (1) and release screws underneath.

Tightening torque **13 71 5AZ** .

Remove cable clip (2).

Remove the **HEAT SHIELD** (3) at top.

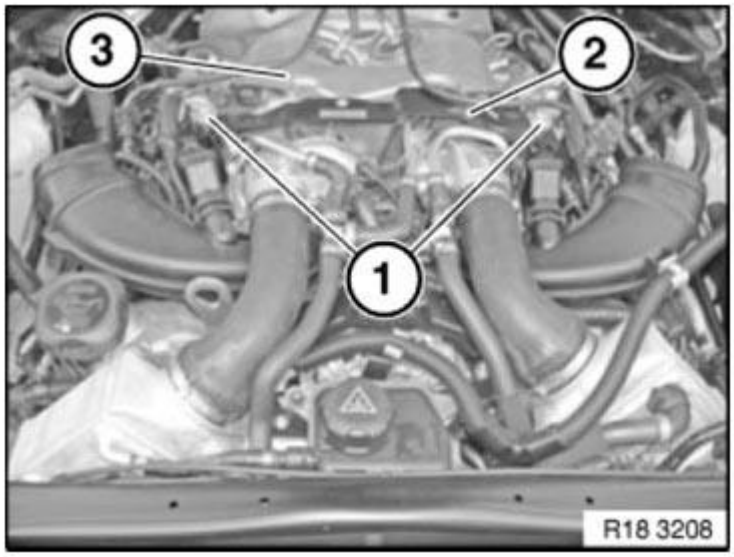


Fig. 39: Identifying Rubber Mounts, Cable Clip And Heat Shield At Top
Courtesy of BMW OF NORTH AMERICA, INC.

Remove heat shield (1) at rear left and right.

This is described further below in the instructions.

Release screws (2) on catalytic converter.

Tightening torque **18 32 4AZ** .

Loosen the clamps (3) from the catalytic converter.

Replace clamps (3).

Tightening torque **18 32 1AZ** .

Installation note:

Clamps must be installed with the screws toward the inside (Figure). Otherwise, a top heat shield can no longer be installed.

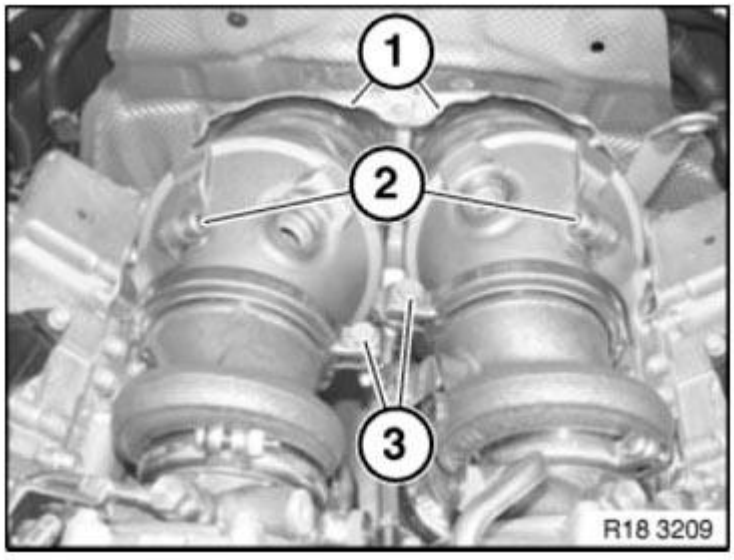


Fig. 40: Identifying Heat Shield At Rear Left And Right, Clamp With Screw On Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The ends of the V-band clamps must rest parallel to each other.

Tightening torque **18 32 1AZ** .

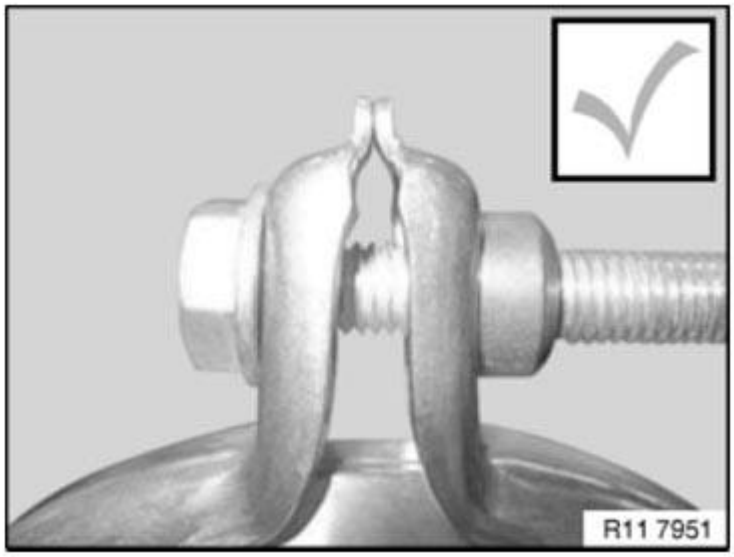


Fig. 41: Identifying V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If you can see a gap between the ends of the V - band clamps, release and then repeat the screw connection.

Tightening torque **18 32 1AZ** .

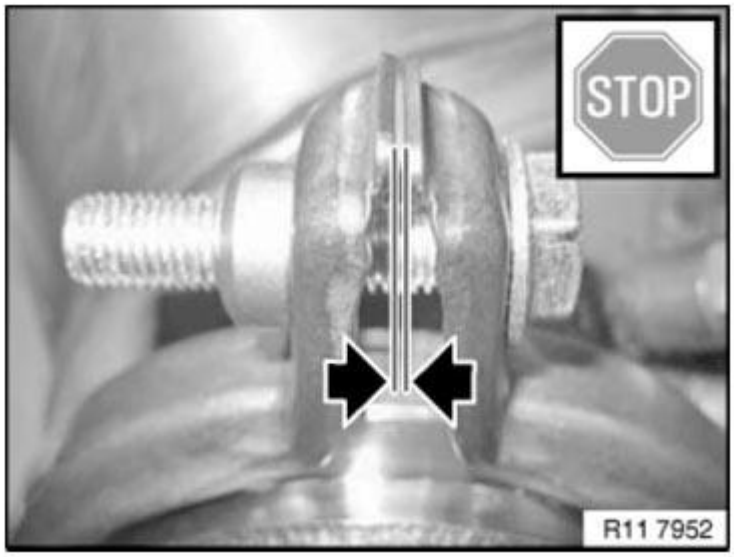


Fig. 42: Locating V - Band Clamps Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If the ends of the V-band clamps are positioned under each other, release and then repeat the screw connection.

Tightening torque **18 32 1AZ** .

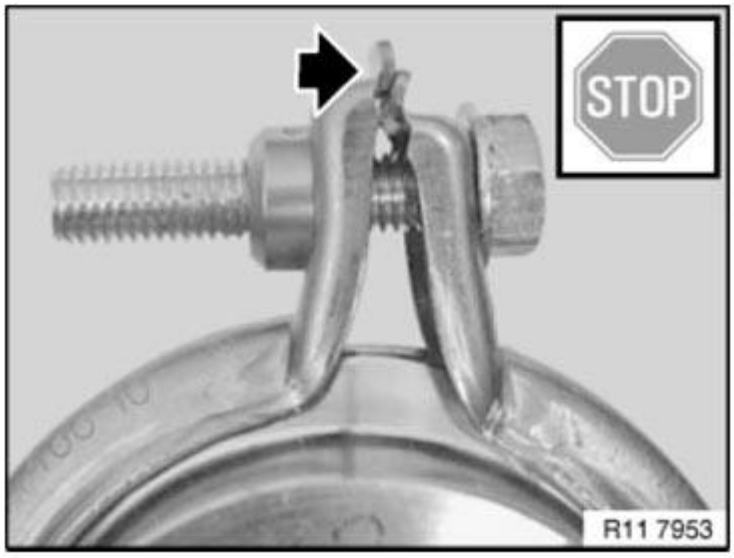


Fig. 43: Locating V - Band Clamps Position
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) from heat shields (2) and (3).

Screw (1) is located between the catalytic converters.

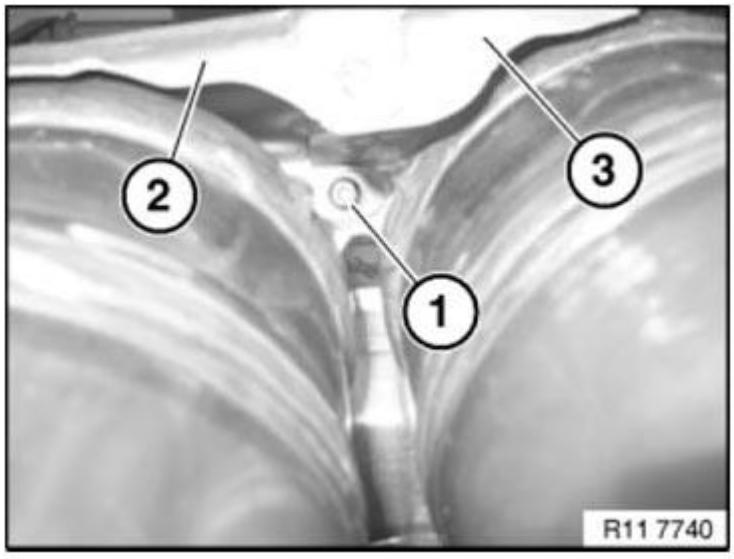


Fig. 44: Identifying Screw On Heat Shields And Catalytic Converters
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screws (1) on left heat shield.

Unclip left heat shield and remove.

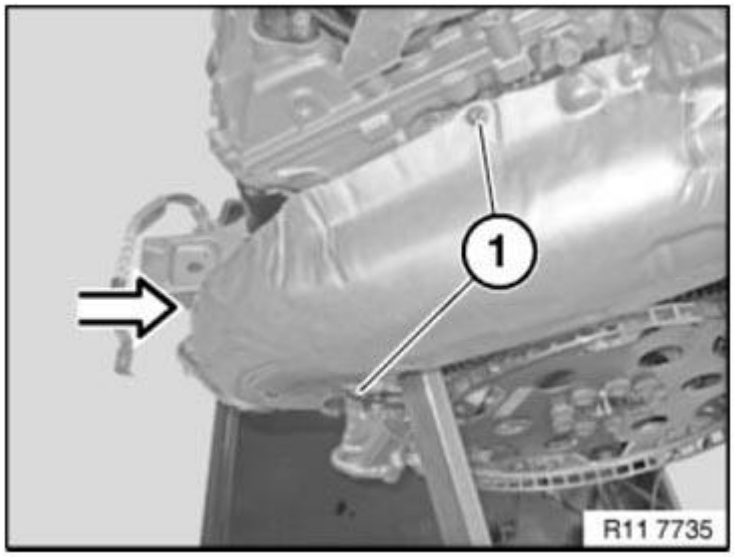


Fig. 45: Identifying Screws On Left Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screw (1) on right heat shield.

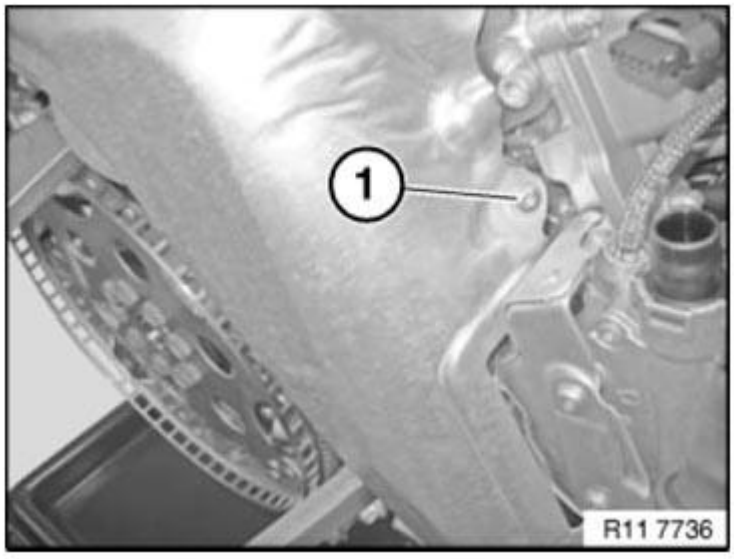


Fig. 46: Identifying Screws On Right Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screw (1) on heat shield at bottom right.

Unclip heat shield and remove.

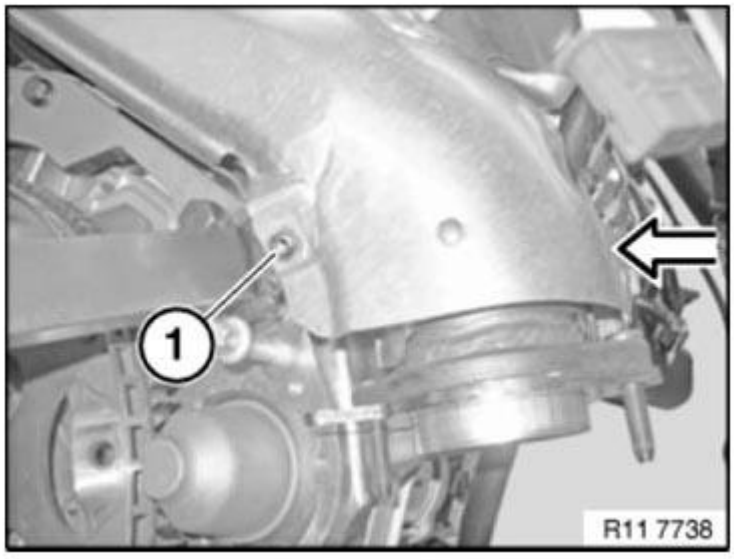


Fig. 47: Identifying Screws On Right Heat Shield At Bottom
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, carry out the operation for the right side in an identical way.

Release screws (1).

Detach hose (2) from cylinder head cover.

Release screws (3) on holder.

Tightening torque **18 32 2AZ** .

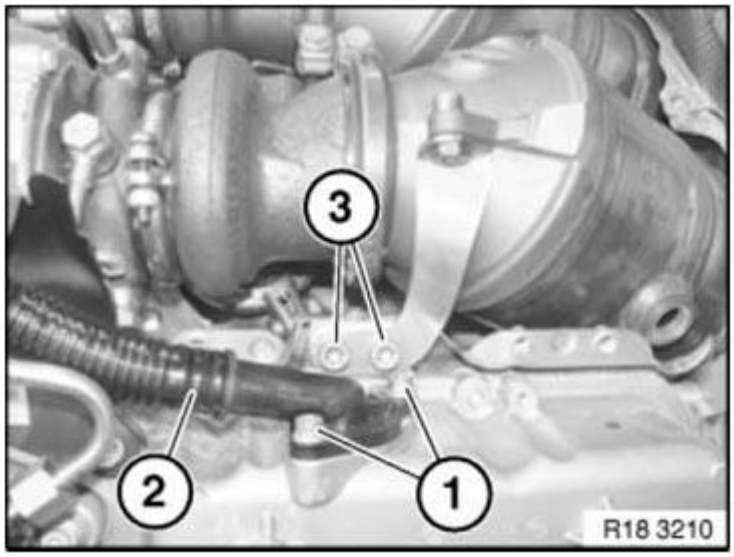


Fig. 48: Identifying Hose On Cylinder Head Cover And Screws On Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Loosen screws (1) on the catalytic converter cylinders 1-4 on the back of the cylinder head.

Tightening torque **18 32 3AZ** .

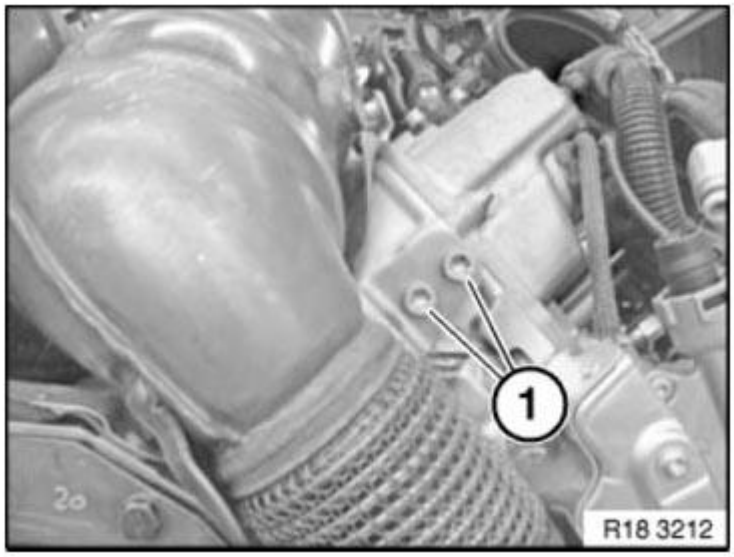


Fig. 49: Identifying Screws On Catalytic Converter Cylinders 1-4 On Back Of Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screws (1) on catalytic converter, cylinders 5 - 8, rear, at cylinder head.

Tightening torque **18 32 3AZ** .

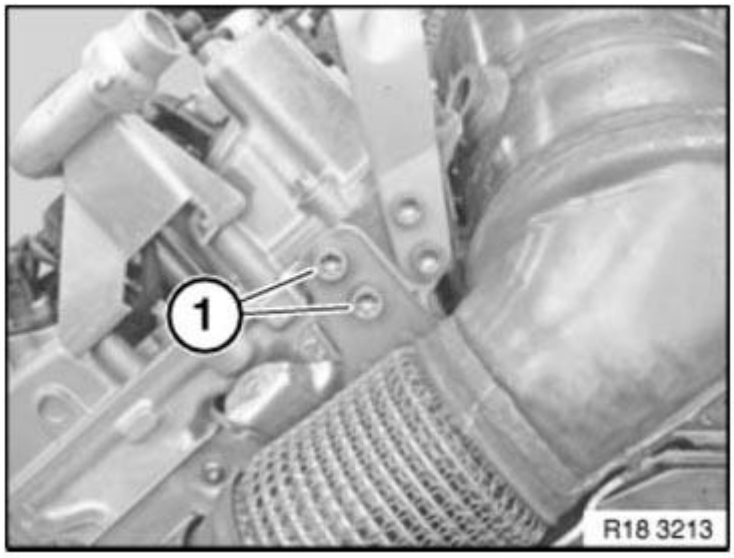
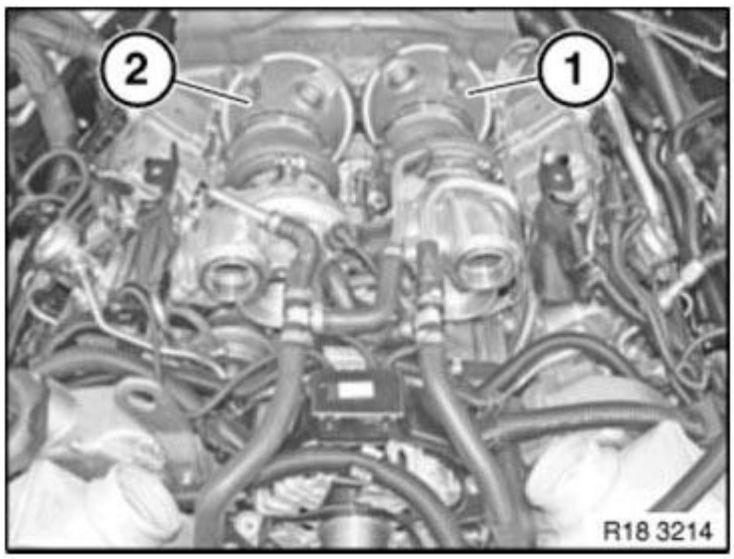


Fig. 50: Identifying Screws On Catalytic Converter, Cylinders 5--8, Rear, At Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To remove the catalytic converter cylinders 1-4, it is necessary to remove the catalytic converter cylinders 5-8.

1. Remove catalytic converter for cylinders 5 - 8 (1).
2. Remove catalytic converter for cylinders 1 - 4 (2).



Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Picture shows the engine removed.

Replace the seals (1) on the exhaust turbocharger.

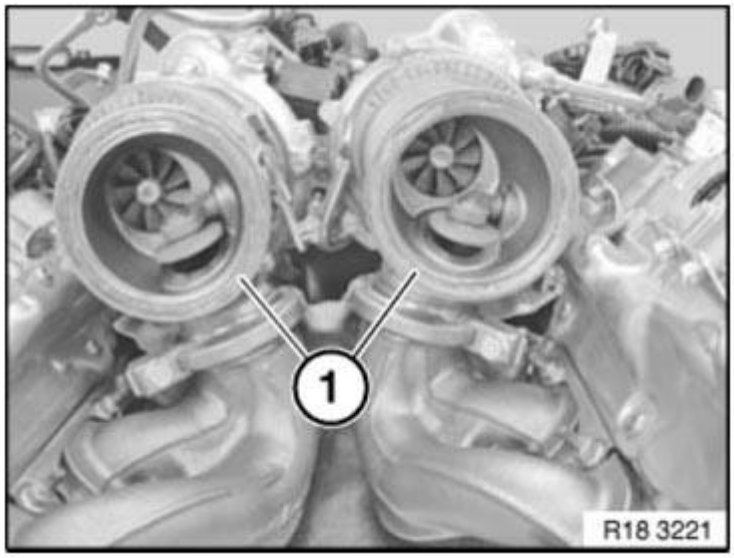


Fig. 52: Identifying Seals On Exhaust Turbocharger
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Picture shows the left side, the procedure for the right side is identical.

Clean sealing surfaces.

Replace gasket (1).

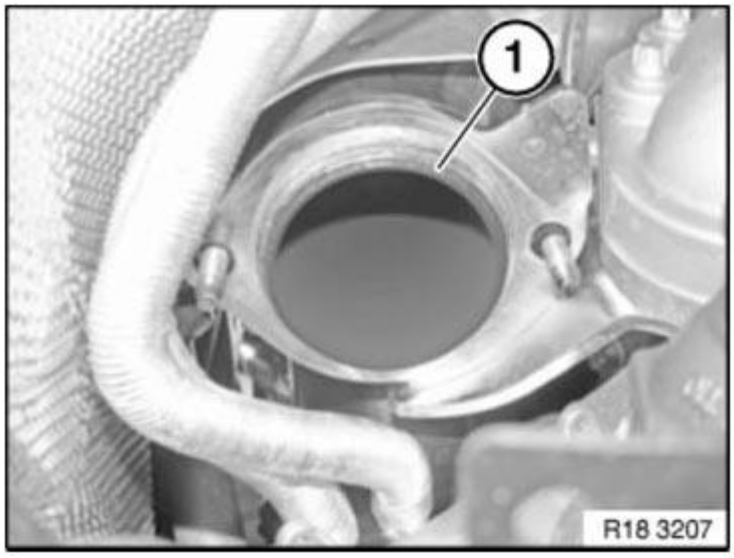


Fig. 53: Identifying Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leak tightness.

1840 EXHAUST MANIFOLD WITH INTEGRATED CATALYTIC CONVERTER

1840010 REMOVING AND INSTALLING/RENEWING LEFT EXHAUST MANIFOLD (N63)

WARNING: Risk of burning!
Only perform this repair work on an engine that has cooled down.

Necessary preliminary work

- Remove left **TURBOCHARGER** .
- Remove right **TURBOCHARGER** .
- Remove **ALTERNATOR (not F04)** .

Release screws (1).

Tightening torque **18 31 4AZ** .

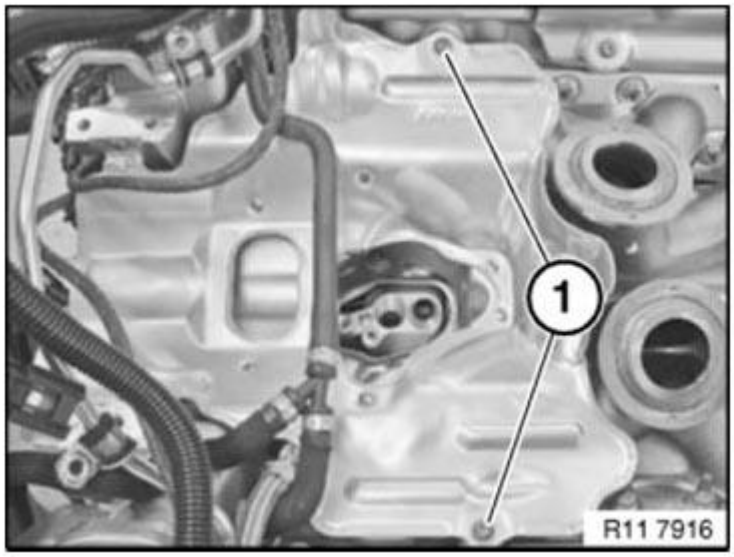


Fig. 54: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **18 31 4AZ** .

Remove heat shield (2).

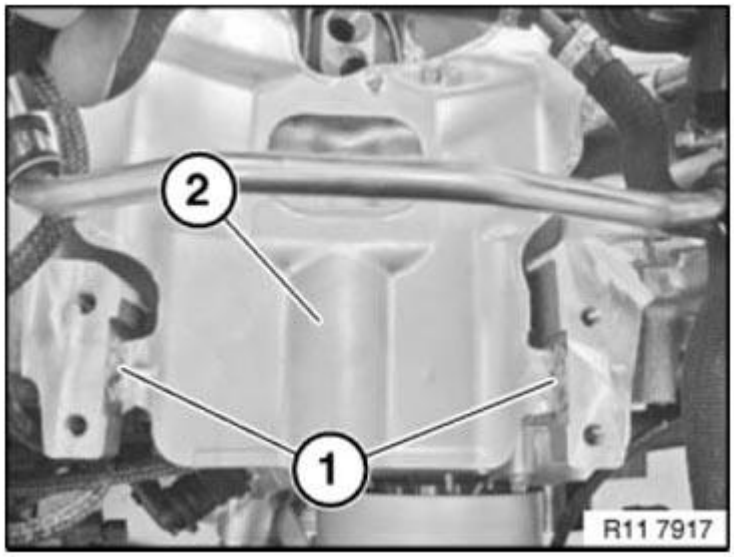


Fig. 55: Identifying Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **18 31 4AZ** .

Remove heat shield (2) at rear left.

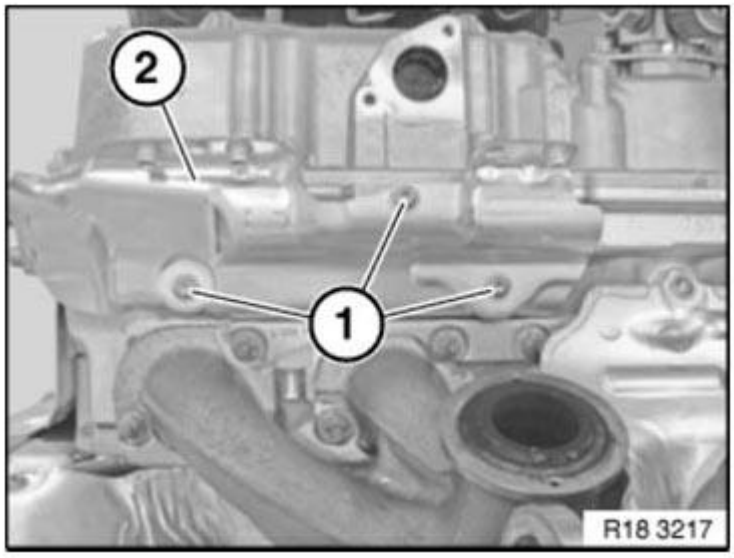


Fig. 56: Identifying Screws And Heat Shield At Rear Left
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Replace nuts.

Tightening torque **18 31 3AZ** .

Remove exhaust manifold (1).

Installation note:

Replace gasket (2).

Reinstall securing strip.

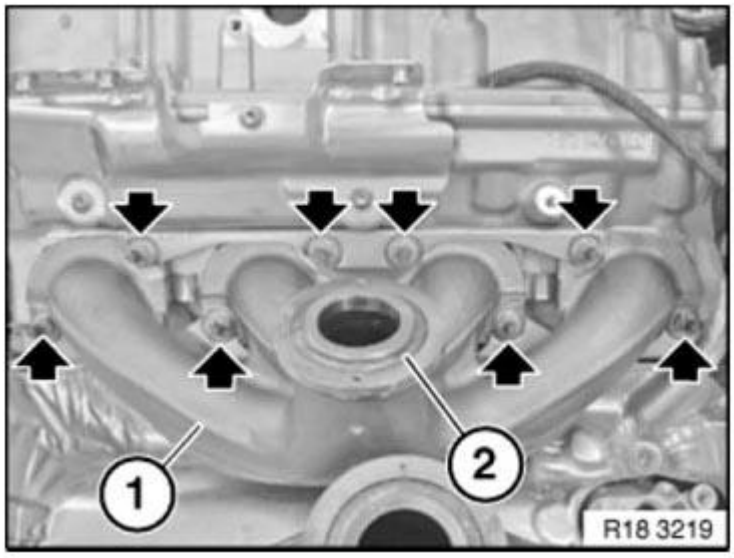


Fig. 57: Locating Exhaust Manifold Nut And Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace gaskets (1).

Seal beads faces the exhaust manifold.

Coat threads with copper paste.

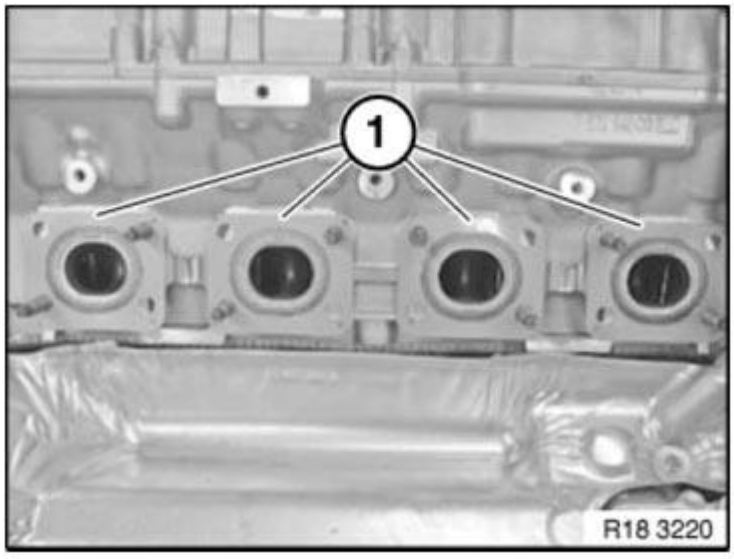


Fig. 58: Identifying Exhaust Manifold Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leak tightness.

1840020 REMOVING AND INSTALLING/REPLACING RIGHT EXHAUST MANIFOLD (N63)

WARNING: Risk of burning!
Only perform this repair work on an engine that has cooled down.

Necessary preliminary work

- Remove left **TURBOCHARGER** .
- Remove right **TURBOCHARGER** .
- Remove **ALTERNATOR (not F04)** .

Release screws (1).

Tightening torque **18 31 4AZ** .

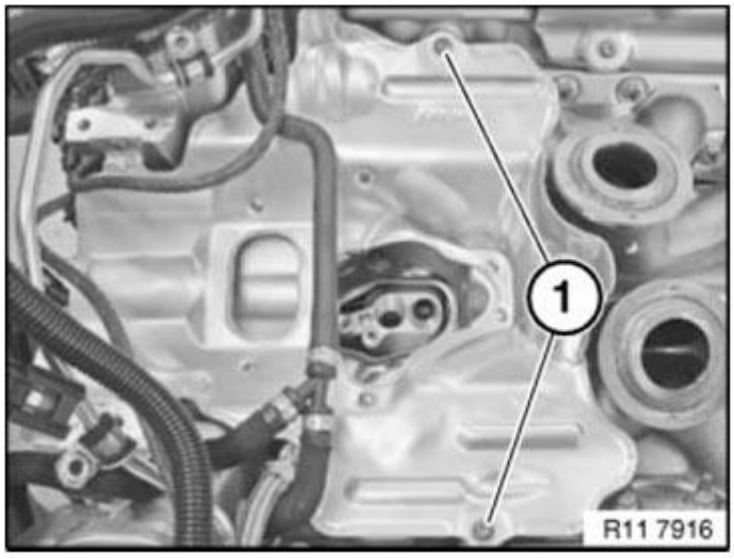


Fig. 59: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **18 31 4AZ** .

Remove heat shield (2).

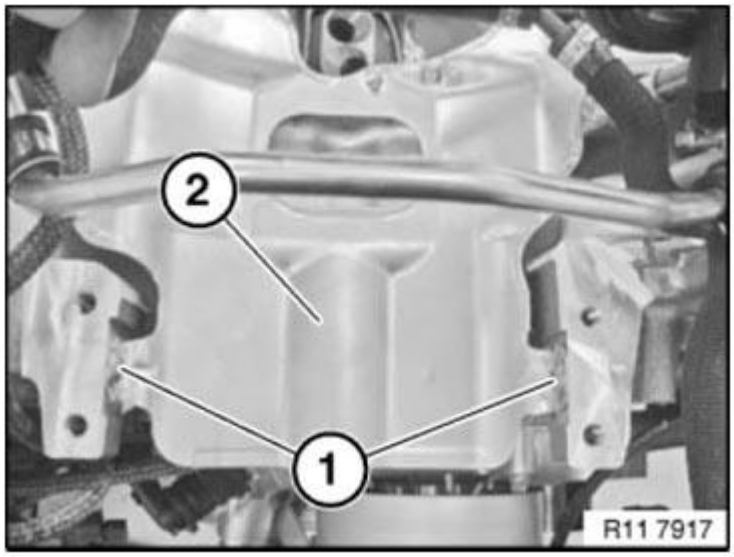


Fig. 60: Identifying Heat Shield With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **18 31 4AZ** .

Remove heat shield (2) at rear right.

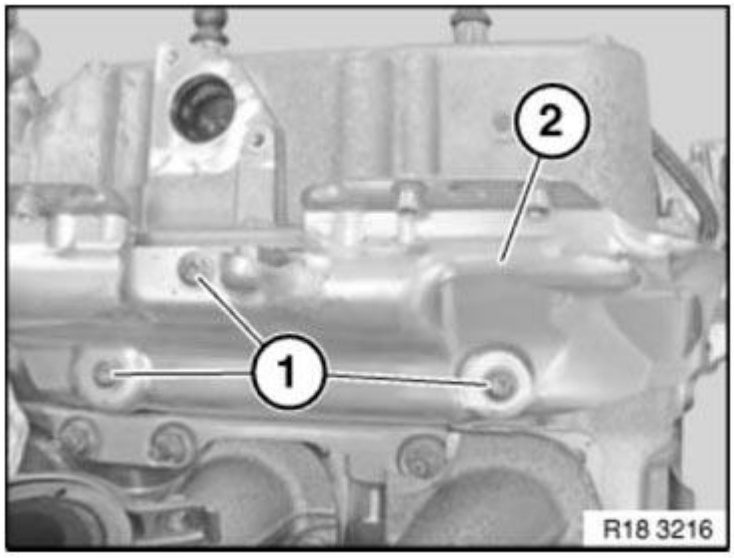


Fig. 61: Identifying Heat Shield At Rear Right With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Replace nuts.

Tightening torque **18 31 3AZ** .

Remove exhaust manifold (1).

Installation note:

Replace gasket (2).

Reinstall securing strip.

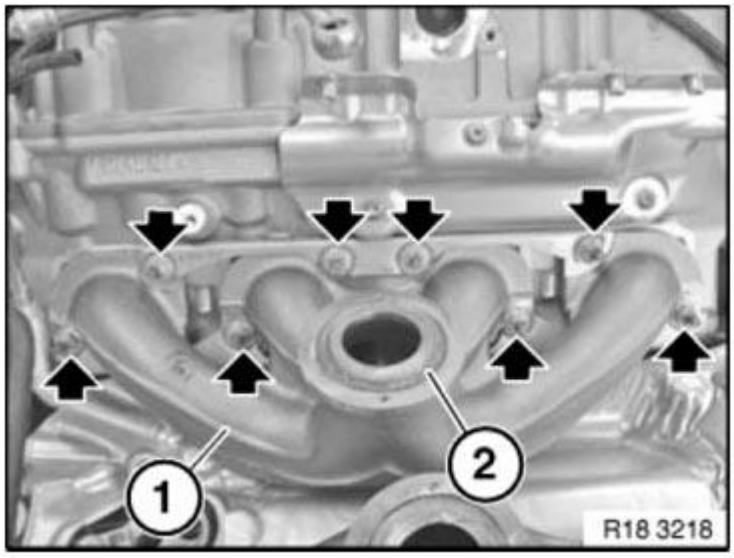


Fig. 62: Locating Exhaust Manifold And Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace gaskets (1).

Seal beads faces the exhaust manifold.

Coat threads with copper paste.

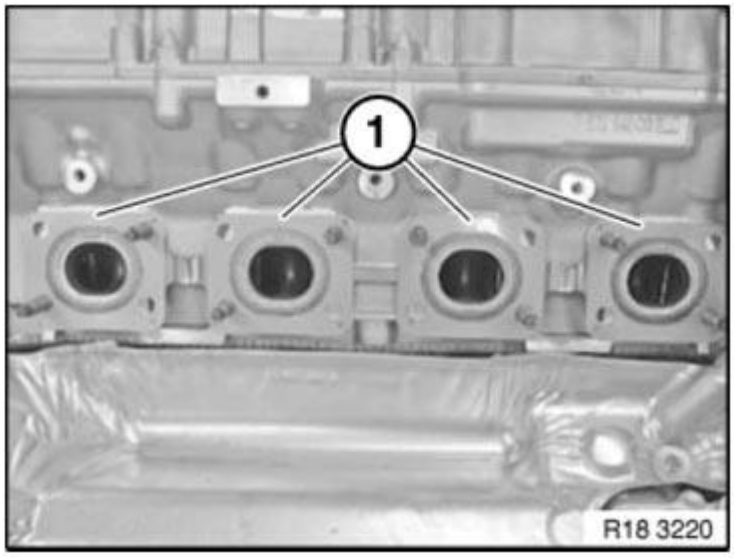


Fig. 63: Identifying Exhaust Manifold Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leak tightness.

1832050 REMOVING AND REPLACING THE CATALYTIC CONVERTER CYLINDER 1-4 (N63)

WARNING: Risk of burning!
Only perform this repair work on an engine that has cooled down.

Necessary preliminary work

- Remove **ACOUSTIC COVER**
- **REMOVE BOTH INTAKE SILENCER HOUSINGS** .
- Remove **EXHAUST SYSTEM** .
- Remove both control sensors. See **REPLACING LEFT CONTROL SENSOR (N63)** and **REPLACING RIGHT CONTROL SENSOR (N63)** .
- Remove both monitoring sensors. See **REPLACING LEFT MONITOR SENSOR (N63)** and **REPLACING RIGHT MONITOR SENSOR (N63)** .

Picture shows the left side, carry out the operation for the right side in an identical way.

Release screws (1).

Remove cable clips on left and right.

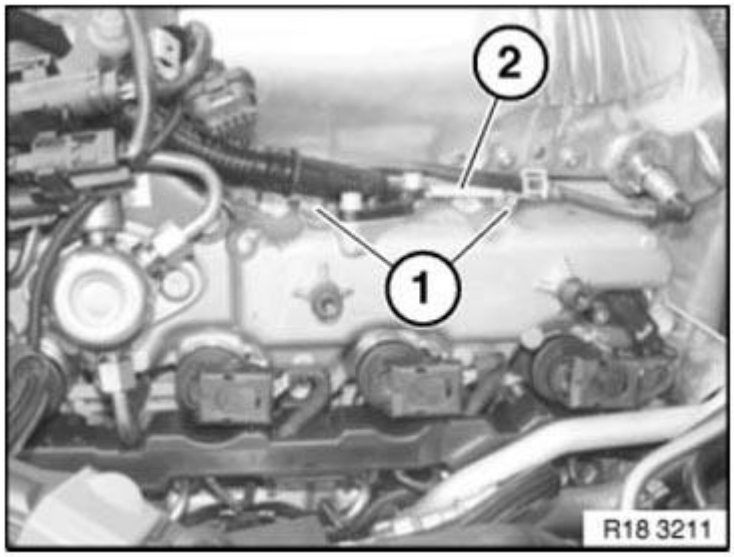


Fig. 64: Identifying Cable Clips On Left And Right With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove rubber mounts (1) and release screws underneath.

Tightening torque **13 71 5AZ** .

Remove cable clip (2).

Remove the **HEAT SHIELD** (3) at top.

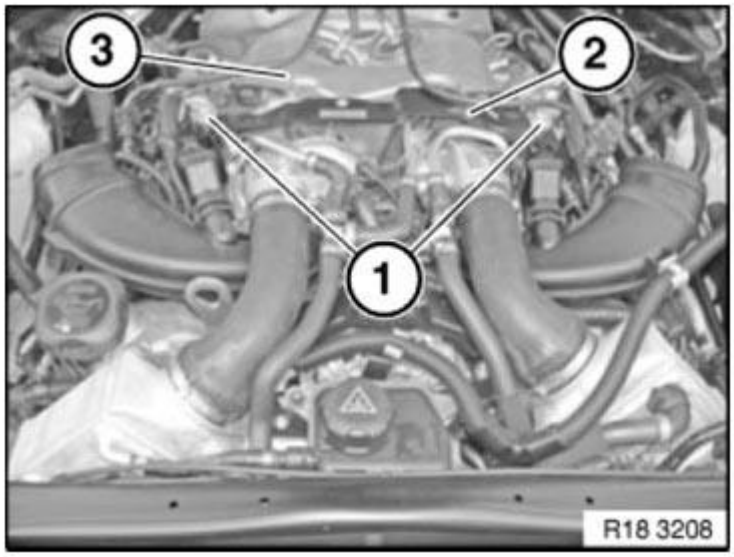


Fig. 65: Identifying Rubber Mounts, Cable Clip And Heat Shield At Top
Courtesy of BMW OF NORTH AMERICA, INC.

Remove heat shield (1) at rear left and right.

This is described further below in the instructions.

Release screws (2) on catalytic converter.

Tightening torque **18 32 4AZ** .

Loosen the clamps (3) from the catalytic converter.

Replace clamps (3).

Tightening torque **18 32 1AZ** .

Installation note:

Clamps must be installed with the screws toward the inside (Figure). Otherwise, a top heat shield can no longer be installed.

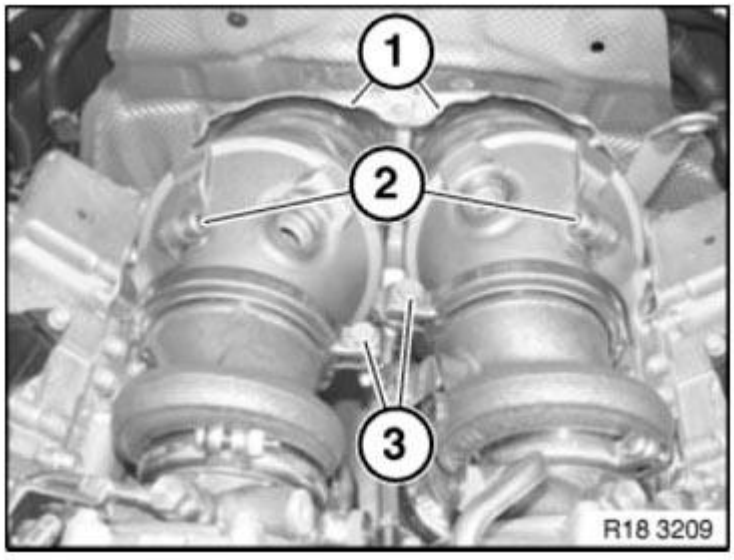


Fig. 66: Identifying Heat Shield At Rear Left And Right, Clamps And Screws On Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The ends of the V-band clamps must rest parallel to each other.

Tightening torque **18 32 1AZ** .

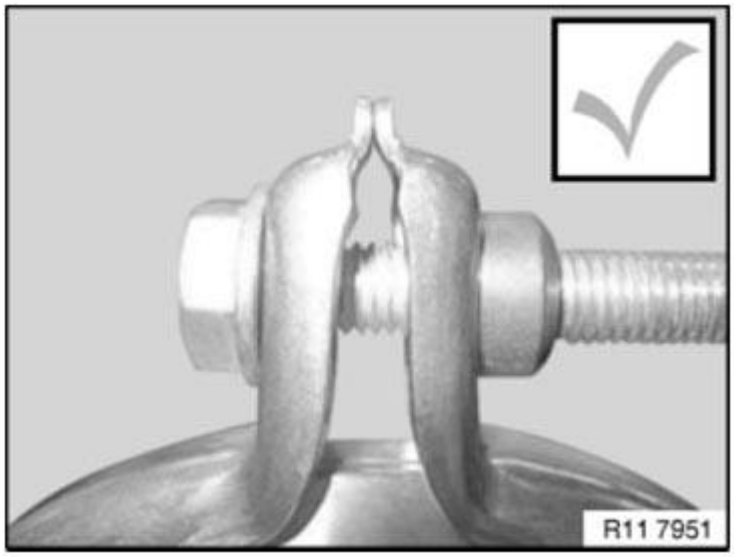


Fig. 67: Identifying V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If you can see a gap between the ends of the V - band clamps, release and then repeat the screw connection.

Tightening torque **18 32 1AZ** .

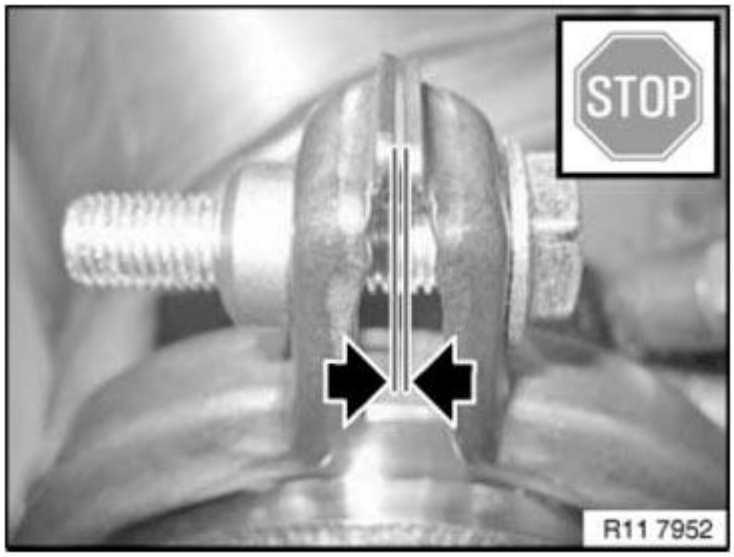


Fig. 68: Locating V - Band Clamps Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If the ends of the V-band clamps are positioned under each other, release and then repeat the screw connection.

Tightening torque **18 32 1AZ** .

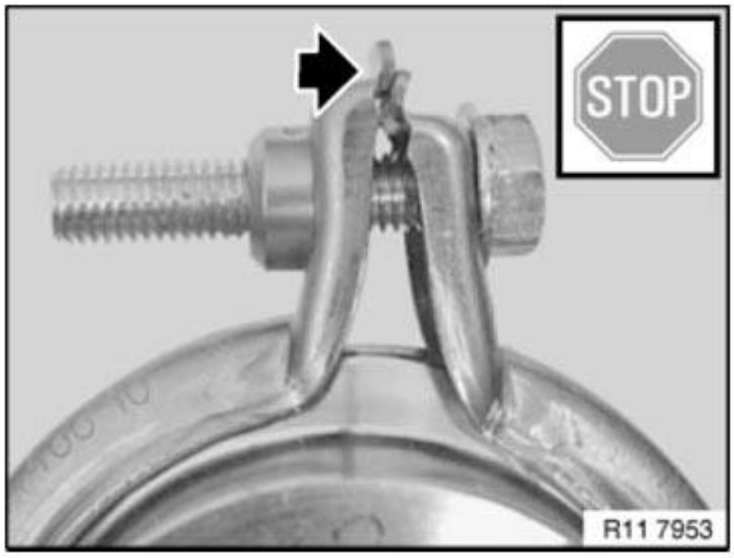


Fig. 69: Locating V - Band Clamps Position
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) from heat shields (2) and (3).

Screw (1) is located between the catalytic converters.

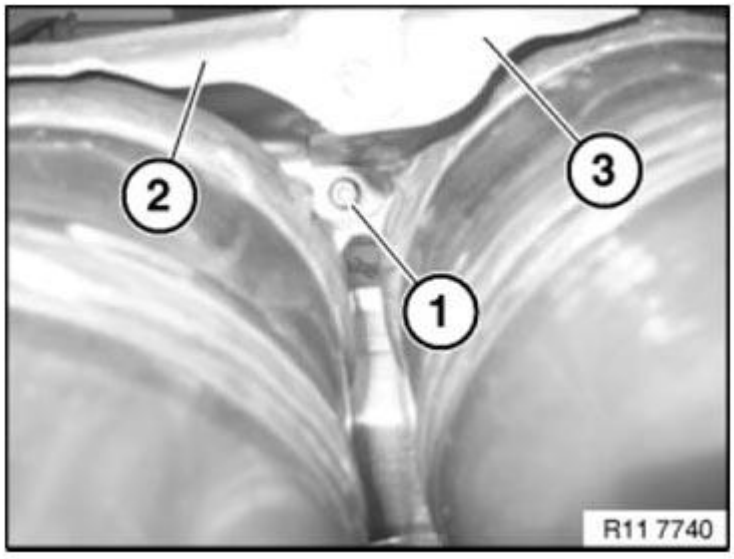


Fig. 70: Identifying Screws On Heat Shields And Catalytic Converters
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screws (1) on left heat shield.

Unclip left heat shield and remove.

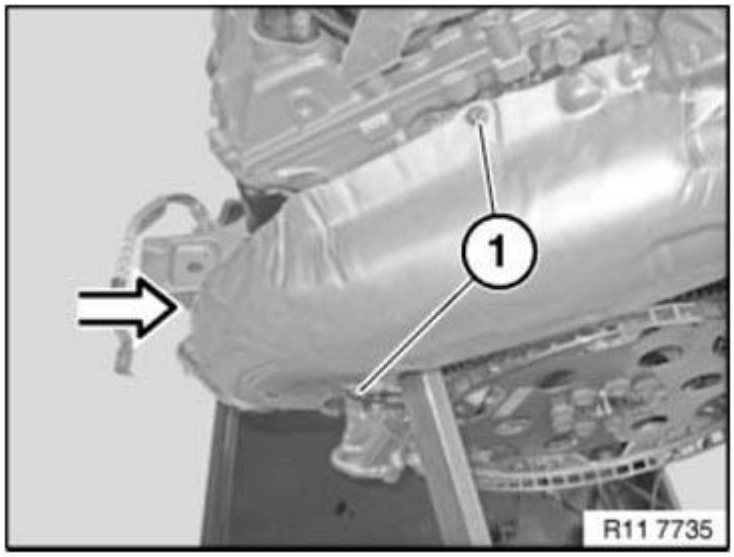


Fig. 71: Identifying Screws On Left Heat Shields
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screw (1) on right heat shield.

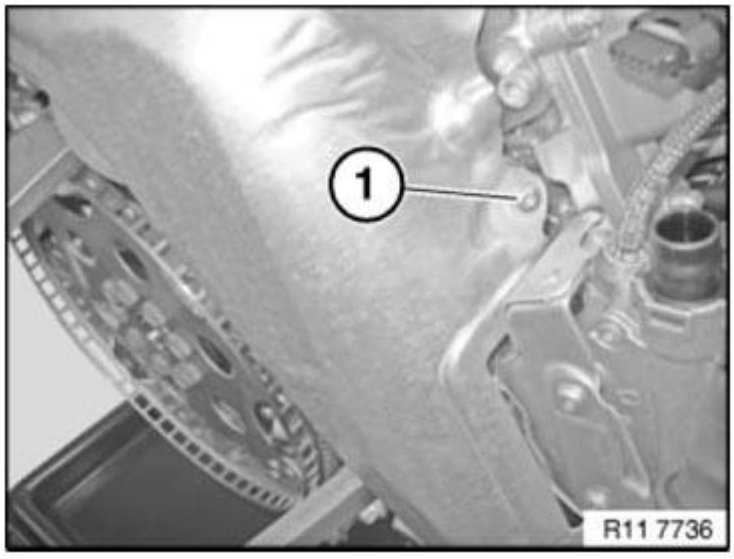


Fig. 72: Identifying Screws On Right Heat Shields
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screw (1) on heat shield at bottom right.

Unclip heat shield and remove.

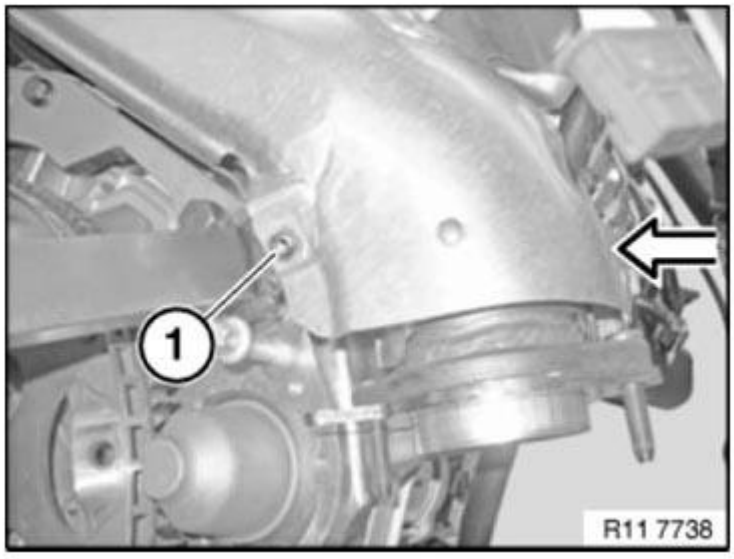


Fig. 73: Identifying Screw On Heat Shields At Bottom Right
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, carry out the operation for the right side in an identical way.

Release screws (1).

Detach hose (2) from cylinder head cover.

Release screws (3) on holder.

Tightening torque **18 32 2AZ** .

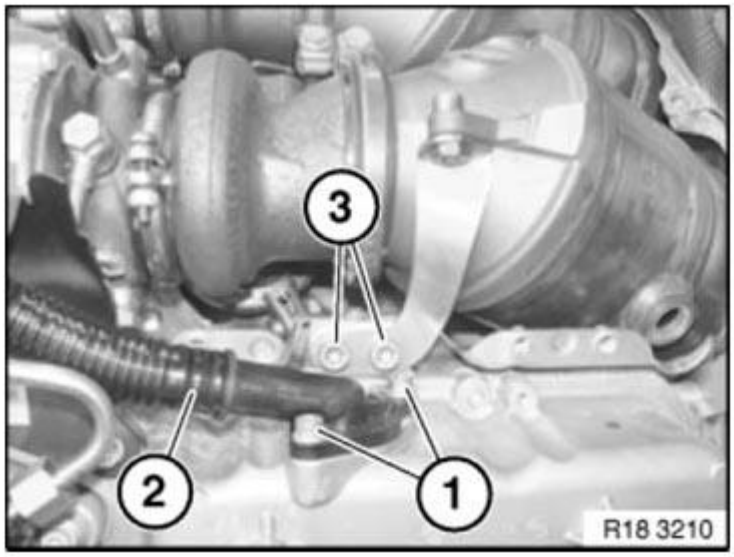


Fig. 74: Identifying Hose On Cylinder Head Cover And Screws On Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Loosen screws (1) on the catalytic converter cylinders 1-4 on the back of the cylinder head.

Tightening torque **18 32 3AZ** .

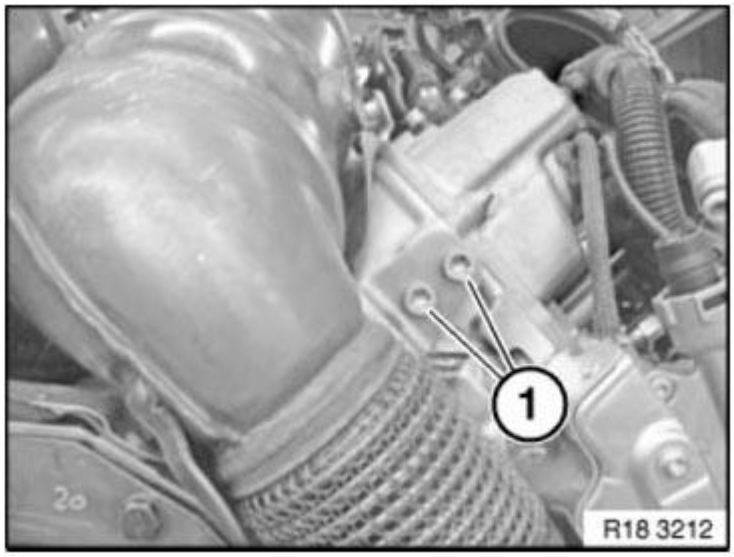


Fig. 75: Identifying Screws On Catalytic Converter Cylinders 1-4 On Back Of Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows the engine removed.

Release screws (1) on catalytic converter, cylinders 5 - 8, rear, at cylinder head.

Tightening torque **18 32 3AZ** .

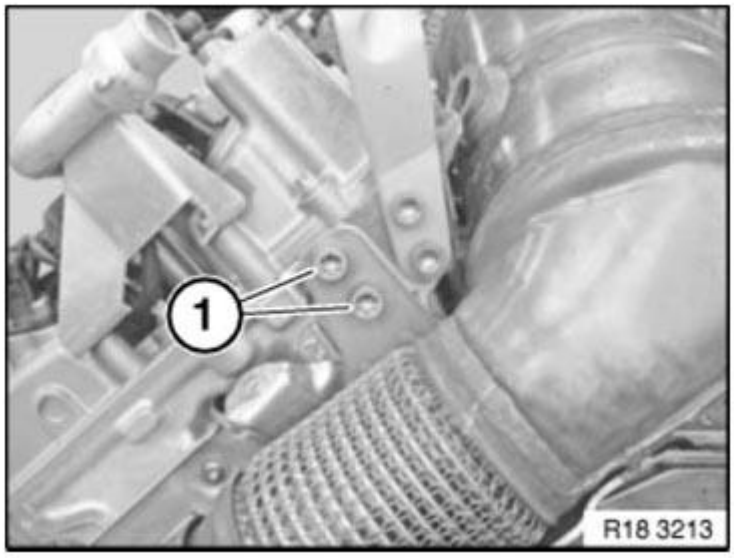
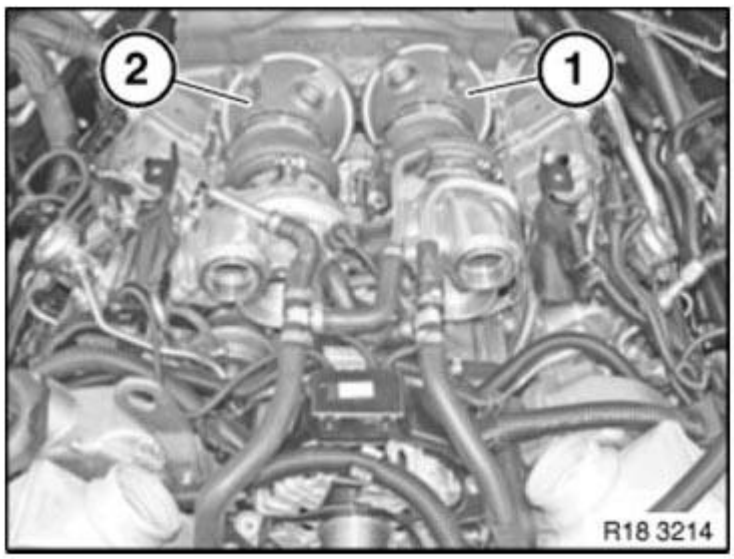


Fig. 76: Identifying Screws On Catalytic Converter, Cylinders 5--8, Rear, At Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To remove the catalytic converter cylinders 1-4, it is necessary to remove the catalytic converter cylinders 5-8.

1. Remove catalytic converter for cylinders 5 - 8 (1).
2. Remove catalytic converter for cylinders 1 - 4 (2).



Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Picture shows the engine removed.

Replace the seals (1) on the exhaust turbocharger.

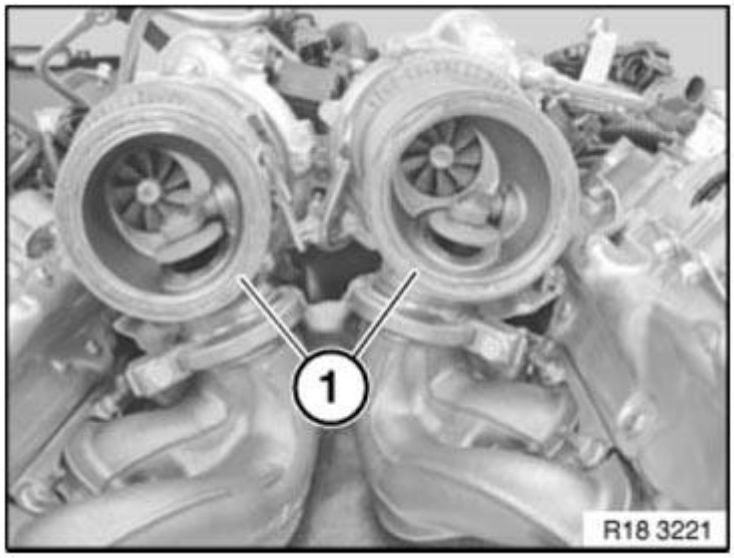


Fig. 78: Identifying Seals On Exhaust Turbocharger
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Picture shows the left side, the procedure for the right side is identical.

Clean sealing surfaces.

Replace gasket (1).

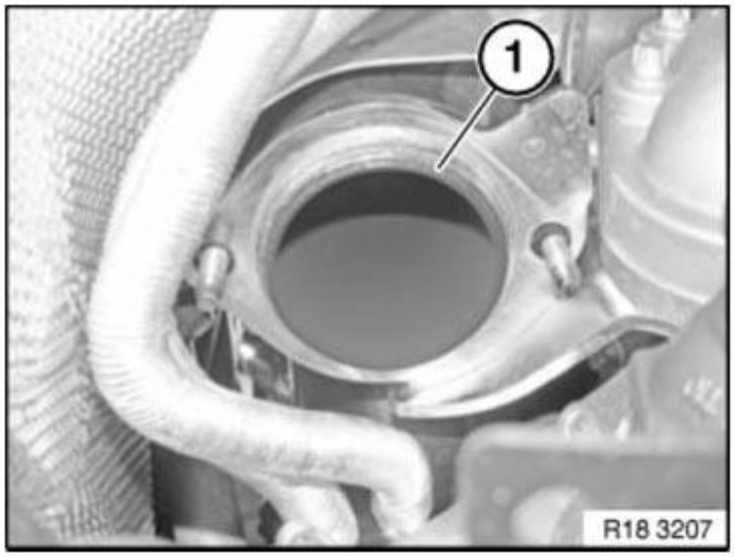


Fig. 79: Identifying Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leak tightness.

SUSPENSION

Front Axle - Technical Data

FRONT AXLE - RIDE HEIGHT

31 00 FRONT AXLE - RIDE HEIGHT F01/F02/REAR WHEEL

FRONT AXLE - RIDE HEIGHT AND REAR WHEEL SPECIFICATION

Ride level height in normal position Attach tape measure to bottom middle of rim flange and measure to lower edge of wheel arch		
Tolerance ride height in ○ **NORMAL POSITION** max. 10 mm ○ **DESIGN POSITION** max. 2 mm		
Difference ride height between left/right in ○ **NORMAL POSITION** 10 mm ○ **DESIGN POSITION** 2 mm		
Series		
17" rim	mm	632
18" rim	mm	645
19" rim	mm	657
20" rim	mm	670
21" rim	mm	682
1 - axle air spring		
17" rim	mm	632
18" rim	mm	645
19" rim	mm	657
20" rim	mm	670
21" rim	mm	682

FRONT AXLE DIFFERENTIAL

31 50 FRONT AXLE DIFFERENTIAL F01/F02

FRONT AXLE DIFFERENTIAL SPECIFICATION

Oil grade: refer to **OPERATING FLUIDS**		
New oil filling volume	liter	0.65

GENERAL - TRACK WIDTH / WHEELBASE

31 00 GENERAL - TRACK WIDTH/WHEELBASE F02 ALLR

GENERAL - TRACK WIDTH/WHEELBASE SPECIFICATION

Track width for normal position and offset (ET)		
o ET27		
o ET30	mm	1612
o ET25	mm	1622
Wheelbase		3210

31 00 GENERAL - TRACK WIDTH/WHEELBASE F02

GENERAL - TRACK WIDTH/WHEELBASE SPECIFICATION

Track width for normal position and offset (ET)		
o ET27		
o ET30	mm	1611
o ET25	mm	1621
Wheelbase		3210

SHOCK ABSORBERS

31 32 SHOCK ABSORBERS F01/F02 SERIE

SHOCK ABSORBERS SPECIFICATION

Note:		Currently no details! Reason: Avoidance of incorrect assessments on account of different measurement procedures
Front Axle	mm	- -
Rear Axle	mm	- -

31 32 SHOCK ABSORBERS F01/F02 ALLR

SHOCK ABSORBERS SPECIFICATION

Note:		Currently no details! Reason: Avoidance of incorrect assessment on account of different measurement procedures
Front Axle	mm	
Rear Axle	mm	

31 32 SHOCK ABSORBERS F01/F02

SHOCK ABSORBERS SPECIFICATION

		Currently no details! Reason: Avoidance of incorrect assessments on account of different

Note:		measurement procedures
Front Axle	mm	- -
Rear Axle	mm	- -

DRIVELINE/AXLES

Front Axle - Operating Fluids

1.0 GENERAL INFORMATION ON HIGH TEMPERATURE MULTI-PURPOSE GREASE

High temperature multi-purpose grease consists of a lithium complex soap in a mineral oil product with a selected combination of additives. Extremely fine soap is contained in the oil, and serves as the basic ingredient.

This lubricating grease possesses the following properties:

- Very good thermal resistance and penetration stability

  The structure and consistency must be maintained over long service life with temperatures from -22°F to +302°F (-30°C to +150°C) in continuous operation and very high loads.

- Oxidation stability

  A lubricating grease contains effective inhibitors (which limit or prevent chemical reactions) in order to stop oxidation at very high operating temperatures.

- Water resistance and corrosion inhibition

A high temperature multi-purpose grease is water resistant. At the same time lubricated parts are given maximum protection against rust by the corrosion inhibitors.

2.0 APPROVED HIGH TEMPERATURE MULTI-PURPOSE GREASE

High temperature multi-purpose grease is used for the lubrication of wheel bearings.

Ball Bearings (E24 from mid 1982, E28, E30, E31, E32 and all following)

Provided with lifetime lubrication.

No subsequent lubrication approved!

Tapered Roller Bearings (E23, E21)

50 grams grease packing in wheel hub and 20 grams in wheel hub grease cap per wheel.

Grease type: Retinax A

CRC Part No. SL 3131 (former BMW Part No. 81 22 9 407 710)

3.0 APPROVED FRONT AXLE FINAL DRIVE OILS

Approvals are the same as for rear axle final drive oils.

SUSPENSION

Front Axle - Repair

3100 GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

31 00... FRONT AXLE + STEERING: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

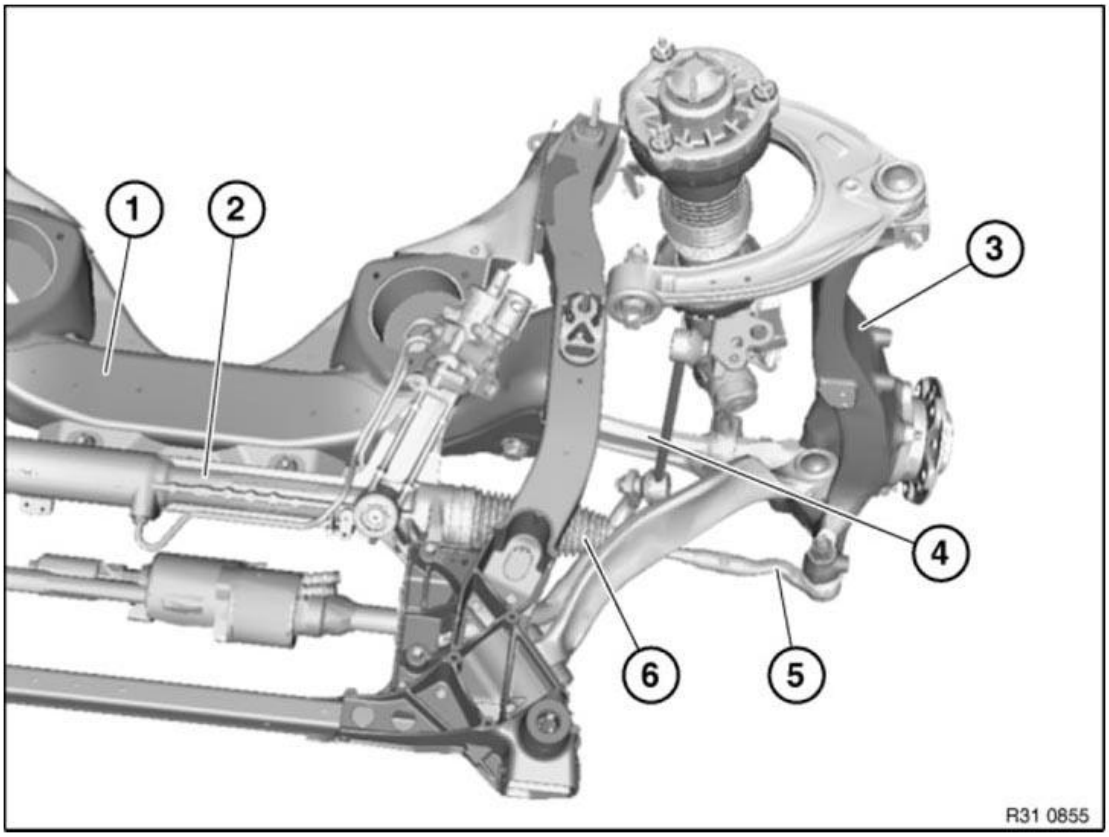


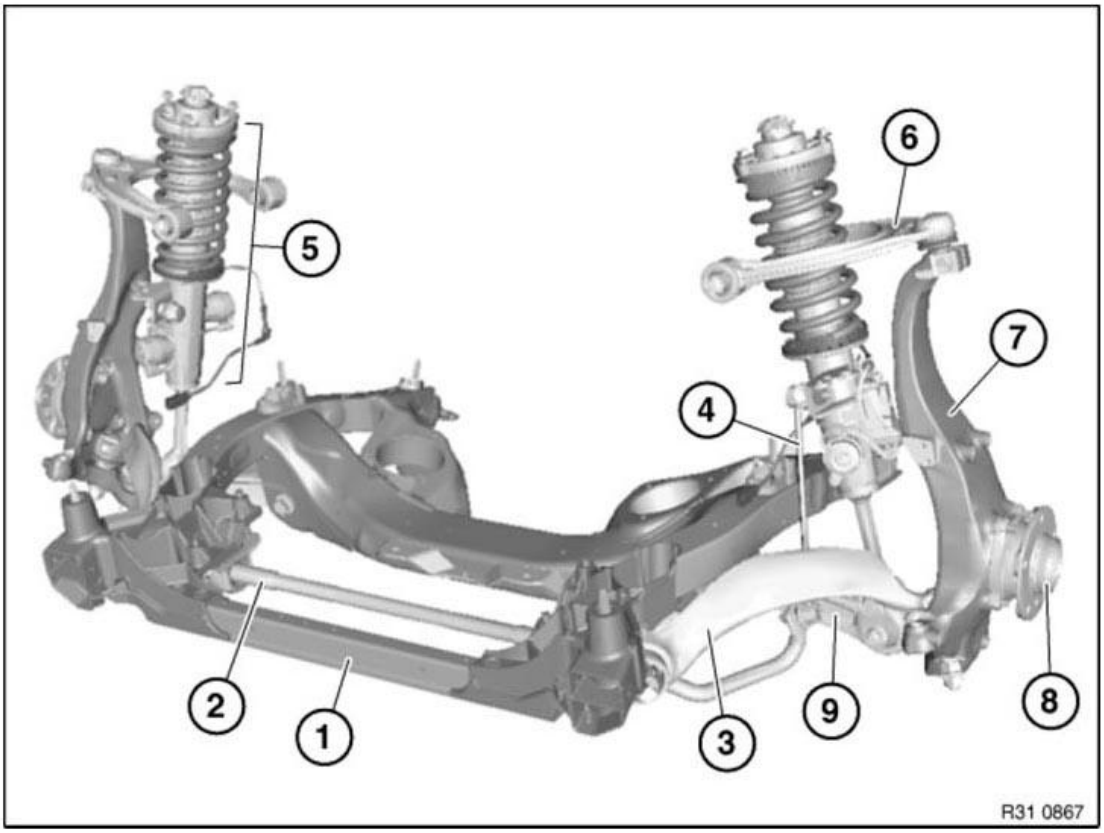
Fig. 1: Identifying Front Axle Support, Steering Gear, Swivel Bearing, Lower Wishbone And Track Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Illustrations show F01/F02:

A **WHEEL/CHASSIS ALIGNMENT CHECK** must be carried out after the following work:

- **Release of following screw/bolt connections:**
  - Steering gear to front axle support (with identification no alignment check required, see **REMOVING AND INSTALLING HYDRAULIC STEERING GEAR** or **REMOVING AND INSTALLING ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR**).
  - Lower wishbone to front axle support
  - Track rod end to track rod
- **Replacement of following parts:**
  1. Front axle support
  2. Steering gear
  3. Swivel bearing
  4. Lower wishbone
  5. Track rod end
  6. Track rod

31... FRONT AXLE OVERVIEW



Safety precautions and general information

1 Front axle support
2 Stabiliser
3 Tension strut
4 Stabiliser link
5 Layout of spring strut shock absorber
6 Upper control arm
7 Swivel bearing
8 F01/F02/F07/F10: Wheel bearing screwed in
F03: Wheel bearing pushed in
9 Lower control arm

Adjustment work

Fig. 2: Overview Of Front Axle
Courtesy of BMW OF NORTH AMERICA, INC.

31 00... INFORMATION ON REPLACING SHOCK ABSORBERS

Situation

When a shock absorber is faulty on one side (leaking, noises, etc.), often both shock absorbers on the axle in question are replaced.

Effect

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.

Exception: On all M-GmbH models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

31 00... INSTRUCTIONS (CHASSIS COMPONENTS MADE OF ALUMINIUM)

Due to the chemical and corrosion characteristics of aluminium, always comply with the following points when handling aluminium components:

- Do not bring into contact with battery acid!
- Do not clean with wire brushes made of brass or iron! Always use wire brushes with stainless steel bristles!
- Do not expose to flying sparks when grinding/separating! Cover components!
- Do not strike with steel welding splashes! Cover components!
- Do not expose to temperatures > 80°C, even for brief periods! Temperatures in paint facilities do not have the same impact

00..... LIFTING VEHICLE WITH A VEHICLE HOIST

WARNING: Danger to life!
Read and follow operating instructions for lifting platform.
Do not exceed carrying capacity of lifting platform.

NOTE: The lifting platform must comply with the relevant statutory accident prevention regulations and be serviced according to the manufacturer's instructions.

IMPORTANT: Risk of damage!
Before driving onto a lifting platform, make sure there is sufficient ground clearance between the lifting platform and the car.
The vehicle may only be raised with the lifting platform at the four jacking points.

Necessary preliminary tasks

- If necessary, remove jacking points from equipment pack and insert from below into openings in front

and rear sill areas

IMPORTANT: Risk of damage!
Align support plates (2) of lifting platform arms to jacking points (1) in such a way that no adjoining components are touched and thereby damaged.

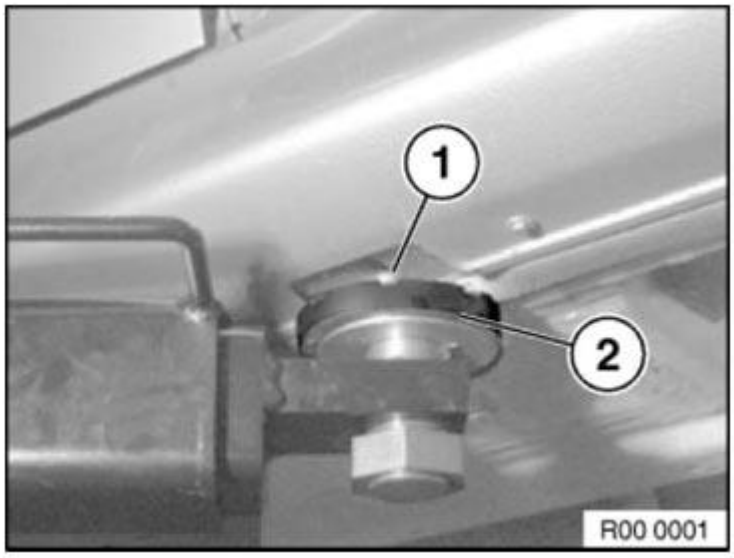


Fig. 3: Identifying Lifting Platform Arms Support Plates On Jacking Point
Courtesy of BMW OF NORTH AMERICA, INC.

31 00 MOBILE TABLE LIFT

WARNING: Danger of injury!
Before beginning work, position table lift with the lower frame securely on the floor.
Danger area around mechanism below platform.

- **Do not reach into or step into the danger area.**
- **Note permissible bearing capacity of table lift.**
- **Mount load centrally (danger of tipping) and secure against shifting.**

Follow the operating instructions from the equipment manufacturer.

The mobile table lift is used for collision repairs and when removing large engines.

Adaptations for mounting front axle with engine and transmission.

ADAPTATIONS FOR MOUNTING FRONT AXLE WITH ENGINE AND TRANSMISSION

No. 10	For mounting swivel bearing with brake disc

No. 20	Retaining element for adjustable fixture
No. 30	Adjustable fixture
No. 40	Distance pin 40 x 160 mm
No. 50	Distance pin 40 x 110 mm
No. 60	Distance pin 40 x 60 mm
No. 70	Fixture with Uprofile
No. 80	Plate fixture Ø=100 mm

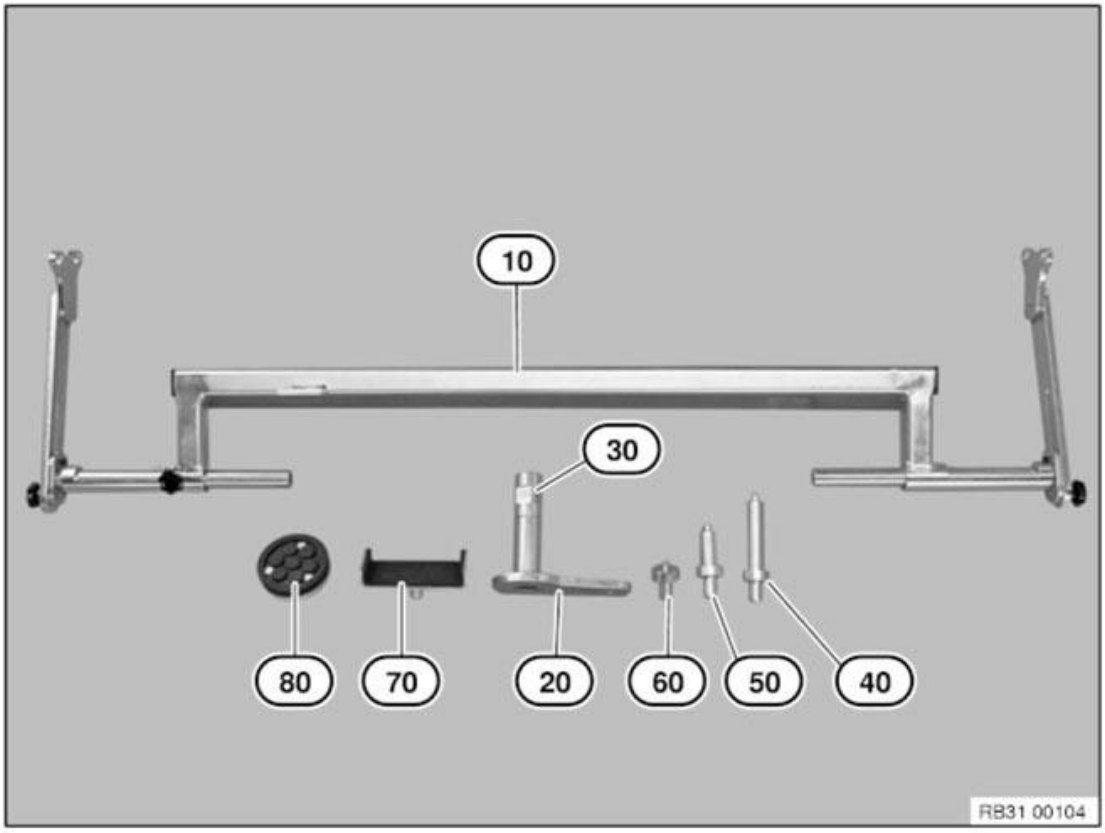


Fig. 4: Adaptations For Mounting Front Axle With Engine And Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

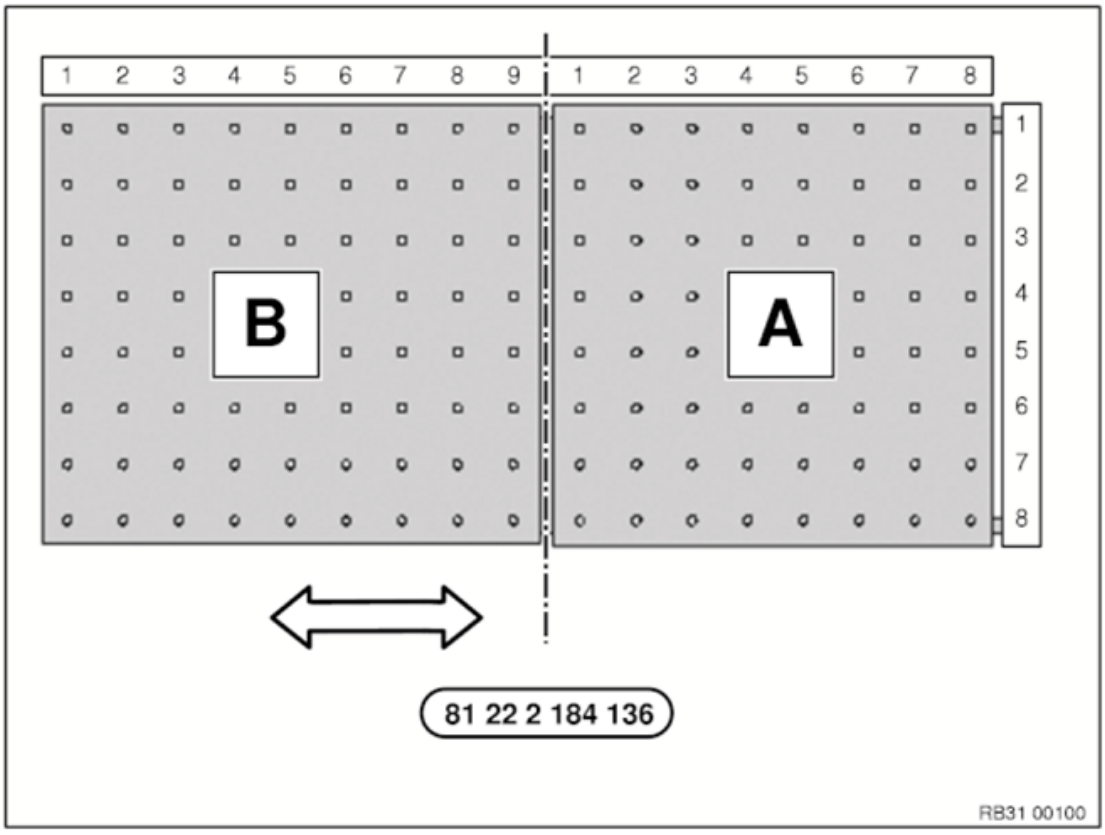


Fig. 5: Identifying Working Plates
Courtesy of BMW OF NORTH AMERICA, INC.

Release star knob screw on working plate (B) of table lift; the working surface (B) can be extended by approx. 310 mm.

Release all push-pull clamps and the working plates can be shifted by approx. 20 mm.

Working plate (A and B) can be raised and lowered by 3° on the long side and by 5° on the transverse side.

Working plate (A and B) is subdivided by a coordinate system and a possible installation position is recommended in the respective repair manual.

IMPORTANT: Follow the operating instructions from the equipment manufacturer.

31 00... NOTES

- Accident-related repairs:

  Read and comply with **NOTES ON REPLACING STEERING GEAR AFTER ACCIDENT DAMAGE** .

  If the control arm or tie rod is bent, it is essential for safety reasons to check the spring strut piston rod for

straightness.

31 00... NOTES ON REPAIRING THREADS

IMPORTANT: Install Helicoil thread inserts so that they are flush with the original thread!

NOTE: Damaged threads may be repaired with Helicoil thread inserts. Follow the PROCEDURE described in the example.

HELICOIL THREAD SPECIFICATIONS

Screw connection	Vehicle	Bolting point(s)	Helicoil thread insert
Front axle support to engine support	F01, F02, F03, F04, F07, F10, F11, F12, F13, F18, F25	All	M12x1.5x24
Rear axle support to side member	F01, F02, F03, F04, F07, F10, F11, F12, F13, F18, F25	All	M14x1.5x28
Support bearing screw connection front axle	F25		M8x1, 25x16

31 00... NOTES ON REPAIRING THREADS

IMPORTANT: Install Helicoil thread inserts so that they are flush with the original thread.

NOTE: Damaged threads in engine support may be repaired with Helicoil thread inserts. Comply with the procedure described in the example.



Fig. 6: Identifying Damaged Helicoil Thread

Courtesy of BMW OF NORTH AMERICA, INC.

Procedure

1. Create a clean core hole; if necessary, drill out screw remnants

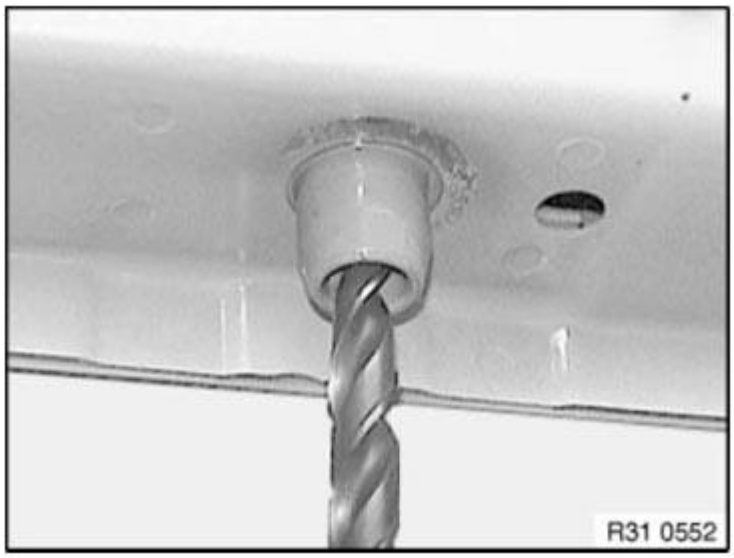


Fig. 7: Creating Clean Core Hole
Courtesy of BMW OF NORTH AMERICA, INC.

2. Create locating thread for Helicoil thread insert



Fig. 8: Inserting Helicoil Thread On Locating Thread
Courtesy of BMW OF NORTH AMERICA, INC.

3. Pick out Helicoil thread insert in accordance with the **TABLE** and screw into the locating thread until flush with the original thread

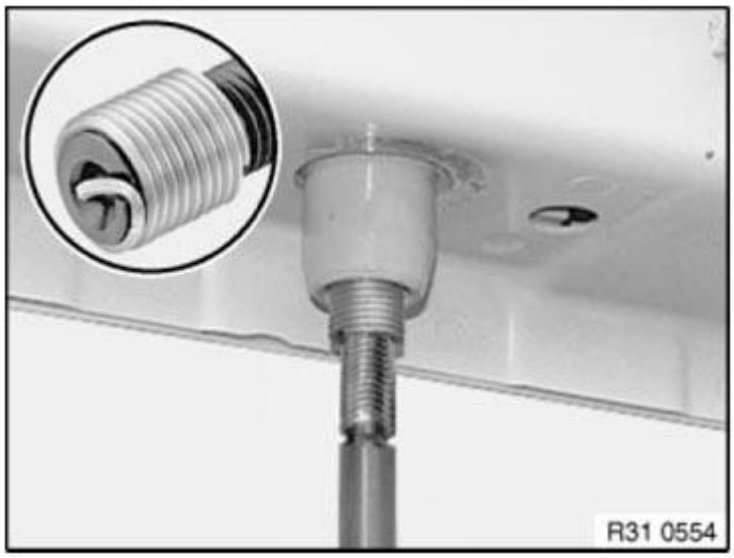


Fig. 9: Inserting Helicoil Thread On Original Thread
Courtesy of BMW OF NORTH AMERICA, INC.

4. Break drive pin and remove



Fig. 10: Removing Drive Pin
Courtesy of BMW OF NORTH AMERICA, INC.

00..... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

1. **Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.**
2. **Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!**
3. **Check the rubber plate on the trolley jack prior to each use, replacing if necessary.**

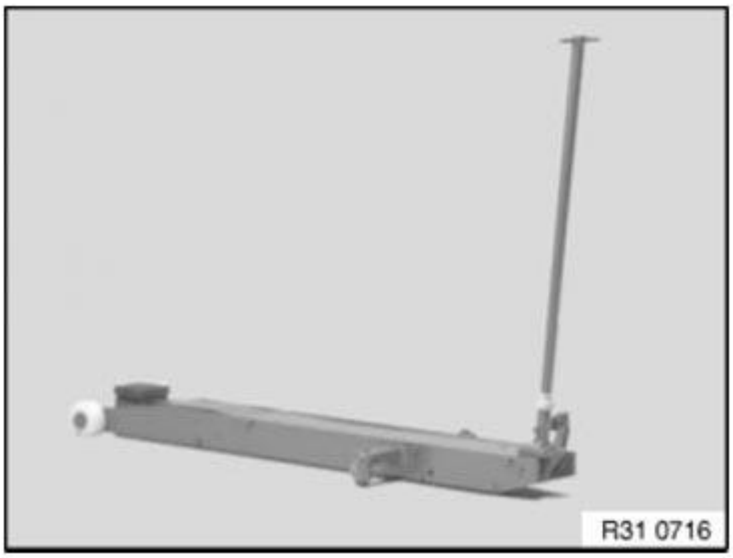
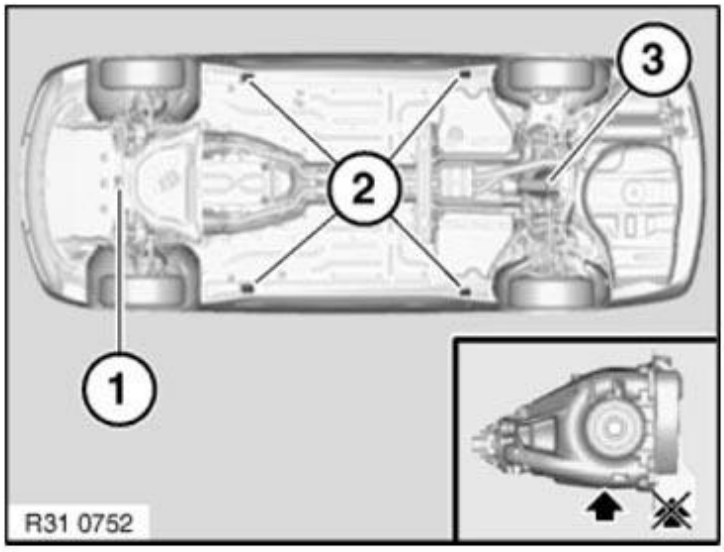


Fig. 11: Identifying Trolley Jack
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: All-wheel drive vehicles may only be raised with the stiffening plate mounted on the front axle (1)!
Raising directly on the front axle support without stiffening plate is not permissible!

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!



1 Car jacking point
2 Side car jacking points
3 Rear axle final drive

Fig. 12: Identifying Jacking Points
Courtesy of BMW OF NORTH AMERICA, INC.

1. Car jacking point
2. Side car jacking points
3. Rear axle final drive

Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

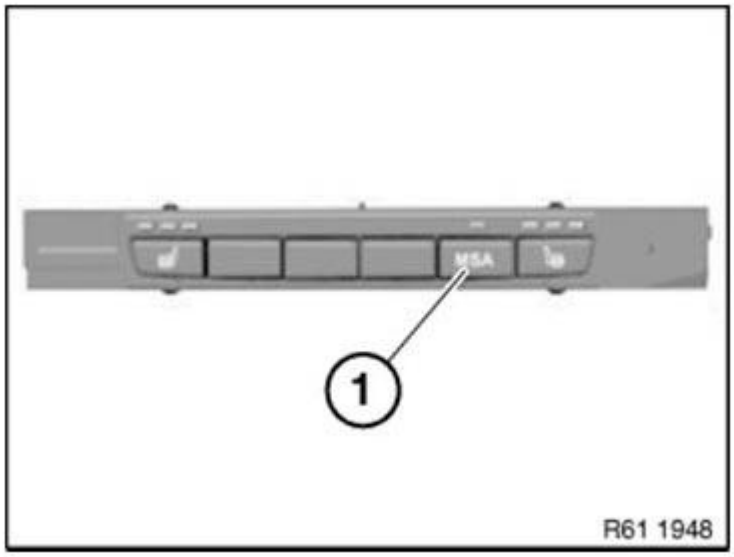


Fig. 13: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

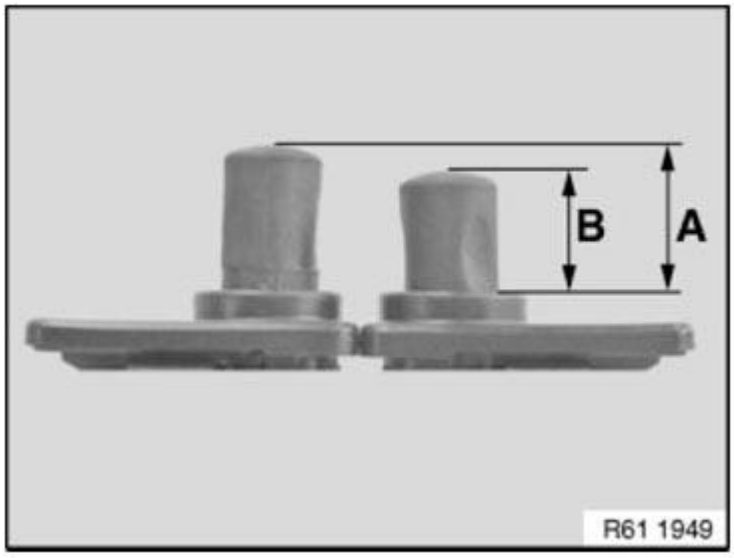


Fig. 14: Identifying Basic Setting For Engine Hood/Bonnet Open
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work

area. Wear personal protective clothing/equipment.

- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

3110 FRONT AXLE SUSPENSION

31 10 010 REMOVE AND INSTALL/REPLACE STIFFENING PLATE (ALL-WHEEL DRIVE)

IMPORTANT: Observe safety instructions for raising the vehicle
Driving without stiffening plate is not permissible!

Necessary preliminary work

- Remove **UNDERBODY PROTECTION** in front and rear

Release screws (1).

Remove stiffening plate (reinforcement plate) (2).

Installation note:

Replace screws.

Tightening torque **31 10 2AZ** .

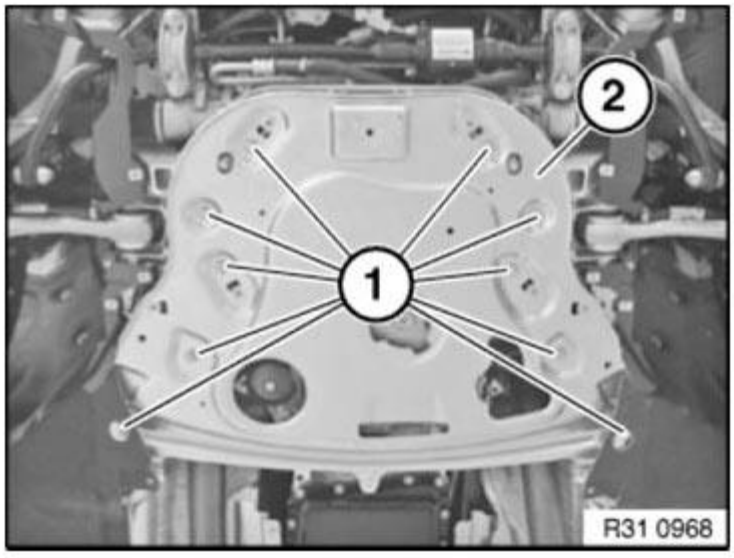


Fig. 15: Identifying Stiffening Plate (Reinforcement Plate) With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 490 REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION

Graphic is only an example. Detail deviations depending on model or engine version are possible.

Unscrew all bolts.

Remove underbody protection (1) in direction of arrow from bumper trim (2).

Installation note:

Make sure underbody protection (1) is correctly seated.

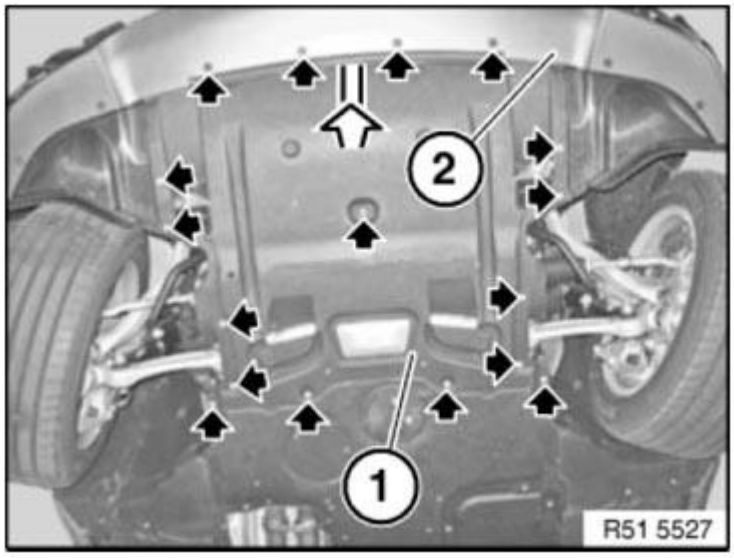


Fig. 16: Removing Underbody Protection From Bumper Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**

Unscrew all bolts.

Remove underbody protection (1).

Installation:

Make sure underbody protection (1) is correctly seated.

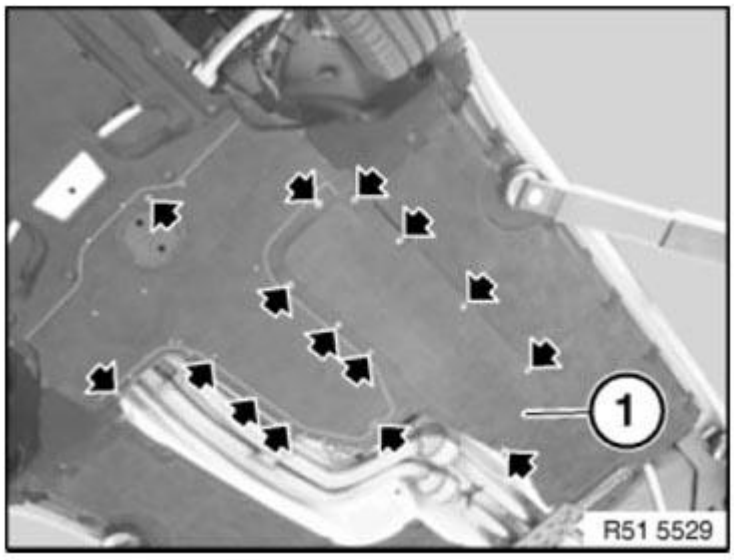


Fig. 17: Locating Underbody Protection Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

3111 FRONT SUB-FRAME

31 11 506 LOWERING/RAISING FRONT AXLE SUPPORT (UNIVERSAL LIFTER)

Notes

IMPORTANT: Before lowering front axle support:
Observe SAFETY INFORMATION on raising the vehicle.
In order to avoid damage to vehicle hoist, perform weight compensation on vehicle.
Load spring strut domes with sand bags.

WARNING: SECURE ENGINE IN INSTALLATION POSITION WITH SPECIAL TOOL to prevent it from falling down.

IMPORTANT: N57: Risk of shorting the starter motor!

Necessary preliminary work

- Secure **ENGINE IN INSTALLATION POSITION**
- Remove **FRONT WHEELS**
- Remove underbody protection at front and rear. See **REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** and **REMOVING AND INSTALLING/REPLACING**

- F03 only: Remove underbody protection
- Remove **STEERING BOX COVER AT TOP LEFT AND RIGHT** .
- Remove **ANTI-ROLL BAR LINK FROM ANTIROLL BAR**
- Partly detach front left and right wheel arch covers (rear section) in rear area.
- Remove steering shaft from steering box
- Remove **HYDRAULIC LINES FROM VALVE BLOCK** (only on version with Dynamic Drive)
- Disconnect plug connection and expose connecting line up to hydraulic steering gear (only on version with active front steering)

Release screws (1).

Remove front left/right wheel arch cover (2) from bumper trim.

Installation note:

Make sure wheel arch cover is correctly positioned.

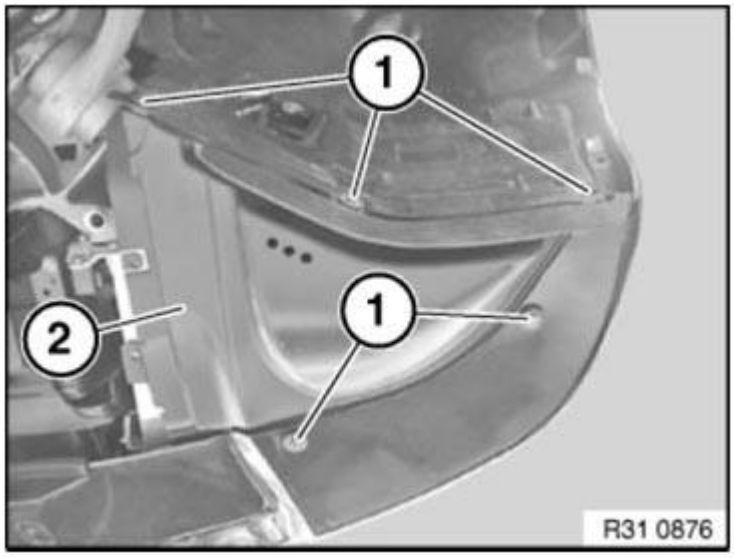


Fig. 18: Identifying Front Left/Right Wheel Arch Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove brake air duct (2).

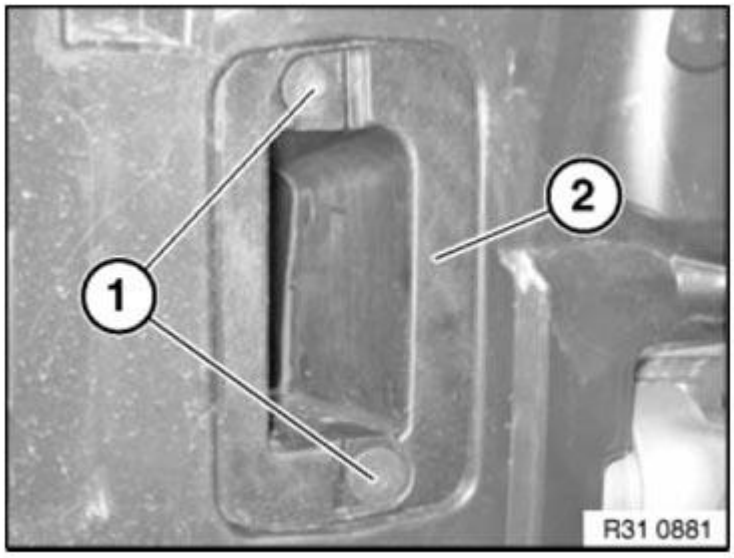


Fig. 19: Identifying Brake Air Duct With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Graphic shows: F01, F02

Release screws (1).

Release deformation element (3) from front axle support (2).

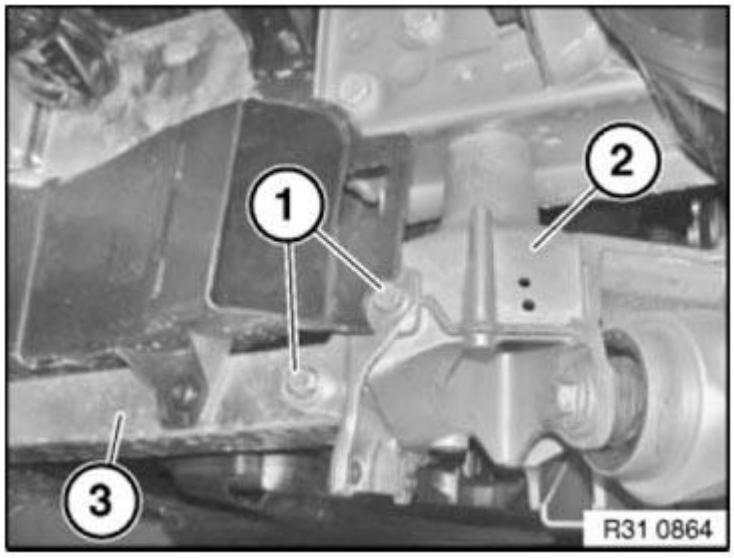


Fig. 20: Identifying Deformation Element, Front Axle Support With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

only: F01, F02

Release bolt (1) and remove holder (2) from oil line

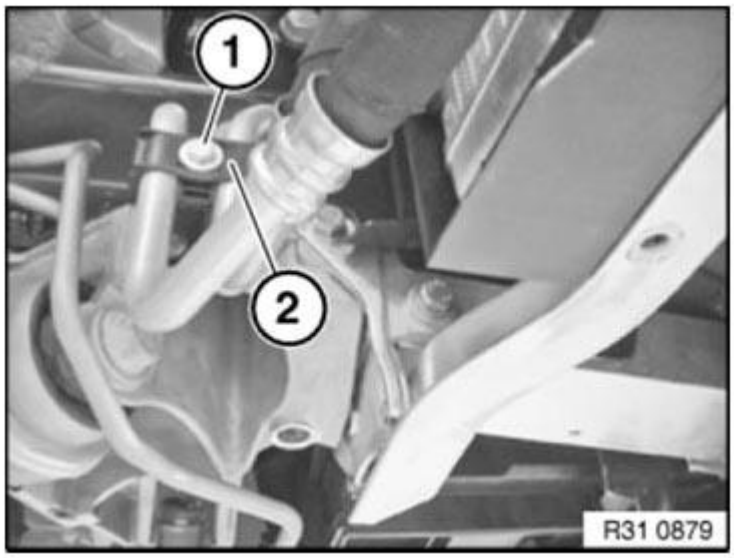


Fig. 21: Identifying Oil Line Holder With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Secure swivel bearing (1) with special tool 33 5 206 on spring strut.

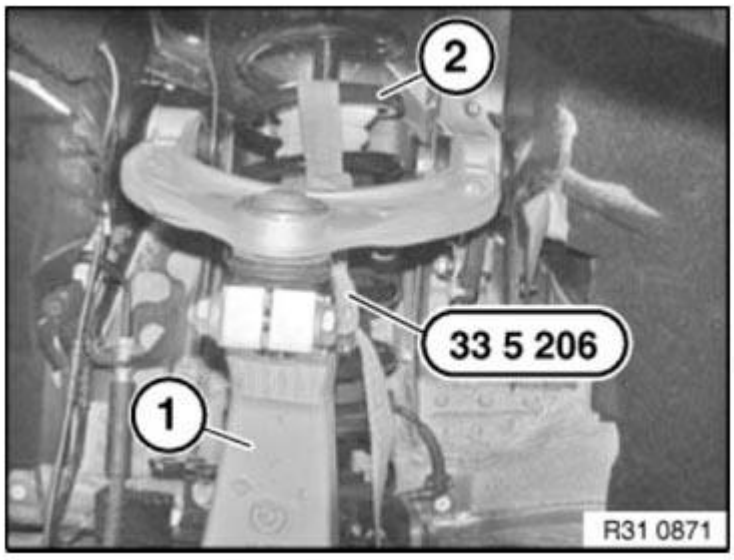


Fig. 22: Securing Swivel Bearing On Spring Strut Using Special Tool (33 5 206)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove screw. Remove spring strut from wishbone (2).

Tightening torque **31 12 7AZ** .

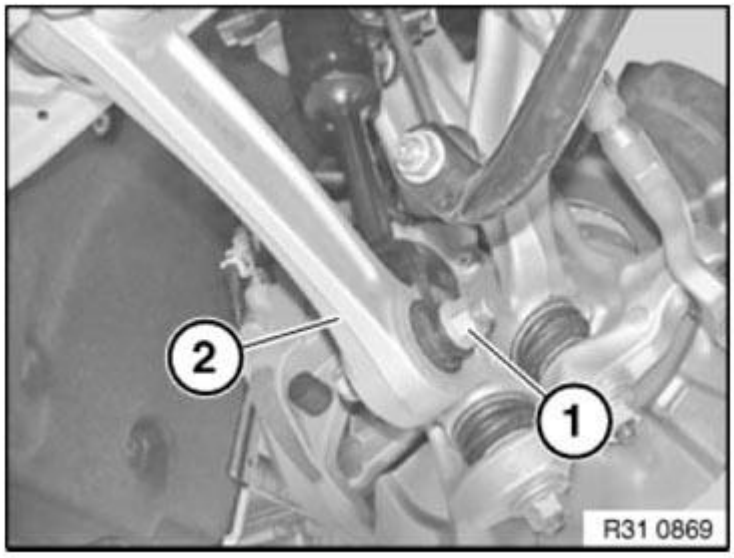


Fig. 23: Identifying Wishbone With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Engage special tool 31 5 251 with a 2nd person helping completely on workshop jack **00 2 030** .

Insert special tools 31 5 255 in telescopic supports of a profile rail pair.

NOTE: In a profile rail pair two profile rails are connected to each by gearing.

Insert special tools 31 5 256 in telescopic supports of other profile rail pair.

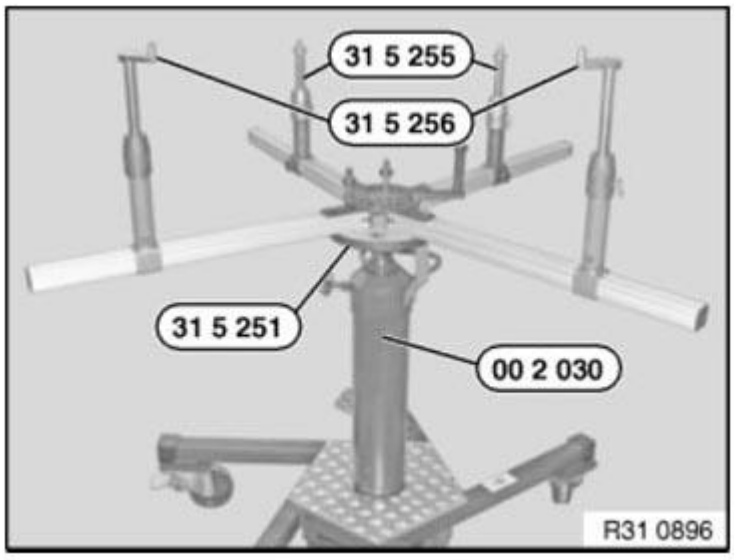


Fig. 24: Identifying Special Tools (31 5 255, 31 5 256, 31 5 251 And 00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The jacking points (1) on the left side are shown.

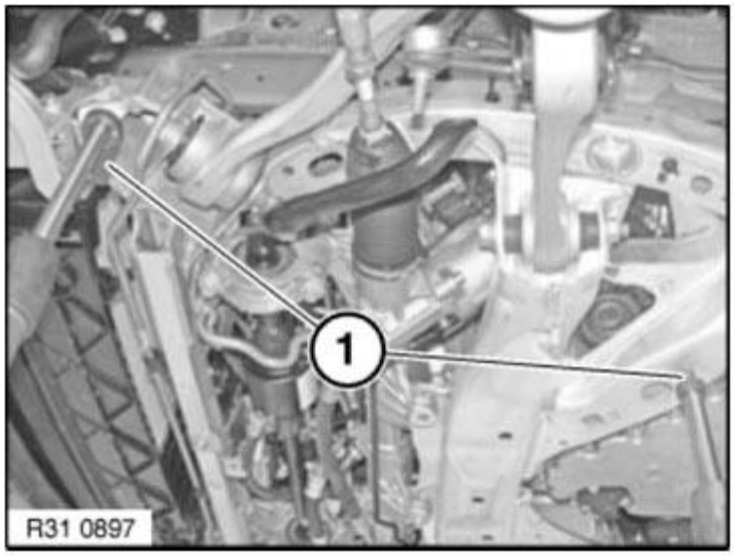


Fig. 25: Identifying Jacking Points
Courtesy of BMW OF NORTH AMERICA, INC.

Align special tools 31 5 255 and 31 5 256 to front axle support.

Support front axle support by operating workshop jack **00 2 030** .

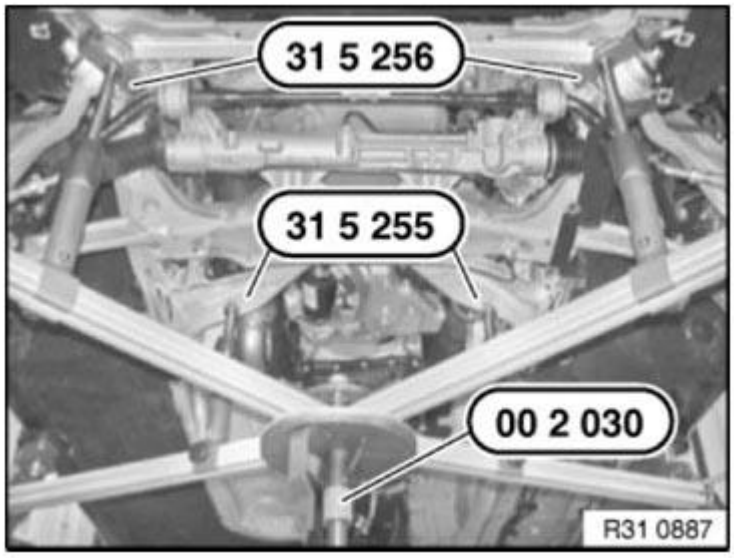


Fig. 26: Supporting Front Axle Using Jack (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to hydraulic steering hoses and lines when lowering and raising.

Hoses/lines must not be kinked/tensioned/bent!

Release screws (1, 2).

Tightening torque **31 10 1AZ** .

Installation note:

Check threads for damage; if necessary, repair with **HELICOIL THREAD INSERTS** .

1. = M12x1.5x65 screw
2. = M12x1.5x95 screw

Tighten down first screws (1) and then screws (2).

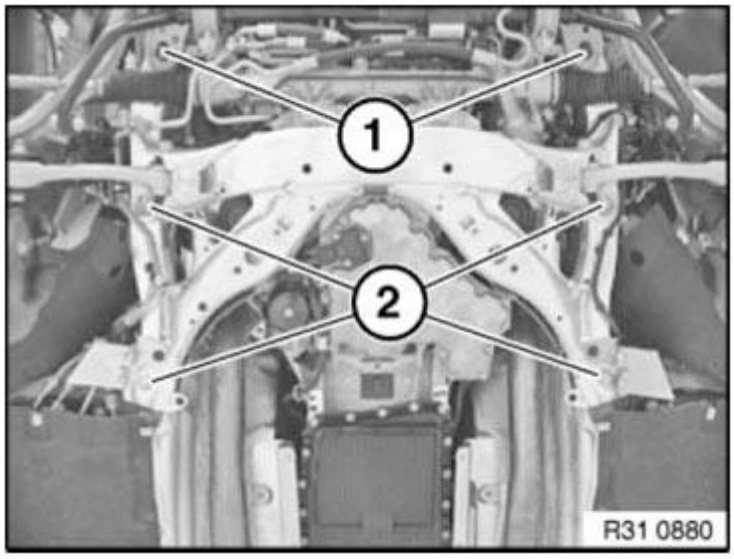


Fig. 27: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Lower front axle support by max. 10 cm.

After installation

- **FILL AND BLEED HYDRAULIC SYSTEM**
- Check line connections for leaks
- **DYNAMIC DRIVE START-UP**

31 11 001 REPLACING FRONT AXLE SUPPORT

IMPORTANT: Before removing front axle support:
In order to avoid damage to lifting platform, perform weight compensation on vehicle.
Load spring strut domes with sand bags.

WARNING: SECURE ENGINE IN INSTALLATION POSITION WITH SPECIAL TOOL to prevent it from falling down.

Necessary preliminary tasks

- Lower **FRONT AXLE SUPPORT**
- Remove **BOTH LOWER WISHBONES FROM FRONT AXLE SUPPORT**
- Remove **BOTH TRAILING LINKS FROM FRONT AXLE SUPPORT**
- Remove **HYDRAULIC STEERING GEAR**

Picture shows F01.

Remove both engine mounts from front axle support. See **REPLACING RIGHT ENGINE MOUNT (N63)** and **REPLACING LEFT ENGINE MOUNT (N63)** .

Take front axle support down and set down on a suitable surface.

Installation note:

Use previous front axle support as a template for modifying or replacing small parts.

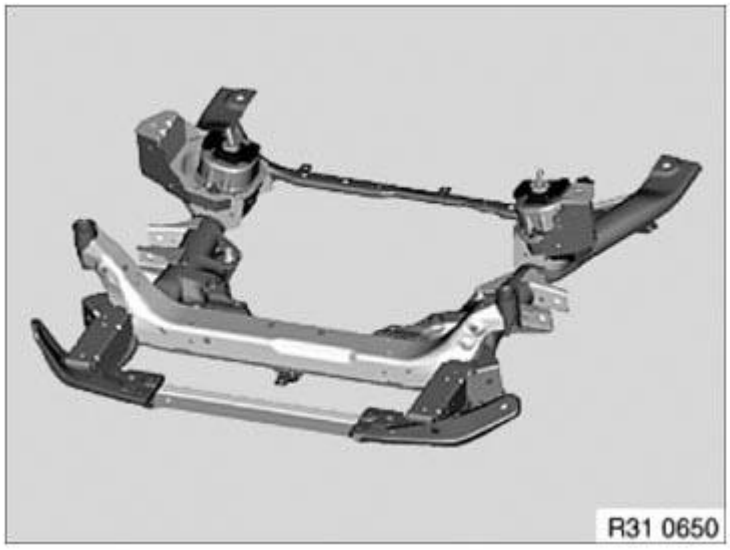


Fig. 28: Identifying Engine Mounts With Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD** .

3112 STRUTS W. RUBBER MOUNTS

31 12 003 REMOVING AND INSTALLING/REPLACING TOP RIGHT WISHBONE

NOTE: Control arms with + or - marking (see graphic) are camber correction arms:
- Underdimension variant
+ Overdimension variant
These camber correction arms are used to correct the camber values by 30 minutes. To be used only if the tolerance values are exceeded or undershot!
An unmarked control arm is a standard part.

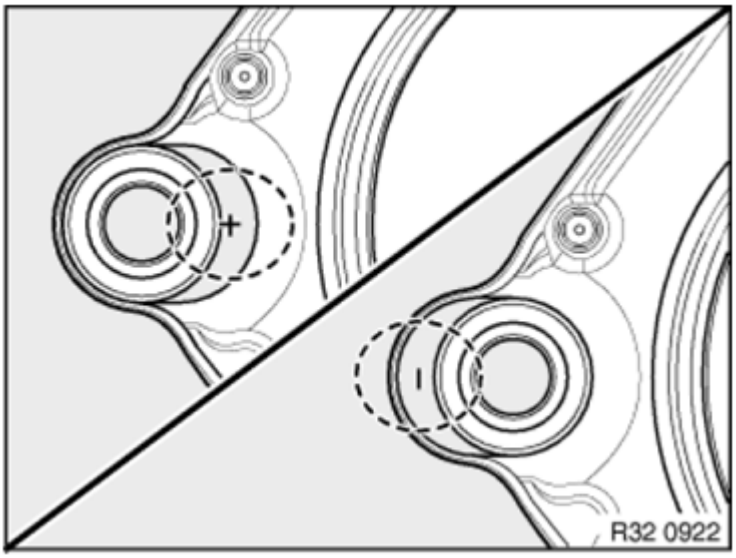


Fig. 29: Identifying Under And Over Dimension Variant Of Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary work

- Remove electronics box, if applicable. See **REMOVING AND INSTALLING/REPLACING ELECTRONICS BOX** or **REMOVING AND INSTALLING/REPLACING ELECTRONICS BOX ADD-ON** .

IMPORTANT: The spring strut/lower wishbone screw connection does not have to be released!

Further procedure is identical to:

- Removing and installing/replacing **TOP LEFT CONTROL ARM** .

31 12 004 REMOVING AND INSTALLING/RENEWING LEFT OR RIGHT LOWER WISHBONE

Notes

IMPORTANT:

- **With vehicles F01, F02 and F07 up to version 02/2010, only renew wishbones in pairs!**
- **Read and comply with BMW Parts Department notes.**
- **If the lower wishbone is detached from the front axle support, it is necessary after reinstallation to carry out a chassis/wheel alignment check.**

Necessary preliminary work

- Remove **FRONT WHEEL**
- Remove **STEERING BOX COVER**
- Remove **GAITER** from steering box

Release nut (1) and remove screw.

Tightening torque **31 12 7AZ** .

Release spring strut from wishbone (2).

Installation note:

Replace self-locking nut.

Note direction of insertion of screw.

Observe assembly sequence.

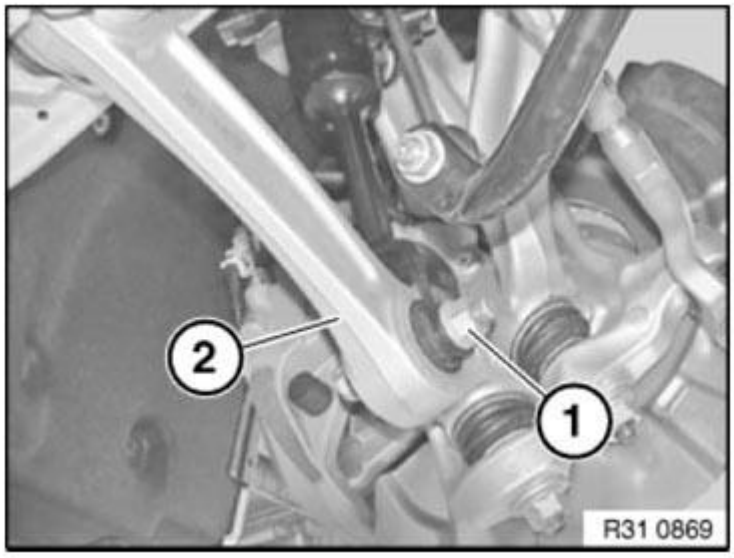


Fig. 30: Identifying Wishbone With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove wishbone (2) from front axle support.

Tightening torque **31 12 3AZ** .

Installation note:

Note direction of insertion of screw.

Replace self-locking nut.

Observe assembly sequence.

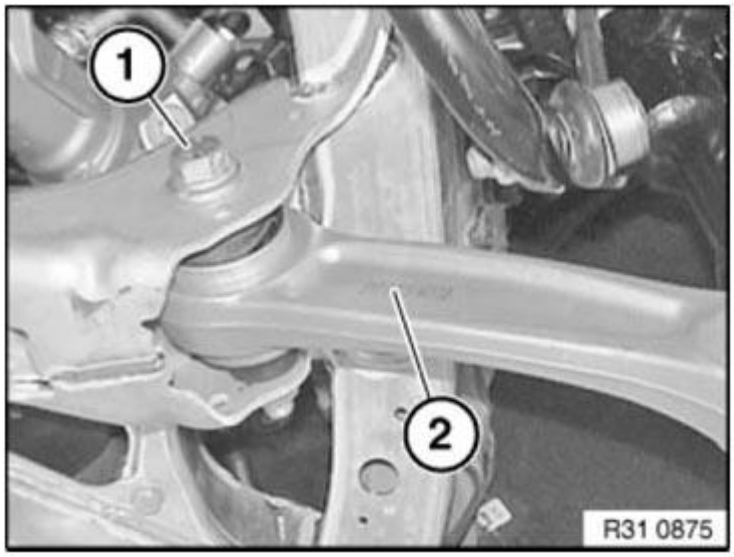


Fig. 31: Identifying Wishbone With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not release wishbone from swivel bearing with impact tool.

The swivel bearing must be removed if the steel bushing moves.

Rubber boot of wishbone must not be damaged!

Do not pull stainless steel ring off journal.

Release nut (1) and remove wishbone (2) from swivel bearing.

Tightening torque **31 12 4AZ** .

Installation note:

Keep wishbone to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

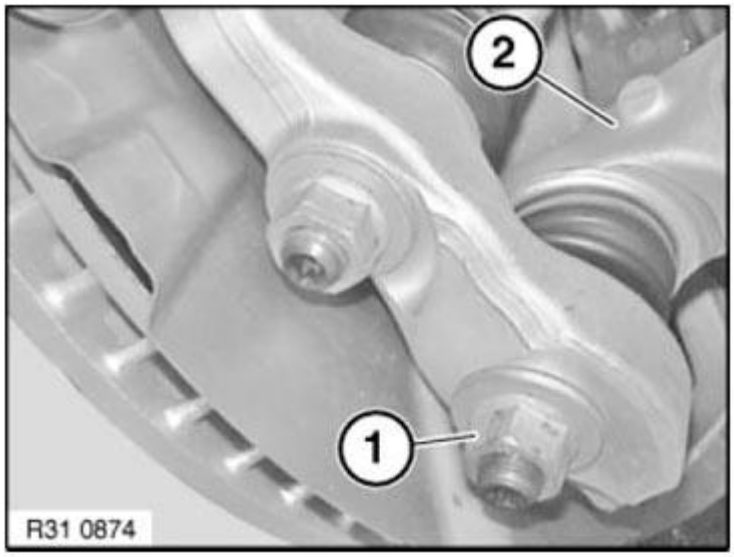


Fig. 32: Identifying Swivel Bearing Wishbone With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Observe assembly sequence.
Lower wishbone must be screwed in normal position! (Adjustment of normal position, see below).

1. Install lower wishbone (do not tighten down screw connection)
2. Secure special tool **31 5 220** to wheel hub with wheel studs
3. Raise swivel bearing using workshop jack in conjunction with special tool **31 5 220**
4. Adjust upper wishbone to body to dimension (A)
5. Tighten lower wishbone/swivel bearing screw connection

   Tightening torque **31 12 4AZ** .

6. Tighten lower wishbone/front axle support screw connection

   Tightening torque **31 12 3AZ** .

7. Tighten lower wishbone/spring strut screw connection

   Tightening torque **31 12 7AZ** .

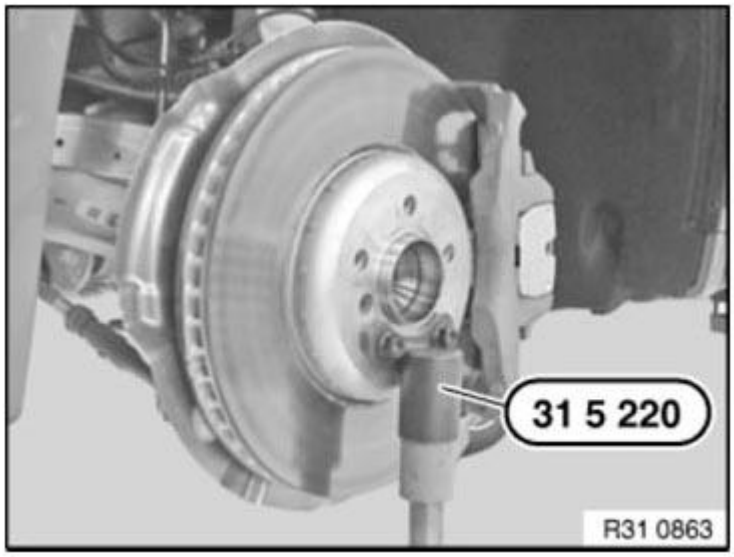


Fig. 33: Identifying Special Tool (31 5 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting normal position

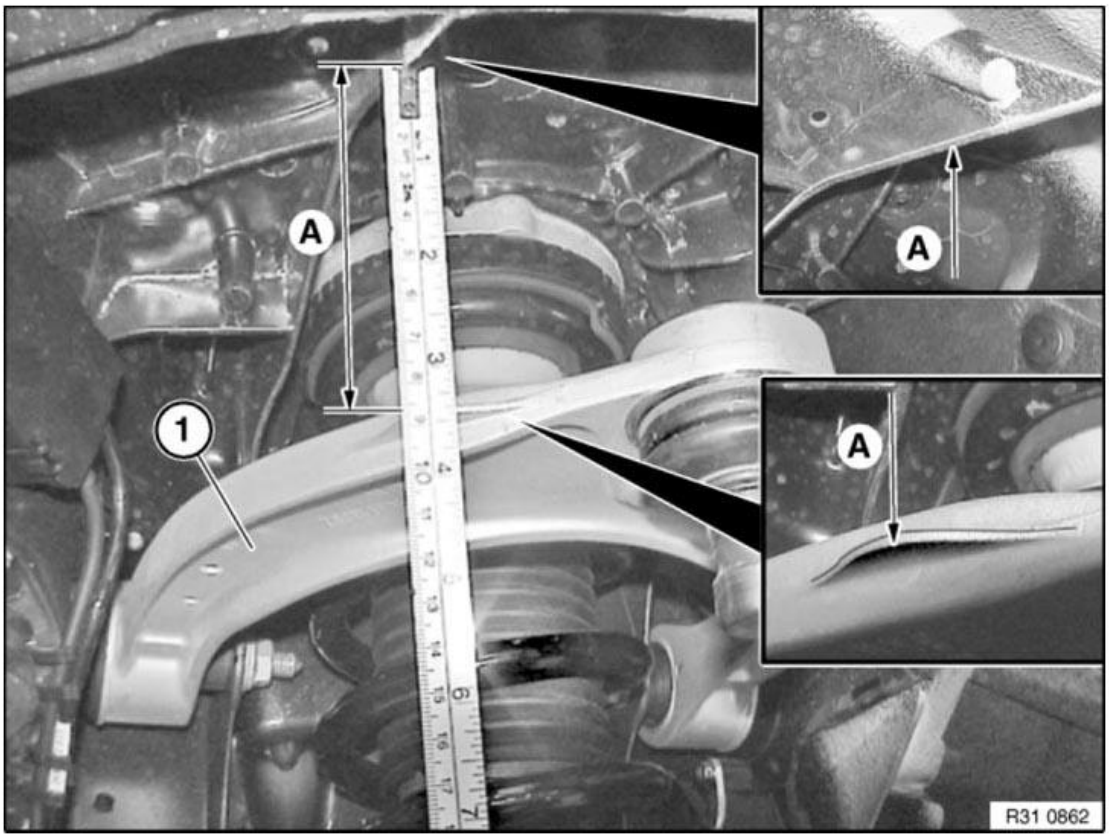


Fig. 34: Adjusting Normal Position
Courtesy of BMW OF NORTH AMERICA, INC.

(Swivel bearing is removed for purposes of clarity)

Installation note:

Secure upper wishbone (1) to body vertically to dimension (A) = 85 mm.

After installation

- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD** .

31 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TRAILING LINK

IMPORTANT: Both trailing links must always be replaced!

Necessary preliminary work

- Remove **FRONT ASSEMBLY UNDERSIDE PROTECTION** .

Release screws (1).

Remove front wheel arch cover (2) from bumper trim.

Installation note:

Make sure wheel arch cover is correctly positioned.

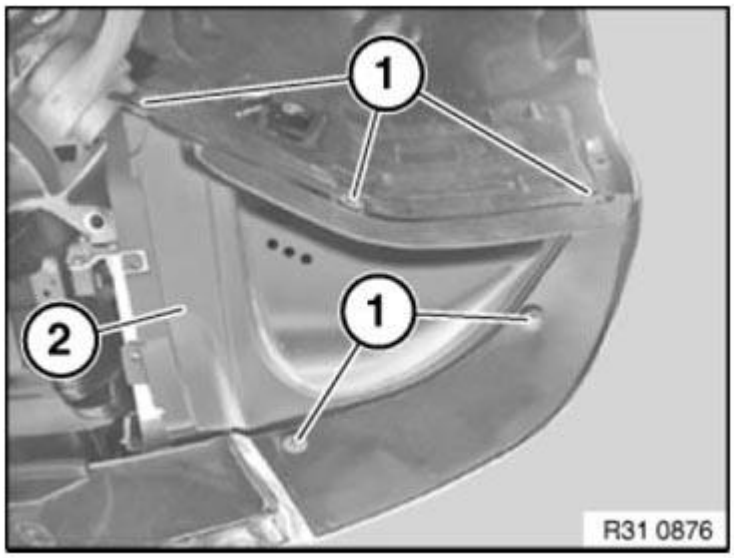


Fig. 35: Identifying Front Wheel Arch Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove screw (2).

Tightening torque **31 12 1AZ** .

Remove tension strut (3) from front axle support.

Installation note:

Observe assembly sequence (see below)

Replace screw and nut.

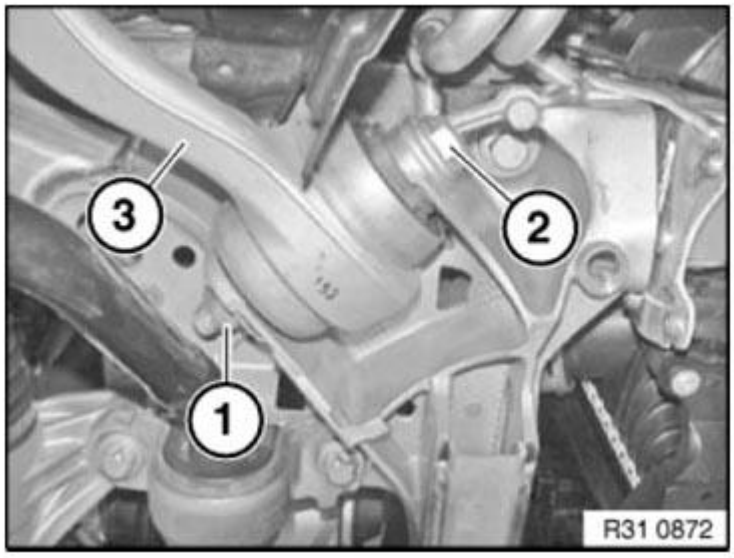


Fig. 36: Identifying Tension Strut With Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not release tension strut from swivel bearing with impact tool.
The swivel bearing must be removed if the steel bushing moves.
Rubber gaiter of tension strut must not be damaged!
Do not pull stainless steel ring off journal.

Release nut (1) and remove trailing link (2) from swivel bearing.

Tightening torque **31 12 2AZ** .

Installation note:

Keep tension strut to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

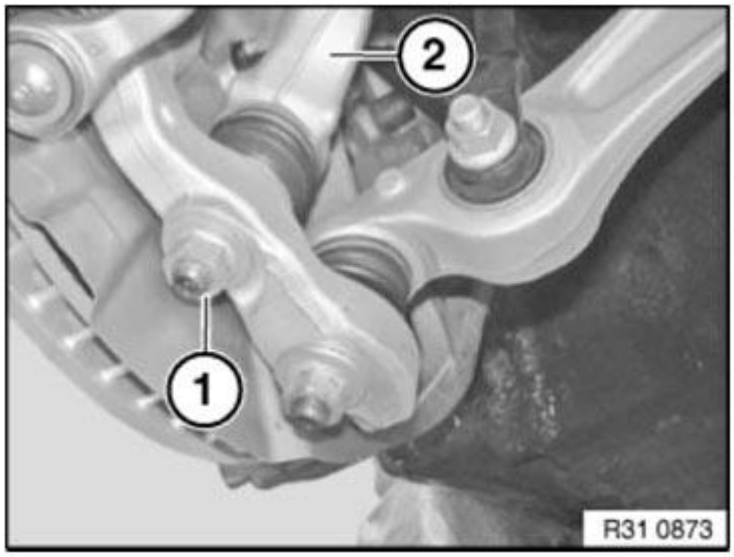


Fig. 37: Identifying Trailing Link With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Observe assembly sequence.

Tension strut must be screwed in normal position!

(Adjustment of normal position, see below).

Installing tension strut

1. Install tension strut on front axle support (do not tighten down bolt connection)
2. Adjust tension strut to swivel bearing to dimension (A) and tighten on front axle support

   Tightening torque **31 12 1AZ** .

   Dimension (A) = 2 cm (vehicle on vehicle hoist, spring strut rebounded)

   NOTE: Installing the tension strut to dimension (A) corresponds to the normal position in the compressed state!

3. Press trailing link into swivel bearing and tighten trailing link/swivel bearing

   Tightening torque **31 12 2AZ** .

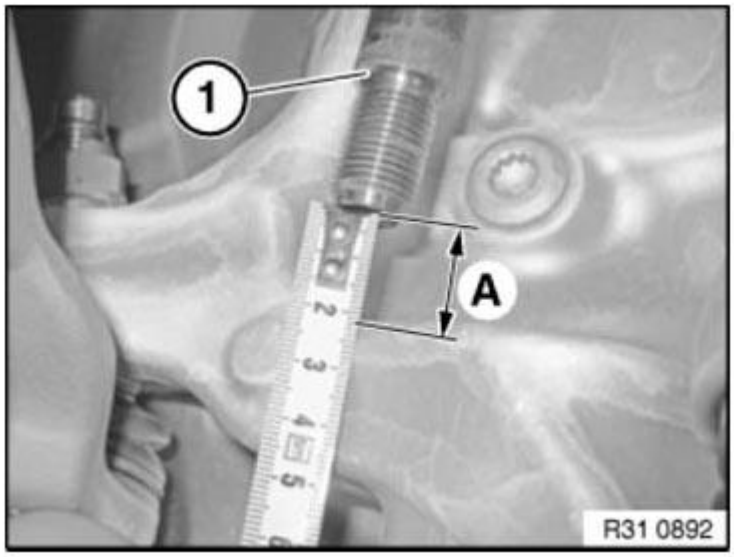


Fig. 38: Identifying Tension Strut On Swivel Bearing Adjusting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

31 12 002 REMOVING AND INSTALLING/REPLACING TOP LEFT WISHBONE

Notes

NOTE: **Wishbones with + or - marking (see graphic) are camber correction arms:**
- Underdimension variant
+ Overdimension variant
These camber correction arms are used to correct the camber values by 30 minutes. To be used only if the tolerance values are exceeded or undershot!
An unmarked control arm is a standard part.

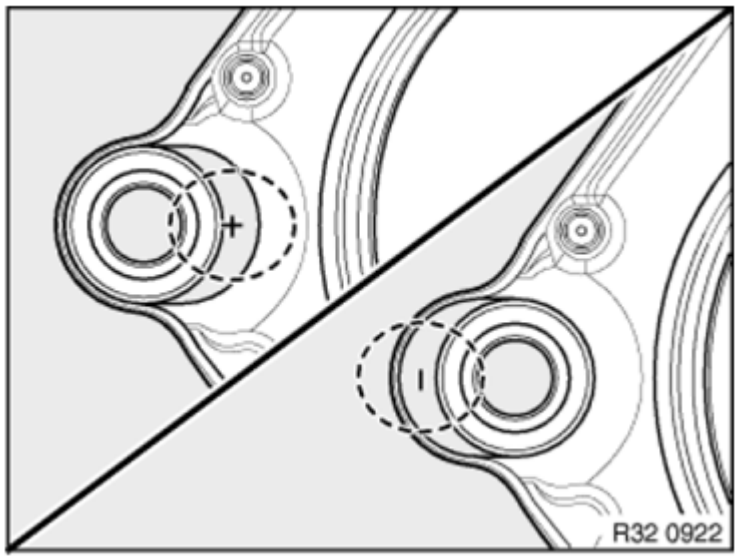


Fig. 39: Identifying Under And Over Dimension Variant Of Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary work

- Remove **FRONT WHEEL** .
- **IF NECESSARY, REMOVE OIL RESERVOIR FOR HYDRAULIC STEERING** from the left wheel arch.
- Remove **E-BOX ON RIGHT WHEEL ARCH, IF NECESSARY** .

Release nut (1) on wishbone (2) and remove.

Tightening torque **31 12 5AZ** .

Installation note:

Replace nut.

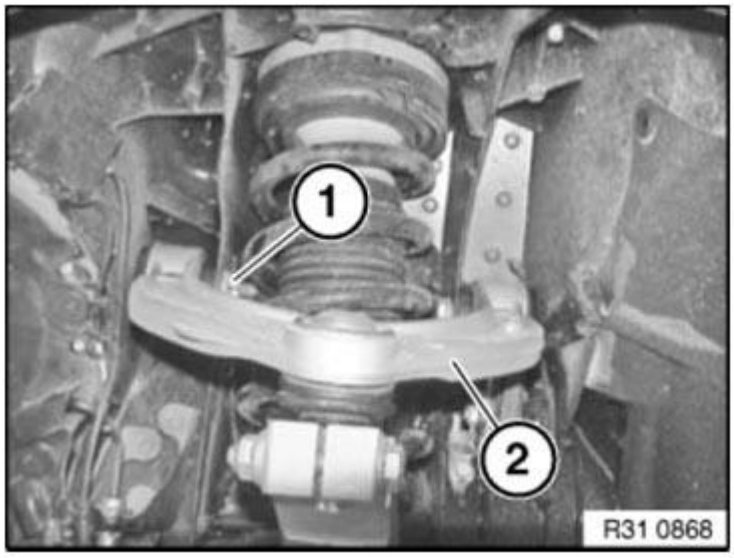


Fig. 40: Identifying Wishbone With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Secure swivel bearing (1) 33 5 206 with tensioning belt to spring (2).

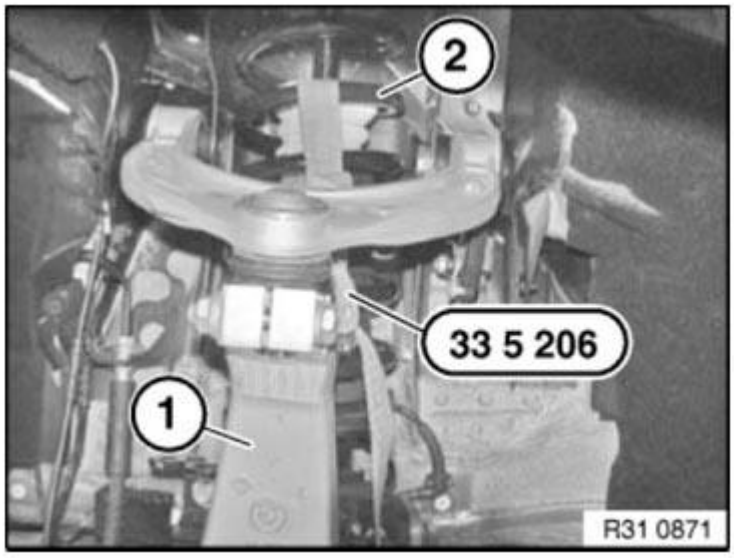


Fig. 41: Identifying Swivel Bearing And Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove ride height sensor jointed rod from wishbone.

Installation note:

Replace self-locking nut.

Tightening torque **37 14 5AZ**

Release nut (2) and remove bolt (3).

Tightening torque **31 12 6AZ** .

Installation note:

Keep wishbone to swivel bearing connection clean and free from oil and grease.

Note direction of insertion of screw.

Screw must rest correctly in groove of ball stud!

Replace nut.

Tighten wishbone as far as it will go in relation to swivel bearing.

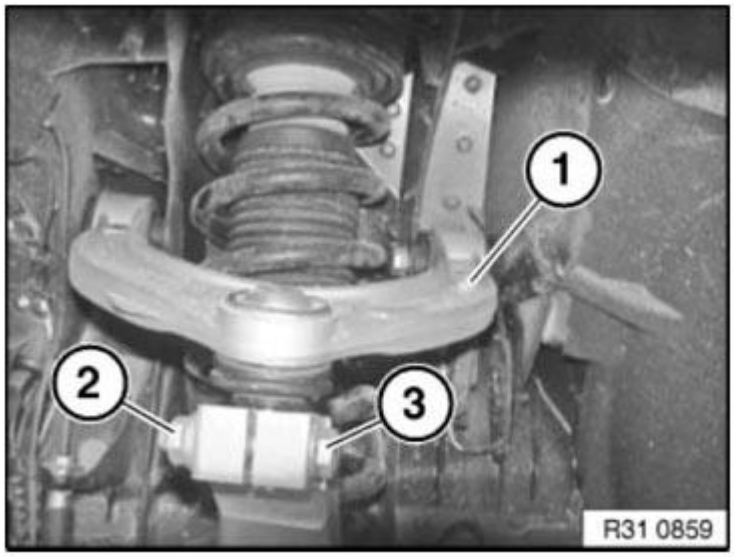


Fig. 42: Identifying Wishbone Nut And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release spring strut (1) on lower wishbone (2).

Tightening torque **31 12 7AZ** .

Installation note:

Replace self-locking nut.

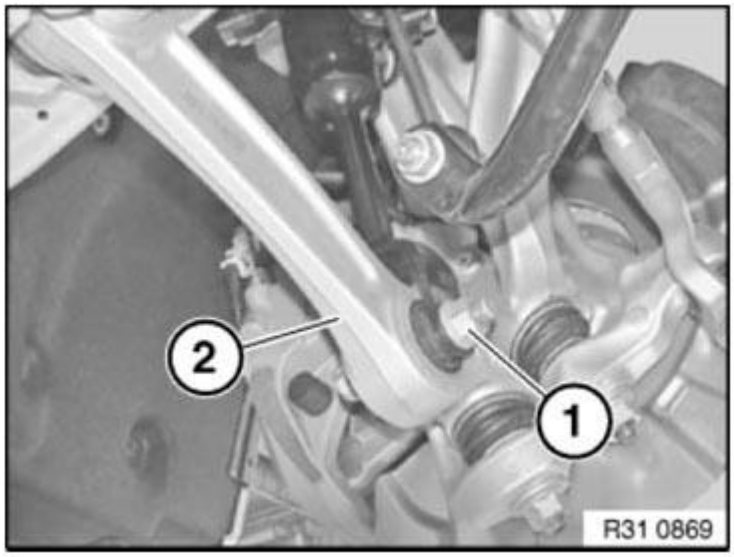


Fig. 43: Identifying Spring Strut On Lower Wishbone
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **31 12 5AZ** .

Pull spring strut outwards and remove screw (1).

Remove wishbone (2).

Installation note:

Replace nut.

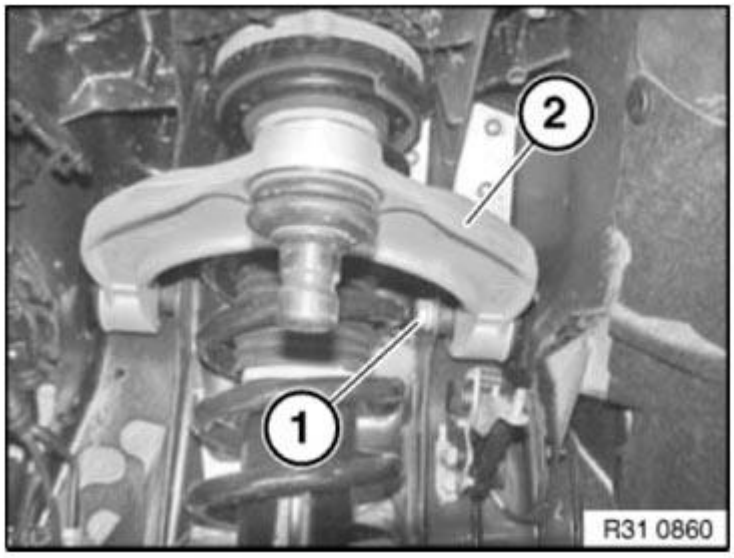


Fig. 44: Identifying Wishbone And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Observe assembly sequence.

Upper wishbone must be screwed in normal position! (Adjustment of normal position, see below).

1. Insert bolt (2) (do not tighten down)
2. Adjust upper wishbone to body to dimension (A).
3. Tighten screw (2).

   Tightening torque **31 12 5AZ** .

4. Tighten screw (1).

Tightening torque **31 12 5AZ** .

5. Tighten spring strut/wishbone (lower) screw connection.

   Tightening torque **31 12 7AZ** .

6. Tighten wishbone/swivel bearing (3) screw connection.

   Tightening torque **31 12 6AZ** .

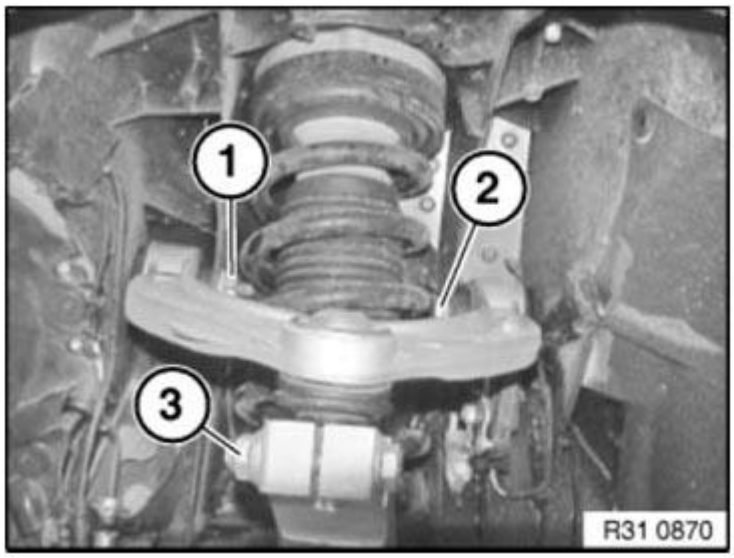


Fig. 45: Identifying Wishbone/Swivel Bearing And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting normal position

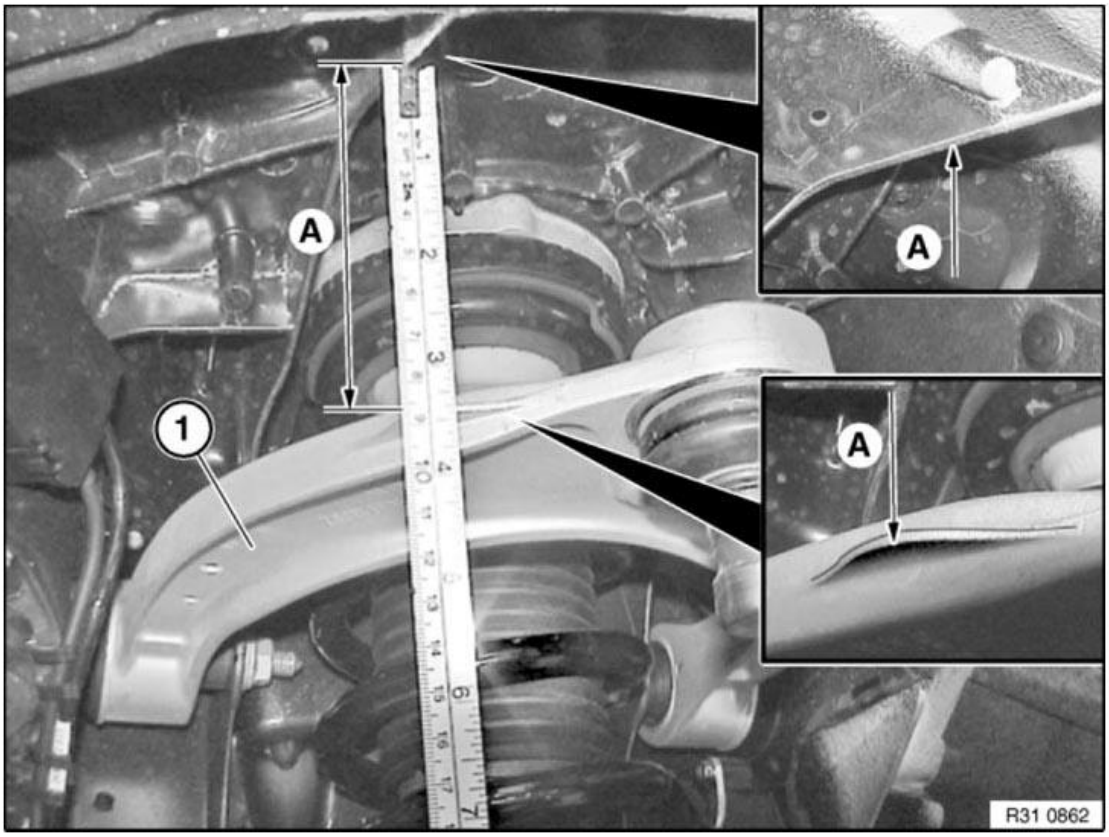


Fig. 46: Adjusting Normal Position
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Secure control arm (1) to body vertically to dimension (A) = 85 mm.

31 12 134 REPLACING RUBBER MOUNT IN LEFT OR RIGHT TRAILING LINK

Notes

IMPORTANT: Rubber mount may only be renewed once!

Necessary preliminary tasks

- Check ball joints of tension links while installed, replace **TRAILING LINK** if necessary
- Remove **TRAILING LINK**

IMPORTANT: If the trailing link already features an identification mark with a center punch, it is necessary to replace the trailing link.

Mark trailing link with a punch mark in area (A).

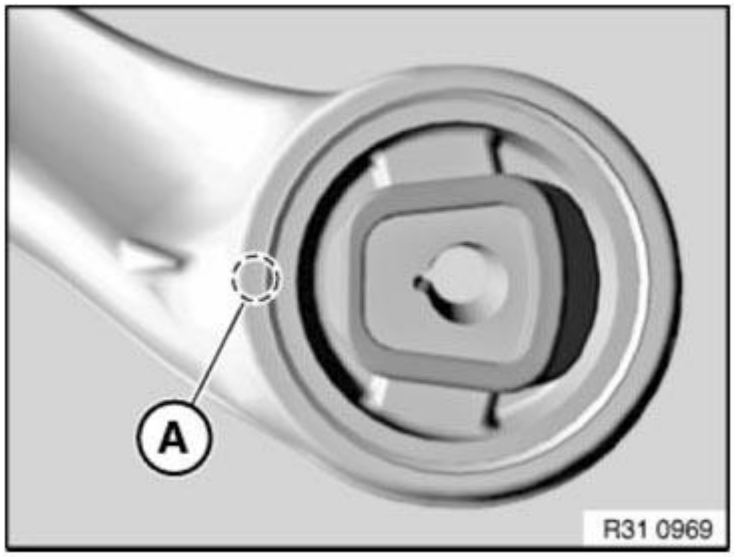


Fig. 47: Identifying Punch Mark On Tension Strut
Courtesy of BMW OF NORTH AMERICA, INC.

Using a press and special tools 33 3 322 and 31 3 032, press rubber mount out of tension strut.

NOTE: Special tool 33 3 322 must be exactly flush with rubber mount bush.

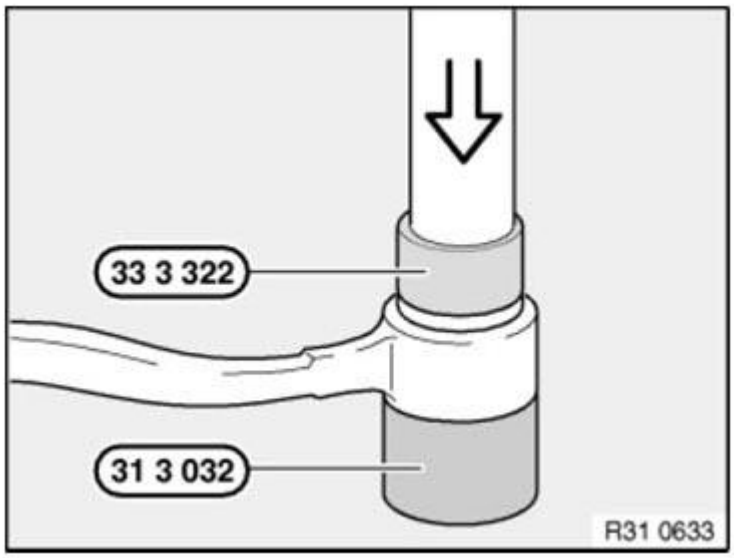


Fig. 48: Pressing Rubber Mount Out Of Tension Strut Using Press And Special Tools (33 3 322, 31 3 032)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep rubber mount and bushing in tension strut clean and free from grease.

Align rubber mount using notch to marking on tension strut and press in.

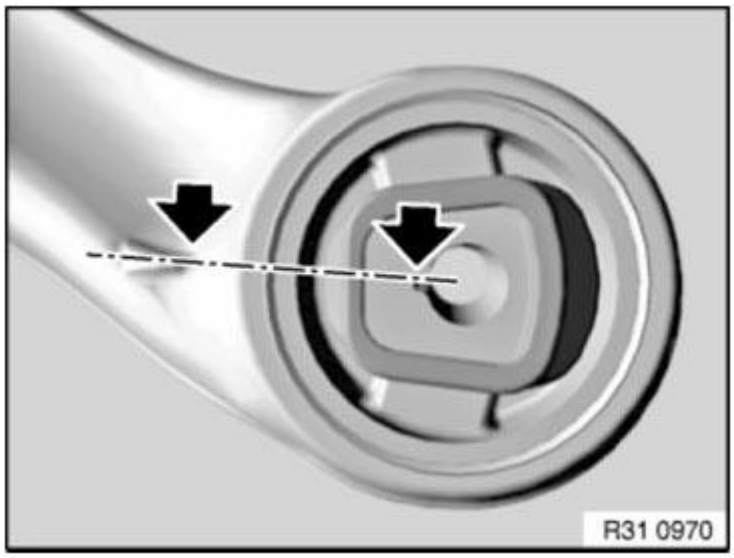


Fig. 49: Locating Rubber Mount Alignment Position
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Protrusion (A) equally large.

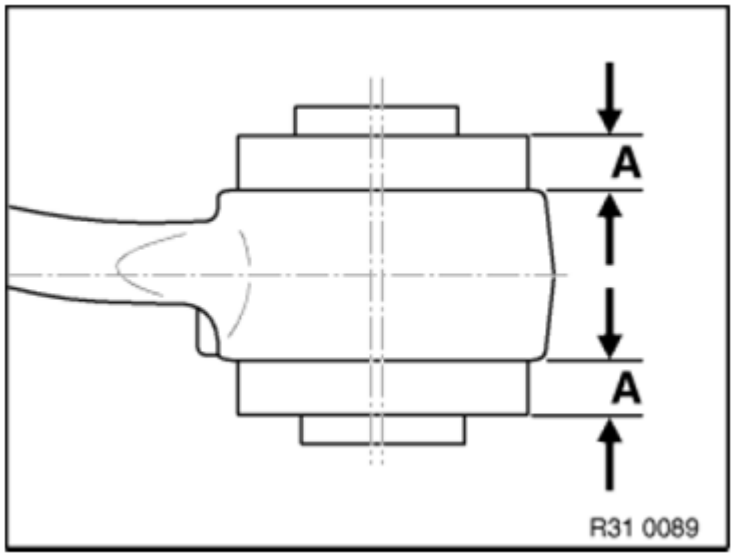


Fig. 50: Identifying Profusion
Courtesy of BMW OF NORTH AMERICA, INC.

3121 WHEEL BEARINGS AND STUB AXLE

31 21 180 REPLACING BEARINGS (WHEEL HUB) FOR FRONT WHEEL

Necessary preliminary tasks

- Remove **BRAKE DISC**
- Remove **FRONT PULSE GENERATOR**

NOTE:

- **Check brake pads and renew if necessary!**

Slacken nut (1).

Tightening torque **31 12 2AZ** .

Remove tension strut (2) from swivel bearing (3).

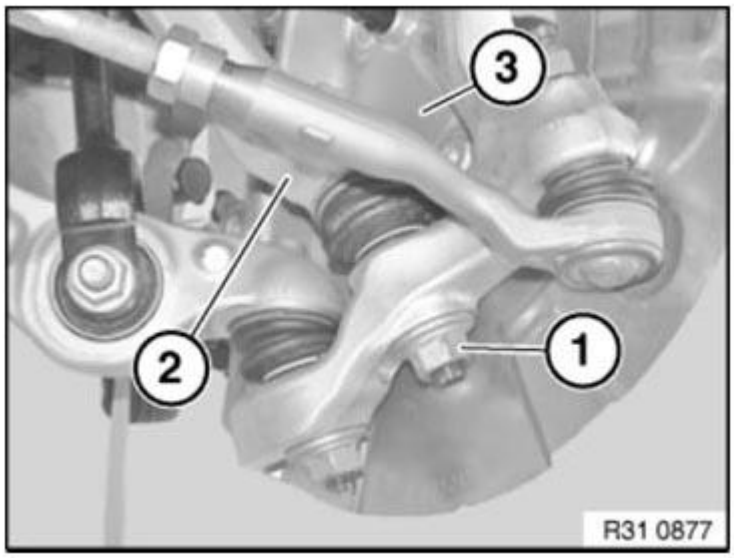


Fig. 51: Identifying Tension Strut With Nut And Swivel Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove mount.

Tightening torque **31 21 1AZ** .

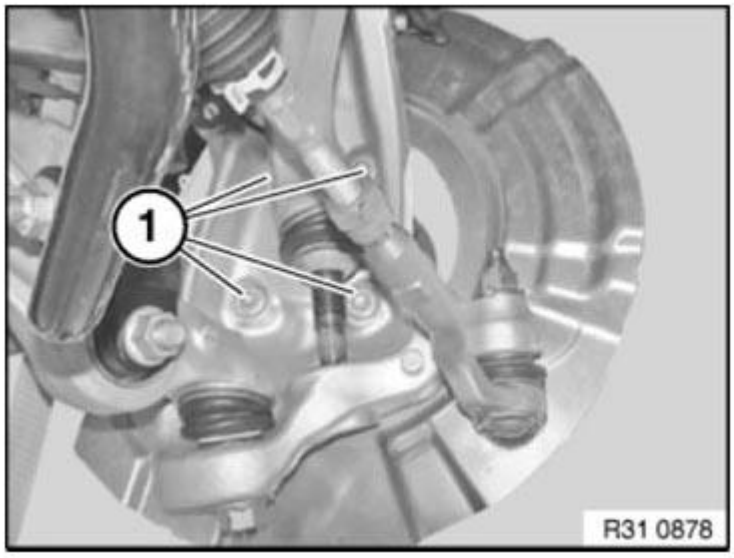


Fig. 52: Identifying Mount Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace screws.

Keep tapped holes (1) clean and free from grease.

Keep contact surface (2) of wheel bearing and swivel bearing clean and free from grease.

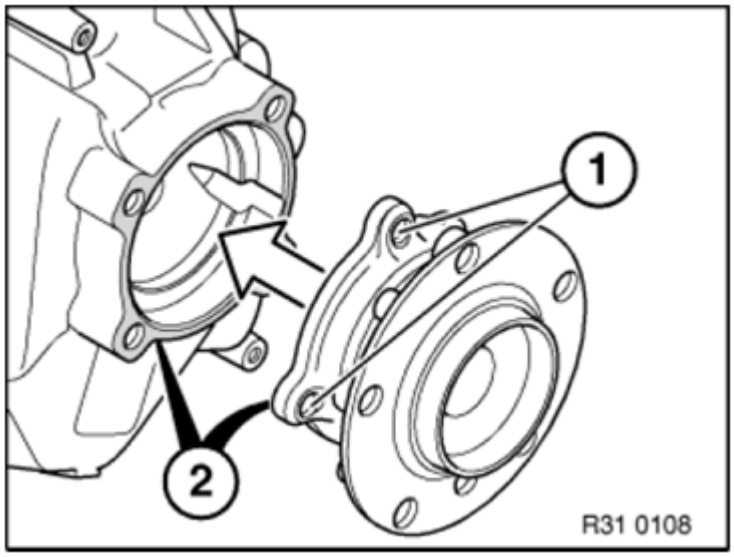


Fig. 53: Identifying Wheel Bearing And Swivel Bearing Contact Surface And Holes
Courtesy of BMW OF NORTH AMERICA, INC.

31 21 090 REPLACING LEFT/RIGHT SWIVEL BEARING

Necessary preliminary tasks

- Remove **FRONT WHEEL**

IMPORTANT: Secure swivel bearing against falling out.

Remove **BRAKE DISC** .

Remove upper wishbone from swivel bearing. See **REMOVING AND INSTALLING/REPLACING TOP LEFT WISHBONE** or **REMOVING AND INSTALLING/REPLACING TOP RIGHT WISHBONE**.

Remove **TRAILING LINK FROM SWIVEL BEARING**

Remove **TRACK ROD END FROM SWIVEL BEARING** .

Remove **LOWER WISHBONE FROM SWIVEL BEARING** .

F04: Detach wheel control joint from wishbone.

Remove swivel bearing.

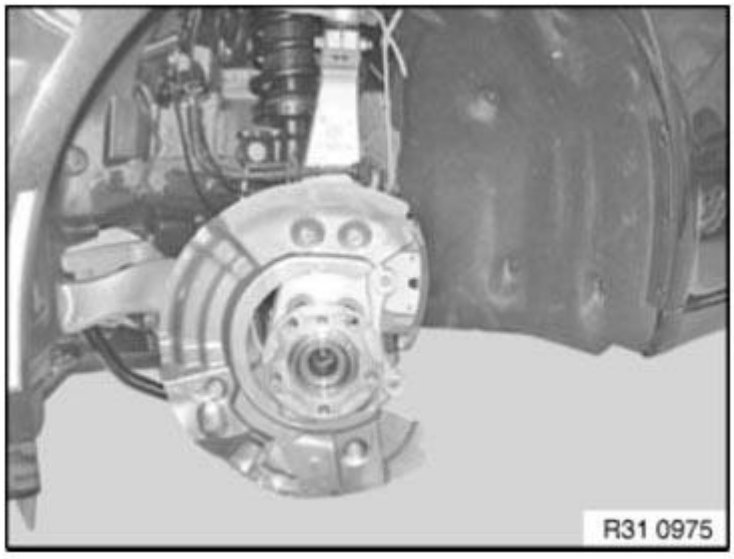


Fig. 54: Identifying Front Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace **WHEEL BEARING**

Modify **BRAKE ANCHOR PLATE/BRAKE GUARD PLATE** .

Modify cable clip/pulse sensor on swivel bearing.

After installation

- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD** .

31 21 121 REPLACING LEFT OR RIGHT WHEEL HUB

NOTE: Procedure is described in REPLACING FRONT WHEEL BEARING.

3131 SPRING STRUT

31 00... INFORMATION ON REPLACING SHOCK ABSORBERS

Situation

When a shock absorber is faulty on one side (leaking, noises, etc.), often both shock absorbers on the axle in question are replaced.

Effect

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.

Exception: On all M-GmbH models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

51 71 345 REMOVING AND INSTALLING/REPLACING LEFT (REAR) SUSPENSION CROSS-BRACE

IMPORTANT: Driving without the suspension cross-brace is not permitted. (risk of damage to the body).

Release expanding rivets (1) and remove cover (2).

Installation note:

Replace damaged expanding rivets.

Holders (3) must snap into place in suspension cross-brace when cover (2) is installed.

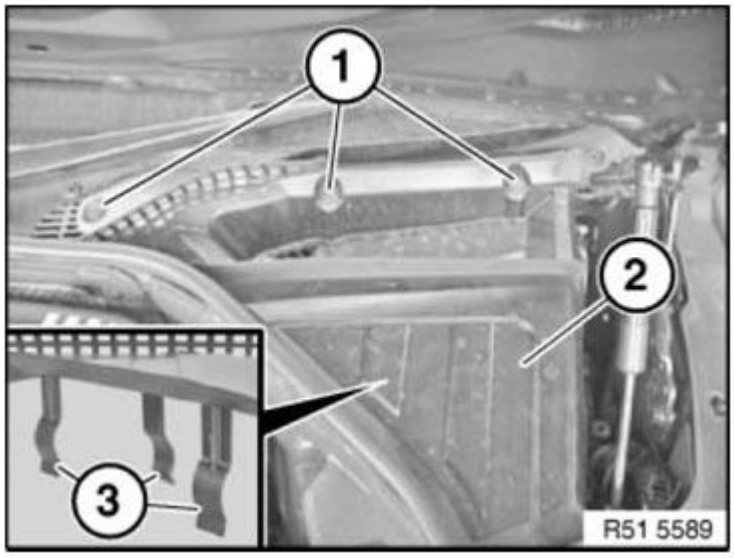


Fig. 55: Identifying Suspension Cross-Brace Expanding Rivets, Cover And Holders (51 71 345)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **51 61 1AZ** .

Remove suspension cross-brace (2).

Installation note:

Make sure suspension cross-brace (2) is in correct installation position.

Replace screws (1).

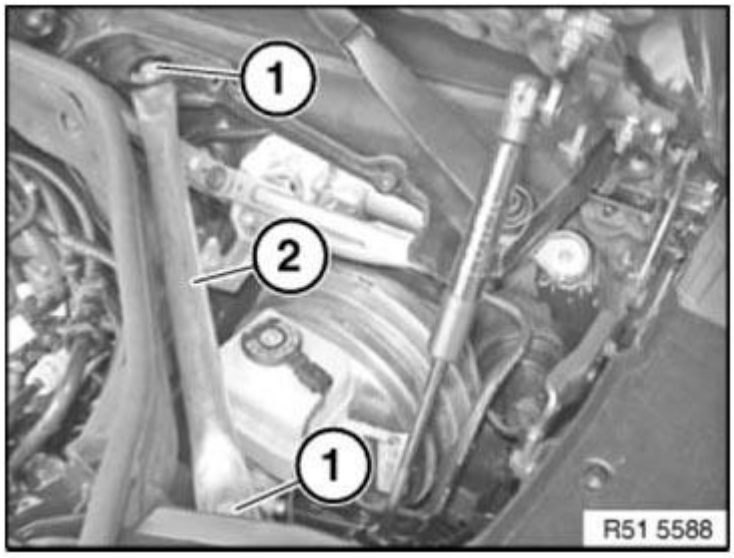


Fig. 56: Identifying Suspension Cross-Brace With Screws (51 71 345)
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 346 REMOVING AND INSTALLING/REPLACING RIGHT (REAR) SUSPENSION CROSS-BRACE

IMPORTANT: Driving without the suspension cross-brace is not permitted. (risk of damage to the body).

Release expanding rivets (1) and remove cover (2).

Installation note:

Replace damaged expanding rivets.

Holder of cover (2) must snap into place in suspension cross-brace during installation.

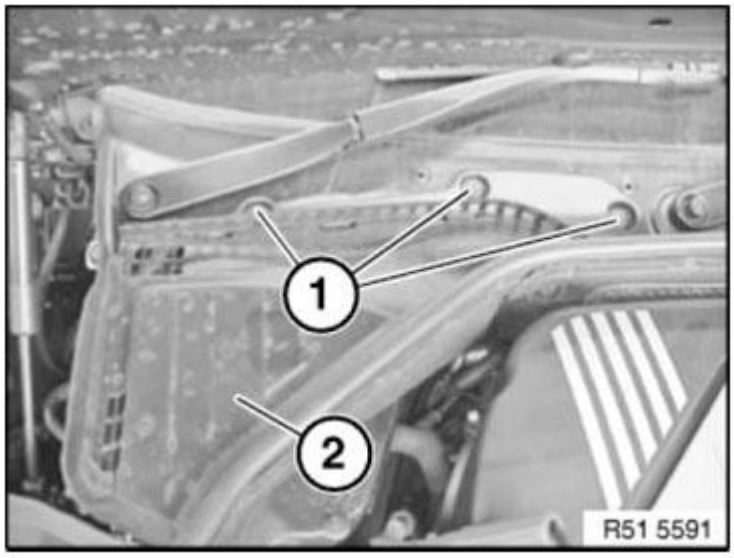


Fig. 57: Identifying Suspension Cross-Brace Expanding Rivets, Cover And Holders (51 71 346)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **51 61 1AZ** .

Remove suspension cross-brace (2).

Installation note:

Make sure suspension cross-brace (2) is in correct installation position.

Replace screw (1).

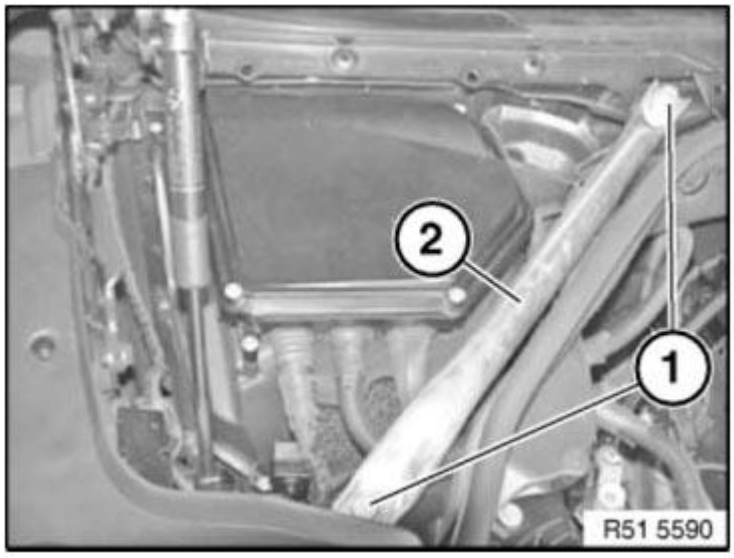


Fig. 58: Identifying Suspension Cross-Brace With Screws (51 71 346)
Courtesy of BMW OF NORTH AMERICA, INC.

37 11 030 REMOVING AND INSTALLING FRONT LEFT OR RIGHT SPRING STRUT

Necessary preliminary work

- Remove **FRONT WHEEL**
- Remove upper wishbone from swivel bearing. See **REMOVING AND INSTALLING/REPLACING TOP LEFT WISHBONE** or **REMOVING AND INSTALLING/REPLACING TOP RIGHT WISHBONE**.
- Remove **ANTI-ROLL BAR LINK FROM SPRING STRUT**

IMPORTANT: Risk of damage!
Secure spring strut against falling out.

Release screws (1).

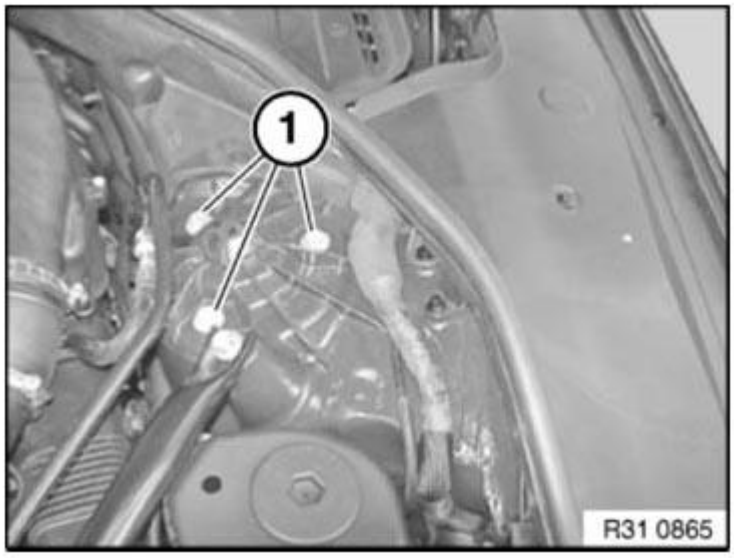


Fig. 59: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Turn support bearing in direction of travel up to stop in clockwise direction and tighten.

Clean contact surface in spring strut dome.

Tightening torque **31 31 1AZ** .

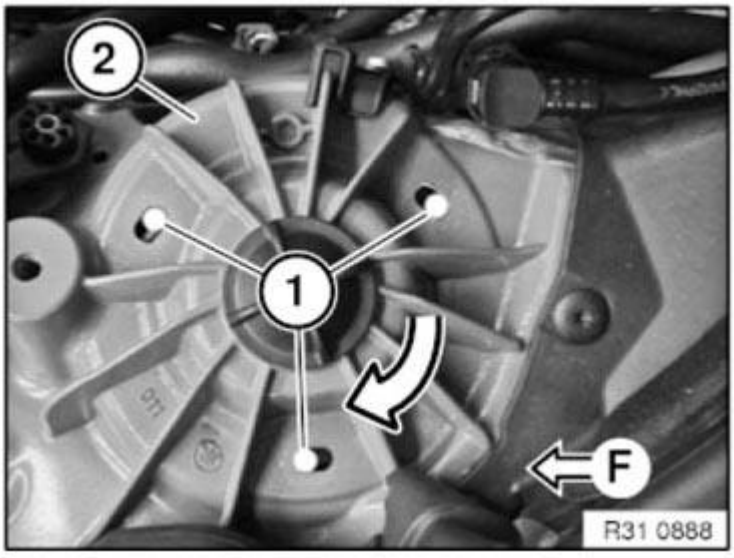


Fig. 60: Turning Support Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect feed line (2) from mounting.

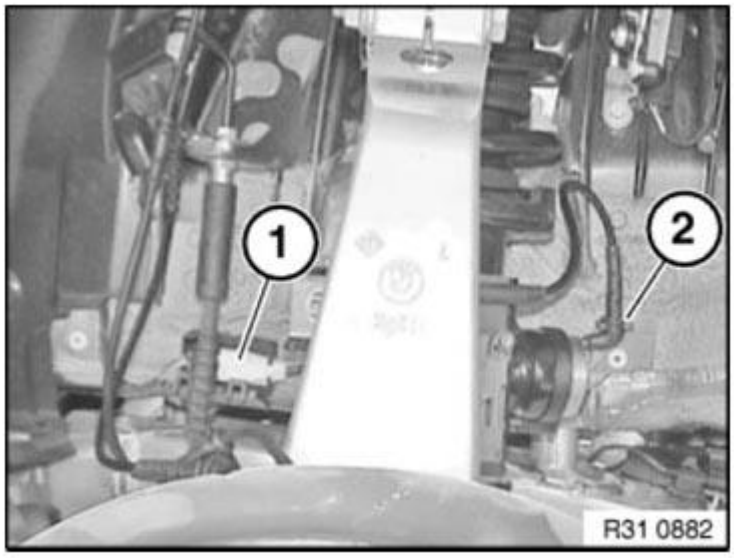


Fig. 61: Identifying Plug Connection And Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove screw.

Release spring strut from wishbone (2).

Installation note:

Replace self-locking nut.

F03: Replace screw and nut

Note direction of insertion of screw.

Adhere to the assembly sequence.

Tightening torque **31 12 7AZ** .

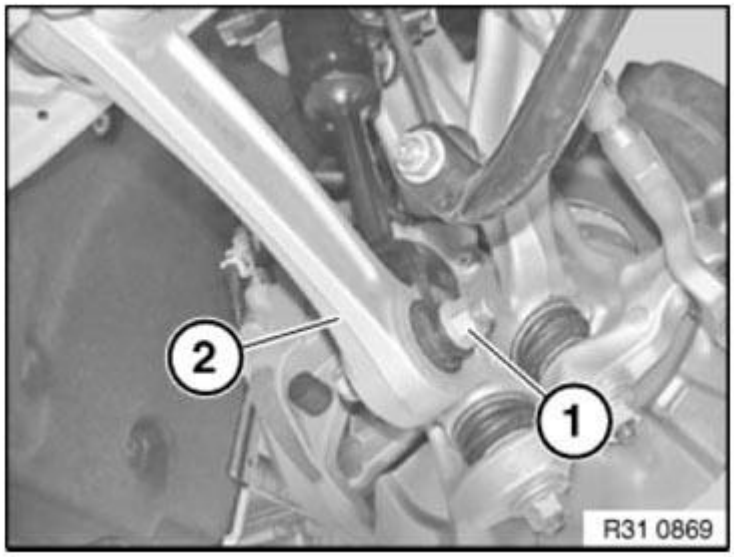


Fig. 62: Identifying Wishbone With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove spring strut downwards out of wheel arch.

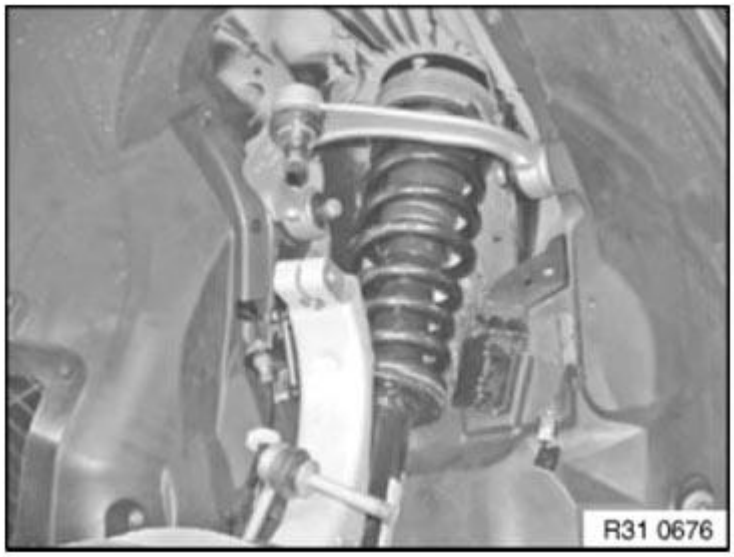


Fig. 63: Identifying Spring Strut
Courtesy of BMW OF NORTH AMERICA, INC.

31 31 032 REPLACING FRONT LEFT OR RIGHT COIL SPRING

Notes

IMPORTANT: Both coil springs on the relevant axle must be replaced only in the event of corrosion breakage!

The coil spring is allocated in the Electronic Parts Catalogue (EPC) under the menu item "Spring table" after the vehicle identification number has been entered and the relevant optional equipment of the car has been selected.

WARNING: Prior to each use of special tool 31 3 340 , it is essential to read the associated Owner's Handbook fully!
All the safety information and instructions contained in the Owner's Handbook must be strictly observed!

Failure to observe these safety precautions and instructions increases the risk of serious physical injury, damage to your health and damage to property and equipment!

IMPORTANT:

1. **Prior to each use, check the special tools for defects, modifications and operational reliability.**
2. **Damaged/modified special tools must not be used!**
3. **No changes or modifications may be made to the special tools!**
4. **These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.**
5. **Keep special tools dry, clean and (down to the spindle) free from grease.**
6. **Impact screwdrivers are prohibited!**
7. **Do not compress coil spring to full extent.**

Necessary preliminary work

- Remove **FRONT SPRING STRUT**

Relieve tension on coil spring and remove from special tools 31 3 351.

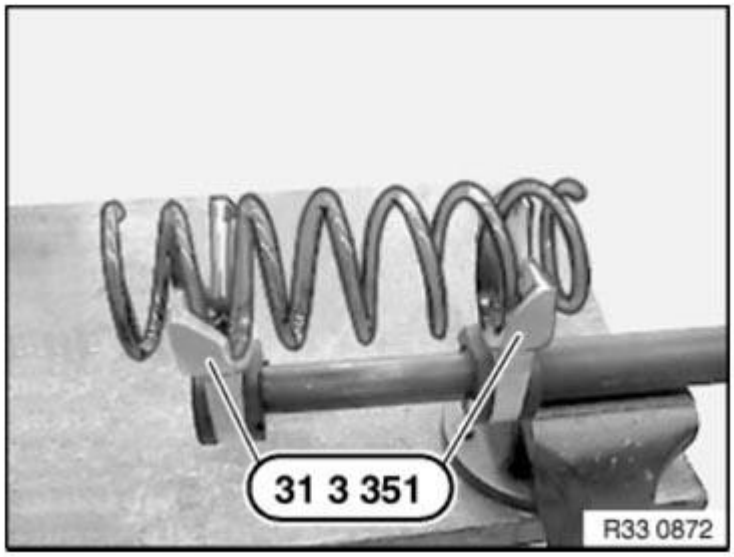


Fig. 64: Removing Coil Spring From Special Tool (31 3 351)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To be able to align the support bearing to the spring-strut bore when assembling the spring strut (see illustration), the spring in the spring tensioner must be positioned correctly!

- **The spring coil with the largest diameter must be positioned against the support bearing**
- **The upper coil spring end must be in contact with the limit position of the spring pad!**
- **Position the spring with mounted support bearing and gauge 83 30 2 210 780 in the spring tensioner so that the marks (1) are positioned vertically toward the top.**

  Position the gauge on the support bearing:

  Right support bearing:

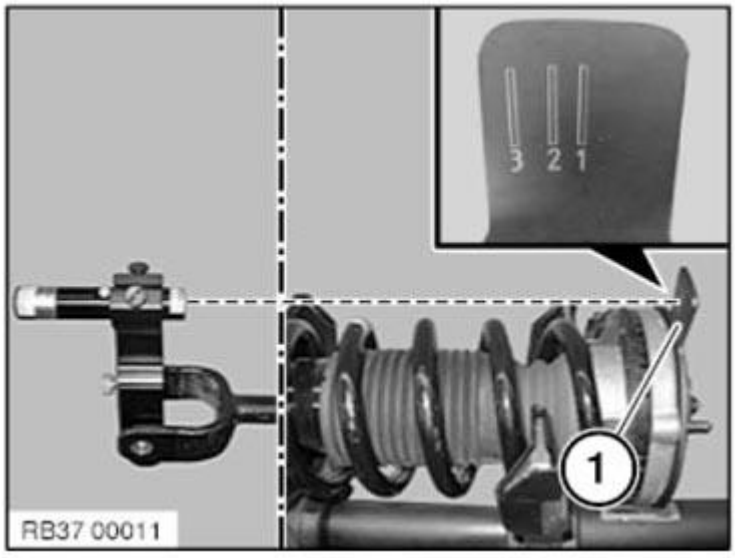


Fig. 65: Identifying Support Bearing On Spring-Strut Bore Aligning Mark
Courtesy of BMW OF NORTH AMERICA, INC.

In vehicles to 04/2010, position mark "RIGHT A" on arrow at support bearing

In vehicles from 04/2010, position mark "RIGHT B" on arrow at support bearing

Left support bearing:

Position mark "LEFT" on arrow at support bearing

See also REPLACING SPRING STRUT!

WARNING: Do not compress coil spring to full extent.
Coils of coil spring must be located completely in recesses of special tools 31 3 351!

Tension coil spring.

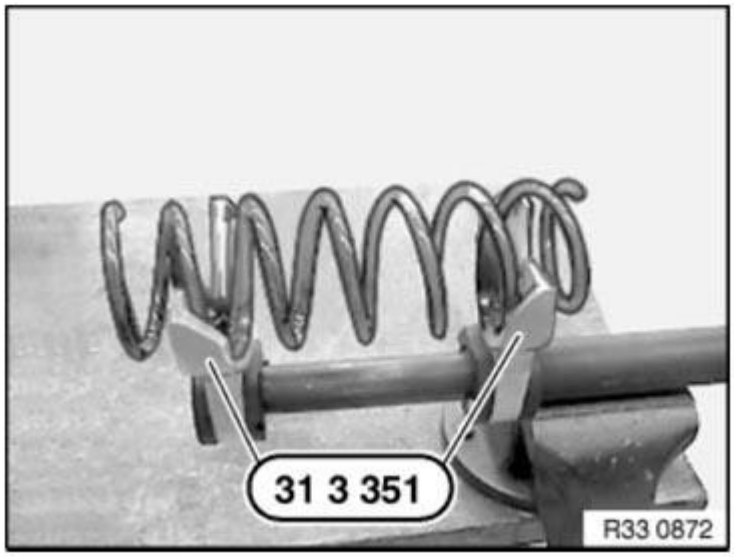


Fig. 66: Removing Coil Spring From Special Tool (31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Further assembly:

See **REPLACING FRONT LEFT OR RIGHT SPRING STRUT**

37 11 032 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

Notes

WARNING: Prior to each use of special tool 31 3 340 , it is essential to read the associated Owner's Handbook fully!
All the safety information and instructions contained in the Owner's Handbook must be strictly observed!
Failure to observe these safety precautions and instructions increases the risk of serious physical injury, damage to your health and damage to property and equipment!

IMPORTANT:

1. **Prior to each use, check the special tools for defects, modifications and operational reliability.**
2. **Damaged/modified special tools must not be used!**
3. **No changes or modifications may be made to the special tools!**
4. **These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.**
5. **Keep special tools dry, clean and (down to the spindle) free from grease.**
6. **Impact screwdrivers are prohibited!**
7. **Do not compress coil spring to full extent.**

Necessary preliminary work

- Remove **FRONT SPRING STRUT**

Removing

Clamp special tool 31 3 341 in vice.

Fit special tools 31 3 351 from above on special tool 31 3 341 until retaining bolts (1) can be felt and heard to snap into place.

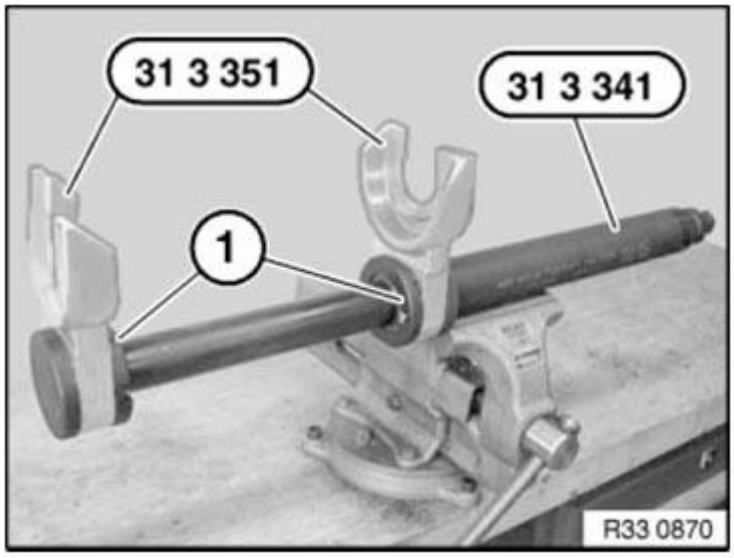


Fig. 67: Identifying Bolt And Special Tools (31 3 341 And 31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert spring strut into spring tensioner in such a way that anti-roll bar link fixture (1) is horizontally positioned to left or right.

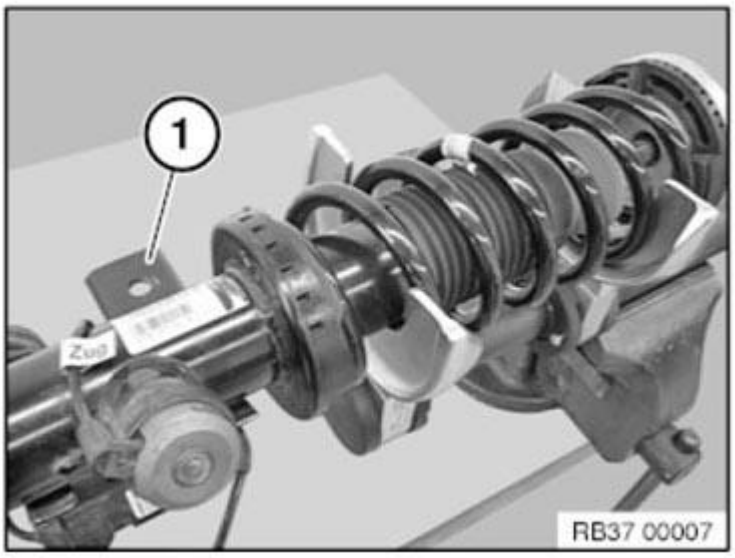


Fig. 68: Identifying Anti-Roll Bar Link Fixture
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Coils of coil spring must be located completely in recesses of special tools 31 3 351!

Compress coil spring until stress on piston rod is relieved.

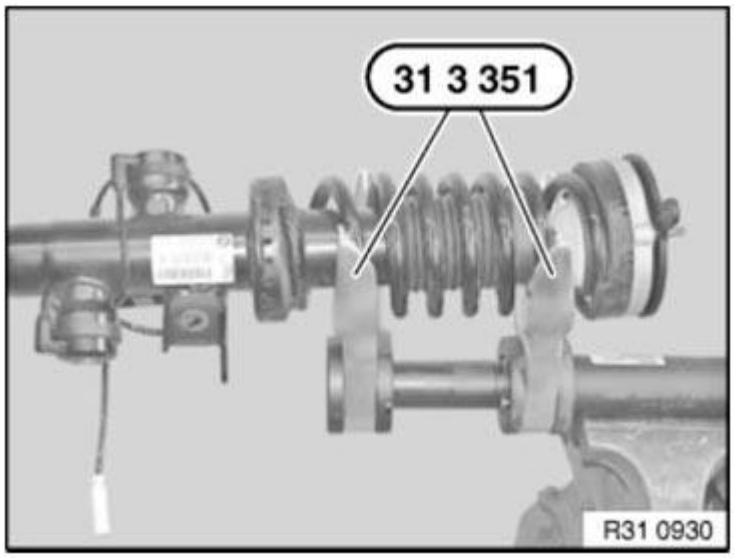


Fig. 69: Identifying Special Tool (31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut with special tool 33 0 040 Socket.

Check support bearing and spring pad for damage and replace if necessary.

Remove shock absorber, auxiliary damper, protective tube and spring pad from tensioned coil spring, examine and replace if necessary.

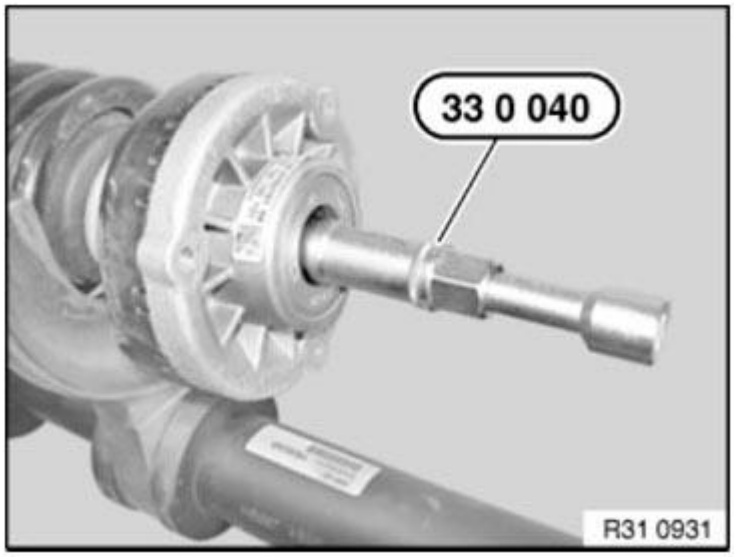


Fig. 70: Releasing Nut Using Special Tool (33 0 040)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When mounting, spring strut and support bearing must aligned using special tool 83 30 2 210 778!
The following procedure must be followed.

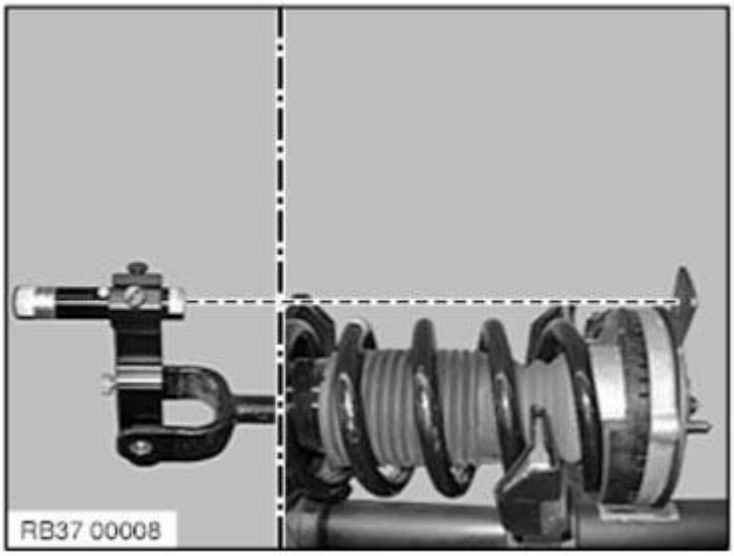


Fig. 71: Aligning Spring Strut And Support Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Insert shock absorber in tensioned coil spring.

Slide auxiliary damper, protective tube and spring pad onto piston rod.

IMPORTANT: Lower end of coil spring must rest against spring pad (1).

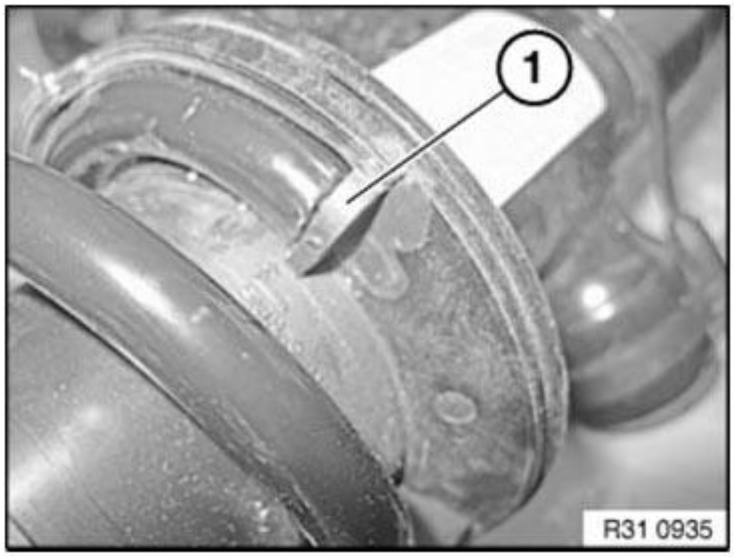


Fig. 72: Identifying Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fit support bearing and align with end of coil spring.

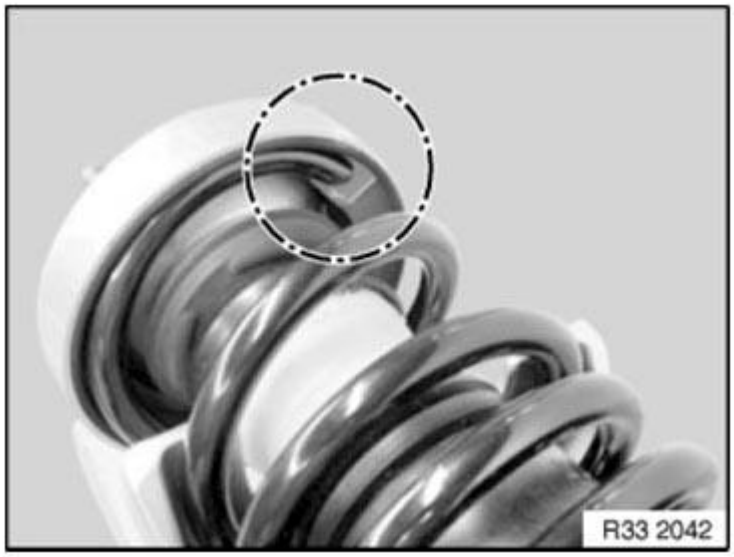


Fig. 73: Identifying Support Bearing On Coil Spring Aligning Position
Courtesy of BMW OF NORTH AMERICA, INC.

Use special tool 33 0 040 Socket to attach support bearing.

Replace nut!

Tightening torque **31 31 2AZ** .

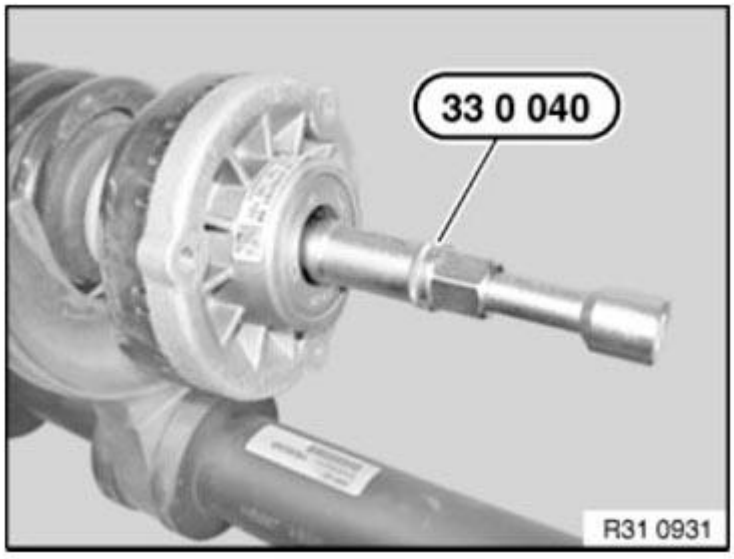


Fig. 74: Releasing Nut Using Special Tool (33 0 040)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!
Adjusting device emits laser beam!
Do not look into the beam!
Laser class 2
To EN60825-1 : 1994
P < or = 1 mW

Align laser (1) with prism mirror (2)!

- Mount laser (1) in damper eyelet
- Mount prism mirror (2) vertically onto spring strut!

  The prism mirror must be mounted on a clean, smooth surface. Do not mount prism mirror on label or weld beads!

  Laser beam must face mirror!

- Adjust the laser with adjusting screw (3) in such a way that the laser beam is projected onto mark (4) via the mirror.
- Remove prism mirror **->After this, the laser adjustment must not be changed at the adjusting screw (3)!**

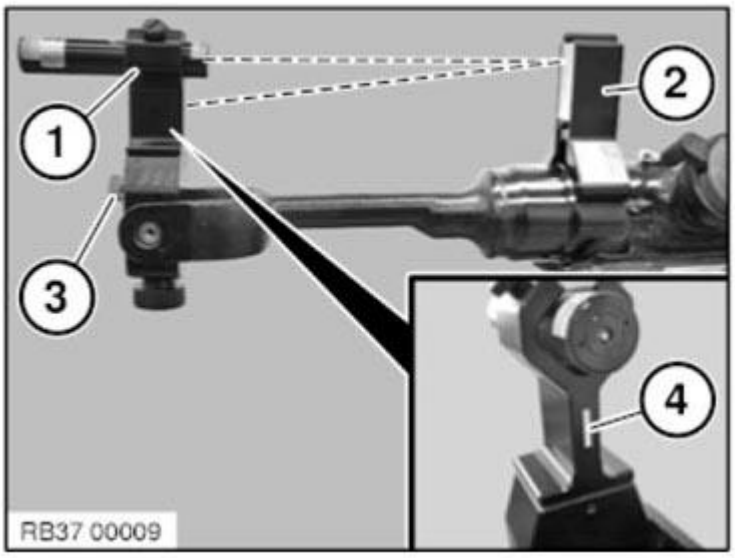


Fig. 75: Aligning Laser On Mark Using Prism Mirror
Courtesy of BMW OF NORTH AMERICA, INC.

Align spring strut and support bearing with each other

Mount gauge 83 30 2 210 780 onto support bearing!.

Right spring strut:

Vehicles built before 04/2010: Position mark (1) **"RIGHT A"** on arrow (2) on support bearing.

On vehicles from 04/2010: Position mark (1) **"RIGHT B"** on arrow (2) on support bearing.

Left spring strut:

Position mark (1) **"LEFT"** on arrow (2) on support bearing.

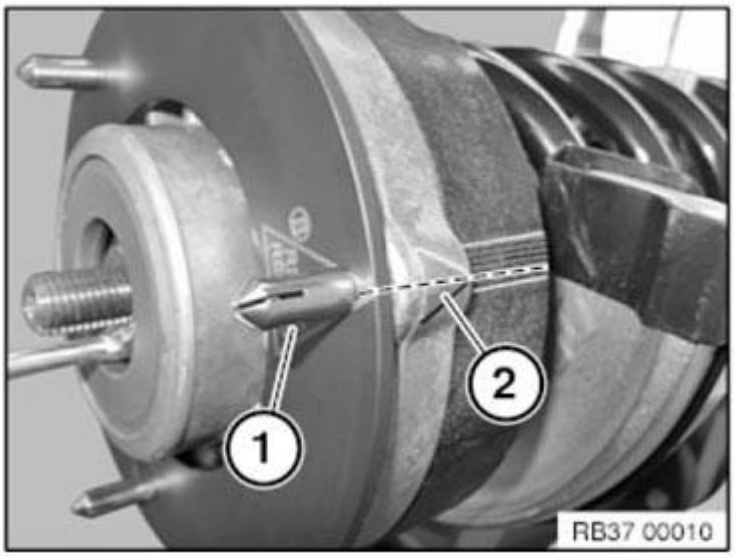


Fig. 76: Identifying Position Mark On Support Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Align spring strut with support bearing or with corresponding mark on gauge (1) using laser beam and relieve tension.

IMPORTANT: After the spring tension is relieved, the laser beam must point to the specified mark of gauge (1).
Failure to observe this requirement will result in substantial impairment of handling characteristics.

Vehicles built before 04/2010: Position laser beam on mark **"3"** of gauge.

On vehicles from 04/2010: Position laser beam on mark **"2"** of gauge.

Relieve spring tension.

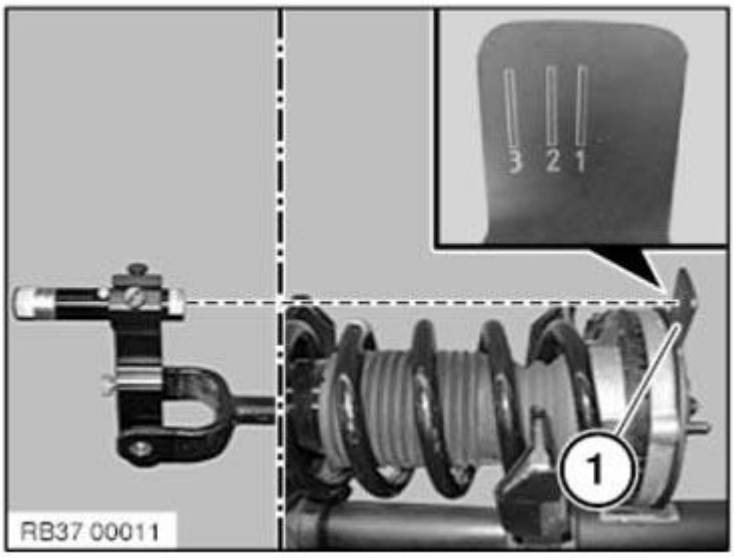


Fig. 77: Identifying Support Bearing On Spring-Strut Bore Aligning Mark
Courtesy of BMW OF NORTH AMERICA, INC.

3133 SPRING WITH SUSPENSION

31 33... MEASURING VEHICLE RIDE HEIGHT

Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to wheel arch lower edge (1).

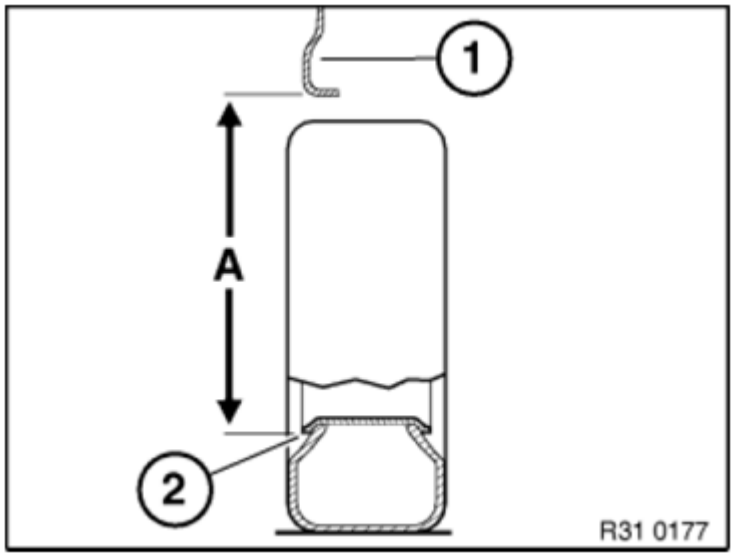


Fig. 78: Identifying Vehicle Ride Height From Wheel Arch Lower Edge To Rim Flange
Courtesy of BMW OF NORTH AMERICA, INC.

31 33 001 REMOVING AND REFITTING/REPLACING FRONT LEFT OR RIGHT SPRING STRUT

BEARING

NOTE: Procedure is described in REPLACING FRONT LEFT OR RIGHT SPRING STRUT.

31 33 100 REPLACING FRONT LEFT OR RIGHT COIL SPRING

See **REPLACING FRONT LEFT OR RIGHT COIL SPRING**.

3135 STABILIZER BAR

31 35 005 REMOVING AND INSTALLING/REPLACING ANTI-ROLL BAR LINK (STABILIZER LINK) FOR LEFT/RIGHT STABILIZER

IMPORTANT: Observe SAFETY INSTRUCTIONS for raising the vehicle

Unscrew nuts (1).

Remove anti-roll bar link (2).

Installation note:

Replace self-locking nut.

Tightening torque **31 35 2AZ** .

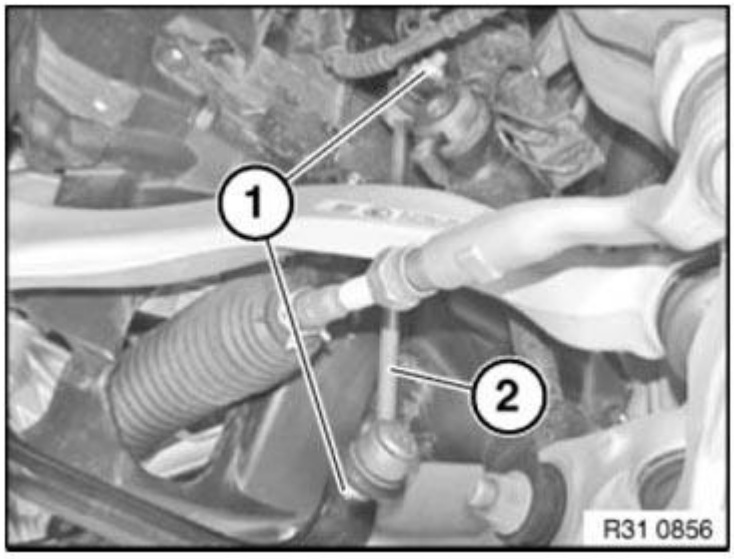


Fig. 79: Identifying Anti-Roll Bar Link With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

31 35 000 REMOVING AND INSTALLING/REPLACING FRONT STABILIZER

Necessary preliminary work

- **REMOVE** front underbody protection.
- Remove **BOTH ANTI-ROLL BAR LINKS FROM ANTI-ROLL BAR** .
- Remove F12/F13: stiffening plate.

Release screws (1).

Tightening torque **31 35 1AZ**

Remove anti-roll bar (2) downwards.

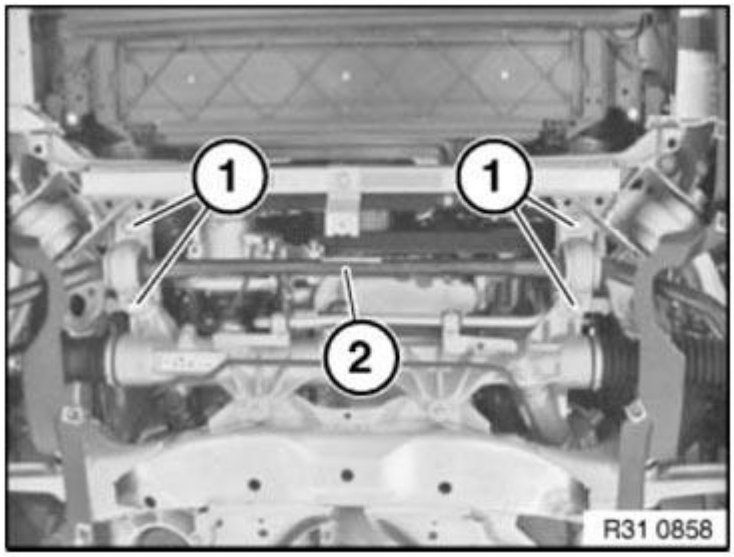


Fig. 80: Identifying Anti-Roll Bar Link With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

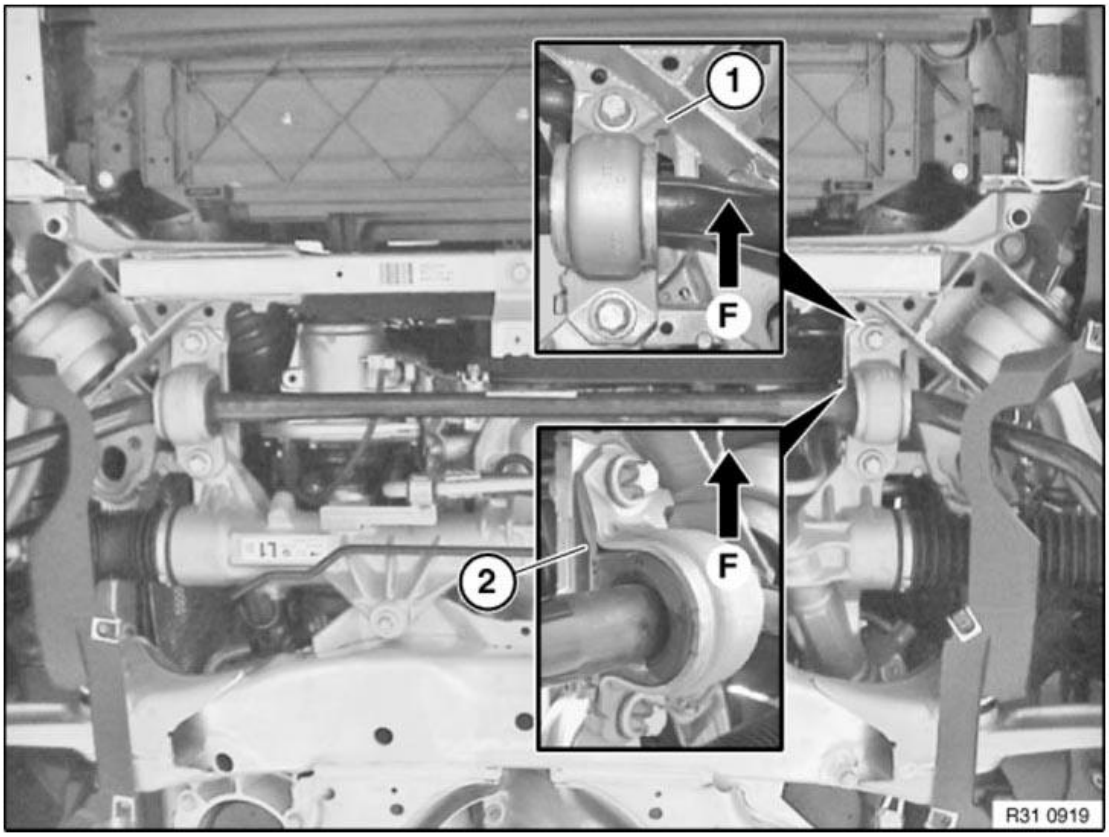


Fig. 81: Identifying Nose On Retaining Bracket And Curve On Lower Mounting Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace screws.

Pay attention to installation location of retaining bracket and mounting plate!

- Nose (1) on retaining bracket must point left in direction of travel
- Curve (2) on lower mounting plate points to rubber bearing

3160 OUTPUT SHAFT

31 60... NOTES ON REMOVING AND INSTALLING LOW PROFILE BAND CLAMPS

Notes

IMPORTANT: During removal Low Profile band clamp (dotted line) is overstretched and must not be reused!



Fig. 82: Identifying Low Profile Band Clamp (Dotted Line)
Courtesy of BMW OF NORTH AMERICA, INC.

Removing

Place special tool 31 5 200 on tabs (1, 2).

NOTE: Make sure that the movable piece (3) of the special tool is placed on lug (1).

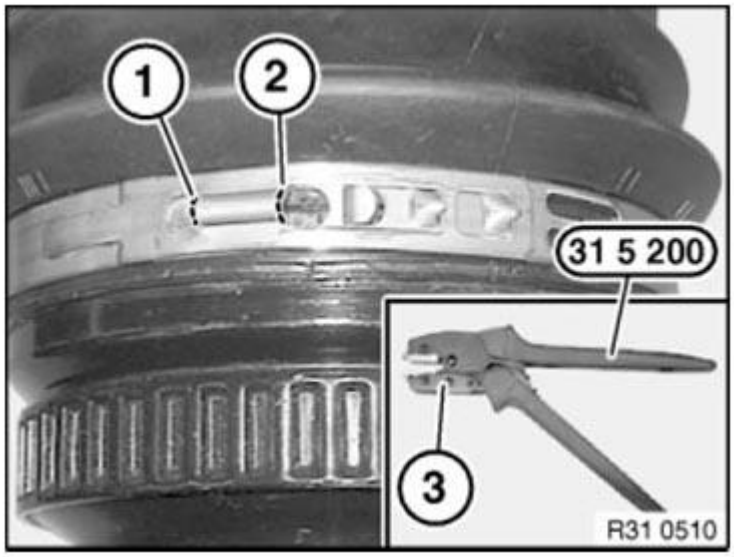


Fig. 83: Identifying Special Tool (31 5 200) On Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Compress Low Profile band clamp with special tool 31 5 200 until end of band clamp (1) lifts up.

Relieve tension on special tool and remove Low Profile band clamp.

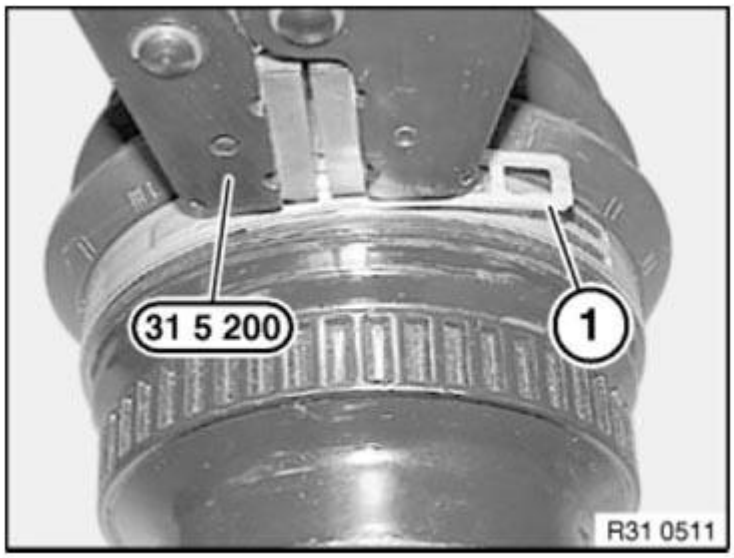


Fig. 84: Compressing Low Profile Band Clamp Using Special Tool (31 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly

Position Low Profile band clamp in installation position (A) on gaiter.

Place special tool 31 5 200 on tabs (1, 2).

NOTE: Make sure that the movable piece (3) of the special tool is placed on lug (1).

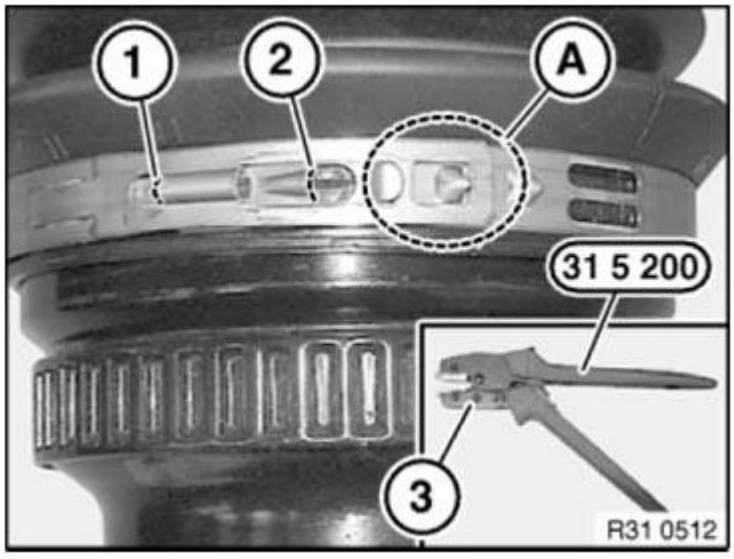


Fig. 85: Identifying Low Profile Band Clamp Installation Position

Courtesy of BMW OF NORTH AMERICA, INC.

Check and if necessary correct positions of gaiter and Low Profile band clamp.

Compress Low Profile band clamp with special tool 31 5 200 and press on end of band clamp (1).

Relieve tension on special tool and remove.

Check hook fastener (H); if necessary, repeat operation with new Low Profile band clamp.

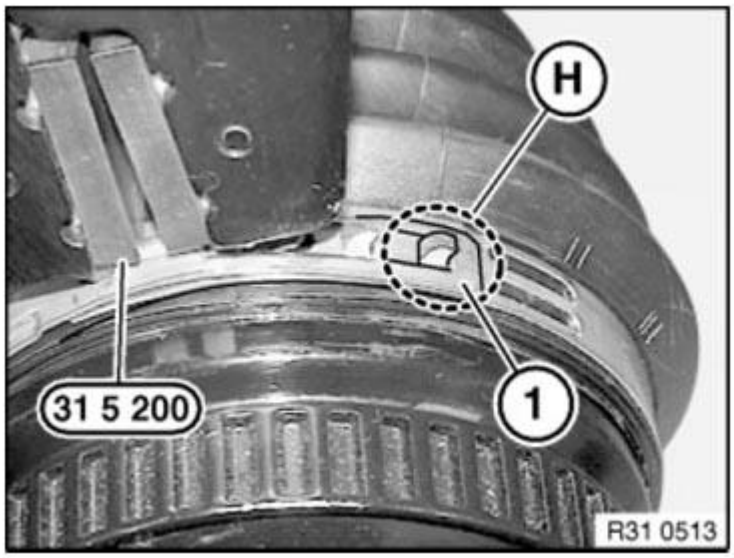


Fig. 86: Compressing Low Profile Band Clamp Using Special Tool (31 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

SUSPENSION

Front Axle - Special Tools

31 FRONT AXLE

315090 ADAPTER

0491982 315090 Adapter MW

Note: (Adapter) For pulling off the taper roller bearings from the equalization housing in the front axle differential



W31 5 090

Fig. 1: Identifying Adapter (315090)
Courtesy of BMW OF NORTH AMERICA, INC.

315120 BUSH

0491985 315120 Bush MW

Note: (impact bush) For fitting the radial sealing ring to the drive flange of the front axle differential

Storage Location

X7

SI number

01 04 93 (664)

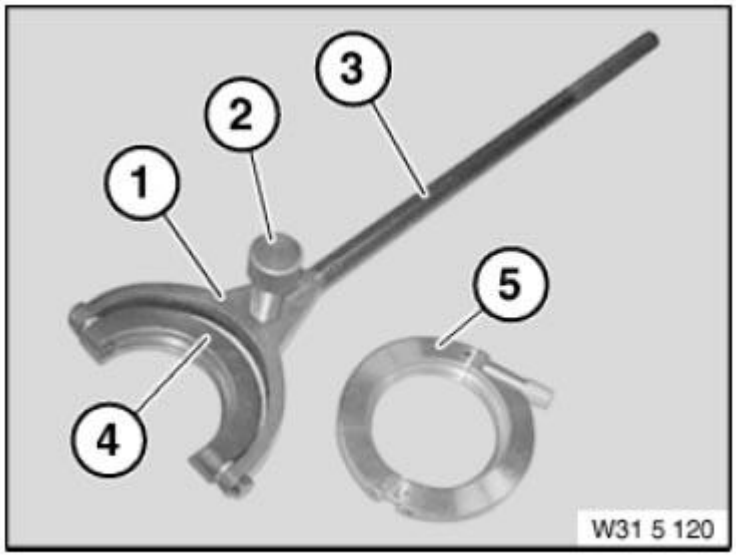


Fig. 2: Identifying Bush (315120)
Courtesy of BMW OF NORTH AMERICA, INC.

315070 DEVICE

0491978 315070 Device MW

Note: For determining the fitting dimension at the drive bevel gear in the front axle differential

Consisting of:

1 = 0491979 Bridge

NOTE: (Measuring bridge)

2 = 0491980 Washer

NOTE: (Measuring disc 7 mm)

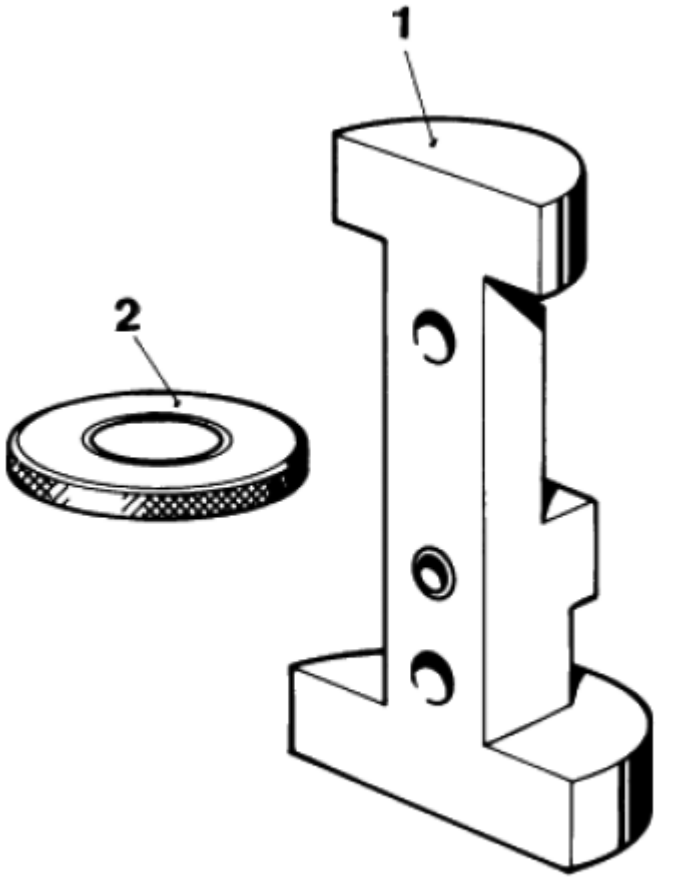


Fig. 3: Identifying Device (315070)
Courtesy of BMW OF NORTH AMERICA, INC.

312160 DEVICE

0491924 312160 Device MW

Replaced by: 0492053

Note: For pressing the wishbone off the spring strut/Replaced by 32 3 090 (0 492 053)

Consisting of:

1 = 0493260 Spindle

NOTE: Replaced by 32 3 090.(0 492 053)

2 = 0493261 Bolt

NOTE: Replaced by 32 3 090.(0 492 053)

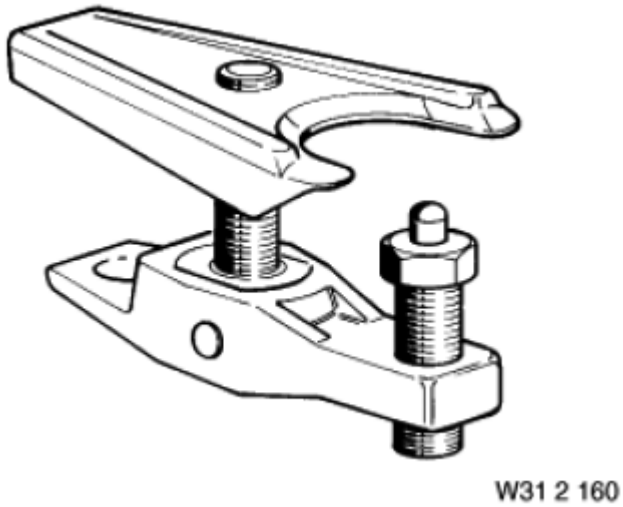


Fig. 4: Identifying Device (312160)
Courtesy of BMW OF NORTH AMERICA, INC.

315250 FIXTURE

0495567 315250 Fixture MW

Note: (Universal axle take-up) Fixture for accommodating all front and rear axles when removing and installing.

SI number

01 24 06 (309)

Consisting of:

1 = 0495817 Basic body

NOTE: (basic body)

2 = 0495818 Support

NOTE: (telescopic supports) 4 pieces

3 = 0495819 Adapter

NOTE: (take-up adapter U-section (2 pieces))

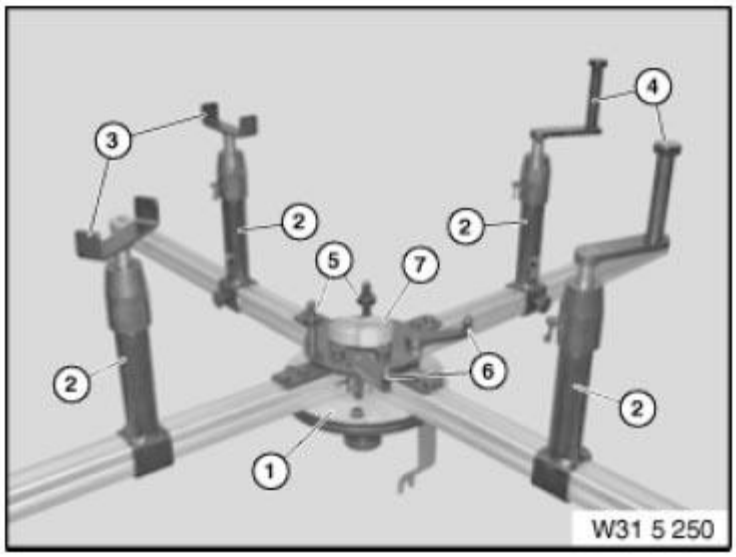


Fig. 5: Identifying Fixture (315250)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0495820 Adapter

NOTE: (take-up adapter (2 pieces))

5 = 0495821 Adapter

NOTE: (take-up adapter for bore holes (2 pieces))

6 = 0495822 Adapter

NOTE: (take-up adapter for bore holes (2 pieces))

7 = 0495824 Belt

NOTE: (Tensioning strap)

315220 FIXTURE

0495485 315220 Fixture MW

Note: For securing wheel hub when removing and installing spring strut.

Storage Location

A19

SI number

01 23 05 (224)

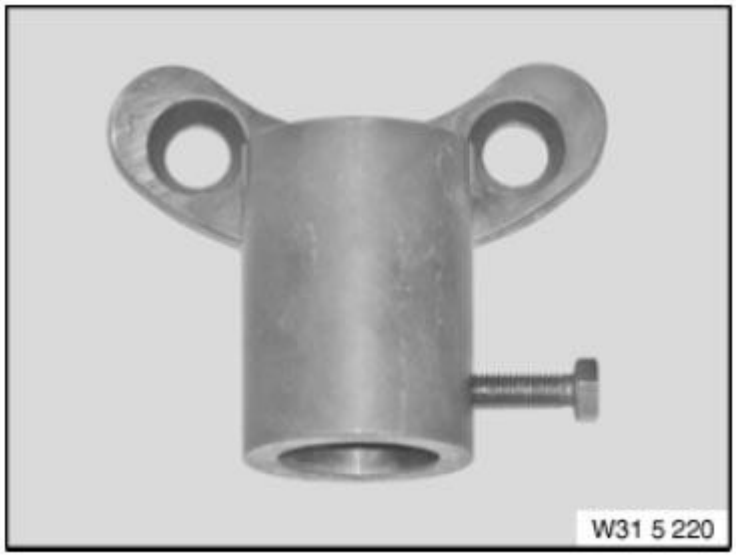


Fig. 6: Identifying Fixture (315220)
Courtesy of BMW OF NORTH AMERICA, INC.

315000 FIXTURE

0491969 315000 Fixture MW

Note: (mounting fixture) For the front axle differential

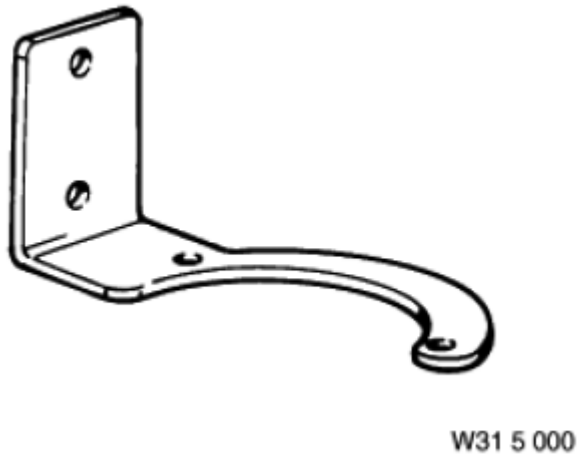


Fig. 7: Identifying Fixture (315000)

Courtesy of BMW OF NORTH AMERICA, INC.

313350 HOLDER

0493560 313350 Holder MW

Note: (spring retainer) For accommodating coil springs when tensioning. No. 31 3 350 reserved for consecutive sub-number spring tensioner 31 3 340.

Storage Location

Individual

SI number

01 11 99 (438)

Consisting of:

8 = 0494397 Ring

NOTE: (insert ring) For use with repair instructions only. For insertion in spring retainer ring 31 3 354. Model series: E87

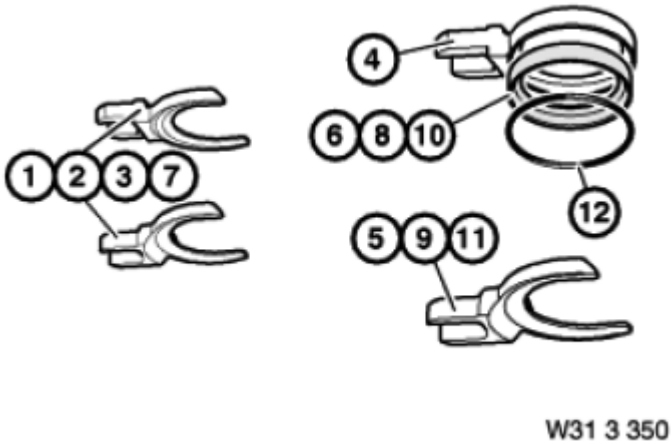


Fig. 8: Identifying Holder (313350)
Courtesy of BMW OF NORTH AMERICA, INC.

9 = 0494624 Ring

NOTE: (spring retainer ring) For use with repair instructions only.

4 = 0493568 Ring

NOTE: (spring retainer ring) For use with repair instructions only.

6 = 0493570 Ring

NOTE: (centering ring) For use with repair instructions only.

7 = 0494053 Holder

NOTE: (spring retainer (2 pieces)) For use with repair instructions only.

10 = 0494625 Holder

NOTE: (spring retainer) For use with repair instructions only.

= 0494804

11 = 0494804 Holder

NOTE: (spring retainer) For use with repair instructions only.

1 = 0493561 Holder

NOTE: (spring retainer (2 pieces)) For use with repair instructions only.

2 = 0493566 Holder

NOTE: (spring retainer (2 pieces)) For use with repair instructions only.

3 = 0493567 Holder

NOTE: (spring retainer (2 pieces)) For use with repair instructions only.

5 = 0493569 Holder

NOTE: (spring retainer) For use with repair instructions only.

31 3 358 INSERT RING

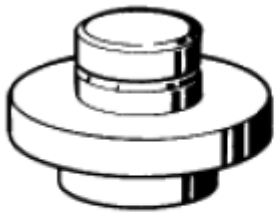
31 3 358 Insert ring

Note: For inserting spring retainer ring 31 3 354 model series (PL2)

315030 MANDREL

0491974 315030 Mandrel MW

Note: (drift) For output shaft radial sealing ring in the front axle differential



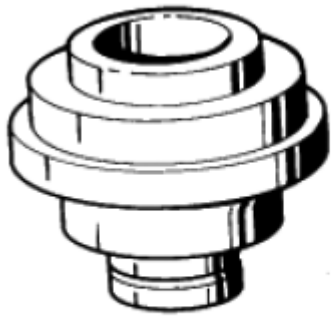
W31 5 030

Fig. 9: Identifying Mandrel (315030)
Courtesy of BMW OF NORTH AMERICA, INC.

315020 MANDREL

0491973 315020 Mandrel MW

Note: (drift) For radial sealing ring of the drive shaft in the front axle differential



W31 5 020

Fig. 10: Identifying Mandrel (315020)
Courtesy of BMW OF NORTH AMERICA, INC.

315060 PIN

0491977 315060 Pin MW

Note: (drive pin) For radial gears in the front axle differential for checking the coefficient of friction



W31 5 060

Fig. 11: Identifying Pin (315060)
Courtesy of BMW OF NORTH AMERICA, INC.

313340 SPRING TENSIONER

0493555 313340 Minimum set: Mechanical tools Spring tensioner MW

Note: For tensioning coil springs when removing and installing spring strut. Used only in conjunction with repair instructions.

Storage Location

Individual

SI number

01 11 99 (438)

Consisting of:

1 = 0493556 Spring tensioner

NOTE: (spring tensioner, individual)

2 = 0493557 Pin

NOTE: (replacement pin)

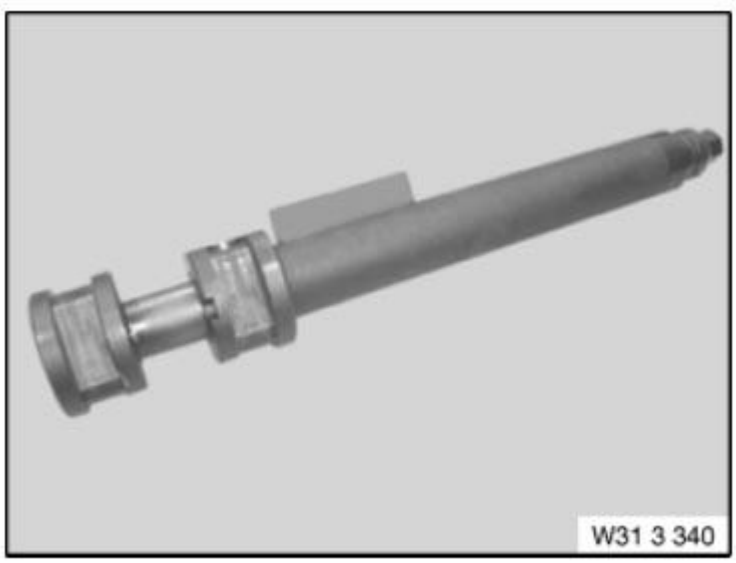


Fig. 12: Identifying Spring Tensioner (313340)
Courtesy of BMW OF NORTH AMERICA, INC.

315050 THRUST PIECE

0491976 315050 Thrust piece MW

Note: For press-fitting the roller bearing onto the differential casing



Fig. 13: Identifying Thrust Piece (315050)
Courtesy of BMW OF NORTH AMERICA, INC.

313030 TOOL

0494187 313030 Minimum set: Mechanical tools Tool MW

Note: (Pressing-in/-out tool) For rubber mount on trailing arm

Storage Location

B46

SI number

01 14 01 (766)

Consisting of:

2 = 0494188 Bell housing

1 = 0494189 Bush

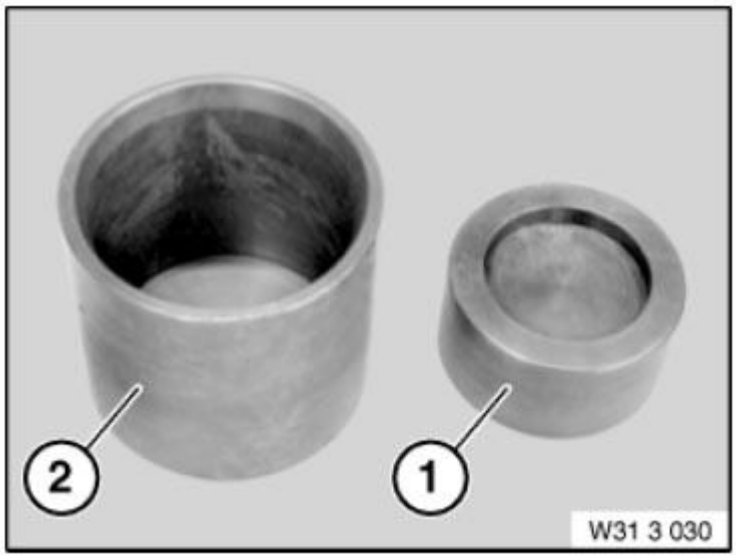


Fig. 14: Identifying Tool (313030)
Courtesy of BMW OF NORTH AMERICA, INC.

315040 WASHER

0491975 315040 Washer MW

Note: (Spring washer) For pretensioning the differential side gears when determining the installation size in the front axle differential



W31 5 040

Fig. 15: Identifying Washer (315040)
Courtesy of BMW OF NORTH AMERICA, INC.

315100 WASHER

0491983 315100 Washer MW

Note: For pulling the outer bearing race into the bearing housing in the front axle differential



W31 5 100

Fig. 16: Identifying Washer (315100)
Courtesy of BMW OF NORTH AMERICA, INC.

315080 WASHER

0491981 315080 Washer MW

Note: For determining the fitting clearance of the radial gears in the front axle differential



W31 5 080

Fig. 17: Identifying Washer (315080)
Courtesy of BMW OF NORTH AMERICA, INC.

SUSPENSION

Front Axle - Tightening Torques

ANTI-ROLL BAR

31 35 ANTI-ROLL BAR

TIGHTENING TORQUE SPECIFICATION - ANTI-ROLL BAR

		Type	Thread	Tightening specifications	Dimension
1AZ	Retaining bracket for anti-roll bar to front axle support/steering box	F01/F02/F04/F07/F10/F11/F12/F13/F18	M12	Replace screw. Jointing torque Angle of rotation	100 Nm 105 °
		F03	M12	Replace screw. Jointing torque	100 Nm
		F03	M14	Replace screw. Jointing torque	165 Nm
		F25	M10		56 Nm
2AZ	Anti-roll bar link to anti-roll bar/damper	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M12	Replace nuts. Jointing torque Angle of rotation	45 Nm 45°
3AZ	Anti-roll bar link to anti-roll bar	F25	M12	Replace nut.	100 Nm
4AZ	Anti-roll bar link to damper	F25	M12	Replace nut.	108 Nm

FRONT AXLE SUSPENSION

31 10 FRONT AXLE SUSPENSION

TIGHTENING TORQUE SPECIFICATION - FRONT AXLE SUSPENSION

		Type	Thread	Tightening specifications	Dimension
1AZ	Front axle support to engine support (screw connection, front, middle, rear)	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M12	Observe repair instructions.	100 Nm
		F25	M12	Replace screws. Jointing torque Angle of rotation	100 Nm 90 °
				Replace	

				screws.	
2AZ	Stiffening plate to front axle support	F01/F02/F04/F07/F10/F11/F12/F13	M8	Jointing torque Angle of rotation	15 Nm 90 °
		F25	M12		110 Nm

HANDLEBARS AND STRUTS

31 12 HANDLEBARS AND STRUTS

TIGHTENING TORQUE SPECIFICATION - HANDLEBARS AND STRUTS

	Type	Thread	Tightening specifications	Dimension
1AZ Trailing link to front axle support	F01/F02/F04/F07/F10/F11/F12/F13/F18	M14	Replace screw and nut. Jointing torque Angle of rotation	85 Nm 180 °
	F03	M18	Replace screw and nut. Jointing torque Angle of rotation	360 Nm 180 °
2AZ Trailing link to swivel bearing	F01/F02/F04/F07/F10/F11/F12/F13/F18	M16	Replace nut. Jointing torque Angle of rotation	100 Nm 90 °
	F03	M18	Replace nut. Jointing torque Angle of rotation	200 Nm 90 °
3AZ Lower wishbone to front axle support	F01/F02/F04/F07/F10/F11/F12/F13/F18	M14	Replace screw and nut. Jointing torque Angle of rotation	85 Nm 180 °
	F03	M18	Replace screw and nut. Jointing torque Angle of rotation	360 Nm 180 °
	F01/F02/F04/F07/F10/F11/F12/F13/F18	M16	Replace nut. Jointing torque	100 Nm

4AZ	Lower wishbone to swivel bearing/wheel control joint			Angle of rotation	90 °
		F03	M18	Replace nut. Jointing torque Angle of rotation	200 Nm 90 °
5AZ	Upper wishbone to body	F01/F02/F04/F07/F10/F11/F12/F13/F18	M10	Replace nuts.	54 Nm
		F03	M12		100 Nm
6AZ	Upper wishbone to swivel bearing	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M10	Replace nut.	56 Nm
7AZ	Wishbone to lower damper fork	F01/F02/F04/F07/F10/F11/F12/F13/F18	M14	Replace screw and nut. Jointing torque Angle of rotation	90 Nm 180 °
		F03	M18	Replace screw and nut. Jointing torque Angle of rotation	200 Nm 180 °
8AZ	Wheel control joint to swivel bearing	F01/F02/F04/F07/F10/F11/F12/F13	M30	Replace nut.	380 Nm

SPRING STRUTS

31 31 SPRING STRUTS

TIGHTENING TORQUE SPECIFICATION - SPRING STRUTS

		Type	Thread	Tightening specifications	Dimension
1AZ	Support bearing flange to body	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M8	Replace screws.	28 Nm
		F25	M8	Replace screws. Jointing torque Angle of rotation	25 Nm 45 °
2AZ	Support bearing flange to spring strut shock absorber	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M12	Replace nuts.	34 Nm
		F25	M12	Replace nut.	71 Nm
3AZ	Spring strut shock absorber to	F25	M12	Follow repair instruction. Replace screw and nut.	

swivel bearing			Jointing torque Angle of rotation	60 Nm 90 °

WHEEL BEARINGS AND STEERING STUB

31 21 WHEEL BEARINGS AND STEERING STUB

TIGHTENING TORQUE SPECIFICATION - WHEEL BEARINGS AND STEERING STUB

	Type	Thread	Tightening specifications	Dimension
1AZ	Wheel bearing to swivel bearing	F01/F02/F04/F07/F10/F11/F12/F13/F18/F25	M12	Replace screws. Jointing torque Angle of rotation	 80 Nm 90 °
2AZ	Drive flange to front axle shaft end	F03			420 Nm

ENGINE

Fuel Supply System - Repair

1600 DRAWING OFF OF FUEL, SYSTEM CLEANING

1600100 CHECKING FUEL TANK AND TANK VENTILATION SYSTEM FOR LEAKS

Notes

NOTE: The following procedure is only applicable to vehicles without the tank leak diagnosis module.

Necessary preliminary work

- Remove rear right wheel arch trim.

Comply with the following conditions in order to obtain plausible test results:

- Content of fuel tank:
  1. Maximum 90 %
  2. Minimum 13 % (reserve telltale must not light up)
- Park the car in the workshop at least 2 hours before the test so that the fuel temperature is approximately that of the workshop temperature (ideal fuel temperature approx. 10... 20°C).
- Never refuel the vehicle directly prior to the leak test due to the strong emission of gas by the fresh fuel

Using special tool **16 1 070** , seal opening (1) on carbon canister.

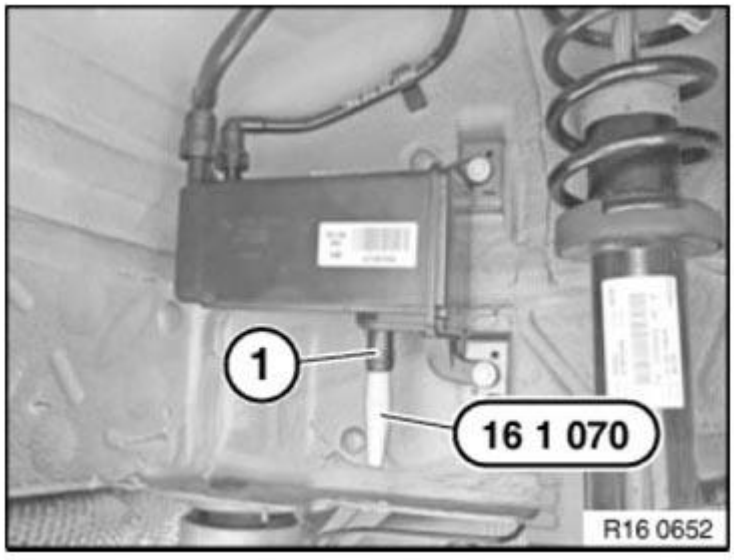


Fig. 1: Sealing Carbon Canister Opening Using Special Tool (16 1 070)

Courtesy of BMW OF NORTH AMERICA, INC.

Remove fuel filler cap and connect special tool 16 1 174 to fuel filler neck.

Using thumbwheel (1), clamp special tool 16 1 174 to fuel filler neck.

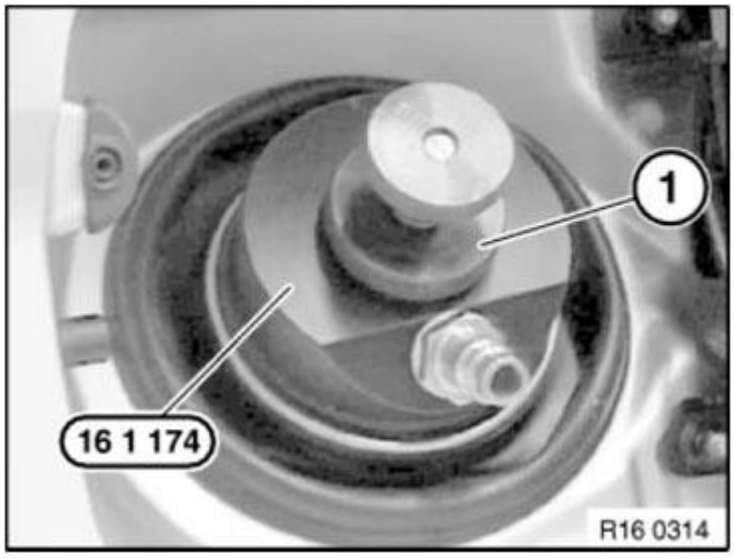


Fig. 2: Clamping Special Tool (16 1 174) To Fuel Filler Neck Using Thumbwheel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Turn pressure regulator on special tool 16 1 171 counter-clockwise as far as the stop.

Using compressed air line (1), connect special tool 16 1 171 to workshop compressed air system (8... 10 bar).

Connect pressure sensor (2) from Diagnosis and Information System with a measuring range of 0...3.5 bar.

IMPORTANT: Do not connect quick-release coupling (3) of special tool 16 1 171 as yet.

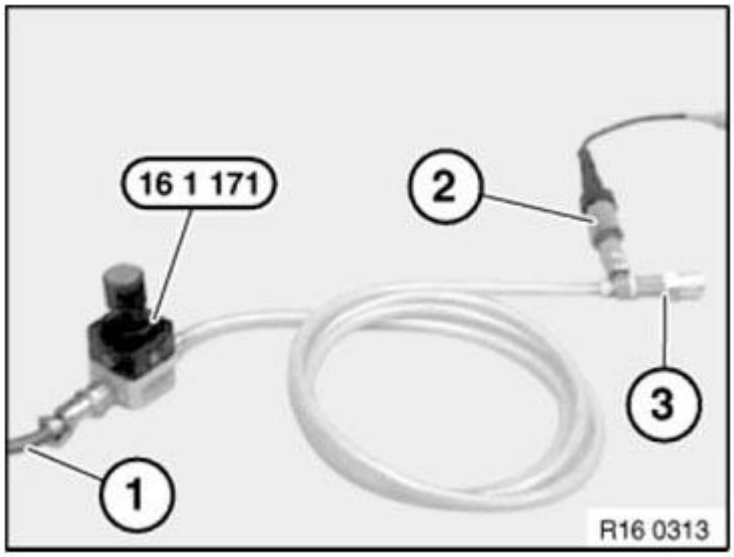


Fig. 3: Identifying Compressed Air Line, Pressure Sensor And Quick Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Select "Measurement" function on Diagnosis and Information System (DIS).

Set measuring range according to pressure sensor to 0...3.5 bar.

Using pressure regulator on special tool 16 1 171, increase pressure by 0.050 bar.

Connect special tool 16 1 174 to quick-release coupling of special tool 16 1 171.

Using pressure regulator on special tool 16 1 171, reset pressure in fuel tank to 0.050 bar above atmospheric.

IMPORTANT: Do not under any circumstances increase pressure by more than 0.100 Checking fuel tank and tank ventilation system for leaks Page 3 of 4 bar as this would result in damage to the fuel tank and the fuel tank venting system.

Using special tool **13 3 010** , disconnect delivery line (1) from special tool 16 1 171 to fuel filler neck.

Allow a rest period of approx. 20 sec.

Read off and note down starting pressure value.

Approx. Wait 60 seconds.

Read off final pressure value and compare with starting pressure value.

Measurement evaluation:

PRESSURE DROP MEASUREMENT EVALUATION

Pressure drop between 0.008 and 0.010 bar.	Repeat measurement.
Pressure drop in 60 secs. greater than 0.010 bar.	System leaking beyond permitted levels. **CARRY OUT LEAK TEST** .

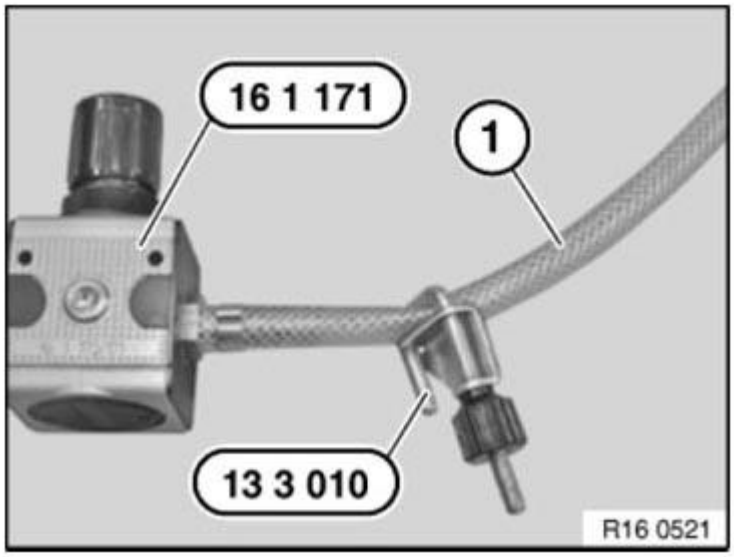


Fig. 4: Pinching Off Fee Line Using Special Tool (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

1600510 CONDUCTING LEAK TEST ON FUEL TANK AND TANK VENTING SYSTEM

IMPORTANT: On vehicles with tank leak diagnosis modules (DMTL), do not work with external pressurization as the tank ventilation system will leak under this condition.
On account of emerging fuel vapors, carry out all work in well ventilated rooms. Or use a suitable extractor system.
Observe country-specific accident prevention and occupational safety regulations.

NOTE: The following procedure is only applicable to vehicles with the tank leak diagnosis module (DMTL).
For vehicles without tank leak diagnosis module:
Pressurize FUEL TANK AND TANK VENTING SYSTEM .
During the leak test with a leak detector, be sure to follow the operating instructions of the equipment manufacturer.

NOTE: Select "Tank leak diagnosis module (DMTL)" on Diagnosis and Information System (DIS).

- **The leak diagnosis pump pressurizes the fuel tank and tank ventilation system for 30 sec.**

- **If pressure is needed for longer than 30 sec., press "Activate" button again after 30 sec.**

The leak test can be carried out with a leak detector.

Possible causes may be:

- - Tank cap leaking (check **TANK CAP PRESSURE RELIEF VALVE**)
- - Tank ventilation lines leaky (fuel tank-activated carbon canister-tank ventilation valve)
- - Tank ventilation valve leaky (engine compartment)
- - Fuel level sensor flange on tank leaking

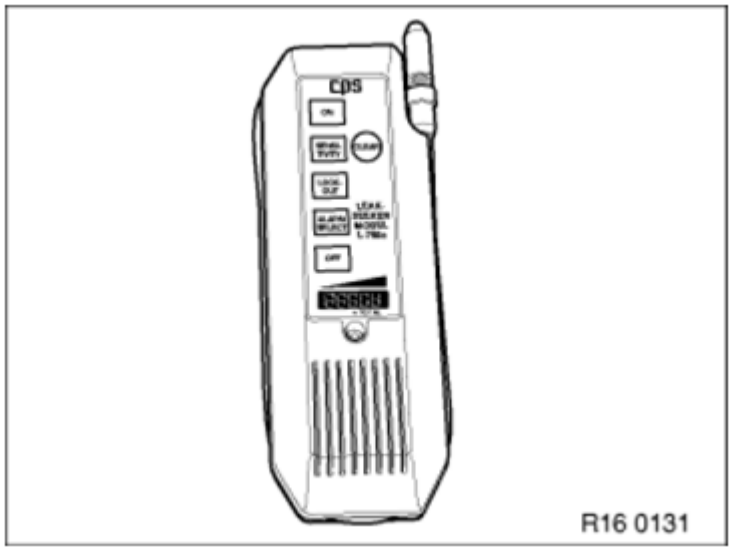


Fig. 5: Identifying Fuel Tank And Tank Venting System
Courtesy of BMW OF NORTH AMERICA, INC.

1600005 DRAINING AND FILLING FUEL TANK

Notes

IMPORTANT: Observe country-specific safety regulations.
Ensure adequate ventilation in the place of work!
Connect the exhaust and extraction systems to the exhaust tailpipe.
The electric fuel pump must not operate without fuel! After completing repairs but before starting the engine for the first time, fill the fuel tank with min. 5 l fuel through the fuel filler pipe.
Do not damage non-return flap when pulling out extraction hose.

Diesel vehicles

Before starting the engine for the first time, if the tank has been run dry or drawn off, fill with diesel fuel and turn on ignition for approx. 1 minute. The fuel circuit is thus filled and vented, which results in the engine firing more quickly.

Drawing off fuel

Start engine and allow to run.

The electric fuel pump runs.

In this way, the fuel is repumped through the suction jet pump from the left to the right side of the fuel tank.

NOTE: Fuel can be drawn out of left and right sides of tank through filler neck, leaving only a small residue. The residual amount is drawn off via the service opening.

Insert special tool **16 1 080** into fuel filler neck.

Special tool **16 1 080** has two different diameters for petrol/gasoline and diesel vehicles!

Slide extraction hose of extractor unit, refer to BMW Service Workshop Equipment and Planning Documentation, through special tool **16 1 080** into the fuel filler pipe, turning in the process if necessary.

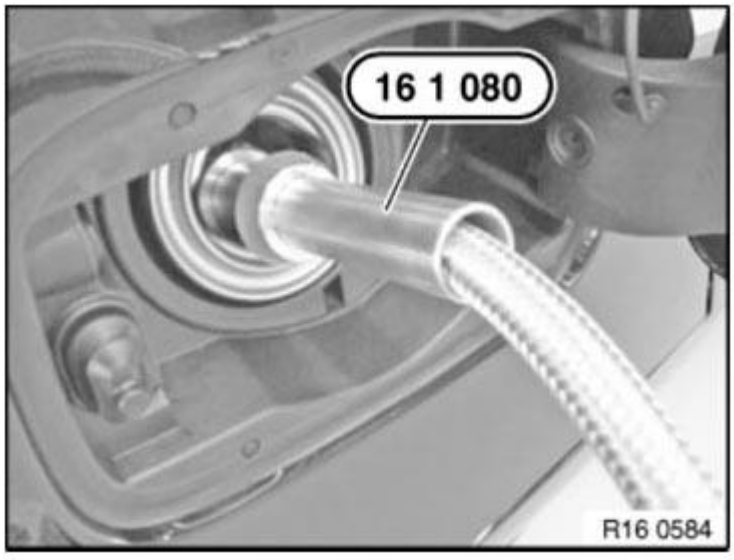


Fig. 6: Inserting Special Tool (16 1 080) Into Filler Neck
Courtesy of BMW OF NORTH AMERICA, INC.

Insertion length approx. 170 cm.

Draw off fuel with suction unit (refer to BMW Service Workshop Equipment) as far as possible.

Follow drawing off of fuel on fuel gauge in instrument cluster.

Drawing off residual fuel quantity

Drawing off residual fuel amount is not included in the time value of this operation.

IMPORTANT: Ensure car interior is adequately ventilated.
Catch dripping fuel in a suitable container.

Remove **flange cover** See **1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER (OUTER FUEL FILTER)** or **1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER**.

Draw off residual fuel quantity through service openings.

Fuel filling

Insert special tool **16 1 080** into fuel filler neck.

Special tool **16 1 080** has two different diameters for petrol/gasoline and diesel vehicles!

Slide extraction hose of extractor unit, approx. 40 cm into fuel filler pipe.

Fill fuel from suction extractor unit.

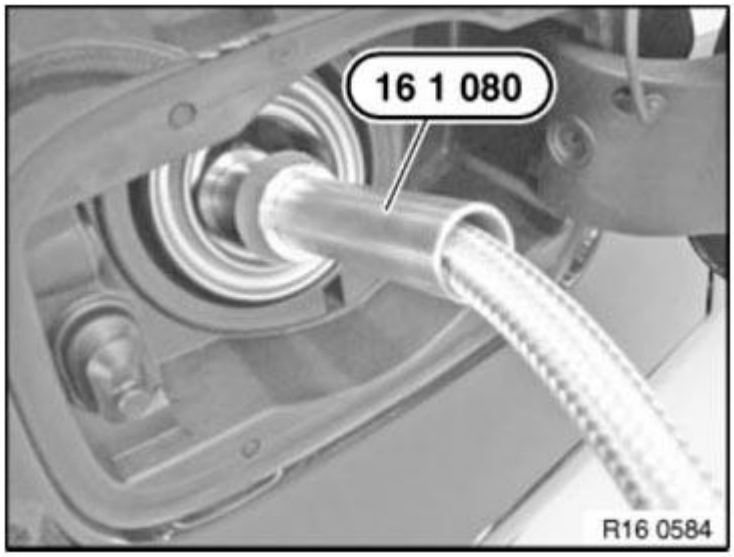


Fig. 7: Inserting Special Tool (16 1 080) Into Filler Neck
Courtesy of BMW OF NORTH AMERICA, INC.

Extracting fuel after a defect in the suction jet pump or fuel pump

Draw off right half of tank completely through fuel filler pipe.

Remove **flange cover** See **1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER (OUTER FUEL FILTER)** or **1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER**.

Insert extraction hose through service opening in tank, fuel (also residual quantity) can be drawn off.

1600 FUNCTIONAL DESCRIPTION FOR GENERAL FUEL SUPPLY SYSTEMS

Fuel supply systems in gasoline engines

Fuel system

The fuel is delivered from the fuel tank by the fuel pump via the feed line with a defined primary pressure to the high pressure pump. The primary pressure is monitored by the fuel pressure sensor. The fuel is delivered by the fuel pump as required. A return line is not required.

Tank-venting system

The tank safety valve is a closed system that is bled via a carbon canister. The carbon in the canister is stored as granules. The large surface of the granules traps the fuel vapor, that occurs in the fuel tank. The carbon canister needs to be refreshed regularly in order to be able to continue to store fuel vapor. This is done by flushing it with fresh air from the intake pipe. This process is controlled by the engine control unit.

Diesel engine fuel supply systems

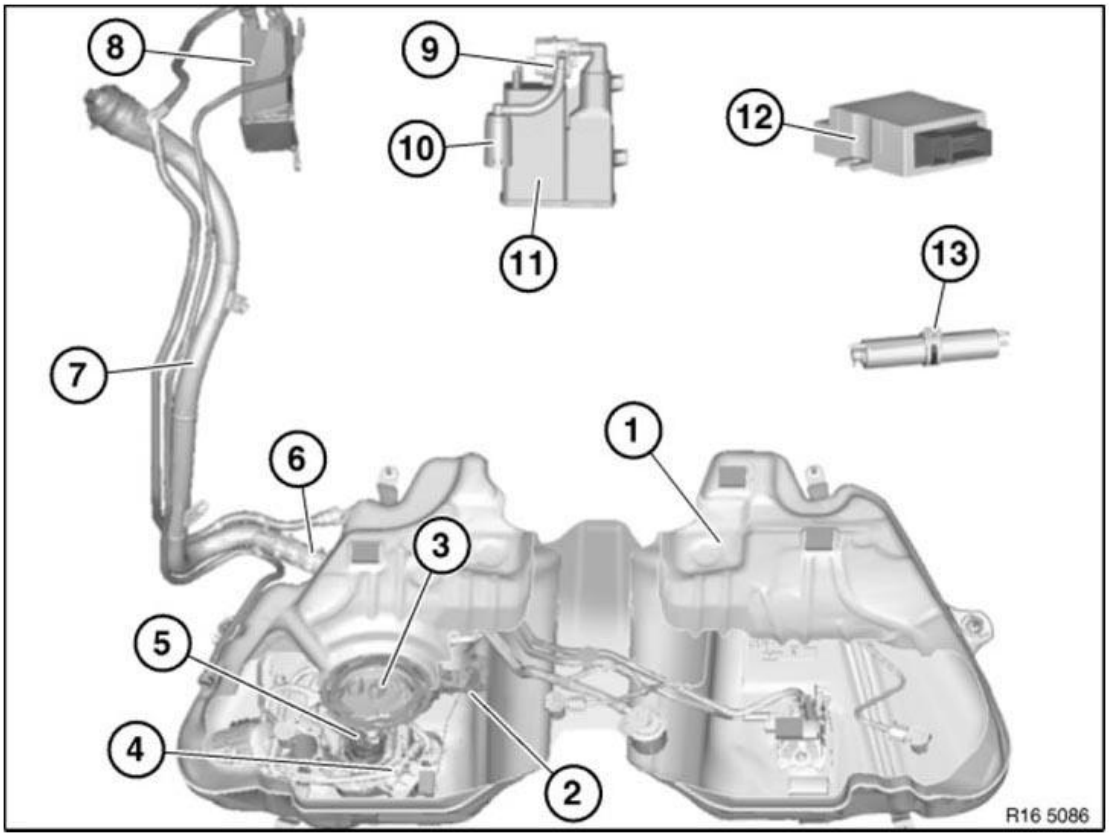
Fuel system

The fuel is delivered from the fuel tank by the fuel pump via the feed line to the high pressure pump. The fuel pump delivers more fuel than the engine requires. A return line is required.

Tank-venting system

Diesel fuel is slow-evaporating, therefore no carbon canister is required. The fuel tank is bled directly into the atmosphere.

1600.. OVERVIEW OF FUEL SUPPLY SYSTEM (PETROL/GASOLINE)



0 Draw off fuel

1 Fuel tank
2 Tank fill level sensor
3 Flange cover
4 Fuel filter with pressure regulator
5 Fuel pump
6 Filling hose
7 Fuel filler pipe
8 Carbon canister
9 Tank leak diagnosis module (US version)
10 Dust filter (US version)
11 Carbon canister (US version)
12 Control unit for electric fuel pump
13 Fuel filter (outer)

Fig. 8: Overview Of Fuel Supply System (Petrol/Gasoline)
Courtesy of BMW OF NORTH AMERICA, INC.

1611 FUEL TANK WITH MOUNTING

1611130 CHECKING FILLER CAP PRESSURE RELIEF VALVE

Notes

Set pressure regulator on special tool 16 1 171 fully in "-" direction.

Connect special tool 16 1 171 using compressed air line (1) to workshop compressed air system (8... 10 bar).

Connect pressure sensor (2) from Diagnosis and Information System.

Connect special tool 16 1 172 to quick-release coupling (3).

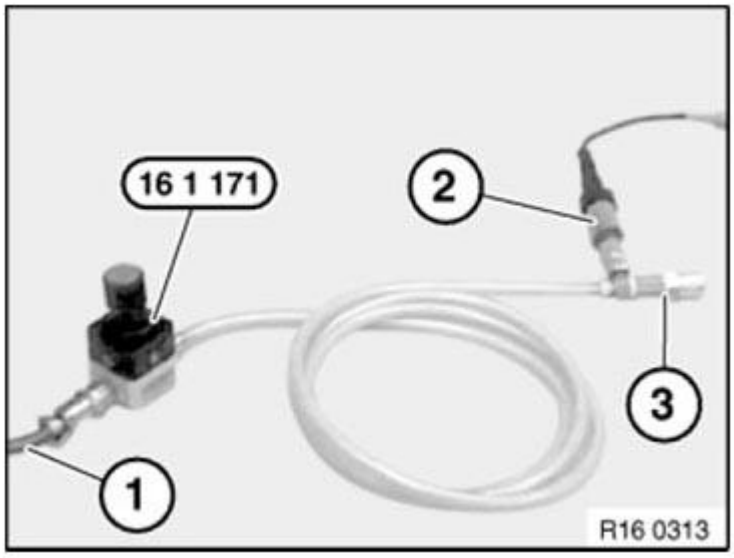


Fig. 9: Identifying Pressure Sensor, Air Line, Quick Release Coupling And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Install fuel filler cap on special tool 16 1 172.

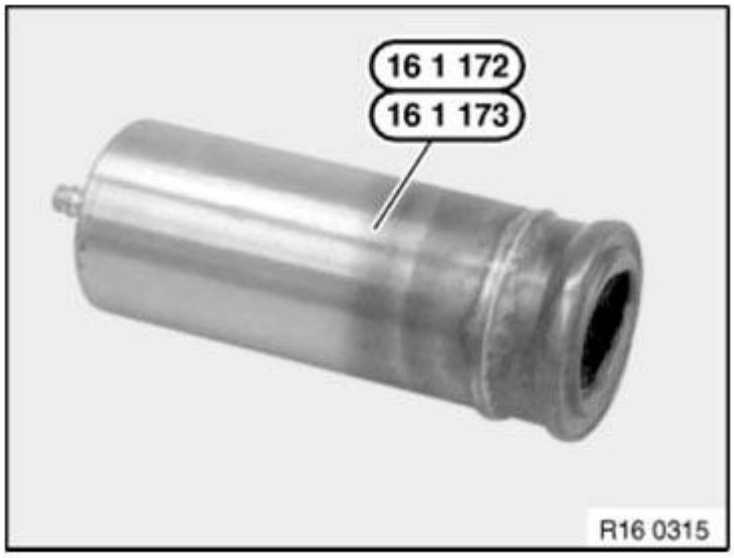


Fig. 10: Identifying Fuel Filler Cap With Special Tool (16 1 172)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Only the absolute pressure is indicated in the display of the Diagnosis and Information System (DIS). The current ambient air pressure is already displayed

without additional pressurization.

Check testing equipment for leaks.

Select "Measurement/Pressure" function on Diagnosis and Information System (DIS).

Using pressure regulator on special tool 16 1 171, increase pressure by 0.2 bar.

Using special tool **13 3 010** clamp off feed line from special tool 16 1 171.

Read off and note down pressure.

Wait 60 seconds.

Read off pressure again and compare with starting pressure value.

Measurement evaluation:

PRESSURE DROP MEASUREMENT EVALUATION

Pressure drop > 0.012 bar	Test equipment leaking. Check connection points for leaks.

Check fuel filler cap pressure relief valve!

Select "Measurement/Pressure" function on Diagnosis and Information System (DIS).

Using pressure regulator on special tool 16 1 171, increase pressure by 0.3 bar.

Using special tool **13 3 010** clamp off feed line from special tool 16 1 171.

Read off and note down pressure.

Wait 60 seconds.

Read off pressure value again and compare with starting pressure value.

Measurement evaluation:

PRESSURE DROP MEASUREMENT EVALUATION

Pressure drop > 0.012 bar	Filler cap pressure relief valve faulty. Replace filler cap.

1611060 REMOVING AND INSTALLING OR REPLACING FUEL FILLER PIPE (PETROL/GASOLINE)

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!
Before starting the engine for the first time:

- **Fill fuel tank with at least 5 liters of fuel.**
- **Check ground connection at fuel filler neck to body for continuity. If necessary, clean contact surface between body and fuel filler pipe screw connection.**

Necessary preliminary tasks

- Draw off **FUEL** from fuel tank
- Remove **REAR RIGHT WHEEL ARCH TRIM**

Unhook retaining strap (1) from tank flap.

Open cap and set to one side.

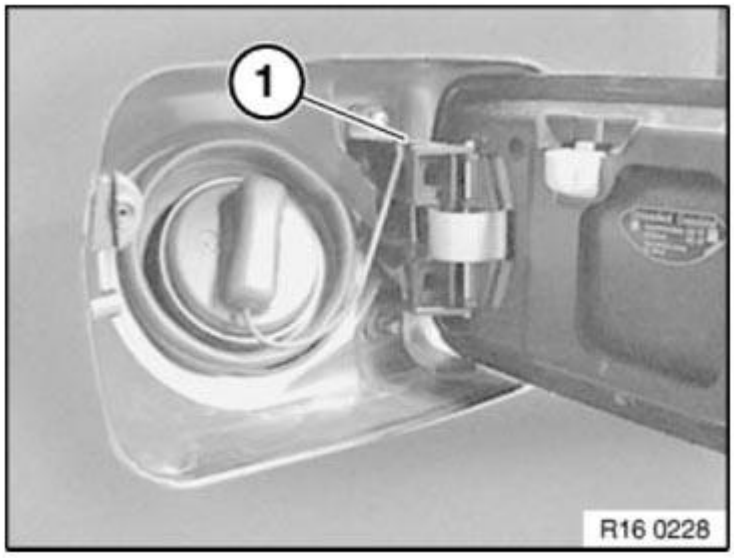


Fig. 11: Identifying Tank Flap Retaining Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Release plastic nut (1).

Installation:

Check plastic nut (1), replace if necessary.

Tightening torque **16 12 2AZ** .

Unclip line holder (2).

Release hexagon nut (3).

Installation:

Tightening torque **16 12 2AZ** .

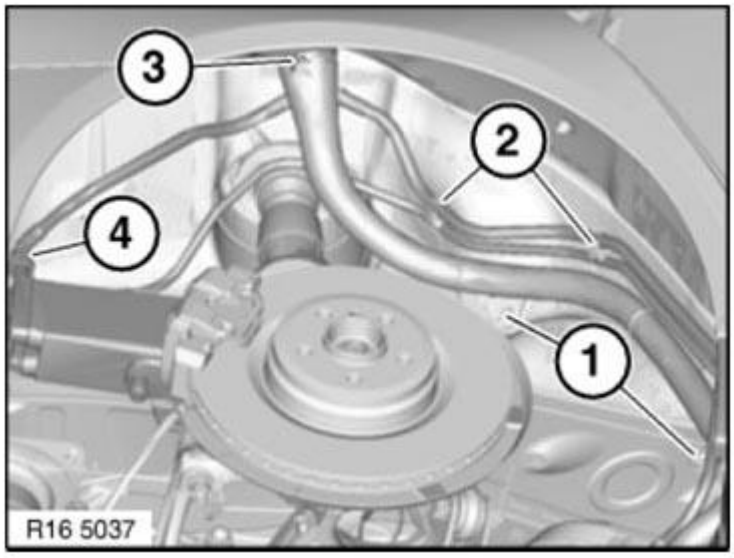


Fig. 12: Identifying Quick Release Coupling, Line Holder And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release quick-release coupling (4).

Unclip line (1).

Installation:

Make sure lines (1) and (2) are correctly seated in holder.

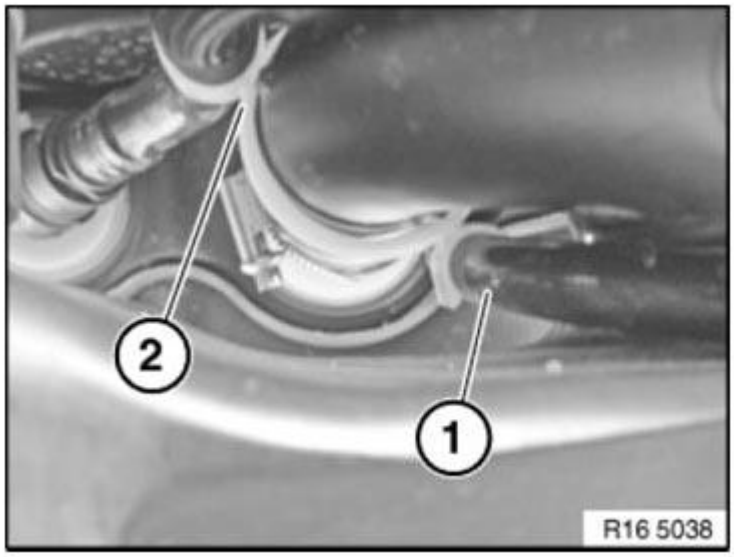


Fig. 13: Identifying Line Holders
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There may be residual amounts of fuel in the tank! Catch escaping fuel in a suitable container.

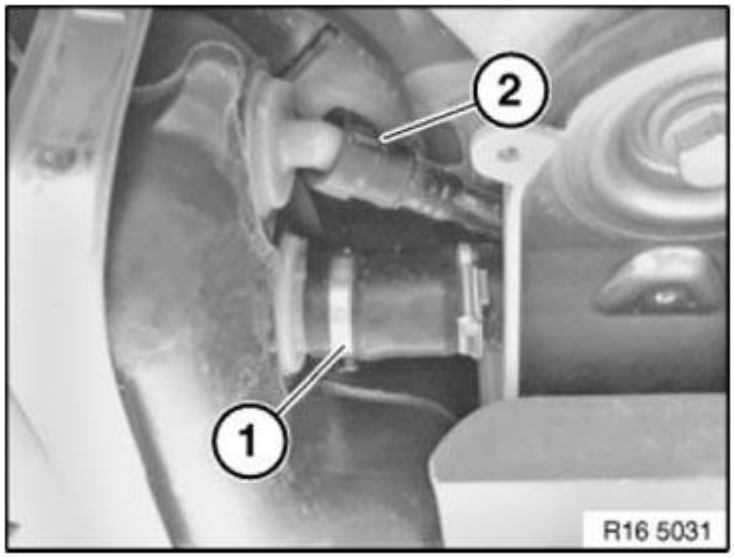


Fig. 14: Identifying Fuel Tank Hose Clip And Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Installation:

Check hose clamp, replace if necessary.

Tightening torque **16 12 1AZ** .

Release quick-release coupling (2).

Remove fuel filler pipe.

Replacement

Unfasten hose clip (1).

Installation:

Check hose clamp, replace if necessary.

Tightening torque **16 12 1AZ** .

Detach filler hose (2) from fuel filler pipe (3).

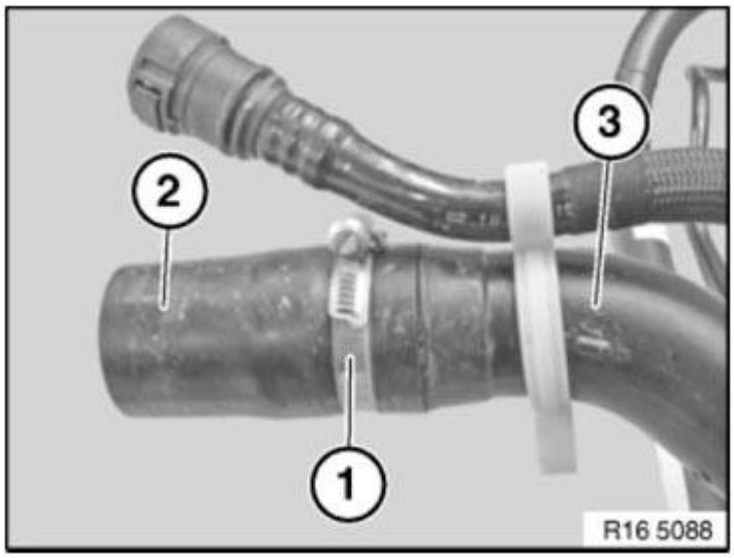


Fig. 15: Identifying Fuel Filler Pipe, Filler Hose And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

1611048 REMOVING AND INSTALLING/REPLACING FUEL FILTER WITH PRESSURE REGULATOR

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!
Ensure absolute cleanliness when working on the open fuel system.
Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

- Necessary preliminary tasks:
- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:**

  Remove right **REAR SEAT**

- **REMOVE FLANGE COVER**
- Remove **FUEL PUMP**

NOTE: Picture does not show the fuel tank outer skin.

Unclip grounding cable (1) and feed out of holders.

Disconnect fuel line (2).

Press pressure regulator together at tabs (4) and detach in upward direction.

Unlock fuel filter (3) and pull out.

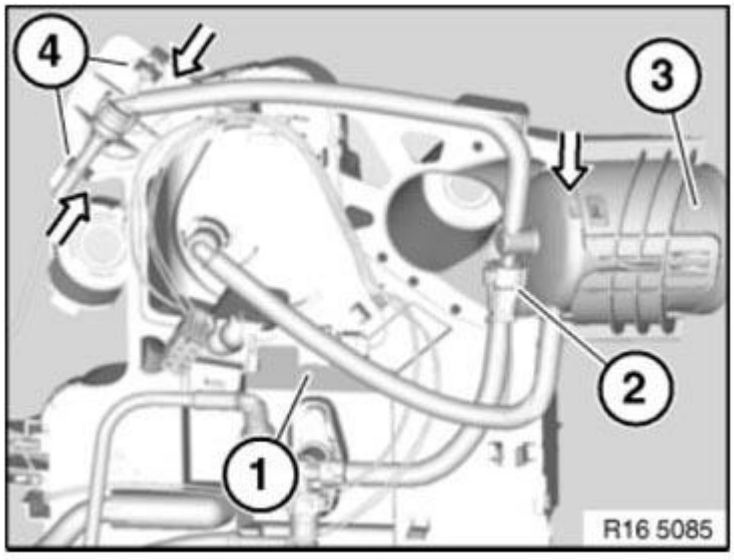


Fig. 16: Identifying Fuel Filter, Grounding Cable, Pressure Regulator Tabs And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

1611030 REMOVING AND INSTALLING/REPLACING FUEL TANK (PETROL/GASOLINE)

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!
After installation of fuel tank/prior to first engine start-up:

- **Check ground connection at fuel filler neck to body for continuity. If necessary, clean contact surface between body and fuel filler pipe screw connection.**
- **Fill fuel tank with at least 5 liters of fuel.**

Necessary preliminary tasks

- Draw off **FUEL** from fuel tank
- Remove **REAR SEAT**
- **Vehicles with comfort seat:**

  Remove right **REAR SEAT**

- Remove rear right **WHEEL ARCH TRIM**
- Remove **PROPELLER SHAFT**
- Remove **TENSION STRUT** on left and right

For F02 rear air conditioners:

- Remove refrigerant lines

Remove sound insulation (1).

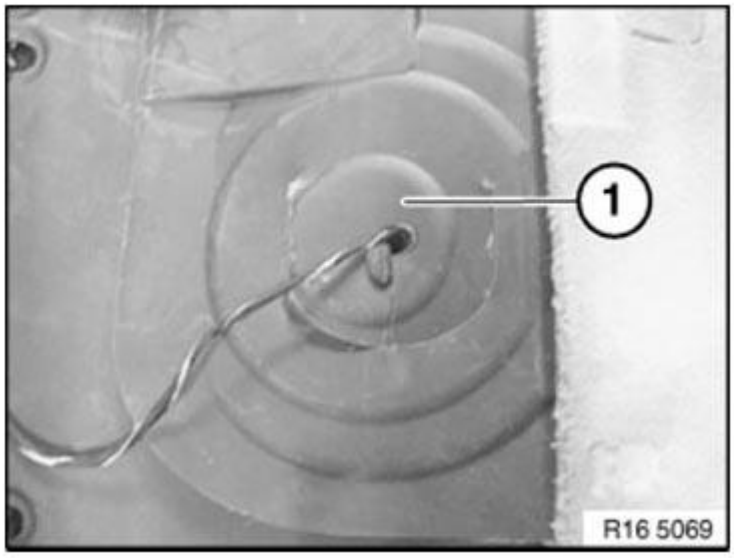


Fig. 17: Identifying Sound Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Remove cover for service opening (2).

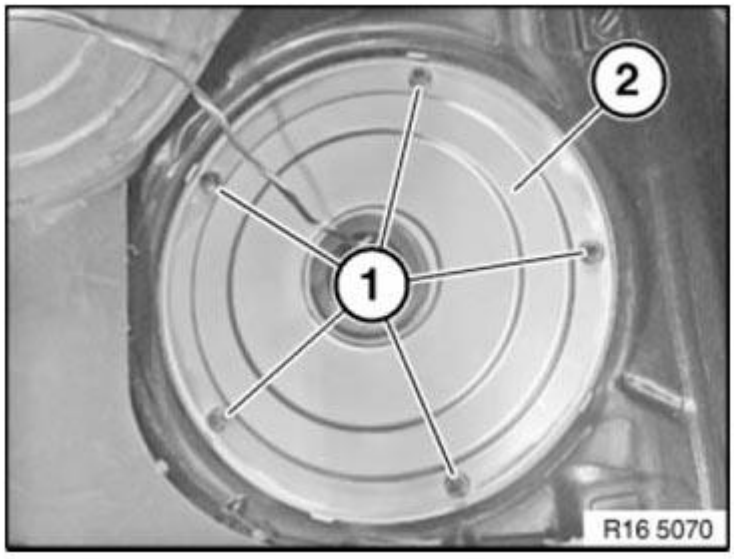


Fig. 18: Identifying Sound Insulation Cover Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect fuel line (2).

If necessary, disconnect fuel line for independent heating.

Installation:

Check seal (3), replace if necessary.

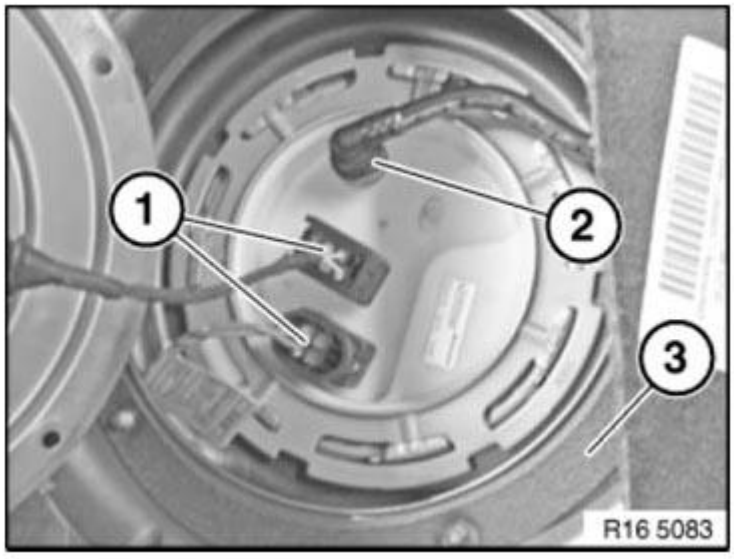


Fig. 19: Identifying Plug Connection, Fuel Line And Oil Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Vehicles with outer fuel filter (S1AKA):

Disconnect plug connection (1).

Disconnect fuel lines (2).

Installation:

Check seal (3), replace if necessary.

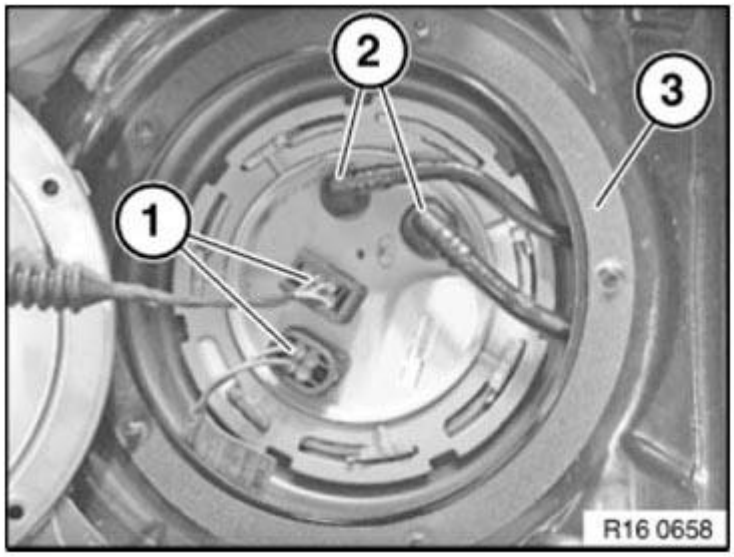


Fig. 20: Identifying Plug Connection, Fuel Line And Oil Seal (Vehicles With Outer Fuel Filter)
Courtesy of BMW OF NORTH AMERICA, INC.

Release plastic nuts (1).

Installation:

Check plastic nuts (1), replace if necessary.

Tightening torque **16 12 2AZ** .

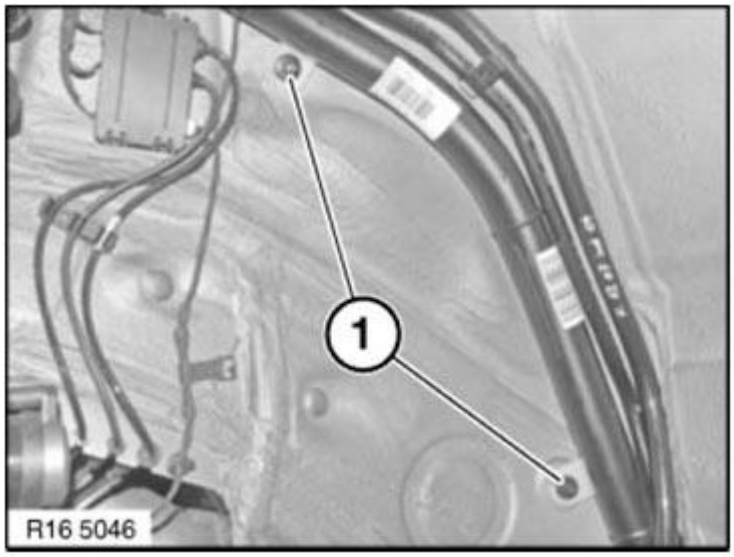


Fig. 21: Identifying Plastic Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There may be residual amounts of fuel in the tank.

Catch escaping fuel in a suitable container.

Unfasten hose clip (1).

Installation:

Check hose clamp (1), replace if necessary.

Tightening torque **16 12 1AZ** .

Release quick-release coupling (2). Detach line.

Detach fuel filler pipe.

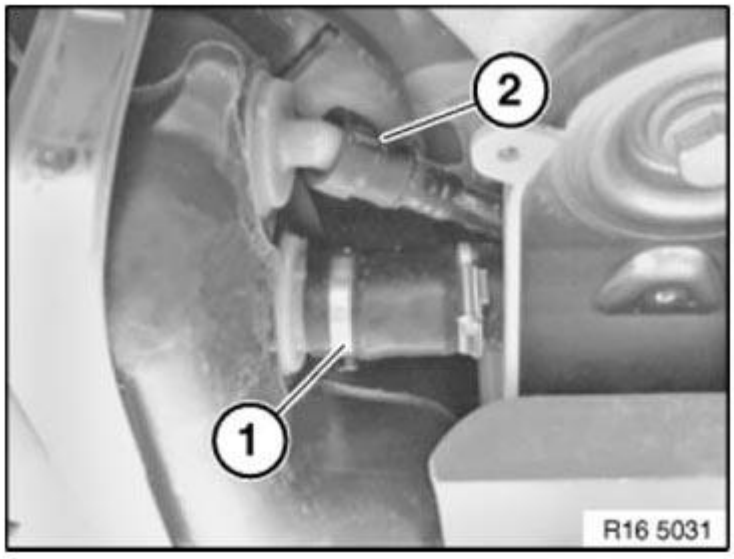


Fig. 22: Identifying Hose Clip And Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure lines (1) and (2) are correctly seated in holder.

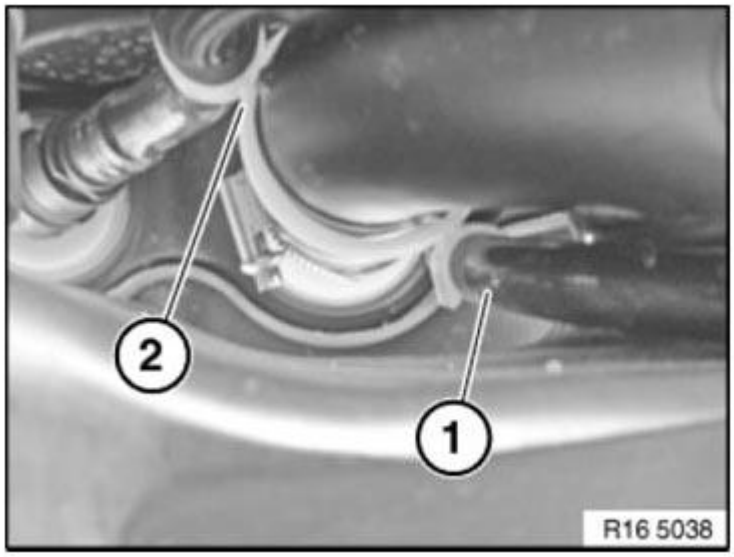


Fig. 23: Identifying Fuel Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Tightening torque **16 11 1AZ** .

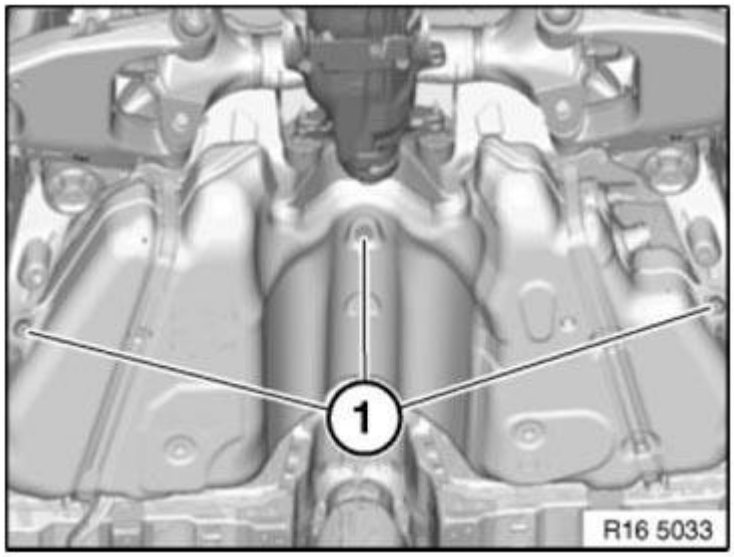


Fig. 24: Identifying Fuel Tank Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Secure fuel tank against slipping and falling out.

Heavily support the fuel tank.

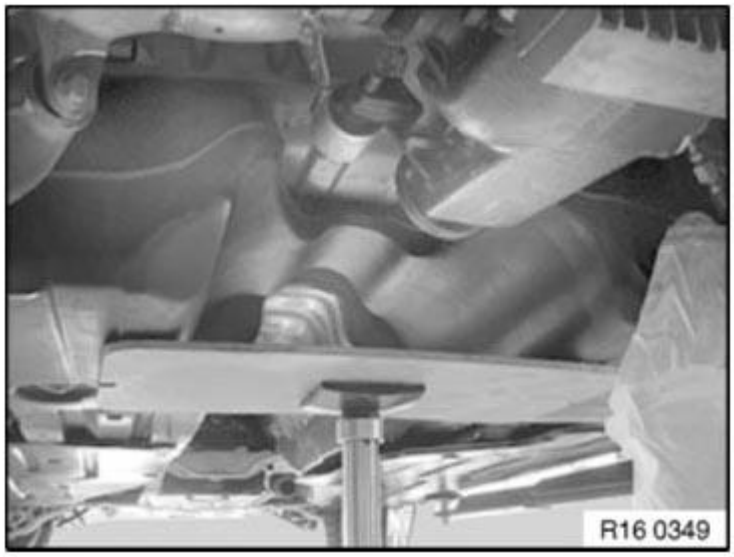


Fig. 25: Identifying Fuel Tank With Support
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Tightening torque **16 11 2AZ** .

Lower fuel tank.

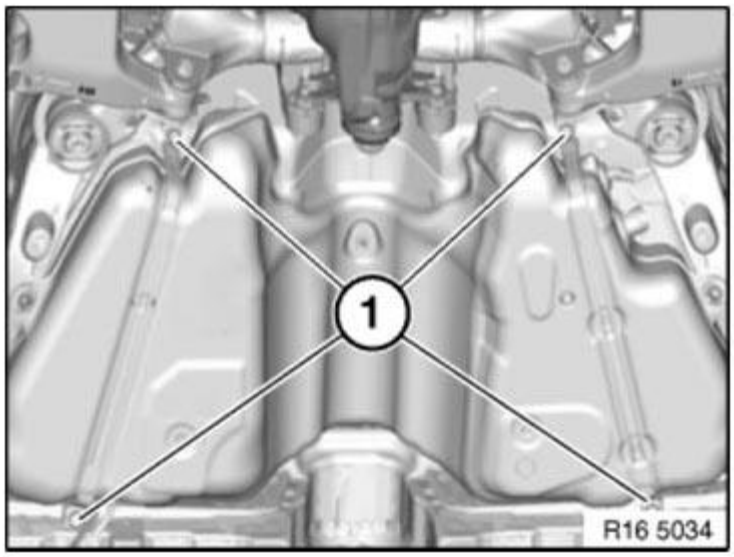


Fig. 26: Identifying Fuel Tank Mounting Screws

Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, disconnect fuel line for independent heating.

Remove fuel tank.

Replacement

- Convert **flange cover** See **1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER (OUTER FUEL FILTER)** or **1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER**
- Convert **fuel pump** See **1614200 REMOVING AND INSTALLING/REPLACING FUEL PUMP (OUTER FUEL FILTER)** or **1614200 REMOVING AND INSTALLING OR REPLACING FUEL PUMP**
- Convert **pressure regulator** See **1614220 REMOVING AND INSTALLING/REPLACING PRESSURE REGULATOR (OUTER FUEL FILTER)** or **1611048 REMOVING AND INSTALLING/REPLACING FUEL FILTER WITH PRESSURE REGULATOR**
- Convert **TANK FILL LEVEL SENSOR**

1611030 REMOVING AND INSTALLING/REPLACING FUEL TANK FILLER HOSE

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready. Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!
After installation of fuel tank/prior to first engine start-up:

- **Check ground connection at fuel filler neck to body for continuity. If necessary, clean contact surface between body and fuel filler pipe screw connection.**
- **Fill fuel tank with at least 5 liters of fuel.**

Necessary preliminary tasks

- Draw off **FUEL** from fuel tank
- Remove rear right **WHEEL ARCH TRIM**

Release plastic nuts (1).

Installation:

Check plastic nuts (1), replace if necessary.

Tightening torque **16 12 2AZ** .

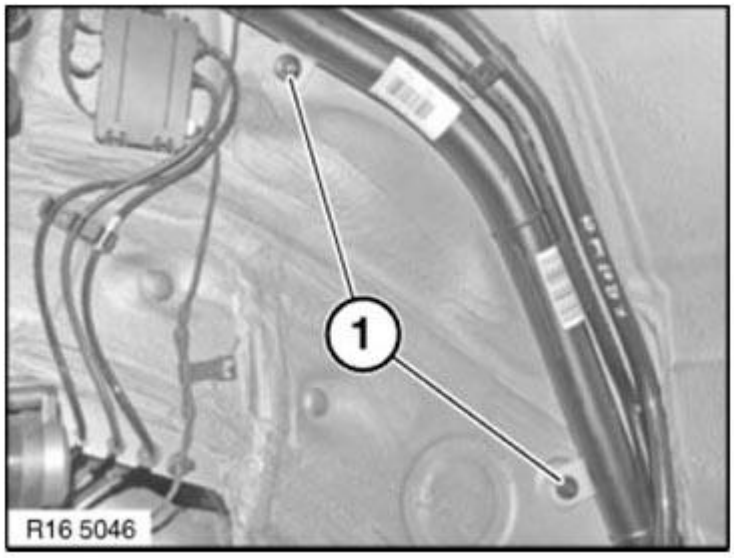


Fig. 27: Identifying Plastic Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There may be residual amounts of fuel in the tank. Catch escaping fuel in a suitable container.

Unfasten hose clip (2).

Installation:

Check hose clamp (2), replace if necessary.

Tightening torque **16 12 1AZ** .

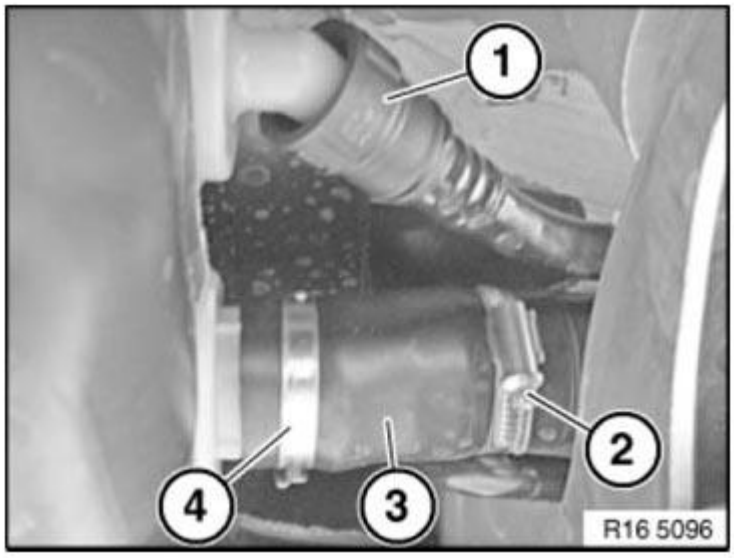


Fig. 28: Identifying Filler Hose, Hose Clamp And Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Release quick-release coupling (1).

Detach fuel filler pipe from filler hose (3).

Release hose clamp (4) and remove filler hose (3).

Installation:

Check hose clamp (4), replace if necessary.

Tightening torque **16 12 1AZ** .

Installation:

Make sure lines (1) and (2) are correctly seated in holder.

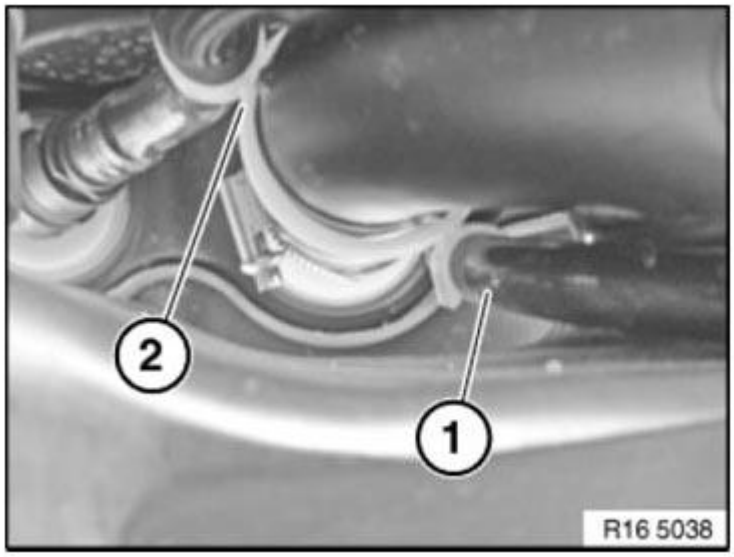


Fig. 29: Identifying Fuel Lines
Courtesy of BMW OF NORTH AMERICA, INC.

1611350 REPLACING CLAMPING BANDS FOR FUEL TANK

Necessary preliminary tasks

- F03: Remove underbody panelling

IMPORTANT: Secure fuel tank against slipping and falling out.

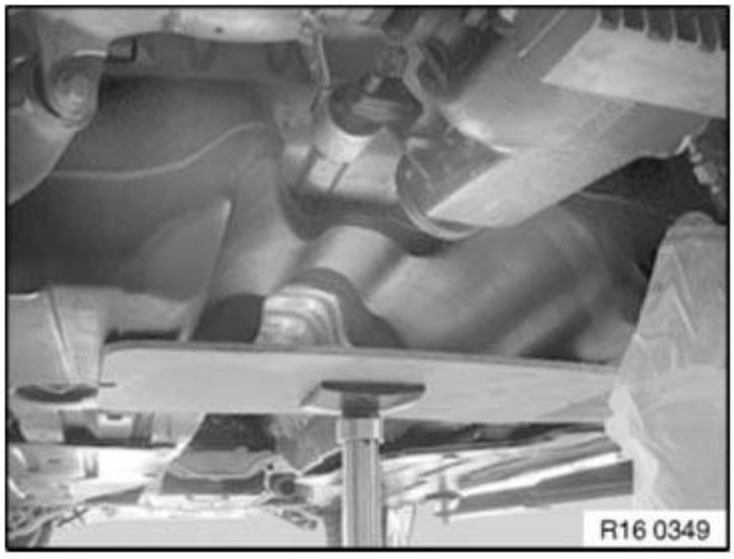


Fig. 30: Identifying Fuel Tank With Support
Courtesy of BMW OF NORTH AMERICA, INC.

Generously support the fuel tank.

Release screws (1).

Installation:

Tightening torque **16 11 2AZ** .

Remove tightening strap (2).

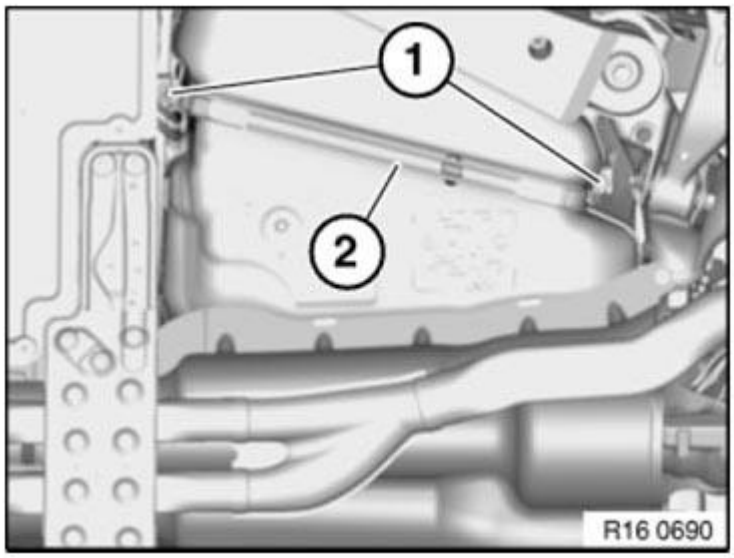


Fig. 31: Identifying Tightening Strap With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

1612 FUEL DELIVERY, SENSOR FOR DISPLAY

1612010 REMOVING AND INSTALLING OR REPLACING CARBON CANISTER

Necessary preliminary tasks

- Remove rear right **WHEEL ARCH COVER**

Unlock quick-release fasteners (1) and disconnect vent lines.

Release screws (2) and swing out carbon canister (3).

Installation:

Tightening torque **16 13 1AZ** .

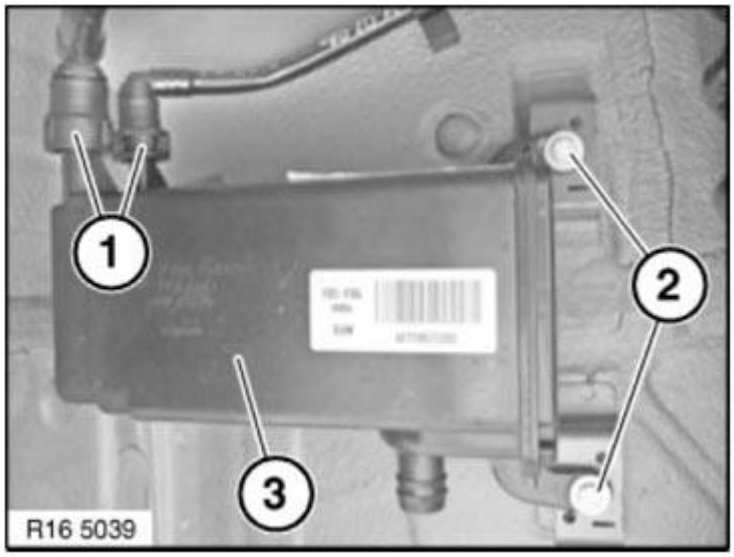


Fig. 32: Identifying Carbon Canister With Quick-Release Fasteners And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

16 12 060 REMOVING AND INSTALLING/REPLACING CARBON CANISTER (US VERSION NVLD)

Necessary preliminary work:

- Remove rear right **WHEEL ARCH PANEL** .

Unlock snap fasteners (1) and remove tank ventilation lines.

Disconnect plug connection (2).

Release screws (3) and swing out carbon canister.

Installation note:

Tightening torque **16 13 1AZ** .

The following components must be modified when the carbon canister is replaced:

- **DUST FILTER NVLD**
- **PRESSURE SWITCH NVLD**

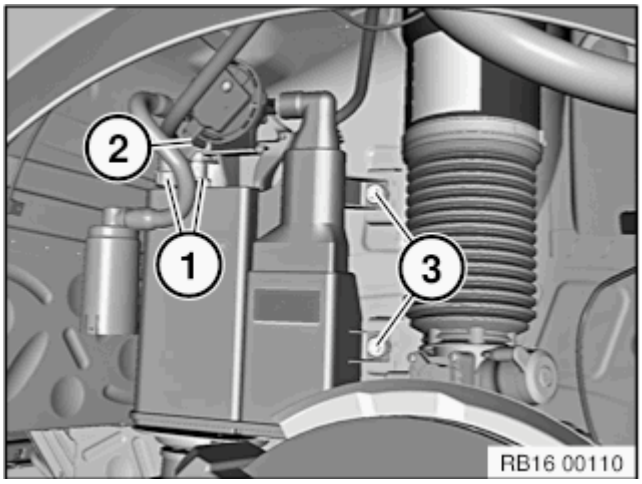


Fig. 33: Identifying Snap Fasteners, Connector, And Screws For Carbon Canister (NVLD)
Courtesy of BMW OF NORTH AMERICA, INC.

1612010 REMOVING AND INSTALLING/REPLACING CARBON CANISTER (US VERSION)

Necessary preliminary tasks

- Remove rear right **WHEEL ARCH COVER**

Disconnect plug connection (1).

Unlock quick-release fasteners (2) and disconnect vent lines.

Release screws (3) and swing out carbon canister (4).

Installation:

Tightening torque **16 13 1AZ** .

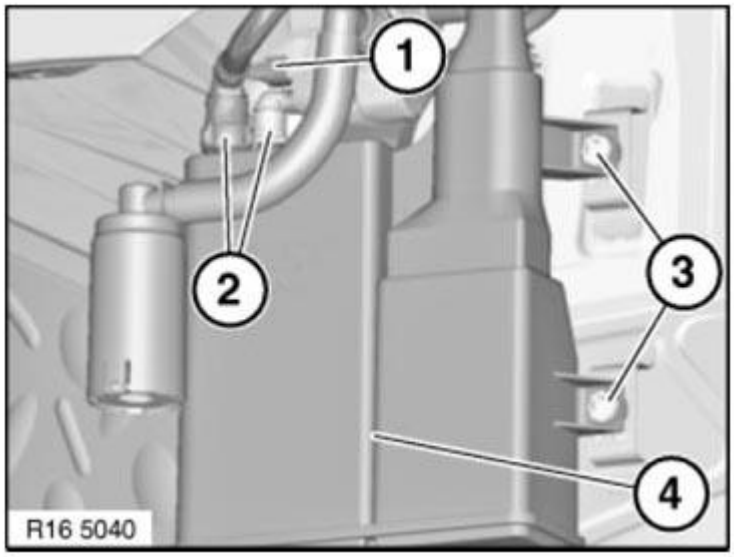


Fig. 34: Identifying Carbon Canister (US Version) With Quick-Release Fasteners And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

The following components must be modified when the carbon canister is replaced:

- **DUST FILTER**
- **DIAGNOSIS MODULE**

1612000 REMOVING AND INSTALLING/REPLACING SENSOR FOR FUEL GAUGE

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!
Ensure absolute cleanliness when working on the open fuel system.
Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:**

Remove right **REAR SEAT**

- **Remove flange cover** See **1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER (OUTER FUEL FILTER)** or **1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER**

NOTE: Picture does not show the fuel tank outer skin.

Unclip connecting line for level sensor (2) through service opening (1).

Disconnect plug connector for level sensor (3) from plug connector installation unit on left (4).

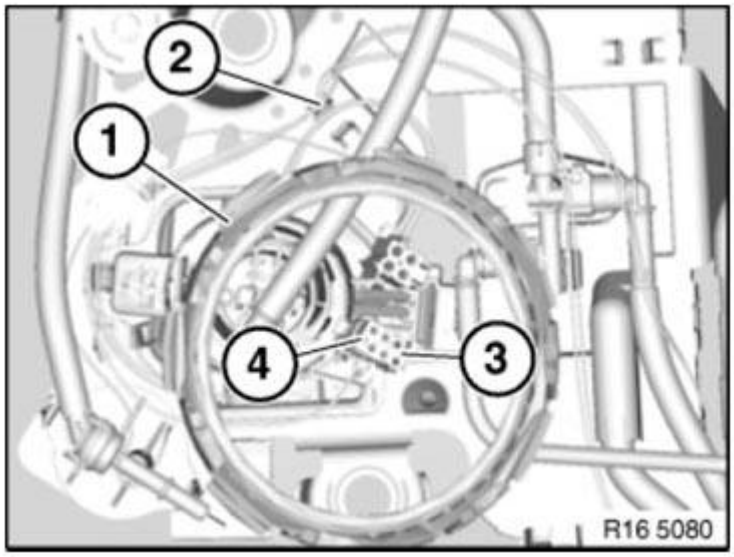


Fig. 35: Identifying Fuel Level Sensor With Connector, Service Opening And Connector Installation Unit
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture does not show the fuel tank outer skin.

Unlock tab (3) in upward direction through service opening (1) and lift out level sensor (2).

Installation:

Level sensor (2) must audibly snap into place.

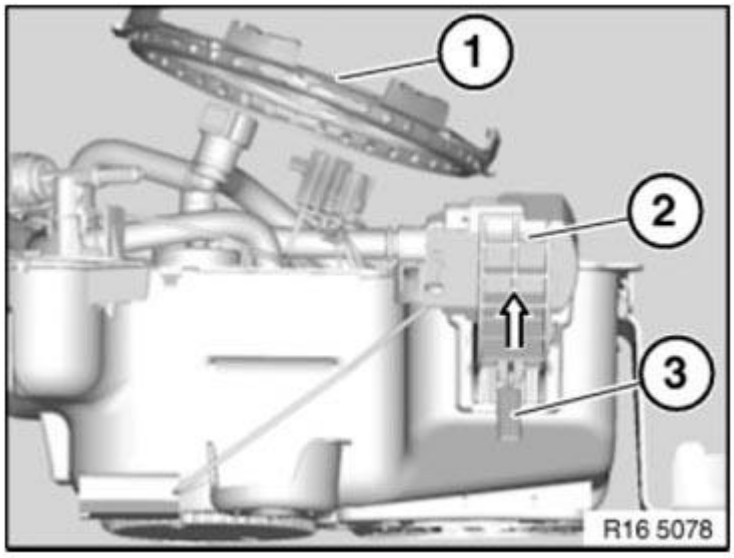


Fig. 36: Unlocking Fuel Level Sensor Tab In Upward Direction
Courtesy of BMW OF NORTH AMERICA, INC.

1612.. REPLACING OUTER FUEL FILTER

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid contact with skin!
Avoid contact with eyes!
Fuel escapes when fuel lines are detached. Have a collecting container ready.
Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

- Remove left **UNDERBODY PANELLING**

IMPORTANT: Fuel in fuel lines is under pressure
Fuel escapes when fuel lines (1) are disconnected!
Catch and dispose of escaping fuel.

Disconnect fuel lines (1).

Release screw (2).

Remove fuel filter (3).

Installation:

After completing tasks, check fuel system for leaks.

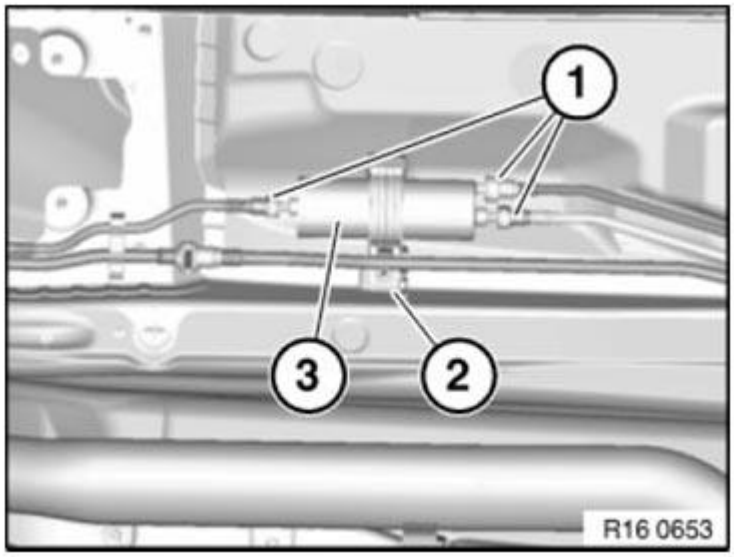


Fig. 37: Identifying Fuel Filter With Fuel Lines And Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

1613 FUEL DE-AERATION

16 13 521 REMOVING AND INSTALLING/REPLACING PRESSURE SWITCH FOR NATURAL VACUUM LEAK DETECTION (NVLD)

Necessary preliminary work:

- Remove **CARBON CANISTER**.
- Remove **DUST FILTER**.

Unlock and disconnect snap fastener (1).

Unfasten screws (2).

Pull off pressure switch (3) in direction of arrow.

Installation note:

Check gaskets and replace if necessary.

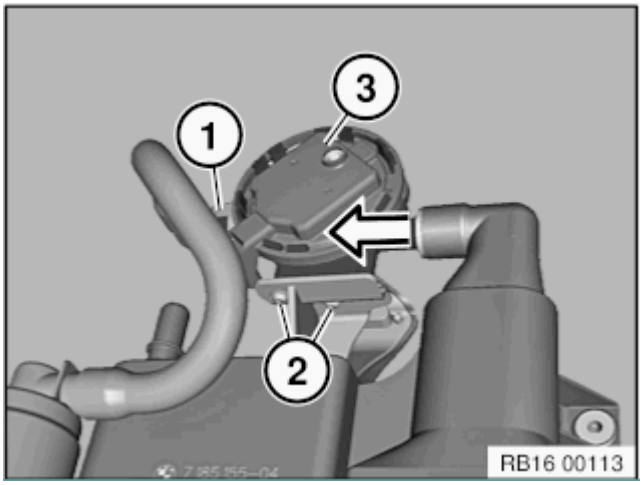


Fig. 38: Identifying Natural Vacuum Leak Detection (NVLD) Pressure Switch, Snap Fastener, And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

1613015 REMOVING AND INSTALLING/REPLACING TANK LEAK DIAGNOSIS MODULE (PETROL/GASOLINE CARS WITH US DMTL VERSION)

Necessary preliminary tasks

- Remove **CARBON CANISTER**

Unlock and disconnect snap fastener (1).

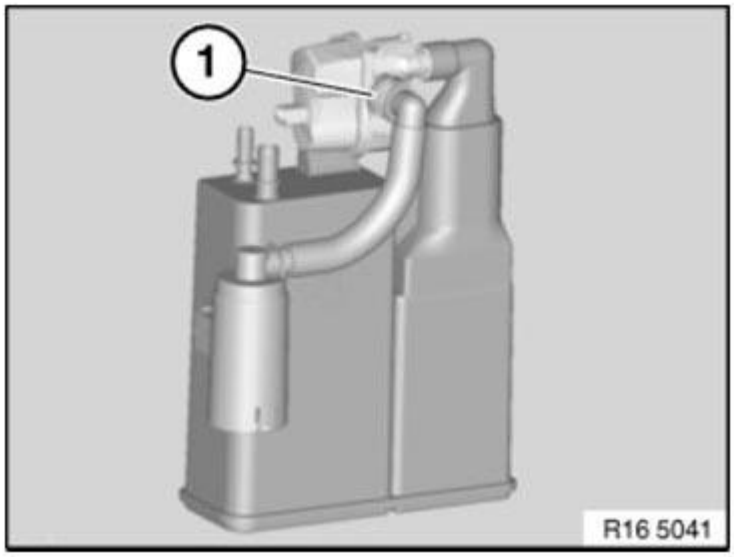


Fig. 39: Identifying Carbon Canister Snap Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Detach diagnosis module (2).

Installation:

Replace gasket (3).

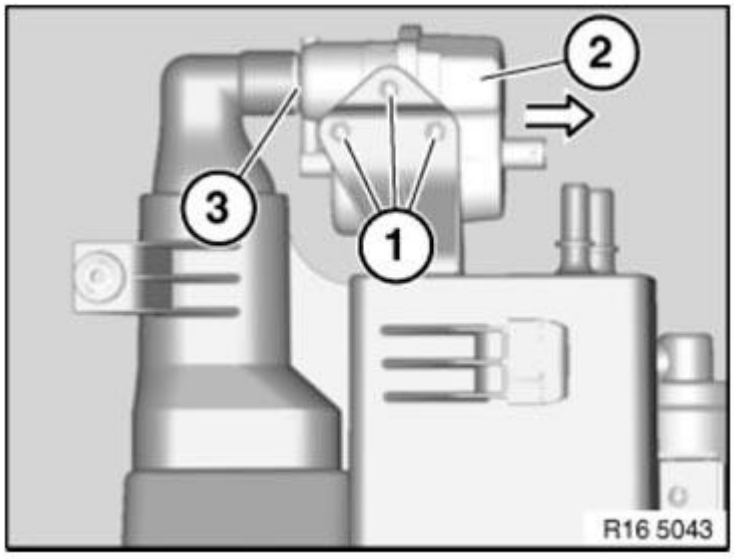


Fig. 40: Identifying Carbon Canister Diagnosis Module And Gasket With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

1614 FUEL PUMP

1614500 REMOVING AND INSTALLING OR REPLACING CONTROL UNIT FOR ELECTRIC FUEL PUMP

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection).

Necessary preliminary tasks

- Remove **STORAGE COMPARTMENT** in luggage compartment

Disconnect plug connection (1).

Unfasten screws (2).

Remove control unit (3).

Installation:

Tightening torque **16 14 1AZ** .

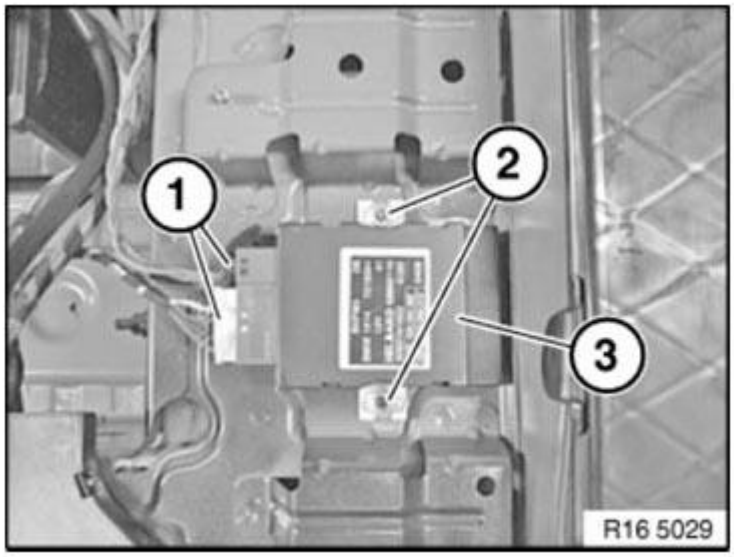


Fig. 41: Identifying Electric Fuel Pump Control Unit With Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out programming/encoding

1614200 REMOVING AND INSTALLING OR REPLACING FUEL PUMP

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!
Ensure absolute cleanliness when working on the open fuel system.
Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:**

  Remove right **REAR SEAT**

- **REMOVE FLANGE COVER**

NOTE: Picture does not show the fuel tank outer skin.

Disconnect earth cable (1).

Disconnect fuel lines (2).

Release lock (4) and remove pump housing cover (3).

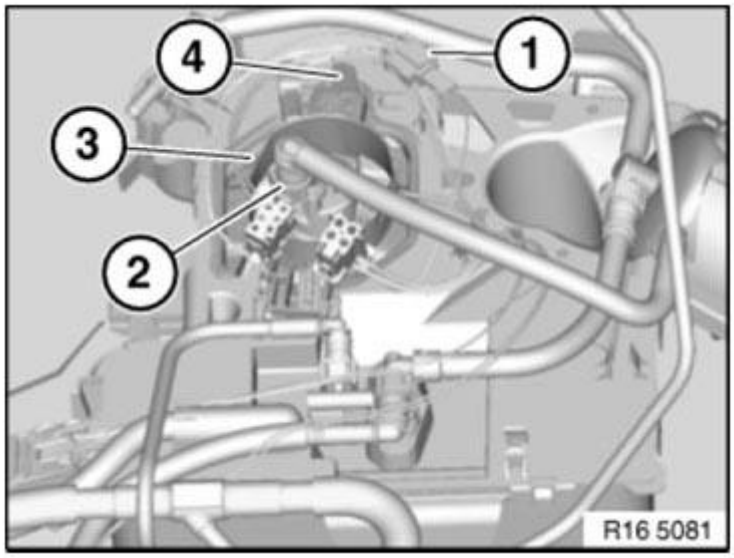


Fig. 42: Identifying Fuel Pump Housing Cover With Fuel Lines, Earth Cable And Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Release lock (1) and remove fuel pump (2) towards top.

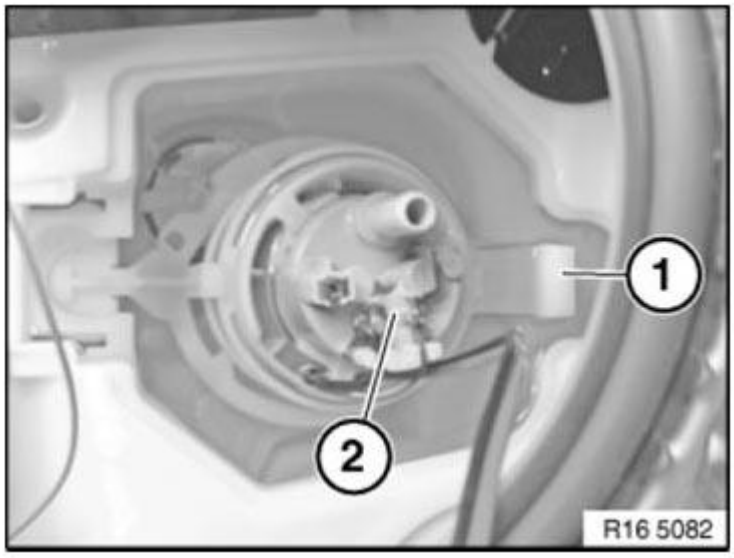


Fig. 43: Identifying Fuel Pump With Lock
Courtesy of BMW OF NORTH AMERICA, INC.

16 14 065 REMOVING AND INSTALLING/REPLACING DUST FILTER FOR NATURAL VACUUM LEAK DETECTION (NVLD)

Necessary preliminary work:

- Remove **CARBON CANISTER**.

Unlock and disconnect snap fastener (1).

Release screw (2) and remove dust filter (3).

Installation note:

Check gasket and replace if necessary.

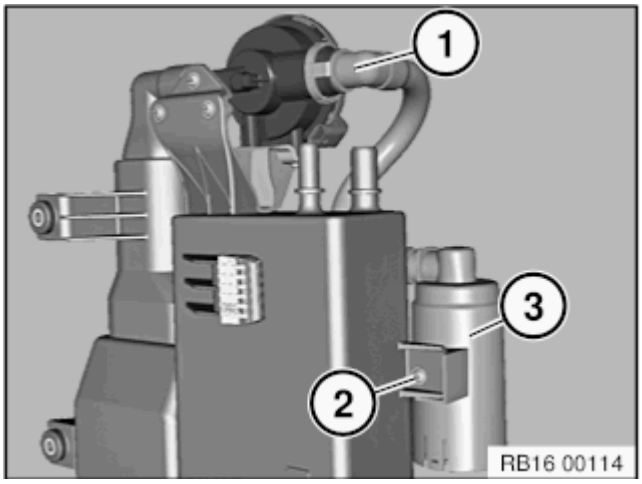


Fig. 44: Identifying Natural Vacuum Leak Detection (NVLD) Dust Filter, Snap Fastener, And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

1614060 REMOVING AND INSTALLING/REPLACING DUST FILTER FOR TANK LEAK DIAGNOSIS MODULE (DMTL)

Necessary preliminary tasks

- Remove **CARBON CANISTER**

Unlock and disconnect snap fastener (1).

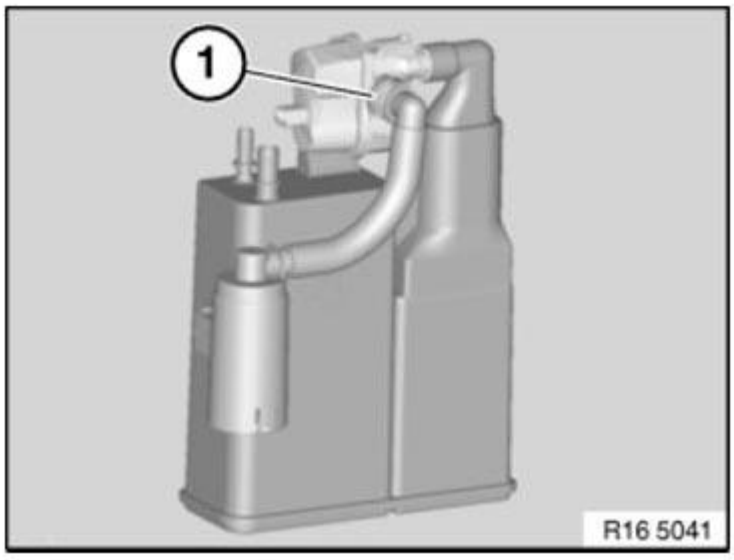


Fig. 45: Identifying Carbon Canister Snap Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove dust filter (2).

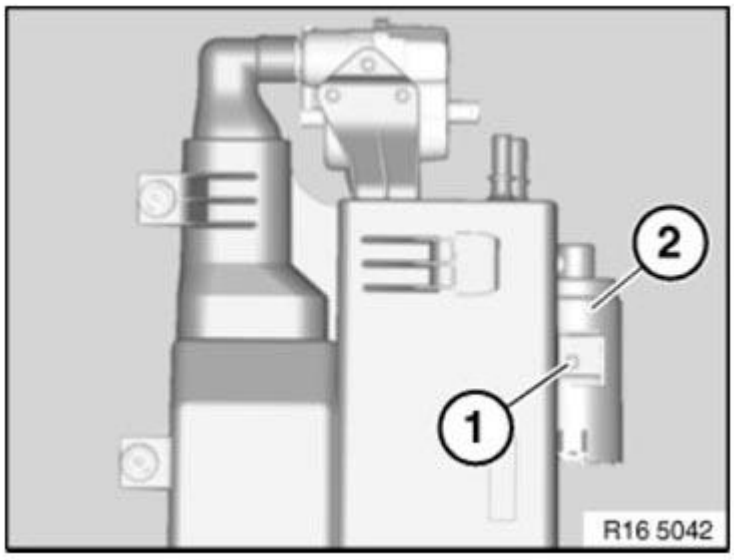


Fig. 46: Identifying Dust Filter With Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

1614... REMOVING AND INSTALLING/REPLACING FILTER CARTRIDGE FOR TANK LEAK DIAGNOSIS MODULE (DMTL)

Necessary preliminary tasks

- Remove rear right **WHEEL ARCH TRIM**

Press lugs (1) apart slightly in direction.

Pull out filter cartridge (2) downwards.

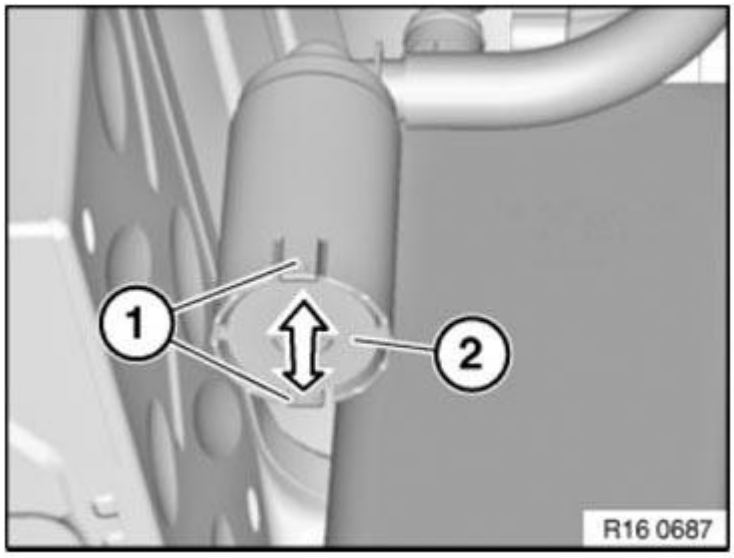


Fig. 47: Identifying Filter Cartridge With Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!
Ensure absolute cleanliness when working on the open fuel system.
Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:**

  Remove right **REAR SEAT**

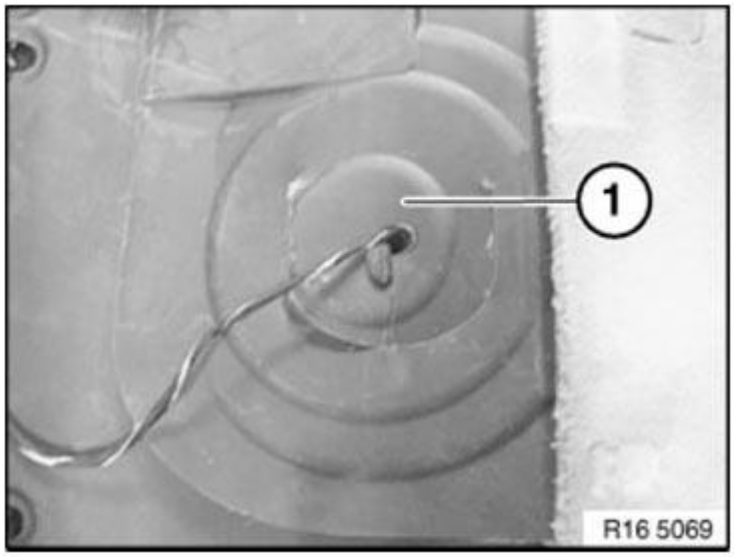


Fig. 48: Identifying Sound Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sound insulation (1).

Release screws (1).

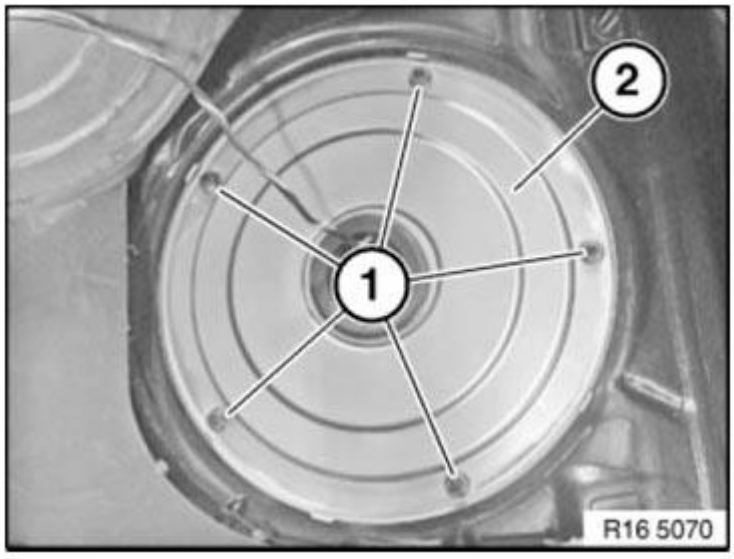


Fig. 49: Identifying Flange Cover With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect fuel line (2).

If necessary, disconnect fuel line for independent heating.

Installation:

Check seal (3), replace if necessary.

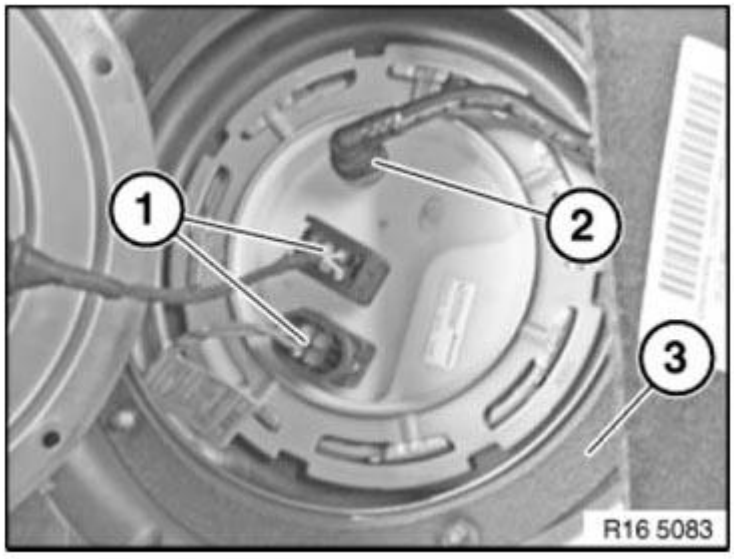


Fig. 50: Identifying Fuel Line, Plug Connection And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **16 1 190** with wide web (1) towards rear onto locking ring (2).

Connect special tool **33 5 070** to 1/2"

reversible ratchet head (3) and position on special tool **16 1 190** .

Release locking ring (2) in counterclockwise direction.

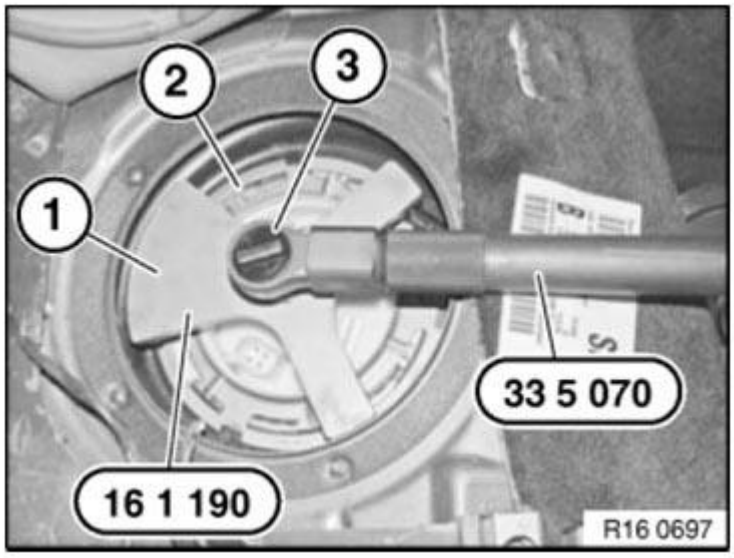


Fig. 51: Release Locking Ring In Counterclockwise Direction Using Special Tools (33 5 070 And 16 1 190)
Courtesy of BMW OF NORTH AMERICA, INC.

Lift off flange cover (1).

Disconnect plug connections (2).

Disconnect fuel line (3).

Installation:

Replace sealing ring (4).

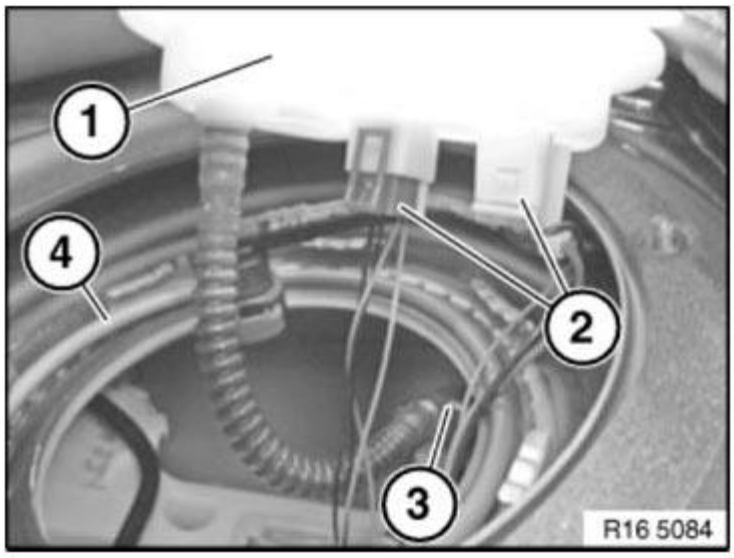


Fig. 52: Identifying Flange Cover With Fuel Line, Plug Connection And Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER (OUTER FUEL FILTER)

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!

Ensure absolute cleanliness when working on the open fuel system. Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:**

Remove right **REAR SEAT**

Remove sound insulation (1).

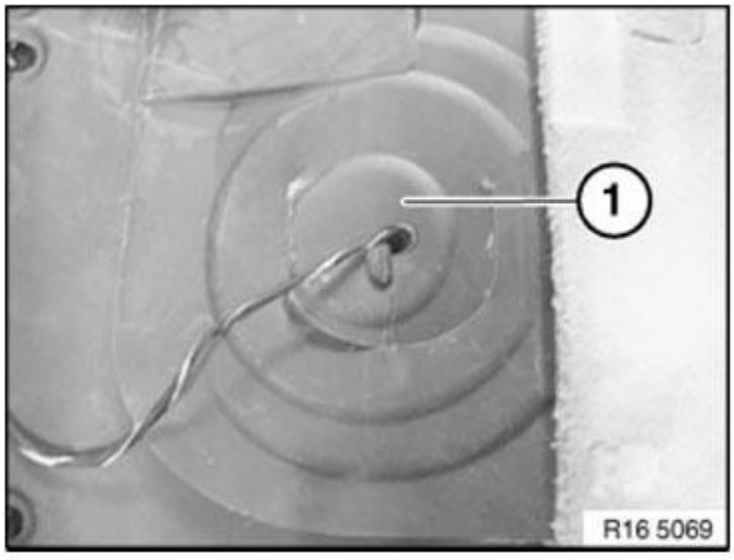


Fig. 53: Identifying Sound Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove cover for service opening (2).

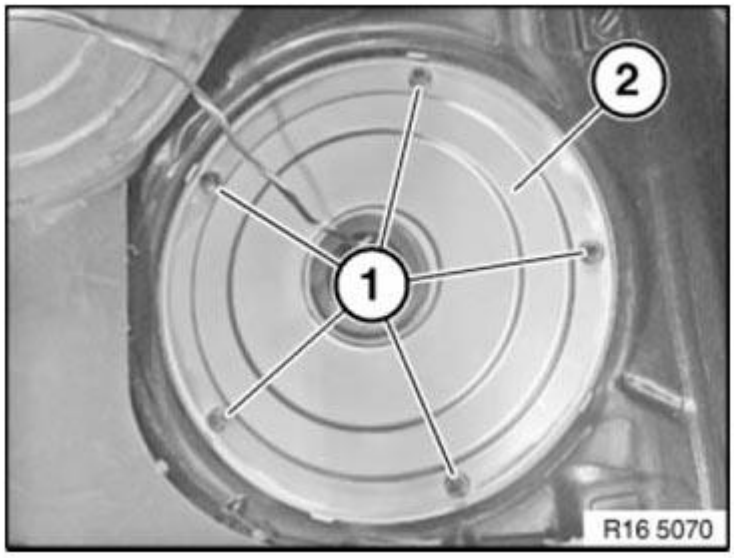


Fig. 54: Identifying Flange Cover (Outer Fuel Filter) With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect fuel lines (2).

Installation:

Check seal (3), replace if necessary.

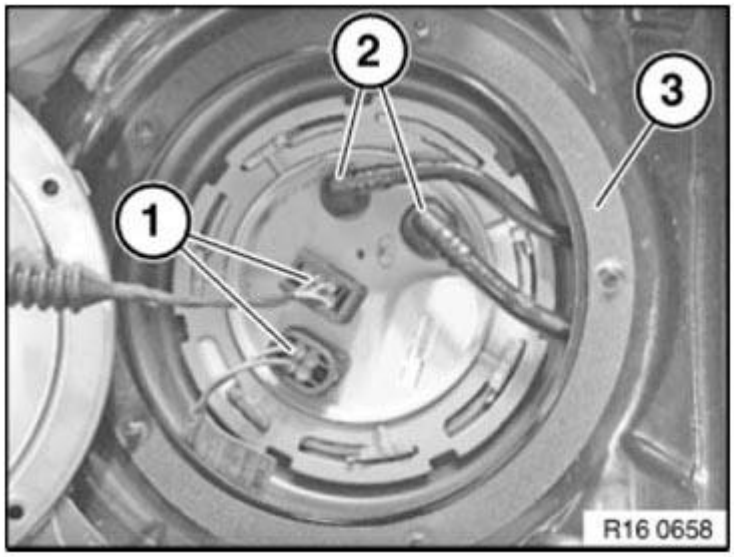


Fig. 55: Identifying Plug Connections, Seal And Fuel Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **16 1 190** with wide web (1) towards rear onto locking ring (2).

Connect special tool **33 5 070** to 1/2" reversible ratchet head (3) and position on special tool **16 1 190** .

Release locking ring (2) in counterclockwise direction.

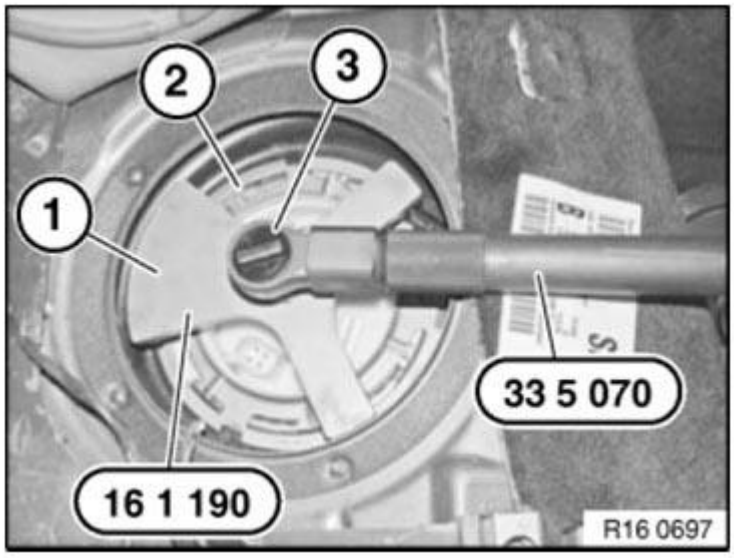


Fig. 56: Unlocking Ring In Counterclockwise Direction Using Special Tools (33 5 070 And 16 1 190)
Courtesy of BMW OF NORTH AMERICA, INC.

Lift off flange cover (3).

Release plug connection (1) and disconnect fuel lines (2) from flange cover (3).

Remove flange cover (3).

Installation:

Replace sealing ring (4).

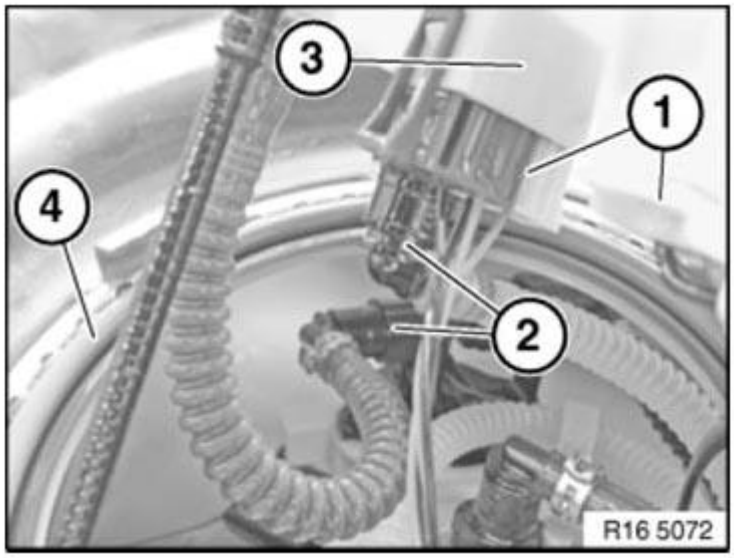


Fig. 57: Identifying Flange Cover, Fuel Lines, Plug Connection And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

1614200 REMOVING AND INSTALLING/REPLACING FUEL PUMP (OUTER FUEL FILTER)

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!
Ensure absolute cleanliness when working on the open fuel system.
Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks

- **DRAW OFF FUEL**

- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:**

  Remove right **REAR SEAT**

- **REMOVE FLANGE COVER**

NOTE: Picture does not show the fuel tank outer skin.

Disconnect earth cable (1).

Disconnect fuel lines (2).

Release lock (4) and remove pump housing cover (3).

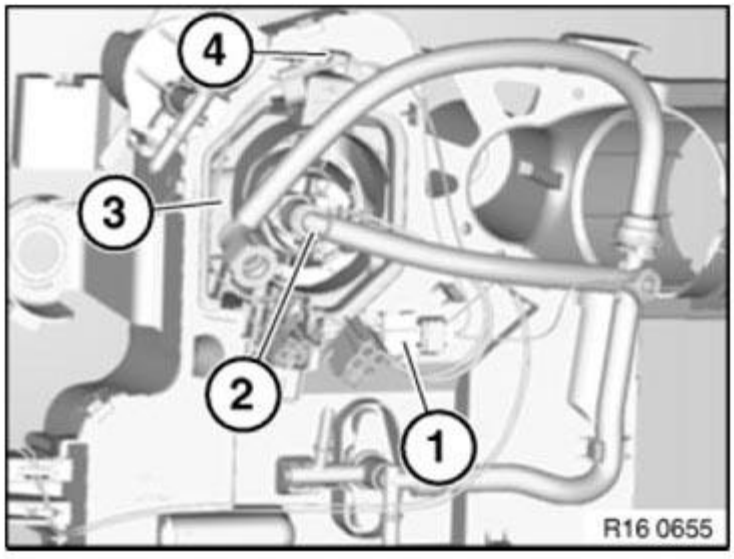


Fig. 58: Identifying Fuel Pump Housing Cover (Outer Fuel Filter) With Earth Cable, Fuel Lines And Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Release lock (1) and remove fuel pump (2) towards top.

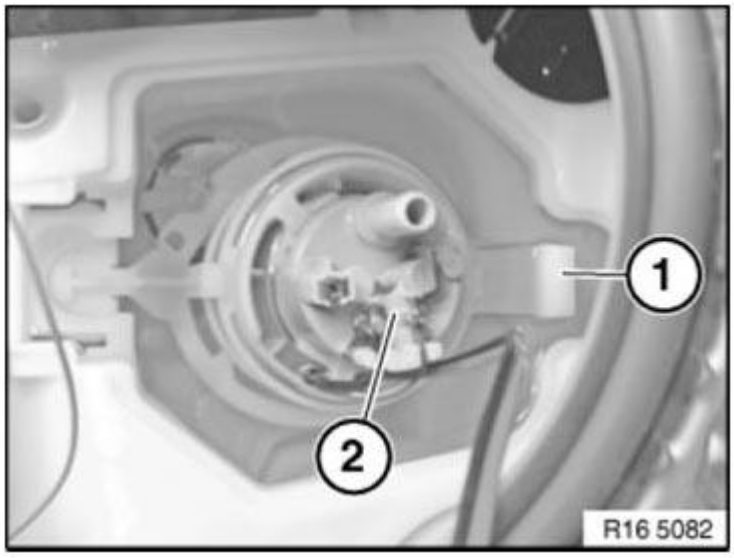


Fig. 59: Identifying Fuel Pump With Lock
Courtesy of BMW OF NORTH AMERICA, INC.

1614220 REMOVING AND INSTALLING/REPLACING PRESSURE REGULATOR (OUTER FUEL FILTER)

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!
Ensure absolute cleanliness when working on the open fuel system.
Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- Vehicles with comfort seat:

  Remove right **REAR SEAT**

- Remove **FLANGE COVER**

NOTE: Picture does not show the fuel tank outer skin.

Press pressure regulator (2) together at tabs (3) and detach in upward direction.

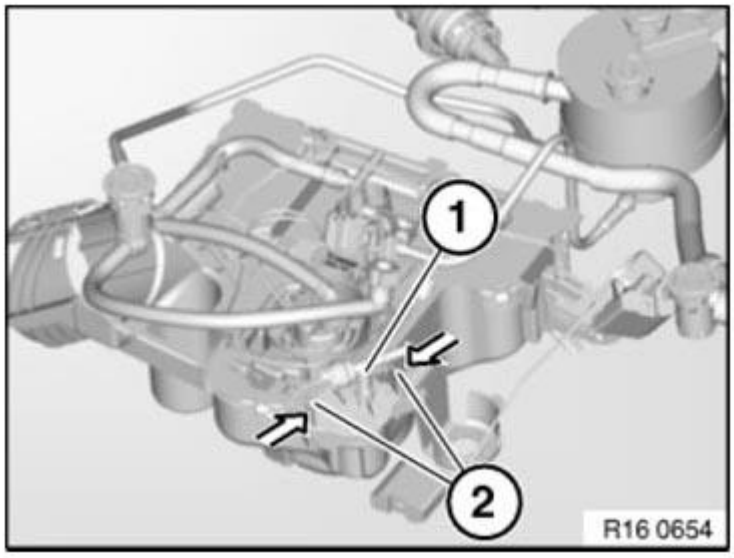


Fig. 60: Pressing Pressure Regulator Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug on lock (1) and detach grounding cable (3) from pressure regulator (2).

Installation:

IMPORTANT: Check by pulling locking of grounding cable plug.
Observe cable routing (3) at pressure regulator.

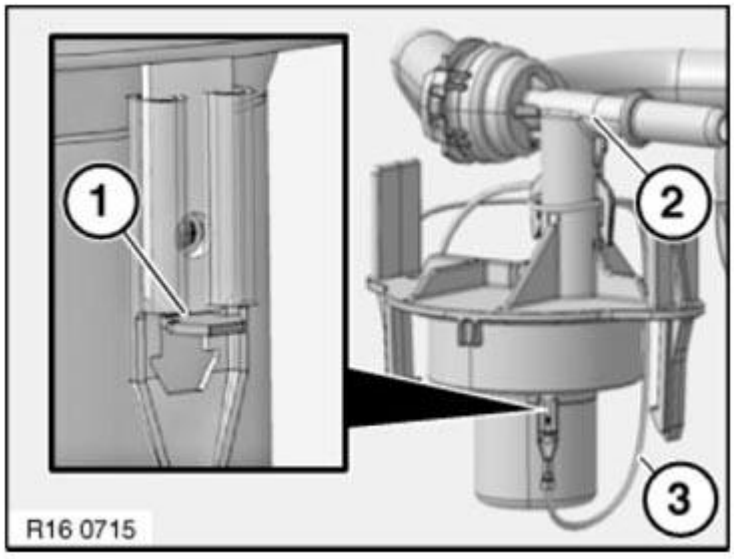


Fig. 61: Identifying Pressure Regulator With Lock And Grounding Cable
Courtesy of BMW OF NORTH AMERICA, INC.

1612000 REMOVING AND INSTALLING/REPLACING SENSOR FOR FUEL GAUGE

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves)!
Ensure absolute cleanliness when working on the open fuel system.
Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:**

  Remove right **REAR SEAT**

- **Remove flange cover** See **1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER (OUTER FUEL FILTER)** or **1614200 REMOVING AND INSTALLING/REPLACING FLANGE COVER**

NOTE: Picture does not show the fuel tank outer skin.

Unclip connecting line for level sensor (2) through service opening (1).

Disconnect plug connector for level sensor (3) from plug connector installation unit on left (4).

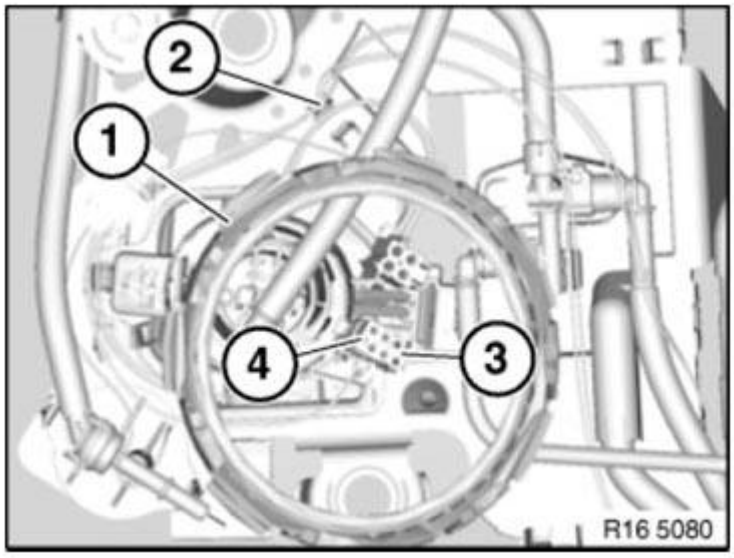


Fig. 62: Identifying Fuel Level Sensor, Service Opening, Plug Connector And Installation Unit
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture does not show the fuel tank outer skin.

Unlock tab (3) in upward direction through service opening (1) and lift out level sensor (2).

Installation:

Level sensor (2) must audibly snap into place.

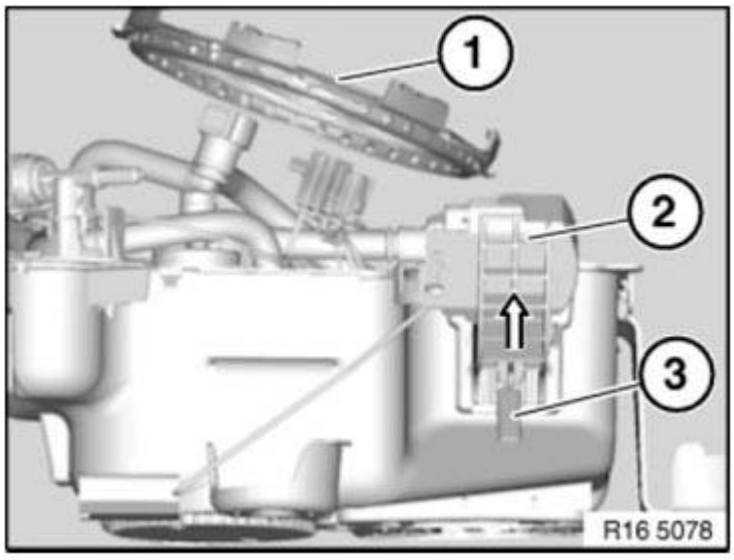


Fig. 63: Unlocking Fuel Sensor Tab In Upward Direction Through Service Opening
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE PERFORMANCE

Fuel System - Repair

1300 CHECKING SETTING ENGINE EMISSION

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

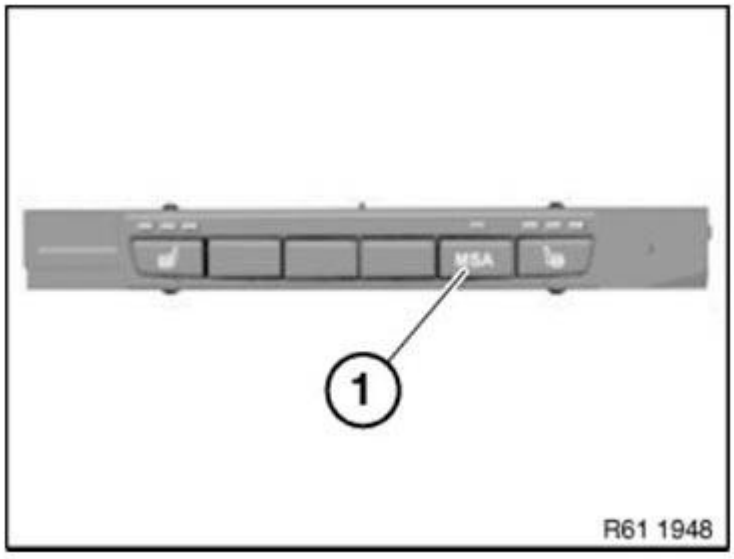


Fig. 1: Identifying Automatic Engine Start/Stop Switch (MSA)
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

A = 10 mm

- Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

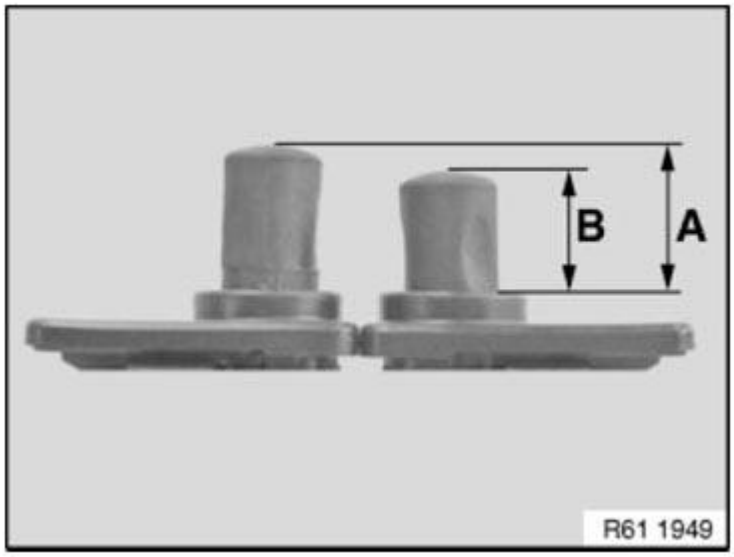


Fig. 2: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

1331 FUEL PUMP WITH DRIVE AND LINE

13 31 032 CHECK FUEL PRESSURE

Necessary preliminary work:

Connect BMW diagnosis system.

IMPORTANT: Lines are under pressure!

Wear protective goggles and gloves.

Fuel can emerge spontaneously at high velocity when the fuel line is released!

Recycling:

Catch and dispose of escaping fuel with auxiliary materials.

Observe country-specific waste disposal regulations.

Check fuel delivery pressure:

To check the fuel delivery pressure, special tool **13 0 290** must be assembled as follows.

Screw adapter **11 4 310** onto line 13 0 291 (line). Screw the IMIB 100 bar pressure sensor (1) onto adapter **11 4 310** .

Alternatively, the pressure gauge from the set of special tools **13 3 060** can be screwed onto line 13 0 291 (line).

Between lines 13 0 291 (line) and 13 0 292 (line), mount a shutoff tap (2) and a T-piece (3) from the set of special tools **13 3 060** .

Close up T-piece (3) from the set of special tools with the cap 13 0 293 (fastener).

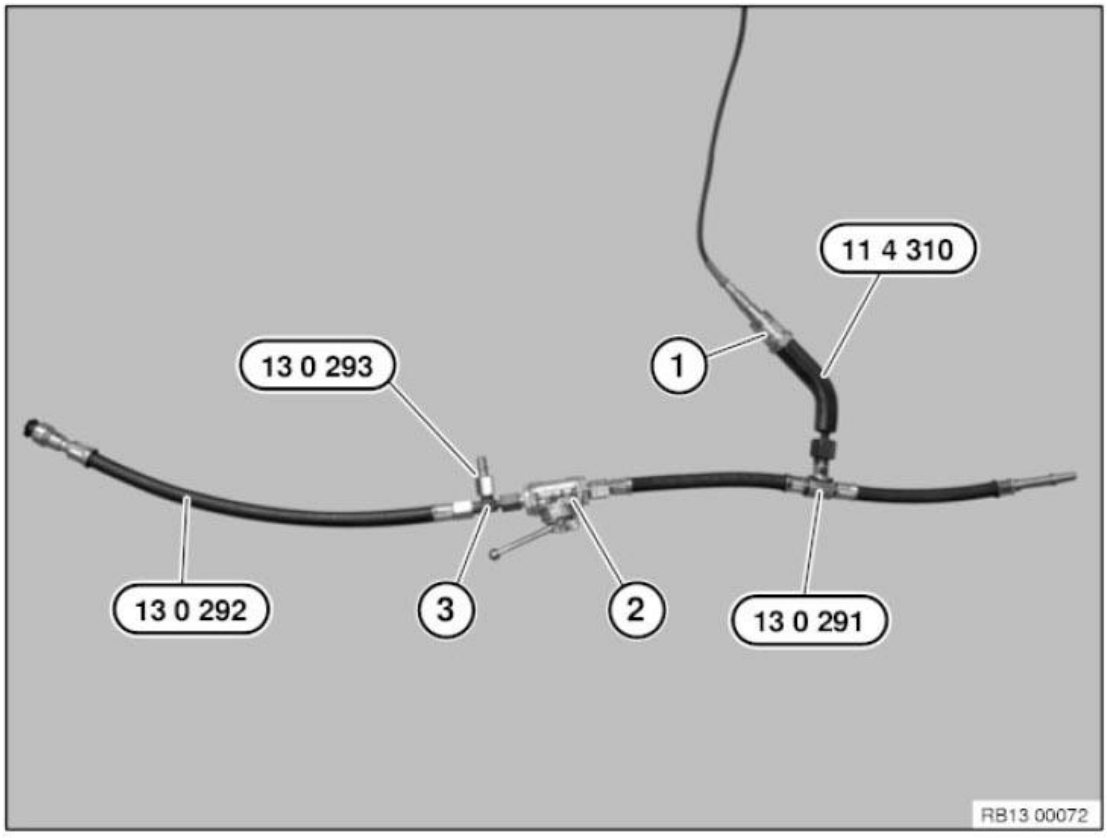


Fig. 3: Checking Fuel Delivery Pressure Using Pressure Sensor, Special Tools And Adapters
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The graphic shows F07.

The procedure is identical for other vehicles.

Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.

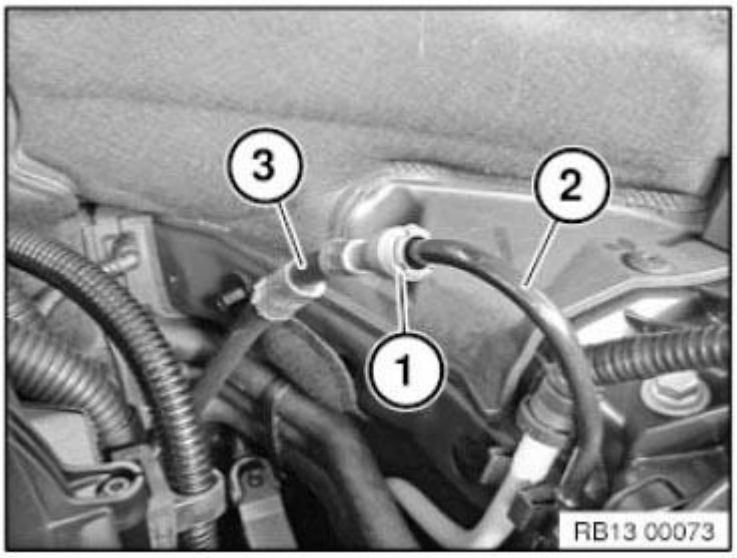


Fig. 4: Identifying Circlip, Fuel Line And Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool (1) **13 0 290** into detached fuel line with IMIB fuel pressure sensor (100 bar).

Connect IMIB with fuel pressure sensor.

Establish fuel delivery pressure. Read off fuel delivery pressure on IMIB and compare with values in diagnosis system.

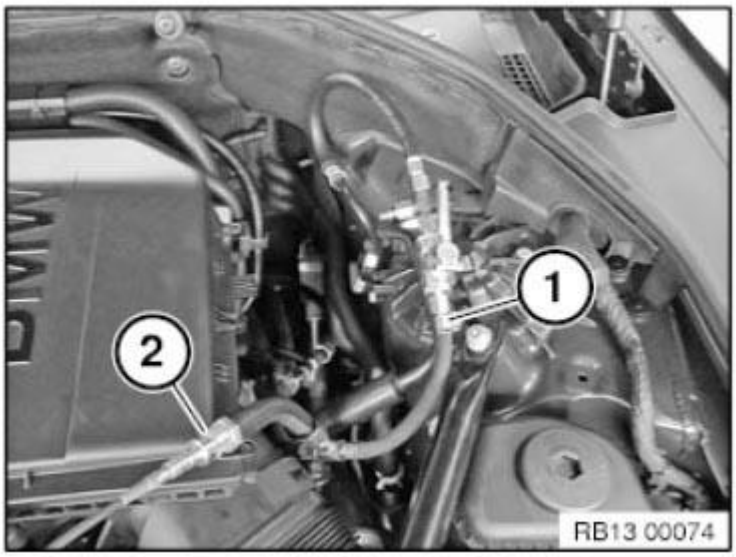


Fig. 5: Installing Special Tool (13 0 290) With Fuel Pressure Sensor To Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Check fuel holding pressure:

To check the fuel holding pressure, special tool **13 0 290** must be assembled as follows.

Screw adapter **11 4 310** onto line 13 0 291 (line). Screw the IMIB 100 bar pressure sensor (1) onto adapter **11 4 310** .

Alternatively, the pressure gauge from the set of special tools **13 3 060** can be screwed onto line 13 0 291.

Between lines 13 0 291 (line)and 13 0 292 (line), mount a shutoff tap (2) and a T-piece (3) from the set of special tools **13 3 060** .

Mount pressure gauge (4) from special tool set **13 3 060** onto T-piece (3) from special tool set **13 3 060** .

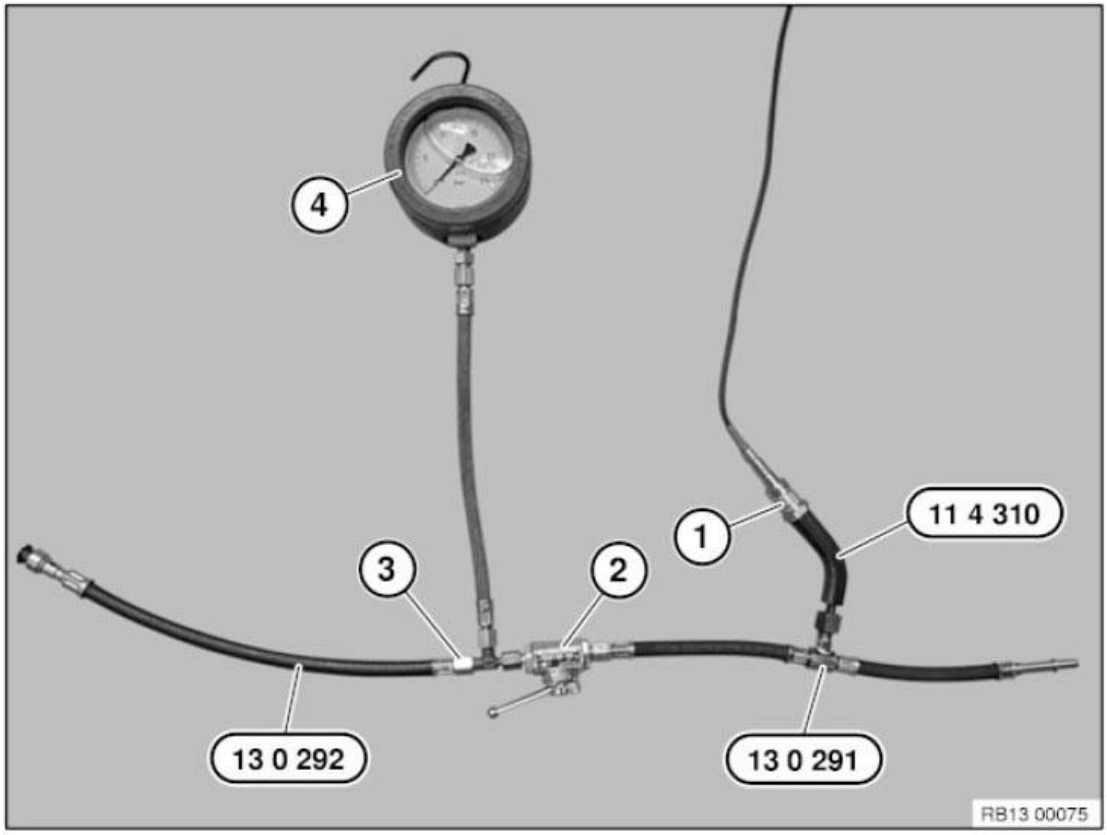


Fig. 6: Checking Fuel Delivery Pressure Using Pressure Sensor, Special Tools And Adapters
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The graphic shows F07.

The procedure is identical for other vehicles.

Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.

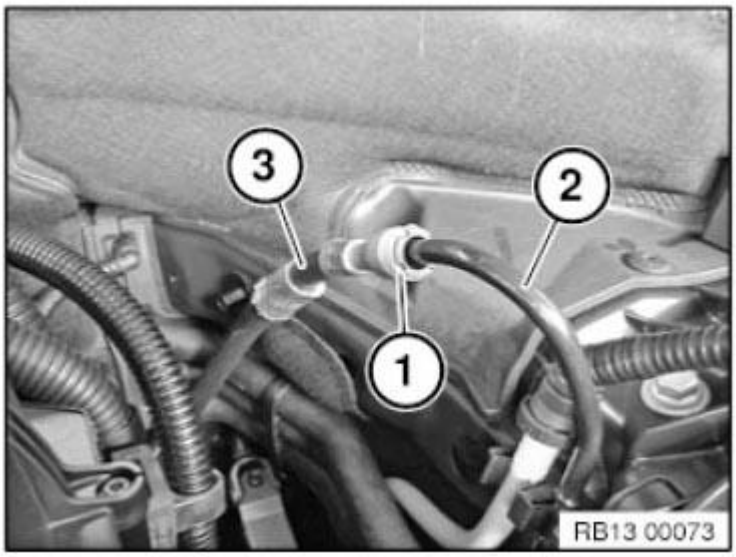


Fig. 7: Identifying Circlip, Fuel Line And Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool (1) **13 0 290** with pressure gauge (2) and IMIB 100 bar fuel pressure sensor (3) into the detached fuel line.

Establish fuel delivery pressure.

Close shutoff tap (4) and switch off the engine.

Read off fuel holding pressure of high pressure pump from IMIB tester and compare with values in diagnosis system.

Read off fuel holding pressure to fuel tank on pressure gauge (2) and compare with values in diagnosis system.

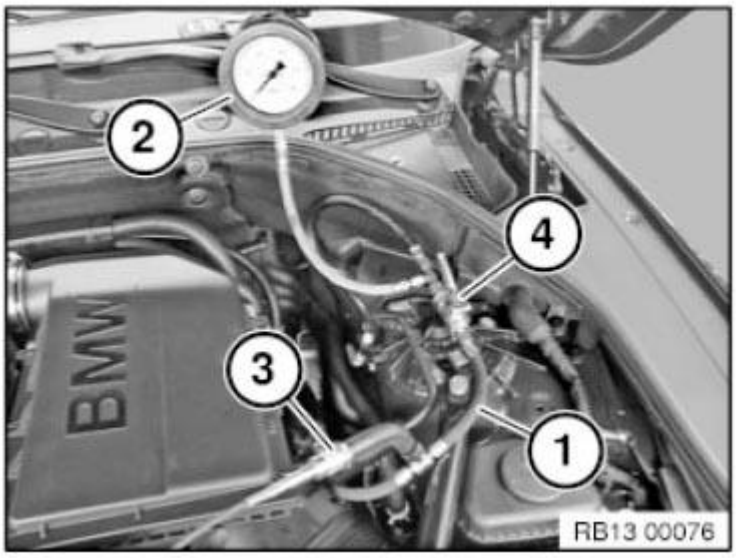


Fig. 8: Installing Special Tool (13 0 290) With Pressure Gauge And Fuel Pressure Sensor To Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leak tightness.

13 31 029 CHECKING FUEL DELIVERY PRESSURE (N20, N53, N54, N55, N63, N74)

Necessary preliminary work:

Connect BMW diagnosis system.

IMPORTANT: Lines are under pressure!

Wear protective goggles and gloves.

Fuel can emerge spontaneously at high velocity when the fuel line is released!

Recycling:

Catch and dispose of escaping fuel with auxiliary materials.

Observe country-specific waste disposal regulations.

NOTE: Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.

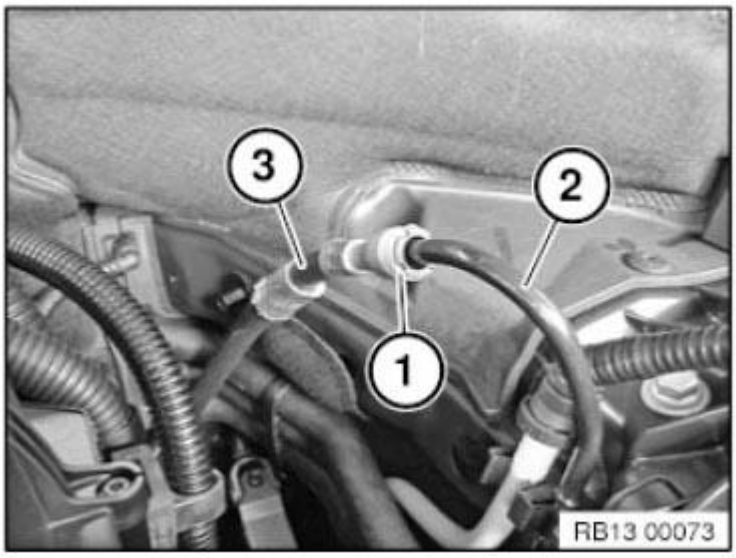


Fig. 9: Identifying Circlip, Fuel Line And Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew adapter (1) from special tool 13 5 270.

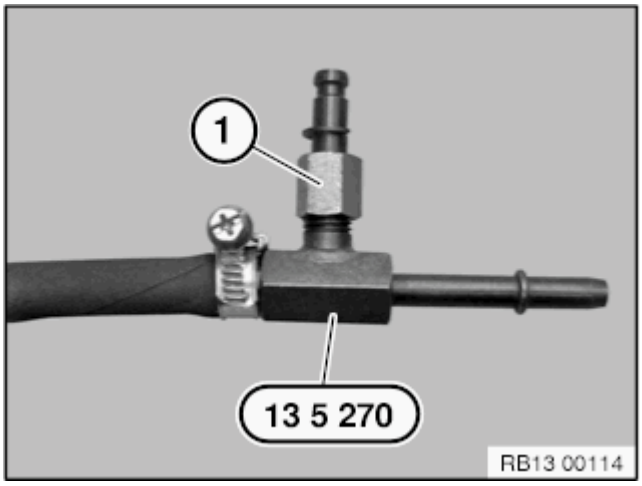


Fig. 10: Identifying Adapter And Special Tool 13 5 270
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 13 5 270 into disconnected fuel line.

Screw onto special tool 13 5 270, the special tool **11 4 310** .

Screw IMIB 100 bar pressure sensor (1) on the special tool **11 4 310** .

NOTE: As an alternative to the 100 bar IMIB pressure sensor (1), the 25 bar pressure sensor can also be used. For this, screw on special tool 11 5 364 instead of special tool 11 4 310 into special tool 13 5 270. Or directly screw the pressure

manometer from the set of special tools 13 3 060 onto the special tool 13 5 270.

Establish fuel delivery pressure. Read off fuel delivery pressure on IMIB and compare with values in diagnosis system.

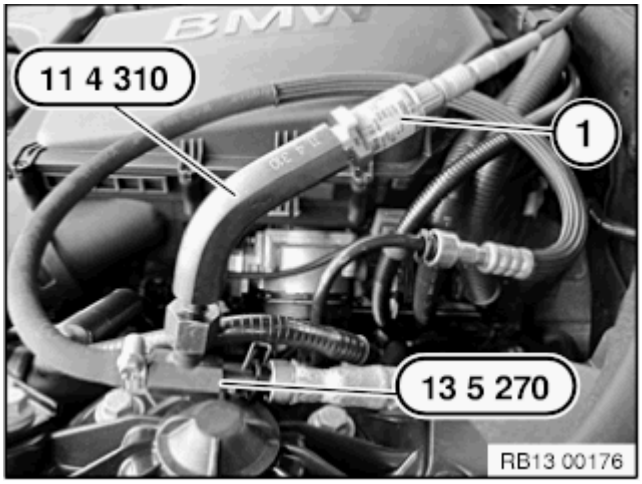


Fig. 11: Identifying Pressure Sensor And Special Tools 11 4 310 And 13 5 270
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for tightness.

13 31... NOTES REGARDING THE FUEL PRESSURE TEST (REFERENCE PRESSURE: SURROUNDING AREA)

The characteristic of this version with ambient pressure:

The connection for the vacuum hose of the fuel pressure regulator is located between the throttle and the air cleaner or on the air cleaner.

Test prerequisite:

The correct fuel pressure regulator is fitted.

- Using the EPC, check whether the fuel pressure regulator suitable for the car is fitted:

  Connect test adapter. See **CHECK FUEL PRESSURE** or **CHECKING FUEL DELIVERY PRESSURE (N20, N53, N54, N55, N63, N74)**.

The regulating function of the fuel pressure regulator must be ensured under all operating conditions. The fuel pump must always be able to generate a fuel pressure that is higher than the pressure that is adjusted by the pressure regulator.

The DME controls the injection period for which the injection rate is adjusted.

The fuel return line is depressurized at engine standstill and ignition key position 0.

The pressure regulator will close at engine standstill and ignition key position 0. The fuel pressure in the feed will be maintained for an extended period of time. A non-return valve will close in the fuel pump. This measure will maintain the fuel pressure in the fuel system. Extended start times are thereby prevented.

- Let the engine run at idle and measure the fuel pressure.

When the measured value is less than the nominal value - 0.2 bar:

- The line cross-sections in the fuel feed are constricted or the fuel filter is plugged,

  or

- The voltage supply to the fuel pump function is not OK: For example, as a result of high contact resistance (corrosion) in the plug connection between the wiring harness and the fuel pump.

When the measured value exceeds the nominal value + 0.2 bar:

- Stop the engine and then monitor the measured value.
- When the measured value drops to the nominal value, the line cross-sections in the fuel return line are constricted or plugged.
- Check the fuel lines for kinks.

  If no kinks are visible:
  - Replace the return lines.

When the measured value remains too high, the pressure regulator is most likely faulty.

Attention:

There is a low probability that the return line is completely closed due to obstruction. Fuel would then leak out under pressure when the pressure regulator is removed!

- Have a cleaning rag ready and catch and dispose of escaping fuel.
- Do not replace the pressure regulator. Replace the return line instead.
- Let the engine run briefly at idle and then stop the engine.
- Write down the measured value at engine standstill.
- Read the measured value again after about 20 to 30 minutes at engine standstill.

The following check requires special tool 13 3 010 (hose clip).

If the measured value dropped by more than 0.5 bar:

- Start the engine and wait briefly for stable pressure build-up
- Stop the engine and immediately disconnect the feed line just before the pressure gauge with special tool 13 3 010
- Write down the measured value
- Read the measured value again after about 20 to 30 minutes at engine standstill

The following faults may be present if the measured value now dropped less than 0.5 bar:

- Fault in the feed lines
- Fault in the internal tank feed hose
- Faulty pressure-maintaining stop valve in the fuel pump

Check components. Replace faulty components.

If the measured value dropped again by more than 0.5 bar:

- Replace the pressure regulator

- All fuel hoses and their hose clamps that were loosened during the checks must be replaced.
- Read out fault memory of DME control unit. Check stored fault messages. Rectify fault. Clear diagnostic fault entries from fault memory.

1351 INJ.PUMP, REGULATOR, MIXT.REGULATOR

1353170 REMOVING AND INSTALLING/REPLACING ALL PRESSURE LINES (N63)

Notes

**WARNING: Electric fuel pump starts up automatically when door is opened!
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Observe warning on cylinder head cover.**

**WARNING: Carry out installation work on fuel system only with coolant temperature below 40°C.
Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity when the high-pressure line is released!**

**IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!**

- **Do not allow any dirt particles or foreign bodies to get into the system.**

- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs 32 1 270 .**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**

Necessary preliminary tasks:

- Remove **IGNITION COILS**
- Remove intercooler on left and right. See **REMOVING AND INSTALLING/REPLACING RIGHT CHARGE AIR COOLER (N63)** and **REMOVING AND INSTALLING/REPLACING LEFT CHARGE AIR COOLER (N63)** .
- Partially remove **WIRING HARNESS** for engine
- Partially remove **WIRING HARNESS** for injectors
- Detach **BATTERY POSITIVE LEAD** from battery positive terminal, partially remove battery positive lead
- Remove **FLUID RESERVOIR** for power steering
- Remove suction line for power steering. See **REPLACING SUCTION LINE FOR POWER STEERING (FROM CONNECTING PIECE TO VANE PUMP)** and **REPLACING SUCTION LINE FOR POWER STEERING (FROM FLUID RESERVOIR TO CONNECTING PIECE)** .
- Remove coolant **EXPANSION TANK**
- Remove **ELECTRONICS BOX**
- Remove **WATER VALVE** for heater/air conditioner and lay water hoses to one side
- Detach tank vent line from tank venting valve and point of separation
- Remove suspension cross-braces on left and right. See **REMOVING AND INSTALLING/REPLACING LEFT (REAR) SUSPENSION CROSS-BRACE** and **REMOVING**

AND INSTALLING/REPLACING RIGHT (REAR) SUSPENSION CROSS-BRACE .

- Remove **ACOUSTIC INSULATION** for bulkhead on left and right
- Drain off **AIR CONDITIONING SYSTEM**

Release screw (1).

Tightening torque **64 53 3AZ** .

Detach A/C line (2) and place to one side.

Replace sealing ring on A/C line.

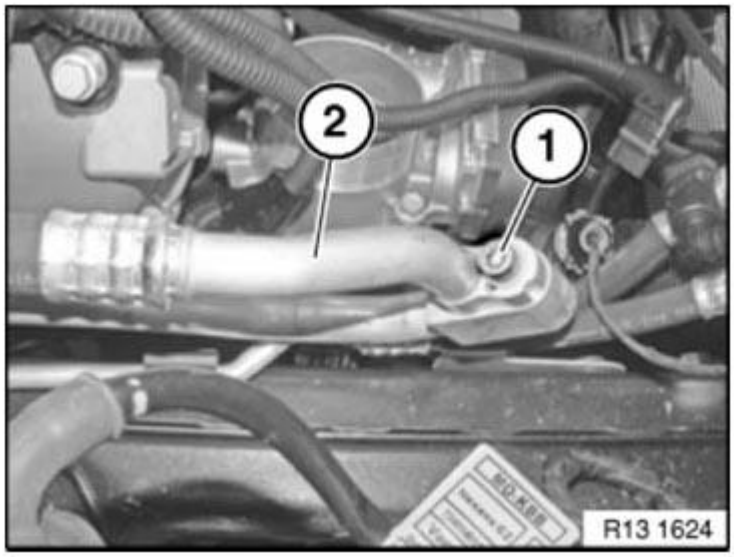


Fig. 12: Identifying A/C Line With Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **12 42 7AZ** .

Remove battery positive lead (2) and place to one side.

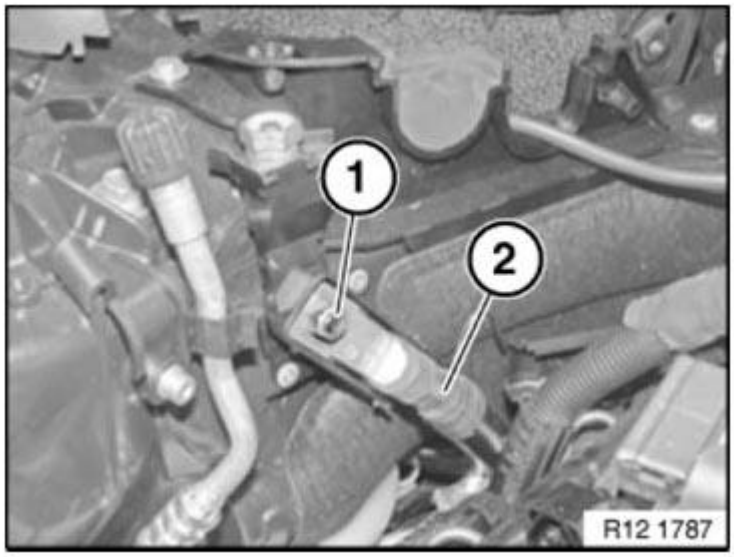


Fig. 13: Identifying Battery Positive Lead With Slack Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp off fuel delivery line. Seal off fuel lines with special tools (1) **13 5 160** and (2) 13 5 162.

Catch and dispose of escaping fuel.

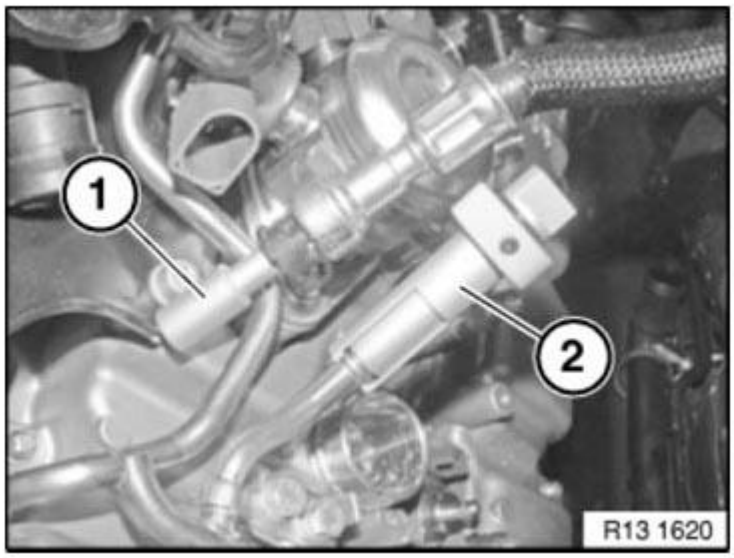


Fig. 14: Sealing Off Fuel Lines With Special Tools (13 5 160 And 13 5 162)
Courtesy of BMW OF NORTH AMERICA, INC.

Removing high-pressure fuel line from injector to rail

NOTE: The following description applies to all pressure lines.
First release pressure line on rail to reduce existing fuel pressure if necessary.

Fuel must not get into the spark plug slot. Then release pressure line on injector.

Release union nuts (1).

Disconnect pressure line (2).

Set down pressure lines in order.

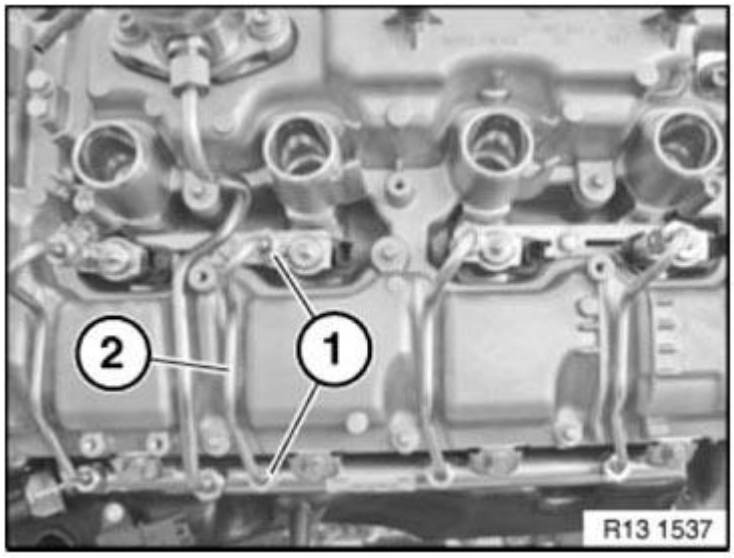


Fig. 15: Identifying High Pressure Fuel Lines With Union Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Secure injector against twisting with wrench (2).

Release union nut (1).

IMPORTANT: If several pressure lines are removed, ensure that each pressure line is reinstalled in its original location (cylinder).
Mark pressure lines.

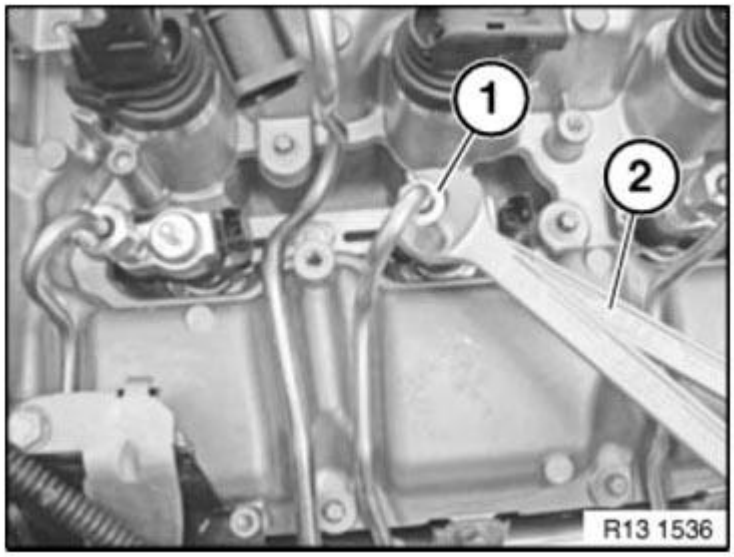


Fig. 16: Removing Union Nut Using Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Only if injector has to be rotated in fitted position

- Release bolt a few turns until holding-down element (3) is slackened.
- Turn injector (1) in direction of arrow until union nuts (2) on pressure line can be easily screwed on by hand.
- To do so, engage wrench on hexagon head of injector if necessary.
- Tighten union nuts on pressure line handtight.

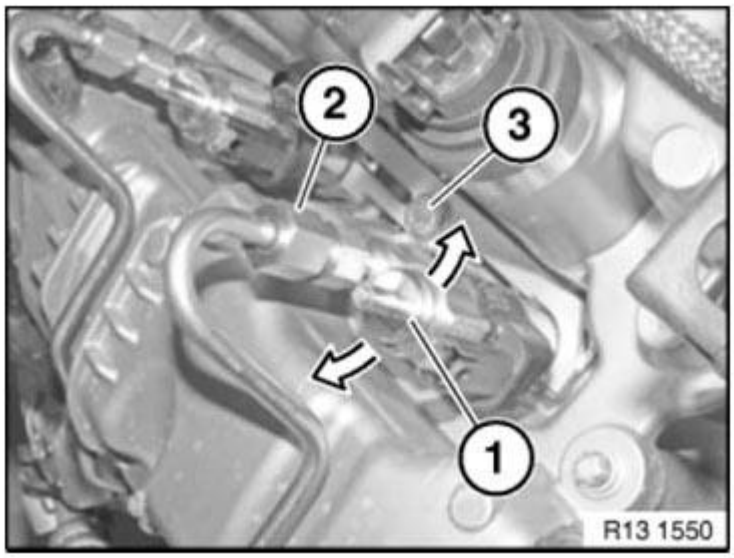


Fig. 17: Turning Injector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not under any circumstances pull injector out of bore!
If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced! Replacing PTFE sealing ring, refer to 13 53 315 .

Adhere to tightening sequence:

- First tighten down union nut on injector.
- Then tighten down union nut on rail.

Tighten high-pressure fuel lines with special tool **13 0 160** .

Tighten high-pressure fuel line on injector with torque wrench (2) and special tool (1) 13 0 161. In so doing, grip hexagon head of injector with wrench (3).

Tighten union nuts with special tool (1) 13 0 161.

Tightening torque **13 53 2AZ** .

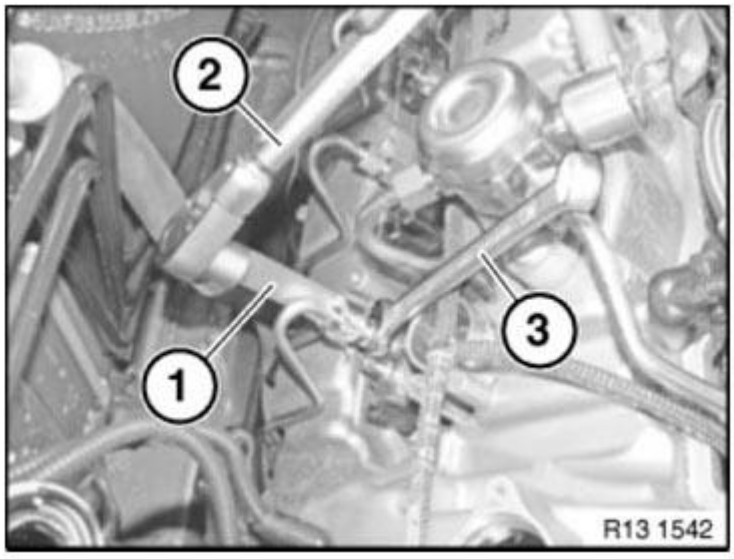


Fig. 18: Tightening High-Pressure Fuel Line On Injector Using Torque Wrench And Special Tool (13 0 161)
Courtesy of BMW OF NORTH AMERICA, INC.

On cylinders 4 and 8 tighten down pressure line (1) to torque (2) and with crowfoot wrench (3). In so doing, grip hexagon head of injector with wrench.

Tightening torque **13 53 2AZ** .

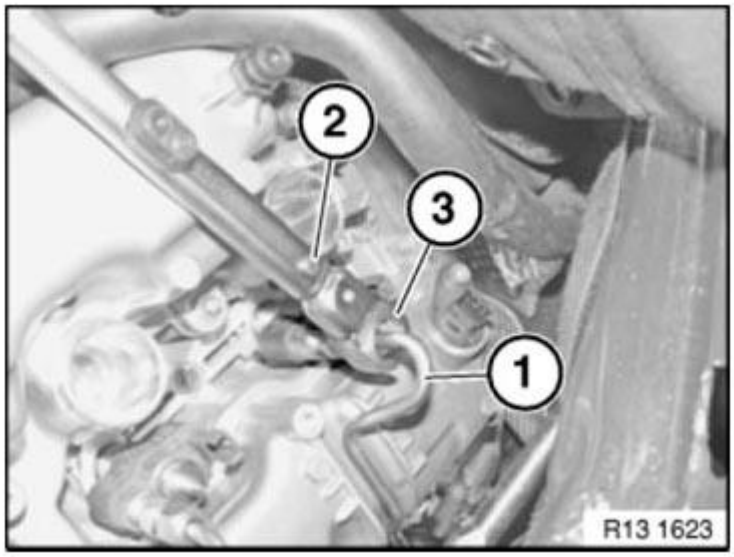


Fig. 19: Tightening Pressure Line Using Crowfoot Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down pressure line on rail with torque wrench (1) and special tools (2) **00 1 440** , (3) 13 0 162 and (4) 13 0 161.

Tightening torque **13 53 2AZ** .

Installation:

When tightening high-pressure line on rail, note that angle of rotation of special tool 13 0 161 is limited. Re-position special tool if necessary.

Distortion of torque possible!

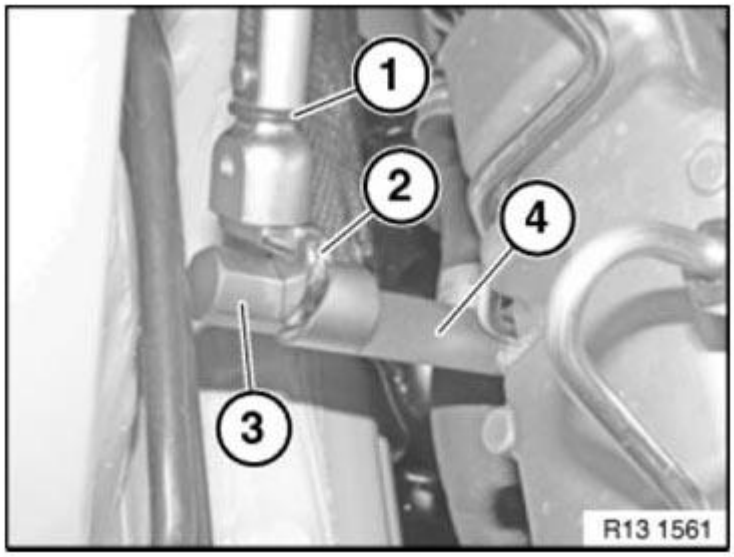


Fig. 20: Tighten Pressure Line On Rail Using Torque Wrench And Special Tools (001440, 13 0 162 And 13 0 161)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove high-pressure line from high-pressure pump to rail.

Picture describes the left side, the procedure for the right side is identical.

Release union nuts (1).

Disconnect pressure line (2).

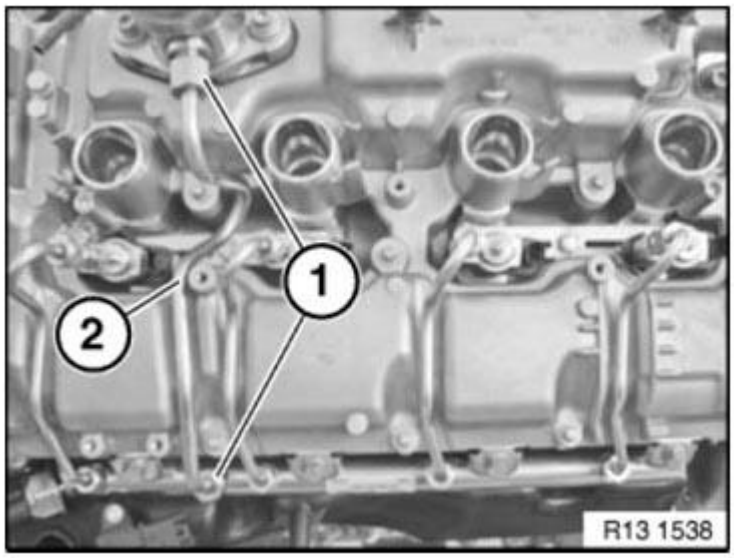


Fig. 21: Identifying High Pressure Line With Union Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Refit high-pressure line from high-pressure pump to rail.

Tighten down pressure line (1) hand-tight on rail and injector.

First tighten high-pressure line (1) on high-pressure pump using torque wrench (2) and special tool (3) **00 1 440** .

Tightening torque **13 53 3AZ** .

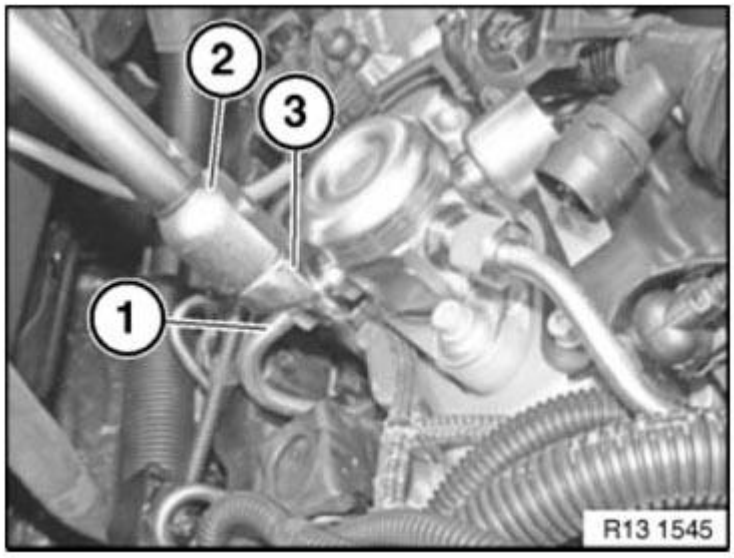


Fig. 22: Tightening High-Pressure Line On High-Pressure Pump Using Torque Wrench And Special Tool (00 1 440)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When tightening high-pressure line on rail, note that angle of rotation of special tool **13 0 140** is limited. Re-position special tool if necessary.

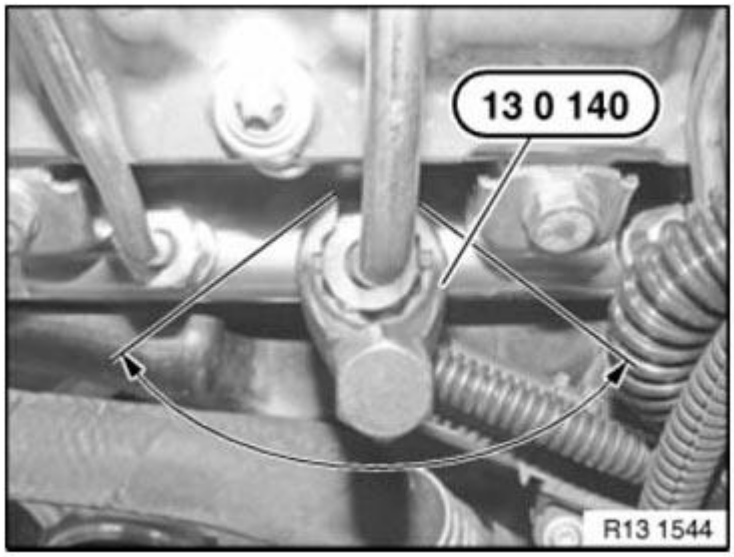


Fig. 23: Identifying Angle Of Rotation For Special Tool (13 0 140)
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten high-pressure line (1) on rail using torque wrench (2), long crowfoot spanner (3) and special tool (4) **13 0 140** .

Tightening torque **13 53 3AZ** .

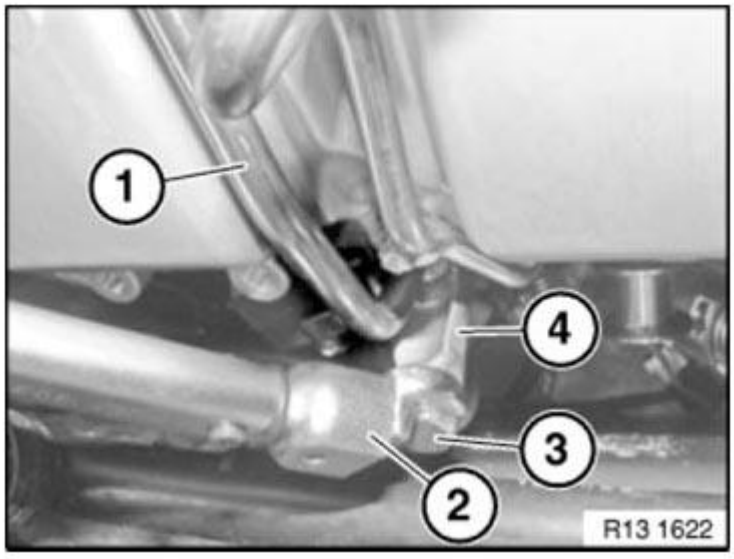


Fig. 24: Tightening High-Pressure Line On Rail Using Torque Wrench, Long Crowfoot Spanner And Special Tool (13 0 140)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Vent fuel system with BMW diagnosis system.

Check fuel system for leaks.

Check function of DME.

1353332 REMOVING AND INSTALLING/REPLACING FEED LINE (N63)

Notes

WARNING: Clamp off BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

Wear protective goggles.

Wear protective gloves.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks:

- Remove **LEFT AND RIGHT INTAKE FILTER HOUSINGS**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Release clamps (1) and (2).

Replace clamps (2).

Detach both charge-air ducts (3) and remove.

Check gaskets on turbocharger, replacing if necessary.

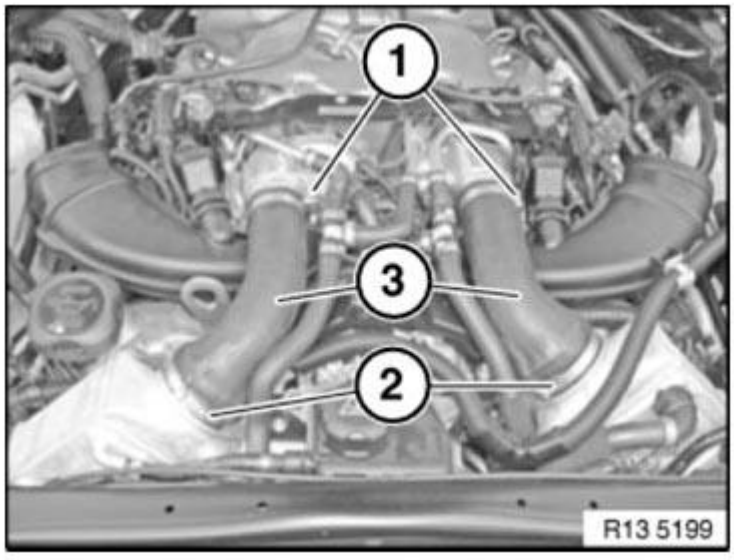


Fig. 25: Identifying Air-Ducts With Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Detach hoses (1) from clean-air pipe.

Release screw (2).

Tightening torque **13 71 1AZ** .

Detach clean-air pipe (3) in direction of travel from turbocharger.

Check seal on clean-air pipe, replacing if necessary.

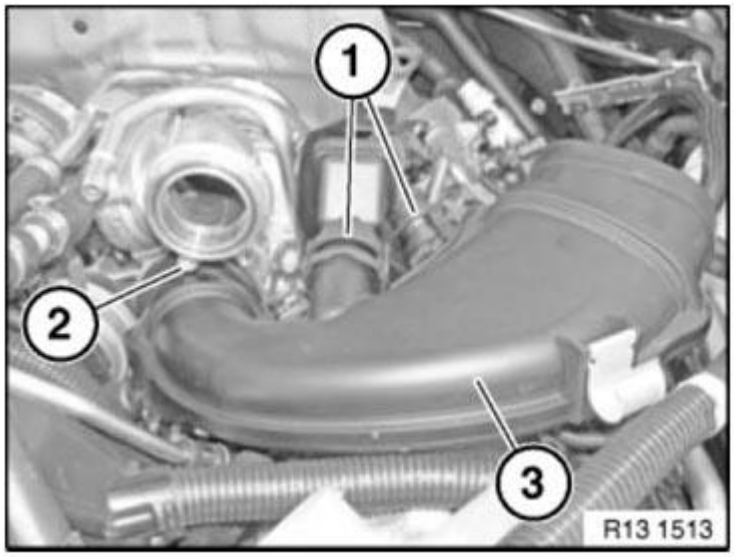


Fig. 26: Identifying Clean Air Pipe With Hoses And Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect fuel feed line (1).

Seal fuel lines with special tools **13 5 160** and 13 5 162.

Unlock and disconnect plug (2) on fuel low-pressure sensor.

Release fuel feed line (3) on high-pressure pump.

Tightening torque **13 53 4AZ** .

Release bolts (4).

Tightening torque **13 53 6AZ** .

Catch and dispose of escaping fuel.

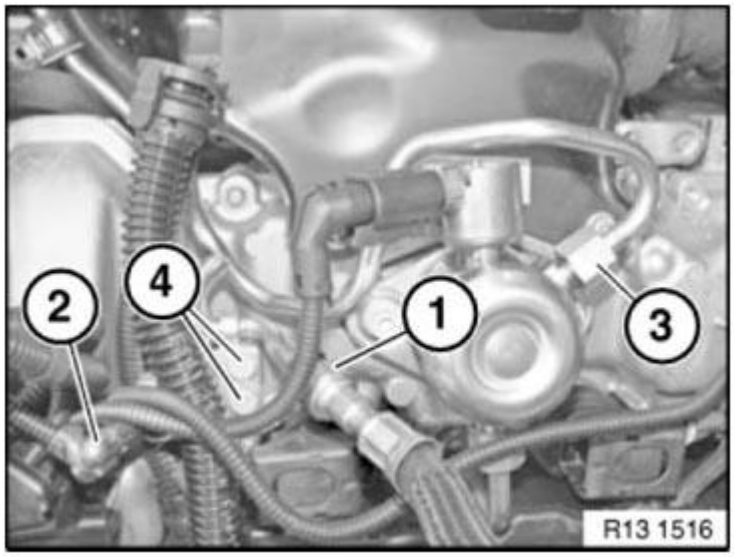


Fig. 27: Identifying Fuel Feed Line With Plug And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Seal fuel lines with special tools (1) **13 5 160** and (2) 13 5 162.

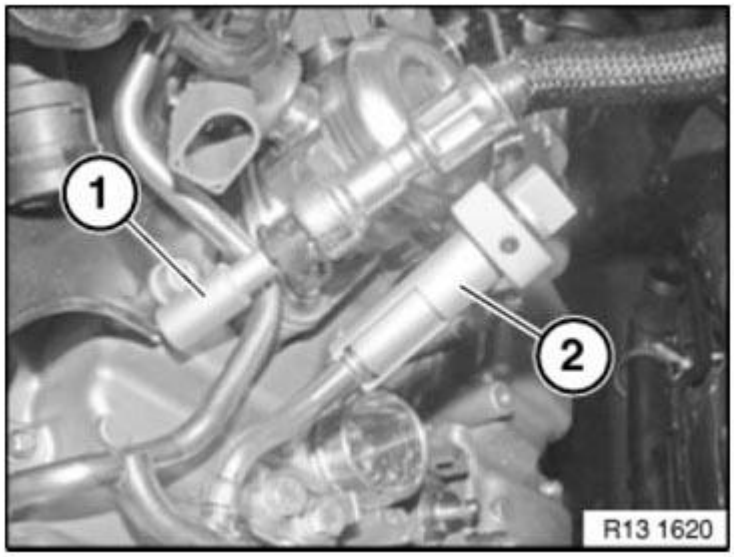


Fig. 28: Sealing Fuel Lines Using Special Tools (13 5 160)
Courtesy of BMW OF NORTH AMERICA, INC.

Release fuel feed line (1) on high-pressure pump.

Tightening torque **13 53 4AZ** .

Catch and dispose of escaping fuel.

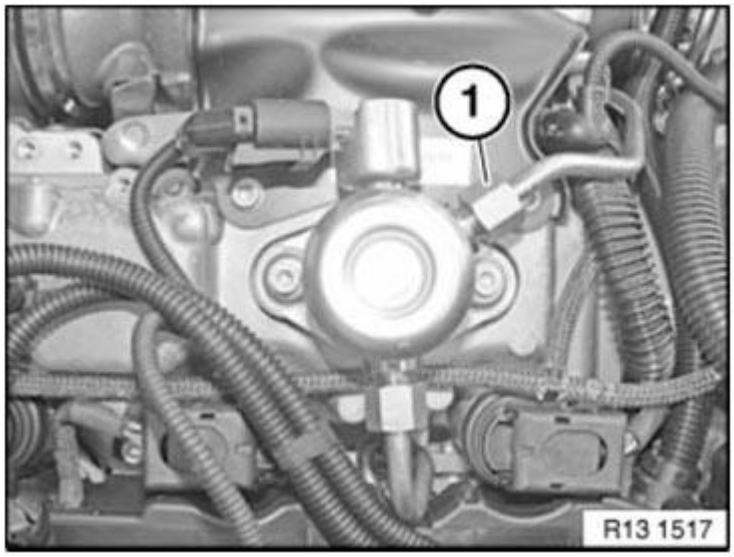


Fig. 29: Identifying Fuel Feed Line On High-Pressure Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) on retaining clips.

Tightening torque **13 53 7AZ** .

Feed out and remove fuel feed line (2).

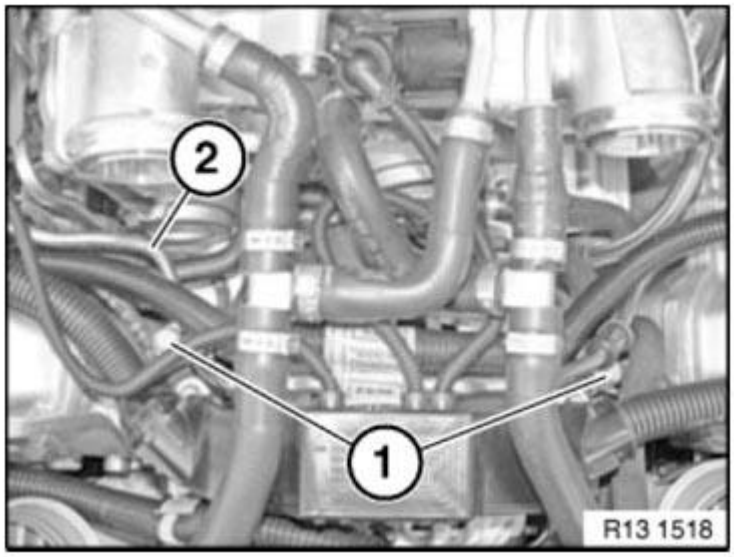


Fig. 30: Identifying Fuel Feed Line With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe tightening sequence.

- Fit fuel feed line.

  In so doing, tighten screw connections **hand-tight only.**

- Tighten down fuel feed line (1) on high-pressure pumps to torque (2) and with crowfoot wrench (3).

  Tightening torque **13 53 4AZ** .

- Tighten down lugs on fuel low-pressure sensor.

  Tightening torque **13 53 6AZ** .

- Tighten down retaining clips.

  Tightening torque **13 53 7AZ** .

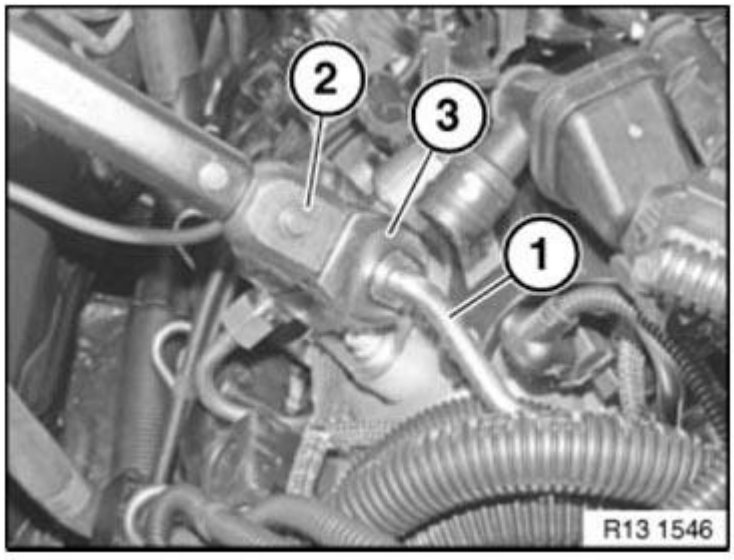


Fig. 31: Tightening Fuel Feed Line Using Crowfoot Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1351065 REMOVING AND INSTALLING/REPLACING LEFT HIGH PRESSURE PUMP (N63)

WARNING: Observe warning on cylinder head cover.

Disconnect NEGATIVE BATTERY TERMINAL (risk of fire due to short circuit on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high speed when the high pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be fouled by fuel.
The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!
Cover ignition coil with suitable means.

Necessary preliminary tasks

- Remove **FUEL FEED LINE** .
- Remove **HIGH-PRESSURE LINE** from left high-pressure pump to rail.

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

IMPORTANT: High-pressure pump can be pretensioned by camshaft cams!

Slacken screws (1) of high pressure pump (2) a little. The engine must be rotated when the high pressure pump is pushed out.

Otherwise it will not be possible to install the high-pressure pump!

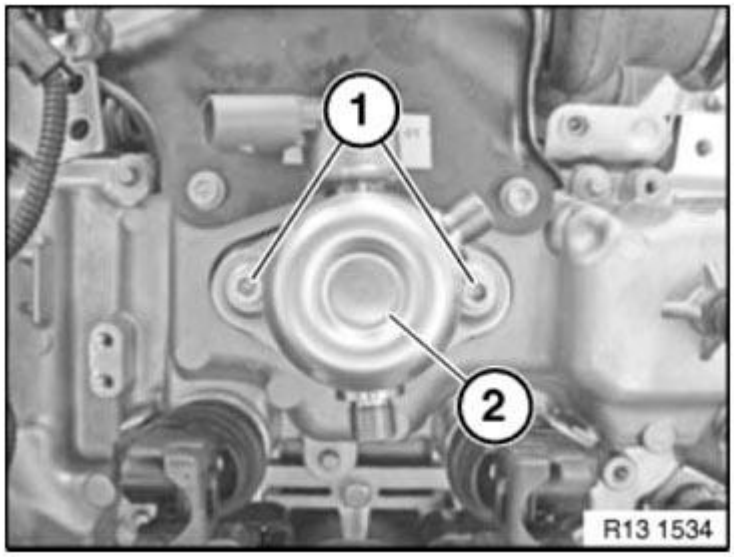


Fig. 32: Identifying High Pressure Pump With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate engine at central bolt through 90° in direction of engine rotation.

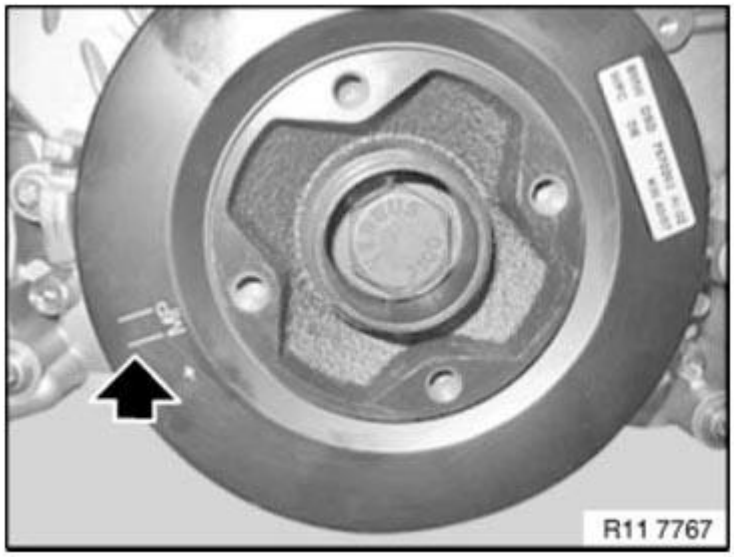


Fig. 33: [Engine Rotation Position At Central Bolt]
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Replace screws (1). Screws (1) are coated with sealant.

IMPORTANT: The pump plunger can fall out when the high-pressure pump (2) is pulled out!

Detach high-pressure pump (2) and remove.

Engine oil can escape when pump is detached; have a cleaning cloth ready.

Installation note:

Provisionally fasten screws (1) and tighten uniformly in 180° increments until final tightening.

Tightening torque **13 51 1AZ** .

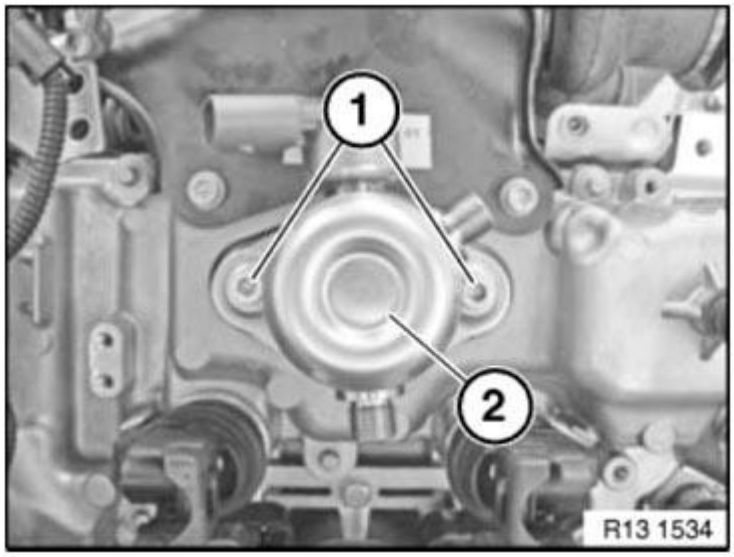


Fig. 34: Identifying High Pressure Pump With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing ring (1).

Clean contact surfaces.

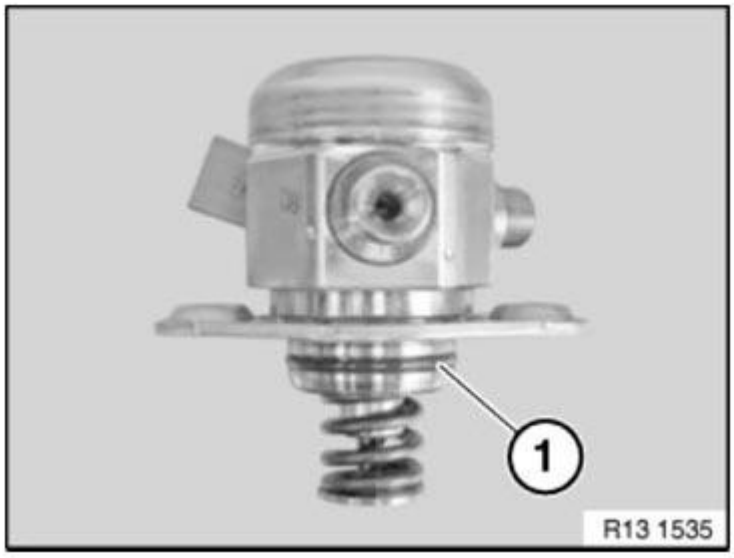


Fig. 35: Identifying High Pressure Pump Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for tightness.

Check function of DME.

1351070 REMOVING AND INSTALLING/REPLACING RIGHT HIGH PRESSURE PUMP (N63)

WARNING: Observe warning on cylinder head cover.
Disconnect NEGATIVE BATTERY TERMINAL (risk of fire due to short circuit on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high speed when the high pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**

- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be fouled by fuel.
The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!
Cover ignition coil with suitable means.

Necessary preliminary tasks

- Remove **FUEL FEED LINE** .
- Remove **HIGH-PRESSURE LINE** from right high-pressure pump to rail.

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

IMPORTANT: High-pressure pump can be pretensioned by camshaft cams!

Slightly slacken screws (1) of high pressure pump (2). If the high pressure pump is forced out, the engine will have to be turned to bring the camshafts to a different position.

Otherwise it will not be possible to install the high-pressure pump!

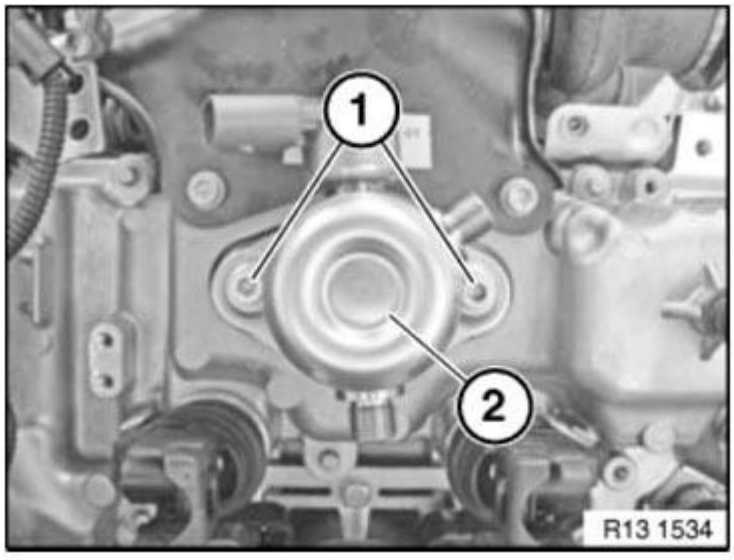


Fig. 36: Identifying High Pressure Pump With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate engine at central bolt through 90° in direction of engine rotation.

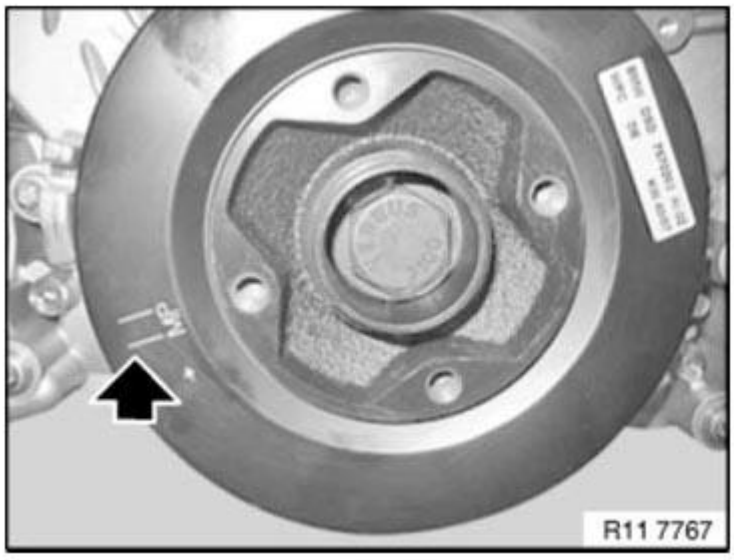


Fig. 37: [Engine Rotation Position At Central Bolt]
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Replace screws (1). Screws (1) are coated with sealant.

IMPORTANT: Pump plunger can fall out when high-pressure pump (2) is pulled out!

Detach high-pressure pump (2) and remove.

Engine oil can escape when pump is detached; have a cleaning cloth ready.

Installation note:

Provisionally fasten screws (1) and tighten uniformly in 180° increments until final tightening.

Tightening torque **13 51 1AZ** .

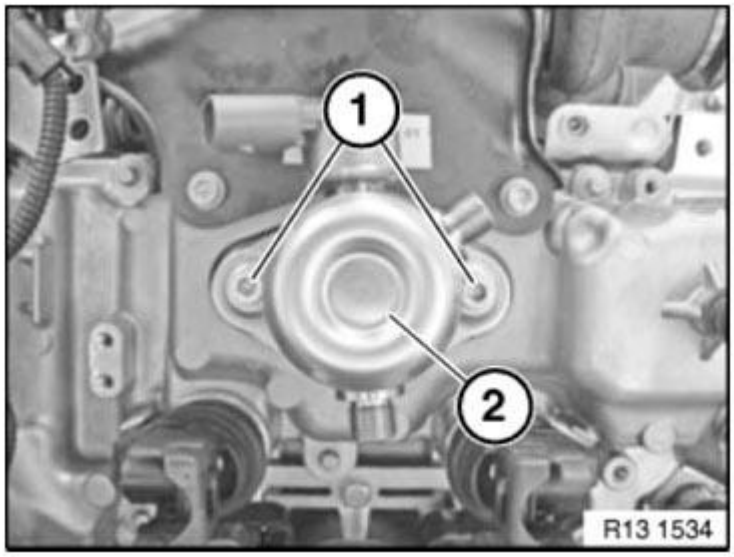


Fig. 38: Identifying High Pressure Pump With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing ring (1).

Clean contact surfaces.

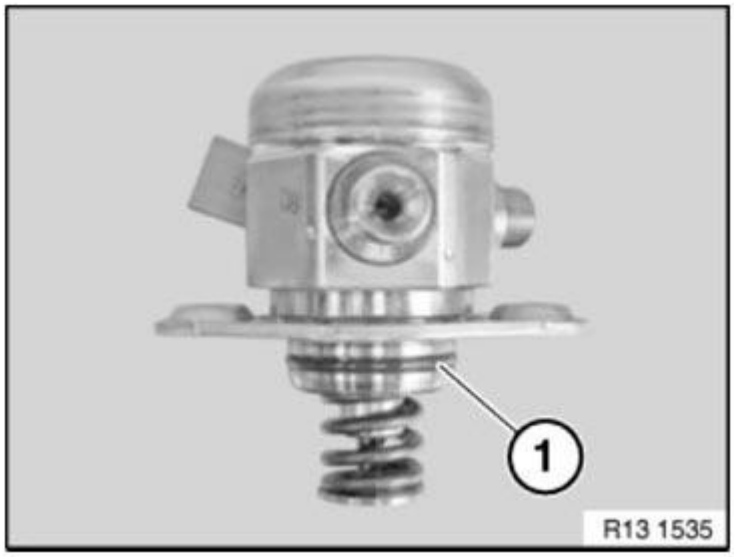


Fig. 39: Identifying High Pressure Pump Seal Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for tightness.

Check function of DME.

1353594 REPLACING LOW-PRESSURE FUEL SENSOR (N63)

WARNING: Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

Wear protective goggles.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be fouled by fuel.
The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!
Cover ignition coil with suitable means.

Necessary preliminary tasks

- Remove left intake duct.

Recycling

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Release low-pressure fuel sensor (2).

Tightening torque **13 53 9AZ** .

Installation:

Replace sealing ring on low-pressure fuel sensor.

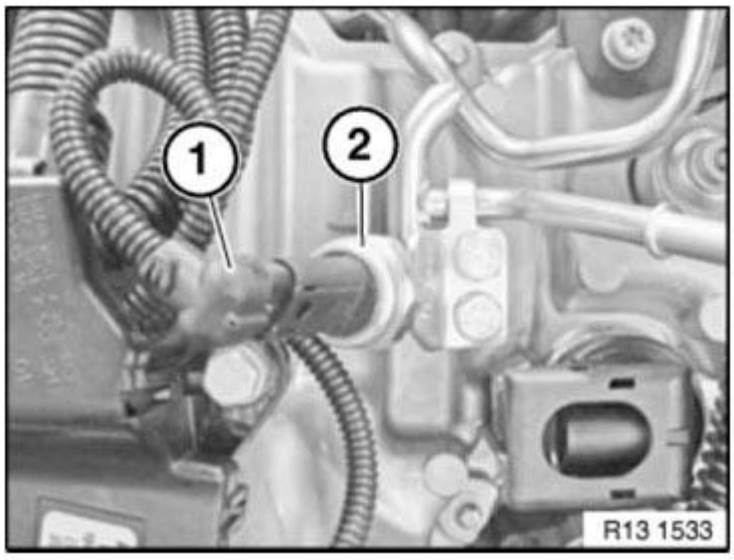


Fig. 40: Identifying Low-Pressure Fuel Sensor With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1353602 REPLACING LEFT HIGH-PRESSURE FUEL SENSOR (N63)

WARNING: Observe warning on cylinder head cover.
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**

- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks

- Remove left **RAIL**

Recycling

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Release high-pressure sensor (1) and remove.

Tightening torque **13 53 8AZ** .

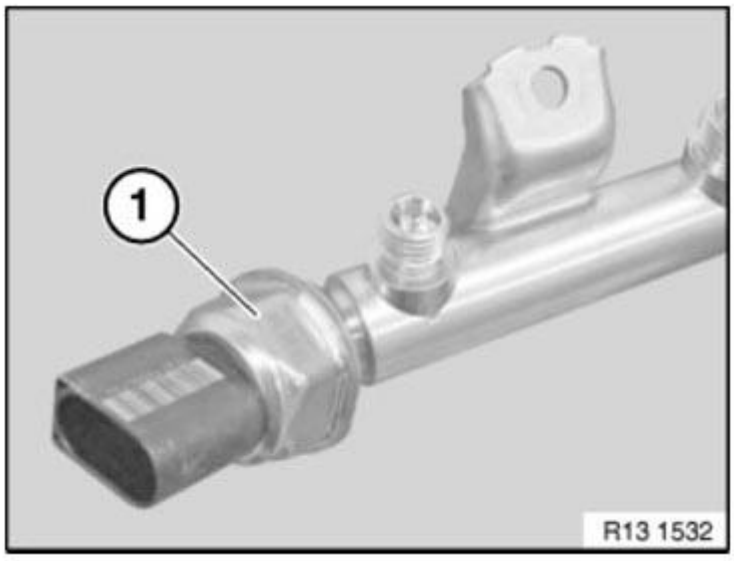


Fig. 41: Identifying High Pressure Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1353602 REPLACING RIGHT HIGH-PRESSURE FUEL SENSOR (N63)

WARNING: Observe warning on cylinder head cover.
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks

- Remove right **FUEL RAIL** .

Recycling

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Release high-pressure sensor (1) and remove.

Tightening torque **13 53 8AZ** .

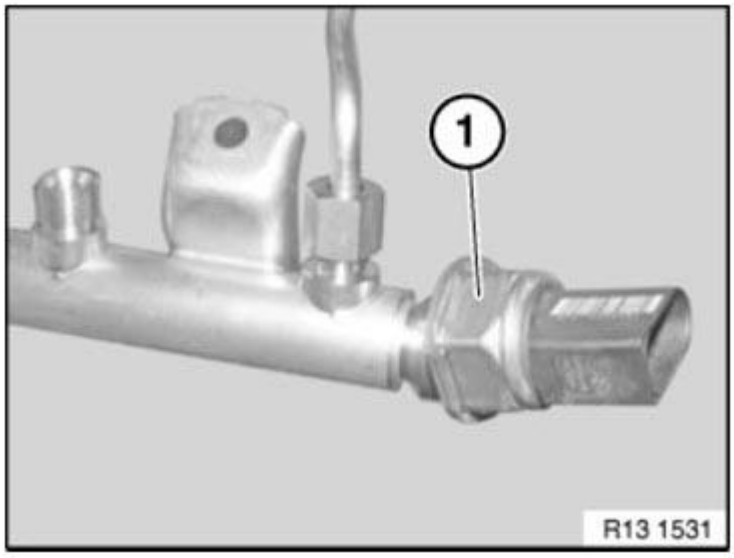


Fig. 42: Identifying High Pressure Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1353 INJECTION NOZZLE AND LINES

1353170 REMOVING AND INSTALLING/REPLACING ALL PRESSURE LINES (N63)

Notes

WARNING: Electric fuel pump starts up automatically when door is opened!
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Observe warning on cylinder head cover.

WARNING: Carry out installation work on fuel system only with coolant temperature below 40°C.
Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs 32 1 270 .**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**

Necessary preliminary tasks

- Remove **IGNITION COILS**
- Remove intercooler on left and right. See **REMOVING AND INSTALLING/REPLACING RIGHT CHARGE AIR COOLER (N63)** and **REMOVING AND INSTALLING/REPLACING LEFT CHARGE AIR COOLER (N63)** .
- Partially remove **WIRING HARNESS** for engine
- Partially remove **WIRING HARNESS** for injectors
- Detach **BATTERY POSITIVE LEAD** from battery positive terminal, partially remove battery positive lead
- Remove **FLUID RESERVOIR** for power steering
- Remove suction line for power steering. See **REPLACING SUCTION LINE FOR POWER STEERING (FROM CONNECTING PIECE TO VANE PUMP)** and **REPLACING SUCTION LINE FOR POWER STEERING (FROM FLUID RESERVOIR TO CONNECTING PIECE)** .
- Remove coolant **EXPANSION TANK**
- Remove **ELECTRONICS BOX**
- Remove **WATER VALVE** for heater/air conditioner and lay water hoses to one side
- Detach tank vent line from tank venting valve and point of separation
- Remove suspension cross-braces on left and right. See **REMOVING AND**

INSTALLING/REPLACING LEFT (REAR) SUSPENSION CROSS-BRACE and **REMOVING AND INSTALLING/REPLACING RIGHT (REAR) SUSPENSION CROSS-BRACE** .

- Remove **ACOUSTIC INSULATION** for bulkhead on left and right
- Drain off **AIR CONDITIONING SYSTEM**

Release screw (1).

Tightening torque **64 53 3AZ** .

Detach A/C line (2) and place to one side.

Replace sealing ring on A/C line.

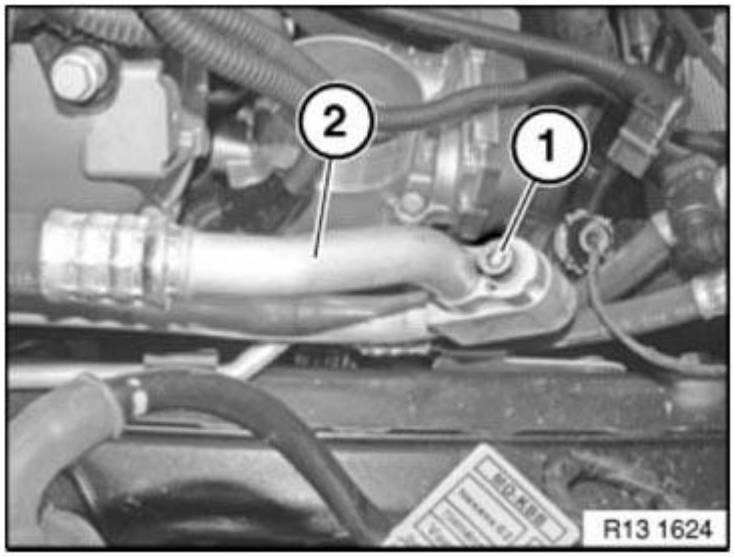


Fig. 43: Identifying A/C Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **12 42 7AZ** .

Remove battery positive lead (2) and place to one side.

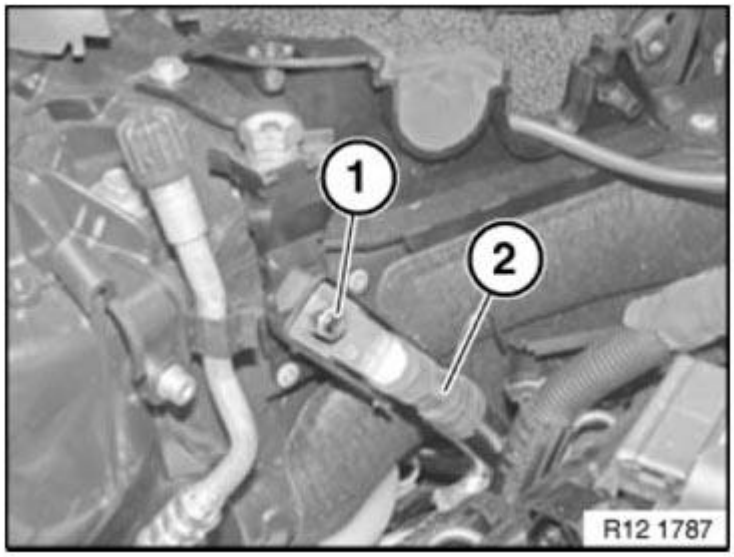


Fig. 44: Identifying Battery Positive Lead With Mounting Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp off fuel delivery line. Seal off fuel lines with special tools (1) **13 5 160** and (2) 13 5 162.

Catch and dispose of escaping fuel.

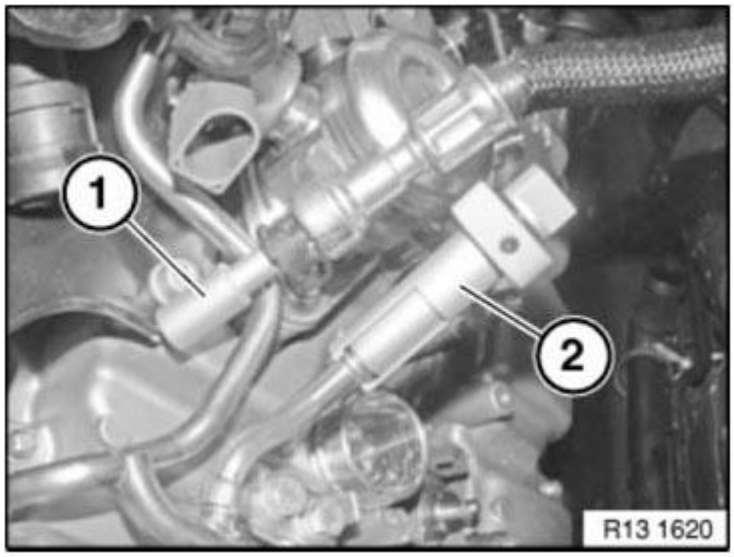


Fig. 45: Sealing Off Fuel Lines Using Special Tools (13 5 160 And 13 5 162)
Courtesy of BMW OF NORTH AMERICA, INC.

Removing high-pressure fuel line from injector to rail

NOTE: The following description applies to all pressure lines.
First release pressure line on rail to reduce existing fuel pressure if necessary.

Fuel must not get into the spark plug slot. Then release pressure line on injector.

Release union nuts (1).

Disconnect pressure line (2).

Set down pressure lines in order.

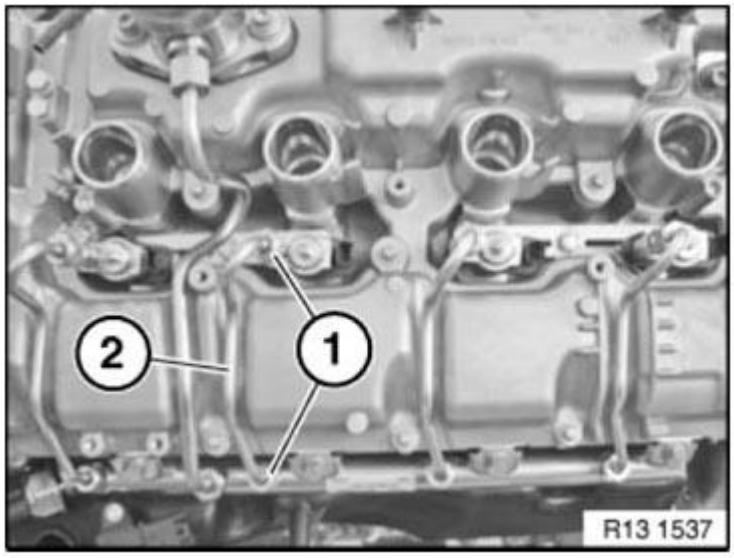


Fig. 46: Identifying Pressure Lines With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Secure injector against twisting with wrench (2).

Release union nut (1).

IMPORTANT: If several pressure lines are removed, ensure that each pressure line is reinstalled in its original location (cylinder).
Mark pressure lines.

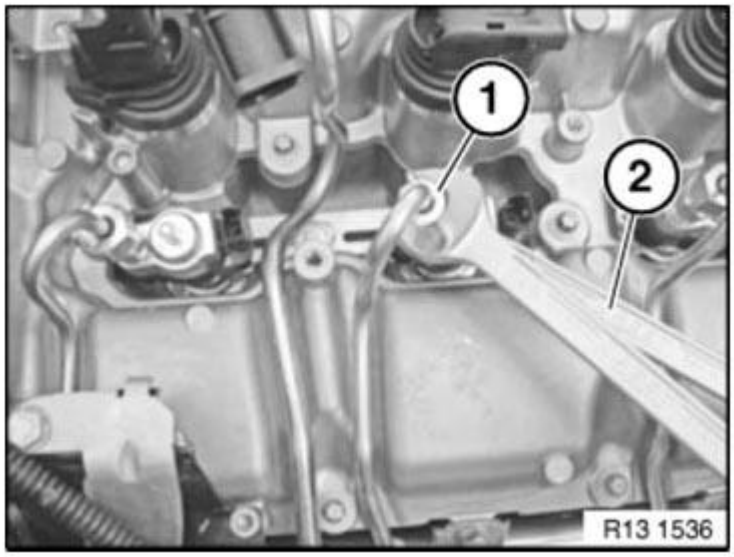


Fig. 47: Releasing Union Nut Using Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Only if injector has to be rotated in fitted position

- Release bolt a few turns until holding-down element (3) is slackened.
- Turn injector (1) in direction of arrow until union nuts (2) on pressure line can be easily screwed on by hand.
- To do so, engage wrench on hexagon head of injector if necessary.
- Tighten union nuts on pressure line hand-tight.

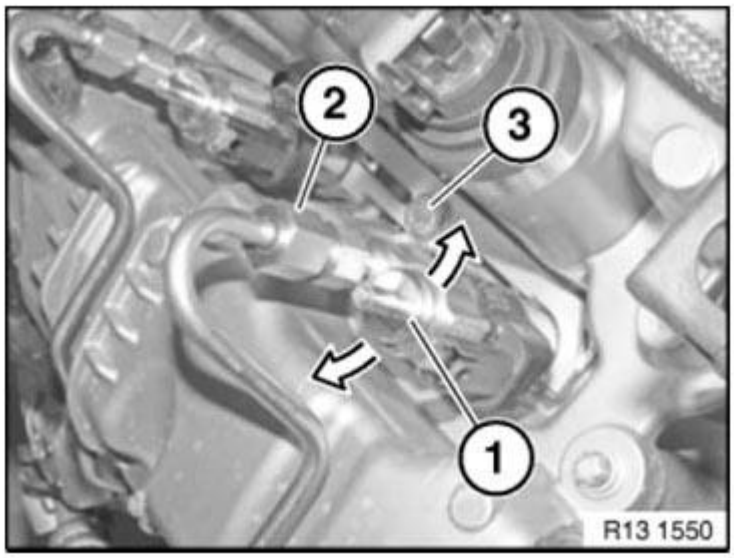


Fig. 48: Turning Injector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not under any circumstances pull injector out of bore!
If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced! Replacing PTFE sealing ring, refer to 13 53 315 .

Adhere to tightening sequence:

- First tighten down union nut on injector.
- Then tighten down union nut on rail.

Tighten high-pressure fuel lines with special tool **13 0 160** .

Tighten high-pressure fuel line on injector with torque wrench (2) and special tool (1) 13 0 161. In so doing, grip hexagon head of injector with wrench (3).

Tighten union nuts with special tool (1) 13 0 161.

Tightening torque **13 53 2AZ** .

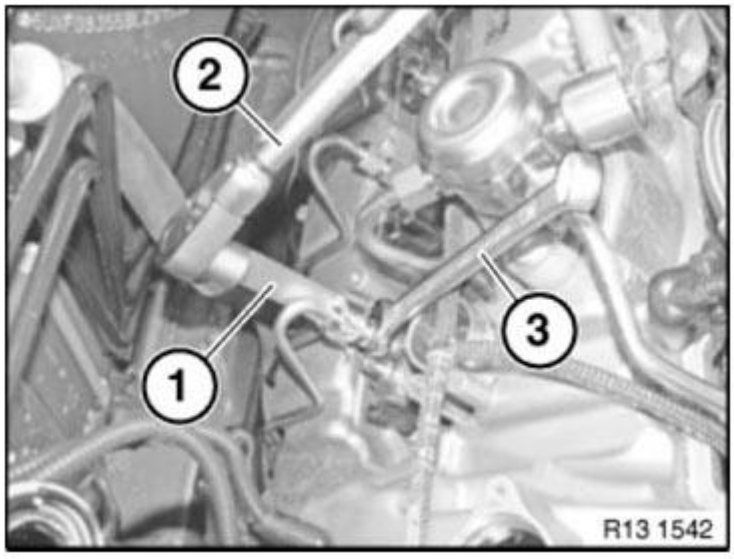


Fig. 49: Tightening High-Pressure Fuel Line On Injector Using Torque Wrench And Special Tool (13 0 161)
Courtesy of BMW OF NORTH AMERICA, INC.

On cylinders 4 and 8 tighten down pressure line (1) to torque (2) and with crowfoot wrench (3). In so doing, grip hexagon head of injector with wrench.

Tightening torque **13 53 2AZ** .

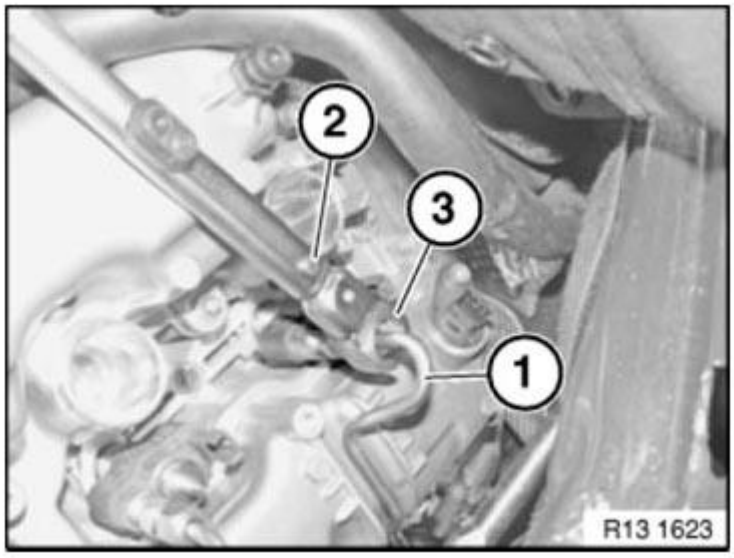


Fig. 50: Tightening Down Pressure Line Using Crowfoot Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down pressure line on rail with torque wrench (1) and special tools (2) **00 1 440** , (3) 13 0 162 and (4) 13 0 161.

Tightening torque **13 53 2AZ** .

Installation:

When tightening high-pressure line on rail, note that angle of rotation of special tool 13 0 161 is limited. Re-position special tool if necessary.

Distortion of torque possible!

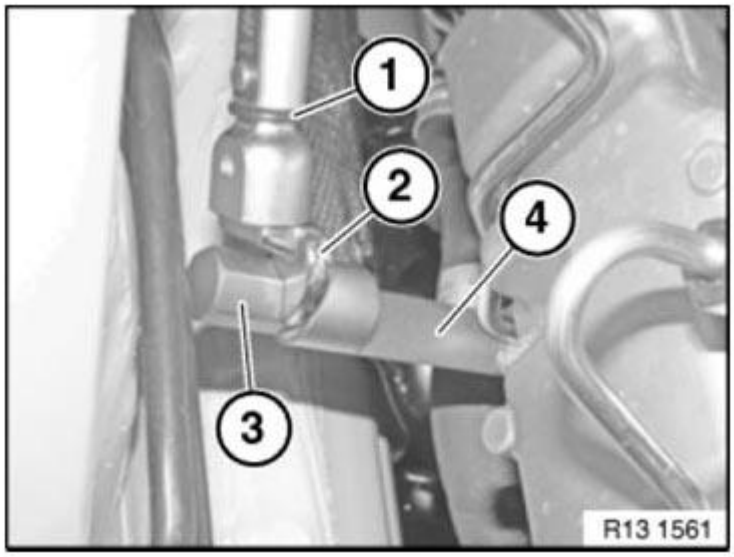


Fig. 51: Tightening Pressure Line On Rail Using Torque Wrench And Special Tools (001440, 13 0 162 and 13 0 161)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove high-pressure line from high-pressure pump to rail.

Picture describes the left side, the procedure for the right side is identical.

Release union nuts (1).

Disconnect pressure line (2).

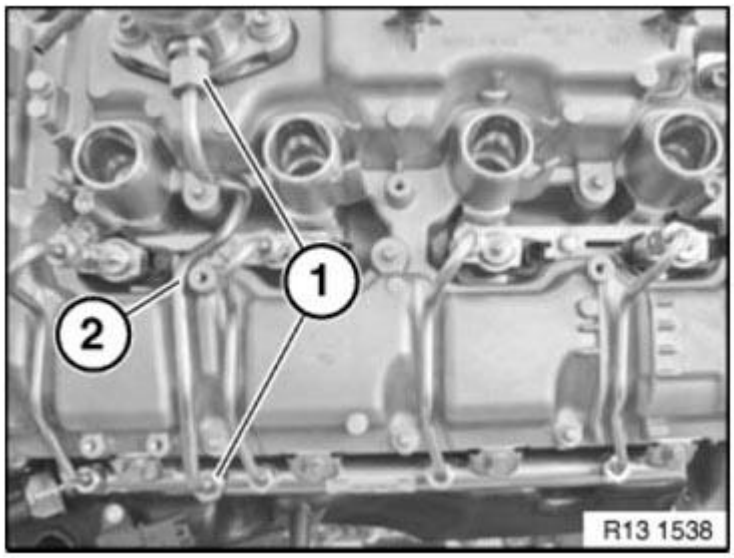


Fig. 52: Identifying High Pressure Line With Union Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Refit high-pressure line from high-pressure pump to rail.

Tighten down pressure line (1) hand-tight on rail and injector.

First tighten high-pressure line (1) on high-pressure pump using torque wrench (2) and special tool (3) **00 1 440** .

Tightening torque **13 53 3AZ** .

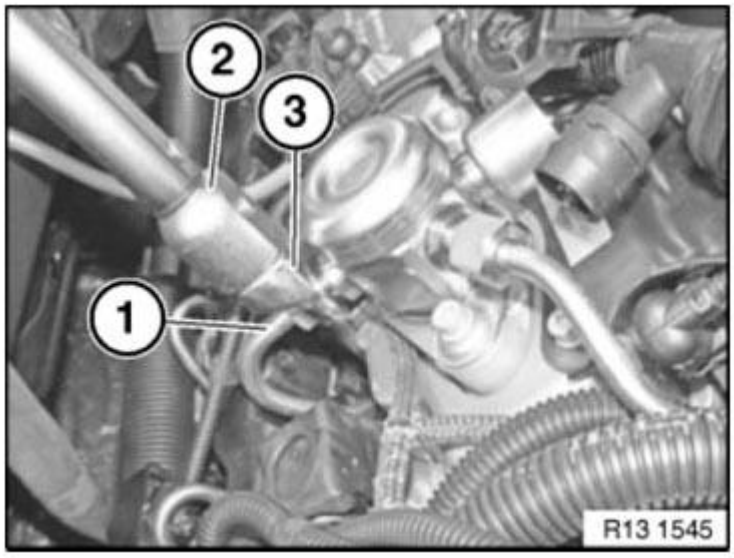


Fig. 53: Tightening High-Pressure Line On High-Pressure Pump Using Torque Wrench And Special Tool (00 1 440)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When tightening high-pressure line on rail, note that angle of rotation of special tool **13 0 140** is limited. Re-position special tool if necessary.

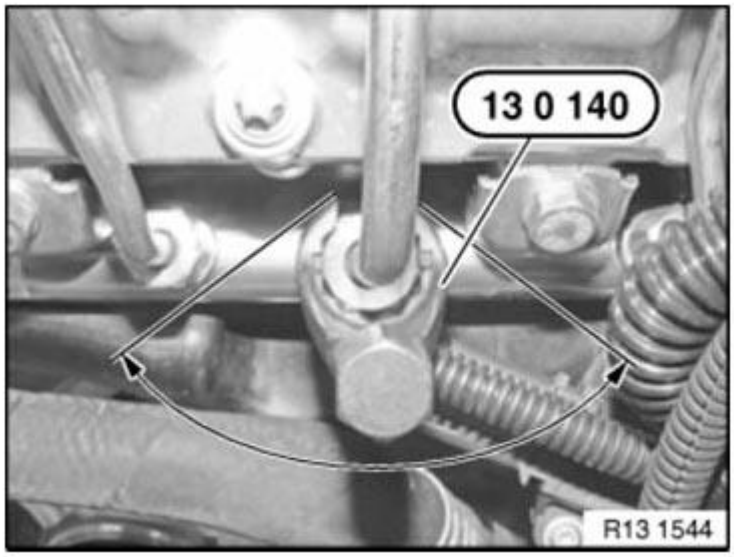


Fig. 54: Identifying Angle Of Rotation For Special Tool (13 0 140)
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten high-pressure line (1) on rail using torque wrench (2), long crowfoot spanner (3) and special tool (4) **13 0 140** .

Tightening torque **13 53 3AZ** .

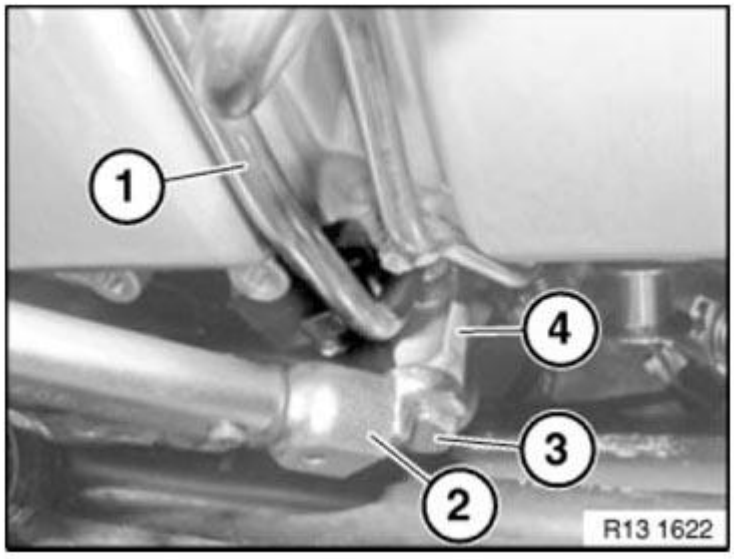


Fig. 55: Tightening High-Pressure Line On Rail Using Torque Wrench, Long Crowfoot Spanner And Special Tool (13 0 140)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Vent fuel system with BMW diagnosis system.

Check fuel system for leaks.

Check function of DME.

1353310 REMOVING AND INSTALLING/REPLACING AN INJECTOR (N63)

Notes

WARNING: Observe warning on cylinder head cover.
Clamp off battery negative terminal (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

WARNING: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity from the fuel injectors!
To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.
There is a risk of injury if the fuel pressure is not reduced!

IMPORTANT: Observe without fail the tightening sequences and tightening torques when reassembling.
Disregard of these requirements may result in leaks!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

IMPORTANT: Injectors are not waterproof!
Carry out engine cleaning/washing only with ignition coil cover fitted.

Necessary preliminary tasks

- Remove **IGNITION COIL** of corresponding cylinder

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**
- **Remove PRESSURE LINES on corresponding injectors**

NOTE: The following description applies to all injectors.

Release bolt (1) and remove holding-down element (2).

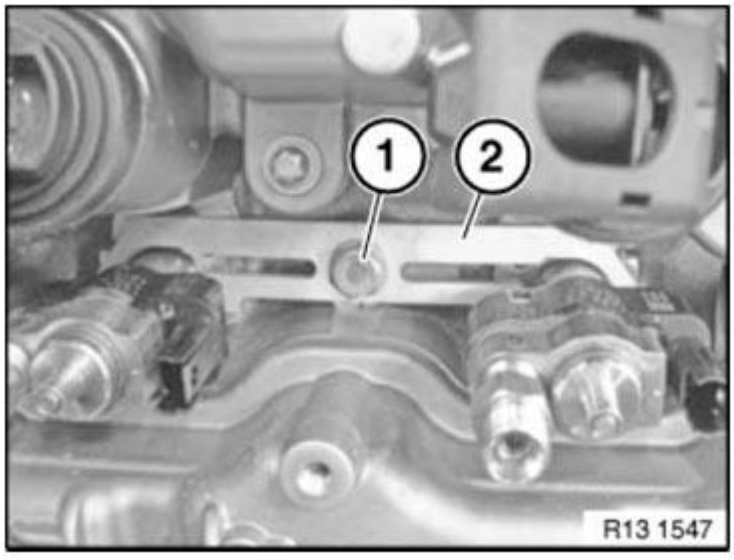


Fig. 56: Identifying Injector Holding Down Element With Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Remove injector (1).

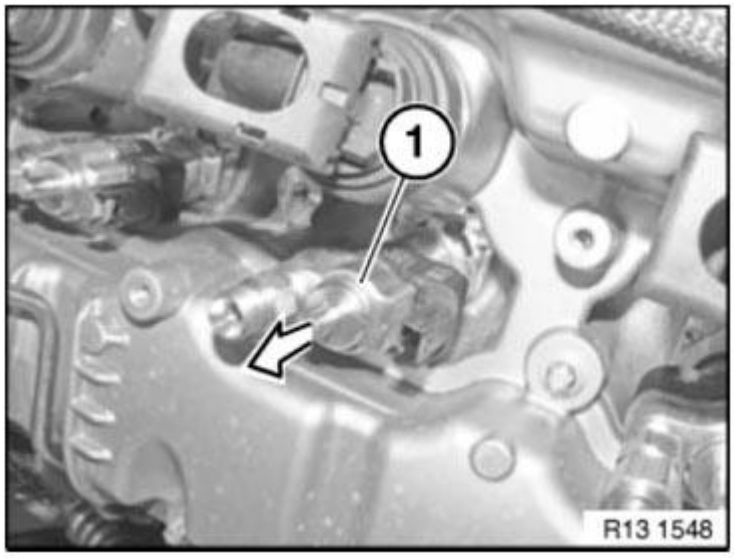


Fig. 57: Removing Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If several injectors are removed, ensure that each injector is reinstalled in its original location (cylinder).
Mark injectors.

After removing, fit protective caps (1 and 3) to injector tip and fuel line connection.

Protective caps are available from BMW Parts Service.

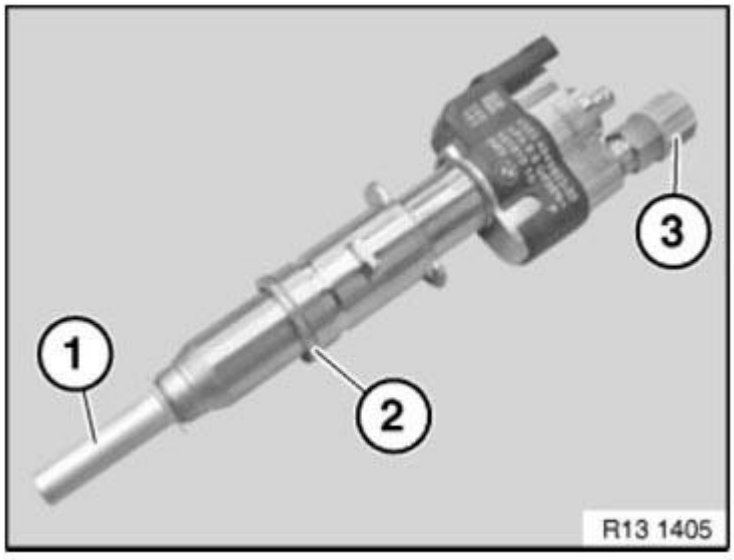


Fig. 58: Identifying Fit Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing a new injector:

- Use a new uncoupling element (2).
- Remove protective cap (1) from injector tip max. 10 min. before installation (PTFE sealing ring swells up).

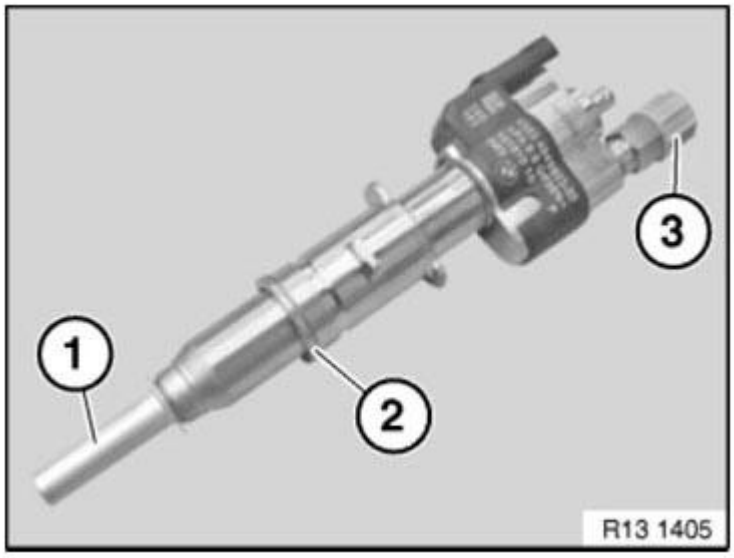


Fig. 59: Identifying Fit Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reusing fuel injector:

- Replace uncoupling element (2).
- Replace PTFE sealing ring (1).

  A PTFE seal which has been heated once by engine operation must be replaced before the fuel injector is reinstalled.

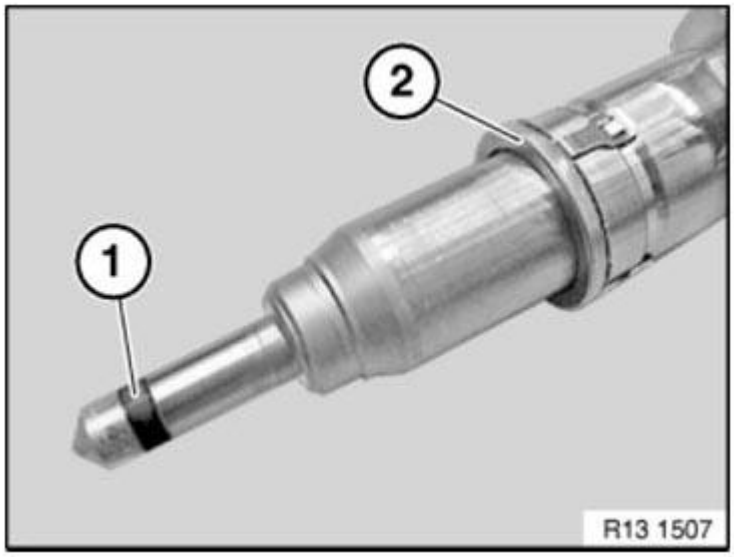


Fig. 60: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing PTFE sealing ring

Before replacing PTFE sealing ring (1), make sure hands and work surface are clean and free of oil.

Avoid mechanical contact with injector tip (2).

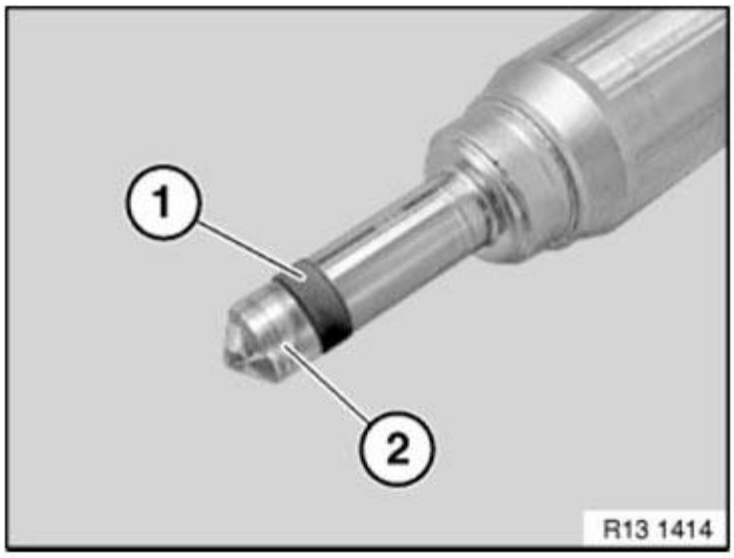


Fig. 61: Identifying PTFE Sealing Ring And Injector Tip
Courtesy of BMW OF NORTH AMERICA, INC.

Remove PTFE sealing ring (1) with special tool 13 0 191 from injector (2).

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other tools/agents).

Do not clean injector tip.

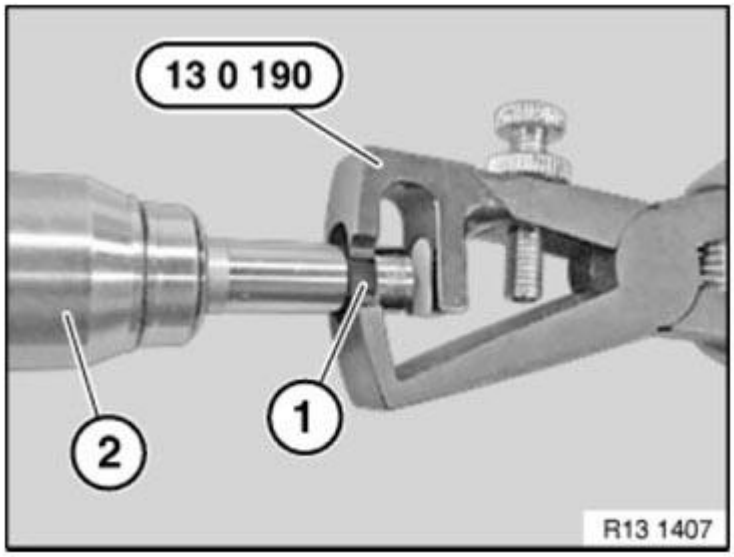


Fig. 62: Removing PTFE Sealing Ring From Injector Using Special Tool (13 0 191)
Courtesy of BMW OF NORTH AMERICA, INC.

Slide new PTFE sealing ring (1) onto mounting taper 13 0 195.

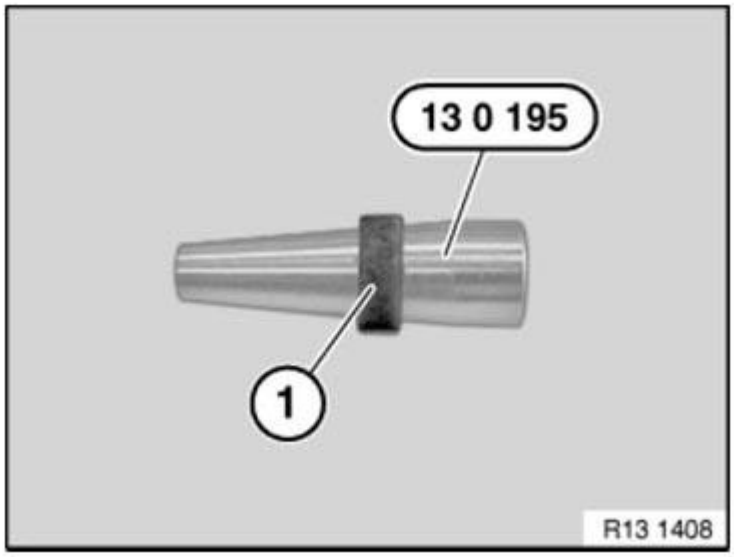


Fig. 63: Identifying PTFE Sealing Ring Onto Mounting Taper 13 0 195
Courtesy of BMW OF NORTH AMERICA, INC.

Use fingers and mounting taper 13 0 195 to slide PTFE sealing ring (1) onto injector (2).

NOTE:

- **Do not use fingernails to slide PTFE sealing ring on.**
- **Do not use any lubricating agents.**
- **The sealing ring is expanded when slid on.**

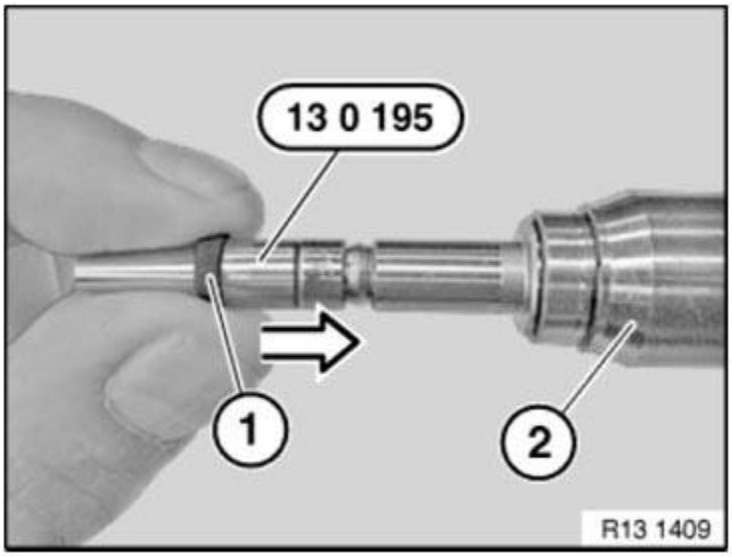


Fig. 64: Sliding PTFE Sealing Ring Onto Injector Using Fingers And Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

To bring the expanded PTFE sealing ring to its installation dimension, slide three mounting sleeves with decreasing diameters onto the injector.

Slide mounting sleeve (1) with large opening first onto injector (1).

Do not use any lubricating agents.

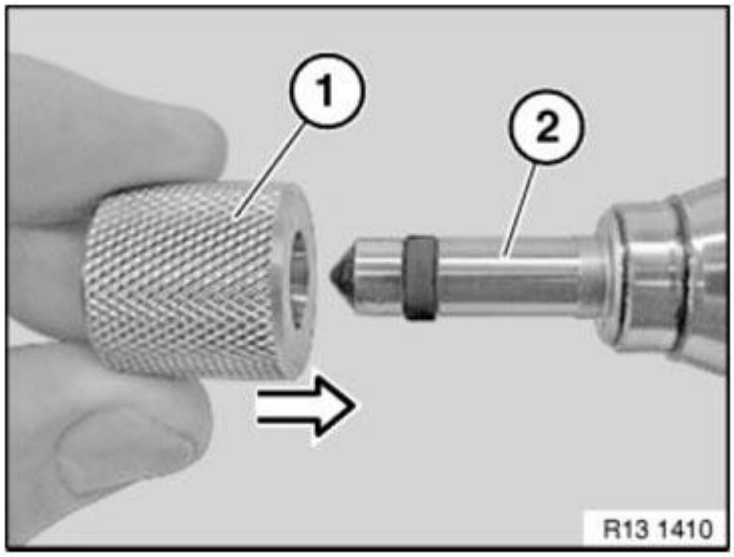


Fig. 65: Sliding Mounting Sleeve Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

First slide mounting sleeve 13 0 192 (large diameter) onto injector (1).

Then slide mounting sleeve 13 0 193 (medium diameter) onto injector (1).

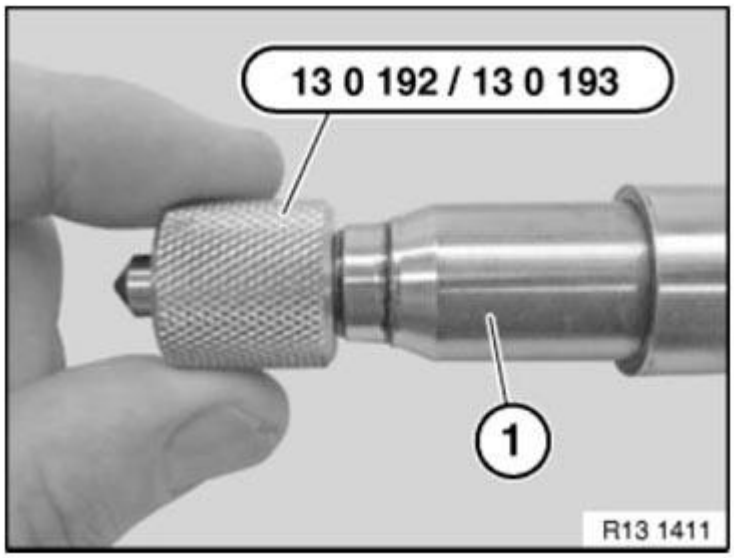


Fig. 66: Sliding Mounting Sleeve 13 0 192 (Large Diameter) Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Finally, press injector (1) into mounting sleeve 13 0 194 (small diameter).

Installation:

Install injector within 10 minutes or slide on protective cap (**Fig. 59**) (PTFE sealing ring swells up).

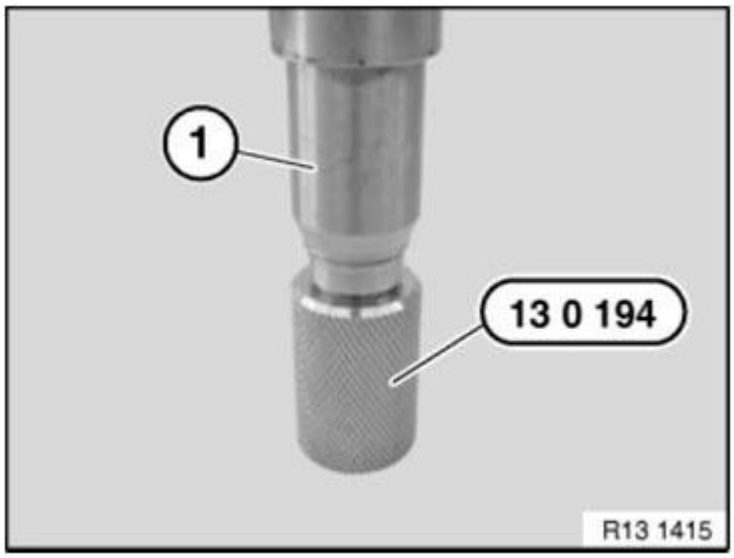


Fig. 67: Identifying Injector Into Mounting Sleeve 13 0 194 (Small Diameter)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation of injector is described separately from removal.

Before installing injector in engines that have been run

- Check injector bore for dirt.

  Clean **only dirty** injector bores.

  Important - do not damage injector!

- Clean injector bore: To do so, preferably slide injector without uncoupling element (2) but with new PTFE sealing ring (1) in and out of injector bores several times.

  The PTFE sealing ring must then be replaced.

- Clean contact surfaces of uncoupling elements (2) in cylinder head.
- Replace uncoupling element (2).

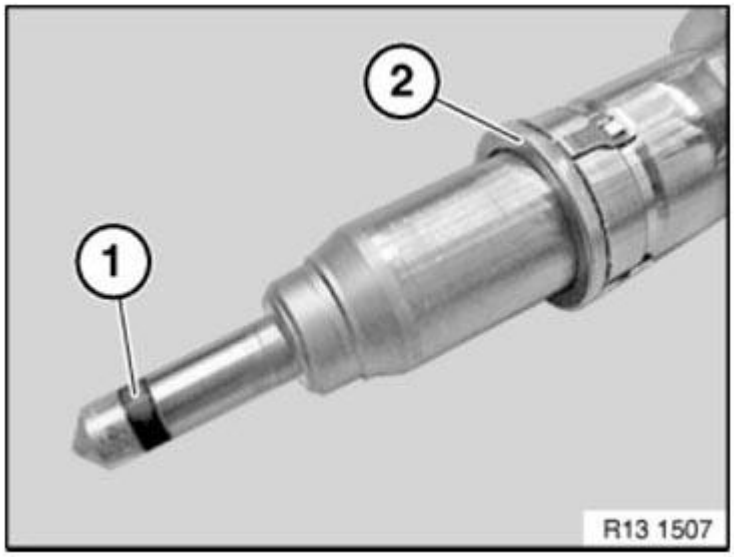


Fig. 68: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Injector adjustment!

An injector adjustment must be carried out if an injector is replaced or changed on the cylinder side.

Injector adjustment is carried out with the aid of a so-called adjustment value.

The adjustment value is printed in two blocks of three digits on the injector.

The adjustment value must be read off **before** installation!

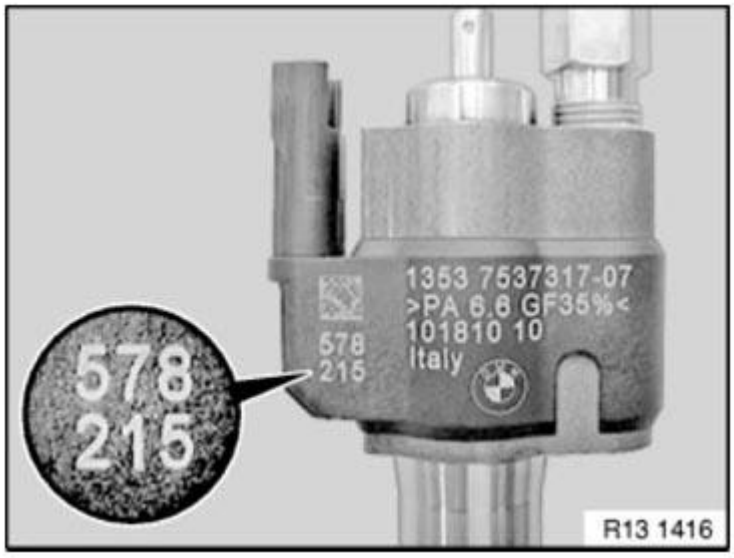


Fig. 69: Identifying Adjustment Value Printed In Blocks Of Digits On Injector

Courtesy of BMW OF NORTH AMERICA, INC.

Enter the adjustment value according to the installation position (cylinder) of the injector.

If injector adjustment is not carried out, the engine may run roughly or fail to start.

Description of injector adjustment at end of instruction.



Fig. 70: Identifying Adjustment Value On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Install injector (1).

Install holding-down element (2).

NOTE: Make sure holding-down element (2) is correctly seated.

IMPORTANT: Tighten bolt (3) hand-tight only so that holding-down element (2) is slack and if necessary injector (1) can still be turned.

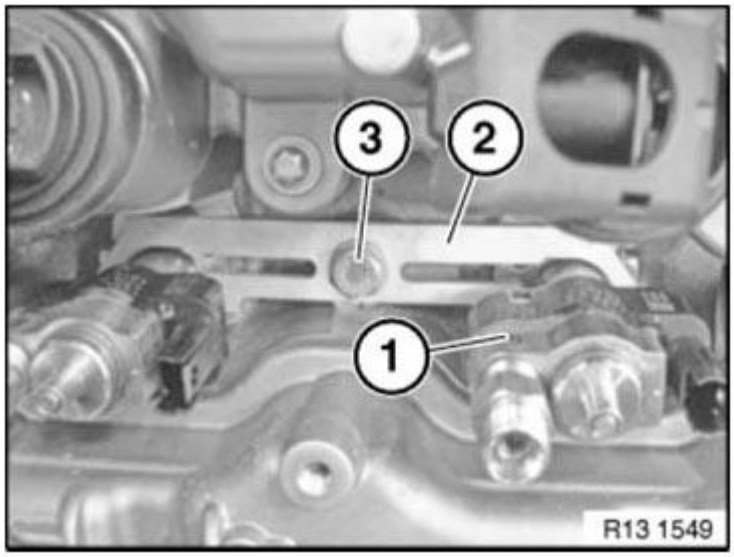


Fig. 71: Identifying Injector With Holding Down Element And Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Connect pressure line (2), tightening nuts (1) handtight only in the process.

IMPORTANT: Connect pressure line (2) without tension only.
To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!
If the nuts cannot be screwed on easily by hand, the injector must if necessary be turned a little.

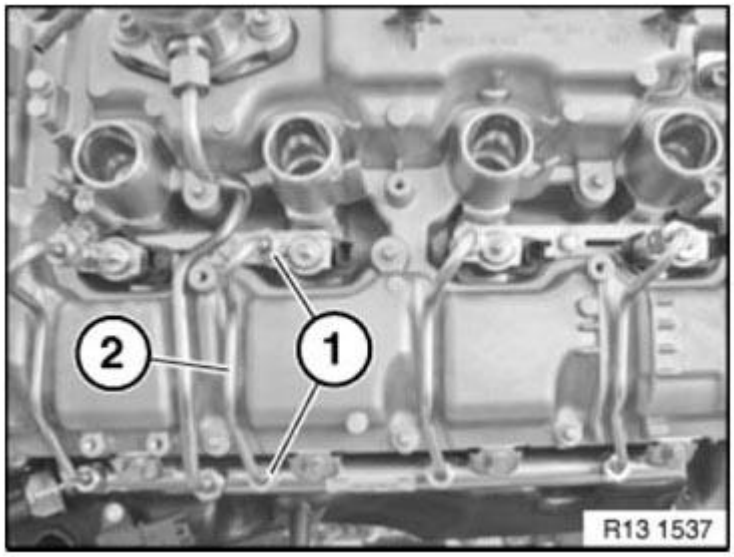


Fig. 72: Identifying Pressure Lines With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Turn injector (1) if necessary in direction of arrow until nuts on pressure line can be easily screwed on by hand.

Tighten nut (2) of pressure line hand-tight.

Then tighten down bolt for holding-down element (3).

Tightening torque **13 53 5AZ** .

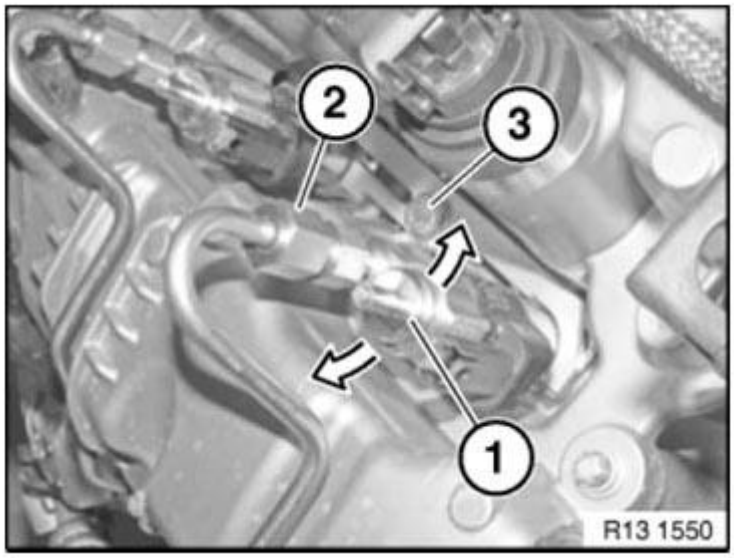


Fig. 73: Turning Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence:

- First tighten down pressure line on injector.

Tighten down nut on injector with special tool (1) 13 0 161 and to torque (2). In so doing, grip hexagon head of injector with wrench (3).

Tightening torque **13 53 2AZ** .

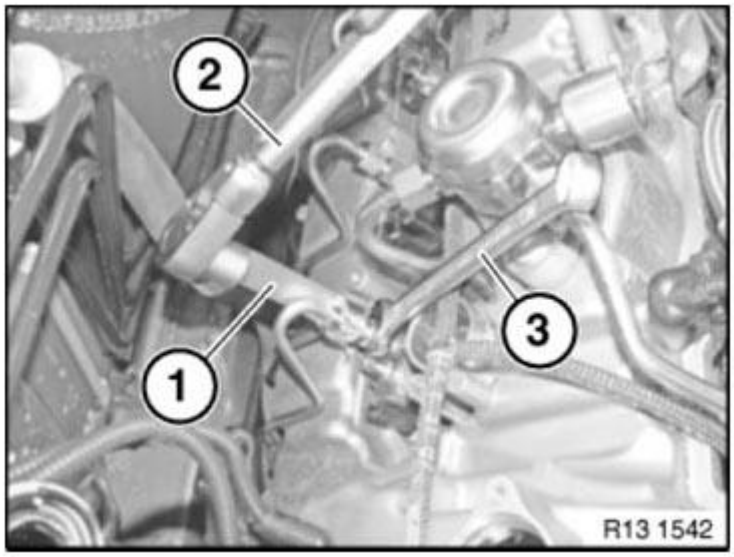


Fig. 74: Tightening Down Nut On Injector Using Special Tool (13 0 161)
Courtesy of BMW OF NORTH AMERICA, INC.

On cylinders 4 and 8 tighten down pressure line (1) to torque (2) and with crowfoot wrench (3). In so doing, grip hexagon head of injector with wrench.

Tightening torque **13 53 2AZ** .

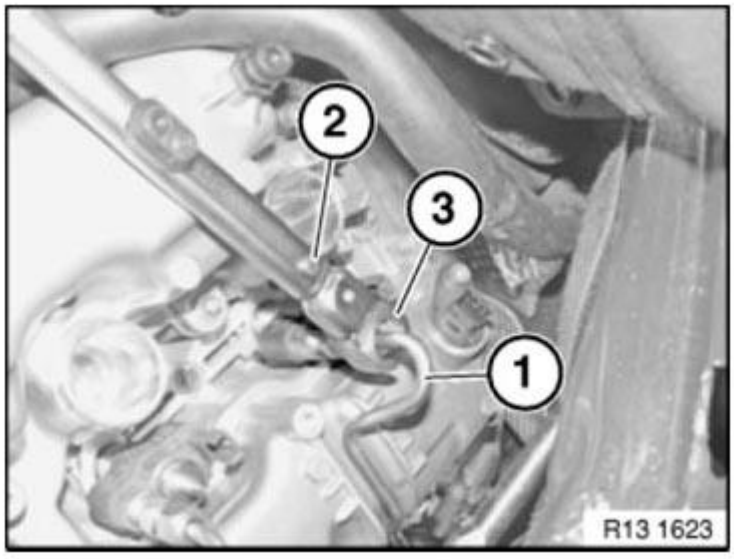


Fig. 75: Tightening Down Pressure Line Using Crowfoot Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

- Then tighten down pressure line on rail.

Tighten down pressure line on rail with torque wrench (1) and special tools (2) **00 1 440** , (3) 13 0 162 and (4)

13 0 161.

Tightening torque **13 53 2AZ** .

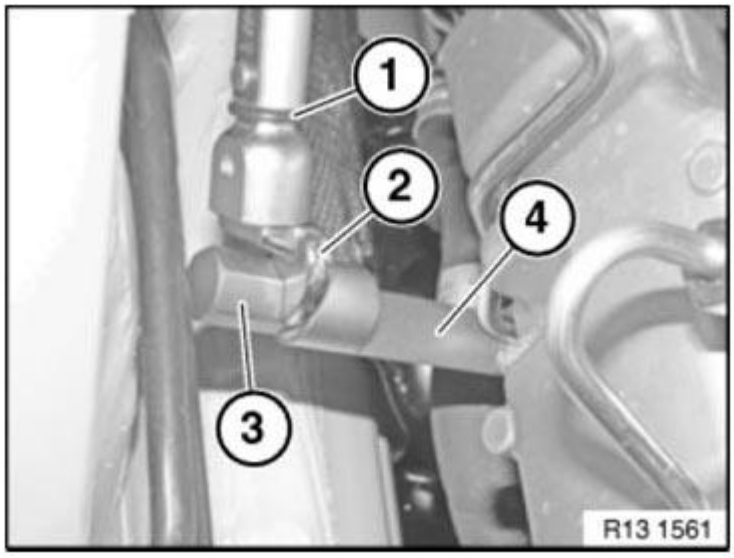


Fig. 76: Tightening Pressure Line On Rail With Torque Wrench And Special Tools (00 1 440)
Courtesy of BMW OF NORTH AMERICA, INC.

Carrying out injector adjustment

- Connect DIS Tester
- Identify car
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment programs"
- Select "Adjust injectors"
- Change "Test schedule"
- For each replaced injector, the adjustment value must be entered according to the installation position (cylinder).

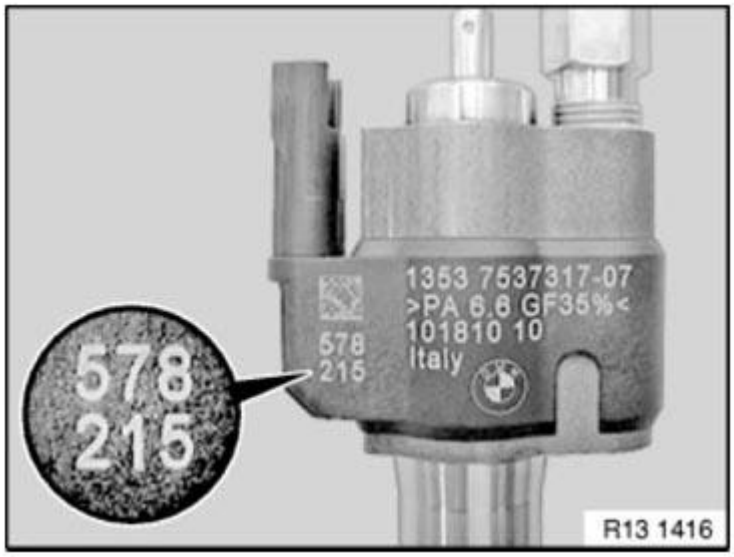


Fig. 77: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Vent fuel system with BMW diagnosis system.

Check fuel system for leaks.

Check function of DME.

1353332 REMOVING AND INSTALLING/REPLACING FEED LINE (N63)

Notes

WARNING: Clamp off BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

Wear protective goggles.

Wear protective gloves.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**

- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks:

- Remove **LEFT AND RIGHT INTAKE FILTER HOUSINGS**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Release clamps (1) and (2).

Replace clamps (2).

Detach both charge-air ducts (3) and remove.

Check gaskets on turbocharger, replacing if necessary.

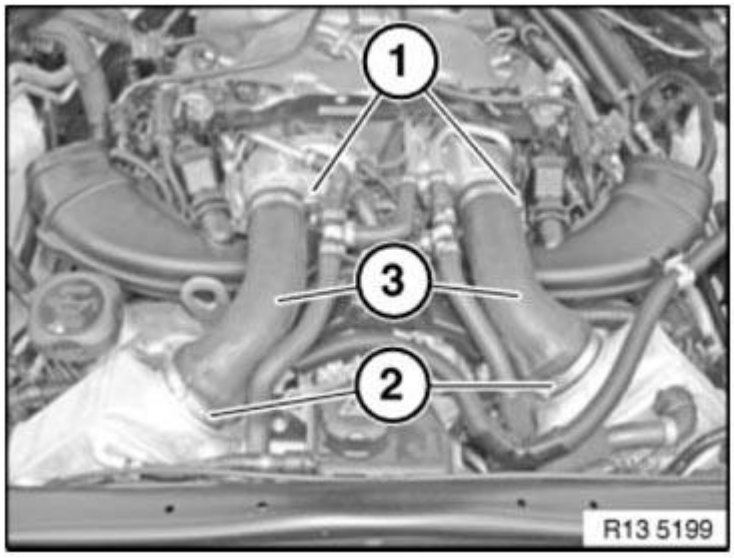


Fig. 78: Identifying Air Duct With Mounting Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Detach hoses (1) from clean-air pipe.

Release screw (2).

Tightening torque **13 71 1AZ** .

Detach clean-air pipe (3) in direction of travel from turbocharger.

Check seal on clean-air pipe, replacing if necessary.

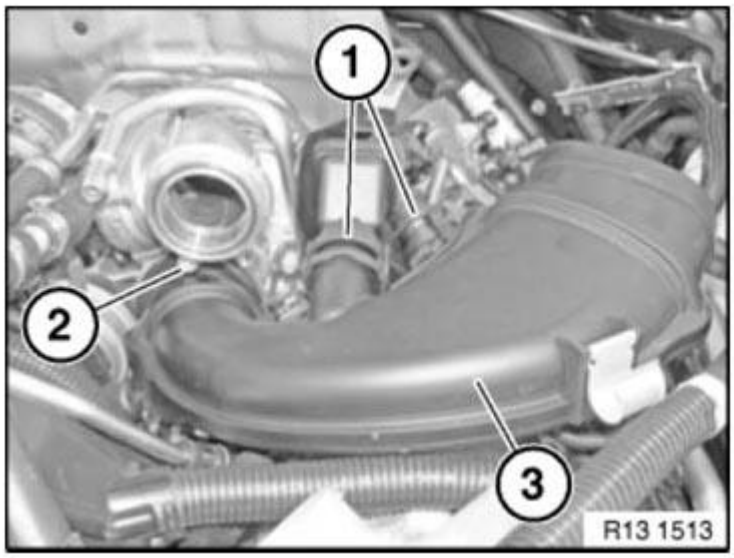


Fig. 79: Identifying Clean Air Pipe With Hoses And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect fuel feed line (1).

Seal fuel lines with special tools **13 5 160** and 13 5 162.

Unlock and disconnect plug (2) on fuel low-pressure sensor.

Release fuel feed line (3) on high-pressure pump.

Tightening torque **13 53 4AZ** .

Release bolts (4).

Tightening torque **13 53 6AZ** .

Catch and dispose of escaping fuel.

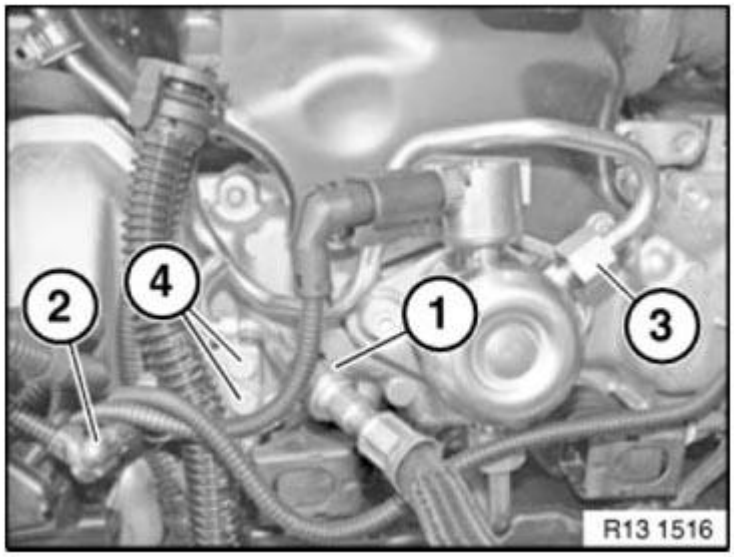


Fig. 80: Identifying Fuel Feed Line With Plug And Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Seal fuel lines with special tools (1) **13 5 160** and (2) 13 5 162.

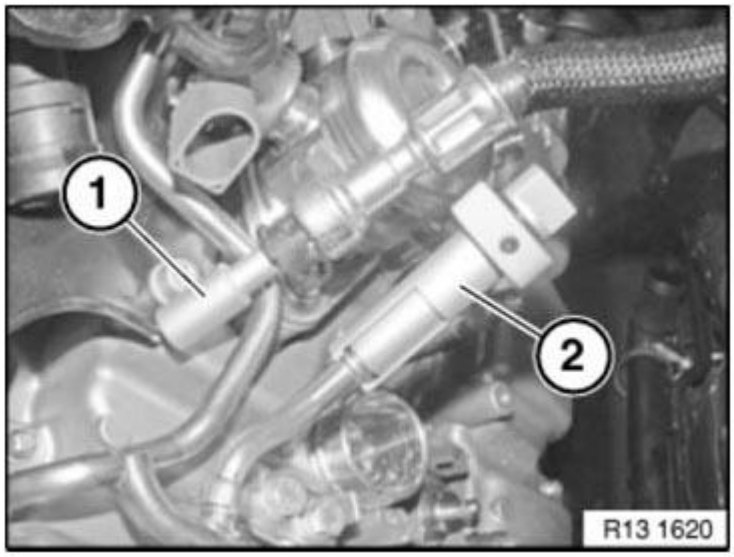


Fig. 81: Sealing Fuel Lines Using Special Tools (13 5 160 And 13 5 162)
Courtesy of BMW OF NORTH AMERICA, INC.

Release fuel feed line (1) on high-pressure pump.

Tightening torque **13 53 4AZ** .

Catch and dispose of escaping fuel.

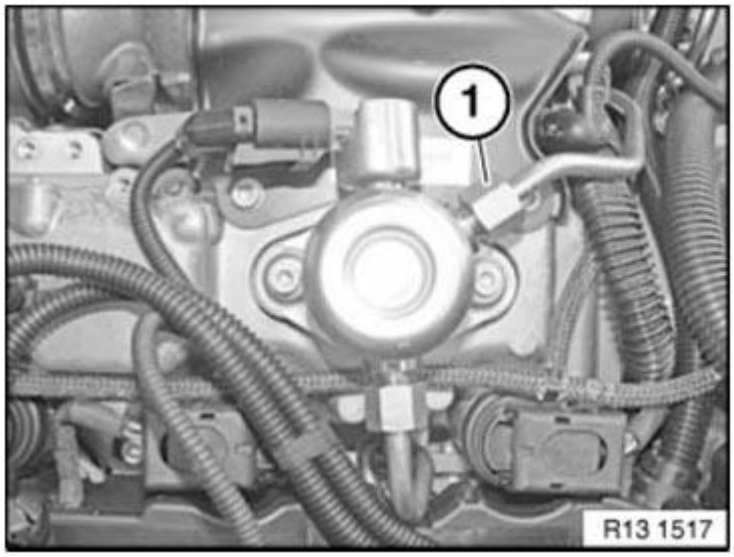


Fig. 82: Identifying Fuel Feed Line On High-Pressure Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) on retaining clips.

Tightening torque **13 53 7AZ** .

Feed out and remove fuel feed line (2).

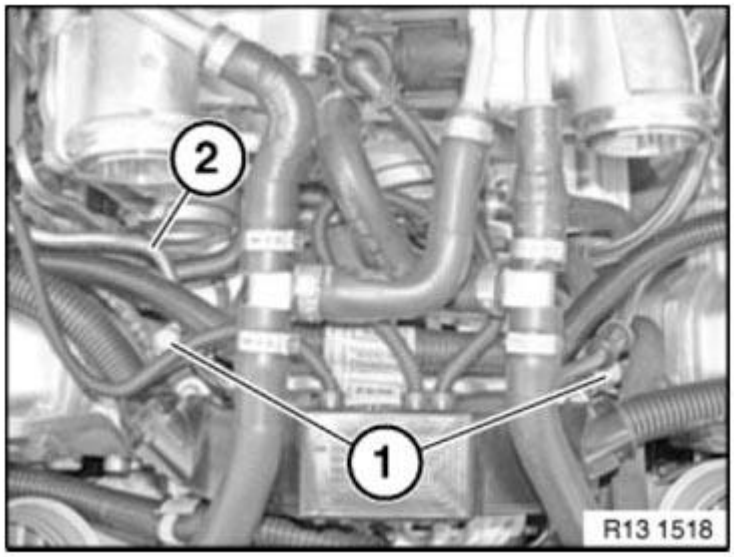


Fig. 83: Identifying Fuel Feed Line With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe tightening sequence.

- Fit fuel feed line.

  In so doing, tighten screw connections **hand-tight only.**

- Tighten down fuel feed line (1) on high-pressure pumps to torque (2) and with crowfoot wrench (3).

  Tightening torque **13 53 4AZ** .

- Tighten down lugs on fuel low-pressure sensor.

  Tightening torque **13 53 6AZ** .

- Tighten down retaining clips.

  Tightening torque **13 53 7AZ** .

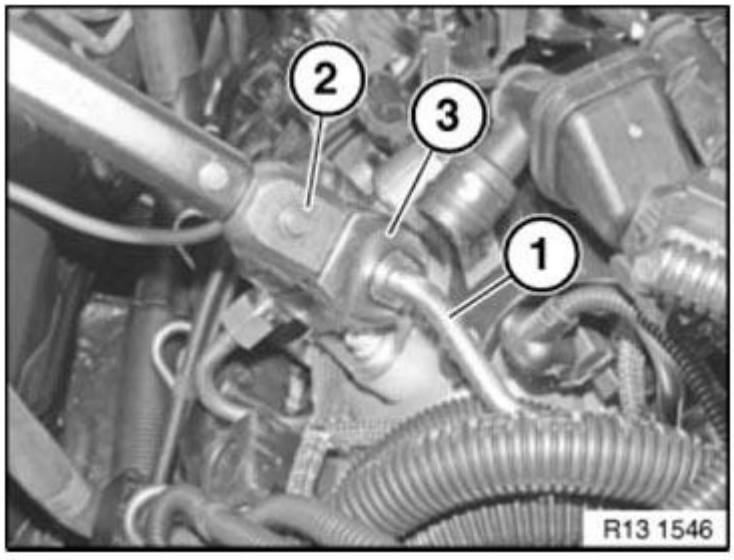


Fig. 84: Tightening Fuel Feed Line On High-Pressure Pumps Using Crowfoot Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1353205 REMOVING AND INSTALLING/REPLACING LEFT RAIL (N63)

WARNING: Electric fuel pump starts up automatically when door is opened!

Observe warning on cylinder head cover.
Disconnect NEGATIVE BATTERY TERMINAL (risk of fire due to short circuit on removal).
Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high speed when the high pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced dirt contamination can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt contamination before removing lines or separate components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Recycling

Fuel escapes when fuel line is detached. Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Read out the fault memory of the DME control unit. If necessary, work through test schedules.
- Switch off ignition.
- Remove left **INTERCOOLER** .
- Remove **COOLANT EXPANSION TANK** .
- Remove **WATER VALVE** and set the coolant hoses onto the side.
- Partially remove **WIRING HARNESS** for engine.
- Partially remove **WIRING HARNESS** for injectors and ignition coils.
- Disconnect all **PRESSURE LINES** on left side.
- **If installed:**

  Remove **OIL RESERVOIR** for hydraulic steering or dynamic drive.

- **If installed:**

  Remove suction line for hydraulic steering or dynamic drive. See **REPLACING SUCTION LINE FOR**

POWER STEERING (FROM CONNECTING PIECE TO VANE PUMP) and **REPLACING SUCTION LINE FOR POWER STEERING (FROM FLUID RESERVOIR TO CONNECTING PIECE)** .

Unlock plug (1) on high-pressure sensor and disconnect.

Unfasten screws (2).

Tightening torque **13 53 1AZ** .

Remove rail (3).

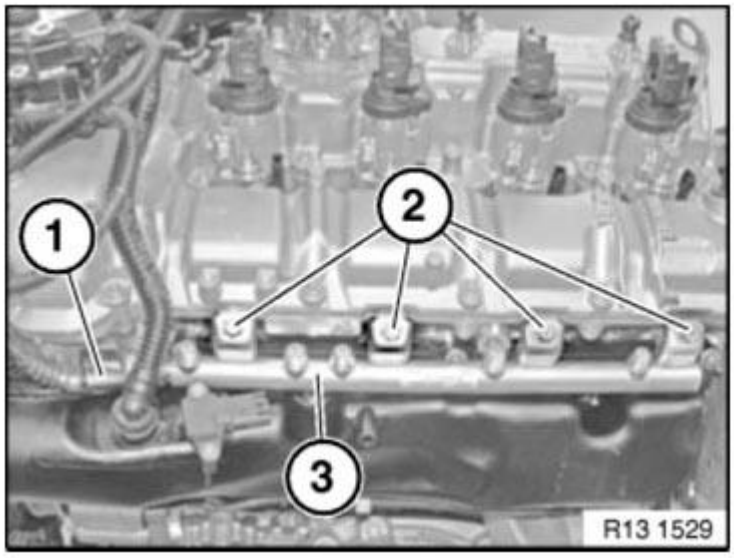


Fig. 85: Identifying High Pressure Sensor With Plug And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine
Check fuel system for leak tightness.
Delete fault memory.

1353208 REMOVING AND INSTALLING/REPLACING RIGHT RAIL (N63)

WARNING: Electric fuel pump starts up automatically when door is opened!
Observe warning on cylinder head cover.
Disconnect NEGATIVE BATTERY TERMINAL (risk of fire due to short circuit on removal).
Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced dirt contamination can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt contamination before removing lines or separate components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Recycling

Fuel escapes when fuel line is detached. Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Read out the fault memory of the DME control unit. If necessary, work through test schedules.
- Switch off ignition.
- Remove right **INTERCOOLER** .
- Remove **ELECTRONICS BOX** .
- Partially remove **WIRING HARNESS** for engine.
- Partially remove **WIRING HARNESS** for injectors and ignition coils.
- Disconnect all **PRESSURE LINES** on right.

Unlock plugs from high-pressure fuel sensor with a long screwdriver.

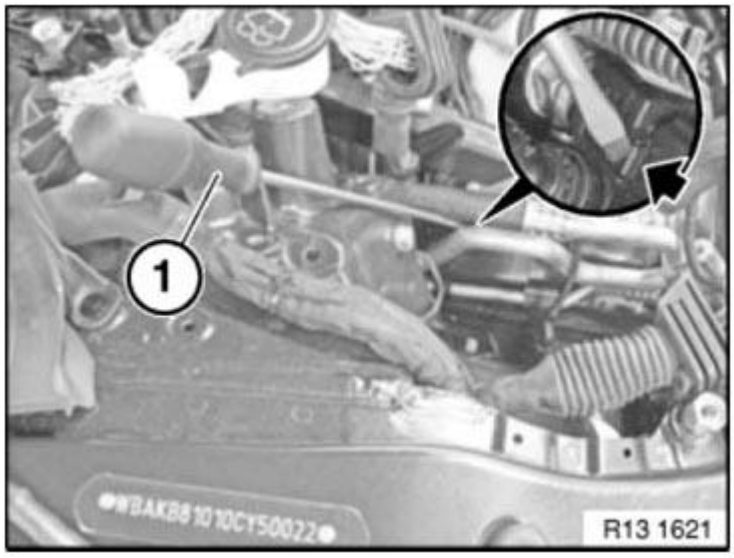


Fig. 86: Unlocking High-Pressure Fuel Sensor Plugs Using Long Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug (1) from high-pressure sensor.

Unfasten screws (2).

Tightening torque **13 53 1AZ** .

Remove rail (3).

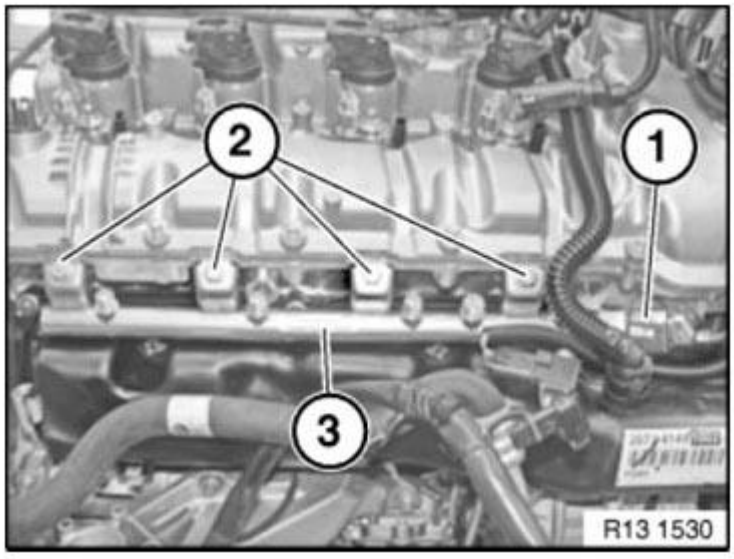


Fig. 87: Identifying Fuel Rail With High-Pressure Sensor Plug And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Assemble engine**
Check fuel system for leak tightness.
Delete fault memory.

1353594 REPLACING LOW-PRESSURE FUEL SENSOR (N63)

WARNING: **Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).**
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

Wear protective goggles.

IMPORTANT: **Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.**
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: **Ignition coils must not be fouled by fuel.**
The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!
Cover ignition coil with suitable means.

Necessary preliminary tasks

- Remove left intake duct.

Recycling

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Release low-pressure fuel sensor (2).

Tightening torque **13 53 9AZ** .

Installation:

Replace sealing ring on low-pressure fuel sensor.

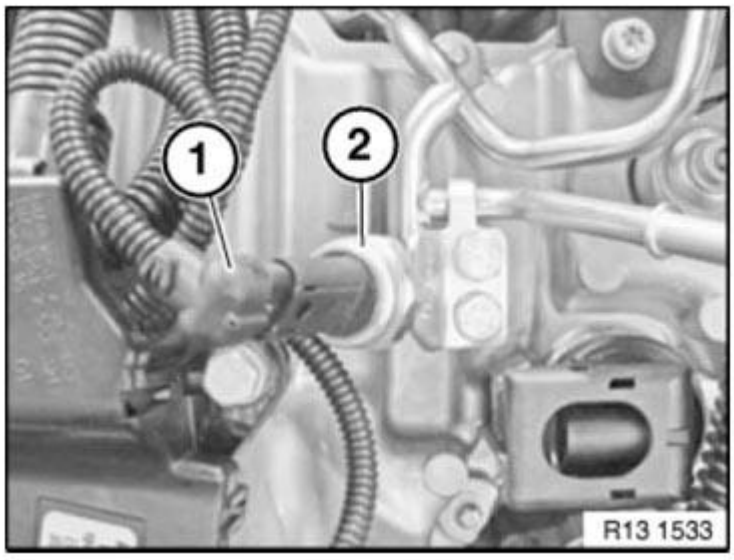


Fig. 88: Identifying Low Pressure Fuel Sensor With Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1353602 REPLACING LEFT HIGH-PRESSURE FUEL SENSOR (N63)

WARNING: Observe warning on cylinder head cover.
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**

- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks

- Remove left **RAIL**

Recycling

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Release high-pressure sensor (1) and remove.

Tightening torque **13 53 8AZ** .

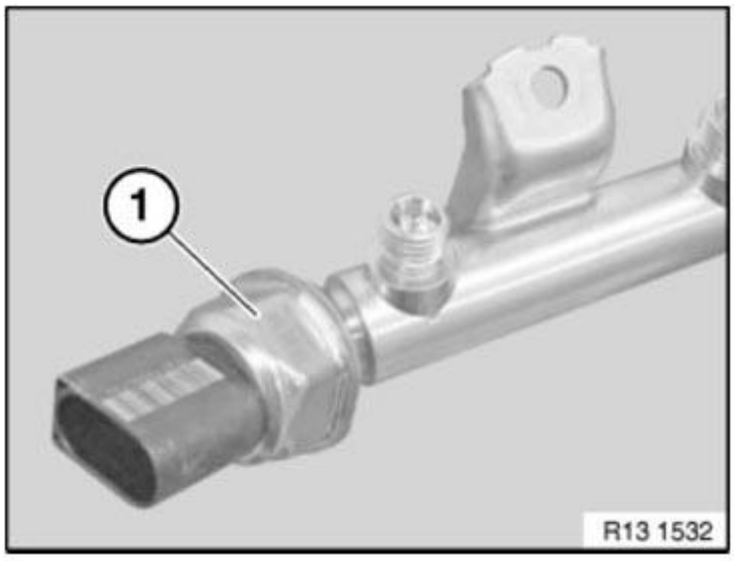


Fig. 89: Identifying High-Pressure Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1353602 REPLACING RIGHT HIGH-PRESSURE FUEL SENSOR (N63)

WARNING: Observe warning on cylinder head cover.
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks

- Remove right **FUEL RAIL** .

Recycling

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Release high-pressure sensor (1) and remove.

Tightening torque **13 53 8AZ** .

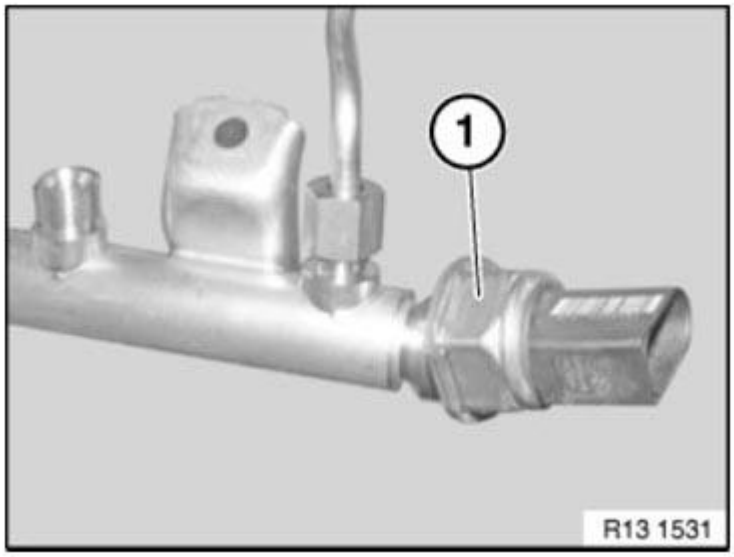


Fig. 90: Identifying High-Pressure Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1354 THROTTLE AND OPERATION

1354015 REMOVING AND INSTALLING/SEALING LEFT THROTTLE VALVE ASSEMBLY (N63)

Necessary preliminary tasks

- Switch off ignition.
- Remove left **INTERCOOLER** .

Unlock plug (1) and remove.

Unfasten screws (2).

Tightening torque **13 54 1AZ** .

Remove throttle valve assembly (3).

Installation:

Check plug connection (1) for coolant remnants. If necessary, clean plug connection (1) with compressed air.

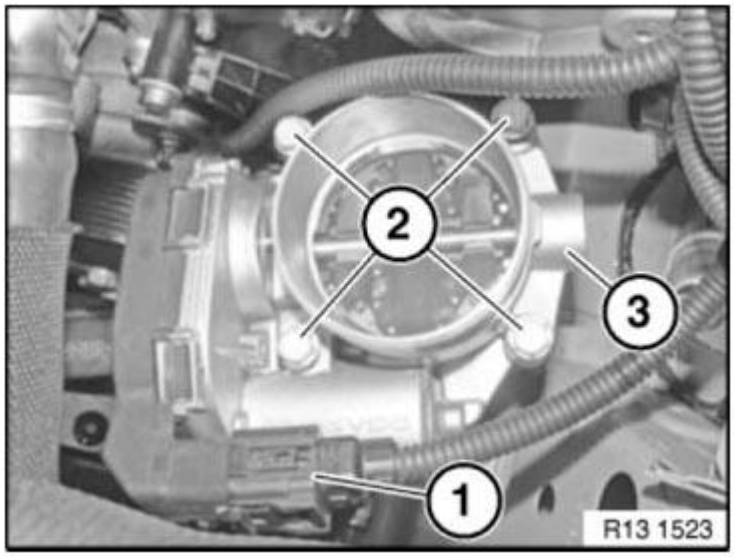


Fig. 91: Identifying Throttle Valve Assembly With Plug And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Replace sealing ring (1) of throttle assembly (2).

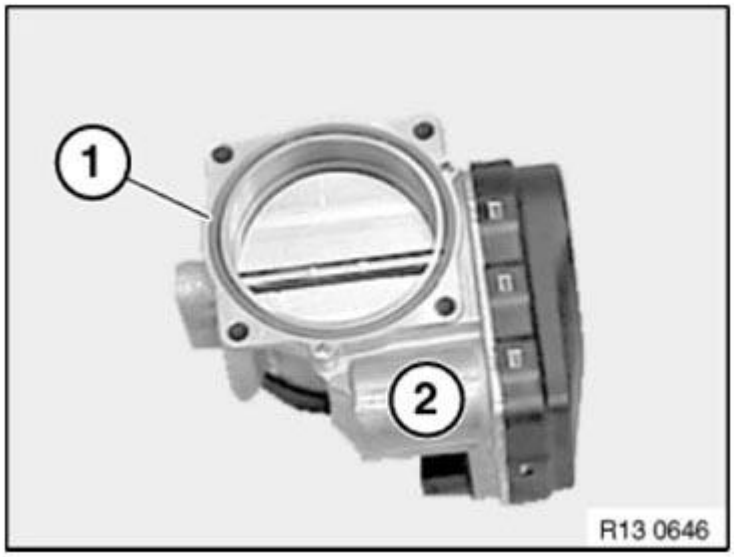


Fig. 92: Identifying Sealing Ring Of Throttle Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check stored fault message.

Now clear the fault memory.

1354020 REMOVING AND INSTALLING/SEALING RIGHT THROTTLE VALVE ASSEMBLY (N63)

Necessary preliminary tasks

- Switch off ignition.
- Remove right **INTERCOOLER** .

NOTE: Picture shows the left throttle valve assembly, the procedure for the right side is identical.

Unlock plug (1) and remove.

Unfasten screws (2).

Tightening torque **13 54 1AZ** .

Remove throttle valve assembly (3).

Installation:

Check plug connection (1) for coolant remnants. If necessary, clean plug connection (1) with compressed air.

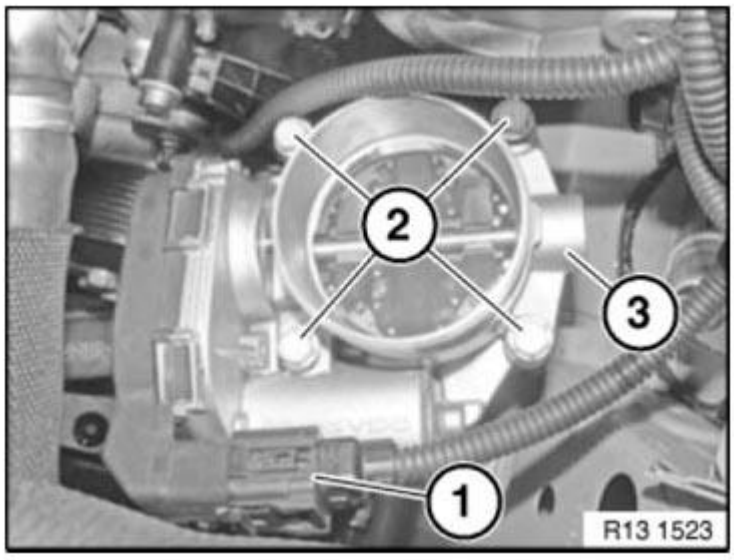


Fig. 93: Identifying Throttle Valve Assembly With Plug And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Replace sealing ring (1) of throttle assembly (2).

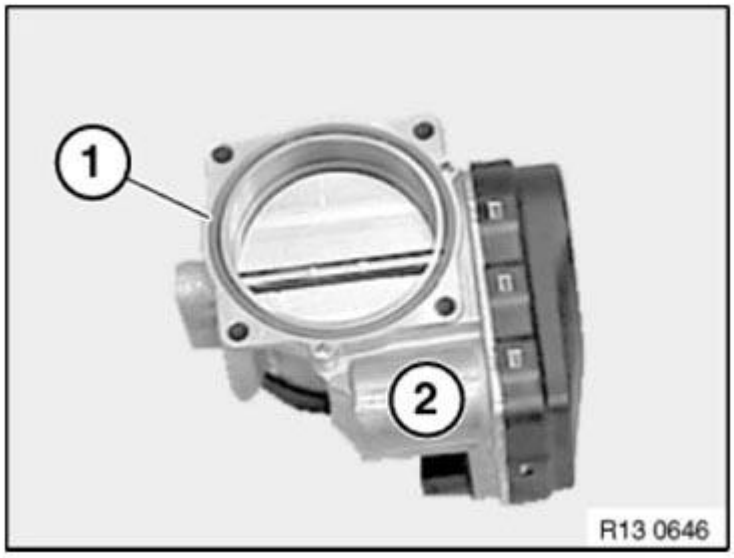


Fig. 94: Identifying Sealing Ring Of Throttle Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check stored fault message.

Now clear the fault memory.

1362 SENSOR FOR CONTROL UNIT

1362560 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT AIR-MASS FLOW SENSOR (N63)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Remove **ACOUSTIC COVER**

Picture shows the left side, the procedure for the right side is identical.

Unlock plug (1) and remove.

Release screws (2).

Tightening torque **13 62 6AZ** .

Pull air-mass flow sensor (3) out of upper section of intake filter housing.

Installation:

Replace gasket on air-mass flow sensor.

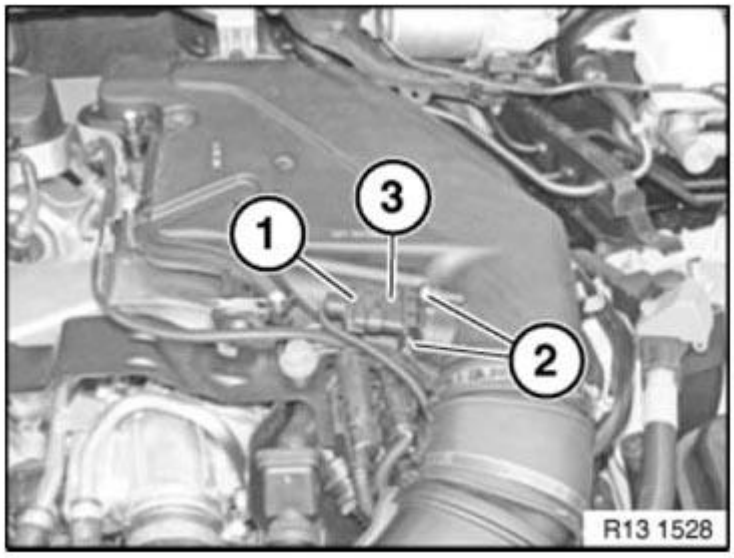


Fig. 95: Identifying Air-Mass Flow Sensor With Plug And Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Now clear the fault memory.

1362591 REMOVING AND INSTALLING/REPLACING PRESSURE SENSOR ON LEFT INTERCOOLER (N63)

Necessary preliminary tasks

- Read out fault memory of DME control unit.
- Switch off ignition
- Remove left intake duct.

Unlock plug (1) and remove.

Release screws (2).

Tightening torque **13 62 7AZ** .

Pull pressure sensor (3) out of left intercooler.

Installation:

Replace sealing ring on pressure sensor.

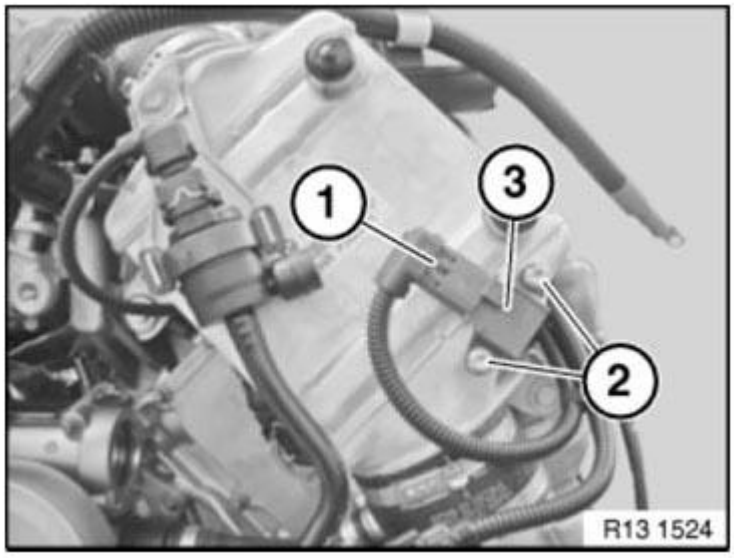


Fig. 96: Identifying Pressure Sensor With Plug And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Now clear the fault memory.

1362593 REMOVING AND INSTALLING/REPLACING PRESSURE SENSOR ON LEFT PLENUM CHAMBER (N63)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Remove coolant **EXPANSION TANK**
- Remove **FLUID RESERVOIR** for hydraulic steering
- Remove **WATER VALVE** for heater/air conditioner and lay coolant hoses to one side
- Release suction line for hydraulic steering and place to one side, do not remove. See **REPLACING SUCTION LINE FOR POWER STEERING (FROM CONNECTING PIECE TO VANE PUMP)** and **REPLACING SUCTION LINE FOR POWER STEERING (FROM FLUID RESERVOIR TO CONNECTING PIECE)** .
- Secure **ENGINE** in installation position

Unlock plug (1) and remove.

Release screws (2) with a reversible ratchet, extension, universal joint and a magnetic Torx socket.

Tightening torque **13 62 2AZ** .

Pull pressure sensor (3) out of left plenum chamber.

Installation:

Coat sealing ring with anti-friction agent.

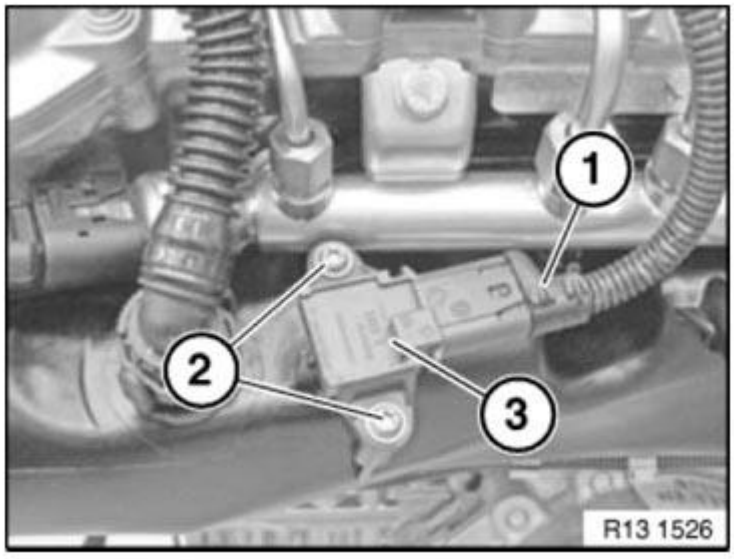


Fig. 97: Identifying Pressure Sensor With Plug And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

clear fault memory.

1362594 REMOVING AND INSTALLING/REPLACING PRESSURE SENSOR ON RIGHT INTAKE PLENUM (N63)

Necessary preliminary work

- Read out DME fault memory.
- Switch off ignition.
- Remove **ELECTRONICS BOX** .
- Draw off **A/C SYSTEM** .
- Secure **ENGINE** in installation position.

Release screw (1).

Tightening torque **64 53 3AZ** .

Detach A/C line (2) and place to one side.

Replace sealing ring on A/C line.

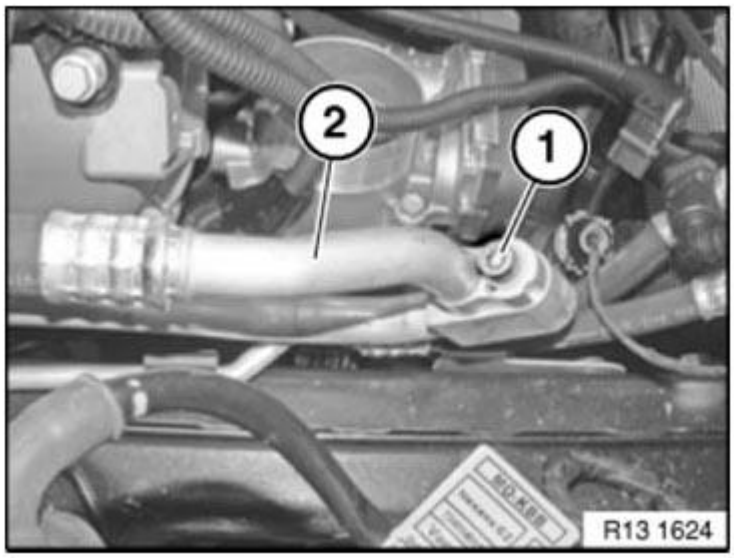


Fig. 98: Identifying A/C Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector (1) and remove.

Release screws (2) with a reversible ratchet, extension, universal joint and a magnetic Torx socket.

Tightening torque **13 62 2AZ** .

Pull pressure sensor (3) out of left intake plenum.

Installation note:

Coat sealing ring with lubricant.

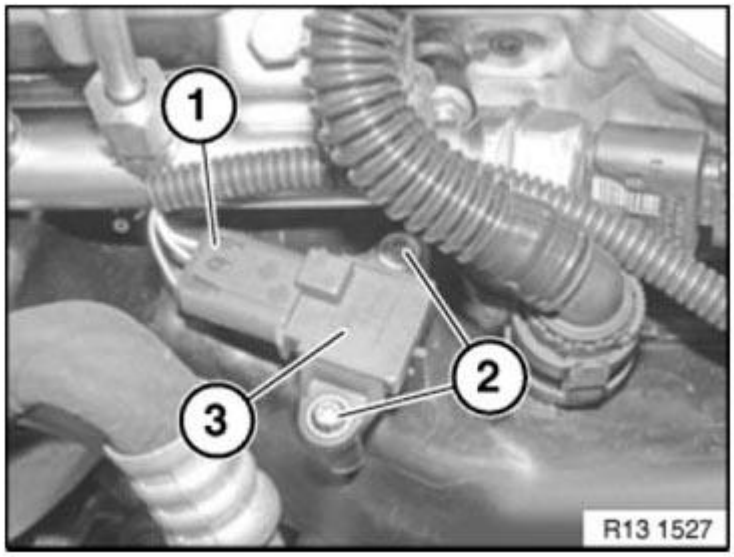


Fig. 99: Identifying Pressure Sensor With Connector And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Delete fault memory.

1362592 REMOVING AND INSTALLING/REPLACING PRESSURE SENSOR ON RIGHT INTERCOOLER (N63)

Necessary preliminary tasks

- Read out fault memory of DME control unit.
- Switch off ignition
- Remove right intake duct.

Unlock plug (1) and remove.

Release screws (2).

Tightening torque **13 62 7AZ** .

Pull pressure sensor (3) out of right intercooler.

Installation:

Replace sealing ring on pressure sensor.

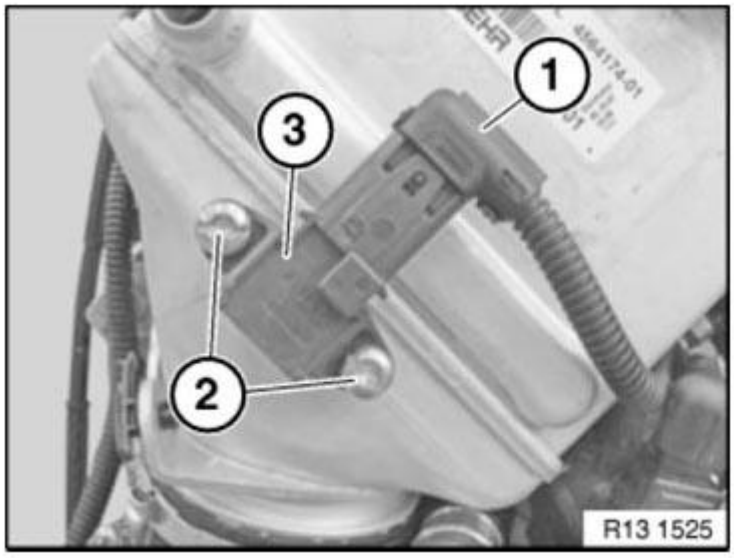


Fig. 100: Identifying Intercooler Pressure Sensor With Plug And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Now clear the fault memory.

1362531 REPLACING COOLANT TEMPERATURE SENSOR (N63)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: Protect alternator against coolant.
Cover alternator with suitable apparatus (risk of damage).

Necessary preliminary tasks

- Read out fault memory of DDE control unit, working through test schedules if necessary.
- Switch off ignition.
- Remove **AUXILIARY WATER PUMP** for exhaust turbocharger.

Unlock connector (1) and remove.

Unfasten coolant temperature sensor (2).

Installation note:

Tightening torque **13 62 1AZ** .

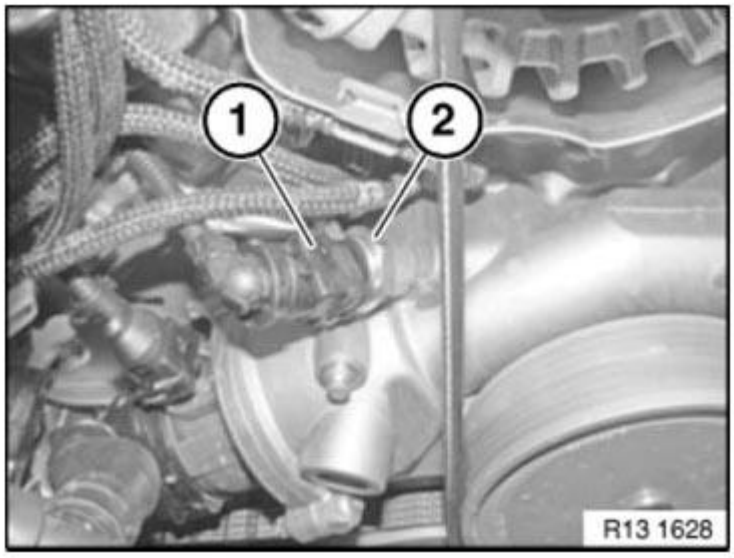


Fig. 101: Identifying Coolant Temperature Sensor With Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Delete fault memory.

1364 START VALVES

1353310 REMOVING AND INSTALLING/REPLACING AN INJECTOR (N63)

Notes

WARNING: Observe warning on cylinder head cover.
Clamp off battery negative terminal (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40°C.

WARNING: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity from the fuel injectors!
To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.
There is a risk of injury if the fuel pressure is not reduced!

IMPORTANT: Observe without fail the tightening sequences and tightening torques when reassembling.
Disregard of these requirements may result in leaks!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-

pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

IMPORTANT: Injectors are not waterproof!
Carry out engine cleaning/washing only with ignition coil cover fitted.

Necessary preliminary tasks

- Remove **IGNITION COIL** of corresponding cylinder

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**
- **Remove PRESSURE LINES on corresponding injectors**

NOTE: The following description applies to all injectors.

Release bolt (1) and remove holding-down element (2).

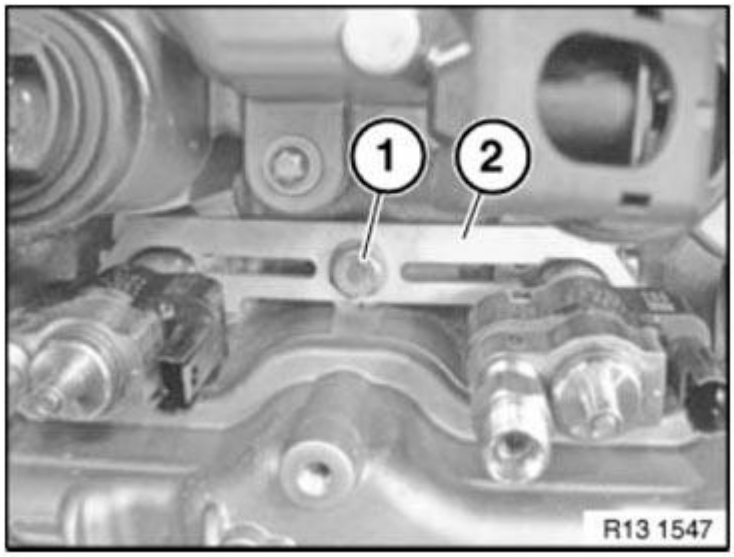


Fig. 102: Identifying Injector Holding Down Element With Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Remove injector (1).

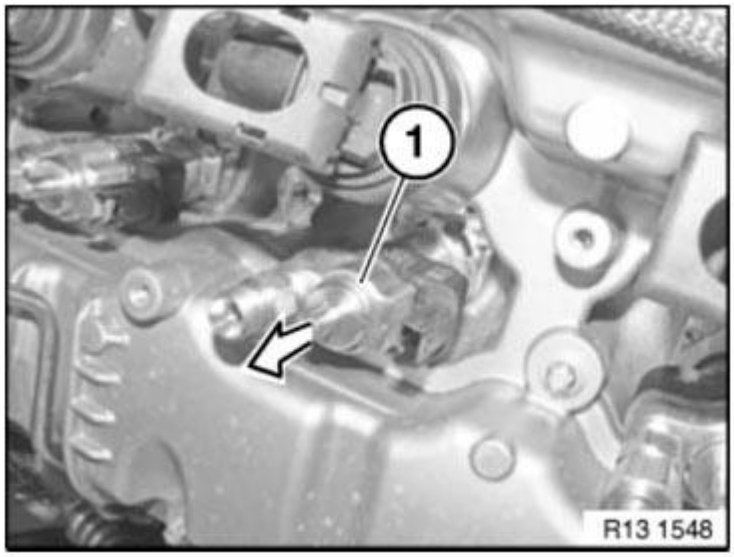


Fig. 103: Removing Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If several injectors are removed, ensure that each injector is reinstalled in its original location (cylinder).
Mark injectors.

After removing, fit protective caps (1 and 3) to injector tip and fuel line connection.

Protective caps are available from BMW Parts Service.

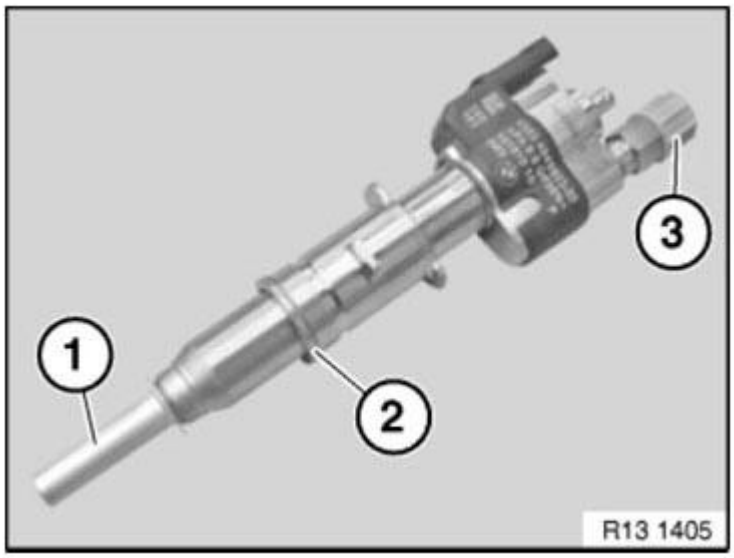


Fig. 104: Identifying Fit Protective Caps With Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing a new injector:

- Use a new uncoupling element (2).
- Remove protective cap (1) from injector tip max. 10 min. before installation (PTFE sealing ring swells up).

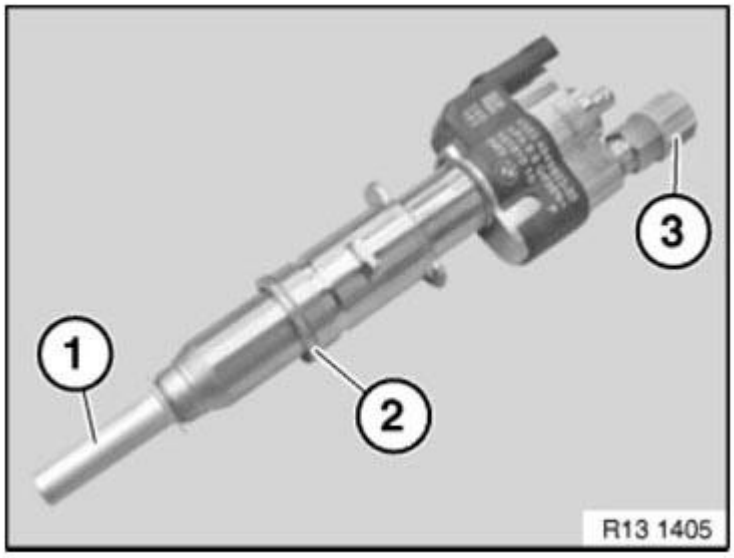


Fig. 105: Identifying Fit Protective Caps With Uncoupling Element

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reusing fuel injector:

- Replace uncoupling element (2).
- Replace PTFE sealing ring (1).

A PTFE seal which has been heated once by engine operation must be replaced before the fuel injector is reinstalled.

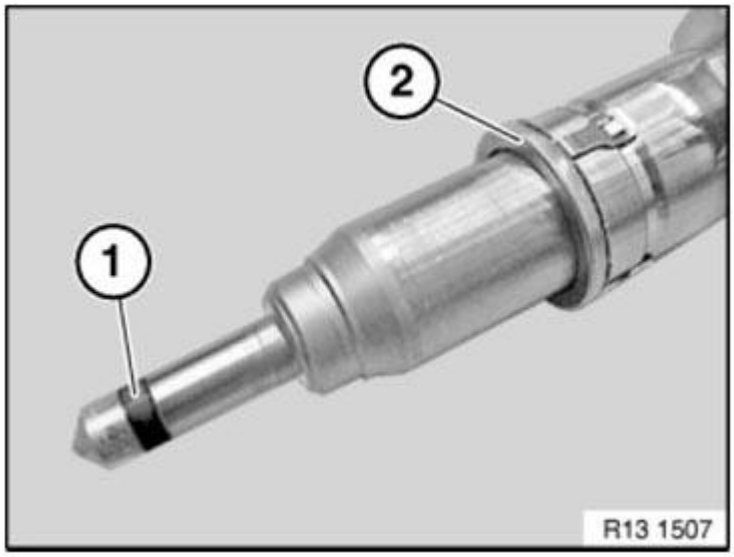


Fig. 106: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing PTFE sealing ring

Before replacing PTFE sealing ring (1), make sure hands and work surface are clean and free of oil.

Avoid mechanical contact with injector tip (2).

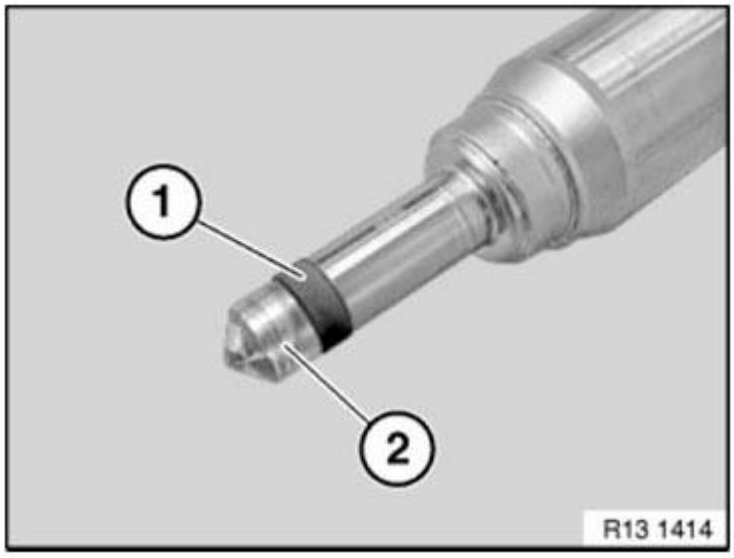


Fig. 107: Identifying PTFE Sealing Ring And Injector Tip
Courtesy of BMW OF NORTH AMERICA, INC.

Remove PTFE sealing ring (1) with special tool 13 0 191 from injector (2).

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other tools/agents).

Do not clean injector tip.

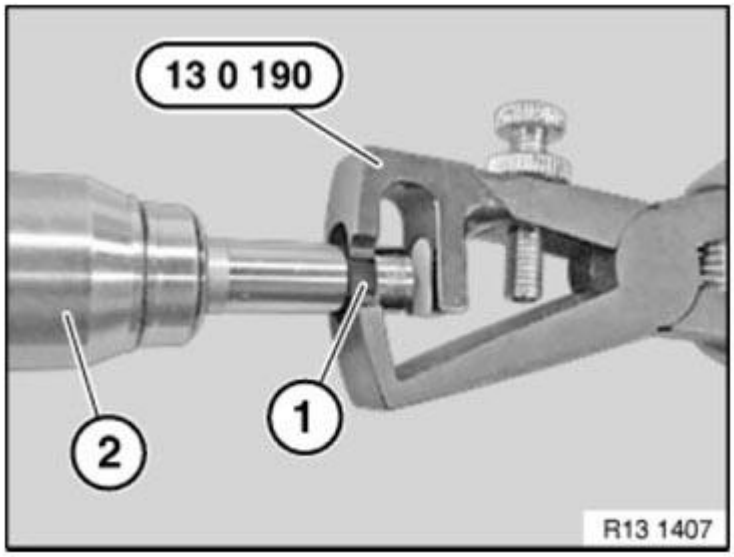


Fig. 108: Removing PTFE Sealing Ring From Injector Using Special Tool (13 0 191)
Courtesy of BMW OF NORTH AMERICA, INC.

Slide new PTFE sealing ring (1) onto mounting taper 13 0 195.

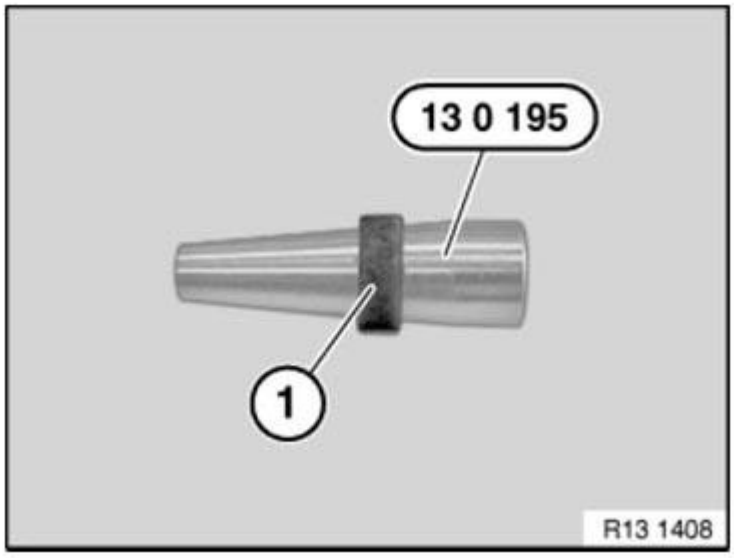


Fig. 109: Identifying PTFE Sealing Ring Onto Mounting Taper 13 0 195
Courtesy of BMW OF NORTH AMERICA, INC.

Use fingers and mounting taper 13 0 195 to slide PTFE sealing ring (1) onto injector (2).

NOTE:

- **Do not use fingernails to slide PTFE sealing ring on.**
- **Do not use any lubricating agents.**
- **The sealing ring is expanded when slid on.**

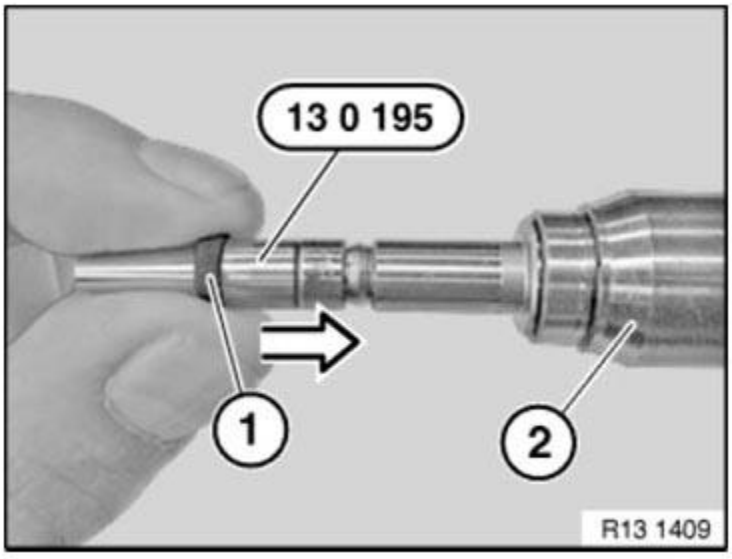


Fig. 110: Sliding PTFE Sealing Ring Onto Injector Using Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

To bring the expanded PTFE sealing ring to its installation dimension, slide three mounting sleeves with decreasing diameters onto the injector.

Slide mounting sleeve (1) with large opening first onto injector (1).

Do not use any lubricating agents.

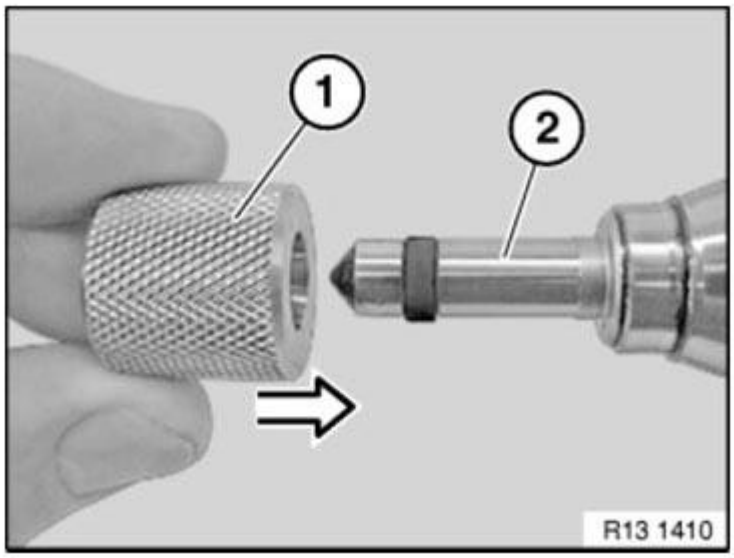


Fig. 111: Sliding Mounting Sleeve Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

First slide mounting sleeve 13 0 192 (large diameter) onto injector (1).

Then slide mounting sleeve 13 0 193 (medium diameter) onto injector (1).

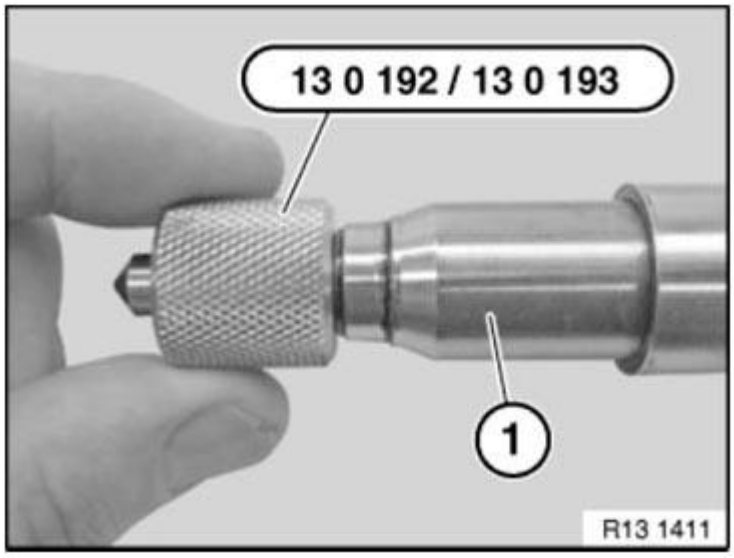


Fig. 112: Sliding Mounting Sleeve 13 0 192 (Large Diameter) Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Finally, press injector (1) into mounting sleeve 13 0 194 (small diameter).

Installation:

Install injector within 10 minutes or slide on protective cap (**Fig. 105**) (PTFE sealing ring swells up).

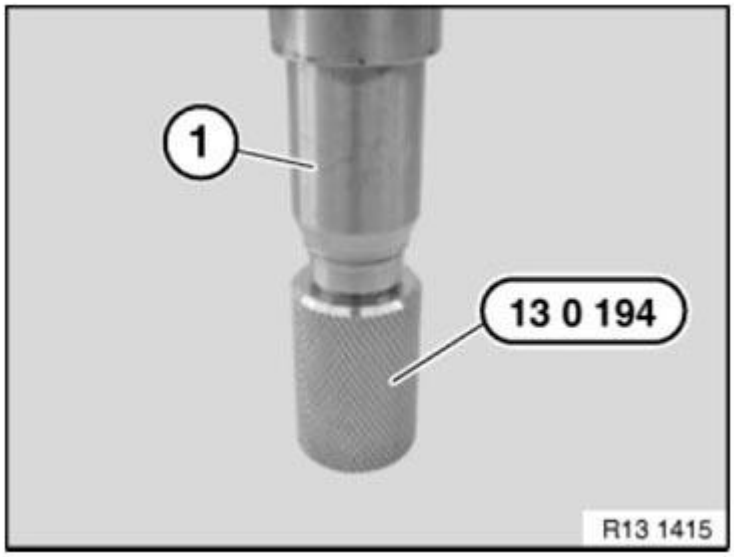


Fig. 113: Identifying Injector Into Mounting Sleeve 13 0 194 (Small Diameter)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation of injector is described separately from removal.

Before installing injector in engines that have been run

- Check injector bore for dirt.

  Clean **only dirty** injector bores.

  Important - do not damage injector!

- Clean injector bore: To do so, preferably slide injector without uncoupling element (2) but with new PTFE sealing ring (1) in and out of injector bores several times.

  The PTFE sealing ring must then be replaced.

- Clean contact surfaces of uncoupling elements (2) in cylinder head.

- Replace uncoupling element (2).

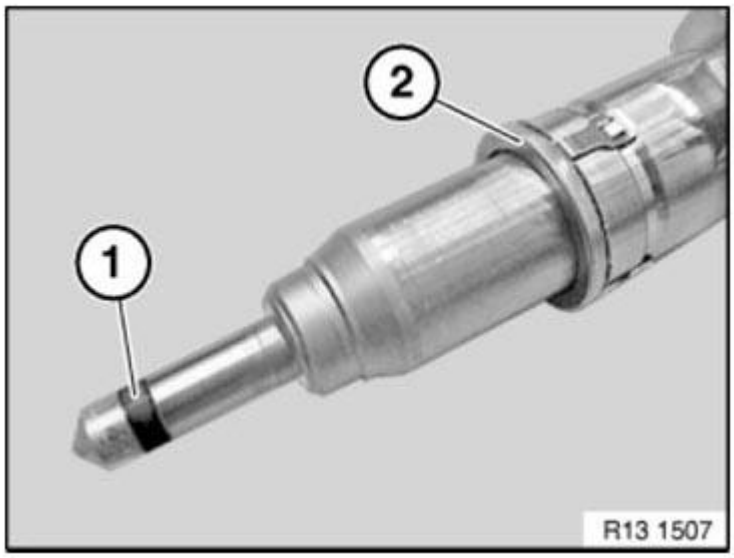


Fig. 114: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Injector adjustment!

An injector adjustment must be carried out if an injector is replaced or changed on the cylinder side.

Injector adjustment is carried out with the aid of a so-called adjustment value.

The adjustment value is printed in two blocks of three digits on the injector.

The adjustment value must be read off **before** installation!

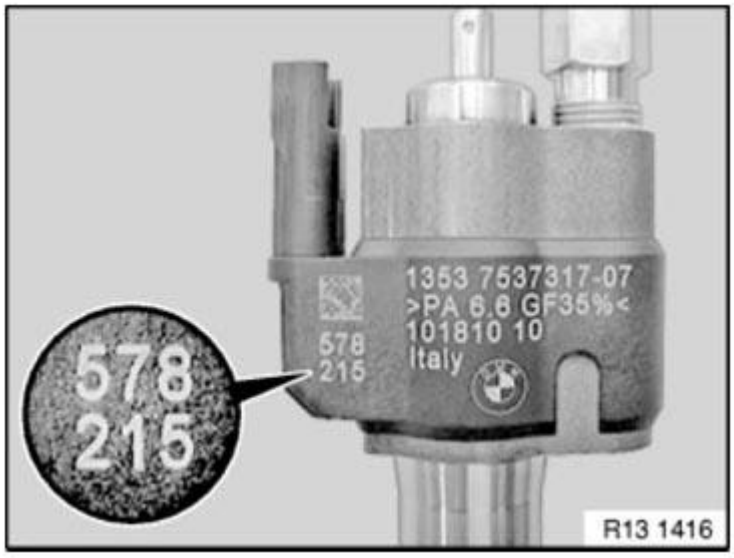


Fig. 115: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Enter the adjustment value according to the installation position (cylinder) of the injector.

If injector adjustment is not carried out, the engine may run roughly or fail to start.

Description of injector adjustment at end of instruction.



Fig. 116: Identifying Adjustment Value On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Install injector (1).

Install holding-down element (2).

NOTE: Make sure holding-down element (2) is correctly seated.

IMPORTANT: Tighten bolt (3) hand-tight only so that holding-down element (2) is slack and if necessary injector (1) can still be turned.

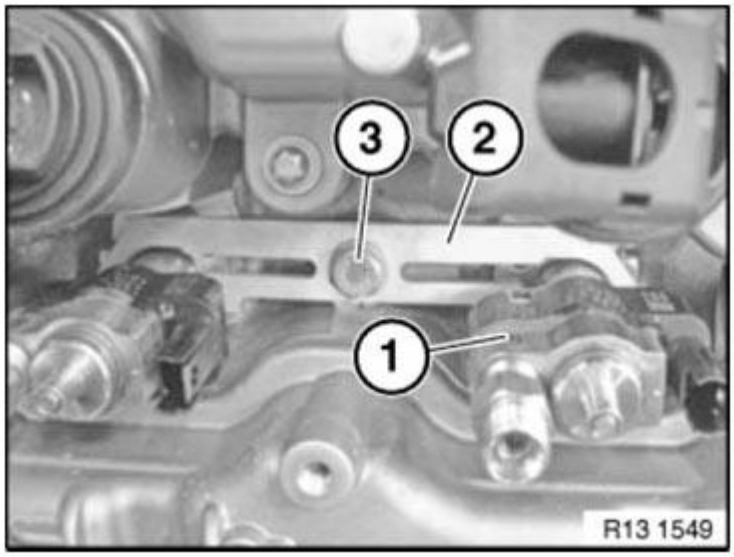


Fig. 117: Identifying Injector With Holding Down Element And Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Connect pressure line (2), tightening nuts (1) handtight only in the process.

IMPORTANT: Connect pressure line (2) without tension only.
To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!
If the nuts cannot be screwed on easily by hand, the injector must if necessary be turned a little.

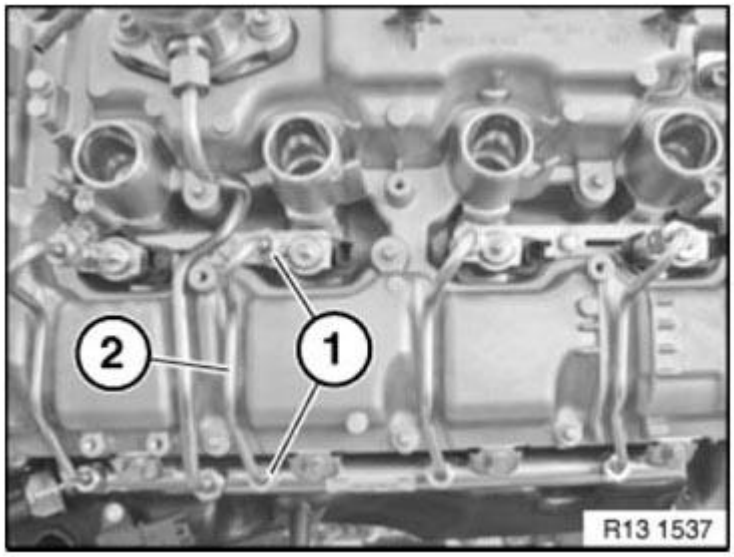


Fig. 118: Identifying Pressure Lines With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Turn injector (1) if necessary in direction of arrow until nuts on pressure line can be easily screwed on by hand.

Tighten nut (2) of pressure line hand-tight.

Then tighten down bolt for holding-down element (3).

Tightening torque **13 53 5AZ** .

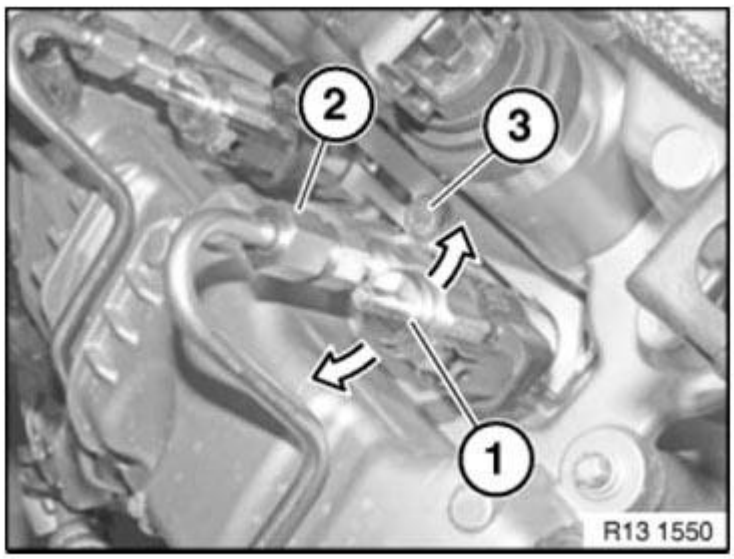


Fig. 119: Turning Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence:

- First tighten down pressure line on injector.

Tighten down nut on injector with special tool (1) 13 0 161 and to torque (2). In so doing, grip hexagon head of injector with wrench (3).

Tightening torque **13 53 2AZ** .

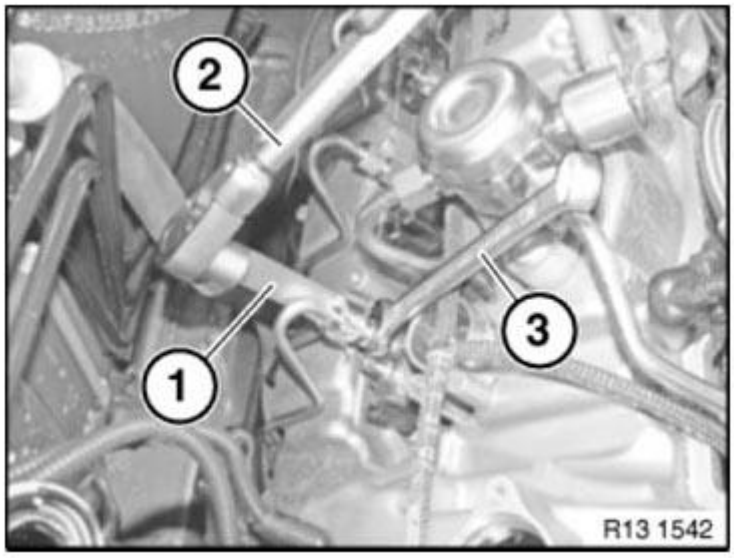


Fig. 120: Tightening Nut On Injector Using Special Tool (13 0 161)
Courtesy of BMW OF NORTH AMERICA, INC.

On cylinders 4 and 8 tighten down pressure line (1) to torque (2) and with crowfoot wrench (3). In so doing, grip hexagon head of injector with wrench.

Tightening torque **13 53 2AZ** .

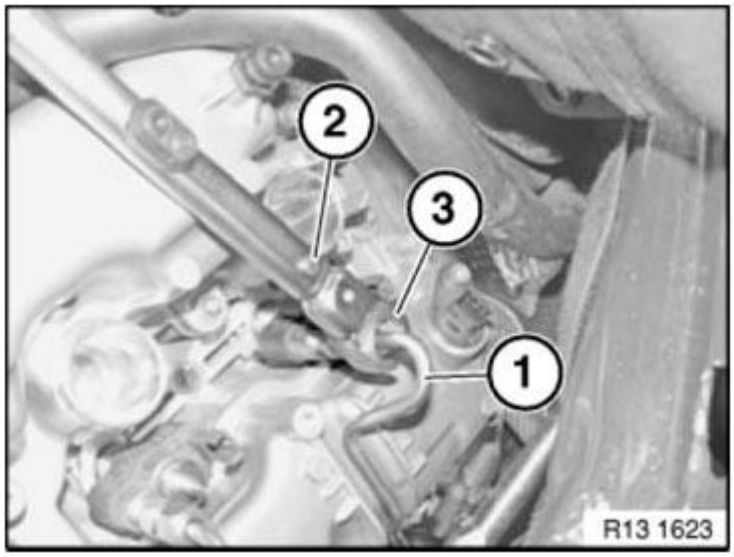


Fig. 121: Tightening Pressure Line Using Crowfoot Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

- Then tighten down pressure line on rail.

Tighten down pressure line on rail with torque wrench (1) and special tools (2) **00 1 440** , (3) 13 0 162 and (4) 13 0 161.

Tightening torque **13 53 2AZ** .

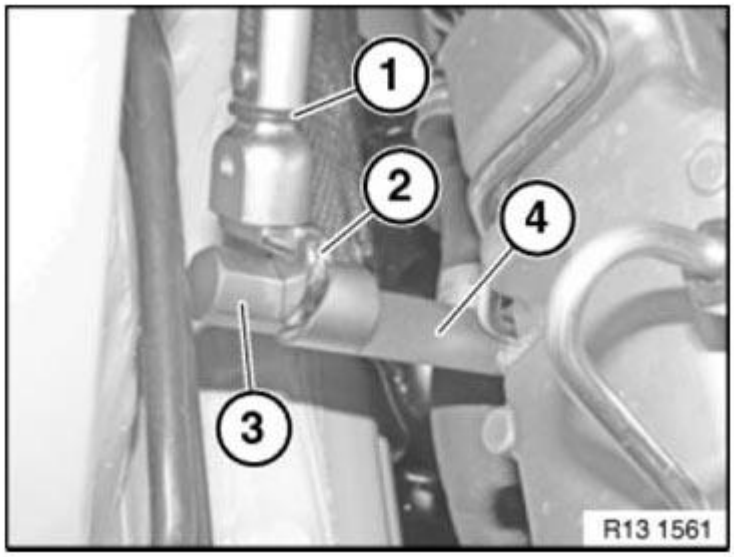


Fig. 122: Tightening Down Pressure Line On Rail With Torque Wrench And Special Tool (00 1 440)
Courtesy of BMW OF NORTH AMERICA, INC.

Carrying out injector adjustment

- Connect DIS Tester
- Identify car
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment programs"
- Select "Adjust injectors"
- Change "Test schedule"
- For each replaced injector, the adjustment value must be entered according to the installation position (cylinder).

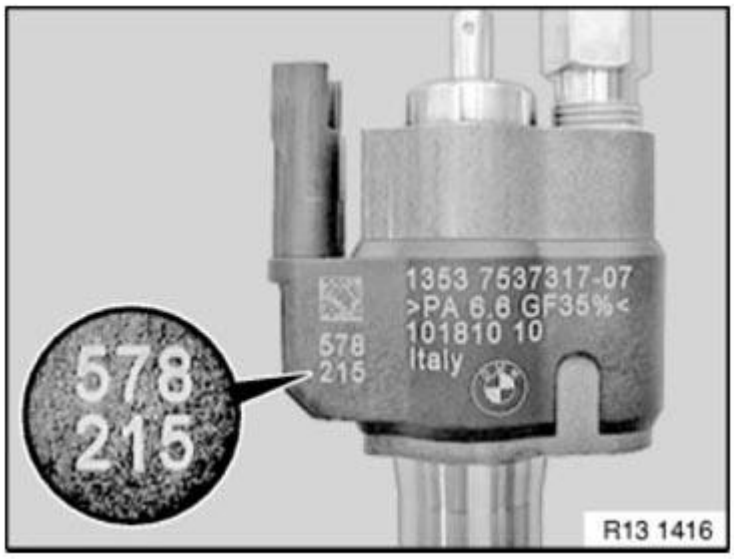


Fig. 123: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Vent fuel system with BMW diagnosis system.

Check fuel system for leaks.

Check function of DME.

1371 INTAKE SILENCER

1371030 REMOVING AND INSTALLING/REPLACING BOTH INTAKE FILTER HOUSINGS (N63)

Necessary preliminary work

- Switch off ignition.
- Remove **ACOUSTIC COVER**

NOTE: Description for intake filter housing. Procedure on right side identical.

Release clamps (1).

Tightening torque **13 62 9AZ** .

Disconnect connector (2) at the hot film air mass meter.

Release clamp (3).

Unclip oxygen sensor cable from intake filter housing.

Detach intake air filter housing from intake port and pull off upwards.

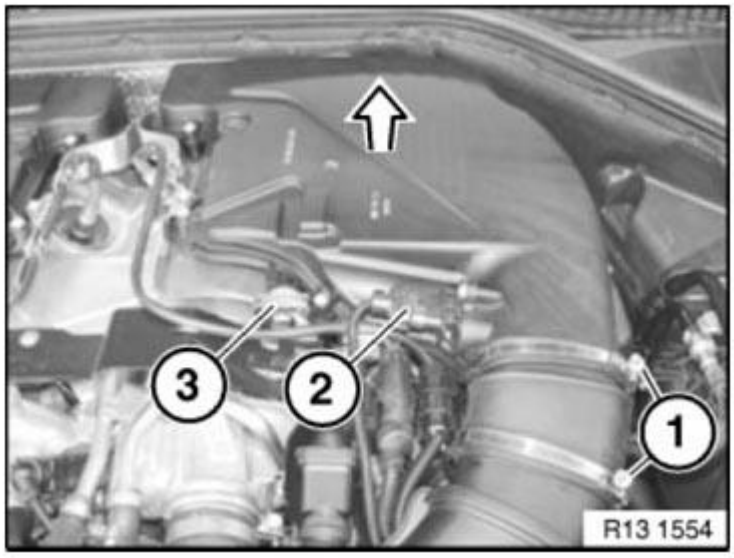


Fig. 124: Pulling Intake Air Filter Housing Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

1372002 REPLACING BOTH AIR FILTER ELEMENTS (N63)

Necessary preliminary tasks

- Turn off ignition
- Remove **ACOUSTIC COVER**

NOTE: Description relates to the left intake filter housing. Procedure for the right side is identical.

Release clamp (1).

Tightening torque **13 62 9AZ** .

Disconnect plug (2) on air-mass sensor.

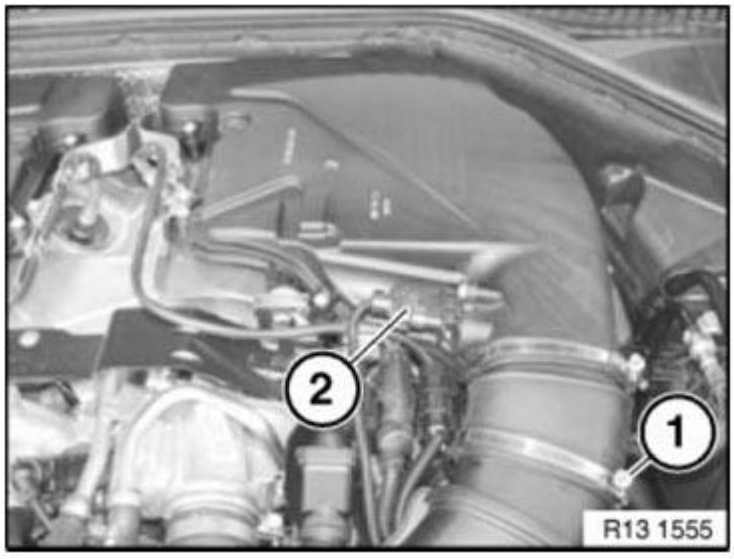


Fig. 125: Identifying Air-Mass Sensor With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws along line (1).

Tightening torque **13 62 8AZ** .

Remove air filter cover (2).

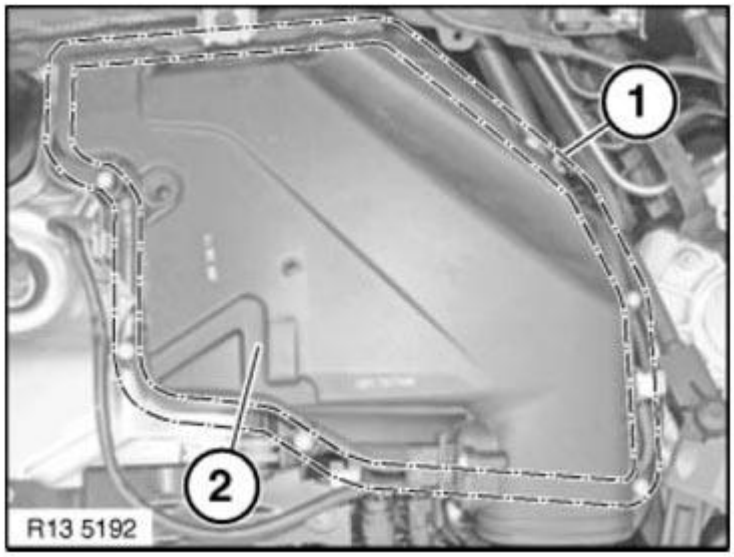


Fig. 126: Identifying Air Filter Cover With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove air filter insert.

Installation:

Clean upper and lower sections of intake filter housing from inside.

Replacing air filter element.

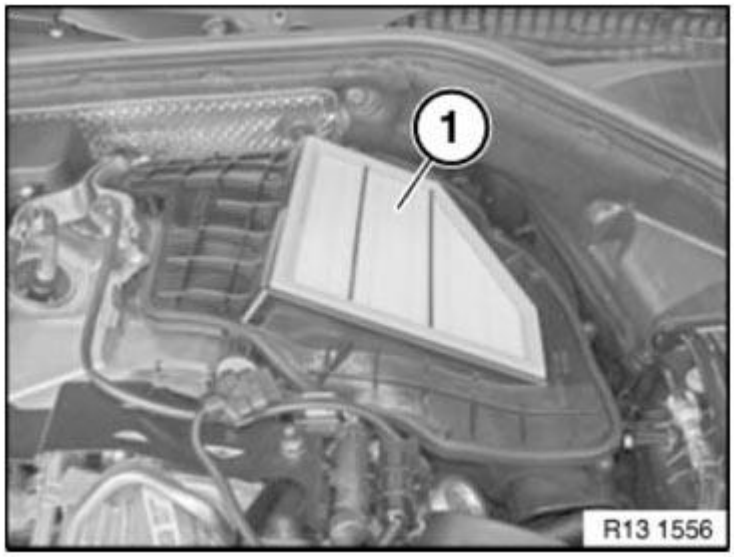


Fig. 127: Identifying Air Filter
Courtesy of BMW OF NORTH AMERICA, INC.

1372 AIR CLEANER

1372002 REPLACING BOTH AIR FILTER ELEMENTS (N63)

Necessary preliminary tasks:

- Turn off ignition
- Remove **ACOUSTIC COVER**

NOTE: Description relates to the left intake filter housing. Procedure for the right side is identical.

Release clamp (1).

Tightening torque **13 62 9AZ** .

Disconnect plug (2) on air-mass sensor.

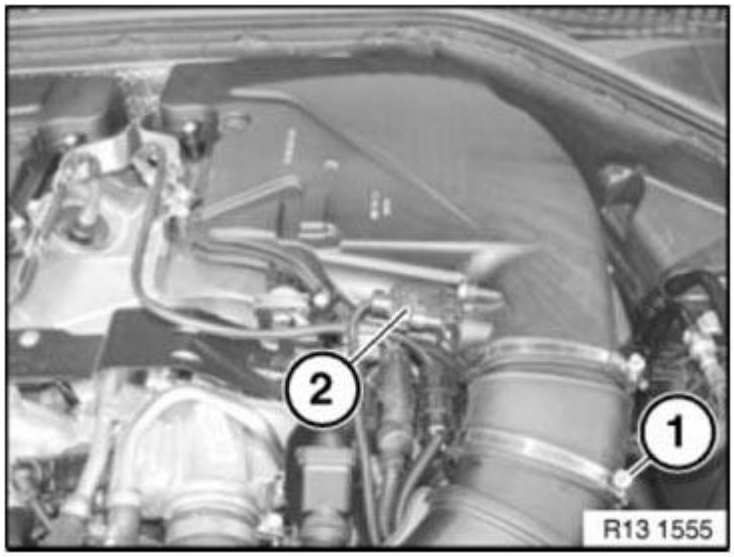


Fig. 128: Identifying Air-Mass Sensor Plug And Mounting Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws along line (1).

Tightening torque **13 62 8AZ** .

Remove air filter cover (2).

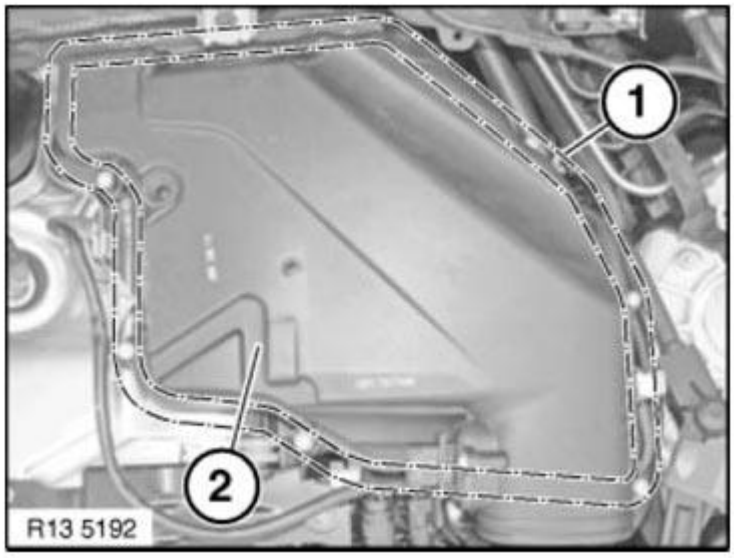


Fig. 129: Identifying Air Filter Cover With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove air filter insert.

Installation:

Clean upper and lower sections of intake filter housing from inside.

Replacing air filter element.

Replacing both air filter elements (N63)

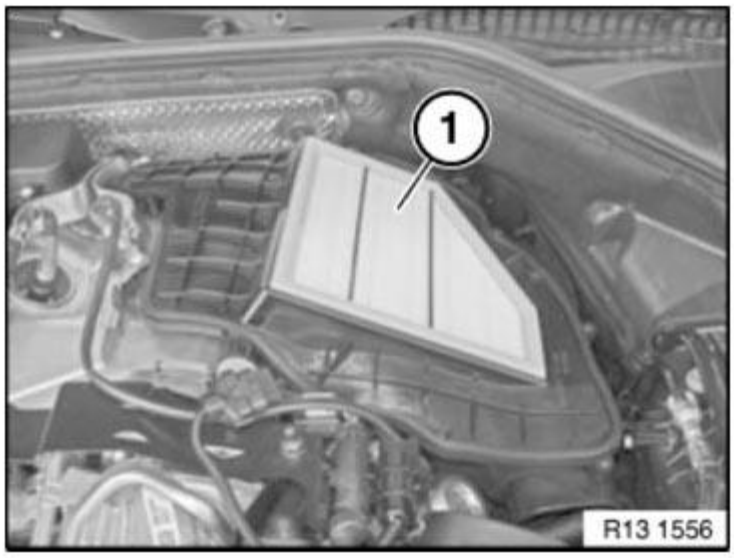


Fig. 130: Identifying Air Filter

Courtesy of BMW OF NORTH AMERICA, INC.

1390 CARBON CANISTER VENTILATION

1390500 REPLACING TANK VENTING VALVE (N63)

Necessary preliminary tasks

- Check stored fault message.
- Switch off ignition.
- Remove **FAN COWL** .

Unlock connector (1) and remove.

Unlock hose (2) and detach.

Unlock hose (3) further below on intake manifold and detach.

Detach tank vent valve (4) from holder and remove.

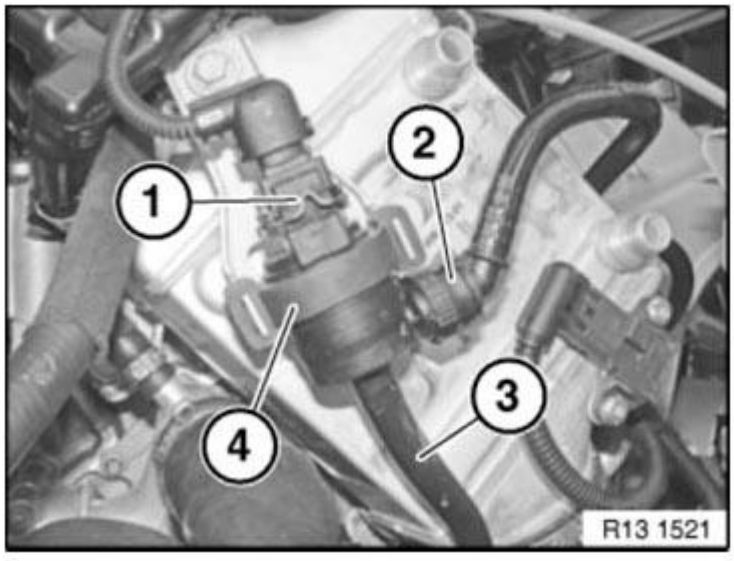


Fig. 131: Identifying Tank Vent Valve With Connector And Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock hose (1) on intake manifold and detach.

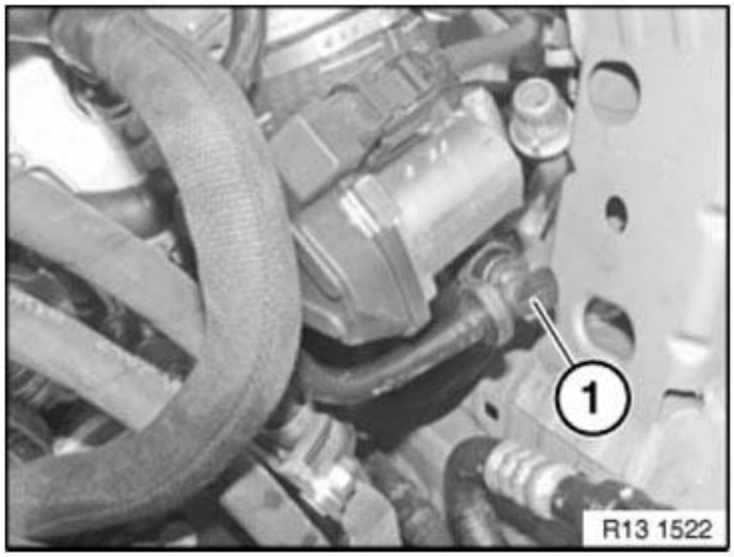


Fig. 132: Identifying Intake Manifold Hose
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Read out fault memory of DME control unit.
Delete fault memory.

TRANSMISSION

Gear Shift Mechanism - Repair

25 GEAR SHIFT MECHANISM

00..... PRECAUTIONARY MEASURES ON VEHICLES WITH ACTIVE PEDESTRIAN PROTECTION SYSTEM

WARNING: Danger to life!

Triggering the active pedestrian protection system while the engine compartment lid is open may cause serious injury by the retaining hooks.

Use protection systems when carrying out all work with bonnet open (front protective cover and head protection system retaining hook).

Cover front panel in area of engine compartment lid catches with protective cover (1).

Order number, protective cover 81 47 2 159 868.

Support engine compartment lid a suitable tool.

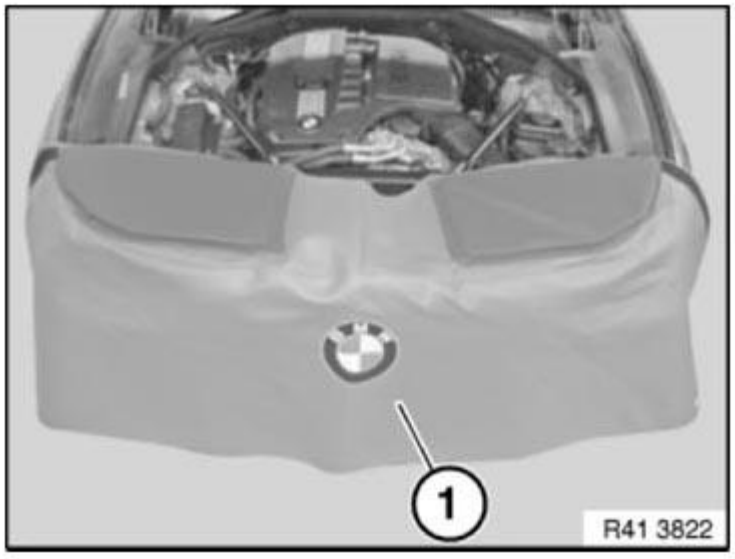


Fig. 1: Identifying Front Panel Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Use Velcro strips (2) to fasten head protection (1) to catch hook.

Order number for head protection catch hook (pair) 81 47 2 159 869.

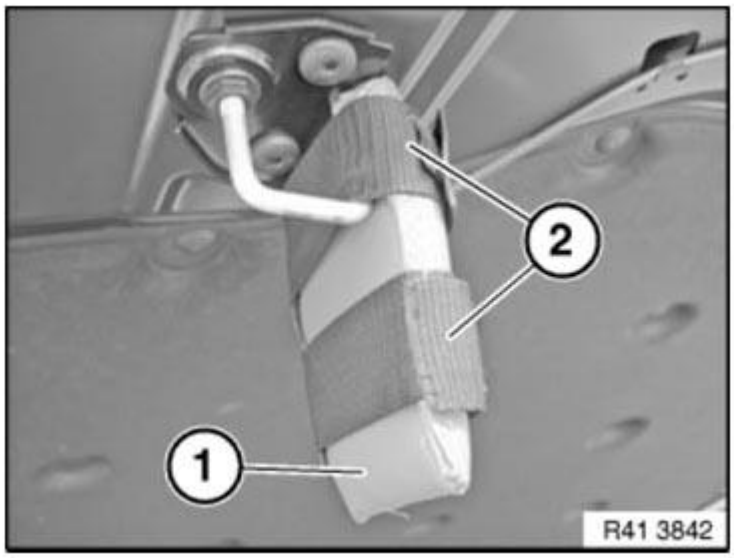


Fig. 2: Identifying Fasten Head Protection To Catch Hook With Velcro Strips
Courtesy of BMW OF NORTH AMERICA, INC.

ELECTRICAL

Electrical System - Operating Fluids

1.0 BATTERY

Only distilled water (available locally) is to be used when topping up the electrolyte level.

If a new battery (delivered dry) is to be placed into service, use only battery electrolyte ("sulfuric acid"), available locally.

2.0 SEALANT/SUPER GLUE/CONTACT CLEANER

Sealant

Aftermarket accessory installations which require routing electrical wires through metal body panels are to have the access holes sealed.

(former BMW Part No. 81 22 9 400 013)

BMW PART NUMBER SPECIFICATION

Wurth	Part No. 893430

SUPER GLUE

The rubber seal around the trunk release button of E39 vehicles can be repositioned with Wurth Rubberized Super Glue (Part No. 893 4103).

3.0 ELECTRICAL CONTACT ENHANCER AND CONTACT CLEANER

ELECTRICAL CONTACT/CONNECTOR GREASE

NyoGel 760G is resistive to moisture and can used for a lubrication of tin-lead type electrical connectors.

NyoGel 760G BMW Part No. 83 23 0 392 297

ELECTRICAL CONTACT ENHANCER

Stabilant 22A evaporates and leaves a thin polymer film which is conductive between the mating surfaces, while staying non-conductive between adjacent pins. At the same time it prevents the formation of any further harmful deposits.

BMW PART NUMBER SPECIFICATION

Wurth	Part No. 893622 (Stabilant 22A)

NOTE: 1 : Stabilant 22A must not be used on Oxygen Sensor connectors. To function, oxygen sensors require a flow of oxygen through the terminal connector to the sensor element. Stabilant 22A will affect this flow of oxygen, and will result in irreparable damage to the sensor.

NOTE: 2 : Stabilant 22A must not be used on plug connectors which carry fiber optics. Stabilant 22A may migrate to the fiber optic and attenuate the optical signal.

CONTACT CLEANER SPRAY

Use to clean electrical and electronic components of dirt, grease, etc. Will not harm components or epoxy coverings. Allow to air dry. **Do not** dry with shop air supply as this may contaminate the connector.

BMW PART NUMBER SPECIFICATION

Wurth	Part No. 89365 (Zero Residue Electrical Contact Cleaner)

ACCESSORIES AND BODY, CAB

General Electrical System - Repair

6100 TROUBLESHOOTING

61 20... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular engine types and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents a possible short circuit.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery replacement

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, there will always be only one work scope provided that is permitted by the current status of information.

If the performance readiness drops below a defined minimum, a Check Control message will be generated to advise the driver that the battery must be replaced.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

NOTE: Only this registration/logon will ensure that the corresponding Check Control message will go out again.

system:

Register battery replacement

- Service functions
- Body

- Voltage supply
- Register battery replacement
- Test plan

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting

61 20 908 CARRYING OUT BATTERY "POWER RESET"

IMPORTANT: Observe SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY .

The following steps must be carried out for a "power reset"

- Switch off and disconnect battery charger
- Turn off ignition

  Vehicles with ID transmitter: Remove identification sensor from slot

  Vehicles with comfort access system: Make sure terminal is in 0 position

- Disconnect battery negative terminal
- Reconnect battery negative terminal (to ensure bus activity)
- Waiting time (5-10 seconds)
- Disconnect battery negative terminal
- Waiting time (1 minute)
- Connect battery negative terminal and tighten, tightening torque **61 21 1AZ**
- Connect and switch on battery charger
- Switch on ignition.

61 00... DIAGNOSIS FOR CONDITION BASED SERVICE

NOTE: Red symbol for pre-delivery check

The vehicle is coded at the end of the assembly line so that the red symbol for the pre-delivery check is shown in the Next Service display (same symbol as vehicle check).

The symbol is a reminder to the Service staff that the pre-delivery check has not yet been carried out on this car.

NOTE: Do not carry out a reset.

Do **not** confuse this function with the "Vehicle check" scope of maintenance work. Do not perform a reset via the instrument panel.

When performing the pre-delivery check with the service function "Transport mode/pre-delivery check": The symbol is suppressed automatically after carrying out the service function.



Fig. 1: Service Display Symbol
Courtesy of BMW OF NORTH AMERICA, INC.

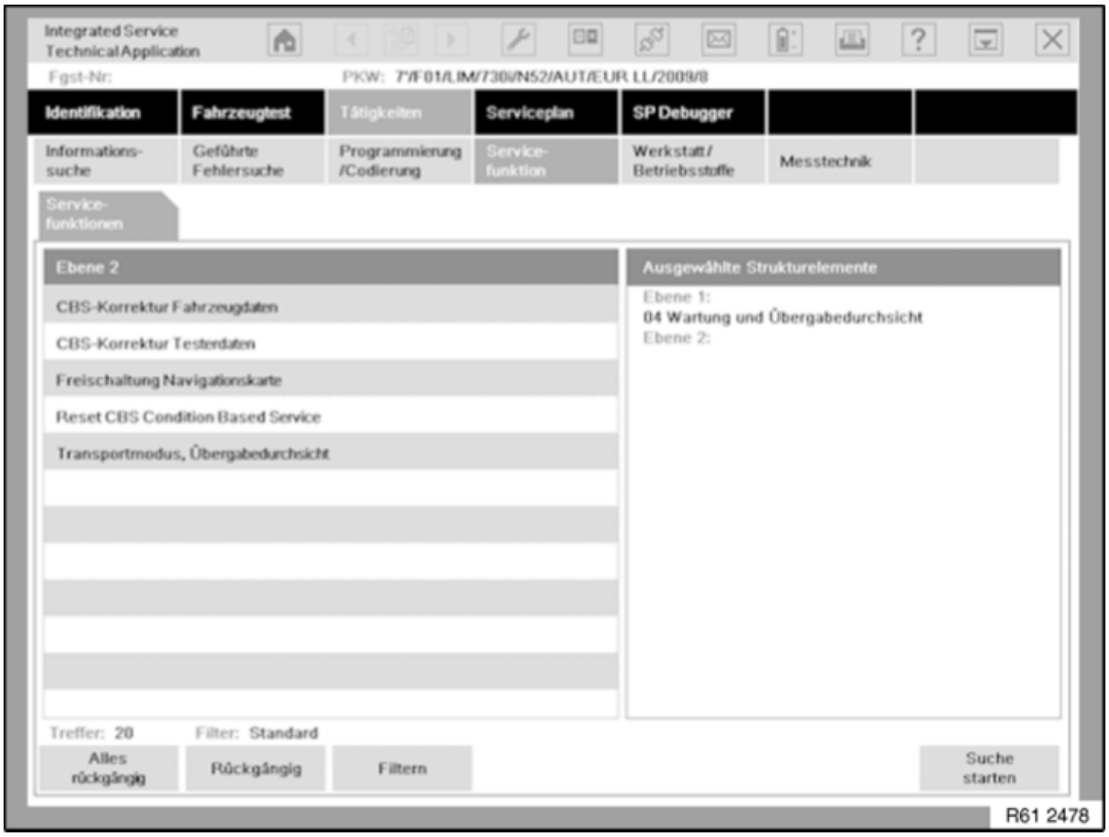


Fig. 2: Display - Service Functions
Courtesy of BMW OF NORTH AMERICA, INC.

4 service functions are available in the BMW diagnosis system for maintenance:

- Transport mode/pre-delivery check
- CBS correction, tester data
- Reset CBS
- CBS vehicle data correction

Service Function: Transport Mode/Pre-delivery check

In order to ensure that a vehicle can be handed over to the customer in proper condition, the "Transport mode/pre-delivery check" service function must be performed.

The following items are checked during the pre-delivery check:

- Deactivation of the transport mode.
- To determine the vehicle-specific distance travelled per week an adaptation process is activated. Transport and immobilization periods before vehicle delivery to the customer therefore do not have any effect on the customer-specific weekly distance travelled.

The weekly mileage/kilometrage is used to control escalation from "green" to "yellow" (approx. 4 weeks before "red") for maintenance scopes with remaining distances. It is the distance travelled determined over the last 6 weeks which is taken into account.

- Encoding or deletion of the legally-specified intervals for the legally stipulated vehicle inspection and emissions test.
- Inputting the target dates for the legally stipulated vehicle inspection and emissions test (automatically or manually).

  Automatically: By entering the date of the first registration and the interval

  Manually: by directly entering the target date

- Entry of local, service-related phone numbers, depending on vehicle equipment specification (e.g. BMW Group Mobile Service, BMW Hotline, customer's local dealer).

  The country-specific phone numbers are displayed in the BMW diagnosis system as information text. When asked for input information the phone numbers can simply be read off.

- Information on initializing the TeleService depending on the vehicle equipment.
- Checking and where necessary adjusting the on-board date for the vehicle.
- Entry of the date of the first registration of the vehicle.
- Delete fault memory.

NOTE: Reduction of input effort.

In order to minimize the input effort for the workshop, standardized data is saved on the BMW diagnosis system (for repeat use). The standardized data can be changed with the "CBS Correction Tester Data" service function.

Service Function: CBS Correction Tester Data

During the service function "Pre-delivery check", the data is automatically stored in the vehicle. With the service function "CBS correction, tester data", standardized data can be changed.

The following standardized data can be modified:

- Phone numbers:
  - BMW Group Mobile Service
  - BMW Hotline
  - Local dealer

  The country-specific phone numbers are contained in the BMW diagnosis system as information text (to be read off when required for input). The phone numbers must be input with the international dialling code.

- Legally stipulated vehicle inspection (country-specific):
  - Encoding or deletion
  - Interval for calculating the target date

  The target date is calculated on the basis of the date of the first registration.

- Legally stipulated emissions test (country-specific):
  - Encoding or deletion
  - Interval for calculating the target date

  The target date is calculated on the basis of the date of the first registration.

NOTE: Automation after installation of the BMW diagnosis system. If the pre-delivery check is being carried out for the first time, the standardized data will be defined automatically. It is therefore not necessary to enter the data separately.

Service Function: Reset CBS Condition Based Service

The scope of maintenance work can be reset with the "Reset CBS Condition Based Service" service function. Even if availability is above 80 %. The reset via the BMW diagnosis system has the advantage that the on-board date is corrected automatically.

The individual maintenance scopes are displayed in the BMW diagnosis system with service counter and availability.

- The service counter is increased by one count on resetting. In new vehicles all service counters are set to "1".

  The service counters are used in the Service Acceptance Module (SAM) to control the additional work for specific maintenance operations.

- On resetting the availability is set at 100%. The percentage availability is the wear value for the maintenance operation.

  The greater the availability, the further away the next service.

  0% means that the maintenance operation must be carried out.

Service Function: CBS vehicle data correction

IMPORTANT: The dates have been exceeded.

After carrying out this service function, it will no longer be possible to restore the previous status.

The service function "CBS vehicle data correction" is available if resetting has been carried out

unintentionally. Thus the availability of a maintenance operation can be corrected to a value which corresponds more closely to the actual situation.

For this correction a date or kilometer reading is entered. This data is processed internally to give a percentage availability. Here, the BMW diagnosis system will only accept a value which is lower that the current status in the control unit. In addition, the service counter of the scope is automatically reduced by one counter.

The entries in the service booklet are used to determine the actual availability. The most recent maintenance measure (kilometer reading and date) allows the reconstruction availability for the specific scope that corresponds more closely to the actual situation. This excludes the correction of availability for brake pads. The remaining brake pad thickness must be measured and entered (in millimeters).

NOTE: Reference for distance- and time-dependent maintenance scopes

On correction the availability depends on the distance-dependent and time-dependent calculation.

61 12... GENERAL INFORMATION ON INTELLIGENT BATTERY SENOR (IBS)

NOTE: Do not connect the charger to the 12 V charging socket.

The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the power supply be registered by the vehicle.

WARNING: Danger of destruction in event of mechanical strain

- **Do not introduce any additional connections at the battery negative terminal.**
- **Do not modify the grounding cable. The grounding cable also serves to dissipate heat.**
- **Do not establish any connection between the IBS and the sensor screw.**
- **Do not use force when disconnecting the pole shoe from the battery terminal:**
  - **Do not pull on the grounding cable.**
  - **Do not place any tools under the IBS to lever off the pole shoe.**
- **Do not use IBS connections as levers.**
- **Use a torque wrench and set tightening torque in accordance with repair instructions.**
- **Do not release or tighten down sensor screw (screw with Torx head).**
- **Avoid contact between IBS and ground.**

WARNING: Danger of destruction to IBS and cables when battery is replaced

- **The IBS and the cables can be destroyed by mechanical strain when the battery is replaced. Therefore avoid mechanical strain.**
- **The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).**
- **Use the battery size (capacity) installed as standard when replacing the battery.**
- **Register battery replacement via Service functions in diagnosis system.**
- **Delete fault entries in the Digital Engine Electronics (DME) associated with battery replacement.**
- **Always proceed in accordance with the repair instructions.**

NOTE: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- **For this reason, only replace the IBS when a corresponding fault entry in the DME or DDE.**

61 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe **SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY** .

Before disconnecting battery

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

IMPORTANT:

- **There is a danger of mixing up battery leads: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.**
- **The on-board computer and clock may lose your data.**

General notes on disconnecting battery

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

  Do not under any circumstances pull/lever off pole shoes by force.

Do not under any circumstances release socket-head cap screw of IBS.

- Disconnect terminal of **BATTERY NEGATIVE LEAD** from vehicle battery. Cover battery negative terminal(s) and secure.

- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque **61 21 1AZ** .

After connecting battery

IMPORTANT: The scope of application of some systems may be restricted after a power supply interruption.

Likewise, individual settings may be lost.

Settings or activations must be carried out, depending on the equipment specification.

For example:

- **If necessary, carry out ADJUSTMENT OF ACTIVE STEERING**
- **If necessary, activate SLIDE/TILT SUNROOF**
- **If necessary, activate power windows. See NOTES ON INITIALIZING POWER WINDOW REGULATOR .**

Refer to the diagnosis system for further vehicle-specific information.

61 13... INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

Notes

SPECIAL TOOLS DESCRIPTION CHART

Abbreviations of contacts and what they mean:	
ELA	**Strand seal**
D 1.5/2.5/3.5	**Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter**
MDK	**Miniature double flat spring contact**
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system

MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact

IMPORTANT: The contacts can be changed on ultrasonically welded plugs (1).

Ultrasonically welded plugs (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

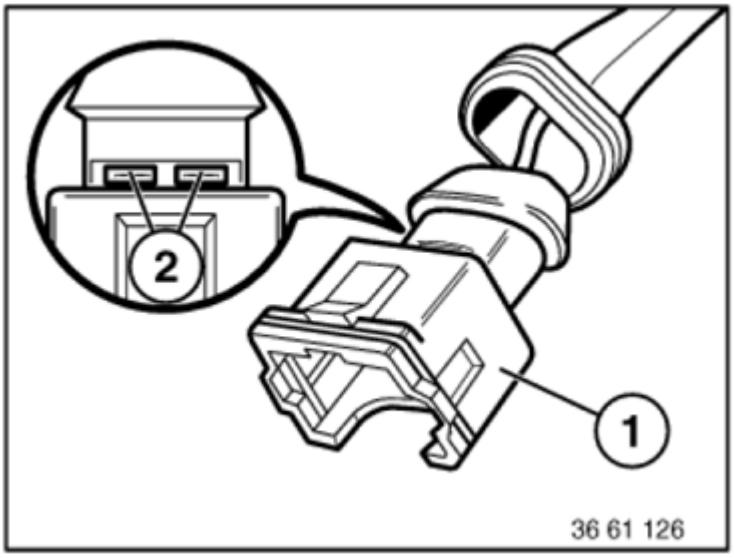


Fig. 3: Identifying Ultrasonic-Welded Connectors With Welds
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool kits:

- **Release and pressing-off tool 61 1 150**

  will be replaced on 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)

- **Release and pressing-off tool 61 1 100 (engine)**

Repair instructions for opening plug housings and removing contacts of different plug systems

Plug system D 1.5/D 2.5

- **CIRCULAR PLUGS, 7-, 8-PIN, SYSTEM D2.5**
- **CIRCULAR CONNECTOR, 13-PIN, SYSTEM D2.5**
- **CIRCULAR CONNECTOR, 20-PIN, SYSTEM D2.5**
- **CIRCULAR CONNECTORS, 4-, 7-, 10- 12-, 25-PIN, SYSTEM D1.5/D2.5**
- **INLINE CONNECTORS, 15-PIN, SYSTEM D2.5**
- **INLINE PLUGS, 8-, 12-PIN, SYSTEM D2.5**
- **IN-LINE CONNECTORS, 30-PIN, SYSTEM D2.5**
- **IN-LINE PLUGS, 20-PIN, SYSTEM D2.5**

Plug system JPT/MDK/DFK

- **IN-LINE PLUGS, 2-PIN, SYSTEM JPT ELA**
- **IN-LINE CONNECTORS, 2-PIN, SYSTEM MDK 3PLUS 2.8**
- **IN-LINE PLUGS, 4-PIN, SYSTEM DFK ELA**

Plug system Elo/Elo Power

- **INLINE PLUGS, 4-, 10-PIN, SYSTEM ELO**
- **IN-LINE PLUGS, 6- TO 50-PIN, SYSTEM ELO**
- **IN-LINE CONNECTORS, 3-, 6-PIN, SYSTEM ELO-POWER 2.8**

Plug system LSK

- **CONNECTOR HOUSING, LCC CONTACT (LOAD CURRENT CONTACT)**

Plug system MQS/MPQ

- **INLINE CONNECTORS, 6-, 8-PIN, SYSTEM MQS**
- **INLINE PLUGS, 2-PIN, SYSTEM MPQ 2.8**
- **CONTROL UNIT CONNECTORS, 25-, 35-, 55-, 83-, 88-PIN**
- **IN-LINE PLUGS, 24-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSING 42-, 43-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSINGS, 2X21-, 2X27-PIN, HYBRID SYSTEMS MQS/MPQ, ELO/ELO POWER**
- **IN-LINE CONNECTORS, 30-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSINGS, 5-PIN, 8-PIN, SYSTEM MQS/MPQ**
- **SOCKET HOUSING (RADIO CONNECTOR), HYBRID SYSTEM MQS/MPQ**

61 00... NOTES ON HANDLING OPTICAL FIBRES

IMPORTANT: To avoid damage when handling optical fibres, comply with the following points:

- **The minimum permitted bending radius is 25 mm**
- **Do not subject optical fibres to compressive and tensile load**
- **Protect optical fibres against the effects of heat > or =85 °C (e.g. during welding work, drying work with infrared heater or hot air blower)**
- **Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary**

NOTE: The optical fibres are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety and I ntegration S ystem) fiber-optic cable**
- **Orange=repair fibre-optic cables**

Follow instructions for processing cables and optical fibres. See **6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** and **6113... CRIMPING OPTICAL FIBRES**.

61 00... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: **Fibre-optic cables are colored differently as follows:**

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange=repair fibre-optic cables**

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables: see **TREATING CABLES AND FIBRE-OPTIC CABLES**.

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

12 00... NOTES/INFORMATION ON START ASSISTANCE (JUMP STARTING)

Do not start the engine with help of starting sprays.

Preparation

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.
- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

IMPORTANT: **Never touch electrically live ignition system components: high voltage - danger of injury!**

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

IMPORTANT: Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

61 00... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations

Safety regulations for **HANDLING COMPONENTS OF AIRBAG SYSTEM** .

INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .

Procedure for cable repair

In event of non-visible damage to wiring harness

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of them being mixed up! Cut through one cable after the other at an appropriate

wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in car parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the connectors and shrink-fit hoses in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colors. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

- **CUTTING OFF AND INSULATING CABLES**
- **REPAIRING A PLUG CONNECTION USING CONNECTORS**
- **INSTALLING AND REMOVING CONTACTS**

In event of visible damage

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair lead in car parallel to existing airbag lead up to cutting point. Cut off excess length of repair lead. Twist open cables. Connect cables with connectors and shrink-fit hoses in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

- **CUTTING OFF AND INSULATING CABLES**
- **REPAIRING A PLUG CONNECTION USING CONNECTORS**
- **INSTALLING AND REMOVING CONTACTS**

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as

to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

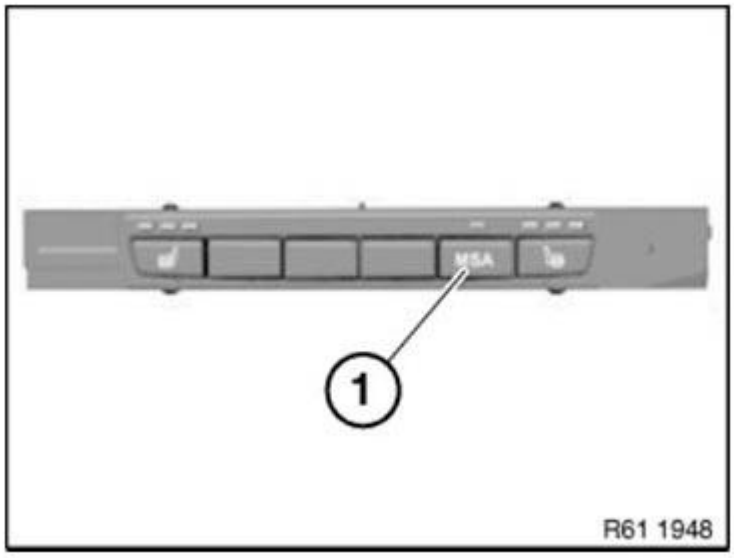


Fig. 4: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

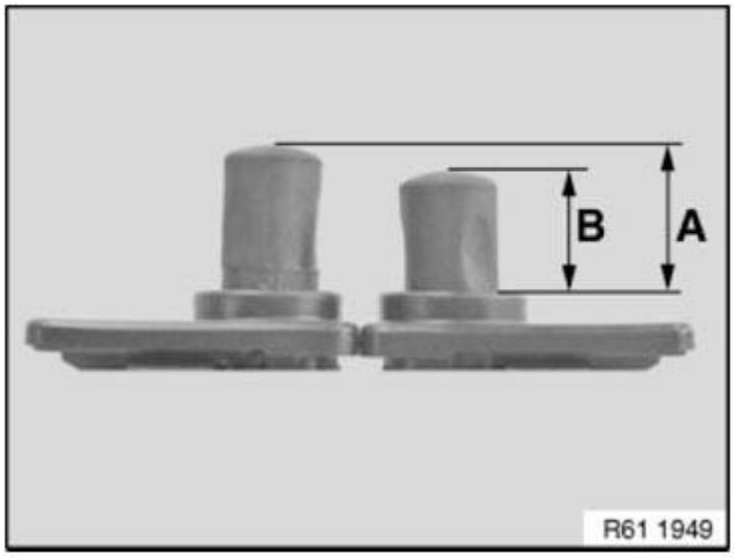


Fig. 5: Identifying Basic Setting For Engine Hood/Bonnet Open
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

61 13... TREATING CABLES AND FIBRE-OPTIC CABLES

Notes

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool kits:

SPECIAL TOOLS DESCRIPTION CHART

Repair range for vehicle electrical system	SI 2 04 07 341
Crimping set with pliers for fibre-optic cables, Micro Power Quadlock (MPQ), Micro Quadlock System (MQS) contacts and universal crimping head	**61 4 320** **61 0 200**

Subject of repair instructions

- **SPECIAL TOOLS FOR WIRING HARNESS REPAIRS**
- **CUTTING CABLES TO LENGTH AND STRIP INSULATION**
- Crimping stop parts (contacts): see **6113... CRIMPING STOP PARTS**
- **BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION**
- **COMB CONNECTOR FOR RETROFITTING/REPAIRS**
- Cutting to length and stripping insulation from optical fibres and crimping optical fibres: see **6113...**

CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH and **6113... CRIMPING OPTICAL FIBRES**.

6111 WIRING HARNESS

61 11... INSTALLING REPAIR CABLE FOR LEFT SIDE VIEW CAMERA

Read and comply with notes on **HANDLING WIRING HARNESSES AND WIRING**.

NOTE: Work is shown on the F01 by way of example. There may be differences in detail in the case of other vehicle types and equipment specifications.

Necessary preliminary tasks:

- Remove **FRONT WHEEL ARCH COVER (FRONT SECTION)**
- Remove **SEAL MOUNTING FOR ENGINE COMPARTMENT LID**
- Remove **FOOTWELL SIDE TRIM PANEL ON A-PILLAR, LEFT**
- Preliminary work is described in **REMOVING CONTROL UNIT FOR TOP-/REAR-/SIDE- VIEW CAMERA** , but do not remove the control unit.
- Remove **FRONT SEAT ON THE DRIVER'S SIDE**
- Remove backrest side section on rear seat backrest.
- Remove **BACKREST**
- Remove **BOTTOM TRIM PANEL FOR DOOR POST**

NOTE: Required preliminary may vary according to vehicle type and equipment.

Lever expanding rivets (1) out of cover (2).

Remove cover (2).

Installation note:

If necessary, replace damaged expanding rivet.

Make sure holders (3) are correctly seated.

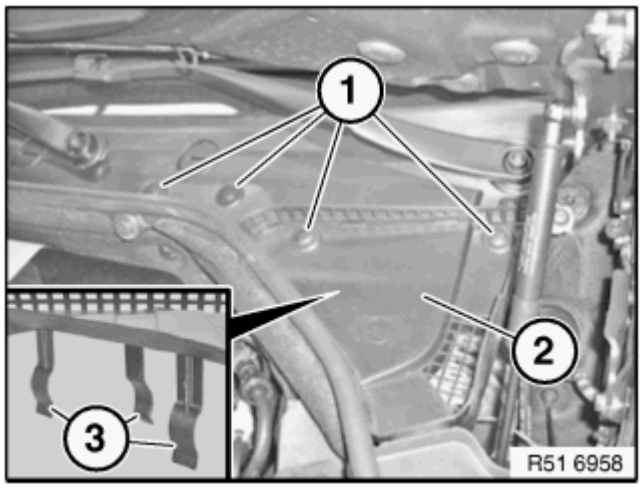


Fig. 6: Identifying Rivets, Cover, And Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock the lock (1) in direction of arrow with suitable tool.

IMPORTANT: Risk of damage!

Unlock the lock (3) carefully with a suitable tool. Pull connector housing (4) of line (2) in direction of arrow.

Installation note:

Pay attention to encoding (5)!

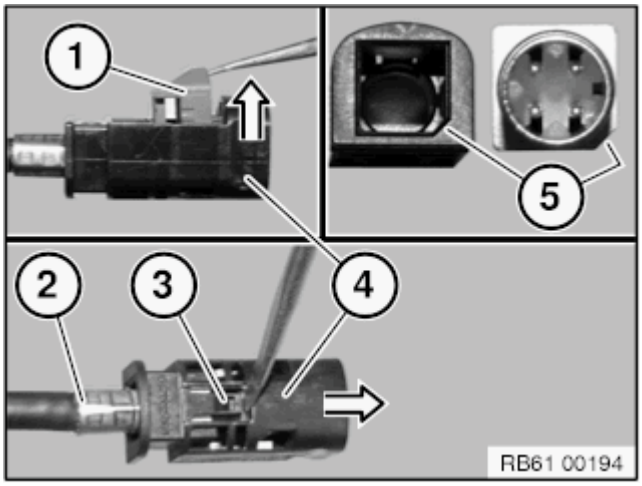


Fig. 7: Identifying Lock And Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Connect repair cable (2) to Side View camera (1).

Lay repair cable (2) in direction of arrow along wiring harness (3) and secure at points marked with an arrow.

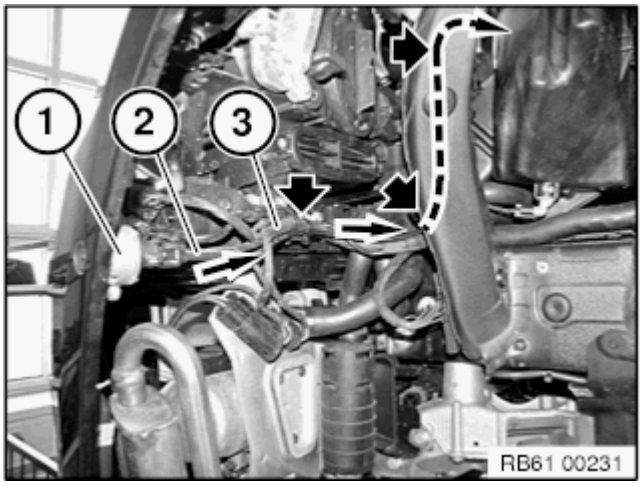


Fig. 8: Identifying Side View Camera, Wiring Harness, And Repair Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Loosen screws from expansion tank (5) and set expansion tank to one side.

Lay repair cable (1) in direction of arrow along wiring harness (4) and secure at points marked with an arrow.

IMPORTANT: Risk of damage to wiring harness.

Carefully feed repair cable (1) through grommet (2).

After repair cable (1) has been fed through and secured, mask grommet (2) at point (3) with suitable adhesive tape.

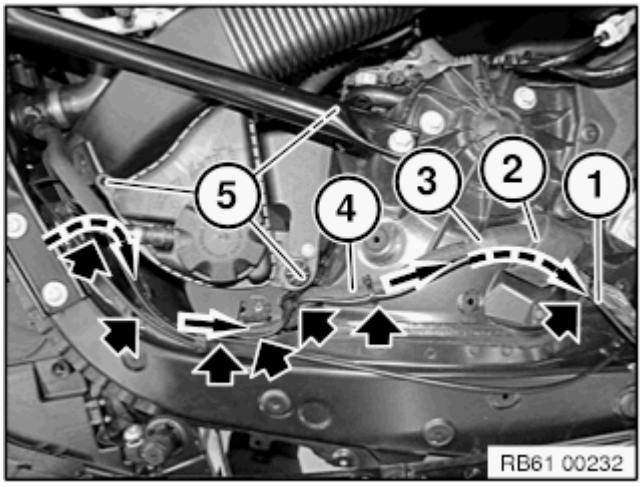


Fig. 9: Feeding Repair Cable Through Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage to wiring harness.

Break through rubber grommet (3) at point (4) using a suitable tool.

Lay repair cable (2) in direction of arrow along wiring harness (1) and secure at points marked with an arrow.

Feed through repair cable (2) at point (4) in driver's footwell.

IMPORTANT: To prevent moisture from entering the passenger compartment, seal opening (4) on the outside, using suitable means!

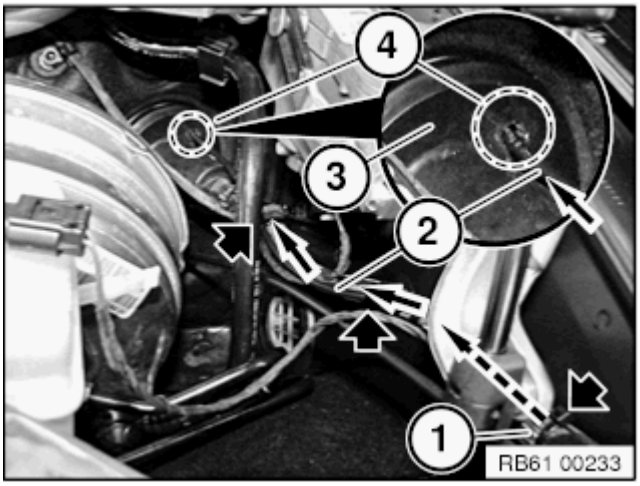


Fig. 10: Routing Repair Cable To Driver's Footwell
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully lay carpet (4) to one side. Lay repair cable (2) from entry point (1) in direction of arrow along wiring harness (3) below carpet (4) and secure to wiring harness (3) at suitable distances.

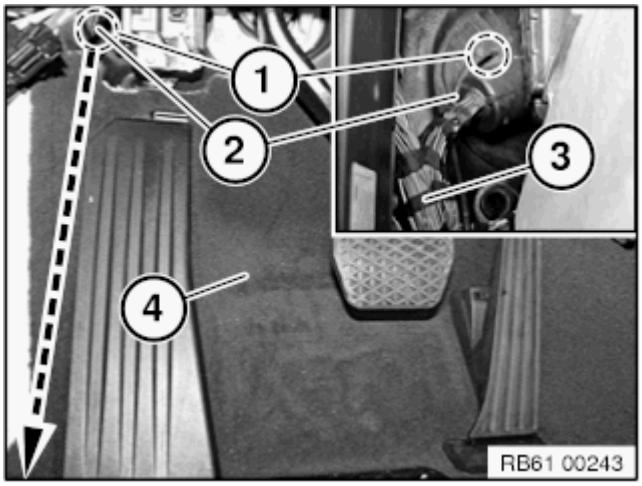


Fig. 11: Routing Repair Cable From Entry Point Along Wiring Harness Below Carpet
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully lay carpet to one side. Lay repair cable (2) in direction of arrow along wiring harness up to all-round

vision camera control unit (1) secure to wiring harness at suitable distances.

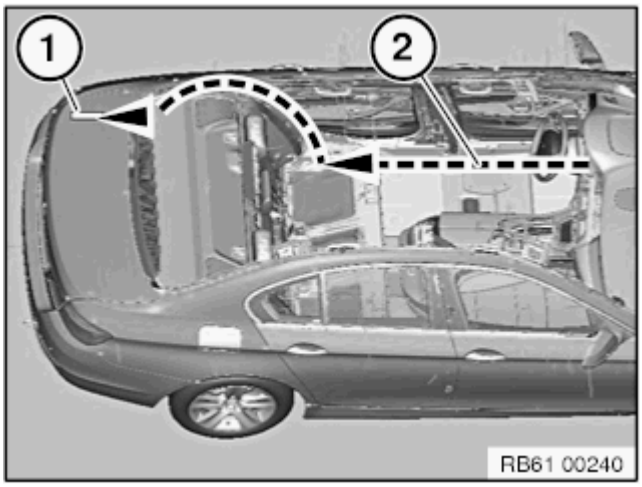


Fig. 12: Routing Repair Cable Up To Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble repair cable. Connect repair cable to slot (2) of all-round vision camera control unit (3).

NOTE: Lay and secure and overlengths of repair cable below wheel arch trim panel in left luggage compartment.

After successful completion of function check , detach start and end of faulty cable at first mounting point.

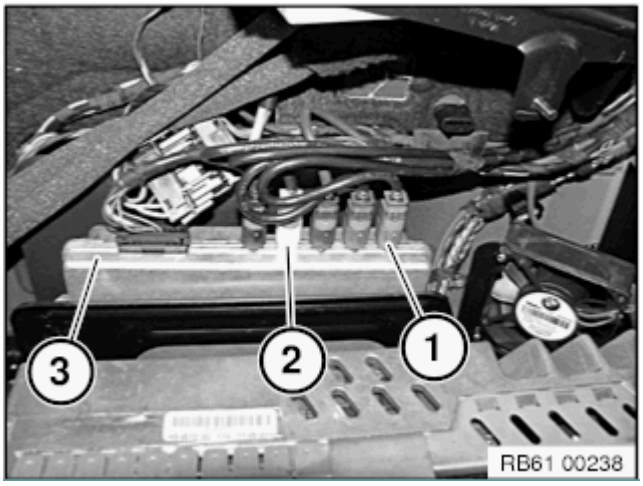


Fig. 13: Connecting Repair Cable To Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

61 11... INSTALLING REPAIR CABLE FOR REVERSING CAMERA

Read and comply with notes on **HANDLING WIRING HARNESSES AND WIRING**.

NOTE: Work is shown on the F01 by way of example. There may be differences in detail in the case of other vehicle types and equipment specifications.

Remove trim panels.

Lay repair cable from reversing camera (3) along wiring harness (2) up to TRSVC control unit (1, middle slot) and secure sufficiently.

After successful completion of function check , detach start and end of faulty cable at first mounting point.

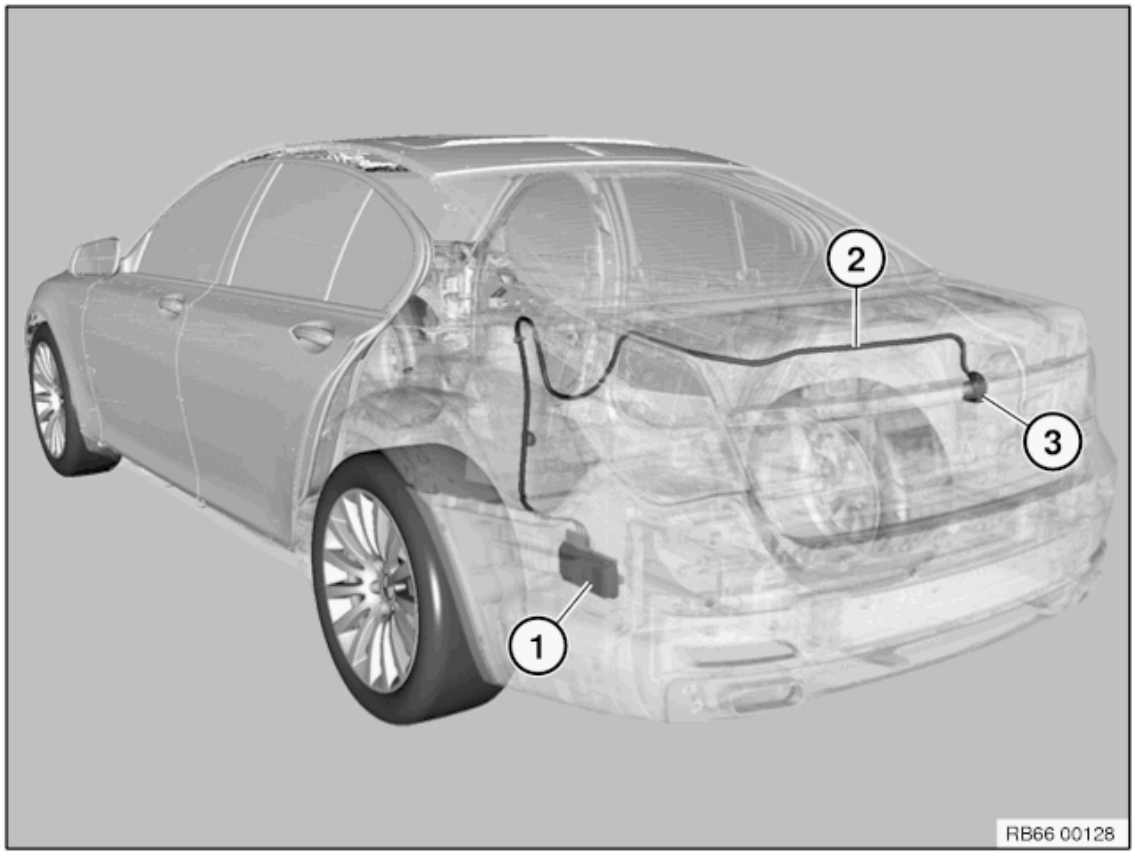


Fig. 14: Identifying Camera, Wiring Harness, And Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

61 11... INSTALLING REPAIR CABLE FOR RIGHT SIDE VIEW CAMERA

Read and comply with notes on **HANDLING WIRING HARNESSES AND WIRING**.

NOTE: Work is shown on the F01 by way of example. There may be differences in detail in the case of other vehicle types and equipment specifications.

Necessary preliminary tasks:

- Remove **FRONT WHEEL ARCH COVER (FRONT SECTION)**
- Remove **HEATER/AIR CONDITIONER BLOWER**
- Remove **SEAL MOUNTING FOR ENGINE COMPARTMENT LID** .
- Remove **SIDE TRIM PANEL, FOOTWELL, ON A-PILLAR, RIGHT** .
- Preliminary work is described in **REMOVING CONTROL UNIT FOR TOP-/REAR-/SIDE- VIEW CAMERA** , but do not remove the control unit.
- Remove **FRONT SEAT ON THE DRIVER'S SIDE**
- Remove backrest side section on rear seat backrest.
- Remove **BACKREST**
- Remove **BOTTOM TRIM PANEL FOR DOOR POST**

NOTE: Required preliminary may vary according to vehicle type and equipment.

Unlock the lock (1) in direction of arrow with suitable tool.

IMPORTANT: Risk of damage!

Unlock the lock (3) carefully with a suitable tool. Pull connector housing (4) of line (2) in direction of arrow.

Installation note:

Pay attention to encoding (5)!

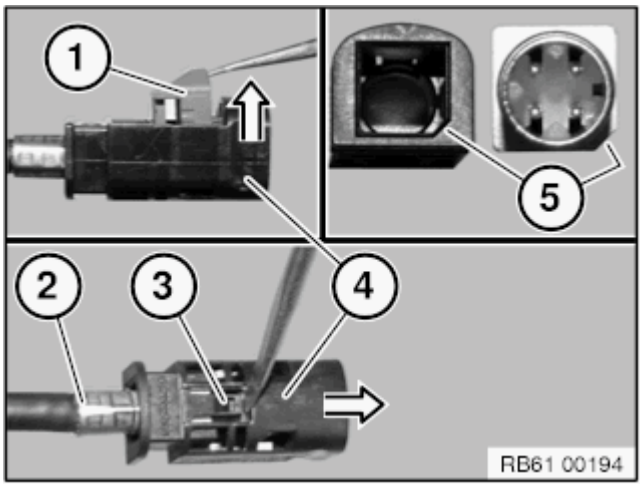


Fig. 15: Identifying Lock And Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Connect repair cable (2) to Side View camera (1).

Lay repair cable (2) in direction of arrow along wiring harness (3) and secure at points marked with an arrow.

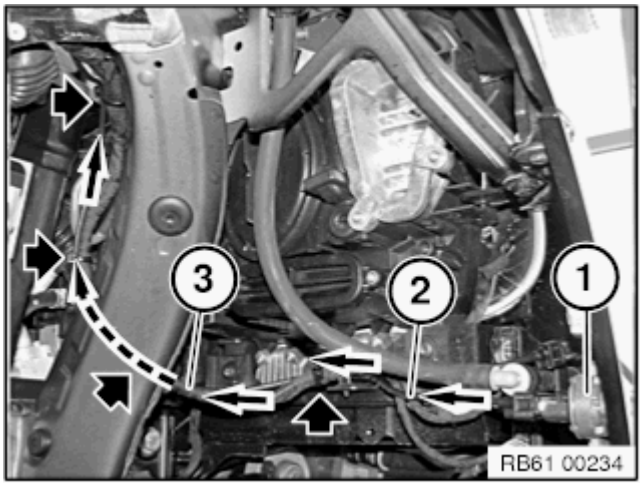


Fig. 16: Identifying Side View Camera, Wiring Harness, And Repair Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Route repair cable (1) in direction of arrow along wiring harness (2) and attach at locations marked with arrow.

IMPORTANT: Risk of damage to wiring harness.

Carefully thread repair cable (1) through grommet (4).

After threading and securing repair cable (1), tape off grommet (4) at location (3) with suitable adhesive tape.

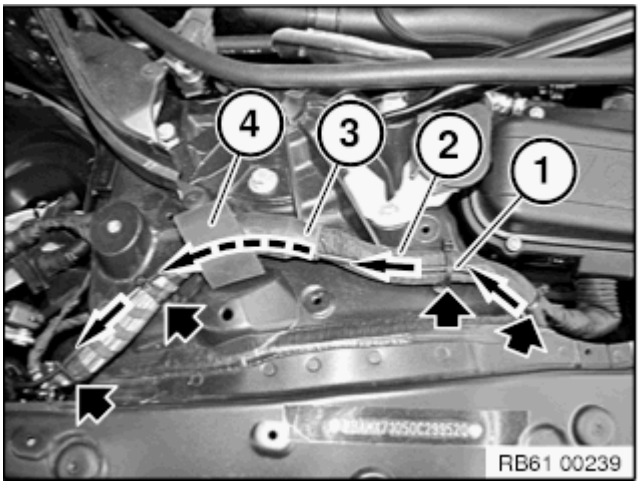


Fig. 17: Threading Repair Cable Through Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage to wiring harness.

Break through rubber grommet (3) at point (4) using a suitable tool.

Route repair cable (1) in direction of arrow along wiring harness (2) and attach at locations marked with arrow.

Thread repair cable (1) into blower housing at location (4) and continue routing in passenger footwell.

IMPORTANT: To prevent moisture from entering the passenger compartment, seal opening (4) on the outside, using suitable means!

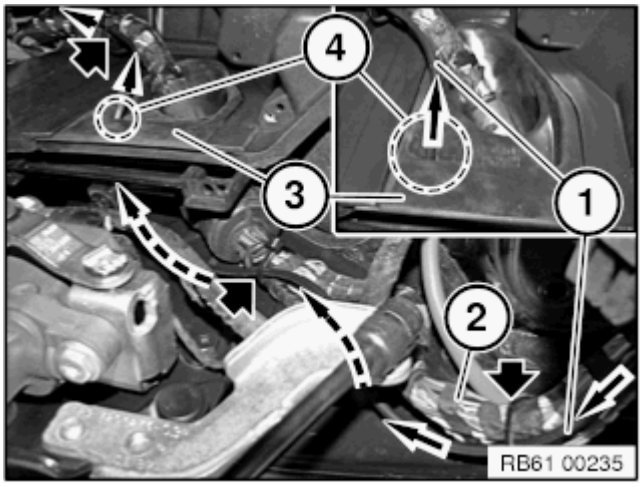


Fig. 18: Routing Repair Cable To Passenger Footwell
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of carpet damage!

Carefully move carpet (3) aside in passenger footwell.

Route repair cable (1) in direction of arrow and secure at locations marked with arrow. In area of sound insulation (2), secure repair cable (1) with adhesive tape. Thread repair cable (1) under heating and air-conditioning unit (5) in driver's footwell.

IMPORTANT: Risk of damage!

Repair cable (1) must not touch edge (4).

Maintain sufficient distance between repair cable (1) and edge (4).

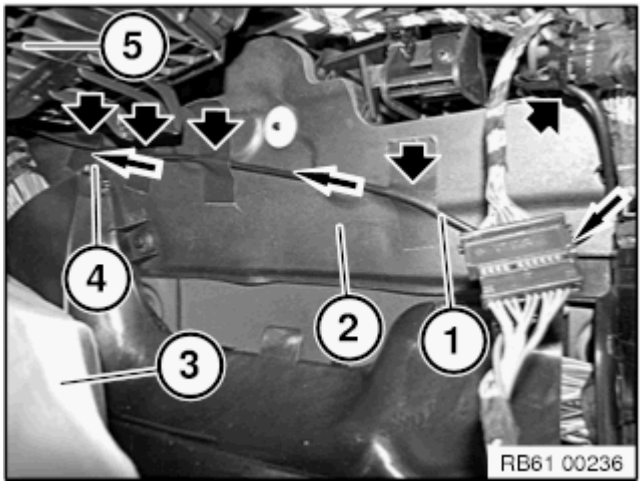


Fig. 19: Threading Repair Cable Under Heating And Air-Conditioning Unit In Driver's Footwell
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully pull carpet (5) downward. Route repair cable (2) in direction of arrow under heating and air-conditioning unit (1) and under wiring harness (3) and attach at locations marked with arrow. Attach repair cable (2) over edge (4) with adhesive tape.

IMPORTANT: Risk of damage!

Repair cable (2) must not touch edge (4).

Maintain sufficient distance between repair cable (2) and edge (4).

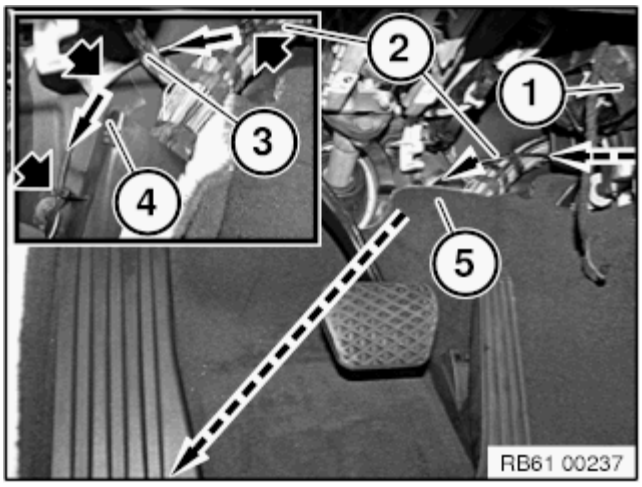


Fig. 20: Routing Repair Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully lay carpet to one side. Lay repair cable (2) in direction of arrow along wiring harness up to all-round vision camera control unit (1) secure to wiring harness at suitable distances.

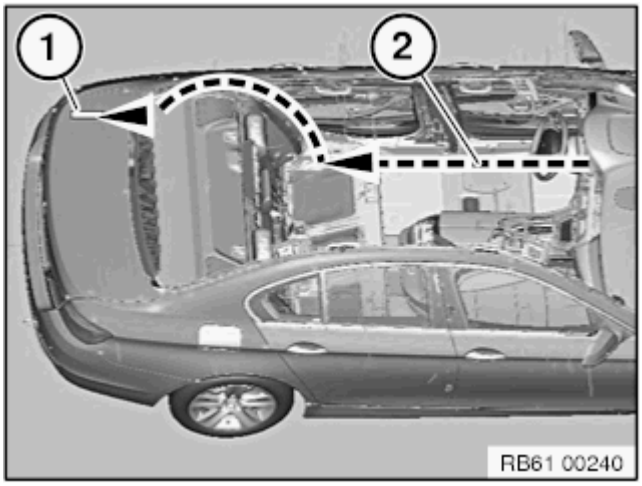


Fig. 21: Routing Repair Cable Up To Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble repair cable. Connect repair cable to slot (1) of all-round vision camera control unit (3).

NOTE: Lay and secure and overlengths of repair cable below wheel arch trim panel in left luggage compartment.

After successful completion of function check , detach start and end of faulty cable at first mounting point.

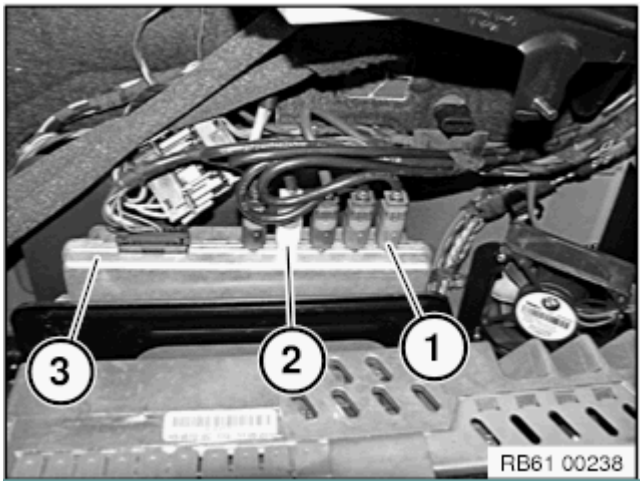


Fig. 22: Connecting Repair Cable To Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

61 00... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

Avoid compressive and tensile loads

- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- **G reen = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange=repair fibre-optic cables**

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables: see **TREATING CABLES AND FIBRE-OPTIC CABLES**.

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

6112 AUXILIARY CABLE

61 12... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

NOTE: Do not connect the charger to the 12 V charging socket.

The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the power supply be registered by the vehicle.

WARNING: Danger of destruction in event of mechanical strain

- **Do not introduce any additional connections at the battery negative terminal.**
- **Do not modify the grounding cable. The grounding cable also serves to dissipate heat.**
- **Do not establish any connection between the IBS and the sensor screw.**
- **Do not use force when disconnecting the pole shoe from the battery terminal:**
  - **Do not pull on the grounding cable.**
  - **Do not place any tools under the IBS to lever off the pole shoe.**
- **Do not use IBS connections as levers.**
- **Use a torque wrench and set tightening torque in accordance with repair instructions.**
- **Do not release or tighten down sensor screw (screw with Torx head).**
- **Avoid contact between IBS and ground.**

WARNING: Danger of destruction to IBS and cables when battery is replaced

- **The IBS and the cables can be destroyed by mechanical strain when the battery is replaced. Therefore avoid mechanical strain.**
- **The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).**
- **Use the battery size (capacity) installed as standard when replacing the battery.**
- **Register battery replacement via Service functions in diagnosis system.**
- **Delete fault entries in the Digital Engine Electronics (DME)**

associated with battery replacement.

- **Always proceed in accordance with the repair instructions.**

NOTE: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- **For this reason, only replace the IBS when a corresponding fault entry in the DME or DDE.**

61 13... INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

Notes

SPECIAL TOOLS DESCRIPTION CHART

Abbreviations of contacts and what they mean:	
ELA	**Strand seal**
D 1.5/2.5/3.5	**Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter**
MDK	**Miniature double flat spring contact**
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact

IMPORTANT: The contacts can be changed on ultrasonically welded plugs (1).

Ultrasonically welded plugs (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

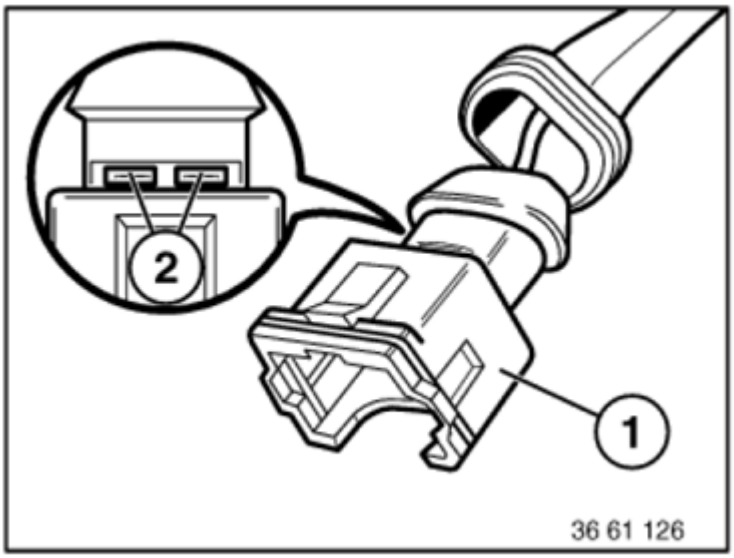


Fig. 23: Identifying Ultrasonic-Welded Connectors With Welds
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Special tools referred to in the repair instructions below are contained in the following special tool kits:**

- **Release and pressing-off tool 61 1 150**

  will be replaced on 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)

- **Release and pressing-off tool 61 1 100 (engine)**

Repair instructions for opening plug housings and removing contacts of different plug systems

Plug system D 1.5/D 2.5

- **CIRCULAR PLUGS, 7-, 8-PIN, SYSTEM D 2.5**
- **CIRCULAR CONNECTOR, 13-PIN, SYSTEM D2.5**
- **CIRCULAR CONNECTOR, 20-PIN, SYSTEM D2.5**
- **CIRCULAR CONNECTORS, 4-, 7-, 10- 12-, 25-PIN, SYSTEM D1.5/D2.5**
- **INLINE CONNECTORS, 15-PIN, SYSTEM D2.5**
- **INLINE PLUGS, 8-, 12-PIN, SYSTEM D2.5**
- **IN-LINE CONNECTORS, 30-PIN, SYSTEM D2.5**
- **IN-LINE PLUGS, 20-PIN, SYSTEM D2.5**

Plug system JPT/MDK/DFK

- **IN-LINE PLUGS, 2-PIN, SYSTEM JPT ELA**

- **IN-LINE CONNECTORS, 2-PIN, SYSTEM MDK 3PLUS 2.8**
- **IN-LINE PLUGS, 4-PIN, SYSTEM DFK ELA**

Plug system Elo/Elo Power

- **INLINE PLUGS, 4-, 10-PIN, SYSTEM ELO**
- **IN-LINE PLUGS, 6- TO 50-PIN, SYSTEM ELO**
- **IN-LINE CONNECTORS, 3-, 6-PIN, SYSTEM ELO-POWER 2.8**

Plug system LSK

- **CONNECTOR HOUSING, LCC CONTACT (LOAD CURRENT CONTACT)**

Plug system MQS/MPQ

- **INLINE CONNECTORS, 6-, 8-PIN, SYSTEM MQS**
- **INLINE PLUGS, 2-PIN, SYSTEM MPQ 2.8**
- **CONTROL UNIT CONNECTORS, 25-, 35-, 55-, 83-, 88-PIN**
- **IN-LINE PLUGS, 24-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSING 42-, 43-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSINGS, 2X21-, 2X27-PIN, HYBRID SYSTEMS MQS/MPQ, ELO/ELO POWER**
- **IN-LINE CONNECTORS, 30-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSINGS, 5-PIN, 8-PIN, SYSTEM MQS/MPQ**
- **SOCKET HOUSING (RADIO CONNECTOR), HYBRID SYSTEM MQS/MPQ**

61 12 013 REPLACING BATTERY NEGATIVE LEAD

WARNING: Observe (SAFETY) INFORMATION ON AGM BATTERY and follow INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY.

Read and comply with notes and instructions on INTELLIGENT BATTERY SENSOR .

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **LUGGAGE COMPARTMENT STORAGE COMPARTMENT**

Slacken nut (1) on negative battery terminal.

Tightening torque **61 21 1AZ** .

IMPORTANT: Do not under any circumstances use force to pull off negative terminal.

Detach battery negative lead with intelligent battery sensor (IBS) in upward direction, lay to one side and secure.

Disconnect plug connection (2).

Release nut (3) and battery negative lead (4).

Tightening torque 61 21 6AZ .

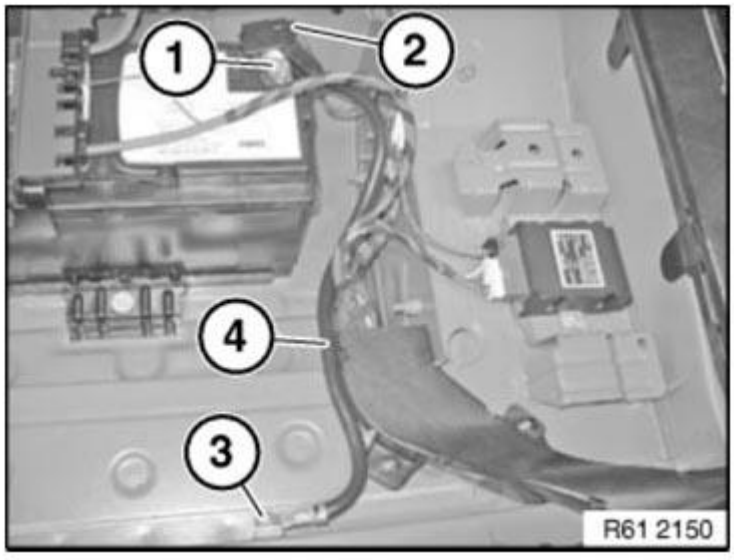


Fig. 24: Identifying Battery With Nut, Plug Connection And Negative Lead
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 002 REPLACING POSITIVE BATTERY CABLE (FROM BATTERY TO LUGGAGE COMPARTMENT CABLE CONNECTOR)

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary work

- Clamp off **BATTERY NEGATIVE LEAD**

If necessary, unlock and disconnect plug connection (1) of safety battery terminal lead.

IMPORTANT: Do not under any circumstances pull/lever off safety battery terminal (1) by force.

Loosen nut (2).

Tightening torque **61 21 1AZ** .

Unscrew nut (3).

Tightening torque **61 21 2AZ** .

Slacken nut (4).

Tightening torque **61 21 4AZ** .

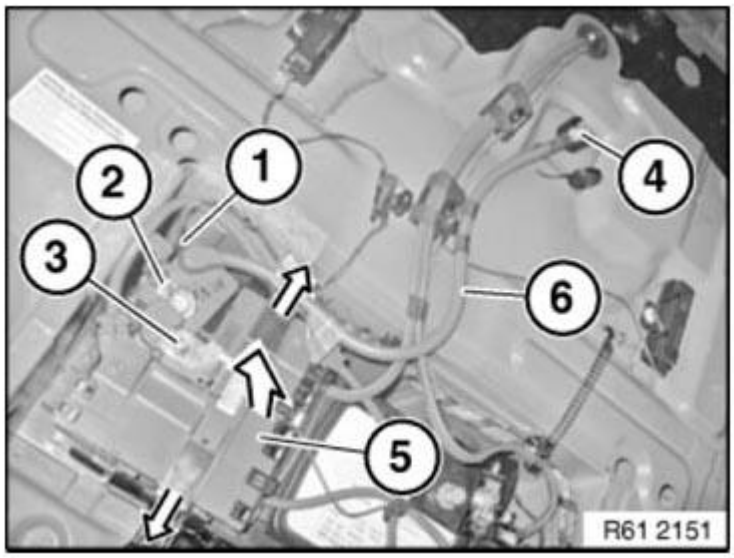


Fig. 25: Raising Power Distribution Box
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip locking brackets from power distribution box (5) in direction of arrow.

Raise power distribution box (5) in direction of arrow and remove positive battery cable (6).

61 12 062 REPLACING WIRING HARNESS FOR FRONT BUMPER

IMPORTANT: Read and comply with notes on HANDLING WIRING HARNESSES and cables.

Necessary preliminary tasks

- Remove **FRONT BUMPER TRIM** .

Disconnect plug connections (1) on five ultrasonic transducers.

Unclip wiring harness (2) from bumper trim.

Remove wiring harness (2).

Remove PDC. See **6620515 REMOVING AND INSTALLING/REPLACING A FRONT LEFT ULTRASONIC TRANSDUCER** ; **6620516 REMOVING AND INSTALLING/REPLACING A FRONT RIGHT ULTRASONIC SENSOR** ; **6620517 REMOVING AND INSTALLING/RENEWING A CENTRE FRONT LEFT ULTRASONIC SENSOR** ; **6620519 REMOVING AND INSTALLING/RENEWING A CENTRE FRONT RIGHT ULTRASONIC SENSOR** and **6620521 REMOVING AND INSTALLING/REPLACING A FRONT CENTRE ULTRASONIC SENSOR** .

Installation:

Make sure wiring harness (2) is laid correctly.

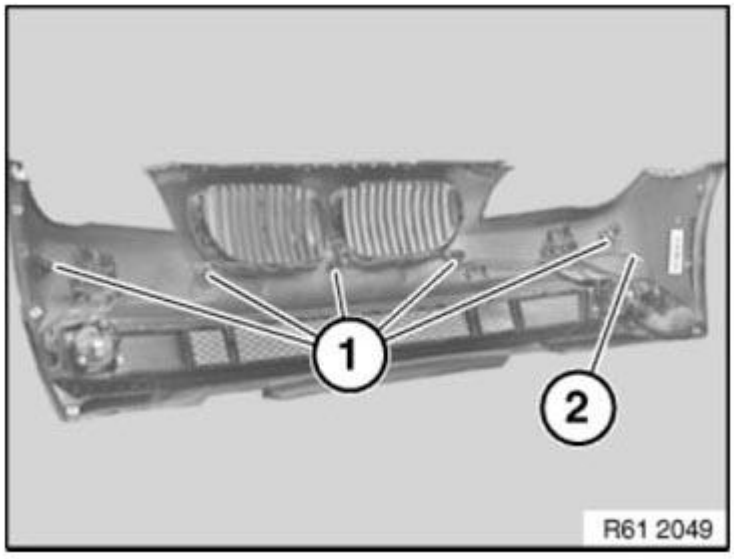


Fig. 26: Identifying Ultrasonic Transducer Plug Connections And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 200 REPLACING WIRING HARNESS IN LEFT OR RIGHT FRONT DOOR

IMPORTANT: Read and comply with notes on HANDLING WIRING HARNESSES and cables.

Necessary preliminary work

- Close front side window completely
- Disconnect **BATTERY CABLE**
- Remove **SOUND INSULATION IN FRONT DOOR**
- Remove **LEFT-HAND OUTER DOOR HANDLE ON FRONT DOOR** .

Unlock plug connections (1) and disconnect.

If necessary, unlock and disconnect Soft Close plug connection.

Unclip door wiring harness (2) at points (3).

Feed out door wiring harness (2).

Installation note:

Make sure door wiring harness (2) is correctly laid.

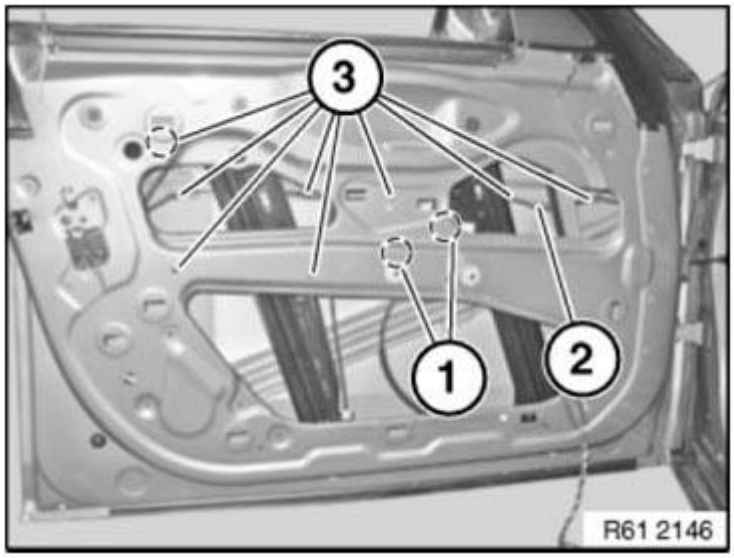


Fig. 27: Identifying Plug Connections And Points Of Door Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Front side wall shown removed for purposes of clarity.

Release screw (1), fold door wiring harness connector on A-pillar (2) downwards slightly and remove.

Unlock plug connection behind and disconnect.

Pull rubber grommet (3) in direction of arrow out of front door (4).

Feed out door wiring harness towards front to A-pillar and remove.

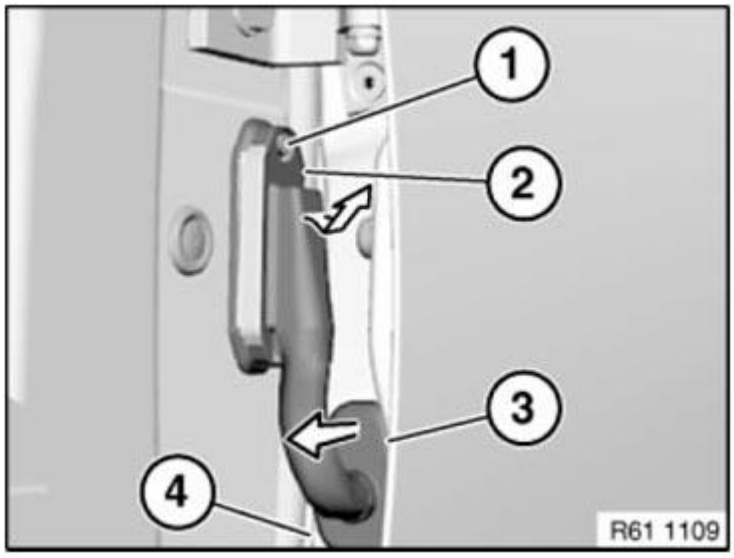


Fig. 28: Pulling Rubber Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... UNLOCKING AND DISCONNECTING DIFFERENT PLUG CONNECTIONS

NOTE: Examples of unlocking and disconnecting different plug connections.

Press lock and open clamp in direction of arrow.

Disconnect plug connection.

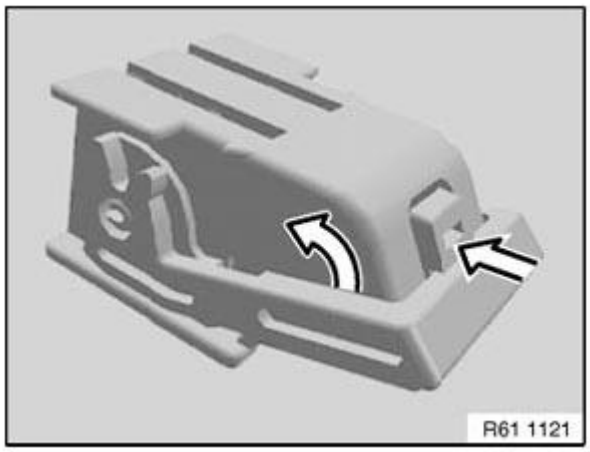


Fig. 29: Disconnecting Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and open clamp in direction of arrow.

Disconnect plug connection.

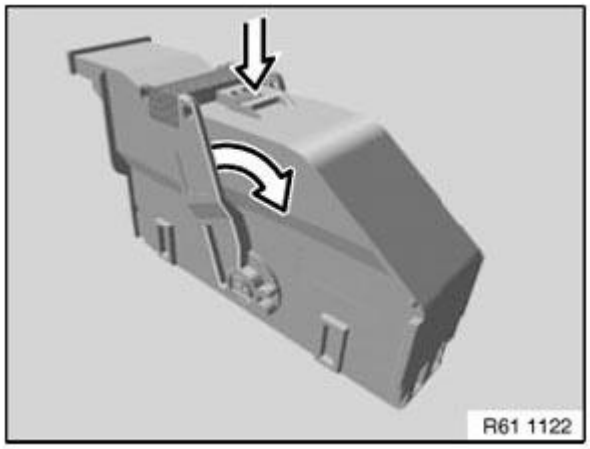


Fig. 30: Pressing Lock And Open Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Open clip in direction of arrow and disconnect plug connection in direction of arrow.

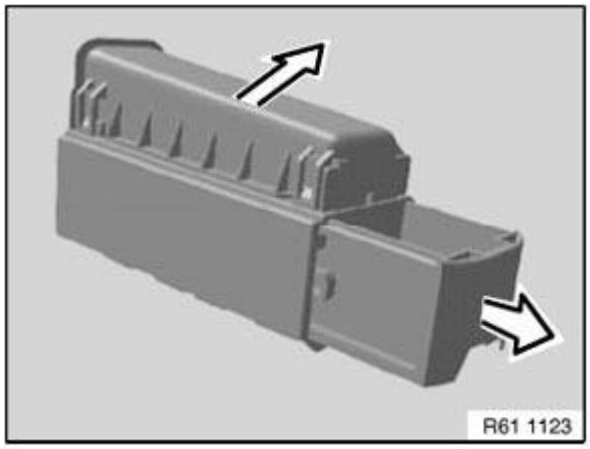


Fig. 31: Disconnecting Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

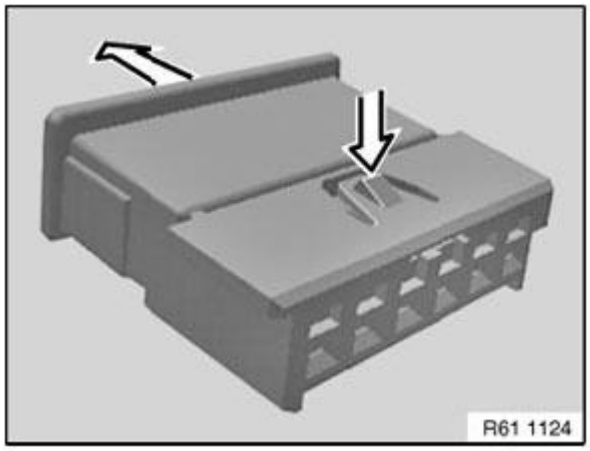


Fig. 32: Pressing Lock And Disconnect Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

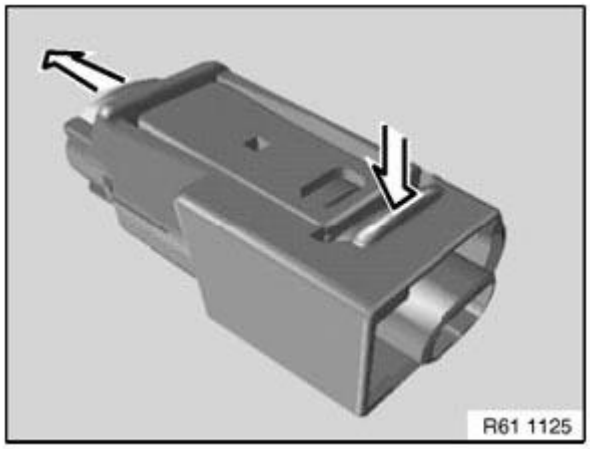


Fig. 33: Pressing Lock And Disconnect Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

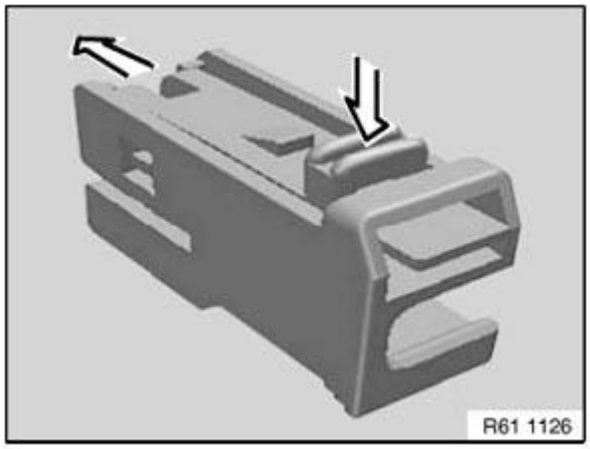


Fig. 34: Pressing Lock And Disconnect Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

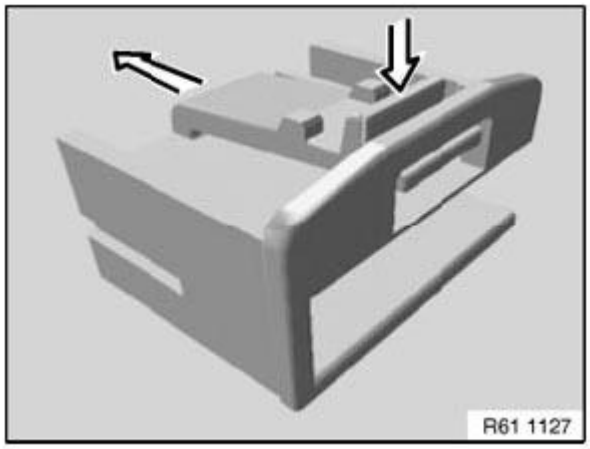


Fig. 35: Pressing Lock And Disconnect Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

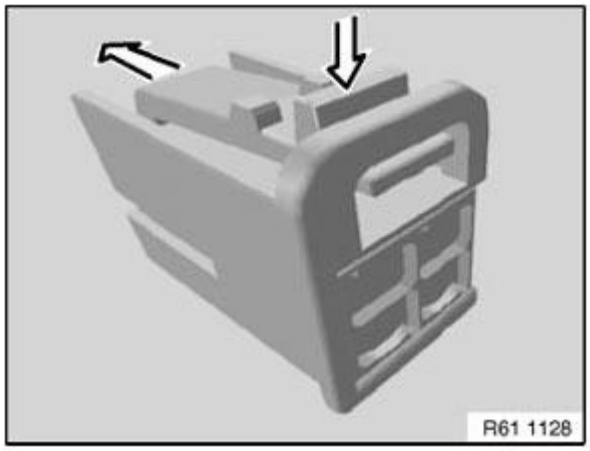


Fig. 36: Pressing Lock And Disconnect Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock and disconnect plug connection in direction of arrow.

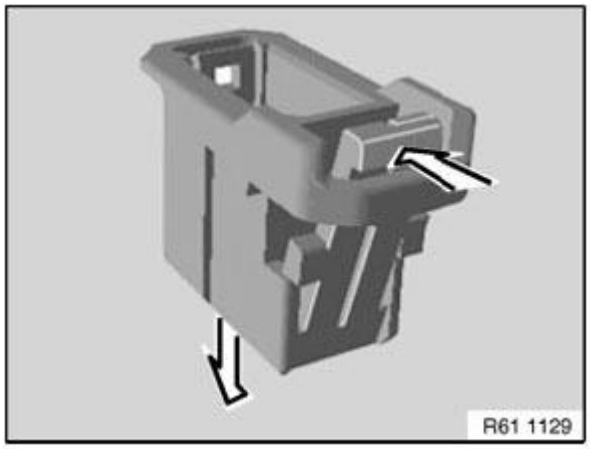


Fig. 37: Pressing Lock And Disconnect Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press the lock and detach plug connection.

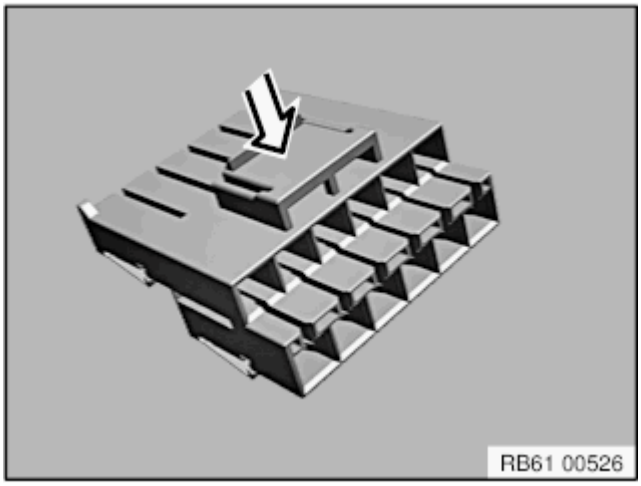


Fig. 38: Pressing Lock And Detaching Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press the lock and detach plug connection.

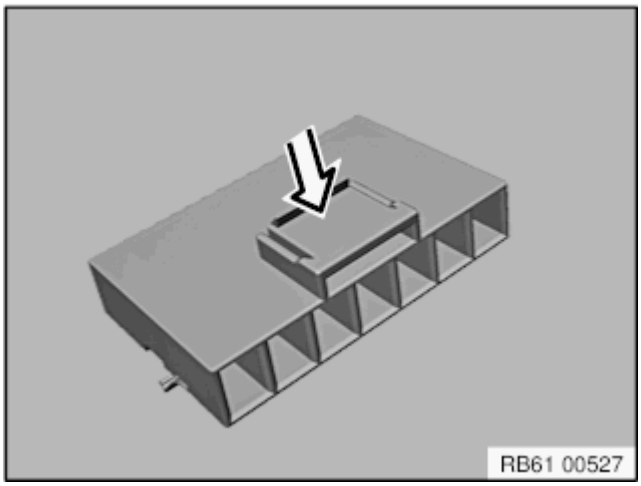


Fig. 39: Pressing Lock And Detaching Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press the lock on both sides and detach plug connection.

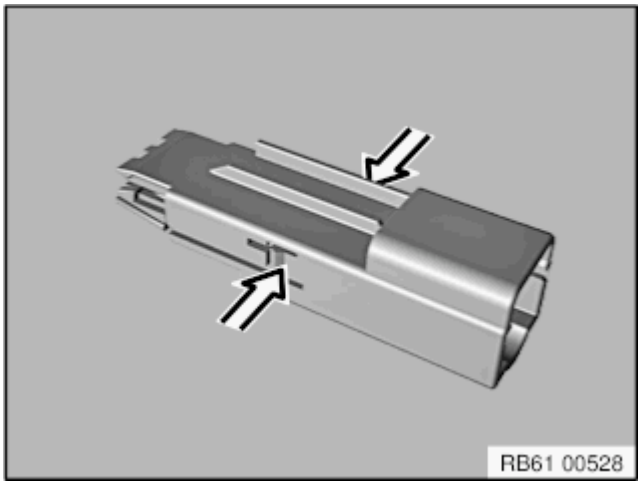


Fig. 40: Pressing Lock And Detaching Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press the lock and detach plug connection.

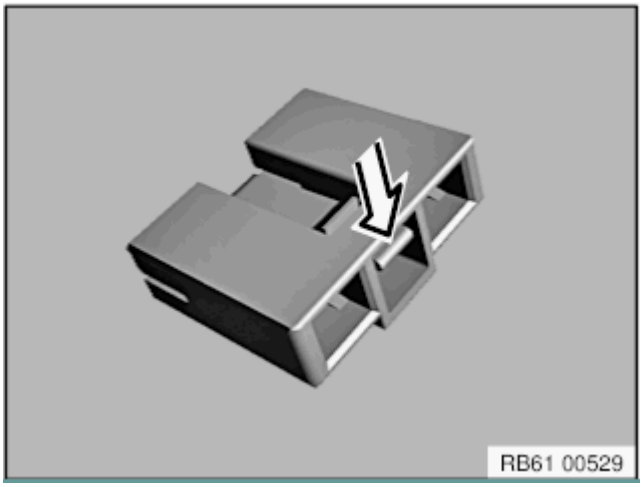


Fig. 41: Pressing Lock And Detaching Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

6113 PLUG CONNECTION, TERMINAL, FUSE BOX

61 13... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

Notes

IMPORTANT:

1. **Identify cause of damage (e.g. sharp-edged body parts, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).**
2. **Read out fault memory**
3. **Eliminate cause of damage.**

4. **Disconnect battery negative terminal**
5. **Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced.**

   Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Service)

6. **Carry out function test and read out fault memories again**
7. **Eliminate new faults if applicable and clear fault memories**

NOTE: The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Service.

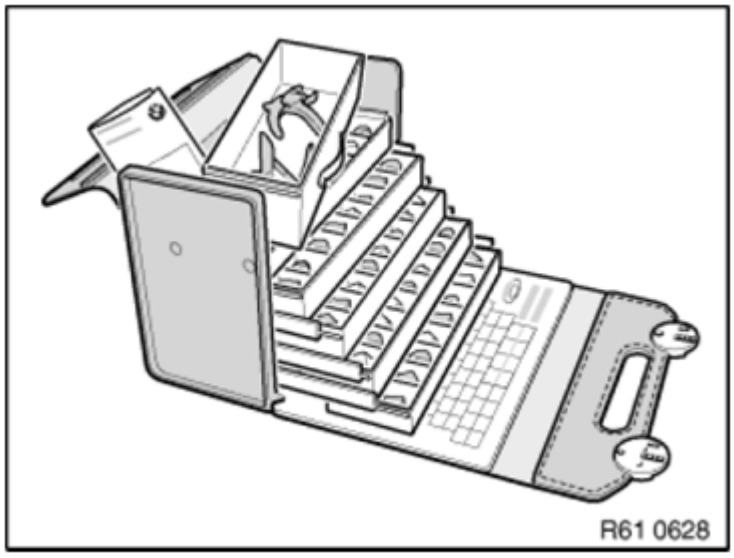


Fig. 42: Identifying Special Tools For Vehicle Electrical System Repairing
Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular plug system D 2.5.

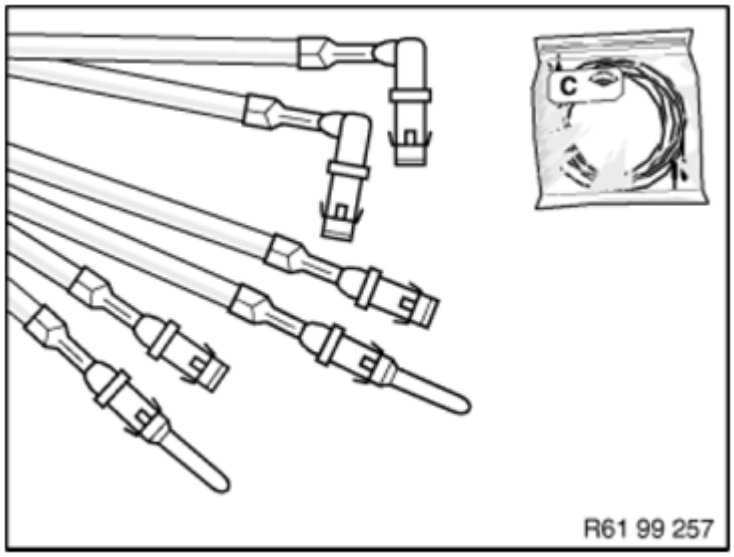


Fig. 43: Identifying Circular Plug System D 2.5
Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts:

1. Pre-packaged end of cable with requisite wire cross-section
2. Crimp connector for selected wire cross-section
3. Shrink-fit hose

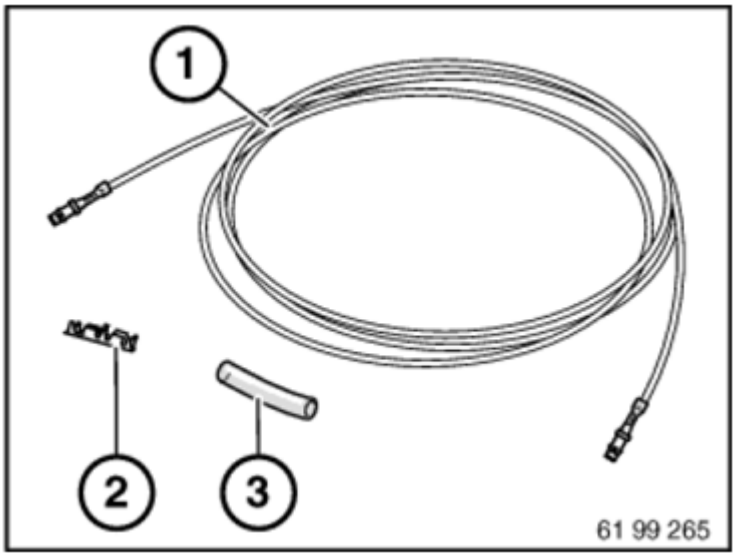


Fig. 44: Identifying Cables, Connectors And Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool kit **61 0 300**).

See repair instructions

INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS of different plug contact systems.

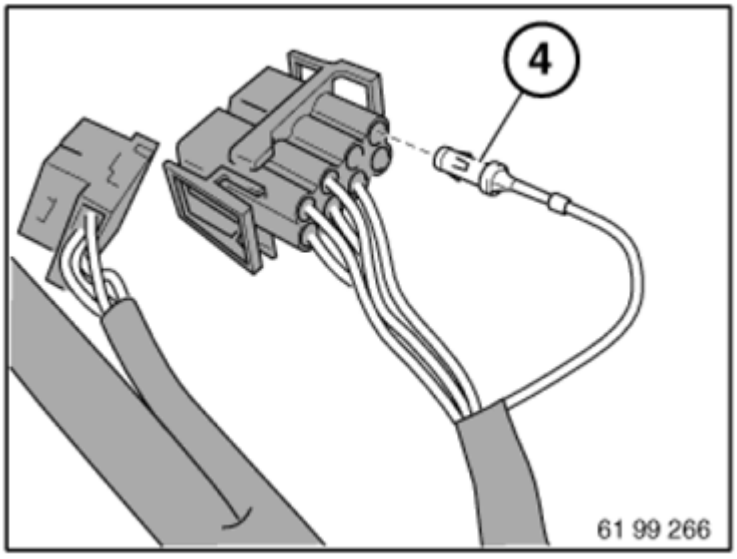


Fig. 45: Identifying Damage Cable With Socket Number
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Check maximum length of repair cable**
- **If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.**

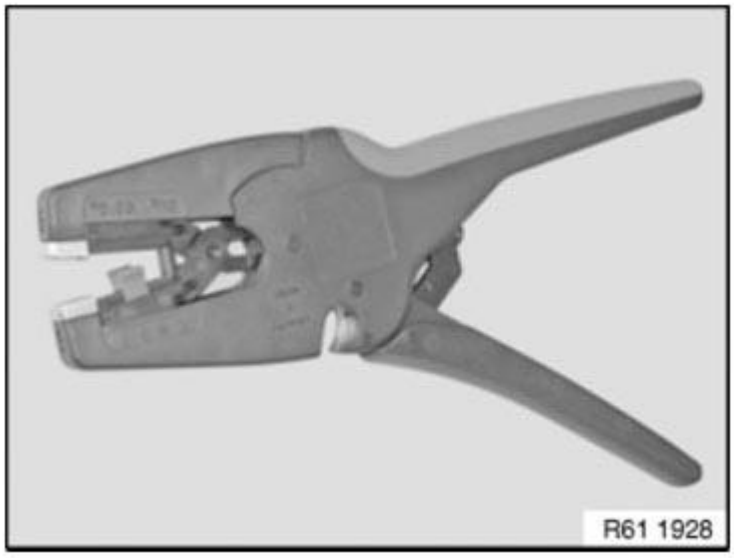


Fig. 46: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut pre-assembled wire end to length and strip insulation

Refer also to repair instruction:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

Crimp butt connector on pre-assembled wire end.

Special tools:

- 61 4 328 (0.35 - 2.5 mm^2
- **61 0 240** (4.0 - 6.0 mm^2

See repair instructions

CRIMPING ON STOP PARTS

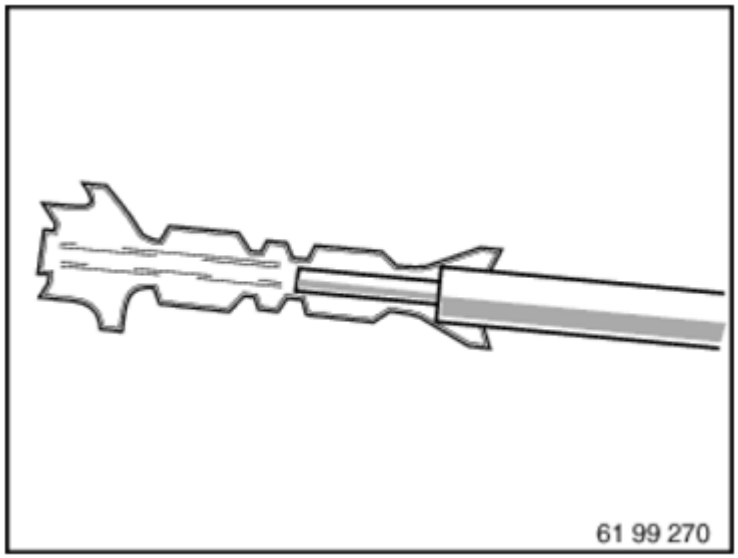


Fig. 47: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (8) onto free wire end.

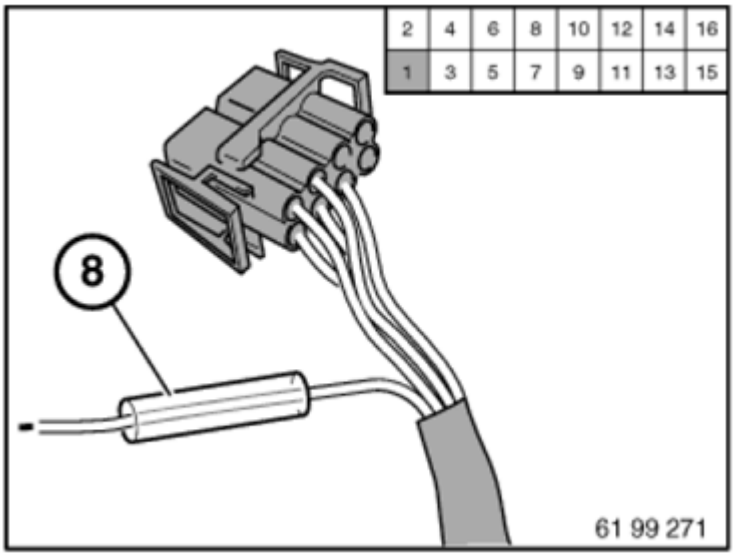


Fig. 48: Identifying Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.

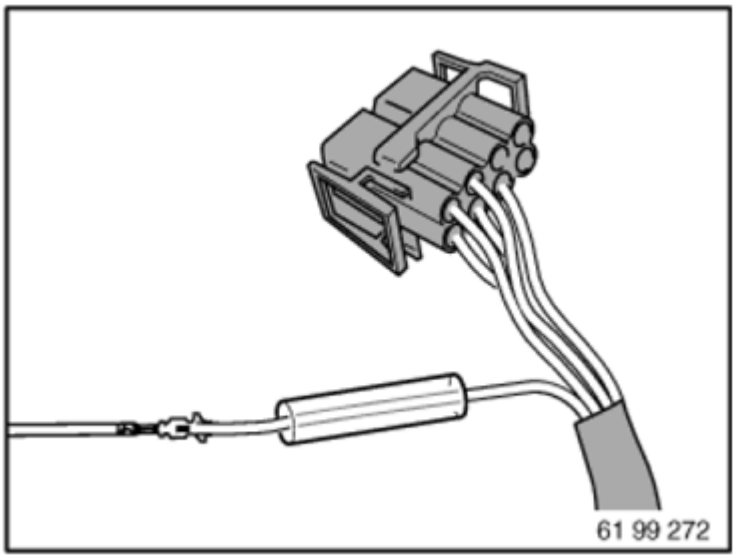


Fig. 49: Identifying Crimping Of Unused Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

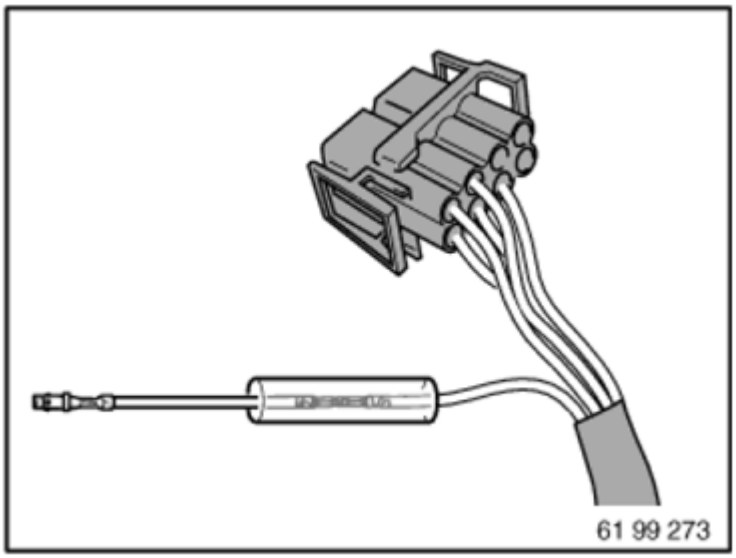


Fig. 50: Identifying Shrink-On Sleeve Over Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

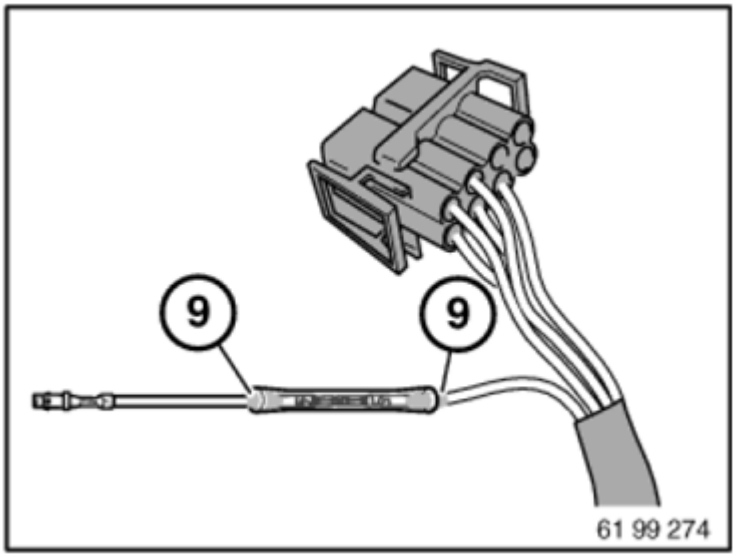


Fig. 51: Identifying Shrink On Shrink-On Sleeve Ends
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CIRCULAR CONNECTOR, 7-PIN, 8-PIN, SYSTEM D2.5

Notes

Carefully pull off rubber grommet (1).

Carefully press back retaining lugs (2) of internal connector (3).

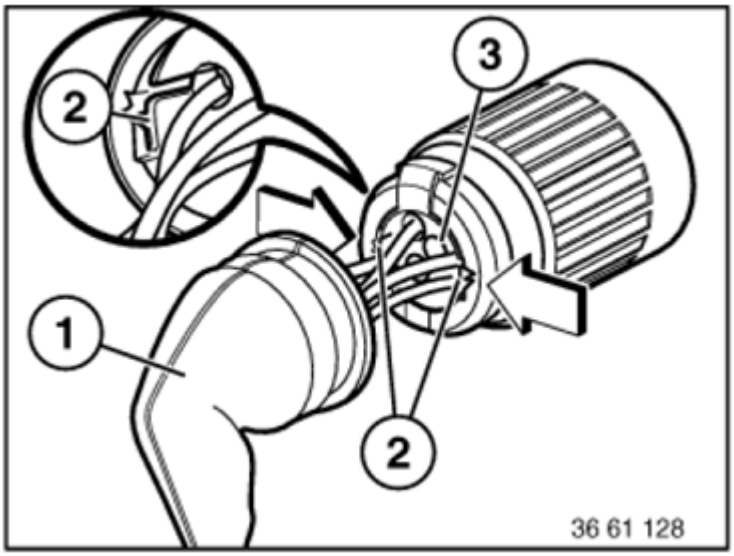


Fig. 52: Pressing Back Retaining Lugs Of Internal Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Slide internal connector (3) in direction of arrow until retaining lugs (2) lock into locking groove (4).

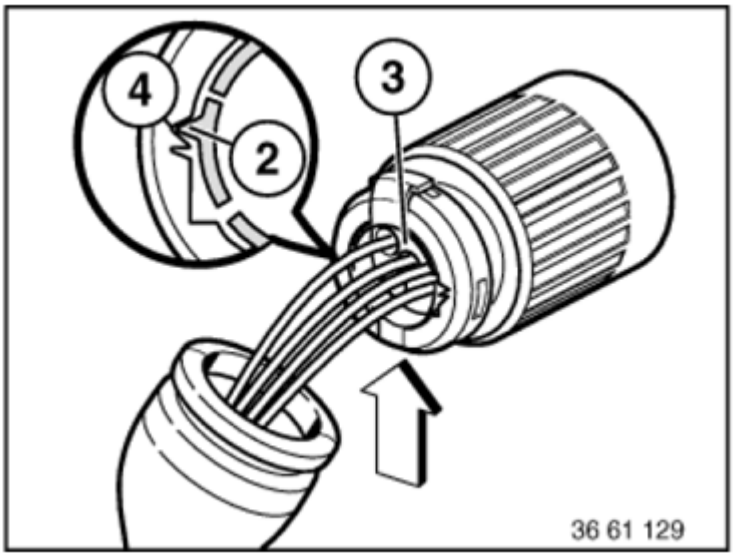


Fig. 53: Sliding Internal Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Use special tool **61 0 303** (61 1 132) to press back retaining hook (5) of corresponding contact and pull out cable with contact.

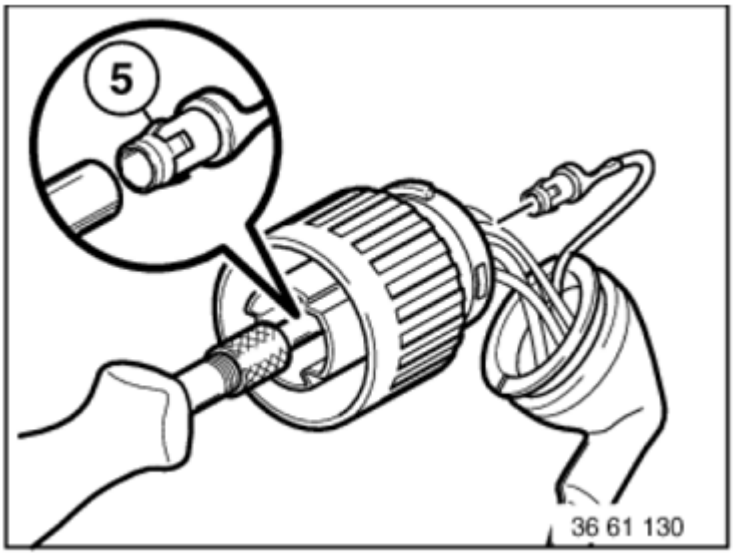


Fig. 54: Pressing Back Retaining Hook Using Special Tool (61 0 303)
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CIRCULAR CONNECTOR, 13-PIN, SYSTEM D2.5

Notes

Pull off rubber grommet (1).

Carefully pull out lock (2) in direction of arrow.

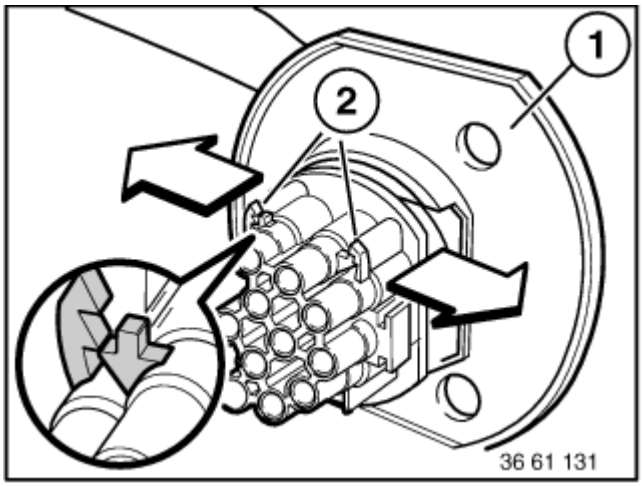


Fig. 55: Identifying Lock And Rubber Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

Move lower section of connector (3) in direction of arrow until retaining lugs (4) snap into release groove (5).

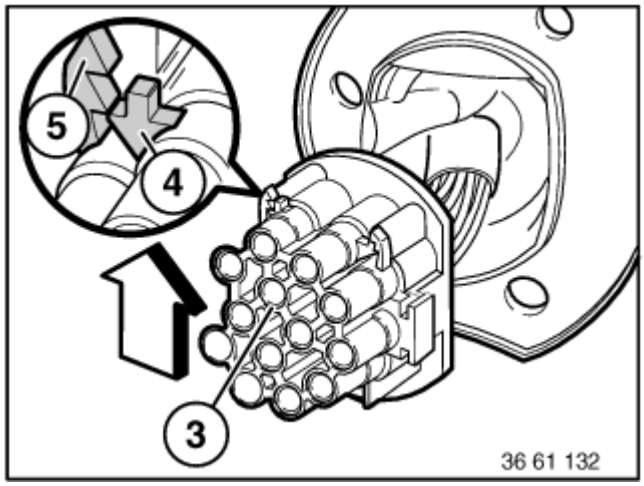


Fig. 56: Identifying Connector, Retaining Lugs, And Locking Groove
Courtesy of BMW OF NORTH AMERICA, INC.

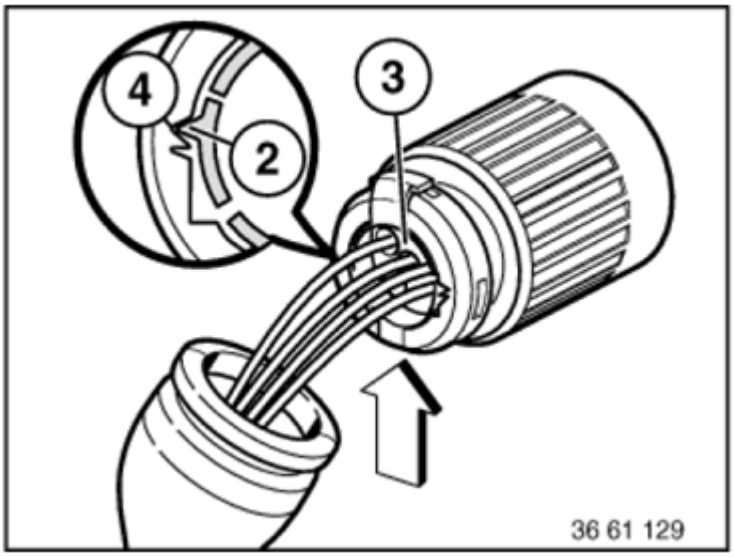


Fig. 57: Sliding Internal Connector
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool **61 0 303** , press down retaining lugs (6) of corresponding contact and pull out cable.

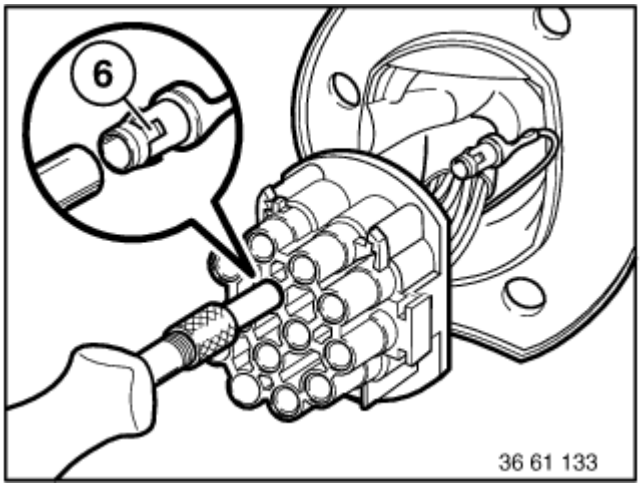


Fig. 58: Identifying Retaining Hook And Special Tool 61 1 132
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CIRCULAR CONNECTOR, 20-PIN, SYSTEM D2.5

Notes

Carefully press back retaining lugs (1) of internal connector (2).

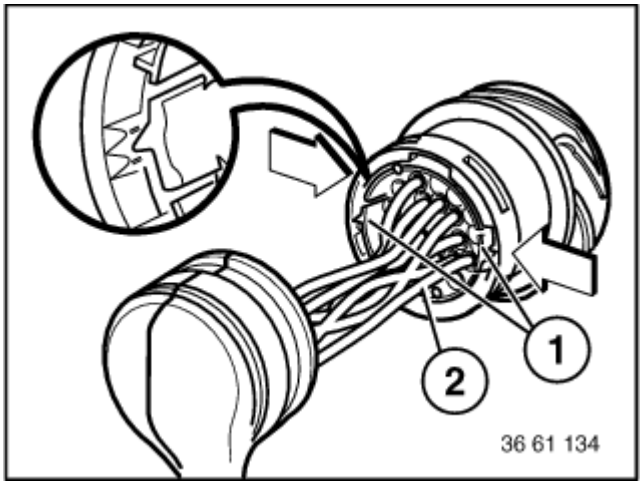


Fig. 59: Identifying Retaining Lugs And Internal Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Turn internal connector (2) until retaining lugs (1) snap into release groove (3).

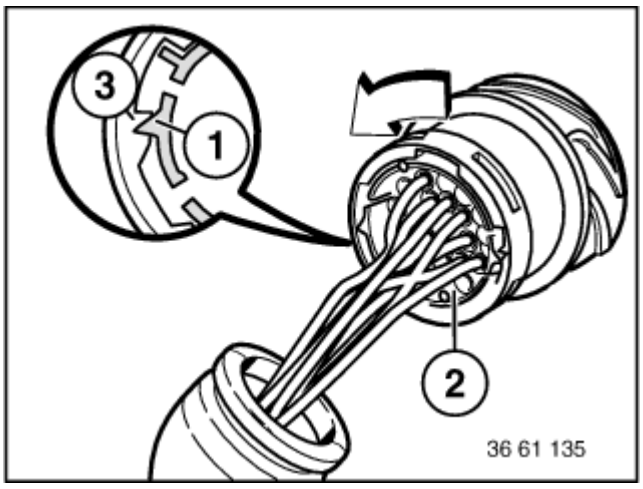


Fig. 60: Identifying Retaining Lugs And Locking Groove
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool **61 0 303** , press down retaining hook (4) of corresponding contact and pull out cable.

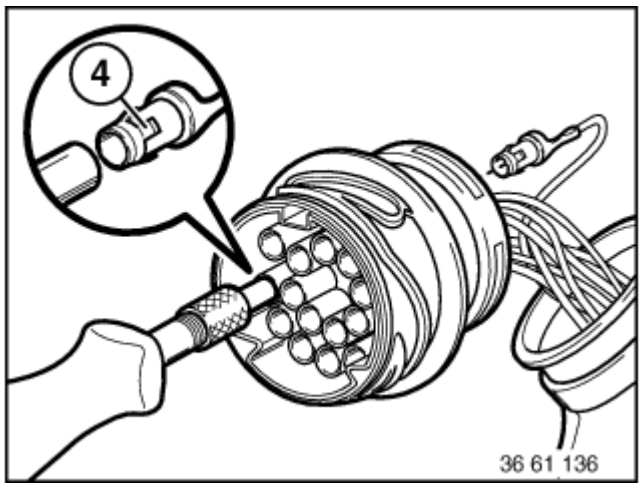


Fig. 61: Identifying Arrester Hook And Special Tool 61 1 132
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CIRCULAR CONNECTORS, 4-, 7-, 10- 12-, 25-PIN, SYSTEM D1.5/D2.5

Notes

Insert special tool with suitable connection side in connector and twist approx. 3° counter-clockwise.

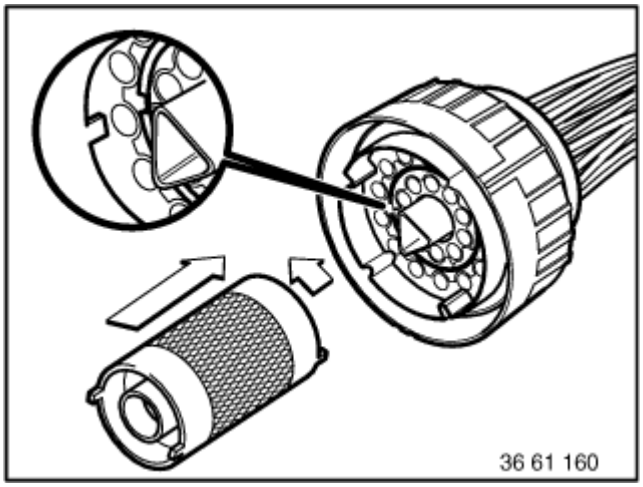


Fig. 62: Using Special Tool To Unlock Connector
Courtesy of BMW OF NORTH AMERICA, INC.

The connector is locked down if retaining lug (3) is located in locking groove (2).

1. Unlocking groove
2. Locking groove
3. Retaining lug

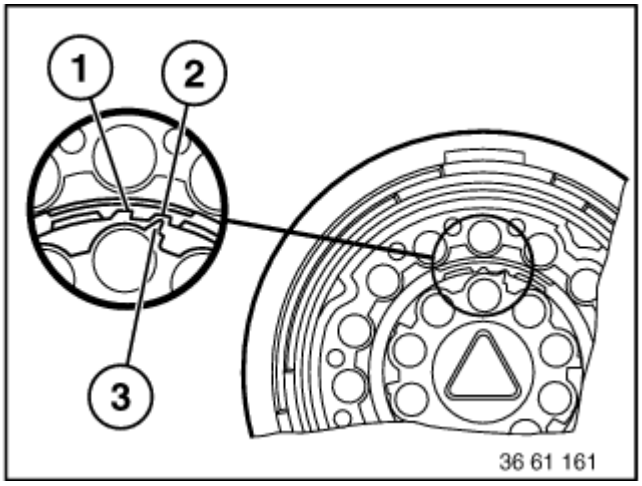


Fig. 63: Identifying Unlocking Groove, Locking Groove, And Detent Lug
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool **61 0 303** , press down retaining hook (4) of corresponding contact and pull out cable.

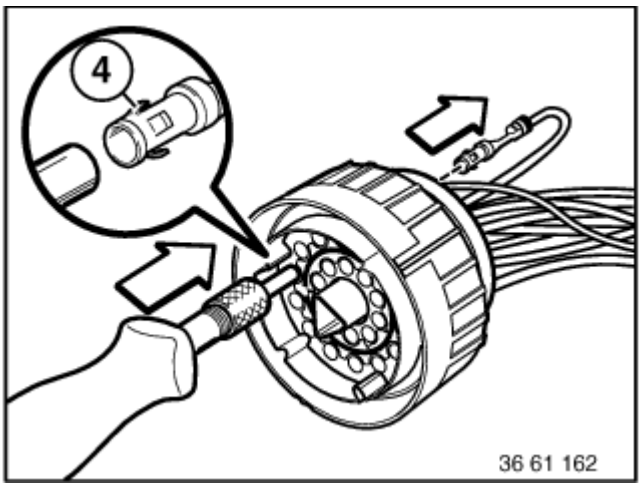


Fig. 64: Identifying Arrester Hook And Special Tool 61 1 132
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... INLINE CONNECTORS, 15-PIN, SYSTEM D2.5

Notes

Carefully pull external connector (1) in area of retaining lugs (2) apart slightly.

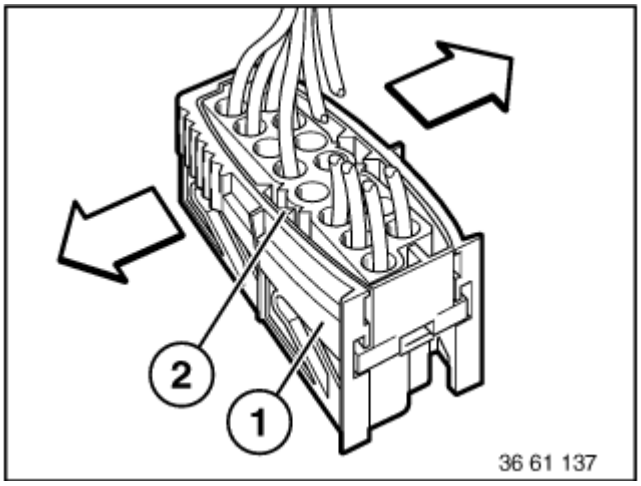


Fig. 65: Identifying External Connector And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Pull internal connector (3) until limit position in direction of arrow.

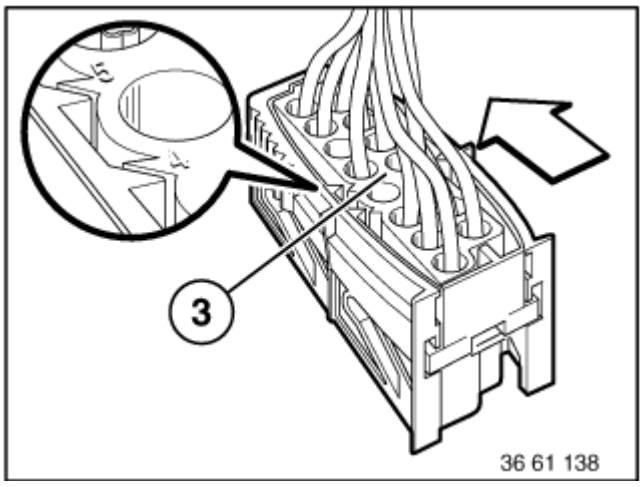


Fig. 66: Pulling Internal Connector In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool **61 0 303** , press down retaining hook (4) of corresponding contact and pull out cable with contact.

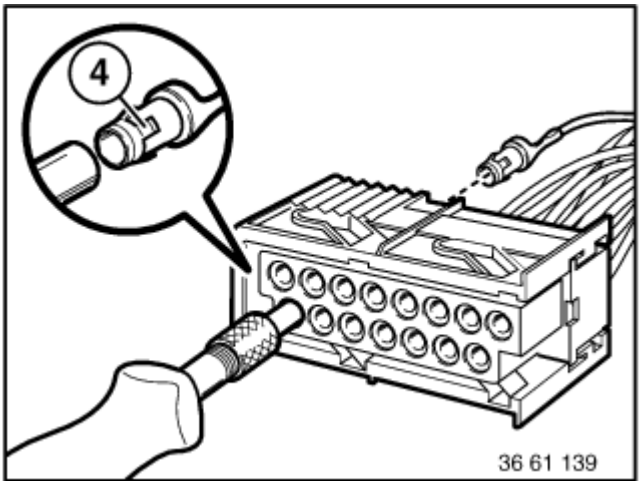


Fig. 67: Identifying Arrester Hook And Special Tool 61 1 132
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... INLINE PLUGS, 8-, 12-PIN, SYSTEM D2.5

Notes

Move upper section of connector (1) and lower section of connector (2) against each other in direction of arrow.

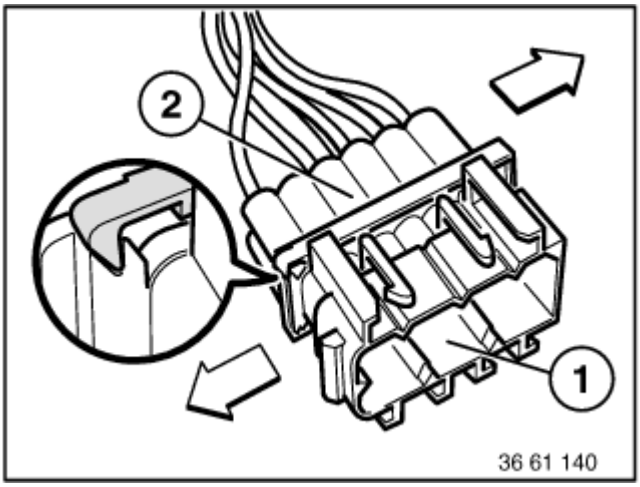


Fig. 68: Identifying Upper And Lower Connector Sections
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool **61 0 303** , press back retaining hook (3) of corresponding contact and pull out cable with contact.

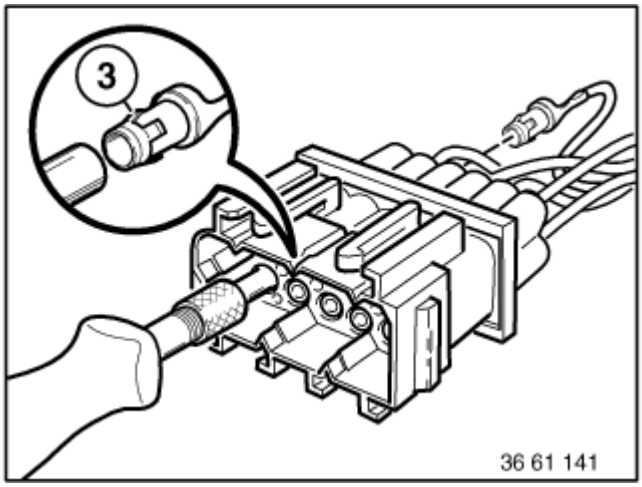


Fig. 69: Identifying Arrester Hook And Special Tool 61 1 132
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE CONNECTORS, 30-PIN, SYSTEM D2.5

Notes

Carefully pull external connector (1) in area of retaining lugs (2) apart slightly.

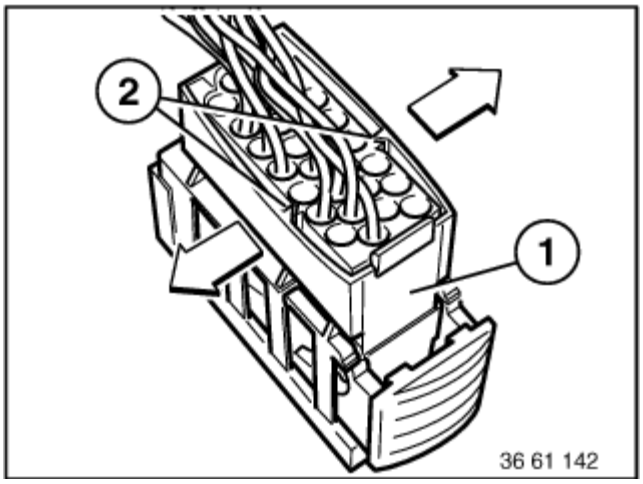


Fig. 70: Identifying External Connector And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Pull internal connector (3) until limit position in direction of arrow.

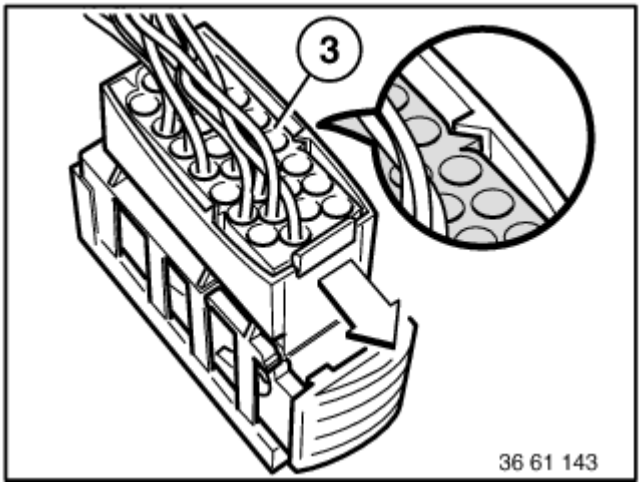


Fig. 71: Pulling Internal Connector In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool **61 0 303** , press down retaining hook (4) of corresponding contact and pull out cable with contact.

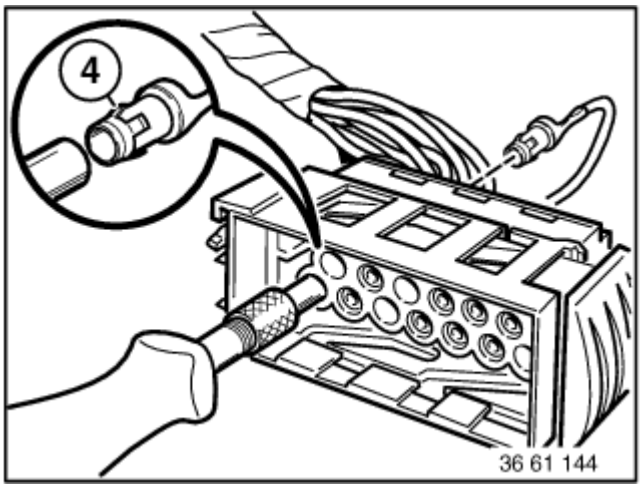


Fig. 72: Identifying Arrester Hook And Special Tool 61 1 132
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE PLUGS, 20-PIN, SYSTEM D2.5

Notes

Pull locking slide (1) out of connector (2).

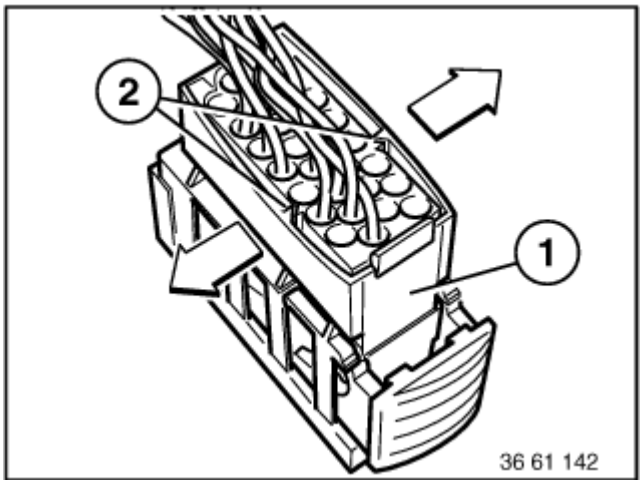


Fig. 73: Identifying External Connector And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool **61 0 303** press back retaining hook (3) of corresponding contact and pull out cable with contact.

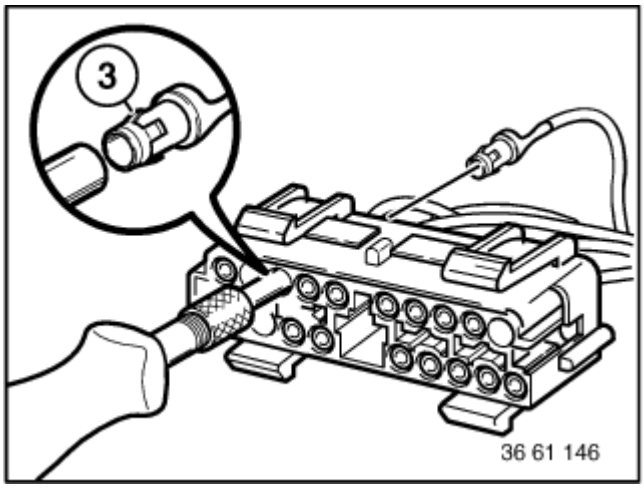


Fig. 74: Identifying Arrester Hook And Special Tool 61 1 132
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE PLUGS, 2-PIN, SYSTEM JPT ELA

Notes

Press lock (1) in direction of arrow and slide connector forward.

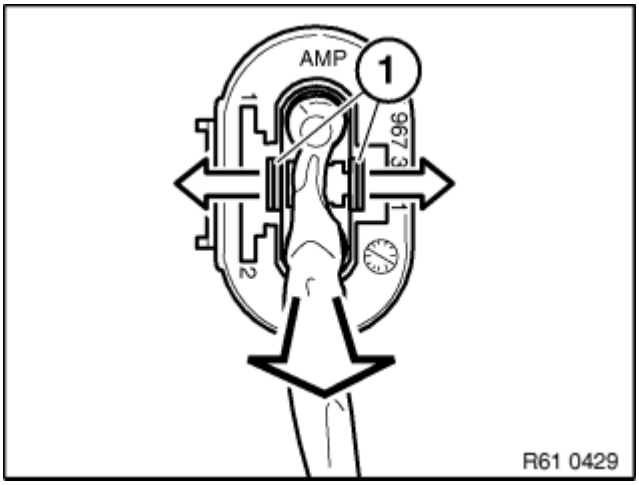


Fig. 75: Locating Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock (1) downward and slide out to one side.

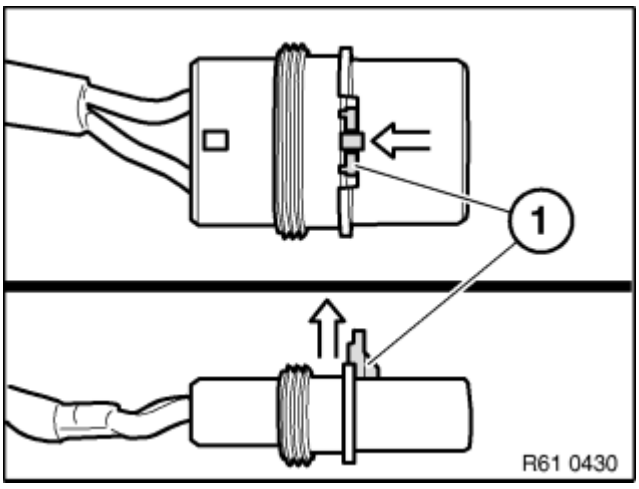


Fig. 76: Locating Lock
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool **61 0 316** (61 1 136), unlock contact and pull out cable (1) with contact towards rear.

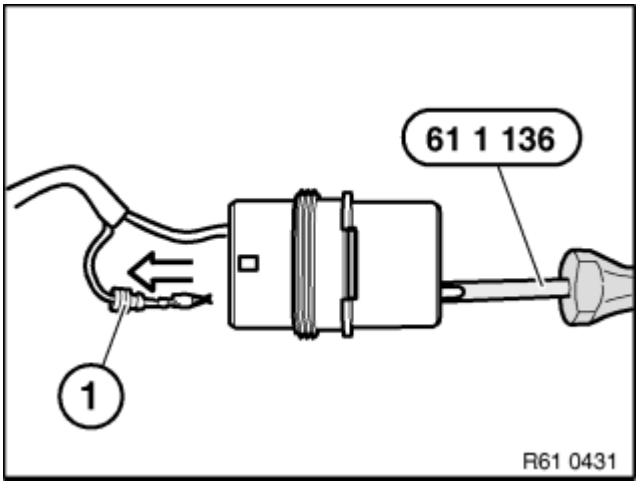


Fig. 77: Removing Cable Using Special Tool 61 1 132
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE CONNECTORS, 2-PIN, SYSTEM MDK 3PLUS 2.8

Notes

Unlock lock (1) on outside at retaining hook and slide out lock (1) to side.

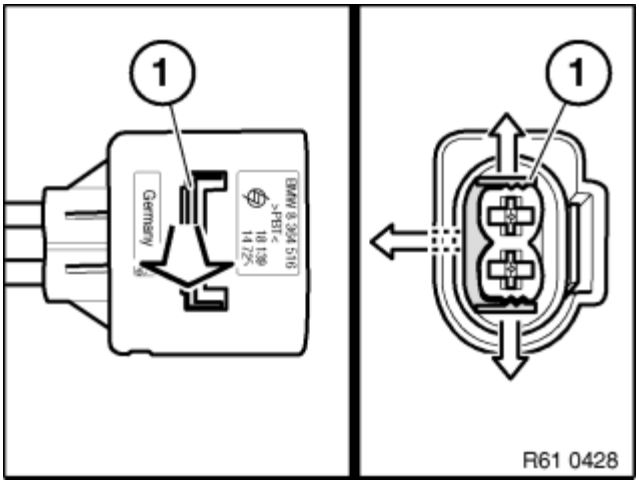


Fig. 78: Locating Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock (1) downward and slide out to one side.

With special tool **61 0 316** (61 1 136), unlock contact and pull out cable with contact (1) towards rear.

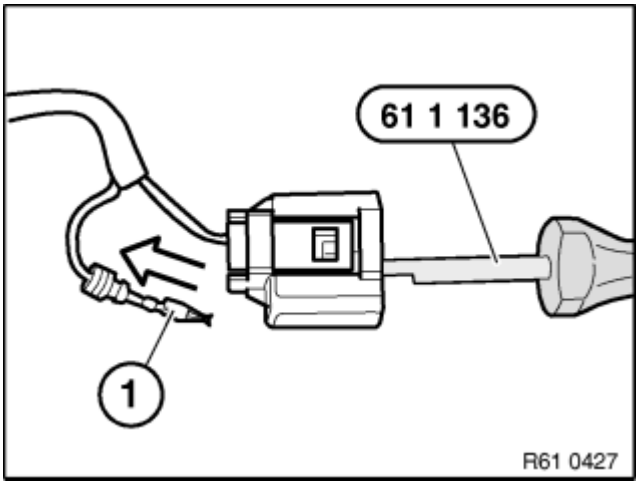


Fig. 79: Removing Cable Using Special Tool 61 1 132
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE PLUGS, 4-PIN, SYSTEM DFK ELA

Notes

Press retaining hook in direction of arrow and remove lock (1).

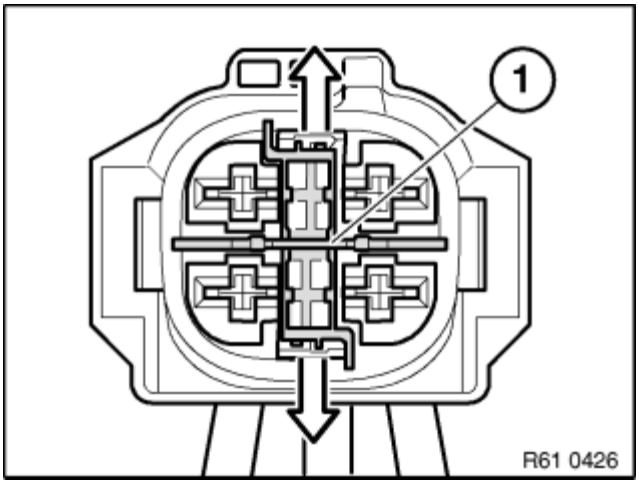


Fig. 80: Pressing Arrester Hook In Direction Of Arrow To Remove Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Installation notes:

If necessary, side lock must also be unlocked with screwdriver.

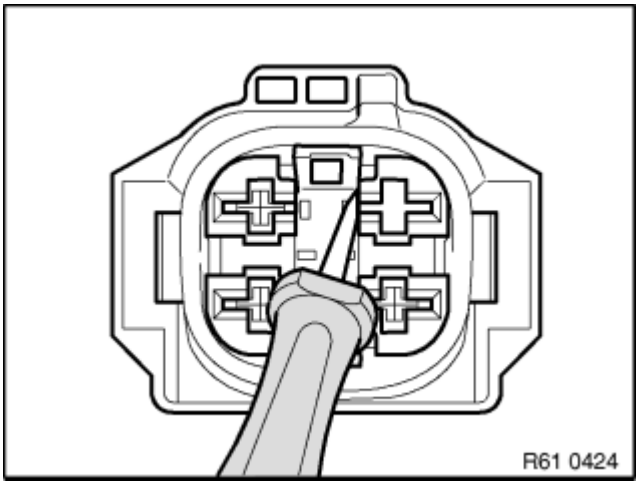


Fig. 81: Using Screwdriver To Unlock Side Lock
Courtesy of BMW OF NORTH AMERICA, INC.

With special tool **61 0 316** (61 1 136), unlock contact and pull out cable (1) with contact towards rear.

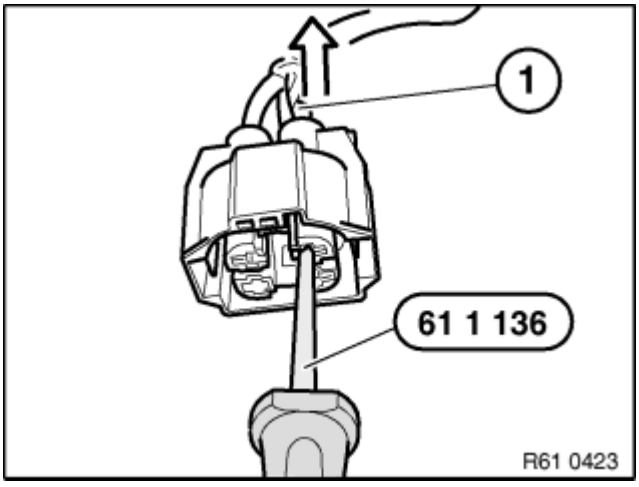


Fig. 82: Removing Cable Using Special Tool 61 1 132
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... INLINE PLUGS, 4-, 10-PIN, SYSTEM ELO

Notes

Detach fastener (1) from contact carrier (2).

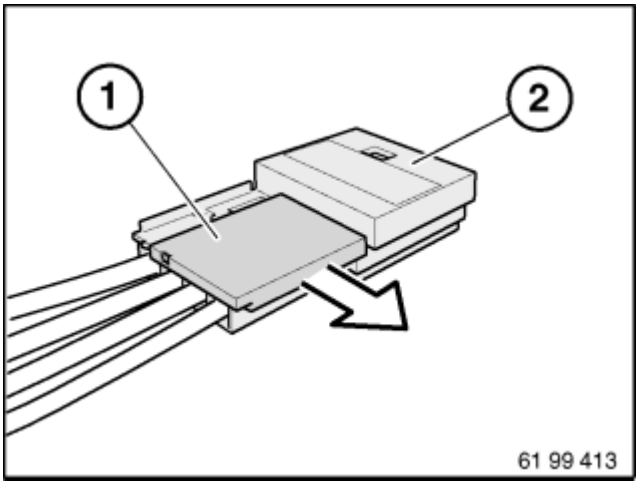


Fig. 83: Identifying Connector And Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook (3) of defective contact and pull cable and contact up to secondary lock (6).

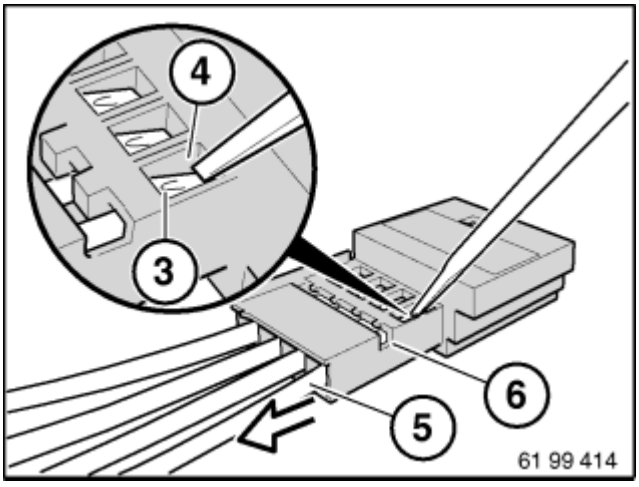


Fig. 84: Identifying Arrester Hook And Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook once again in secondary lock and pull cable and contact completely out of contact carrier.

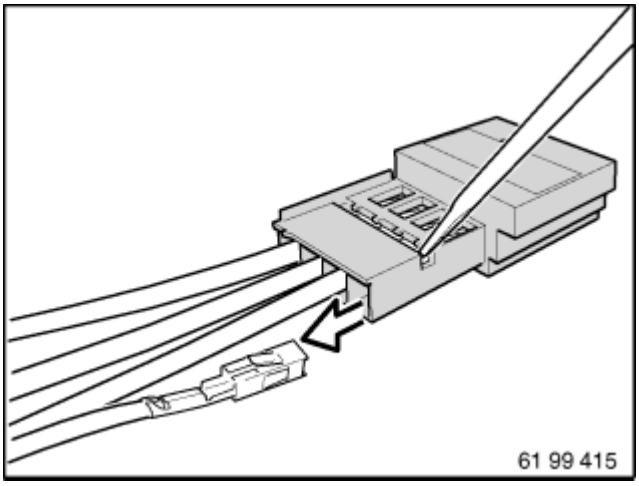


Fig. 85: Pulling Cable And Contact Out From Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE PLUGS, 6- TO 50-PIN, SYSTEM ELO

Notes

Open lock.

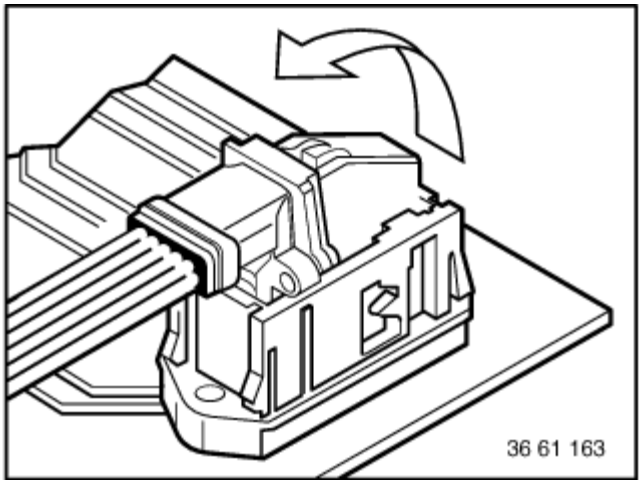


Fig. 86: Unlocking Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Detach cable strap.

Installation note:

Cable strap must be reinstalled.

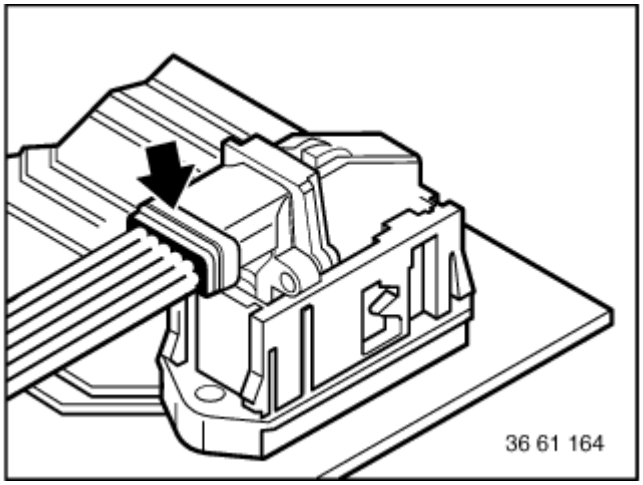


Fig. 87: Unfastening Cable Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Detach catch (1) from connector housing (2).

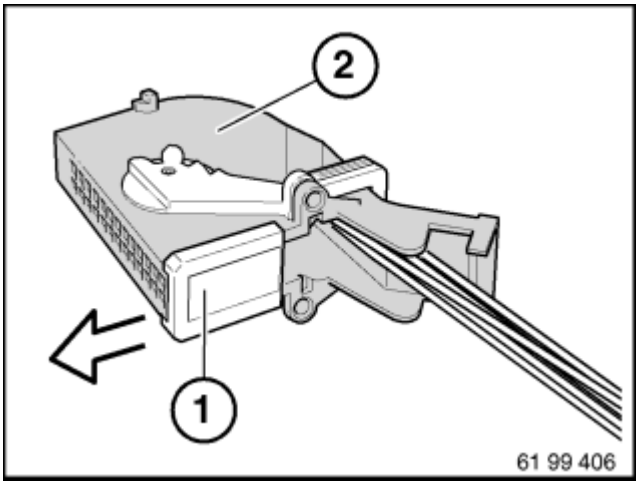


Fig. 88: Identifying Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Press out contact carrier (3) with wiring harness (4) through opening (5).

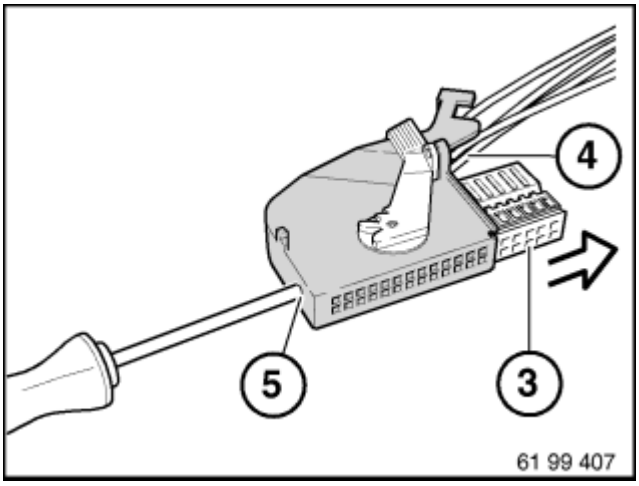


Fig. 89: Identifying Contact Carrier, Wiring Harness, And Opening
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook (6) of defective contact and pull cable and contact up to secondary lock (8).

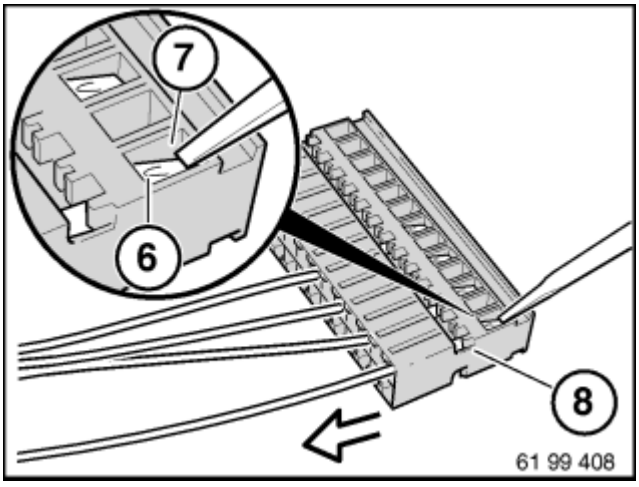


Fig. 90: Identifying Arrester Hook And Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook once again in secondary lock (8) and pull cable and contact completely out of contact carrier.

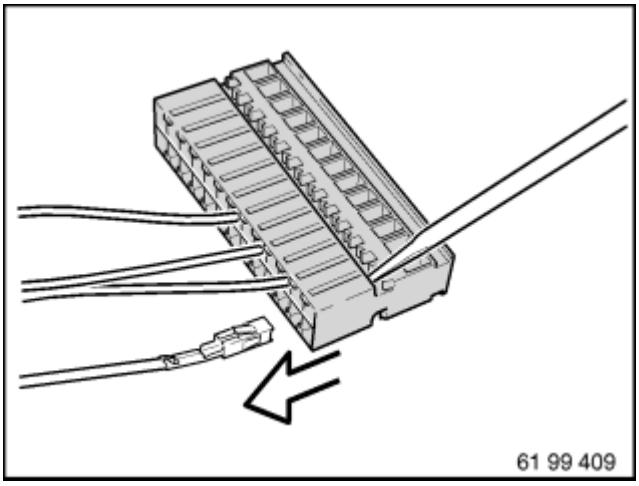


Fig. 91: Pulling Cable And Contact Out From Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE CONNECTORS, 3-, 6-PIN, SYSTEM ELO-POWER 2.8

Notes

Press locking hook (1) in direction of arrow and disengage. Then unlock locking hook (2) and remove lock.

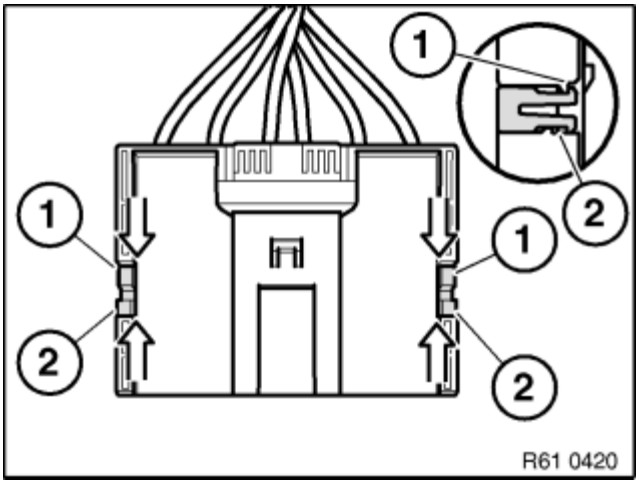


Fig. 92: Identifying Locking Hook
Courtesy of BMW OF NORTH AMERICA, INC.

Press down retaining hook with screwdriver (1) and pull out cable with contact towards rear.

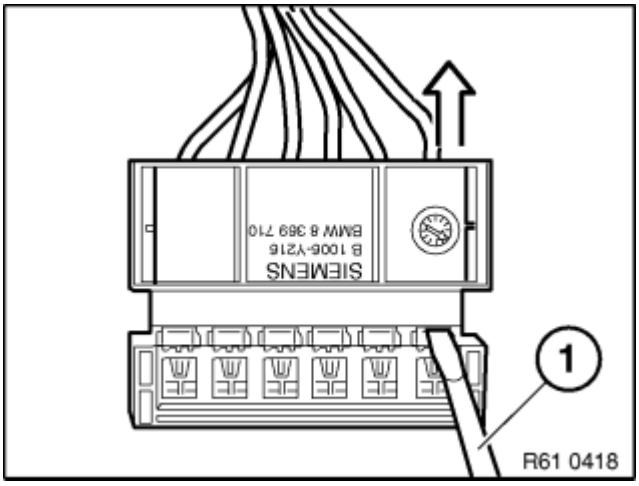


Fig. 93: Pressing Down Arrester Hook With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... INLINE CONNECTORS, 6-, 8-PIN, SYSTEM MQS

Notes

Press lock (1) in direction of arrow and slide connector forward.

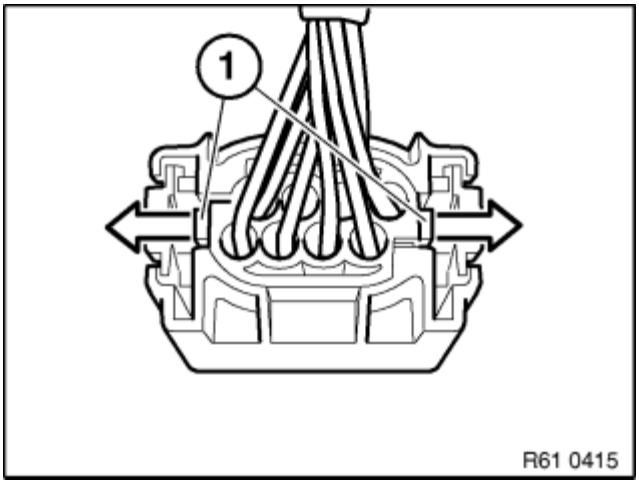


Fig. 94: Identifying Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking hook (2) downward and slide lock (1) out.

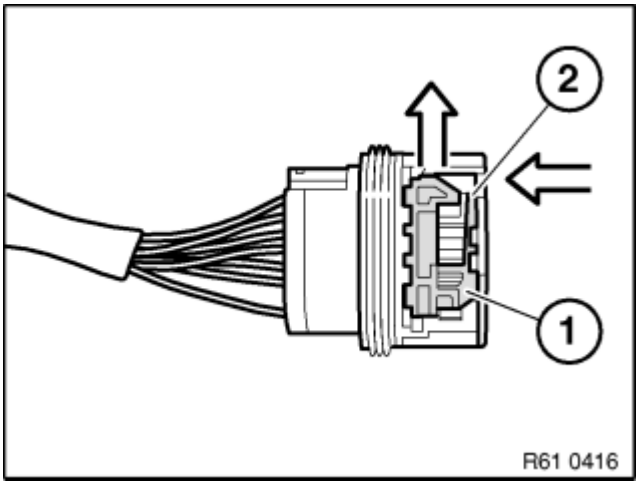


Fig. 95: Identifying Locking Hook And Slide Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Press down retaining hook (1) with screwdriver and pull out cable with contact towards rear.

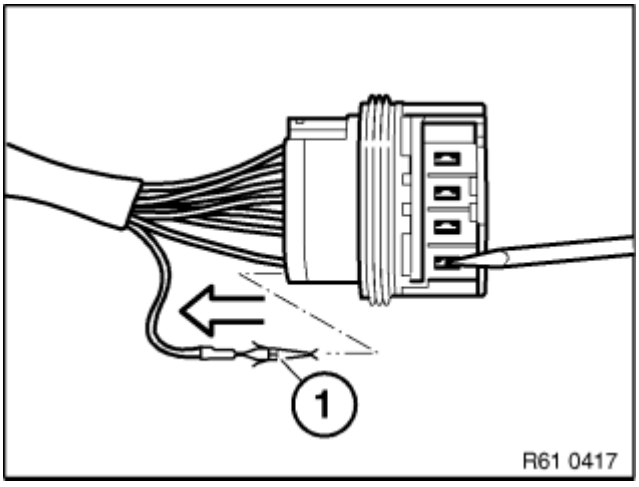


Fig. 96: Pressing Down Arrester Hook With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... INLINE PLUGS, 2-PIN, SYSTEM MPQ 2.8

Notes

Press grid on outside in direction of arrow and remove towards top.

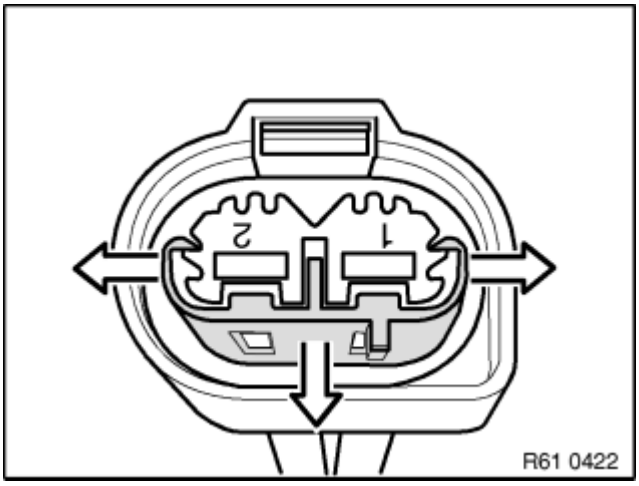


Fig. 97: Identifying Catch
Courtesy of BMW OF NORTH AMERICA, INC.

Press down retaining hook (1) with screwdriver and pull out cable and contact (2) towards rear.

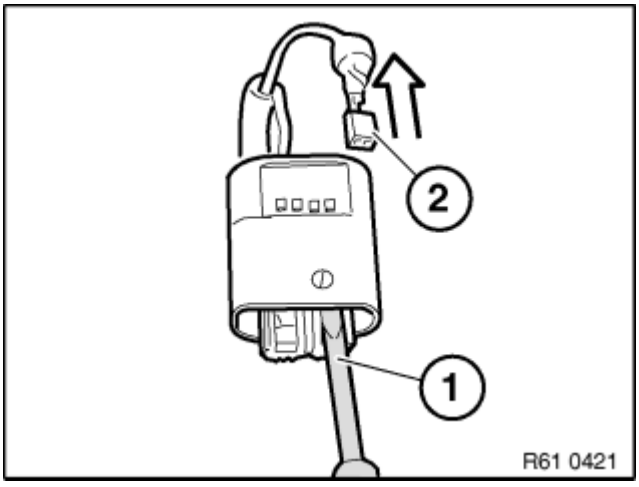


Fig. 98: Identifying Arrester Hook And Cable
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE PLUGS, 24-PIN, HYBRID SYSTEM MQS/MPQ

Notes

Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Socket housing:

Press locks (1) on protective cap (2) upwards on both sides.

Detach protective cap from contact carrier (3).

NOTE: Detaching the protective cap releases the secondary locks of the socket contacts.

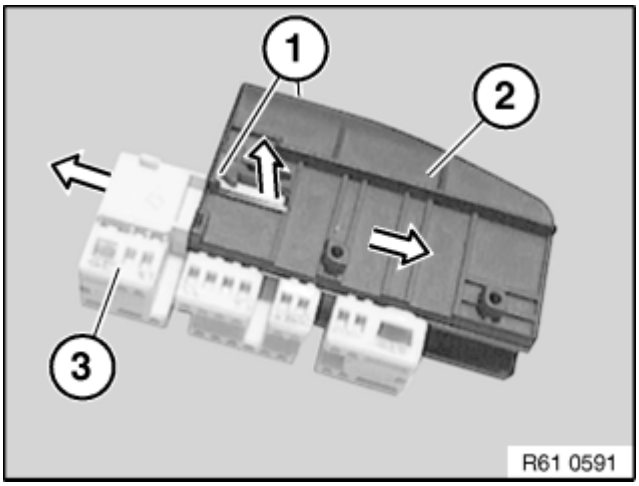


Fig. 99: Identifying Locks, Cap, And Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).

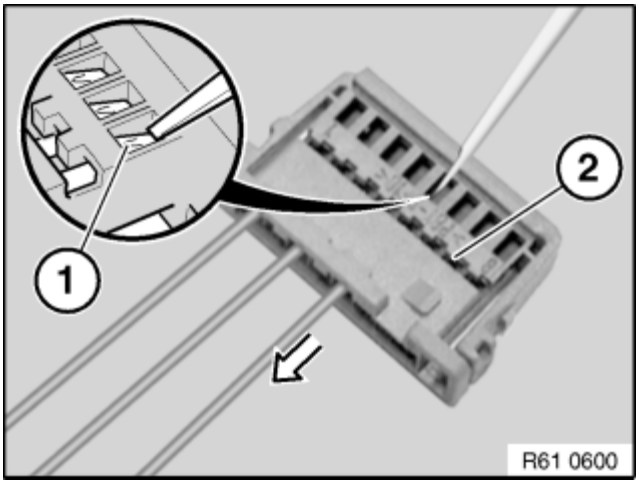


Fig. 100: Identifying Retaining Hook And Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

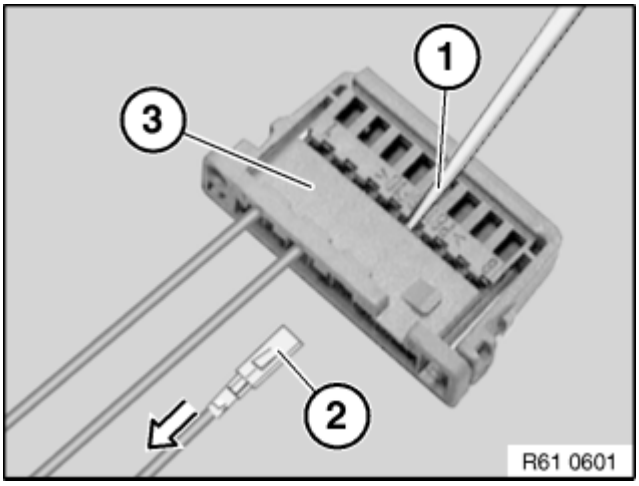


Fig. 101: Removing Cable With Socket Contact From Secondary Lock And Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Pin housing:

Press locks (1) on protective cap (2) upwards on both sides.

Detach protective cap from housing carrier (3).

NOTE: Detaching the protective cap releases the secondary locks of the pin contacts in the contact carriers.

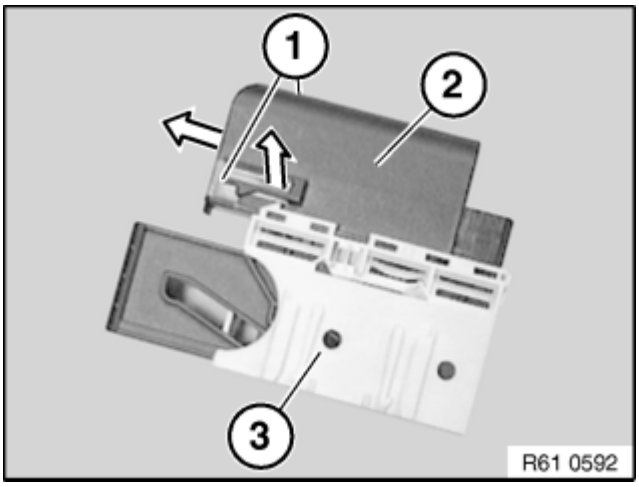


Fig. 102: Identifying Locks, Cap, And Housing Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Pull contact carrier (1) out of housing carrier (2).

The pin contacts are pulled out of a contact carrier as described under "Socket housing".

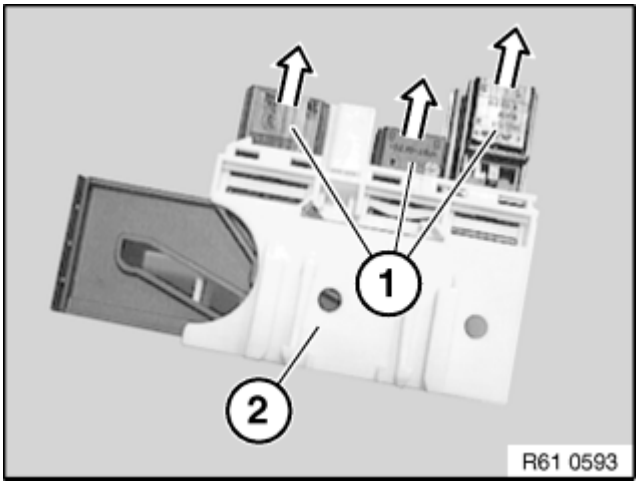


Fig. 103: Removing Contact Carrier From Housing Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... IN-LINE CONNECTORS, 30-PIN, HYBRID SYSTEM MQS/MPQ

Notes

Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Socket housing:

Raise lock (1) on housing (2).

Push contact carrier (3) out of housing (2).

NOTE: Pushing out the contact carrier releases the secondary locks of the socket contacts.

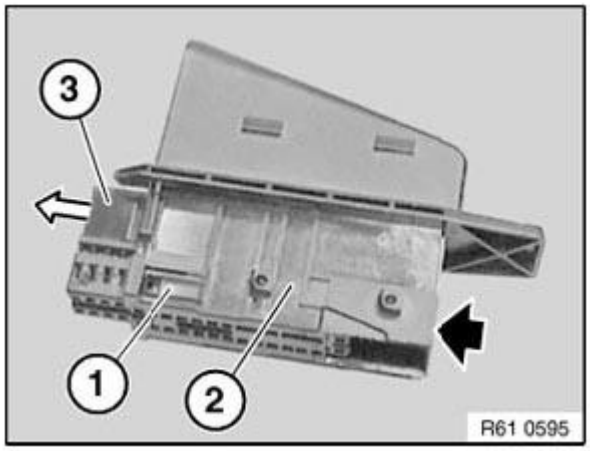


Fig. 104: Raising Lock On Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).

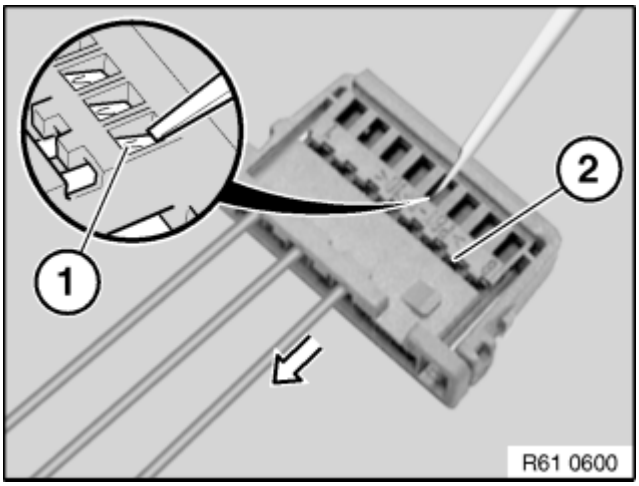


Fig. 105: Identifying Retaining Hook And Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

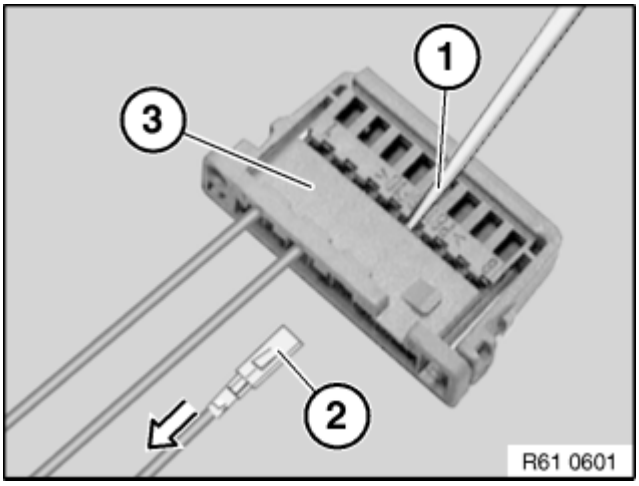


Fig. 106: Removing Cable With Socket Contact From Secondary Lock And Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Pin housing:

Contacts 1... 13 and 19... 27:

Raise locking slide (1) on both sides (2) of housing and detach.

NOTE: Detaching the locking slide releases the secondary locks of the pin contacts.

Contacts 14... 18 and 28... 30:

Pull slide (1) outwards completely.

Raise lock (2) on housing.

Pull contact carrier (3) out of housing.

NOTE: Pulling out the contact carrier releases the secondary locks of the pin contacts.

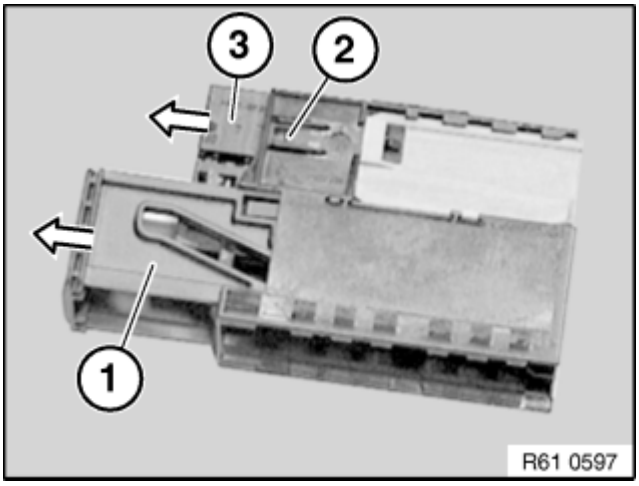


Fig. 107: Removing Contact Carrier From Housing Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

The pin contacts are pulled out of a contact carrier as described under **SOCKET HOUSING**.

61 13... CONTROL UNIT CONNECTORS, 25-, 35-, 55-, 83-, 88-PIN

Notes

Release screws (1).

Lever out pin sensor (2) with gasket (3) in direction of arrow.

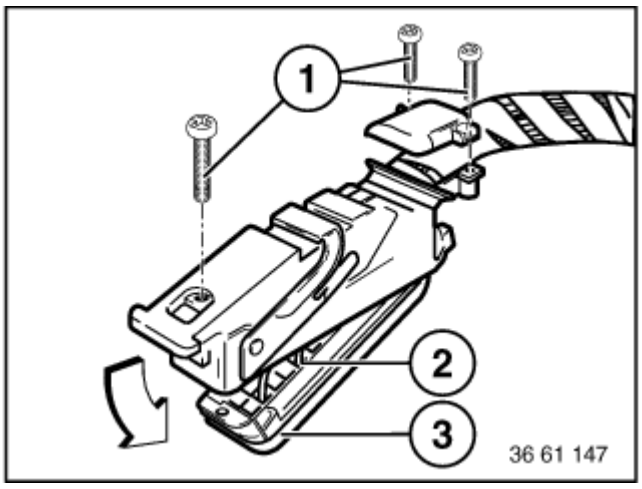


Fig. 108: Identifying Screws, Pin Sensor, And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Remove gasket (3).

Pull out housing lock (4) in direction of arrow and unlock.

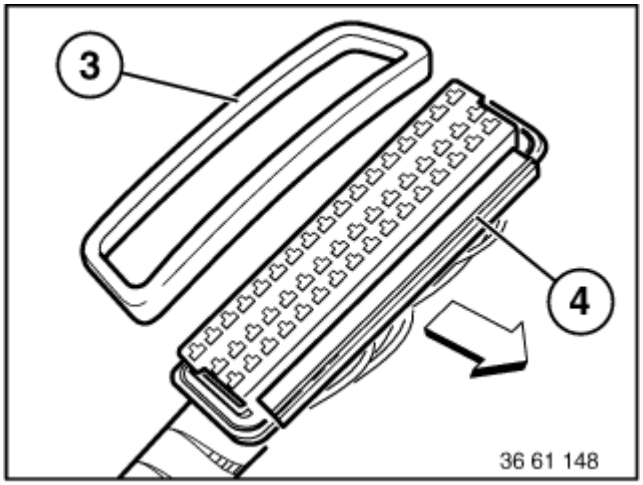


Fig. 109: Identifying Seal And Housing Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Press down retaining hook (5) of corresponding contact and pull out cable with contact.

Special tool **61 0 312** (61 1 134) for mini flat spring contacts.

Special tool **61 0 314** (61 1 135) for mini flat spring contacts.

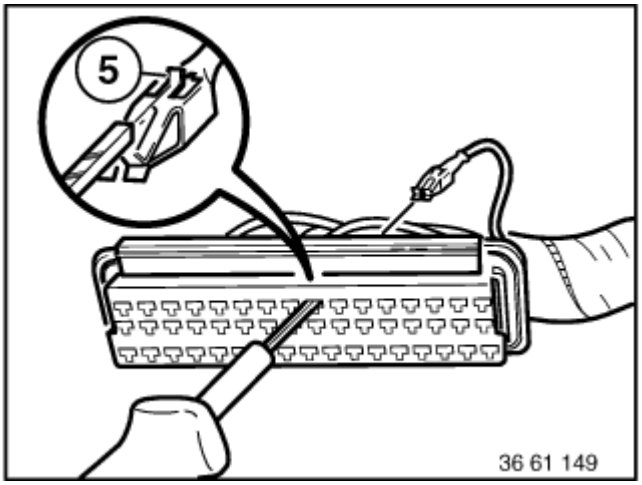


Fig. 110: Pressing Down Arrester Hook
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool **61 0 315** (61 1 151) for double flat spring contacts (dual retaining hooks)

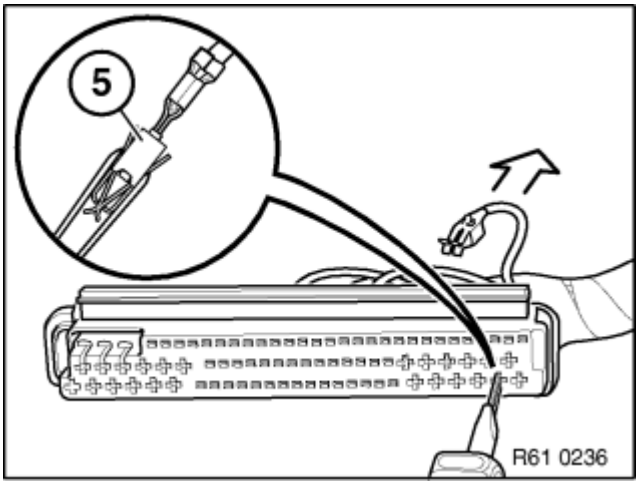


Fig. 111: Using Special Tool 61 1 151
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool **61 0 323** (61 1 152) for double flat spring contacts (special retaining hook)

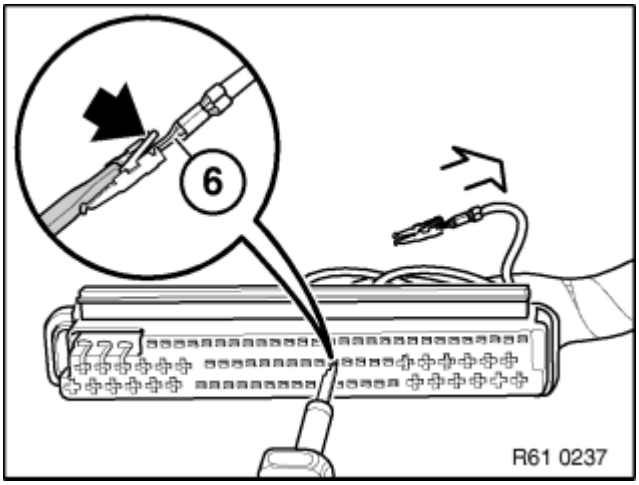


Fig. 112: Using Special Tool 61 1 152
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CONNECTOR HOUSING, LCC CONTACT (LOAD CURRENT CONTACT)

Notes

Socket housing:

Press lock (1) with suitable tool (2) in direction of arrow out of socket housing (3).

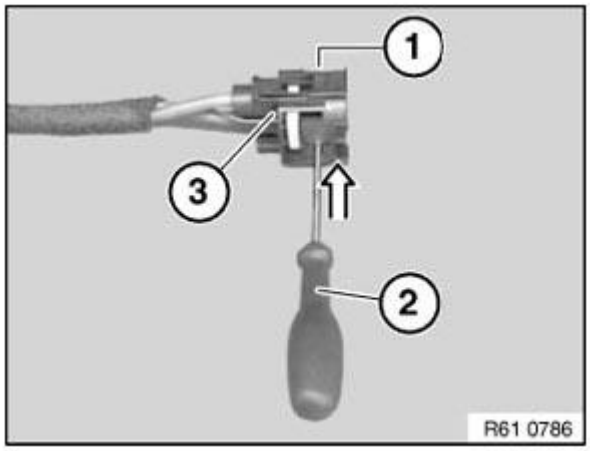


Fig. 113: Pressing Lock With Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Pull lock (1) out of socket housing (2).

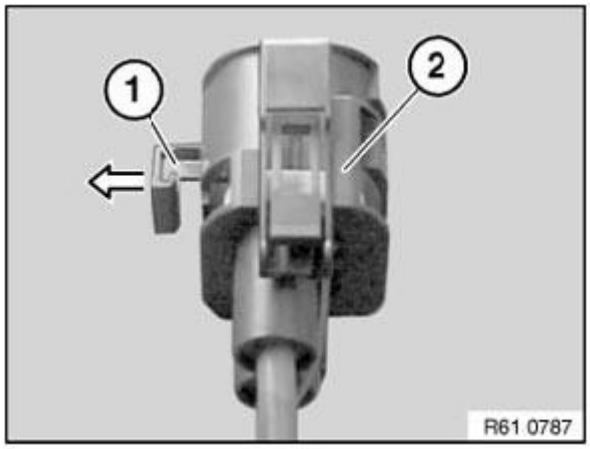


Fig. 114: Pulling Lock Of Socket Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **61 0 317** into socket housing (1) and pull out wiring with LCC contact (2) in direction of arrow.

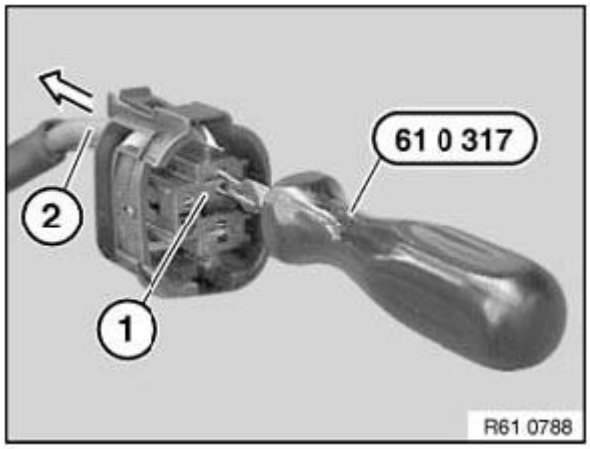


Fig. 115: Identifying Socket Housing And LCC Contact
Courtesy of BMW OF NORTH AMERICA, INC.

Pin housing:

Unlock locking slide (1) of pin housing (2) with suitable tool (3) in direction of arrow.

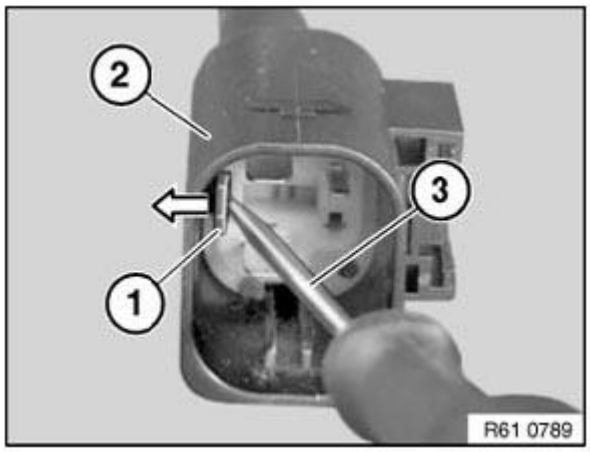


Fig. 116: Identifying Locking Slide Of Pin Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **61 0 317** into pin housing (1) and pull out wiring with LCC contact (2) in direction of arrow.

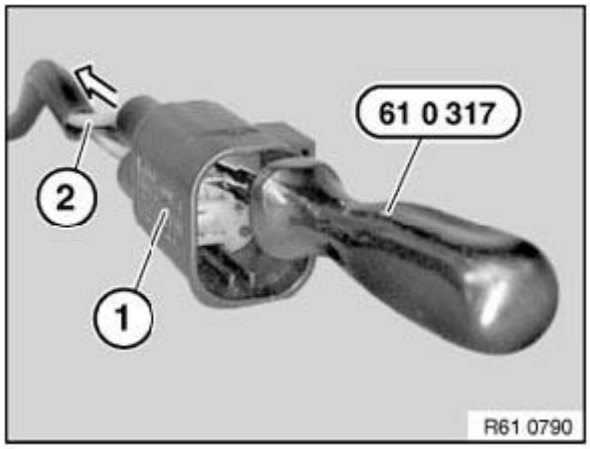


Fig. 117: Identifying Pin Housing And LCC Contact
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... SOCKET HOUSING (RADIO CONNECTOR), HYBRID SYSTEM MQS/MPQ

Notes

Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Removing MPQ contacts from radio connector:

Press lock (1) in direction of arrow.

Detach secondary lock (2) from radio connector.

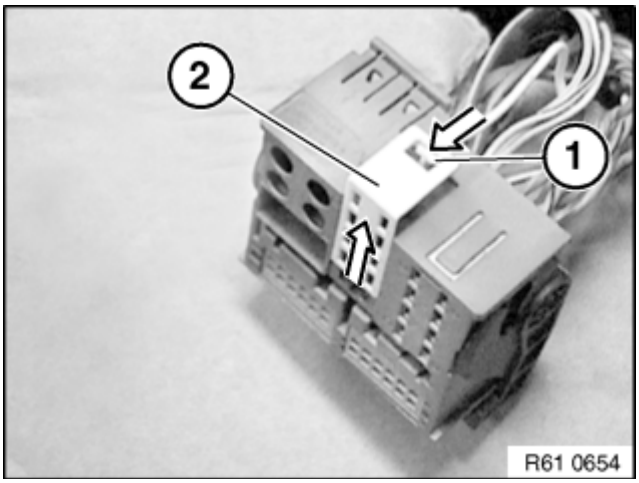


Fig. 118: Pressing Lock And Detaching Secondary Lock From Radio Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Feed special tool **61 0 314** (61 1 135) past side of contact.

Press special tool **61 0 314** (61 1 135) in direction of arrow.

Pull wire (1) with socket contact out of radio connector (2).

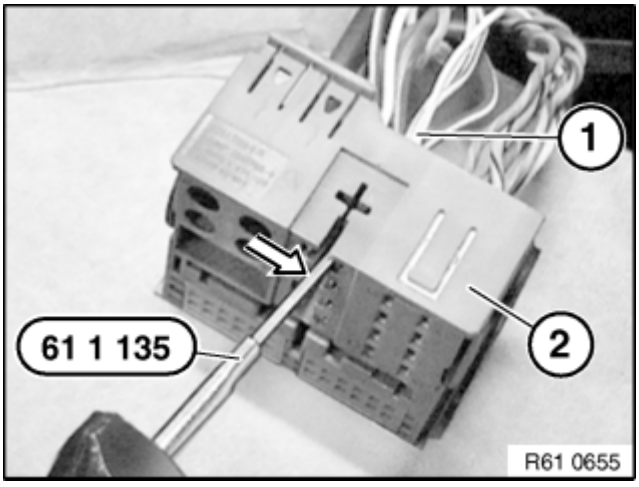


Fig. 119: Using Special Tool (61 1 135) To Remove Socket Contact From Radio Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Removing MQS contacts from contact carrier:

Press lock (1) in direction of arrow and pull housing (2) out of radio connector.

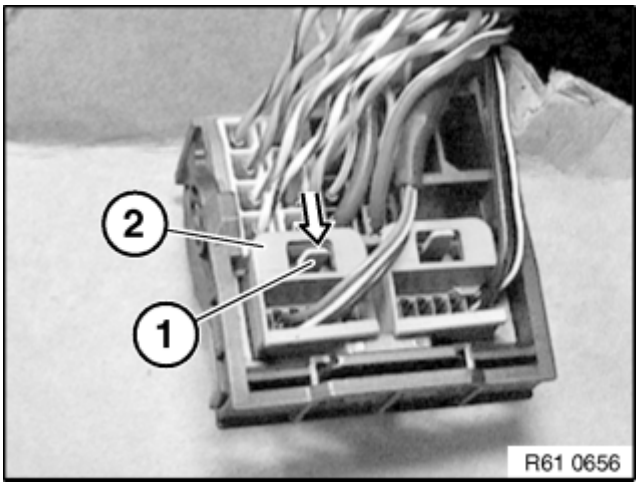


Fig. 120: Pressing Lock To Remove Housing From Radio Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock (1) in direction of arrow. Pull contact carrier (2) out of housing (3).

NOTE: When the contact carrier is pulled out, the secondary locks of the socket contacts are raised.

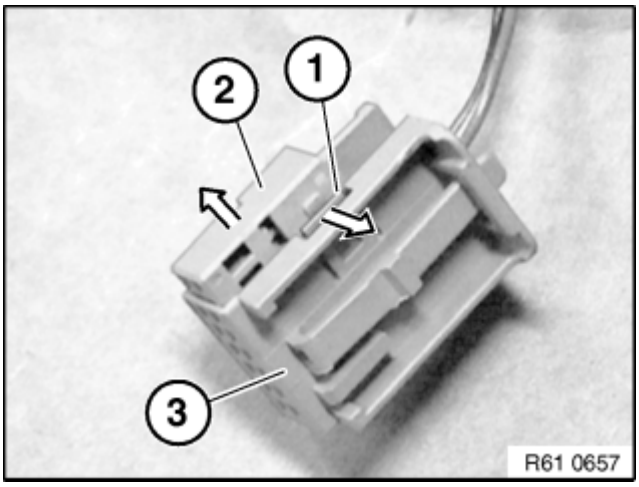


Fig. 121: Identifying Lock, Contact Carrier, And Housing
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic diagram shows the 8-pin socket housing by way of example.

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).

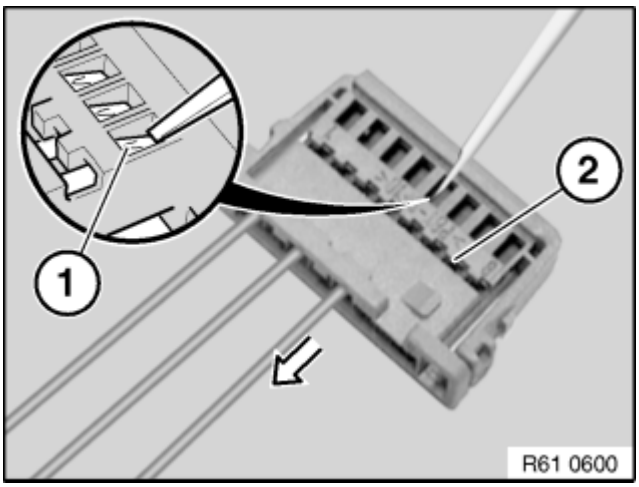


Fig. 122: Identifying Retaining Hook And Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook in secondary lock (1) again. Pull wire with socket contact (2) out of contact carrier (3).

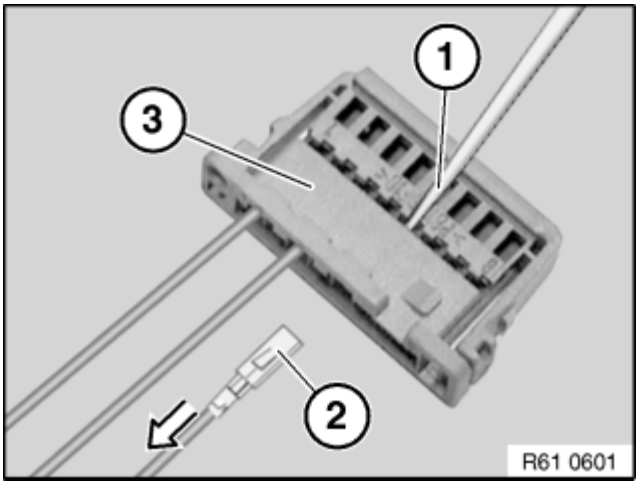


Fig. 123: Removing Cable With Socket Contact From Secondary Lock And Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Removing MPQ contacts from contact carrier:

Remove contact carrier (1) with MQS contacts from radio connector.

Raise lock (2) on radio connector.

Pull contact carrier (3) out of radio connector.

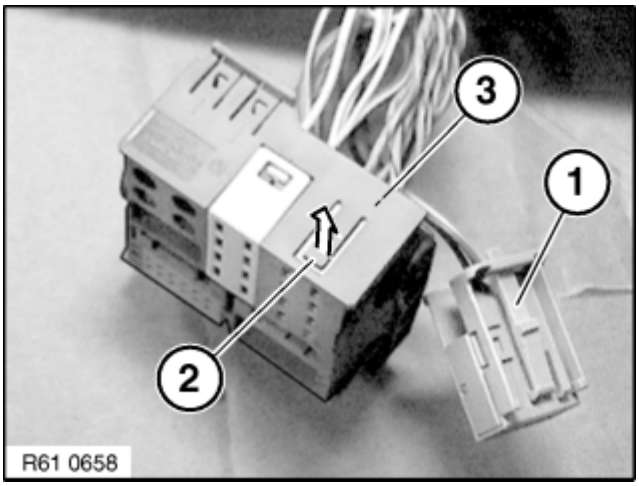


Fig. 124: Identifying Contact Carriers And Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Press lock (1) in direction of arrow.

Pull secondary lock (2) in direction of arrow completely out of contact carrier (3).

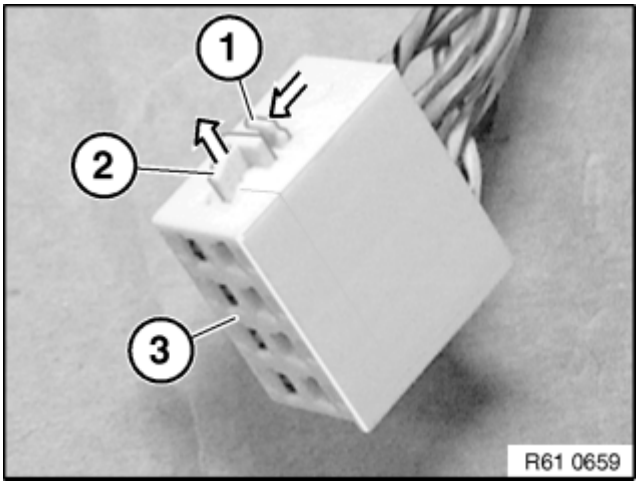


Fig. 125: Identifying Lock, Secondary Lock, And Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool **61 0 314** (61 1 135) on inside of contact into contact carrier (2).

Pull wire with socket contact (1) out of contact carrier (2).

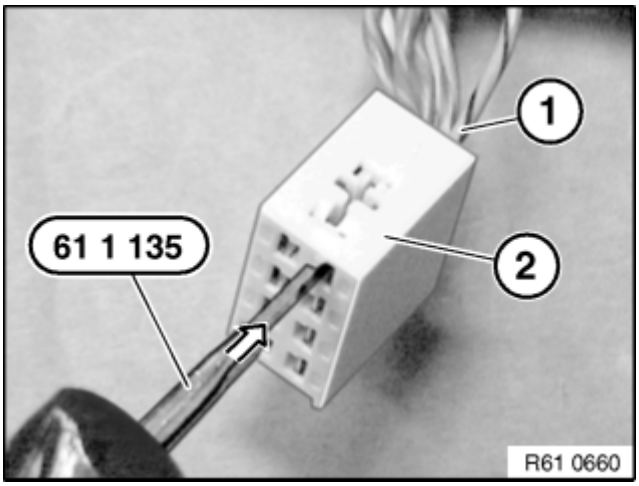


Fig. 126: Using Special Tool (61 1 135) To Remove Socket Contact From Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... SOCKET HOUSING 42-, 43-PIN, HYBRID SYSTEM MQS/MPQ

Notes

Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)

MPQ, width 5.2 mm (Micro Power Quadlock)

Open secondary locks (1) on socket housing.

Press back retaining hook of MQS contacts (2) with special tool **61 0 312** (61 1 134) and pull out cable with contact.

Press back retaining hook of MPQ contacts (3) with screwdriver and pull out cable with contact.

NOTE: Detaching the protective cap releases the secondary locks of the socket contacts.

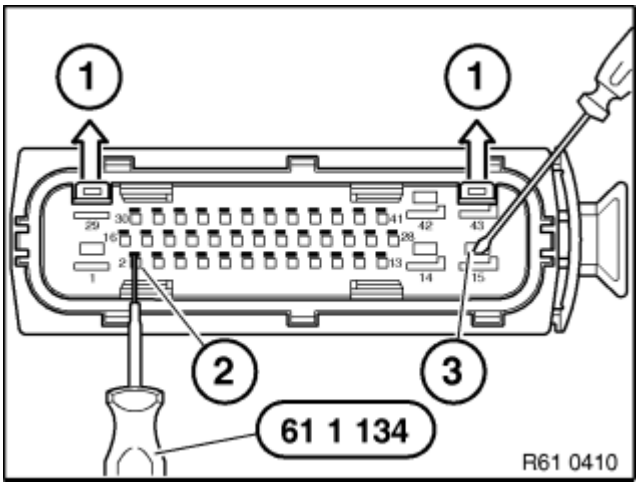


Fig. 127: Identifying Secondary Locks And MQS Contacts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Bend open retaining hook of contacts gently before inserting into connector housing.

For installation of contacts, observe chamber numbers on reverse side of socket housing.

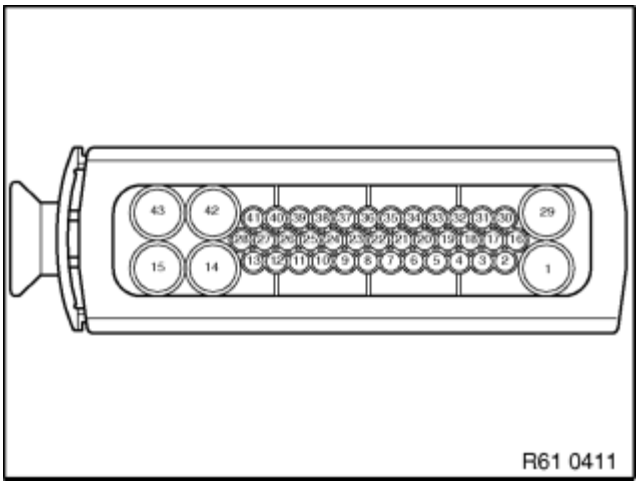


Fig. 128: Identifying Chamber Numbers On Reverse Side Of Socket Housing

Courtesy of BMW OF NORTH AMERICA, INC.

61 13... SOCKET HOUSINGS, 2X21-, 2X27-PIN, HYBRID SYSTEMS MQS/MPQ, ELO/ELO POWER

Notes

Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Manufactured by Siemens: The following contact types without strand sealing can be fitted in the connector housings:

- Elo (electrical contact)
- Elo Power 2.8 mm width (electrical contact for heavy loads)
- Elo Power 5.2 mm width (electrical contact for heavy loads)

Raise lock (1) on housing (2).

Push contact carrier (3) from rear out of housing.

NOTE: The second contact carrier is pushed out in the same way.

Pushing out the contact carrier releases the secondary locks of the socket contacts.

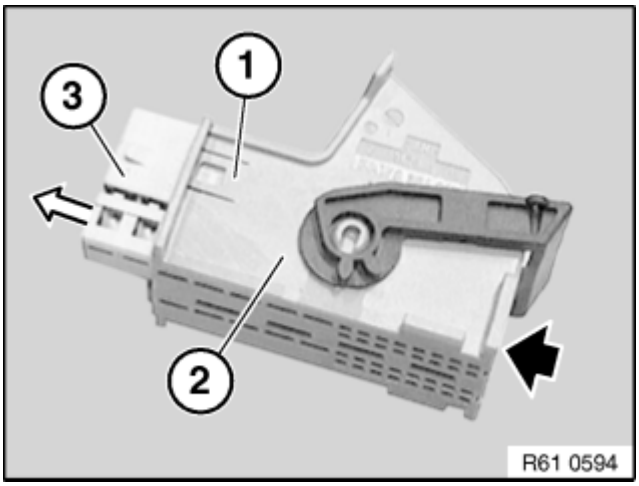


Fig. 129: Identifying Locks, Cap, And Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Hold down retaining hook (1) of socket contact in opening of contact carrier with a small screwdriver.

Pull wire with socket contact in direction of arrow as far as secondary lock (2).

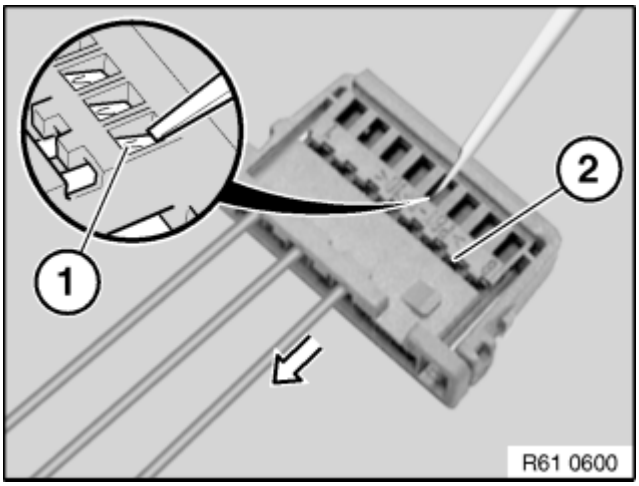


Fig. 130: Identifying Retaining Hook And Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3).

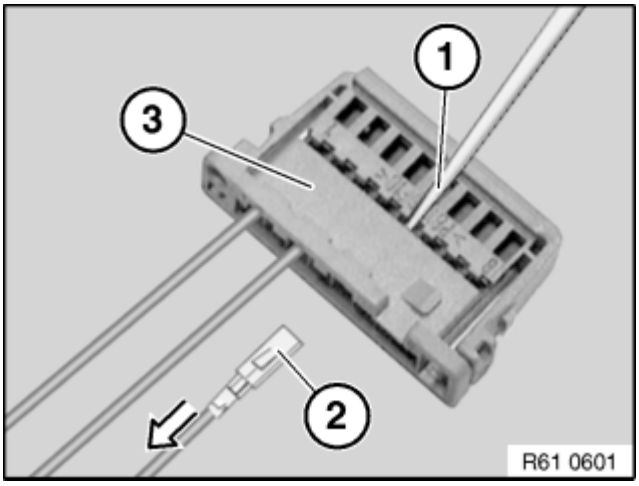


Fig. 131: Removing Cable With Socket Contact From Secondary Lock And Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... SOCKET HOUSINGS, 5-PIN, 8-PIN, SYSTEM MQS/MPQ

Notes

Manufactured by AMP: The following contact types without strand sealing can be fitted in the connector

housings:

- MQS (Micro Quadlock System)
- MPQ, width 2.8 mm (Micro Power Quadlock)
- MPQ, width 5.2 mm (Micro Power Quadlock)

Socket housing, 5-pin (Hybrid System MQS/MPQ)

Raise fastener (1) over retaining lug (2) and pull off from contact carrier (3).

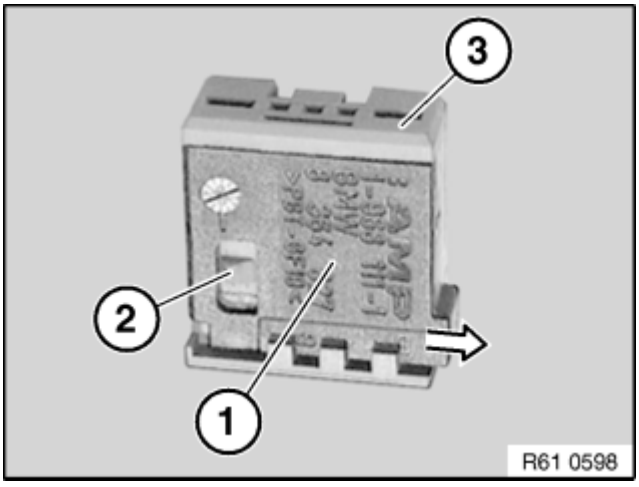


Fig. 132: Identifying Fastener, Retaining Lug, And Contact Carrier On Socket Housing, 5-Pin (Hybrid System MQS/MPQ)
Courtesy of BMW OF NORTH AMERICA, INC.

Socket housing, 8-pin (MQS):

Raise fastener (1) over retaining lug (2) and pull off from contact carrier (3).

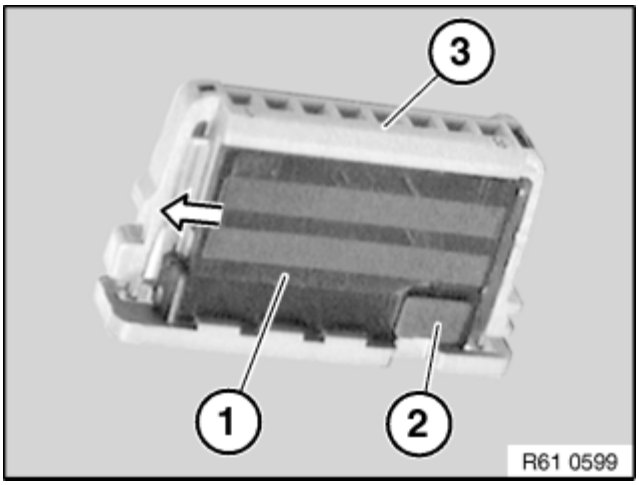


Fig. 133: Identifying Fastener, Retaining Lug, And Contact Carrier On Socket Housing, 8-Pin (MQS)

Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook (1) of contact and pull cable with contact as far as secondary lock (2).

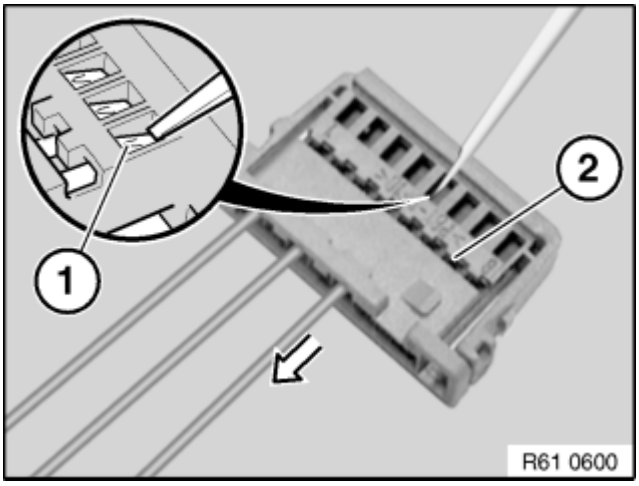


Fig. 134: Identifying Retaining Hook And Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Hold down retaining hook in secondary lock (1) again and pull cable with contact (2) completely out of contact carrier (3).

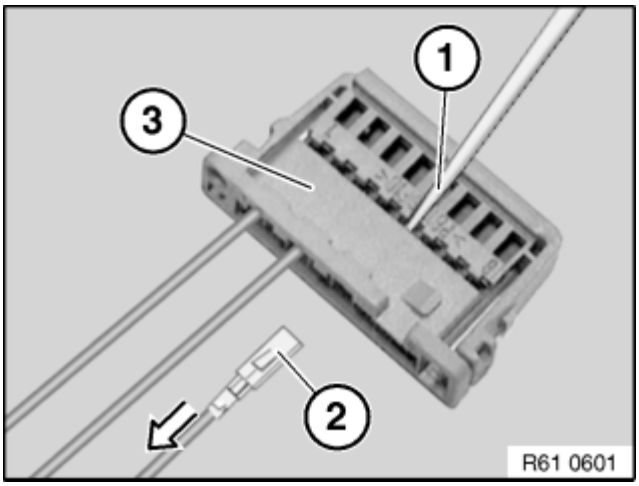


Fig. 135: Removing Cable With Socket Contact From Secondary Lock And Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CRIMPING MICRO POWER QUADLOCK CONTACTS (MPQ)

Notes

To crimp MPQ contacts, use hand pliers 61 4 321 (1) in conjunction with crimping head 61 4 325 (2) from crimping set **61 4 320** .

NOTE: Hand pliers (1) open automatically as far as they will go when handles are pressed together.

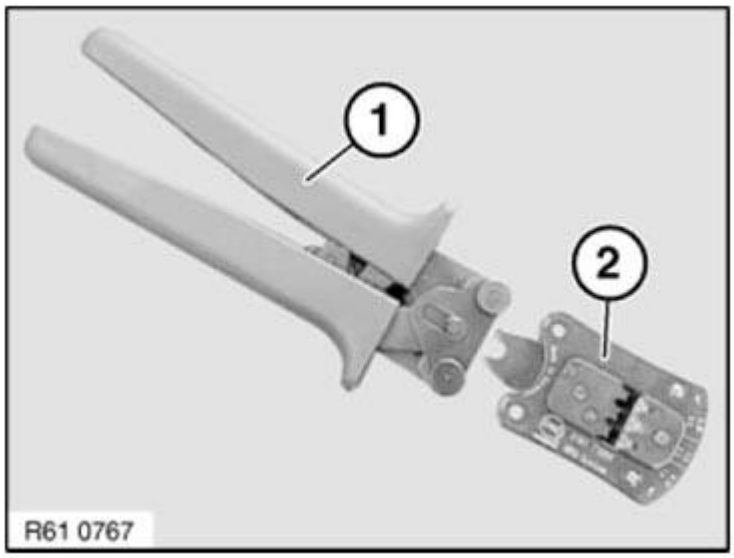


Fig. 136: Identifying Hand Pliers With Crimping Head (61 4 325)
Courtesy of BMW OF NORTH AMERICA, INC.

Open hand pliers (1).

NOTE: Place contact (2) with utmost care in designated nest (observe line cross-section) in crimping head (3). Make sure it is exactly positioned.

Place MPQ contact (2) in crimping head (3).

Close hand pliers (1) one notch.

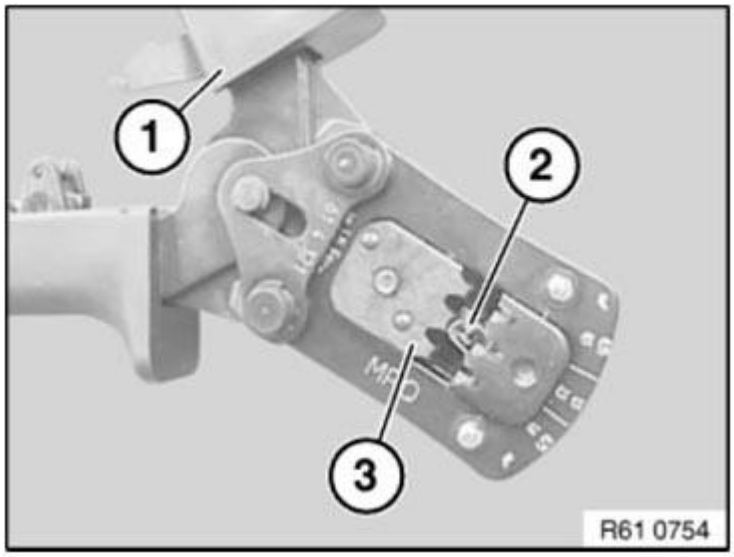


Fig. 137: Identifying Hand Pliers With Crimping Head And MPQ Contact
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION from cables.

Insert stripped cable (2).

Close hand pliers (1) fully.

Open hand pliers (1) and remove cable (2).

IMPORTANT: Check contact for correct crimping.

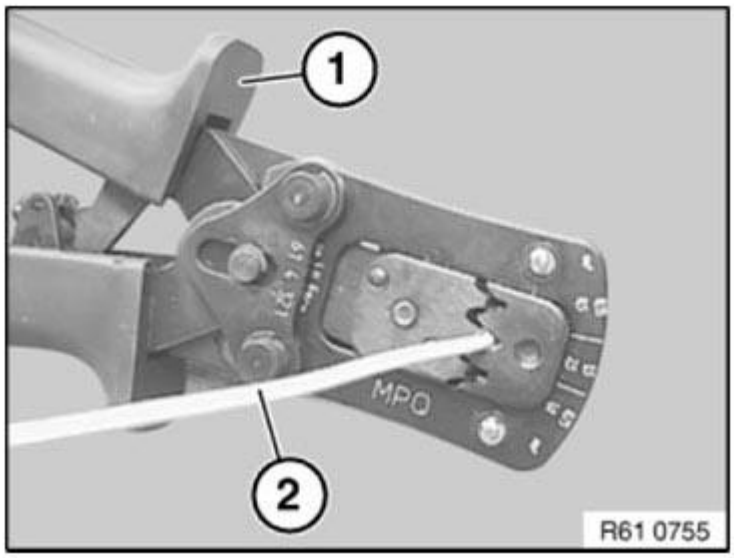


Fig. 138: Removing Cable Using Hand Plier
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CRIMPING MICRO QUADLOCK SYSTEM CONTACTS (MQS)

Notes

To crimp MPQ contacts, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 324 (2) from crimping set **61 4 320** .

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

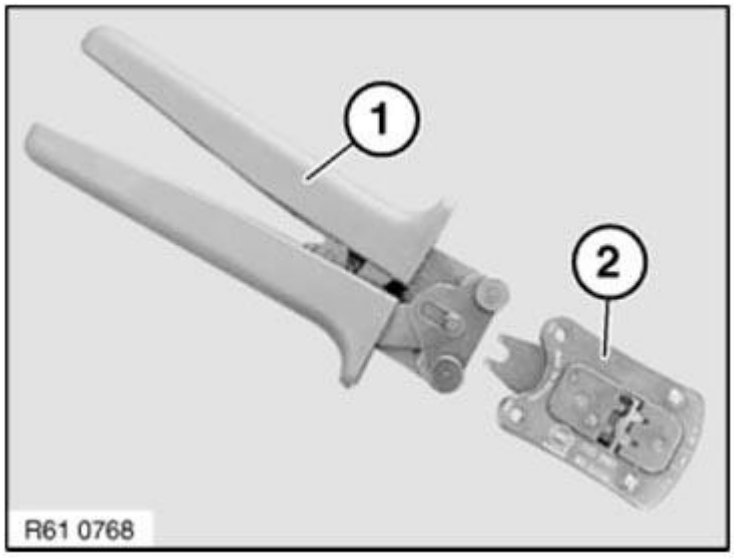


Fig. 139: Identifying Hand Pliers With Crimping Head (61 4 324)
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (1).

Fold up contact carrier (2).

Insert MQS contact (3) in contact carrier (2).

Fold back contact carrier (2).

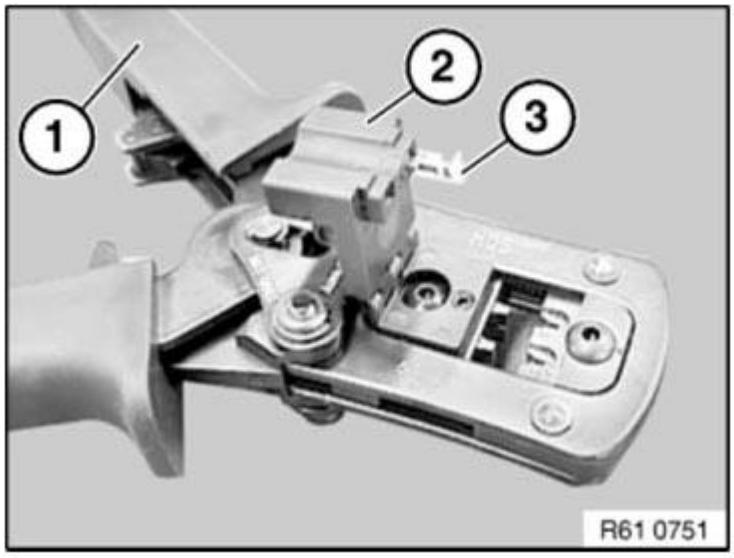


Fig. 140: Inserting MQS Contact In Contact Carrier Of Plier
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION from cables.

Close pliers (1) one notch.

Insert stripped cable (2).

Close pliers (1) fully.

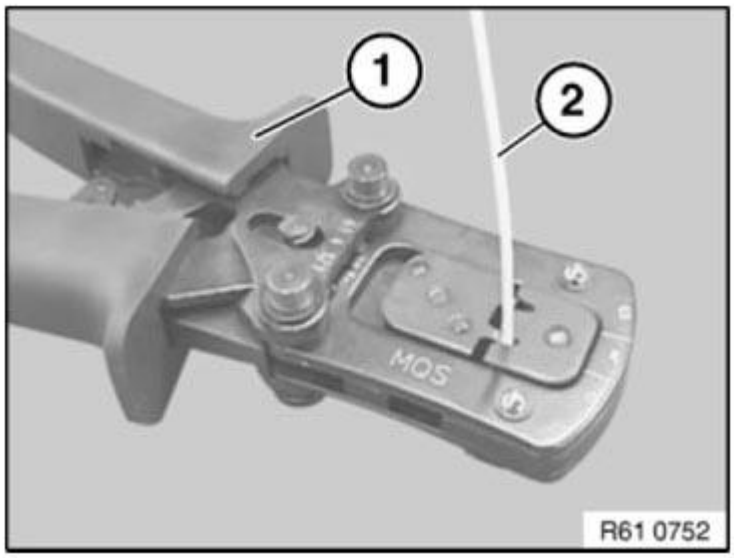


Fig. 141: Inserting Stripped Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (1).

Open contact carrier (2) gently and carefully remove MQS contact.

IMPORTANT: Check contact for correct crimping.

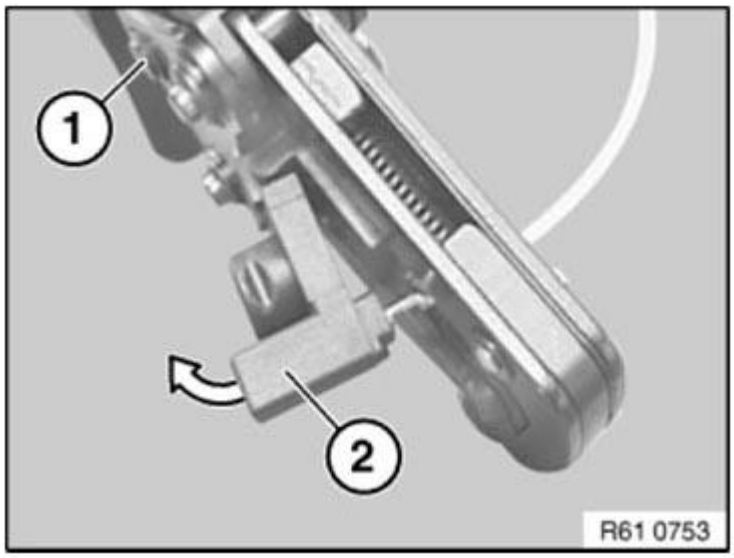


Fig. 142: Removing MQS Contact
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CRIMPING OPTICAL FIBRES

Notes

To crimp optical fibres, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 323 (2) from crimping set **61 4 320** .

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

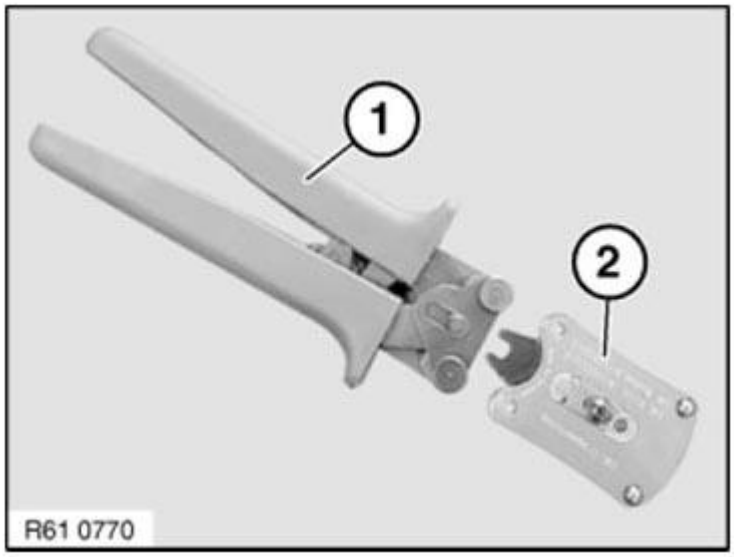


Fig. 143: Identifying Hand Pliers With Crimping Head (61 4 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Move contact guide by means of stop lever (1) into corresponding position (pin contact or jack).

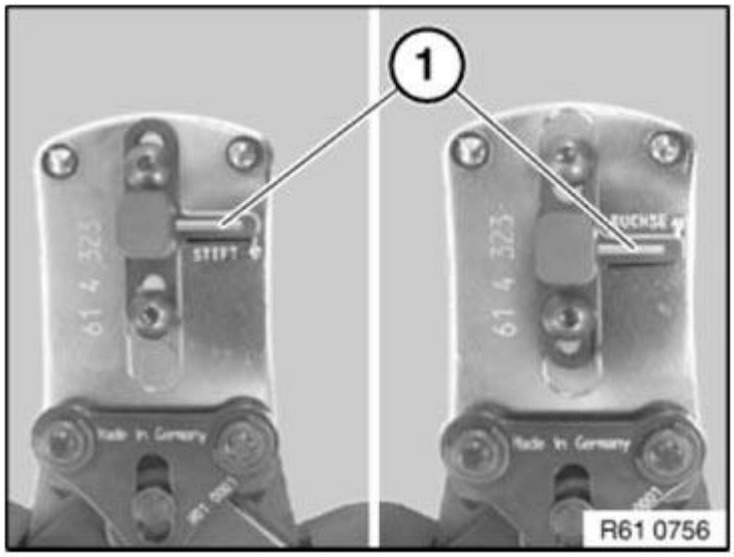


Fig. 144: Identifying Stop Lever On Plier
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (2).

Place pin contact or jack (1) in crimping head and secure with locking lever (3).

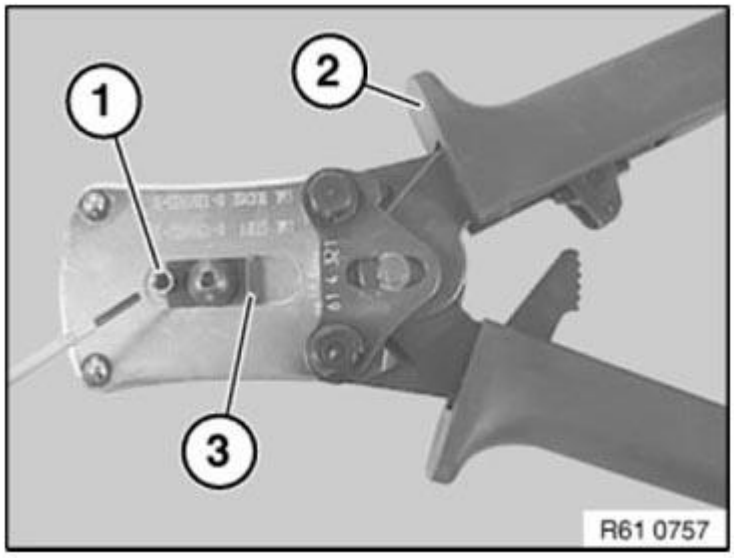


Fig. 145: Placing Pin Contact Or Jack On Crimping Head
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION FROM OPTICAL FIBRES .

Insert stripped optical fibre (1) as far as it will go into pin contact or jack (2).

Close pliers (3) fully.

Open pliers (3) and locking lever (4).

Remove optical fibre (1).

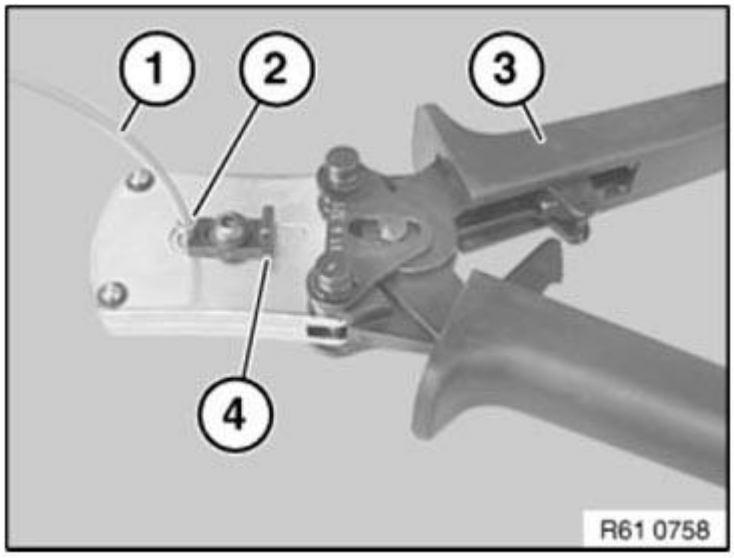


Fig. 146: Removing Optical Fibre
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure optical fibre is correctly seated in jack.

Right (A)

End of optical fibre (1) must be flush with tip of pin contact (2).

Wrong (B)

End of optical fibre (1) is not flush with tip of pin contact (2).

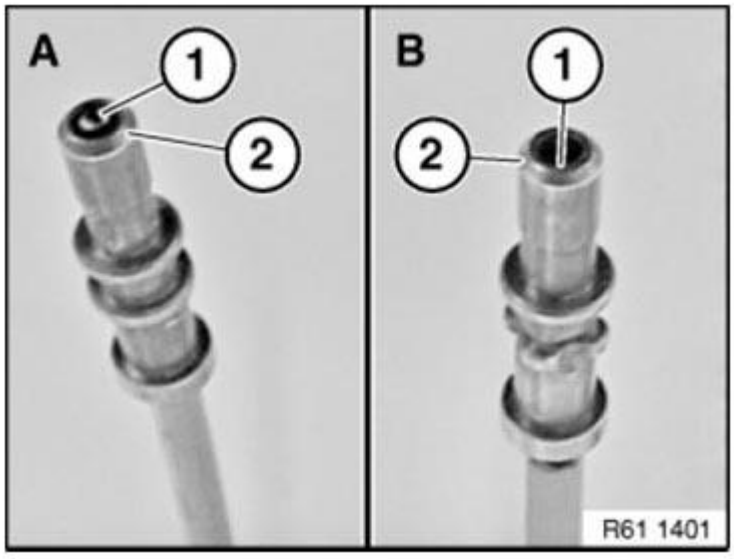


Fig. 147: Identifying Optical Fibre End With Pin Contact Tip
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CRIMPING STOP PARTS

Notes

Necessary preliminary work:

- Cutting cables to length and strip insulation

Special tools for wiring harness repairs.

Spare parts for vehicle electrical system (stop parts and housings):

- Sourcing reference: BMW Parts Service.
- Refer to Service Information SI 2 04 07 341

1. **Crimping stop parts up to 2.5 mm ^{2}**

   Crimping Micro Quadlock System contacts (MQS).

   - Special tool **61 4 320**

     Crimping Micro Power Quadlock contacts (MPQ).

   - Special tool 61 4 325

     Crimping miscellaneous stop parts up to 2.5 mm^2

   - Special tool 61 4 328

     Refer to Service Information SI 2 04 06 293.

2. **Crimping stop parts including and over 2.5 mm ^{2}**

   Crimping load current contacts (LSK 8).

   - Special tool **61 0 210**

     Crimping SLK 2.8.

   - Special tool **61 0 220**

     Refer to Service Information SI 2 02 05 194.

     Crimping double spring contact (DFK 40)

     Crimping MAK 8

   - Special tool **61 0 230**
   - Refer to Service Information **SI 2 07 05 233**

Checking crimping

Check insulation crimping (8) and wire crimp (9) against following illustrations to ensure crimps are correctly located.

NOTE: Illustration shows butt connectors and contact sleeves for comb connectors knocked on one side. The crimping procedure is identical here.

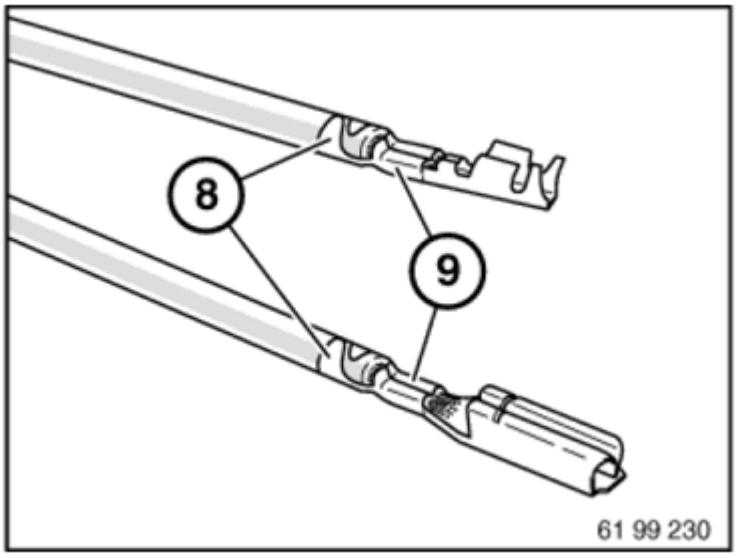


Fig. 148: Identifying Crimping Insulation And Wire Crimp
Courtesy of BMW OF NORTH AMERICA, INC.

Correct crimping:

Visible conductor end (10).

Visible insulation end (11).

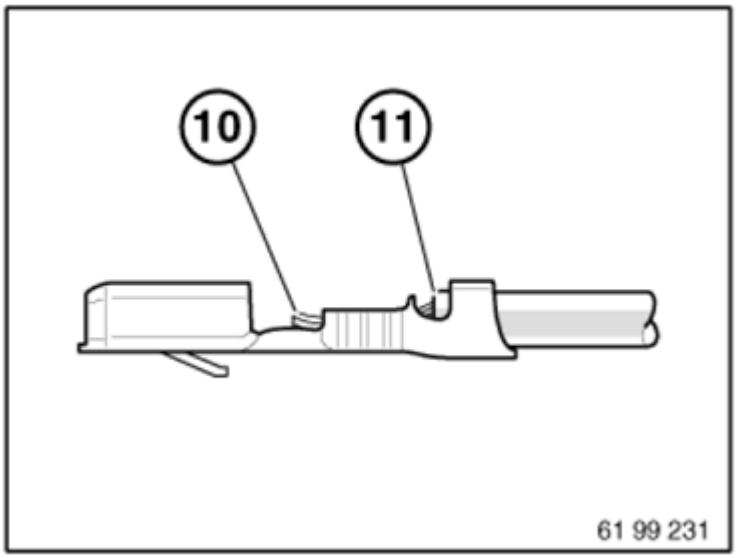


Fig. 149: Identifying Conductor And Insulator Ends
Courtesy of BMW OF NORTH AMERICA, INC.

Incorrect crimping:

Conductor end (10) inserted too far.

Insulation end (11) in wire crimp.

If necessary, repeat crimping with a new contact.

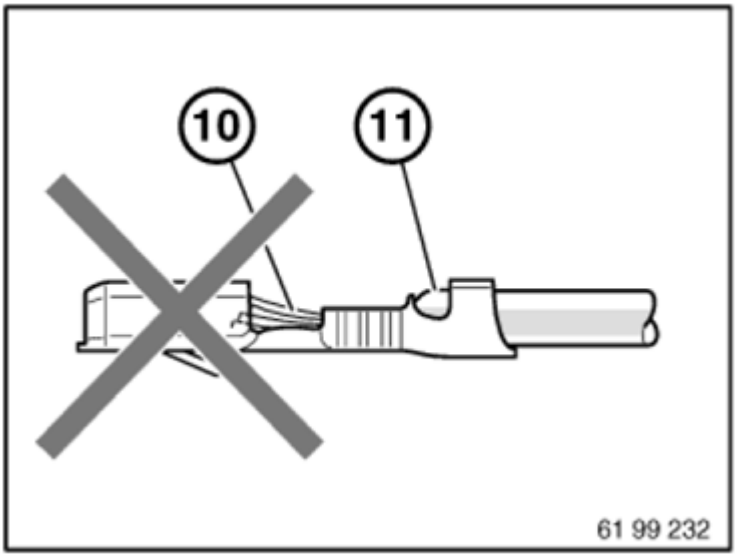


Fig. 150: Incorrect Crimping (Conductor End Inserted Too Far)
Courtesy of BMW OF NORTH AMERICA, INC.

Incorrect crimping:

Conductor end (10) not visible.

Insulation end (11) not visible.

If necessary, repeat crimping with a new contact.

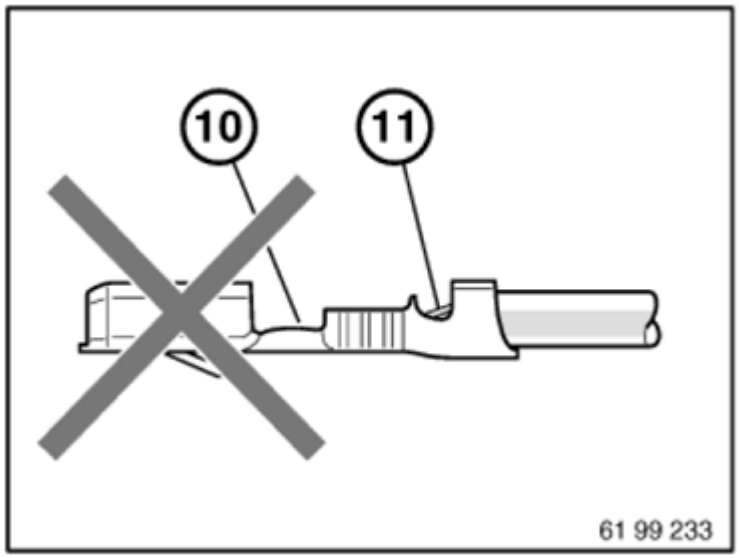


Fig. 151: Incorrect Crimping (Conductor End Not Visible)
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH

Notes

To cut off, strip insulation and cut optical fibres to length, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 322 (2) **61 4 320** from crimping set.

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

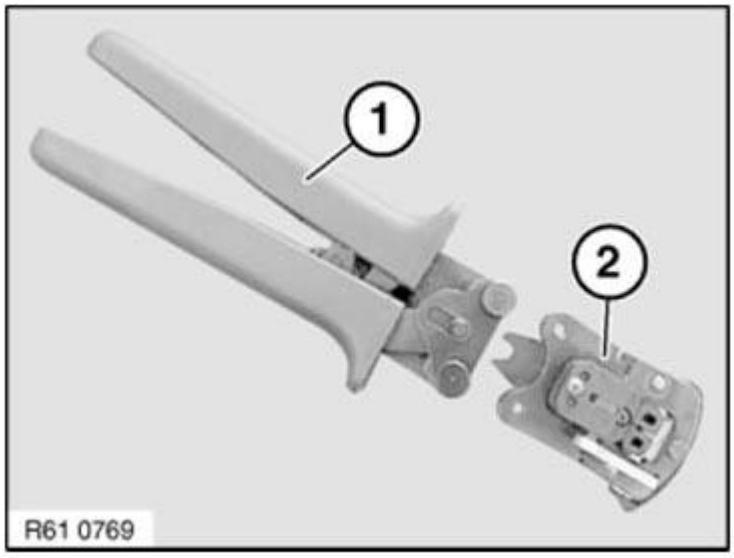


Fig. 152: Identifying Hand Pliers With Crimping Head (61 4 320)

Courtesy of BMW OF NORTH AMERICA, INC.

Cutting optical fibre

Open pliers (1).

Place optical fibre (2) in cutting device (3).

Close pliers (1) and remove optical fibre (2).

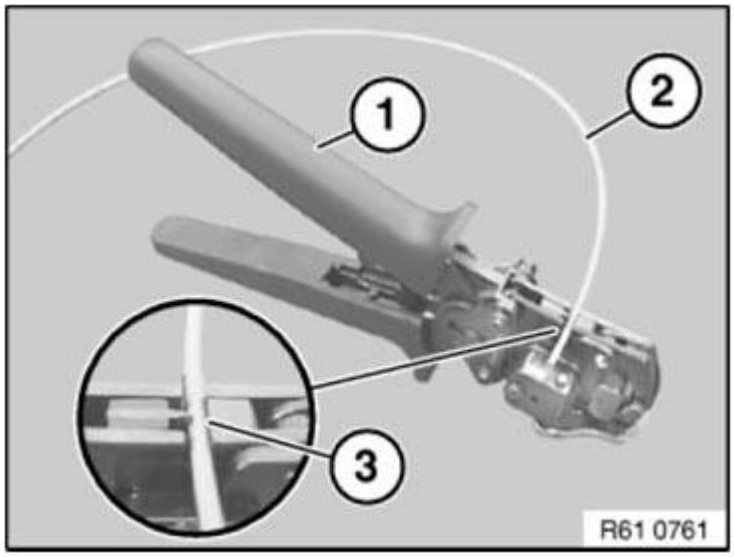


Fig. 153: Removing Optical Fibre Using Plier
Courtesy of BMW OF NORTH AMERICA, INC.

Stripping insulation from optical fibre

Open pliers (1).

Open lever (2) in direction of arrow.

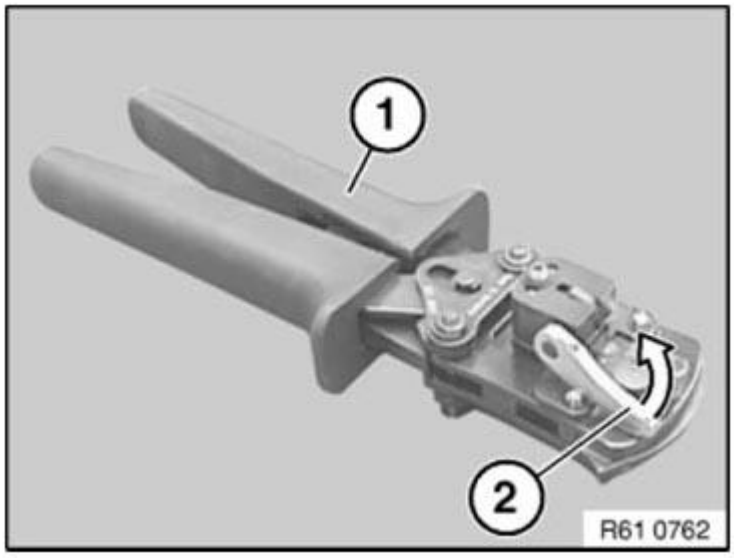


Fig. 154: Opening Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Slide optical fibre (1) into stripping device (2) until flush at point (3).

Close pliers (4) fully.

Close clamping lever (5) in direction of arrow.

Open pliers (4) by one tooth notch.

Open clamping lever (5) against direction of arrow again and remove optical fibre (1).

NOTE: A stripping replacement blade set is available under number 61 4 327.

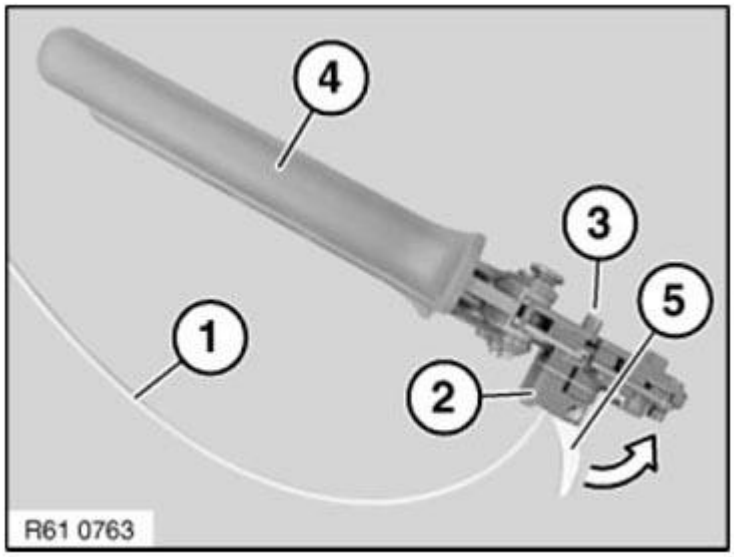


Fig. 155: Closing Clamping Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Cutting optical fibre to length

IMPORTANT: The cutting blade must be replaced prior to each cutting of the optical fibre.

Pull pin (1) in direction of arrow.

Fold up blade retaining link (2) in direction of arrow.

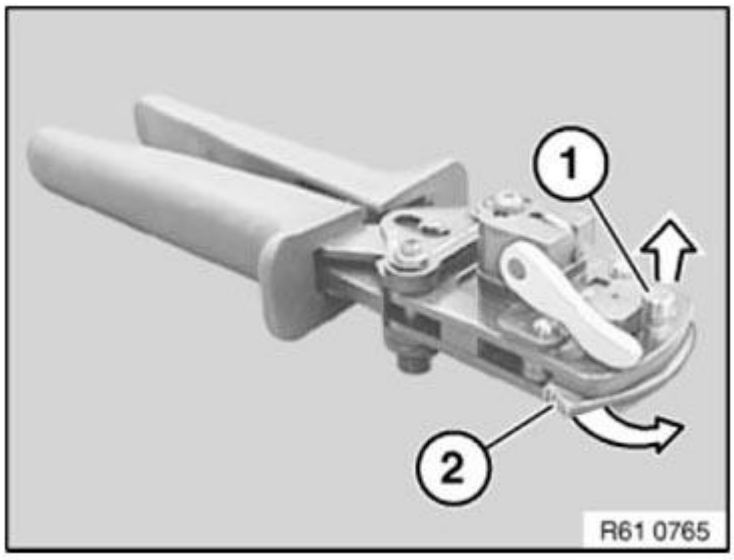


Fig. 156: Pulling Pin
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury when changing the blade.

Remove blade (1) and replace.

Installation:

Make sure blade (1) is correctly seated on locating points (2).

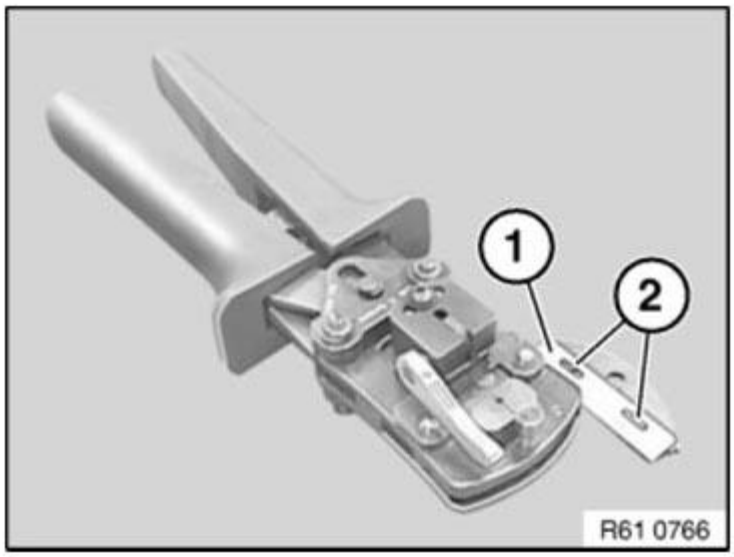


Fig. 157: Identifying Locating Points On Blade
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (3).

Slide optical fibre (1) into cutting device (2) until insulation of optical fibre (1) butts against clamping device.

Close pliers (3) fully and keep closed.

Remove optical fibre (1).

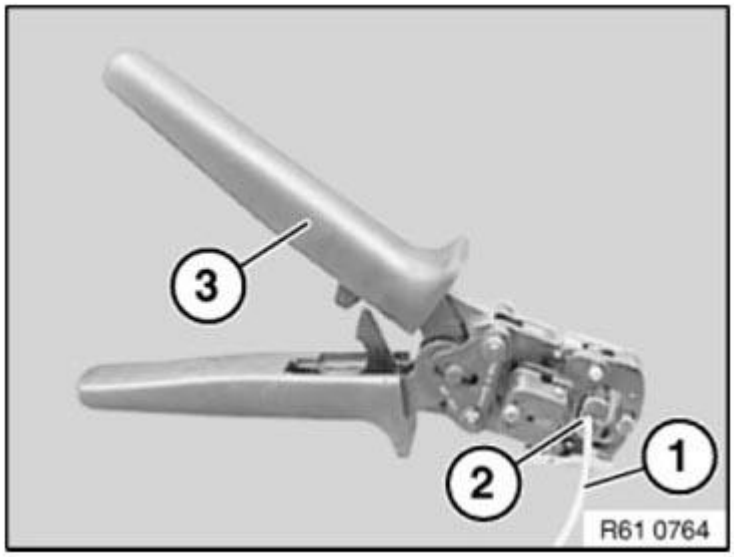


Fig. 158: Removing Optical Fiber
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

Stripped length:

STRIPPED LENGTH REFERENCE CHART

Wire cross-section (mm^2)	Stripped length (mm)
0.35... 0.50	4.0
0.75... 1.00	4.5
1.00... 2.50	5.0

61 13... INSTALLING FAN CONNECTOR FOR RETROFITTING/REPAIRS

Notes

NOTE: The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Service.

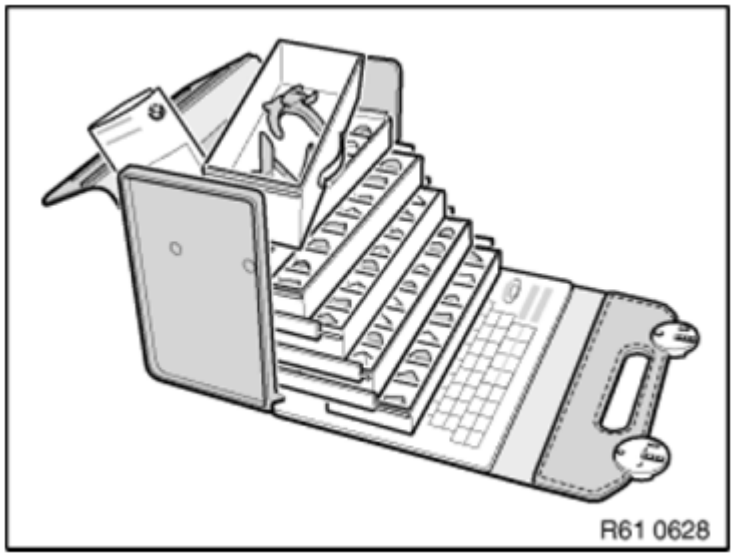


Fig. 159: Identifying Special Tools For Vehicle Electrical System Repairing
Courtesy of BMW OF NORTH AMERICA, INC.

Choose contact sleeve (up to 4 mm^2) in accordance with wire cross-section.

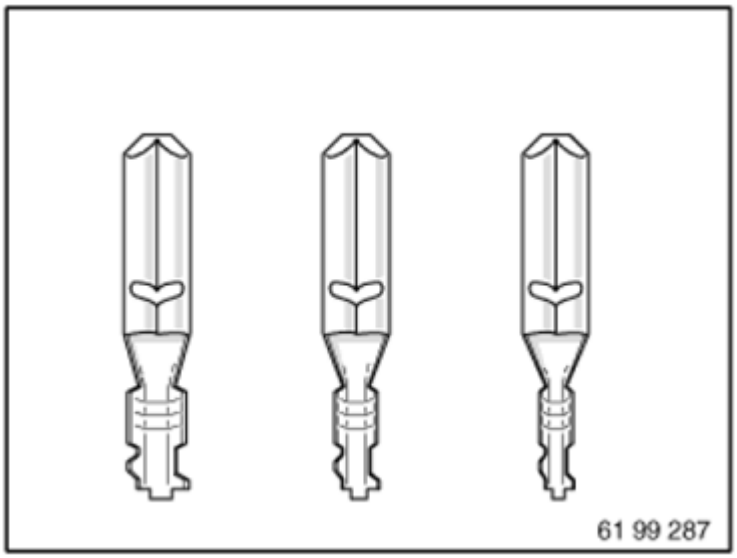


Fig. 160: Identifying Contact Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Alternatively:

Choose contact sleeves (up to 2.5 mm^2) for fan connectors.

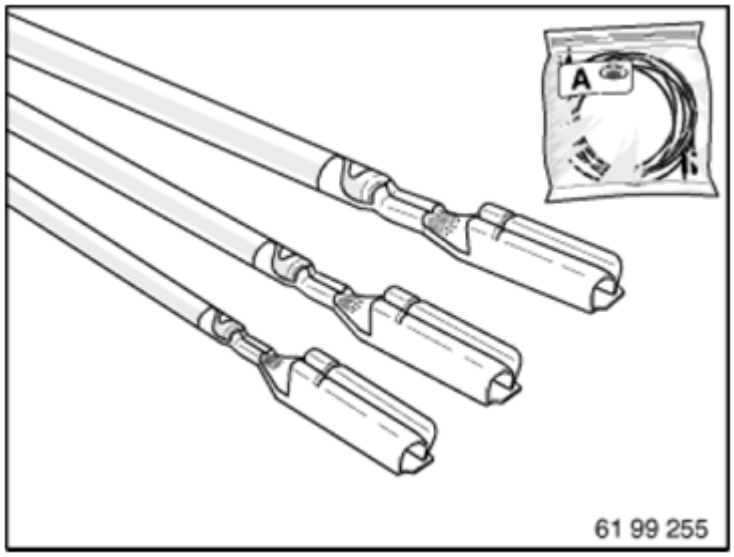


Fig. 161: Identifying Contact Sleeves For Fan Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through wire loop in wiring harness at established point.

Strip insulation from both wire ends.

See repair instructions

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

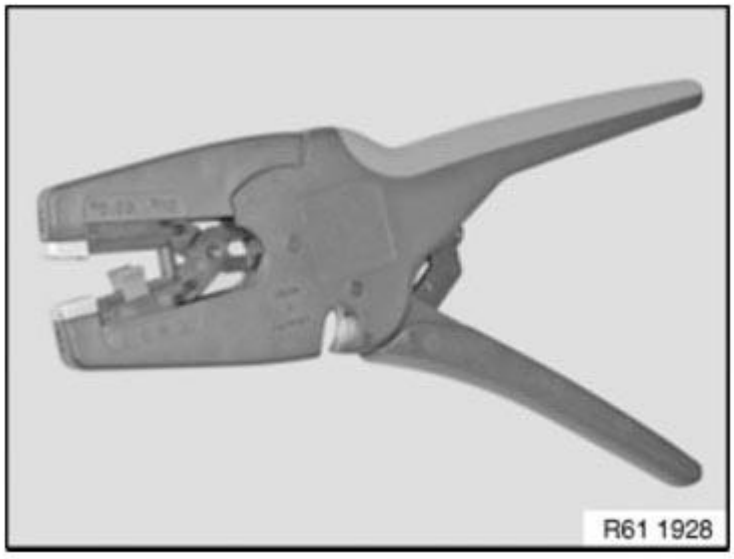


Fig. 162: Identifying Plier
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp contact sleeves on both wire ends.

See repair instructions

CRIMPING ON STOP PARTS

NOTE: If using repair kit for contact sleeves, refer to repair instruction:

BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION .

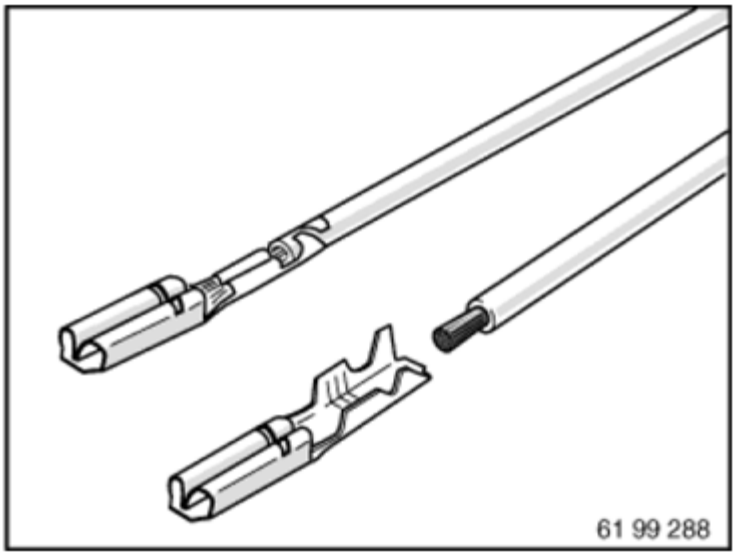


Fig. 163: Identifying Crimp Contact Sleeves On Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp connecting cable for retrofitting likewise with contact sleeve.

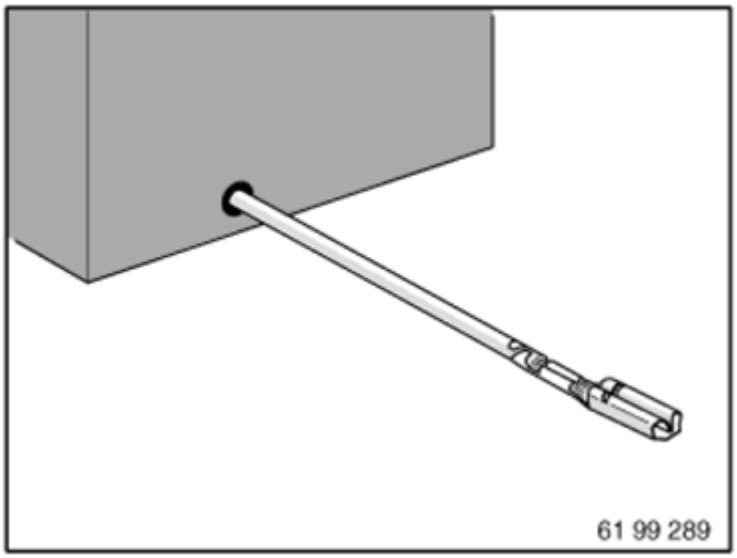


Fig. 164: Identifying Crimp Connecting Cable For Retrofitting
Courtesy of BMW OF NORTH AMERICA, INC.

Cut required number of poles to length for fan connectors.

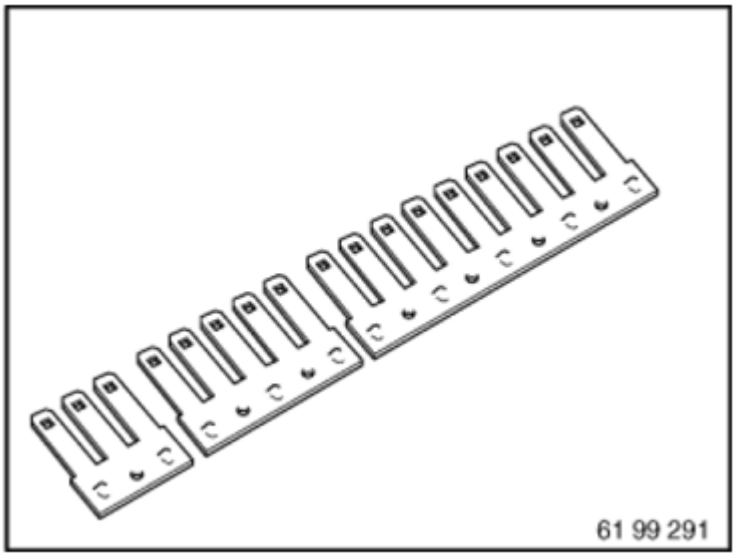


Fig. 165: Identifying Poles
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 61 9 041 (hand crimping tool) in conjunction with 61 9 042 (matrix) are used for pushing contact sleeves onto fan connectors.

See repair instructions

SPECIAL TOOLS FOR WIRING HARNESS REPAIRS .

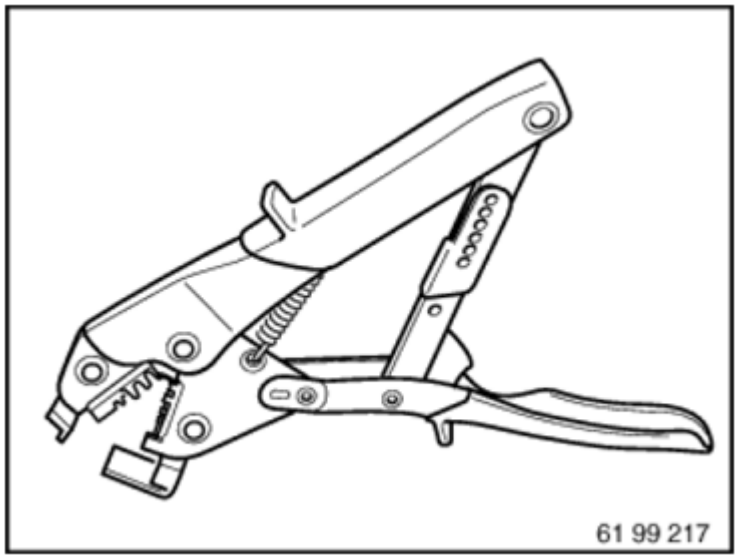


Fig. 166: Identifying Special Tool 61 9 041 (Hand Crimping Tool)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock special tool 61 9 041:

Squeeze grips (1) lightly and push unlocking lever (2) in direction of arrow.

Or:

Compress handles as far as they will go, tool unlocks automatically.

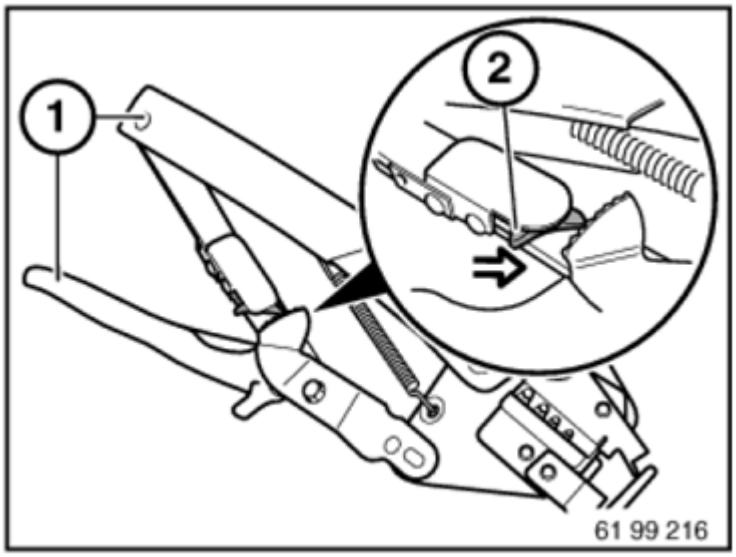


Fig. 167: Pushing Unlocking Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Insert prepared fan connectors (3) in special tool 61 9 041/61 9 042.

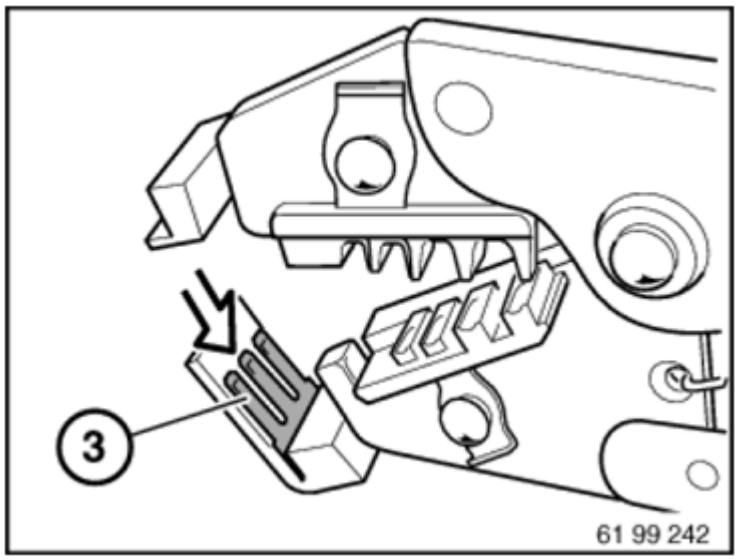


Fig. 168: Inserting Fan Connectors In Special Tool (61 9 041 / 61 9 042)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach wire with contact sleeve to fan connector.

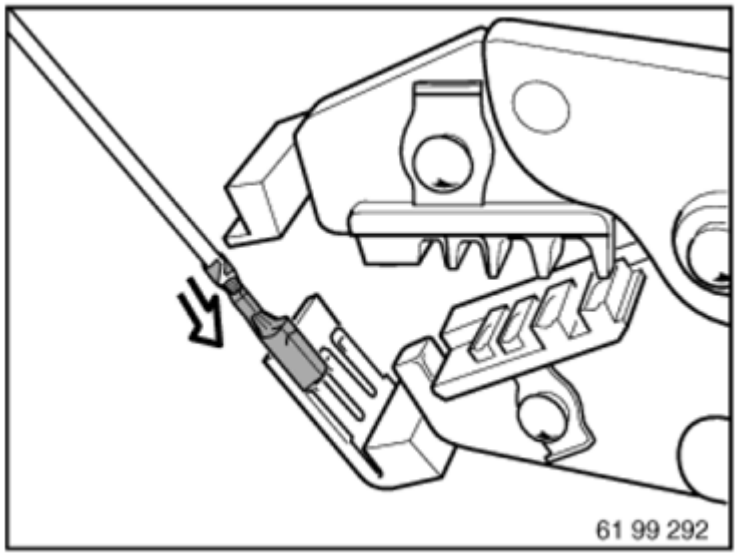


Fig. 169: Attaching Wire With Contact Sleeve To Fan Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Press crimping tool together and slide contact sleeve firmly home.

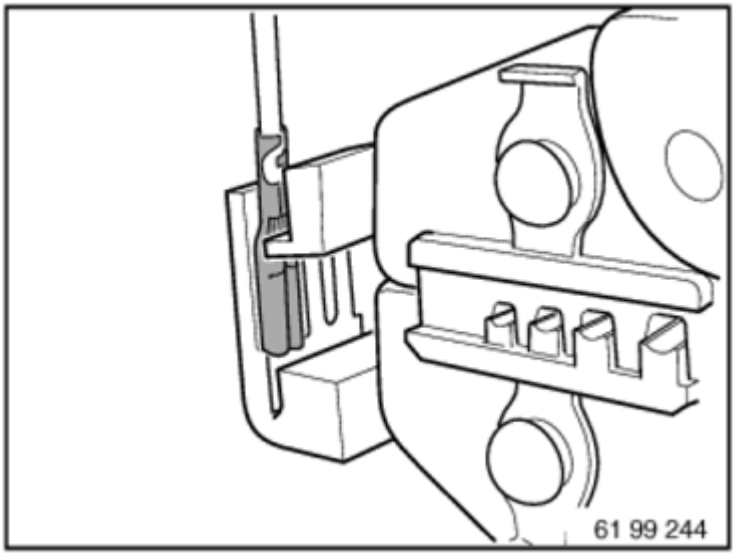


Fig. 170: Pressing Crimping Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Once contact sleeves have been pushed on, they should not be detached again from the fan connector or reused.

Push on further contact sleeves for potential branching.

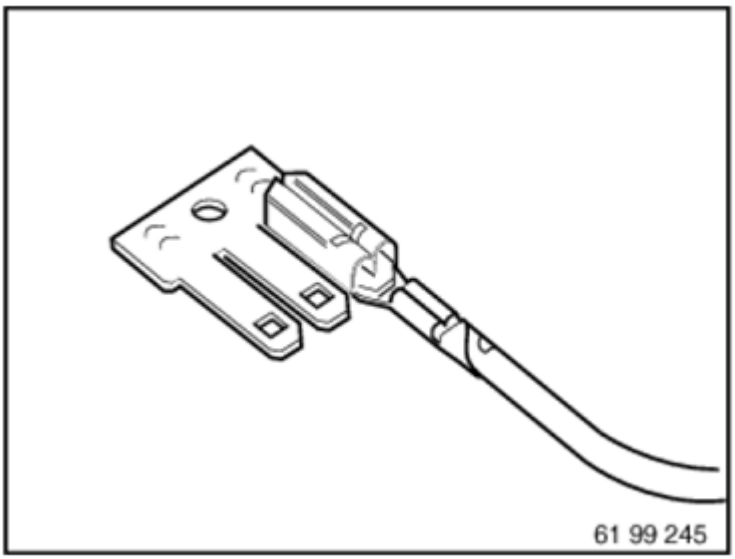


Fig. 171: Identifying Contact Sleeve On Fan Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Installation in wet area (engine compartment, wheel arch)

Apply sealing compound on both sides and press into contacts (1).

Fit shrink-fit hose and heat up with hot air blower (2) (approx. 250 °C).

NOTE: Ensure that fan connector has sufficient contact surface on mounting point.

Do not heat shrink-fit hose on edges of fan connector too strongly, risk of cracking.

Allow shrink-fit hose to cool down until hand-warm. Then press sealing material again into contacts and onto edges of fan connector.

If necessary, carefully heat shrink-fit hose again.

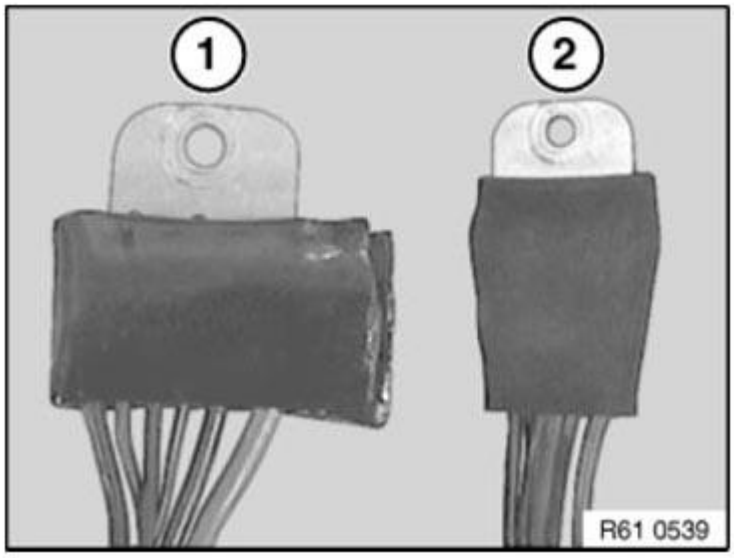


Fig. 172: Identifying Shrink-Fit Hose With Contacts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation in dry area (interior, luggage compartment)

Slide assembled fan connector into insulation housing until it locks into place.

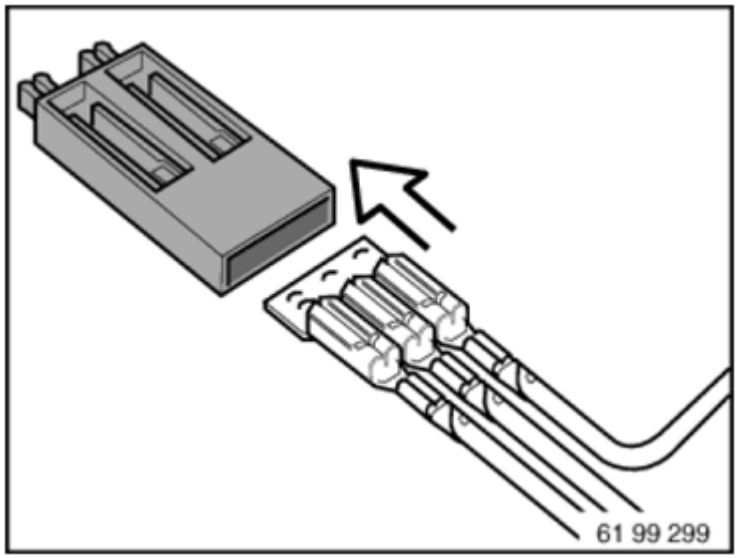


Fig. 173: Sliding Assembled Fan Connector Into Insulation Housing
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

Notes

SPECIAL TOOLS DESCRIPTION CHART

Abbreviations of contacts and what they mean:	
ELA	**Strand seal**
D 1.5/2.5/3.5	**Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter**
MDK	**Miniature double flat spring contact**
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact

IMPORTANT: The contacts can be changed on ultrasonically welded plugs (1).

Ultrasonically welded plugs (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

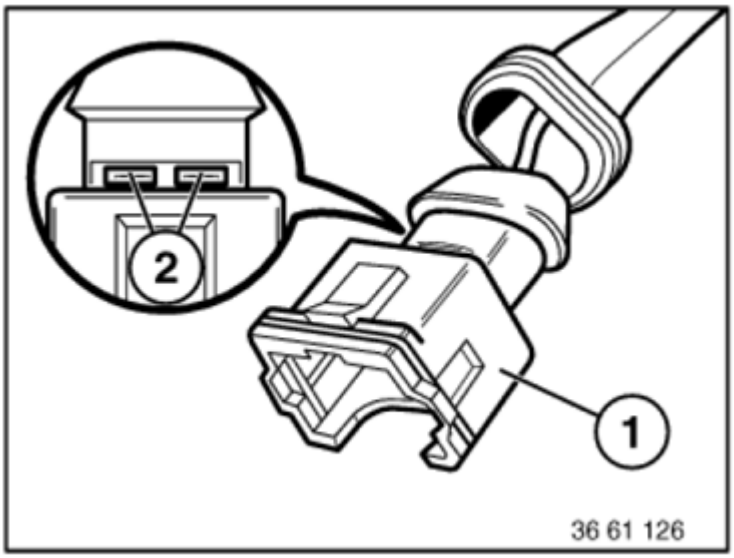


Fig. 174: Identifying Ultrasonic-Welded Connectors With Welds
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Special tools referred to in the repair instructions below are contained in the following special tool kits:**

- **Release and pressing-off tool 61 1 150**

  will be replaced on 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)

- **Release and pressing-off tool 61 1 100 (engine)**

Repair instructions for opening plug housings and removing contacts of different plug systems

Plug system D 1.5/D 2.5

- **CIRCULAR PLUGS, 7-, 8-PIN, SYSTEM D 2.5**
- **CIRCULAR CONNECTOR, 13-PIN, SYSTEM D2.5**
- **CIRCULAR CONNECTOR, 20-PIN, SYSTEM D2.5**
- **CIRCULAR CONNECTORS, 4-, 7-, 10- 12-, 25-PIN, SYSTEM D1.5/D2.5**
- **INLINE CONNECTORS, 15-PIN, SYSTEM D2.5**
- **INLINE PLUGS, 8-, 12-PIN, SYSTEM D2.5**
- **IN-LINE CONNECTORS, 30-PIN, SYSTEM D2.5**

- **IN-LINE PLUGS, 20-PIN, SYSTEM D2.5**

Plug system JPT/MDK/DFK

- **IN-LINE PLUGS, 2-PIN, SYSTEM JPT ELA**
- **IN-LINE CONNECTORS, 2-PIN, SYSTEM MDK 3PLUS 2.8**
- **IN-LINE PLUGS, 4-PIN, SYSTEM DFK ELA**

Plug system Elo/Elo Power

- **INLINE PLUGS, 4-, 10-PIN, SYSTEM ELO**
- **IN-LINE PLUGS, 6- TO 50-PIN, SYSTEM ELO**
- **IN-LINE CONNECTORS, 3-, 6-PIN, SYSTEM ELO-POWER 2.8**

Plug system LSK

- **CONNECTOR HOUSING, LCC CONTACT (LOAD CURRENT CONTACT)**

Plug system MQS/MPQ

- **INLINE CONNECTORS, 6-, 8-PIN, SYSTEM MQS**
- **INLINE PLUGS, 2-PIN, SYSTEM MPQ 2.8**
- **CONTROL UNIT CONNECTORS, 25-, 35-, 55-, 83-, 88-PIN**
- **IN-LINE PLUGS, 24-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSING 42-, 43-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSINGS, 2X21-, 2X27-PIN, HYBRID SYSTEMS MQS/MPQ, ELO/ELO POWER**
- **IN-LINE CONNECTORS, 30-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSINGS, 5-PIN, 8-PIN, SYSTEM MQS/MPQ**
- **SOCKET HOUSING (RADIO CONNECTOR), HYBRID SYSTEM MQS/MPQ**

61 00... NOTES ON HANDLING OPTICAL FIBRES

IMPORTANT: To avoid damage when handling optical fibres, comply with the following points:

- **The minimum permitted bending radius is 25 mm**
- **Do not subject optical fibres to compressive and tensile load**
- **Protect optical fibres against the effects of heat > or =85 °C (e.g. during welding work, drying work with infrared heater or hot air blower)**
- **Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary**

NOTE: The optical fibres are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Y ellow = ISIS (I ntelligent S afety and I ntegration S ystem) fiber-optic cable**
- **Orange=repair fibre-optic cables**

Follow instructions for processing cables and optical fibres. See **6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** and **6113... CRIMPING OPTICAL FIBRES**.

61 00... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- Green = **MOST** (**M** edia **O** riented **S** ystems **T** ransport) optical fibre
- Yellow = **ISIS** (**I** ntelligent **S** afety **I** ntegration **S** ystem) optical fibre
- Orange=repair fibre-optic cables

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical**

fibre if necessary

- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables: see **TREATING CABLES AND FIBRE-OPTIC CABLES**.

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

61 00... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body components; use edge protection if necessary
- Secure additionally laid cables/lines with cable straps

The following additionally applies

Shielded lines

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial line

- Shielded RTK031 coaxial lines may only be repaired with special crimping tool for repairing the coaxial line RTK031.

CVBS lines

- CVBS lines may not be repaired.
- CVBS lines must be replaced in their entirety.

HSD lines

- HSD lines may not be repaired.
- HSD lines must be replaced in their entirety.

Optical fibre cable:

NOTE: Optical fibre cables are colored differently as follows:

- Green = **MOST** (**M** edia **O** riented **S** ystems **T** ransport) optical fibre
- Yellow = **ISIS** (**I** ntelligent **S** afety **I** ntegration **S** ystem) optical fibre
- Orange = repair optical fibre cables

IMPORTANT:

- **Optical fibre cables are permitted to show only one separation point (bridge), replace optical fibre cables if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid influence of heat > or = 85 °**

Treating cables and optical fibre cables

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

NOTE:

- **The line is a twisted cable. If possible, maintain twist in line after repair.**

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables Z

61 31 137 REMOVING AND INSTALLING/RENEWING USB INTERFACE CONNECTING SOCKET

Necessary preliminary work:

- Remove **SWITCH FOR FRONT PASSENGER AIRBAG DEACTIVATION**

NOTE: Open glove box

Disconnect plug connection (1).

Unlock retaining clips (2) on left/right.

Press out USB interface connecting socket (3) in direction of arrow.

Installation note:

Retaining clips (2) must not be damaged.

Make sure USB interface connecting socket (3) is correctly seated.

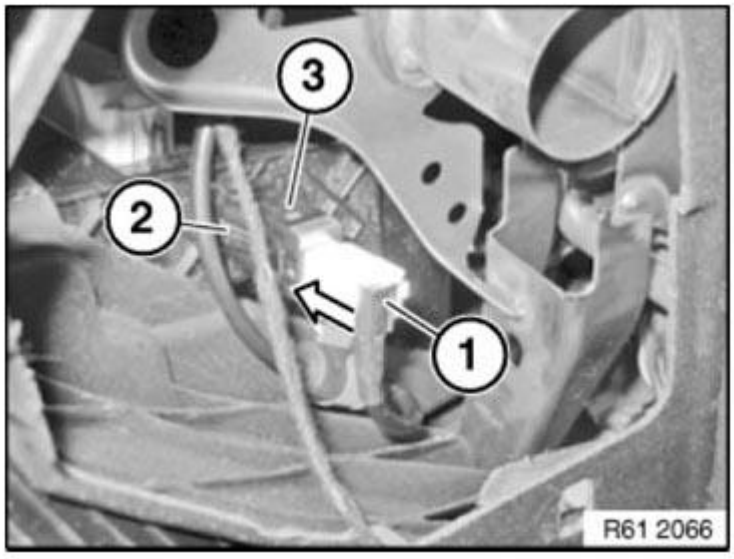


Fig. 175: Pressing Out USB Interface Connecting Socket
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 050 REMOVING AND INSTALLING/REPLACING POWER DISTRIBUTION BOX IN PASSENGER COMPARTMENT

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary work

- Disconnect **NEGATIVE BATTERY CABLE**
- Remove both battery cables at F03

- Remove **RIGHT GLOVE BOX WITH HOUSING**

Release screw (4).

Unlock clamps (5) and remove power distribution box in passenger compartment (2) in direction of arrow.

Disconnect plug connections at the back.

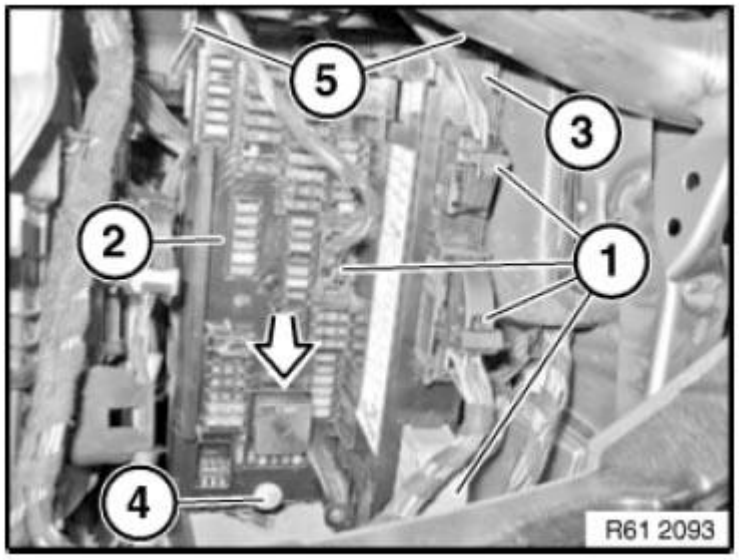


Fig. 176: Removing Power Distribution Box In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove **JUNCTION BOX ELECTRONICS** (3).

Remove fuses.

61 00... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations

Safety regulations for **HANDLING COMPONENTS OF AIRBAG SYSTEM** .

INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .

Procedure for cable repair

In event of non-visible damage to wiring harness

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of them being mixed up! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in car parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the connectors and shrink-fit hoses in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colors. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

- **CUTTING OFF AND INSULATING CABLES**
- **REPAIRING A PLUG CONNECTION USING CONNECTORS**
- **INSTALLING AND REMOVING CONTACTS**

In event of visible damage

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair lead in car parallel to existing airbag lead up to cutting point. Cut off excess length of repair lead. Twist open cables. Connect cables with connectors and shrink-fit hoses in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

- **CUTTING OFF AND INSULATING CABLES**
- **REPAIRING A PLUG CONNECTION USING CONNECTORS**
- **INSTALLING AND REMOVING CONTACTS**

61 13 042 REPLACING POWER DISTRIBUTION BOX (LUGGAGE COMPARTMENT)

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary work

- Clamp off **BATTERY NEGATIVE LEAD**
- Disconnect both negative battery cables at F03
- Remove **FLAP IN LUGGAGE COMPARTMENT TRIM PANEL** on right
- If necessary, remove right **WHEEL ARCH PANEL** (at F01/F02/03)

Disconnect plug connection (1).

Unscrew nuts (2).

Remove power distribution box (3).

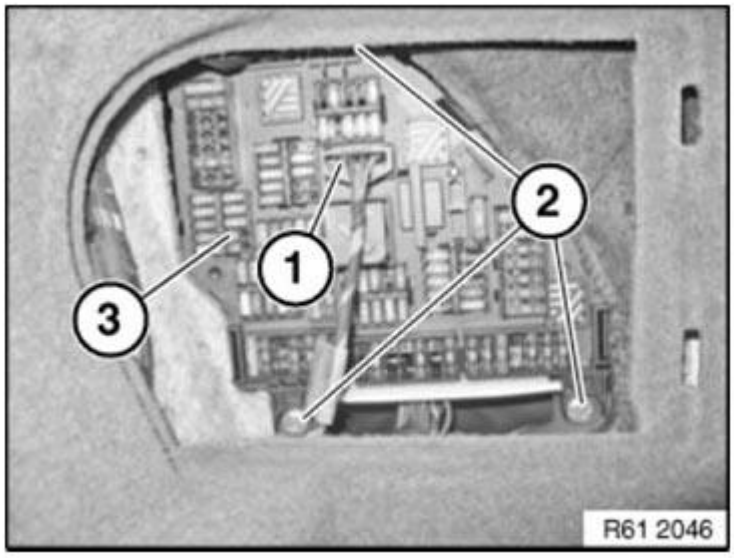


Fig. 177: Identifying Power Distribution Box With Plug Connection And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect all plug connections.

Remove power distribution box (1).

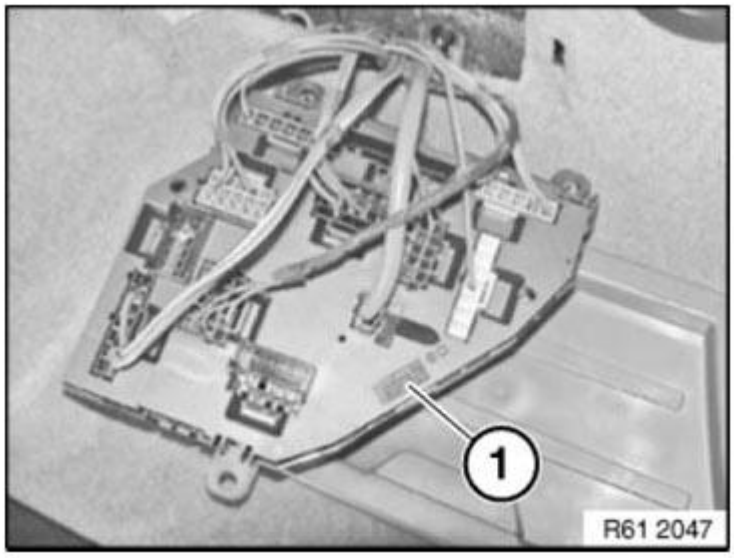


Fig. 178: Identifying Power Distribution Box
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... SPECIAL TOOLS FOR WIRING HARNESS REPAIRS

Notes

Repair range, vehicle electrical system

Single parts for wiring harness repairs*

* Sourcing reference: BMW Parts Department

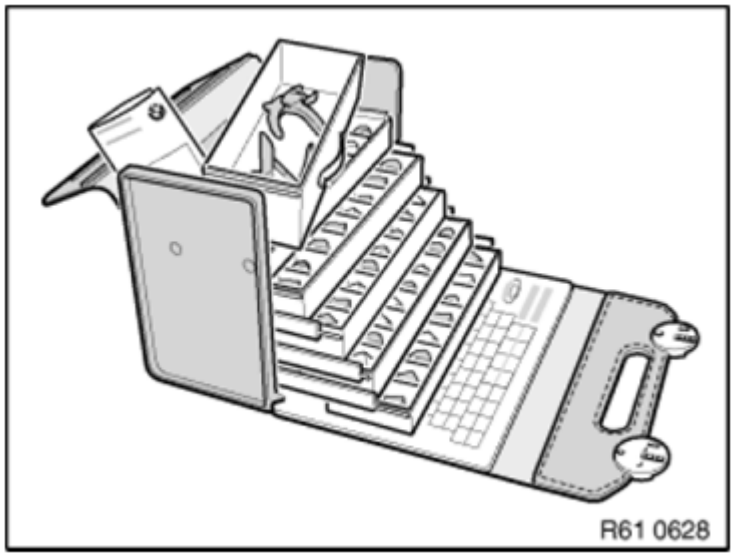


Fig. 179: Identifying Special Tools For Vehicle Electrical System Repairing

Courtesy of BMW OF NORTH AMERICA, INC.

Release and press-out tool

- Special tool **61 0 300**
- Special tool 61 0 400 (MINI N12/N14)
- Special tool 61 1 100 (engine)

Handling:

- **INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS** of different plug contact systems



Fig. 180: Identifying Special Tool (61 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Cutting to length and stripping insulation from cables

Wire stripper MultiStrip10*

*Sourcing reference

Handling:

- **CUTTING CABLES TO LENGTH AND STRIP INSULATION**

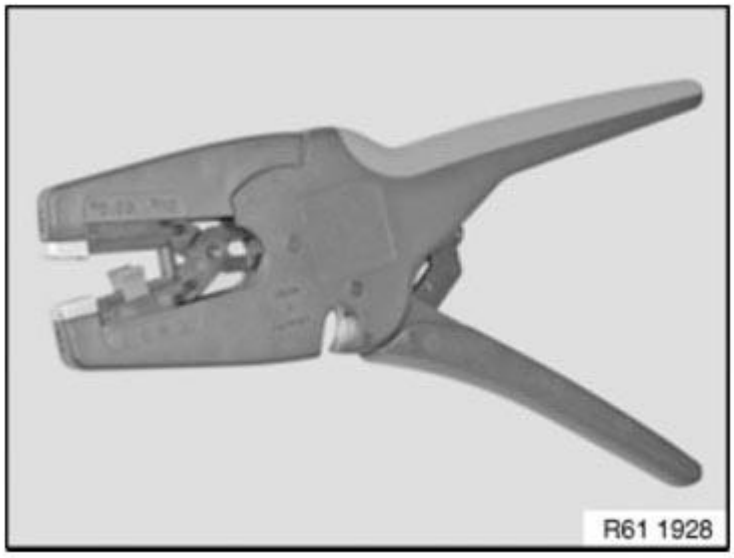


Fig. 181: Identifying Plier
Courtesy of BMW OF NORTH AMERICA, INC.

Crimping stop parts (small contacts) and butt connectors

- Special tool **61 4 320**

1. Tool without crimping head
2. Crimping head **(STRIPPING INSULATION AND CUTTING FIBRE-OPTIC CABLES TO LENGTH)**
3. Crimping head **(CRIMPING FIBRE-OPTIC CABLE CONTACTS)**
4. Crimping head **(CRIMPING MQS CONTACTS)**
5. Crimping head **(CRIMPING MPQ CONTACTS)**

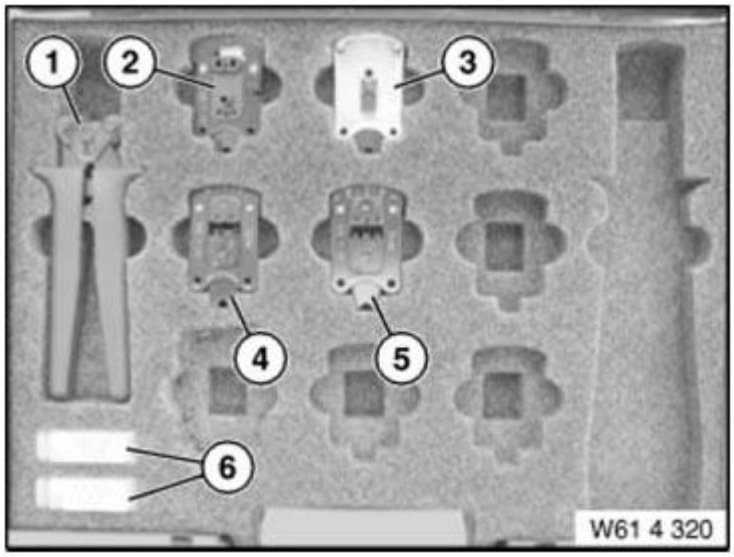


Fig. 182: Identifying Crimping Heads
Courtesy of BMW OF NORTH AMERICA, INC.

6. Replacement blade (face-cutting fibre-optic cables)
7. Replacement blade with tool (insulation stripping unit)
8. Universal crimping head

Crimping stop parts (large contacts) and butt connectors

- Special tool **61 0 200** (crimping set)
- Special tool **61 0 210** (matrix set SLK 8)
- Special tool **61 0 220** (matrix set SLK 2.8)
- Special tool **61 0 230** (matrix set MAK 8/DFK4)
- Special tool **61 0 240** (butt connector 4.0 - 6.0 mm^2)

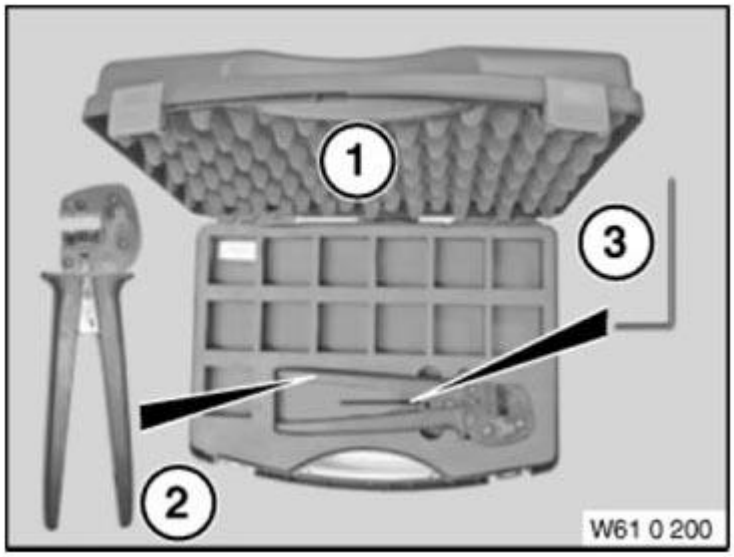


Fig. 183: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

61 13... TREATING CABLES AND FIBRE-OPTIC CABLES

Notes

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool kits:

SPECIAL TOOLS DESCRIPTION CHART

Crimping set with pliers for fibre-optic cables, Micro Power Quadlock (MPQ), Micro Quadlock System (MQS) contacts and universal crimping head	**61 4 320** **61 0 200**

Subject of repair instructions

- **SPECIAL TOOLS FOR WIRING HARNESS REPAIRS**
- **CUTTING CABLES TO LENGTH AND STRIP INSULATION**
- Crimping stop parts (contacts): see **6113... CRIMPING STOP PARTS**
- **BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION**
- **COMB CONNECTOR FOR RETROFITTING/REPAIRS**
- Cutting to length and stripping insulation from optical fibres and crimping optical fibres: see **6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** and **6113... CRIMPING OPTICAL FIBRES**.

6114 DISTRIBUTION BOX, POWER SUPPORT POINTS

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary work

- Disconnect **BATTERY CABLE**

Fold up covers (1). Unscrew nuts (2).

Tightening torque **61 21 2AZ** .

Unscrew nut (3).

Tightening torque **61 21 3AZ** .

Disconnect plug connection (4).

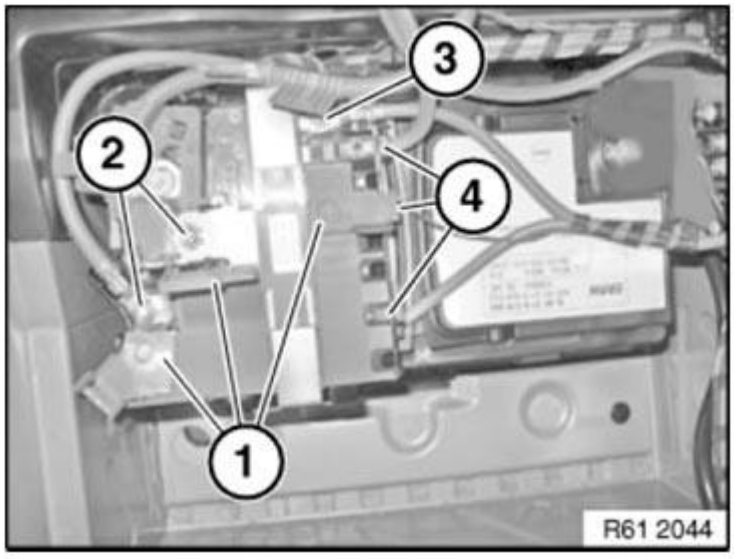


Fig. 184: Identifying Battery Cover, Nuts And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking brackets (1) downwards and unclip in direction of arrow.

If necessary, using a screwdriver, expand locking bracket (1) at lower end and clip out.

Remove distribution box (2) towards top.

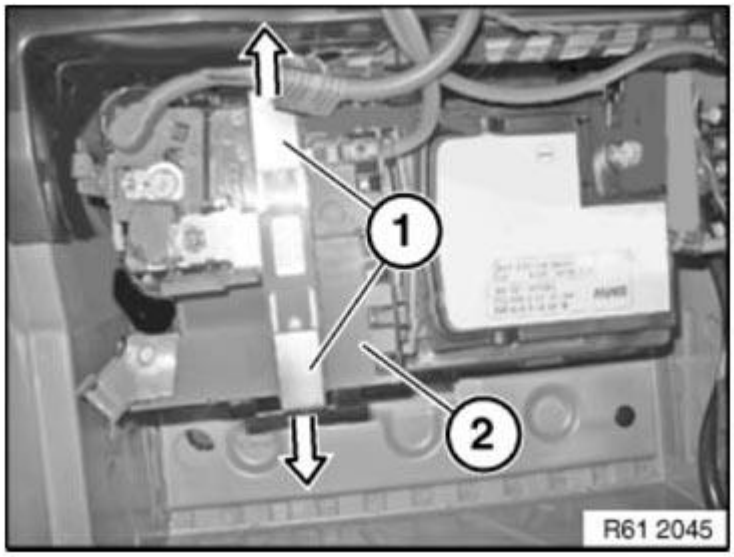


Fig. 185: Pressing Locking Brackets
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 042 REPLACING POWER DISTRIBUTION BOX (LUGGAGE COMPARTMENT)

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary work

- Clamp off **BATTERY NEGATIVE LEAD**
- Disconnect both negative battery cables at F03
- Remove **FLAP IN LUGGAGE COMPARTMENT TRIM PANEL** on right
- If necessary, remove right **WHEEL ARCH PANEL** (at F01/F02/03)

Disconnect plug connection (1).

Unscrew nuts (2).

Remove power distribution box (3).

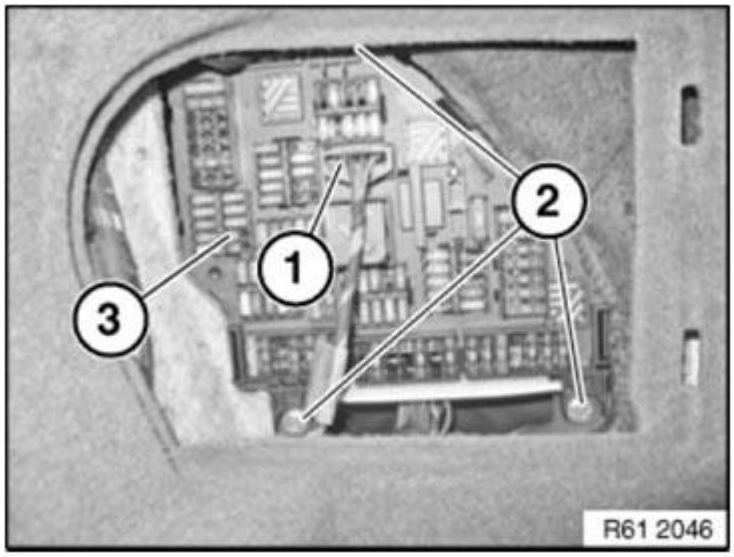


Fig. 186: Identifying Power Distribution Box With Plug Connection And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect all plug connections.

Remove power distribution box (1).

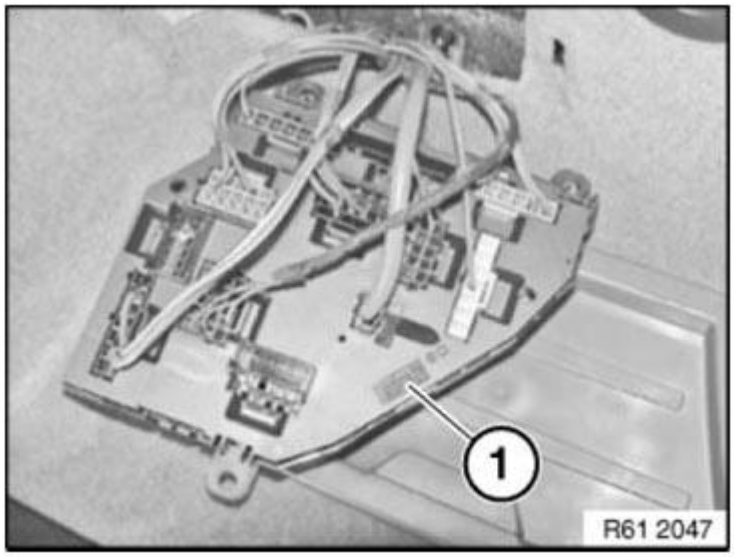


Fig. 187: Identifying Power Distribution Box
Courtesy of BMW OF NORTH AMERICA, INC.

6120 BATTERY

61 20... (SAFETY) INFORMATION ON AGM BATTERY

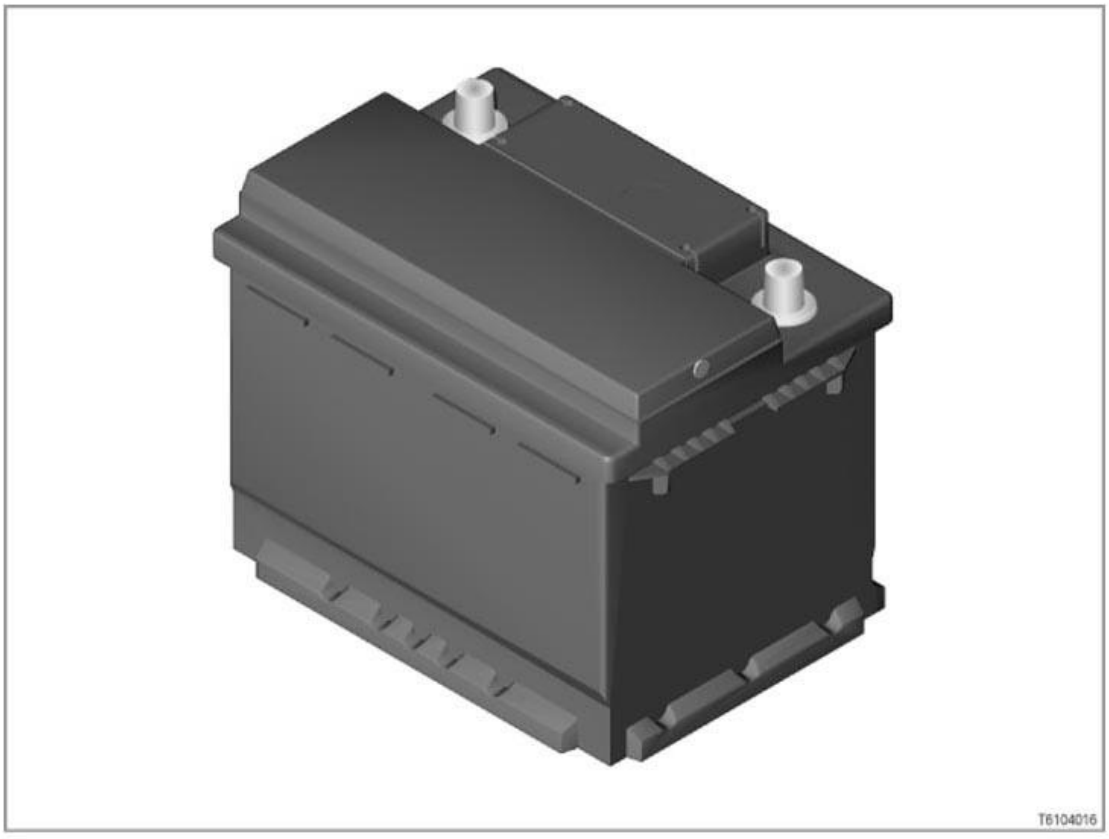


Fig. 188: Identifying AGM Battery
Courtesy of BMW OF NORTH AMERICA, INC.

Introduction

In September 2002, the first so-called VRLA batteries, better known as **AGM batteries** came into use. (VRLA means **V** alve **R** egulated **L** ead **A** cid, i.e. lead acid battery with pressure relief valve; **AGM stands for A** bsorbent **G** lass **M** at, i.e. absorbent glass-fibre fleece)

The constantly increasing energy demand of modern vehicle electrical systems calls for ever more powerful battery solutions. A modern luxury-class vehicle has some 100 actuator motors that have to be fed with electrical current. Added to these are safety, environmental and comfort and convenience elements which are increasingly becoming standard features, such as e.g. Anti-lock Brake System (ABS), Dynamic Stability Control (DSC), electric steering effort assistance (EPS), heated catalytic converter, electronic chassis and suspension control, air conditioning and navigation system. Current consumption is considerable even when the vehicle is not in use.

The somewhat higher price compared with a battery of similar size is fully balanced by the following benefits:

- greatly longer service life
- improved starting reliability at low temperatures
- reliable starting of engines with high starting current requirements, e.g. high-performance diesel engines

- 100 % freedom from maintenance
- low risk in the event of an accident (reduced environmental risk)

Service life of AGM batteries

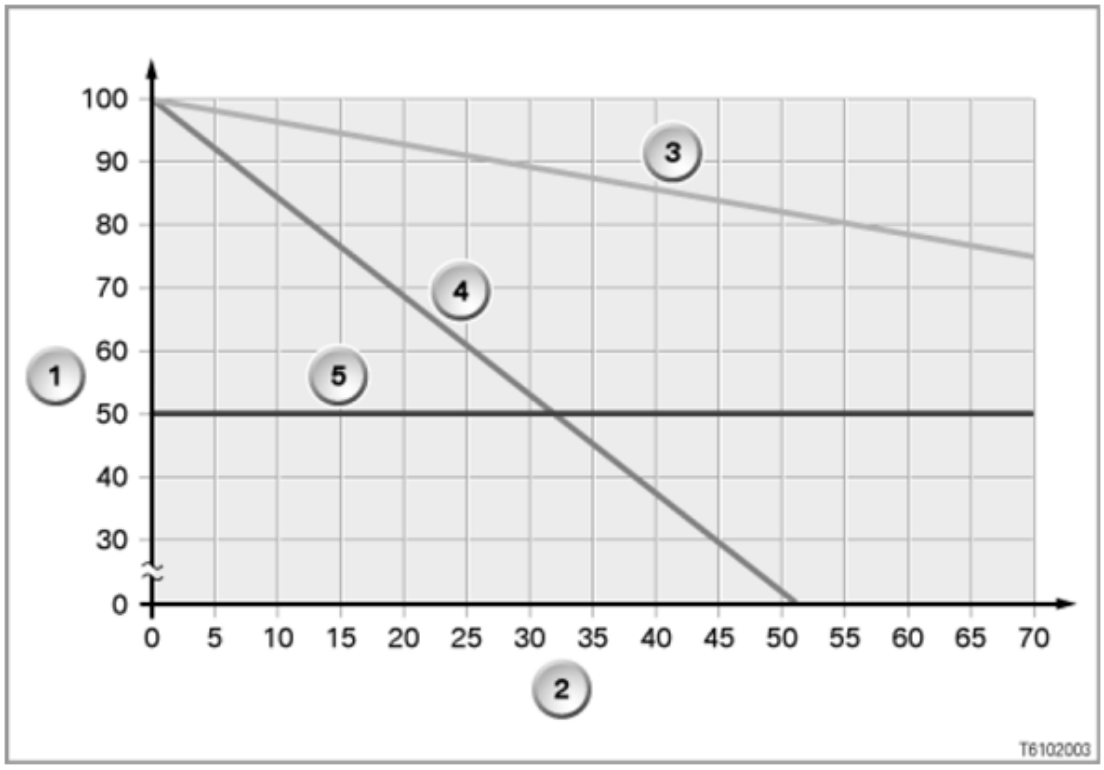


Fig. 189: Service Life Of AGM Batteries
Courtesy of BMW OF NORTH AMERICA, INC.

BATTERY CAPACITY

Item	Description	Item	Description
1	Available capacity [%]	2	Mileage [thousand km]
3	AGM battery	4	Lead-calcium battery
5	50 % capacity limit		

In contrast to conventional lead-calcium batteries, the sulfuric acid in a battery with fleece technology is not held freely in the battery housing. Rather, 100% of the sulfuric acid is bound into the mats of the glass-fibre fleece (separators). For this reason, no acid can escape if the battery housing is damaged. In addition, the AGM battery is sealed to be airtight. This is possible because the gases are converted back into water as a result of the separator permeability.

Brief component description

An AGM battery can be recognized by its black housing and the lack of a so-called "Magic Eye".

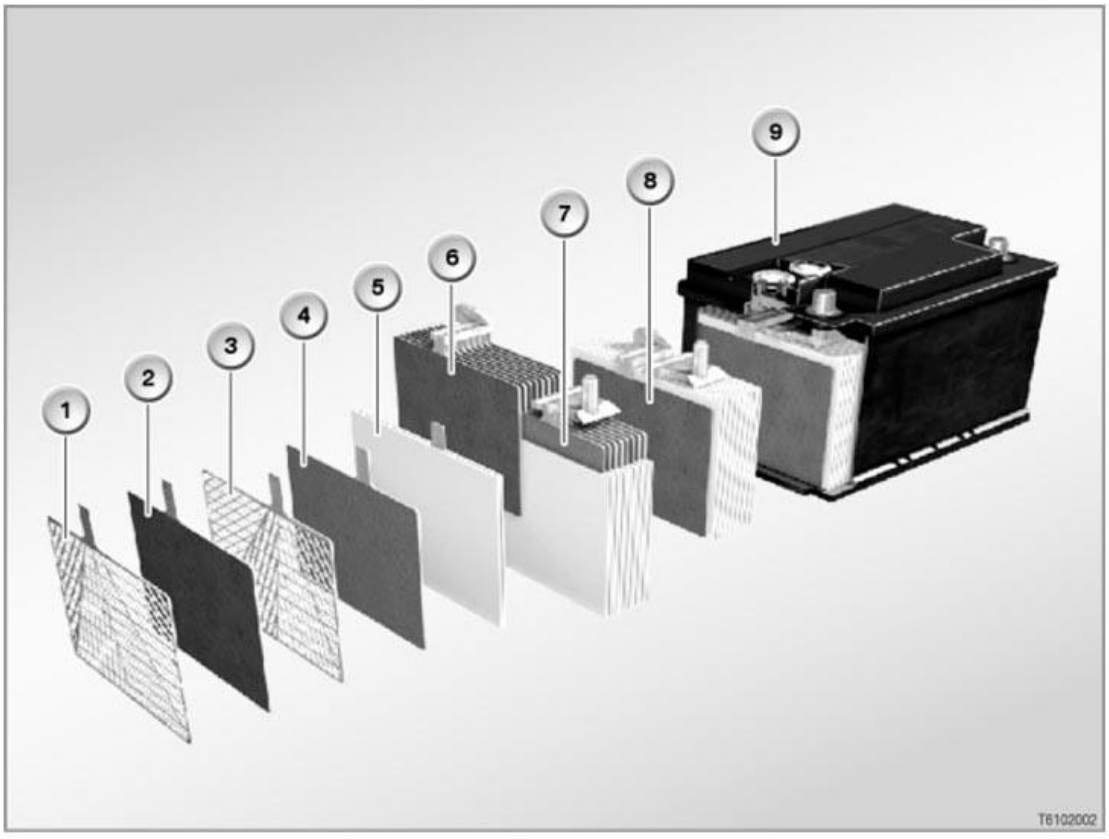


Fig. 190: Identifying AGM Battery Components
Courtesy of BMW OF NORTH AMERICA, INC.

AGM BATTERY REFERENCE CHART

Item	Description	Item	Description
1	Positive grille with silver alloy	2	Positive plate
3	Negative grille	4	Negative plate
5	Separator made of glass-fibre fleece	6	Set of positive plates
7	Set of negative plates	8	Block of plates
9	Block box with base strips		

Construction

The AGM battery differs from the conventional lead calcium battery as follows:

- larger plates: Larger plates allow a 25% larger power density.
- Separators made of glass-fibre fleece: These can cause an up to 3-times higher cycle stability to be reached. This improves the cold starting capability, the power consumption and service life.
- Airtight housing with pressure relief valve (please refer to "How it works"):

The inspection plugs are sealed and can not be opened.

- Battery acid bound in glass-fibre fleece: Battery acid is not found free in the housing as before, but is rather bound 100% in the glass-fibre fleece. This gives increased security against the acid escaping and thus reduces the environmental risk.

How it works

The AGM battery differs from conventional batteries in its non-polluting and substance-retaining behavior during charging.

When a vehicle battery is charged, the electrolysis process emits the gases oxygen and hydrogen.

- In a conventional wet lead calcium battery, the two gases hydrogen and oxygen are dissipated into the atmosphere.
- In an AGM battery, the two gases are converted back into water: The oxygen which is created at the positive electrode during charging passes through the permeable glass fibre fleece to the negative electrode. At the negative electrode the oxygen reacts with the arriving hydrogen ions in the electrolyte to form water (oxygen cycle).

In this manner, the gas, and thus the electrolyte, is not lost.

Only in the event of an excessively heavy build-up of gas, i.e. excessively high pressure build-up (20 to 200 mbar), does the pressure relief valve discharge the gas. In this process, the pressure relief valve does not allow any oxygen in the air to enter. Because the pressure in the battery is regulated by a valve, the AGM battery is also known as the VRLA battery (valve-regulated lead acid).

Notes for Service department

It is necessary when handling an AGM battery to observe some particular points pertaining to battery changing and installation location.

Charging

WARNING: Do not charge the AGM battery with > or = 15.2 V. Do not use rapid-charging programs!

When charging removed batteries (so-called stand-alone batteries), do not exceed the maximum charging voltage of 15.2 V at room temperature. Also, for charging via positive battery connection point the maximum charging voltage of 15.2 volt at room temperature must not be exceeded. The batter can be damaged even with short charging of the AGM battery with a charging voltage higher than 15.2 volts. A charging voltage of more than 15.2 V is usually used in quick-charging routines.

Installation location

WARNING: Do not install the AGM battery in the engine compartment.

The AGM battery must not be installed in the engine compartment on account of the high spatial temperature differences, otherwise its service life will be significantly shortened.

Housing

WARNING: Do not open AGM batteries.

On no account may AGM batteries be opened, as the ingress of oxygen from the atmosphere would cause the battery to lose its chemical balance, rendering it unserviceable.

61 20... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular engine types and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents a possible short circuit.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery replacement

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, there will always be only one work scope provided that is permitted by the current status of information.

If the performance readiness drops below a defined minimum, a Check Control message will be generated to advise the driver that the battery must be replaced.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

NOTE: Only this registration/logon will ensure that the corresponding Check Control message will go out again.

system:

Register battery replacement

- Service functions
- Body
- Voltage supply
- Register battery replacement
- Test plan

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting

61 20 908 CARRYING OUT BATTERY "POWER RESET"

IMPORTANT: Observe SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY .

The following steps must be carried out for a "power reset"

- Switch off and disconnect battery charger
- Turn off ignition

  Vehicles with ID transmitter:

  Remove identification sensor from slot

  Vehicles with comfort access system: Make sure terminal is in 0 position

- Disconnect battery negative terminal
- Reconnect battery negative terminal (to ensure bus activity)
- Waiting time (5- -10 seconds)
- Disconnect battery negative terminal
- Waiting time (1 minute)
- Connect battery negative terminal and tighten, tightening torque **61 21 1AZ**
- Connect and switch on battery charger
- Switch on ignition.

61 20 900 DISCONNECTING AND CONNECTING NEGATIVE BATTERY CABLE

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Follow instructions FOR DISCONNECTING AND CONNECTING BATTERY !

Observe notes on POWER SUPPLY /on intelligent battery sensor (IBS).

Necessary preliminary work

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

  F07 only:

- Remove spare wheel well trim panel

  F11 only:

- Raise cargo area floor

Loosen nut (1).

Tightening torque **61 21 1AZ** .

IMPORTANT: Do not under any circumstances use force to pull off negative terminal.

Detach battery earth lead with IBS towards top, lay to one side and secure.

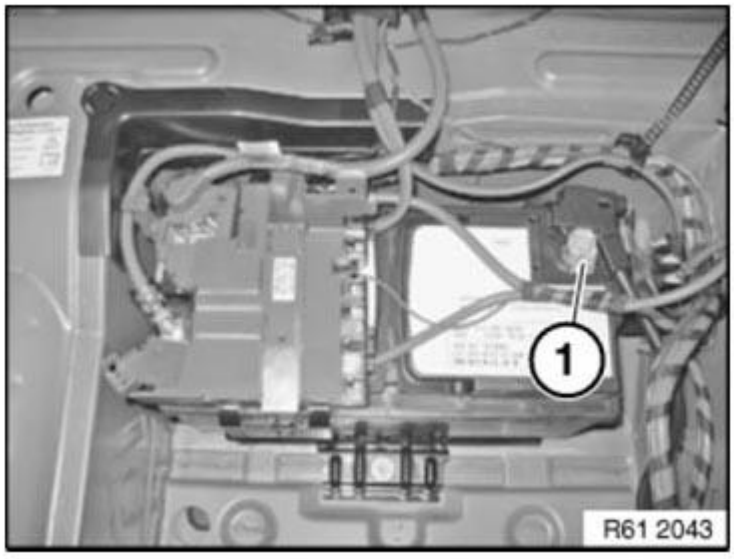


Fig. 191: Identifying Battery Nut
Courtesy of BMW OF NORTH AMERICA, INC.

61 12... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

NOTE: Do not connect the charger to the 12 V charging socket.

The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the power supply be registered by the vehicle.

WARNING: Danger of destruction in event of mechanical strain

- **Do not introduce any additional connections at the battery negative terminal.**
- **Do not modify the grounding cable. The grounding cable also serves to dissipate heat.**
- **Do not establish any connection between the IBS and the sensor screw.**
- **Do not use force when disconnecting the pole shoe from the battery terminal:**
  - **Do not pull on the grounding cable.**
  - **Do not place any tools under the IBS to lever off the pole shoe.**
- **Do not use IBS connections as levers.**
- **Use a torque wrench and set tightening torque in accordance with repair instructions.**
- **Do not release or tighten down sensor screw (screw with Torx head).**
- **Avoid contact between IBS and ground.**

WARNING: Danger of destruction to IBS and cables when battery is replaced

- **The IBS and the cables can be destroyed by mechanical strain when the battery is replaced. Therefore avoid mechanical strain.**
- **The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).**
- **Use the battery size (capacity) installed as standard when replacing the battery.**
- **Register battery replacement via Service functions in diagnosis system.**
- **Delete fault entries in the Digital Engine Electronics (DME) associated with battery replacement.**
- **Always proceed in accordance with the repair instructions.**

NOTE: Battery draining possible in spite of the intelligent battery sensor IBS being

fault-free.

- A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- **For this reason, only replace the IBS when a corresponding fault entry in the DME or DDE.**

61 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe **SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY** .

Before disconnecting battery:

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

IMPORTANT:

- **There is a danger of mixing up battery leads: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.**
- **The on-board computer and clock may lose your data.**

General notes on disconnecting battery

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

  Do not under any circumstances pull/lever off pole shoes by force.

  Do not under any circumstances release socket-head cap screw of IBS.

- Disconnect terminal of **BATTERY NEGATIVE LEAD** from vehicle battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque **61 21 1AZ** .

After connecting battery

IMPORTANT: The scope of application of some systems may be restricted after a power supply interruption.

Likewise, individual settings may be lost.

Settings or activations must be carried out, depending on the equipment specification.

For example:

- **If necessary, carry out ADJUSTMENT OF ACTIVE STEERING**
- **If necessary, activate SLIDE/TILT SUNROOF**
- **If necessary, activate power windows. See NOTES ON INITIALIZING POWER WINDOW REGULATOR .**

Refer to the diagnosis system for further vehicle-specific information.

12 00... NOTES/INFORMATION ON START ASSISTANCE (JUMP STARTING)

Do not start the engine with help of starting sprays.

Preparation

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.
- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

IMPORTANT: Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

IMPORTANT: Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

61 20 503 VEHICLE BATTERY - CLOSED-CIRCUIT CURRENT MONITORING

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary work

- Clamp off **BATTERY NEGATIVE LEAD**
- Disconnect Both negative battery cables

Connect adapter for closed-circuit current measurement..

Connect BMW diagnosis system.

Measure closed-circuit current.

6121 BATTERY/VAPOR SEPARATOR

61 20 908 CARRYING OUT BATTERY "POWER RESET"

IMPORTANT: Observe SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY .

The following steps must be carried out for a "power reset"

- Switch off and disconnect battery charger
- Turn off ignition

  Vehicles with ID transmitter:

  Remove identification sensor from slot

  Vehicles with comfort access system: Make sure terminal is in 0 position

- Disconnect battery negative terminal
- Reconnect battery negative terminal (to ensure bus activity)

- Waiting time (5- -10 seconds)
- Disconnect battery negative terminal
- Waiting time (1 minute)
- Connect battery negative terminal and tighten, tightening torque **61 21 1AZ**
- Connect and switch on battery charger
- Switch on ignition.

61 21 028 CHARGE BATTERY

WARNING: Read and comply with SAFETY INSTRUCTIONS pertaining to vehicle battery.

IMPORTANT: To prevent the intelligent battery sensor from malfunctioning, use the charging points in the engine compartment.

NOTE: Use BMW-recommended charging computers* to charge the battery.

*Sourcing reference BMW Workshop Equipment Catalogue

61 21 010 REMOVE AND INSTALL OR REPLACE BATTERY

WARNING: Observe SAFETY INFORMATION for handling the battery.

To ensure the correct safety and convenience functions, install only the original battery (battery size and type) stored in the vehicle order. **OBSERVE NOTE ON BATTERY REPLACEMENT** .

Necessary preliminary work

- Remove **POWER DISTRIBUTION BOX**

Fold back cover (1) as shown.

Slacken nut (2).

Tightening torque **61 21 1AZ** .

IMPORTANT: Do not under any circumstances pull/lever safety battery terminal off by force.

Detach safety battery terminal towards top, lay to one side and secure.

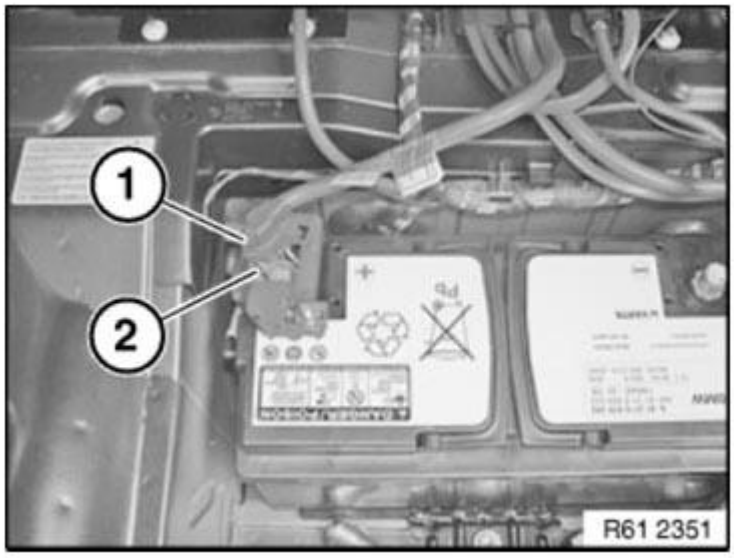


Fig. 192: Identifying Battery Back Cover And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove holder (2).

Tightening torque **61 21 5AZ** .

Detach vent hose from battery.

Pull out battery.

Installation note:

Make sure battery is correctly seated in mounting.

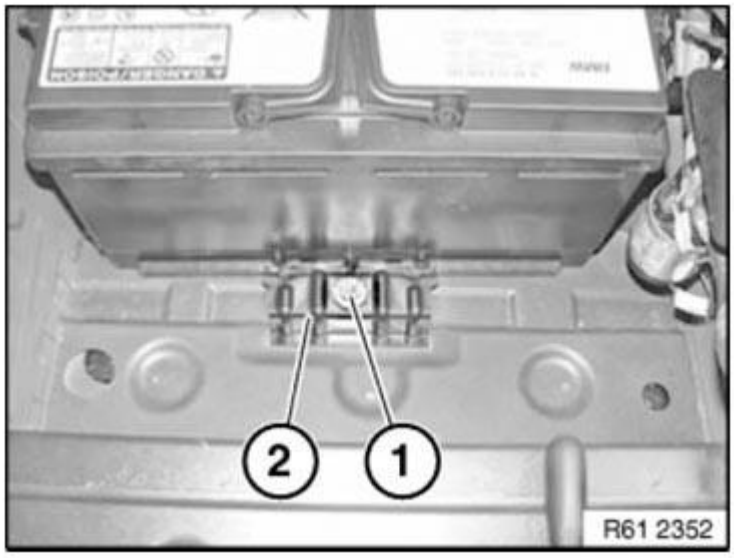


Fig. 193: Identifying Battery Screw And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

1. In vehicles with IBS (intelligent battery sensor)

   REGISTER battery replacement.

2. Read out fault memory, clear if necessary.

NOTE:

- **Check Control message disappears when fault memory is cleared. This requires that the registration is performed first .**

61 21 028 TESTING BATTERY WITH BATTERY TESTER

WARNING: Read and comply with SAFETY INFORMATION pertaining to vehicle battery.

Necessary preliminary work

Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL** .

NOTE: Use BMW-recommended battery tester* to test the battery.

*Sourcing reference BMW Workshop Equipment Catalogue

Procedure:

- Turn off ignition and close doors
- Connect battery tester directly to battery terminals
- Select Battery test and confirm
- Enter vehicle identification number
- Enter battery data
- Carry out battery test



Fig. 194: Identifying BMW-Recommended Battery Tester
Courtesy of BMW OF NORTH AMERICA, INC.

6131 SWITCH

61 31 996 CARRYING OUT STEERING ANGLE SENSOR ADJUSTMENT

IMPORTANT: In vehicles with active steering, steering angle sensor adjustment is integrated in the service function "INITIAL OPERATION/ADJUSTMENT FOR ACTIVE STEERING " and must not be carried out separately!

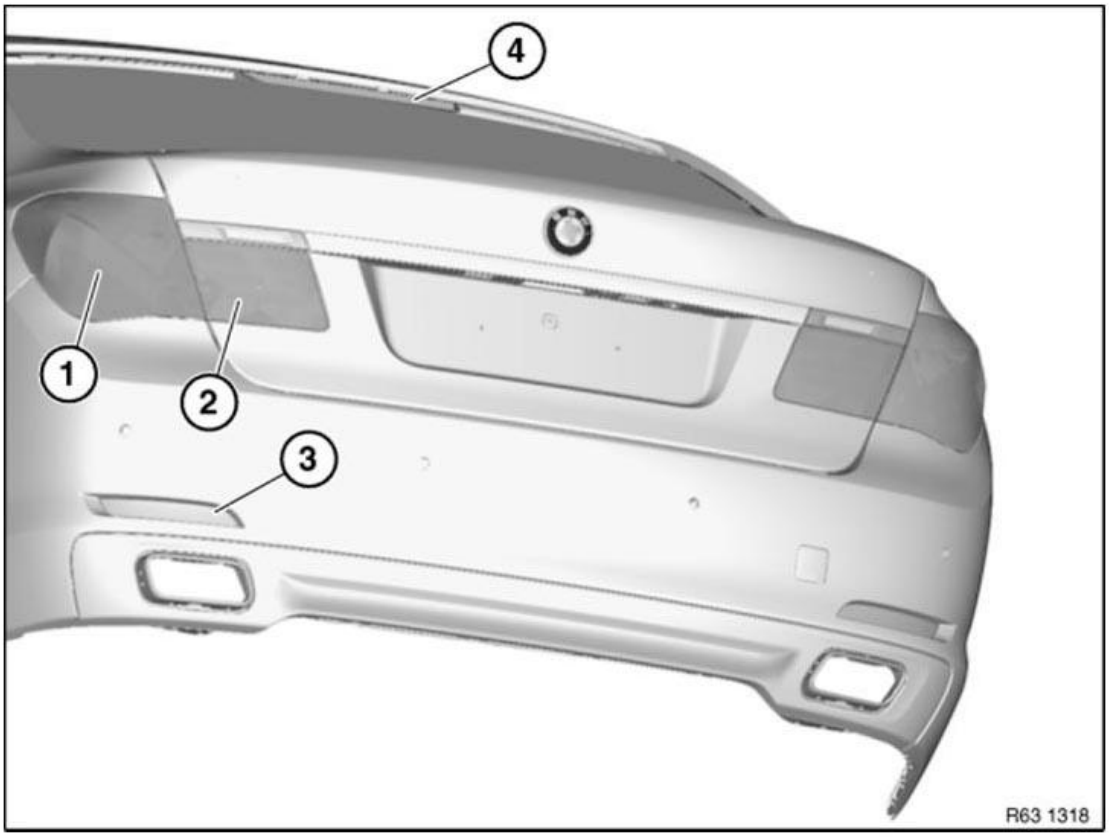
NOTE: Steering angle sensor adjustment must be carried out:

- **after replacement of following components:**
  - **Steering column switch cluster**

Connect vehicle to BMW diagnosis system.

Select and carry out steering angle sensor adjustment under Service functions.

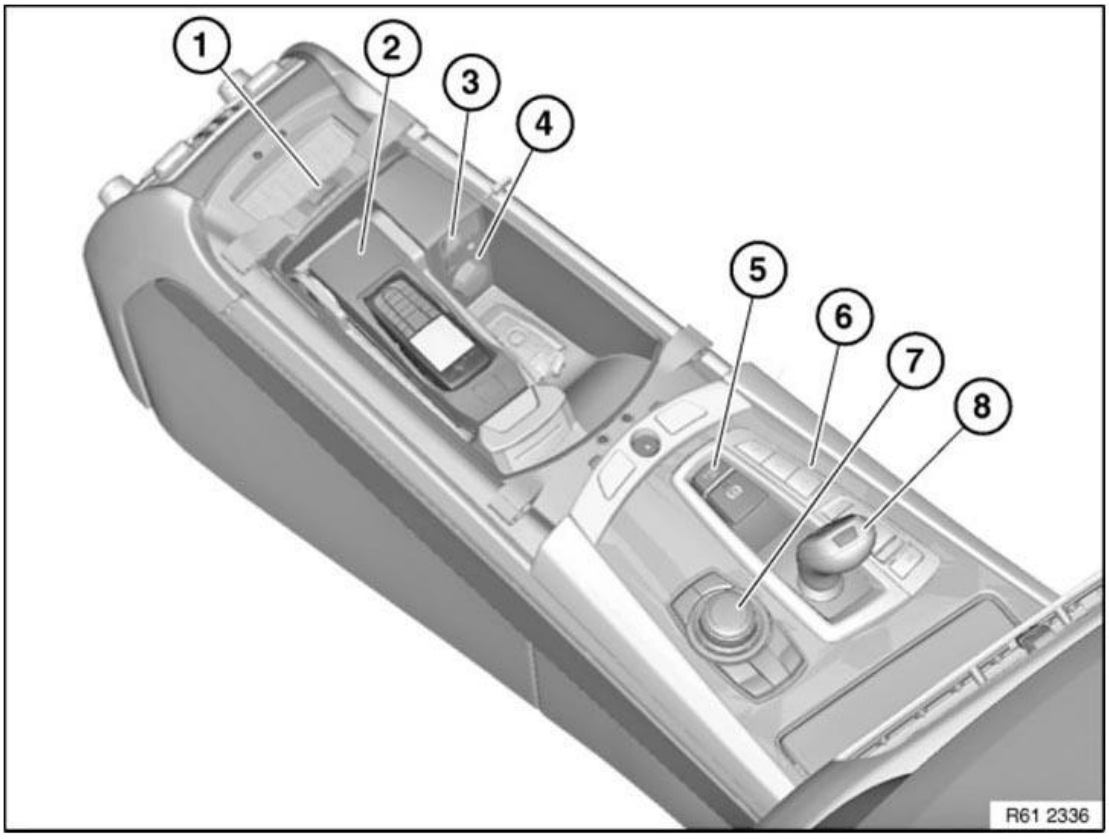
63 21.. OVERVIEW OF REAR LIGHTS



1 Rear light, left (side panel) 2 Rear light, left (on tail panel)
3 Reflector, rear 4 Additional brake light

Fig. 195: Overview Of Rear Lights
Courtesy of BMW OF NORTH AMERICA, INC.

61 31.. OVERVIEW OF SWITCHES IN CENTER CONSOLE/STORAGE COMPARTMENT



1 Switch, hotel setting
2 Base plate
3 LED for centre armrest storage compartment
4 Connecting socket, USB/audio interface
5 Switch for parking brake
6 Centre console operating unit
7 Controller
8 Gear selector switch

Fig. 196: Overview Of Switches In Centre Console/Storage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

51 42... PUNCHING CONTOUR FOR SEAT MEMORY SWITCH INTO REAR DOOR TRIM PANEL

Notes

Necessary preliminary tasks

- Remove **REAR DOOR TRIM PANEL**

Position special tool 51 4 107 or 51 4 108 on the recess in the door trim panel storage compartment (1).

Mark cutouts (2).

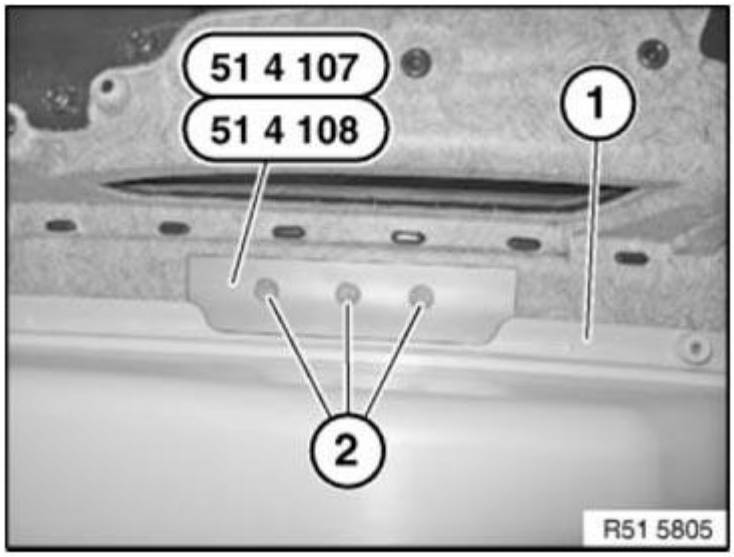


Fig. 197: Identifying Special Tool (51 4 107 Or 51 4 108)
Courtesy of BMW OF NORTH AMERICA, INC.

Use special tool 51 4 109 to punch holed\non the previously marked points in the door trim panel (1).

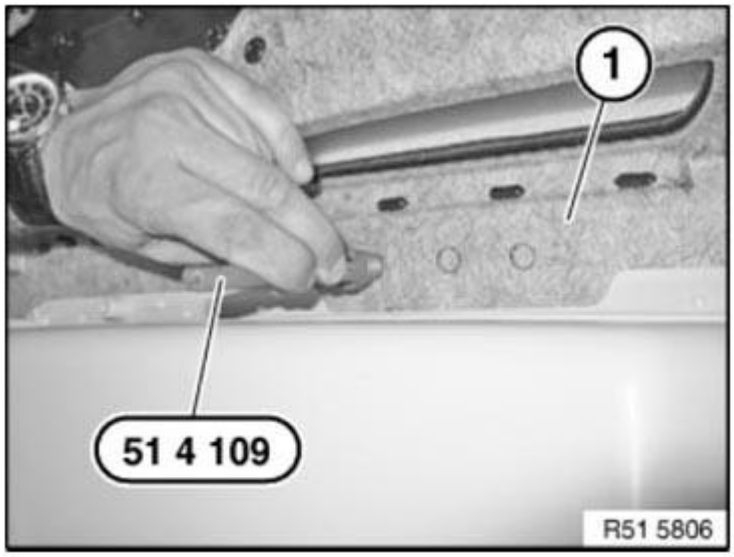


Fig. 198: Punching Hole On Door Trim Panel Using Special Tool (51 4 109)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: For punching work on F01/F02, special tools 51 4 103 and 51 4 104 must be used as the cutting equipment.

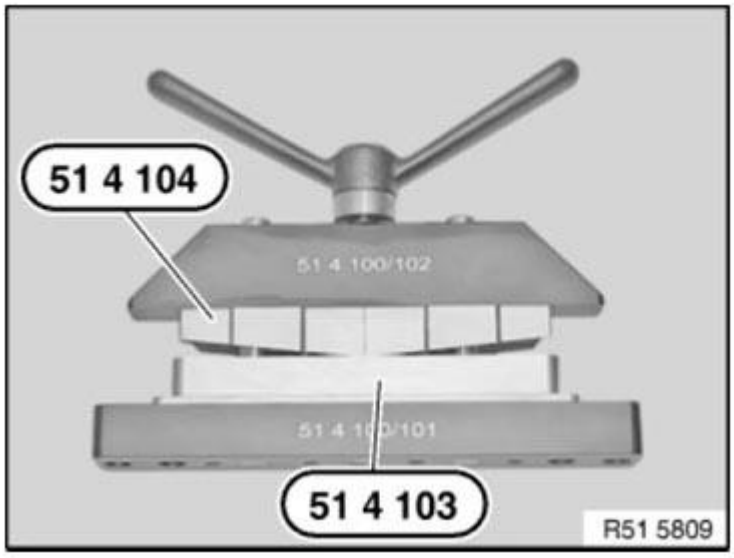


Fig. 199: Identifying Special Tools (51 4 103 And 51 4 104)
Courtesy of BMW OF NORTH AMERICA, INC.

51 4 101 Slide special tool through holes stamped into door trim panel (1).

NOTE: Guide pins of punching tool are coded. Distortion is thus not possible.

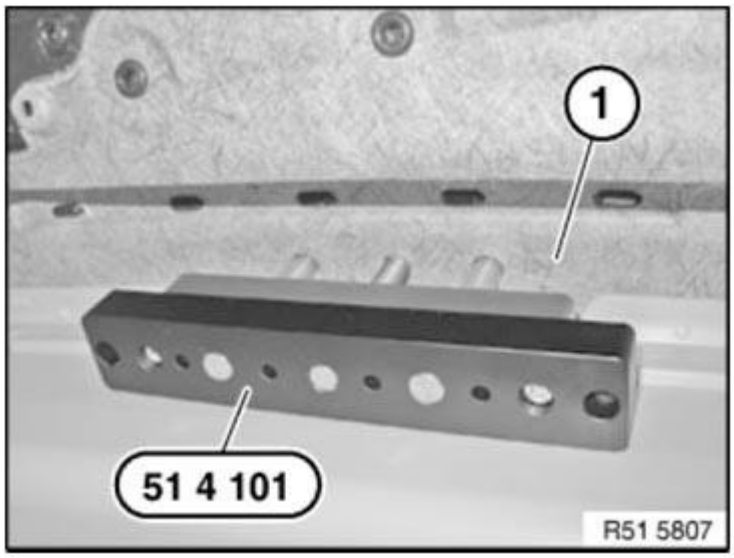


Fig. 200: Sliding Special Tool (51 4 101) Through Door Trim Panel Holes
Courtesy of BMW OF NORTH AMERICA, INC.

51 4 105 Mount special tools and on punching tool 51 4 106(1).

Compress punching tool (1) via spindle.

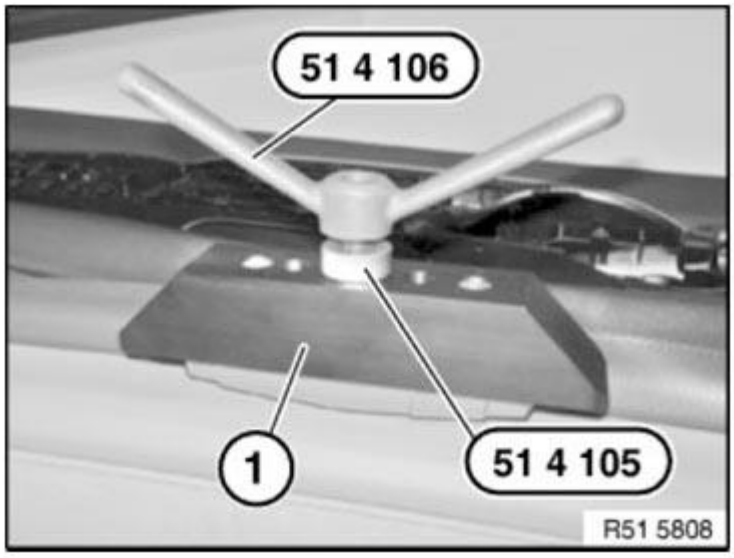


Fig. 201: Compressing Punching Tool
Courtesy of BMW OF NORTH AMERICA, INC.

51 4 111 Press punching remnants with special tool from rear out of punching tool.

NOTE: This work step is necessary to prevent the cutting surfaces from being damaged during a renewed punching operation.

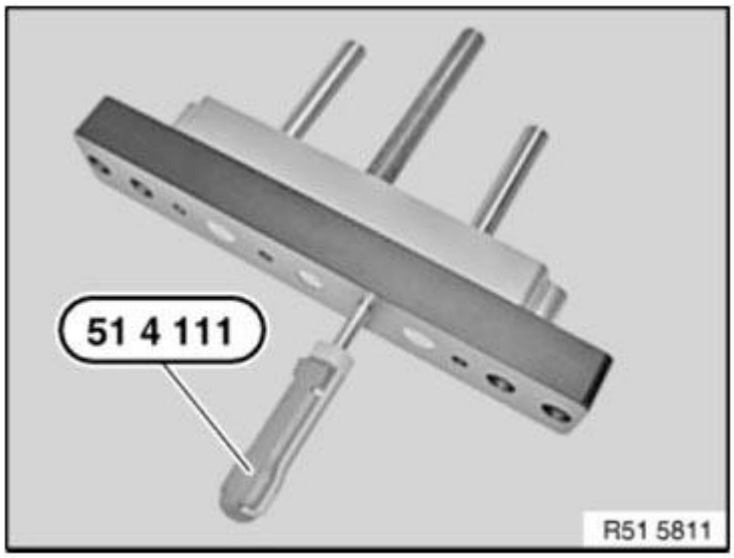


Fig. 202: Identifying Special Tool (51 4 111)
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 195 REMOVING AND INSTALLING (REPLACING) FRONT CONTROLLER

IMPORTANT: Risk of damage!

The button for the controller must not be removed!

Necessary preliminary work

- Remove **CENTRE CONSOLE TRIM**

Release screws (1).

Tightening torque **61 31 2AZ** .

Remove controller (2) from center console cover (3).

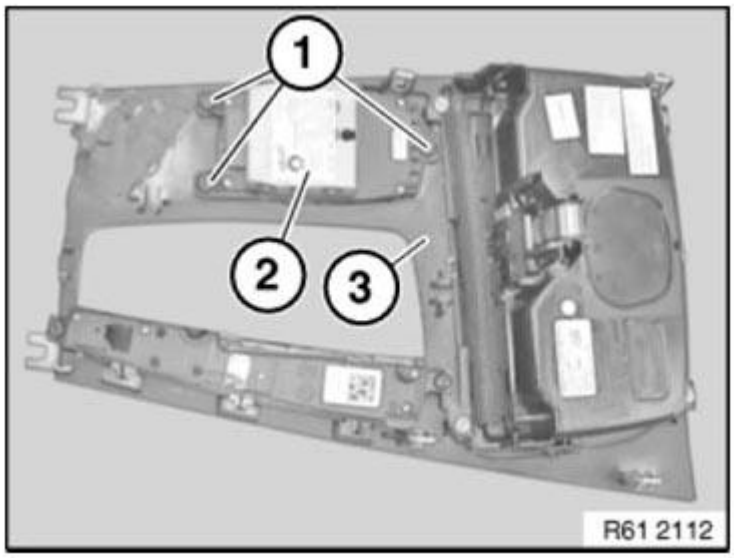


Fig. 203: Identifying Front Controller With Screws And Centre Console Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING/ENCODING** .

61 31 196 REMOVING AND INSTALLING (REPLACING) REAR CONTROLLER

Necessary preliminary tasks:

- Remove **BOTH SWITCH COMBINATIONS FOR SEAT ADJUSTMENT**

Release screws (1) on left/right.

Remove wood trim on rear center armrest (2).

Unlock plug connection behind and disconnect.

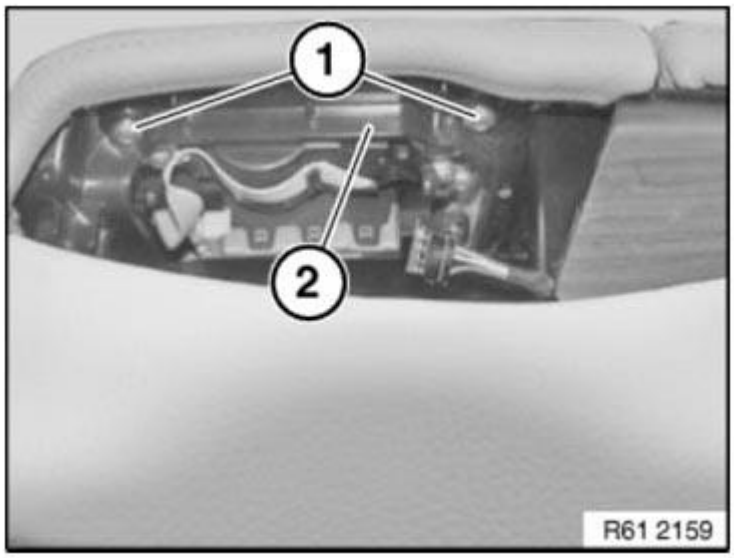


Fig. 204: Identifying Rear Centre Armrest With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unfasten screws (2).

Remove rear controller (3) from wood trim on rear center armrest (4).

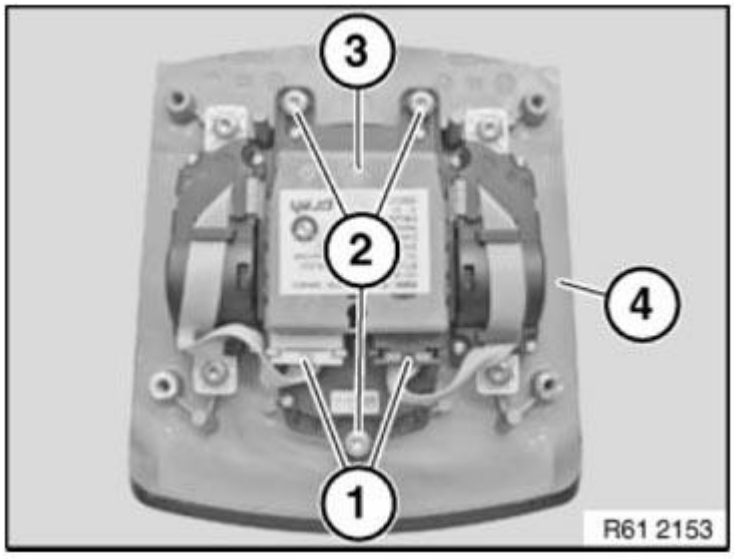


Fig. 205: Identifying Rear Controller With Screws And Plug Connection And Rear Centre Armrest
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING/ENCODING** .

61 31 122 REMOVING AND INSTALLING/REPLACING TOW HITCH SWITCH

Necessary preliminary tasks

- Remove **RIGHT LUGGAGE COMPARTMENT WHEEL ARCH PANEL**
- Partially remove luggage compartment wheel arch trim on right in F10

Release screws (1).

Disconnect plug connection underneath and remove tow hitch switch (2).

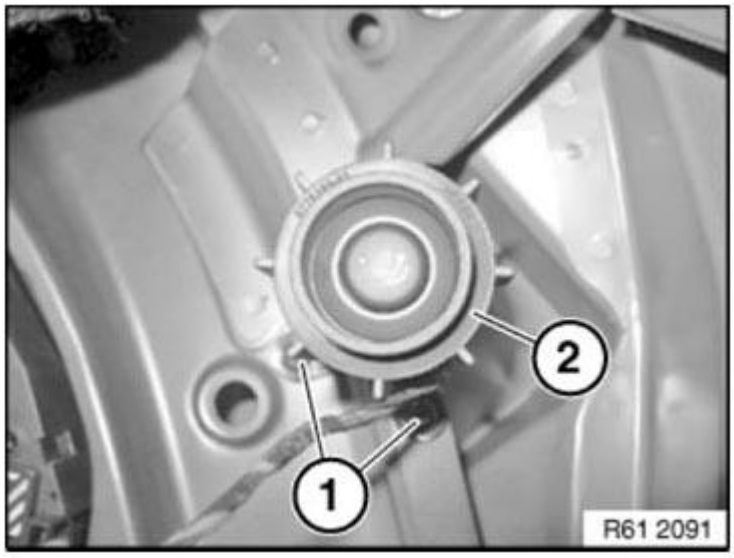


Fig. 206: Identifying Tow Hitch Switch With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 041 REMOVING AND INSTALLING OPERATING ELEMENT FOR DRIVER ASSISTANCE SYSTEM

Notes

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work:

- Remove **DECORATIVE STRIP ON INSTRUMENT PANEL ON LEFT**

Carefully lever driver assist system (1) out with special tool **00 9 317** .

Disconnect plug connection behind and remove driver assistance system (1).

Installation note:

Make sure driver assistance system (1) is correctly seated.



Fig. 207: Removing Lever Driver Assist System Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 174 REMOVING AND INSTALLING OPERATING UNIT FOR ADDITIONAL SEAT FUNCTIONS

Notes

Release latch mechanism (1) on operating unit (2) using special tool **64 1 020** . At same time carefully lever out operating unit (2) using special tool **00 9 317** .

Disconnect plug connection behind and remove operating unit (2).

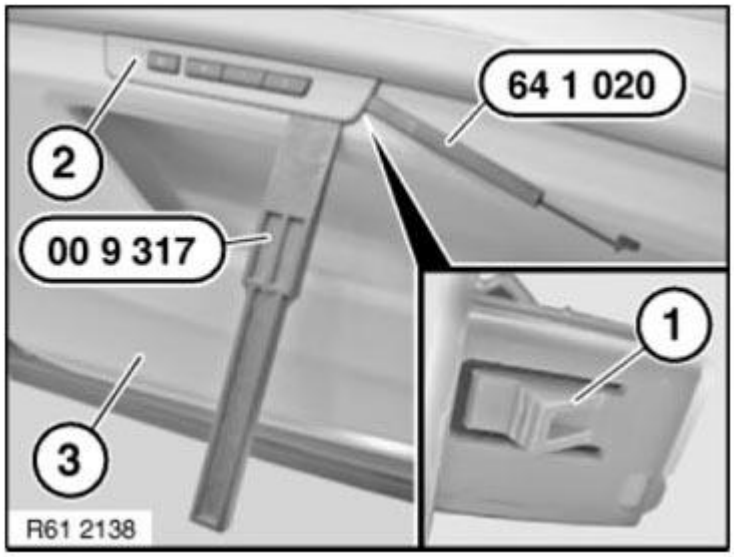


Fig. 208: Releasing Latch Mechanism On Operating Unit Using Special Tool (64 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure operating unit for additional seat functions (2) is correctly seated.

Right-hand drive vehicles only:

The operating unit in the rear passenger compartment is always supplied with the ID for left-hand drive vehicles.

It is therefore necessary after replacement to execute the service module Configuration memory switch rear passenger compartment to new allocation of ID for right-hand drive vehicles.

Perform following service function:

- Configuration memory switch rear passenger compartment

61 31... REMOVING AND INSTALLING OPERATING UNIT FOR ADDITIONAL SEAT FUNCTIONS (REAR PASSENGER COMPARTMENT)

Operation is described in:

Removing **OPERATING UNIT FOR ADDITIONAL SEAT FUNCTIONS (FRONT)**

61 31 334 REMOVING AND INSTALLING OR REPLACING GRIP TRIM FOR GEAR SELECTOR SWITCH

Notes

Carefully unclip knob cover (1) using special tool **00 9 322** on points (2) from gear selector switch (3) and remove in the direction of arrow.

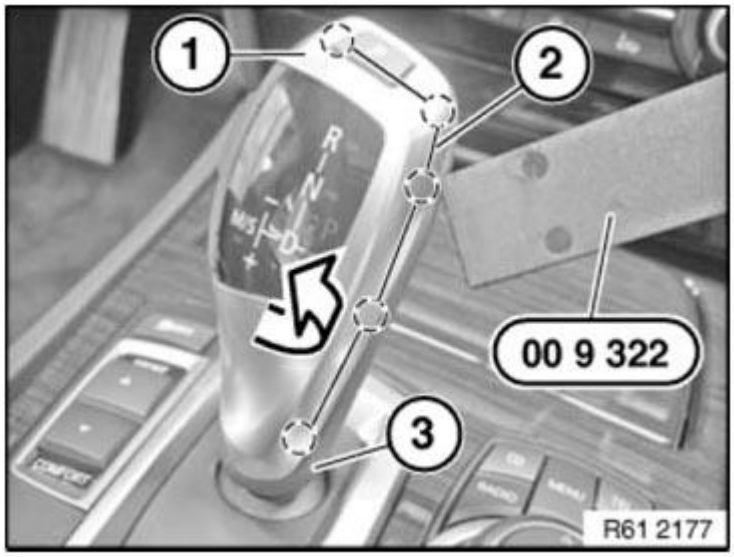


Fig. 209: Removing Gear Selector Switch Knob Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) must not be damaged during removal.

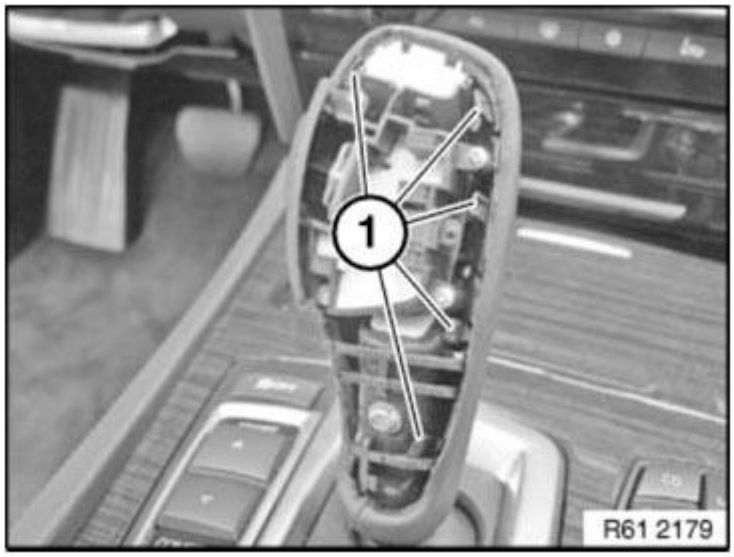


Fig. 210: Identifying Gear Selector Switch Knob Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Engagement lugs (1) and guide (2) must not be damaged.

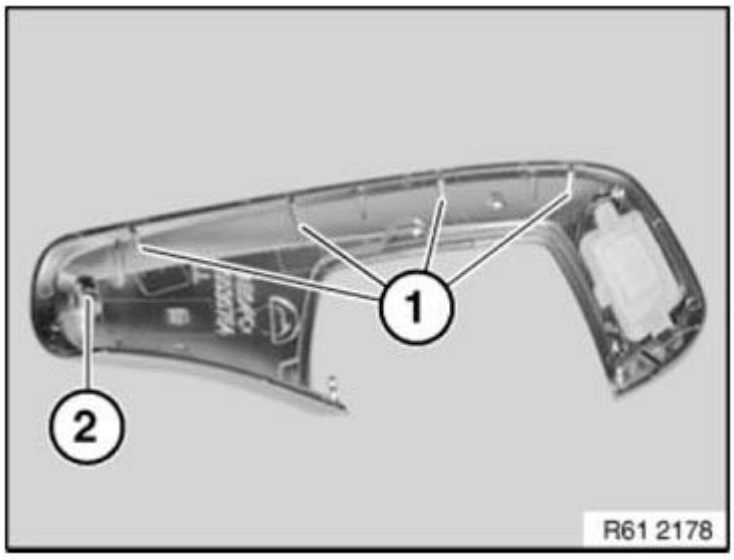


Fig. 211: Identifying Engagement Lugs And Guide
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 008 REMOVING AND INSTALLING STEERING COLUMN SWITCH CLUSTER

WARNING: Move wheels into straight-ahead position and do not alter this position during the repair work.

Do not under any circumstances turn the steering column switch cluster when the steering wheel is removed.

Necessary preliminary work

- Remove steering wheel. See **3233010 REMOVING AND INSTALLING/REPLACING SPORT STEERING WHEEL** or **3233000 REMOVING AND INSTALLING/REPLACING STEERING WHEEL**

Unclip steering column shroud upper and lower sections (1).

Unfasten screws (2).

Tightening torque **61 31 3AZ** .

Remove steering column switch cluster (3) in direction of arrow.

Installation note:

Carry out **STEERING ANGLE SENSOR ADJUSTMENT** .

On vehicles with active steering, steering angle sensor adjustment is performed by means of **START-UP** /adjustment of active steering.

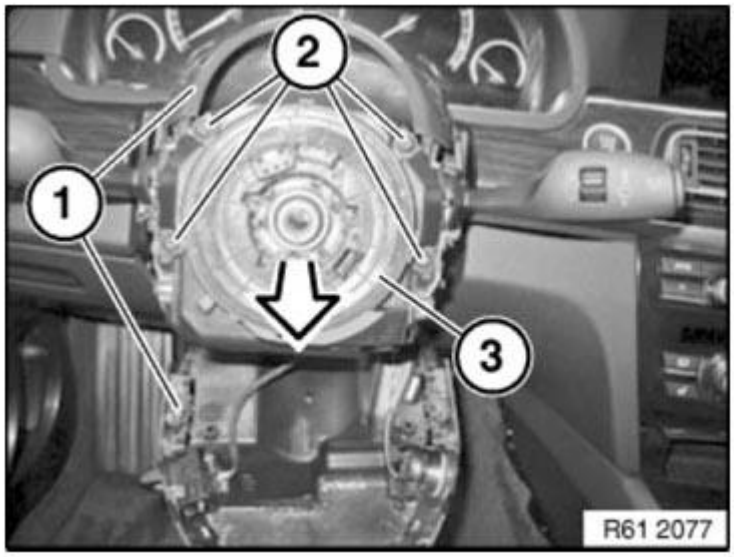


Fig. 212: Removing Steering Column Switch Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Remove steering column switch cluster (2).

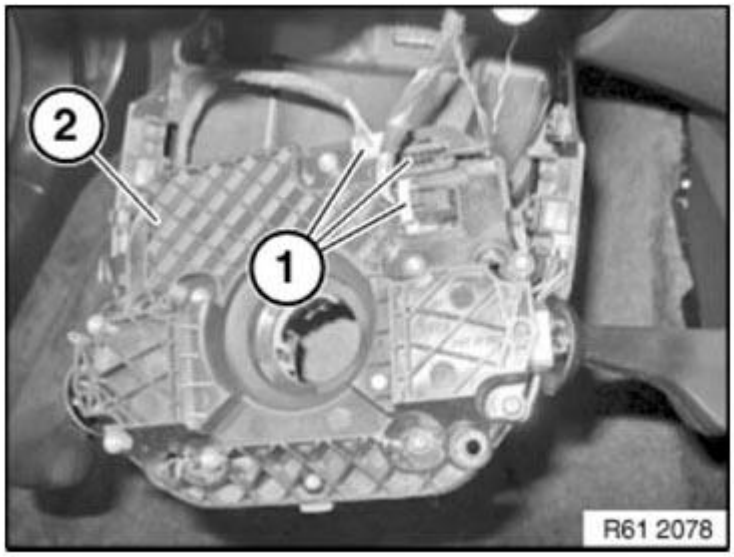


Fig. 213: Identifying Steering Column Switch Cluster With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **VEHICLE PROGRAMMING/ENCODING**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**
- **Vehicles with active steering:**
  - Steering angle sensor is adjusted by means of **INITIAL OPERATION/ADJUSTMENT** of active front steering
  - If necessary, proceed in accordance with instructions

61 31 137 REMOVING AND INSTALLING/RENEWING USB INTERFACE CONNECTING SOCKET

Necessary preliminary work:

- Remove **SWITCH FOR FRONT PASSENGER AIRBAG DEACTIVATION**

NOTE: Open glove box

Disconnect plug connection (1).

Unlock retaining clips (2) on left/right.

Press out USB interface connecting socket (3) in direction of arrow.

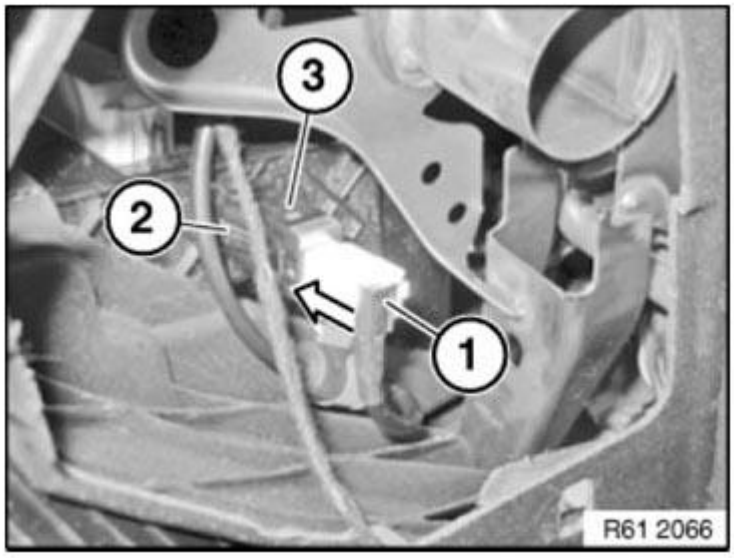


Fig. 214: Pressing Out USB Interface Connecting Socket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Retaining clips (2) must not be damaged.

Make sure USB interface connecting socket (3) is correctly seated.

61 31 062 REMOVING AND INSTALLING/RENEWING BUTTON FOR STEERING WHEEL HEATING

Operation is described in:

Remove **SWITCH FOR STEERING COLUMN ADJUSTMENT**

61 31 197 REMOVING AND INSTALLING/RENEWING CENTER CONSOLE OPERATING UNIT

Necessary preliminary work

- Remove **CENTRE CONSOLE TRIM**

Release screws (1).

Remove center console operating unit (2) from center console trim (3).

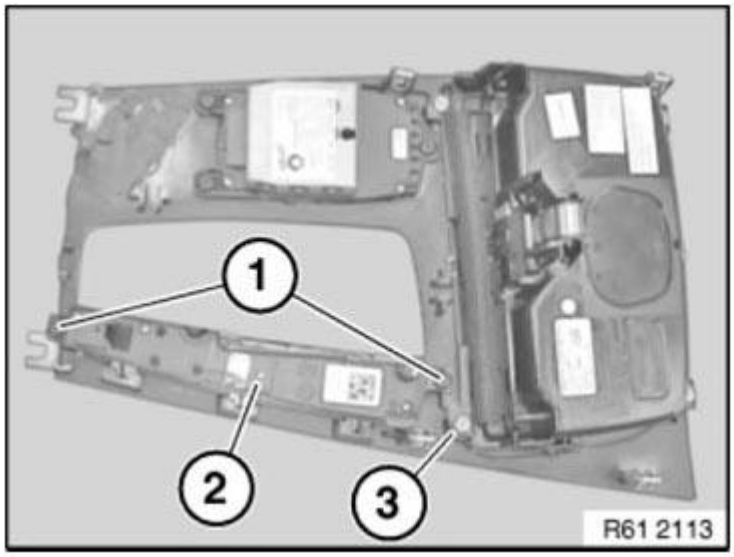


Fig. 215: Identifying Centre Console Operating Unit With Screws And Centre Console Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

For an uniform join, press center console operating unit (1) sideways up against center console trim (3).

Centering ribs (1) must touch the center console trim (3).

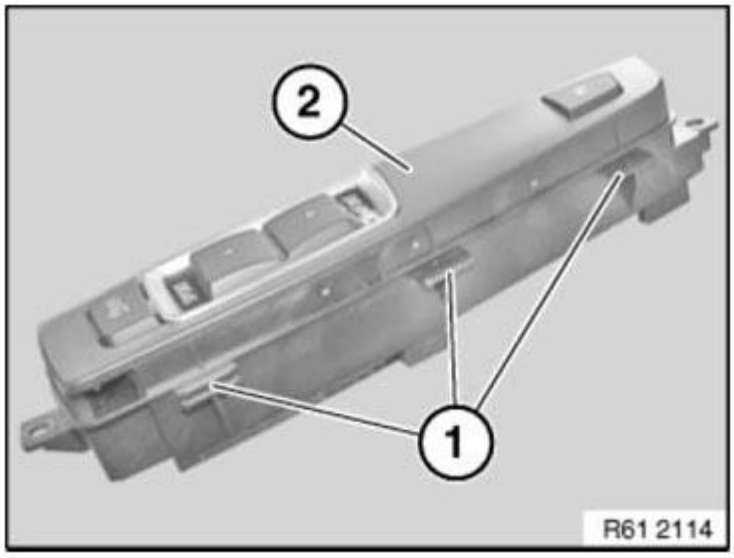


Fig. 216: Identifying Centering Ribs On Centre Console Trim
Courtesy of BMW OF NORTH AMERICA, INC.

63 21 176 REMOVING AND INSTALLING/RENEWING CHROME TRIM ON LEFT OR RIGHT REAR LIGHT

Necessary preliminary tasks:

- Remove **PANEL FOR TAILGATE**
- Remove left rear light

Release screws (1).

Remove chrome trim (2) from rear light (3).

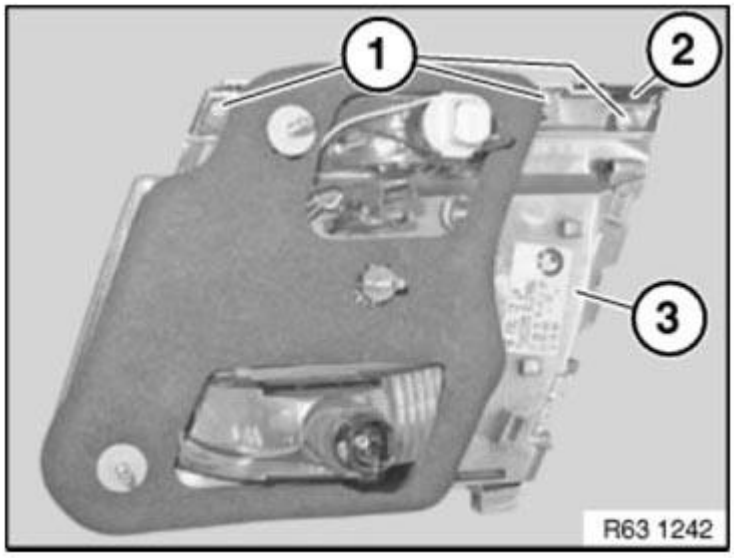


Fig. 217: Identifying Chrome Trim With Screws And Rear Light
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 342 REMOVING AND INSTALLING/RENEWING GEAR SELECTOR SWITCH

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work

- Remove **GEAR SELECTOR SWITCH COVER**

Release screws (1).

Tightening torque **61 31 1AZ** .

Remove gear selector switch (2) from center console (3) and unlock and disconnect plug connection underneath.

Installation note:

Align gear selector switch (2) centrally.

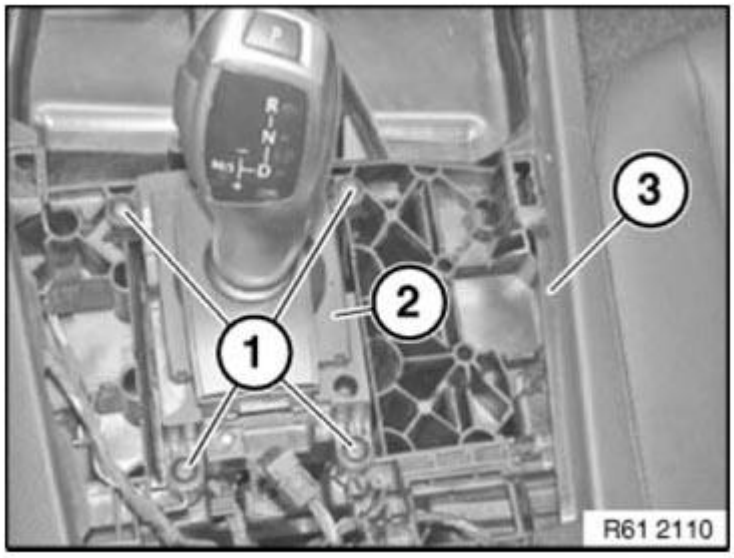


Fig. 218: Identifying Gear Selector Switch With Screws And Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING/ENCODING** .

61 31 037 REMOVING AND INSTALLING/RENEWING LIGHT OPERATING FACILITY

Necessary preliminary work:

- Remove decorative strip on dashboard on left

Release screws (1).

Remove light operating facility (2) from left decorative strip (3).

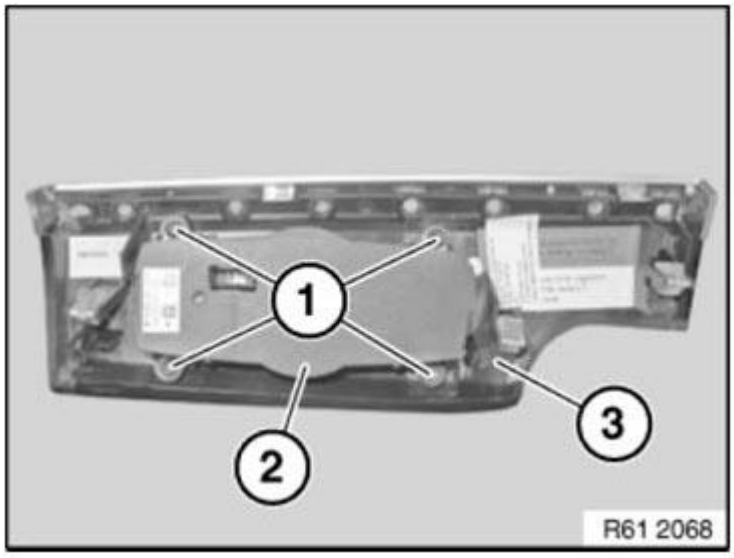


Fig. 219: Identifying Light Operating Facility With Screws And Left Decorative Strip
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 231 REMOVING AND INSTALLING/RENEWING STEERING WHEEL ELECTRONICS MODULE CONTROL UNIT

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work:

- Remove **AIRBAG UNIT**

NOTE: For purposes of clarity.

Graphic shows steering wheel trim removed.

Remove steering wheel electronics control unit (1) in direction of arrow.

Disconnect plug connections behind.

Remove steering wheel electronics control unit (1).

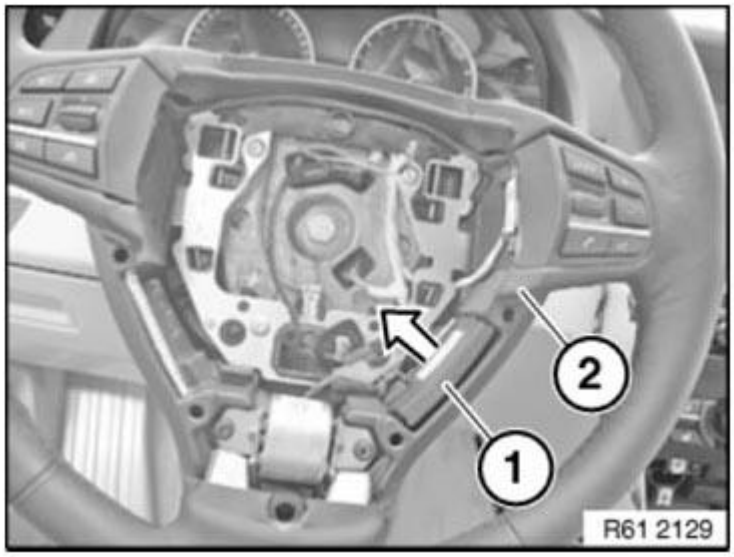


Fig. 220: Removing Steering Wheel Electronics Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 035 REMOVING AND INSTALLING/RENEWING SWITCH FOR STEERING COLUMN ADJUSTMENT

Necessary preliminary tasks:

- **REMOVE LOWER SECTION OF STEERING COLUMN TRIM**

Release switch for steering column adjustment (1) on both sides and press out from steering column trim (2).

Installation:

Make sure switch for steering column adjustment (1) is correctly seated

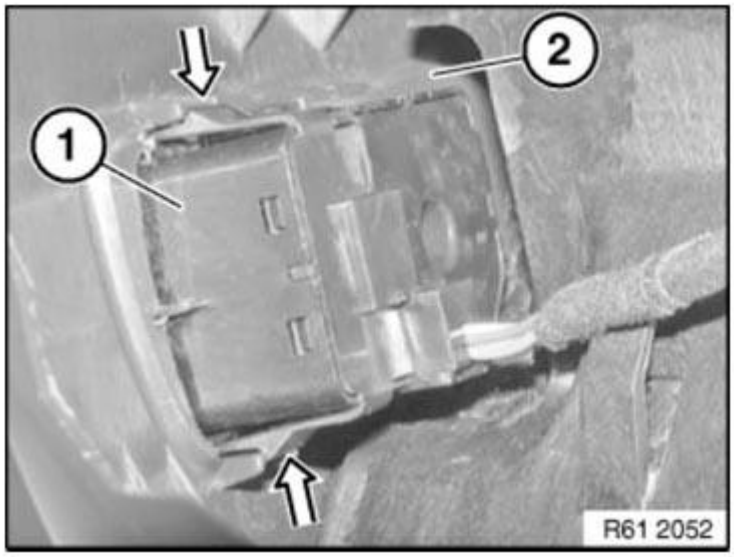


Fig. 221: Releasing Switch For Steering Column Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 083 REMOVING AND INSTALLING/RENEWING SWITCH FOR UNLOCKING REAR LID

Notes

Lever switch for rear lid unlocking (1) sideways out of A-pillar trim (2) using special tool **00 9 323** .

Disconnect associated plug connection and remove switch for unlocking rear lid (1).

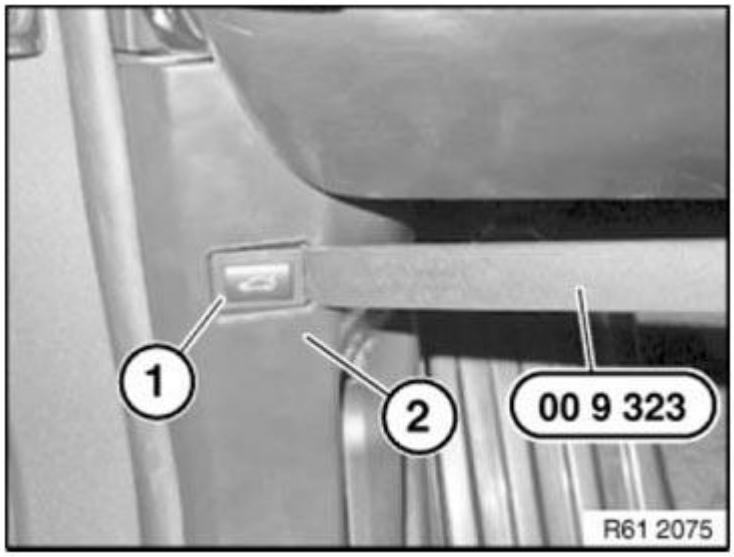


Fig. 222: Removing Switch From A-Pillar Trim Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 133 REMOVING AND INSTALLING/REPLACING AV CONNECTING SOCKET

Operation is described in:

Remove **USB AUDIO INTERFACE CONNECTING SOCKET**

61 31 233 REMOVING AND INSTALLING/REPLACING LANE DEPARTURE WARNING ENGINE ELECTRICS (TLC ACTUATOR)

Necessary preliminary work

- Remove **AIRBAG UNIT**
- Remove lower steering wheel trim

Disconnect plug connection (1).

Release screws (2) and remove engine electrics (3).

Tightening torque **32 33 2AZ.**

Installation note:

Replace screws (2).

Ensure correct cable routing.

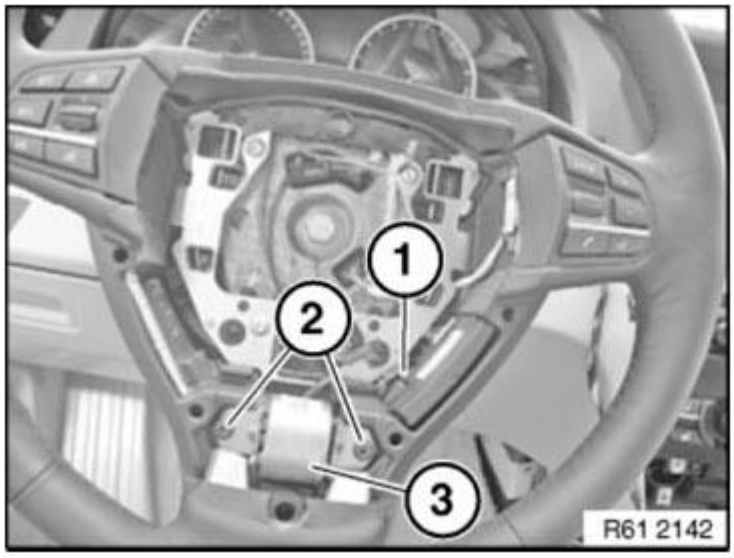


Fig. 223: Identifying Engine Electrics With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement from build date 03/2009:

Engine electrical system must be readjusted.

The service module "Adjustment actuator Lane Departure Warning" can be found at:

- Body
- Camera-based driver support systems
- Adjustment actuator Lane Departure Warning

61 31 014 REMOVING AND INSTALLING/REPLACING START/STOP SWITCH

Necessary preliminary work

- Remove **DECORATIVE STRIP ON DASHBOARD IN MIDDLE**

Release screws (1) and remove Start/Stop switch (2).

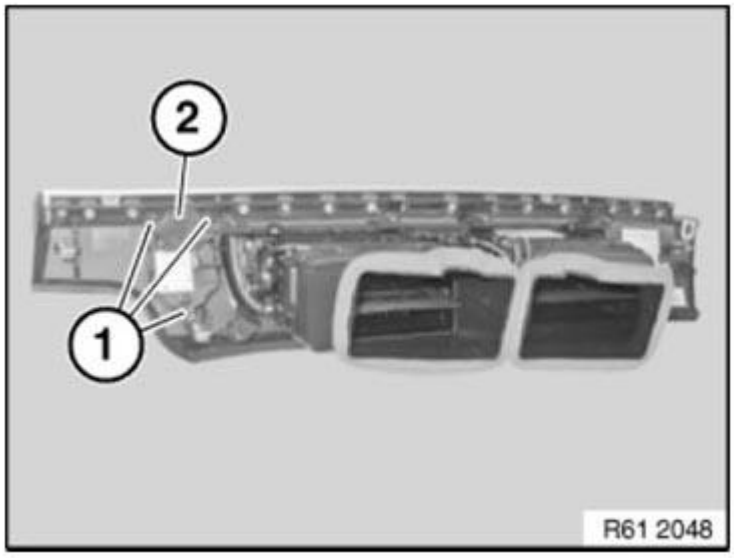


Fig. 224: Identifying Start/Stop Switch With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 134 REMOVING AND INSTALLING/REPLACING USB AUDIO INTERFACE CONNECTING SOCKET

Necessary preliminary work

- Remove **CENTRE ARMREST STORAGE COMPARTMENT**

Disconnect plug connection (1).

Installation note:

- Retaining lug (3) must not be damaged.
- Make sure connecting socket (2) is correctly seated in storage compartment (4).

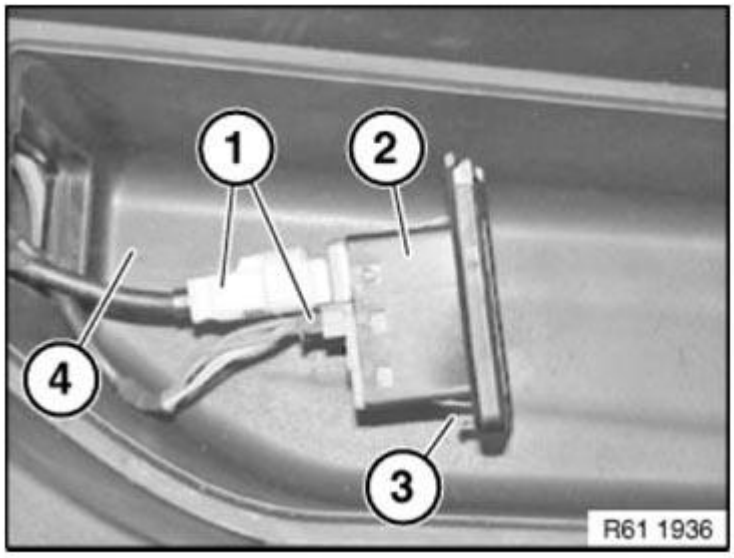


Fig. 225: Identifying Centre Armrest Storage Compartment With Plug Connection, Socket And Retaining Lug
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 221 REMOVING AND INSTALLING/REPLACING BOTH MULTIFUNCTION STEERING WHEEL SWITCHES

Necessary preliminary work:

- Remove **AIRBAG UNIT**

Release screws (1) on left/right on back of steering wheel (2).

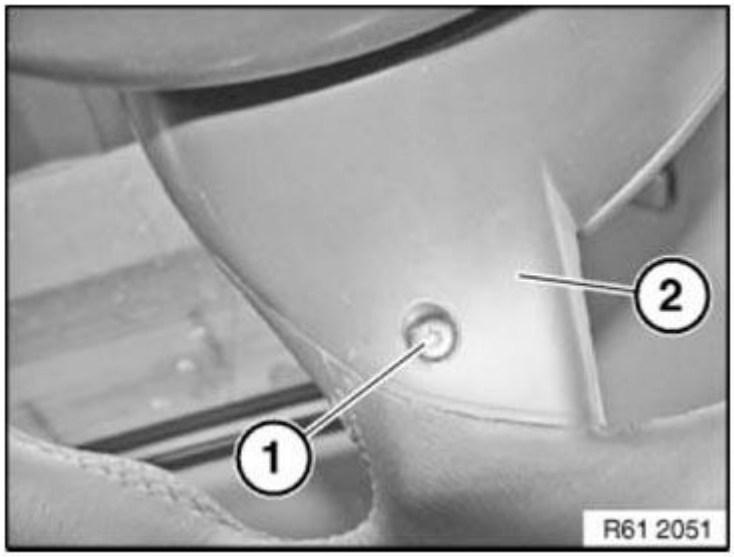


Fig. 226: Identifying Steering Wheel Back With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Both multifunction steering wheel switches (1) are connected to each other by the wiring harness (2).

Feed wiring harness (2) out of steering wheel.

Remove both multifunction steering wheel switches (1) in direction of arrow.

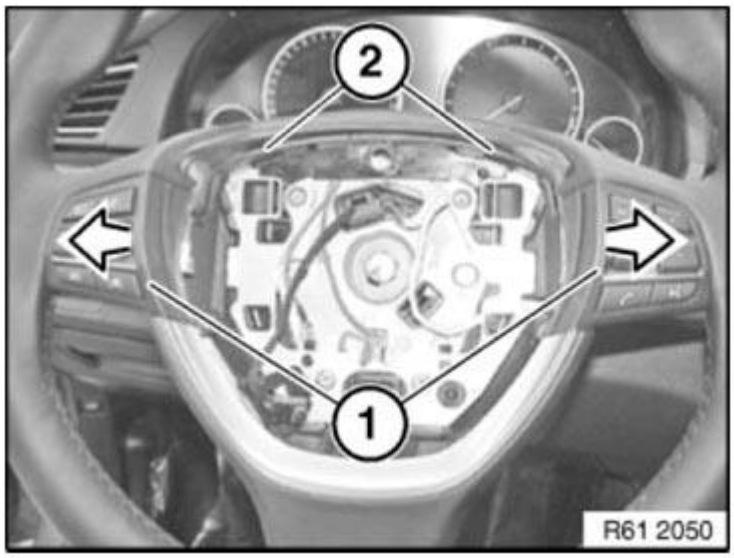


Fig. 227: Removing Multifunction Steering Wheel Switches
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove both multifunction steering wheel switches (2).

Installation note:

Make sure electrical wiring is correctly routed.

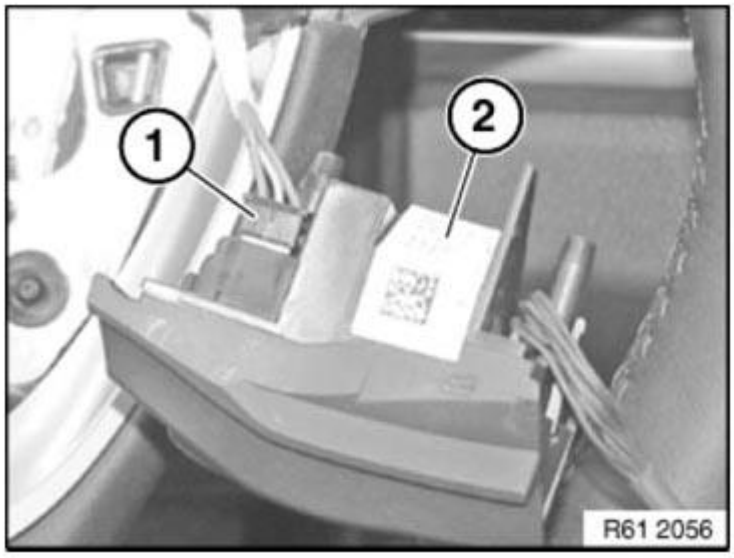


Fig. 228: Identifying Multifunction Steering Wheel Switch With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 021 REMOVING AND INSTALLING/REPLACING EMERGENCY STARTING COIL

Necessary preliminary work:

- **REMOVE STEERING COLUMN SHROUD LOWER SECTION**

Release emergency starting coil (1) and pull in direction of arrow out of steering column shroud (2).

Installation note:

Make sure emergency starting coil (1) is correctly seated.

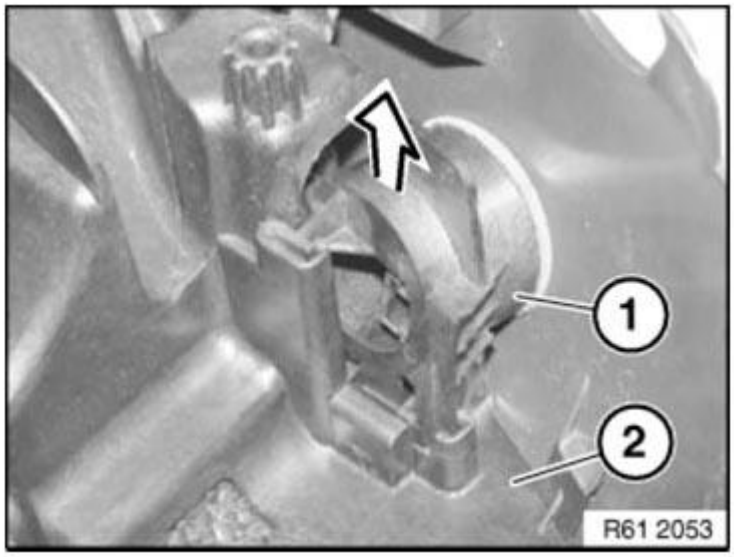


Fig. 229: Pulling Out Emergency Starting Coil From Steering Column Shroud
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 338 REMOVING AND INSTALLING/REPLACING GRIP COVER FOR GEAR SELECTOR SWITCH (CERAMIC APPLICATION, OPERATING ELEMENTS)

Notes

Carefully unclip knob cover (1) **00 9 322** with special tool at points (2) from gear selector switch (3) and remove in direction of arrow.

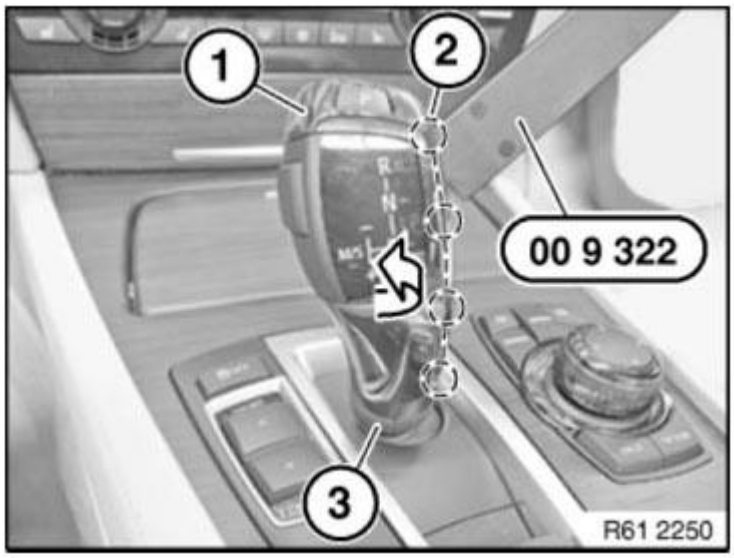


Fig. 230: Removing Gear Selector Switch Knob Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove support (2).

Tightening torque **61 31 4AZ** .

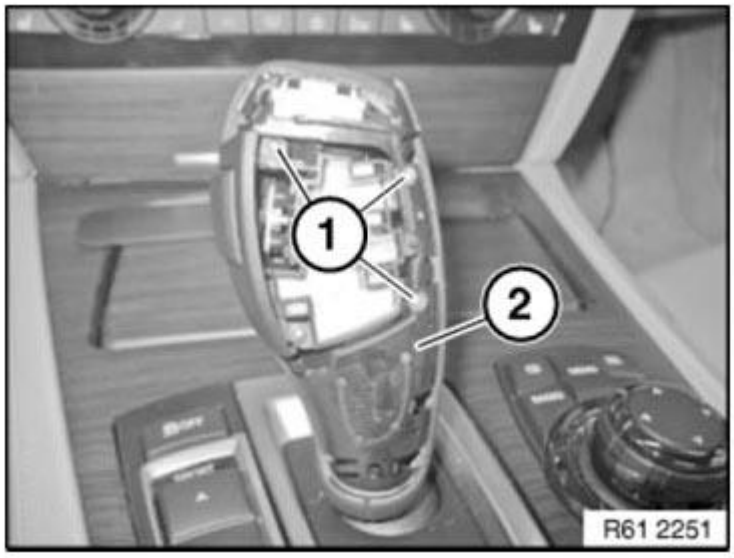


Fig. 231: Identifying Gear Selector Switch Support And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removed ceramic carrier (2) must not be reused.

Installation note:

Engagement lugs (1) of ceramic carrier (2) must not be damaged.

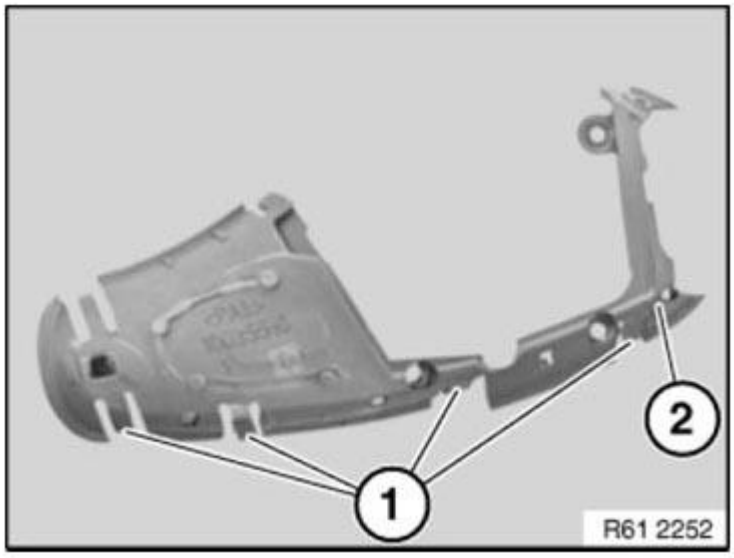


Fig. 232: Identifying Engagement Lugs On Ceramic Carrier

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 066 REMOVING AND INSTALLING/REPLACING HOTEL SETTING SWITCH

Necessary preliminary tasks:

- Raise **CENTRE ARMREST STORAGE COMPARTMENT**

Press hotel setting switch (1) from below upwards in direction of arrow.

Disconnect plug connection underneath and remove hotel setting switch (1).



Fig. 233: Pressing Hotel Setting Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 117 REMOVING AND INSTALLING/REPLACING POWER WINDOW SWITCH (DRIVER'S SIDE)

Necessary preliminary work:

- Remove **FRONT DOOR TRIM PANEL, LEFT**

Pull locking pins (1) out of frame (2) for power window switch (3).

Press power window switch (3) upwards in direction of arrow and remove.

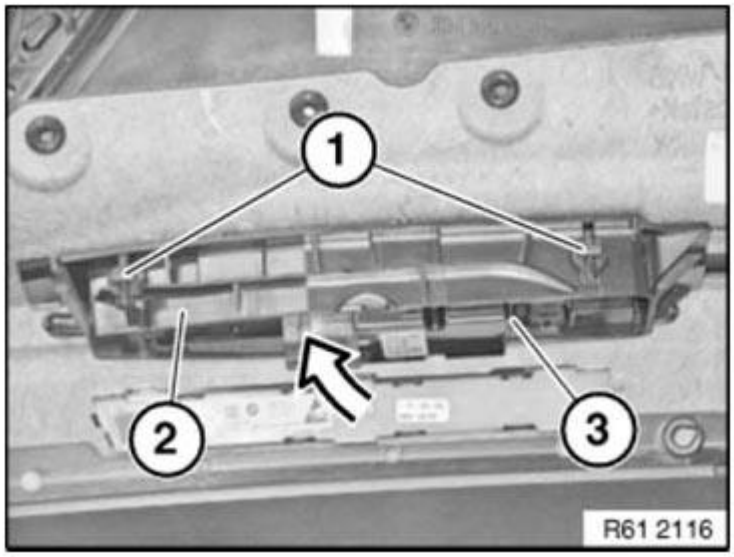


Fig. 234: Pressing Power Window Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure power window switch (3) is correctly guided (1) and engaged (2).

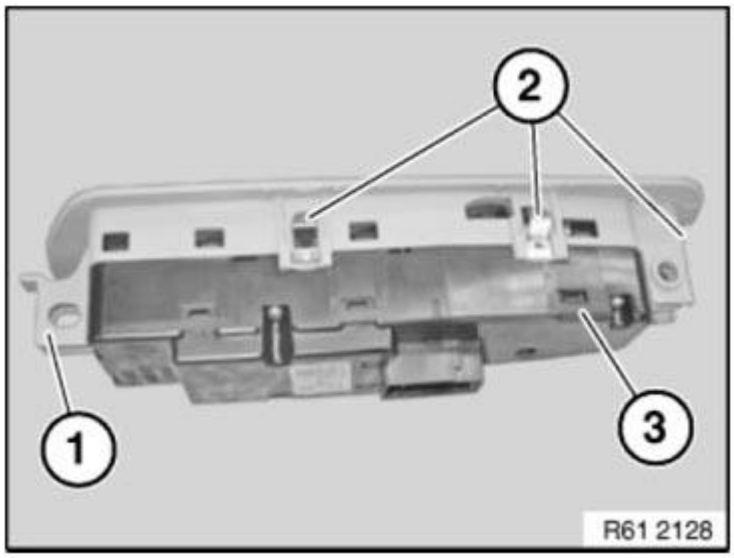


Fig. 235: Identifying Power Window Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 321 REMOVING AND INSTALLING/REPLACING RADIO AND A/C CONTROL PANEL

Notes

IMPORTANT: Risk of damage!

A hard disk is installed in the Car Information Computer (CIC).

Carry out mechanical work on the CIC and adjacent components with care.

Avoid subjecting the CIC to vibration/shocks.

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

IMPORTANT: Carry out installation in a dust-free workshop area only.

To avoid damage, do not touch or dirty the display field.

Necessary preliminary work:

- Remove **DECORATIVE STRIP ON INSTRUMENT PANEL IN MIDDLE**

NOTE: Example illustration!

Release screws (1).

Carefully lever out radio and A/C control panel (2) with special tool **00 9 317** at points (3) in direction of arrow.

IMPORTANT: Assign keypad depending on optional equipment.

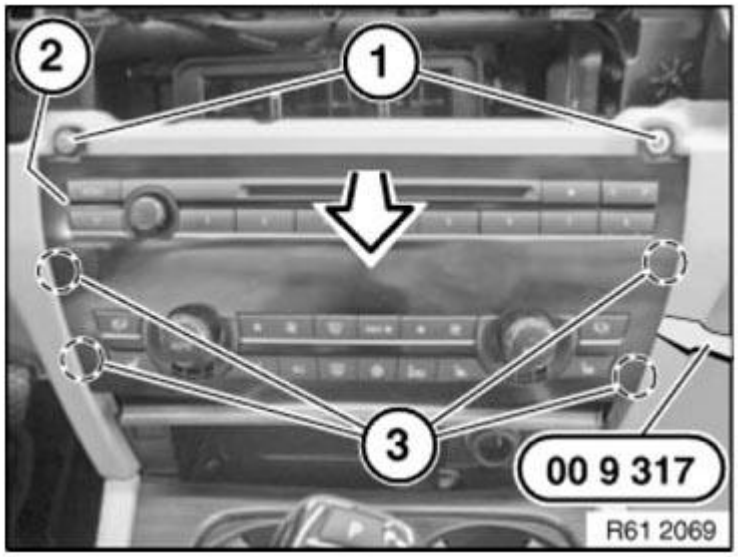


Fig. 236: Removing A/C Control Panel Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Remove radio and A/C control panel (2).

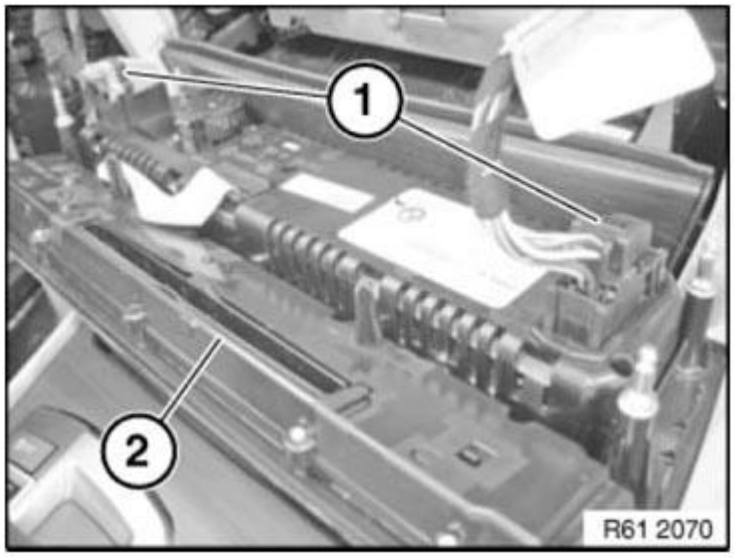


Fig. 237: Identifying A/C Control Panel With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 246 REMOVING AND INSTALLING/REPLACING REAR LID BUTTON

Operation is described in:

Removing and installing **MIDDLE TRIM STRIP ON REAR LID** .

61 31 043 REMOVING AND INSTALLING/REPLACING ROOF SWITCH CLUSTER (COMPLETE WITH COVER) (ROOF FUNCTION CENTER)

Notes

IMPORTANT: Follow instructions for handling light bulbs (INTERIOR LIGHTS) .

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Carefully unclip cover (1) with special tool **64 1 020** and remove.

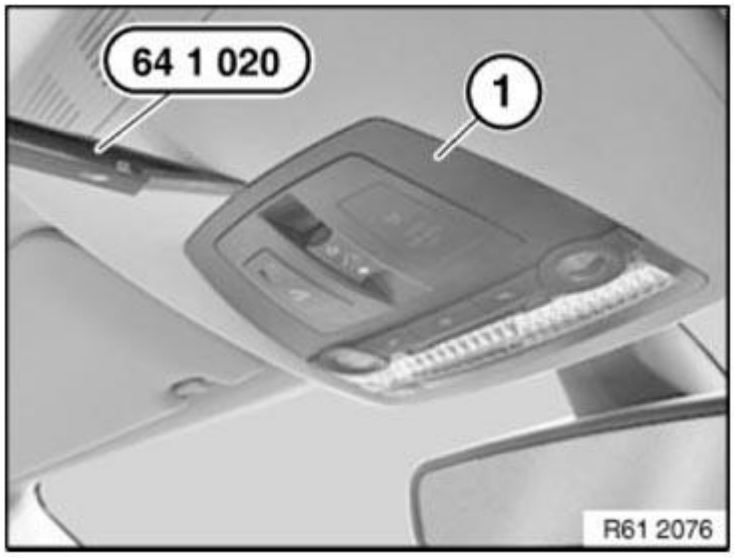


Fig. 238: Removing Roof Switch Cluster Cover Using Special Tool (64 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove roof switch cluster (2) in direction of arrow.

Disconnect plug connections underneath.

Installation note:

Make sure roof switch cluster (2) is correctly seated.

Ensure cover (1) is correctly seated.

Installation note:

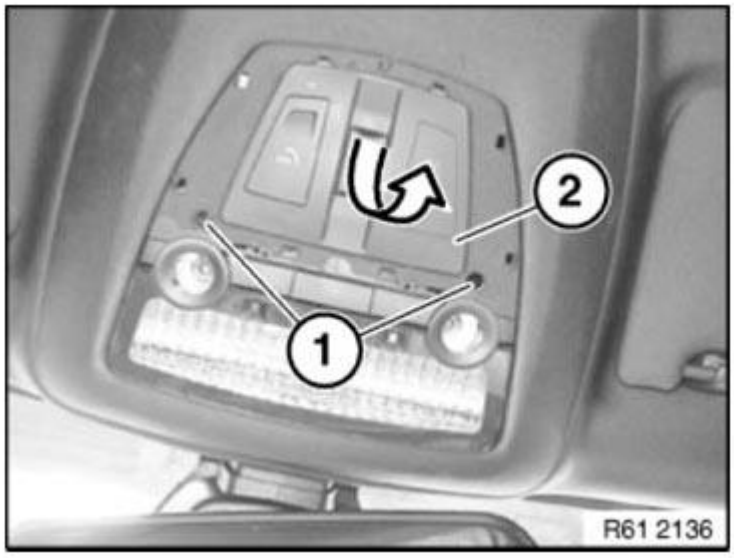


Fig. 239: Removing Roof Switch Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, initialize slide/tilt sunroof

IMPORTANT: Disconnecting the plug connection for the emergency call button results in fault entries in the telephone control unit (limitation in the emergency call system).

After fitting, read out fault memory and if necessary delete entries.

61 31 084 REMOVING AND INSTALLING/REPLACING SWITCH FOR AUTOMATIC REAR LID ACTUATION

Notes

Lever switch for automatic rear lid actuation (1), with special tool **00 9 323** , sideways out of tailgate trim (2).

Disconnect associated plug connection and remove switch for automatic rear lid actuation (1).

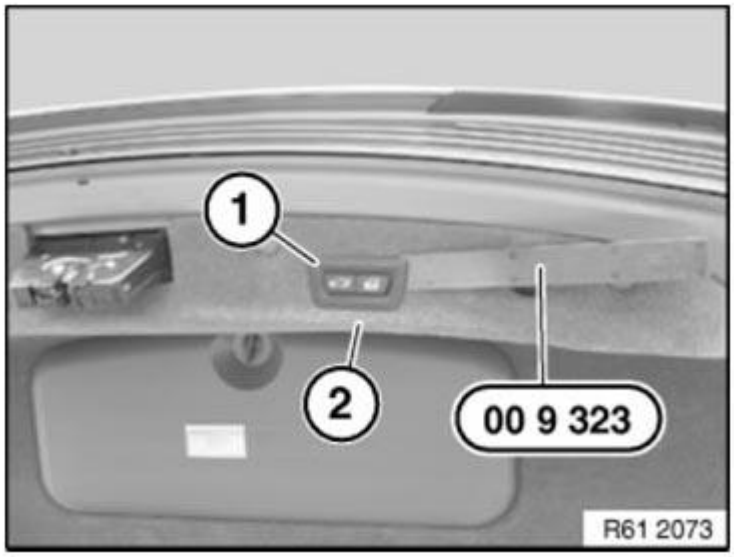


Fig. 240: Removing Switch From Tailgate Trim Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 172 REMOVING AND INSTALLING/REPLACING SWITCH FOR ELECTROMECHANICAL PARKING BRAKE

Necessary preliminary work:

- **DISCONNECT NEGATIVE BATTERY CABLE** (to avoid fault entries)
- **F03** Only: Disconnect both negative battery cables
- Remove **GEAR SELECTOR SWITCH COVER**

Release screws (1).

Remove switch for electromechanical parking brake (2) from cover for gear selector switch (3).

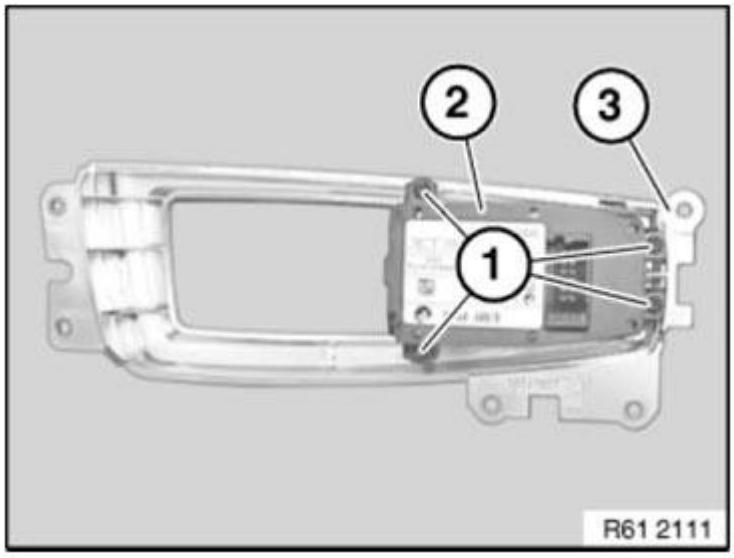


Fig. 241: Identifying Electromechanical Parking Brake With Switch And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 208 REMOVING AND INSTALLING/REPLACING SWITCH FOR FRONT LUMBAR SUPPORT

Operation is described in:

REPLACING SWITCH COMBINATION FOR FRONT SEAT ADJUSTMENT

61 31 038 REMOVING AND INSTALLING/REPLACING SWITCH FOR FRONT PASSENGER AIRBAG DEACTIVATION

Notes

WARNING: **Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt pretensioners.**

Incorrect handling can lead to airbag deployment and cause injury.

Necessary preliminary work

- Disconnect **BATTERY EARTH CABLE**
- Disconnect both negative battery cables at F03

Carefully lever out side cover (1) with special tool **00 9 323** .

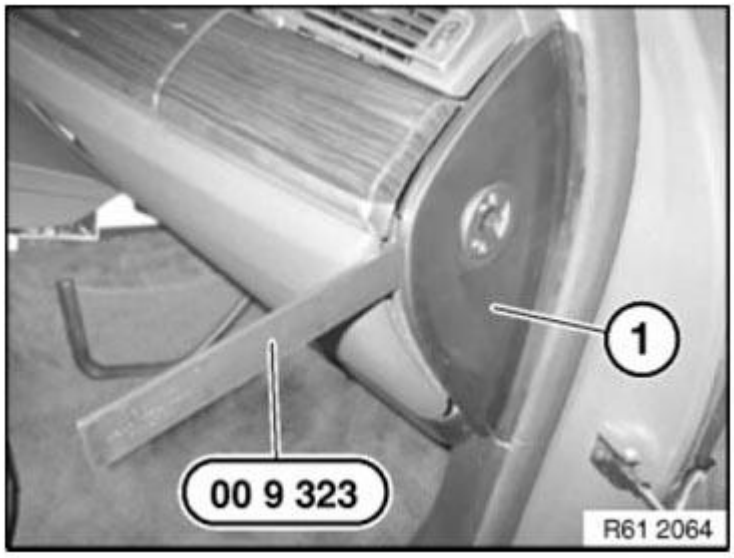


Fig. 242: Removing Out Side Cover Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release latch mechanisms (4) in direction of arrow.

Feed switch for front passenger airbag deactivation (2) out of side cover (3).

Installation note:

Make sure switch for passenger airbag deactivation (2) is correctly seated in side cover (3).

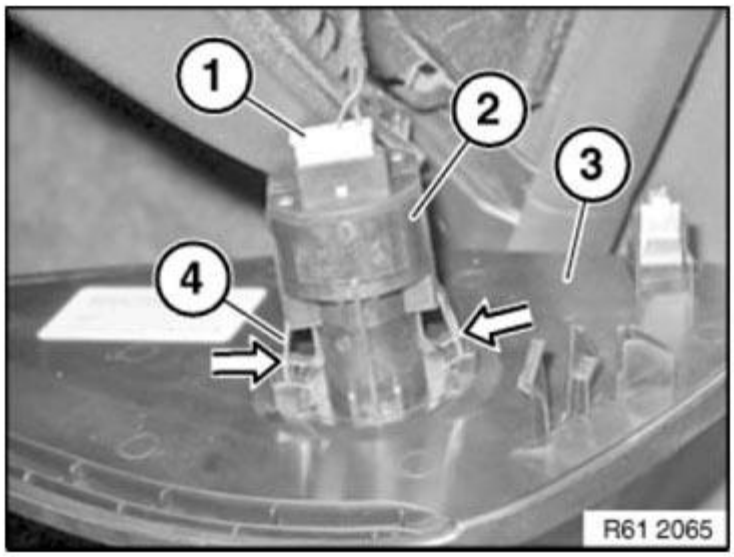


Fig. 243: Releasing Latch Mechanisms

Courtesy of BMW OF NORTH AMERICA, INC.

61 31 079 REMOVING AND INSTALLING/REPLACING SWITCH FOR HAZARD WARNING FLASHERS/CENTRAL LOCKING

Necessary preliminary work

- Remove **DECORATIVE STRIP ON DASHBOARD IN MIDDLE**

Unclip switch for hazard warning flashers/central locking (1) in direction of arrow from middle dashboard decorative strip (2).

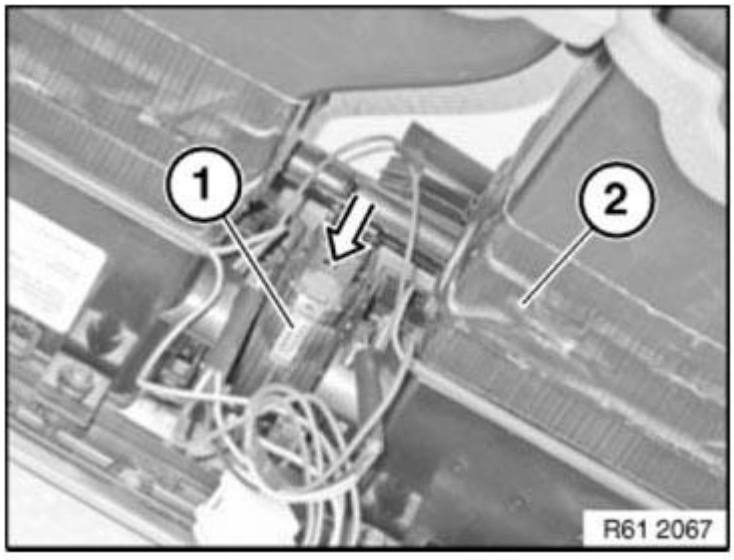


Fig. 244: Removing Switch For Hazard Warning Flashers/Central Locking
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 336 REMOVING AND INSTALLING/REPLACING TRIM FOR GEAR SELECTOR SWITCH

Necessary preliminary work

- Disconnect **BATTERY NEGATIVE LEAD**
- Remove both negative battery cables atF03
- Remove **CENTRE CONSOLE TRIM**

NOTE: Trim for gear selector switch (2) is secured from version 04/2009 with four screws.

Release screws (1) and raise trim for gear selector switch (2) slightly.

Disconnect plug connection underneath for parking brake switch and remove trim for gear selector switch (2).

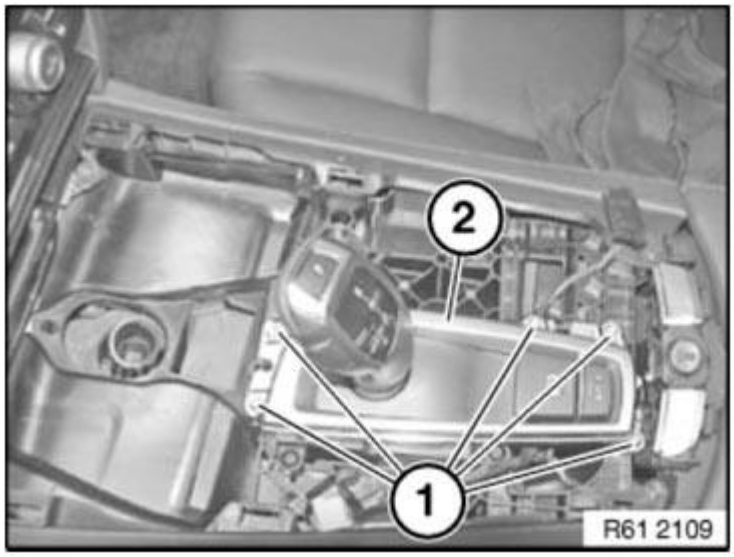


Fig. 245: Identifying Gear Selector Switch With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove **SWITCH FOR ELECTROMECHANICAL PARKING BRAKE** .

61 31 330 REMOVING SWITCH FOR GLOVE BOX LIGHT

Necessary preliminary tasks:

- Remove **RIGHT GLOVE BOX WITH HOUSING**

Unlock switch for glove box light (1) on both sides and press in direction of arrow out of glove box (2).

Installation:

Make sure switch for glove box light (1) is correctly seated.

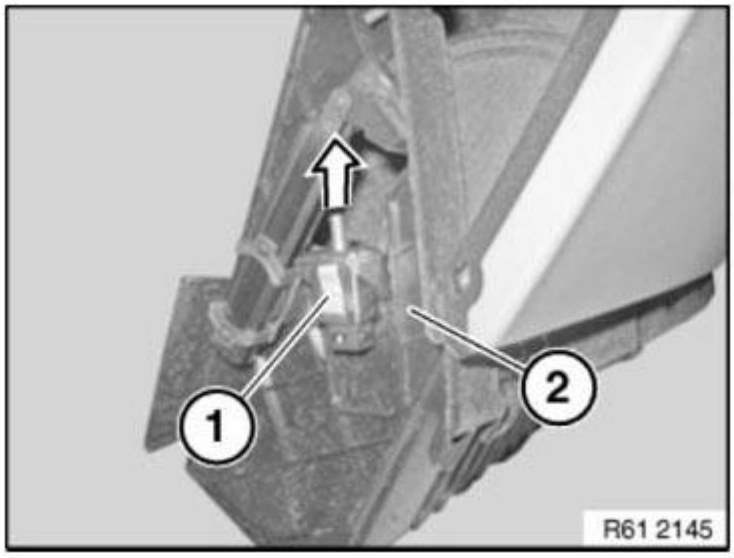


Fig. 246: Pressing Out Switch From Glove Box Light
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 823 REPLACING AUDIO UNIT

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

IMPORTANT: Use of supplied gloves is mandatory

Carry out installation in a dust-free workshop area only.

To avoid damage, do not touch or dirty the display field.

Necessary preliminary work:

- Remove **RADIO AND IHKA CONTROLS**

IMPORTANT: Retrofitting must only be done in the supplied installation cassettes.

Use of supplied gloves is mandatory, so that there is no damage to the display.

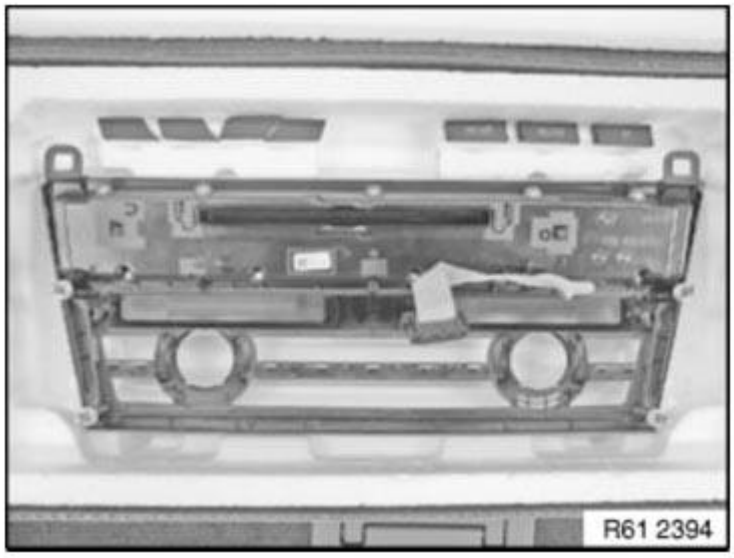


Fig. 247: Identifying Audio Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Modify **IHKA CONTROLS** on new audio unit.

Replacement:

Carry out **VEHICLE PROGRAMMING/ENCODING** .

61 31 310 REPLACING BRAKE LIGHT SWITCH

Necessary preliminary work

- Remove trim panel for pedal mechanism. See **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (US ONLY)** .

Disconnect plug connection (1).

Pull brake light switch (2) in direction of arrow out of brake light switch holder (4).

Installation note:

- Press brake pedal (3) to floor.
- Push brake light switch (2) as far as it will go into brake light switch holder (4).
- Counter hold brake light switch (4) holder, slowly return brake pedal (3) to initial position and **tighten to stop** .

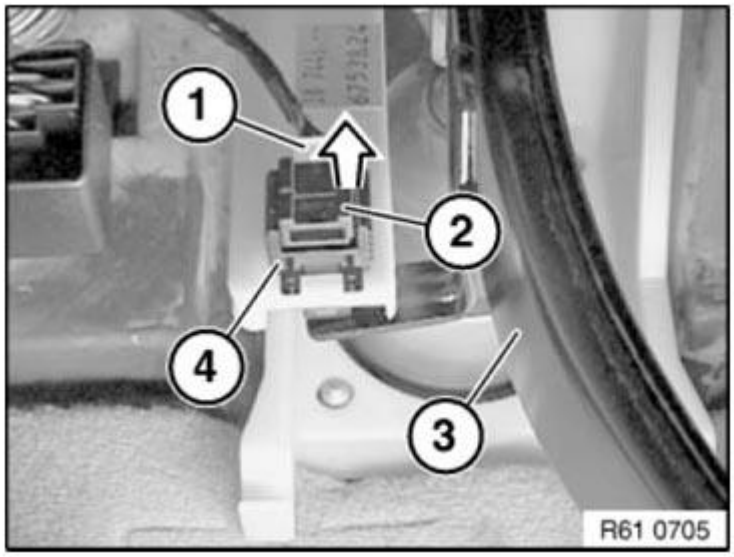


Fig. 248: Pulling Brake Light Switch
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Removing brake light switch holder (1):

Press brake pedal.

Unclip brake light switch holder (1) at shanks (2) and remove towards rear.

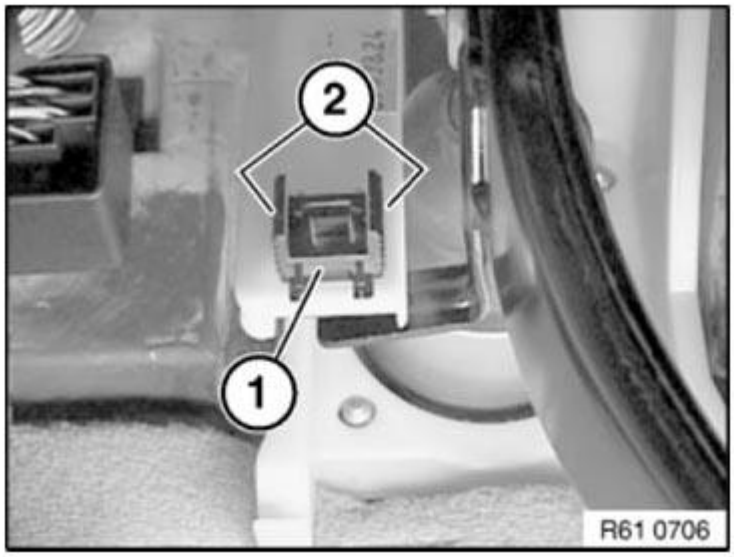


Fig. 249: Identifying Brake Light Switch Holder On Shanks
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 382 REPLACING COOLANT LEVEL SWITCH

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Necessary preliminary work:

- Remove **TRAILING LINK**
- Remove intake duct.
- Release **OIL RESERVOIR**

Release screws (1).

Lift out coolant expansion tank (2) with oil reservoir (3) in direction of arrow.

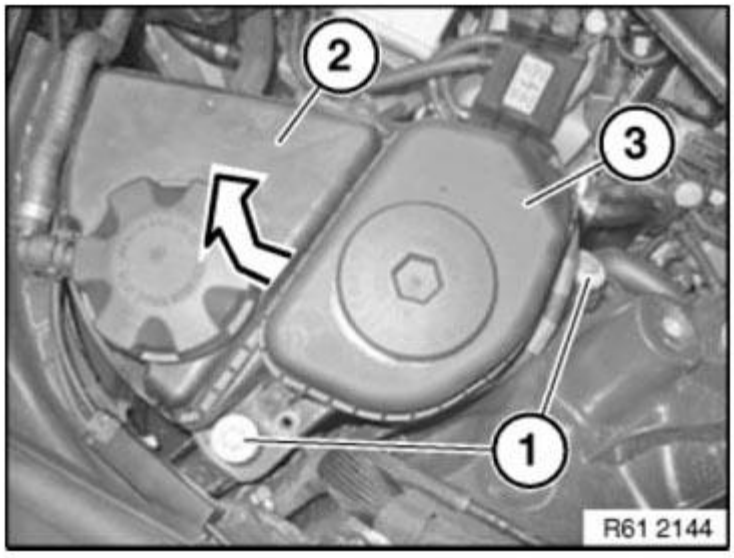


Fig. 250: Lifting Out Coolant Expansion Tank With Oil Reservoir
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Turn coolant level switch (2) in direction of arrow and pull downwards out of expansion tank (3).

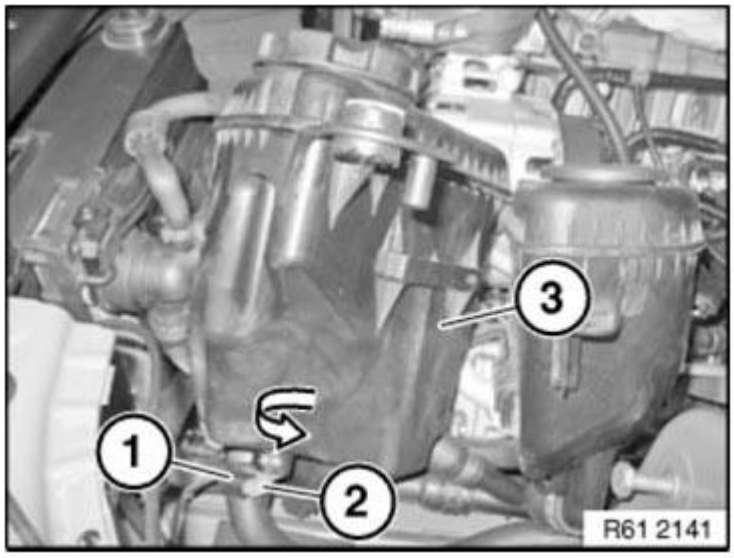


Fig. 251: Turning Coolant Level Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 118 REPLACING FRONT PASSENGER POWER WINDOW SWITCH

Operation is described in:

Removing **POWER WINDOW SWITCH (DRIVER'S SIDE)**

32 41 285 REPLACING LEVEL SWITCH FOR DYNAMIC DRIVE FLUID RESERVOIR

Necessary preliminary work

- Remove intake duct for air filter housing

Release screws (1) and (2).

Remove washers.

Tightening torque **32 41 1AZ/2AZ**

Remove fluid reservoir by pulling upwards.

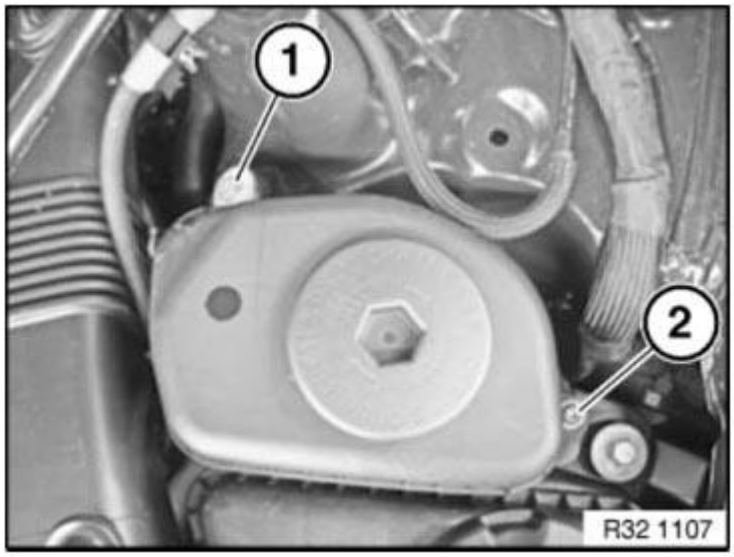


Fig. 252: Identifying Fluid Reservoir Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Raise and/or turn fluid reservoir in order to gain better access to plug connection.

Disconnect plug connection (1).

Turn level switch (2) through approx. 45° and remove towards bottom.

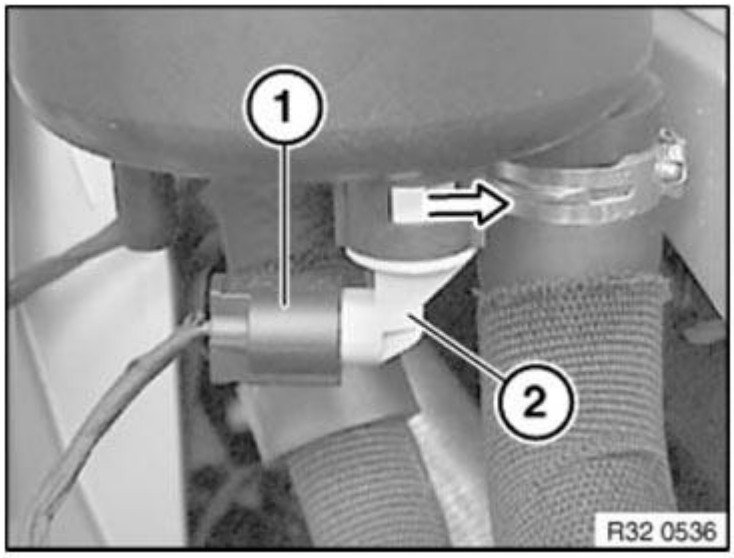


Fig. 253: Turning Level Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 492 REPLACING LEVEL SWITCH FOR WINDSCREEN WASHER SYSTEM

Necessary preliminary tasks

- Remove **FLUID RESERVOIR FOR WINDSCREEN WASHER SYSTEM**

Disconnect plug connection (1).

Turn level switch for windscreen washer system (2) in direction of arrow, pull down out of fluid reservoir (3) and remove.

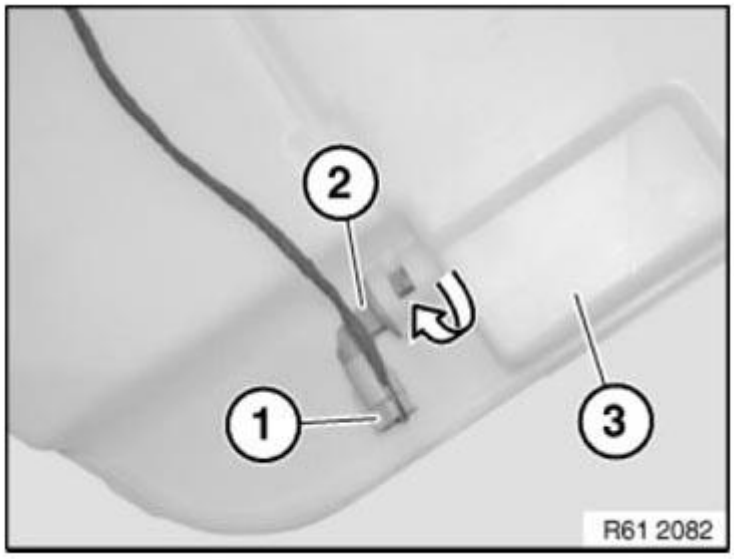


Fig. 254: Turning Level Switch For Windscreen Washer System
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 539 REPLACING OPERATING ELEMENT FOR DRIVER ASSISTANCE SYSTEM

Necessary preliminary work

- Remove **OPERATING ELEMENT FOR DRIVER ASSIST SYSTEM**

IMPORTANT: Read and comply with notes on protection against electrostatic discharge (ESD PROTECTION) .

The function keys (2) on the replacement may differ from those on the originally installed operating element (1).

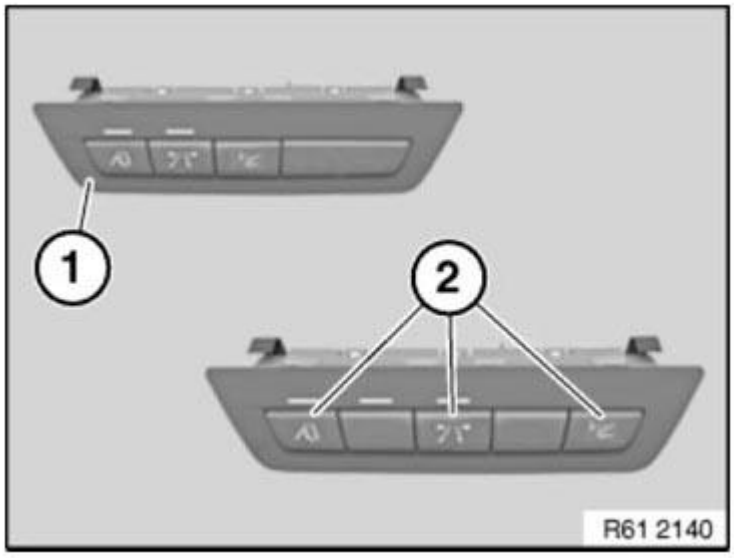


Fig. 255: Identifying Function Keys On Operating Element
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows function key (1) for full equipment specification.

Assign function keys (1) according to respective equipment specification.

Blind caps (2) are marked on the back with the corresponding position numbers.

IMPORTANT: The function keys (1) and blind caps (2) must be clipped onto the correct positions otherwise correct operation is not guaranteed and the operating element may be damaged.

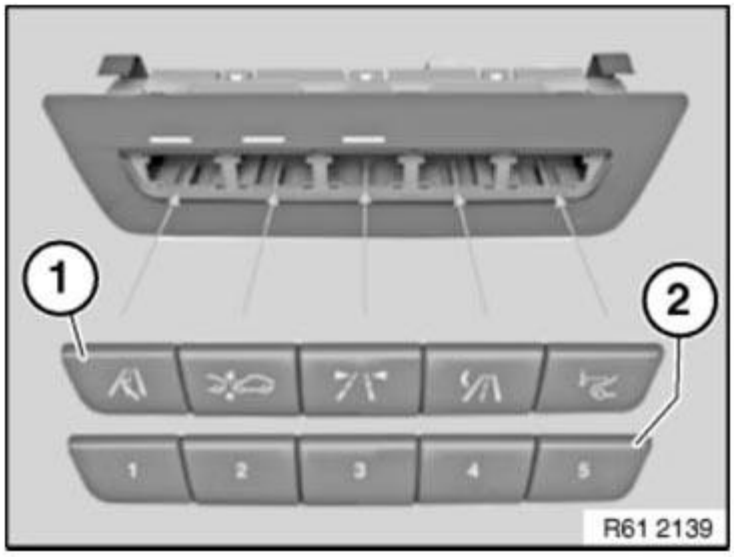


Fig. 256: Identifying Function Keys And Blind Capx

Courtesy of BMW OF NORTH AMERICA, INC.

Carry out **VEHICLE PROGRAMMING/ENCODING** .

61 31 204 REPLACING OPERATING UNIT FOR SEAT ADJUSTMENT

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work

- Remove **COVER FROM FRONT SEAT**

Release screws (1).

Raise operating unit for seat adjustment (2).

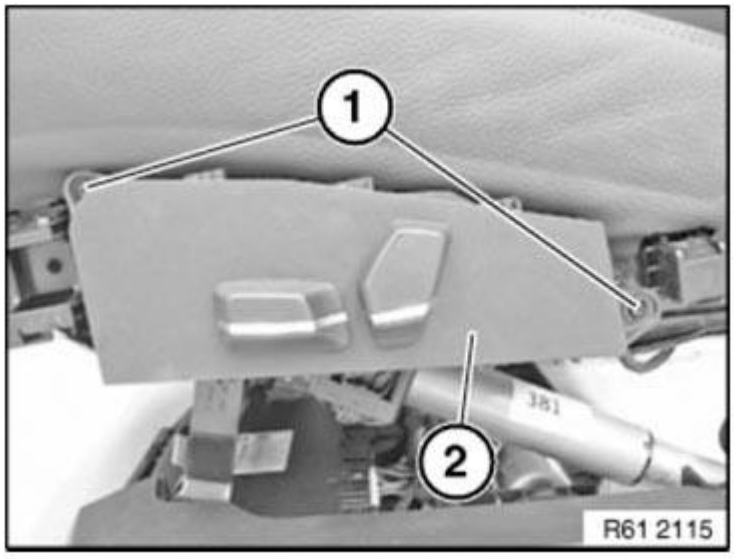


Fig. 257: Identifying Operating Unit With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove operating unit for seat adjustment.

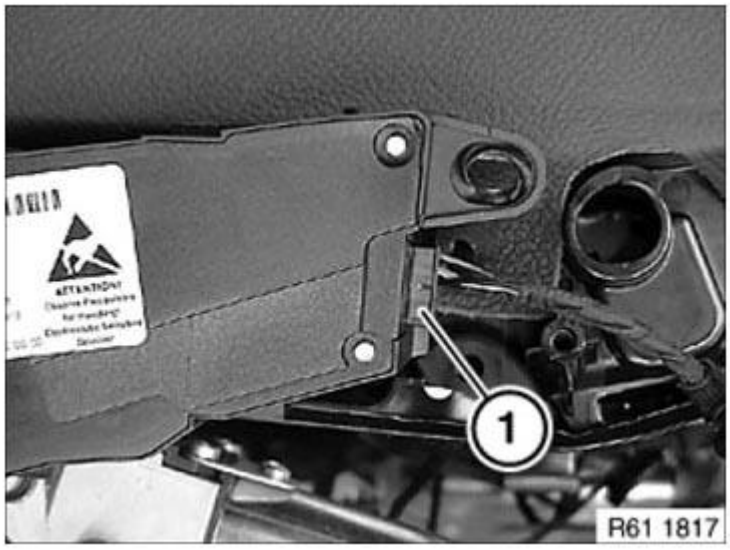


Fig. 258: Identifying Operating Unit Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

64 11... REPLACING REAR PASSENGER COMPARTMENT A/C CONTROL PANEL FAN MOTOR

Necessary preliminary work

- Remove **REAR PASSENGER COMPARTMENT A/C CONTROL PANEL**

Release screws (1).

Remove fan motor (3) from A/C control panel (2).

Installation note

Make sure pins (4) are correctly seated on fan motor (3).

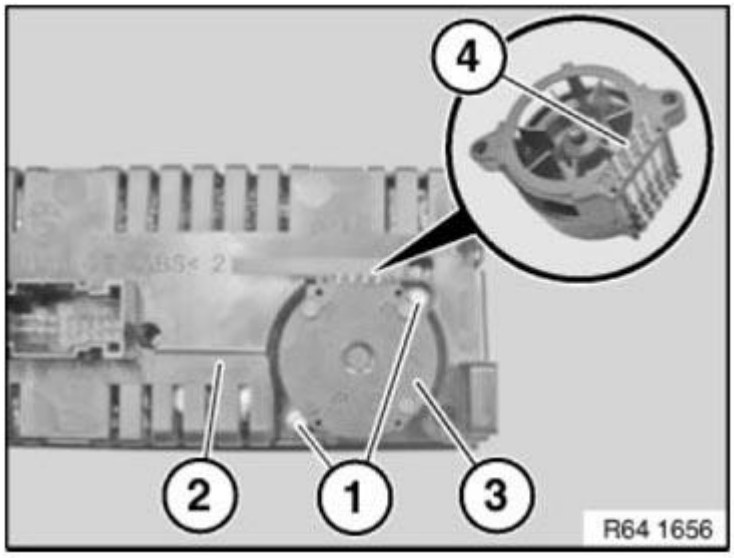


Fig. 259: Identifying A/C Control Panel With Screws, Pins And Fan Motor
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 116 REPLACING ROCKER SWITCH FOR SIDE WINDOW OPERATION (REAR)

Notes

Carefully lever out rocker switch (1) using special tool **00 9 317** from the rear door armrest (2).

Disconnect plug connection behind and remove rocker switch (2).

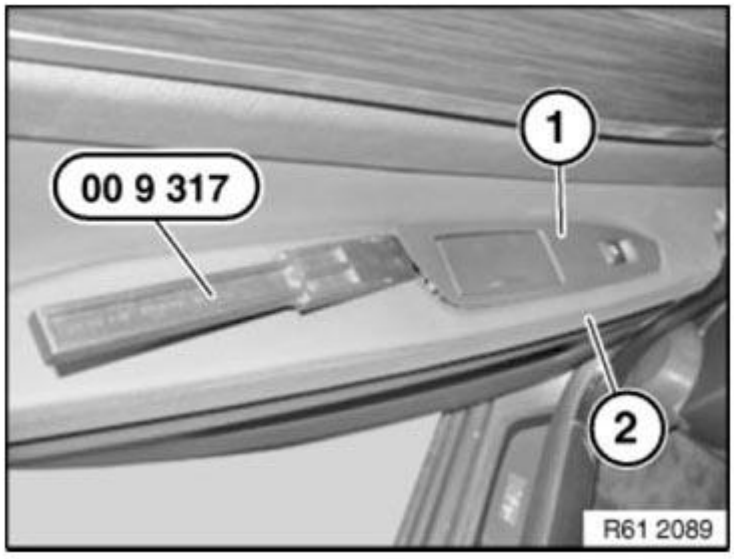


Fig. 260: Lifting Out Rocker Switch Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note

Make sure latch mechanisms (1) of rocker switch (2) are correctly seated.

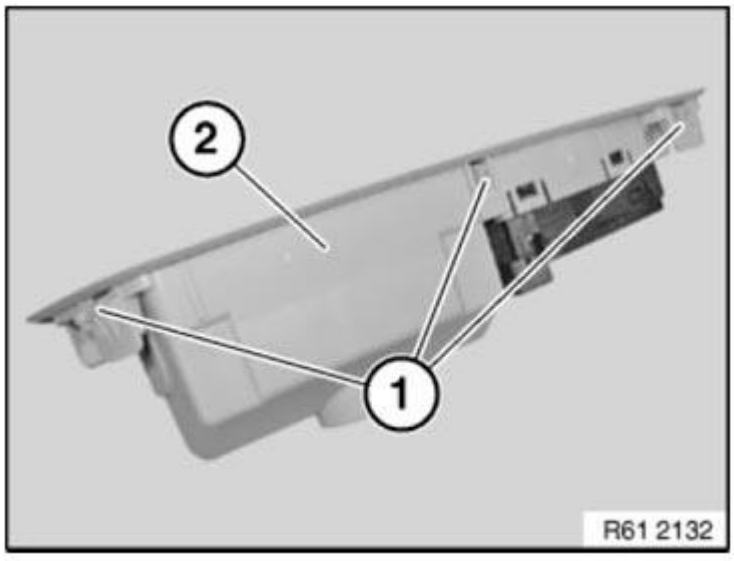


Fig. 261: Identifying Latch Mechanisms On Rocker Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 544 REPLACING ROOF SWITCH CLUSTER (ROOF FUNCTION CENTER)

IMPORTANT: Only new parts may be used for replacement (repair kit)*.

*Sourcing reference: BMW Parts Catalogue

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work

- Remove **ROOF SWITCH CLUSTER**

Secure switch unit (1) to cover (2).

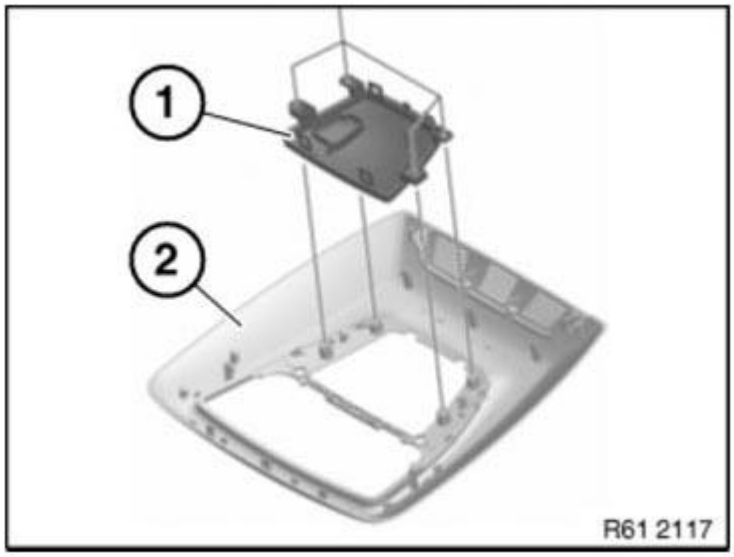


Fig. 262: Identifying Switch Unit On Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Clip light unit (1) into cover (2).

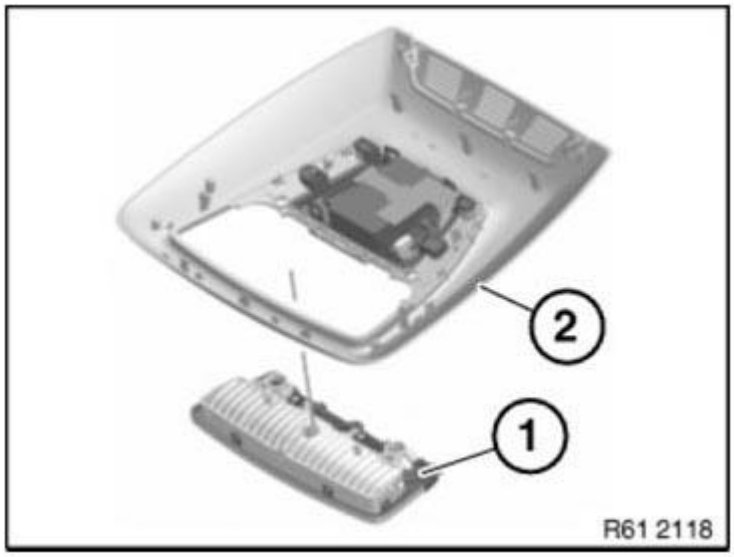


Fig. 263: Identifying Light Unit With Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Insert retaining lugs on switching mat (1) correctly into designated guides on board (2).

Connect USIS sensor plug connections (3) to board (2).

NOTE: USIS sensors (3) are used only when anti-theft alarm system is fitted.

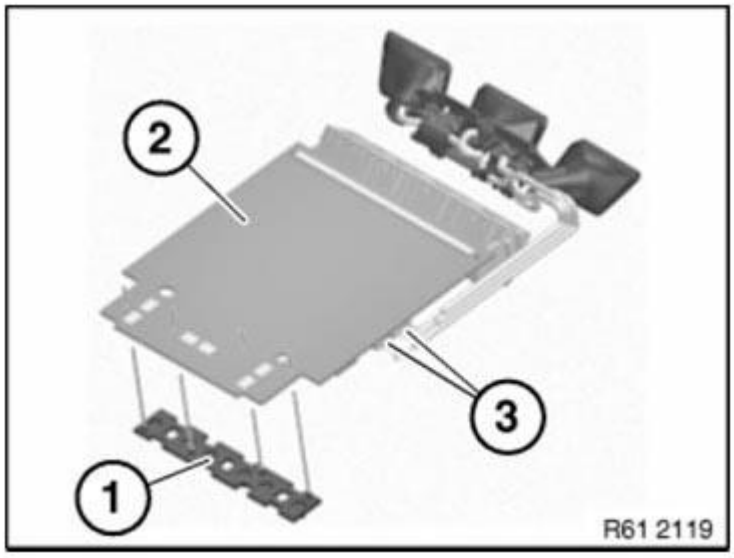


Fig. 264: Identifying Switching Mat, USIS Sensor Plug Connections And Board
Courtesy of BMW OF NORTH AMERICA, INC.

Insert USIS sensors (1) in direction of arrow into frame (2).

NOTE: USIS sensors (1) are used only when anti-theft alarm system is fitted.

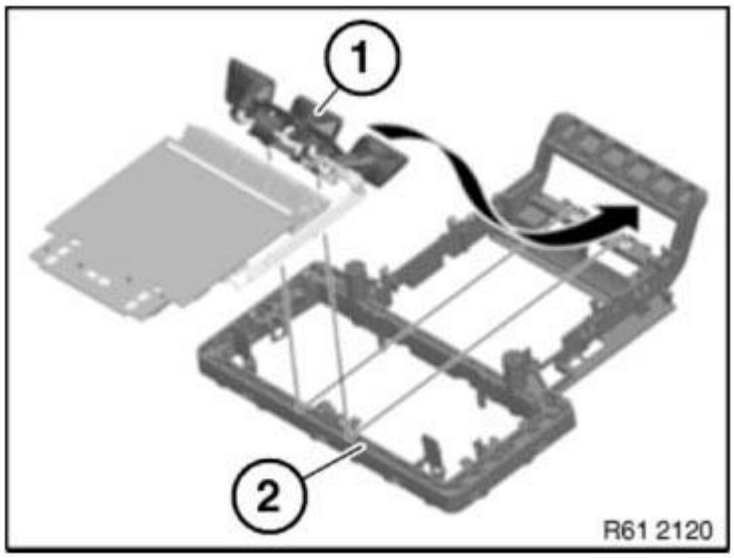


Fig. 265: Inserting USIS Sensors Into Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Clip frame (1) into cover (2).

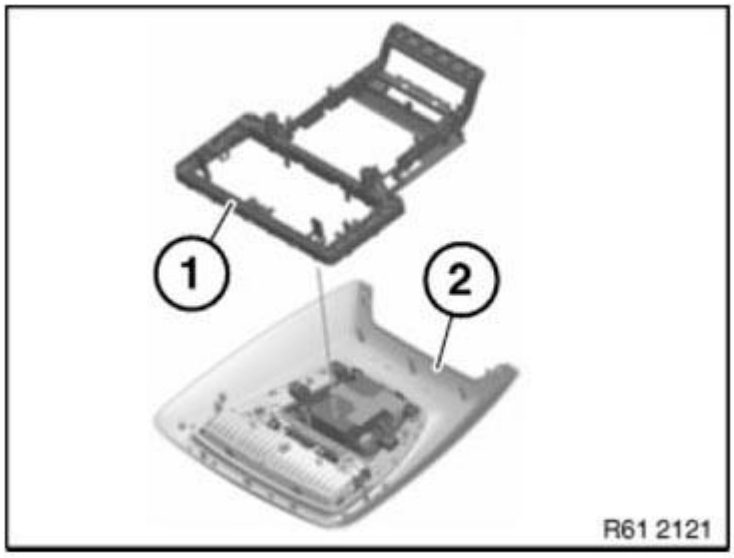


Fig. 266: Identifying Frame With Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Turn board (1) over in direction of arrow and connect plug connection (2) to board (1).

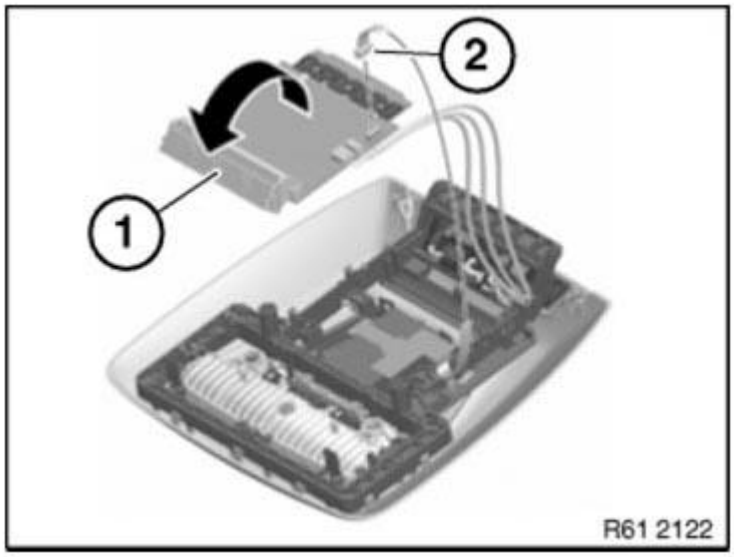


Fig. 267: Turning Board
Courtesy of BMW OF NORTH AMERICA, INC.

Version from 08/2009

Rotate PCB (1) in direction of arrow.

Wind cable (2) in direction of arrow and connect with PCB (1).

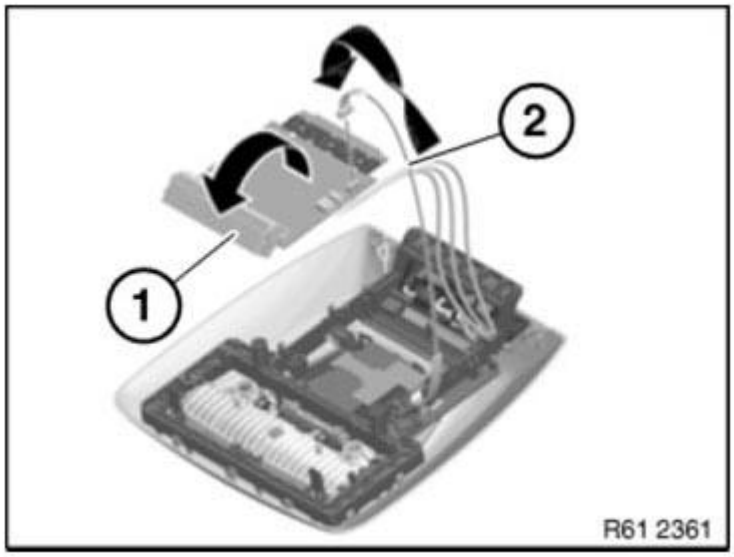


Fig. 268: Rotating PCB
Courtesy of BMW OF NORTH AMERICA, INC.

Clip board (1) onto frame (2).

Installation note

Make sure guide (3) is correctly seated in frame (2).

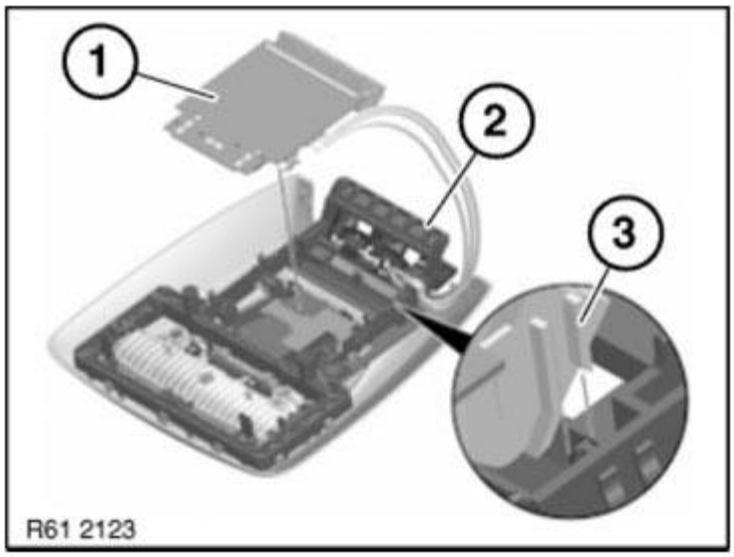


Fig. 269: Identifying Board On Frame And Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note

If anti-theft alarm system is fitted, make sure USIS sensor lead (1) is correctly seated in retaining tabs (2) on frame (3).

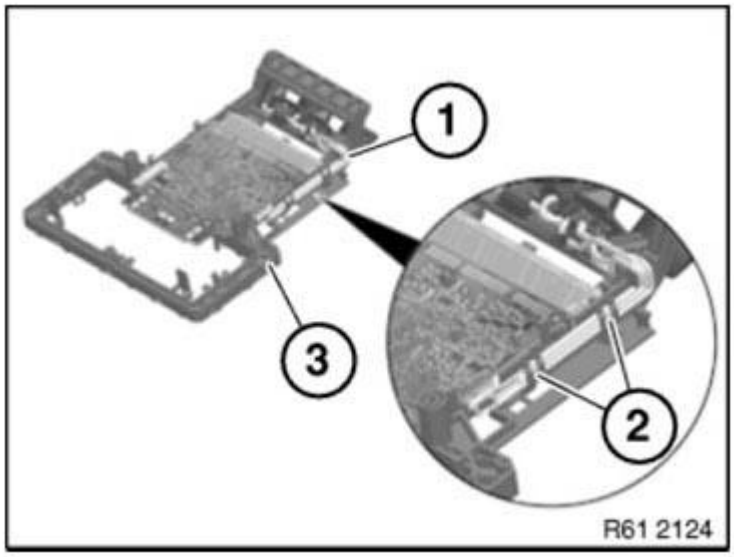


Fig. 270: Identifying USIS Sensor Lead And Retaining Tabs On Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Clip light pressed screen (1) into light unit (2).

Installation note:

Make sure pin (3) is correctly seated on board (4).

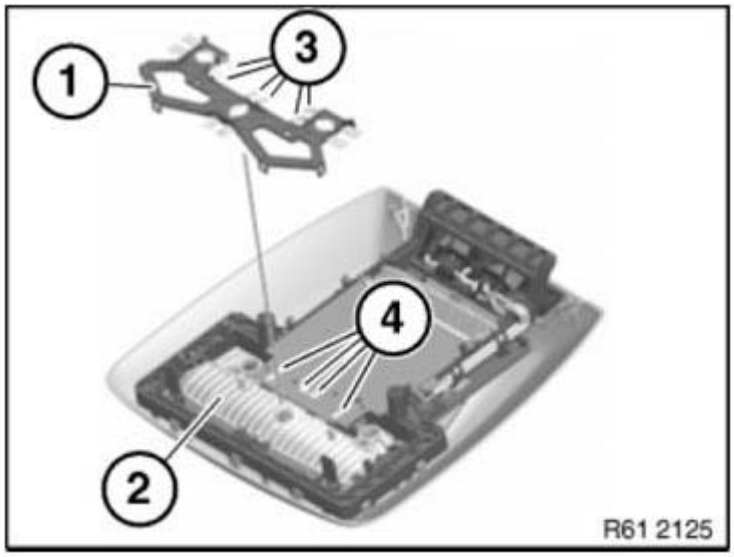


Fig. 271: Identifying Light Pressed Screen On Light Unit And Pins On Board
Courtesy of BMW OF NORTH AMERICA, INC.

Install bulbs (1) in light pressed screen (2).

Installation note:

Note **BULB TYPE** .

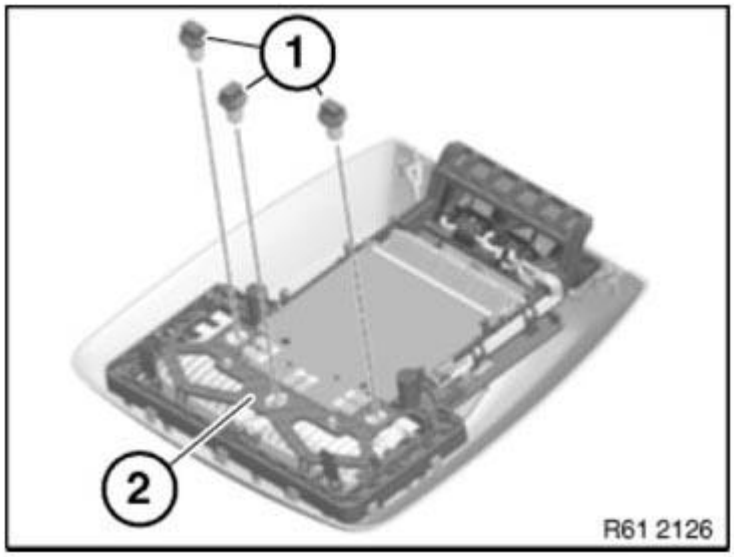


Fig. 272: Identifying Bulbs On Light Pressed Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Screw down base (1) to roof switch cluster (2).

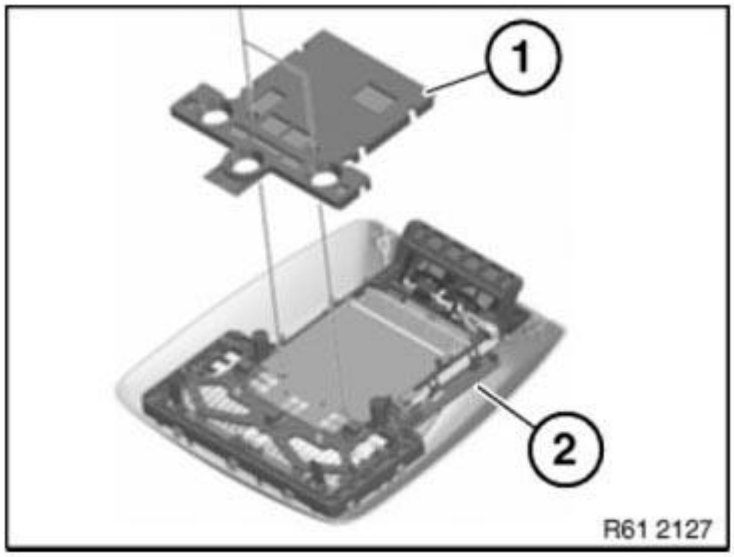


Fig. 273: Identifying Roof Switch Cluster With Base
Courtesy of BMW OF NORTH AMERICA, INC.

- Carry out **VEHICLE PROGRAMMING/ENCODING**

61 31 166 REPLACING SWITCH COMBINATION FOR SEAT ADJUSTMENT (COMFORT SEAT IN REAR COMPARTMENT)

Notes

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Carefully lever out cover (1) with special tool **00 9 317** and release screws underneath.

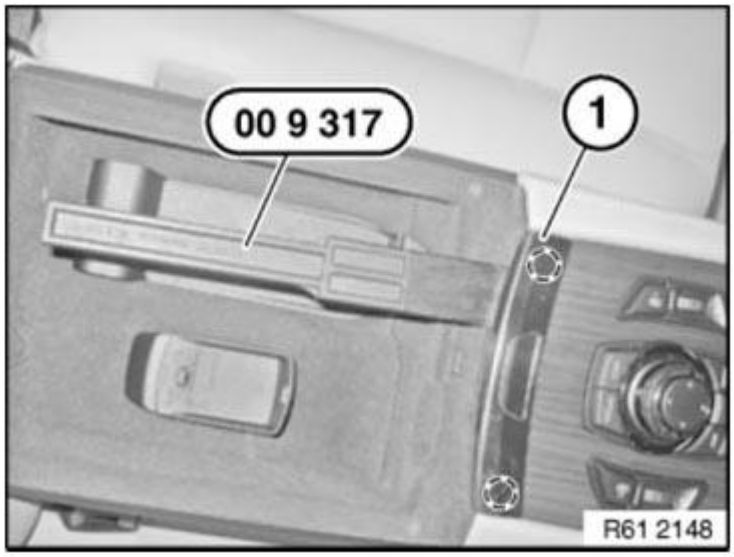


Fig. 274: Removing Cover Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully raise center armrest decorative trim (1) in direction of arrow.

Lift switch combination for seat adjustment (2) in direction of arrow out of side guide (3) and feed out.

Disconnect plug connection behind.

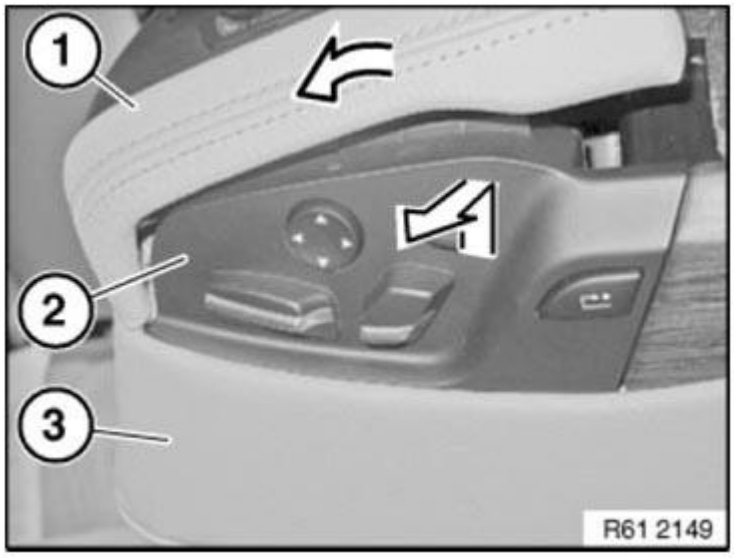


Fig. 275: Lifting Switch Combination For Seat Adjustment Out Of Side Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Make sure switch combination for seat adjustment (2) is correctly seated in side guide (3).

61 31 255 REPLACING SWITCH FOR EXTERIOR MIRROR

Operation is described in:

Removing **POWER WINDOW SWITCH (DRIVER'S SIDE)**

6133 HORN

61 33 050 REMOVING AND INSTALLING/REPLACING LEFT FANFARE HORN

Necessary preliminary work

- Remove **FRONT LEFT WHEEL ARCH COVER**
- On vehicles with auxiliary heaters as equipment specification, remove **BUMPER TRIM**

Disconnect plug connection (1) and release nut (2).

Remove fanfare horn (3).

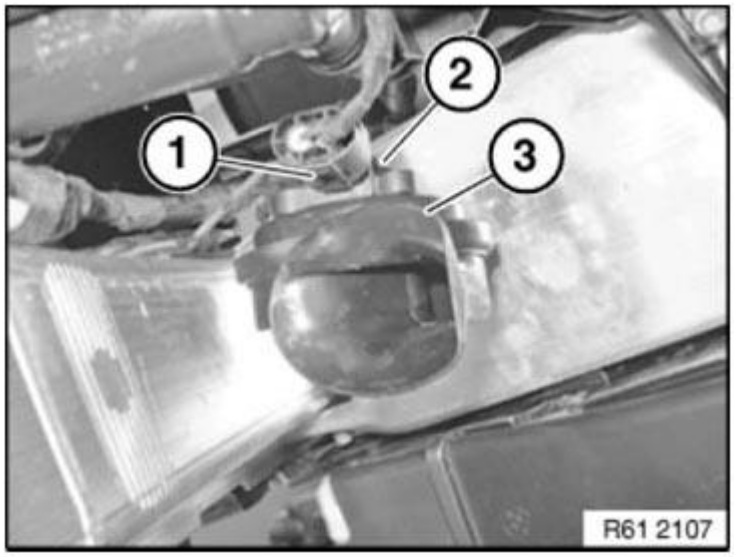


Fig. 276: Identifying Fanfare Horn With Plug Connection And Nut (61 33 050)
Courtesy of BMW OF NORTH AMERICA, INC.

61 33 055 REMOVING AND INSTALLING/RENEWING RIGHT FANFARE HORN

Necessary preliminary work

- Remove **FRONT BUMPER TRIM**

Disconnect plug connection (1) and release nut (2).

Remove fanfare horn (3).

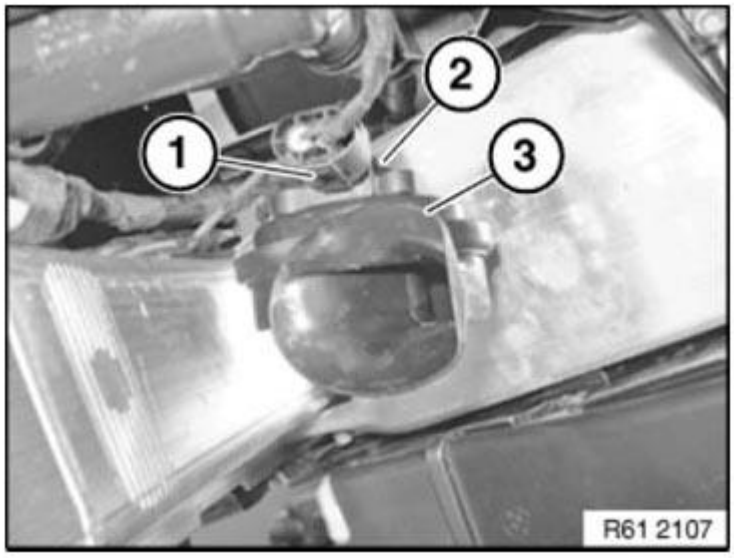


Fig. 277: Identifying Fanfare Horn With Plug Connection And Nut (61 33 055)

Courtesy of BMW OF NORTH AMERICA, INC.

61 33 060 REMOVING AND INSTALLING/REPLACING BOTH FANFARE HORNS

Necessary preliminary work

- Remove **FRONT BUMPER TRIM** .

Unlock plug connections (1) and disconnect.

Release nut (2) and remove fanfare horns on right/left (3).

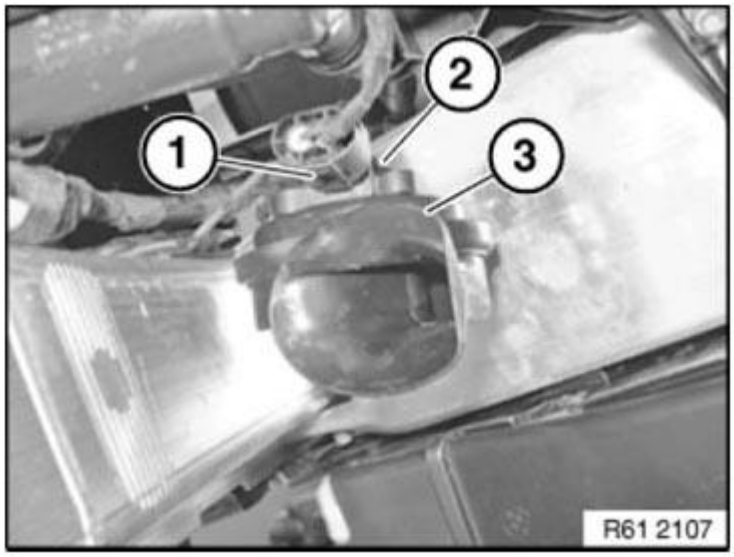


Fig. 278: Identifying Fanfare Horn With Plug Connection And Nut (61 33 060)
Courtesy of BMW OF NORTH AMERICA, INC.

6134 INSERT HOLDER FOR CIGARETTE LIGHTER

61 34... REMOVING AND INSTALLING/REPLACING 12V SOCKET IN CENTER ARMREST STORAGE COMPARTMENT

Necessary preliminary tasks

- **REMOVE CENTRE ARMREST STORAGE COMPARTMENT**

Remove 12V socket with special tool 61 0 250.

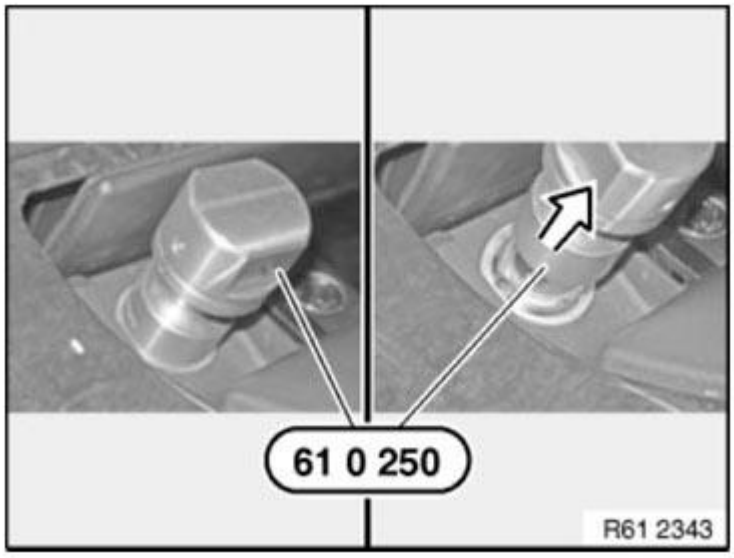


Fig. 279: Removing 12V Socket Using Special Tool (61 0 250)
Courtesy of BMW OF NORTH AMERICA, INC.

61 34 REMOVING AND INSTALLING/REPLACING 12V SOCKET IN FRONT STORAGE COMPARTMENT (ASHTRAY)

Necessary preliminary tasks

- **REMOVE FRONT STORAGE COMPARTMENT**

Disconnect plug connection (1). Unlock plug and pull out of mounting in direction of arrow.

Unlock socket light (2) and pull out.

Expose cable (3).

Installation:

Ensure correct routing of cables.

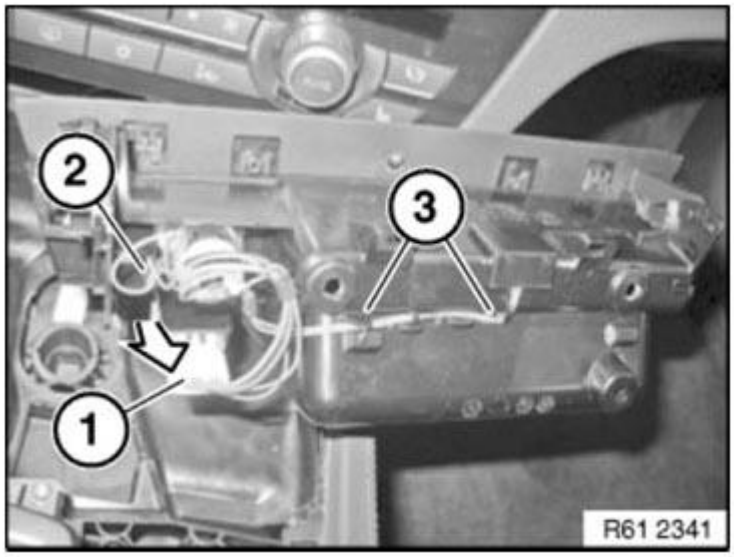


Fig. 280: Pulling Out Plug Out Of Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Open cap (1) towards top.

Press retaining lugs together with a suitable tool and lift out ashtray light (2).

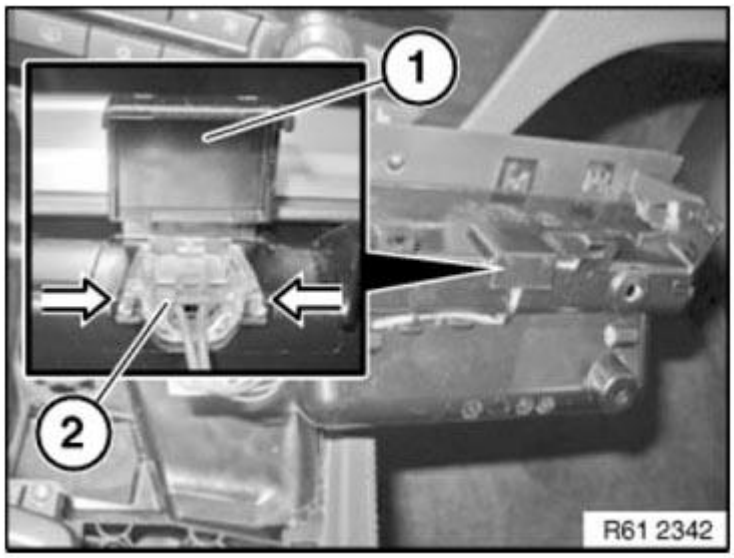


Fig. 281: Pressing Retaining Lugs Together Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Remove 12V socket with special tool 61 0 250.

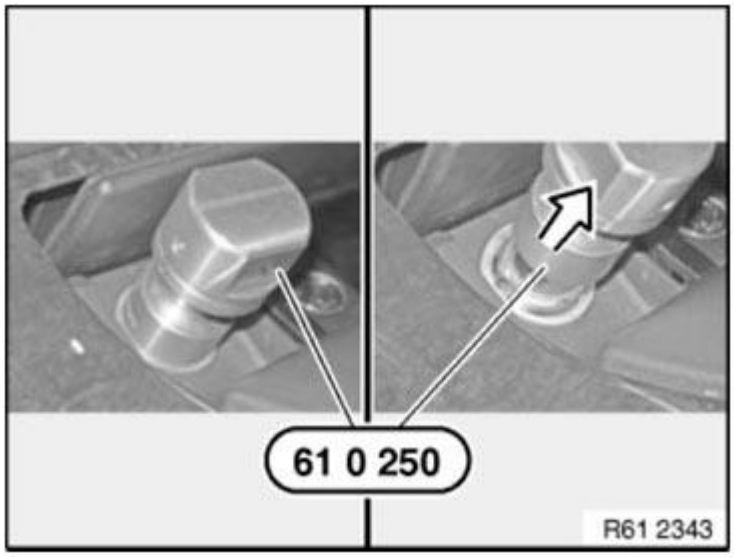


Fig. 282: Removing 12V Socket Using Special Tool (61 0 250)
Courtesy of BMW OF NORTH AMERICA, INC.

6135 CONTROL UNITS, MODULES

61 35 679 INITIALIZING RAIN/LIGHT (SOLAR) SENSOR

NOTE: **Initialization is necessary:**

- **after replacing windscreen**
- **after replacing rain/light (solar) sensor**
- **after replacing optics on rain/light (solar) sensor**
- **after installing a used rain/light (solar) sensor**

NOTE:

- **Connect BMW diagnosis system**
- **Initializing rain/light (solar) sensor**

61 35... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE)

Notes

NOTE: **Electrical components which are particularly sensitive to electrostatic discharge (electronic control units, sensors, etc.) are marked with the ESD warning symbol.**

E - Electro

S - Static

D - Discharge

Statically charged persons can discharge themselves when they touch electrical components.

NOTE: Humans can only detect a discharge starting from a level of approx. 3000 V.

The danger threshold for electrical components already starts from a level of approx. 100 V.

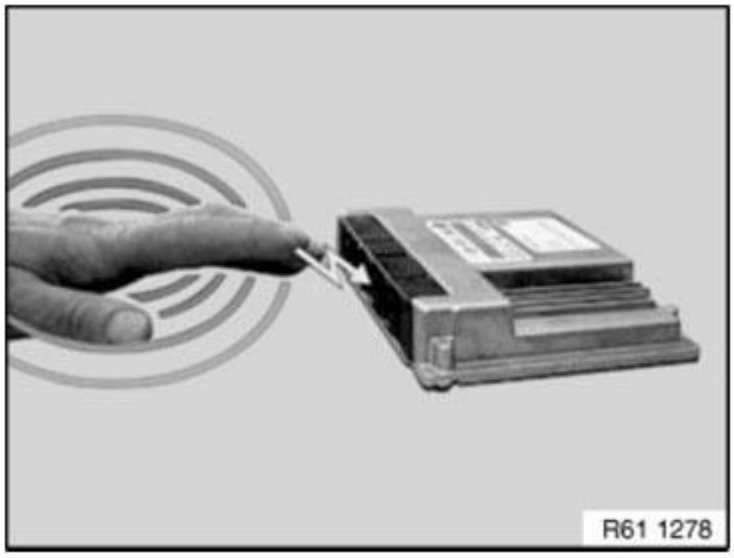


Fig. 283: Discharging Charged Person By Touching Electrical Components
Courtesy of BMW OF NORTH AMERICA, INC.

Example:

Mechatronic control unit.

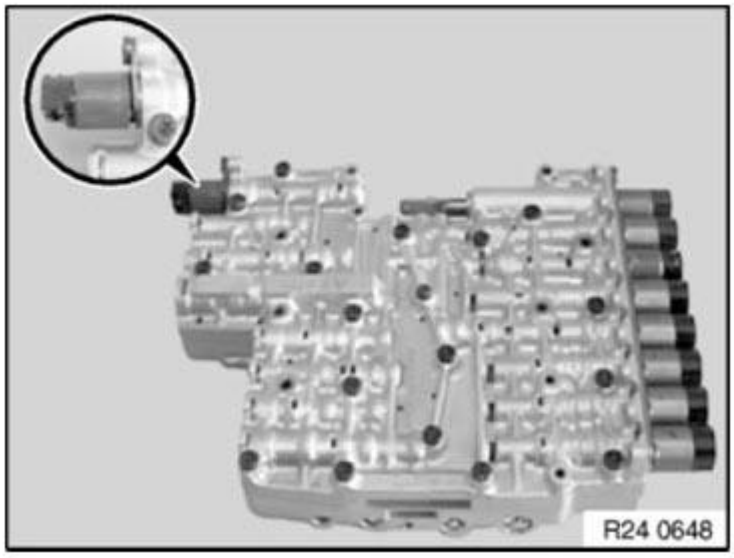


Fig. 284: Identifying Mechatronic Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 285: Precaution For Pins And Multi-Pin Connectors Directly
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not touch pins and multi-pin connectors directly!

Touch electrical components by their housings only.

IMPORTANT: To avoid damaging or destroying electrical components as a result of electrostatic discharge, it is absolutely essential to observe the following instructions:

- **When replacing electrical components, leave the replacement components in their original packaging until immediately before they are to be installed**
- **If necessary, always return a removed component in its original packaging (always pack the component away immediately)**
- **Read and comply with user information on using the associated special tool 12 7 060**

Personal protective equipment:

Electrically conducting clothing (high wool content, antistatic shoes required).

These can primarily be identified by the logo on the side.



Fig. 286: Identifying Antistatic Shoes
Courtesy of BMW OF NORTH AMERICA, INC.

61 00... PROGRAM / ENCODE THE CONTROL UNIT (E)

NOTE: In order to avoid incorrect programming procedures and fault messages, it is essential to always use the most current version when working with the ISTA/P

programming system.

NOTE: Battery voltage must not drop below 13.0 V during programming. Connect battery charger prior to programming Use only BMW-recommended battery chargers* *Sourcing reference Workshop Equipment Catalogue

programming routine via ISTA/P:

- Connect the battery charger to the vehicle.
- Connect the programming system with the vehicle.
- Determine the action plan and, if necessary, add complete car coding to the action plan.
- Accept action plan with the control units to be programmed/encoded and enabled, if necessary or work through.
- Observe the reworking list!
- Connect the workshop system to the vehicle.
- Perform brief test and delete fault memory.

61 35 245 REMOVING AND INSTALLING (REPLACING) SMART OPENER BOTTOM SENSOR LINE (NON-CONTACT REAR LID OPENING)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION).

Necessary preliminary work:

- Remove **COVER ON REAR BUMPER PANEL** .

Release latch mechanisms (1) and remove control unit (2) in direction of arrow.

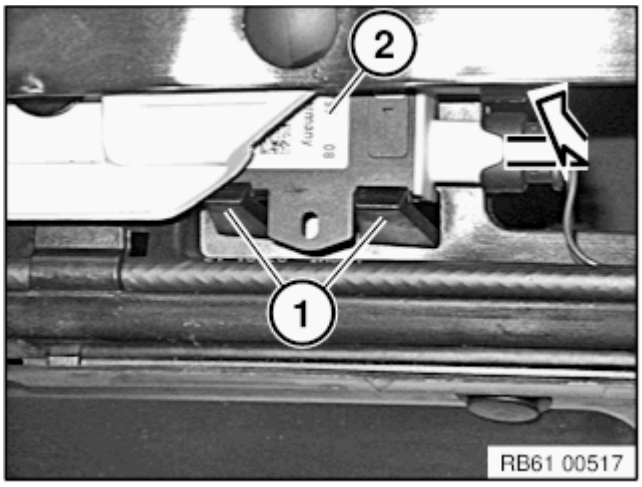


Fig. 287: Identifying Control Unit And Latch Mechanisms
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock associated plug connection (1) on control unit (2) and disconnect.

Feed out connecting line from cable clips (3).

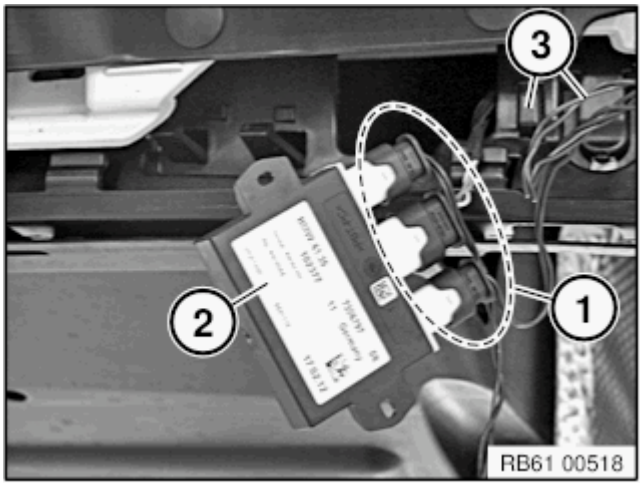


Fig. 288: Identifying Control Unit, Plugs, And Cable Clips
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage, do not kink sensor line!

Dismantling sequence:

- Detach sensor line (1) from holder (2) to the top
- Detach sensor cable (1) from holder (2) to the right

Installation note:

Make sure plug connection and sensor line (1) are correctly fitted.

Make sure connecting line is correctly laid.

Brackets must not be damaged.

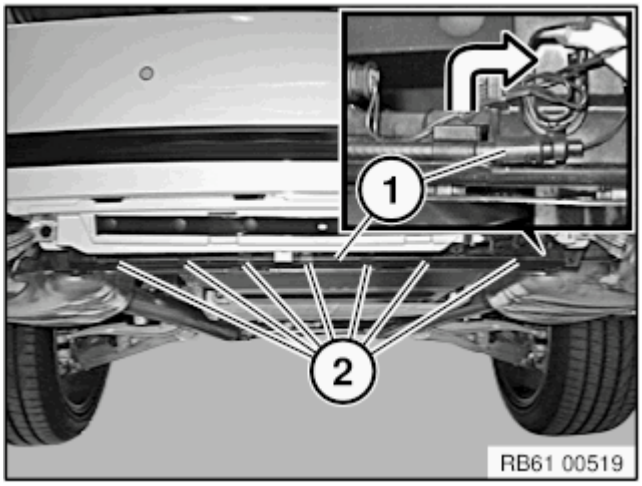


Fig. 289: Identifying Sensor Line And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 240 REMOVING AND INSTALLING (REPLACING) SMART OPENER CONTROL UNIT (NON-CONTACT REAR LID OPENING)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION).

Necessary preliminary work:

- Remove **COVER ON REAR BUMPER PANEL** .

Release latch mechanisms (1) and remove control unit (2) in direction of arrow.

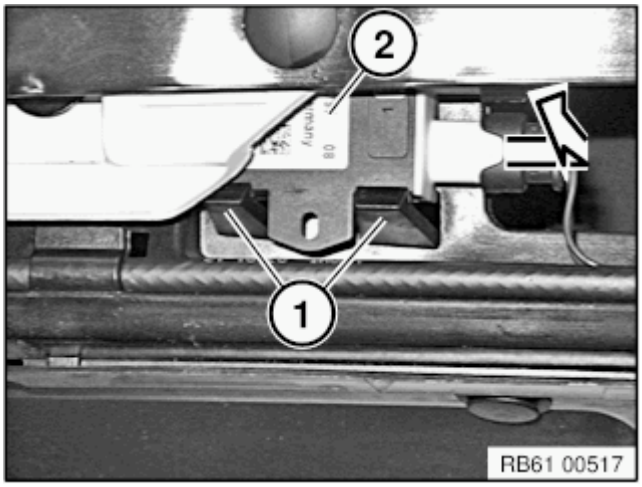


Fig. 290: Identifying Control Unit And Latch Mechanisms
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock associated plug connection (1) on control unit (2) and disconnect.

Feed out connecting line from cable clips (3).

Installation note:

Make sure plug connections (1) and control unit (2) are correctly fitted.

Make sure connecting lines are correctly routed at holder (3).

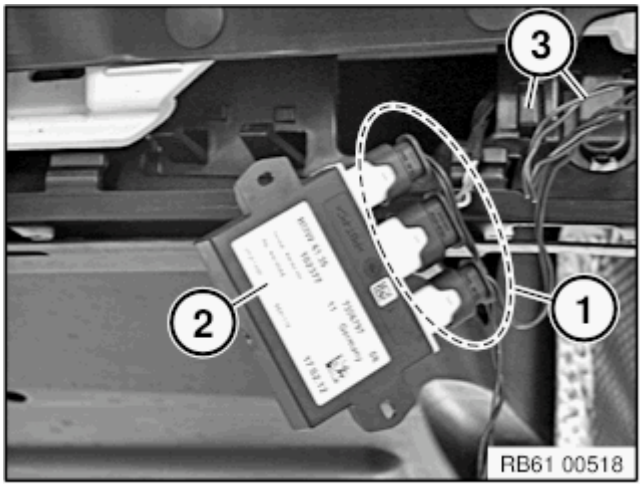


Fig. 291: Identifying Control Unit, Plugs, And Cable Clips
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 243 REMOVING AND INSTALLING (REPLACING) SMART OPENER TOP SENSOR LINE (NON-CONTACT REAR LID OPENING)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION).

Necessary preliminary work:

- Remove **COVER ON REAR BUMPER PANEL** .

IMPORTANT: Risk of damage, do not kink sensor line!

Unlock plug connection (1) and disconnect.

Feed out connecting line from holder.

Release sensor line (2) at clips (3) and remove.

Installation note:

Make sure plug connection (1) and sensor line (2) are correctly seated.

Make sure connecting line is correctly laid.

Clips (3) must not be missing or damaged.

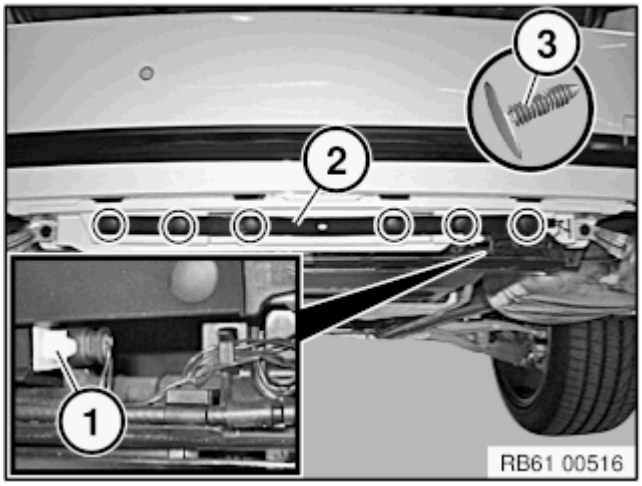


Fig. 292: Identifying Plug Connection, Sensor Line, And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 015 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR CAR ACCESS SYSTEM

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary work:

- Disconnect **BATTERY GROUND LEAD**
- Remove both battery cables at F03
- Remove trim panel for pedal mechanism. See **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (US ONLY)** .

Disconnect plug connection (1).

Release screw (2).

Tightening torque **61 35 1 AZ** .

Remove control unit for Car Access System (3) in direction of arrow.

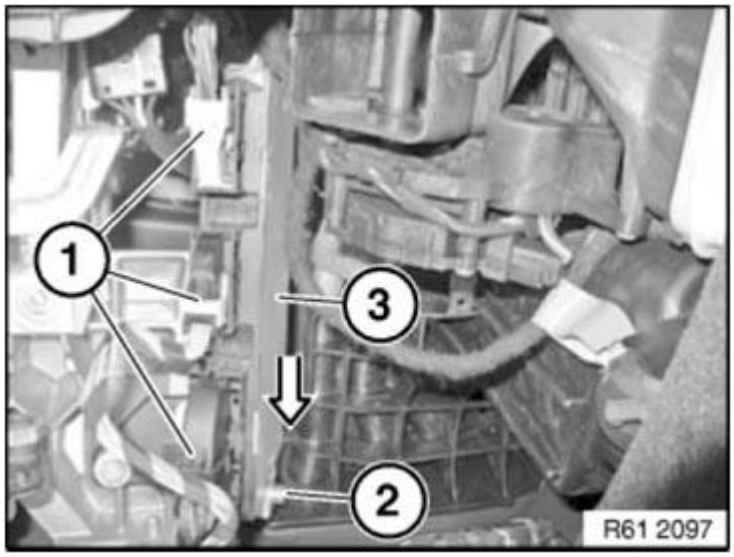


Fig. 293: Removing Control Unit For Car Access System
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Feed guide (1) of control unit for Car Access System (2) correctly into associated mounting.

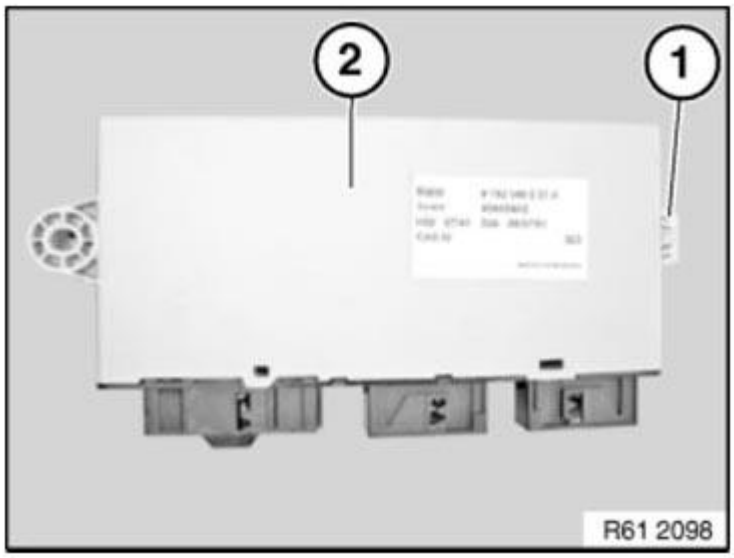


Fig. 294: Identifying Car Access System With Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/ENCODING**

For vehicles with rear-seat entertainment (RSE):

Teach in RSE master key via path:

- Body
- Rear seat entertainment system
- Teach in radio remote control
- Radio remote control

61 35 196 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR AUTOMATIC OPERATION OF TAILGATE SYSTEM

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work:

- **DISCONNECT NEGATIVE BATTERY CABLE**
- Remove both battery earth leads at F03
- Remove right **LUGGAGE COMPARTMENT WHEEL ARCH PANEL** .

NOTE: From 09/2010, the control unit is installed with a different placement of connector chambers:

1. **control unit to 09/2010**
2. **control unit from 09/2010**

Replacement:

Control unit (2) is installed as shown in vehicles with a production date up to 09/2010.

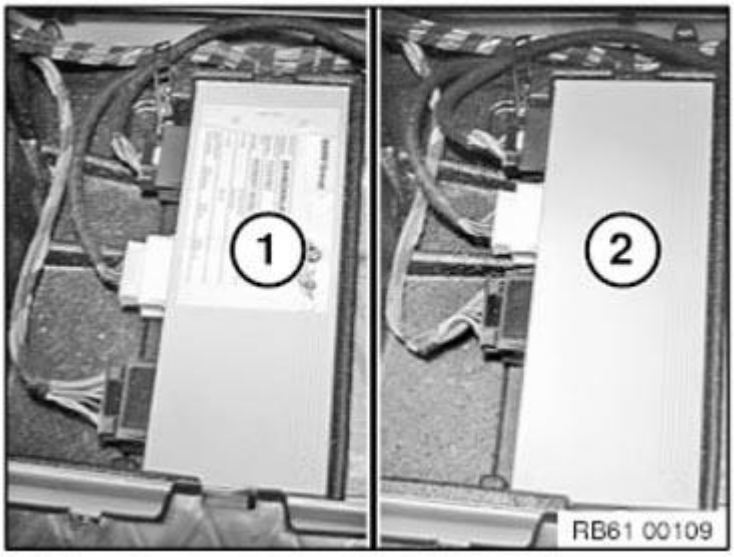


Fig. 295: Identifying Control Units
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Pull out control unit for automatic tailgate activation (2) in direction of arrow.

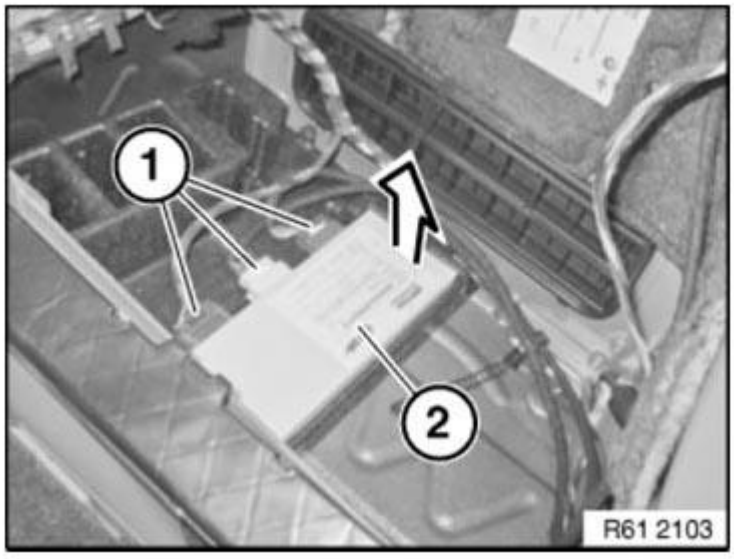


Fig. 296: Pulling Out Control Unit For Automatic Tailgate Activation
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING AND ENCODING** .

66 53 180 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR REVERSING CAMERA

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work

- Remove **LUGGAGE COMPARTMENT WHEEL ARCH PANEL ON LEFT** .

Unlock plug connections (2) and disconnect.

Unscrew nuts (1).

Remove control unit (3) in direction of arrow.

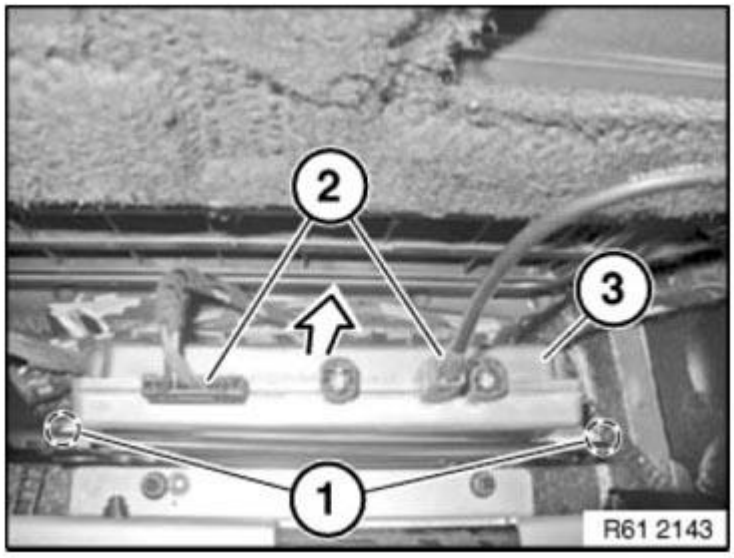


Fig. 297: Removing Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **PROGRAMMING/ENCODING** .
- **CALIBRATE REVERSING CAMERA**

61 35 001 REMOVING AND INSTALLING (REPLACING) TRAILER MODULE

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work:

- Remove right **LUGGAGE COMPARTMENT WHEEL ARCH PANEL** .

Disconnect plug connection (1).

Pull out trailer module (2) upwards in direction of arrow.

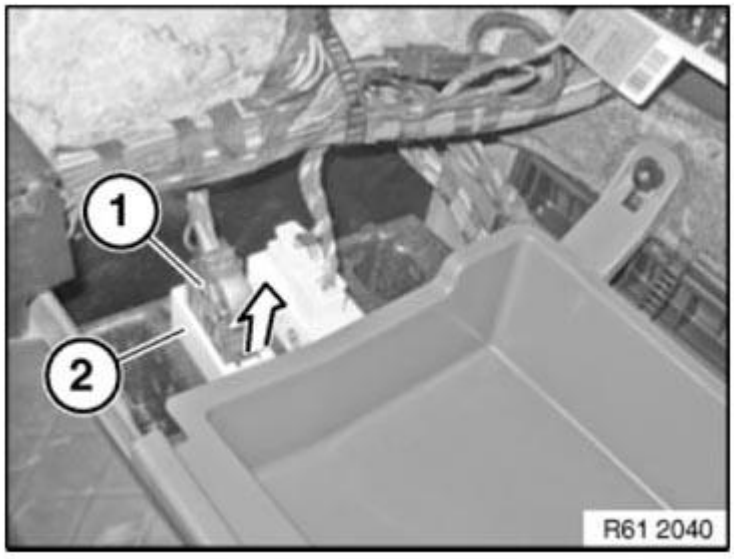


Fig. 298: Pulling Out Trailer Module
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING/ENCODING** .

61 35 250 REMOVING AND INSTALLING CONTROL UNIT FOR LEFT ELECTRIC-MOTOR-DRIVEN RETRACTOR

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work:

- Remove **LEFT B-PILLAR SENSOR**

Version with electric motor retractor:

Release screws (1).

Installation note:

Replace screws.

Tightening torque **72 11 01AZ** .

Unlock automatic reel (2) and remove from B-pillar.

Installation note:

Retractor mechanism is coded against incorrect assembly.

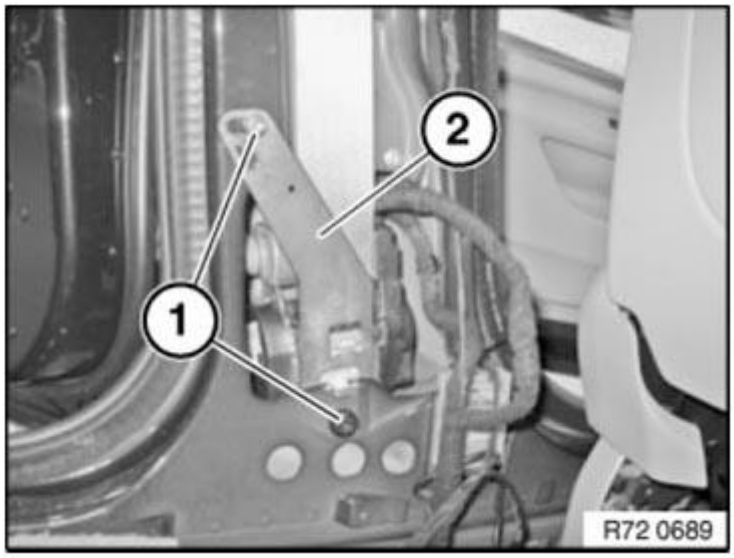


Fig. 299: Identifying Automatic Reel With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Lay seat belt to one side.

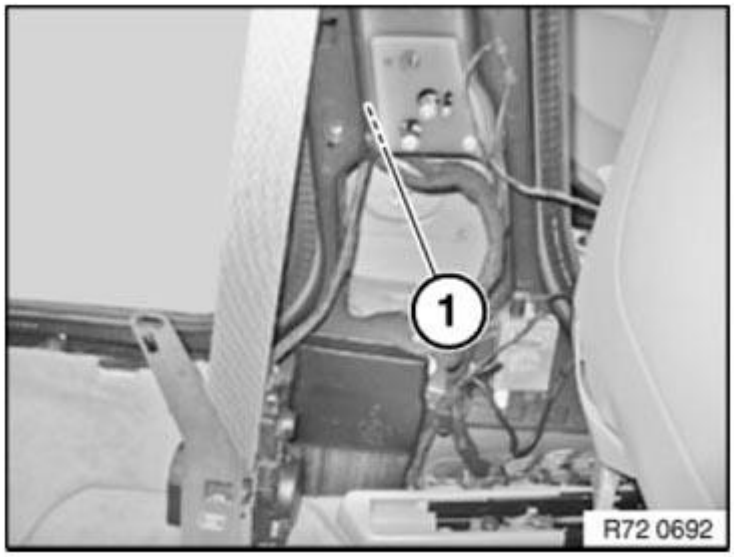


Fig. 300: Identifying Automatic Reel Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1)

Raise control unit (2) at screws slightly.

Feed control unit (2) in direction of arrow out of B-pillar.

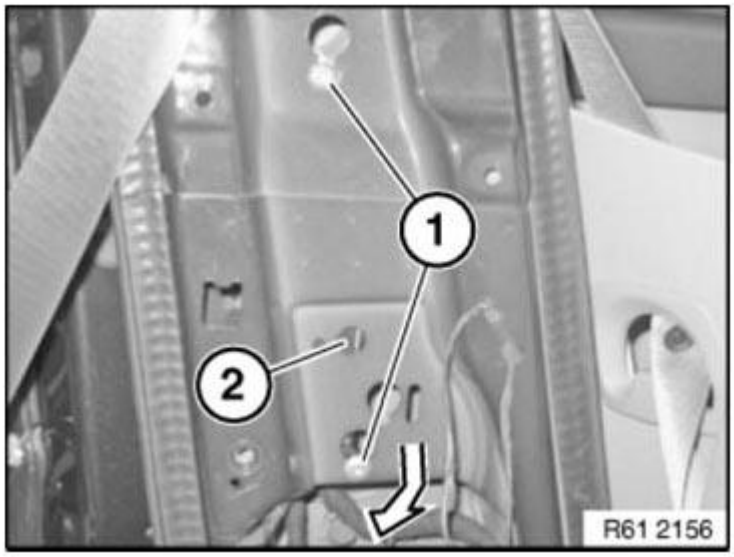


Fig. 301: Removing Control Unit Out Of B-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Remove control unit (2).

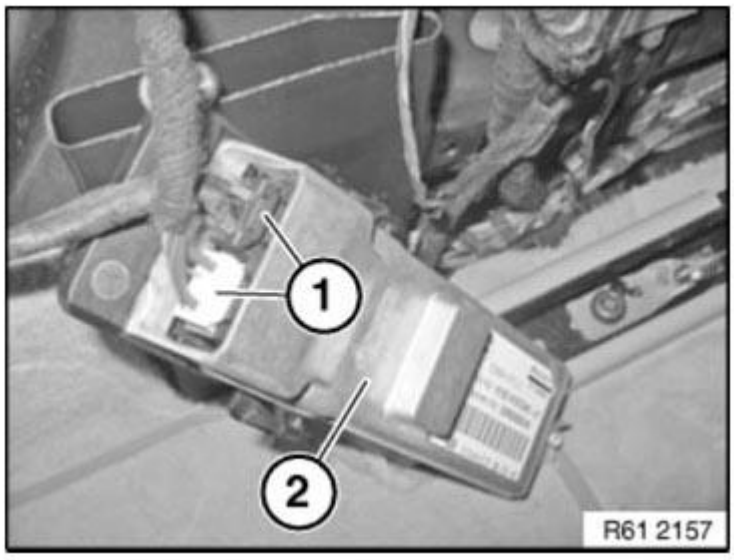


Fig. 302: Identifying Control Unit With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 252 REMOVING AND INSTALLING CONTROL UNIT FOR RIGHT ELECTRIC-MOTORDRIVEN RETRACTOR

Operation is described in:

Removing **CONTROL UNIT FOR LEFT ELECTRIC-MOTOR-DRIVEN RETRACTOR** .

61 35 095 REMOVING AND INSTALLING CONTROL UNIT/MODULE FOR SEAT HEATING (REAR SEAT)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary tasks:

- **REMOVE AND INSTALL REAR SEAT**

Disconnect plug connection (1).

Unclip clip (2) and remove control unit for seat heating (3).

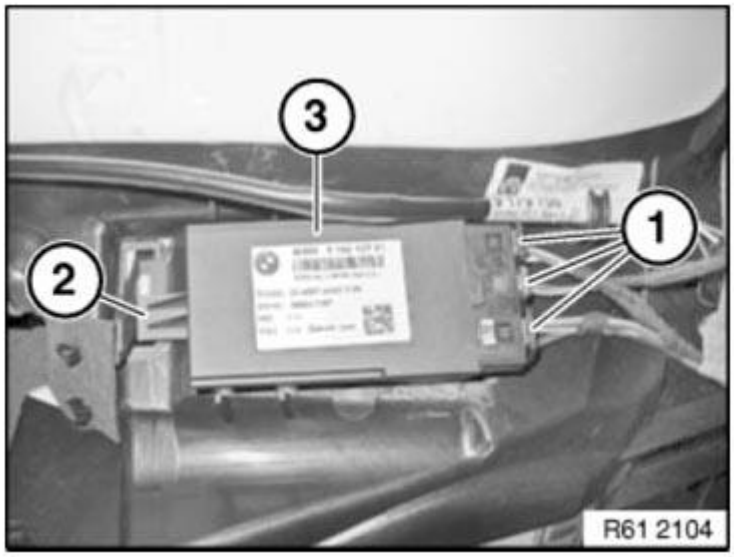


Fig. 303: Identifying Clip, Plug Connection And Control Unit For Seat Heating
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure mount (1) and retaining lugs (3) of control unit for seat heating (2) are correctly seated.

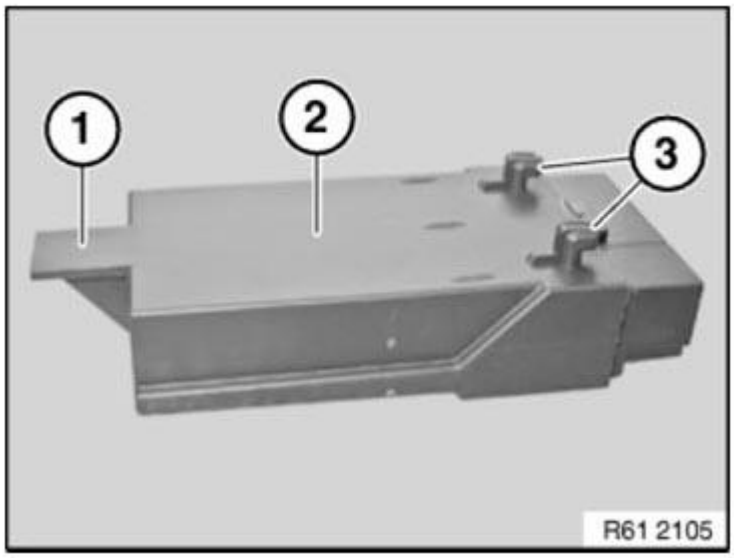


Fig. 304: Identifying Mount, Retaining Lugs And Control Unit For Seat Heating
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 107 REMOVING AND INSTALLING OR REPLACING JUNCTION BOX ELECTRONICS

IMPORTANT: Read and comply with notes on protection against electrostatic discharge (ESD PROTECTION) .

Necessary preliminary work

- Partially remove power distribution box for passenger compartment. See **REMOVING AND INSTALLING/REPLACING POWER DISTRIBUTION BOX IN PASSENGER COMPARTMENT**.

Disconnect plug connection (1).

Pull junction box electronics (2) out of bracket.

Installation note:

Make sure junction box electronics and plug connections (1) are correctly seated.

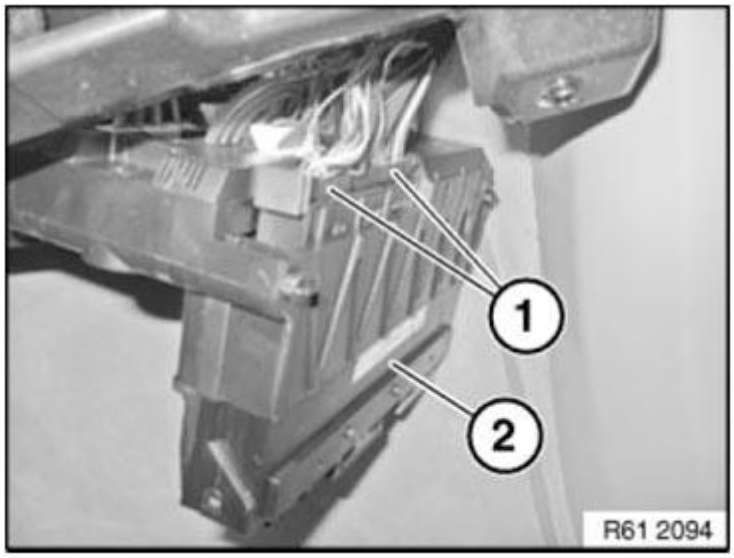


Fig. 305: Identifying Junction Box Electronics With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING/ENCODING** .

Delete transport mode.

61 35 980 REMOVING AND INSTALLING/RENEWING AERIAL FOR COMFORT ACCESS SYSTEM ON LEFT OR RIGHT

Necessary preliminary work:

- Remove **PANEL FOR COVER ON SIDE MEMBER**

Unlock and remove aerial for comfort access system (2) from bracket (3).

Installation note:

Make sure interior aerial for comfort access system (2) is correctly seated in designated holder (3).

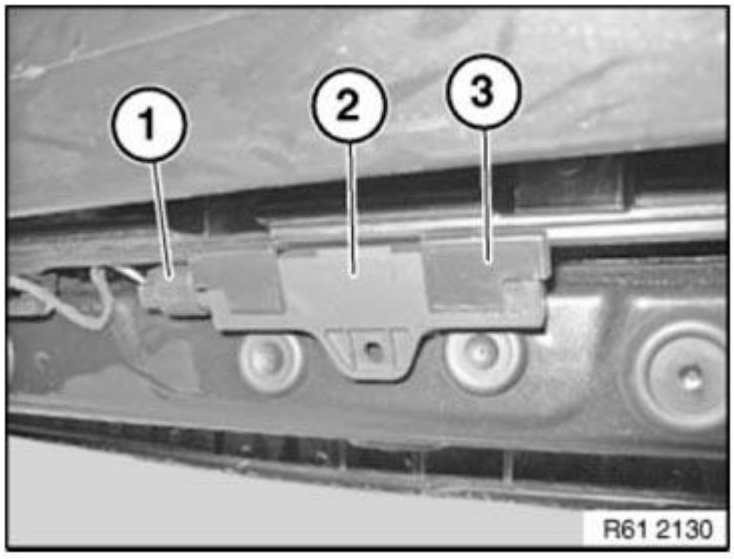


Fig. 306: Identifying Comfort Access System With Plug Connection And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 127 REMOVING AND INSTALLING/REPLACING BODY GATEWAY MODULE

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Read out **PROGRAMMING/ENCODING** .

- Print out and make a note of settings for Car&Key Memory in CKM menu

Necessary preliminary work

- Disconnect **NEGATIVE BATTERY CABLE**
- Disconnect both negative battery cables atF03
- Remove trim panel for pedal mechanism. See **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (US ONLY)** .

Disconnect plug connection (1).

Release screw (2) and remove cable shoe (4).

Tightening torque **61 35 3AZ** .

Pull body module (3) out of equipment holder (5) in direction of arrow.

Installation note:

Make sure body module (3) is correctly installed in equipment holder (5).

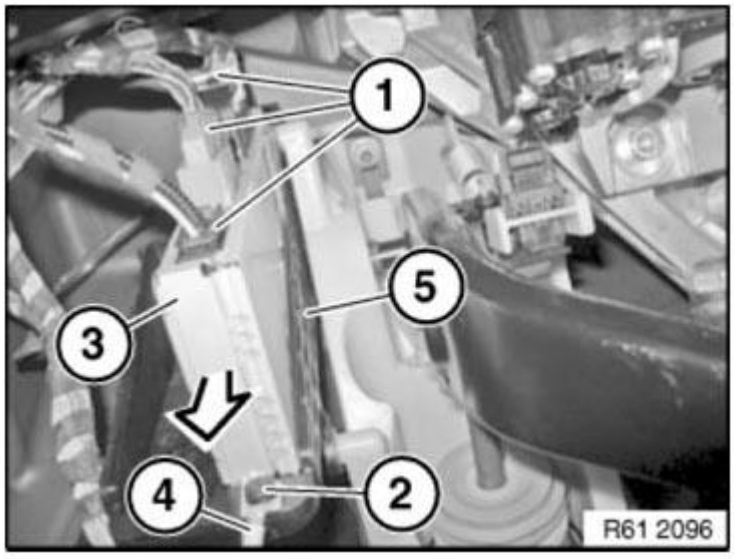


Fig. 307: Pulling Body Module Out Of Equipment Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/ENCODING** .

Perform FlexRay synchronization via path:

- Body
- Central Gateway Module
- Initialize FlexRay

Check printed-out or noted-down settings for car and key memory in CKM menu and reset if necessary

61 35 975 REMOVING AND INSTALLING/REPLACING BUMPER AERIAL FOR COMFORT ACCESS SYSTEM

If necessary, extend trailer tow hitch.

Disconnect plug connection (1).

Unlock and remove bumper aerial for comfort access system (2) from holder (3).

Installation:

Make sure bumper aerial for comfort access system (2) is correctly seated in designated holder (3).

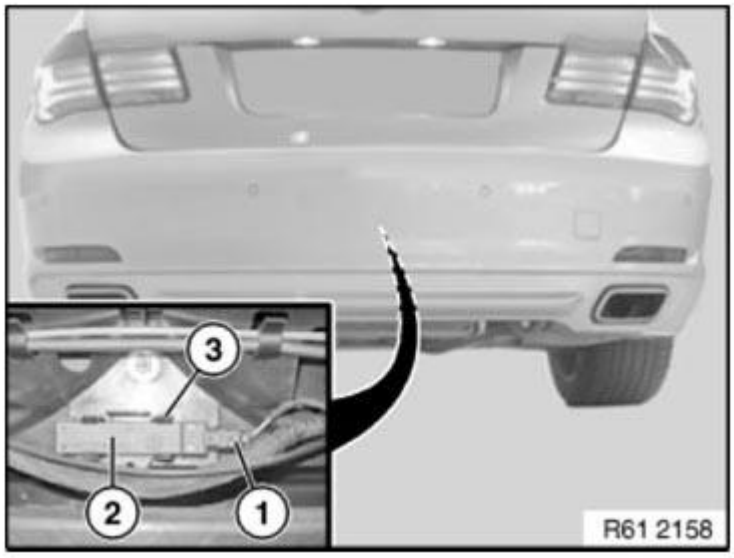


Fig. 308: Identifying Bumper Aerial For Comfort Access System And Plug Connection And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

66 53 170 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR TOP-/REAR-/SIDE-VIEW CAMERA

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work

- Remove **LUGGAGE COMPARTMENT WHEEL ARCH PANEL ON LEFT** .

Unlock plug connections (2) and disconnect.

Unscrew nuts (1).

Remove control unit (3) in direction of arrow.

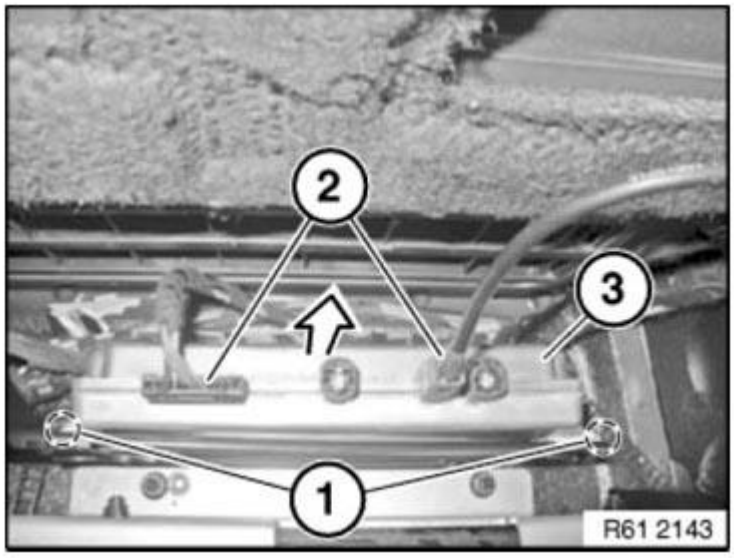


Fig. 309: Removing Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **PROGRAMMING/ENCODING** .
- **CALIBRATE REVERSING CAMERA**

32 43 010 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR ACTIVE FRONT STEERING

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary work

- Disconnect **BATTERY EARTH LEAD**
- **RELEASE LEFT FRONT SEAT** and tilt towards rear
- Remove front left **DOOR SILL COVER STRIP**
- Remove footwell **SIDE TRIM PANEL** on A-pillar
- Remove cover of **BASS SPEAKER** at left front

Fold back front left carpet to one side.

Unscrew nuts (1).

Tightening torque **32 43 1AZ** .

Installation note:

Secure grounding strap (2) to screw fastening point.

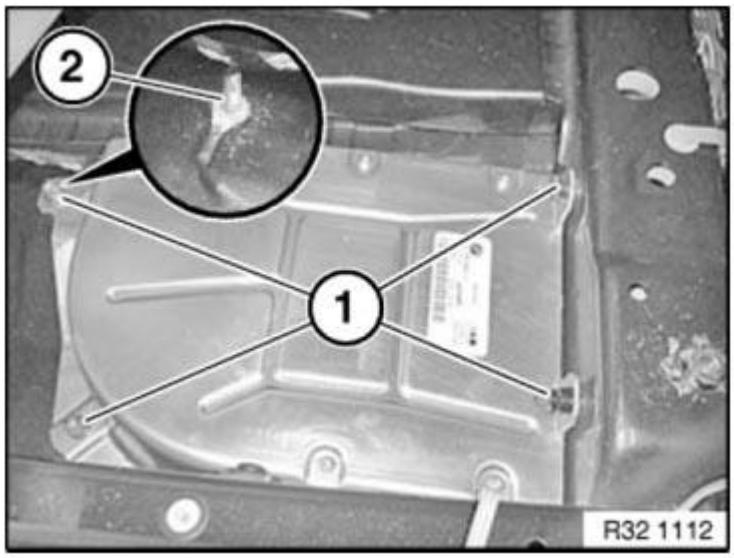


Fig. 310: Identifying Grounding Strap With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **32 43 2AZ** .

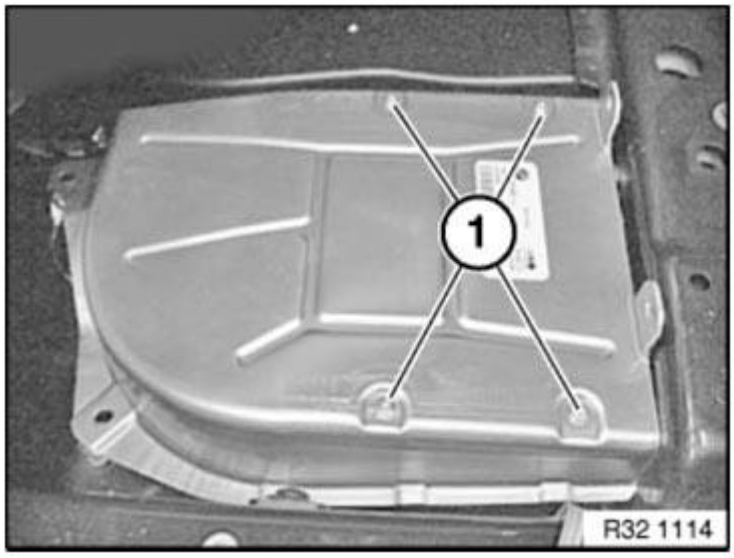


Fig. 311: Identifying Control Unit Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) and remove control unit.

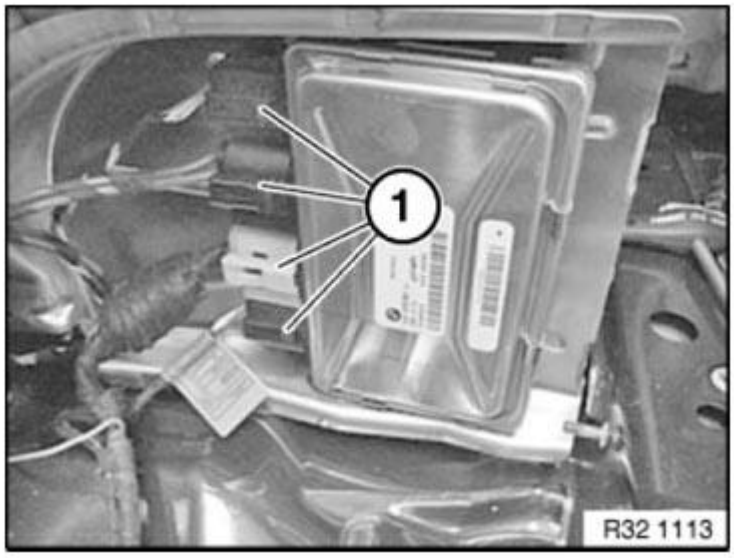


Fig. 312: Identifying Control Unit Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Replacement only: Carry out **PROGRAMMING/ENCODING**
- **ADJUSTMENT FOR ACTIVE STEERING**

61 35 360 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR CAMERA-BASED DRIVER ASSISTANCE SYSTEMS (KAFAS)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove both negative battery cables at F03
- Remove trim panel for pedal assembly. See **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (US ONLY)**

Disconnect plug connection (1).

Release screw (2).

Tightening torque **61 35 2AZ** .

Pull control unit (3) out of equipment carrier (4) in direction of arrow.

Make sure control unit (3) is correctly installed in equipment carrier (4).

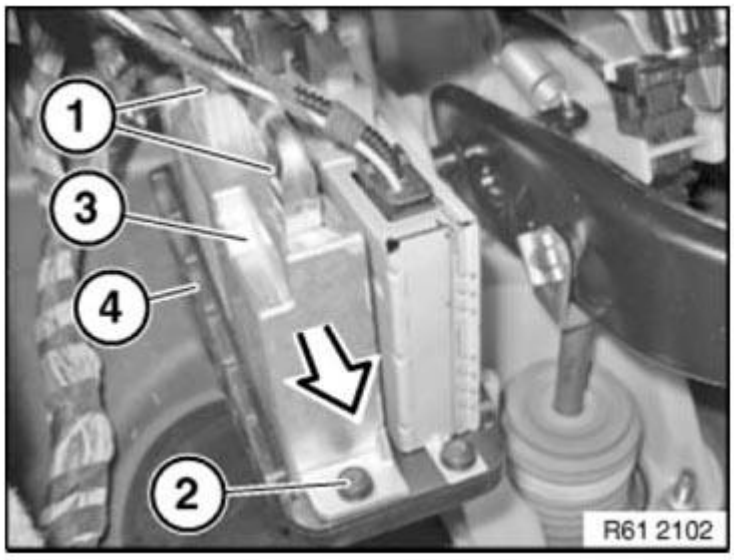


Fig. 313: Pulling Control Unit Out Of Equipment Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **PROGRAMMING/ENCODING** .

Carry out calibration:

- Service function
- Body
- Display and information functions
- Camera-based driver assistance system
- Calibration of lane departure warning

61 35 080 REMOVING AND INSTALLING/REPLACING CONTROL UNIT/MODULE FOR LEFT OR RIGHT SEAT ADJUSTMENT

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work:

- **CLAMP OFF BATTERY NEGATIVE LEAD**
- Remove both battery earth leads at F03

Unclip cover in upper rail at front (1) in direction of arrow and remove.



Fig. 314: Removing Cover From Upper Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock latch mechanisms (1).

Feed out control unit for seat adjustment (2) in direction of arrow.

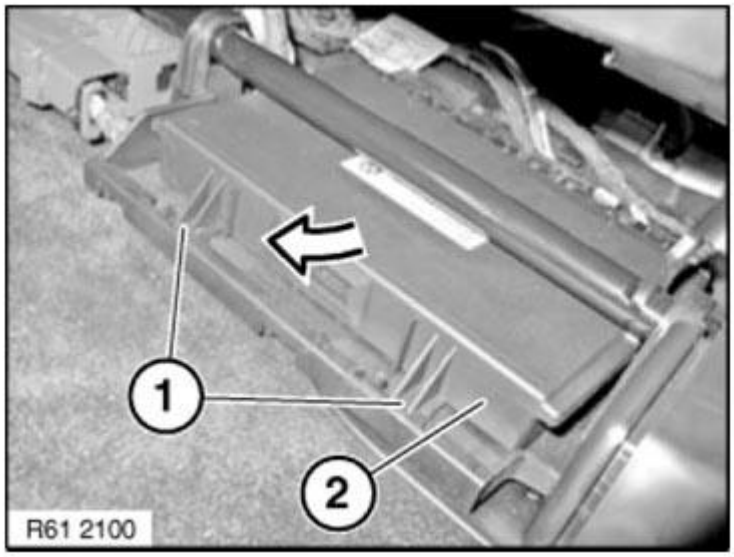


Fig. 315: Removing Control Unit For Seat Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Remove control unit for seat adjustment (2).

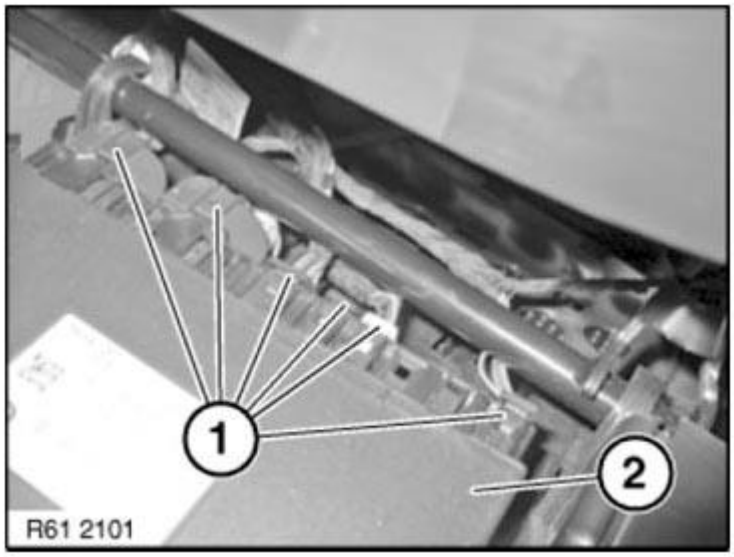


Fig. 316: Identifying Control Unit For Seat Adjustment And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure mounts (1) and retaining tabs (2) of control unit for seat adjustment (3) are correctly seated.

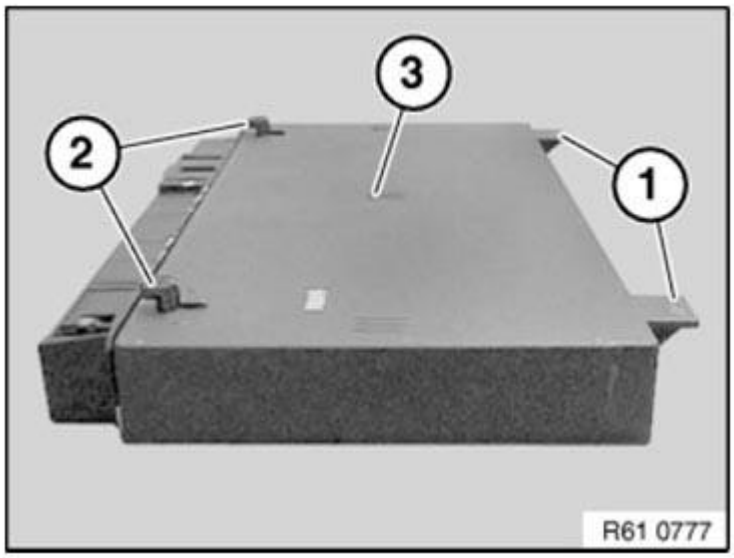


Fig. 317: Identifying Control Unit For Seat Adjustment, Mounts And Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle **PROGRAMMING/ENCODING** .

61 35 085 REMOVING AND INSTALLING/REPLACING CONTROL UNIT/MODULE FOR LEFT OR RIGHT SEAT ADJUSTMENT (REAR COMFORT SEAT)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work:

- Disconnect **BATTERY EARTH LEAD**
- Remove **THE CENTRE ARMREST FOR THE REAR SEAT BACKREST COMPLETELY**

NOTE: For purposes of clarity, the following operations are shown in the released state.

Detach cover (1) from Velcro fastener.

Pull cover (1) upwards out of guide from four-bar lever.

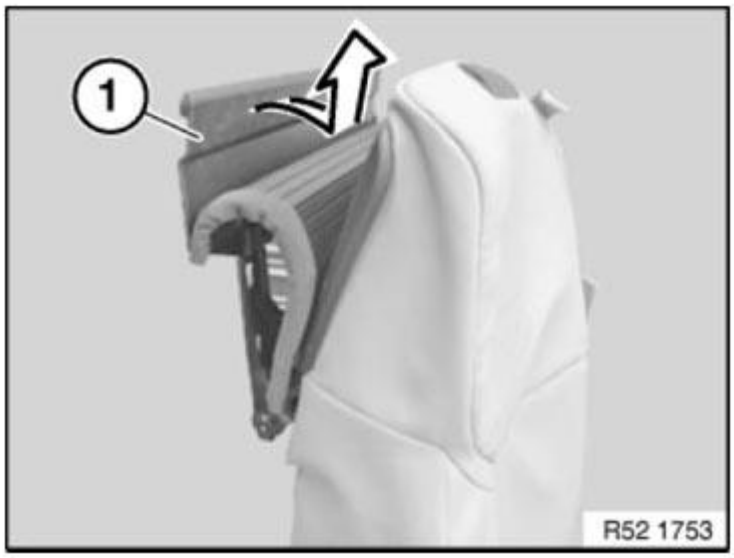


Fig. 318: Pulling Guide Cover From Four-Bar Lever
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, graphic shows backrest removed:

Unlock and disconnect all plug connections in marked area.

Installation note:

Plug connections are coded against incorrect assembly.

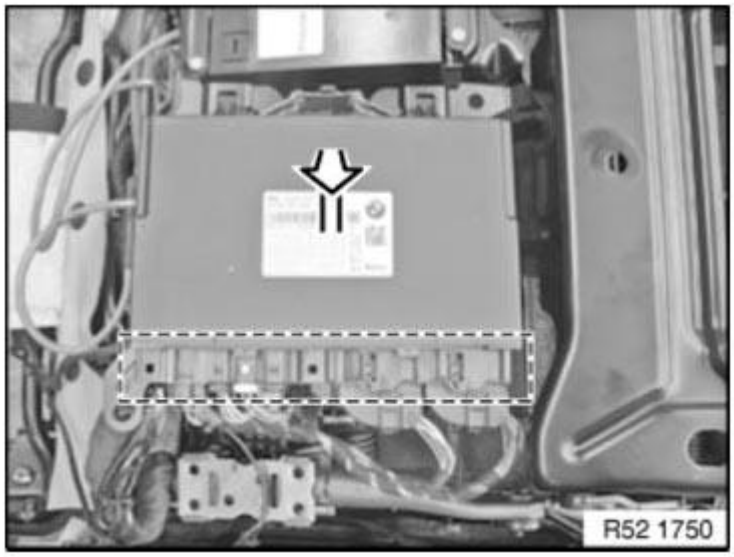


Fig. 319: Disconnecting Plug Connections In Marked Area
Courtesy of BMW OF NORTH AMERICA, INC.

Press control unit against spring and remove towards top.

NOTE: If the rear Comfort seat is defective:

Partially remove the backrest for the seat on the left or right.

Necessary preliminary work

Remove **LEFT OR RIGHT REAR SEAT**

Release screw (1).

Installation note:

Replace screw (1).

Tightening torque **52 25 05AZ** .

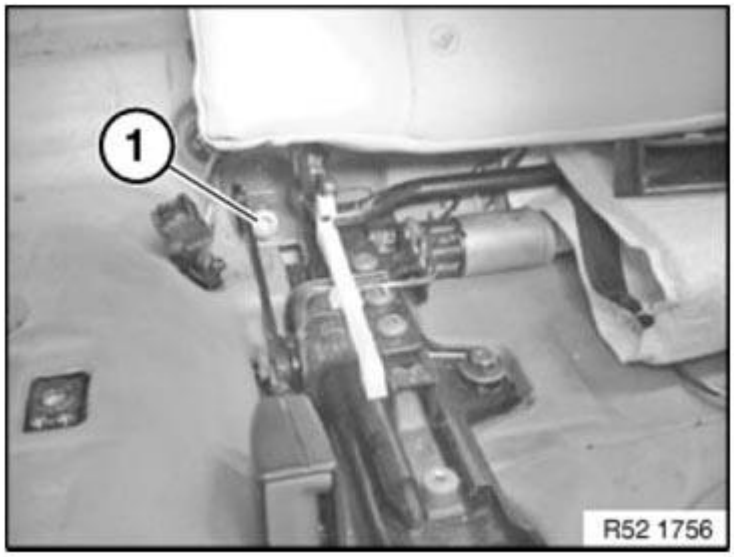


Fig. 320: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Carefully raise the seat frame (2) in the direction of arrow.

Installation note:

Replace nuts (1).

Tightening torque **52 25 05AZ** .

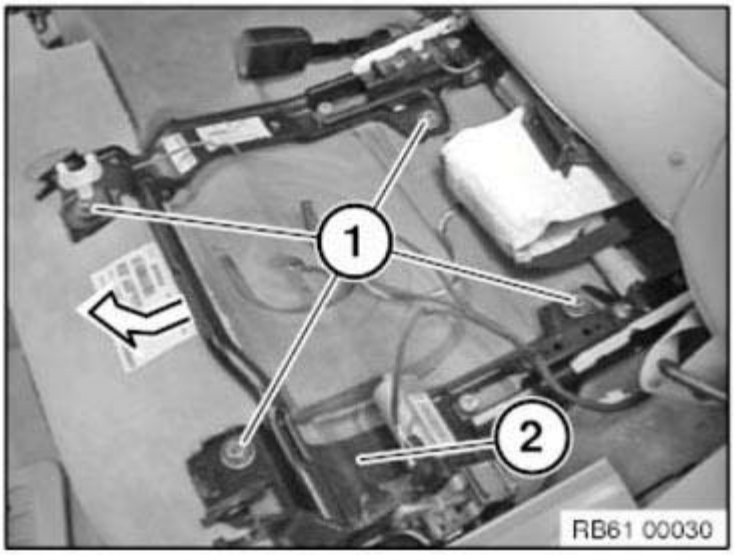


Fig. 321: Raising Seat Frame

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Press control unit against spring and feed out.

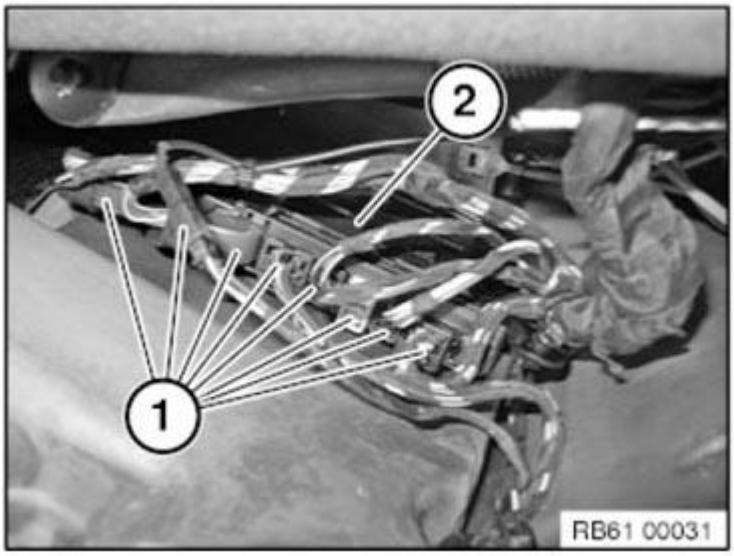


Fig. 322: Identifying Seat Frame With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure mounting (1) and retaining tabs (2) of control unit (3) are correctly seated.

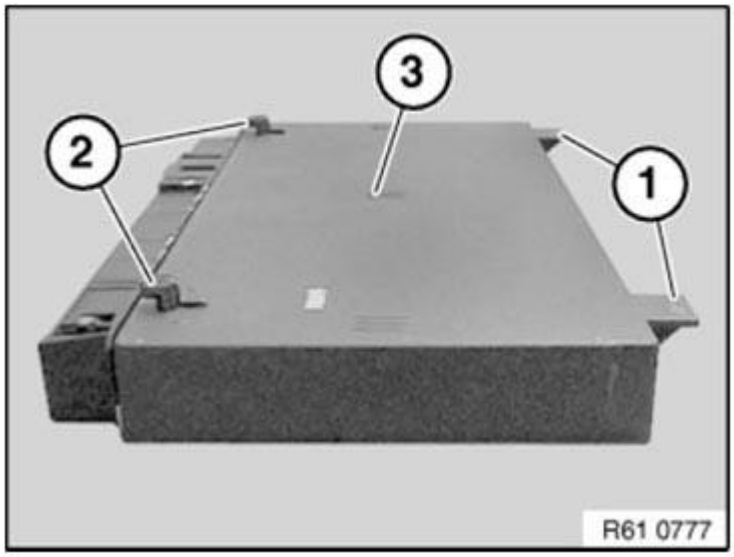


Fig. 323: Identifying Control Unit With Mount And Retaining Tabs

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle **PROGRAMMING/ENCODING** .

61 35 115 REMOVING AND INSTALLING/REPLACING FOOTWELL MODULE

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work

- Disconnect **BATTERY EARTH LEAD**
- Remove both battery earth leads at F03
- Remove **FOOTWELL SIDE TRIM PANEL ON A-PILLAR, LEFT**

Disconnect connector connections (1) and (3).

Release nuts (2) and remove footwell module (4).

Tightening torque **61 35 4AZ** .

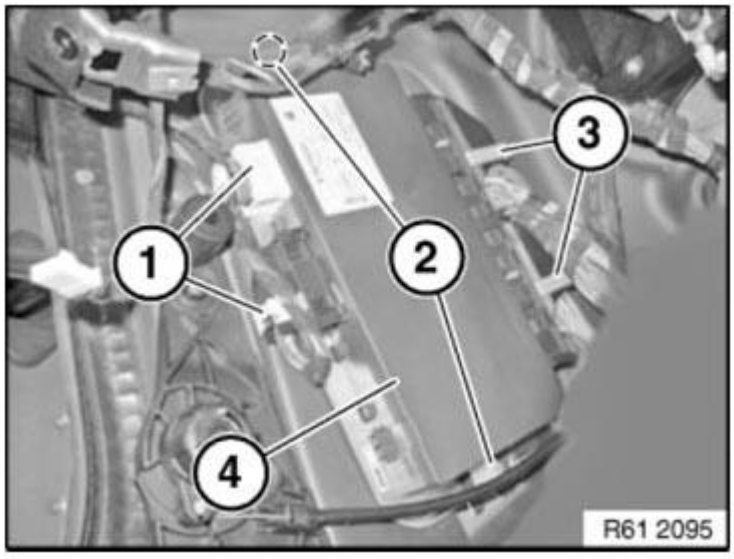


Fig. 324: Identifying Footwell Module With Connector Connections And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING/ENCODING** .

61 35 958 REMOVING AND INSTALLING/REPLACING INTERIOR AERIAL FOR COMFORT ACCESS SYSTEM ON LEFT OR RIGHT (LUGGAGE COMPARTMENT, SIDE)

Necessary preliminary work:

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

Disconnect plug connection (1).

Unclip interior aerial for Comfort Access System (2) and remove.

Installation note:

Make sure interior aerial for Comfort Access System (2) is correctly seated in designated holder.

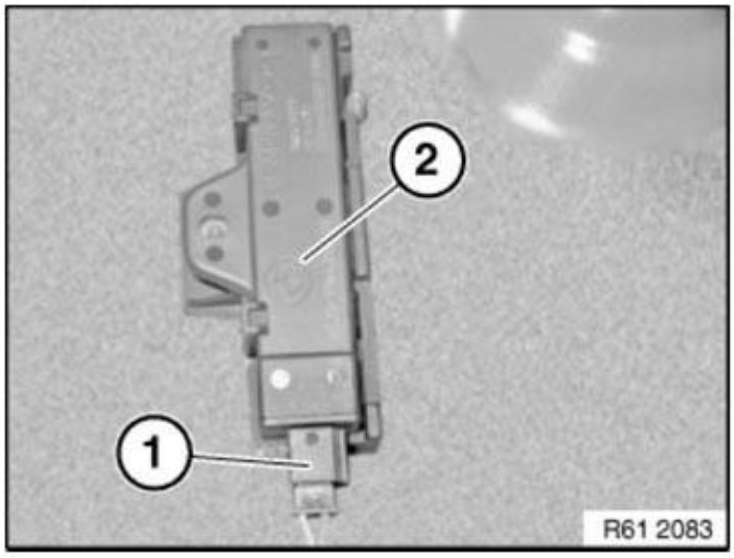


Fig. 325: Identifying Interior Aerial For Comfort Access System With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 953 REMOVING AND INSTALLING/REPLACING INTERIOR AERIAL/ANTENNA FOR COMFORT ACCESS SYSTEM (FRONT CENTER CONSOLE)

Necessary preliminary tasks:

- Remove **FRONT STORAGE COMPARTMENT**

Disconnect plug connection (1).

Unlock and remove interior aerial for comfort access system (2) from holder (3).

Installation:

Make sure interior aerial for comfort access system (2) is correctly seated in designated holder (3).

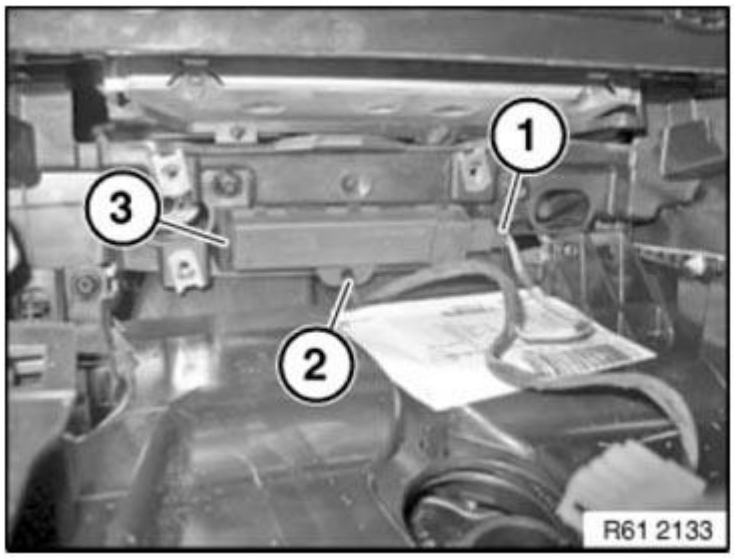


Fig. 326: Identifying Interior Aerial For Comfort Access System With Plug Connection And Holder (61 35 953)
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 954 REMOVING AND INSTALLING/REPLACING INTERIOR ANTENNA FOR COMFORT ACCESS SYSTEM (REAR CENTER CONSOLE)

Necessary preliminary tasks:

- Remove **REAR CENTRE CONSOLE TRIM**

Disconnect plug connection (1).

Release screw (2) and remove interior aerial for comfort access system (3).

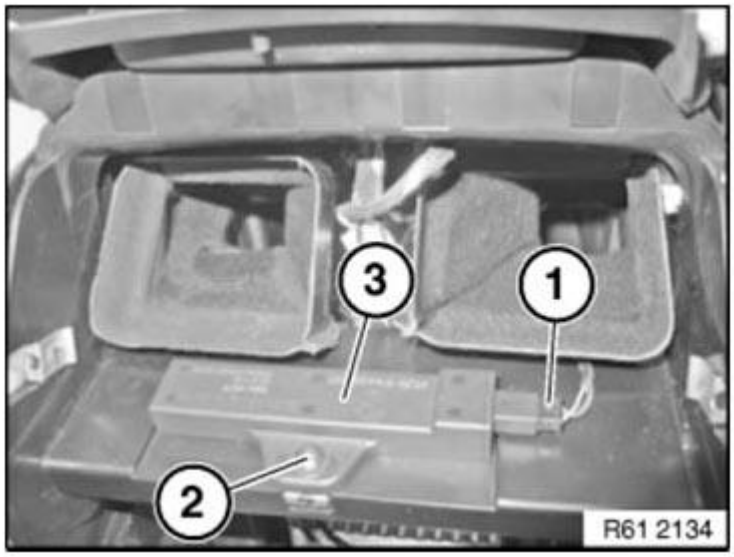


Fig. 327: Identifying Interior Aerial For Comfort Access System With Plug Connection And Holder (61 35 954)
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 965 REMOVING AND INSTALLING/REPLACING REAR PARCEL ANTENNA FOR COMFORT ACCESS SYSTEM

Necessary preliminary work:

- Remove **TRIM PANEL FOR STORAGE SHELF** .

Disconnect plug connection (1).

Release screw (2) and remove rear parcel shelf aerial for comfort access system (3).

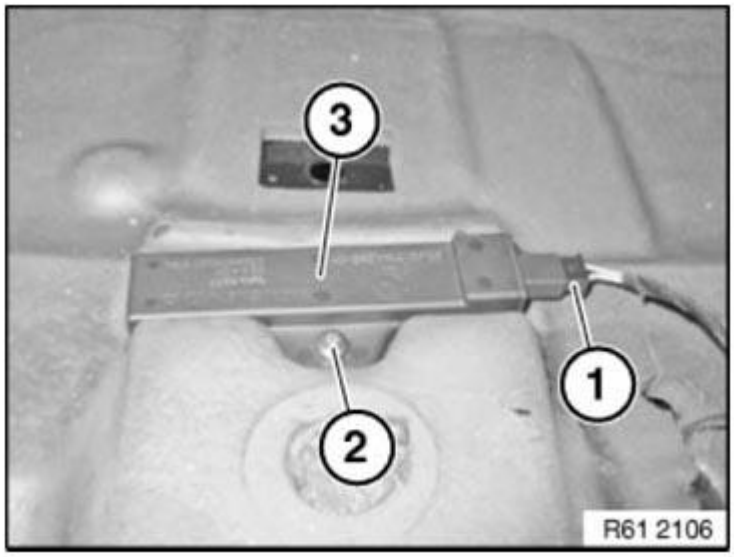


Fig. 328: Identifying Rear Parcel Shelf Aerial For Comfort Access System With Screw And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 823 REPLACING AUDIO UNIT

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

IMPORTANT: Use of supplied gloves is mandatory

Carry out installation in a dust-free workshop area only.

To avoid damage, do not touch or dirty the display field.

Necessary preliminary work:

- Remove **RADIO AND IHKA CONTROLS**

IMPORTANT: Retrofitting must only be done in the supplied installation cassettes.

Use of supplied gloves is mandatory, so that there is no damage to the display.

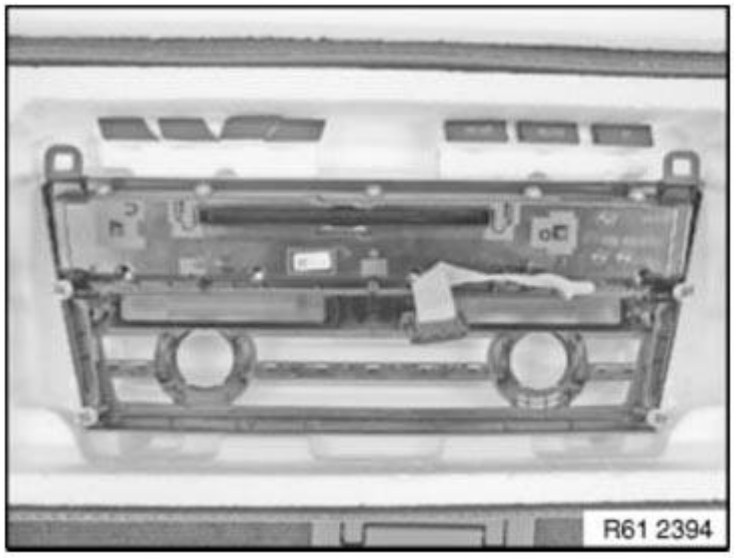


Fig. 329: Identifying Audio Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Modify **IHKA CONTROLS** on new audio unit.

Replacement:

Carry out **VEHICLE PROGRAMMING/ENCODING** .

61 35 683 REPLACING OPTICS FOR RAIN/LIGHT SOLAR SENSOR (UP TO 03/2009)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary work

- Remove **RAIN/LIGHT SOLAR SENSOR**

Carefully unlock latch mechanisms (1) of rain/light solar sensor (2).

Remove optics for rain/light solar sensor (3).

Installation note:

Detach protective cover from new optics for rain/light solar sensor.

Latch mechanisms (1) of rain/light solar sensor (2) must not be damaged or missing.

Observe laser marking (4) of fitting aid.

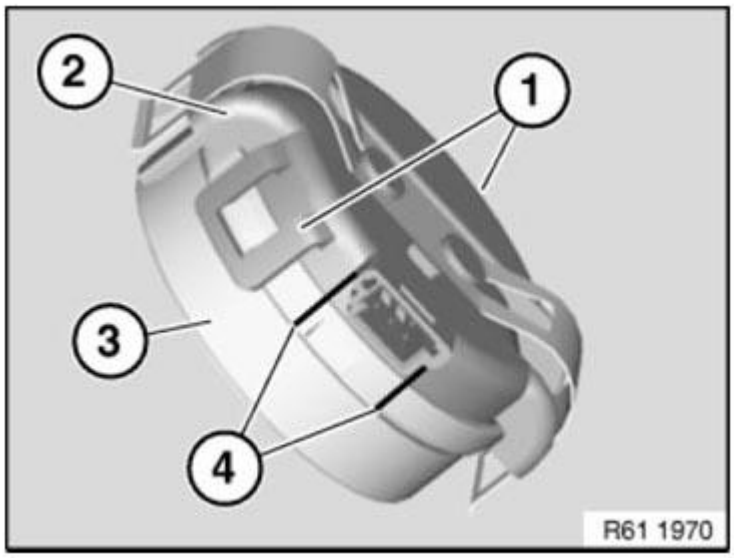


Fig. 330: Identifying Latch mechanisms, Rain/Light Solar Sensor With Optics And Laser Marking
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Encoding is automatically performed by JBBFE.**
- **Carry out INITIALIZATION to calibrate the rain sensor to the windscreen.**

61 35 685 REPLACING RAIN/LIGHT SOLAR SENSOR

IMPORTANT: Read and comply with notes on protection against electrostatic discharge (ESD PROTECTION) .

Necessary preliminary work

- If necessary, remove **INSIDE MIRROR** .

Disconnect plug connection (1).

Unlock metal spring (3) in direction of arrow.

Pull off rain/light solar sensor (2) from windscreen.

Installation note:

Close plug connection (1) only after fitting rain/light solar sensor on windscreen!

Carefully clean the windscreen at the contact area with the rain/light solar sensor! Remove all silicone residues.

Pull off protective cover from new rain/light solar sensor. The silicone-coated surface below it must not be touched!

Align rain/light solar sensor (2) and press firmly on windscreen. Pay attention to mechanical encoding (5).

Press metal spring (3) centrally to ensure that retaining element (4) engages correctly in both hooks (6).

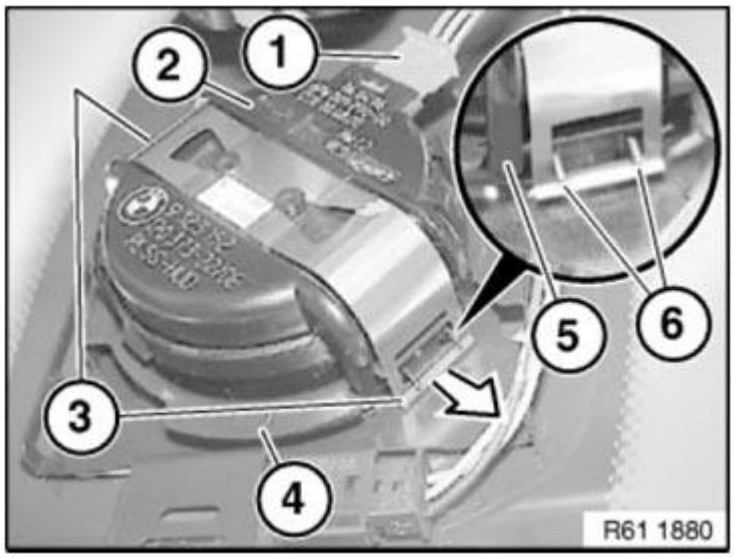


Fig. 331: Installing Rain/Light Solar Sensor Hook
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Encoding is automatically performed by **JBBFE.**
- Carry out **INITIALIZATION** to calibrate the rain sensor to the windscreen.

61 35 180 REPLACING REAR AIR CONDITIONING CONTROL UNIT

Necessary preliminary tasks

- Remove all luggage compartment trim panels. See **5147243 REMOVING AND INSTALLING/REPLACING ALL LUGGAGE COMPARTMENT TRIMS (WITHOUT SKI BAG)** or **5147244 REMOVING AND INSTALLING/REPLACING ALL LUGGAGE COMPARTMENT TRIMS (WITH SKI BAG)** .
- If necessary, remove cool box

Unfasten plug connection (1) and disconnect.

Release screw (2).

Remove control unit (3).

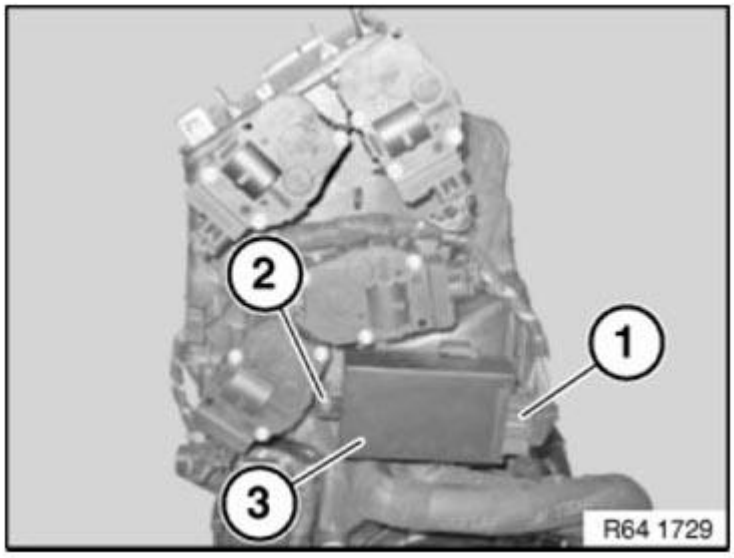


Fig. 332: Identifying Control Unit With Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

61 35... REPLACING SEAT MODULE (UP TO 09/2009)

Notes

NOTE: From version 09/2009 a seat module in which plugs 4 and 5 have been altered will be fitted.

Necessary preliminary tasks:

- Remove **SEAT MODULE**

NOTE: Positions of plugs and associated pin assignments are set out in the diagnosis system.

The repair instruction represents the highest vehicle configuration. Pin assignments of plug connections may be absent if optional equipment is not fitted.

Special tools for disconnecting:

Secondary lock: Special tool **61 0 313**

Primary lock: Special tool **61 0 326**

SPECIAL TOOLS DESCRIPTION CHART

Separate housing. Provide leads with new stop parts and connect in new housing (BMW Parts Department 6 901 842) as follows:				

	Pin assignment, previous	Pin assignment, new	Part number, stop part	Color, lead
Plug 4 (Heating, cushion)	1	1	6 931 524.9	brown/yellow
	2	3	6 931 510.9	blue/green
	3	4	6 931 522.9	black/yellow

SPECIAL TOOLS DESCRIPTION CHART

Disconnect leads from housing and connect in new housing (BMW Parts Department 6 901 832) as follows:		
Plug connector 5 (Heating, backrest)	Pin assignment, previous	Pin assignment, new
	1	1
	2	2
	3	3

61 35 688 REPLACING SOLAR RAIN/LIGHT SENSOR AND CONDENSATION SENSOR

IMPORTANT: Read and comply with notes on protection against electrostatic damage NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE).

Necessary preliminary work:

- If necessary, remove interior rearview mirror. See **MIRRORS/COVERS/ASHTRAYS/SHELVES/TRAYS** .

For equipment specifications up to 09/2009:

- without 2-zone automatic air conditioning (optional equipment 534)
- without 4-zone automatic air conditioning (optional equipment 4 NB)
- with Head-Up Display (optional equipment 610)

From 09/2009 onward, considered standard equipment and thus not dependent on equipment specifications.

Disconnect plug connection (2).

Unlock metal spring (3) in direction of arrow.

Remove solar rain/light and condensation sensor (1) from windscreen.

Installation note:

Close plug connection (2) only after fitting solar rain/light and condensation sensor on windscreen!

Carefully clean windscreen in the contact area with the solar rain/light and condensation sensor! Remove all silicone residues.

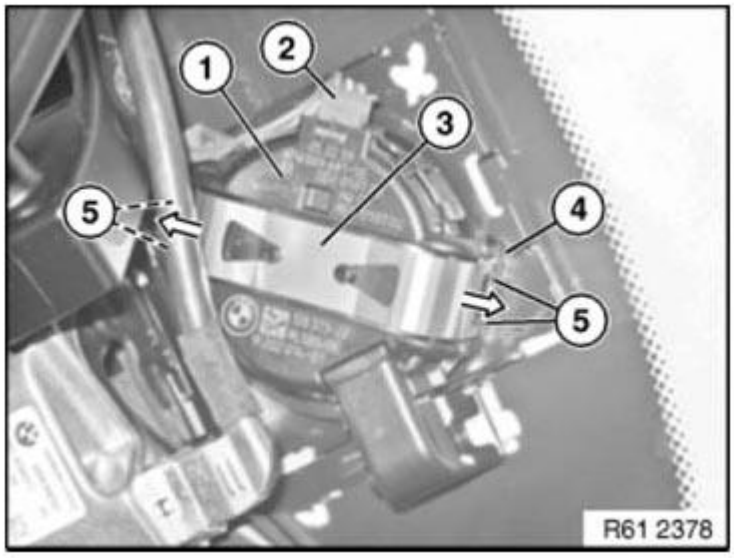


Fig. 333: Unlocking Metal Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Remove protective cover from the new solar rain/light and condensation sensor. The silicone-coated surface below it must not be touched!

Press metal spring (3) centrally to ensure that there is correct engagement in both hooks (5) on every side of the retaining element (4).

NOTE:

- **Solar rain/light and condensation sensor is automatically coded by junction box.**
- **Carry out initialization to calibrate the rain sensor to the windscreen. See INITIALIZING RAIN/LIGHT (SOLAR) SENSOR.**

61 35... VEHICLE PROGRAMMING AND CODING

NOTE:

- **In order to avoid incorrect programming procedures and error messages, it is essential when working with the ISTA/P programming system always to use the version.**
- **Battery voltage must not drop below 13.0 V during programming. Connect battery charger prior to programming**

  Use only BMW-recommended battery chargers*

  ***Sourcing reference BMW Workshop Equipment Catalogue**

Programming sequence via ISTA/P:

- Identifv vehicle and read out control unit data

- Draw up and configure measures plan
- Prepare programming, export CBS/CKM data
- Carry out repair measures, replace control units if necessary
- Identify vehicle again after repair. Update measures plan
- Carry out programming
- Assess programming afterwards, import CBS/CKM data
- Programming successfully completed

6161 WINDSCREEN WIPERS

61 61 010 CHECKING CONTACT ANGLE OF WINDSCREEN WIPER ARMS ON FRONT WINDSCREEN

Notes

NOTE: Precisely adjusting the contact angle of the wiper arms is crucial to determining wiping quality.

IMPORTANT: Wiper arms are only checked and not adjusted. ADJUSTMENT DIMENSIONS

Remove wiper blade (1) from wiper arm (2).

Pin (3) is locator for special tool **61 6 100** .

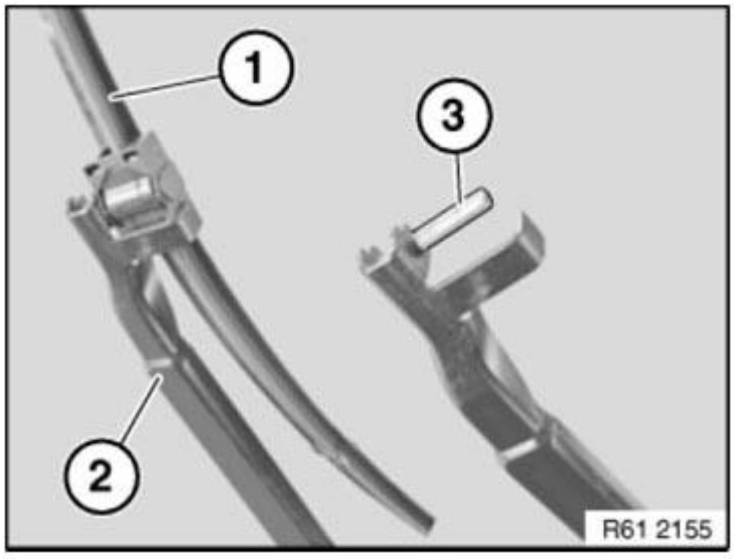


Fig. 334: Identifying Wiper Blade, Wiper Arm And Pin Of Special Tool (61 6 100)
Courtesy of BMW OF NORTH AMERICA, INC.

Slide special tool **61 6 100** onto pin (1).

Place special tool **61 6 100** on windscreen (2) and read off value in degrees on scale.

NOTE: LHD vehicles are covered by the scale range of 0 to -5 and RHD vehicles by the scale range of 0 to +5.

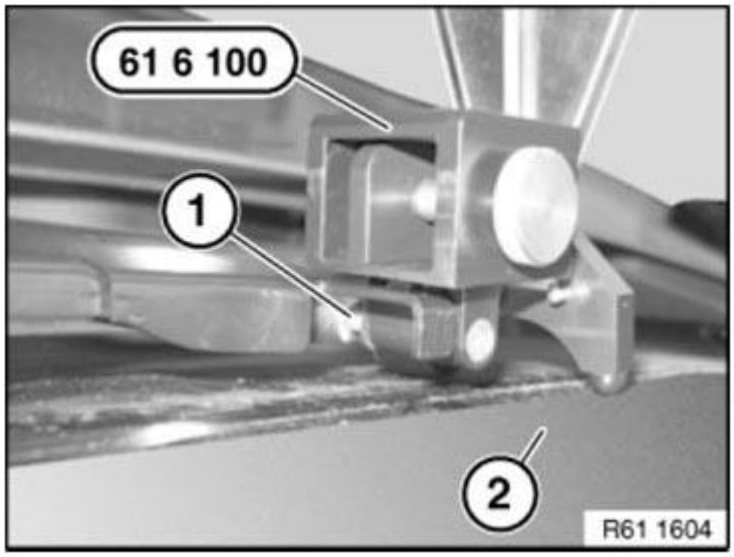


Fig. 335: Sliding Special Tool (61 6 100) Onto Pin
Courtesy of BMW OF NORTH AMERICA, INC.

61 61... CHECKING CONTACT ANGLE OF WINDSCREEN WIPER ON LEFT OR RIGHT

Notes

Correctly adjusting the contact angle of the wiper arms is crucial to determining wiping quality. For adjustment, refer to the vehicle-specific repair instruction.

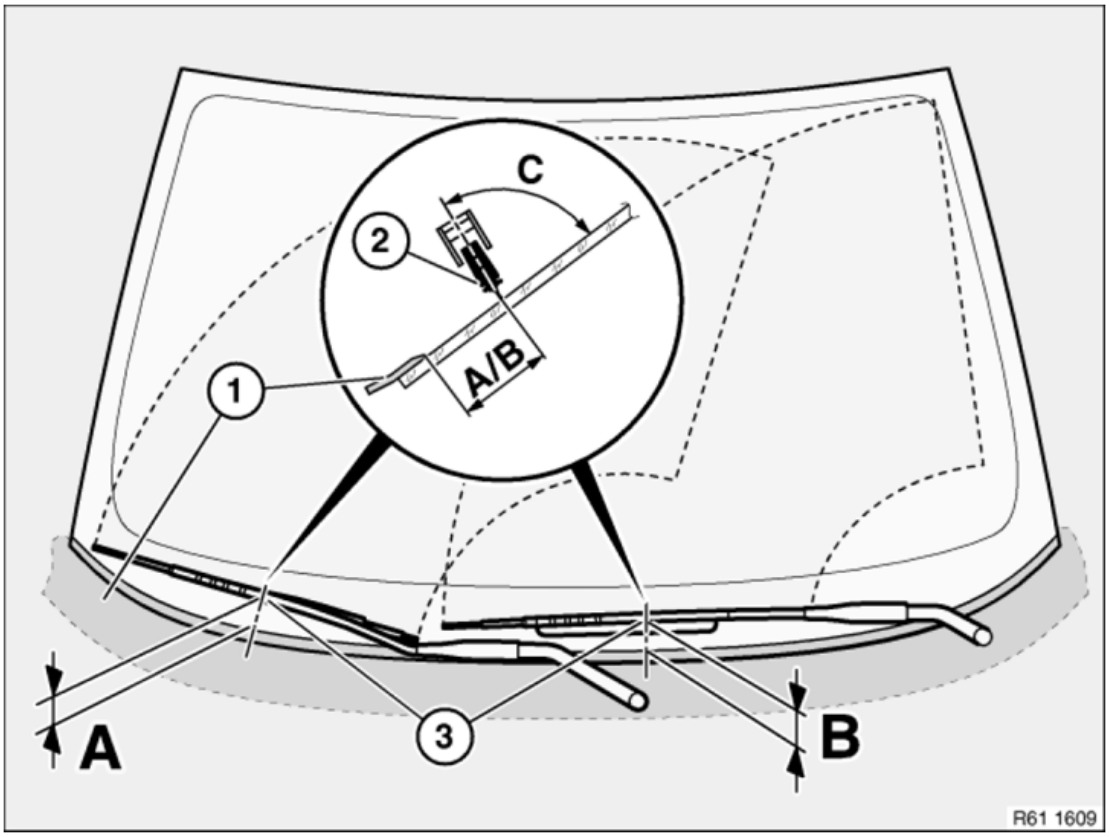


Fig. 336: Identifying Contact Angle Between Wiper Blade Centre Plane And Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

A/B = Distance between windscreen wiper blade (2) and trim panel on cowl panel (1)

NOTE: Measurement is taken at the height of the locators (3) for the windscreen wiper arms

C = Contact angle between wiper blade center plane and windscreen

When using special tool **61 6 100** , check the scale value according to the following table.

For RHD vehicles, change the preceding sign of the scale values.

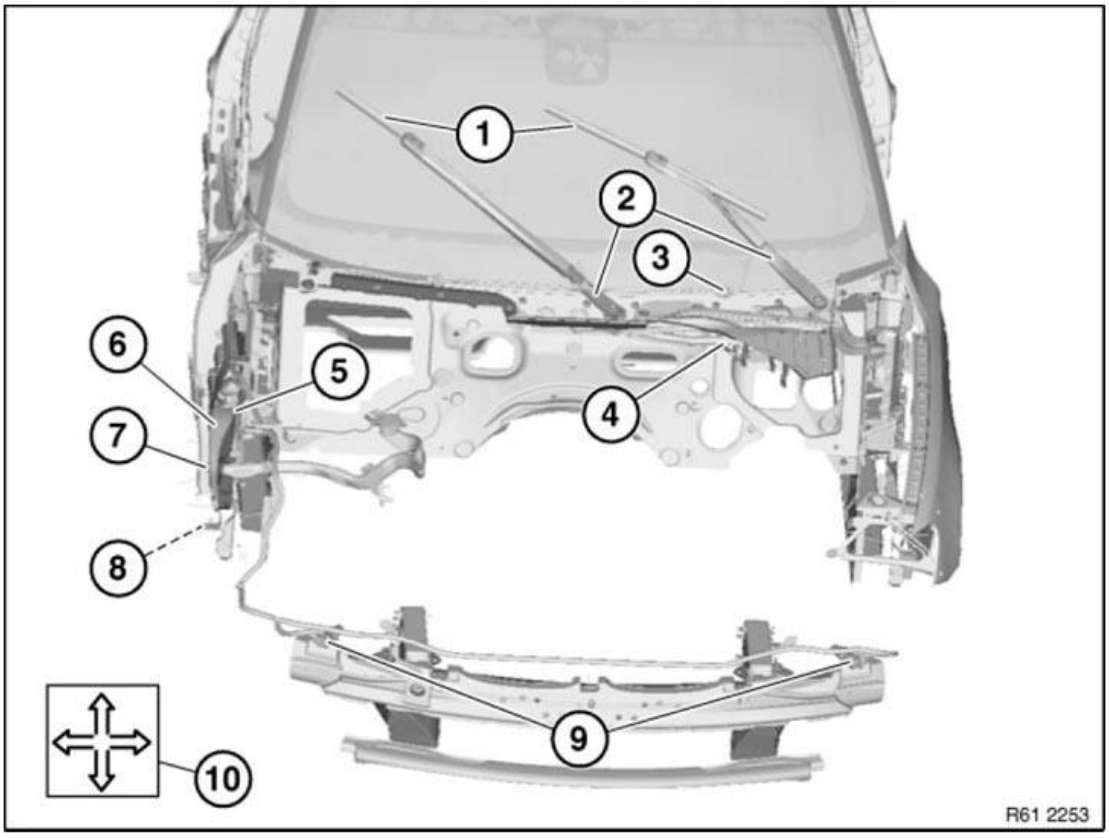
- LHD vehicles, scale range 0 to -5
- RHD vehicles, scale range 0 to +5

SPECIAL TOOLS DESCRIPTION CHART

Model	Contact angle (C) on windscreen wiper arm		Scale value (LHD) on special tool		Setting dimension (A, B) on windscreen wiper arm		
	Front		Front		Front		

		passenger side	Driver side	passenger side	Driver side	passenger side	Driver side	
1'	F01/F02/F07	85.0 ° +3.0°-3.0°	85.0 ° +3.0° - 3.0°	-5 +3.0 -3.0	-5 +3.0 -3.0		60±3 mm	70±3 mm

61 61... OVERVIEW OF WINDSCREEN WASHER SYSTEM AND HEADLIGHT WASHER SYSTEM (SRA)



1 Windscreen wiper blades
2 Windscreen wiper arms
3 Spray nozzles for windscreen washer system
4 Wiper bracket
5 Washer pump for headlight washer system
6 Windscreen washer pump
7 Fluid reservoir for windscreen washer system
8 Level switch for windscreen washer system
9 High-pressure nozzles of SRA
10 Checking, adjusting, venting

Fig. 337: Overview Of Windscreen Washer System And Headlight Washer System (SRA)
Courtesy of BMW OF NORTH AMERICA, INC.

61 61 270 REMOVING AND INSTALLING OR REPLACING CONSOLE FOR WINDSCREEN WASHER SYSTEM COMPLETE WITH MOTOR

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

IMPORTANT: Before installing the wiper arms, allow wiper motor to run into rest position.

IMPORTANT: Emergency operation - danger of injury!

Disconnect BATTERY CABLE

Disconnect both negative battery cables for F03.

Necessary preliminary work

- Remove **COWL PANEL COVER**
- Remove **LEFT/REAR SUSPENSION CROSS-BRACE** for

F01/F02/F03F12F13

Release screws (1).

Tightening torque **61 61 1AZ** .

Remove console for windscreen wiper system (2) in direction of arrow and disconnect plug connection (3).

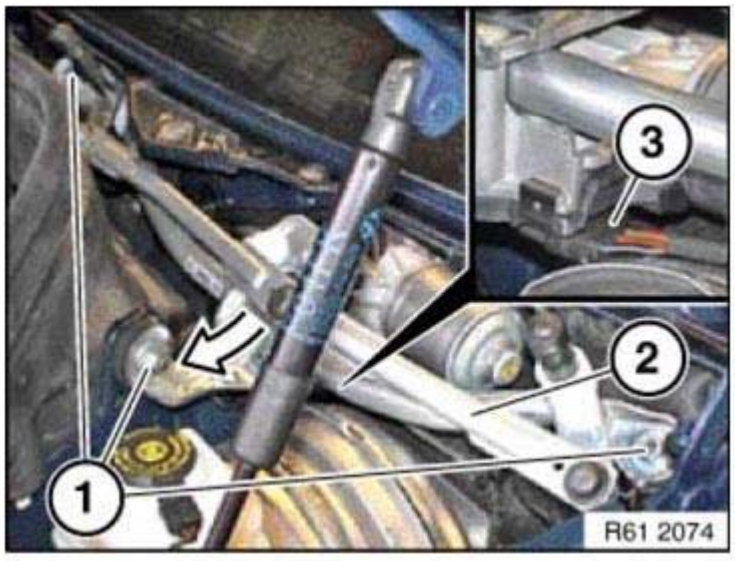


Fig. 338: Removing Console For Windscreen Wiper System
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Vacuum line (1) must not be trapped by windscreen washer system (2).

Contact with vacuum line (1) is only permitted at the positions (A/D/C) specifically designed for this purpose.

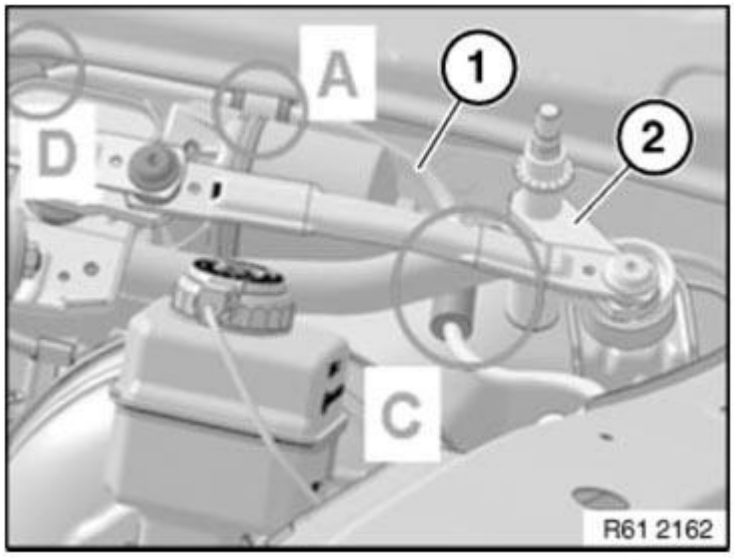


Fig. 339: Identifying Windscreen Washer System With Vacuum Line
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: As of 09/2009, an additional holder (1) is installed for the vacuum line (2).

Installation note:

Make sure the vacuum line (2) is correctly seated in the holder (1)!

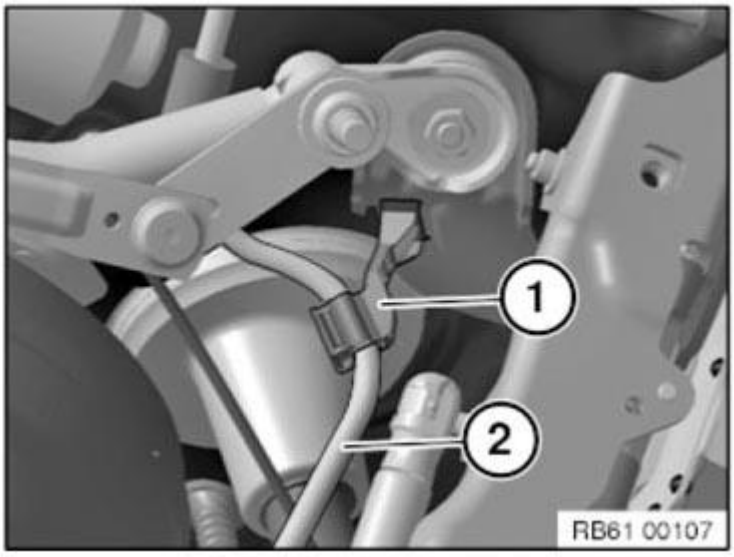


Fig. 340: Identifying Windscreen Washer System Vacuum Line With Holder

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: After installing, check freedom of movement between wiper kinematics and vacuum line!

61 61 100 REMOVING AND INSTALLING/REPLACING BOTH WINDSCREEN WIPER ARMS

Notes

IMPORTANT: After installation check setting dimension and contact angle of the wiper arm. See 6161010 CHECKING CONTACT ANGLE OF WINDSCREEN WIPER ARMS ON FRONT WINDSCREEN.

Remove caps (1).

Release nuts underneath.

Tightening torque **61 61 2AZ** .

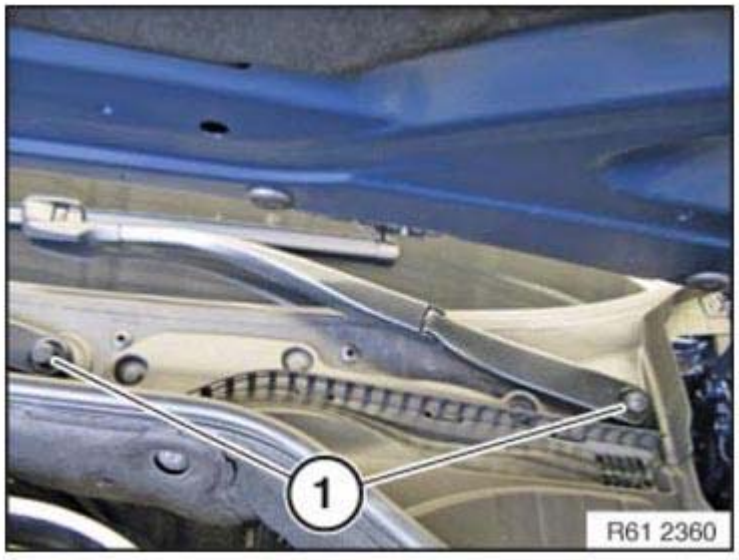


Fig. 341: Identifying Cap
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of breakage!

Do not bend wiper arm when removing.

Detach windscreen wiper arm with special tool 61 6 060.



Fig. 342: Detaching Windscreen Wiper Arm Using Special Tool (61 6 060)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of loosening!

Observe tightening specifications without fail.

61 61 021 REPLACING LEFT OR RIGHT WINDSCREEN WIPER BLADE

Move wipers into fold-out position:

- Switch on terminal "R" and then switch off again immediately
- Press wiper lever upwards and hold for approx. 3 seconds until wiper arms stop in roughly vertical position (fold-out position)

Take infrared remote control (ignition key).

Raise wiper arm (1) and fold back windscreen wiper blade (2).

Remove windscreen wiper blade (2) in direction of arrow from wiper arm (1).

Installation note:

Make sure wiper blade (2) is guided.

Fold wiper arms onto windscreen.

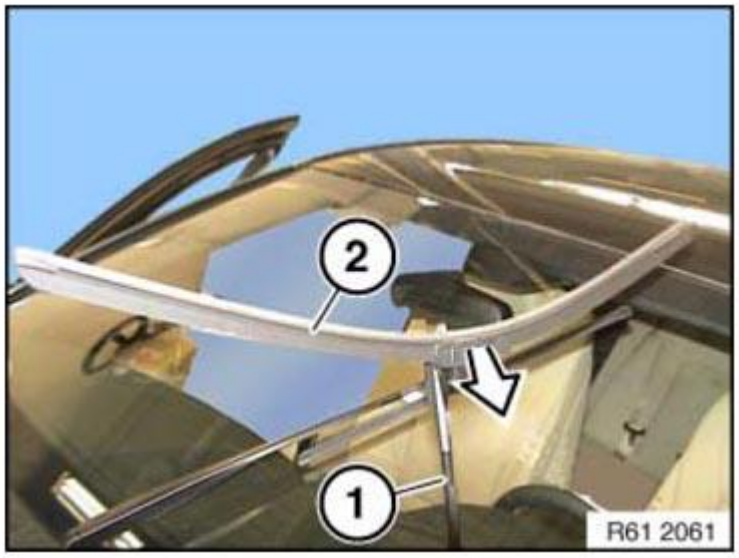


Fig. 343: Removing Windscreen Wiper Blade
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before switching on terminal "R" or the ignition or starting the engine, you must fold the wiper arms onto the windscreen otherwise damage will be caused.

Switch on terminal "R".

Move windscreen wipers to rest position with a flick wipe.

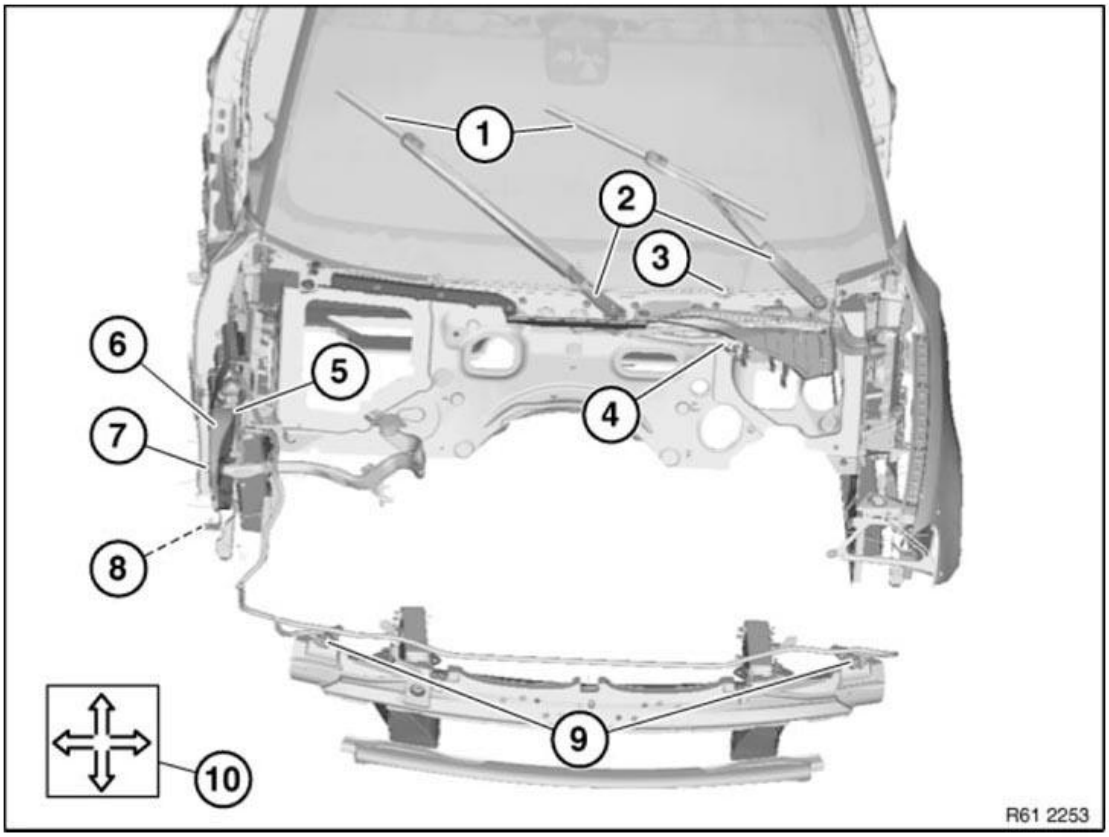
6167 HEADLIGHT WASHER SYSTEM

61 67 040 ADJUSTING WASHER JETS FOR HEADLIGHT WASHER SYSTEM

NOTE: The washer jets of the headlight washer system have been adjusted at the factory and normally this setting is not altered (except by an accident). The nozzles therefore do not have to be adjusted.

The washer jets do not have to be adjusted even in the event of replacement as the washer jets themselves and the telescopic nozzle form a single unit (high-pressure nozzle) and are already preset.

61 61... OVERVIEW OF WINDSCREEN WASHER SYSTEM AND HEADLIGHT WASHER SYSTEM (SRA)



1 Windscreen wiper blades
2 Windscreen wiper arms
3 Spray nozzles for windscreen washer system
4 Wiper bracket
5 Washer pump for headlight washer system
6 Windscreen washer pump
7 Fluid reservoir for windscreen washer system
8 Level switch for windscreen washer system
9 High-pressure nozzles of SRA
10 Checking, adjusting, venting

Fig. 344: Overview Of Windscreen Washer System And Headlight Washer System (SRA)
Courtesy of BMW OF NORTH AMERICA, INC.

61 67 010 REMOVING AND INSTALLING/RENEWING WASHER PUMP OF HEADLIGHT WASHER SYSTEM

Necessary preliminary tasks:

- Remove **FLUID RESERVOIR FOR WINDSCREEN WASHER SYSTEM**

Disconnect plug connection (1).

Unlock hose (2) and detach from washer pump of headlight cleaning system (3).

Turn washer pump of headlight cleaning system (3) in direction of arrow and pull upwards out of fluid tank for

windshield washer system (4).

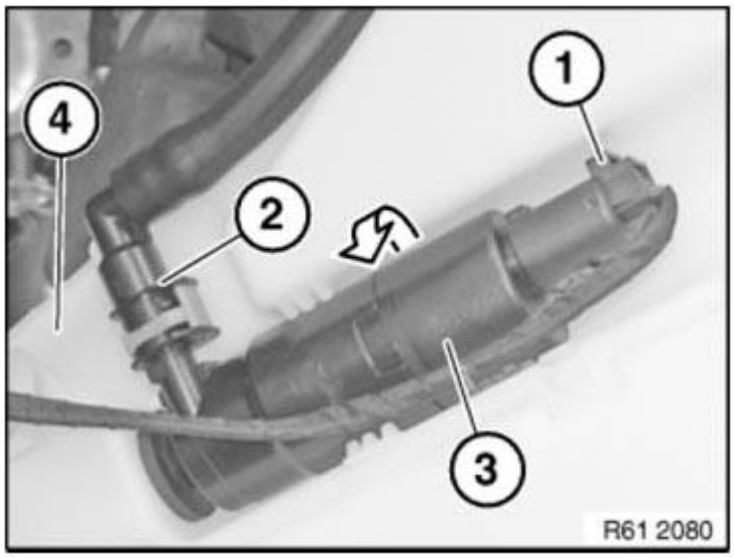


Fig. 345: Turning Washer Pump Of Headlight Cleaning System
Courtesy of BMW OF NORTH AMERICA, INC.

61 67 100 REMOVING AND INSTALLING/REPLACING LEFT HIGH-PRESSURE NOZZLE OF HEADLIGHT WASHER SYSTEM

Notes

Necessary preliminary work:

- Remove **FRONT BUMPER TRIM**

To prevent excess escape of washer fluid, seal off end of high pressure line with special tool **13 3 010** .

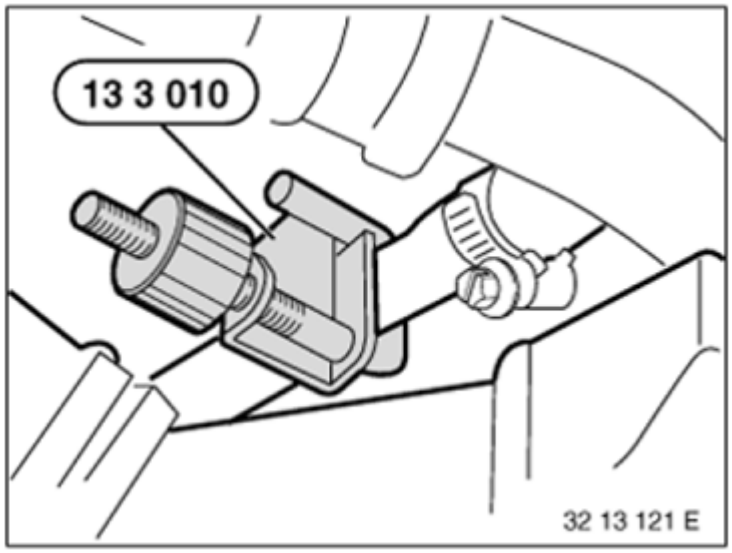


Fig. 346: Sealing High Pressure Line End Using Special Tool (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock high pressure line (1) and detach from high-pressure nozzle (2).

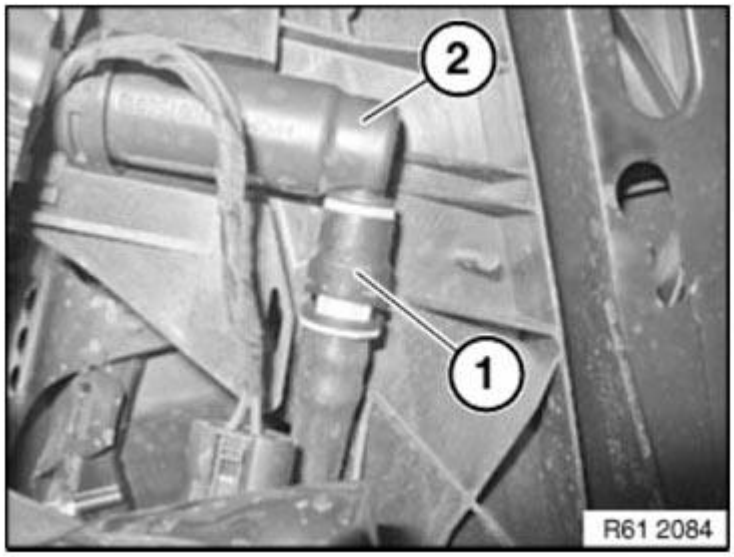


Fig. 347: Identifying High Pressure Line With Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock high-pressure nozzle (1) and remove in direction of arrow towards rear.

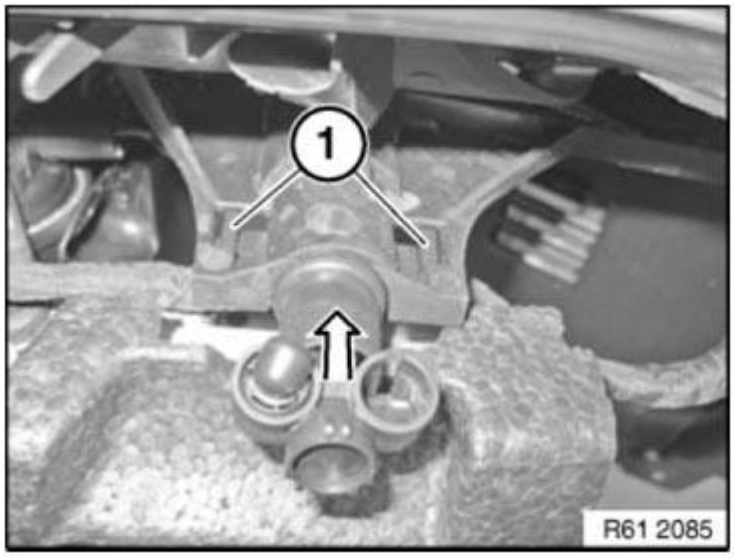


Fig. 348: Removing High-Pressure Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Ensure guide (1) is correctly seated.

New washer jets are already preset.

Carry out function check.

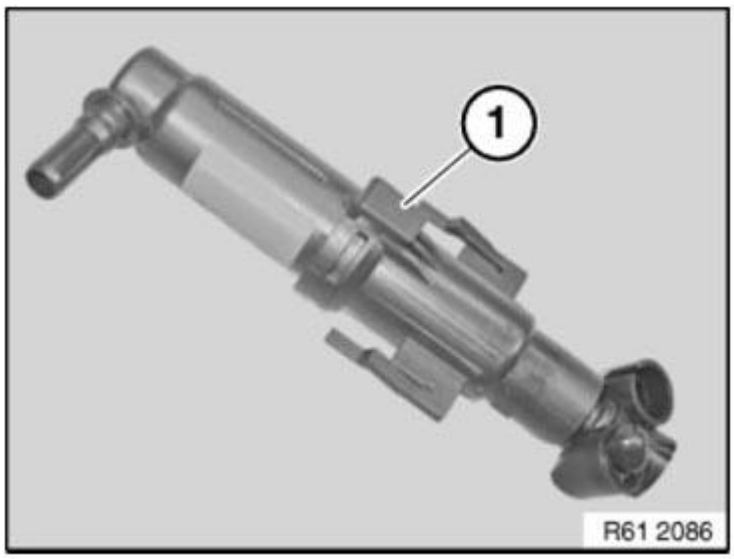


Fig. 349: Identifying Washer Jets Guide
Courtesy of BMW OF NORTH AMERICA, INC.

61 67 102 REMOVING AND INSTALLING/RENEWING RIGHT HIGH-PRESSURE NOZZLE OF HEADLIGHT WASHER SYSTEM

Operation is described in:

Removing and installing/renewing **LEFT HIGH-PRESSURE NOZZLE OF HEADLIGHT WASHER SYSTEM** .

61 67 200 REMOVING AND INSTALLING/REPLACING SPRAY NOZZLE FOR NIGHT VISION CAMERA

Necessary preliminary tasks

- Remove **MIDDLE LEFT RADIATOR GRILLE**

Release screws (1).

Remove high-pressure nozzle (2) from night vision camera (3).

Installation:

New spray nozzle is already preset.

Check function.

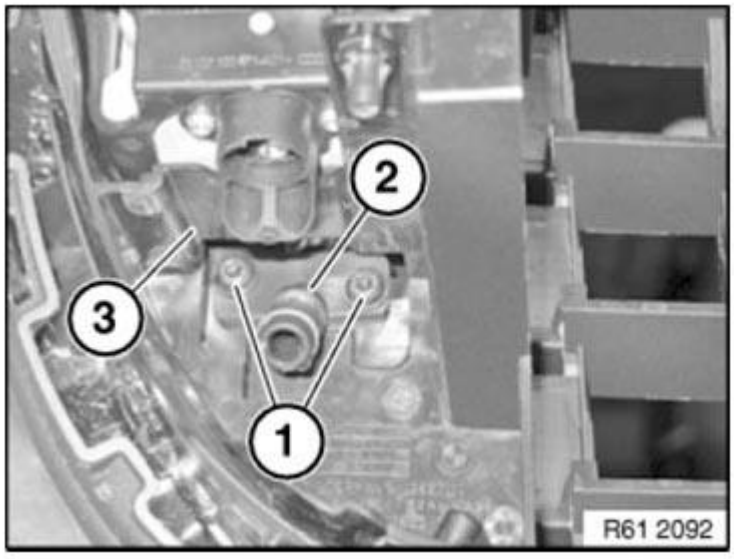


Fig. 350: Identifying High-Pressure Nozzle With Screws And Night Vision Camera
Courtesy of BMW OF NORTH AMERICA, INC.

6171 WINDOW WASHER SYSTEM

61 71 004 ADJUSTING WASHER JETS FOR WINDSCREEN WASHER SYSTEM

Triple nozzle system

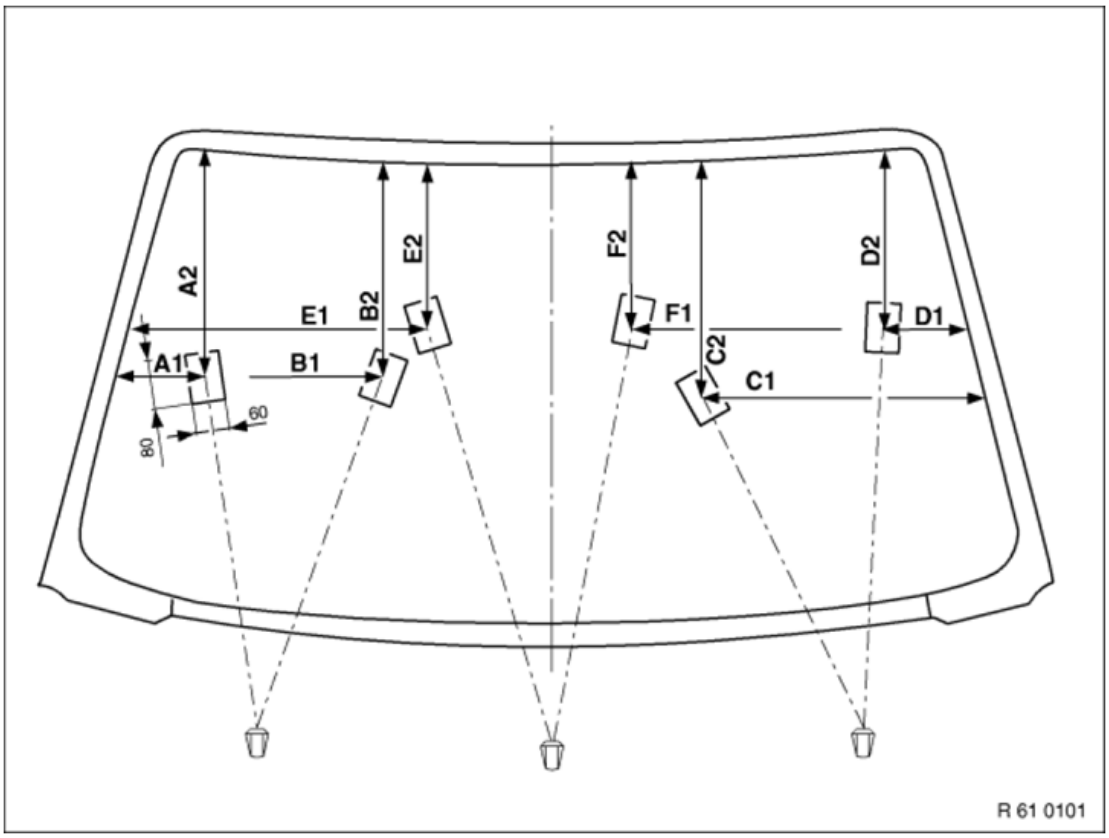


Fig. 351: Identifying Washer Spray Jet Adjusting Values
Courtesy of BMW OF NORTH AMERICA, INC.

The spray jets should hit the middle of the wiping area.

Adjustment values in mm

A1= 200

A2= 400

B1= 400

B2= 400

C1= 450

C2= 450

D1= 230

D2= 350

E1= 500

E2= 350

F1= 550

F2= 350

If necessary, adjust left/right or middle washer jet (1) by way of screw (2).

NOTE: If necessary, remove adhesive residue from windscreen.

Fill up with washer fluid.

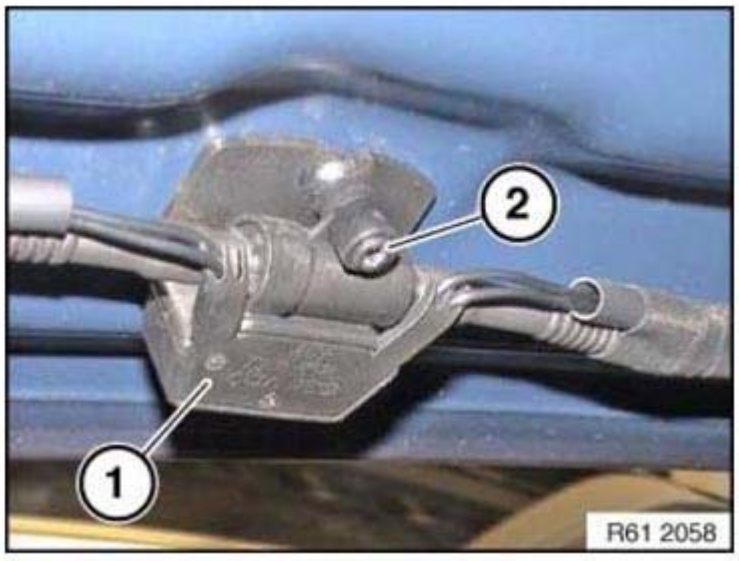
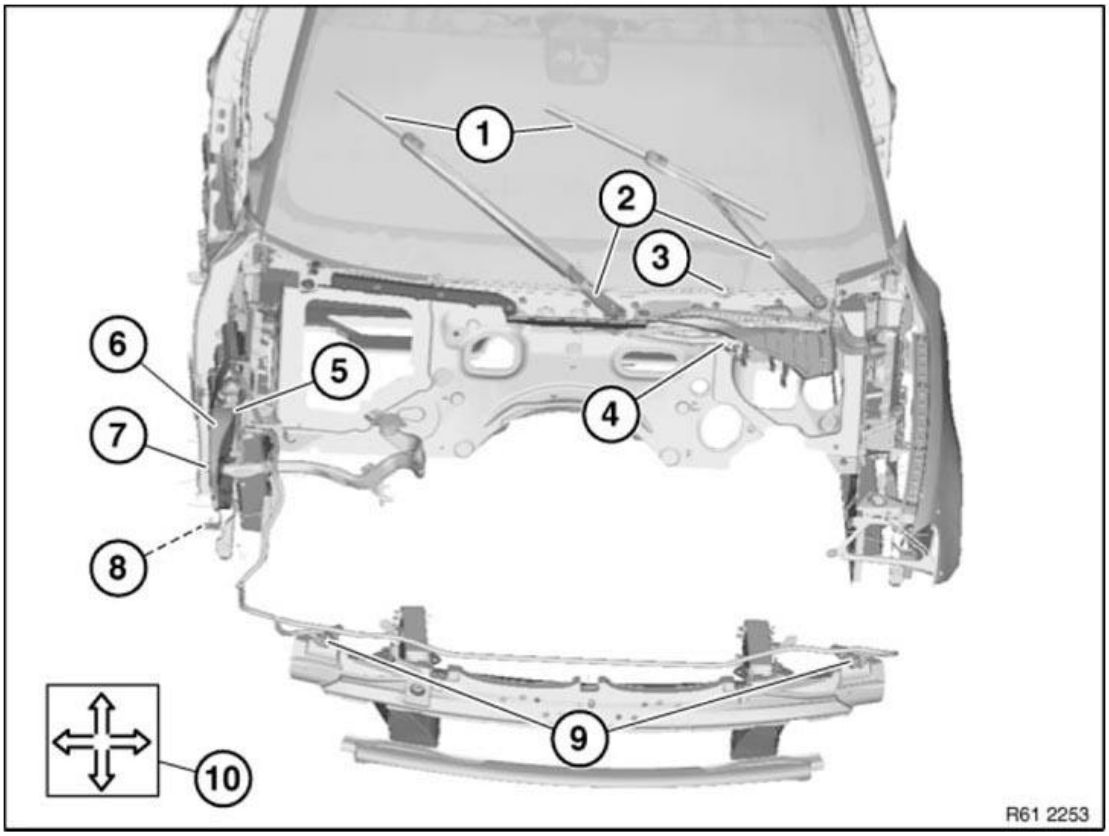


Fig. 352: Identifying Washer Jet With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

61 71... CHECKING FUNCTION OF SPRAY NOZZLES FOR WINDSCREEN WASHER SYSTEM

- Switch on terminal "R" and then switch on again immediately.
- Press wiper lever to "Clean windscreen" for more than 3 seconds.
- Washer fluid is sprayed out of the spray nozzles without the wiper arms being moved.
- Check function of spray nozzles.
- If necessary, **REPLACE** spray nozzles.
- Top up washer fluid.

61 61... OVERVIEW OF WINDSCREEN WASHER SYSTEM AND HEADLIGHT WASHER SYSTEM (SRA)



1 Windscreen wiper blades
2 Windscreen wiper arms
3 Spray nozzles for windscreen washer system
4 Wiper bracket
5 Washer pump for headlight washer system
6 Windscreen washer pump
7 Fluid reservoir for windscreen washer system
8 Level switch for windscreen washer system
9 High-pressure nozzles of SRA
10 Checking, adjusting, venting

Fig. 353: Overview Of Windscreen Washer System And Headlight Washer System (SRA)
Courtesy of BMW OF NORTH AMERICA, INC.

61 71... PROCEDURE FOR REPLACING HIGH-PRESSURE LINES

When replacing the H.P. lines, you must carry out a venting procedure after filling the fluid reservoir.

During the venting operation, a large amount of washer fluid may emerge from the spray nozzles. Have cleaning cloths at hand.

Call up service function "Vent headlight cleaning system" by way of DIS or MoDiC (refer to Diagnosis and

vented.

Top up washer fluid.

61 71 030 REMOVING AND INSTALLING/RENEWING ALL WASHER JETS OF WINDSCREEN WASHER SYSTEM

Turn clamp (3) in direction of arrow and washer fluid line (2) in direction of arrow.

Disconnect plug connection (1) and remove from bracket (4).

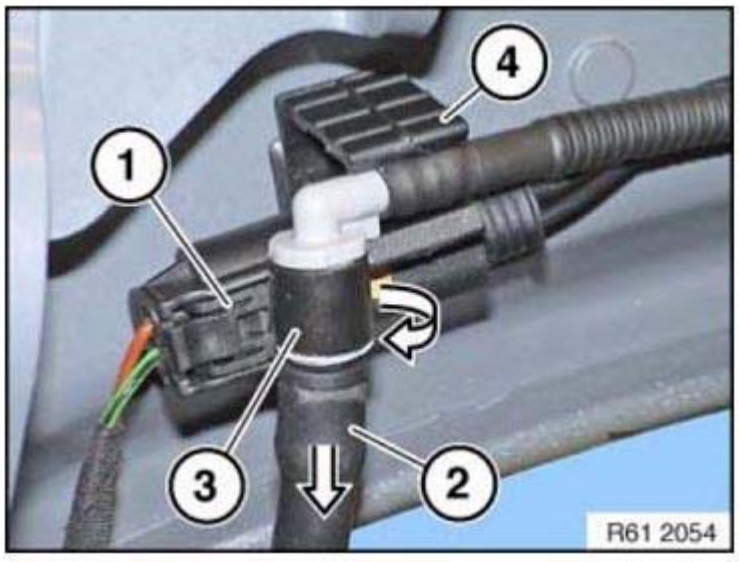


Fig. 354: Turning Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Press all washer jets (1) in direction of arrow upwards and remove.

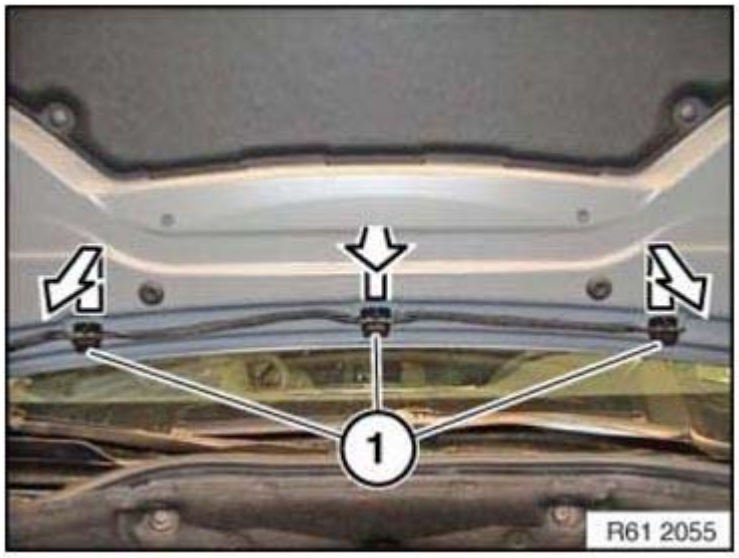


Fig. 355: Pressing Washer Jets
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

- Retaining lugs (1) must not be damaged.
- Check **ADJUSTMENT OF WASHER JETS** and correct if necessary
- Observe **FILLING CAPACITY FOR WINDSCREEN WASHER SYSTEM**

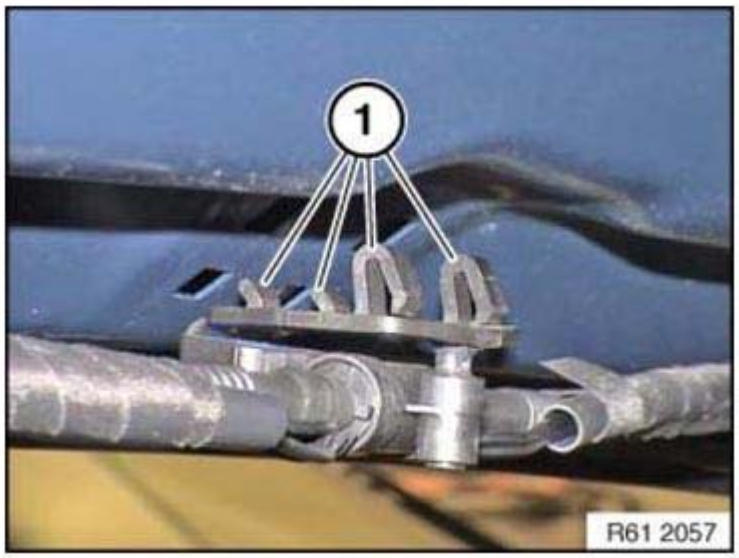


Fig. 356: Identifying Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

61 71 100 REMOVING AND INSTALLING/REPLACING WINDSCREEN WASHER PUMP

Necessary preliminary tasks:

- Remove **FRONT WHEEL ARCH COVER REAR SECTION**
- Remove **RIGHT AUXILIARY DIRECTION INDICATOR**
- Drain fluid tank for windscreen washer system.

Feed cable for auxiliary direction indicator (1) out of fluid reservoir (2).

Press windscreen washer pump (3) upwards in direction of arrow and lay to left side.

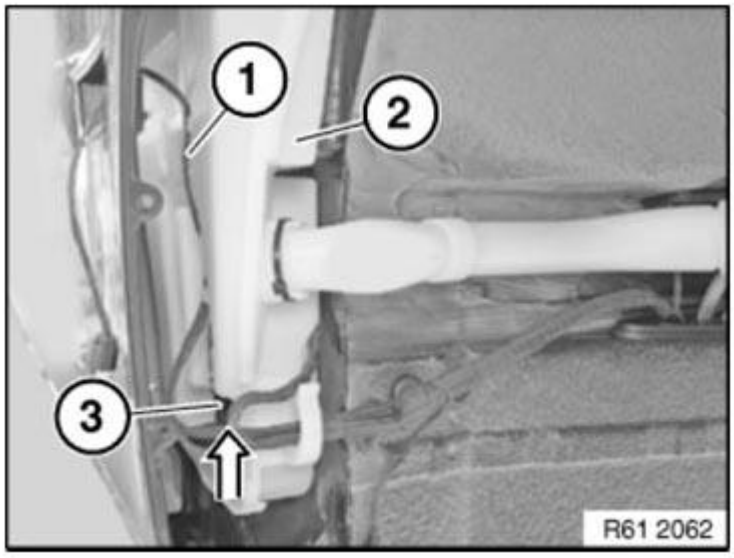


Fig. 357: Pressing Windscreen Washer Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Detach washer fluid line (2) from windscreen washer pump (3).

Remove windscreen washer pump (3).

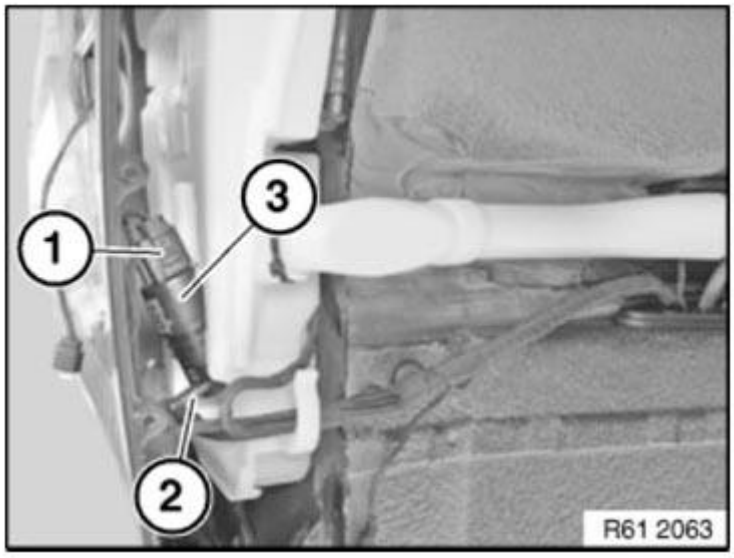


Fig. 358: Identifying Windscreen Washer Pump, Washer Fluid Line And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace strainer for windscreen washer pump.

If necessary, coat sealing ring of windscreen washer pumps with lubricant.

Ensure hose is laid without kinks.

Make sure electrical leads are correctly laid.

61 71 061 REPLACING WASHER FLUID RESERVOIR FOR WINDSCREEN WASHER SYSTEM

Necessary preliminary work:

- Remove **FRONT LEFT AUXILIARY TURN INDICATOR**
- Remove **FRONT WHEEL ARCH PANEL COVER**

NOTE: Washer fluid will escape when the windscreen washer pump is pulled out. Have a suitable collecting vessel and cleaning cloth ready. OBSERVE filling capacities of fluid reservoir.

Remove level switch for windscreen washer system, windscreen washer pump and if necessary washer pump for headlight cleaning system from fluid reservoir and set to one side. See **REMOVING AND INSTALLING/REPLACING WINDSCREEN WASHER PUMP**, **REPLACING LEVEL SWITCH FOR WINDSCREEN WASHER SYSTEM**, and **REMOVING AND INSTALLING/RENEWING WASHER PUMP OF HEADLIGHT WASHER SYSTEM**.

NOTE: Lines remain connected.

Release cable strap (1).

Pull filler channel (2) out of washer fluid reservoir (3).

Installation note:

Replace sealing ring on filler channel (2).

Release nut (4) and remove washer fluid reservoir (3) in direction of arrow.

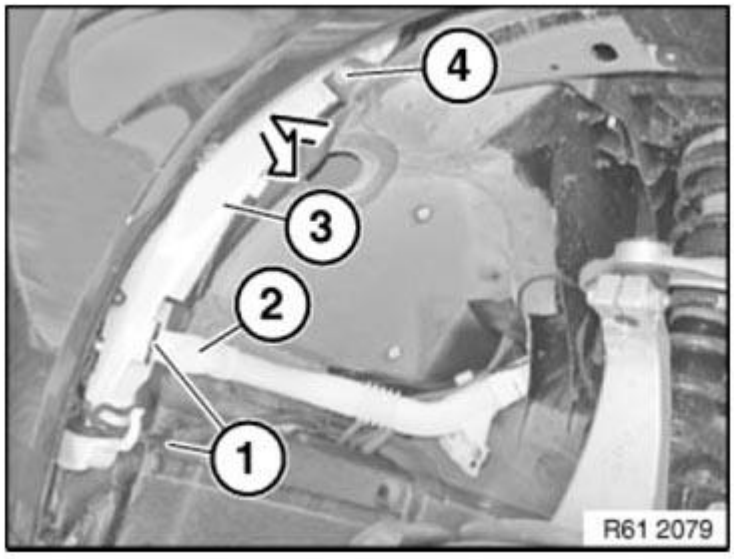


Fig. 359: Removing Washer Fluid Reservoir
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing rings and strainers of windscreen washer pumps.

Coat sealing rings of windscreen washer pumps with lubricant.

Lay windscreen washer pump lines without kinks and clip into holders on fluid reservoir.

Fill washer fluid reservoir for windscreen washer system.

OBSERVE capacities.

2009 ACCESSORIES AND BODY, CAB

General Vehicle Electronics - 750i

COMFORT ACCESS

INTRODUCTION

Keyless Vehicle Access

Using Comfort Access, the customer can unlock and open the vehicle without active use of the ID transmitter. Access to the vehicle can be gained from any point. It is important that the ID transmitter be located in the vehicle's immediate vicinity (approximately 5 feet). It is sufficient to have the ID transmitter somewhere on your person.

Comfort Access was first introduced on the E65 (03/2002). The system was then gradually introduced on different BMW models. There were the 1 Series, 3 Series, 5 Series, 6 Series, X5 and X6.

The F01/F02 will have Comfort Access from the start of series production in 09/2008. Comfort Access can be ordered as an option.

The benefits of Comfort Access are:

- High level of convenience when unlocking and locking the vehicle
- Convenient and fast access to the vehicle
- Simple engine start/stop procedure
- Maximum comfort for the driver
- No more annoying hunting for keys.

The Comfort Access in the F01/F02 is based on predecessor systems and is adapted to the F01/F02. However, the entire function is now located in the Car Access System 4. For this reason, there is no separate control unit for Comfort Access in the F01/F02, in contrast to previous systems.

The vehicle is unlocked when you place your hand into the handle recess on the outside of the door and opened when you pull the door handle.

You can lock the vehicle again by subsequently pressing on the sensitive surface of the outside door handle.

For vehicles fitted with Soft Close Automatic, the Soft Close Automatic drive fully closes the vehicle door. You can then lock the vehicle again by subsequently pressing on the sensitive surface of the outside door handle.

The ID transmitter must be located in the vehicle interior in order for the engine to be started. The engine can now be started by pressing the START-STOP button and the vehicle is ready to be driven.

NOTE: In vehicles with automatic transmission, the brake pedal must be depressed in

order for the engine to be started.
In vehicles with manual transmission, the clutch pedal must be depressed in order for the engine to be started.

System Overview

Input/Output - Comfort Access

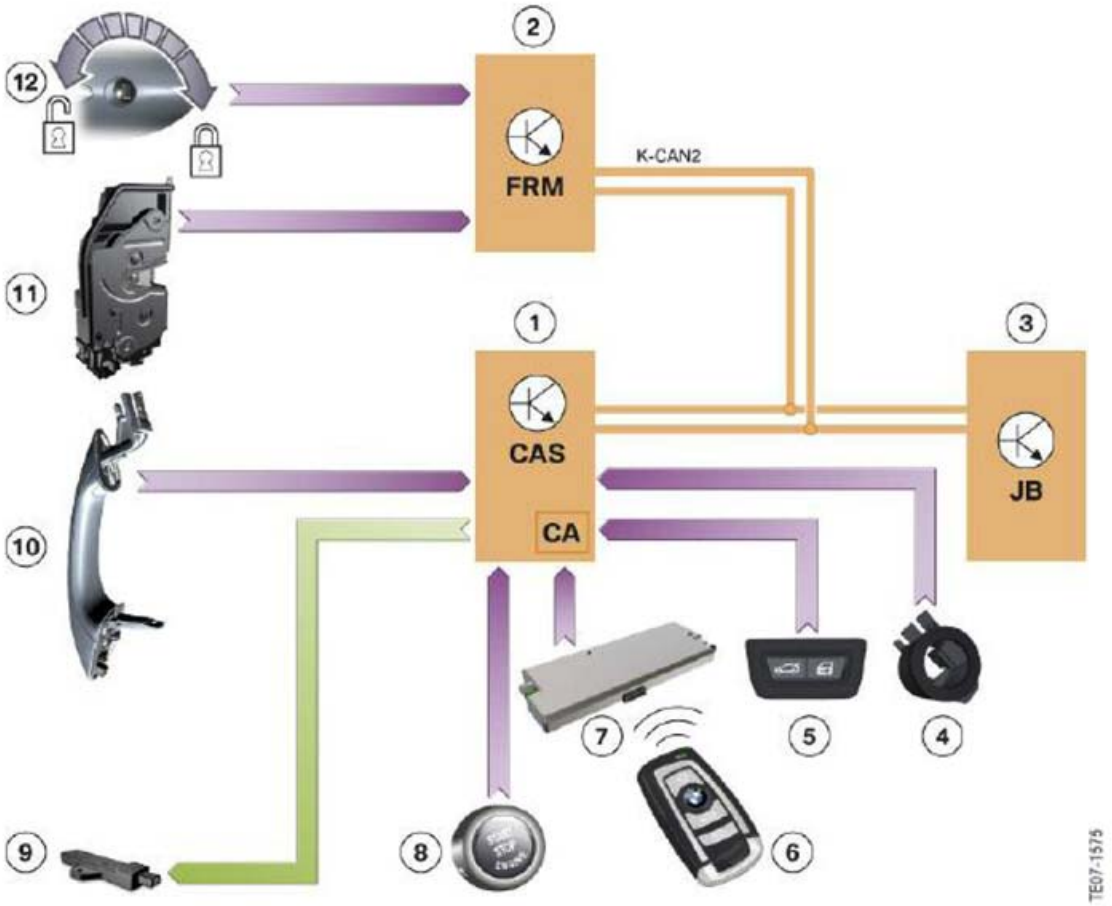


Fig. 1: Comfort Access Input/Output Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	CAS 4 Car Access System 4
2	Footwell module (FRM)
3	Junction box electronics (JB)
4	Emergency start coil (transponder coil)
5	Central locking button 12 Driver's door lock cylinder
6	ID transmitter
7	Diversity module

8	START-STOP button
9	Antenna for Comfort Access
10	Outside door handle electronics module
11	Lock with door contact
CA	Comfort Access (function)
K-CAN2	Body CAN2

System Circuit Diagram - Comfort Access

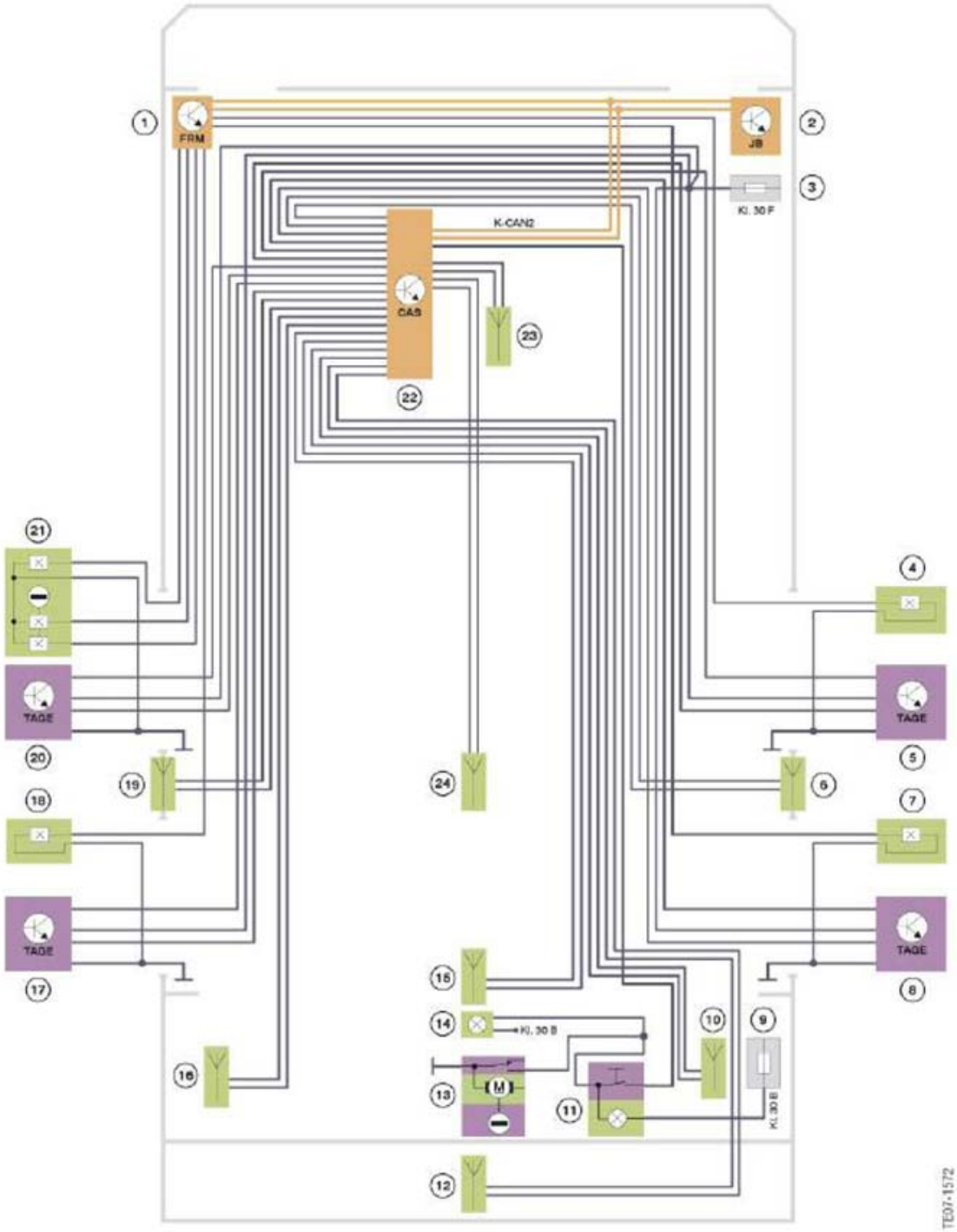


Fig. 2: Comfort Access System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Footwell module (FRM)

2	Junction box electronics (JB)
3	Front distribution box
4	Lock door contact, front-passenger side, front
5	Outside door handle electronics, front-passenger side, front
6	Antenna for Comfort Access, door sill, front-passenger side
7	Lock door contact, front-passenger side, rear
8	Outside door handle electronics, front-passenger side, rear
9	Luggage-compartment distribution box
10	Luggage-compartment antenna, front-passenger side
11	Central locking button
12	Antenna for Comfort Access, bumper
13	Trunk lock
14	Luggage compartment lighting
15	Interior antenna for Comfort Access, parcel shelf
16	Luggage-compartment antenna, driver's side
17	Rear driver's side outside door handle electronics
18	Lock door contact, driver's side, rear
19	Antenna for Comfort Access, door sill, driver's side
20	Outside door handle electronics, driver's side, front
21	Lock door contact, driver's side, front and locking cylinder in driver's door
22	Car Access System 4 (CAS 4) with Comfort Access (CA) function
23	Antenna for Comfort Access, interior, front
24	Antenna for Comfort Access, interior, rear
K-CAN2	Body CAN2

FUNCTIONS

Function Overview

Comfort Access is divided into the following functions:

- Passive Entry
- Passive Go
- Passive Exit.

ID transmitters are required for Comfort Access to function.

An ID transmitter comprises, among other things:

- A battery
- Remote control function
- Transponder coil for emergency start function

- Mechanical key
- Receiver unit.

Remote Control Function for Comfort Access

When the unlocking or locking button on the ID transmitter is pressed, it emits an encrypted remote control signal. The antenna in the rear window forwards the remote control signal to the diversity module. The diversity-module remote control receiver demodulates, processes and then sends the signal to the Car Access System on the LIN bus.

If the vehicle is in sleep mode, the remote control receiver wakes the Car Access System to reduced consumption mode via the LIN bus. The Car Access System thus receives the request that was sent using the ID transmitter. The ID transmitter is checked by the remote control receiver at this stage. If the result of the check is positive, the remote control receiver forwards the request via the LIN bus. If the request is authenticated, the Car Access System wakes the vehicle and initiates the unlocking or locking of the vehicle. To do so, the Car Access System issues the release signal for the junction box electronics to actuate the central-locking drive.

The ID transmitter can also be used to open the trunk separately. For this, only the button with the open trunk symbol need be pressed.

The Car Access System is responsible for communication via the LIN bus. The diversity module therefore only forwards the LIN bus signal if prompted to do so by the Car Access System 4. This applies to a vehicle that is not in sleep mode.

Passive Entry

The graphic below shows the functional principle of "Passive Entry".

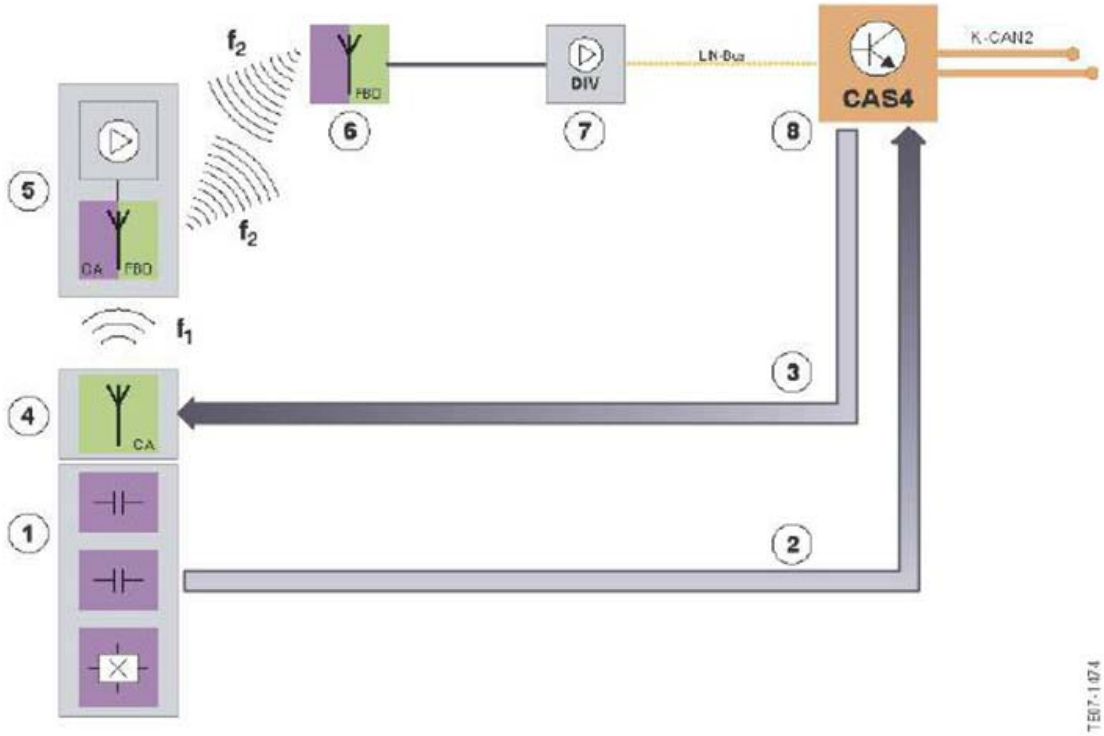


Fig. 3: Signal Path For Comfort Access In F01/F02 Passive Entry System
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Outside door handle electronics module (TAGE)
2	TAGE request to the CAS
3	Prompt about Comfort Access antenna
4	Comfort Access antenna
5	ID transmitter
6	Rear window antenna
7	Remote control receiver in the diversity module
8	Car Access System 4 (CAS 4)
LIN-Bus	Local Interconnect Network bus
f_1	Low frequency in the kHz range
f_2	High frequency in the MHz range
K-CAN2	Body CAN2
CA/FBD	Comfort Access/remote control services

Passive Entry enables access to the vehicle without the ID transmitter being actively operated.

For example, if the outside door handle is pulled, this triggers a pulse in the sensor. The outside door handle electronics analyze the sensor and inform the Car Access System that vehicle access is requested.

The Car Access System prompts the ID transmitter to identify report to the vehicle. For this, a low-frequency signal is emitted by Comfort Access via the antennas. Transmission is via the 125 kHz antennas.

The 125-kHz signal serves only to wake the ID transmitter. The ID transmitter responds with its transmission frequency. Subsequent communication is now bi-directional, i.e. in two directions. The Car Access System sends or receives all further information via the LIN bus.

The remote control receiver is equipped with both a receiver unit and a transmitter unit. It establishes the connection with the ID transmitter via the rear-window antenna. For that reason, only the high frequency range is now used.

Bi-directional communication has the advantage that data can be requested from or sent to the ID transmitter. The Car Access System has sole responsibility for this communication.

If the ID transmitter is able to be authenticated, the Car Access System initiate the request, e.g. unlocking the vehicle. The junction box electronics execute the unlocking.

The transmission frequency of the ID transmitter varies for the US is 315MHz.

NOTE: When it is not required, the ID transmitter is in sleep mode. This reduces its energy consumption. For sleep mode to be ended, the ID transmitter requires a wake-up signal. The wake-up signal can be sent by the Car Access System via the Comfort Access antennas. Pressing one of the buttons on the ID transmitter also wakes it.

Passive Entry at the Trunk

An authentication check also takes place before the trunk is opened.

If the outside trunk button in the trunk handle strip is operated, it changes its status. The junction box electronics analyze the status and send it via the K-CAN2.

The Car Access System 4 therefore knows that the outside trunk button has been operated.

The Car Access System initiates the emission of the 125 kHz signal, so that the ID transmitter can report to the vehicle.

At the same time, the Car Access System initiates communication to the ID transmitter.

The Car Access System sends the requests for this via the LIN bus to the remote control receiver. The latter sends the requests from the Car Access System via the rear-window antenna.

If the ID transmitter is recognized as belonging to the vehicle, the Car Access System prompts the junction box electronics to unlock the trunk.

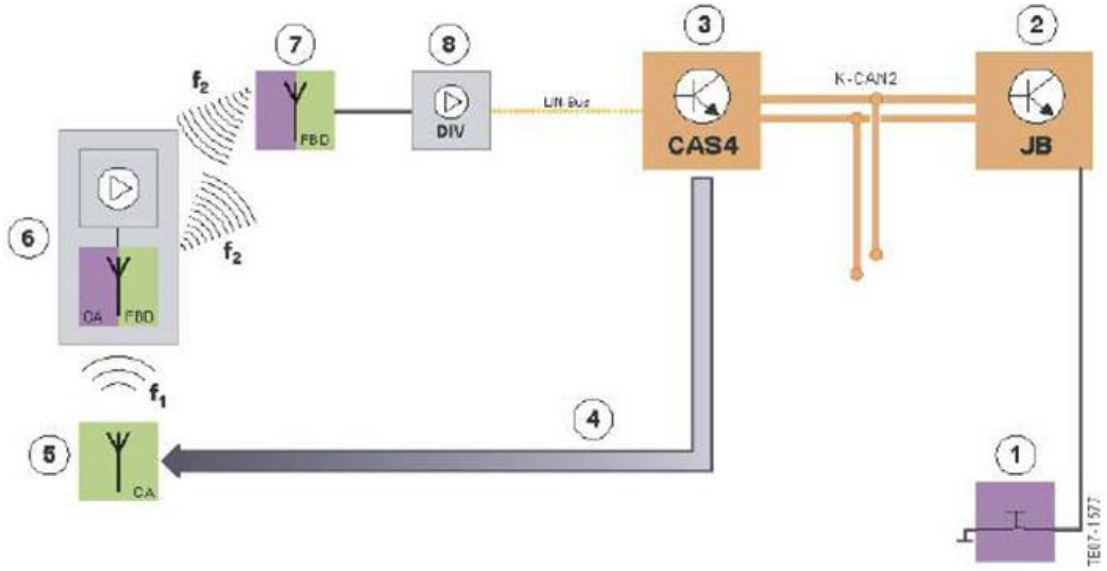


Fig. 4: Principle Of Comfort Access At Trunk
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Outside trunk button in the handle strip of the luggage compartment lid
2	Junction box electronics (JB)
3	Car Access System 4 (CAS 4)
4	CAS request to the CA antenna
5	Bumper antenna for Comfort Access
6	ID transmitter
7	Rear window antenna
8	Remote control receiver in the diversity module
LIN-Bus	Local Interconnect Network bus
K-CAN2	Body CAN2
f_1	Low frequency in the kHz range
f_2	High frequency in the MHz range
CA/FBD	Comfort Access/remote control services

Passive Go

The "Passive Go" function makes it possible to start the vehicle when the ID transmitter is in the passenger compartment.

Issuing Start Enable

Authorization to start the engine is only given when there is an ID transmitter in the vehicle. Once the last door is closed, the Car Access System begins its search for a valid ID transmitter.

The Car Access System 4 requests a signal to be sent out to identify a valid ID transmitter. The interior antennas are used for this.

The ID transmitter responds using a high-frequency range (315 MHz). If the ID transmitter is authenticated, the Car Access System 4 grants permission for the engine to be started.

NOTE: The electronic immobilizer gives its own approval for the engine to be started.

The search for an ID transmitter in the passenger compartment can also be triggered by pressing the START-STOP button. This will take place if the START-STOP button is pressed before the last door is closed, for instance.

Or if the vehicle is stationary too long and therefore loses communication with the ID transmitter. Pressing the START-STOP button triggers the search for the ID transmitter in the vehicle interior.

Passive Exit

The Passive Exit function makes it possible to lock the vehicle without actively using the ID transmitter.

Locking Procedure

After the vehicle door has been closed, the locking procedure is started by pressing the sensitive area on the outside door handle. The outside door handle electronics module sends the request to unlock the vehicle to the Car Access System 4.

The Car Access System 4 checks whether a valid ID transmitter is in the vicinity of the outside door handle using the outside antennas.

The ID transmitter is instructed to send an authentication signal.

In turn, the identification sensor sends encrypted data via the high-frequency link to the remote control receiver.

The remote control receiver processes the data and sends it via the LIN bus to the Car Access System. The Car Access System causes the communication with the ID transmitter to be established.

If the ID transmitter is recognized as belonging to the vehicle, the Car Access System 4 issues authorization for the vehicle to be unlocked.

The junction box electronics activate the central-locking drives.

Special Comfort Access Functions

The Comfort Access additionally features the special functions described in the following that are determined by the actions of the vehicle user.

Second ID Transmitter Remains in the Vehicle Interior

By checking via the interior antennas, the Car Access System 4 recognizes whether there is a valid ID transmitter in the vehicle interior. If the Car Access System 4 detects a valid ID transmitter in the vehicle interior and the vehicle is locked by means of another valid ID transmitter (located outside), the ID transmitter located in the vehicle interior is set to "blocked".

This ID transmitter will not be recognized as belonging to the vehicle for Comfort Access until the vehicle is unlocked again.

NOTE: The "blocked" status only applies to the functions of Comfort Access. The remote control functions are still available.

Identification Transmitter in Luggage Compartment

If an ID transmitter is located in the luggage compartment when the vehicle is locked and the trunk open and the trunk is then closed, the trunk will immediately be automatically opened again. Audible and visual signals draw the customer's attention to the fact that the ID transmitter is located in the luggage compartment.

The Car Access System 4 starts the request via the luggage-compartment antennas.

If a valid ID transmitter is detected in the luggage compartment, the Car Access System 4 will not issue authorization for the trunk to be locked.

The trunk cannot be closed before the ID transmitter has been removed and is located outside the luggage compartment.

NOTE: This behavior only occurs if the Comfort Access does not find a valid ID transmitter in the vicinity of the vehicle when it searches the outside of the vehicle.

Starting the Engine without an ID Transmitter

This function makes it possible to start the vehicle within 10 seconds after "engine OFF" without detecting the ID transmitter. This function is intended for cases where, for example, the ID transmitter is not detected due to high-frequency interference.

Unintentional Wake-up Function

The vehicle cannot be woken simply by someone gripping the outside door handle. A valid ID transmitter must be detected in the vicinity of the vehicle.

Locking with Engine Running

The vehicle can also be unlocked with the engine running if the engine was started with Passive Go. When leaving the vehicle, the ID transmitter should also be taken and the vehicle locked from the outside.

Emergency Start Coil

In unfavorable situations, the ID transmitter cannot be found in the passenger compartment. The Car Access System therefore causes a message to be output to the instrument cluster. The message tells the customer that the ID transmitter could not be found.

Because there is no slot for the ID transmitter in the F01/F02, there is an emergency start coil on the steering column. Communication via the emergency start coil allows the engine to be started and the vehicle is then ready to be driven.

The emergency start coil has the same function as the transponder coil. Communication via the transponder coil makes it possible for the Car Access System 4 to identify the ID transmitter. The Car Access System 4 can issue the start authorization following successful identification.

The remote control or ID transmitter cannot be found in the following situations:

- Fault in the remote control/ID transmitter
- Interference in the transmission to the remote control/ID transmitter
- Flat battery in the remote control/ID transmitter.



Fig. 5: Identifying Emergency Start Coil
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM COMPONENTS

Control Unit

The Car Access System is located above the steering column on the right-hand side.

For the Comfort Access function, the Car Access System controls the transmitting antennas for the vehicle

The outside door handle electronics are read by the Car Access System.

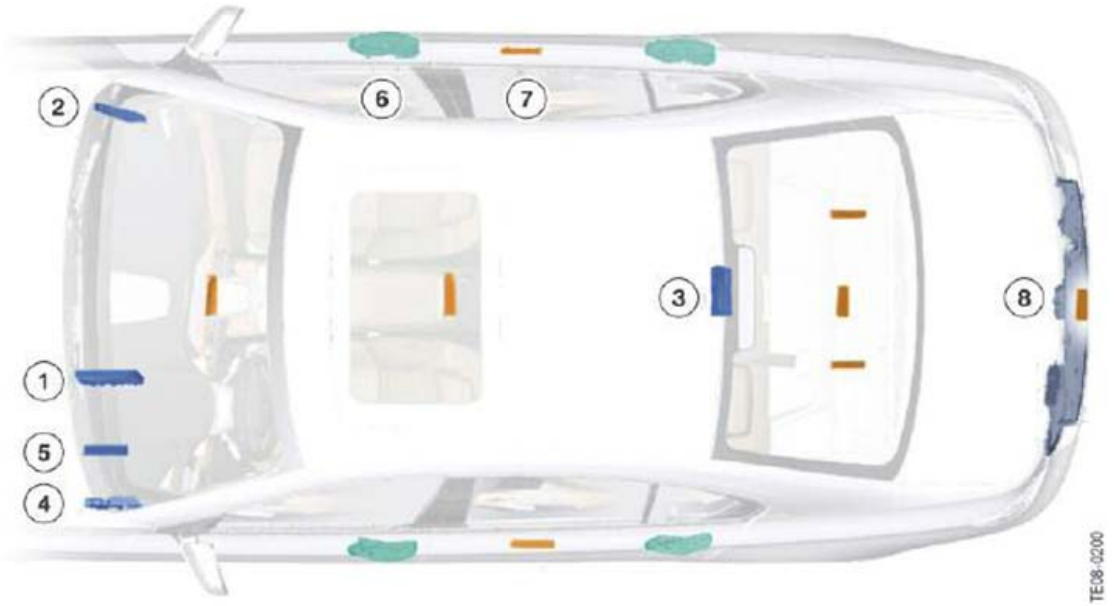


Fig. 6: Installation Location Of Car Access System 4 With Comfort Access
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Car Access System 4 with Comfort Access
2	Junction box electronics
3	Remote control receiver in the diversity module
4	Footwell module
5	Central gateway module
6	Outside door handle electronics
7	Antennas for Comfort Access
8	Central locking components in the trunk

Control Elements

ID Transmitter

The ID transmitter for Comfort Access must be actuated by means of a radio signal. The ID transmitter is therefore equipped with a receiver for the coded 125 kHz radio signal that is transmitted by the Comfort Access antennas. The radio signal wakes the ID transmitter. The ID transmitter registers with the vehicle automatically (authentication).

For this purpose, the ID transmitter emits a coded 315 MHz high-frequency signal to enable identification of the ID transmitter as being valid and belonging to the vehicle.

The ID transmitter is exclusively responsible for use of the Comfort Access system. The ID transmitter has a battery, the service life of the battery in the ID transmitter is about 4 years.

Voltage Monitoring

The ID transmitter monitors its own battery voltage. The battery voltage is monitored in 2 stages.

The first stage signals to the Car Access System 4 that the battery is flat. In response, the Car Access System 4 generates a check control message. The check control message informs the customer that the battery needs to be changed.

If the battery is not changed, the voltage monitoring facility switches to the second stage. This means that the data in the ID transmitter is saved. The ID transmitter is then set to "inoperative".

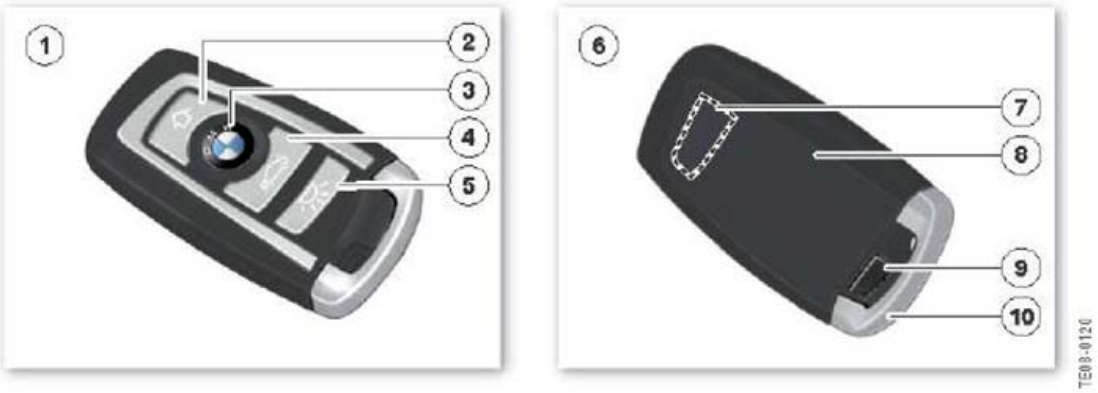


Fig. 7: Identifying F01/F02 ID Transmitter
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Top view of ID transmitter
2	Vehicle unlock button
3	Vehicle lock button
4	Trunk unlock button
5	Follow-me-home lights button
6	Rear view of ID transmitter
7	Transponder coil
8	Battery compartment
9	Mechanical key button
10	Mechanical key

Data for Conditioned Based Service

From terminal status "terminal 15 ON", data for the Conditioned Based Service is transferred to the ID

transmitter in the high-frequency range. The ID transmitter then confirms that the transmission was received.

Antennas for Comfort Access

Eight antennas are installed for the Comfort Access system. Five antennas are for the vehicle interior and three are for the vehicle exterior.

The antennas for the exterior and interior are inductive antennas and have a ferrite core.

The antenna transmission frequency is 125 kHz. All messages that are sent via the antennas are encrypted.

Antenna Installation Locations

Exterior antennas

The exterior antennas are installed in the following locations on the F01/F02:

- Door sill on the driver's side, in the center of the vehicle
- Door sill on the front-passenger side, in the center of the vehicle
- Rear bumper in the center



Fig. 8: Identifying Passenger-Compartment Antenna In Door Sills In F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

The antennas are designed to give about 5 feet (1.5 m) of coverage around the vehicle.

The exterior antennas are equipped with a splash-proof plug connection.

Interior antennas

The interior antennas are installed in the following locations in the F01/F02:

- Passenger compartment, front center console
- Passenger compartment, middle center console

- Luggage compartment, left and right
- Parcel shelf

The antenna characteristic is spherical. The entire vehicle interior is covered by the front and middle antennas.



Fig. 9: Identifying Front Passenger-Compartment Antenna In F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

Luggage compartment antenna

The luggage-compartment antennas are of the same design as the interior antennas. They are integrated in the left- and right-hand sides of the luggage compartment.

The luggage-compartment antennas are configured so that they cover the entire luggage compartment.

Outside Door Handle Electronics Module

The outside door handle electronics are connected to terminal 30F and work within a voltage range of 9 V to 16 V. The Car Access System is directly connected to the data line of the outside door handle electronics. This provides the Car Access System with information about the capacitive sensors and the piezo sensors. The status of the "pull" Hall sensor is monitored directly by the Car Access System.

The outside door handle electronics detect the status of the outside door handle using the sensors.

Each change in the status of the outside door handle module triggers the corresponding function.

These functions are:

- Trigger pulse by inserting a hand into the handle recess of the outside door handle; Capacitive sensor 1
- Unlock request by pulling the outside door handle; Hall sensor
- Lock request by pressing the sensitive area on the outside door handle; capacitive sensor 2 plus piezo sensor.

Capacitive sensor 1

If a hand is placed into the handle recess of the outside door handle, for example, this is detected by the outside door handle electronics. On detecting this, the outside door handle electronics send the request to the Car Access System. The request initially contains the information to wake up the Car Access System. The Car Access System is woken and reads the request. Then, the Car Access System establishes communication with the ID transmitter.

The Car Access System switches the remote control receiver on permanently and therefore ensures that the data sent by the ID transmitter can be received.

NOTE: The remote control receiver is integrated in the diversity module.

Capacitive sensor 2/piezo sensor

Touching the sensitive surface generates the capacitive sensor 2 signal. Together with the piezo sensor, a press on the sensitive surface is detected. A lock signal is only triggered if the capacitive sensor and piezo sensor are both actuated.

The outside door handle electronics analyze the two sensors and send the request to the Car Access System.

Outside door handle Hall sensor

The Hall sensor is redundant to the capacitive sensor 1. The Hall sensor is analyzed directly by the Car Access System. The Car Access System monitors the Hall sensor using a clocked voltage supply.

If the vehicle has already been woken by someone reaching into the handle recess, pulling on the outside door handle triggers the unlocking on the vehicle.

In unfavorable situations, it may be necessary to pull on the outside door handle twice to trigger the vehicle unlocking. This is caused if the signal from the capacitive sensor 1 is not present or is implausible.

Door Locks

The vehicle has rapid opening locks in the doors as standard. A spring exerts pretension on the central locking drive for the unlocking procedure. The door is already unlocked before an attempt is made to open it with the outside door handle.

NOTE: However, if the outside door handle is pulled very fast, the vehicle door may not yet be unlocked. In this case, it is necessary to pull the outside door handle a second time in order to open the door.

CENTRAL LOCKING SYSTEM

INTRODUCTION

Unlocking and Locking the Vehicle

The central locking system makes it possible to unlock or lock the vehicle. It is fitted as standard equipment and relates to all vehicle doors, the fuel filler flap and the trunk.

The central locking can be operated via the following components:

- ID transmitter
- Driver's-door lock barrel (door lock)
- Central-lock button
- Trunk lock barrel
- Exterior trunk button
- Interior trunk button in the A-pillar
- Outside door handle * (outside door handle electronics/Car Access System)
- Central locking button in the trunk lid *.

* Component of the Comfort Access option.

The central locking system in the F01/F02 is based on the central locking system as it is already known in, for instance, the E90 or E70. The function of the central locking system is basically divided between three control units.

The Car Access System has overall control. The Car Access System is aware of the statuses of the central locking system. Therefore it is the Car Access System which causes the unlocking, locking and central locking of the vehicle.

The junction box electronics module executes the request to unlock or lock the vehicle.

NOTE: The Car Access System is now entering its fourth control-unit generation and contains the functions of its predecessor.
With Car Access System 4, Comfort Access functionality is now also integrated into this control unit. This means that, on the F01/F02 there is no separate control unit for Comfort Access.

It is possible to unlock and lock the vehicle actively or passively.

- Active means that the vehicle can be opened after it has been unlocked by a press of the button on the ID transmitter. The vehicle can be locked by pressing the Lock button after the doors have been closed.

NOTE: The vehicle can only be locked with the driver's door closed.

Passive locking and unlocking requires the option Comfort Access.

- Passive means the vehicle is unlocked when the outer door handle is grasped, provided the ID transmitter is located within a radius of no more than approximately 1.5 meters from the vehicle. The locking function is triggered by pressing on the sensitive area on the outer door handle.

The trunk is fitted with the automatic soft-close function as standard. With the automatic soft-close function, it is sufficient to gently press the trunk into the trunk lock. As soon as the locking pawl reaches the pre-locking position, automatic soft-close fully closes the trunk. The locking pawl is then located in the main locking position.

An alternative is automatic soft-close, the automatic soft-close function is available for all vehicle doors. When equipped with the automatic soft-close function, the vehicle door needs only to be gently pulled or pushed into the lock. The automatic soft-close function then completely closes the door.

The Car Access System (4) evaluates the signal from the ID transmitter (1) and requests the unlocking or locking of the vehicle. The junction box electronics module (8) executes the requests.

The lock barrel (12) in the driver's door is used for mechanically unlocking or locking the door. The footwell module (10) evaluates the movement (status of Hall sensors) of the lock barrel and the status of the door contacts.

SYSTEM OVERVIEW

Input/output Central Locking

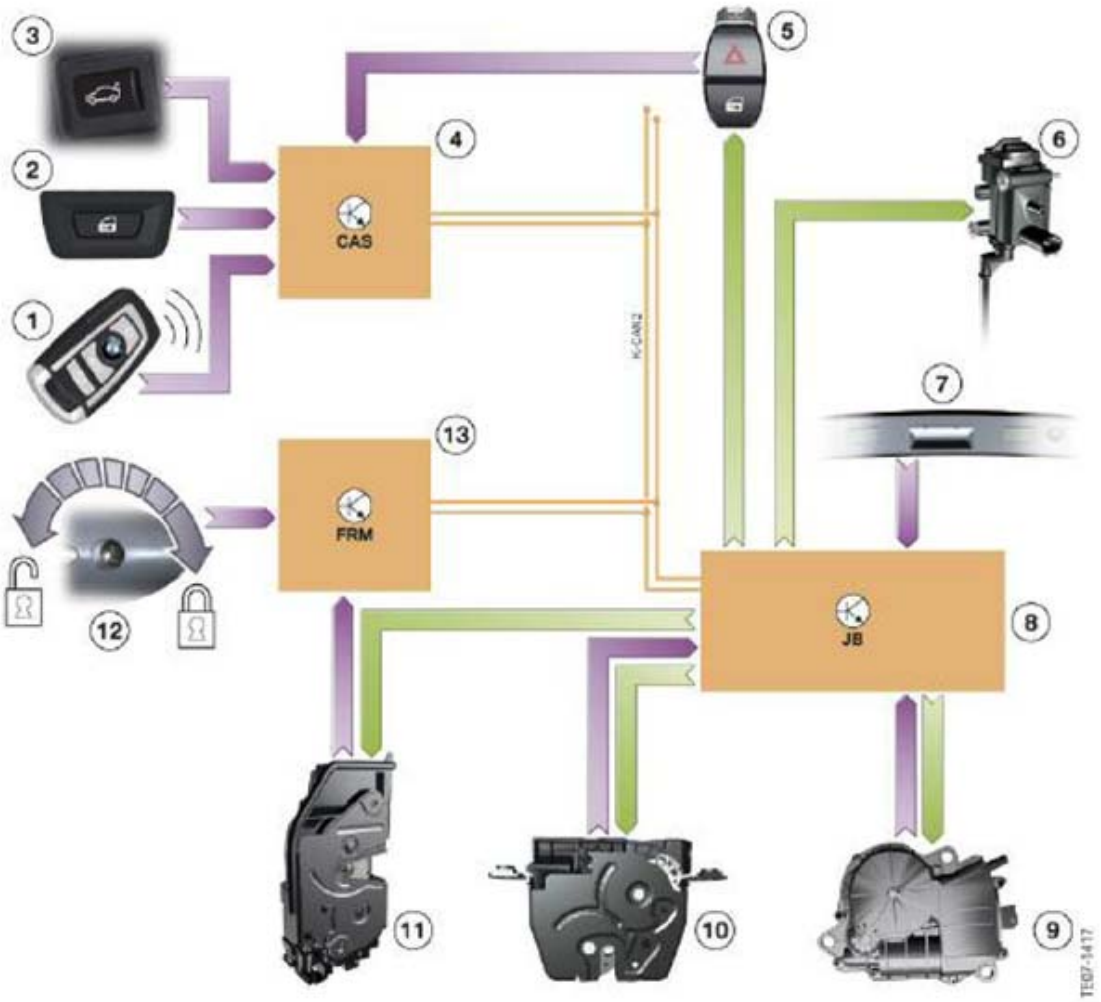


Fig. 10: Central Locking Input/Output Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	ID transmitter
2	Central locking button
3	Interior trunk button in the A-pillar
4	Car Access System 4 (CAS 4)
5	Center-lock button
6	Central locking, fuel filler flap
7	Exterior trunk button
8	Junction box electronics module (JB)
9	Automatic soft-close drive in the trunk lock
10	Trunk central locking system
11	Lock (4x) in vehicle doors

12	Driver's-door lock barrel
13	Footwell module (FRM)
K-CAN2	Bodyshell CAN

Central Locking System Circuit Diagram

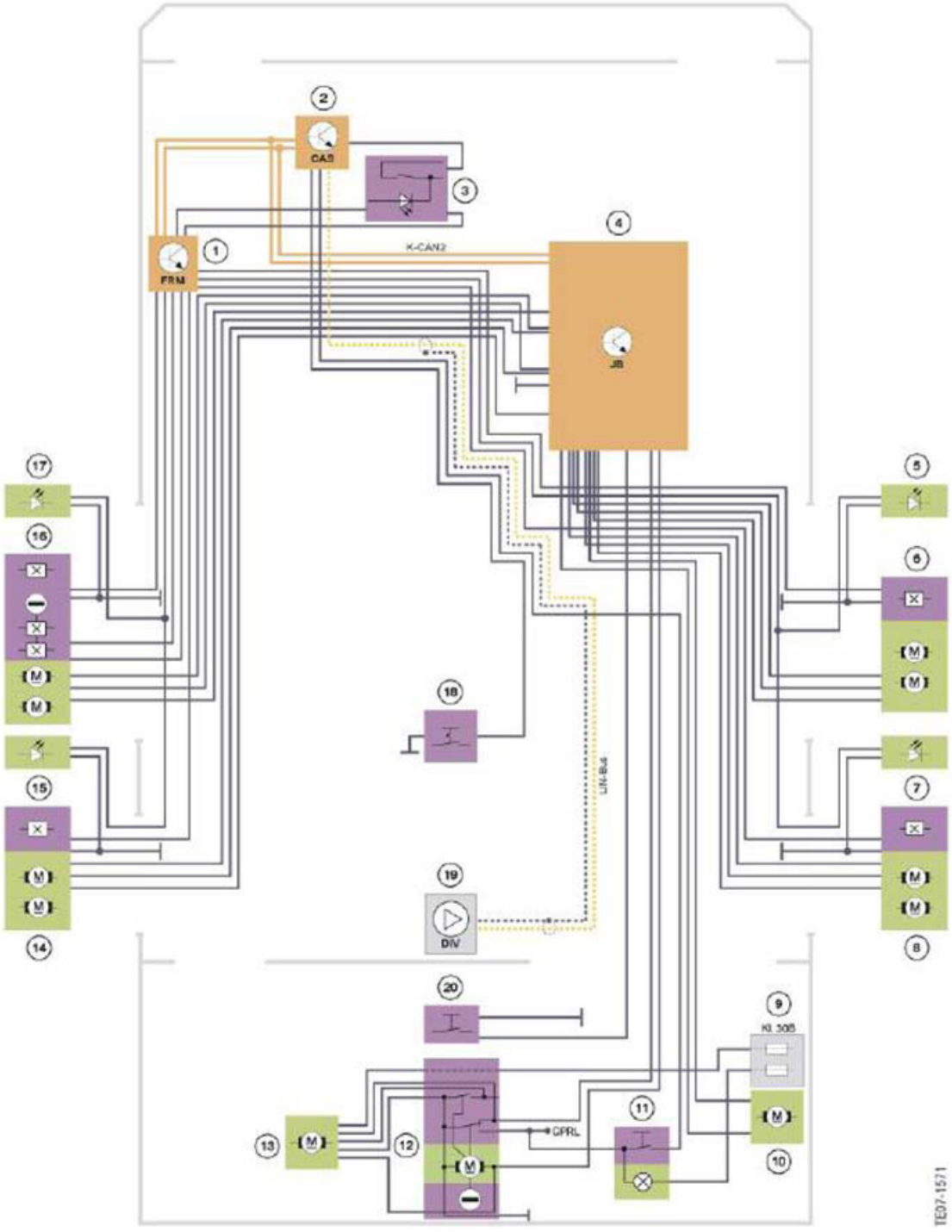


Fig. 11: Central Locking System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Footwell module (FRM)
2	Car Access System (CAS)
3	Center-lock button
4	Junction box electronics module (JB)
5	Front-passenger-door illuminated entry system
6	Door contact, central locking, front passenger door
7	Rear, passenger-side illuminated entry system
8	Door contact, central locking, rear passenger side
9	Fuse in the luggage compartment power distribution box
10	Central locking, fuel filler flap
11	Central locking button
12	Trunk lock central locking system
13	Automatic soft-close drive in the trunk lock
14	Rear, driver's side central locking system
15	Rear, driver's side illuminated entry system
16	Hall sensors for lock barrel, door contact, driver's-door central locking system
17	Driver's-door illuminated entry system
18	Valet switch
19	Remote control receiver in diversity module
20	Exterior trunk button
K-CAN2	Bodyshell CAN2
KI. 30B	Terminal 30, basic operation
LIN-Bus	Local Interconnect Network bus
GPRL	Luggage compartment light

K-CAN signals at Car Access System 4

CAR ACCESS SYSTEM K-CAN SIGNALS CHART

In/out	Information	Source/sink	Function
In	Crash signal	Crash sensor > Advanced Crash Safety Management	Unlock central locking in the event of a crash
In	Driving speed	Wheel-speed sensor > Integrated Chassis Management	Lock central locking from a defined driving speed
Out	Hall sensor status, driver's-door lock barrel	Driver's-door lock barrel > Footwell module	Comfort opening of vehicle
Out	Hall sensor status, driver's-door lock barrel	Driver's-door lock barrel >	Comfort closing of vehicle Footwell module

The radio signal from the ID transmitter is received by the rear window antenna. The remote control receiver integrated in the diversity module (19) forwards the signal to the Car Access System (2). After the signal has been successfully checked, the Car Access System issues a request for control of the central locking system. The Car Access System is the master control unit for the central locking system.

The junction box electronics module (4) executes the unlocking or locking of the vehicle.

The footwell module (1) evaluates the status of all door contacts (6, 8, 14 and 16). It communicates the current status on the KCAN2. This means, for example, that the Car Access System is able to prevent locking when the driver's door is open.

The status of the center-lock button (3) is evaluated by the Car Access System and communicated over the K-CAN2. Depending on the status, the junction box electronics module activates central locking. The junction box electronics modules is also responsible for registering the status and activating central locking in the trunk.

The junction box electronics module is also responsible for controlling the fuel filler flap (10).

The footwell module evaluates the signals from the Hall sensors for the lock barrel (16) and makes this information available on the K-CAN2.

With this information, the Car Access System knows the status of the door lock in the driver's door. This is important if a request is issued to unlock or lock the vehicle using the ID transmitter, for example.

The central locking button is integrated in the underside of the trunk and is part of the Comfort Access option.

FUNCTIONS

Unlocking/locking the Vehicle

The vehicle unlocking/locking procedure is initiated by the following system components:

- ID transmitter
- Mechanical key/spare key
- Exterior trunk button (only unlocks the trunk)
- Central-lock button
- Interior trunk button on the A-pillar (only unlocks the trunk)
- Outside door handle *
- Central locking button * trunk.

* Vehicle equipment for Comfort Access.

The central locking system activates the following system components:

- Central locking, driver's and front passenger door
- Central locking, rear doors

- Central locking, fuel tank
- Trunk central locking system (with automatic soft-close drive).

The following example shows the signal path when the trunk is unlocked.

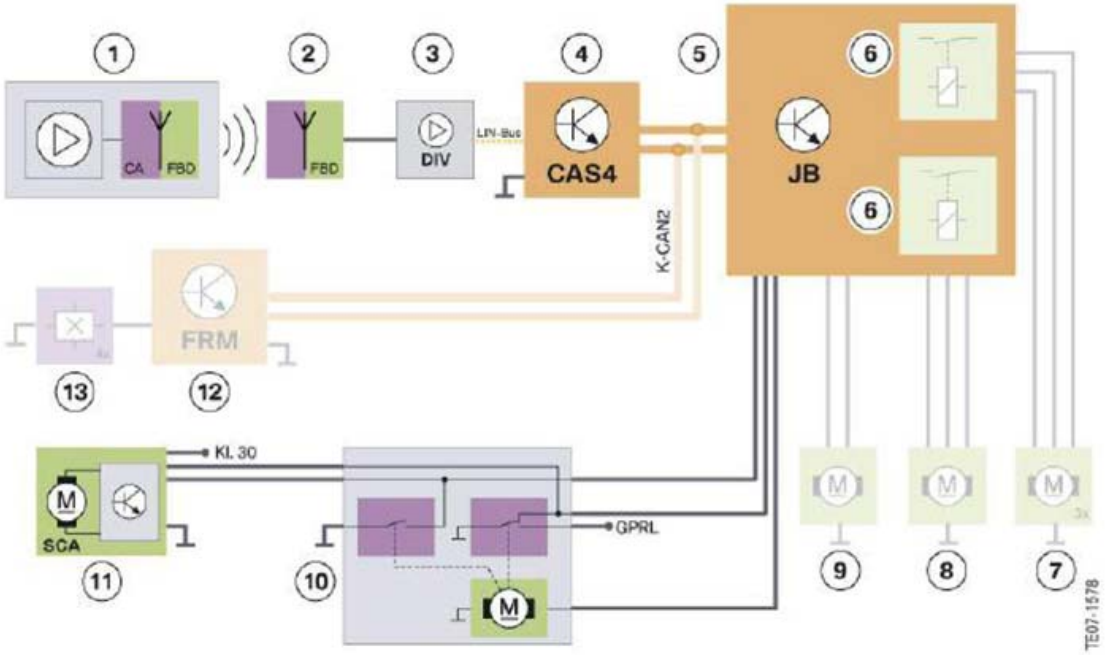


Fig. 12: Unlocking/Locking Signal Path Diagram (Trunk Unlocked)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	ID transmitter
8	Central locking, driver's door
2	Rear window antenna
9	Central locking, fuel filler flap
3	Remote control receiver in diversity module
10	Trunk central locking system
4	Car Access System 4 (CAS 4)
11	Trunk automatic soft-close
5	Junction box electronics module (JB)
12	Footwell module
6	Relay for central locking
13	Door contacts
7	Central locking, front passenger door and rear doors

Functional Procedure

Unlocking

Pressing the Unlock button on the ID transmitter causes an encrypted remote control signal to be transmitted. The antenna in the rear window forwards the remote control signal to the diversity module. The diversity module remote control receiver demodulates, processes and then sends the signal to the Car Access System on the LIN bus.

If the vehicle is in sleep mode, the remote control receiver wakes up the Car Access System via the LIN bus for reduced-consumption operation. This allows the Car Access System to receive the request which was sent out by the ID transmitter. The ID transmitter has already been checked in the remote control receiver. If the result of the check is positive, the remote control receiver forwards the request via the LIN bus. If the request is authorized, the Car Access System wakes up the vehicle and causes the vehicle to unlock. The Car Access System thereby gives the junction box electronics module permission to unlock the central-locking drive.

The junction box electronics module then activates the relay and power output stages and triggers the unlocking of the vehicle.

NOTE: The Car Access System is responsible for communication over the LIN bus. This means that the diversity module only passes on a LIN bus signal when instructed to do so by the Car Access System 4. This applies to vehicles not currently in sleep mode.

Locking

The vehicle can only be locked once the footwell module has evaluated the door contacts and the Car Access System 4 has reported that the driver's door is closed.

The further signal progression for locking the vehicle corresponds analogously to the signal progression of the unlocking procedure.

During the vehicle locking process, all central locking drives are moved into the "Lock" position. The central-locking drives in the doors are additionally moved into the "centrally-locked" position. Following the central arrest procedure, the locking buttons in the doors are mechanically separated from the central locking drive system.

The vehicle can now no longer be unlocked using the locking buttons in the doors.

NOTE: The trunk can either be locked manually or using automatic trunk actuation.

Central locking button

The central locking button can be used to lock and centrally lock all vehicle doors.

The central locking button is located on the underside of the trunk and can therefore only be used with the trunk open.

Additional information is presented under the Central locking button section, which follows.

Center-lock Button

The vehicle can be locked/unlocked with the center-lock button.

If the center-lock button is not being pressed, the junction box electronics module receives a high signal (battery voltage approximately 12 V). The high signal changes to a low signal (approximately 0 V) as soon as the center-lock button is pressed.

The junction box electronics module evaluates the change from the high signal to the low signal and locks/unlocks the vehicle.

In order for locking or unlocking to take place, the driver's door and front passenger door must be closed.

Mechanical Key/Spare Key

The mechanical key/spare key is used to unlock/lock the driver's door. Should the ID transmitter fail, e.g. if the battery is flat, it is still possible to access or lock the vehicle.

Driver's-door lock barrel

The footwell module evaluates the Hall sensors for the lock barrel in the driver's door. The Car Access System 4 is informed of the change in status via the K-CAN2.

The Car Access System 4 enables the vehicle unlocking/locking procedure. The junction box electronics module triggers the unlocking/locking of the vehicle.

The normal procedure for unlocking or locking using the mechanical key occurs within a period of approximately 20 ms to 1 second. Evaluation of the lock barrel Hall sensors occurs within this period of time.

NOTE: Turning the mechanical key in the driver's-door lock barrel too quickly or slowly, means that only the driver's door will be mechanically unlocked or locked. In such situations, the central locking system does not operate.

Trunk lock

The trunk lock can be unlocked by using the mechanical key in the lock barrel, and then opened.

NOTE: If the anti-theft alarm system is fitted, unlocking the trunk may trigger an alarm.

To close the trunk, the trunk must be pushed into the trunk lock. As soon as the locking pawl reaches the pre-locking position, automatic soft-close begins and closes the trunk.

NOTE: In the F01, the trunk lock is pulled closed via an automatic soft-close drive. Slamming the trunk closes the trunk so quickly that automatic soft-close is not activated.

Locking Button on Vehicle Doors

All four doors can be mechanically locked separately with the locking button.

The inside door handle of the door to be unlocked must be pulled twice before the door will unlock.

However, the junction box electronics module does not activate central locking.

If the vehicle is centrally locked, the locking knobs are mechanically disconnected from the lock. It is thus no longer possible to unlock the vehicle either via the locking knobs or by pulling twice on the door handle. On vehicles with an anti-theft alarm system, this also activates the system.

Car Access System 4

As soon as the Car Access System 4 receives the signal from the remote control receiver, it checks whether the ID transmitter is valid and belongs to the vehicle. Only if the check is successful will the Car Access System 4 forward the request to the central locking.

The check, also referred to as authentication, takes a few milliseconds. As the master control unit of the central locking system, the Car Access System 4 grants authorization for control of the central locking system.

The junction box electronics module receives the enable via the K-CAN2.

Junction Box Electronics Module

The junction box electronics module is the The trunk central locking system is activated slave control unit which unlocks/locks the directly via a power output stage. entire vehicle. The unlocking/locking relays are located in the junction box electronics module. The following relays are activated:

- Relay for unlocking/locking central locking
  - Driver's door.
- Relay for unlocking/locking central locking
  - Rear doors
  - Front passenger door
  - Fuel filler flap.

Footwell Module

The footwell module monitors the Hall The request to lock the vehicle, for example, is sensors of the door contacts. Opening or not executed while the driver's door is open. closing a door causes a change in status of the door contact in question to occur.

The junction box electronics module receives the current status of the door contacts from the footwell module via the K-CAN2. The junction box electronics module passes the status of the door contacts on to the Car Access System 4.

Unlocking the Trunk

The trunk can be unlocked via the ID transmitter and the exterior or interior trunk button, and then opened.

ID transmitter

The ID transmitter is used to trigger the unlocking of the trunk by means of a brief (approximately 500 ms) press on the trunk symbol button.

The junction box electronics module executes the unlocking of the trunk.

The motor in the trunk lock is activated via the power output stage in the junction box electronics module.

NOTE: If the vehicle is fitted with the automatic trunk actuation option, the trunk symbol button must be pressed and held for longer than 1.2 seconds.

Exterior trunk button

As soon as the vehicle is unlocked, the trunk can be opened with the exterior trunk button in the trunk. The button switches to ground when the exterior trunk button is pressed.

The button is monitored by the junction box electronics. When the signal of the button changes to low, the trunk is unlocked and can be opened.



Fig. 13: Identifying Exterior Trunk And Exterior Trunk Button
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Exterior trunk button
2	License plate light

Interior trunk button in the A-pillar

As soon as the vehicle is unlocked, the trunk can be unlocked and opened by pressing the interior trunk button.

The button is integrated into the A-pillar and switches to ground.

The Car Access System evaluates the button and sends the signal for the junction box electronics module over the K-CAN2. The junction box electronics module evaluates the message and triggers the trunk to unlock.

Closing the trunk

Gently pressing the trunk into the trunk lock triggers the automatic soft-close drive.

A microswitch in the trunk lock is activated by the locking pawl being located in the prelocking position. The drive electronics for automatic soft-close assess the change in status as a starting signal.

The drive then pulls the rotary striker closed via a Bowden cable. As soon as the locking pawl engages in the main locking position, the automatic soft-close drive is stopped.

NOTE: The automatic soft-close drive serves to ensure that the trunk closes both safely and securely.

Special Functions

Automatic locking (personal profiles)

At speeds in excess of 16 km/h (10 mph), the vehicle locks automatically. The speed signal is supplied by the Integrated Chassis Management.

The vehicle is unlocked in connection with Comfort Access as soon as terminal 15 is switched off.

NOTE: Various functions of the central locking system can be individually customized using "personal profiles".

Unlocking after a crash

A locked central locking system is unlocked as soon as the Car Access System 4 receives a crash message from the advanced crash safety management.

After this crash message is received, the central locking controls are blocked.

The controls are only enabled again after Advanced Safety Crash Management (ASCM) stops sending the crash message or if, after 10 seconds, the crash message is no longer received.

Selective unlocking

With corresponding coding, the vehicle can also be unlocked selectively. In this case, initially the driver's door

is unlocked. The rest of the vehicle is unlocked in response to a renewed unlock request.

Central Locking Button

A new function for the central locking system is the ability to activate central locking from the trunk.

The central locking button is located on the underside of the trunk. Whether or not the button is present depends on which equipment is installed on the vehicle.

Pressing the central locking button locks and centrally locks all vehicle doors.

NOTE: The central locking button is only accessible with the trunk open.

The button status is evaluated by the Car Access System. If the vehicle is in sleep mode, it must first be woken up.

The Car Access System recognizes that the central locking button has been pressed and locks and centrally locks the car as appropriate.

CENTRAL LOCKING BUTTON REFERENCE CHART

Option	Central locking button	
Comfort Access (CA)	Central locking button	
Automatic Trunk Actuation (HKL)	Button for HKL actuation is located next to central locking button	

SYSTEM COMPONENTS

Components of the Central Locking System

Footwell Module

The footwell module is installed at the left-hand A-pillar. It evaluates the status of the door contacts and reads in the Hall sensor signals of the lock barrel in the driver's door and transfers the information via the K-CAN2 to the junction box electronics module or Car Access System 4.

Car Access System 4

The Car Access System 4 is installed on the right, above the steering column. It assumes the master function for the central locking system. The Car Access System 4 has the exclusive system authorization and is simply supported by the other control units.

The Car Access System 4 also registers the status of the center lock button. The Car Access System 4 activates central locking, depending on the status of the central locking system. Briefly pressing the center lock button triggers the vehicle to lock or unlock.

The Car Access System evaluates the status of the interior trunk button on the A-pillar and the central locking button on the trunk.

Junction Box Electronics Module

The junction box electronics module is plugged into the front power distribution box.

NOTE: The power distribution box and the junction box electronics module are two separate components. This must be borne in mind when performing service work.

The junction box electronics module contains the relays for activating the central locking drive units.

The trunk central locking is activated via a power output stage in the junction box electronics module.

The status of the exterior trunk button is read by the junction box electronics module and this information is passed on to the Car Access System 4.

The automatic soft-close drive and the remote control receiver are supplied with power by the rear power distribution box.

Controls

The central locking can be operated from the following controls (among others):

- ID transmitter
- Driver's-door/trunk lock barrel

- Central locking button
- Interior trunk button in the A-pillar
- Central locking button.

ID transmitter

Each vehicle is supplied with a purse key/spare key and two ID transmitters. The adapter for the spare key is located in the glove compartment.

NOTE: Up to eight ID transmitters can be used in conjunction with the Comfort Access function. Four ID transmitters can be used for personal profiles.

The ID transmitter has one button for locking and one for unlocking the vehicle. There is a separate button for unlocking the trunk. Pressing the trunk symbol button triggers automatic closing/opening of the trunk. Automatic closing requires the automatic trunk actuation option.

The ID transmitter contains a battery which lasts up to four years.

The mechanical key is located in the ID transmitter.

NOTE: The passenger airbag can also be deactivated/activated with the mechanical key.

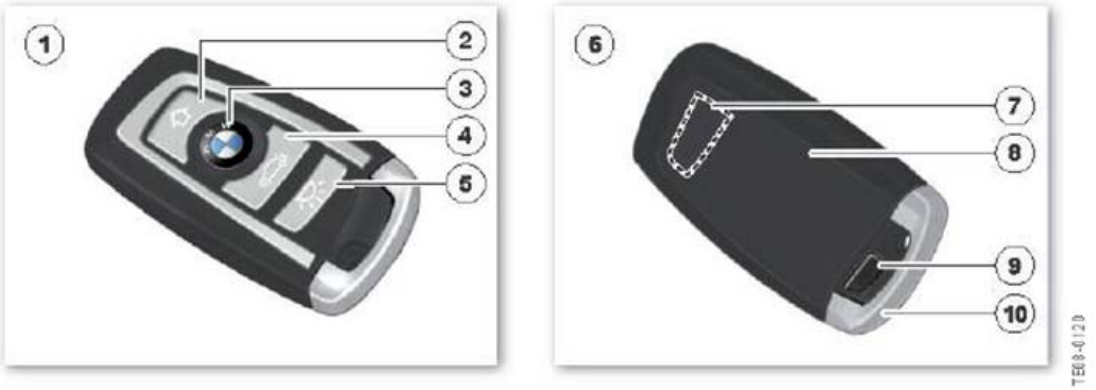


Fig. 14: Identifying F01/F02 ID Transmitter
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	ID transmitter top view
2	Unlock/comfort open
3	Lock/comfort close
4	Button for OPEN trunk

5	Button for vehicle search function
6	ID transmitter rear view
7	Transponder coil area
8	Battery compartment
9	Button for mechanical key
10	Mechanical key

The ID transmitter has a 512 MB data memory. The following data can be stored in the ID transmitter:

ID TRANSMITTER DATA

Data	Explanation
km reading (mileage)	Current km reading of vehicle
VIN	
Key number	Number of the ID transmitter
Fault code memory entries	Which displays fault code memory entries and associates them with possible PuMAs
NAVI-DVD version	Data status of navigation DVD
Engine oil	Information on topping up or draining the engine oil, e.g. in the case of overfilling
Battery condition	Battery charge status
Integration stages	Integration stage that left the factory, integration stage last programmed or currently available integration stage.

NOTE: The remote control receiver is integrated in the antenna diversity facility and passes the remote control signal to the Car Access System 4 via the LIN bus.

Driver's-door lock barrel

The lock barrel is connected mechanically via a linkage to the door lock. Hall sensors for the lock barrel are integrated in the door lock.

The footwell module evaluates the signals from the Hall sensors for locking/unlocking purposes.

Trunk locking barrel

The lock barrel is connected mechanically via a Bowden cable to the trunk lock. Turning the spare key in the lock barrel opens the trunk lock.

NOTE: If the vehicle is fitted with an anti-theft alarm system, this causes an alarm to be triggered. 1 Center lock button 2 Center lock button

Center-lock button

The center-lock button is installed between the center of the outlets in the dashboard. The center-lock button forms one unit together with the hazard warning lights button.



Fig. 15: Identifying F01/F02 Button Unit
Courtesy of BMW OF NORTH AMERICA, INC.

CENTRAL LOCKING BUTTON REFERENCE CHART

Index	Explanation
1	Hazard warning flasher button
2	Central locking button

NOTE: The center lock button can also be operated when the vehicle is locked. However, opening the vehicle door will trigger an alarm from the anti-theft alarm system.

Central Locking Drive Units

A central locking drive unit consists of an electric drive unit and the unlocking/locking mechanism.

The central locking drive units in the doors are equipped with two motors to facilitate the unlocking/locking and central arrest functions of the vehicle.

Central arrest means that the locking button in the doors is separated mechanically from the central locking drive unit.

As a result, the vehicle cannot be opened by pulling the locking button.

The Hall sensor for the door contact is additionally integrated in the central locking drive unit.

Trunk central locking drive (trunk lock)

The central locking drive for the trunk is equipped with a motor for unlocking.

The central locking drive contains two microswitches which are actuated by the locking pawl. If the locking

electronics in the automatic soft-close drive register the status and activate the drive. As soon as the locking pawl engages in the main locking position, the drive stops.

NOTE: The junction box electronics module evaluates the status of the microswitch. The junction box electronics module sends the status via the K-CAN2. This applies to vehicles with automatic trunk actuation. The trunk lift requires this information so that it can start at the right time, and not cause damage to the trunk lock.

The second microswitch is used to switch on the luggage compartment lighting. The change in the status of the microswitch which occurs when the trunk is opened or closed is also used to monitor the trunk for the purposes of the anti-theft alarm system.

The automatic soft-close drive is connected to the trunk lock with a Bowden cable. This has the benefit that the drive can be fitted regardless of the available installation space. The drive is connected to terminal 30B. The fuse is located in the rear power distribution box. An electronics module is integrated into the automatic soft-close drive which is used to monitor its proper functioning.

Closing the trunk places the rotary striker in the trunk lock in the pre-locking position. To this end, a microswitch is located in the trunk lock which changes status when the lock is actuated.

The electronics module in the automatic soft-close drive evaluates this change in status and triggers the drive to switch on. The automatic soft-close drive is actuated until the rotary striker is located in the main locking position. Once this has occurred, the microswitch changes status again and the drive is switched off.

NOTE: The drive and the trunk lock can be replaced individually.

Fuel filler flap central locking drive

The central locking drive is equipped with a motor for unlocking/locking.

Manually releasing the fuel filler flap

The fuel filler flap can be released manually in the event of an electrical defect. The release mechanism is located in the luggage compartment, on the right-hand side.

Manually Unlocking the Trunk

The US variant of the F01/F02 has an emergency trunk release mechanism. This makes it possible to open the trunk manually from inside the luggage compartment.

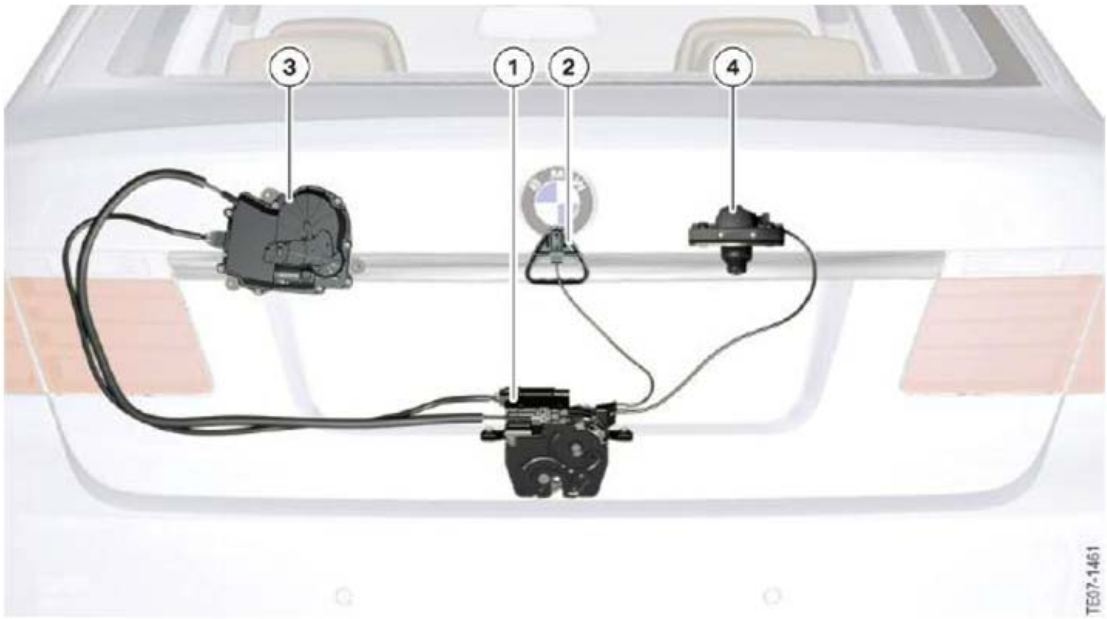


Fig. 16: Identifying F01/F02 Emergency Trunk Release Mechanism
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Trunk lock
2	Handle for the emergency release
3	Automatic soft-close drive
4	Trunk lock barrel mechanism

Pulling on the handle (item no. 2) unlocks the trunk lock. The pulling motion on the handle is transferred to the trunk lock by a Bowden cable, causing the trunk lock to unlock.

AUTOMATIC SOFT CLOSE

INTRODUCTION

F01/F02 Available with Automatic Soft Close Function

The Automatic Soft Close function (SCA) is available and can be ordered as of volume production launch.

The Automatic Soft Close function requires the installation of suitable door locks with drives for Automatic Soft Close (SCA drives).

The particular feature of this Automatic Soft Close function is that the door lock and the Automatic Soft Close drive unit are no longer a single unit. The Automatic Soft Close drive unit is separate and controls the door lock by way of a cable.

This means that the lock and the drive can be fitted separately and the installation space available can be used to the best effect.

The Automatic Soft Close option is only available for all doors on the vehicle.

The benefit of the Automatic Soft Close function is that the doors only have to be pushed or pulled lightly into the lock. This action starts the Automatic Soft Close function which closes the doors fully.

NOTE: The Automatic Soft Close function for the trunk is standard equipment and thus is not part of this option.

SYSTEM OVERVIEW

System Circuit Diagram for Automatic Soft Close Function

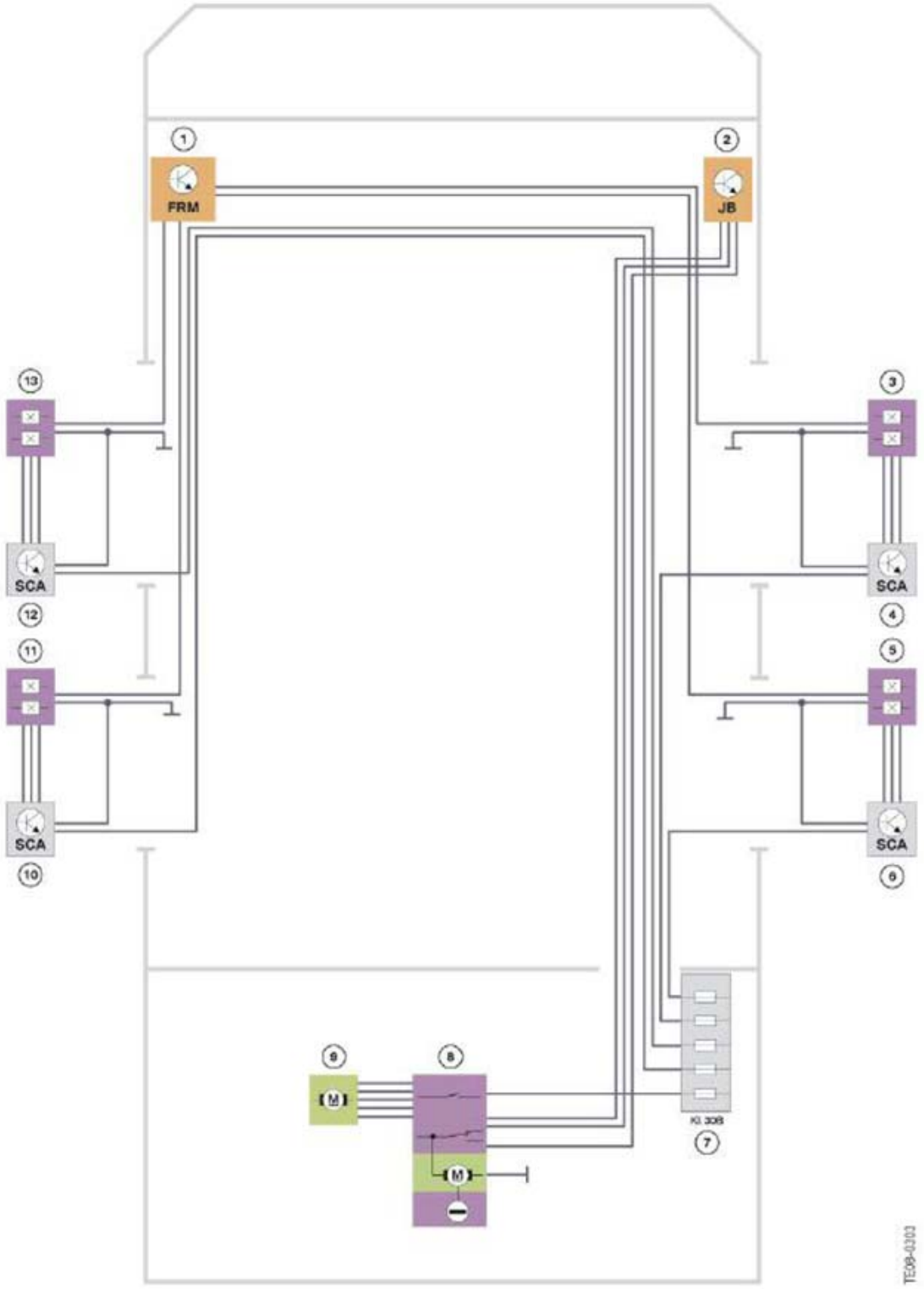


Fig. 17: Automatic Soft Close Function System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Footwell module (FRM)
2	Junction box module (JB)
3	Door switch, central locking, Hall-effect sensor for front passenger door Automatic Soft Close function
4	Front passenger door Automatic Soft Close unit (SCA)
5	Door switch, central locking, Hall-effect sensor for near-side rear door
6	Near-side rear door Automatic Soft Close unit (SCA)
7	Luggage compartment power distribution box
8	Trunk central locking unit
9	Trunk Automatic Soft Close unit
10	Off-side rear Automatic Soft Close unit
11	Door switch, central locking, Hall-effect sensor for off-side rear door Automatic Soft Close function
12	Driver's door Automatic Soft Close unit (SCA) Automatic Soft Close function
13	Door switch, central locking, Hall-effect sensor for driver's door Automatic Soft Close function
KI. 30B	Terminal 30 basic mode

FUNCTIONS

Automatic Soft Close

The Automatic Soft Close function is an autonomous function. The only connection to the car's electrical system is Terminal 30 basic mode (Terminal 30B) and the ground connection. The Automatic Soft Close function is operational as of "Terminal 30B ON".

Circuit Diagram for an Automatic Soft Close System

The electronics for controlling and monitoring the function are located in the Automatic Soft Close function drive.

The sensors for the Automatic Soft Close function are Hall-effect sensors and are located in the locks. The Hall sensors are built into the lock of each vehicle door. One Hall sensor is for the locking pawl, the other for the rotary striker.

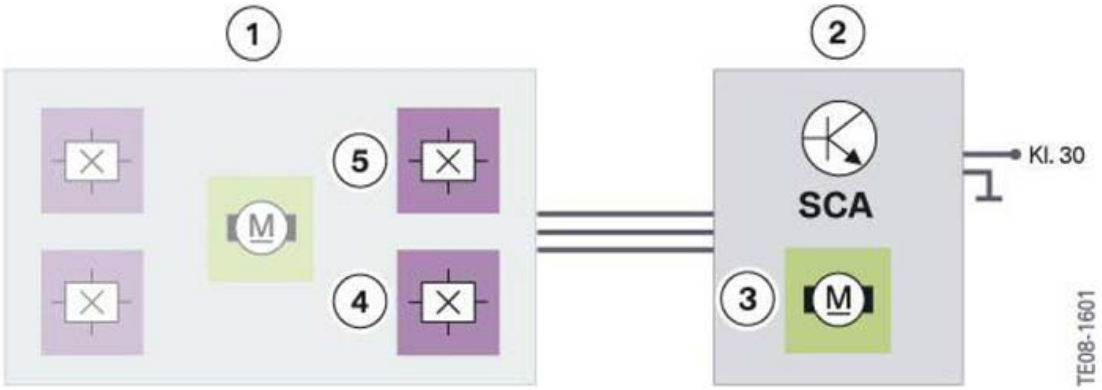


Fig. 18: Automatic Soft Close System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Lock in the vehicle door
2	Automatic Soft Close function drive
3	Automatic Soft Close function drive motor
4	Locking pawl Hall sensor
5	Rotary striker Hall sensor

The Automatic Soft Close function analyzes the status of the Hall sensors. The Automatic Soft Close drive units are operated or moved back to their starting position according to status.

The Automatic Soft Close function drive is connected to lock by way of a Bowden cable and a 3 wire cable.

The following illustration shows where the Automatic Soft Close function drives are fitted.

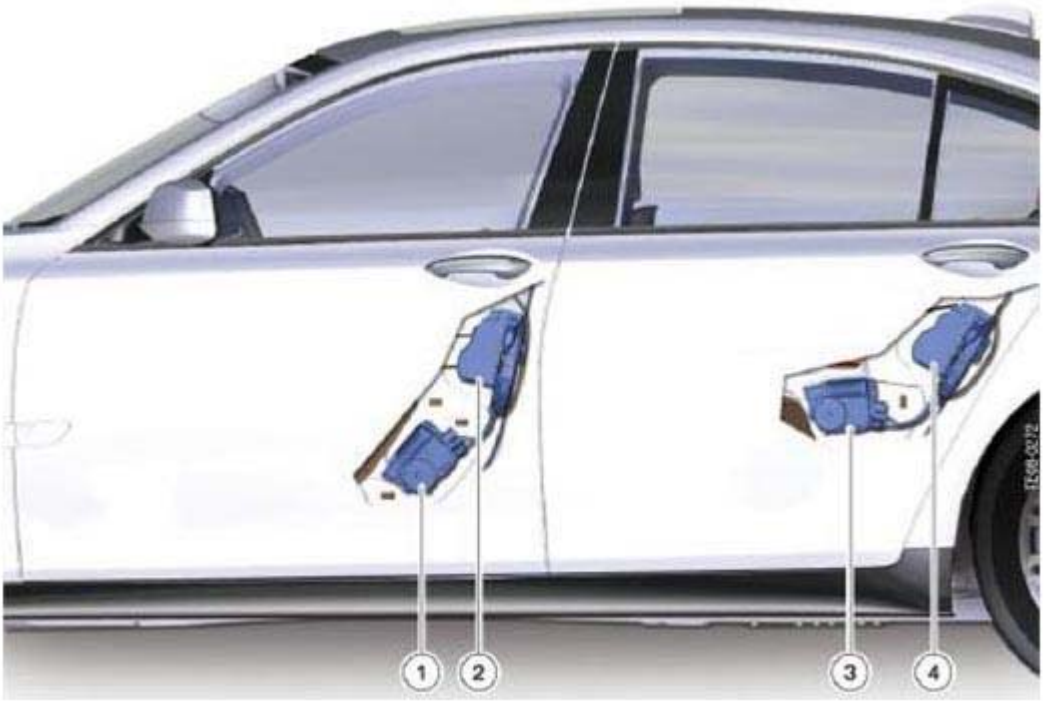


Fig. 19: Location Of F01/F02 Automatic Soft Close System
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Drive for Automatic Soft Close function in driver's side door
2	Lock for driver's side door
3	Drive for Automatic Soft Close function in driver's side rear door
4	Lock for driver's side rear door

Locking Procedure when Door is Pushed into the Lock

Starting position: Door open, the Automatic Soft Close function is in the standby position.

When the door is closed normally, first the locking pawl (lock) Hall sensor changes its status. The electronics in the Automatic Soft Close function drive start the door closing operation after a delay of 200 ms. This prevents the Automatic Soft Close drive unit starting before the lock bolt is located in the rotary striker. The drive operates the rotary striker by way of the Bowden cable until the Hall sensor for the rotary striker changes its status. The locking pawl is then engaged and secured in the rotary striker. Operation of the Automatic Soft Close drive unit is then stopped and the Automatic Soft Close drive unit returns to its parked position.

When the door is opened using the outside door handle (bow handle) or inside door handle, the system runs back to its original position. This is also known as the standby position.

NOTE: Only when the rotary striker sensor has changed its status is the rotary striker

mechanically locked by the locking pawl. This is particularly important, as only then is it guaranteed that the door is truly closed.

Closing the Door by Slamming

Slamming the door would make closing with the Automatic Soft Close function drive unnecessary. However, since it is essential to ensure that the door is definitely closed, the Automatic Soft Close drive unit is nevertheless still operated for safety reasons.

The electronic circuitry in the Automatic Soft Close drive unit detects the slamming of the door by the fact that the locking pawl and rotary striker Hall-effect sensors have changed their status within a short time.

Anti-repeat Circuit

Every Automatic Soft Close function drive has an anti-repeat circuit to prevent overheating of the Automatic Soft Close function drive. It permits 15 operations (counter incriminated up to 15 times) of the control for the Automatic Soft Close function drive. The Automatic Soft Close function drive is then locked electrically for approximately 2 minutes.

Design of the Lock and Drive

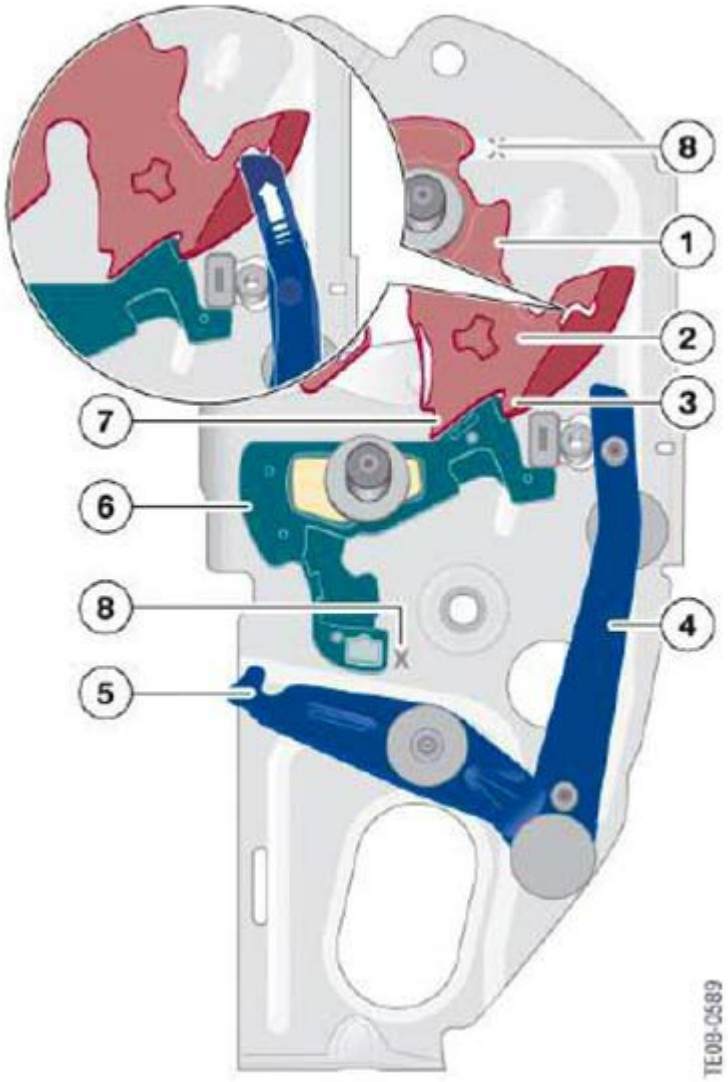


Fig. 20: Identifying Lock And Drive Design
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Rotary striker
2	Rotary striker pull pawl
3	Advance detent tooth for rotary striker
4	Drive pawl
5	Automatic Soft Close function drive actuating lever
6	Locking pawl
7	Rotary striker main detent tooth
8	Hall sensor installation locations

Light closing causes the advance detent tooth (3) of the rotary striker (1) to engage on the locking pawl (6). The Automatic Soft Close function drive pulls on the actuating lever (5). The actuating lever rotates the rotary striker by means of the pull latch (4) until it is rotated over the main detent tooth (7). The locking pawl can now engage in the main detent tooth of the rotary striker. The rotary striker is thus secured and the lock can no longer open by itself.

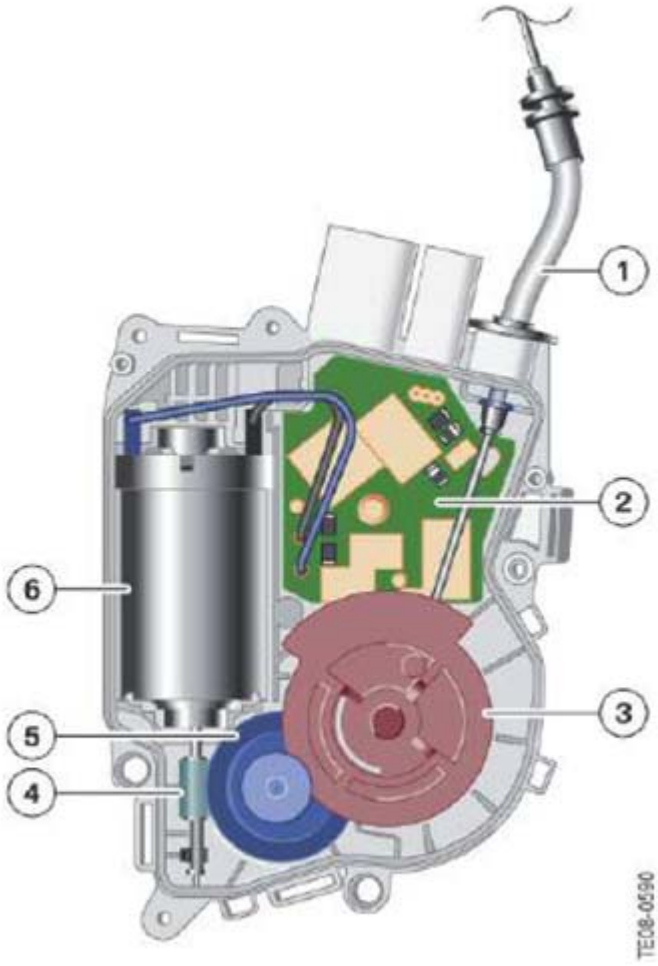


Fig. 21: Basic Principle Of Automatic Soft Close Drive Unit (E70)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Bowden cable
2	Control electronics
3	Bowden cable drive wheel
4	Drive worm
5	Idler gear
6	Drive motor

The Automatic Soft Close function drive motor (6) has a two-start worm (4) on its shaft. This permits drive in the CLOSE direction for the Automatic Soft Close function. The rotary motion of the drive worm is transferred to the driven wheel (3) by the idler gear (5). The drive gear transfers the rotary motion to the Bowden cable (1). This means that the actuating lever in the lock is pulled by the Bowden cable and thus the vehicle door is fully closed.

SERVICE INFORMATION

Lock and Drive

The lock and the Automatic Soft Close function drive are a closed unit (modular). This means that a faulty lock or Automatic Soft Close function drive cannot be replaced individually. Opening the drive, for instance, destroys it, and perfect operation is no longer guaranteed. The Automatic Soft Close function drive is inseparably fastened to the lock. The lock and the Automatic Soft Close drive unit can only be ordered together as spare parts.

NOTE: There is no diagnostic function for the Automatic Soft Close function drive in the diagnostics system. Retrofitting the Automatic Soft Close system would be very complicated and is therefore not envisaged.
There is no diagnostic function for the Automatic Soft Close function drive in the diagnostics system.

POWER WINDOWS

SYSTEM OVERVIEW

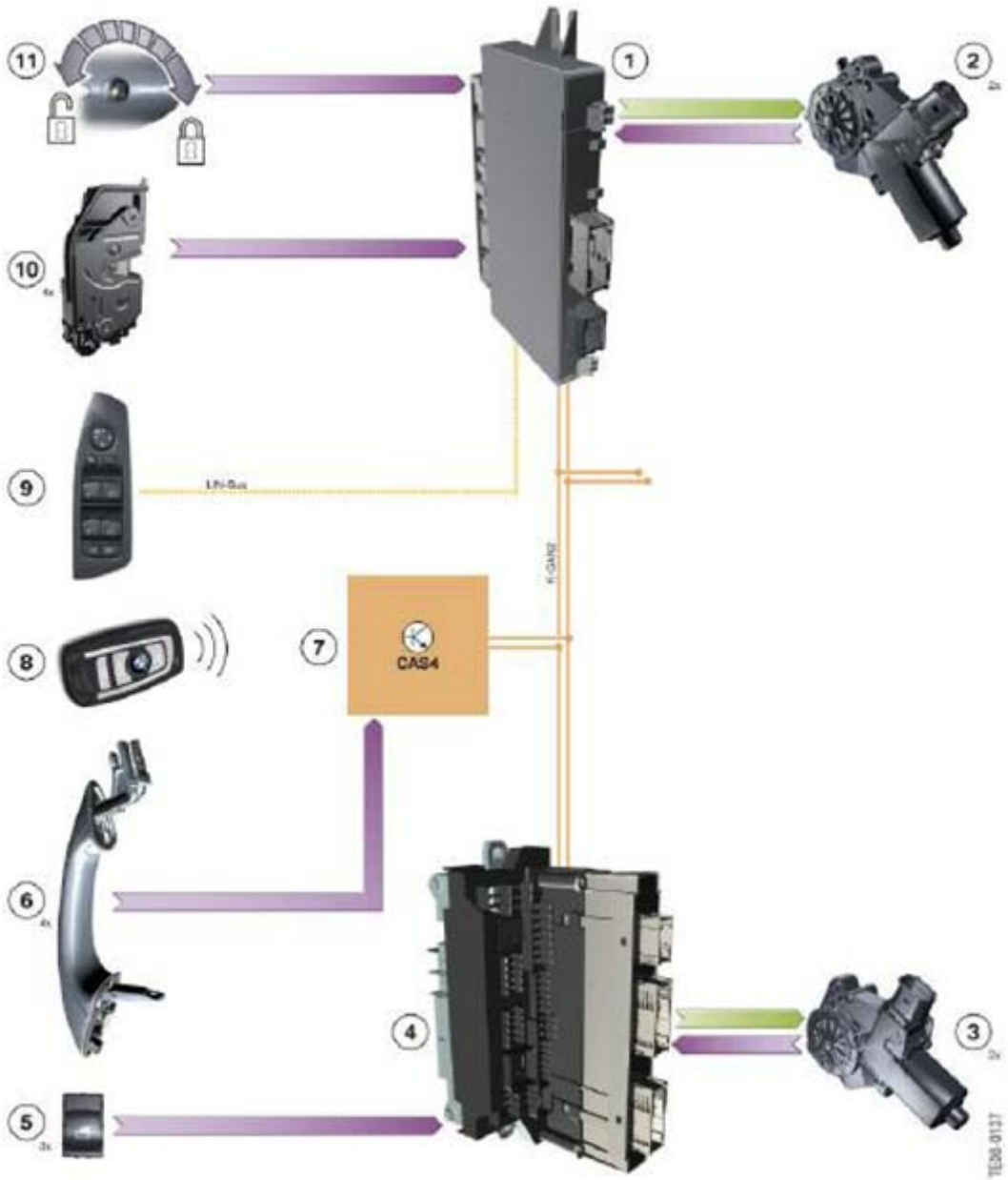


Fig. 22: Power Windows System Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Footwell module
2	Power window motor, front
3	Power window motor, rear
4	Junction box electronics
5	Power window switch, driver's side rear passenger side front and rear

6	Outside door handle for Comfort Access
7	Car Access System 4
8	Identification transmitter
9	Driver's door switch cluster
10	Lock with door contact
11	Lock cylinder, driver's door
K-CAN	Body CAN
LIN	Local Interconnect Network bus

System Circuit Diagram - Power Windows

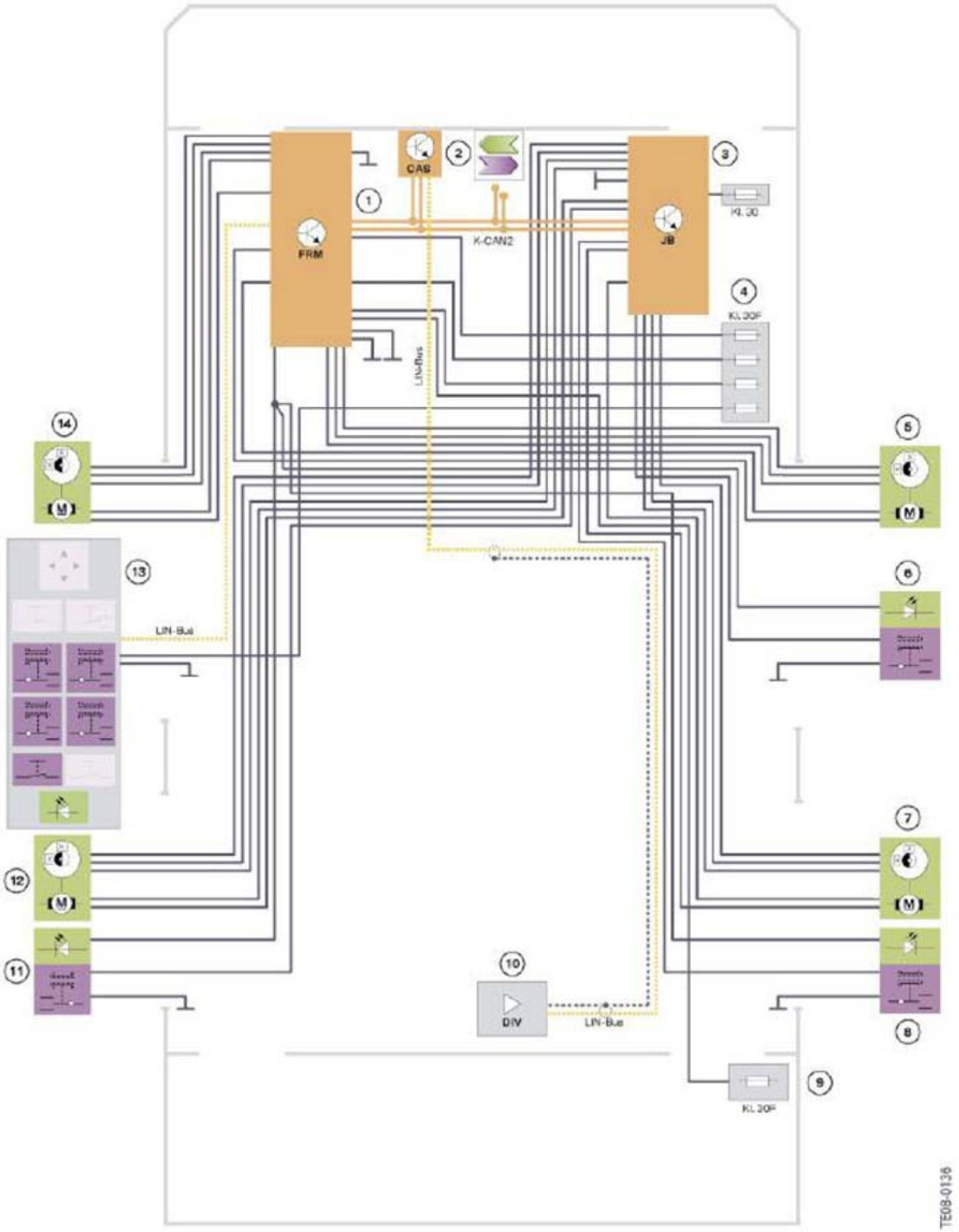


Fig. 23: Power Windows System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Footwell module (FRM)

2	Car Access System 4 (CAS 4)
3	Junction box electronics (JB)
4	Front power distribution box
5	Power window motor with indirect pressure-sensitive finger guard on front passenger's side
6	Power window switch, passenger side front
7	Power window motor with indirect pressure-sensitive finger guard on rear passenger's side
8	Power window switch, passenger side rear
9	Rear power distribution box
10	Remote control receiver in diversity module
11	Power window switch, driver's side rear
12	Power window motor with indirect pressure-sensitive finger guard on rear driver's side
13	Driver's door switch cluster
14	Power window with indirect pressure-sensitive finger guard on driver's door
K-CAN2	Body-CAN2
LIN-Bus	Local Interconnect Network bus
KI. 30	Terminal 30
KI. 30F	Terminal 30, fault switched

The Car Access System (2) issues the enable to actuate the power window motors (5, 7, 12 and 14). If a power window switch is then activated, the footwell module (1) (front power window motor) or the junction box electronics (3) (rear power window motor) executes the request.

Examples of the Signal Path

The following examples of a signal path show the path taken by the signal before the power window motor opens or closes the window. A requirement is that the Car Access System 4 has issued the enable to operate the power windows.

Driver's Door Switch Cluster

When the power window switch for the window in the driver's door or front passenger 's door is operated, the signal is routed via the LIN bus to the footwell module. The footwell module drives the corresponding power window motor.

The signal is routed from the driver's door switch cluster via the LIN bus to the footwell module when the power window switches for the windows in the rear doors are operated. The footwell module sends the signal via the K-CAN2 to the junction box electronics. The junction box electronics receives the signal and activates the corresponding power window motor.

Power Window Switch, Front Passenger's Door

The signal is routed to the junction box electronics when the power window switch in the front passenger's door is operated.

The junction box electronics sends the signal via the K-CAN2 to the footwell module. The footwell module

drives the power window motor.

Power Window Switch, Rear Doors

When the power window switches in the rear doors are operated, the signal is routed to the JBE. The JBE drives the power window motor.

Overview

All four windows on the F01/F02 are electrically operated. The power windows are equipped with an indirect pressure-sensitive finger guard. The electric power windows have the following functions:

- Opening and closing
- Opening and closing with toll function
- Auto-remote opening and closing
- Indirect pressure-sensitive finger guard
- Panic mode
- Load shut-down at terminal 50
- Overheating protection of power window motors.

Opening and Closing

The Car Access System 4 has the central control function for electric opening and closing of the power windows.

This means that the Car Access System 4 issues the enable to open and close the power windows. The footwell module and the junction box electronics actuate the power window motors and monitor the motor speed of the respective power window motor. This means the footwell module or the junction box electronics can respond to the following operating situations:

- Trapping
- Overheating of the power window motor
- Blocking of power window motors.

The corresponding power window motor is activated in OPEN or CLOSE direction by pressing or pulling the power window switches to the first notch position. The power window motor remains active until the corresponding power window switch is released.

To ensure the power window is closed reliably, the power window motor is briefly driven to block status at the upper stop.

Opening and Closing with Toll Function

The toll function is implemented for all power windows. The corresponding power window motor is driven in the OPEN or CLOSE direction by pressing or pulling a power window switch beyond the limit stop.

The power window motor moves the window automatically until it is completely open or closed. Power window operation is stopped when the power window switch is pressed or pulled again.

By way of example, the opening and closing procedure for one of the rear windows is illustrated by the signal path in the following graphic. The opening or closing function is initiated from the driver's door switch cluster.

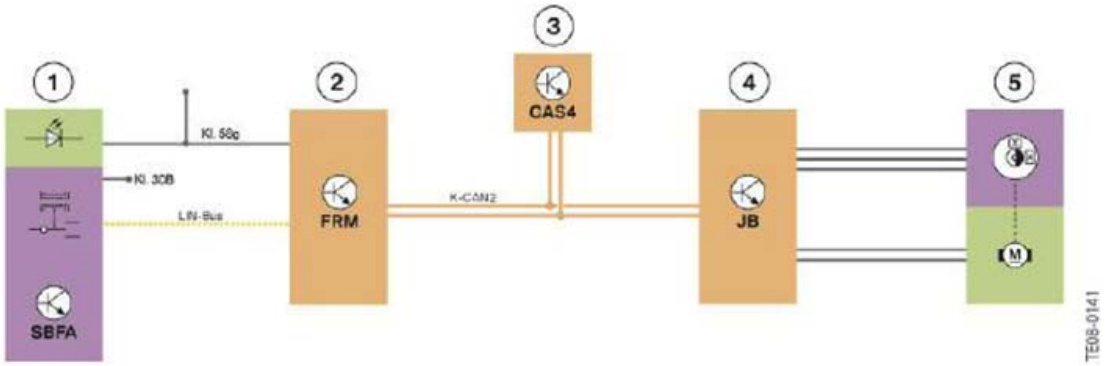


Fig. 24: Identifying Rear Window Opening Or Closing In F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	SBFA power window switch in driver's door switch cluster
2	Footwell module (FRM)
3	Car Access System 4 (CAS 4)
4	Junction box electronics (JB)
5	Power window motor
LIN-Bus	LIN-bus
K-CAN2	Body-CAN2
KI. 30B	Terminal 30, basic operation
KL. 58g	Terminal 58g

Auto-remote Opening and Closing

Auto-remote opening or closing can be performed with the identification transmitter via the door lock in the driver's door or the outside driver's/passenger's door handle.

Auto-remote opening with identification transmitter

The auto-remote opening function is initiated by unlocking the vehicle with the identification transmitter and keeping the button pressed for longer than 5 seconds.

Initially, the front windows are opened, followed after a short time delay by the rear windows and the panorama glass roof.

NOTE: **If the fold-in/out exterior mirrors option is installed and the mirrors are folded in, the mirrors will be folded out at the same time as the rear windows are opened.**
Only the version sold in Japan offers auto-remote closing or auto-remote opening for folding the exterior mirrors in or out.

The signal from the identification transmitter is picked up by the Car Access System 4 via the remote control receiver.

The Car Access System 4 issues the enable to operate the power windows and initiates the auto-remote opening function. The footwell module and the junction box electronics correspondingly activate the power window motors.

Auto-remote closing with identification transmitter

The auto-remote closing function is initiated after locking the vehicle with the identification transmitter and keeping the button pressed for longer than 5 seconds. Initially, the panorama glass roof is closed followed after a short time delay by the rear/front windows.

If the folding exterior mirrors option is installed, the mirrors are folded in simultaneously as the rear windows are closed.

Auto-remote opening and closing via the driver's door lock barrel

There are two Hall sensors installed in the door lock for the purpose of opening and closing the vehicle. The Hall sensors enable the footwell module to detect the position of the mechanical key or of the spare key in the lock barrel.

The key must be turned to the open or close position to initiate the auto-remote opening and closing function. The auto-remote opening or closing function is initiated when the key is held in this position.

The footwell module sends the request via the K-CAN. On conclusion of the corresponding check, the Car Access System 4 initiates the auto-remote opening or closing procedure.

Auto-remote closing with Comfort Access

In connection with Comfort Access, the auto-remote closing function is triggered via the driver's/passenger's outside door handle.

It is sufficient to touch the sensitive area of the outside door handle in order to trigger the auto-remote closing function via the door handle. Auto-remote closing is triggered if the sensitive area is touched for longer than 5 seconds. The ID transmitter must be within an approximate 2 m radius of the vehicle.

NOTE: **Touching the outside door handle corresponds to pressing the lock button on the ID transmitter.**

Indirect Pressure-sensitive Finger Guard

Essentially, the indirect pressure-sensitive finger guard does not prevent an object being trapped but rather it limits the trapping force to maximum 80 N. The power window motor is reversed on exceeding this trapping force.

The footwell module and the junction box electronics monitor the activated power window motors. The indirect pressure-sensitive finger guard for the front windows is activated by the footwell module. The indirect pressure-sensitive finger guard for the rear windows is activated by the junction box electronics.

The indirect pressure-sensitive finger guard in the E90 is based on the evaluation of the Hall pulses from the power window motors. The speed is derived from the Hall pulses of the power window motors. Speed fluctuations within certain ranges trigger the indirect pressure-sensitive finger guard so that the windows are opened. Operation of the power window switches is ineffective while the windows are in the process of opening.

If no operable pressure-sensitive finger guard is detected as the result of defective Hall sensors, the window can only be operated in jolts. The power window is in emergency mode and must be reinitialized.

NOTE: The initialization procedure is described in the Service Information.

The customer is shown a Check Control message.

CHECK CONTROL MESSAGE REFERENCE CHART

Check Control message	Meaning	Information on the central information display
	Power window pressure-sensitive finger guard!	Power window pressure-sensitive finger guard deactivated.
	Power window pressure-sensitive finger guard!	Power window pressure-sensitive finger guard failed. Ask your nearest BMW Service to check this.

Panic Mode

Panic mode is triggered by overpulling releasing-overpulling (overpulling = pulling beyond limit stop) the power window switches.

It is necessary to release and overpull the switch again as the pressure-sensitive finger guard is still active the first time the switch is overpulled. Overpulling the power window switch the second time within 4 seconds closes the window with maximum force.

NOTE: The indirect pressure-sensitive finger guard is no longer active in this case. The window closes at the maximum closing force and does not reverse.

Load shut-down, Terminal 50

Car Access System 4 sends the "terminal 50 ON" status. The signal is received by the footwell module and junction box electronics via K-CAN.

The junction box electronics and the footwell module prevent operation of the power windows during the start procedure or interrupt current operation of the power windows. This protects the battery during the starting procedure.

The power window switches must be pressed again following an interruption in operation.

Operation of the power windows is not possible until the start procedure has been completed.

Overheating Protection of Power Window Motors

The footwell module and the junction box electronics monitor the motor temperature. The motor temperature is determined based on the outside temperature, motor running time and the time the motor is stationary (not operative). Each motor can be switched off individually to prevent the power window motors overheating during operation of the power windows. The motor is then deactivated for a defined period of time.

started, a power window function is not interrupted by the overheating protection facility. In panic mode the window can still be closed even when the overheating protection function is active.

Roller Sun Blind

Roller sun blinds are available as an option for the rear window and rear side windows. The roller sun blinds can be raised and lowered electrically.

The switch for the roller sun blind on the rear window is located in the driver's door switch cluster. The footwell module detects the switch status via the LIN-bus. When the button is pressed, the footwell module issues the operational request via the K-CAN2. The complete control and function monitoring facility is integrated in the junction box electronics. The junction box electronics therefore executes the operational request.

Every time the roller sun blinds are operated, their positions are stored in the junction box electronics.

Other operating points are located in the armrests on the rear doors. The switches are located next to the switches for the power windows.

Three switches are provided in each armrest. The switches are:

- Switch for roller sun blind on rear window
- Switch for roller sun blind on left side window
- Switch for roller sun blind on right side window.

The roller sun blinds can be raised and lowered separately with the switches.

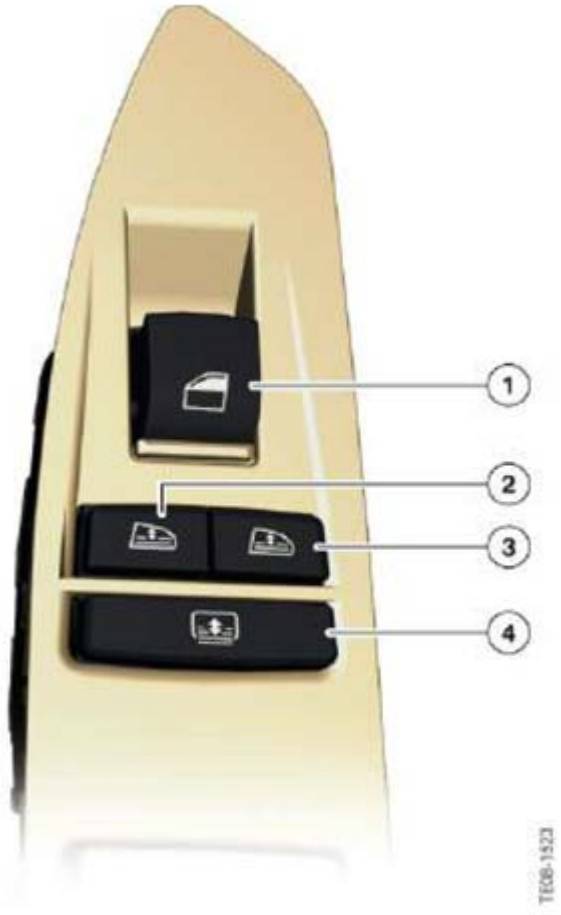


Fig. 25: Identifying Power Window Switch And Roller Sun Blind Switches
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Power window switch
2	Switch for roller sun blind on left side window
3	Switch for roller sun blind on right side window
4	Switch for roller sun blind on rear window

Each rear door has two roller sun blinds, one for the side window and one for the quarter light.

Both roller sun blinds are raised or lowered by means of an electric motor.

NOTE: The roller sun blinds are raised and lowered completely. They cannot be raised or lowered to an intermediate position.

If a new operational request is sent to the roller sun blinds during their actuation, they will reverse their direction of movement immediately.

The enable for operating the roller sun blinds on the rear doors is linked to the closed window position.

The Car Access System issues the enable for operating the roller sun blinds.

The roller sun blind of the corresponding side window is automatically lowered in response to an operational request to open the side window.

Operation of the roller sun blinds is restricted in the event of undervoltage.

By monitoring the outside temperature and interior temperature, the function "lower" roller sun blind is executed at an interior temperature > 11°C and outside temperature <- 16°C.

The roller sun blinds can be operated as from terminal 15N ON.

NOTE: Operation of the roller sun blinds is disabled when the child safety lock is activated.

System Circuit Diagram - Roller Sun Blind

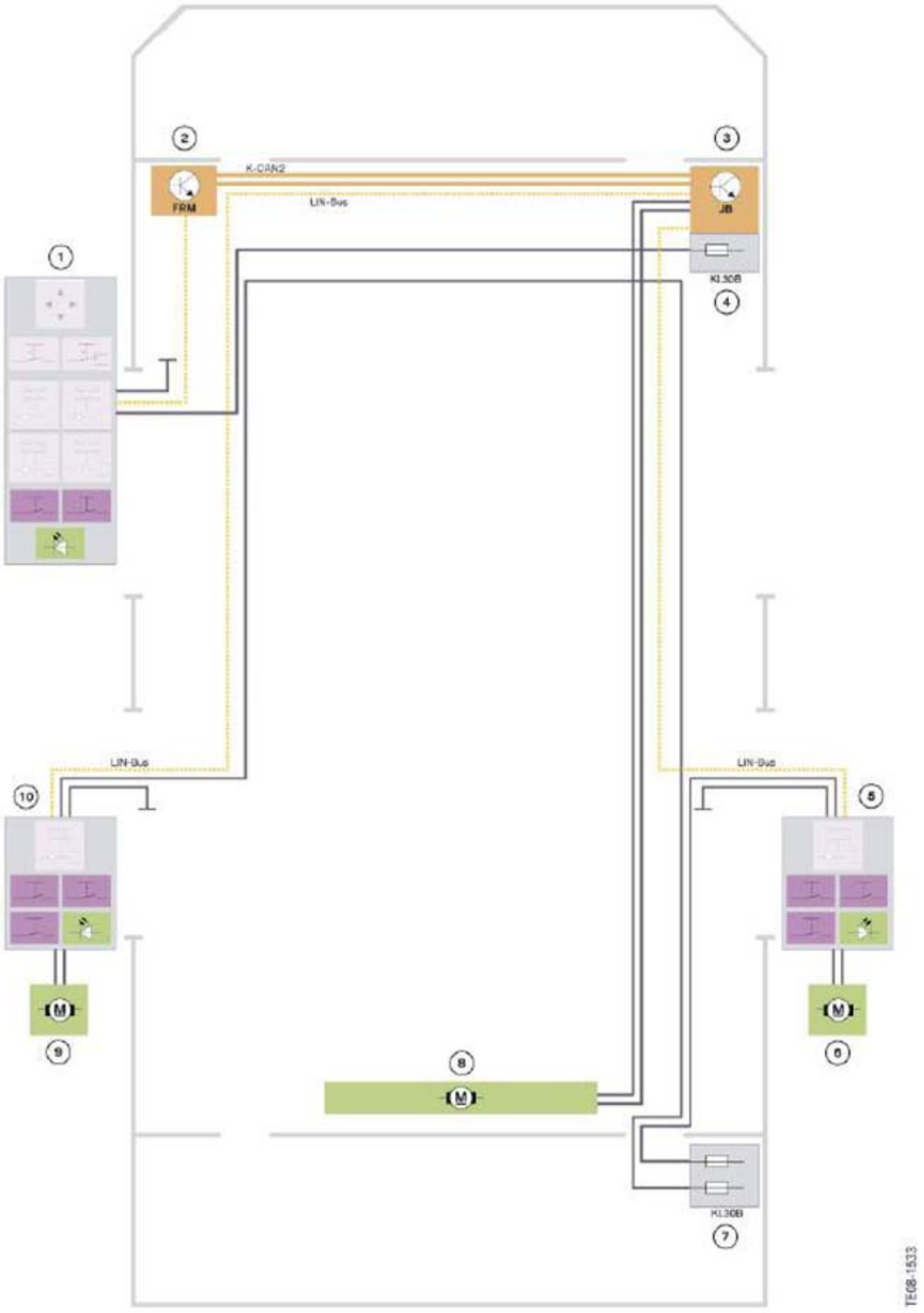


Fig. 26: Roller Sun Blind System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Driver's door switch cluster
2	Footwell module (FRM)
3	Junction box electronics (JB)
4	Front power distribution box
5	Switch cluster in rear passenger's side door
6	Motor for roller sun blind, rear passenger's side
7	Rear power distribution box
8	Motor for roller sun blind, rear window
9	Switch cluster in rear driver's side door
10	Motor for roller sun blind, rear driver's side
K-CAN2	Body-CAN2
LIN-Bus	Local Interconnect Network bus
KI. 30B	Terminal 30, basic operation

Overview of Functional Principle

The functional principle of the electrically operated roller sun blinds is described in the following.

Pressure-sensitive Finger Guard for Side Window

The roller sun blind has no electronic pressure-sensitive finger guard! The mechanism and drive units are designed such as to rule out any danger for the occupants posed by excessively high forces.

Nevertheless, to prevent trapping, the roller sun blinds can only be extended when the corresponding side window is closed. However should a trapping situation occur, movement of the roller sun blind will be stopped. The roller sun blind is then moved in the opposite direction in response to the next operational request. It is always possible to retract the roller sun blinds at the side windows.

The direction of roller sun blind movement that has already started can only be reversed 1.5 seconds after the button is pressed again.

Further button operation is ignored during the initial 1.5 seconds of roller sun blind movement. This function is intended to protect the operating mechanism of the roller sun blind.

Roller Sun Blind on Rear Window

The roller sun blind on the rear window can be operated by means of the roller sun blind switches. There are three operating points:

- Driver's door switch cluster

  The junction box electronics receives the switch status via the K-CAN2.

- Switch cluster in rear driver's side armrest*
- Switch cluster in rear passenger's side armrest*.

*The junction box electronics cyclically evaluates the switches at the rear doors via the LIN-bus.

The roller sun blind for the rear window is raised or lowered by briefly pressing the switch.

A special function is activated when the switch for the rear window roller sun blind is pressed longer. This special function allows all three roller sun blinds to extend or retract to assume the same position.

In this function, the roller sun blind for the rear window is actuated and, if necessary, also the roller sun blinds for the side windows.

Every time the roller sun blinds are operated, their positions are stored in the junction box electronics.

The end stops are detected by the motors blocking, thus cancelling activation.

A repeat inhibit function is integrated in the system to prevent the motor overheating due to continuous operational requests initiated by children playing with the switch. The repeat inhibit blocks operation of the roller sun blind in the down position. Once started, movement of the roller sun blind is not interrupted by the repeat inhibit.

The renewed enable to raise the roller sun blind depends on the number of times the roller sun blind is operated and the intervals between operation.



Fig. 27: Identifying Rear Window Roller Sun Blind F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

Position of roller sun blinds unknown

The raised or lowered positions of the roller sun blinds are stored in the junction box electronics. An unknown position of the roller sun blind may occur, for example, as a result of a voltage reset. If the position is not known, the junction box electronics interprets the roller sun blind as being in the raised position. The roller sun

blind is then initially lowered in response to the next operational request. The direction is reversed if the junction box electronics detects blocking directly after actuation. Blocking signals that the roller sun blind is at the lower end stop position.

Blocking detection

The junction box electronics is equipped with a blocking detection facility to protect the motor. This function serves the purpose of immediately switching off the motor on reaching the upper or lower end position.

Motor actuation is additionally subject to a time monitoring function. Consequently, actuation of the motors is terminated after a defined maximum period of time.

The roller sun blinds on the side windows also feature a blocking detection function. This function is integrated in the electronic circuitry of the switch cluster in the rear door armrest.

This blocking detection function serves the purpose of switching off the motor on reaching the upper or lower end position.

The end positions are detected by evaluating the current consumption of the motors, thus cancelling activation. After detecting a significant increase in current consumption, the motor is short-circuit braked in blocked position and the drive is briefly reversed to relief the strain on the mechanical system.

The actuation time of the motor for the roller sun blind is additionally monitored. The actuation time is limited to 15 seconds. Actuation is then terminated after this period of time has elapsed.

Child safety lock

The child safety lock function is switched on or off by means of the child safety lock switch in the switch cluster on the driver's side.

The roller sun blinds can no longer be operated with the rear switches when the child safety lock is switched on.

No request to raise or lower the roller sun blind is triggered when the child safety lock button is pressed. Current movement of the roller sun blind is not interrupted when the child safety lock is engaged.

Roller sun blind switches

All switches have a LIN-bus connection. The switches are connected to terminal 30B and a ground connection.

The motors for the roller sun blinds in the side windows are connected directly to the respective switch cluster. The motor for the roller sun blind on the rear window is connected to the junction box electronics.

The electronic circuitry for the LIN-bus and the power electronics for actuation of the motors are integrated in the switch cluster. The electronic circuitry monitors actuation and detects the end positions of the roller sun blind.

The junction box electronics receives information on the end positions from the LIN-bus.

SYSTEM COMPONENTS

Components Involved

The following graphic shows all the components of the power window system together with the respective control units and control elements.

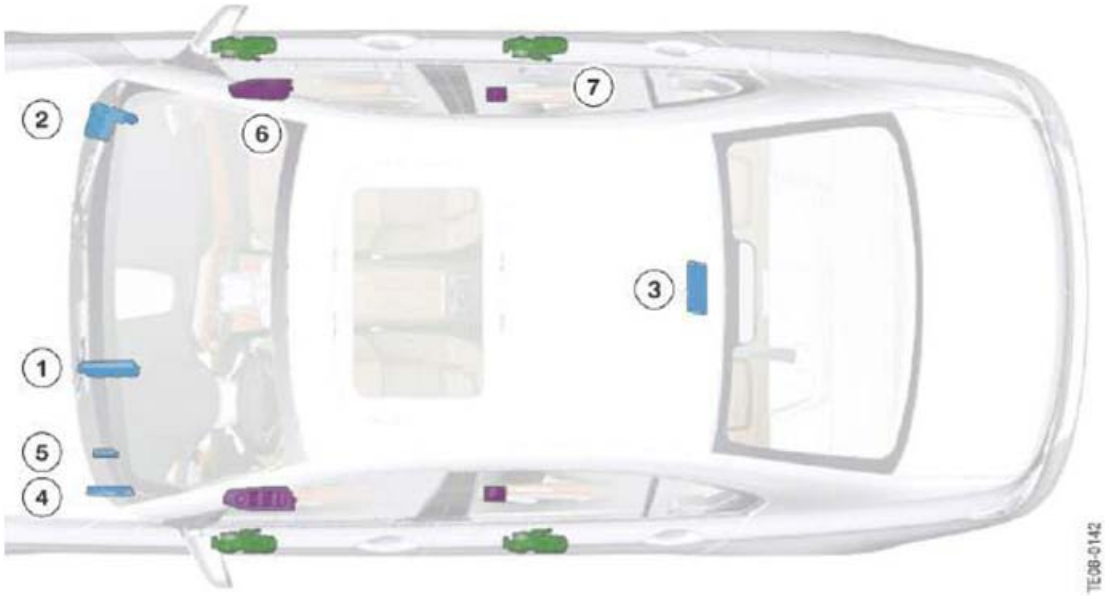


Fig. 28: Identifying Power Window System Components
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Car Access System 4
2	Junction box electronics
3	Remote control receiver in diversity module
4	Footwell module
5	Central gateway module
6	Power window switch
7	Power window motors

The following components are described:

- Controls
- Control units
  - Car Access System 4
  - Footwell module
  - Junction box electronics

- Power window motor

Controls

Driver's door switch cluster

The driver's door switch cluster is connected via the LIN bus to the footwell module.



Fig. 29: Identifying Driver's Door Switch Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Outside mirror adjustment switch
2	Selector switch, outside mirror left/right
3	Power window button, passenger's door
4	Power window button, rear right
5	Roller sun blind button

6	Child safety lock button
7	Power window button, rear left
8	Power window button, driver's door
9	Outside mirror fold-in button

For opening or closing, the power window switch has two notch positions. The first notch position is used for the manual power window function. The second notch position (press) is used for the toll function of the power windows.

The power window switches are resistance-coded and switched to ground. The following graphic shows the principle of a resistance-coded switch.

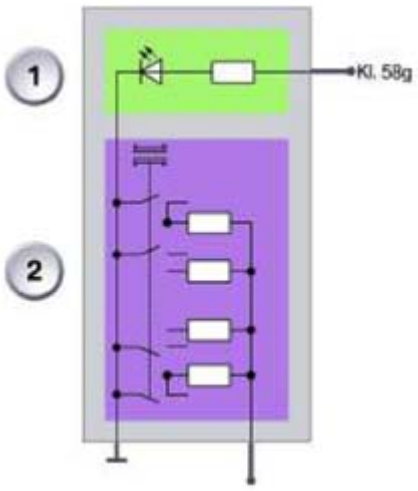


Fig. 30: Identifying Resistance-Coded Switch F01/F02 And Power Window Switch
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Illumination of power window switch
2	Resistance-coded switch

Signal evaluation of the power window switches

The signals of the power window switch in the driver's door switch console are evaluated directly by the driver's door switch cluster and transferred to the footwell module via the LIN bus.

The signals from the power window switches in the front passenger's door as well as the power window switches of both rear doors are evaluated by the junction box electronics.

Control Units

Car Access System 4

The Car Access System 4 is the central control unit for opening and closing the windows. Therefore, it issues the enable to operate the power windows.

"Terminal 50 ON" status is sent while starting the engine. The junction box electronics and the footwell module prevent operation of the power windows during the start procedure or interrupt current operation of the power windows. This means more energy from the battery is available for the starter during engine start-up.

Footwell module

The relays for the power window motors for the front doors are installed in the footwell module.

The footwell module provides information on the status of the door contacts and the driver's door lock cylinder.

The footwell module also provides the power window switch and the driver's door switch console with information on the "Terminal 58g ON" status.

Junction box electronics

The relays for the power window motors for the rear doors are installed in the junction box electronics.

Identification Transmitter

The identification transmitter can initiate auto-remote opening/closing of the power windows.

The operating procedure is defined in the Owner's Handbook.

Power Window Motors

The power window motors are equipped with Hall sensors that generate signals during motor operation. These signals serve the purpose of monitoring motor operation and are evaluated for the pressure-sensitive finger guard.

The signals are evaluated in the footwell module and the junction box electronics.

SERVICE INFORMATION

Initialization

Initialization of Power Windows

The front and rear power windows can be initialized via the power window switches or the BMW diagnosis system.

NOTE: The power windows can only be moved in jolts if not initialized.

Initialization via the power window switches

- Completely close window by pulling the power window switch beyond the limit stop.
- Briefly interrupt pulling the power window switch and then pull the switch upwards again for approximately 1 second.

Initialization via the BMW diagnosis system

The power windows can be initialized as part of an initialization job using the diagnosis system. A detailed description of the initialization procedure is provided in the BMW diagnosis system.

SLIDING TILTING SUNROOF

INTRODUCTION

The F01/F02 with Slide/tilt Sunroof

The slide/tilt sunroof is an option on the F01/F02. Several control units are involved in the operation of the slide/tilt sunroof.

The roof control module controls and monitors the motors of the slide/tilt sunroof.

The roof control module (FZD) is linked with the Car Access System CAS which enables or disables operation of the slide/tilt sunroof.

The footwell module FRM supplies the signal from the door contacts. The Junction Box electronics provide the power supply for the motors via terminal 30.

The dynamic stability control acquires the signals from the wheel speed sensors while the integrated chassis management makes available the speed signal to the vehicle electrical system.

Slide/tilt Sunroof Operating Concept

The button for operating the slide/tilt sunroof has three directions of movement. In addition to the manual and overpress functions, the button has a double-click function in the three movement directions.

With the double-click function the button is actuated twice within a short time into the overpress position or tilt position.

This allows the customer to have the slide/tilt sunroof opened and closed automatically from any position of the slide/tilt sunroof and sunroof shade.

While moving, the slide/tilt sunroof can be stopped by pressing the button again.

System Overview

Input/output slide/tilt sunroof



Fig. 31: Slide/Tilt Sunroof Input/Output Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Footwell module FRM
2	Door contacts (4x) in the vehicle doors
3	Driver's door lock barrel
4	Wheel speed sensor
5	Dynamic stability control
6	Junction Box electronics JB PT-CAN Powertrain CAN
7	Slide/tilt sunroof motors
8	Roof control module

9	Identification transmitter
10	Outer door handles, driver's side and passenger side
11	Car Access System 4 CAS 4
K-CAN2	Body-CAN2

System Circuit Diagram - Slide/tilt Sunroof

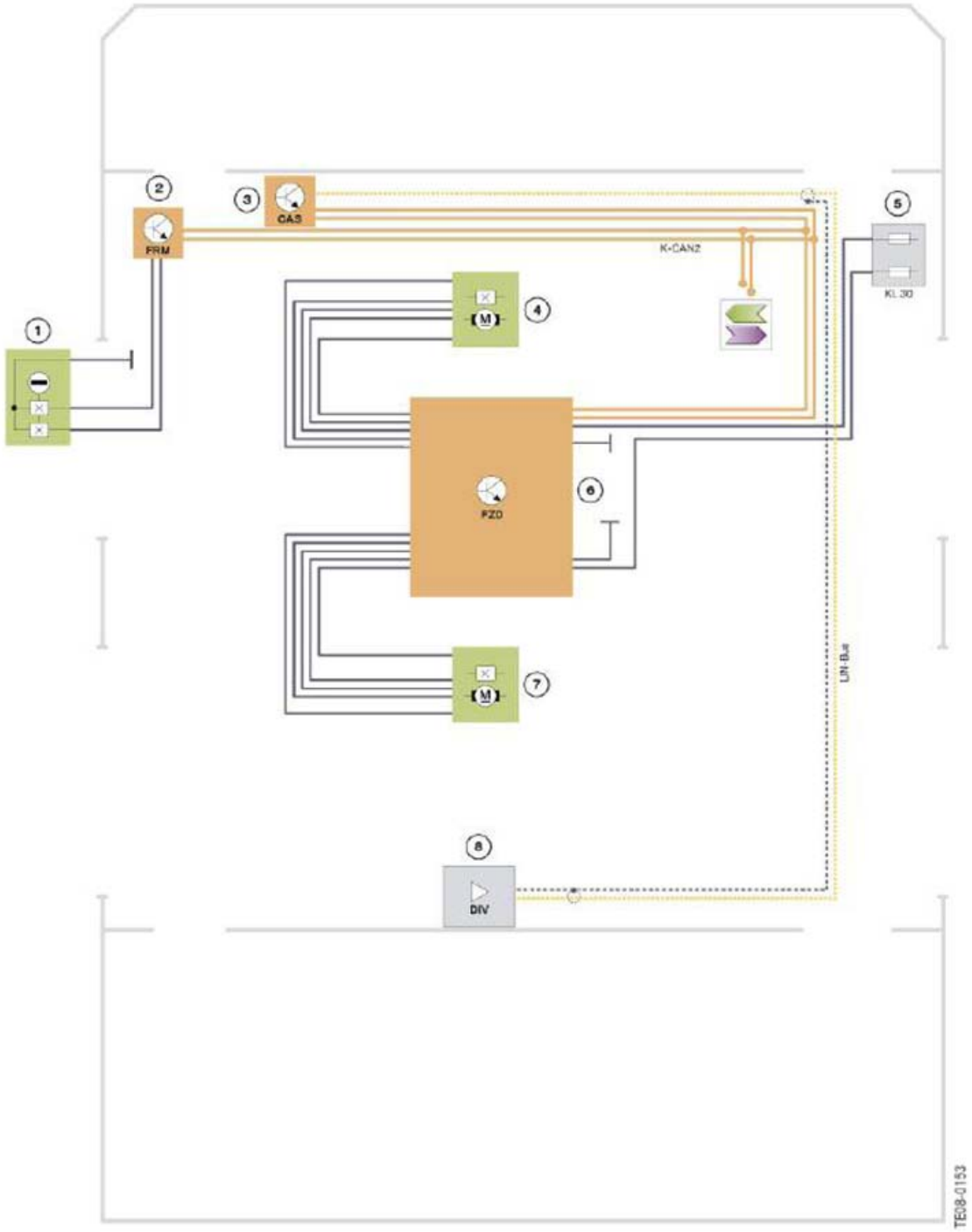


Fig. 32: Slide/Tilt Sunroof System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Hall sensors, driver's door lock barrel

2	Footwell module (FRM)
3	Car Access System (CAS)
4	Slide/tilt sunroof motor
5	Front power distribution box
6	Roof control module FZD with button for slide/tilt sunroof
7	Slide/tilt sunroof motor
8	Remote control receiver in Diversity module
K-CAN2	Body-CAN2
LIN-Bus	Local Interconnect Network bus
KI. 30	Terminal 30

K-CAN2 signals at roof control module

CAR ACCESS SYSTEM K-CAN SIGNALS CHART

In/out	Information	Source/sink	Function
In	Vehicle speed	Wheel speed sensor > Dynamic stability control >	Release wind deflector Integrated chassis management
In	Outside temperature	Outside temperature sensor > instrument cluster	Value used in determining overheating protection for the slide/tilt sunroof motors
In	Slide/tilt sunroof enable	Car Access System 4 > roof control module	Enable for slide/tilt sunroof operation
In	Terminal 50 status	Car Access System 4 > roof control module	Interruption in sunroof slide/tilt sunroof actuation
In	Auto-remote opening	Identification transmitter > Car Access System 4	Slide/tilt sunroof auto-remote opening
In	Auto-remote opening	Driver's door lock barrel > footwell module	Slide/tilt sunroof auto-remote opening
In	Auto-remote closing	Identification transmitter > Car Access System 4	Slide/tilt sunroof auto-remote closing
In	Auto-remote closing	Driver's door lock barrel > footwell module	Slide/tilt sunroof auto-remote closing
In	Auto-remote closing	Outer door handle > Comfort Access	Slide/tilt sunroof auto-remote closing
Out	Anti-trapping protection function deactivated	Roof control module > instrument cluster	Anti-trapping protection function indicator deactivated

Auto-remote opening and auto-remote closing can be operated from the identification transmitter/remote control or via the lock barrel in the driver's door. This is done by holding down the lock/unlock button until the slide/tilt sunroof is closed/opened.

The lock barrel operates in a similar fashion. The mechanical key must be held in the lock/unlock position until the slide/tilt sunroof is closed/opened.

With comfort access, the slide/tilt sunroof can be closed by touching the touch-sensitive area on the outer door

handle. The touch-sensitive area must be touched until the slide/tilt sunroof is closed.

FUNCTIONS

Overview

The roof control module receives signals from the other control units for the functions of the slide/tilt sunroof.

The executing control unit is the roof control module. It controls the slide/tilt sunroof motors while also monitoring motor rotation.

The slide/tilt sunroof is equipped with two motors. One motor is for the glass panel and the other for the sunroof shade.

The following functions of the slide/tilt sunroof are integrated in the roof control module:

- Reading operation requests
- Controlling slide/tilt sunroof motors
- Opening/closing the slide/tilt sunroof and sunroof shade
- Anti-trapping protection function
- Blocking protection
- Panic mode
- Load cut-out during start procedure
- Terminal 58g
- Initialization

Reading Operation Requests

Slide/tilt sunroof operation may be requested through the following controls:

- Slide/tilt sunroof button
- Identification transmitter
- Driver's door lock barrel
- Outer door handle in Comfort Access

Slide/tilt sunroof button

The button for the slide/tilt sunroof is located in the roof control module.

When operated, the button sends a low signal to the electronic module that drives the slide/tilt sunroof motor corresponding to the button selection.

The power to the LED (locator lamp) of the button in the roof control module is supplied from "Terminal 58g ON".

Identification transmitter

The auto-remote opening/closing function is initiated by pressing the button on the identification transmitter.

Driver's door lock barrel

The convenient opening/closing function is triggered by turning and holding the mechanical key or the spare key in the open/close position in the driver's door lock barrel.

Outer door handle

Auto-remote closing can only be triggered using the outer door handle with Comfort Access. The touch-sensitive area must be touched for a longer time to start auto-remote closing.

Only then will the roof control module execute auto-remote closing. Releasing the touch-sensitive area interrupts auto-remote closing.

Controlling Slide/tilt Sunroof Motors

The roof control module actuates the integrated relay when it receives a corresponding request for the slide/tilt sunroof. The slide/tilt sunroof motor is supplied with power through the relay.

The relay contacts are monitored by the roof control module to ensure trouble-free operation of the motor and the slide/tilt sunroof. In addition, the motor speed is calculated and the direction of the motor's rotation is detected from the pulses of the Hall sensors.

The distance the slide/tilt sunroof must cover during the opening or closing procedure is defined in the roof control module. The slide/tilt sunroof motor generates a certain number of pulses within this distance and therefore recognizes the end positions of the slide/tilt sunroof.

Anti-trapping Protection Function

Both the glass panel and the sunroof shade are equipped with an indirect anti-trapping protection function. The indirect anti-trapping protection function operates on the basis of the power consumption of the slide/tilt sunroof motor.

If the roof control module detects a trapping situation, the corresponding motor is stopped and controlled in the opposite direction. This opens the glass panel or sunroof shade again (approximately 20 cm) and releases the obstruction.

Blocking Protection

If the pulses from the Hall sensors drop out for more than 500 ms during an opening or closing operation, the roof control module detects a blockage.

The power supply to the motor is switched off.

Overheating Protection

The overheating protection for the slide/tilt sunroof motor is calculated in the roof control module. To this end, a temperature sensor is mounted on the board in the roof control module to measure the ambient temperature.

The roof control module calculates the current temperature of the motor based on the running time of the slide/tilt sunroof motor.

The warm-up and cool-down periods are stored in a temperature model in the roof control module.

The current temperature is stored in the memory before the roof control module passes into sleep mode. The motor temperature is made equal to the ambient temperature when the vehicle is started again.

Panic Mode

The slide/tilt sunroof is closed with maximum closing force in panic mode. Panic mode is triggered by pressing and holding, reversing, releasing and again pressing and holding the slide/tilt sunroof button.

A valid enable signal from Car Access System is the precondition for executing the emergency closing function.

It is necessary to release and press the button again as the first time the button is pressed the anti-trapping protection function is still active. The slide/tilt sunroof closes with maximum force after pressing the button again within a short period of time.

It is possible to activate panic mode up to a vehicle speed of 16 km/h (10 mph). Panic mode can be activated from both the tilt position (approximately 100 ms) and from the open position (approximately 1 s).

Load Deactivation

Operation of the slide/tilt sunroof is stopped/interrupted during the vehicle start procedure.

The Car Access System sends "Terminal 50 ON" status. The signal is received by the footwell module and Junction Box electronics via K-CAN2.

The Junction Box electronics and the footwell module prevent operation of the slide/tilt sunroof during the starting procedure or interrupt current operation.

This protects the battery during the starting procedure.

Operation of the slide/tilt sunroof can resume on completion of the starting procedure.

Terminal 58g

When the exterior lighting is switched on, the footwell module sends this information via KCAN2.

The roof control module receives this information and adopts the set value for the instrument lighting.

The LED in the button for the slide/tilt sunroof is controlled by a pulse-width modulated signal from the roof control module. This achieves a constant brightness of the LED even under fluctuating system voltage

conditions.

Opening/closing the Slide/tilt Sunroof

The button can be moved to two engaged positions in the opening and closing directions. In the first engaged position, a movement is initiated which is only executed for as long as the button is being pressed.

Control functions

- Opening sunroof shade only
- Opening sunroof shade and glass panel (to comfort position)
- Glass panel tilt position and sunroof shade ventilation position
- Closing glass panel only
- Closing glass panel and sunroof shade
- Closing sunroof shade only with glass panels already closed.

All control functions are also available as one-touch control functions (comfort functions). The one-touch control function is reached by pressing the button again to the second engaged position in the direction required for the slide/tilt sunroof.

The one-touch control function automatically opens or closes of the slide/tilt sunroofs.

Directions of movement

Initial state:

The glass panel and sunroof shade are closed.

Opening sunroof shade

Press "OPEN" 1 x

- Signal from switch to roof control module
- Roof control module controls the rear motor for as long as the button is pressed or until the sunroof shade is fully opened.
- Rear motor opens the sunroof shade
- Glass panel remains closed.

Opening sunroof shade (one-touch control function)

Press "OPEN" 1 x

- Signal from switch to roof control module
- Roof control module activates rear motor
- Rear motor opens the sunroof shade

- Glass panels remains closed

Opening sunroof shade and glass panel

Press "OPEN" 2 x (double-click function)

- Signal from switch to roof control module
- Roof control module first activates the rear motor
- Rear motor opens the sunroof shade
- Roof control module controls the front motor after a time, from a short distance from the sunroof shade.
- Front motor opens the glass panel
- Rear motor raises wind deflector.

Tilt position

Press "TILT" 1 x

- Signal from switch to control unit
- Roof control module activates both motors
- Front motor tilts the glass panel
- Rear motor moves the sunroof shade into the gap position (front ventilation position).

Closing glass panel

Press "CLOSE" 1 x

- Signal from switch to roof control module
- Roof control module controls the front motor for as long as the button is pressed or until the glass panel is fully closed.
- Front motor closes the glass panel.

Closing the glass panel (one-touch control function)

Press "CLOSE" 1 x past the first stop

- Signal from switch to roof control module
- Roof control module activates front motor
- Front motor closes the glass panel.

Closing glass panel and sunroof shade

Press "CLOSE" 2 x (double-click function)

- Signal from switch to roof control module

- Roof control module first activates the front motor
- Front motor closes the glass panel
- Roof control module controls the rear motor after a time, from a short distance from the glass panel.
- Rear motor closes the sunroof shade and releases the wind deflector so that the glass panel can press it down.

Closing the sunroof shade

(only possible if glass panel is already closed) Press "CLOSE" 1 x

- Signal from switch to roof control module
- Roof control module activates rear motor
- Rear motor closes the sunroof shade.

Wind deflector with roof open

The roof control module receives the speed signal from the integrated chassis management. The dynamic stability control DSC evaluates the wheel speed sensors.

The roof control module controls the rear motor to release the wind deflector from a road speed of 180 km/h (112 mph). Consequently, the wind deflector is depressed into a lower position.

NOTE: The motor only runs lightly, the sunroof shade does not move.

Auto-remote opening

The slide/tilt sunroof can be opened by extended actuation of the unlock button with the identification sensor by turning the mechanical key in Open direction.

NOTE: Movement of the power windows must be completed before auto-remote opening of the slide/tilt sunroof can be started.

Auto-remote closing

The slide/tilt sunroof can be closed by extended actuation of the lock button with the identification sensor by turning the mechanical key in Close direction.

If the vehicle is equipped with Comfort Access, auto-remote closing can be started by touching the touch-sensitive outer surface.

SYSTEM COMPONENTS

Spare Parts of Slide/tilt Sunroof

The slide/tilt sunroof in the F01/F02 consists The following table lists the most important of mechanical and

electrical components.

COMPONENTS DESCRIPTION CHART

Mechanical components	Electrical components
Glass panel	Button
Sunroof shade	Control unit (CAS 4, FRM, FZD)
Slide/tilt sunroof module	Sunroof motors
Wind deflector	

Electrical Components

The following graphic shows all the electrical components of the slide/tilt sunroof system together with the appropriate control units.



Fig. 33: Identifying Slide/Tilt Sunroof System Electrical Components
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Car Access System
2	Junction Box electronics
3	Remote control receiver in Diversity module
4	Footwell module
5	Central gateway module
6	Dynamic stability control
7	Roof control module
8	Door lock with door contact *Hall sensors, lock barrel, only driver's door

9	Slide/tilt sunroof motor

Control Units

Car Access System 4

The Car Access System 4 issues the enable signal for the slide/tilt sunroof.

"Terminal 50 ON" status is sent via K-CAN2 while starting the engine. The roof control module prevents activation of the motors for the slide/tilt sunroof or interrupts current operation. This means that there is more energy available from the battery for the starter to start the engine.

Footwell module

The footwell module makes available the status of the door contacts and the driver's door lock barrel.

The footwell module also supplies the roof control module with information concerning the "Terminal 58g ON" status.

Roof control module

The roof control module contains the complete functions of the slide/tilt sunroof. The roof control module is always installed in connection with the slide/tilt sunroof.

The relays required to drive the slide/tilt sunroof motors are integrated in the roof control module.

Slide/tilt Sunroof Motors

One motor for the slide/tilt sunroof has two Hall sensors.

The Hall sensors are located on the motor shaft and are offset against one another by 90°.

When the motor is running, this results in two temporally offset Hall signals that are used to register the direction of rotation of the motor and for the anti-trapping protection function.

NOTE: Two motors are fitted to move the slide/. tilt sunroof.

SERVICE INFORMATION

Initialization

Initialization of the slide/tilt sunroof involves the following procedures that are necessary to ensure complete functionality of the slide/tilt sunroof:

- Normalization

  Normalization means locating the mechanical end position at the stop for the tilt position. This position is

stored and is used in calculating the remaining end positions for the slide/tilt sunroof.

- Learning the characteristic curve

  The learning procedure registers the closing force necessary for each direction of the slide/tilt sunroof and stores this value.

Complete functionality of the slide/tilt sunroof can be guaranteed only by full initialization.

The initialization procedure can be initiated with the button for the slide/tilt sunroof or via the diagnosis system.

Initialization with the Button

Initialization is performed as follows:

- Press and hold control button in slide/tilt sunroof Tilt direction

  The glass panel moves into the tilt position and the sunroof shade into the ventilation position

- After approximately 15 seconds the initialization run starts in the tilt direction and stores the end position
- The slide/tilt sunroof is closed after 5 seconds in the Tilt position
- The slide/tilt sunroof is then opened and the end position stored.

NOTE: The control button must remain pressed during the entire initialization procedure. The initialization procedure must be repeated if the button is released.

Initialization takes approximately 120 seconds.

Interruption in Power Supply

An interruption in the power supply does not require a new normalization. The initialization is invalidated if the power supply is interrupted during the initialization. A new initialization will then be necessary.

Clearing the initialization

Initialization is cleared under the following circumstances:

- Failure of the power supply during initialization
- Hall sensor fault detected
- Position implausible
- Certain calls in the diagnostics
- Changed vehicle coding
- Coding data faulty.

ANTI-THEFT SYSTEM

INTRODUCTION

Anti-theft System

The anti-theft system is available as an option. The task of the anti-theft system is to indicate unauthorized access to the vehicle by emitting an alarm. The alarm can be triggered both audibly and visually. To do this, however, the anti-theft system must be activated. When activated, the alarm monitors the whole of the vehicle interior.

In addition the anti-theft system monitors the engine compartment and the vehicle's rest position. In order that nothing can be stolen from the trunk, the anti-theft system monitors opening of the trunk lid.

The alarm also signals an attempt to tamper with the vehicle, e.g. cutting of the supply line to the emergency power siren.

The anti-theft system's ultrasonic interior movement detector is entirely integrated in the roof function center.

The ultrasonic signal passes into the inside of vehicle through apertures in the grille of the roof function center. The emergency power siren and combined tilt sensor is located near the rear wheel arch.

System Overview

Anti-theft System Circuit Diagram

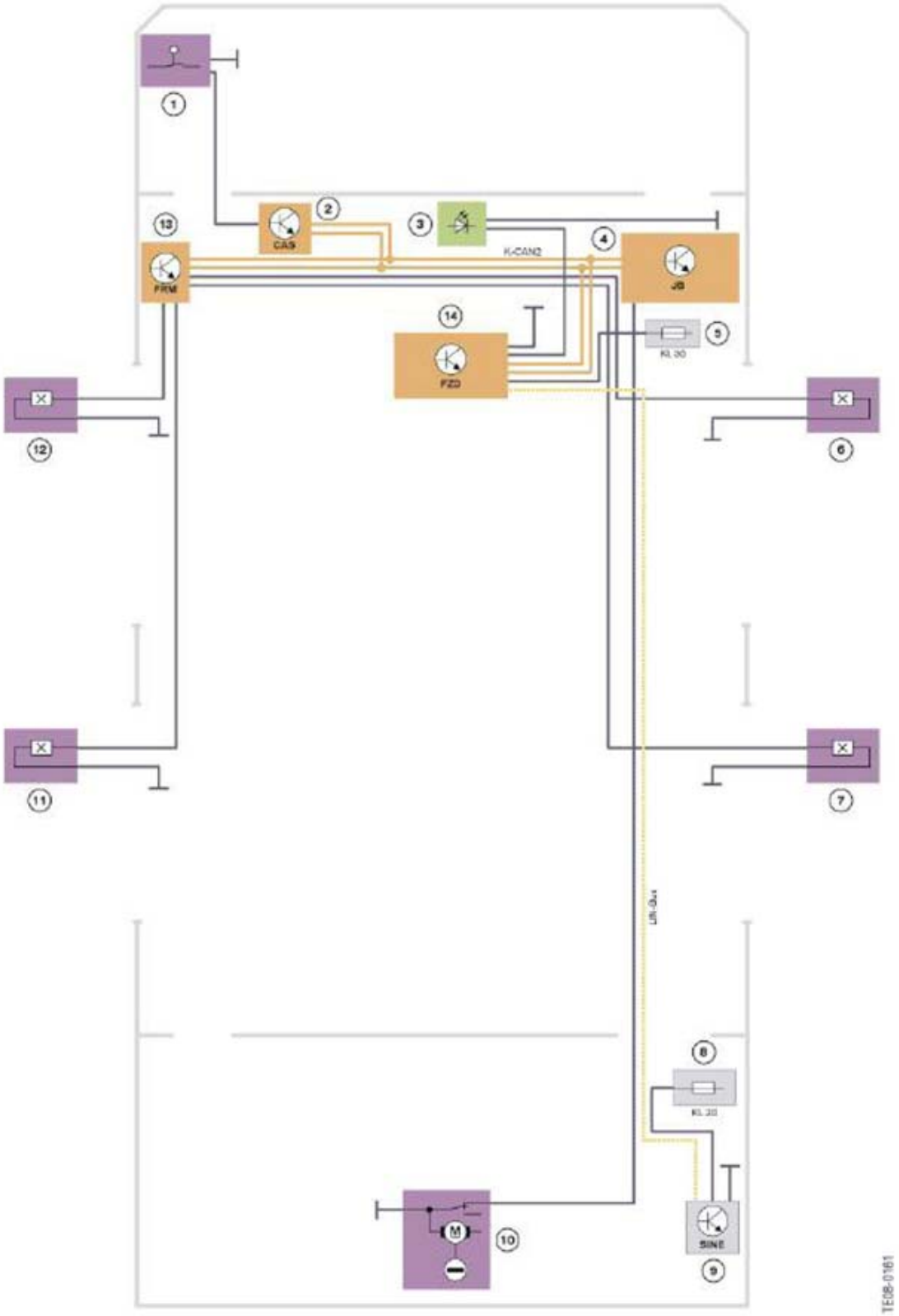


Fig. 34: Anti-Theft System Circuit Diagram

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Hood switch
2	Car Access System 4 (CAS4)
3	Anti-theft system (DWA) LED
4	Junction Box electronics (JB)
5	Front power distribution box
6	Door contact, passenger's door
7	Door contact, rear passenger's side
8	Rear power distribution box
9	Emergency power siren with integrated tilt alarm sensor (SINE)
10	Trunk lock with trunk-lid switch
11	Door contact, rear driver's side
12	Door contact, driver's door
13	Footwell module (FRM)
14	Roof function center (FZD) with ultrasonic interior movement detector USIS
LIN-Bus	Local Interconnect Network bus
K-CAN2	Body CAN2
KI. 30	Terminal 30

The anti-theft system on the F01/F02 is equipped with an ultrasonic interior movement detector for monitoring the vehicle interior. The ultrasonic interior movement detector USIS is fully integrated in the FZD.

The anti-theft system is equipped with an ultrasonic interior movement detector. The ultrasonic interior movement detector has been fully integrated into the FZD.

The door switches (6, 7, 11, 12, Hall-effect sensors) are monitored by the footwell module (13). As soon as the status of a Hall-effect sensor changes, the ultrasonic interior movement detector (14) receives that information via the K-CAN2. If the anti-theft system is activated, an alarm is triggered.

The hood switch (1) is monitored by the Car Access System 4 (2). If the status changes, an alarm is triggered in the same way.

Opening of the trunk lid is monitored by the Junction Box electronics (4). If the status of the trunk-lid switch (10) changes, it triggers an alarm.

FUNCTIONS

Overview

When activated, the anti-theft system on the F01/F02 monitors the entire vehicle. The doors and hood/trunk lid, emergency current siren, the vehicle interior and the DWA bus in particular are monitored. The anti-theft system can be activated or deactivated at terminal 30. It is not possible to activate the anti-theft system when the Terminal R or Terminal 15 signal is present.

Activating the Anti-theft System

The anti-theft system is activated when the vehicle is centrally locked. Activation can be triggered by the following components:

- Driver's door lock barrel
- ID transmitter
- Outside door handle with Comfort Access (sensitive surface)

After the vehicle has been centrally locked, the emergency power siren is first activated together with the tilt alarm sensor. Then the signals from all door switches, the hood switch and the trunk-lid switch are checked for plausibility. Once the contacts are set, they are then linked to the vehicle monitoring system by the anti-theft system.

The tilt sensor and the ultrasonic interior movement detector must be adjusted to the vehicle's situation each time the vehicle is centrally double-locked. This is called initializing. The tilt alarm sensor delivers information on the vehicle's rest position. If this value is plausible, the tilt alarm sensor is included in the vehicle monitoring process.

The anti-theft system's ultrasonic interior movement detector monitors the passenger compartment. It therefore takes a little time before the ultrasonic interior movement detector can actively be used for the anti-theft system. The ultrasonic interior movement detector is switched to 'activated' approximately 30 seconds after the contacts have been linked to the anti-theft system.

NOTE: You should wait approximately one minute before testing the interior motion detector.

Deactivating tilt sensor and ultrasonic interior movement detector

It is advisable to deactivate the tilt sensor and ultrasonic interior movement detector in the following situations:

- Vehicle in tilt-type duplex garage
- Vehicle on ship transport
- Vehicle on car transporter
- Persons or animals in vehicle

Deactivation is performed by centrally double-locking or auto-remote closing the vehicle a second time within 10 seconds of doing so the first time. To acknowledge, the anti-theft system LED is lit for 2 seconds.

NOTE: The tilt sensor/ultrasonic interior movement detector can be permanently deactivated by coding.

Deactivating the anti-theft system

The anti-theft system is deactivated by the "unlock" or "selective unlock" central locking functions. An audible

and/or visual signal can be output in connection with deactivating corresponding to the country-specific version.

If an alarm was triggered during the time when the anti-theft system was activated, the anti-theft system LED flashes for 5 minutes. If a terminal status changes, e.g. if the central locking is unlocked, while the LED is flashing then the LED stops flashing. If the alarm is deactivated while the alarm is active, the deactivate instruction is not acknowledged and the alarm signal is completed.

Unlocking the trunk

The tilt alarm sensor and ultrasonic interior movement detector are blanked out if the luggage compartment is unlocked and opened on an armed vehicle. Loading the vehicle might result in a new vehicle resting position. Initialization of the ultrasonic interior movement detector and the tilt sensor starts 6 seconds after the trunk is closed again.

NOTE: When the trunk is closed, the visual confirmation signal is repeated to indicate to the driver that the trunk is properly closed.

No crosswise operation

If crosswise operation is not implemented, an alarm is triggered when the anti-theft system is deactivated.

This only applies to activating with the ID transmitter and deactivating via the driver's door lock. The footwell module detects that the vehicle has been unlocked via the driver's door lock and broadcasts that information via the K-CAN2.

The Car Access System detects that the driver's door lock has been unlocked but does not unlock the vehicle. The anti-theft system remains activated and triggers the alarm when the driver's door is opened.

This function is coded on the Car Access System.

Feedback from the Anti-theft System

When the alarm is activated, the system does not signal confirmation until all doors, the hood and the trunk have been closed. That confirmation may be in the form of a visual or audible signal. If confirmation is by a visual signal, the alarm LED or the hazard warning lights may flash, for example. If the confirmation signal is audible, it is produced by sounding the emergency power siren, for example.

Feedback via DWA LED

The DWA LED serves as an indicator showing the status of the anti-theft system. The roof functions center supplies the DWA LED with signals from the ultrasonic interior movement detector.

DWA LED SIGNAL CHART

DWA Status	DWA LED
Deactivated	OFF
Activated	ON
Armed, but not all contacts closed	Blinks for 10 seconds, then continues flashing

Ultrasonic interior motion/tilt sensor OFF	Lights up for 2 seconds and then remains on
Alarm triggered	Flashes for 5 minutes, then continues flashing in bursts
Deactivating	Goes out
Deactivating after alarm	Flashes for 5 minutes or stops if a terminal status changes (central locking unlocked)

When blinking, the DWA LED is driven at a frequency of 0.5 Hz. The switch-on time is 60 milliseconds. When the DWA LED flashes, it is activated at a frequency of 2 Hz.

Confirmation from turn signal indicators

Visual confirmation by the turn signal indicators of anti-theft system activation and deactivation serves as an indication for the vehicle user.

The feedback is coded specifically to the country and/or vehicle.

DWA LED SIGNAL INDICATOR CHART

DWA Status	Signal of hazard warning lights
Activation	Hazard warning lights flash once
Deactivation	Hazard warning lights flash twice
Activation after "Easy Access" to trunk	Hazard warning lights flash once after trunk is closed
Deactivating after alarm	Hazard warning lights flash four times at double frequency

Confirmation via the emergency power siren

The audible confirmation signal to the vehicle user when activating and deactivating the alarm is individually coded for the country of purchase.

DWA LED SIGNAL INDICATOR CHART

DWA Status	Signal from siren
Activation	Signal tone sounds once
Deactivation	Signal tone sounds twice
Activation with doors open or trunk lid open	No signal tone, sounds only after closing last door or trunk lid

Comfort Access

If the vehicle is locked but the trunk is open, it is possible for the ID transmitter to be inadvertently left in the trunk. If the trunk lid is closed in such circumstances, it is automatically opened again to prevent the ID transmitter from being locked in.

In addition to automatically opening the trunk lid, the anti-theft system emits an audible warning. The warning consists of the emergency power siren sounding a two-tone signal three times. The footwell module also activates the visual signal by the hazard warning lights.

Alarm Trigger

The anti-theft system can be triggered by the following components:

- Door contacts
- Trunk lid switch
- Hood switch
- Ultrasonic interior movement detector
- Emergency power siren with integral tilt sensor.

Door contacts

The status of the door contacts is evaluated by the footwell module and signalled to the ultrasonic interior movement detector. The status of the individual door contacts is included in the vehicle monitoring system 6 seconds after the status signal "door closed" is issued. This means that an alarm can be triggered via a door that is already closed even if another door contact is still open.

Trunk lid switch

The status of the trunk lid switch is analysed by the Junction Box electronics and signalled to the ultrasonic interior movement detector. When the trunk lid is closed, the Junction Box electronics receives a low signal (approximately 0 V). If the trunk lid is unlocked when the anti-theft system is activated, the signals from the trunk lid switch, ultrasonic interior movement detector and tilt sensor are initially suppressed.

The signals are also suppressed if the trunk lid is unlocked using the ID transmitter when the anti-theft system is activated. The trunk lid switch is reinstated as part of the vehicle monitoring system 6 seconds after the lid is closed. Once there are no other doors open and the trunk lid is closed, the initialization procedure for the ultrasonic interior movement detector and the tilt sensor starts.

Because of the manipulation prevention system, unlocking the luggage compartment with the aid of the mechanical key when the DWA is activated will cause an alarm to be triggered.

Hood

The status of the hood switch is analysed by the Car Access System and signalled to the ultrasonic interior movement detector. The status of the hood switch is included in the vehicle monitoring system 6 seconds after the status "hood closed" is signalled.

The Car Access System interprets a hood switch that is not connected as closed. When the hood is closed, the Car Access System receives a low signal (approximately 0 V).

Ultrasonic interior movement detector

The ultrasonic interior movement detector captures and evaluates movements in the vehicle interior. Initialization of the ultrasonic interior movement detector is started 6 seconds after the hood, trunk lid and the last door have been closed.

The ultrasonic interior movement detector is operational 30 seconds after the start of initialization and is included in the vehicle monitoring system. The ultrasonic interior movement detector has been integrated into the roof function center. The FZD is connected to the K-CAN2 and DWA bus.

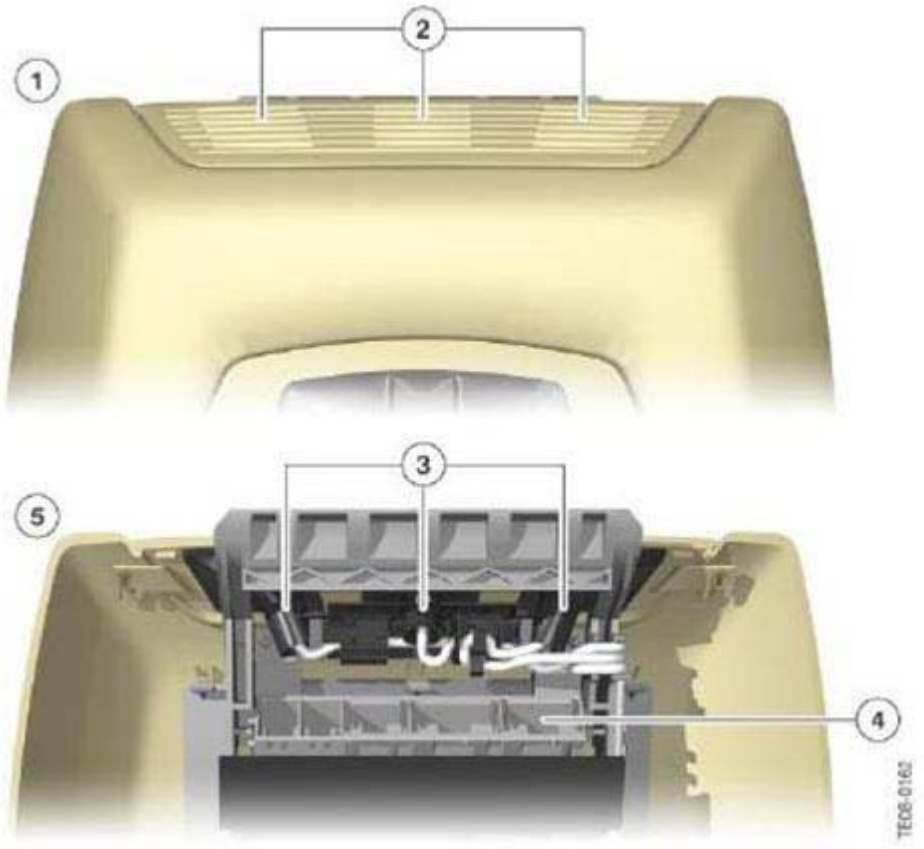


Fig. 35: Identifying Ultrasonic Interior Movement Detector Components
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Front of roof function center
2	Sensor ultrasound emission grille
3	Funnels for the ultrasonic sensors
4	Roof function center connector
5	Rear of roof function center

NOTE: For the ultrasonic interior movement detector to function properly, it is very important that the grille (2) is fitted correctly. The funnels must be touching the grille to prevent/reduce interference between the ultrasonic sensors. The grille must be engaged at the sides and fully located in position in the center.

Tilt alarm sensor

The tilt alarm sensor registers the vehicle rest position when it is activated and detects changes in the position, e.g. jacking up the vehicle. The tilt alarm sensor is integrated in the emergency current siren.

Initialization of the tilt sensor is started 6 seconds after all doors, the trunk lid and the hood are closed. The tilt sensor is ready for operation 60 seconds from the start of initialization and is then included in the vehicle monitoring system.

If the tilt alarm sensor detects vehicle movement, a corresponding signal is sent to the ultrasonic interior movement detector. The anti-theft system decides whether the movement is sufficient to trigger an alarm.

To ensure a false alarm is not triggered as the result of the vehicle rocking, the angle values for the longitudinal and transverse axis are determined every 90 ms. An alarm is triggered only if the vehicle remains in an inclined position for longer than approximately 1.5 seconds.

NOTE: Testing the tilt sensor:
Activate the anti-theft system then wait for one and a half minutes. Then raise the vehicle with a jack at one of the wheels. The alarm should be triggered before the wheel has been raised completely off the ground.

Self-monitoring of emergency current siren

A self-monitoring facility that is activated immediately after the anti-theft system has been activated is implemented in the emergency current siren. The emergency current siren monitors its own power supply and detects overvoltage, undervoltage and line break (open-circuit).

If anyone attempts to manually interfere with the emergency power siren or its supply leads, the emergency power siren will trigger an alarm. At the same time, it reports this alarm to the ultrasonic interior movement detector regardless of whether the DWA bus has been affected.

Line monitoring - DWA bus

The ultrasonic interior movement detector and the emergency current siren are connected via the DWA bus. As soon as the anti-theft system has been activated, the DWA bus is monitored cyclically every 2 seconds.

If the anti-theft system does not register with the SINE within 3.2 s, an alarm is initiated.

The anti-theft system sends a line monitoring request on the DWA bus to the emergency current siren. The emergency power siren must respond within 100 ms. If no response is received, the anti-theft system triggers an alarm. The line monitoring facility is also active while the alarm is triggered.

The anti-theft system in the roof function center measures the system voltage. The line monitoring facility is switched off at a system voltage below 9 V. This avoids false alarms.

Alarm Output

If an alarm criterion is fulfilled with the anti-theft system activated, the alarm is output (triggered) audibly and/or visually corresponding to the country-specific coding.

Audible alarm

The emergency power siren receives a signal via the DWA bus when the ultrasonic interior movement detector triggers an alarm. It is fitted in the rear right wheel arch. The emergency current siren confirms receipt of the alarm request and triggers the audible alarm.



Fig. 36: Identifying Emergency Power Siren On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

If the alarm request is not acknowledged, the anti-theft system will repeat the alarm request up to eight times.

Depending on the country-specific coding of the emergency current siren, an intermittent or interval tone is generated. If the anti-theft system is deactivated, the audible alarm is stopped immediately and without response.

Visual alarm

Depending on the country-specific version, the following components of the exterior lighting can be activated for the visual alarm:

- Turn signal indicators
- Dipped-beam headlights
- High-beam headlights.

When the anti-theft system triggers an audible alarm, a visual alarm is simultaneously triggered for 5 minutes. The anti-theft system sends the request for flashing lights to the footwell module via the K-CAN2. In turn, the footwell module activates the components of the exterior lighting system.

The visual alarm cannot be extended by repeated alarm triggering.

If the anti-theft system is deactivated, the visible alarm is stopped immediately and without response.

Autarkic alarm

If the emergency power siren's wires are tampered with, it initiates the autonomous alarm. If the DWA bus is also cut through, the ultrasonic passenger-compartment sensor detects this situation by the absence of the reply from the emergency current siren. In turn, the ultrasonic interior movement detector triggers the visual alarm.

Panic mode

Panic mode is a means of attracting attention by triggering an alarm when under threat from the outside or in the event of an accident, for example.

Panic mode is initiated by pressing the trunk lid button on the ID transmitter. The button must be pressed for longer than 2.5 seconds irrespective of whether the anti-theft system is activated or not.

The alarm is stopped by pressing any button on the ID transmitter. Panic mode is not stored. On completion of panic mode, the anti-theft system assumes the setting that was selected prior to panic mode.

Panic mode is at present only coded in US vehicles.

Alarm termination

An alarm initiated for testing purposes or by accident can be stopped by deactivating the anti-theft system.

Diagnosis

All information is stored in the non-volatile alarm memory.

Ultrasonic interior movement detector alarm memory

The alarm memory of the ultrasonic interior movement detector stores all alarms apart from the autonomous alarm. The alarm memory contains the following information:

- Cause of alarm trigger
- Subsequent alarm triggers
- Date
- Time
- Ambient conditions
  - Outside temperature
  - Window position
  - Sunroof position
  - Heating.

An alarm history is formed from the beginning to the end of the alarm. The manner in which the alarm is ended is also defined. The alarm can be terminated by deactivating it or by allowing it to run its course. The last 10 alarms are stored in the alarm memory.

Autonomous alarms are stored by the roof function center if the connection between the roof function center and the emergency power siren is in functional order.

AUTOMATIC LUGGAGE COMPARTMENT LID ACTUATING SYSTEM

INTRODUCTION

Features of the Automatic Luggage Compartment Lid Actuating System

The automatic luggage compartment lid actuating system will be available on the F01 as from its launch in 09/08. It will be available to order as an option and only concerns the luggage compartment lid.

Automatic luggage compartment lid operation improves vehicle access in that the luggage compartment lid is opened or closed automatically at the press of a button.

A spindle-driven system is fitted in the F01 for the first time to actuate automatic opening or closing of the luggage compartment lid.

The automatic luggage compartment lid actuating system makes it possible to open and close the luggage compartment lid automatically at the push of a button.

If the vehicle is equipped with Comfort Access, it is even possible to open the luggage compartment lid while the vehicle is locked.

The luggage compartment lid can open automatically when the exterior luggage compartment lid button is pressed. The only requirement being that a vehicle-specific ID transmitter must be present in the immediate vicinity of the rear end of the vehicle.

In connection with Comfort Access, it is now also possible to centrally lock the vehicle doors from the luggage compartment lid. The "central double-lock" button used for this purpose is located in the luggage compartment lid next to the button for automatically closing the luggage compartment lid.



Fig. 37: Identifying Central Double-Lock Button F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

Closing the luggage compartment lid can also be initiated by pressing the "central double-lock" button.

System Overview

Automatic Luggage Compartment Lid Actuating System Input/outputs

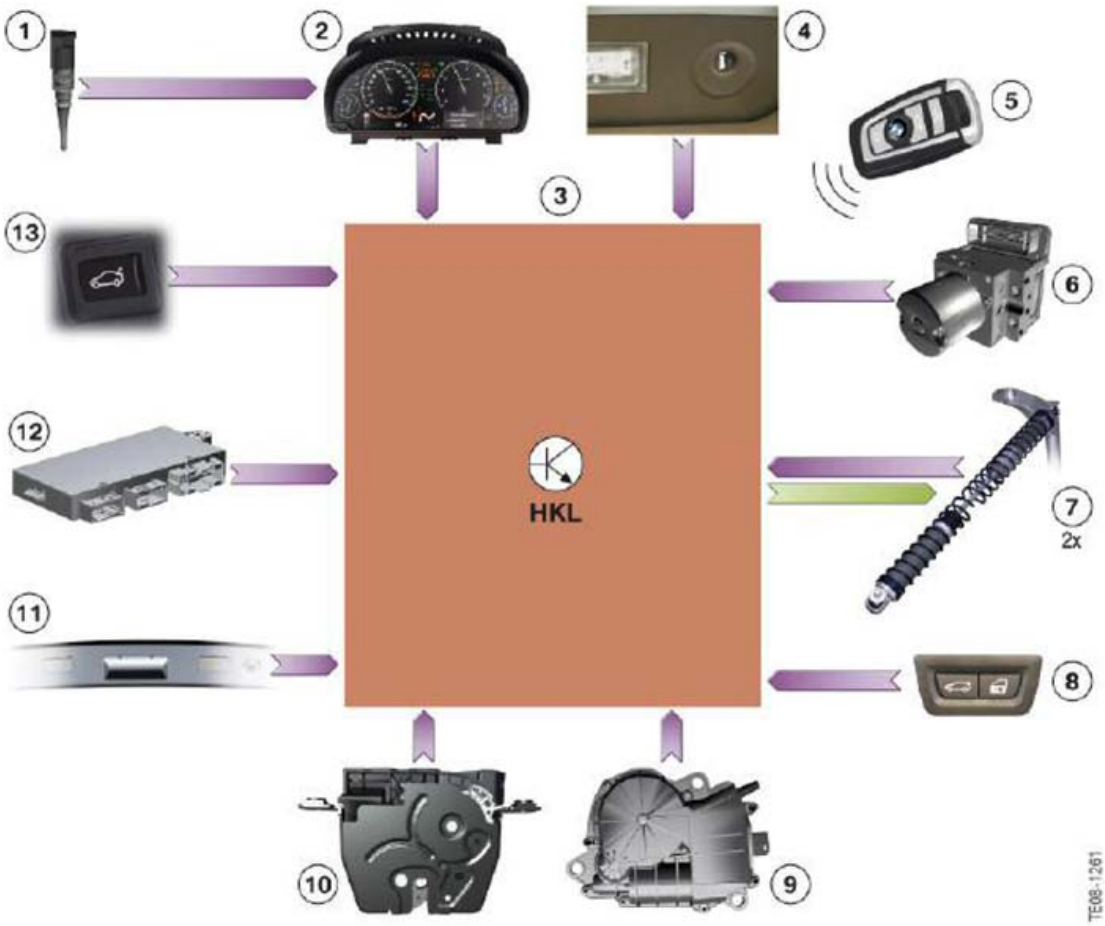


Fig. 38: Automatic Luggage Compartment Lid Actuating System Input/Outputs Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Outside temperature sensor
2	Instrument cluster
3	Control unit for automatic luggage compartment lid actuating system HKL
4	Lock barrel, luggage compartment lid
5	Identification transmitter
6	Dynamic Stability Control
7	Luggage compartment lid spindle
8	Interior luggage compartment lid button
9	Drive for automatic soft-close luggage compartment lid lock
10	Central locking, luggage compartment lid
11	Luggage compartment lid button, outer luggage compartment lid recessed handle
12	Car Access System
13	Luggage compartment lid button, A-pillar drive

Luggage compartment lid lift (3) controls and monitors opening or closing of the luggage compartment lid. Opening or closing of the luggage compartment lid can be triggered by luggage compartment lid buttons (8, 11, 13). The luggage compartment lid can be unlocked and opened by purely mechanical means with the lock barrel in the luggage compartment lid (4).

The signals from the outside temperature sensor (1) and vehicle speed (6) are evaluated to determine whether the luggage compartment lid may be opened or closed in response to a press of a button.

Automatic Luggage Compartment Lid Actuating System Circuit Diagram

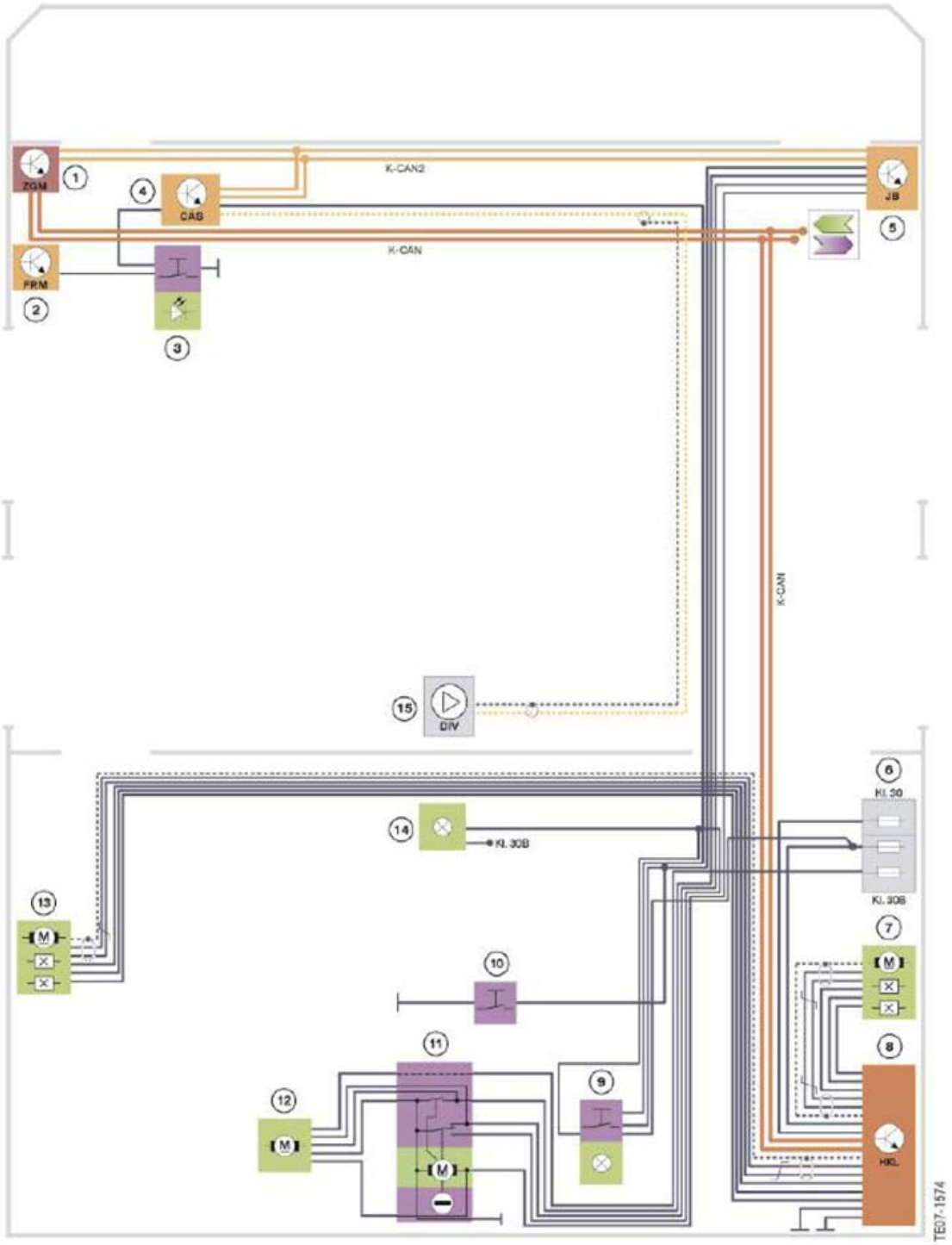


Fig. 39: Automatic Luggage Compartment Lid Actuating System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation

1	Central gateway module (ZGM)
2	Footwell module (FRM)
3	Luggage compartment lid button, A-pillar
4	Car Access System (CAS)
5	Junction box electronics (JB)
6	Rear power distribution box
7	Spindle drive motor, right
8	Luggage compartment lid lift (HKL)
9	Inner luggage compartment lid button/central double-lock button
10	Outer luggage compartment lid button
11	Luggage compartment lid lock with luggage compartment lid switch/lock barrel
12	Automatic soft-close luggage compartment lid
13	Spindle drive motor, left
14	Luggage compartment lighting, underside of rear window shelf
15	Remote control receiver in diversity module
K-CAN	Body CAN
K-CAN2	Body-CAN2
KI. 30	Terminal 30
KI. 30B	Terminal 30, basic operation
LIN-Bus	Local Interconnect Network bus

K-CAN signals at the luggage compartment lid lift

K-CAN SIGNALS CHART

In/out	Information	Source/sink	Function
In	Outside temperature	Outside temperature sensor > instrument cluster	Value for calculating overheating protection for the spindle motors
In	Driving speed	Wheel speed sensors > Dynamic stability control > Integrated chassis management	Permit/deny control functions of the luggage compartment lid

The radio signal from the identification transmitter is received by the rear window antenna. The remote control receiver in diversity module (15) forwards the signal to Car Access System (4). The Car Access System is the master control unit for the central locking function.

Once the signal has been successfully verified, the Car Access System issues a command to control the central locking in the luggage compartment lid.

The junction box electronics (5) execute the command to control the central locking in the luggage compartment lid. The junction box electronics register the status of the luggage compartment lid switch (11) for the "automatic luggage compartment lid actuation" function. The status of the luggage compartment lid switch is sent on the K-CAN to the luggage compartment lid lift (8). The status is one of the triggering criteria for luggage compartment lid operation.

Sensors (13 and 7) in the spindle drives monitor the movement of the luggage compartment lid. The luggage compartment lid lift is therefore able to reverse the closing movement of an obstructed luggage compartment lid, allowing the obstruction to be freed.

An obstruction to luggage compartment lid movement during the opening procedure causes the luggage compartment lid to stop and it is not reversed.

As a backup to the Hall sensors, the luggage compartment lid lift monitors the power consumption of the spindle drive. An increase in current when the luggage compartment lid blocks causes the luggage compartment lid to stop and, if need be, reverse.

FUNCTIONS

Luggage Compartment Lid Actuating Points

The luggage compartment lid can be unlocked and opened or closed from various operating points. The operating points are the:

- Outer luggage compartment lid button
- Luggage compartment lid button on the interior of the luggage compartment lid (only when the luggage compartment lid is open)
- Central double-lock button on the interior of the luggage compartment lid (only when the luggage compartment lid is open)
- Luggage compartment lid button on the identification transmitter
- Luggage compartment lid button on A-pillar in vehicle interior
- Luggage compartment lid lock barrel (mechanical unlocking).

The automatic luggage compartment lid actuating system cannot be activated when the vehicle is in motion, only when the vehicle is stationary.

Automatic luggage compartment lid actuation is controlled and monitored by a control unit. This control unit is designated luggage compartment lid lift HKL.

The HKL has an integrated "soft-opening" or "soft-closing" function. This means that the closing or opening speed is slowed shortly before the end stops are reached so that the luggage compartment lid moves softly into the respective end stop. The soft end stop is achieved by a change in the pulse width of the control voltage.

The luggage compartment lid moves quietly and smoothly. This gives the impression of a harmonious movement during the luggage compartment lid opening or closing procedure.

To achieve this, the speed of the luggage compartment lid movement is regulated by the HKL. Luggage compartment lid movement depends on whether the luggage compartment lid is covered with hoarfrost or snow. If the weight of the snow is too heavy for the luggage compartment lid, no luggage compartment lid movement will take place.

The HKL receives signals on the K-CAN from the following control units:

- Car Access System
  - Luggage compartment lid button, A-pillar
  - Central double-lock button
  - Enable for operating luggage compartment lid or terminal status
  - Request from identification transmitter
- Integrated Chassis Management Driving speed signal
- Junction box electronics
  - Outer luggage compartment lid button
  - Luggage compartment lid button on interior of luggage compartment lid.

Operation by Luggage Compartment Lid Buttons

The luggage compartment lid can be opened, stopped or closed by pressing one of the luggage compartment lid buttons. It is also possible to stop or resume the movement of the luggage compartment lid from any open position. Tapping a luggage compartment lid button is sufficient input for the luggage compartment lid to continue to the respective end position (luggage compartment lid open or closed). The luggage compartment lid movement stops automatically as soon as the end position is reached.

Direction of luggage compartment lid movement

The direction of movement of the luggage compartment lid changes with every second press of the interior or exterior luggage compartment lid button. Initial state of luggage compartment lid closed:

- Button stroke > Open
- Button stroke > Stop
- Button stroke > Close
- Button stroke > Stop
- Button stroke > Open, etc.

Luggage compartment lid button, A-pillar

The interior luggage compartment lid button on the A-pillar can only be used to open or stop the luggage compartment lid.

- Button stroke > Open
- Button stroke > Stop
- Button stroke > Open
- Button stroke > Stop, etc.

Central double-lock button

In vehicles equipped with Comfort Access, the inner luggage compartment lid button is installed together with the central double-lock button.



Fig. 40: Identifying Inner Luggage Compartment Lid Button And Central Double-Lock Button F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

The central double-lock button is connected to the Car Access System. The central double-lock button is used to lock and centrally arrest the vehicle doors. To provide maximum convenience for the customer, closing the luggage compartment lid can be initiated by pressing the central double-lock button.

The central double-lock button can only be used to close and stop the luggage compartment lid.

- Button stroke > Close
- Button stroke > Stop
- Button stroke > Close
- Button stroke > Stop, etc.

NOTE: A command sent from the central double-lock button can only be executed with the luggage compartment lid open. This is due to the fact that the button has a connection to ground via the luggage compartment lid contact switch only when the luggage compartment lid is open.

Outer luggage compartment lid button

The junction box electronics evaluate the status of the luggage compartment lid button.

Evaluation depends on whether or not the vehicle is in sleep mode. If the vehicle is in sleep mode, it will have to be woken first. Only then can the request be sent to the HKL on the K-CAN. The HKL triggers the appropriate request.

When closed, the luggage compartment lid is unlocked by the junction box electronics. The luggage compartment lid lift HKL then opens the luggage compartment lid. The luggage compartment lid is completely opened automatically.

The outer luggage compartment lid button can be used to open, stop or close the luggage compartment lid.

- Button stroke > Open *
- Button stroke > Stop
- Button stroke > Close **
- Button stroke > Stop

- Button stroke > Open
- Button stroke > Stop etc.

* Always in open direction with luggage compartment lid closed

** Always in close direction with luggage compartment lid completely open.

NOTE: Additional information on luggage compartment lid operation can be found under "Manual opening and closing".

Interior luggage compartment lid button

Parallel to the outer luggage compartment lid button, the inner luggage compartment lid button is connected to the junction box electronics. For this reason, the junction box electronics do not distinguish between the two luggage compartment lid buttons.



Fig. 41: Identifying Inner Luggage Compartment Lid Button F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A command sent from the inner luggage compartment lid button can only be executed with the luggage compartment lid open. This is due to the fact that the button has a connection to ground via the luggage compartment lid contact switch only when the luggage compartment lid is open.

ID transmitter luggage compartment lid button

If the complete vehicle is locked, it is possible to trigger an automatic opening of the luggage compartment lid by pressing the luggage compartment lid button with the luggage compartment lid symbol. Firstly, the luggage compartment lid is unlocked. Then the luggage compartment lid begins to open automatically.

Operation of the luggage compartment lid with the identification transmitter is subject to specific legal requirements. There are differences between the European variant, the US variant and the Canadian variant.

European variant

Pressing the luggage compartment lid button with the luggage compartment lid symbol on the identification transmitter:

- Luggage compartment lid closed

  - Short press Luggage compartment lid opens to end position
  - Press and hold Luggage compartment lid opens to end position
- Luggage compartment lid open
  - Pressed and held > Luggage compartment lid closed to end or until button released.

It is possible to initiate the opening procedure by means of the luggage compartment lid button while the luggage compartment lid is closed. Releasing the luggage compartment lid button has no effect. The luggage compartment lid is opened until it is completely open. A brief press of the luggage compartment lid button while the luggage compartment lid is opening stops the opening procedure.

A long press of the luggage compartment lid button while the luggage compartment lid is opening triggers the luggage compartment lid closing procedure. The opening procedure stops first to allow the luggage compartment lid to begin closing immediately. The closing procedure ends if the luggage compartment lid button is released or the "CLOSED" position is reached.

NOTE: **The Car Access System evaluates the requests from the identification transmitter. The luggage compartment lid lift receives the requests on the K-CAN. The signal must be routed through various bus systems. These bus systems are:**

- **LIN-bus (diversity module > CAS)**
- **K-CAN2 (CAS > ZGM)**
- **K-CAN > (ZGM > HKL).**

US variant

The luggage compartment lid movement does not begin until the luggage compartment lid button has been released. The identification transmitter sends a message indicating that the luggage compartment lid button has been released. From this message, it is possible for the luggage compartment lid button stroke to be detected. Automatic opening is initiated after the luggage compartment lid has unlocked. The luggage compartment lid is completely opened.

NOTE: **The remote control cannot be used to close the luggage compartment lid on the US variant for legal reasons.**

Automatic Opening

The luggage compartment lid is opened or closed automatically when one of the luggage compartment lid buttons is pressed. A basic prerequisite being that there must be no "inhibit condition" present. You will find a description of the inhibit conditions in the "Luggage compartment lid movement inhibit conditions" section of this Product Information.

Automatic Opening Procedure

The following procedure begins with a closed luggage compartment lid.

- Luggage compartment lid button with luggage compartment lid symbol pressed briefly

NOTE: On the US variant, the luggage compartment lid button on the identification transmitter must be released otherwise the luggage compartment lid will not be opened automatically.

- Power supply switched to luggage compartment lid lift and request to unlock the luggage compartment lid issued by the Car Access System
- The junction box electronics unlock the luggage compartment lid. Initially, the luggage compartment lid lock is actuated.
- The luggage compartment lid contact switch changes from closed to open.
- The HKL controls the spindle drives to open the luggage compartment lid.

The luggage compartment lid is completely opened. If one of the inhibit conditions becomes active during luggage compartment lid movement, this will stop further movement of the luggage compartment lid.

Luggage Compartment Lid Opening with Comfort Access

Vehicles equipped with the Comfort Access option also have a "keyless opening" luggage compartment lid function.

The junction box electronics wake a sleeping vehicle in response to the outer luggage compartment lid button being pressed. The junction box electronics send the request on the K-CAN2. The Car Access System with Comfort Access receives the request and arranges for the identification transmitter to register with the vehicle.

Once the identification transmitter has been successfully verified by the Car Access System, the latter arranges for the luggage compartment lid to be unlocked. The junction box electronics execute the unlocking procedure. As soon as the status of the luggage compartment lid contact switch changes, the junction box electronics issue a notification on the K-CAN2. The central gateway module implements the signal on the K-CAN. In response, the HKL then executes the automatic opening procedure.

Automatic Closing

With the exception of the luggage compartment lid button in the A-pillar, all luggage compartment lid buttons are able to initiate automatic closing.

This luggage compartment lid button cannot be used to start the automatic closing procedure.

Closing Luggage Compartment Lid

The luggage compartment lid can be closed by pressing the inner luggage compartment lid button, outer luggage compartment lid button or central double-lock button.

The junction box electronics wake a sleeping vehicle in response to the inner luggage compartment lid button being pressed. The junction box electronics send the request on the K-CAN2. The Car Access System with Comfort Access receives the request and initiates the automatic closing procedure.

In response, the HKL then executes the automatic closing procedure.

As soon as the status of the luggage compartment lid contact switch changes, the junction box electronics issue a notification on the K-CAN2. The central gateway module implements the signal on the K-CAN. The HKL then knows that the closing process has ended.

Manual Opening and Closing

Moving the Luggage Compartment Lid by Hand

It is possible to open or close an open luggage compartment lid at any time in any vehicle idle mode situation. Three vehicle statuses govern the manual opening and closing procedure. These are:

- Luggage compartment lid lift active
- Luggage compartment lid lift in sleep mode
- Luggage compartment lid lift at terminal 30B OFF.

Luggage compartment lid lift active

While terminal 30B is switched on, detection of manual luggage compartment lid movements is straightforward.

The HKL detects luggage compartment lid movement by means of Hall sensors located in the spindle drive motors. The HKL evaluates the pulses of the Hall sensors and stores the current position of the luggage compartment lid.

This position is used as the starting position for subsequent luggage compartment lid movement.

Luggage compartment lid lift in sleep mode

The current position of the luggage compartment lid is stored in the HKL before the vehicle enters sleep mode.

Once the vehicle is in sleep mode, the HKL checks the Hall sensors on a cyclical basis. The vehicle is woken if a luggage compartment lid movement is detected. The HKL is then switched on and detects the luggage compartment lid being moved by hand.

Terminal 30B OFF

If terminal 30B is switched off, the power supply to the spindle drives is switched off and so too are the Hall sensors. In this situation, therefore, manual luggage compartment lid movements can no longer be detected.

If the position of the luggage compartment lid has been altered manually, the stored value would no longer match the current value.

At the next request, the luggage compartment lid is always closed first. The HKL detects the lower end stop from the status of the luggage compartment lid contact switch. This enables the current position of the luggage compartment lid to be compared with the stored starting position. The position of the luggage compartment lid

is, in this way, newly referenced.

NOTE: If the luggage compartment lid movement is stopped before the lower end stop is reached, the luggage compartment lid will be opened the next time it is operated.

Since the position of the luggage compartment lid has not yet been referenced, the luggage compartment lid is only opened by as much it was previously closed.

Luggage Compartment Lid Movement Inhibit Conditions

The luggage compartment lid is not permitted to be operated in various situations. These situations include engine starting or driving or cases where there may be a risk of vehicle damage.

If luggage compartment lid operation needs to be inhibited while the luggage compartment lid is closing, an attempt is made to complete the movement that has commenced through to the end. For example, an attempt is made to complete luggage compartment lid movement until it closes while the vehicle is driving off. The luggage compartment lid lift will terminate actuation if the luggage compartment lid comes up against a blocking situation.

The inhibit conditions are listed as follows:

MOVEMENT INHIBIT CONDITIONS CHART

Inhibit condition	Explanation/information
Vehicle speed v_{max} > 3 km	The speed signal is made available by the integrated chassis management. **NOTE:** **The luggage compartment lid can be set in motion in the presence of an invalid road speed signal.**
Outside temperature <-30 °C and + 80 °C >	The outside temperature signal is issued by the instrument cluster. **NOTE:** **The luggage compartment lid can be set in motion in the presence of an invalid temperature signal.**
On-board supply voltage <9 V to 16 V >	In the event of undervoltage <9 V or overvoltage > 16 V, the luggage compartment lid can no longer be set in motion.
Engine start (status "terminal 50 ON")	The signal is issued on the K-CAN2 by the Car Access System. Cancellation if luggage compartment lid movement in progress, luggage compartment lid operation is inhibited.

If the luggage compartment lid is reversing, the inhibit conditions are ignored and the luggage compartment lid movement is followed through to the end.

Additional Functions of the Luggage Compartment Lid Lift

Position Detection

The spindle drives are each integrated with a motor. The motor contains two Hall sensors. The Hall sensors are arranged with relative offset. This enables detection of the motor's direction of rotation. In addition, it is possible to draw conclusions as to the remaining path of the luggage compartment lid based on the Hall sensor pulses.

The complete movement range of the luggage compartment lid from "CLOSED" to "OPEN" is recorded during assembly in the works. The HKL therefore knows how many Hall sensor pulses were generated between lower and upper end stop of the luggage compartment lid.

The number of Hall sensor pulses corresponds to the distance covered by the luggage compartment lid. With this information, the HKL is able to determine the opening angle of the luggage compartment lid.

The path of the luggage compartment lid is subdivided into various segments. From the Hall sensor pulses, the HKL knows the segment in which the luggage compartment lid is positioned. If the luggage compartment lid is fully open, it is positioned within the range of the upper segment. From there, the luggage compartment lid is always moved in the closing direction.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Upper segment
2	Range between the upper and lower segment
3	Lowermost segment

If the luggage compartment lid is in the range of the lower segment, i.e. closed, the luggage compartment lid is always moved in the opening direction.

The current position of the luggage compartment lid is stored by the HKL before it enters sleep mode. When the vehicle wakes up, the most recently stored position is used as the current position.

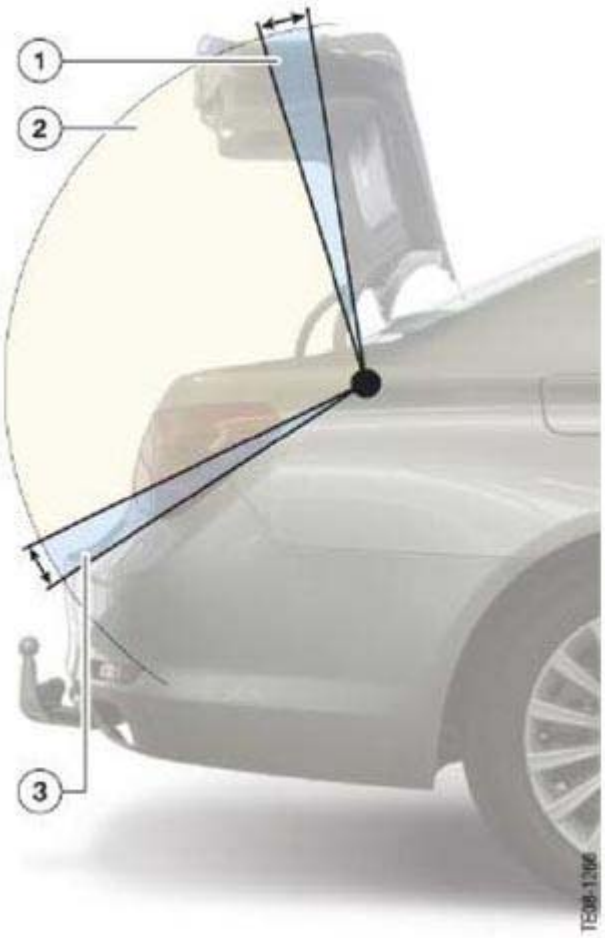


Fig. 42: Identifying Luggage Compartment Lid Segments F01
Courtesy of BMW OF NORTH AMERICA, INC.

Obstruction Detection

Obstruction detection is active during the luggage compartment lid opening and closing procedure. An obstruction to luggage compartment lid movement during the opening procedure causes the luggage compartment lid to stop moving immediately. If the luggage compartment lid is obstructed in the closing direction, the HKL briefly controls the spindle drives in the opposite direction. If the luggage compartment lid remains obstructed, the HKL stops controlling the spindle drive motors.

There is no reversal of the direction of movement if the luggage compartment lid is obstructed as it opens or closes at the end stop.

Obstruction detection principle

The HKL evaluates the Hall sensor pulses in the spindle drive motors. The motor current is also recorded.

If the motor current increases and the Hall sensor pulses drop out, the HKL detects that the luggage compartment lid is being obstructed.

NOTE: Obstruction detection is deactivated during initialization of the luggage compartment lid lift. This allows the luggage compartment lid drives to be controlled with the maximum current available.

Repeat Interlock

The HKL is equipped with a repeat interlock to prevent the motors from overheating. The motor run-time is cumulated for the repeat interlock.

If the sum exceeds a maximum running time of 2 minutes, a new operation command will be rejected. An action that is already in progress always follows through to the end.

After a cooling phase of 6 minutes, it is possible for the motor to accrue a run-time of 2 minutes again.

The current motor run-time is stored by the HKL before it enters sleep mode.

The motor run-time of the repeat interlock is halved when the control unit is woken from sleep mode.

The repeat interlock is cleared in the event of a terminal 30B reset. This means that a motor run-time of 2 minutes is immediately available.

SYSTEM COMPONENTS

Control Units, Control Elements and Spindle Drives

Luggage Compartment Lid Lift

The luggage compartment lid lift is fitted on the right-hand side in the luggage compartment floor. The HKL controls and monitors the operation of the automatic luggage compartment lid actuating system.

The control logic module is connected to terminal 30B. The HKL is also connected to terminal 30 for the load current through the spindle drives.

In sleep mode, the HKL requires a certain amount of closed-circuit current. With terminal 30B OFF, the HKL is no longer supplied with off-load current.

NOTE: Terminal 30B is switched off with a delay.

The luggage compartment lid lift operates at a voltage of between 9 V and 16 V. Outside this range, the functions may no longer be supported.

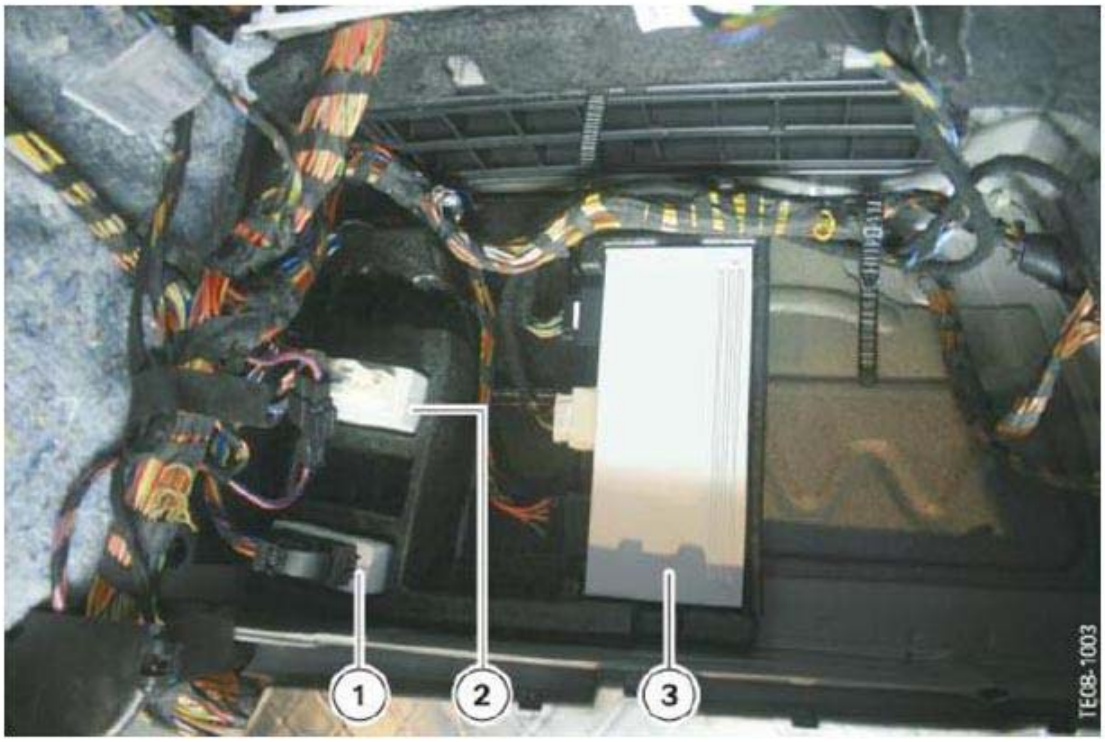


Fig. 43: Identifying Luggage Compartment Lid Lift Control Units, Control Elements And Spindle Drives
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Not for US market
2	Not for US market
3	HKL control module

Car Access System

The Car Access System is fitted next to the steering column. It is the master control unit for the central locking. It is therefore also responsible for having the luggage compartment lid unlocked.

Junction Box Electronics

The junction box electronics are connected to the front power distribution box.

NOTE: The power distribution box and the junction box electronics are two separate components. This is an important point for the Service to note.

The central locking of the luggage compartment lid is controlled by a power output stage in the junction box electronics. The automatic soft-close drive is supplied by a relay in the distribution box at the rear. The junction box electronics control the relay.

Control Elements

Outer Luggage Compartment Lid Button

The outer luggage compartment lid pushbutton switches to ground. The signal from the outer luggage compartment lid button is sent to the junction box electronics. The junction box electronics signal the status of the outer luggage compartment lid button to the luggage compartment lid lift.

Interior Luggage Compartment Lid Button

The luggage compartment lid button switches to ground. The signal from the luggage compartment lid button is sent to the junction box electronics. The junction box electronics signal the status of the luggage compartment lid button to the luggage compartment lid lift.

The lighting of the luggage compartment lid button is only supplied with power under the following conditions:

- Luggage compartment lid open and
- Terminal 30B ON.

NOTE: A command sent from the inner luggage compartment lid button can only be executed with the luggage compartment lid open. This is due to the fact that the button has a connection to ground via the luggage compartment lid contact switch only when the luggage compartment lid is open.

Central Double-lock Button

The central double-lock button is connected to the Car Access System and switches to ground. The Car Access System makes the button status available on the K-CAN2.

NOTE: A command sent from the central double-lock button can only be executed with the luggage compartment lid open. This is due to the fact that the button has a connection to ground via the luggage compartment lid contact switch only when the luggage compartment lid is open.

ID transmitter luggage compartment lid button

The status of the luggage compartment lid button on the identification transmitter is evaluated by the electronics in the identification transmitter.

The identification transmitter sends an encrypted message to the vehicle by radio wave. The message reaches the remote control receiver via the antenna in the rear window. From there, the message is made available to the Car Access System.

The Car Access System verifies the message. Once the message has been successfully verified, the Car Access System sends out the request on the K-CAN2.

Luggage compartment lid button, A-pillar

The luggage compartment lid button is resistance-coded. The status of the luggage compartment lid button is evaluated by the Car Access System. The Car Access System issues the status on the K-CAN2.

Lock barrel, luggage compartment lid

The lock barrel in the luggage compartment lid is connected to the luggage compartment lid locking mechanism by means of a bowden cable. When the bowden cable is operated with the mechanical key, the luggage compartment lid lock releases and the luggage compartment lid can be opened.

NOTE: Opening the luggage compartment lid with the mechanical key can trigger an alarm in the anti-theft system.

Spindle Drives

Each spindle drive comprises the following components:

- Spindle drive
- Drive motor
- Drive motor Hall sensor
- Spring
- Fixture of the spindle drive to the luggage compartment lid
- Fixture of the spindle drive to the body
- Ball bearing for the spindle drive.

NOTE: A defective spindle drive must be replaced as a complete unit.

Luggage Compartment Lid Contact Switch

The luggage compartment lid contact switch is switched to ground while the luggage compartment lid is not open. The status of the luggage compartment lid contact switch is evaluated and made available by the junction box electronics.

SERVICE INFORMATION

Control Unit Replacement

Teaching in the Luggage Compartment Lid End Stops

If the luggage compartment lid lift control unit has been replaced, a new teach-in procedure will be necessary for the upper end stop. To do this, the luggage compartment lid has to be moved until obstructed by the upper stop.

The obstruction of the luggage compartment lid, and thus the drop-out of the Hall sensor pulses, marks the point at which the luggage compartment lid has reached its maximum opening angle. From this point, a value of approximately 5 % of the total opening angle is deducted. This will be the future opening angle of the luggage

compartment lid. This point is also named the soft stop.

The soft stop prevents the luggage compartment lid from opening as far as the end stop and being damaged.

NOTE: The lower end stop is determined by the change in status in the contact switch of the luggage compartment lid lock from open to closed. The junction box electronics send out the status of the luggage compartment lid contact switch on the K-CAN2.

Spindle Drive Replacement

It is necessary to disconnect the plug connections when replacing the spindle drives. To protect the control unit or the spindle drives, terminal 30B should be switched off beforehand.

If the HKL is woken in this situation, it checks whether the spindle drives are connected. If the spindle drives are in fact not connected, a fault code memory entry will be generated. In response to the fault code memory entry, the HKL prevents control of the spindle drives. The automatic luggage compartment lid actuating system does not work, even if the spindle drives are connected now.

The HKL control unit must be allowed to enter sleep mode once more and terminal 30B switched off. The spindle drives are checked again the next time the control unit is woken. If the check is successful, the automatic luggage compartment lid actuating system is switched to active again.

After replacing the spindle drives, closing and opening of the luggage compartment lid must be adapted to given vehicle conditions. The luggage compartment lid lift does not recognize the position of the luggage compartment lid after installing the new spindle drives.

The spindle drives must be taught-in at the vehicle to enable the luggage compartment lid to recognize the position. The corresponding diagnosis order must be carried out for this purpose. This will ensure smooth opening and closing of the luggage compartment lid.

NOTE: The service information does not replace the current information available to Service, nor does it replace repair instructions.

EXTERIOR LIGHTING

INTRODUCTION

Comprehensive Exterior Lighting Systems

The following information outlines the function of the exterior lighting system and the adaptive headlights. The F01/F02 are equipped with standard adaptive headlights.

The F01/F02 features the welcome light, making the vehicle even more customer friendly. The exterior lighting system is switched on for approximately 20 seconds when the vehicle is unlocked. This has the advantage of locating the vehicle more easily under unfavorable light conditions.

A further feature is the daytime driving light that can be activated or deactivated via the Personal Profile.

Control units for the exterior lighting system F01/F02

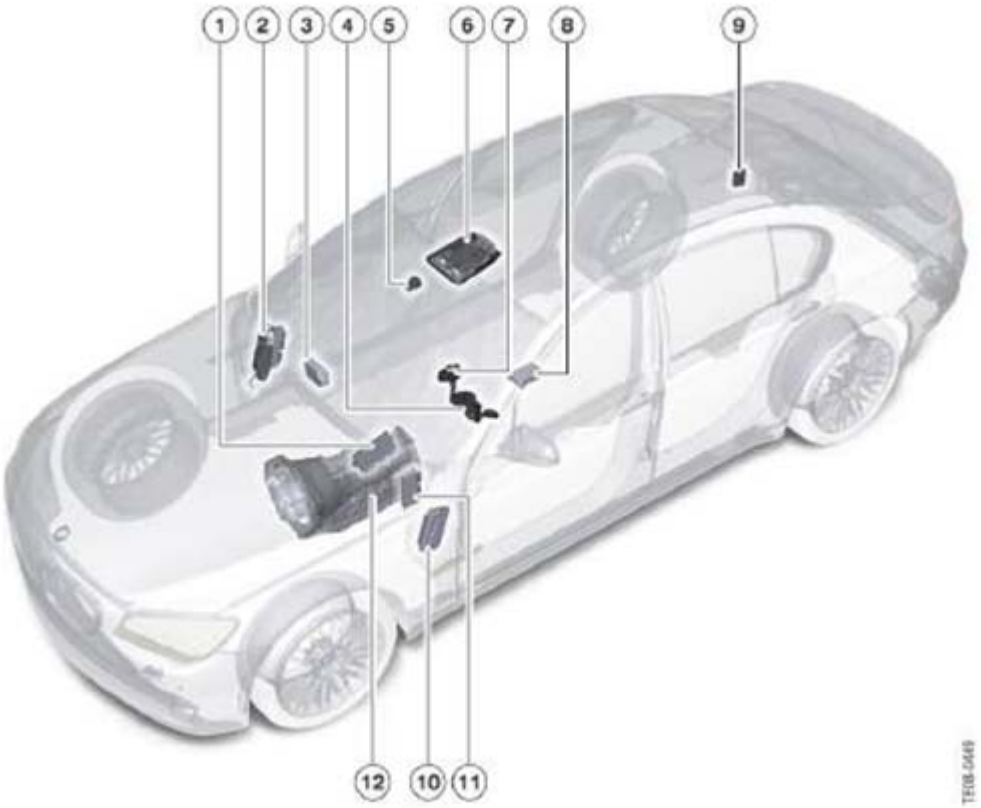


Fig. 44: Identifying Control Units For Exterior Lighting System F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Car Access System
2	Junction box electronics
3	Crash safety module
4	Steering column switch cluster
5	Rain/light/solar/condensation sensor
6	Roof functions center
7	Controller
8	Integrated chassis management
9	Trailer module
10	Footwell module
11	Central gateway module
12	Electronic transmission control

Exterior Lighting System with Adaptive Headlights

The adaptive headlights include the functions of the exterior lighting system. However it allows panning of the bi-xenon low-beam and high-beam headlights when cornering.

NOTE: Standard equipment for the vehicle includes bi-xenon headlights, fog lights and automatic driving lights function.

Panning of the bi-xenon low-beam and high-beam headlights is adapted continuously during cornering. Illumination during cornering therefore improves the driver's vision.

Illumination during cornering results in:

- Safer cornering with faster identification of obstacles
- Better perception of the environment
- Prevention of accidents.

The electronics of the adaptive headlight allow fast reaction to the current driving conditions. The system is controlled by the electronics and is less susceptible to malfunctions than purely mechanical systems.

Furthermore an emergency program can be activated via the electronics.

System Overview

Schematic Circuit Diagram - Exterior Lighting System, Front

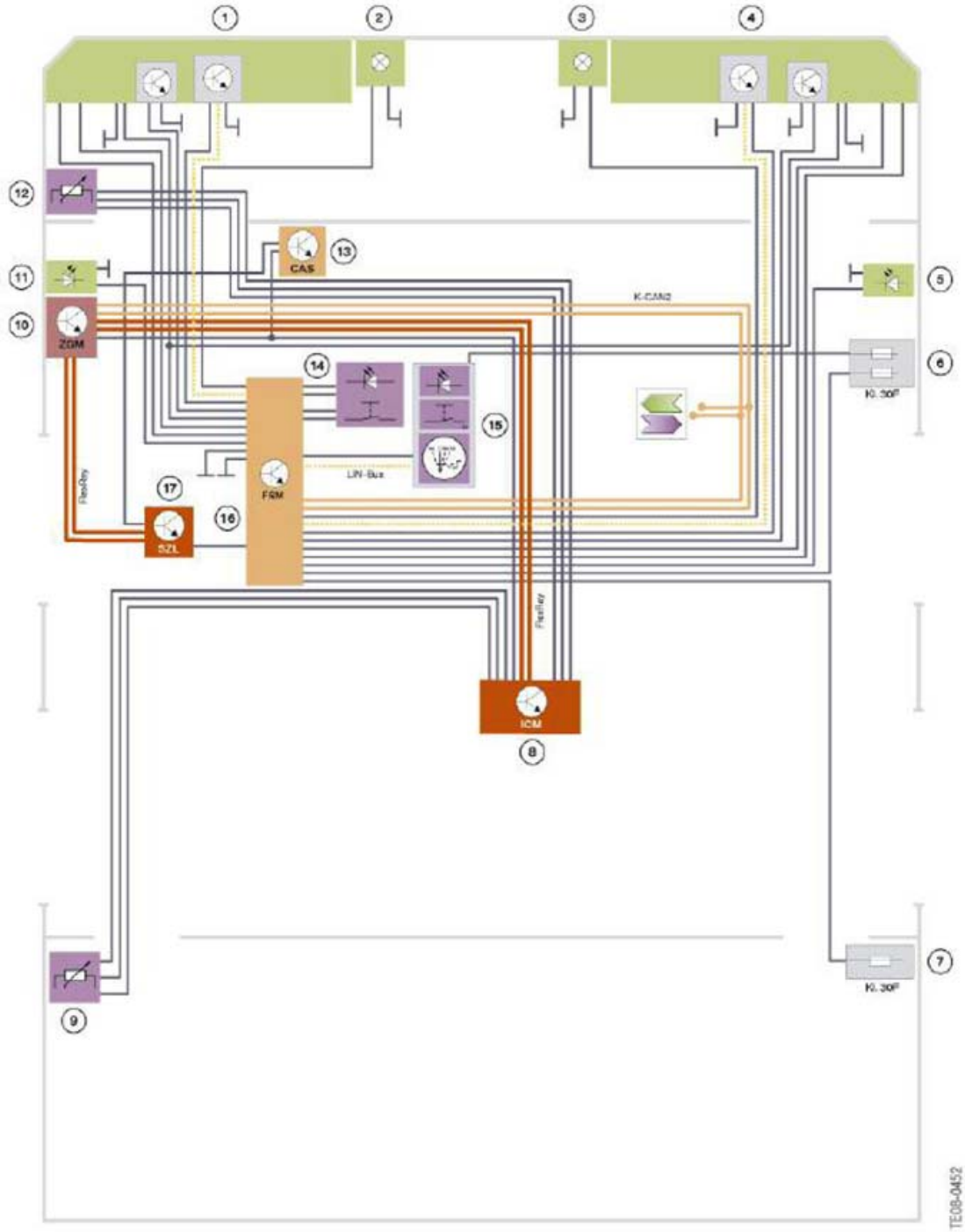


Fig. 45: Exterior Lighting System Circuit Diagram (Front)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Main headlight, left

2	Front fog light, left
3	Front fog light, right
4	Main headlight, right
5	Direction indicator repeater, right
6	Power distribution box, front
7	Power distribution box, luggage compartment
8	Integrated Chassis Management ICM
9	Ride-height sensor, rear
10	Central gateway module ZGM
11	Direction indicator repeater, left
12	Ride-height sensor, front
13	Car Access System (CAS)
14	Hazard warning lights switch
15	Control panel, light switch
16	Footwell module FRM
17	Steering column switch cluster SZL
K-CAN2	Body CAN2
FlexRay	FlexRay
LIN-Bus	Local interconnect network bus
KL. 30F	Terminal 30, fault switched

K-CAN2 signals at footwell module

K-CAN SIGNALS CHART

In/Out	Information	Sender/Receiver	Function
In	Crash signal	Crash sensor > Crash safety module	Interior lighting ON, hazard warning lights ON, Terminal 58g ON
In	Status, trailer module	Trailer socket outlet > trailer module	Trailer lighting
In	Outside temperature	Outside temperature sensor > instrument cluster	Outside temperature for calculation of the headlight overheating protection
In	Delayed switch-off home lights	Controller > Central information display	Switch-on time for the home lights function
Out	Driving lights status	Light switch > Footwell module	Trailer lighting ON/OFF (trailer module)
Out	Direction indicator	Turn-signal/high-beam switch > Footwell module	Direction indicator ON (trailer module)
Out	Direction indicator status	Turn-signal/high-beam switch > Footwell module	Synchronization flashing signal (e.g. display in the instrument cluster)

The lights control panel (15) includes:

- Light switch

- Fog light button
- Rear fog light button
- Thumbwheel, instrument lighting.

The steering column switch cluster (15) includes:

- Steering column stalk, turn-signal/highbeam switch
- Button for automatic driving lights control on wiper steering column stalk.

Illumination, Front

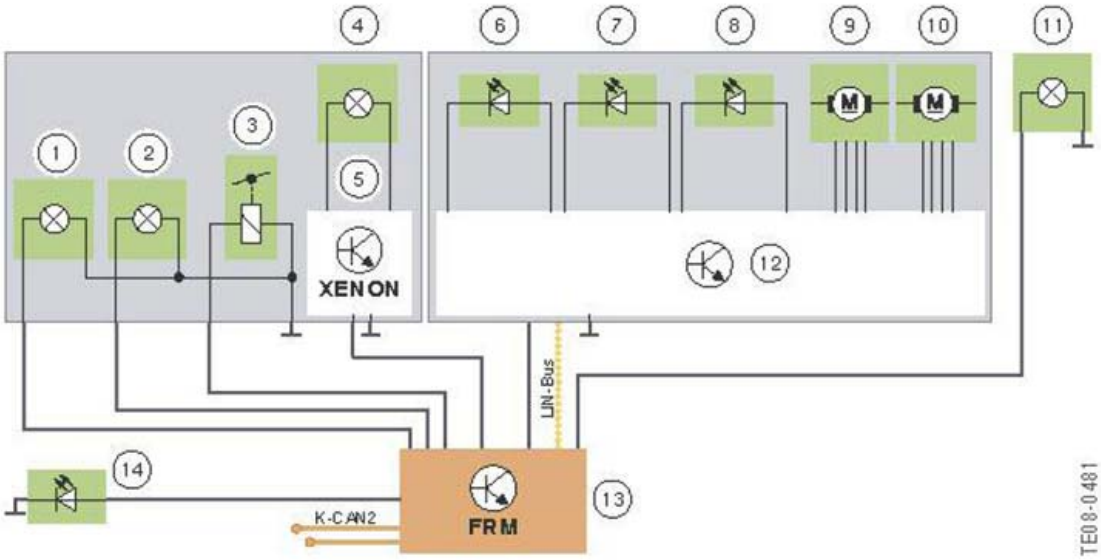


Fig. 46: Illumination Circuit Diagram (Front)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Turning light
2	Side lights/daytime driving light
3	High beam shutter, bi-xenon
4	Bi-xenon lamp for driving light/high-beam headlight
5	Xenon ballast
6	Side marker light
7	Direction indicator lights
8	Design light
9	Stepper motor, headlight vertical aim control
10	Stepper motor for adaptive headlight
11	Fog lights
12	Headlight driver module

13	Footwell module
14	Direction indicator repeater, left

Schematic Circuit Diagram - Exterior Lighting System, Rear

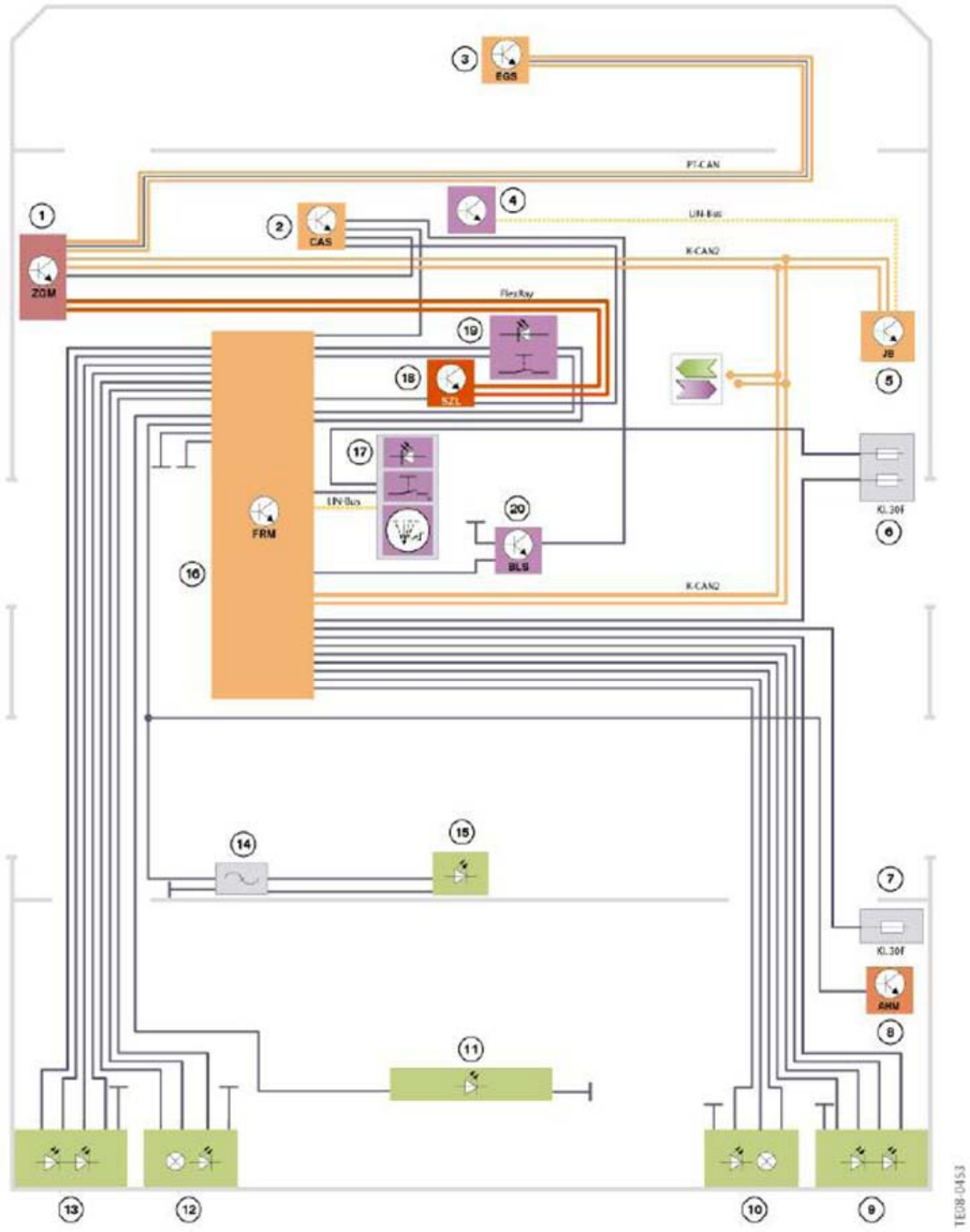


Fig. 47: Exterior Lighting System Circuit Diagram (Rear)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Central gateway module (ZGW)
2	Car Access System (CAS)
3	Electronic transmission control (EGS)
4	Rain/driving lights/condensation/solar sensor *
5	Junction box electronics (JB)
6	Power distribution box, front
7	Power distribution box, luggage compartment
8	Not for US
9	Outer rear light cluster, right
10	Inner rear light cluster, right
11	License plate light
12	Inner rear light cluster, left
13	Outer rear light cluster, left
14	Filter with trap circuit
15	Additional brake light
16	Footwell module (FRM)
17	Control panel, light switch
18	Steering column switch cluster (SZL)
19	Hazard warning switch
20	Brake light switch
PT-CAN	Powertrain CAN
K-CAN2	Body CAN2
FlexRay	FlexRay
LIN-Bus	Local interconnect network bus
KI. 30F	Terminal 30, fault switched

The rear light clusters (9 and 13) include:

- Brake light
- Direction indicator lights
- Tail lights
- Side marker light.

The rear light clusters (10 and 12) include:

- Brake light
- Reversing light
- ail lights
- Adaptive brake light, US version.

Illumination, Rear

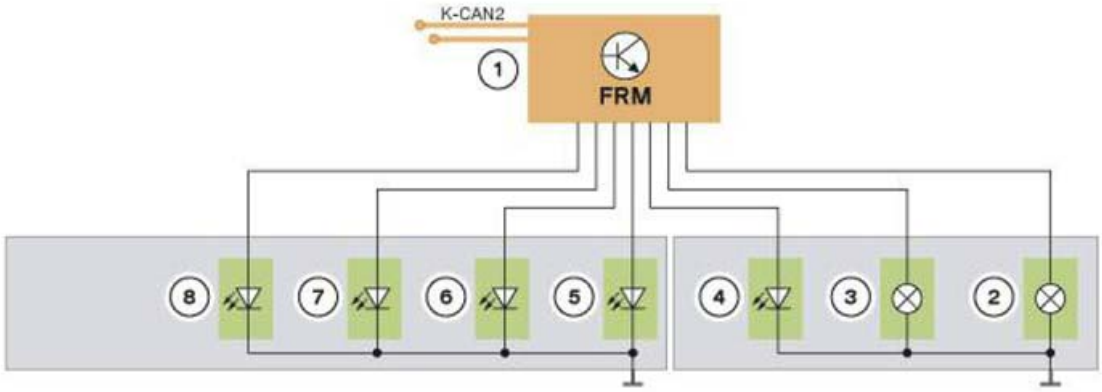


Fig. 48: Illumination Circuit Diagram (Rear)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Footwell module (FRM)
2	Reversing light
3	Rear fog light/brake force display
4	Tail light 2
5	Tail light 1 including side marker light
6	Brake light 2
7	Brake light 1
8	Direction indicator lights
K-CAN2	Body CAN2

FUNCTIONS

Overview

The functions of the exterior lighting are integrated in the footwell module.

These lighting functions are:

- Side lights
- Low beam headlight
- High-beam headlight
  - Headlight flasher
- Fog light
- Direction indicator light
  - Hazard warning light

- Tail light/license plate light
- Dynamic brake light
- Reversing light
- Parking lights
- Welcome light
- Delayed switch-off home lights
- Daytime driving light.

The headlight lighting functions are powered via a headlight driver module or the footwell module.

The footwell module controls a constant brightness level for each headlight. This is achieved with a pulse-width regulated voltage supply. Voltage fluctuations in the vehicle electrical and bus systems are compensated for by the pulse width.

The headlight driver module receives the information on the voltage supply for its light source via the LIN bus.

NOTE: The LEDs, e.g. in the additional brake light, tail light or bi-xenon headlight are not controlled but rather activated at 100%pulse width.

In addition to the standard light functions, further functions for the exterior lighting are integrated in the footwell module:

- Dynamic beam throw adjustment system
- Lamp monitoring
  - Cold monitoring with lights "OFF"
  - Hot monitoring with lights "ON"
- Visual alarm/feedback
  - Central locking system
  - Antitheft alarm system
  - Crash signal
- Special case at "Terminal 15 OFF"
- Emergency operating mode
- Adaptive headlight with
  - Turning lights
  - Adaptive headlight-range adjustment system.

LIGHT FUNCTIONS

Side Light, Low Beam and High Beam

The exterior lighting system is switched on via the light switch.

The following table shows the terminal setting for switching on the exterior lighting.

LIGHT FUNCTIONS

Light function	Activation by	Terminal
Side lights	Light switch, position 1	Terminal 30F ON
Low beam headlight	Light switch, position 2	Terminal 15 ON
High-beam headlight	Briefly press steering column stalk forward	Terminal 15 ON
Headlight flasher	Pull steering column stalk back	Terminal R ON

The control panel contains the light switch for the side lights and low beam headlights as well as the following components:

- Fog light button
- Display for automatic driving lights control
- Thumbwheel for dimming the instrument lighting.

Examples of the lights control panel:

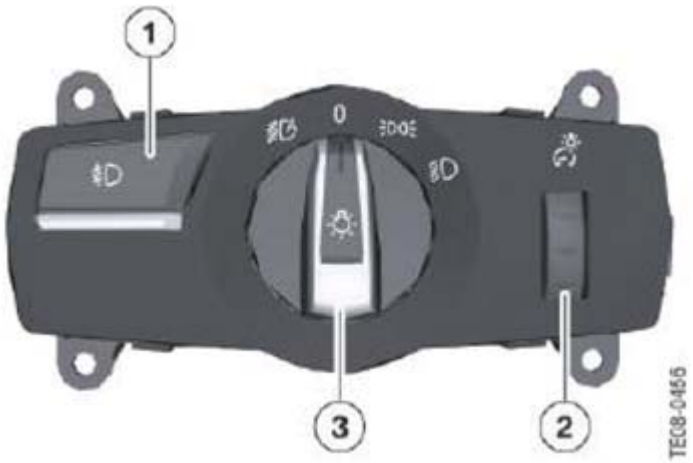


Fig. 49: Identifying Automatic Driving Lights Control Panel Components
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Fog lights
2	Dimmer, instrument lighting
3	Light switch

Side Light

The light switch in the light control unit must be turned to switch position 1 to switch on the side light.

The following lamps are activated together with switching on the side light:

- Daytime driving light corona rings, dimmed on bi-xenon headlights
- Tail lights
- Left/right license plate light
- Terminal 58 switched.

Low Beam Headlight

To switch on the low beam headlights, the light switch in the lights control panel must be turned to low beam headlight (switch position 2) When the low beam headlights are switched-on the bi-xenon headlights are activated.

After turning off the engine, the side lights stay on although the light switch is in switch position 2. The side lights are switched off automatically as the driver's door is opened.

NOTE: The light switch must be consciously set to switch position 1 in order to make the vehicle more easily detectable by means of the side lights when it is dark. An audible signal (gong) sounds and the check control message opposite is shown in the instrument cluster as soon as the side lights are switched on. Leaving the side lights switched on can drain the vehicle battery.



Fig. 50: Identifying Low Beam Headlight
Courtesy of BMW OF NORTH AMERICA, INC.

High-beam Headlight

The high beam headlight is switched on under following conditions:

- Terminal 15 ON and
- Light switch in position 2 low beam and
- Turn-signal/high-beam switch for high-beam headlight ON.

The headlight flasher is activated by pulling on the turn-signal/high-beam switch. The function is operative as from Terminal 30F ON.

Direction Indicator/high Beam Switch

The steering column switch cluster contains the direction indicator/high beam switch. The signal from the turn-signal/high-beam switch is transmitted from the steering column switch cluster via the FlexRay. The central gateway module transfers the signal to the KCAN2. The footwell module thus receives the signals from the turn-signal/high-beam switch.

Automatic Driving Lights Control

The following conditions must apply for the low-beam headlights to be switched on:

- Light switch in position A automatic driving light control and
- Status "Terminal 15 ON" and
- Rain/driving lights/solar sensor or rain/light/solar/condensation sensor signals darkness.

NOTE: The rain/driving lights/solar sensor has now been extended with the condensation sensor function. It performs the condensation sensor function for the air conditioning system.
Only the rain/light/solar/condensation sensor is used from now on in the description. The description also applies correspondingly for the rain/driving lights/solar sensor. Both sensors are connected over the LIN bus.

The footwell module switches on the low-beam light if the signal from the rain/light/solar/condensation sensor fails due to a defect.

The low beam lights are switched on together with the side lights by the automatic driving lights control system as soon as the rain/light/solar/condensation sensor detects a certain level of ambient brightness. The signal is sent from the rain/light/solar/condensation sensor via the LIN bus to the junction box electronics.

The junction box electronics routes the signal via the K-CAN2 to the footwell module. In turn, the footwell module evaluates the signal and switches on the driving lights.

The driving lights switched on by the automatic driving lights control system can be switched off with the light switch or by means of the rain/light/solar/condensation sensor.

The side lights can also remain on after "Terminal 15 OFF" because they were switched on by the automatic driving lights control function. The side lights are switched off automatically after opening the driver's door.

If a different door is used to exit the vehicle, the side lights will be switched off when the vehicle is locked.

The rain/light/solar/condensation sensor supplies the switch-on signal for the driving lights at a specific level of darkness.

The roof functions center is responsible for the voltage supply to the rain/light/solar/condensation sensor.

The junction box electronics queries relevant statuses via the LIN bus and transmits them over the K-CAN2.

Fog Lights

Switching Fog Lights ON/OFF

The fog lights can be switched on under the following conditions:

- Terminal 15 ON and
- Light switch in position 1 side lights or position 2 low-beam headlights ON or automatic driving lights control and
- Fog lights button pressed.

The fog lights are switched off by pressing the button again. When switched on, the fog lights can also be switched off by turning the light switch to the "Lights OFF" position.

The fog lights can be switched on again when the light switch is set to the side lights, low beam or automatic driving lights control position.



Fig. 51: Identifying A H-8 35 W Bulb In Fog Light
Courtesy of BMW OF NORTH AMERICA, INC.

A H-8 35 W bulb is fitted in each fog light.

Direction Indicator Lights

The front and rear direction indicator light as well as the side direction indicator repeaters can be switched on as from Terminal R ON. They are operated by means of the switch on the steering column switch cluster. The signal from the steering column stalk is transmitted redundantly via the FlexRay and a separate wire. This increases system availability, for instance in the event of faults.

It is nonetheless still possible to use the direction indicators if the information does not arrive at the footwell module via the bus system. This is because the information is available redundantly over the separate wire.

NOTE: The redundant transmission is also used for the one-touch indicating and headlight flasher functions.

A defective light source in the front or rear direction indicator lights causes the remaining direction indicator lights to flash at double the rate. A defective light source in the front direction indicator repeaters has no influence on the flashing rate of the direction indicator lights.

All direction indicator lights are equipped with LEDs (Light Emitting Diodes).

One-touch Indicating

The direction indicator lights are activated once in connection with one-touch indicating. In the personal profile it is possible to set the one-touch indicating function from flashing once to three times.

Hazard Warning Lights

The hazard warning lights are switched on by pressing the hazard warning switch. As a result, all direction indicator lights are activated simultaneously and the indicator in the hazard warning switch flashes in time.

The steering column switch has priority if it is moved in left or right direction while the hazard warning lights are active. The hazard warning function resumes after "Terminal 15 OFF" or cancelling the direction indicator.

The hazard warning lights have priority when the direction indicator lights for turning left or right are switched on and the hazard warning light switch is pressed.



Fig. 52: Hazard Warning Light Switch And Central Locking Button On Dashboard F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Hazard warning switch
2	Central-locking button

NOTE: At Terminal 30/Terminal 30B ON the hazard-warning lights are switched on with reduced consumption. This means the hazard-warning lights are on for a shorter time and off for a longer time.

Hazard warning lights in connection with alarm triggered by the anti-theft alarm system

The footwell module receives the request for the hazard warning lights via the K-CAN2. The signal is sent by the ultrasonic interior movement detector.

The alarm time for the hazard warning lights is 6 minutes provided the anti-theft alarm system is not switched off. The hazard warning light switch is blanked out during the alarm and therefore does not flash together with the lights.

NOTE: The ultrasonic interior movement detector is completely integrated in the roof functions center, both in terms of hardware and software.

Visual and Audible Indicators

The instrument cluster provides visual and audible indication of the turn signals. The footwell module informs the instrument cluster via the K-CAN2 to activate the acoustic generator and the indicator lights together with the direction indicator lights.

The visual/audible indicator in the instrument cluster switches off if the vehicle is locked with the central locking while the hazard warning light function is active.

Visual Feedback Through the Central Locking

The visual feedback is set at the factory. The direction indicator lights flash when the central locking is activated. The Car Access System makes available the signal necessary for this purpose via the K-CAN2.

The visual feedback can be deactivated in the personal profile.

The anti-theft alarm system can also initiate visual feedback for the customer.

Tail Light/License Plate Light

In the same way as the side lights, the tail light can be switched on from Terminal 30F ON together with the license plate light by using the light switch (position 1).

Rear Light Cluster

The rear light cluster of the F01/F02 is based on a split design. One part is integrated in the body and the other in the luggage compartment lid. The two parts form the complete rear light cluster.

The rear light cluster in the body section is fitted with LEDs for the following lighting functions.

- Tail lights
- Brake light
- Direction indicator lights
- Side marker light, integrated in the tail light.

Three lighting functions are integrated in the rear light cluster. They are:

- Reversing lights 16 W
- Brake light (US version "Brake Force Display" - BFD)
- Tail lights based on LEDs.

At Terminal 30 the consumption of the tail lights is reduced by only switching on the tail light in the rear side panel.



Fig. 53: Identifying Left-Hand Two-Piece Rear Light Cluster Design, F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Reversing light
2	Tail light (LEDs)
3	Brake light in US version (BFD)
4	Brake light (LEDs, in outside and inside chambers)
5	Reflector, side marking
6	Tail light (LEDs)
7	Direction indicator light (LEDs)

License Plate Light

The license plate light is designed based on LEDs. The LEDs are integrated in the strip handle on the luggage compartment lid. Three LEDs are used for each license plate light.



Fig. 54: Identifying Left And Right License Plate Light With Trunk Release Button
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	L and R License plate lights
2	Trunk release button

Brake Light

As from "Terminal R ON", the brake lights can be switched on by activating the brake light switch.

The Car Access System powers the brake light switch with 5 V voltage. The footwell module evaluates the status of the brake pedal switch and actuates the brake light. The brake light switch provides two levels.

The signal of the brake pedal switch is also used for the beam throw adjustment (LWR).

NOTE: The brake light can also be activated by a braking assistant function such as ACC.

Adaptive Brake Light - US

The current adaptive brake light remains in the national-market version US. Braking is indicated by an increase in size and luminous intensity. It is not permissible for the red surfaces of the brake light to flash. The adaptive brake light is part of the standard equipment.

The following conditions must be met for operation of the adaptive brake light:

- Driving speed > 5 kph (3 mph)
- Brake deceleration above 5 m/s2 or
- Control intervention by the antilock braking system.

Reversing Light

The reversing light can be switched on as from "Terminal 15 ON". The footwell module receives the signal via the K-CAN2. The electronic transmission control unit makes available this signal.

When the vehicle is in trailer towing mode, the reversing light of the trailer is additionally activated via the trailer module.

Parking Lights

The parking lights are switched on with the steering column switch as from "Terminal 30" and detected by the footwell module via the KCAN2.

For the parking light function, the footwell module activates the front side lights and the tail light in the outer chamber of the rear light cluster.

The steering column stalk for the parking lights must be pressed for longer than half a second. This prevents the parking lights being switched on by mistake, e.g. by knocking against the steering column switch while getting out of the car.

More Functions

Bi-xenon Headlights

Bi-xenon headlights are installed as standard equipment and are located in the outer chamber of the headlights.

In connection with the bi-xenon headlights, the shutter for the low beam light is activated by the "high beam ON" signal thus enabling the high beam light. High beam is also used for the headlight flasher function



Fig. 55: Identifying Bi-Xenon Headlights Components
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Turning lights
2	Bi-xenon low beam/high beam
3	Position light/daytime driving lights/design light
4	Side marker light (US only)
5	Direction indicator lights
6	Side lights/daytime driving lights corona ring
7	Side lights/daytime driving lights corona ring

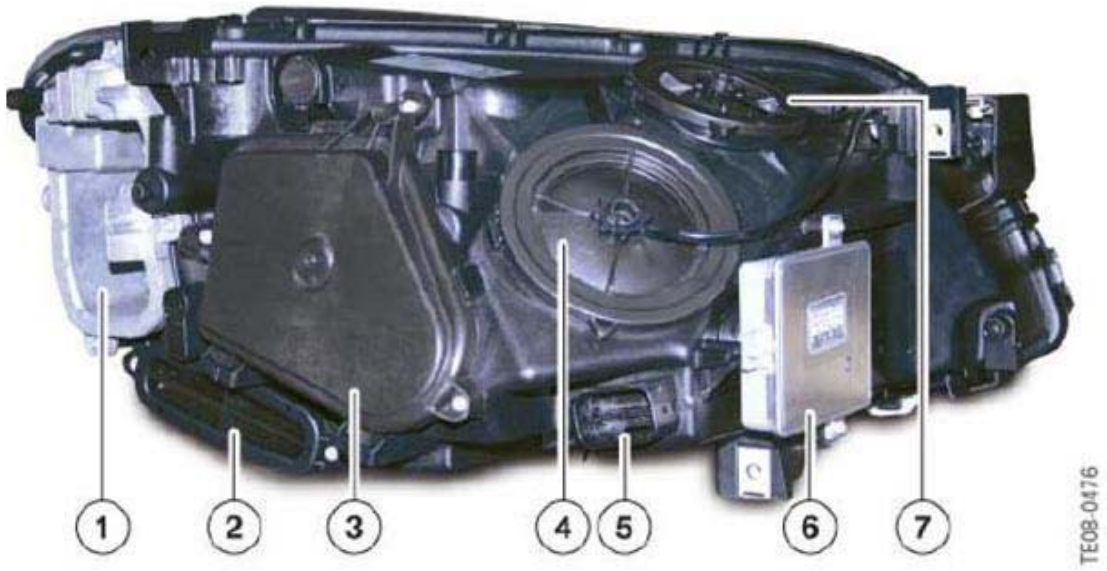


Fig. 56: Identifying Bi-Xenon Headlights F01/F02 (Rear View)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Direction indicator lights heat sink
2	Headlight driver module
3	Cover for bi-xenon lamp
4	Cover for lamp, side lights/daytime driving lights corona ring
5	Headlight connection
6	Voltage supply for bi-xenon lamp
7	Cover for lamp, turning lights

Daytime driving lights

A 35 W bulb for the daytime driving light is in the headlight inner chamber. The daytime driving light with respect to the side lights is produced by the inner and outer corona rings. The corona rings are fiber optics conductors.

The inner corona ring is illuminated from behind. The reflector is designed to ensure that the light mainly illuminates the corona ring. Light from the same headlight chamber is coupled in two fiber optics cables and fed to the outer corona ring.

The footwell module decreases the daytime driving lights as soon as the side lights or low beam lights are switched on. Consequently, both corona rings of the daytime driving light are now used for the side lights.

The light switch must be in position "0" in order to activate the daytime driving lights.

The daytime driving lights are also switched on at low beam OFF with automatic driving lights control. The

light switch must be set to position "A".

The daytime driving lights function is country-specific and is activated as from "Terminal 15 ON". The daytime driving lights can be deactivated/activated via the personal profile.

The daytime driving lights are switched off after "Terminal 15 OFF".

NOTE: The daytime driving lights cannot be deactivated in the personal profile in the US version. The daytime driving lights can also be activated in light switch position 1 side lights.

Welcome Light

The welcome light can not be activated when the light switch is in position "0" or "1". Furthermore, the side lights are also not to be activated.

The welcome light is switched on as soon as the vehicle is unlocked. For this purpose, the Car Access System makes available the status of the central locking system via the K-CAN2.

The footwell module receives the "Unlock vehicle" status and switches on the exterior lighting for approximately 20 seconds.

While switched on, the welcome light can be deactivated with the "Terminal 15 ON" status.

The following light units are activated:

- Tail lights
- Corona rings
- Side marker light
- Interior lighting
- Courtesy lighting
- Indicator light in the instrument cluster.

Delayed Switch-off Home Lights

The delayed switch-off home lights are standard equipment. The lights can be switched on via the steering column switch for high beam as from lights OFF, at Terminal 30.

The switch-on time is set at the factory to 40 seconds and can be set between 0 and 240 seconds in the "Personal Profile".

The low beam, side lights and tail lights are switched on when the home lights function is active.

Beam Throw Adjustment System

The F01/F02 has a dynamic beam throw adjustment system in the standard equipment. The dynamic beam

throw adjustment system is a legal requirement for bi-xenon light. The dynamic beam throw adjustment ensures that oncoming traffic is not dazzled.

One ride-height sensor is installed at the front and one at the rear for the beam throw adjustment system.

Front and rear ride-height sensors

One ride-height sensor is mounted on the front axle and the other ride-height sensor on the rear axle of the vehicle. The signals from the ride-height sensors are used for the beam throw adjustment LWR.

The ride-height sensors are evaluated directly by the integrated chassis management. The footwell module receives the signals from the integrated chassis management via the KCAN2. In the central gateway module the signal must be transferred from the FlexRay to the K-CAN.

Lamp Monitoring

The footwell monitors all lamps of the exterior lighting system both when switched on and when switched off. The monitoring function starts as from "Terminal 15 ON".

Cold monitoring with "Lights OFF"

Cold monitoring is based on measuring the current of the individual lamp outputs. The current pulse used for measurement purposes is so short that the lamps are not illuminated. The footwell module evaluates the individual lamp outputs to establish whether there is a line break or a lamp bulb is defective.

The number of current pulses is increased significantly during the first 4 seconds after "Terminal 15 ON". To check whether the lamps are in working order before setting off. This function is referred to as the pre-drive check.

The number of pulses is then reduced after the pre-drive check. Power is then applied to the lamps every 1.5 minutes.

The lights fitted with LEDs are not included in the cold monitoring system. The LEDs react too fast to the current pulse and would consequently light up.

The bi-xenon headlight is also not included in the cold monitoring.

Hot monitoring with "Lights ON"

Hot monitoring is based on measuring the current of the individual lamp outputs. The lamp current is used to detect an overcurrent or interruption (break). The front and rear direction indicator lights are also included in the lamp monitoring system.

Visual Alarm/feedback

Central locking system

The Car Access System outputs signals for the central locking system function. The footwell module also

receives the signals via the K-CAN2 and uses them for visual feedback of the central locking system.

Antitheft alarm system

The footwell module enables the anti-theft alarm system to trigger the visual alarm via the direction indicator lights.

The roof functions center with integrated ultrasonic interior movement detector makes available the signal for the visual alarm via the K-CAN2. Furthermore, the footwell module receives the signals from the roof functions center for visual feedback of the anti-theft alarm system.

Crash signal

The footwell module switches on the hazard warning lights and the interior lighting when the crash safety module sends a crash signal. The hazard warning lights can be switched off with the hazard warning light switch.

The light in the hazard warning light switch is switched off by pressing the light switch to position 0 "Lights OFF" or by means of the rocker switch on the steering column stalk.

Special Case at "Terminal 15 OFF"

The exterior lighting would be switched off if "Terminal 15 ON" fails during vehicle operation or Terminal 15 is inadvertently deactivated by pressing the START-STOP button. The driving lights remain switched-on in order to maintain road safety in this situation. When the driving speed drops below 20 kph (12 mph), the low beam light is also switched off after a delay of approximately 30 seconds.

Emergency Operating Mode

Emergency operating mode is assumed if a defect occurs in the software of the footwell module that could cause failure of the entire exterior lighting system. In this case, the tail lights and the additional brake light are activated. This function is active as from "Terminal 15 ON".

Driving lights: Low beam headlight and one tail light on each side

Brake lights: Additional brake light and one tail light on each side

Adaptive Headlight

Adaptive headlight are an option and include the following functions:

- Adaptive headlight
- Turning lights
- Variable headlight beam pattern
- Adaptive headlight-range adjustment system.

The adaptive headlight were introduced with the E60. The F01/F02 therefore also includes, for instance, the

functions variable headlight beam pattern or turning lights.

Furthermore, the adaptive headlight-range adjustment system is an additional function.

The light switch must be in the automatic driving lights control position.

Legal Regulation

Panning of headlights for the adaptive headlights is permitted within certain limits. An important point is that oncoming traffic is not to be dazzled by the headlights.

When the driver turns the steering wheel the vehicle moves on a circular track. The circular track is defined by movement of the wheels and the angle setting of the front wheels.

In order to avoid dazzling oncoming traffic, the break point of the headlight cut-off line must not lie on the left of the circular track within the distance of 100 times the headlight installation height.

The statement for the cut-off line refers to driving on the right. For driving on the left the statement for the cut-off line is mirror-symmetrical.

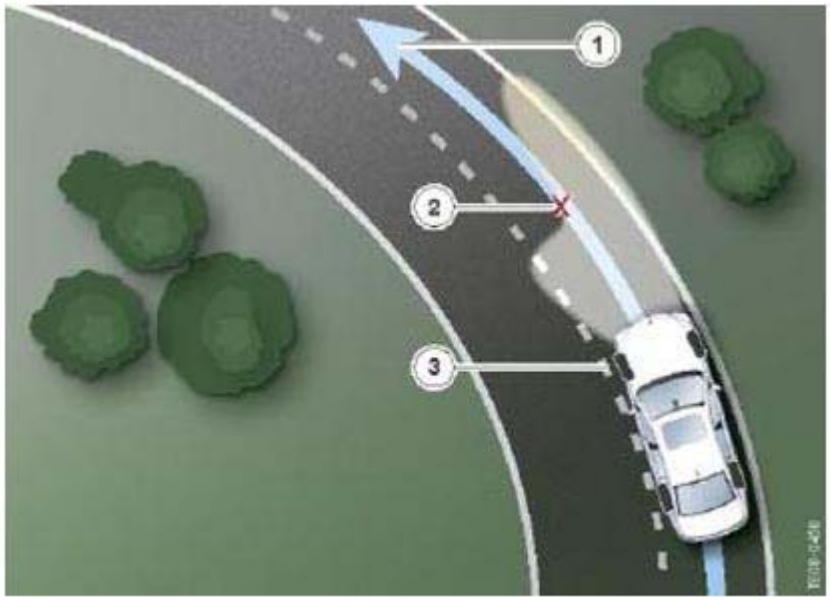


Fig. 57: Identifying Break Point Cut-Off Line For F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Estimated circular track
2	Cut-off line break point
3	Steering angle

Preconditions for the Adaptive Headlight

To ensure its operability, the adaptive headlight must be adapted to the vehicle-specific data. The vehicle-specific data are located in the footwell module and in the headlight driver modules.

The footwell module contains the data:

- Vehicle identification number
- Vehicle type.

The headlight driver modules contain the data for:

- Headlight and headlight swivel range
- Permitted acceleration and deceleration ramps
- Characteristic speed maps
- Encoding
- Vehicle identification number
- Vehicle type.

The footwell module has the central responsibility for the adaptive headlight function. The entire software for the adaptive headlight is therefore located in the footwell module.

The footwell module is connected via the LIN bus for communication with the headlight driver modules.

The footwell module requests the current headlight status. The footwell module sends the requests necessary for panning the light from the headlights to the headlight driver modules via the LIN bus.

The footwell module is also still connected to the vehicle electrical and bus systems via the K-CAN2. Signals important for the function of the adaptive headlights are received by the footwell module via the K-CAN2.

The table below lists those control units that provide input signals.

K-CAN SIGNALS CHART

Control unit	Signal
Car Access System	Wake-up
Dynamic stability control	Vehicle speed and yaw rate
Rain/light/solar/condensation sensor	Switch on lights when dark
Integrated Chassis Management	Vehicle level

Bi-xenon Headlight

Each bi-xenon headlight contains following components:

- Bi-xenon control unit

- Swivel module for bi-xenon headlight
- Stepper motor for headlight vertical aim control
- Side light corona/daytime driving light corona
- Direction indicator lights
- Design light
- Side marker light
- Headlight driver module.

Bi-xenon Control Unit

The bi-xenon control unit is located on the bi-xenon headlights.

It supplies the power and ignition voltage for the bi-xenon light bulb.

Swivel module for bi-xenon headlight

Among other things, the swivel module contains following components:

- Bi-xenon lamp
- Hall sensor for zero position
- Stepper motor.

The bi-xenon light bulb is integrated in the swivel section of the adaptive headlight. The zero position Hall sensor registers the zero position of the swivel module.

The stepper motor provides the swivel movement of the swivel module. A separate stepper motor is installed for the headlight vertical aim control.

The headlight driver module controls and monitors the movement of the stepper motors for the adaptive headlights and the vertical aim control system.

Side lights/daytime driving light

The side lights/daytime driving light is designed as a fiber optics light guide ring. A 35 W bulb (H8) supplies the light to the fiber optics ring from below.

Switch-on Conditions

The adaptive headlight can be activated as from terminal status "Terminal 15 ON".

The rain/light/solar/condensation sensor sends the request to switch on the low beam headlights as soon as it detects low light levels (darkness). Initially, the footwell module switches on the headlight driver modules. The adaptive headlight is ready for operation following a reference run of the bi-xenon headlights.

NOTE: A reference run is performed during every new start.

The conditions for switching on the adaptive headlight are:

- "Terminal 15 ON"
- Light switch in automatic driving light control position
- Rain/light/solar/condensation sensor detects darkness
- Both bi-xenon headlights are intact.

NOTE: The footwell module detects a defective bi-xenon headlight by measuring the intake current of the respective bi-xenon headlight.

Switching on Adaptive Headlight

The adaptive headlight is switched on as soon as the rain/light/solar/condensation sensor sends the switch-on signal for the low-beam headlight.

Function Indicator

The low beam headlight and the headlight vertical aim control remain active in the case of fault. The swivel function of the bi-xenon modules is deactivated. A Check Control message is output on the instrument cluster.

Reference Run

In order to determine the zero position, the adaptive headlight performs a reference run depending on the current position of the swivel module.

To avoid a hysteresis during calibration, the swivel module always moves from the same side over the zero position sensor.

This is achieved in that the swivel module is always moved to the same side of the zero position sensor before switching off the adaptive headlight.

Zero Position Sensor

The zero position of the swivel module with respect to the zero position sensor is detected by a 1/0 edge when swivelling from the direction of the off position in the direction of the optical axis. The swivel module is repeatedly calibrated during operation based on this "soft" reference point.

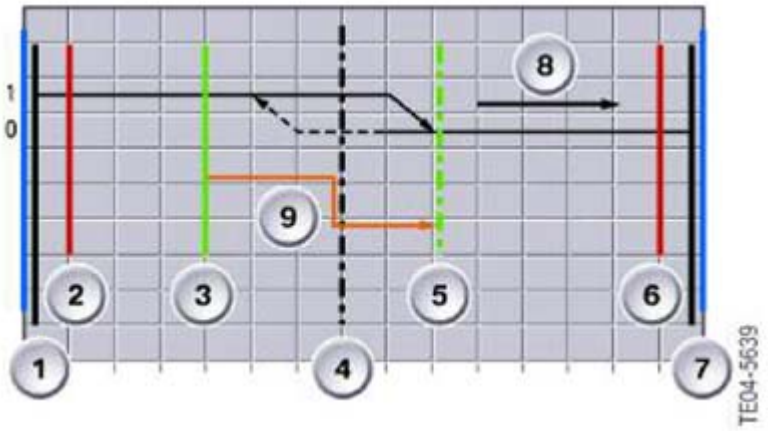


Fig. 58: Zero Position Sensor Detection Range
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Mechanical stop, minimum
2	Electrical stop
3	OFF position
4	Position of zero position sensor
5	Position of optical axis = 0
6	Electrical stop, maximum
7	Mechanical stop
8	Swivel direction
9	Reference run from left

Driving the stepper motor in positive direction of the swivel module corresponds to swivel movement to the right.

Mechanical Stop

Items 1 and 7 represent the mechanical stops of the swivel module. The mechanical stops are defined by the design of the headlights.

Differential Angle

A differential angle is required when the position of the swivel module is not known. A reference run that extends to the mechanical stops must be performed for this purpose. This is known as a "hard" reference run.

Optical Axis

The swivel position, in which the swivel module is in the straight-ahead direction of the vehicle is referred to as the optical axis. An angle of 0° is assigned to this position.

The optical axis is defined exactly as an angle with respect to the zero position sensor and as an angle with respect to the mechanical stop.

Consequently, the optical axis during swivel movement can be "normally" determined by way of the zero position sensor.

The differential angle with respect to the mechanical reference point is used in the case of fault.

Swivel Range

Normally, the swivel module does not move to the mechanical stop but rather to the electric minimum and maximum stops.

Adjustment of the swivel module to the electrical stops avoids the loss of pulses on reaching a mechanical stop.

The minimum and maximum electrical stops are defined as angles with respect to the zero position.

NOTE: The panning ranges define the maximum pan angles that the adaptive headlights can utilize.

Panning, raising and lowering headlights

Via the LIN bus the footwell module instructs the headlight driver modules to actuate the respective stepper motors.

The headlight driver modules activate the stepper motors for panning. For the variable headlight beam pattern, the headlight driver modules also actuate the stepper motors to raise or lower the headlights. The maximum adaptive headlight panning range must not be exceeded when cornering. This must also be considered for the variable beam pattern headlights.

The off-side headlight requires a certain outward pan angle combined with a certain amount of lowering according to the headlight beam pattern.

The outward pan angle must be subtracted from the adaptive headlight pan angle for left-hand bends.

The table below shows which headlights are moved to set the various headlight beam patterns. The first example illustrates the situation for movement when driving in a straight line.

Driving in a straight line, left-hand drive vehicle

LIGHT FUNCTIONS

Light function	Off-side headlight	Near-side headlight
Urban beam pattern	Pan approximately 12° outwards and lower slightly by approximately 0.7°	-
Single-carriageway beam pattern	Basic beam pattern	Basic beam pattern

Fog light	Pan approximately 8° outwards and lower slightly by approximately 0.7°	-
Highway beam pattern	Pan approximately 3.5° outwards and lower slightly by approximately 0.25°	Raise slightly by approximately 0.2°
High beam	Single-carriageway beam pattern and main beam	

The angles quoted relate to headlights in the straight-ahead position!

Example for left-hand bend

When the urban beam pattern is active, the off-side headlight pans approximately 12° outwards. At the same time, the headlight is slightly lowered. Since, a panning range of up to 15° is available for left-hand bends, only 3° more is left for corner illumination.

Example for right-hand bend

When the urban beam pattern is active, the off-side headlight pans approximately 12° outwards. At the same time, the headlight is slightly lowered. For a right-hand bend a panning range of 8° is available. The headlight pans the full 8°.

Traverse Rate

The traverse rate of the swivel modules is up to 30°/second.

Swiveling

The following signals are made available to the footwell module for the purpose of moving the swivel module.

- Steering angle
- Road speed
- Yaw rate.

Under normal driving conditions, the adaptive headlight is controlled by the data from the steering angle sensor up to a speed of approximately 40 kph (25mph).

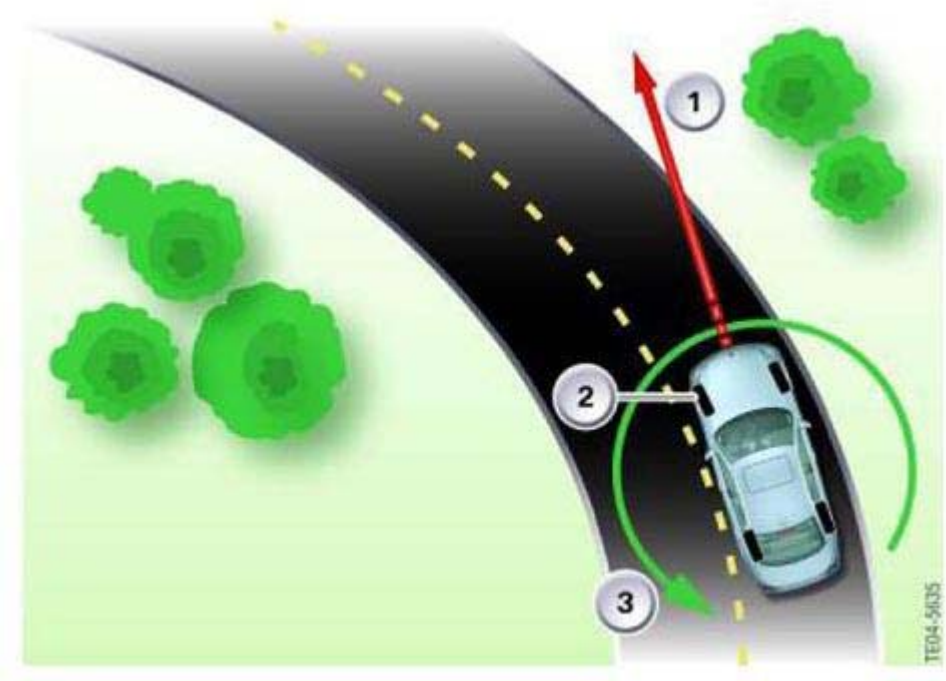


Fig. 59: Input Signals In E90
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Vehicle speed
2	Steering angle
3	Yaw rate

The yaw rate sensor is included in the calculation

- at speeds higher than approximately 40 km/h (25 mph)
- in the event of vehicle oversteering or understeering
- a vehicle tending to yaw.

The wheel speed sensors supply the signals for the vehicle speed. The dynamic stability control evaluates the wheel speed sensor of each wheel.

The vehicle oversteering/understeering or yawing is detected by means of the steering angle sensor and the yaw rate sensor.

The adaptive headlight is deactivated in the event of the vehicle oversteering/understeering or yawing. The swivel module returns to its zero position.

NOTE: The yaw rate sensor makes available signals relating to the yaw of the vehicle about the vertical axis. It is installed between the driver's and front passenger

seats on the transmission tunnel.
The steering angle sensor is integrated in the steering column switch cluster. It is an optical sensor and makes available data relating to the steering wheel lock angle.

Headlight Driver Module

The headlight driver module controls and monitors the stepper motors for the adaptive headlights and the headlight beam throw adjustment system of the respective bi-xenon headlight.

The integrated chassis management makes available the values for the dynamic headlight beam throw adjustment system to the footwell module. The footwell module receives these values via the K-CAN2. In this way the beam angle can be adapted to the different driving situations, e.g. laden/unladen.

The signal from the integrated chassis management must be transferred to the KCAN2 in the central gateway module.

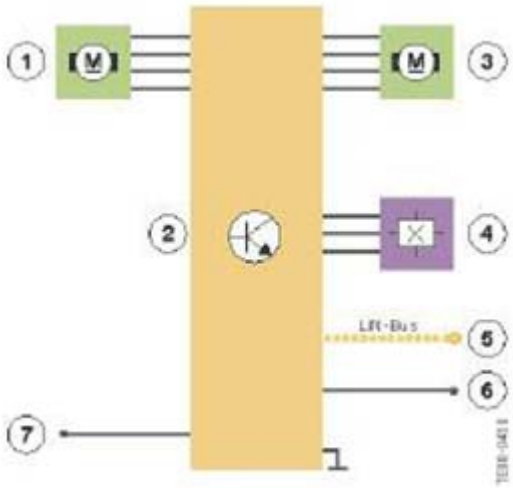


Fig. 60: Headlight Driver Module Circuit
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Stepper motor for adaptive headlight
2	Headlight driver module
3	Stepper motor, headlight vertical aim control
4	Zero position sensor
5	LIN-Bus
6	Coding pin for right/left
7	Voltage supply +

The headlight driver module fulfils the following functions:

- Receiving and evaluating the data sent from the footwell module via the LIN-bus:
  - Reference run
  - Target position commands
  - Diagnosis requests
- Output control of the stepper motors
- Zero position acquisition of swivel module
- Reference run of swivel module
- Position feedback of swivel module to footwell module
- Diagnosis
- Feedback of diagnosis data to the footwell module.

The footwell module in its function as the central control unit for the adaptive headlight checks the status of the headlight driver modules every 20 ms.

Furthermore, the footwell module initiates activation of the LEDs in the front headlights.

Zero Position of Swivel Module

The zero position of the swivel module is determined by the zero position sensor. The zero position sensor is a Hall sensor. The falling edge of the Hall sensor is evaluated to determine the zero position. The zero position corresponds to exactly the position of the swivel module in the straight-ahead position of the vehicle.

The headlight driver modules prepare the data for data transfer via the LIN bus. The footwell module requests the data from the headlight driver modules.

NOTE: The sensor signal can be read out during diagnosis.
The sensor is defective if no sensor signal is applied.

Switch-off Conditions

As from "Terminal 15 OFF", the footwell module sends the request via the LIN bus to assume the rest position of both swivel modules to the headlight driver modules. On reaching the rest position of the swivel modules, the headlight driver modules send a confirmation to the footwell module. The headlight driver modules also activate the side lights function.

Afterunning Time

The afterunning time is 2 seconds.

Check Control Message

The Check Control messages below exist for the adaptive headlights and the beam throw adjustment system.

CHECK CONTROL MESSAGE CHART

Check control message	Description	Information in central information display
	Beam throw adjustment system	Headlight beam throw Beam throw adjustment system of the headlights faulty. Road illumination not optimum. Possible dazzling of oncoming traffic. Have checked by your BMW dealer as soon as possible.
	Adaptive headlight failure	Adaptive headlights. Adaptive headlight failure. Have checked by your BMW dealer.

Turning Lights

The turning light function is available only in connection with the option Adaptive Headlight. In addition to the adaptive headlights, the turning light additionally illuminates the area in front of and beside the vehicle.

The turning light makes it possible to recognize persons or traffic situations earlier in the turn-off area.

Parameters such as the steering angle and vehicle speed are taken into account for the turning light function.

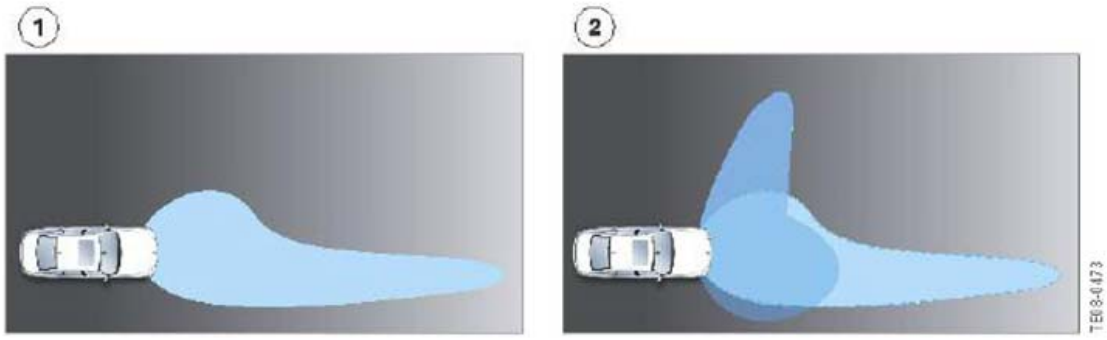


Fig. 61: Fundamental Illumination With Turning Light F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

TURNING LIGHT ILLUMINATION CHART

Index	Explanation
1	Without turning light
2	With turning light

Condition for Switching the Turning Light on and off

The low beam headlight must be switched on by the automatic driving light control function for the turning light to be activated. The turning light is activated only under the following conditions.

Function matrix for activation of the turning light:

CONDITION FOR SWITCHING TURNING LIGHT ON AND OFF

Driving direction	Condition	Side with activated turning light
Forward	• Speed below 40 kph (25mph) • Direction indicator activated.	Same side as activated direction indicator
	• Speed below 70 kph (43 mph) • Steering lock.	On side in direction of steering lock
Reverse	• Speed below 40 kph (25mph) • Reverse gear activated • Direction indicator activated.	Same side as activated direction indicator
	• Speed below 40 kph (25mph) • Reverse gear activated • Steering lock.	Opposite side in direction of steering lock
	Only for US version: • Vehicle speed below 40 kph (25mph) • Reverse gear activated.	Both sides

NOTE: **The turning light is no longer switched off if only one signal fails, e.g. due to a defect.**
The turning light is equipped with an overheating protection. Therefore the turning light may be briefly deactivated when it is used for a long time.

US Version

In the US version, both turning lights are switched on when reverse gear is engaged. The turning light can be activated up to speed below 40 kph (25mph).

Turning lights at speeds up to 70 kph (43 mph)

In very tight corners with a radius of less than 100 m, the turning light function can now be activated for even better illumination at speeds up to 70 kph (43 mph). This is particularly helpful on switchback roads. The function is activated if the steering wheel is turned to an appropriate angle.

NOTE: **The turning light function can be activated below 40 kph (25 mph) by switching on the turn-signal indicator or turning the steering wheel by an appropriate amount.**

Input parameters:

- Headlights switched on by automatic headlights function
- Steering angle
- Road speed
- Light switch in automatic driving light control position.

Adaptive Headlight-range Adjustment System

The adaptive headlight-range adjustment system is designed for driving through dips and over crests.

When driving through a dip the headlight beam throw is increased. The headlights are moved up a small amount. The driver can see further and oncoming vehicles are not dazzled. Obstacles on the roadway can therefore be detected earlier than with earlier headlight systems. This allows an early reaction to obstacles and initiation of any evasive action that may be required.

BMW makes an active contribution to safer driving with the adaptive headlight-range adjustment system.

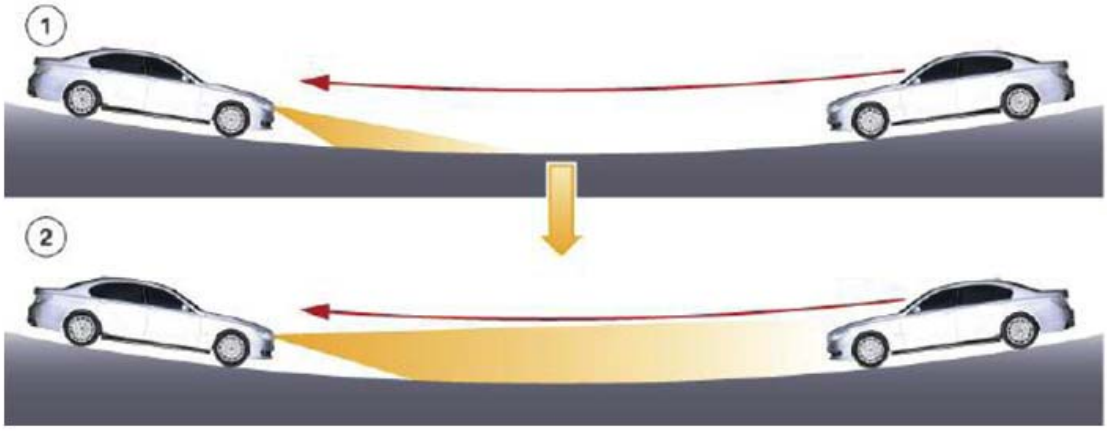


Fig. 62: Driving Through Dip
Courtesy of BMW OF NORTH AMERICA, INC.

When driving over a crest the beam pattern produced by the headlights is slightly lowered. Oncoming vehicles are not dazzled as much as with normal headlights. This contributes towards better road safety.

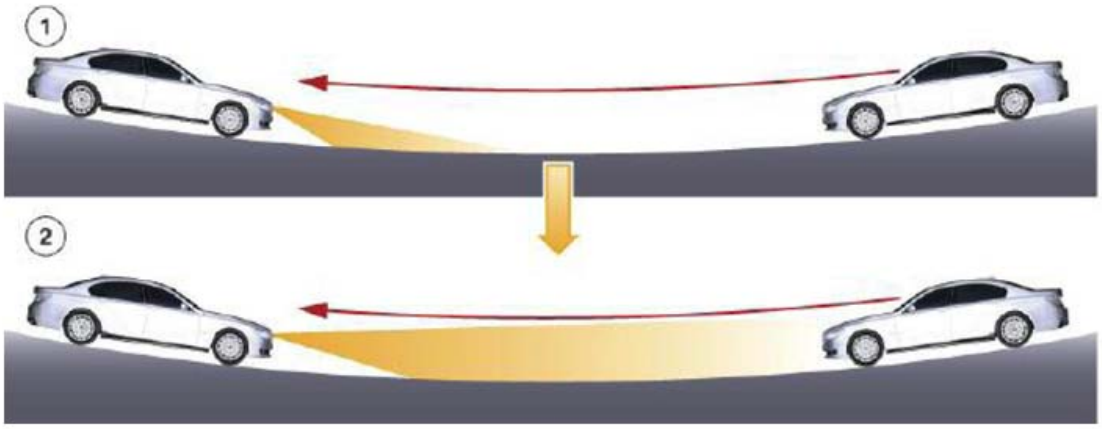


Fig. 63: Driving Over Crest
Courtesy of BMW OF NORTH AMERICA, INC.

ADAPTIVE HEADLIGHT-RANGE ADJUSTMENT SYSTEM

Index	Explanation
1	Vehicle without the adaptive headlight-range adjustment system without raising or lowering the headlights
2	Vehicle with the adaptive headlight-range adjustment system, headlights slightly raised or lowered

The red line shows the eye level of the oncoming traffic. The eye level is the location of the eyes when driving through a dip or over a crest.

NOTE: In the figurative sense, the adaptive regarded as being adaptive headlights rotated headlight-range adjustment system can be by 90°.

Dip and Crest

The graphic illustrates the terms dip and crest as they are used in the road traffic engineering field.

Start of a Crest

When driving over a crest data on the incline angle of the crest are needed. Otherwise the crest can not be detected. Therefore the light is lowered with a short delay at the start of a crest.

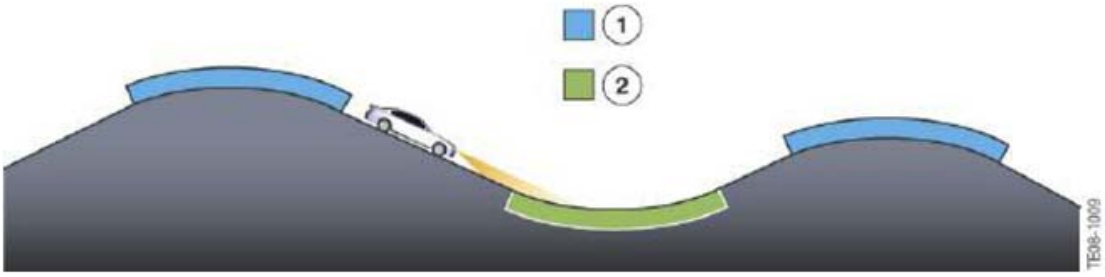


Fig. 64: Identifying Dip And Crest
Courtesy of BMW OF NORTH AMERICA, INC.

DIP AND CREST REFERENCE CHART

Index	Explanation
1	Crest
2	Dip

End of a Crest

The cumulative negative change to the incline angle is used to detect that the end of a crest is being approached. The headlights are lowered for driving over the crest. If the headlights were to remain in this position the light would illuminate the "ground" after a crest. In order to avoid this situation occurring, the footwell module switches the headlights back to the normal beam angle before the end of the crest.

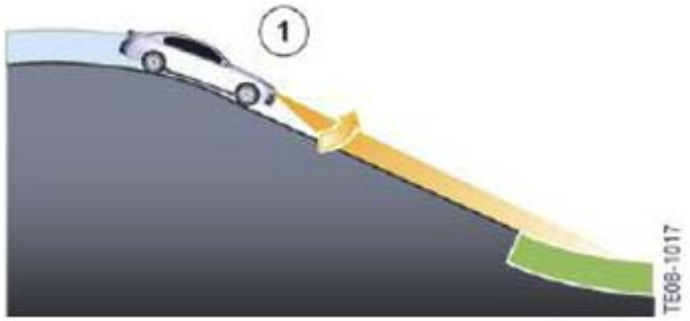


Fig. 65: Vehicle At End Of Crest
Courtesy of BMW OF NORTH AMERICA, INC.

CREST END

Index	Explanation
1	Headlights with normal beam angle at the end of a crest

System Overview

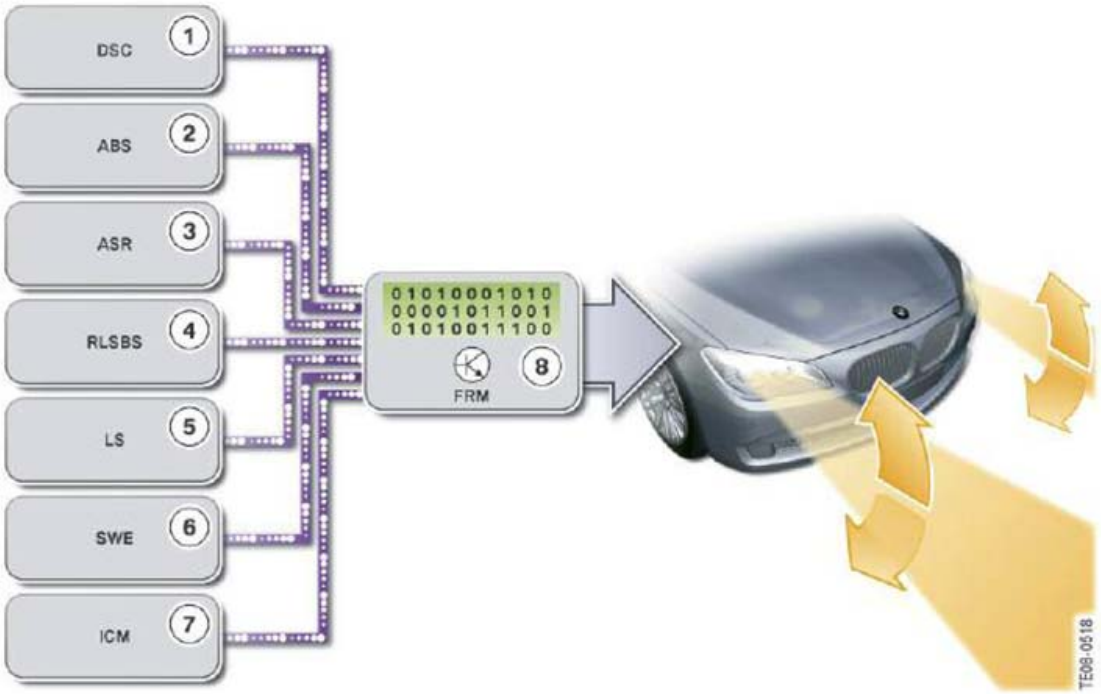


Fig. 66: Overview Of Adaptive Headlight-Range Adjustment System
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Dynamic Stability Control intervention
2	ABS system intervention
3	Automatic Stability Control intervention
4	Rain/light/solar/condensation sensor
5	Light Switch in Position "A"
6	Poor route detection system
7	Footwell Module (FRM)
8	Headlight activation adaptive headlight range adjustment system

Functional Principle

The adaptive headlight-range adjustment system only becomes active when the light switch is in position "A" and the driving lights have been switched on by the rain/light/solar/condensation sensor.

Raising or lowering of the headlight beam pattern is based to a great extent upon the calculation of two signals.

The signals are the driving speed as well as the longitudinal acceleration of the vehicle. These signals are used to calculate the incline and respectively the downhill gradient compared with the horizon. The footwell module continuously imports the signals via the K-CAN2 and uses them to calculate the current values for the adaptive headlight-range adjustment system. The values correspond to the incline angles over the time period. The incline angles may be positive, negative or zero. The difference between the individual incline angles is used by the footwell module to calculate whether it is necessary to adjust the headlights.

The signal from the ride-height sensors is incorporated into the calculation. This allows the pitch angle of the vehicle body, due to a vehicle load for instance, to be included in the calculation.

Data from the longitudinal acceleration sensor and the ride-height sensors are output through the integrated chassis management via the FlexRay. Data for the driving speed are provided by the integrated chassis management also via the FlexRay. The central gateway module transfers the data from the FlexRay to the K-CAN2. The footwell module receives the data via the K-CAN2.

NOTE: The integrated chassis management contains the sensors for the longitudinal and lateral acceleration of the vehicle as well as the yawrate sensor. Signals from the wheel speed sensors are registered by the Dynamic Stability Control for the driving speed signal. The Dynamic Stability Control outputs the data to the FlexRay. The integrated chassis management generates the driving speed signal from the data and makes the signal available to the vehicle electrical and bus systems. 1

Beam throw adjustment is soft to avoid the eyes becoming tired or irritated.

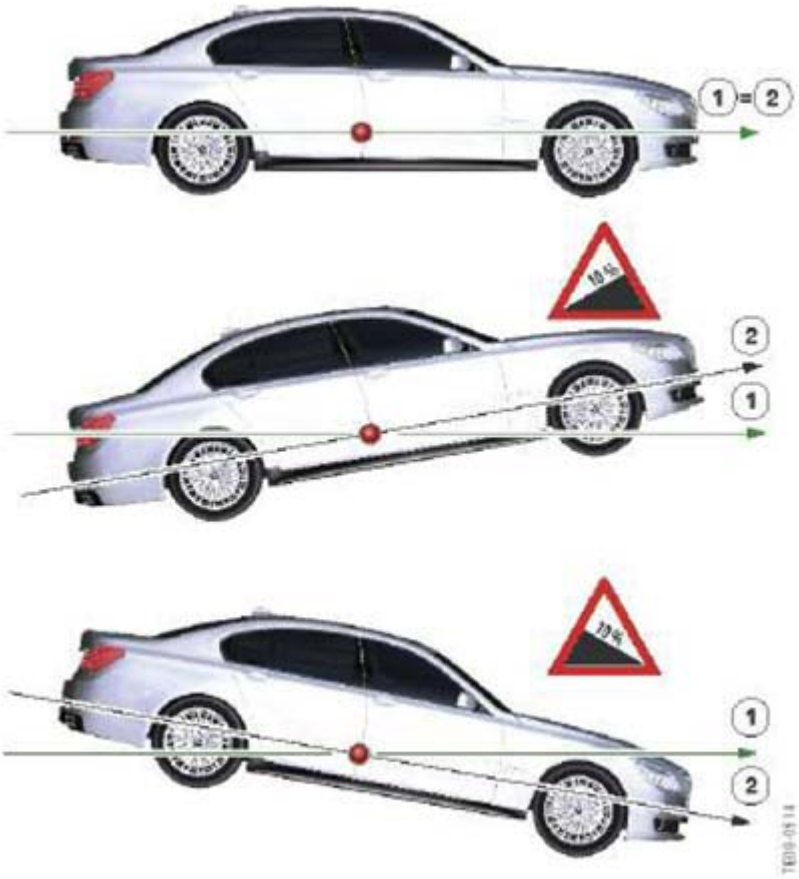


Fig. 67: Identifying Incline Angle Of Adaptive Headlight-Range Adjustment System F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

ADAPTIVE HEADLIGHT-RANGE ADJUSTMENT SYSTEM AXIS CHART

Index	Explanation
1	Horizontal axis
2	Positive or negative incline (negative incline is the downhill gradient)

Short-term function deactivation

In unfavorable, situations the light emitted by the headlights may be set incorrectly by the adaptive headlight-range adjustment system. One consequence of this could be dazzling of oncoming traffic. Therefore the footwell module interrupts the function for a short time to protect other road users.

The following conditions interrupt the function for a short time:

- Signal from the Dynamic Stability Control
  - Control intervention by the antilock braking system
  - Control intervention by the Automatic Stability Control
  - Control intervention by the Dynamic Stability Control

- Signal from the longitudinal acceleration sensor in the integrated chassis management
  - Very high longitudinal acceleration
- Signal from the footwell module from the dynamic beam throw adjustment system
  - Poor-route detection system signals uneven road.

Remote Light

The Remote Light function is the Vehicle Finder visual signalling. The driving lights are switched on for the signalling.

Switch-on conditions

The Remote Light function can be requested via the telematics service provider. The request is only carried out if the battery has not yet reached the limit for starting. The vehicle must be stationary and the engine switched off.

Switch-off conditions

Remote Light can be switched off by the following conditions:

- Battery has reached the limit for starting
- Interior light button is pressed
- Change in status of a Hall sensor in the door contacts
- Renewed request Start of a new sequence for the Remote Light function
- Remote Light time expired
- Terminal status change, START-STOP button pressed.

SERVICE INFORMATION

Adjusting Headlights

The same procedure as before can be adopted for adjusting the lights. On a vehicle with the adaptive headlights optional extra the light switch must be in position "2".

If the lights have been switched on by the automatic headlights function, the urban beam pattern will be active. The headlights can only be correctly adjusted when they are set to the single-carriageway beam pattern.

NOTE: When the lights are set to the urban beam pattern, the off-side headlight turns slightly outwards and is simultaneously slightly lowered. If the lights are adjusted when set to this beam pattern, they will dazzle oncoming traffic when switched to the single-carriageway and highway beam patterns. Therefore, you should always set the lights switch to position "2".

When replacing headlights, make sure to use genuine BMW parts only.

NOTE: It is essential to follow the repair instructions.

Replacing Components

Different repairs may be made during the life of the vehicle. The repairs may mean that components for the adaptive headlights have been installed with different software and hardware states.

New parts and/or used parts are used with the components already installed in the vehicle.

The replaced components must definitely be adapted to the vehicle.

The components below are some of those that could have been replaced during servicing:

- Footwell module
- Headlight driver module
- Bi-xenon headlights.

Footwell Module

Follow the repair instructions when replacing the footwell module. Make sure that only genuine BMW spare parts are used. Only genuine BMW spare parts guarantee correct functioning of the headlights. In the case of a straight swap with a different footwell module there is no guarantee that the replacement will not cause malfunctions in the exterior lighting system.

Diagnosis

Diagnostic Mode

The exterior lighting system must be set to diagnostic mode for different diagnosis orders. These diagnosis orders may be:

- Read out of the relevant bus signals when stationary
  - Road speed
  - Yaw rate
  - Steering angle
- Check of signal plausibility
- Check of switch-on conditions
  - Status of the rain/driving lights/solar sensor
  - Status of the rain/light/solar/condensation sensor
  - Status of the high-beam headlight assistant
  - Status of the light switch.

Missing or non-plausible bus signals are saved in the footwell module as a fault. Fault types are saved in the headlight driver module.

Access to the headlight driver module is achieved via the footwell module.

INTERIOR LIGHTING

INTRODUCTION

All Interior Lighting Systems

The interior lighting is based on the interior lighting on the F01/02 is based on E90. The interior lighting comprises the lights in the passenger compartment roof, luggage compartment, footwell and the interior door lights.

Exterior door lighting is provided by the courtesy lights (exterior door handles) and the doorway lights.

The front and rear passenger compartment roof lights are in the form single light units.

A new feature is the light for the map pocket on the backrest of the front seat.

The graphic below shows the control units that have an influence on the interior lighting:

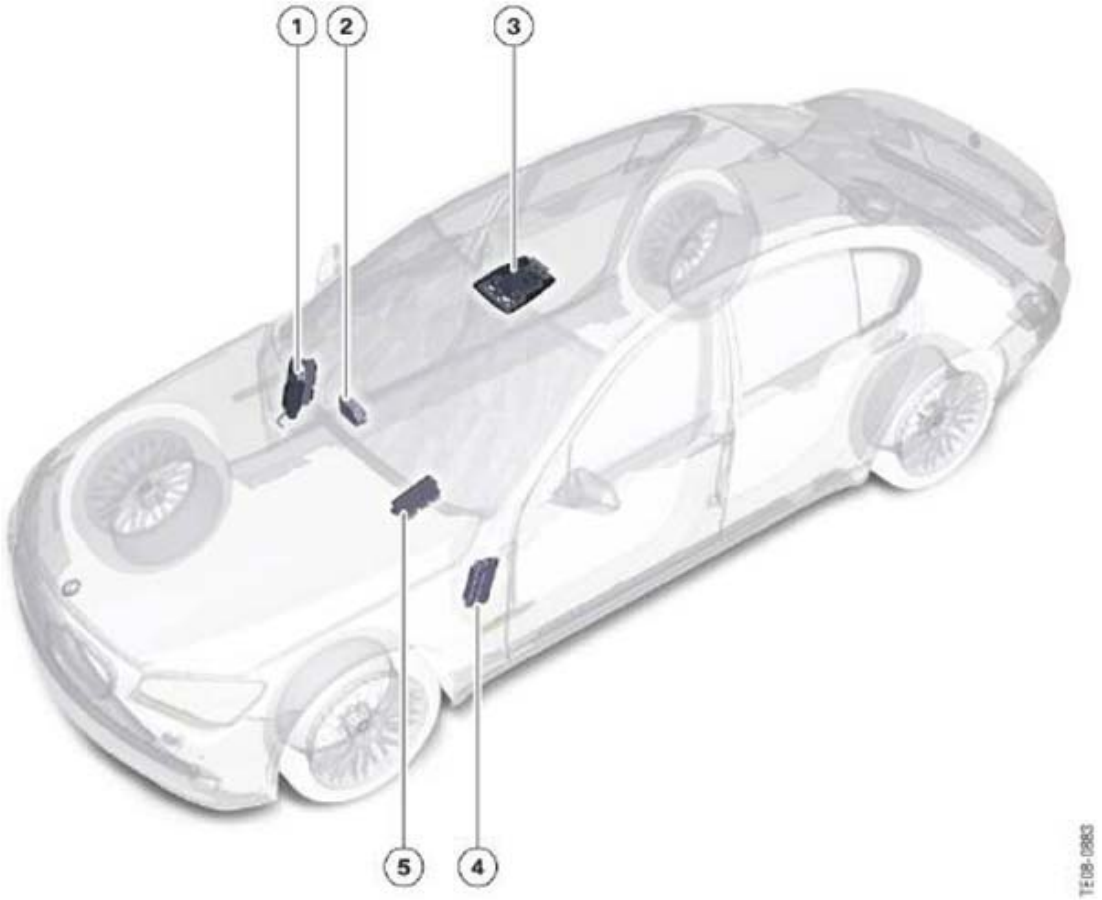


Fig. 68: Identifying Control Units For Interior Lighting On F01/F02

Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Junction box module
2	Advanced crash safety management
3	Roof function center
4	Footwell module
5	Car Access System

Interior Lighting

The following provides an overview of interior lighting.

- Interior light with interior light switch
- Reading light with reading light button for driver and front passenger
- Ambient interior light for driver and front passenger
- Front and rear door pocket lights, driver's/passenger side
- Front and rear interior door handle lights, driver's/passenger side
- Front and rear sill lights, driver's/passenger side
- Front and rear doorway lights, driver's/passenger side
- Driver's/passenger side courtesy lights, front and rear
- Driver's/passenger side exterior door handle lights, front and rear
- Driver's/passenger side vanity mirror lights, front and rear*
- Driver's/passenger side footwell lights, front and rear*
- Glove compartment light
- Center console stow compartment light, front and rear
- Map pocket lights in front seat backrests
- Rear center armrest stow compartment light
- Luggage compartment lighting

* Equipment option only available in rear on F02

SYSTEM OVERVIEW

Schematic System Circuit Diagram - Interior Lighting

The system circuit diagram follows the description below and provides an overview of the full extent of all possible interior lighting options.

The status of the door contact (Hall sensor) in the lock (38) changes, for example, when the door is opened with the vehicle unlocked. The footwell module (1) evaluates the status and sends the request to switch on the

interior lighting.

At the same time, the doorway light (13) for the door that is open and the footwell lights (2, 3, 46, 48) are switched on by the footwell module. The status of the door contact changes again when the vehicle door is closed. The footwell module initiates the procedure to switch off the interior lighting. If the tailgate is opened, the status of the tailgate switch (21) registered by the tailgate central locking module changes. The luggage compartment lighting (24, 53) is connected to the power supply via Terminal 30B so that the luggage compartment lights are switched on via the tailgate switch.

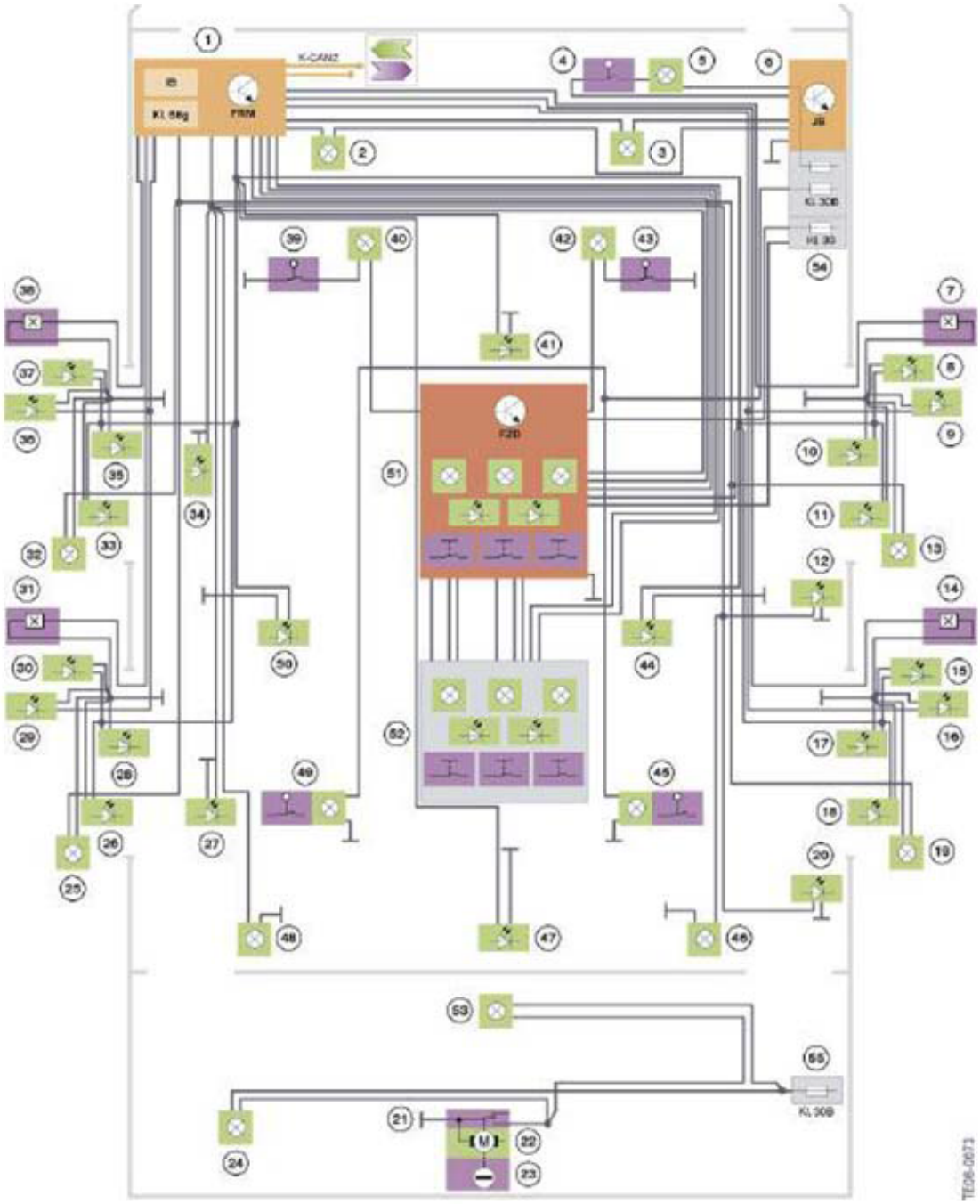


Fig. 69: F01/F02 Interior Lighting System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Footwell module FRM
2	Footwell light, driver's side
3	Footwell light, front passenger's side
4	Glove compartment switch
5	Glove compartment light
6	Junction box module JB
7	Door switch, passenger side, front
8	Exterior door handle light, passenger side, front
9	Courtesy light, passenger side, front
10	Interior door handle light, passenger side, front
11	Door pocket light, passenger side, front
12	Sill light, passenger side, front
13	Doorway light, passenger side, front
14	Door switch, passenger side, rear
15	Exterior door handle light, passenger side, rear
16	Courtesy light, passenger side, rear
17	Interior door handle light, passenger side, rear
18	Door pocket light, passenger side, rear
19	Doorway light, passenger side, rear
20	Sill light, passenger side, rear
21	Tailgate switch
22	Tailgate lock motor
23	Tailgate lock barrel
24	Luggage compartment light in tailgate
25	Doorway light, driver's side, rear
26	Door pocket light, driver's side, rear
27	Sill light, driver's side, rear
28	Interior door handle light, driver's side, rear
29	Courtesy light, driver's side, rear
30	Exterior door handle light, driver's side, rear
31	Door switch, driver's side, rear
32	Doorway light, driver's side, front
33	Door pocket light, driver's side, front
34	Door pocket light, driver's side, front
35	Interior door handle light, driver's side, front
36	Courtesy light, driver's side, front

37	Exterior door handle light, driver's side, front
38	Door switch, driver's side, front
39	Vanity mirror light switch, driver's side, front
40	Vanity mirror light, driver's side, front
41	Center console stow compartment light, front
42	Vanity mirror light, passenger side, front
43	Vanity mirror light switch, passenger side, front
44	Map pocket light, front passenger seat backrest
45	Vanity mirror light with switch, passenger side, rear
46	Footwell light, rear right
47	Rear center armrest stow compartment light
48	Footwell light, rear left
49	Vanity mirror light with switch, driver's side, rear
50	Map pocket light, driver's seat backrest
51	Interior/reading light unit, front
52	Interior/reading light unit, rear
53	Rear center armrest stow compartment light
54	Front power distribution box
55	Luggage compartment power distribution box
KI. 30	Terminal 30
KI. 30B	Terminal 30 basic mode
KI. 58g	Terminal 58g
IB	Interior lighting control

K-CAN2 signals at footwell module

K-CAN SIGNALS CHART

In/Out	Information	Source/sink	Function
In	Status, central locking	Car Access System > footwell module	Interior lighting ON
In	Status, central locking	Car Access System > footwell module	Interior lighting OFF
In	Crash signal	Crash sensor > advanced crash safety management	Interior lighting ON
Out	Electrical load cutout	Footwell module > Junction box module	Interior lighting OFF through electrical load cutout
Out	Status, terminal 58g	Light switch > footwell module	Instrument lighting ON (e.g. control buttons, instrument cluster, gear selector lever)
Out	Status, door switch	Footwell module > Car Access System	Condition for activation of central locking (enabling/allowing)

FUNCTIONS

Important Control Units in the Interior Lighting System

The interior lighting on the F01/F02 is switched on and off by the footwell module (FRM).

The roof function center (FZD) is responsible for the interior lighting components in the passenger compartment roof.

The paragraphs that follow now describe the interior lighting functions in more detail.

Footwell Module

The footwell module is the central control unit for the interior lighting system. All interior lighting outputs of the footwell module are pulse-modulated. This ensures the interior lighting functions at a constant brightness level in the event of voltage fluctuations. The pulse width modulation is additionally used for the soft ON/soft OFF function.

The footwell module features the following functions for the interior lighting:

- Switching the interior lighting on/off
- Electric load shut-down after >8 minutes
- Lighting via terminal 58g.

Switching on the interior lighting

The footwell module receives numerous input signals that switch on the interior lighting. The input signals are read directly by the footwell module or are received via the KCAN2. The input signals for the interior lighting are listed in the following.

CENTRAL LOCKING INPUT SIGNALS REFERENCE CHART

Input signals	From
Central locking signals	CAS
Crash signal	ACSM
Door contacts	FRM
Driver's door barrel lock	FRM
Interior light switch	FRM
Rear reading light buttons	FZD

Switching-on conditions

If any of the following conditions for switching on the interior lighting is met, the interior lighting is switched on. The switch-on function is limited in terms of time. The electrical loads are:

- Unlock via barrel lock in driver's door
- Vehicle unlocked using ID transmitter
- Terminal 15 OFF if Terminal 58g was ON no more than 2 min previously

- Lock button on ID transmitter pressed after the central locking has been in double-locked status for longer than 10 seconds.

The interior lighting remains permanently switched on in certain situations. These situations are:

- Receiving crash signal
- Interior lighting button briefly pressed.

NOTE: Pressing the interior lighting button again switches it off.

Switching off interior lighting

The footwell module receives numerous signals to switch off the interior lighting. Those signals are received via the K-CAN2 or are read directly by the footwell module.

Switch-off conditions

The interior lighting is switched off under the following conditions:

- Central locking in central arrest, all doors and the tailgate are closed
- 8 min after Terminal 15 OFF (cut-out of electrical equipment)
- Interior lighting button pressed for longer than 3 seconds (continuous "OFF")
- Terminal 15 ON when doors closed
- Terminal 58g ON and Terminal 15 OFF. The interior lighting is switched off if no door is opened within 20 seconds.
- The interior lighting is switched off if the vehicle is unlocked via the ID transmitter and no door is opened within 20 seconds.
- "Power down" via diagnosis.

Cut-out of electrical equipment

As of Terminal 15 OFF, the interior lighting is switched off by the footwell module after 8 min. For that purpose, the footwell module broadcasts the electrical equipment cut-out instruction via the K-CAN2.

The roof functions center FZD receives this information and switches off the interior lighting in the roof area.

The interior lights that are switched on directly by the footwell module are also switched off.

Terminal 58g

The footwell module supplies the Terminal 58g signal via the K-CAN2 or conventional wiring. Terminal 58g is pulse width-modulated and features the following two brightness levels:

- The brightness level for the locator lighting is individually adjustable using the thumb wheel on the lights operating unit.

- The brightness level for the function lighting is not dimmed and is switched on at full brightness.

Hazard warning switch

As soon as the hazard warning switch is pressed, the footwell module switches on the switch lighting at full brightness.

NOTE: The hazard warning switch is not illuminated at full brightness level at terminal 58g. The brightness depends on the setting of the locator lighting.

Roof Function Center

The roof function center (FZD) incorporates the front interior light unit.

The FZD is the link to the interior light unit in the rear passenger-compartment roof.

Interior lighting functions

The interior lighting functions in the roof functions center are:

- Loop-through of power supply provided by the footwell module, e.g. IB and Terminal 58g
- Reading of signals from rear reading light buttons
- Power supply to vanity mirror lights or reading lights in the rear interior light unit.

Reading of signals from rear reading light buttons

The roof function center reads the signals from the rear reading light buttons. A flip-flop circuit is used for the purpose for each rear reading light button. Pressing the reading light button changes the status of the flip-flop circuit. The change of status causes the roof function center to switch the reading light concerned on or off accordingly.

The footwell module supplies the Terminal VA status signal. The rear reading lights are among the devices switched off by the electrical equipment cut-out function.

Luggage Compartment Lighting

The luggage compartment lighting is connected directly to Terminal 30B.

The luggage compartment lighting is functional as of status Terminal 30B ON and fused in the rear power distribution box.

When the tailgate is opened, the status of the tailgate switch changes. This means the luggage compartment lights are connected to ground and therefore switched on.

The status of the tailgate switch changes when the tailgate is closed again. The ground connection is interrupted and the luggage compartment lighting switched off.

Glove Compartment Lighting

The light is connected to Terminal 30B in the front power distribution box and protected against short circuits by a fuse.

When the glove compartment is opened, the glove compartment switch closes. As a result, the glove compartment lighting is connected to ground.

The glove compartment lighting is switched off by closing the glove compartment.

Car Access System

The Car Access System supplies the central vehicle has been locking status signal via the K-CAN2. In this way, the footwell module recognizes when the unlocked and consequently switches on the interior lighting.

Courtesy Lighting

The courtesy lighting operates in sync with the interior lighting. That means that the courtesy lighting remains switched on as long as the interior lighting is on.

NOTE: Previously, the courtesy lighting was limited to 20 seconds. This functional feature on the F01/F02 is a change from other BMW models.

SYSTEM COMPONENTS

Interior Lighting, Front

The components for the interior lighting in the front roof area are integrated in the roof functions center and in the sun visors. The footwell lighting is located on the underside of the dashboard.

Interior Lighting in the Roof Function Center

The interior light unit on the F01/F02 is integrated in the roof function center. The interior light unit consists of:

- Reading light with button for driver and front passenger
- Interior light with button
- Ambient interior light for driver and front passenger.

The roof function center is matched to the color of the roof lining.

Various equipment options make it necessary to install additional components in the roof functions center.

If a panoramic glass roof is installed, the roof functions center contains not only the button for the panoramic glass but also the necessary control and monitoring facilities.

The ultrasonic interior movement detector is completely integrated in the roof function center on vehicles equipped with an anti-theft alarm system.

The rood function center simply loops through the signals for all other components. This means the components are connected directly to their respective control units.

These components are:

- Emergency call button
- Passenger airbag OFF lamp.

Interior Light Unit, Rear

The rear interior light unit incorporates the following lights:

- Reading light with button for left and right rear passengers
- Interior light with button
- Ambient interior light for driver and front passenger.

Interior Door Lighting

The interior door lighting comprises the interior door handle light, armrest light and door pocket light. The lights are in the form of LEDs with fiber-optic leads for light distribution. In addition, the doorway light is fitted in the bottom of the door. A 5 W bulb is used for the doorway light.



Fig. 70: Interior Door Lighting On Driver's Door - View From Front And Angled View Upwards From Below
Courtesy of BMW OF NORTH AMERICA, INC.

Map Pocket Lights

The map pocket lights are in the backrests of the front seats. An LED supplies light to a fiber-optic lead. The fiber-optic lead is integrated in the seat backrest. The light from the LED is directed downwards by the fiber-optic lead, thereby illuminating the map pocket.



Fig. 71: Identifying Map Pocket Light In Driver's Seat Backrest On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

Sill Lights

The sill lights are connected directly to the footwell module. LEDs are used as the light source. All four doors have sill lights.



Fig. 72: Identifying Sill Lights On F01
Courtesy of BMW OF NORTH AMERICA, INC.

Vanity Mirror

Vanity mirrors are fitted as standard on the driver's and passenger side at the front. The vanity mirror lights are fused in the front power distribution box and connected to Terminal 30B.

NOTE: Terminal 30B is looped through by the roof function center. 1 On the F02, rear vanity mirrors are also available. The vanity mirror lights are supplied with power directly by the footwell module.

On the F02, rear vanity mirrors are also available. The vanity mirror lights are supplied with power directly by the footwell module.

A vanity mirror light has a power consumption of approximately 5 W.



Fig. 73: Identifying Rear Passenger Side Vanity Mirror On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

Luggage Compartment Lighting

Two lights are used for the luggage compartment lighting. One of the lights is located on the underside of the rear parcel shelf. The other light is integrated in the tailgate. The light in the tailgate has two lenses. One of the lenses is colored red. When the tailgate is open, that lens serves as an indicator lamp for vehicles behind. The second lens directs the light downwards into the luggage compartment.

A 10 W bulb is used for each of the luggage compartment lights.



Fig. 74: Identifying Luggage Compartment Lighting Integrated In Tailgate On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

Control Units

The "interior lighting" function is distributed between several control units that communicate with each other via the K-CAN2. The individual control units are described in the following.

Car Access System

The Car Access System sends the request to unlock/lock the central locking via the KCAN2.

The signals are required to switch the interior lighting on and off.

Footwell Module

The footwell module detects the request to switch the interior lighting on/off based on the signals from the Car Access System, for example.

The footwell module provides a number of outputs for the interior lighting functions.

LIGHTING FUNCTIONS

Output	Light
Doorway light	All doorway lights in the doors
Terminal 58g	Interior door lights, center console stow compartment, center armrest stow compartment, ambient interior lights, map pocket lights and backlighting for various

	switches, etc.
Footwell light	Footwell lights, front
Interior lighting 1	Rear footwell lights, sill lights, front interior light
Interior lighting 2	Interior light, rear
Courtesy lighting	Courtesy lights in the doors
Electrical equipment cutout	Reading lights

The footwell module evaluates the status of the door contacts. The interior lighting is switched on when a door is opened. Each door switch is connected individually to the footwell module.

The footwell module analyzes the status of the front reading light buttons and front/rear interior light buttons.

Roof Function Center

The roof function center provides the power supply for the rear interior light unit. The front vanity mirrors also receive their power supply from the roof function center.

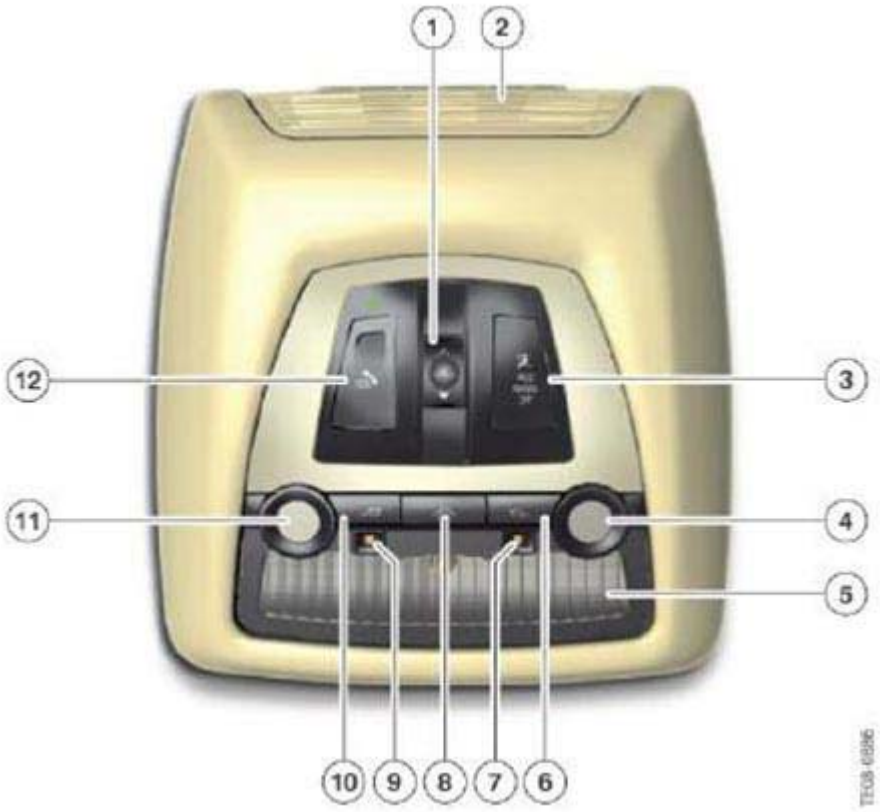


Fig. 75: Identifying Roof Function Center On F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Button for panoramic glass roof
2	Openings for ultrasonic interior movement detector
3	Passenger airbag OFF light
4	Passenger's reading lamp
5	Interior light
6	Passenger's reading light button
7	Ambient lighting
8	Interior lighting button
9	Ambient lighting
10	Driver's reading light button
11	Driver's reading light
12	Emergency call button

WIPER/WASHER SYSTEM

INTRODUCTION

Windscreen Wipers

The F01/F02 has a wiper/washer system for the windscreen as standard.

Windscreen wiping has the following functions:

- Continuous wipe in stage 1
- Continuous wipe in stage 2
- Flick wipe.

The following systems are also available:

- Headlight washer system
- Water jet heater
- Automatic mode using the rain/light/solar/condensation sensor.

The wiper motor for the wiper/washer system is connected via a LIN bus.



Fig. 76: Identifying Wiper Motor For Wiper/Washer System
Courtesy of BMW OF NORTH AMERICA, INC.

Rain/lights/solar/condensation Sensor

The rain/lights/solar/condensation sensor is the same as the rain/driving lights/solar sensor, but has been enhanced with the condensation sensor function. The functionality of the rain sensor, the driving lights sensor and the solar sensor have been retained in full. This means, for example, that the driver is still assisted by the rain sensor automatically initiating the procedure for switching on the windscreen wipers.

The automatic wiping does not relieve the customer from the responsibility of wiping the windscreen. For this reason, the customer can override the automatic wiping function at any time by moving the wiper switch on the steering column stalk up or down or pulling it towards him.

The driving lights sensor supplies the on and off signal for the automatic driving lights control function.



Fig. 77: Identifying Rain/Lights/Solar Sensor
Courtesy of BMW OF NORTH AMERICA, INC.



Fig. 78: Identifying Condensation Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Rain/light/solar sensor (not F01)

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Rain/light/solar sensor
2	Sensor for HUD
3	Condensation sensor

Under unfavorable light conditions such twilight or when driving through a tunnel, the ON signal ensures the driving lights are switched on automatically.

The solar sensor makes sure the automatic climate control system provides optimum air conditioning distribution in the vehicle.

The condensation sensor allows the integrated automatic heating/air-conditioning system to detect when condensation is forming on the windscreen in good time, even before the driver is aware of it. Countermeasures can be taken automatically at an early stage, without the need for driver intervention.

System Overview

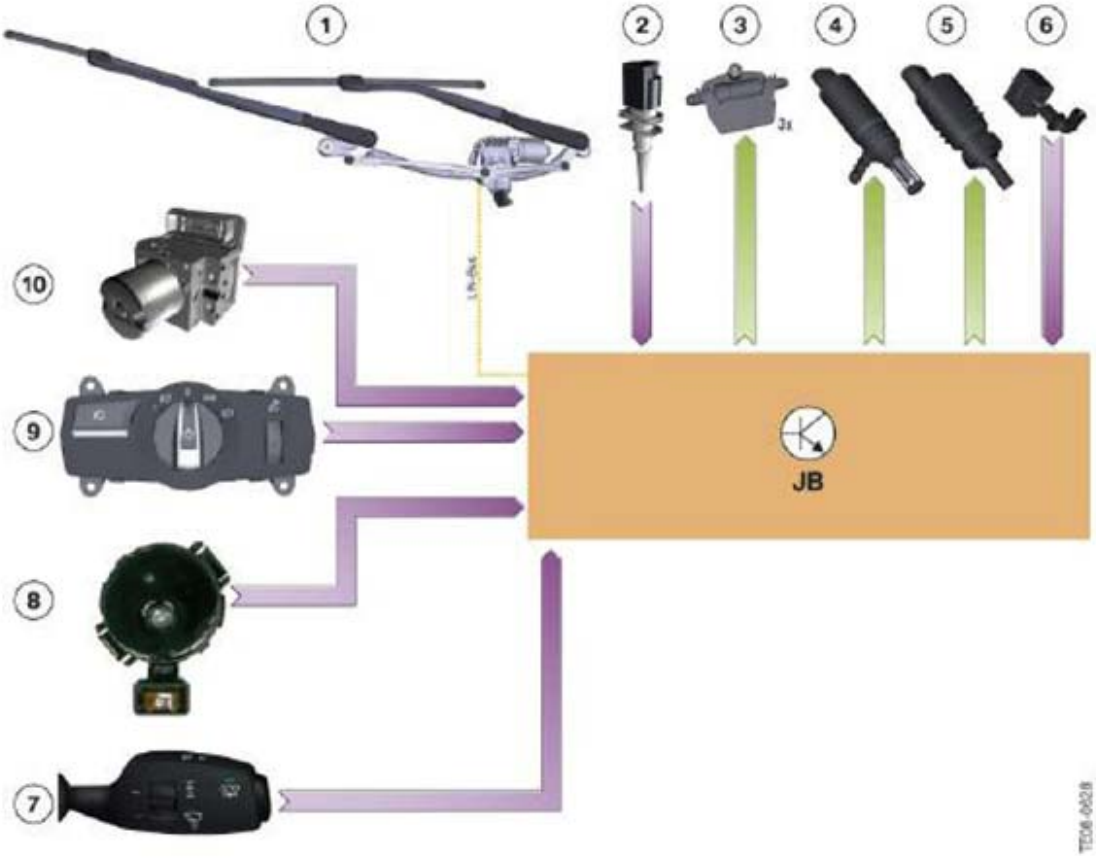


Fig. 79: Rain/Lights/Solar/Condensation Sensor System Overview
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Front wiper motor with wiper
2	Outside temperature sensor
3	Heated washer jet 3x (1)
4	Headlight washer system motor
5	Washer fluid pump motor
6	Washer fluid level sensor
7	Wiper switch on the steering column stalk
8	Rain/lights/solar/condensation sensor
9	Lights operating unit
10	Dynamic stability control
LIN-Bus	Local Interconnect Network bus
JB	Junction box electronics
(1) Heated washer jets on the driver's side, in the center and on the front-passenger side	

When the wiper switch on the steering column stalk (7) is operated, the wiper motor (1) is switched on or off. The junction box electronics execute the functions of the wiper/washer system. The motor for the washer fluid pump (5) or for the headlight cleaning system (4) is switched on or off by the junction box electronics.

On vehicles with automatic driving lights control, the junction box electronics receive the information about switching the wiper/washer system on/off from the rain/lights/solar/condensation sensor (8).

The Dynamic Stability Control (10) provides information about the vehicle speed.

System Circuit Diagram for the Wiper/washer System

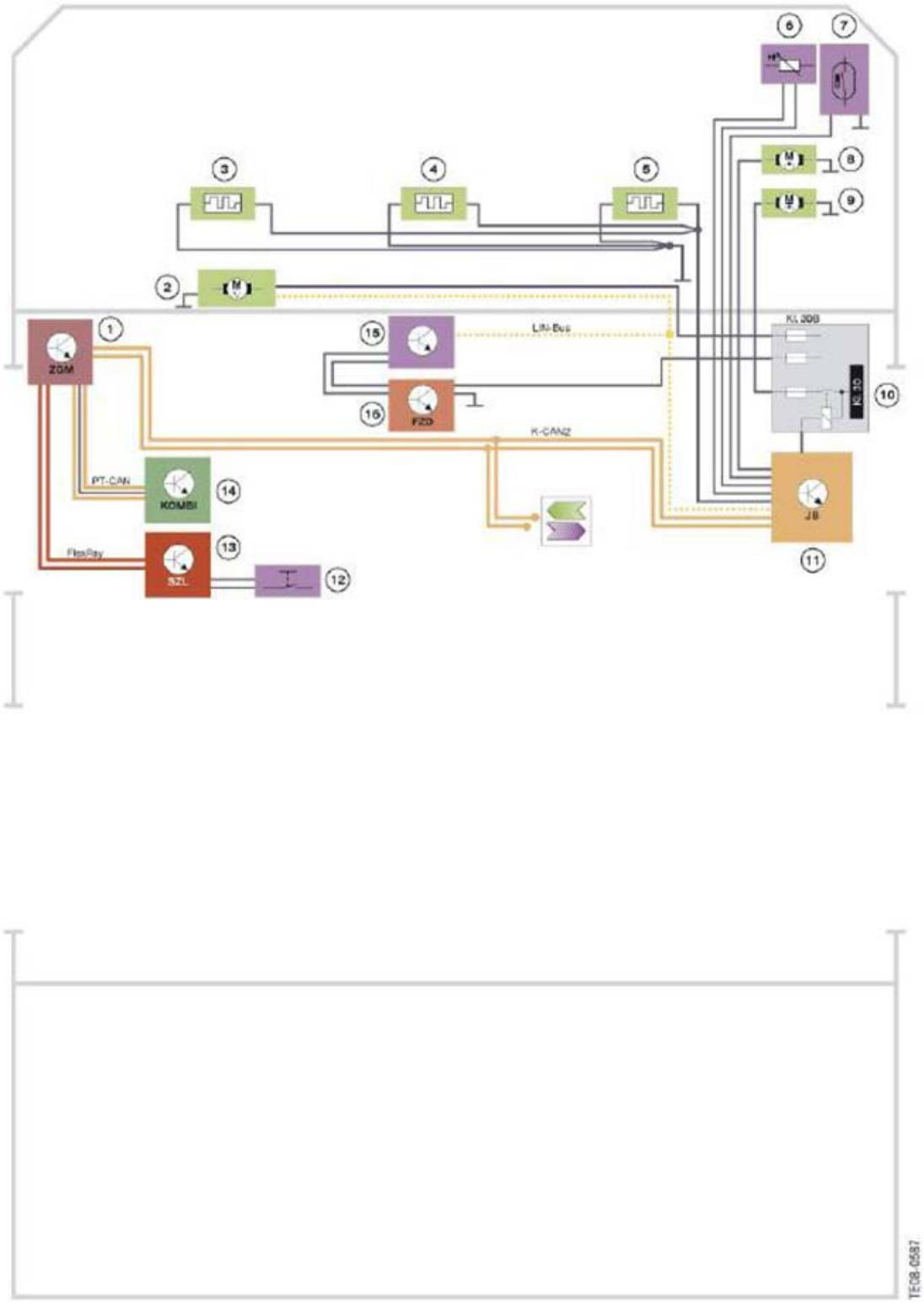


Fig. 80: Wiper/Washer System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	ZGM central gateway module
2	Wiper motor
3	Heated washer jet on the driver's side
4	Heated washer jet in the center of the vehicle
5	Heated washer jet on the front-passenger side
6	Outside temperature sensor
7	Washer fluid level sensor
8	Washer fluid pump motor
9	Motor, headlight washer
10	Front distribution box
11	Junction box electronics (JB)
12	Wiper switch on the steering column stalk
13	Steering column switch cluster (SZL)
14	Instrument cluster
15	Rain/lights/solar/condensation sensor
16	Roof functions center (FZD)
KI. 30	Terminal 30
KI. 30B	Terminal 30 basic operation
K-CAN2	Body CAN2
PT-CAN	Powertrain CAN
LIN-Bus	Local Interconnect Network bus

The signal produced when the wiper switch on the steering column stalk (12) is operated is sent from the SZL steering column switch cluster (13) via the FlexRay to the central gateway module (1). The central gateway module transmits the signal on the K-CAN2. The junction box electronics (11) switch the wiper motor (2) on, for example and monitor its function.

The washer fluid pump (8) is switched on or off by the junction box electronics.

On vehicles with automatic driving lights control, the rain/lights/solar/condensation sensor (15) sends the request to switch on the wiper motor, for instance, via the LIN bus. The junction box electronics receives the request and implements it.

The roof function center (16) supplies the voltage for the rain/lights/solar/condensation sensor.

K-CAN2 signals to the junction box electronics

K-CAN SIGNALS CHART

In/Out	Information	Source/Recipient	Function
In	Vehicle speed	Wheel speed sensor > Dynamic Stability Control	Wiper speed setting depending on vehicle speed

Out	Wiper status	Wiper motor > Junction box electronics	Information for driver assistance systems that involve a video camera at the base of the rear view mirror

FUNCTIONS

Wiping

The wiper/washer system is switched on and off with the wiper switch. The wiper switch is an integral part of the steering column switch cluster SZL.

Wiper Switch

The wiper switch on the steering column stalk does not lock in position. It always returns to its start position after every operation. The button for the rain/lights/solar/condensation sensor also returns to its starting position after every operation. The wiper-stage switch does lock in position.

The following functions are switched on with the wiper switch on the steering column stalk:

- Automatic wipe with rain/lights/solar/condensation sensor
- Continuous wipe, stage 1
- Continuous wipe, stage 2
- Flick wipe
- Wash windscreen

The signals from the wiper switch on the steering column stalk are sent from the steering column switch cluster via the FlexRay to the central gateway module. From the central gateway module, the signal is transmitted to the junction box electronics via the KCAN2. The junction box electronics evaluates the signals and actuates the wiper motor via the LIN bus. The junction box electronics also monitor the wipe function via the LIN bus. To do so, the junction box electronics cyclically request the status of the wiper motor.

Directions of movement



Fig. 81: Identifying Wiping And Wiper Switch Movement Directions
Courtesy of BMW OF NORTH AMERICA, INC.

WIPER SWITCH MOVEMENT DIRECTIONS

Index	Explanation
0	Steering column stalk/start position of wiper-stage switch
1	Wiper stage 1
2	Wiper stage 2
3	Wiping while steering column stalk operated
4	Activates/deactivates the rain/lights/solar/condensation sensor
5	Washer fluid and windscreen wiper at same time
6	Increases the sensitivity of the rain/lights/solar/condensation sensor
7	Reduces the sensitivity of the rain/lights/solar/condensation sensor

Windscreen Wipe Function

The following functions are available for wiping the windscreen:

- Intermittent wipe in stages
- Automatic wipe
- Continuous wipe, stage 1
- Continuous wipe, stage 2
- Flick wipe.

Intermittent wipe

The interval can be set with the multi-stage switch. Four intermittent wipe stages are available. The time intervals depend on the set intermittent wipe stage and the vehicle speed. The junction box electronics calculate the time intervals and actuate the wiper motor accordingly.

Automatic wipe

The automatic wipe function can be activated by pressing the axial button from status "terminal R ON". The LED on the wiper switch indicates that the function is active. A one-off wipe function (acknowledgement wipe) is additionally started. The acknowledgement wipe is also initiated when the wipe interval is increased by means of the wiper-stage switch but not when the wipe interval is decreased.

The rain/lights/solar/condensation sensor initiates wipe requests according to the heaviness of the rain. The junction box electronics analyze the signal from the rain/lights/solar/condensation sensor every 20 ms. For this, the junction box electronics request the relevant signal values and execute the windscreen wipe according to the wipe request.

With the automatic wipe function, the wipe speed depends on the information from the rain/lights/solar/condensation sensor, i.e. continuous wipe stage 1 or stage 2 may be initiated depending on the rain intensity.

Continuous wipe, stage 1

The wiper motor runs at normal speed when stage 1 is switched on with the wiper switch on the steering column

stalk. The wiper motor switches from continuous wipe in stage 1 to intermittent wipe if the vehicle speed is reduced down to standstill.

The continuous wipe function in stage 1 resumes as soon as the vehicle speed is higher than 2.5 mph (4 km/h).

The reset (switch-back) of the wiper stage when the vehicle is stationary can be decoded. In this case, the wiper blades operate in continuous wipe stage 1 mode also when the vehicle is stationary.

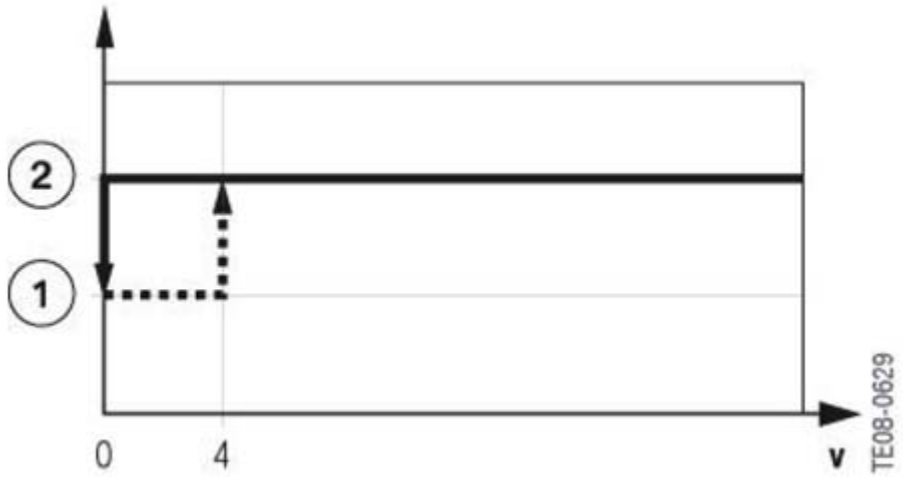


Fig. 82: Identifying Continuous Wipe, Stage 1
Courtesy of BMW OF NORTH AMERICA, INC.

WIPE FUNCTION CHART

Index	Explanation
1	Intermittent wipe
2	Continuous wipe, stage 1
v	Vehicle speed in km/h

Continuous wipe, stage 2

The wiper blades are moved at double the speed in continuous wipe stage 2. When the vehicle is stationary, continuous wipe stage 2 automatically switched back to continuous wipe stage 1. The wiper blades then move at normal speed. Stage 2 is resumed again at a speed in excess of 2.5 mph (4 km/h).

The wipe function switches back to stage 1 at a speed in excess of 130 mph (210 km/h). Stage 2 is switched on again at a speed below 127 mph (205 km/h).

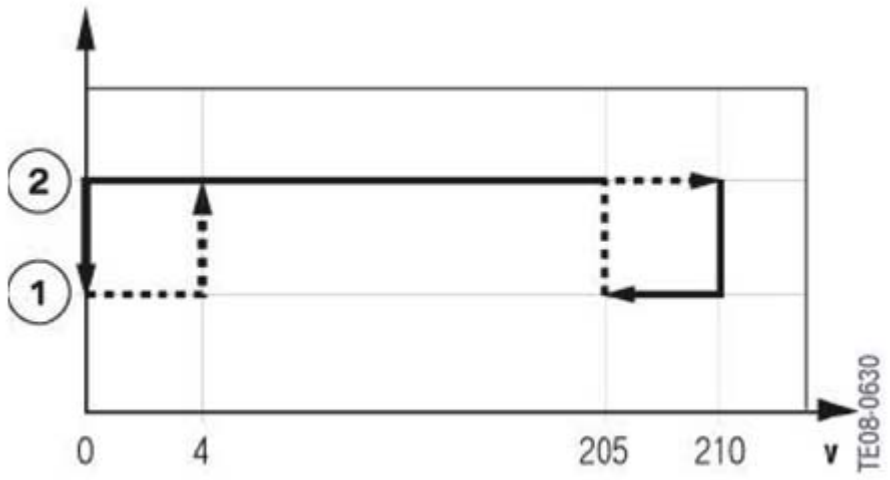


Fig. 83: Identifying Decreasing Wiper Stage (Continuous Wipe Stage 2)
Courtesy of BMW OF NORTH AMERICA, INC.

WIPE FUNCTION CHART

Index	Explanation
1	Continuous wipe stage 1
2	Continuous wipe stage 2
v	Vehicle speed in km/h

The reset of the wiper stages when the vehicle is stationary can be decoded. In this case, continuous wipe stage 2 is retained also when the vehicle is stationary.

Flick wipe

Pressing the wiper switch on the steering column stalk triggers the flick wipe function for as long as the switch is pressed. When the wiper switch on the steering column stalk is released, the wiper movement is completed until the wiper blades reach the rest position.

Windscreen Wiper Anti-blocking Function

The windscreen wiper anti-blocking function is integrated into the electronics of the wiper motor. If the wiper motor is obstructed, the electronics cease the actuation of the motor. The electronics communicate this via the LIN bus the next time the junction box electronics query the status.

A further attempt can be made to switch on the wiper. If the wiper blocks again, it will no longer be operative for approximately 3 minutes.

The wiper interlock is cancelled when the status is switched from "terminal R ON" to "terminal R OFF". The wiper must then be switched on again.

Wash Functions

When the wiper switch on the steering column stalk is pulled, the washer fluid pump is first switched on, followed by the windscreen wiper. The washer fluid pump remains switched on for as long as the wiper switch on the steering column stalk is pulled.

The signal is routed from the steering column switch cluster via the FlexRay to the central gateway module. It is then transmitted from the central gateway module via the K-CAN2 to the junction box electronics. The junction box electronics actuate the washer fluid pump directly.

After the pump is switched off, the wipers continue to operate for several wipe cycles in order to wipe the windscreen dry.

The wipe function set before the windscreen wash cycle is continued after the windscreen has been washed.

The junction box electronics will no longer actuate the washer fluid pump if the fluid level in the washer fluid reservoir is too low. The junction box electronics receive the information necessary for this purpose from the washer fluid level sensor.

Washer fluid level sensor

The junction box electronics monitor the washer fluid level sensor from terminal status "terminal R ON". The washer fluid sensor is integrated in the washer fluid reservoir and is switched to ground.

The junction box electronics receive a low signal when the washer fluid reservoir is full. The switch opens when the fluid level in the washer fluid reservoir drops below a certain level. The low signal changes to a high signal. The junction box electronics consequently generate a message indicating the low level in the washer fluid reservoir.

Terminal 50

The washer function is interrupted or not at all started while the vehicle is started.

If the windscreen washer function was interrupted, the started function is continued after the vehicle start procedure has been completed.

Headlight Washer System

The headlight washer system is switched on during the first wash cycle after terminal status "terminal R ON" and "lights ON". Activation is then suppressed for 7 min. The headlight washer system is activated if the windscreen washer system is operated 5 times within the 7 minutes.

In response to the request from the junction box electronics, the headlight washer system is switched on by means of a relay in the distribution box.

The headlight washer system is no longer activated if the washer fluid level in the washer fluid reservoir is too low. The junction box electronics receive the signal from the washer fluid sensor.

The headlight washer system is not actuated either if obstruction of the wipers is detected.

BMW Night Vision

If the vehicle is equipped with BMW Night Vision with person recognition, the Night Vision Camera lens is cleaned at the same time as the headlights. The pump in the headlight washer system supplies water to all the washer jets for the headlights and the Night Vision Camera.

SYSTEM COMPONENTS

Involved Components

The following components are involved in the wiper/washer system:

- Control units
  - Steering column switch cluster
  - Central gateway module
  - Junction box electronics
  - Instrument cluster
  - Dynamic stability control
- Rain/lights/solar/condensation sensor
- Wiper switch on the steering column stalk
- Relay for headlight washer system
- Wiper motor
- Washer fluid pump
- Pump for headlight washer system
- Heated washer jets

Control Units

Steering column switch cluster

The steering column switch cluster evaluates the status of the wiper switch on the steering column stalk. The respective status is issued by the steering column switch cluster on the FlexRay.

Junction box electronics

The junction box electronics is the central control unit for all wipe and wash functions.

The junction box electronics communicate the current wipe requirement via the LIN bus. This request is received by the electronics in the wiper motor and the relevant wiper stage is initiated.

A separate relay is fitted in the front distribution box for the headlight washer system.

Dynamic stability control

The Dynamic Stability Control provides the road speed signal.

Rain/lights/solar/condensation sensor

The rain/lights/solar/condensation sensor consists of four sensors. The rain sensor is used for the wiper/washer system.

Condensation sensor

The condensation sensor consists of a sensor element with integrated processor on a flexibly mounted circuit board. The condensation sensor records the relative air humidity and the temperature on the inside of the windscreen.

The rain/lights/solar/condensation sensor is integrated in the base of the mirror and is held in place by a spring on a retaining plate. The retaining plate is securely bonded to the inside of the windscreen.

The visual connection between the rain/lights/solar/condensation sensor and the windscreen is formed by a silicone gel layer on the optical element. The condensation sensor is mounted directly on a "flexible" circuit board.

Due to the specified installation location, the flexible circuit board with the condensation sensor is pushed against the windscreen. This ensures a good thermal connection with the windscreen. A permeable membrane made from Teflon protects the condensation sensor from becoming dirty.

Fault code memory entries for the function of the rain/lights/solar/condensation sensor are stored in the junction box electronics.

If the condensation sensor fails, the junction box electronics transmits this via the KCAN2. The central gateway module transmits the information on the K-CAN. The integrated automatic heating/air-conditioning system thus receives the information and deactivates the program to prevent condensation from forming on the windscreen.

NOTE: Replacing the rain/lights/solar/condensation sensor:
It is permissible to replace a rain/lights/solar/condensation sensor as long as no bubbles occur in the silicone gel layer (adhesive layer) when you do so. Please remember to initialize the sensor.

Wiper Switch on the Steering Column Stalk

The wiper switch on the steering column stalk with the following functions is located in the steering column switch cluster:

- Intermittent wipe
- Wipe in stages 1 and 2
- Windscreen washer
- Headlight washer
- Switch for the rain/lights/solar/condensation sensor
- Indicator for activated rain/lights/solar/condensation sensor.

The wiper switch has sliding contacts that are located on the circuit board for the steering column switch cluster. The switch functions are realized by means of these sliding contacts.

The interval switch is a four-stage switch. Each stage produces different input values in the steering column switch cluster. The input values are evaluated for setting the sensitivity of the rain/lights/solar/condensation sensor or the intermittent wipe stage.

The button for the rain/lights/solar/condensation sensor is designed as an ground-switching button. It is required for switching on the rain/lights/solar/condensation sensor. The LED is illuminated when the rain/lights/solar/condensation sensor is activated.



Fig. 84: Identifying Wiper Switch On Steering Column Stalk
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Wiper switch on the steering column stalk
2	Wiper-stage switch for sensitivity of the rain sensor/intermittent wipe stage
3	Rain/lights/solar/condensation sensor LED
4	Rain/lights/solar/condensation sensor button

Function matrix for the wiper/washer system steering column stalk

WIPER/WASHER SYSTEM STEERING COLUMN STALK FUNCTION MATRIX

Operation	Initial state	Function	Design
Push upwards briefly	OFF	Wipe 1	Returns to initial position
	Continuous wipe, stage 1	Wiper stage 2	Returns to initial position
	Continuous wipe, stage 2	Wiper stage 2	Returns to initial position
			Returns to

Push upwards	OFF	Wiper stage 2	initial position
	Continuous wipe, stage 1	Wiper stage 2	Returns to initial position
	Continuous wipe, stage 2	Wiper stage 2	Returns to initial position
Push downwards briefly	OFF	Flick wipe	Returns to initial position
	Continuous wipe, stage 1	Intermittent wipe	Returns to initial position
	Continuous wipe, stage 2	Wiper stage 1	Returns to initial position
Pull briefly towards the driver	OFF	Windscreen wash	Returns to initial position
Turn the knurled wheel up/down	Sensitivity of the rain/lights/solar/condensation sensor Intermittent wipe stage	Sets the sensitivity of the automatic wiping or intermittent wiping	Engages in position

Function matrix of the steering column stalk for the wiper/washer system with automatic wiping by the rain/lights/solar/condensation sensor

WIPER/WASHER SYSTEM STEERING COLUMN STALK FUNCTION MATRIX

Operation	Initial state	Function	Design
Push upwards briefly	OFF	Wiper stage 1	Returns to initial position
	Automatic mode	Wiper stage 1	Returns to initial position
	Continuous wipe,	Wiper stage 2	Returns to initial stage 1 position
	Continuous wipe,	Wiper stage 2	Returns to initial stage 2 position
Push upwards	OFF	Wiper stage 2	Returns to initial position
	Automatic mode	Wiper stage 2	Returns to initial position
	Continuous wipe,	Wiper stage 2	Returns to initial stage 1

			position
	Continuous wipe,	Wiper stage 2	Returns to initial stage 2 position
Push downwards briefly	OFF	Flick wipe	Returns to initial position
	Automatic mode	Flick wipe*	Returns to initial position
	Continuous wipe,	Intermittent wipe	Returns to initial stage 1 position
	Continuous wipe,	Wiper stage 1	Returns to initial stage 2 position
Pull briefly towards the driver	OFF	Windscreen wash	Returns to initial position
Briefly push the automatic wipe button in an axial direction	Automatic wipe switched off	Automatic wipe ON	Returns to initial position
	Automatic wipe switched on	Automatic wipe OFF	Returns to initial position
Turn the knurled wheel up/down	Sensitivity of the rain/lights/solar/condensation sensor	Sets the sensitivity of the automatic wiping or	Engages in position

Wiper Motor

The front wiper motor is a little smaller than the wiper motor in the E65.

Advantages of the wiper motor:

- Lighter
- Less noise
- Reversing wiper motor
- Stable wiper speed
- Reduced tendency of the wiper blades to judder
- Alternating rest position of the wiper blades.

The wiper motor has two speed settings for wiping the windscreen.

The wiper motor receives information about the wiper stage via the LIN bus. The LIN-bus messages are evaluated by electronics in the wiper motor.

A constant speed is generated by the electronics, enabling consistent wiping by the windscreen wipers.

The wiper motor stores the wiper arms, and therefore also the wiper blades, outside the field of vision, as in the E65. In addition, they are stored on alternate sides. This prevents unnecessary wear on the wiper blades and they will remain pliant for longer.

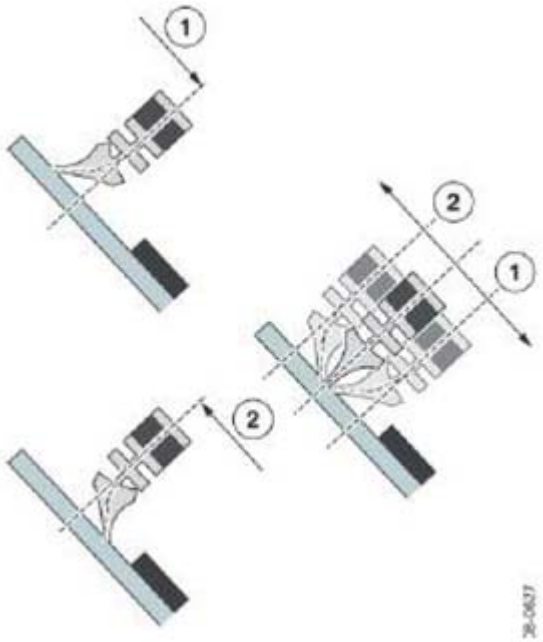


Fig. 85: Identifying Storage Position Of Wiper Blade
Courtesy of BMW OF NORTH AMERICA, INC.

WIPER STORAGE POSITION

Index	Explanation
1	Storage position 1 of the wiper blade
2	Storage position 2 of the wiper blade

Washer Fluid Pump

A washer fluid pump is located in the washer fluid reservoir for cleaning the windscreen. The pump is actuated directly by the junction box electronics.

Pump for Headlight Washer

A high pressure pump is used for the headlight washer system. The pump is activated via a relay in the front power distribution box.

Heated Washer Jets

Three heated water jets are used for the windscreen washer. The washer jets have a PTC resistor that automatically limits the power consumption.

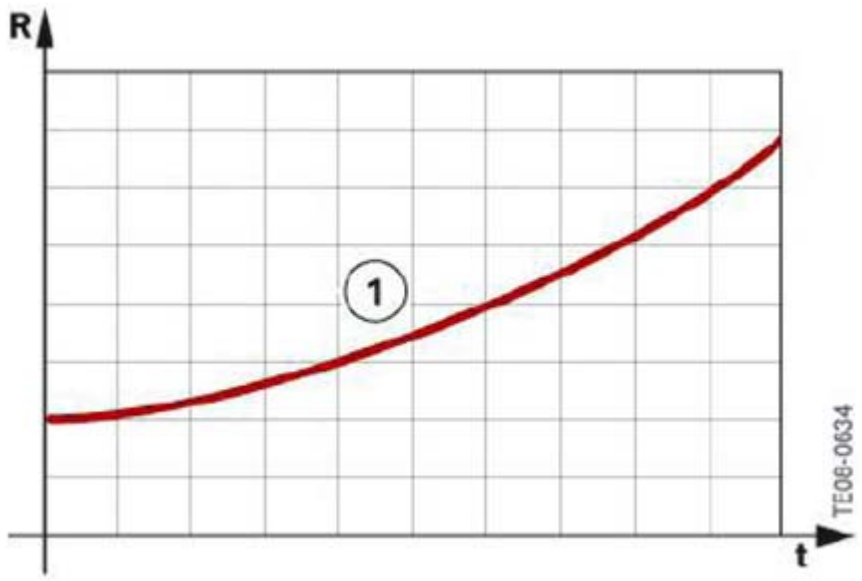


Fig. 86: PTC Resistor Characteristic Graph
Courtesy of BMW OF NORTH AMERICA, INC.

PTC RESISTOR CHARACTERISTIC

Index	Explanation
1	Characteristic of a resistor
R	Resistance
t	Time

SERVICE INFORMATION

Wiper/washer System Emergency Operating Functions

Emergency Operation in the Event of the Steering Column Switch Cluster Failing

The wipers can no longer be operated in the event of the steering column switch cluster failing or a break in the bus connection.

The junction box electronics switch to emergency operating mode and the windscreen wipers are switched on in stage 1.

Emergency Operation if the Rain/lights/solar/condensation Sensor Fails

If there is a fault in the rain/lights/solar/condensation sensor or it fails completely, the junction box electronics take over control of the wiper/washer system and switch to emergency operating mode. Emergency operating mode is an intermittent wipe function that is dependent on the vehicle speed.

NOTE: The same applies if the rain/driving lights/solar sensor fails.

Replacement of the Rain/lights/solar/condensation Sensor

The following steps are necessary after replacing the sensor:

- Code the rain/lights/solar/condensation sensor
- Clear fault code memory
- Initialize the rain/lights/solar/condensation sensor.

NOTE: The same applies to the replacement of the rain/driving lights/solar sensor.

Replacement of the Wiper Motor

The wiper motor is connected to the LIN bus and this must be taken into consideration during the service.

NOTE: The Repair Instructions must be observed when the wiper motor is replaced. If the LIN bus fails, the wiper will go into emergency operation.

Replacing the Wiper Blades

The wiper arms can be moved to a service position in order to replace the wiper blades. This makes the wiper blades easily accessible and allows them to be replaced.

Activating the service position

- Switch on the ignition with the START/STOP button
- Switch off the ignition with the START/STOP button
- Operate the wiper switch on the steering column stalk (push it upwards and hold it there for more than three seconds).

The wiper arms now move into the service position (the upper reversal position of the wiper blades) and the wiper blades can be replaced.

EXTERIOR REAR VIEW MIRRORS

INTRODUCTION

Outside Mirrors

For the F01/F02, there is only one variant of the outside mirrors. The outside mirrors can be electrically adjusted as standard. The outside mirrors are equipped with a mirror heating system.

Optional Interior and exterior mirrors with automatic anti-dazzle function (electrochromic) can be ordered as an optional extra. This option requires the interior rear-view mirror with automatic anti-dazzle function.

The outside mirrors with memory function are connected via the LIN-bus and additionally feature the following functions:

- Outside mirror fold-in
- Electrochromic outside mirrors
- Electrical seat adjustment with memory



Fig. 87: Identifying Electrochromic Outside Mirrors
Courtesy of BMW OF NORTH AMERICA, INC.

System Overview

Input/output - Outside Mirrors

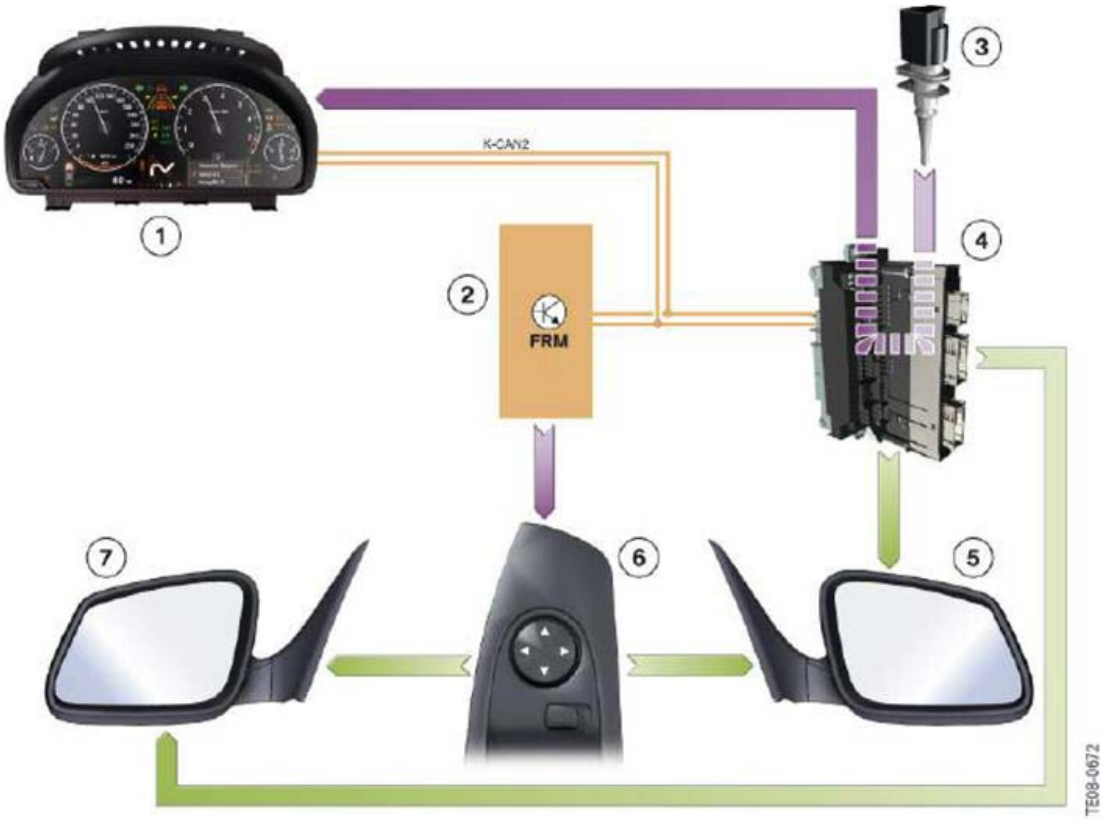


Fig. 88: Outside Mirrors Input/Output System Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Instrument cluster
2	Footwell module FRM
3	Outside temperature sensor
4	Junction box electronics JB
5	Outside mirror, passenger's side
6	Mirror adjustment switch in driver's door switch cluster SBFA
7	Outside mirror, driver's side
K-CAN2	Body CAN 2

Instrument cluster (1) records the outside temperature and makes this information available to the vehicle electrical system.

Junction box electronics (4) supply the outside mirror heating. The outside mirrors (5 + 6) can be adjusted with the mirror adjustment switch in the driver's door switch cluster (6).

System Circuit Diagram - Outside Mirror High

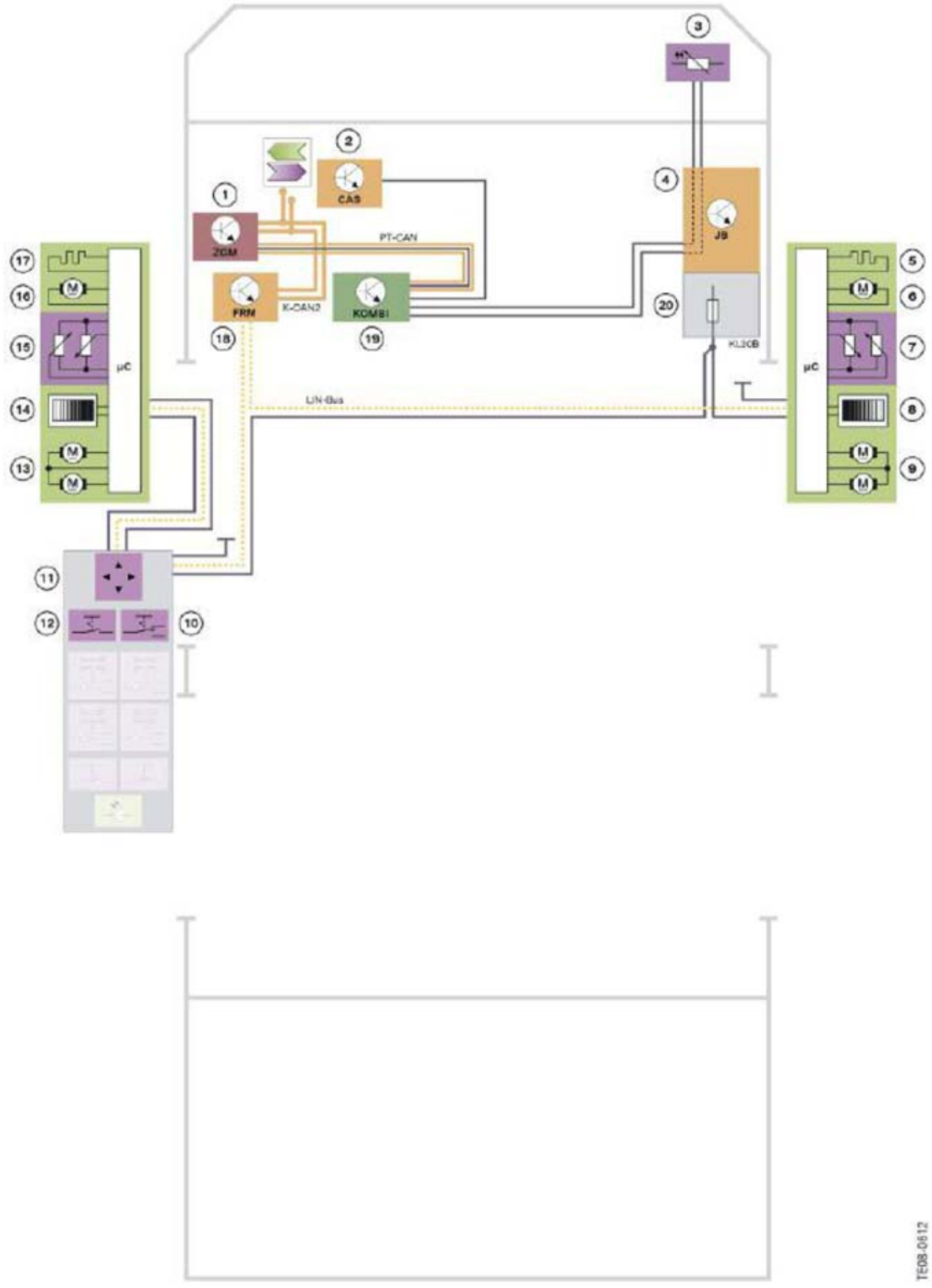


Fig. 89: Outside Mirror High System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Central gateway module (ZGM)
2	Car Access System (CAS)
3	Outside temperature sensor
4	Junction box electronics (JB)
5	Outside mirror heating, passenger's side
6	Motor for folding mirror function, passenger's side
7	Memory, outside mirror potentiometer, passenger's side
8	Electrochromic outside mirror, passenger's side
9	Actuator motor for passenger's side outside mirror
10	Driver's door switch cluster (SBFA) with mirror selector switch
11	Driver's door switch cluster (SBFA) with mirror adjustment switch
12	Driver's door switch cluster (SBFA)
13	Actuator motor for driver's outside mirror
14	Electrochromic outside mirror, driver's side
15	Memory, outside mirror potentiometer, driver's side
16	Motor for folding mirror function, driver's side
17	Outside mirror heating, driver's side
18	Footwell module (FRM)
19	Instrument cluster
20	Front distribution box
LIN-Bus	Local Interconnect Network bus
KI. 30B	Terminal 30 basic operation
KI. 58g	Terminal 58g
K-CAN2	Body CAN2
PT-CAN	Powertrain CAN with mirror folding switch

K-CAN2 signals at footwell module

K-CAN SIGNALS CHART

In/out	Information	Source/sink	Function
In	Vehicle speed	Wheel speed sensor > Dynamic Stability Control	Mirror fold-in lock (inhibit)
In	Status, electrochromic interior rear-view mirror	Photodiode, rear-view mirror > roof function center	Dip outside mirror

The instrument cluster (19) receives the value corresponding to the outside temperature from the outside temperature sensor (3) and makes it available via the PT-CAN. The footwell module (18) evaluates the K-CAN2 signal and initiates activation of the outside mirror heating (5 and 17).

The mirror adjustment motors (9 and 13) are driven by the electronic mirror module. The electronic mirror module receives the request to adjust the outside mirrors via the LIN-bus. The outside mirrors are connected via

the LIN-bus. All information such as the memory-position

or mirror functions, e.g. dip outside mirrors, is transferred via the LIN-bus. 8

FUNCTIONS

Overview

The following outside mirror functions are possible depending on the vehicle equipment:

- Mirror adjustment in up/down and left/right directions
- Mirror heating
- Mirror fold-in
- Electrochromic mirror, outside mirror with memory function
- Automatic parking function
- Manual adjustment
- Motor protection by repeat interlock

Mirror Adjustment

Outside mirror adjustment High

The driver's door switch cluster is connected via the LIN-bus to the footwell module.

The footwell module checks the status of the mirror adjustment switch every 20 ms. The electronics in the driver's door switch cluster evaluates the mirror adjustment switch and sends the signal via the LIN-bus to the footwell module. In turn, the footwell module initiates activation of the adjustment motors.

To protect the mirror drive unit, the mirror adjustment is limited to a maximum activation time of 10 seconds. Activation is maintained within this period of 10 seconds until the mirror adjustment switch is released.

Activation is also maintained until the outside mirror blocks or reaches its end position.

Detecting position of outside mirrors

The High version of the outside mirrors has two potentiometers that register the mirror adjustment. The potentiometers receive their 5V voltage supply from the electronic mirror module. The determined values of the potentiometers are stored in the footwell module for the memory function.

Mirror Heating

The mirror heating is operable as from terminal 15 ON.

Outside mirror

The mirror heating is activated by the footwell module. The corresponding information is passed on to the

electronic mirror module via the LIN-bus.

The instrument cluster makes available the outside temperature value via the PT-CAN. The signal is transferred to the K-CAN2 by the central gateway module.

The junction box electronics provide the information for the wipers via the K-CAN2.

The percentage switch-on time is calculated from both values in the footwell module.

The following table shows the values for the percentage ON time:

MIRROR HEATING CAPACITY EVALUATION CHART

Temperature in °C	< -10	-10 to 5	5 to 15	15 to 25	25 to 35	> 35
Heating capacity in %	100	75	50	0	0	0
Heating capacity with wipers ON in %	100	100	75	50	25	0

The percentage increase is still retained for 300 seconds after the wiper is switched off.

The maximum electric heating output is 28 W that is set by means of voltage and current measurement in the mirror.

Undervoltage

The electronic mirror module switches off the mirror heating in the event of undervoltage. This has a positive effect on the charge balance of the battery. The cutout threshold is at 10.8 V.

The electronic mirror module switches on the mirror heating again as from a voltage of 11.6 V.

Terminal 50

The "terminal 50 ON" status is output during the starting procedure. The mirror heating is switched off for the duration.

Mirror Fold-in

The mirror fold-in function is controlled by the footwell module. For this purpose, the footwell module requests the status of the mirror fold-in switch. The driver's switch cluster evaluates the mirror fold-in switch and forwards the request via the LIN-bus. The footwell module initiates the fold-in function.

The electronic mirror module receives the request and executes this function by activating the corresponding fold-in motor. The footwell module receives the request via the LIN-bus. Both outside mirrors are folded in towards the vehicle thus reducing the vehicle width.

Electrochromic Outside Mirrors

The automatic dip function (anti-dazzle) of the outside mirrors is dependent on the setting of the interior rear-view mirror. The function is available as from "terminal 15 ON".

The interior rear-view mirror forwards the anti-dazzle request to the junction box electronics on the LIN-bus. The junction box electronics transfer the request to the K-CAN. The footwell module is now able to receive the request.

The footwell module sends this request via the LIN-bus to the electronics in the outside mirrors. The electronics implement the request to dim the outside mirrors.

Outside Mirror with Memory Function

The outside mirror High features a memory function that is stored in the footwell module. Three memory locations are available for this purpose. They are:

- Current position when leaving the vehicle
- Memory position of memory button 1
- Memory position of memory button 2.

Identification transmitter

Up to three personalizable ID transmitters are possible per vehicle.

When the vehicle is locked using the ID transmitter, the current mirror position is stored in the memory location for the key memory of the ID transmitter currently used.

As a result, the mirror position last set, referred to the ID transmitter used, is always reassumed when the vehicle is unlocked.

Storing memory position

The position of the outside mirrors is stored in the footwell module by pressing the "M" button followed by pressing one of the memory buttons within 7 seconds.

The footwell module evaluates signals from the memory buttons on the LIN-bus and transmits this information on the K-CAN2. As a result, the seat module also knows when to store the current seat position.

Calling up memory position

When the memory button is pressed, the footwell module receives the request to adjust the outside mirrors to the memory position. The footwell module sends the request to the K-CAN2. The seat module is therefore aware of the request and instructs the seat to move to the memory position.

Automatic Parking Function

The outside mirror on the front passenger's side is swivelled downward when reverse gear is engaged so that the curb can be easily viewed.

The automatic parking function is activated under following conditions:

- Terminal 15 ON and
- Reverse gear signal and
- Mirror selector switch set to driver position.

The footwell module receives the reverse gear signal via the K-CAN2. The automatic transmission control unit then makes this signal available.

Folding Mirror Manually

The outside mirrors can be folded in or out manually. The outside mirrors could lose their set position when folded in or out manually. It may be therefore necessary to fold out the outside mirrors, fold them in and then fold them out again.

The outside mirrors will then again be in the correct locked position.

Motor Protection by Repeat Interlock

The outside mirrors feature a repeat inhibit facility to avoid thermal overheating by frequently folding the mirrors in and out. The motors cannot be activated for 180 seconds when the repeat inhibit is active.

Mirror Auto Remote Fold-in Function (Comfort Function)

The auto remote fold-in function for the outside mirrors can be activated through following components:

- Identification transmitter
- Driver's door lock cylinder
- Outer door handle.

For example, the "Lock" button on the ID transmitter must be pressed for longer than 5 seconds to trigger the fold-in function. Fold-in is then initiated. Initially, the panoramic glass roof is closed, followed after a time delay by the front/rear windows.

With the option "Fold-in outside mirrors" The outside mirrors are folded in simultaneously with closing the rear windows.

SYSTEM COMPONENTS

Overview

The following components are installed in the F01/F02 for the purpose of operating the outside mirrors:

- Driver's door switch cluster with
  - Outside mirror adjustment switch
  - Outside mirror selector switch
  - LIN-bus link

- Outside mirrors
- Footwell module
- Junction box electronics
- Components for comfort/convenience function
  - Car Access System
  - Driver's door lock cylinder
  - Remote control receiver in the diversity module.

Driver's Door Switch Cluster

The driver's door switch cluster is connected via the LIN-bus to the footwell module.

The adjustment motors in the Low version of the outside mirrors are controlled directly by the mirror adjustment switch in the driver's door switch cluster.

The driver's door switch cluster in the High version of the outside mirrors is connected to the outside mirrors via the LIN-bus.

The electronic mirror module in the outside mirrors evaluates the LIN-bus signals and activates the adjustment motors.

NOTE: The driver's door switch cluster is connected to terminal 30B, terminal 31. The driver's door switch cluster receives the status of terminal 58g from the footwell module on the LIN-bus.

Design of the Outside Mirrors

Drive unit with memory

The drive unit with memory function additionally consists of the following components:

- Electronic mirror module
- Position potentiometer
- Folding mirror motor
- LIN-bus
- Electrochromic glass.

NOTE: In combination with the Active Blind Spot Detection (Lane Change Warning) the outside mirror also contains the display for the warning.



Fig. 90: Identifying Outside Mirrors Design
Courtesy of BMW OF NORTH AMERICA, INC.

Footwell Module

The master function for controlling the outside mirrors is integrated in the footwell module.

On vehicles with memory function, the mirror position of the respective memory button (driver's seat) is stored in the footwell module.

The outside mirrors (high) and the driver's door switch cluster are connected to the footwell module via the LIN-bus. The outside mirror functions are activated via the LIN-bus.

Junction Box Electronics

The junction box electronics power the low version of the outside mirror heating system.

The signal is pulse width-modulated and has a frequency of 1 Hz.

The junction box electronics also request the status of the electrochromic interior rearview mirror on the LIN-bus. The mirror electronics feed back the current status of the electrochromic interior rear-view mirror. The junction box electronics send the status to the footwell module on the K-CAN2. The footwell module is therefore aware of the status and is able to control the dimming of the outside mirrors accordingly.

SEATS

INTRODUCTION

Front Seat Equipment

The front seating arrangement of the F01/F02 consists of the multi-function seat as standard equipment. The multi-function seat (Comfort Seat) features 16-way adjustment with 4-way lumbar support which includes the articulated upper backrest, adjustable backrest width, adjustable thigh support, and Active Head Restraints with

adjustable side support.

The front seat also have memory settings for the driver and passenger seats.

An electropneumatic system is installed for lumbar support and the active seat. The advantage of electropneumatic lies in the fact that the overall weight of the seat is reduced.

The active seat is a part of the Luxury Seating package and features pneumatic control rather that the previous fluid based control system on the E65.



Fig. 91: Identifying Front Side Airbag
Courtesy of BMW OF NORTH AMERICA, INC.

The front side airbag (1) is integrated into the backrest of the driver's and front passenger seat. The seat back extends into the seat side. This is known as "encompassing seat wall". When the airbag is triggered, the side is pushed a little. This allows the airbag to open and provide its protective function. The front seats are equipped with seat-occupancy recognition (passenger) and a belt tensioner.

In the F01/F02, the button for the passenger-assist function (gentleman function) is integrated into the armrest of the driver's door. After pressing the button, the driver is able to operate the front-passenger seat using his own seat adjustment buttons.

For example, this allows you to make more space, e.g. before someone gets in on the passenger's side.

The front seats are equipped with crash-active head restraints. In the memory seat, the head restraints have a

button for adjusting the distance to your head.

In the multifunction seat, the distance is adjustable using the upper backrest adjustment.

Rear Seat Options

In the F01/F02, there are two seat models, the basic seat and the optional comfort (multifunction) seat. The rear comfort seat is part of the "Luxury Rear Seating" package which also includes the rear ventilated seats.

On the F02, there is also a "stand-alone" option for the massage function.

All seat equipment comes with the center armrest cup holder. There are two styles for the center armrest. See the following comparison.



Fig. 92: Identifying Center Armrest With Or Without Seat
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Center armrest w/o comfort seat
2	Center armrest w/comfort seat

The buttons for the rear seat heating are integrated into the center console.

Multifunction Seat

The optional massage function can be ordered additionally with the multifunction seat. The massage function is based on current medical knowledge and is integrated into the backrest.

The multifunction seat helps you to feel perfectly refreshed, for example with a back massage on a stressful day.

So that customers are provided with the best sense of well-being, they can select from two different massage intensity levels.

A new feature of the seat air conditioning function in the multifunction seat is that only two fan motors are installed for the ventilation. The fan motors draw in some fresh air from the rear footwell. The fresh air is then guided via air ducts through the multifunction seat until it reaches the backrest and seat surfaces. This helps to provide a pleasant air-temperature control for customers.

SYSTEM OVERVIEW

System Circuit Diagram, Multifunction Seat (comfort seat)

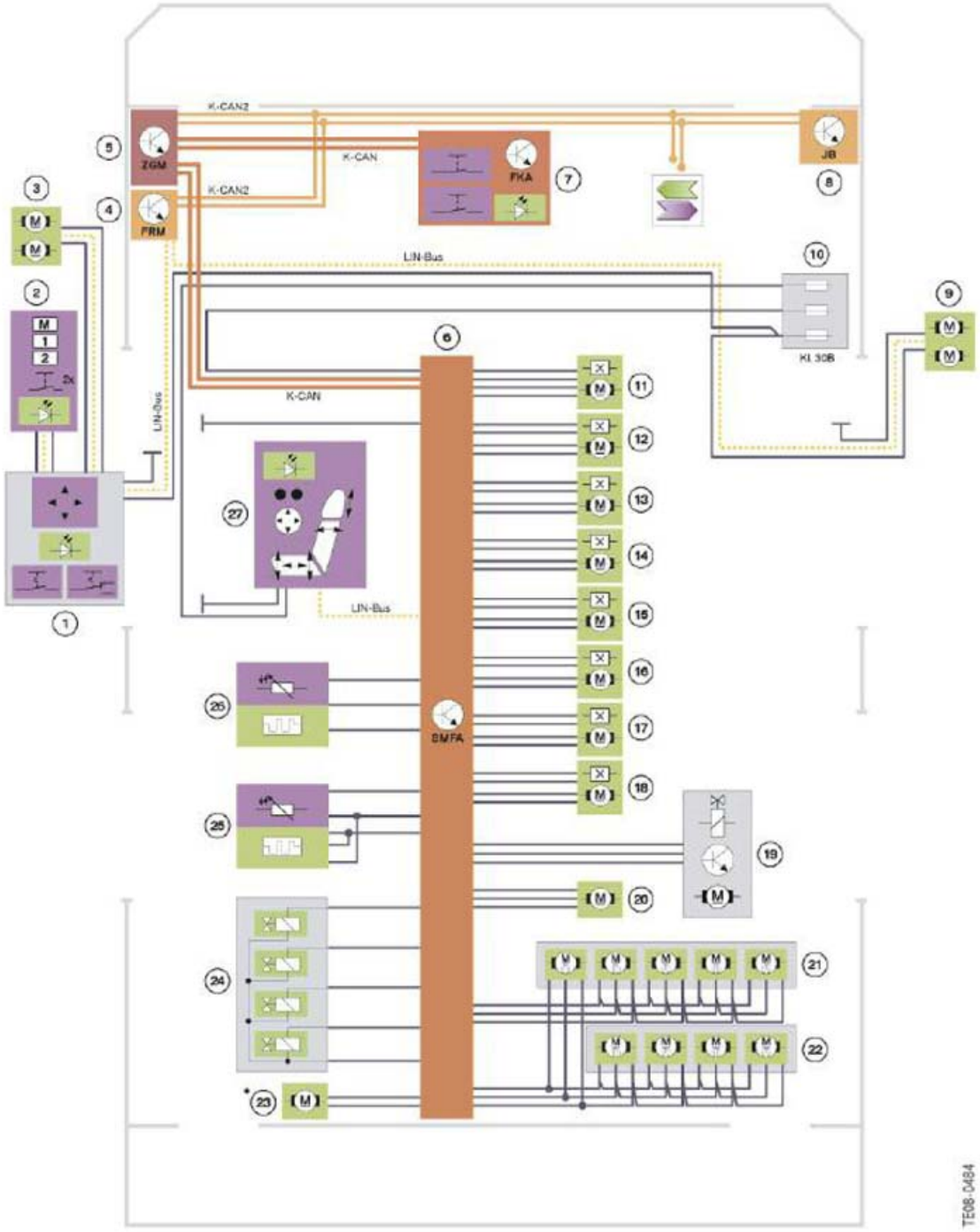


Fig. 93: Multifunction Seat System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Switch block, driver's door
2	Button block in the armrest, driver's side

3	Motors, mirror adjustment, driver's side
4	Footwell module (FRM)
5	Central gateway module (ZGM)
6	Driver's seat module (SMFA)
7	Integrated automatic heating/air conditioning (IHKA)
8	Junction box electronics (JB)
9	Motors, mirror adjustment, passenger's side
10	Fuses in the front distribution box
11	Motor, longitudinal seat adjustment
12	Motor, seat-inclination adjustment
13	Motor, seat-height adjustment
14	Motor, backrest-inclination adjustment
15	Motor, seat-depth adjustment
16	Motor, upper backrest adjustment (LKV)
17	Motor, head-restraint height adjustment
18	Motor, backrest-width adjustment
19	Pump, lumbar support/active seat
20	Pressure distributor, active seat
21	Fan, active seat ventilation, seat surface
22	Fan, active seat ventilation, backrest surface
23(1)	Lumbar support pump
24	Lumbar support, solenoid valves
25	Seat-heating pad, seat surface
26	Seat-heating pad, backrest surface
27	Seat function buttons, driver's seat
K-CAN2	Body CAN2
K-CAN	Body CAN
LIN-Bus	Local interconnect network bus
KI. 30B	Terminal 30 basic operation

(1) Pump in a vehicle equipped with lumbar support. In a vehicle equipped with active seats, a different pump is used. This pump supplies the active seat and lumbar support with air.

K-CAN signals at the seat module

K-CAN SIGNALS CHART

In/Out	Information	Source/sink	Function
In	Outside temperature	Outside temperature sensor > instrument cluster	Ambient conditions when faults are stored
In	Power reduction stage	Energy management system > digital engine control	Power reduction of seat heating

FUNCTIONS

Electric Front Seat Adjustment

The seats can be adjusted from terminal 30B ON. The seat-adjustment switch simply has to be pressed in the desired direction. The seats can have up to eight adjustment axes.

The seat adjustment options are listed in the following table:

SEAT ADJUSTMENT OPTIONS CHART

Index	Comfort (Multi-function seat)	
	Driver's side	Passenger's side
Seat height adjustment	X	X
Longitudinal seat adjustment	X	X
Seat inclination adjustment	X	X
Backrest inclination adjustment	X	X
Head restraint height adjustment	X	X
Seat depth adjustment	X	X
Backrest width adjustment	X	X
Upper backrest adjustment	X	X

Activation of the seat adjustment motors differ depending on the seat equipment.

For example, the seat-adjustment switches are evaluated either directly or via the LIN bus.

Seat Adjustment Options

With the maximum equipment specification, the F01/F02 seats can be adjusted in eight directions back and forth.



Fig. 94: Maximum Seat Adjustment Axes Using F01/F02 Multifunction Seat
Courtesy of BMW OF NORTH AMERICA, INC.

SEAT ADJUSTMENT AXES

Index	Explanation
1	Head restraint height adjustment
2	Upper backrest adjustment
3	Backrest inclination adjustment
4	Longitudinal seat adjustment
5	Seat height adjustment
6	Seat inclination adjustment
7	Seat depth adjustment

8	Backrest width adjustment

The seat can adjusted with the seat adjustment switches. The seat adjustment switches on the comfort seat (multifunction seat) are used again as an example here.

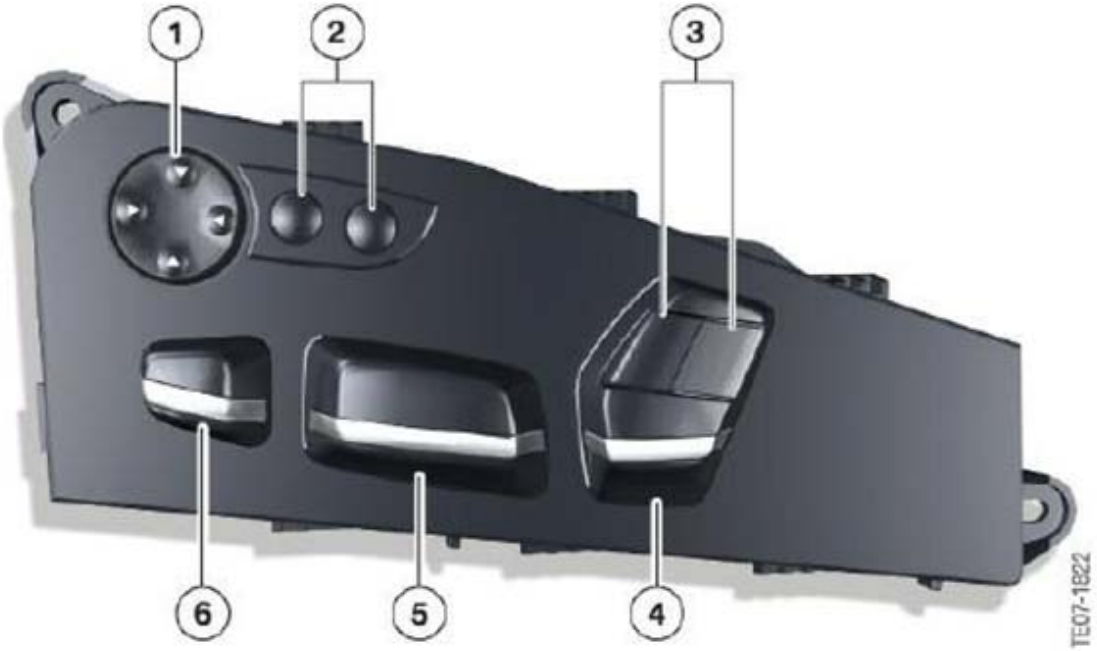


Fig. 95: Identifying Seat Adjustment Switches In F01/F02 Multifunction Seat With Memory Function
Courtesy of BMW OF NORTH AMERICA, INC.

SEAT ADJUSTMENT SWITCHES

Index	Explanation
1	Lumbar support adjustment
2	Backrest width adjustment
3	Upper backrest adjustment
4	Backrest inclination and head restraint height adjustment
5	Longitudinal seat, seat height and seat inclination adjustment
6	Seat depth adjustment

Seat position recording in the US

There is seat calibration in the US version for the driver's and the front-passenger seat. Seat calibration is important, because during the course of many seat adjustments, the seat position may lose accuracy. This generates a Check Control message. Refer to the section entitled Service information.

Front Seat Memory Function

The memory function is available for both the driver's and front-passenger seats. The memory buttons are located on the armrest. The memory function can be activated from terminal 30B ON. The memory function is

integrated into the seat module. The seat module of the seat concerned has sole responsibility for this function.

Two memory positions and the current seat position can be stored.

The memory buttons are integrated into the armrest of the vehicle's doors and connected via the LIN bus to the footwell module.

The LIN bus is "looped through" the switch block of the driver's door. This means that the LIN bus cable is routed from the footwell module to the switch block in the driver's door. From the switch block in the driver's door, the LIN bus is routed further to the memory buttons and the door mirror.

The footwell module evaluates the button status and sends it via the K-CAN2.

The footwell module sends the button status via the K-CAN2 to the central gateway module. The central gateway module receives the signal and issues it on the K-CAN. The seat module evaluates the signal and initiates the storing of the memory position, when requested to do so.

Press the memory button to prepare for storing the memory position. The seat module sends the request to switch on the function indicator. From the function indicator, for example, the customer can recognize that the memory function is ready for storing.

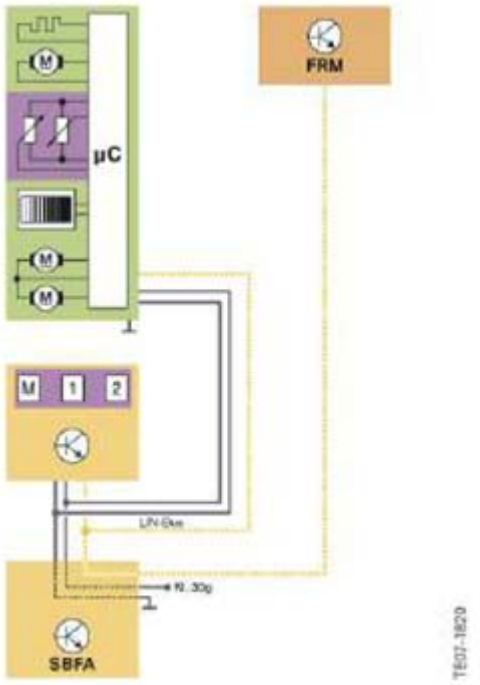


Fig. 96: F01/F02 LIN Bus Loop Through Connection
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation

1	Door mirror, driver's side
2	Memory button block
3	Switch block, driver's door
4	Footwell module

Pressing button "1" or "2" assigns the current position of the driver's seat to the pressed button. One memory position is available for each of the buttons "1" and "2".

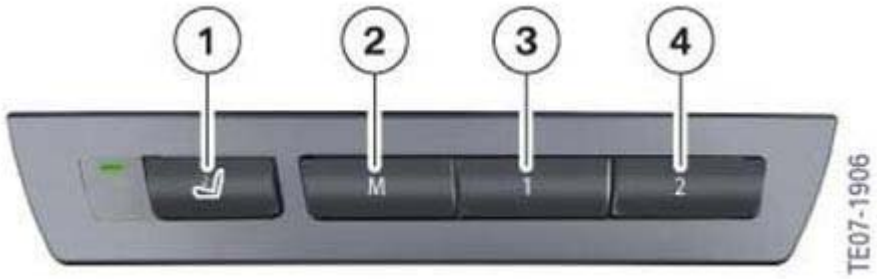


Fig. 97: Identifying Button Block In Armrests Of F01/F02 Driver's Side
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Passenger assist function button
2	M button
3	Button 1
4	Button 2

The data is assigned to the current ID transmitter as part of the Personal Profile, when the memory position is stored.

The button for the passenger-assist function is integrated into the armrest on the driver's side. This function is available in seat models with memory function.

Button illumination

The footwell module sends the status of the terminal 58g. The seat module receives the status of the terminal 58g via the K-CAN. The seat module passes the status of terminal 58g via the LIN bus to the memory buttons.

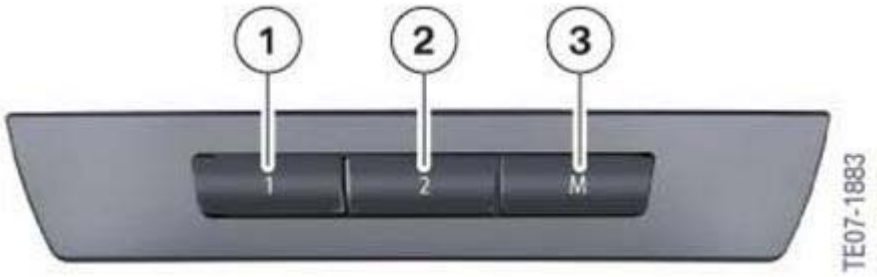


Fig. 98: Identifying F01/F02 Memory Buttons On Passenger's Side
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	M button
2	Button 1
3	Button 2

Memory function for the door mirrors and steering column

Pressing the memory "M" button followed by button "1" or "2" assigns the current position of the door mirrors and steering column to the pressed button.

The seat module sends the request to store the door mirror and steering column position via the K-CAN. The central gateway module transfers the signal to the K-CAN2. The footwell module then stores the position.

The door mirror position is assigned to the memory position of the driver's seat. Due to this fact, the current position of the door mirrors is also assigned to the pressed button "1" or "2".

NOTE: The memory position of the door mirrors and the electric steering column adjustment are stored in the footwell module.

Passenger-assist Function

The passenger-assist function is available from terminal 30B ON. The seat module on the driver's side alone is responsible for the passenger-assist Function. The button status is read in by the footwell module via the LIN bus and sent via the K-CAN2. The central gateway module transfers the signal to the relevant bus system.

As soon as the driver's seat module SMFA detects an operation request from the passenger-assist function button, it prepares the front-passenger seat module for an adjustment request via the K-CAN.

When the seat adjustment switch on the driver's side is now activated, the seat module on the passenger's side executes the request.

The K-CAN is used for communication between the seat modules. This allows all seat adjustment functions for the front-passenger seat and the memory function to be operated from the driver's seat. The passenger-assist

The seat module sends the request via the K-CAN to the function indicator for the activated passenger-assist function button in order to switch on the LED in the button. The request must be transferred on more than one bus system.

NOTE: A seat adjustment made via the buttons on the front-passenger seat has priority over those made from the driver's seat.

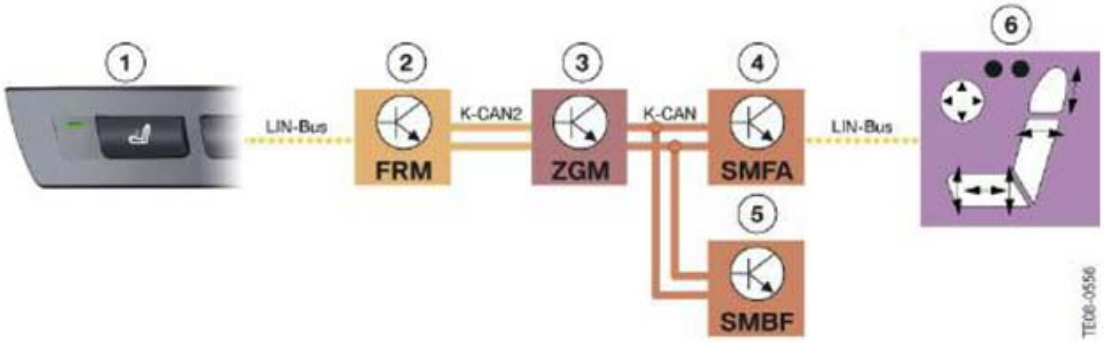


Fig. 99: Signal Path Of Passenger-Assist Function In F01/F02 Front Seats
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Passenger-assist function button
2	Footwell module
3	Central Gateway Module
4	Driver's seat module
5	Passenger's seat module
6	Buttons, seat functions, driver's seat

Front Seat Heating

The seat heating is standard as part of the comfort seats. The seat module is functionally responsible for seat heating.

The seat heating can only be activated from terminal 15 ON. The status of terminal 15 ON is issued by the Car Access System 4 via the K-CAN2. The junction box electronics thus know the status of terminal 15.

The central gateway module transfers the signal to the K-CAN. The seat module is connected to the K-CAN and receives the status of terminal 15.

The button for the seat heating is located in the IHKA/audio control panel. The control panel is connected to the control unit of the integrated automatic heating and air conditioning system.

Pressing the seat heating button, selects the heating stage as shown in the following list.

SEAT HEATING BUTTON

Heating stage	Seat heating pads
3	High
2	Medium
1	Low
0	Off

If the button is pressed for longer than 1.2 seconds with the seat heating activated, the seat heating will be switched off.

If, after terminal 15 OFF, the junction box electronics receive the status terminal 15 ON within 15 minutes, then the last selected function that was activated will come into operation.

The indicator for the selected heating stage is controlled by the seat module. The signal must be sent via several bus systems.

The seat heating module is connected to terminal 30B for the seat-heating load current.



Fig. 100: Identifying IHKA/Audio Control Panel With Buttons For F01/F02 Seat Heating
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Seat-heating button, driver's seat
2	Seat-heating button, front passenger's seat

Seat Heating with Seat Module

When the vehicle wakes up, the junction box electronics determine whether a seat module is installed in the vehicle. It sends a corresponding query via the K-CAN2 for this purpose. The central gateway module transfers the signal to the K-CAN. This allows the seat module to receive the request, respond to it via the K-CAN and take control of the seat heating function.

The seat module has sole responsibility for the seat heating function. The integrated automatic heating and air

conditioning system evaluates the button status and sends the button status via the K-CAN to the seat module.

The seat module evaluates the requests for the desired heating stage, as well as controls and monitors the seat heating functions. The seat-heating pads are connected to the seat module. A NTC resistor in the seat-heating pad is monitored to control the temperature.

Depending on the heating stage, the seat module sends the request for the function to be indicated in the button LEDs to the integrated automatic heating and air conditioning system.

The seat module is connected to terminal 30B for the seat-heating load current.

A fault in the seat-heating system results in a corresponding entry in the fault memory of the driver's seat module.

Power reduction of seat heating

The energy management system in the vehicle can activate the seat heating at a reduced power level corresponding to the vehicle's energy balance. The energy management is located in the digital engine-control system.

The digital engine control sends the request to reduce power via the PT-CAN. The central gateway transfers the information to the KCAN. This allows the seat module to receive the request to reduce power.

The reduction stages are:

- Operation of seat heating in Stage 2
- Operation of seat heating in Stage 2 at only 50%
- Seat heating OFF.

NOTE: In the event of a power reduction, the LEDs in the seat-heating buttons are not switched off.

During a starting cycle (terminal 50 ON) or when the seat adjustment switch is operated, the seat module prevents the seat heating from functioning. The LED indicator for the activated seat heating remains lit.

Heating Circuit for the Seat Heating

The F01/F02 seats are equipped with a two-circuit seat heating system.

Two-circuit seat heating system

A seat-heating pad is located in the surface of the backrest. Two seat-heating pads are integrated into the seat surface. Both seat-heating pads are supplied with power by the seat module.

There is a NTC resistor in each seat-heating pad in the backrest and seat surfaces. This serves as a temperature control.

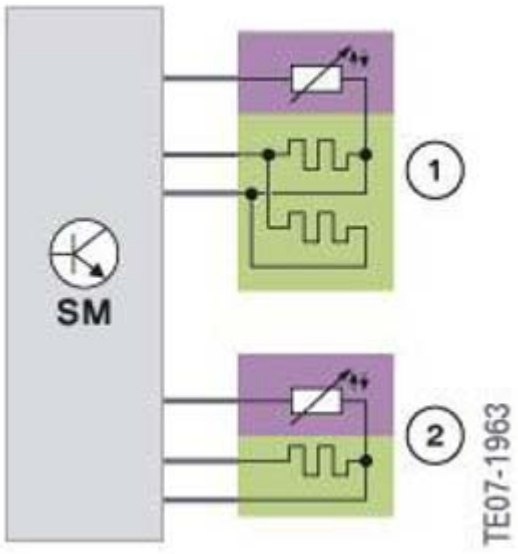


Fig. 101: Schematic Diagram Of Two-Circuit Seat Heating System
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	NTC resistor in the backrest-surface seat heating pad
2	NTC resistor in the seat-surface seat heating pad

The customer can adjust the seat heating air stratification individually. Select the menu item "Settings" using the controller in the Central Information Display.

Settings

- Air conditioning
  - Seat heating distribution
    - Driver
      - Front passenger

Front Lumbar Support

Using lumbar support, the backrest can be individually adapted to the spinal column and thus ensures relaxed driving. Lumbar support is a standard feature in the multifunction seat.

The button for the lumbar support adjustment is located on the side of the front seat and is connected via the LIN bus to the seat module. The function of the lumbar support is integrated completely in the seat module. The lumbar support is adjustable from terminal 30B ON.



Fig. 102: Identifying Seat Adjustment Switches And Lumbar Support Switch
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Button for lumbar-support adjustment
4	Backrest inclination and head restraint adjustment
5	Longitudinal seat, seat-height and seat inclination adjustment

The seat module requests the button status for the lumbar support adjustment via the LIN bus an on a cyclical basis. Lumbar support is provided by two inflatable air cushions in the backrest. The desired air cushion is inflated with air or deflated via two solenoid valves until such time that the button for the lumbar-support adjustment is released.

The pump for lumbar-support adjustment delivers the required air pressure. The pump and the solenoid valves are activated from the seat module.

NOTE: Seats with the lumbar support option are generally fitted with a seat module. For this reason, all seat heating or seat adjustment functions are located in the seat module.
The seat adjustment switches are read in from the seat module via the LIN bus.

Front Active Seat

Active seat function can be activated from the status terminal 15 ON with the Active Seat button. The button is located in the armrests of the front door of the vehicle.

The seat module has sole responsibility for this function.

The footwell module requests the button status via the LIN bus and sends this via the K-CAN2. The central

gateway transfers the signal to the K-CAN. This allows the seat module to receive the button status. The seat module evaluates the button status. If there is a request to switch on the active seat, then this is executed by the seat module.

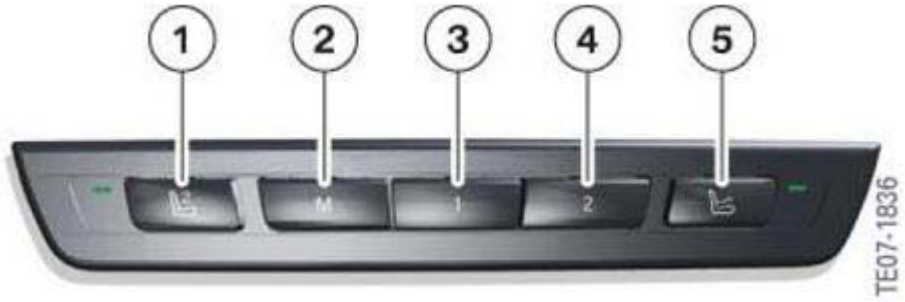


Fig. 103: Identifying Button Block In Armrest Of F01/F02 Driver's Side
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Passenger assist button
2	M button
3	Button 1
4	Button 2
5	Active Seat button

A powerful pneumatic pump is used for the active seat and lumbar support functions. The pump supplies the air cushion, for the lumbar support and the active seat with the required volume of air. For this reason, the pump is somewhat larger than that which is found in a vehicle without the active seat option.

NOTE: Lumbar-support adjustment has priority over the active seat. For lumbar-support adjustment, the pump for lumbar-support adjustment runs at maximum speed. For the active-seat function, the pump for lumbar support adjustment runs at roughly half this speed.

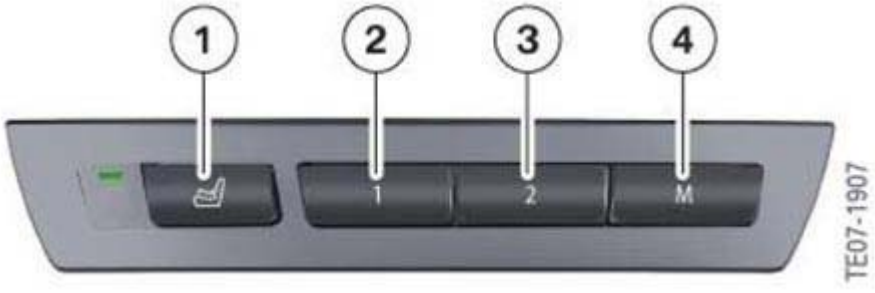


Fig. 104: Identifying Button Block In Armrest Of F01/F02 Front-Passenger's Side
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	M button
2	Button 1
3	Button 2
4	Active seat button

If, after terminal 15 OFF, the seat module receives the status terminal 15 ON within 15 minutes, then the last selected function that was activated will come into operation.

System Overview

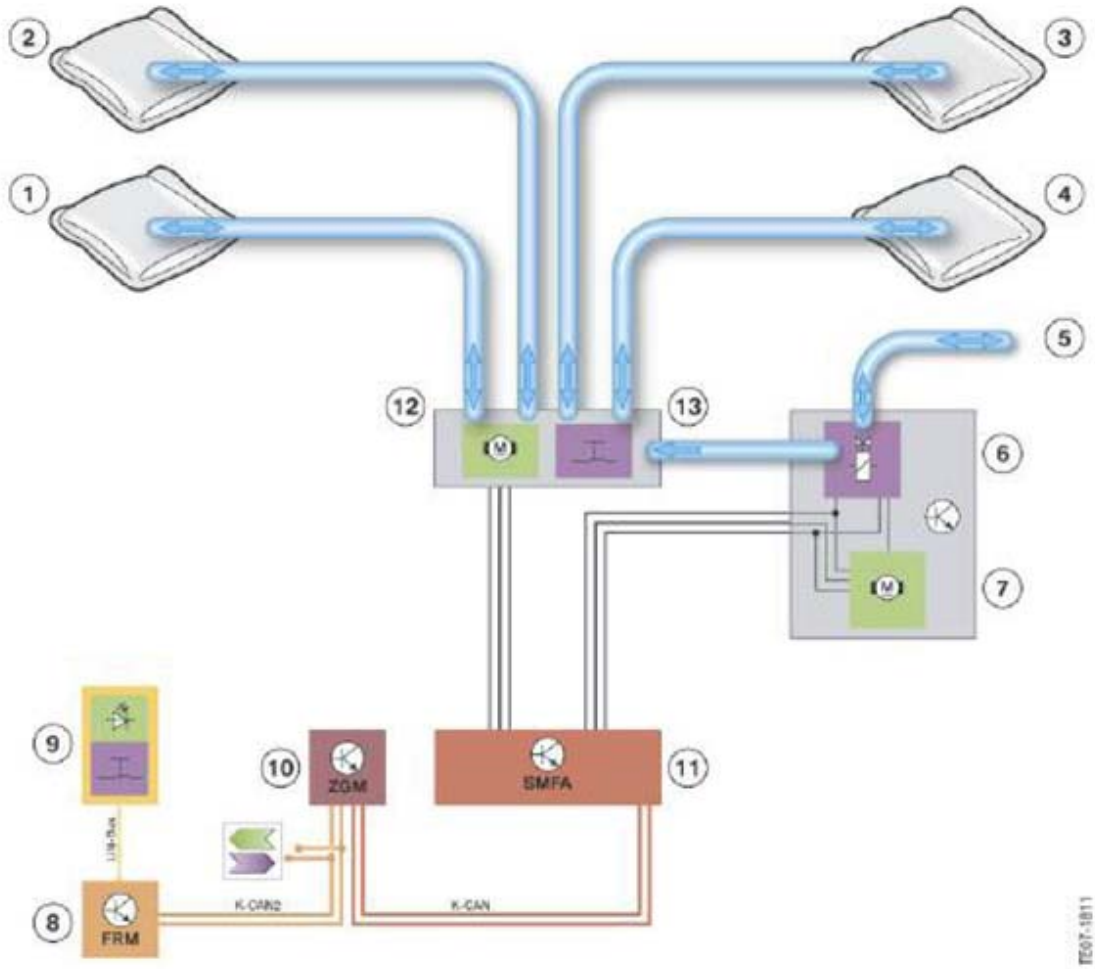


Fig. 105: Basic Activation Of F01/F02 Active Seat System Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Lower air cushion, left

2	Upper air cushion, left
3	Upper air cushion, right
4	Lower air cushion, right
5	Output, lumbar-support adjustment
6	Solenoid valve, changeover, active seat/lumbar-support adjustment
7	Pump for lumbar-support adjustment/active seat
8	Footwell module (FRM)
9	Active seat buttons with function indicator
10	Central gateway module (ZGM)
11	Driver's seat module (SMFA)
12	Distributor module, active seat
13	Air supply, active seat
K-CAN	Body CAN
K-CAN2	Body CAN2
LIN-Bus	Local Interconnect Network bus

K-CAN signals at the seat module

K-CAN SIGNALS CHART

In/Out	Information	Source/sink	Function
In	Outside temperature	Outside temperature sensor > instrument cluster	Ambient conditions when faults are stored
In	Yaw rate	Yaw rate sensor > Integrated Chassis Management	Suspend active seat function
In	Power management	Digital engine control > Seat module	Brief suspension, in order to maintain enough power in the vehicle electrical system

Four air cushions are integrated in the seat surface for the active seat. Two air cushions, one on top of the other, are used in both the left and right seat halves.

The air cushions are inflated with air supplied by the pump for the lumbar-support adjustment. A solenoid valve is integrated in the pump unit. The function of the solenoid valve is to change over the air supply. This ensures that only one function (lumbar support adjustment or active seat) is ever executed.

A distributor module is available for inflating the air cushions. The seat module delivers power to the distributor module as soon as the active seat is switched on.

The distributor module houses a motor, which drives an eccentric shaft. The rotation of the eccentric shaft causes the air inlets to the seat cushions to open or close.

The seat cushions are alternately inflated or deflated, depending on the position of the eccentric shaft. The air inlets are closed when the system is switched off and in the breaks between inflation or deflation.

A switch contact is integrated in the distributor module to switch on the pump for lumbar-support adjustment.

The rotation of the eccentric shaft actuates the contact, which thereby signals activation to the seat module. The seat module switches on the pump for lumbar-support adjustment and changes over the solenoid valve to inflation of the seat cushions.

Undervoltage

If the function fails due to undervoltage when the active seat is switched on, the active seat must be calibrated. The function does this by itself. The seat cushions are completely deflated the next time the active seat is switched on. The active-seat function is then ready for operation again.

Suspension of functions

In the interest of avoiding irritation when cornering at high speed, the active-seat function is stopped immediately in the event of excessive lateral acceleration.

The lateral-acceleration signal comes from the yaw-rate sensor. The Integrated Chassis Management issues the signal via the FlexRay.

The central gateway module transfers the signals to the K-CAN. This allows the seat module to receive the signal for the vehicle's lateral acceleration. The seat module cancels activation when a defined threshold is exceeded. The function indicator however remains lit.

The active seat is switched on again when the lateral-acceleration value drops again.

Power management

Power management is capable of briefly stopping the active seat from functioning. The function indicator however remains lit.

This applies, for example when pressing the starter or to maintain a sufficient energy balance for the vehicle's electrical system.

System faults

In the event of a system fault, the system shuts down or stops in the next center position in order to avoid further damage. A fault memory entry is stored in the seat module.

Active Seat Ventilation

The active seat ventilation option provides the occupants with individual climate control for the seat and backrest surfaces.

Active seat ventilation is available for both the driver's and front-passenger seats. Active seat ventilation can be activated from the status terminal 15 ON.

Stage 3 is engaged when the button is pressed for the first time. This sets the maximum fan stage for seat and backrest.

The next stage lower or OFF is selected on further pressing of the button. Active seat ventilation is deactivated if the button remains pressed for longer than 1.2 seconds.



Fig. 106: Identifying Button For Active Seat Ventilation
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Button for active seat ventilation, driver's seat
2	Button for active seat ventilation, pass seat

The button for the active seat ventilation is located in the IHKA/audio control panel. The seat module has sole responsibility for this function. The integrated automatic heating and air conditioning system evaluates the signals for operating the active seat ventilation and sends the button status to the seat module. This allows the seat module to receive the request, activate the fan and monitor their operation.

Depending on the heating stage, the seat module sends the request for the function to be indicated in the button LEDs to the integrated automatic heating and air conditioning system.

Nine fans are accommodated in each seat. The fans are switched on by the seat module and activated separately for backrest and seat surface. For active ventilation, the seat has two speed stages for the fans, depending on the air-conditioning stage. The seat surface has five fans, while the backrest has four fans.

Seat ventilation stages:

SEAT VENTILATION STAGE

Ventilation stage	Fans, seat	Fans, backrest
3	High	High
2	High	Low
1	Low	Low
0	OFF	OFF

After having been activated for a period in excess of 10 minutes, active seat ventilation is automatically

switched down from Stage 3 to Stage 2.

The activated seat ventilation function remains stored for up to 15 minutes after the status terminal 15 OFF. The previously selected seat ventilation stage is switched on again if in this time the status terminal 15 ON is received by the seat module.

The energy management system in the vehicle can deactivate active seat ventilation briefly depending on the vehicle's energy balance. The function indicator is retained however.

Rear Basic Seat

The standard rear seat for the F01 is the basic seat. Seat heating is available for the rear seat as part of the "Luxury seating package".

The rear basic seat offers seating for three people. The seat in the middle is fitted with a folding head restraint.



Fig. 107: Identifying Rear Basic Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Seat Heating in the Rear Basic Seat

System Circuit Diagram, Rear Seat Heating

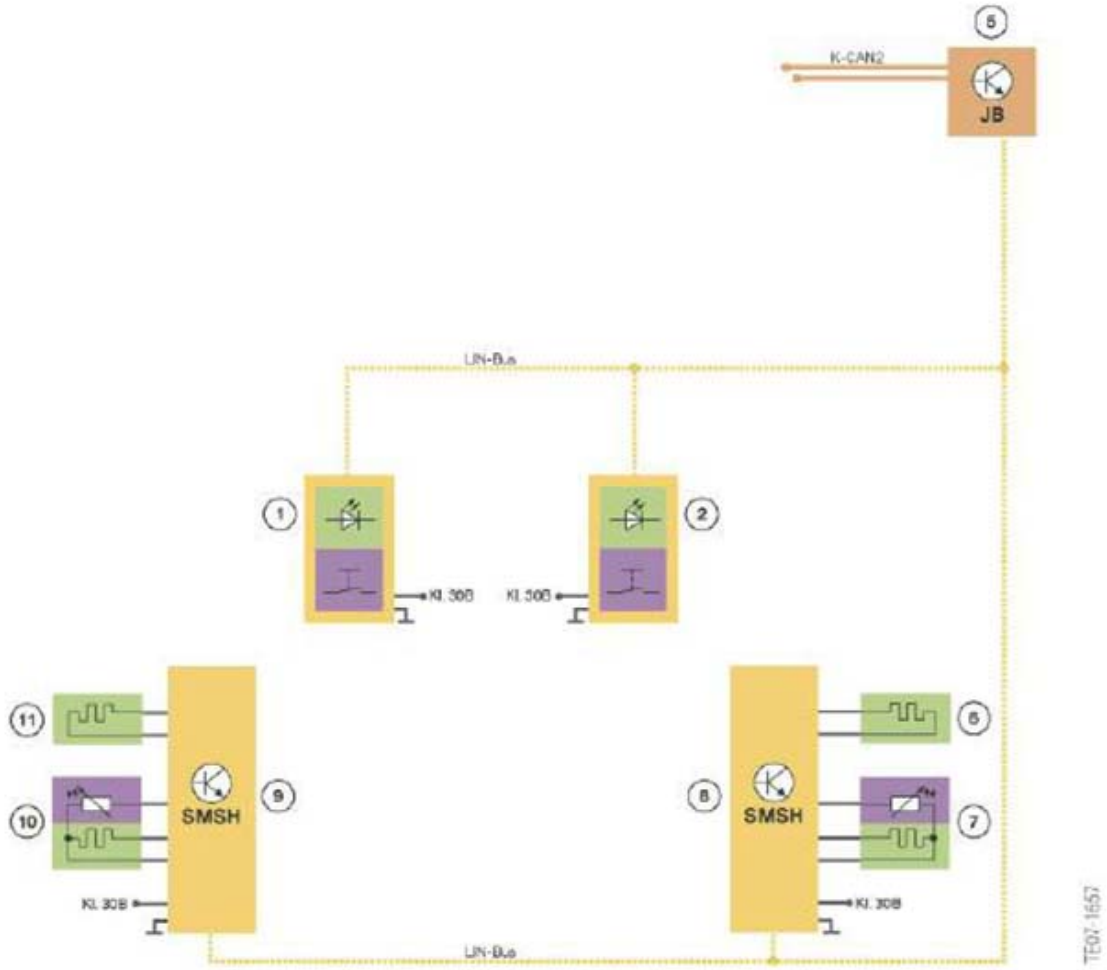


Fig. 108: Rear Seat Heating System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Seat-heating buttons, driver's side, with function indicator, rear
2	Seat-heating buttons, front-passenger's side, with function indicator, rear
5	Junction box electronics (JB)
6	Seat heating module (SMSH), front passenger, rear
7	Seat heating, seat surface
8	Seat heating, backrest surface
9	Seat heating module (SMSH), driver, rear
10	Seat heating, seat surface
11	Seat heating, backrest surface
KL. 30B	Terminal 30 basic operation
K-CAN2	Body CAN2
LIN-Bus	Local interconnect network bus

Rear seat heating

The seat heating is available for the left and the right seat and each has a heating circuit. A seat-heating pad is located in each backrest and seat surface. The seat heating can only be activated from "terminal 15 ON".

The seat-heating buttons are integrated under the air vents in the rear center console.

The seat heating function is fully integrated into the junction box electronics.

The junction box electronics evaluate the buttons for the seat heating. To do this the junction box electronics request the current status of the buttons via the LIN bus.

The junction box control unit then transfers the status to the appropriate seat heating module.

The seat heating modules are connected to the junction box electronics via the LIN bus.

NOTE: The seat heating modules are coded to detect the installed position. Different pins are switched to terminal 31, i.e. to ground for coding. The connectors are coded.

The buttons and the seat heating modules are connected to terminal 30B.

The fuses for the buttons and seat heating modules are located in the distribution box in the luggage compartment.

The seat heating can be switched on in three heating stages. The heating stages and their indications are set out in the following table.

SEAT HEATING STAGES

Heating stage	Seat	Backrest	LED
3	High	High	3
2	Normal	Normal	2
1	Low	Low	1
0	OFF	OFF	OFF

Regulation of the seat heating is controlled via an NTC resistor in the seat-surface seat-heating pad.

Electronic circuitry for indicating operation of the LED and communication via the LIN bus is integrated in each button.

Power reduction of seat heating

The energy management system in the vehicle can activate the seat heating at a reduced power level corresponding to the vehicle's energy balance. The energy management is located in the digital engine-control system.

The digital engine control sends the request to reduce power via the PT-CAN. The central gateway transfers the information to the K-CAN2. The junction box electronics thus know about the request for power reduction.

The junction box electronics send the request for power reduction to the seat heating module.

The reduction stages are:

- Operation of seat heating in Stage 2
- Operation of seat heating in Stage 2 at only 50%
- Seat heating OFF.

NOTE: In the event of a power reduction, the LEDs in the seat-heating switch are not switched off.

During a starting cycle (terminal 50 ON), the seat heating module prevents the seat heating from functioning. The LED indicator for the activated seat heating remains lit.

Rear-compartment Comfort Seat

The rear-compartment comfort seat is available as part of the luxury rear seating option which is currently only available on the F02.



Fig. 109: Identifying Rear-Compartment Comfort Seat
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Memory buttons
2	Seat adjustment function buttons

The rear-compartment comfort seat also has lumbar support. The comfort seat is also known as the multifunction seat.

The seating in the rear-compartment is designed for **two** persons to increase comfort.

As with its predecessor, the F01/F02 has the seat adjustment switch and memory buttons in separately installed positions.

The seat-adjustment switches are located on the center armrest and are connected via the LIN bus to the seat module. The button for adjusting the lumbar support is located next to the seat adjustment switches.

The memory buttons are integrated into the armrest of the vehicle's rear doors. The memory buttons are connected to the junction box electronics via the LIN bus.

As previously described with the basic seat, the comfort seat also has a method of transferring signals from the seat heating button that differs depending on the equipment installed on the vehicle.

The rear-compartment comfort seat can comes with the ventilation feature. Additionally, there is a "stand-alone" option for the massage function.

Electric Seat Adjustment for the Rear-compartment Comfort

The comfort seat has the following electric seat adjustment options:

- Seat-inclination adjustment
- Longitudinal seat adjustment SLV (seat distance to front seat)
- Head-restraint height adjustment
- Backrest-inclination adjustment
- Backrest head-inclination adjustment LKV.

The comfort seat has a large seat module that is integrated into the backrest of the seat concerned. All seat adjustment switches are read in by the seat module via the LIN bus. The seat module has sole responsibility for the seat functions. It controls and monitors the function sequences. The seat position of the comfort seat can be adjusted from terminal 30 ON.

NOTE: The seat module is connected via the K-CAN for communicating with other persons in the vehicle electrical system.

The seat module requests the status of the seat adjustment switches via the LIN bus. The seat module activates the adjustment motors in according to the status of the seat adjustment switches. The adjustment motors are activated via the relay in the seat module.

When the seat adjustment switch is released, the seat module cancels activation. The seat module also cancels activation when the adjustment motor is obstructed or when the end position is reached.

An obstructed motor is detected by the current measuring device integrated into the seat module and by failure of the Hall sensor pulses. In this case, the relays are no longer actuated thus shutting down the motors. The seat module also blanks out these adjustment motors when storing the memory position.

Once the motors are unobstructed, they are available to the memory function again.

The seat module stores the malfunctions. In the service workshop, the fault code entry is read out using the diagnostic system.

Fault code memory entries can be:

- Short-circuiting
- Line breaks
- Adjustment motor or Hall sensor is defective.



Fig. 110: Identifying Buttons For Seat Adjustment Functions In F01/F02 Rear-Compartment Comfort Seat (Driver's Side)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Button for lumbar-support adjustment
2	Upper backrest and head restraint height adjustment
3	Reset button
4	Backrest inclination adjustment
5	Longitudinal seat, seat height and seat inclination adjustment

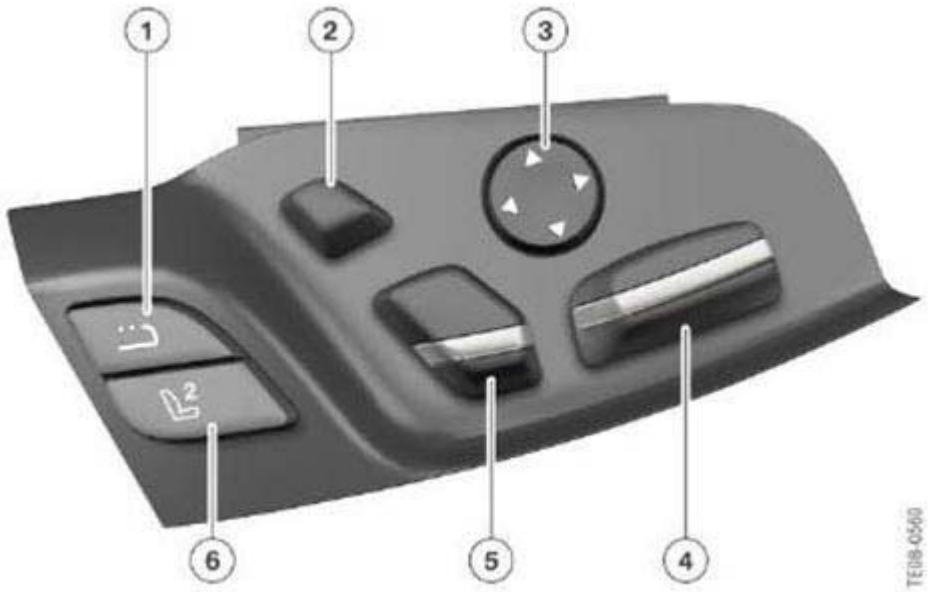


Fig. 111: Identifying Buttons For Seat Functions In F01/F02 Rear-Compartment Comfort Seat (Front-Passenger's Side)
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Reset button
2	Upper backrest and head restraint height adjustment
3	Button for lumbar-support adjustment
4	Longitudinal seat, seat height and seat inclination adjustment
5	Backrest inclination adjustment
	Button for adjusting passenger seat from the rear seat

Other Seat Functions

Reset function

The reset function enables you to set the comfort seat to a pre-set seat position. After the reset button is pressed, the seat automatically moves into position. It can be used to make the seat more easily accessible during servicing. This, for example, is of benefit to customers and service technicians, because getting out of the vehicle and accessing the comfort seat becomes easier.

NOTE: The reset function can also be used for fitting a child seat. After the reset function is activated, the comfort seat is in a better position for fitting the child seat.



Fig. 112: Identifying Reset Button
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Reset button for the rear compartment comfort seat

Position detection

The adjustment motors are equipped with Hall sensors. The Hall sensors generate Hall pulses during activation, which are evaluated by the seat module. The seat module calculates the fixed distance intervals based on the Hall pulses and determines the current seat adjustment position.

The seat position is stored in the seat module and used for the memory position.

Obstruction detection

The seat module records the Hall sensor pulses of the adjustment motors. If the adjustment motor is obstructed the Hall sensor pulses will fail. The seat module also detects an obstructed motor from the increased current when the obstruction occurs. The seat module then cancels activation of the adjustment motors.

The adjustment motor can be activated in the same direction again. If the motor remains obstructed, it must be activated in the opposite direction. If the seat can be moved in the opposite direction, then the seat module allows you to activate the original direction again.

If the obstruction in the adjustment motor cannot be cleared, then this motor is no longer used to store the memory function.

Rear seat adjustment button

In unfavorable situations, the leg room behind the front-passenger seat can seem quite narrow. Someone sitting behind the front-passenger seat may find this unpleasant.

In order to enlarge the space in front of the rear seat on the front-passenger's side, there is an additional button fitted on the center armrest in the rear seat area. This button allows you to operate the front-passenger seat.

The rear seat module behind the front-passenger seat requests the button status via the LIN bus.

This enables it to detect when the button is pressed. If the button is pressed, the rear seat module behind the front passenger seat prepares itself to carry out a seat adjustment to the front-passenger seat.

When the seat adjustment buttons for the rear seat are now operated, they adjust the front-passenger seat accordingly.

The function is deactivated by pressing the button for operating the front-passenger seat again.

NOTE: A seat adjustment made via the buttons on the front-passenger seat has priority over those made from the rear seat.

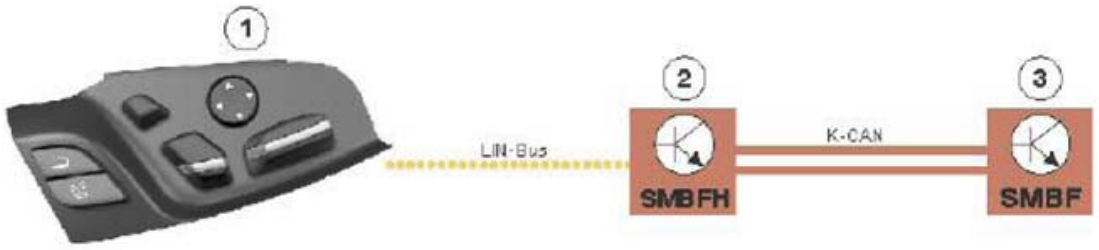


Fig. 113: Signal Path Button For Making Seat Adjustments To Front-Passenger Seat From F01/F02 Rear Seat
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Buttons for seat functions
2	Seat module, passenger side rear (SMBFH)
3	Passenger's seat module (SMBF)

Memory Function for the Rear-compartment Comfort Seat

The memory function is available for both the left and right rear passenger seat and can be activated from terminal 30B ON. The memory buttons are connected to the junction box electronics via the LIN bus.

The seat module of the seat concerned is responsible for the memory function. The junction box electronics request the status of the memory buttons via the LIN bus on a cyclical basis. To enable the seat module to read out the status of the memory buttons, the button status must be transferred on several bus systems. The bus systems are:

- LIN bus (JB > buttons)
- LIN bus (buttons > JB)
- K-CAN2 (JB > ZGM)
- K-CAN (ZGM > SM).

Press the memory button to prepare for storing the memory position. The seat module sends the request to switch on the function indicator. From the function indicator, for example, the customer can recognize that the memory function is ready for storing.

Pressing button "1" or "2" assigns the current position of the driver's seat to the pressed button. One memory position is available for each of the buttons "1" and "2".

The data is assigned to the current ID transmitter as part of the Personal Profile, when the memory position is stored.

If the seat module detects an obstructed adjustment motor, then memory adjustments to the motor remain disabled until the motor is no longer obstructed.

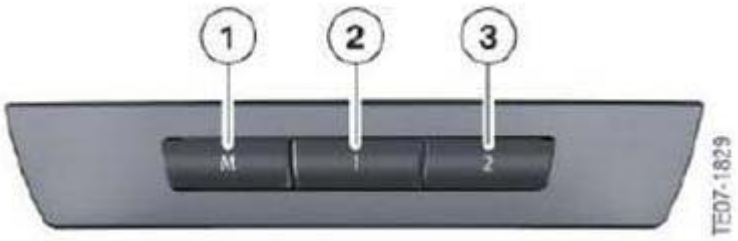


Fig. 114: Memory Buttons In Armrests Of F01/F02 Driver's Side
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	M button
2	Button 1
3	Button 2

Seat Heating in the Rear-compartment Comfort Seat

System Circuit Diagram, Seat Heating

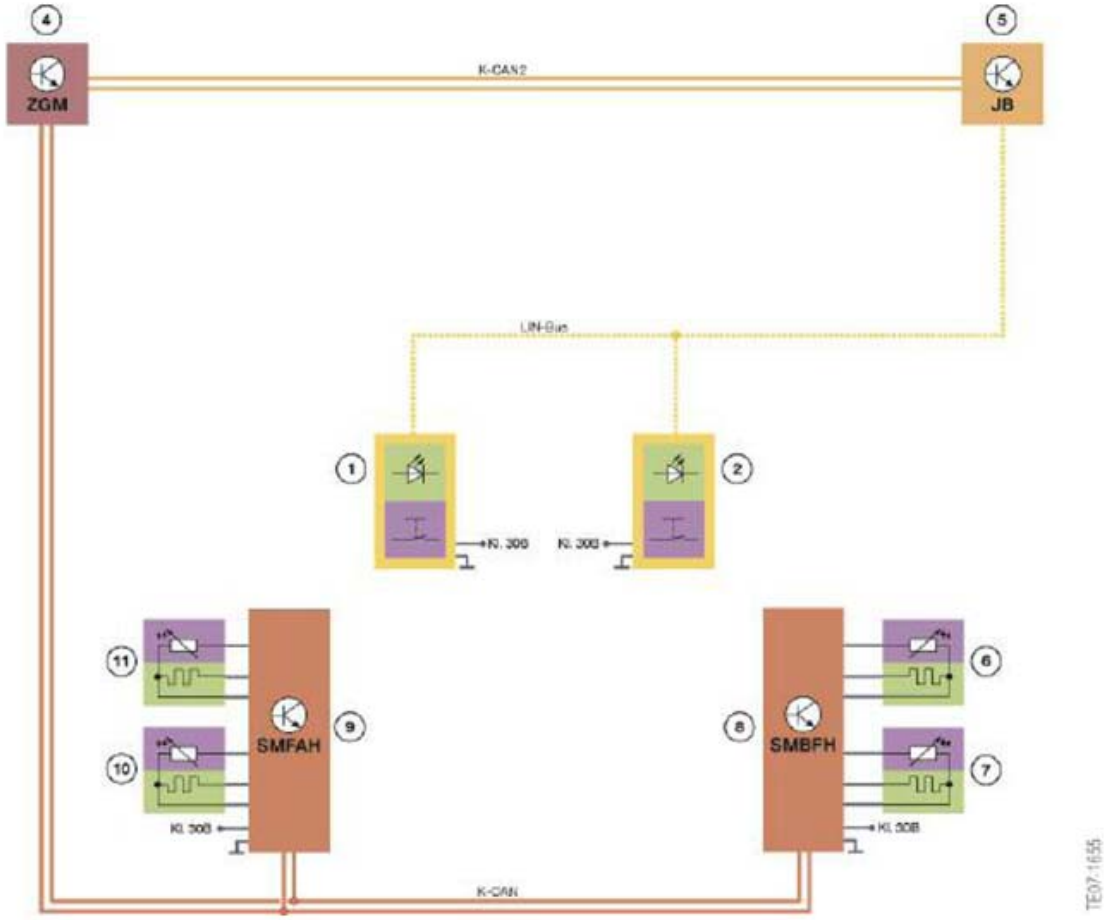


Fig. 115: Rear-Compartment Comfort Seat Heating System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Seat-heating buttons, driver's side, with function indicator, rear
2	Seat-heating buttons, front-passenger's side, with function indicator, rear
4	Central gateway module (ZGM)
5	Junction box electronics (JB)
6	Seat module, passenger side, rear (SMBFH)
7	Seat heating, seat surface
8	Seat heating, backrest surface
9	Driver's rear seat module (SMFAH)
10	Seat heating, seat surface
11	Seat heating, backrest surface
KI. 30B	Terminal 30 basic operation
K-CAN	Body CAN
K-CAN2	Body CAN2

LIN-Bus	Local interconnect network bus

When the vehicle wakes up, the JBE determine whether a seat module is installed in the vehicle. It sends a corresponding query via the K-CAN2 for this purpose. The central gateway module transfers the signal to the K-CAN.

The ZGM transfers the signal to the K-CAN. This allows the seat module to receive the request, respond to it via the K-CAN and take control of the seat heating function. This means that the button status of the seat heating is evaluated, and the seat heating is activated and monitored.

The JBE request the button status for the seat heating via the LIN bus on a cyclical basis and sends it via the K-CAN2. The ZGM transfers the request for the heating stage to the K-CAN. The seat module evaluates the request for the desired heating stage and activates the seat heating accordingly. The seat heating is a two-circuit heating system.

Function indicator

In order to indicate that the seat heating function has been activated, the seat module sends a request via the K-CAN to switch on the LEDs in the button. The request must be transferred on more than one bus system.

The bus systems are, K-CAN (SM > ZGM), K-CAN 2 (ZGM>JB) and LIN (JB>buttons):

Back lighting buttons

The FRM sends the status of the terminal 58g ON via the K-CAN2. This is how the junction box electronics receive the status of terminal 58g ON. The JBE send the status of the terminal 58g ON to the seat heating buttons via the LIN bus.

Power reduction of seat heating

The energy management system in the vehicle can activate the seat heating at a reduced power level corresponding to the vehicle's energy balance. The energy management is located in the digital engine-control system.

The digital engine control sends the request to reduce power via the PT-CAN. The ZGM transfers the information to the K-CAN2.

The JBE then receive the request for power reduction and initiates it.

The reduction stages are:

- Operation of seat heating in Stage 2
- Operation of seat heating in Stage 2 at only 50%
- Seat heating OFF.

NOTE: In the event of a power reduction, the LEDs in the seat-heating switch are not

switched off.

During a starting cycle (terminal 50 ON) or when the seat adjustment switch is operated, the junction box electronics prevent the seat heating from functioning. The LED indicator for the activated seat heating remains lit.

Lumbar Support in the Rear-compartment Comfort Seat

Lumbar-support Adjustment

Using the lumbar support, the backrest can be individually adapted to the spinal column and thus ensures relaxed driving.

The button for the lumbar support adjustment is located on the side of the center armrest and is connected via the LIN bus to the seat module.

The lumbar support function is fully integrated into the seat module and is adjustable from terminal 30B ON.

The seat module requests the button status for the lumbar support adjustment via the LIN bus an on a cyclical basis. The button responds with the current status via the LIN bus.

The seat module evaluates the button status and if necessary activates the lumbar support pump and solenoid valves.

Lumbar support is provided by two inflatable air cushions in the backrest. The desired air cushion is inflated with air or deflated via four solenoid valves until such time that the button for the lumbar-support adjustment is released.

The pump for lumbar-support adjustment delivers the required air pressure. The pump and the solenoid valves are activated from the seat module.

The seat module stores the malfunctions with the lumbar support. In the service workshop, the fault code entry is read out using the diagnostic system.

Fault code memory entries can be:

- Short-circuiting
- Line breaks
- Motor is defective.

Active Seat Ventilation for the Rear-compartment Comfort Seat

The active seat ventilation allows the passenger to have individual cooling of the seat and backrest surfaces.

In the F01/F02, a new concept has been introduced for the active seat ventilation. This concept requires only two fans for each seat. The integrated automatic heating and air conditioning system provides the vehicle with

climate-controlled air. This means there is sufficient fresh and climate-controlled air in the footwell in front of the rear seats. The fans draw some air from the footwell. The drawn-in air is routed via each air-conditioning pad to the seat and the backrest.

The active seat ventilation is available for the seat and backrest on the rear comfort seat and can be activated from status terminal 15 ON.

The seat module has sole responsibility for the active seat ventilation function. Stage 3 is engaged when the button is pressed for the first time. This sets a high fan stage for seat and backrest.

The next fan setting or OFF is selected on further pressing of the button.

AC STAGES CHART

AC stage	Fans, seat	Fans, backrest
3	High	High
2	High	Low
1	Low	Low
0	OFF	OFF

After having been activated for a period in excess of 10 minutes, active seat ventilation is automatically switched down from Stage 3 to Stage 2.

NOTE: The active seat ventilation has 4-zone automatic air conditioning as a requirement. The buttons for the active seat ventilation are in the control panel of the automatic rear-compartment air conditioning.



Fig. 116: Identifying Buttons For Active Seat Ventilation
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation

1	Button, active seat ventilation, driver's side rear
2	Button, active seat ventilation, pass side rear

The air intensity of the active seat ventilation is coupled to the fan setting of the automatic rear-compartment air conditioning. This makes it possible to harmonize the fan noises in the rear compartment. The active seat ventilation therefore reaches its maximum value, when the automatic rear-compartment air conditioning is set to the maximum fan setting.

If the automatic rear-compartment air are activated based on a characteristic map conditioning is not switched on, then the fans that is stored in each seat module.

Switching on the Rear Active Seat Ventilation

The automatic rear-compartment air conditioning evaluates the button status and sends it via the K-CAN.

The seat module evaluates the status, activates the active seat ventilation with the selected air-conditioning setting, and monitors the function.

Two fans are fitted in each seat. The fans are activated from the seat module depending on the selected setting.

An activated seat ventilation function remains stored for up to 15 minutes after the status terminal 15 OFF. The previously active fan setting for the seat ventilation is switched on again if in this time the status terminal 15 ON is received by the seat module.

The energy management system in the vehicle can deactivate active seat ventilation briefly depending on the vehicle's energy balance. The function indicator is retained however.

Function indicator

In order to indicate that the seat ventilation function has been activated, the seat module sends a request via the K-CAN to switch on the LEDs in the button. The automatic rear-compartment air conditioning switches on the LEDs.

Back lighting buttons

The footwell module sends the status of the terminal 58g ON via the K-CAN2. The central gateway module transfers the signal to the K-CAN. Then the automatic rear-compartment air conditioning receives the status terminal 58g ON and activates the back lighting.

NOTE: The indicators in the control panel of the automatic rear-compartment air conditioning use black panel technology. A detailed description of the black panel technology can be found in the Product Information "F01/F02 display and control elements".

Air-conditioning Pad

The air-conditioning pad has openings in the area of the seat and backrest surfaces. Air can be drawn in through

the openings in order to control the temperature of the seat cover.

Special covers are required for active seat ventilation. The covers have very small air outlets.

The air drawn in by the fans can flow through the air outlets. This cools the seat cover and ensures that the temperature of the seat cover remains pleasant.

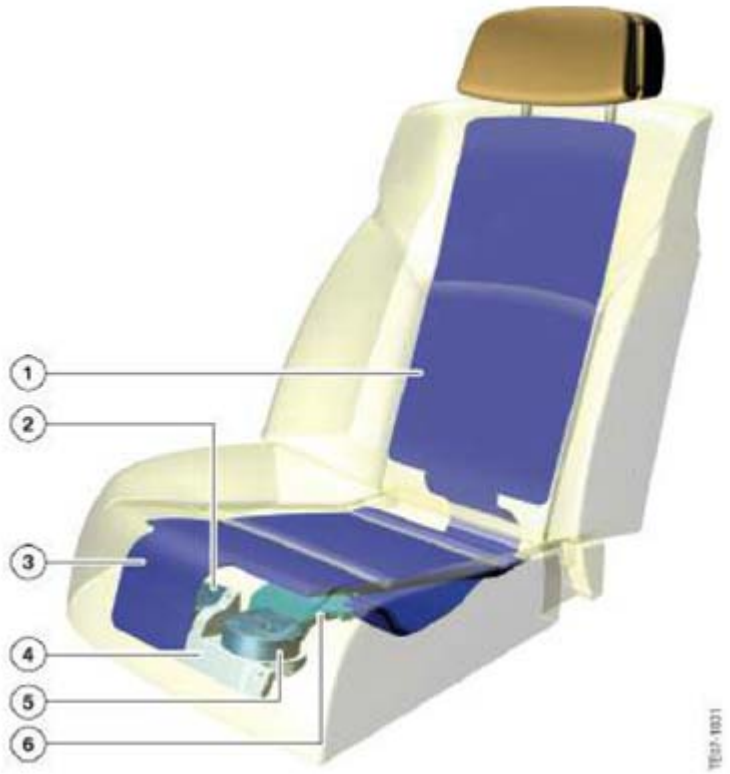


Fig. 117: Identifying Air-Conditioning Pad For Active Seat Ventilation In F01/F02 Rear-Compartment Comfort Seat
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Air-conditioning pad, backrest surface
2	Fans, seat ventilation
3	Air-conditioning pad, seat surface
4	Noise dampen for noise reduction
5	Fans, backrest ventilation
6	Adapter for air-conditioning pad, backrest surface

Massage Function in Rear-compartment Comfort Seat

The optional rear-compartment massage gives the rear-seat passenger even more comfort than in the E65. The

rear-compartment massage function is being offered in the F01/F02 for the first time at BMW.

An electropneumatic system is used to implement the massage function.

The massage function is available for both the left and right rear passenger seat and can be activated from terminal 30B ON. The seat module is integrated into the back of the backrest in the left rear and the right rear seat and has sole responsibility for the massage function.

The buttons for the massage function are connected via the LIN bus to the junction box electronics.

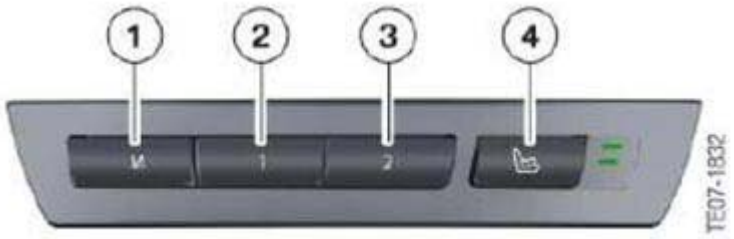


Fig. 118: Identifying Button Block In Armrests Of F01/F02 Driver's Side
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	M button
2	Button 1
3	Button 2
4	Massage function button

The junction box electronics evaluate the status of the massage button and sends the status via the K-CAN2.

The central gateway module transfers the signal to the K-CAN. This allows the seat module to receive the current status of the buttons. The seat module evaluates the status, activates the massage function, and monitors it.

In the backrest of the comfort seat, there is a massage pad for the massage function. Pressing the button starts the massage function at the maximum massage intensity. Pressing the button again switches it to a lower massage intensity level.

Pressing the button once again switches the massage function off.

If the button is pressed for longer than 1.2 seconds during the massage function, the massage function will be switched off.

In order to indicate that the massage function has been activated, the seat module sends the request to switch on the LEDs in the button.

The signal terminal 58g ON is made available through the footwell module. The junction box electronics pass on terminal 58g ON to the button. The button then switches the back lighting on.

Massage

The massage function is divided into massage cycles. A massage cycle consists of the massage and includes back mobilization and lasts approximately 64 seconds. After this, a new massage cycle begins.

There are twelve massage cushions that help to relieve tension in the back muscles through a wave-like motion along the backrest from top to bottom.

The wave-type motion is created by inflating and deflating the massage cushions. The pressure distribution module activates the massage cushions in pairs simultaneously.

The massage function is designed so that the two upper massage cushions are activated first. Activation in this situation means inflating and deflating the massage cushions with air. Following this, the pair of massage cushions lying beneath are activated and this continues until the bottom massage cushions are reached.

Towards the end of the massage cycle, mobilization of the back begins.

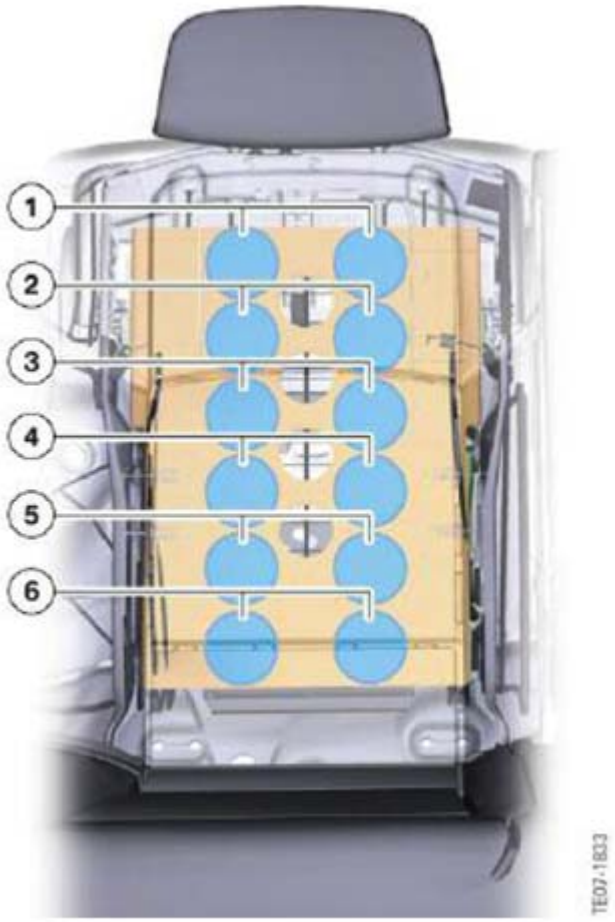


Fig. 119: Identifying F01/F02 Massage Cushions

Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Massage cushion pair 1
2	Massage cushion pair 2
3	Massage cushion pair 3
4	Massage cushion pair 4
5	Massage cushion pair 5
6	Massage cushion pair 6

Mobilization cushions are used for mobilization. There are six mobilization cushions arranged in the outside shoulder area, in the center of the thorax and in the lumbar area.

The mobilization cushions are simultaneously inflated and deflated periodically and sectionally. For example, the mobilization cushions in the right shoulder and right lumbar as well as the mobilization cushions in the left thorax are pumped up and deflated. Following that, the opposite side is inflated and deflated.

If the lumbar support is set when the massage function has been activated, the seat module deactivates the massage function. This allows the pump for the lumbar support adjustment to supply enough air flow to inflate the lumbar cushions.

After the lumbar support has been set, the massage function continues.

The massage function has a defined run-on. With this run-on the massage cushions and mobilization cushions are fully deflated. The run-on encompasses one massage cycle.

The pump for the lumbar support runs at various speeds depending on the function. Refer to the following table:

COMPONENTS DESCRIPTION CHART

Function	Pump speed
Lumbar support	Maximum RPM
Maximum massage intensity	High RPM
Low massage intensity	Low RPM

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Mobilization cushions, right shoulder, left thorax and right lumbar
2	Mobilization cushions, left shoulder, right thorax and left lumbar

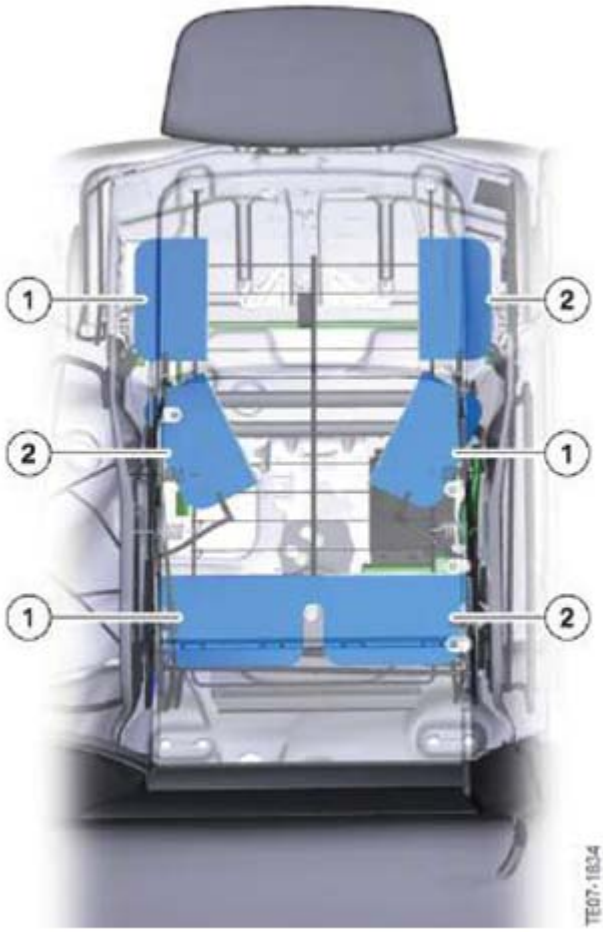


Fig. 120: Identifying F01/F02 Massage Cushions
Courtesy of BMW OF NORTH AMERICA, INC.

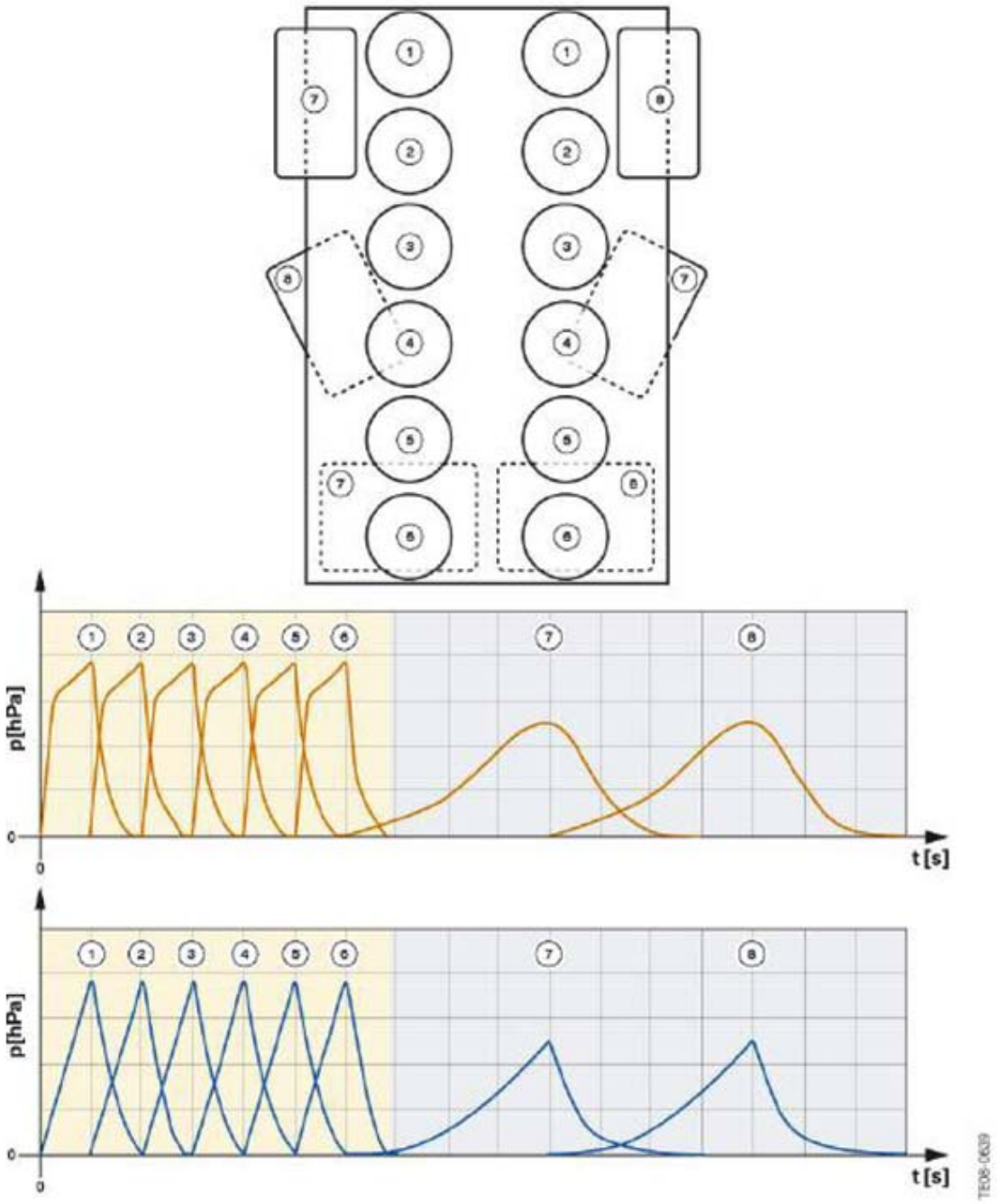


Fig. 121: Massage Cycle Sequence Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

MASSAGE CYCLE SEQUENCE CHART

Index	Explanation
1	Massage cushion pair 1
2	Massage cushion pair 2
3	Massage cushion pair 3

4	Massage cushion pair 4
5	Massage cushion pair 5
6	Massage cushion pair 6
7	Mobilization cushions, right shoulder, left thorax and left lumbar
8	Mobilization cushions, left shoulder, right thorax and left lumbar
Orange	Graph of max. massage intensity
Blue	Graph of min. massage intensity

System Circuit Diagram, Rear Comfort Seat Behind the Driver

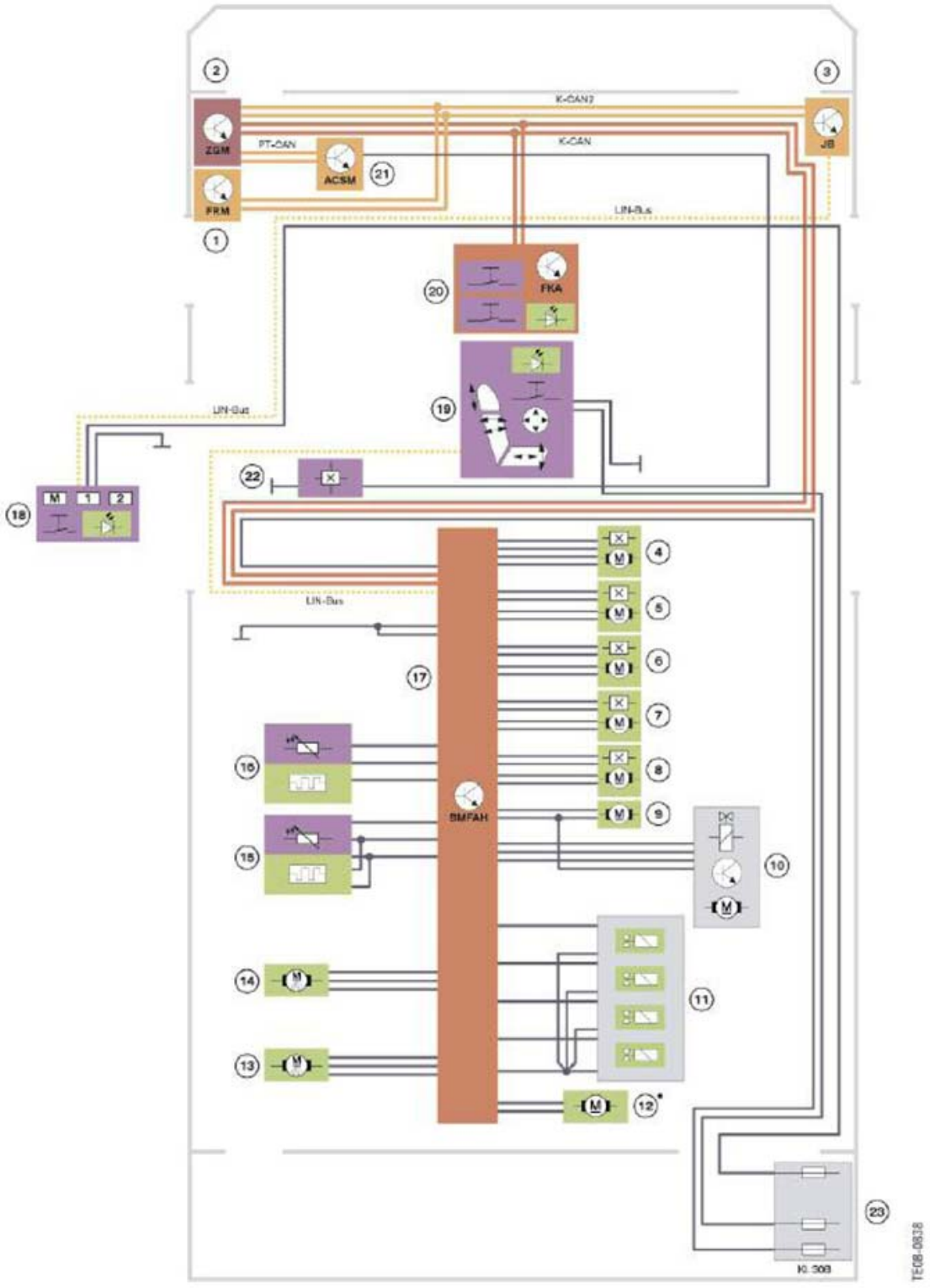


Fig. 122: Rear Comfort Seat System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Footwell module (FRM)
2	Central gateway module (ZGM)
3	Junction box electronics (JB)
4	Motor, longitudinal seat adjustment (SLV)
5	Motor, seat-inclination adjustment (SNV)
6	Motor, backrest-inclination adjustment (LNV)
7	Motor, upper backrest adjustment (LKV)
8	Motor, head-restraint height adjustment (KHV)
9	Pump, lumbar support/massage function 23 Distribution box in luggage compartment
10	Pressure distribution module, massage/lumbar support
11	Solenoid valves for lumbar support
12	Pump for lumbar support(1)
13	Fan, active seat ventilation, backrest surface
14	Fan, active seat ventilation, seat surface
15	Seat-heating pad, backrest surface
16	Seat-heating pad, seat surface
17	Seat module, driver's side, rear (SMFAH)
18	Button block in the armrest, driver's side
19	Buttons, seat functions, driver's seat
20	Integrated automatic heating and air conditioning IHKA
21	Advanced Crash Safety Management (ACSM)
22	Seatbelt-buckle switch
K-CAN2	Body CAN2
K-CAN	Body CAN
LIN-Bus	Local interconnect network bus
KI. 30B	Terminal 30 basic operation
(1) Pump in a vehicle equipped with lumbar support. In a vehicle equipped with massage seats, a different pump is used.	

This pump supplies the massage seat and lumbar support with air.

K-CAN signals at the seat module

K-CAN SIGNALS CHART

In/Out	Information	Source/sink	Function
In	Outside temperature	Outside temperature sensor > instrument cluster	Ambient conditions when faults are stored
In	Power reduction stage	Energy management system > digital engine control	Power reduction of seat heating

The seatbelt-buckle switch signals whether the seatbelt is fastened or not. When the seatbelt is fastened, the seat module adjusts the head restraint with an electric motor to the previously used head restraint height.

If the seatbelt has not been fastened, then the head restraint is fully retracted. This increases the field of vision out the back window.

The Advanced Crash Safety Management evaluates the seatbelt-buckle switch and sends its status via the PT-CAN. The central gateway module transfers the signal to the KCAN. This provides the seat module with information about whether the seatbelt is fastened or not. The seat module sets the head restraint to the maximum height if the seatbelt is on, or completely back if the seatbelt is not on.

SYSTEM COMPONENTS

Controls and Control Units

Controls

The controls for the seat functions are connected depending on the seat equipment. The controls are:

- Seat-adjustment switches
- Lumbar support switch
- Memory buttons
- Active-seat button
- Active seat ventilation button
- Massage function button.

Refer to the following table:

COMPONENTS DESCRIPTION CHART

Switch/button connection	Application
Direct	Seat adjustment motor is directly activated.
Resistance-coded	The seat module reads in the switch directly and effects the request triggered by the switch.
LIN-Bus	The seat module cyclically requests the status of the switch and effects the request triggered by the switch.
LIN bus > K-CAN2	For example, the buttons in the armrests are connected to the footwell module or the junction box electronics. The control units evaluate the button status and send it via the K-CAN2. The signal is transferred from the central gateway module to the K-CAN.
Control unit > K-CAN	For example, the button status for the seat heating in the front seats is evaluated by the integrated automatic heating and air conditioning system and issued via the K-CAN. For example, the button status for the active seat ventilation in the rear seats is evaluated by the automatic rear-compartment air conditioning and issued via the K-CAN.

Control Units

Junction box electronics

The junction box electronics each have a control outlet for the seat heating. In seat heating with a seat heating module, the junction box electronics activate the seat heating via the LIN bus.

NOTE: The junction box electronics cede activation of the seat heating to the seat module of the respective seat.

Seat heating module

The seat heating module evaluates the LIN bus signal from the junction box electronics. The seat heating module is connected by means of three connectors. One connector establishes the connection to the junction box electronics. The other two connectors are responsible for connecting the seat heating.

Seat module

The seat module receives activation information for the seat heating via the K-CAN. Similarly, the seat module evaluates the button status of the controls for the various seat functions.

The requests made by the memory buttons for the door mirror are made available via the K-CAN. The positions for seat memory are stored in the seat module.

The requirements of the seat-adjustment switches are executed by the seat module.

Pressure Distribution Module

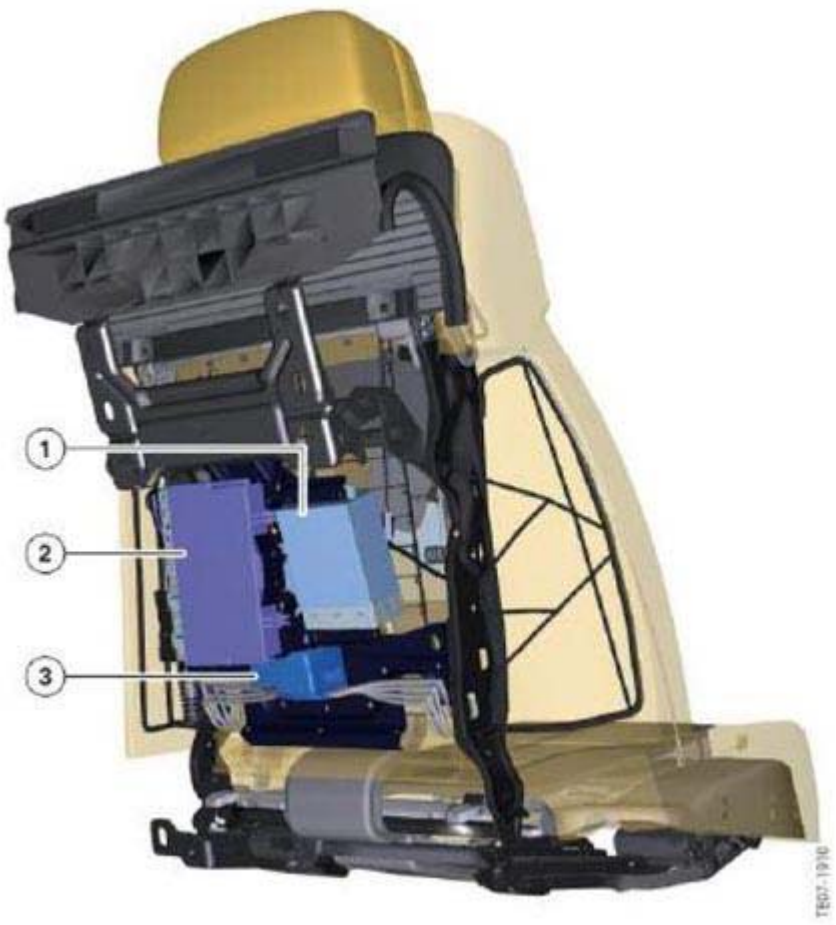


Fig. 123: Identifying Lumbar Support Pump, Pressure Distribution Module And Seat Module
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Lumbar support pump
2	Seat module
3	Pressure distribution module, massage/lumbar support

A pressure distribution module located in the backrest is for inflating and deflating the respective massage or mobilization cushions. The pressure distribution module distributes the air for the massage cycle. There is a motor for this that drives an eccentric shaft. The eccentric shaft is designed so that it alternately opens and closes the air inlets and outlets of the massage cushions and mobilization cushions.

The required air is supplied by the pump for the lumbar-support adjustment. The seat module receives the request for the required air for the massage function from the pressure distribution module. The pump for the lumbar-support adjustment is activated by the seat module.

NOTE: Lumbar-support adjustment has priority over the massage function.

SERVICE INFORMATION

Calibration of the Drivers/front-Passenger Seat in the US Version

The position of the driver's seat in the longitudinal direction can become implausible in the course of that seat's life. This can be caused by repeatedly moving the seat forward and back in the longitudinal direction.

These movements can give rise to an unauthorized position delta which no longer provides for a determination of the seat position.

The seat must therefore be recalibrated. Calibration is easy and can be performed by the customer him-/herself.

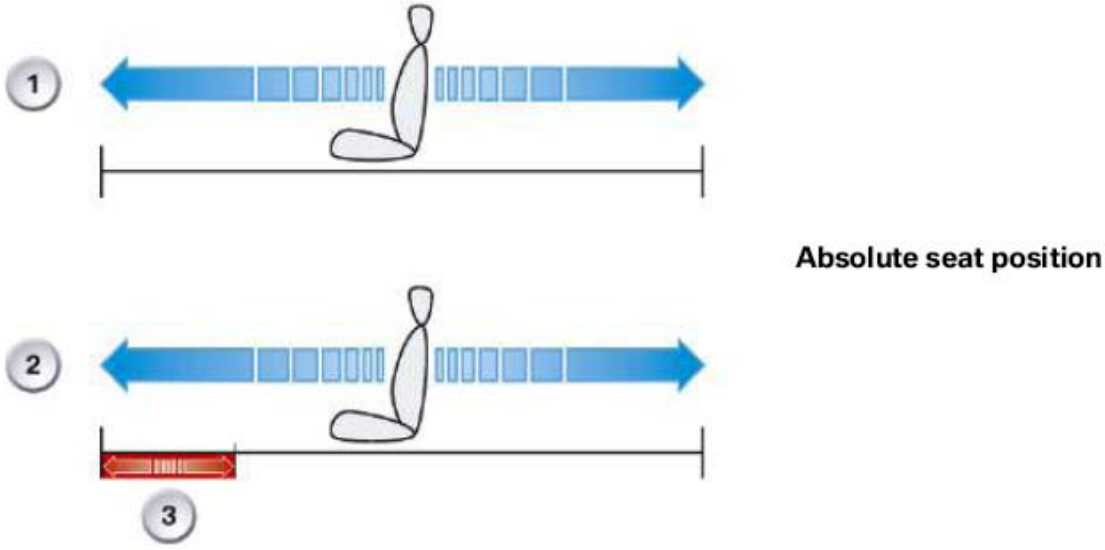


Fig. 124: Identifying Absolute Seat Position
Courtesy of BMW OF NORTH AMERICA, INC.

ABSOLUTE SEAT POSITION CHART

Index	Explanation
1	Relative seat position
2	Absolute seat position
3	5% woman area
Blue arrow	Total seat-adjustment travel
Red arrow	Seat-adjustment travel (5% woman)

NOTE: **The seat must be moved in the mechanical front stop. Then the seat is calibrated and can be adjusted in the desired seat position.**

If the seat is unable to reach the mechanical front stop, the calibration must be performed in the service garage/workshop.

This situation can come about if, for example, a coin is stuck in the seat-adjustment rail and blocks the adjustment travel.

If repairs are made to the seat, the seat must always be calibrated. This is necessary to guarantee seat-position recognition, or more precisely to increase the safe and reliable function of seat-position recognition.

Switching the seat control unit for test purposes for example with one from another vehicle is possible. The seat calibration will be lost however. Because the possibility of the calibration being in order when the old seat control unit is reinstalled cannot be ruled out, it is necessary to calibrate the seat.

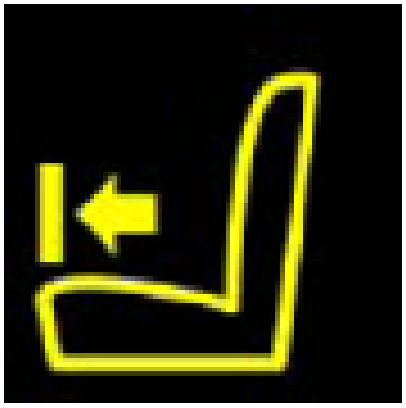
NOTE: **The ACSM receives a message from the seat module once a second as to whether calibration of the seat is necessary.**

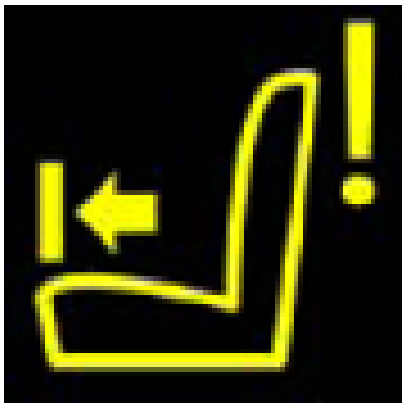
The signal is transferred in the central gateway module from the K-CAN to the PT-CAN.

As soon as the message contains the information "Calibration necessary", the ACSM outputs a Check Control message via the PT-CAN to the instrument cluster.

The seat control unit can likewise trigger the Check Control message. This is possible if for instance the Hall sensor of the longitudinal drive motor is defective. A repair in the garage/workshop will therefore be necessary. The seat must be calibrated after the repair.

CENTRAL LOCKING BUTTON REFERENCE CHART

Check Control Message	Meaning	Information in Central Information Display
	Seat must be recalibrated.	Seat calibration necessary.

	Seat-position recognition malfunctioning!	Seat-position recognition malfunctioning! Have the system checked by BMW Service at the next available opportunity.

Replacing Components

The seats consist of a large number of components. For this reason, the components can be replaced if one becomes faulty.

The Repair Instructions must be observed when replacing or making repairs to a seat. It is also important that only genuine BMW replacement parts are used. This ensures that the seat functions remain intact.

For example, the motors for the seat adjustment cannot be replaced separately from the corresponding output shaft, because they form one electromechanical unit.

STEERING COLUMN SWITCH CLUSTER

INTRODUCTION

The Steering Column Switch Cluster - An Interface

The steering column switch cluster is a "mechanical and electrical interface" from the steering wheel to the vehicle; it is firmly connected mechanically to the steering column. On top of this purely mechanical connection, the steering column switch cluster is connected electrically via bus systems or directly to components.

In the F01/F02, the steering column switch cluster has a steering column stalk on either side of the steering column. The right-hand steering column stalk is for activating/deactivating the wiper/washer system functions. The left-hand steering column stalk is for activating/deactivating the high-beam headlight or turn indicators and for operating the on-board computer functions.

A steering column switch cluster with optical steering-angle sensor is built into the F01/F02. The steering-angle sensor uses a non-contact optical measuring system for steering-angle detection.

The steering column switch cluster receives the button signal of the steering wheel directly or across the LIN bus. These signals are forwarded from the steering column switch cluster to the respective control units.

Signals such as the buttons for controlling the volume of the radio are transmitted by the steering column switch cluster across the FlexRay. The steering column switch cluster receives e.g. the signal to activate the vibration actuator across the FlexRay.

The steering column switch cluster forwards the trigger signal of the driver's airbag directly to the priming caps of the airbag.

For the electrical steering column adjustment, the switch cluster evaluates the button and transmits requests across the FlexRay.

The steering column switch cluster also evaluate the button for the steering wheel heating. The steering column switch cluster forwards this signal across the LIN bus to the steering wheel electronics.

System Overview

Input/output Diagram, Steering Column Switch Cluster

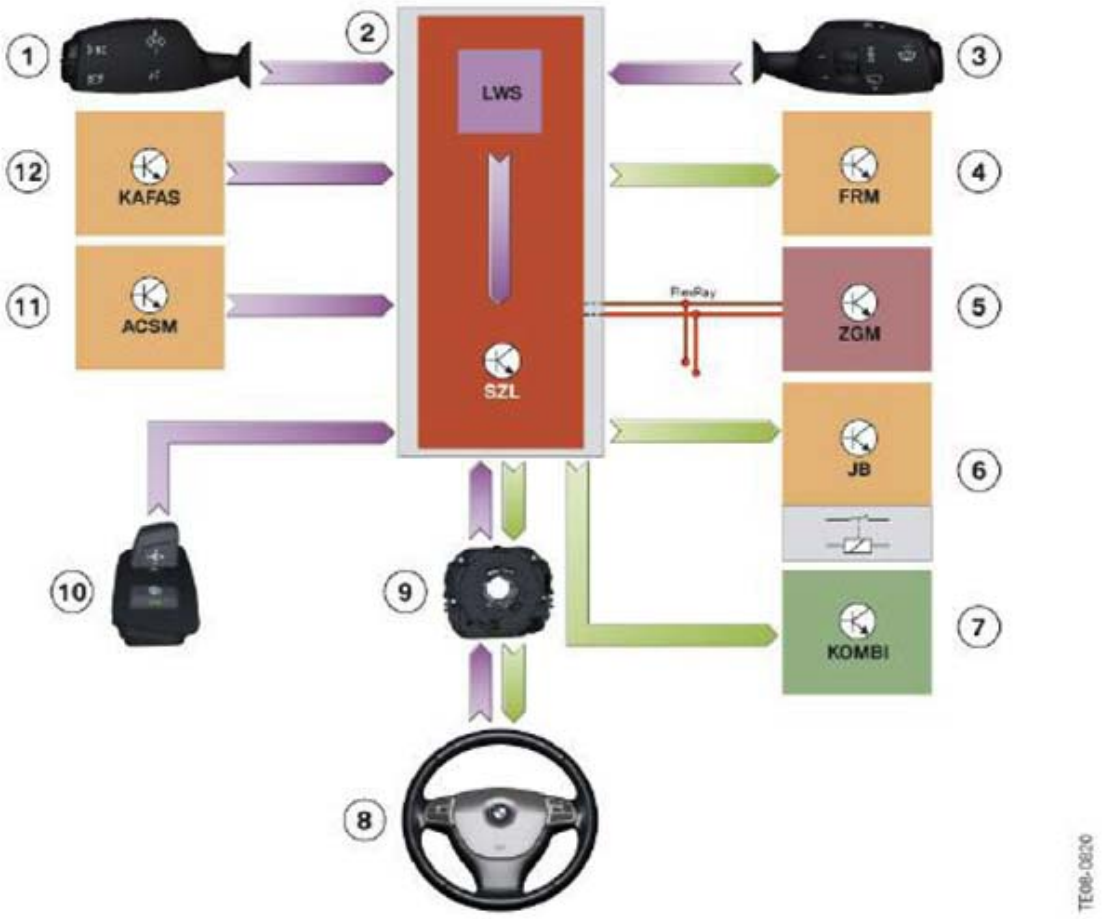


Fig. 125: Steering Column Switch Cluster Input/Output Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Steering column stalk for turn-indicator/high-beam switch
2	Steering column switch cluster (SZL)
3	Steering column stalk wiper switch
4	Footwell module (FRM) 12 Control unit (KAFAS)
5	Central gateway module (ZGM)
FlexRay	FlexRay
6	Junction box electronics (JB)
7	Instrument cluster (KOMBI)
8	Multifunction steering wheel
9	Coil-spring assembly
10	Steering wheel heating/steering wheel adjustment buttons
11	Crash Safety Module (ACSM)
LIN-Bus	Local Interconnect Network bus
LWS	Steering-angle sensor

The signals which are triggered by the turn-indicator/high-beam switch steering column stalk (1) or wiper switch (3) are made available to the footwell module (4) or the junction box electronics (6).

The button signals at the multifunction steering wheel (8) are directed through the coil-spring assembly (9) to the steering column switch cluster (2), where they are evaluated and then transmitted across the FlexRay.

System Circuit Diagram, Steering Column Switch Cluster

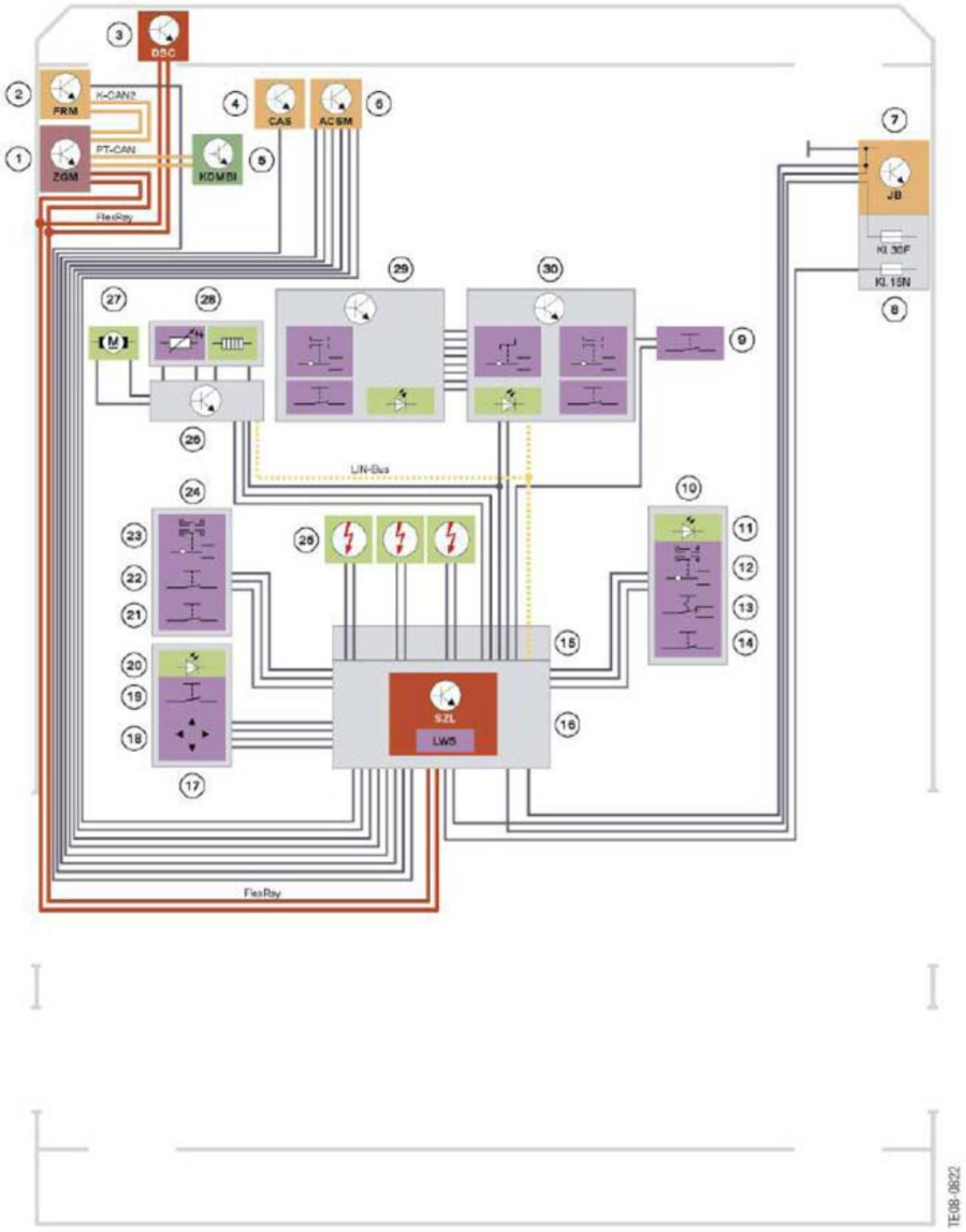


Fig. 126: Steering Column Switch Cluster System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Central gateway module (ZGM)

2	Footwell module (FRM)
3	Dynamic Stability Control (DSC)
4	Car Access System (CAS)
5	Instrument cluster (KOMBI)
6	Crash Safety Module (ACSM)
7	Junction box electronics (JB)
8	Front distribution box
9	Fanfare-horn button
10	Steering column stalk wiper switch
11	Automatic wiping LED
12	Wiper switch
13	Knurled wheel for intensity of the rain-light-solar-condensation sensor
14	Automatic wiping button
15	Steering column switch cluster coil spring
16	Steering column switch cluster (SZL)
17	Button combination steering wheel heating/electrical steering column adjustment
18	Electrical steering column adjustment button
19	Steering wheel heating button
20	Steering wheel heating button LED
21	High-beam assistant button
22	On-board computer button
23	Turn-indicator/high-beam switch
24	Steering column stalk for turn-indicator/high-beam switch
25	Driver's airbag priming caps
26	Steering wheel electronics
27	Vibration actuator
28	Steering wheel heating
29	Button block for cruise control system in the multifunction steering wheel
30	Button block for radio/telephone etc. in the multifunction steering wheel
FlexRay	FlexRay
KI. 30	Terminal 30
KI. 30B	Terminal 30 base operation
LIN-Bus	Local Interconnect Network bus
LWS	Steering-angle sensor

NOTE: A three-stage driver's airbag is installed in the US version.

FUNCTIONS

Signal Detection

The functions of the steering column switch cluster are:

- Detecting the switching signals of the steering-column switches
- Detecting the controls in the multifunction steering wheel
- Resetting the turn indicator
- Transmitting and receiving information.

Detecting the Switching Signals of the Steering-column Switches

The switching signals of the F01/F02 steering-column switches are triggered by the steering column stalks. The relevant switches are located on the printed-circuit board of the steering column switch cluster. The steering column stalks do not have detent notches. Therefore, each time the steering column stalks are operated, they return automatically to their starting position.

The resistance to movement of the steering column stalks is increased at the end stops and in the individual switching positions. This provides the customer with noticeable feedback on the respective lever position.

The toggle switch is designed as locking. Three stop positions are available.



Fig. 127: Identifying Steering Column Switch Cluster F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Steering column stalk for turn-indicator/high-beam switch
2	Connection to the priming caps of the airbag
3	Retaining pin for steering column switch cluster
4	Steering wheel driver
5	Connection to horn button, multifunction buttons and steering wheel electronics
6	Power supply connection for vibration actuator
7	Steering column stalk wiper switch

Steering column stalk for turn-indicator/high-beam switch

The steering column switch cluster generates the switching signals depending on the respective position of the steering column stalk. The switching signals are made available by the steering column switch cluster across the FlexRay.

The footwell module receives the requests from the turn-indicator/high-beam switch as well as for the high-beam assistant.

Pressing the on-board computer button in the axial direction initiates the requests for the onboard computer. The steering column switch cluster sends the requests for display of the on-board computer functions across the FlexRay.

NOTE: In the case of vehicle equipment without the high-beam assistant, the button on the steering column stalk for turn-indicator/high-beam switch is not required. Instead, a large button is used.



Fig. 128: Identifying Movement Directions Of Steering Column Stalk F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING COLUMN STALK MOVEMENT DIRECTIONS

Index	Explanation
1	High-beam assistant button
2	On-board computer button
3	High-beam headlights
4	Triple turn signal for turn indicator, passenger's side
5	Continuous flashing for turn indicator, passenger's side
6	Headlight flasher
7	Triple turn signal for turn indicator, driver's side

8	Continuous flashing for turn indicator, driver's side

Function matrix for turn-indicator/high-beam switch

TURN-INDICATOR/HIGH-BEAM SWITCH FUNCTION MATRIX

Operation	Initial state	Function	Configuration
One-touch operation in upward direction	OFF	One-touch indicating	Setting with no detent notch
	Continuous indicating, right	OFF	Setting with no detent notch
	Continuous indicating, left	OFF	Setting with no detent notch
One-touch operation in downward direction	OFF	One-touch indicating	Setting with no detent notch
	Continuous indicating, right	OFF	Setting with no detent notch
	Continuous indicating, left	OFF	Setting with no detent notch
Overpressing in upward direction	OFF	Continuous indicating, right	Setting with no detent notch
	Continuous indicating, right	Continuous indicating, right	Setting with no detent notch
	Continuous indicating, left	Continuous indicating, right	Setting with no detent notch
Overpressing in downward direction	OFF	Continuous indicating, left	Setting with no detent notch
	Continuous indicating, right	Continuous indicating, left	Setting with no detent notch
	Continuous indicating, left	Continuous indicating, left	Setting with no detent notch
One-touch operation against direction of travel (pulling)	OFF	Headlight flasher	Setting with no detent notch
	High-beam headlights ON	High-beam headlights OFF	Setting with no detent notch
One-touch operation in direction of travel (pressing)	Dipped-beam headlights	High-beam headlights ON	Setting with no detent notch
One-touch in axial direction, on-board computer button (pressing)	On-board computer function switched	OFF On-board computer ON	Setting with no detent notch
	On-board computer function switched on	On-board computer	OFF Setting with no detent notch
One-touch in axial direction, high-beam assistant button	High-beam assistant switched on	Deactivate high-beam assistant	Setting with no detent notch
	High-beam assistant switched OFF	Activate high-beam assistant	Setting with no detent notch

Overpressing in downward direction	Terminal 30, light switch in "0" position	Parking light, left	Setting with no detent notch
Overpressing in upward direction	Terminal 30, light switch in "0" position	Parking light, right	Setting with no detent notch

Steering column stalk wiper switch

This steering column stalk is designed exclusively for the front wiper/washer system. All requests for the wiper/washer system are detected in the steering column switch cluster. The steering column switch cluster sends the requests across the FlexRay to the junction box electronics. The junction box electronics execute the requests.



Fig. 129: Identifying Function Matrix, Steering Column Stalk Wiper Switch
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING COLUMN STALK WIPER SWITCH COMPONENTS

Index	Explanation
1	Steering column stalk wiper switch
2	Intensity of rain-light-solar-condensation sensor
3	Function indicator, automatic wiping activated
4	Rain-light-solar-condensation sensor button

STEERING COLUMN STALK WIPER SWITCH FUNCTION MATRIX

Operation	Initial state	Function	Configuration
One-touch operation in upward direction	OFF	Wiper stage 1	Setting with no detent notch
	Continuous wipe, Stage 1	Wiper stage 2	Setting with no detent notch
	Continuous wipe, Stage 2	Wiper stage 2	Setting with no detent notch
Overpressing in upward direction	OFF	Wiper stage 2	Setting with no detent notch
	Continuous wipe, Stage 1	Wiper stage 2	Setting with no detent notch

	Continuous wipe, Stage 2	Wiper stage 2	Setting with no detent notch
One-touch operation in downward direction	OFF	Flick wipe	Setting with no detent notch
	Continuous wipe, Stage 1	OFF	Setting with no detent notch
	Continuous wipe, Stage 2	Wiper stage 1	Setting with no detent notch
One-touch operation against direction of travel (pulling)	OFF	Windscreen wash	Setting with no detent notch

Rain-light-solar-condensation sensor

If the vehicle is in the automatic mode via rain-light-solar-condensation sensor, the function matrix of the steering column stalk is altered. Please refer to the following function matrix for the functions.

Function matrix, steering column stalk for wiper/washer system

STEERING COLUMN STALK FOR WIPER/WASHER SYSTEM FUNCTION MATRIX

Operation	Initial state	Function	Configuration
One-touch operation in upward direction	OFF	Wiper stage 1	Setting with no detent notch
	Automatic operation	Wiper stage 1	Setting with no detent notch
	Continuous wipe, Stage 1	Wiper stage 2	Setting with no detent notch
	Continuous wipe, Stage 2	Wiper stage 2	Setting with no detent notch
Overpressing in upward direction	OFF	Wiper stage 2	Setting with no detent notch
	Automatic operation	Wiper stage 2	Setting with no detent notch
	Continuous wipe, Stage 1	Wiper stage 2	Setting with no detent notch
	Continuous wipe, Stage 2	Wiper stage 2	Setting with no detent notch
One-touch operation in downward direction	OFF	Flick wipe	Setting with no detent notch
	Automatic operation	Flick wiping*	Setting with no detent notch
	Continuous wipe, Stage	1 Intermittent wipe	Setting with no detent notch
	Continuous wipe, Stage 2	Wiper stage 1	Setting with no detent notch

One-touch operation against direction of travel (pulling)	OFF	Windscreen wash	Setting with no detent notch
One-touch in axial direction, automatic wiping button (pressing)	Automatic wiping switched off	Automatic wiping ON	Setting with no detent notch
	Automatic wiping switched on	Automatic wiping OFF	Setting with no detent notch
Turning the knurled wheel upwards/downwards	Sensitivity of rain-light-solar-condensation sensor	Sensitivity of automatic wiping or	Setting with detent notch

(automatic mode is retained)

Detecting the Controls

The multifunction steering wheel has additional buttons. The buttons increase in-car comfort and convenience by providing for comfort and convenience functions.

The steering column switch cluster reads in the signals from the steering-wheel buttons. The steering column switch cluster transmits these signals across the FlexRay. The associated ECU executes the request.

Steering wheel

The steering wheel is equipped with the following components:

- Fanfare-horn button
- Priming caps for the driver's airbag
- Driver's airbag
- Buttons for radio operation
- Buttons for telephone operation
- Cruise control system buttons
- Steering wheel electronics
- Steering wheel heating
- Vibration actuator.

The fanfare-horn button is connected directly to the steering column switch cluster. The junction box electronics requests the button status of the fanfare-horn button in cycles.

The steering column switch cluster evaluates the button status and sends this across the FlexRay to the junction box electronics.

The buttons for the radio, telephone and cruise control system are connected via the LIN bus. The applies to the steering wheel electronics. The central control unit for this equipment attached to the LIN bus is the steering column switch cluster.

The right-hand button block contains the master function for the left-hand button block and has an electronic

evaluation unit. The electronic evaluation unit picks up the button status of the individual buttons. The electronic evaluation unit implements the button status on the LIN bus. The steering column switch cluster requests the button status in cycles and thus finds out whether a button was operated or not. The steering column switch cluster transmits the button status across the FlexRay. In this way, the information reaches the other control units in the vehicle network.

NOTE: The signal sent from the steering column switch cluster across the FlexRay must be implemented in the central gateway module on the K-CAN2, PT-CAN or MOST. This enables the footwell module, the junction box electronics etc. to execute the desired requests.

Resetting the Turn Indicator

The footwell module the information regarding the steering-wheel turn requires to reset the turn indicator lights.

The steering column switch cluster determines this steering-wheel turn and makes it available across the FlexRay. The central gateway module implements the signal on the K-CAN2, thus providing the footwell module with the information. Depending on the steering-wheel position, the footwell module decides whether the turn indicator has to be deactivated or not.

Steering-wheel-rotation information

The optical steering-angle sensor detects the neutral position within 360° of the optical steering-angle sensor. With a steering wheel turn of more than 360°, the information regarding the steering-wheel turn is also included in the steering angle calculation.

Receiving and Transmitting Signals

The detected and calculated data from the steering column switch cluster are forwarded across the FlexRay to the corresponding control units.

The steering column switch cluster can be diagnosed via the central gateway module with the BMW diagnosis system. The diagnosis information can be called up via the FlexRay.

Vibration actuator

The KAFAS control unit, for example, requests activation of the vibration actuator via the PT-CAN. The central gateway module implements the signal on the FlexRay. This means the Integrated Chassis Management receives the request for activation. The Integrated Chassis Management co-ordinates activation of the vibration actuator.

NOTE: Coordination is necessary, as the lane departure warning and lane change warning can be fitted in the vehicle. Depending on the request from the two assistance systems, the Integrated Chassis Management forwards this to the vibration actuator.

The steering wheel electronics evaluate the request, activate the vibration actuator and monitor its function. In

the event of a defect in the vibration actuator or steering wheel electronics, the steering column switch cluster indicates this via the FlexRay.

Priming caps for the driver's airbag

The priming caps of the driver's airbag are connected directly via the coil spring to the Crash Safety Module, ACSM. Triggering the airbag is the responsibility of the Crash Safety Module.

Redundant signal

The signals from the steering column stalk for turn-indicator/high-beam switch for turn indicator lights as well as headlight flasher are transferred across the FlexRay. To increase the availability, the steering column switch cluster is connected directly by a cable to the footwell module. The signals e.g. for the headlight flasher or turn indicator lights are transferred redundantly across this cable.

Optical Steering-angle Sensor

All systems that influence driving dynamics are required alongside other data for the steering angle and steering-angle speed as the basis for calculation.

The steering angle as well as steering-angle speed are picked up by a non-contact optical measuring system, the optical steering-angle sensor.

The data of the optical steering-angle sensor are processed by the electronics in the steering column switch cluster and sent across the FlexRay to the Integrated Chassis Management.

Information such as the absolute steering angle or the steering-wheel-turn is calculated. The optical steering-angle sensor picks up a steering angle of -640°/+640°.

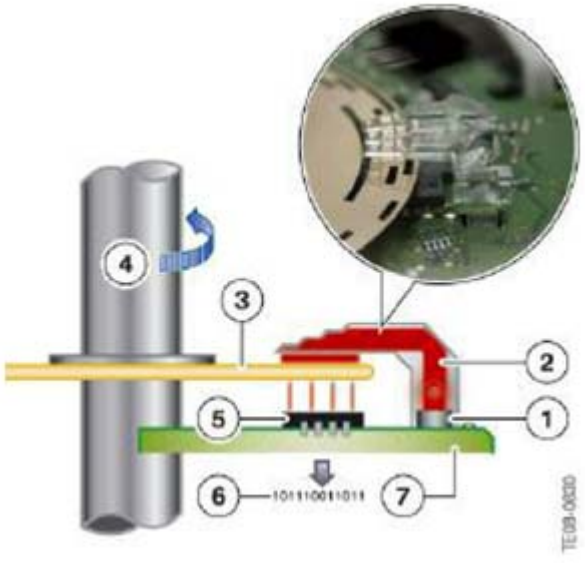


Fig. 130: Structural Principle Of Optical Steering-Angle Sensor F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	LED
2	Light-conducting element
3	Code disc
4	Steering column
5	Photo-transistors
6	Output: Conversion into electrical signals
7	Printed-circuit board

Detecting Steering Angle and Steering-Angle Speed

To pick up the steering angle, a code disc is illuminated from above by an LED and a light-conducting element. Due to the pattern in the code disc, the light from above only reaches down to certain areas. There, the light encounters photo-transistors.

The pattern of the code disc corresponds to the digital code of the steering angle.

The photo-transistors convert the light signals into electrical signals. As the signals are not yet sufficiently unambiguous, they are processed by downstream electronics.

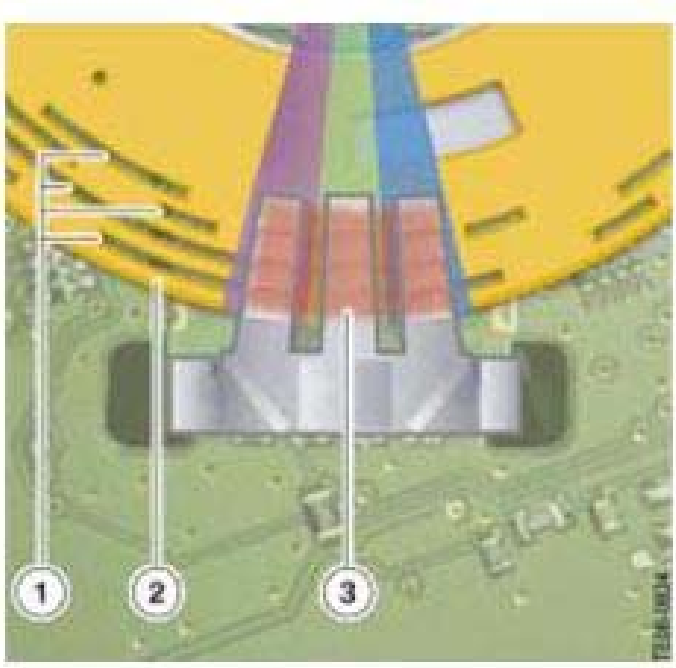
Thereafter, the signals are digitized and have the signal states 1 or 0.

The steering column switch cluster receives the current value of the steering angle, the digital code, and forwards this across the FlexRay.

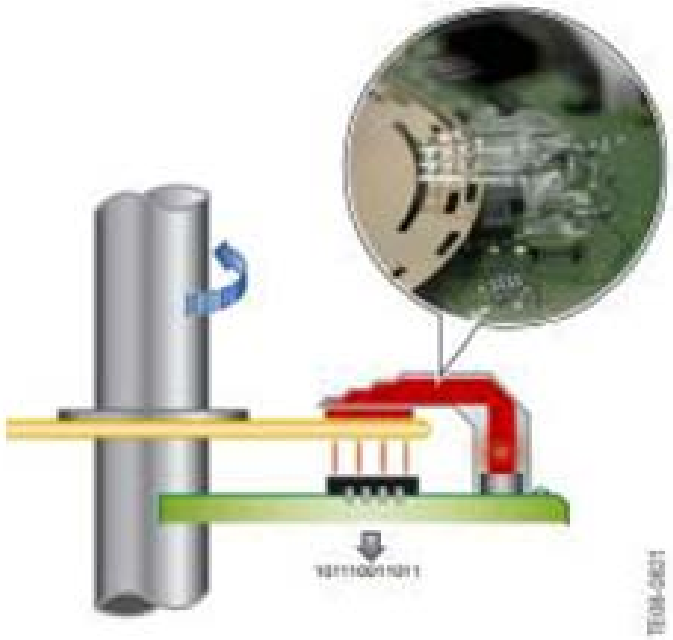
A section of the code disc and the optical sensor are shown below.

COMPONENTS DESCRIPTION CHART

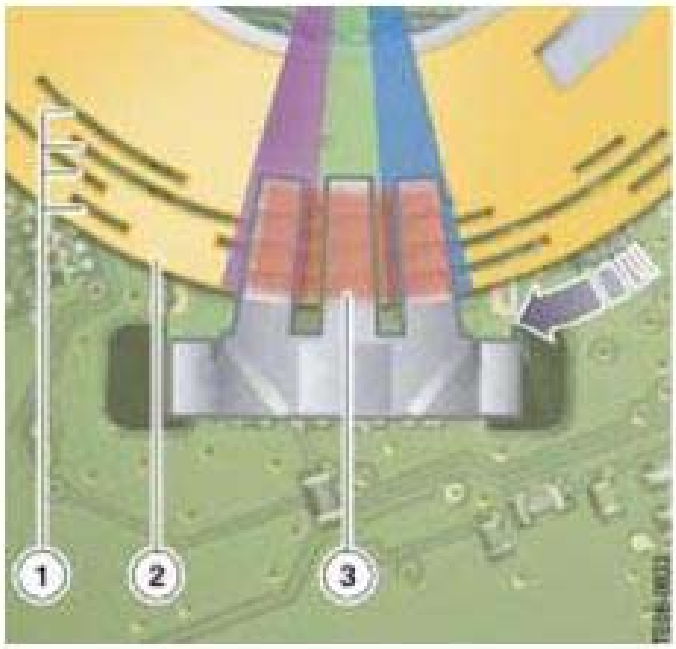
Section on the code disc	Optical sensor



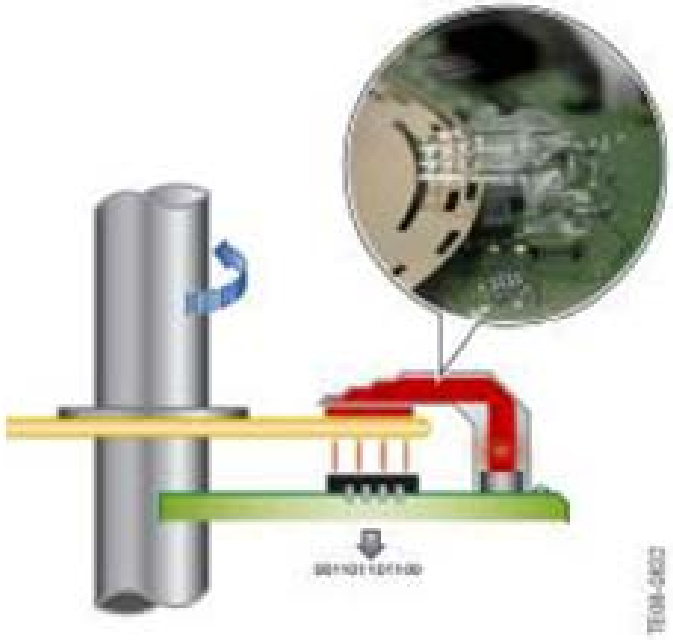
The code disc (1) rotates depending on the steering-wheel position. The pattern of the digital code (2) on the code disc changes in 0.5° steps. The light of the light-conducting element (3) penetrates the pattern of the digital code of the code disc.



The light beams encounter the photo-transistors in accordance with the pattern of the digital code. The photo-transistors convert the light beams into electrical signals. The downstream electronics ensure that the electrical signals have the signal states 1 or 0. This means that the steering angle is available to the steering column switch cluster as a digital code.



If the code disc (1) continues to rotate, the pattern (2)



A new digital code is generated in accordance with the

on the code disc changes. The light of the light-conducting element (3) penetrates the code disc in other areas.	changed pattern of the digital code. This means that the new steering angle is available to the steering column switch cluster as a digital code.

Relative steering angle (± 640°)

The relative steering angle specifies the angle position of the steering wheel. The information regarding the relative steering angle is always retained, even if the power to the control unit is switched off. A renewed zero-point adjustment is only necessary if the steering column switch cluster has been replaced. This also applies if the dynamic stability control system is replaced or repairs become necessary on the steering/steering column.

Absolute steering angle

The absolute steering angle is a calculation based on the relative steering angle and the information regarding steering-wheel turn. The absolute and relative steering angles are defined during the zero-point adjustment of the steering column switch cluster. The steering column switch cluster knows every position of the steering wheel across the entire range of steering rotation.

A precondition before every zero-point adjustment is the straight-ahead setting of the wheels and of the steering wheel.

Steering-angle speed

The steering-angle speed is the product of the change in the individual steering-angle data during steering wheel turn.

The steering column switch cluster calculates the value and forwards it across the FlexRay to the vehicle network.

SYSTEM COMPONENTS

The Steering Column Switch Cluster as Standard Equipment

The steering column switch cluster (SZL) consists of, among other things, the following components:

- Electronic steering column switch cluster module
- Coil-spring assembly
- Steering-column switch for turn indicators
- Steering column switch for wipers
- Optical steering-angle sensor.

The steering column switch cluster (SZL) can only be replaced as a **complete** unit. The individual components such as the coil-spring assembly or steering column stalk can **not** be removed or replaced.

The design and the components of the steering column switch cluster are explained in brief in the following.



Fig. 131: Installation Location Of Steering Column Switch Cluster F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Steering column switch cluster

Rear View of the Steering Column Switch Cluster



Fig. 132: Identifying Steering Column Switch Cluster Connections
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING COLUMN SWITCH CLUSTER CONNECTIONS LEGENDS

Index	Explanation
1	Connection, vehicle wiring harness
2	Connection for wiring harness in the vehicle (airbag signals)
3	Connection for steering wheel heating/electrical steering column adjustment button block

Optical Steering-angle Sensor

The steering column switch cluster contains the optical steering-angle sensor as well as the associated electronics. A second processor on the underside of the board backs up the information regarding the steering angle and steering-angle speed. This is why the steering angle and steering-angle speed are evaluated and calculated in the second processor in addition to the main processor of the steering column switch cluster.

The steering-angle sensor is designed as a non-contact optical angle measurement system. The system consists of a code disc and an optical sensor. The code disc is connected directly to the steering wheel via a driver. If the steering wheel is moved, the code disc rotates within the optical sensor.

The code disc has a pattern of holes. The pattern of holes is arranged in such a way that four circular tracks are formed. The four tracks represent the digital range of the sensor. The digital code changes when the steering is turned every 0.5°.

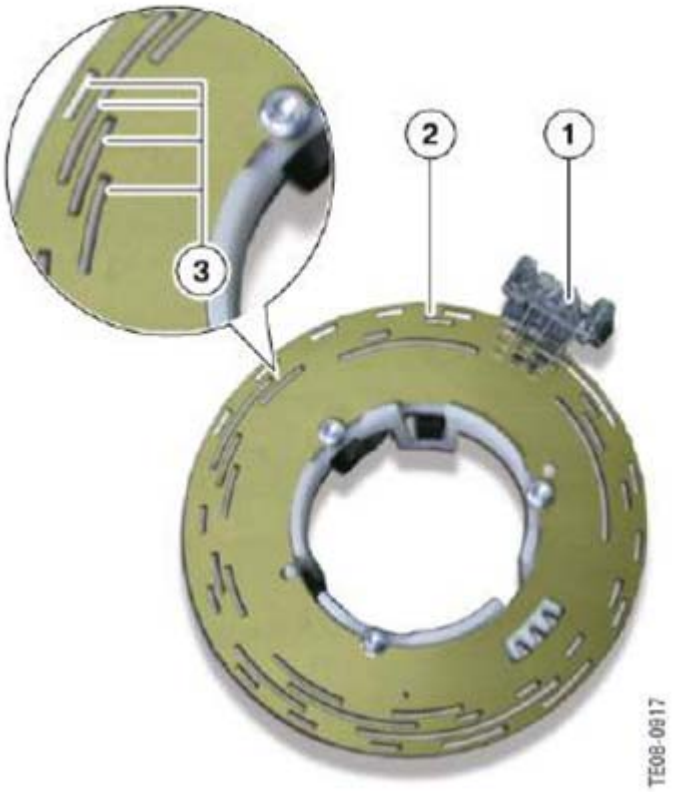


Fig. 133: Identifying Code Disc And Optical Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Optical sensor
2	Code disc
3	Hole pattern tracks

Optical sensor

The optical sensor is located on a circuit board soldered onto the board of the steering column switch cluster. The major components of the measuring system are:

- LED
- Light-conducting element
- Code disc
- Photo-transistors.

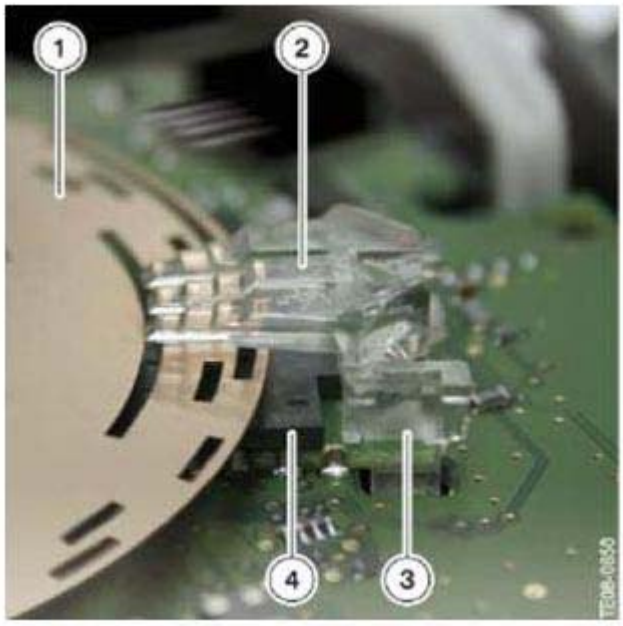


Fig. 134: Identifying Photo-Transistors, Code Disc, Light-Conducting Element And LED
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Code disc
2	Light-conducting element
3	LED
4	Photo-transistors

LED and light-conducting element

The LED - in conjunction with the light-conducting element - has the task of projecting light from above onto the code disc. The LED is directly soldered onto the sensor circuit board. The light-conducting element is clipped onto the board of the steering column switch cluster.

The light-conducting element is split three ways at the light exit. The light is projected in such a way that a light field is formed at each light exit and beamed downwards onto the code disc. Depending on the pattern on the code disc, light is allowed through or not.

Photo-transistors

There are four photo-transistors below the light exits on the circuit board of the optical sensor of the steering column switch cluster. The photo-transistors detect the optical signals that penetrate the code disc. The photo-transistors convert the optical signals into electrical signals.

Operating Principle of Optical Steering Angle Detection

Steering angle detection

The code disc enables a 4-digit digital code to be generated for each light field. The 12- digit digital code is formed by lining up the 4-digit digital codes. The steering-angle speed can be ascertained from the changes to the individual digital codes.

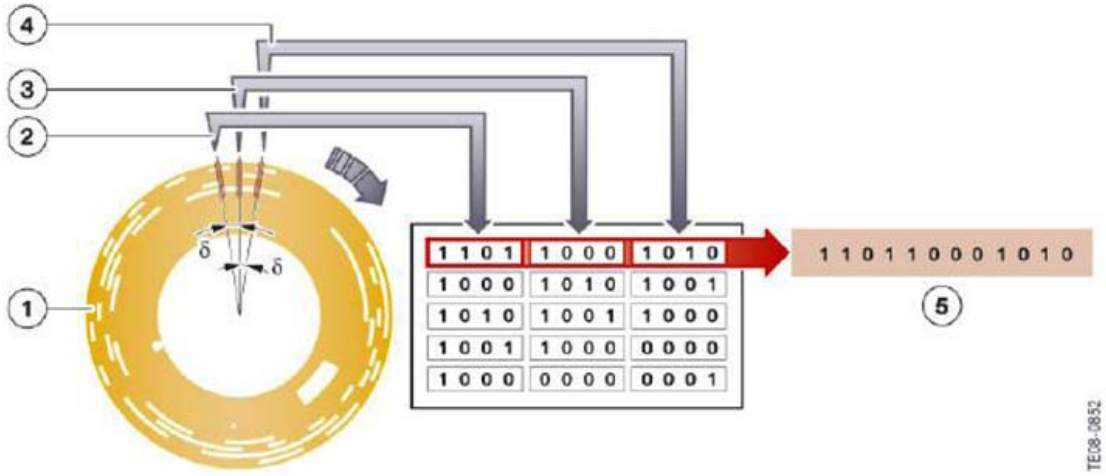


Fig. 135: Operating Principle Of Optical Steering Angle Detection
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Code disc
2	Digital code for light field 1
3	Digital code for light field 2
4	Digital code for light field 3
5	12-digit digital code

Block diagram of steering angle detection

The following block diagram shows the steering angle detection in simplified form.

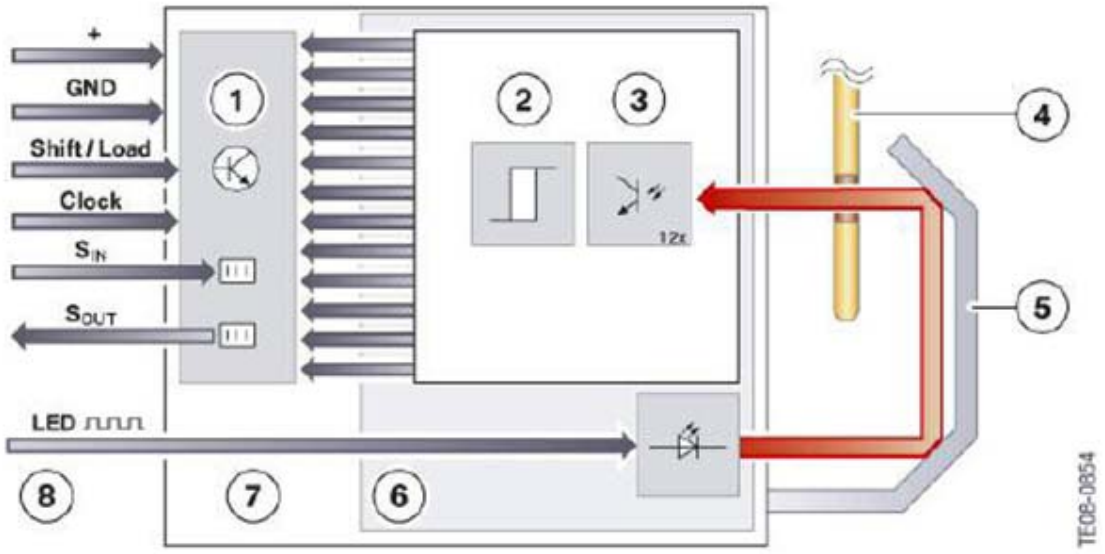


Fig. 136: Steering Angle Detection Block Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Sliding register
2	Schmitt trigger
3	Photo-transistor
4	Code disc
5	Light-conducting element
6	LED (infrared)
7	Sensor circuit board
8	Activation of LED

The LED (8) is supplied with pulse-width modulated voltage, thus also supplying the light-conducting element (5) with infrared light. The light-conducting element projects the light onto the code disc (4). The photo-transistors (3) pick up the light signals.

The signals of the photo-transistors are processed in the downstream electronics (2) into the signals "1" or "0". The signals of the 12 photo-transistors are put together to form the digital code.

The sliding register (1) picks up the digital code and forwards it to the electronics of the steering column switch cluster.

Steering Wheel

Depending on the vehicle equipment, the following components are located in the steering wheel:

- Button block for telephone/radio

- Button block for cruise control system/Active Cruise Control
- Airbag with associated priming caps
- Horn button
- Vibration actuator for lane departure warning
- Steering wheel electronics
- Steering wheel heating.

Steering Wheel Structure



Fig. 137: Identifying Steering Wheel Important Components F01/F02
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Steering wheel heating
2	Button block for cruise control
3	Airbag unit
4	Vibration actuator for lane departure warning
5	Steering wheel electronics system
6	Button block for telephone/radio

The button blocks as well as the steering wheel electronics are linked across the LIN bus to the electronics in the steering column switch cluster.

With the corresponding request, the steering wheel electronics control and monitor the function of the vibration actuator and steering wheel heating.

The priming caps of the airbags are connected directly and are activated by the Crash Safety Module, ACSM.

The fanfare-horn button is evaluated by the electronics of the steering column switch cluster.

Steering Wheel Button Block

Button block for driving functions

The steering wheel contains a button block for the Dynamic Cruise Control (DCC) or Active Cruise Control (ACC) Stop&Go functions. The button block is located on the left-hand side of the steering wheel.

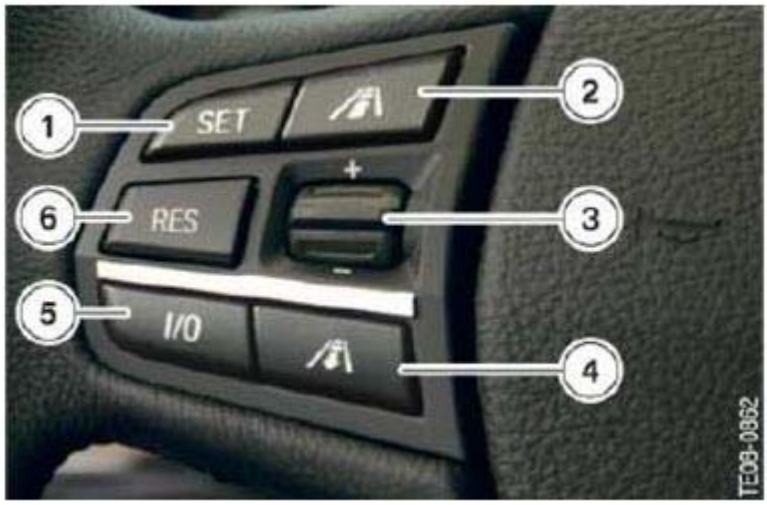


Fig. 138: Identifying Steering Wheel Button Block For Driving Functions
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Set button
2	Reduce distance button (ACC)*
3	Toggle switch
4	Increase distance button (ACC)*
5	Switching DCC/ACC to standby or switching off
6	Resume/call-up stored speed button

* Buttons 2 and 4 are only present on vehicles with the option Active Cruise Control Stop&Go.

The SET button can be used to set the desired driving speed.

The toggle switch be moved upwards or downwards and is not designed as locking. Each time the toggle switch is operated, it returns to its home position. Each direction of the toggle switch has two stages. See table.

The l/0 button can be used to switch the Dynamic Cruise Control (DCC) and Active Cruise Control (ACC) Stop&Go function to standby or to switch it off.

COMPONENTS DESCRIPTION CHART

Position	Explanation
+2	Increase driving speed in steps of 10 kph (6 mph)
+1	Increase driving speed in steps of 1 kph (.5mph)
± 0	Toggle switch in home position
-1	Reduce driving speed in steps of 1 kph (.5 mph)
-2	Reduce driving speed in steps of

Pressing the RES button (resume) calls up and activates the last stored driving speed value.

Button block for telephone/radio

The button block is located on the right-hand side of the steering wheel. The buttons can be used to operate functions for the radio or telephone.

The MODE button can be used e.g. to switch between the individual audio sources.

Operating the toggle switch + or -changes the radio volume, for example.

The knurled wheel is designed as locking. Operating the knurled wheel (turning upwards or downwards) selects individual radio stations, for example.

Pressing the knurled wheel memorizes the selection of the radio station, for example.

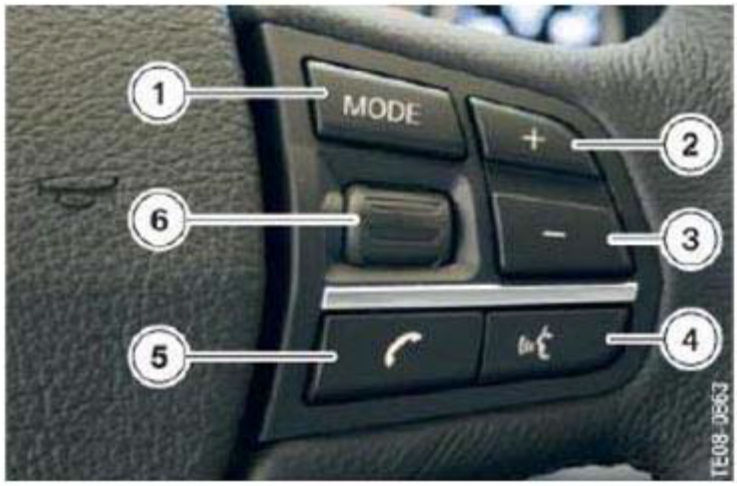


Fig. 139: Identifying Button Block For Telephone/Radio
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	MODE button
2	Toggle switch +
3	Toggle switch -
4	Hands-free button
5	Telephone button
6	Knurled wheel

Electrical Steering Column Adjustment

System Circuit Diagram for Electrical Steering Column Adjustment

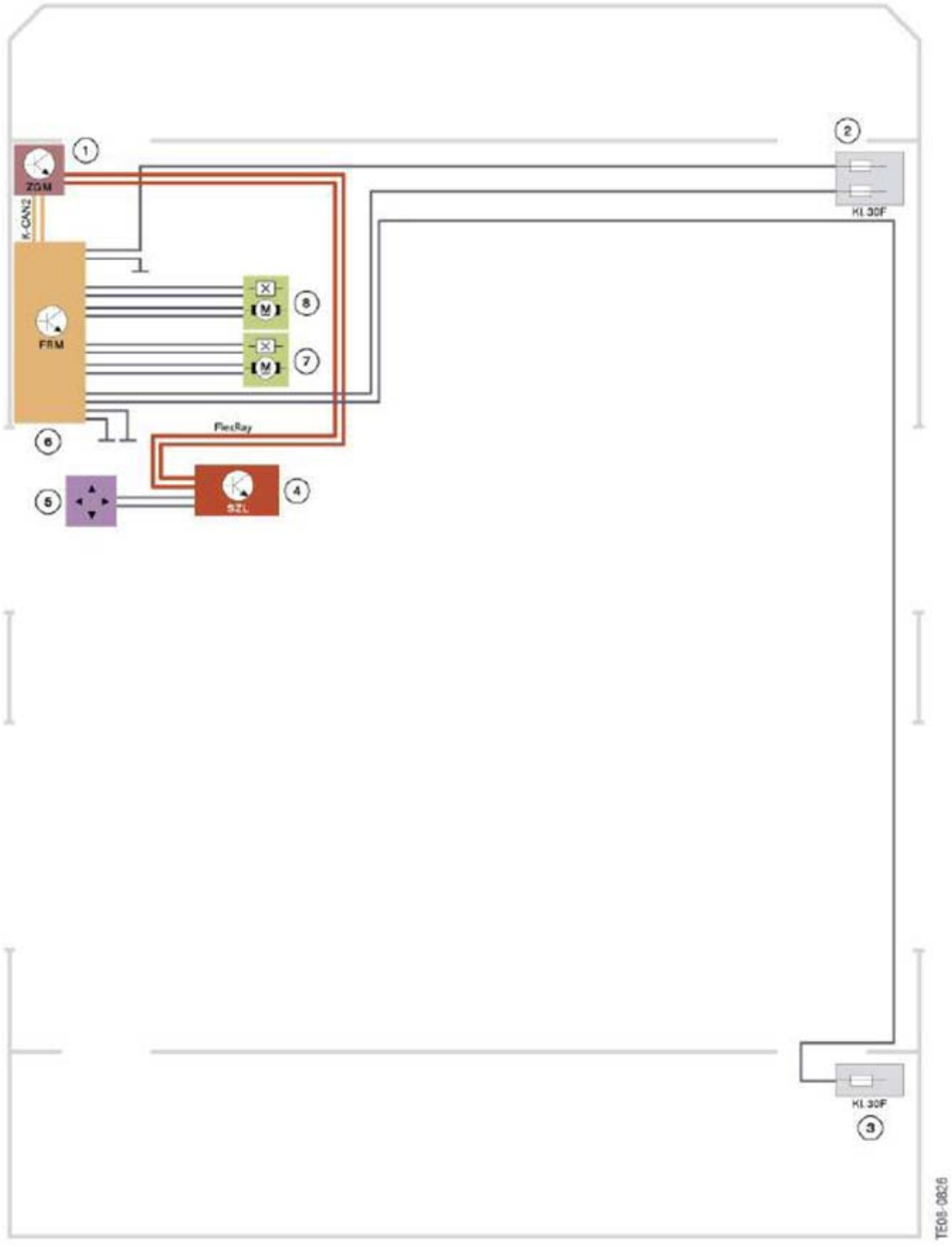


Fig. 140: Electrical Steering Column Adjustment System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Central gateway module ZGM

2	Front distribution box
3	Distribution box in luggage compartment
4	Steering column switch cluster
5	Steering column adjustment button
6	Footwell module
7	Motor for electrical steering column adjustment, height
8	Motor for electrical steering column adjustment, vertical
K-CAN2	Body CAN2
FlexRay	FlexRay
KI. 30F	Terminal 30 incorrectly switched

Steering Column Adjustment and Steering Wheel Heating Button

The button for the steering column adjustment can be moved in four directions. It can be used to adjust the steering column upwards and downwards; the distance to the driver can also be adjusted.

The steering column switch cluster evaluates the button status and forwards it to the footwell module. The signal must go across the FlexRay to the central gateway module. From there, the signal is sent on the K-CAN2 to the footwell module. Accordingly, the footwell module activates the motors for steering column adjustment.

The footwell module monitors activation and function.

NOTE: The footwell module is the central control unit for the electrical steering column adjustment. The position of the steering column can be called up or stored in the footwell module for the memory function.

The button for the steering wheel heating is evaluated by the electronics of the steering column switch cluster. The electronics in the steering column switch cluster send a request across the LIN bus to the steering wheel electronics to switch the steering wheel heating on/off.

The steering wheel electronics switch the steering wheel heating on and monitor its function. The steering wheel heating has an NTC resistor. This resistor is required for temperature control of the steering wheel heating.



Fig. 141: Steering Wheel Heating Button
Courtesy of BMW OF NORTH AMERICA, INC.

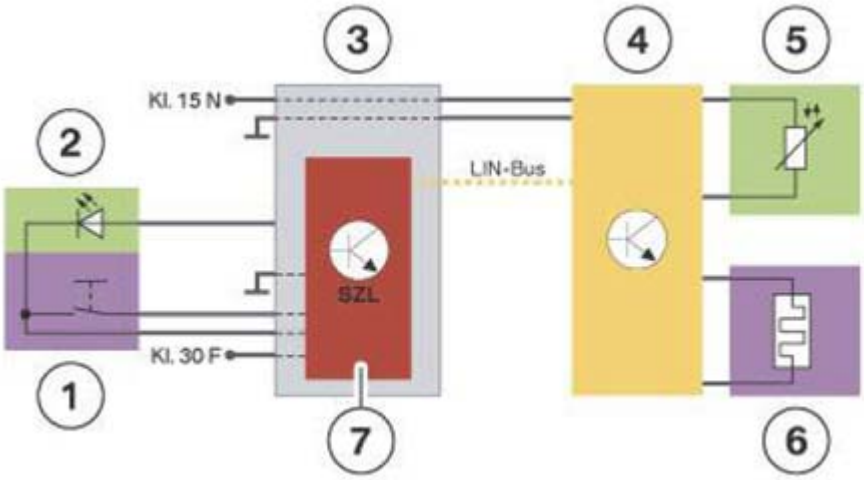


Fig. 142: Steering Wheel Heating System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

COMPONENTS DESCRIPTION CHART

Index	Explanation
1	Steering wheel heating button
2	Steering wheel heating function indicator
3	Steering column switch cluster (SZL)
4	Steering wheel electronics

5	NTC resistor
6	Steering wheel heating
7	Electronics of the steering column switch cluster
KI. 15N	Terminal 15 after-run
KI. 30F	Terminal 30 incorrectly switched
LIN-Bus	Local Interconnect Network bus

SERVICE INFORMATION

Replacing the Steering Column Switch Cluster

Particular care must be taken when replacing the steering column switch cluster or working on the steering column. Comply with the repair instructions.

The coil spring is a very sensitive component of the steering column switch cluster. If sufficient care is not taken when replacing the steering column switch cluster, the coil spring or another component can be destroyed. A consequence of this can be that the steering column switch cluster only works in part or does not work at all.

NOTE: If e.g. communication with the steering column switch cluster across the FlexRay is disrupted, the junction box electronics switch the windscreen wipers to the emergency mode.

The steering column switch cluster can only be ordered as a complete exchange part. After replacement, the new steering column switch cluster must be adapted to the car.

This involves among other things:

- Initialization of the steering column switch cluster
- Zero-point adjustment of the steering-angle sensor
- Front wheels in the straight-ahead position
- Function test.

NOTE: The transportation lock of the steering column switch cluster is only to be removed after replacement, shortly before fitting the steering wheel.

HVAC

Heating and Air Conditioning - Repair

6400 GENERAL

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: **Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!**

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: **Observe following instructions:**

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: **Observe following instructions before use:**

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: **Observe following instructions during use:**

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**

- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid

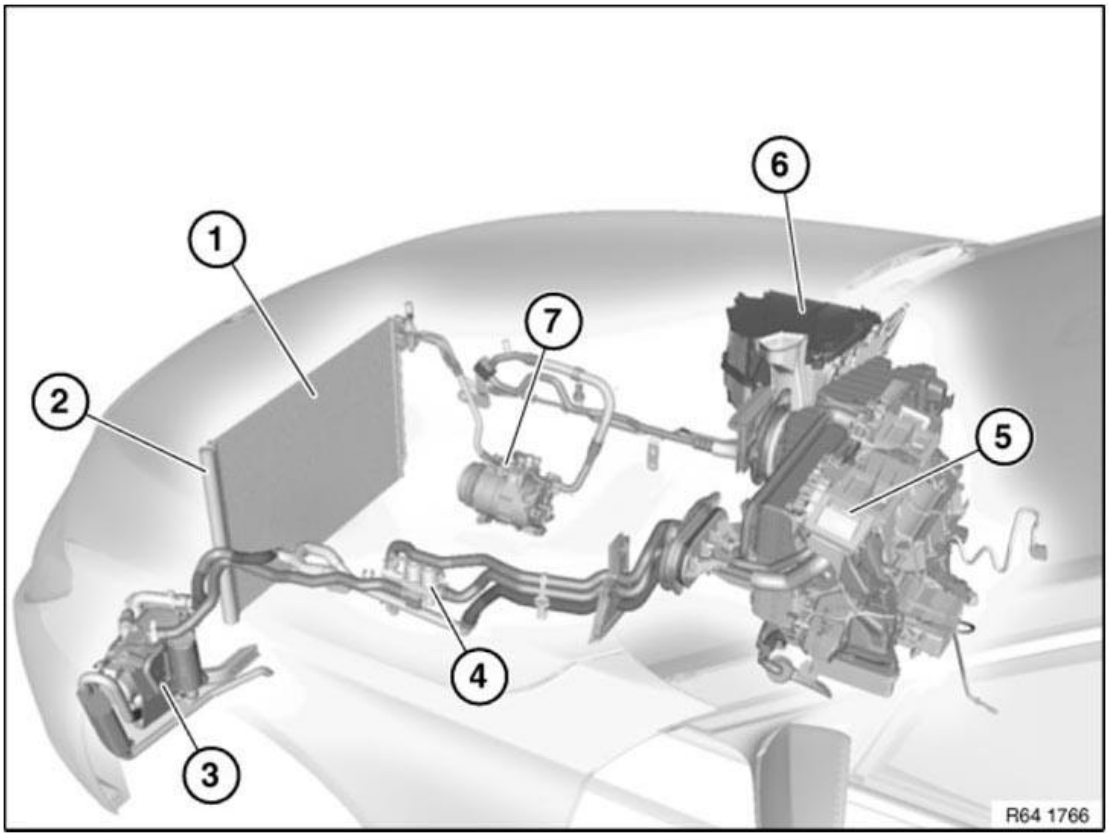
- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

64 00.. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Condenser for air conditioner
2 Drier insert for air conditioner
3 Independent heater and attachment parts
4 Water valve
5 Heater - A/C system and attachment parts
6 Fan and attachment parts
7 Compressor

Fig. 1: Overview Of Heater And A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

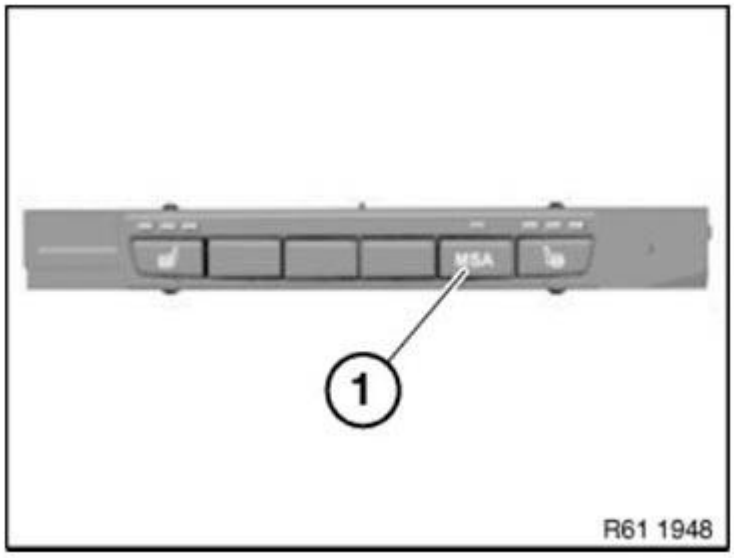


Fig. 2: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

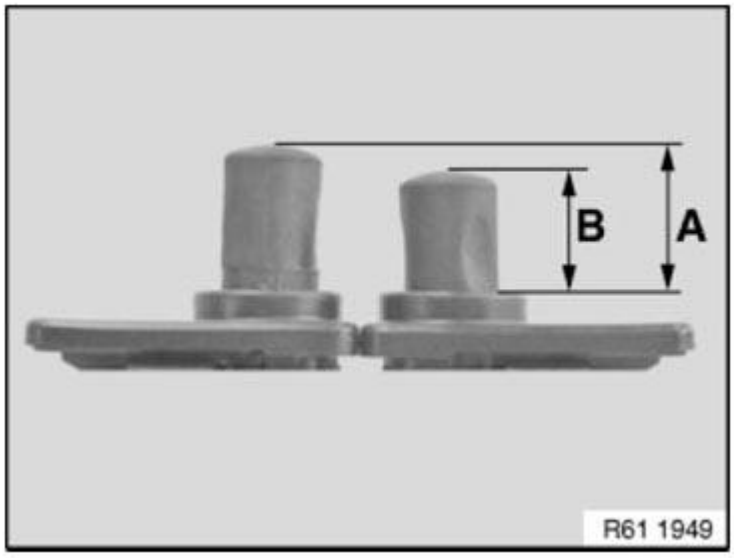


Fig. 3: Identifying Engine Bonnet/Hood Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

6411 HEATER WITH OPERATION

64 11... INSTALLING SERVODRIVE

Installation:

If necessary, align shaft of flap(s) to be actuated to position of servodrive to be installed.

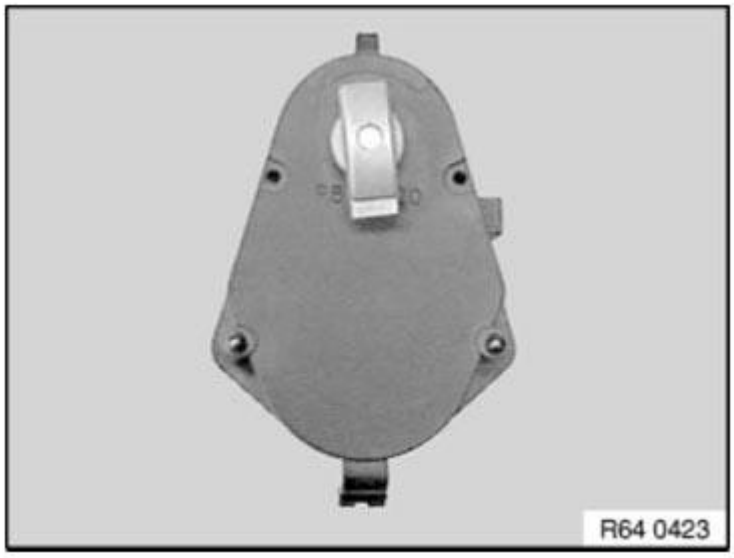
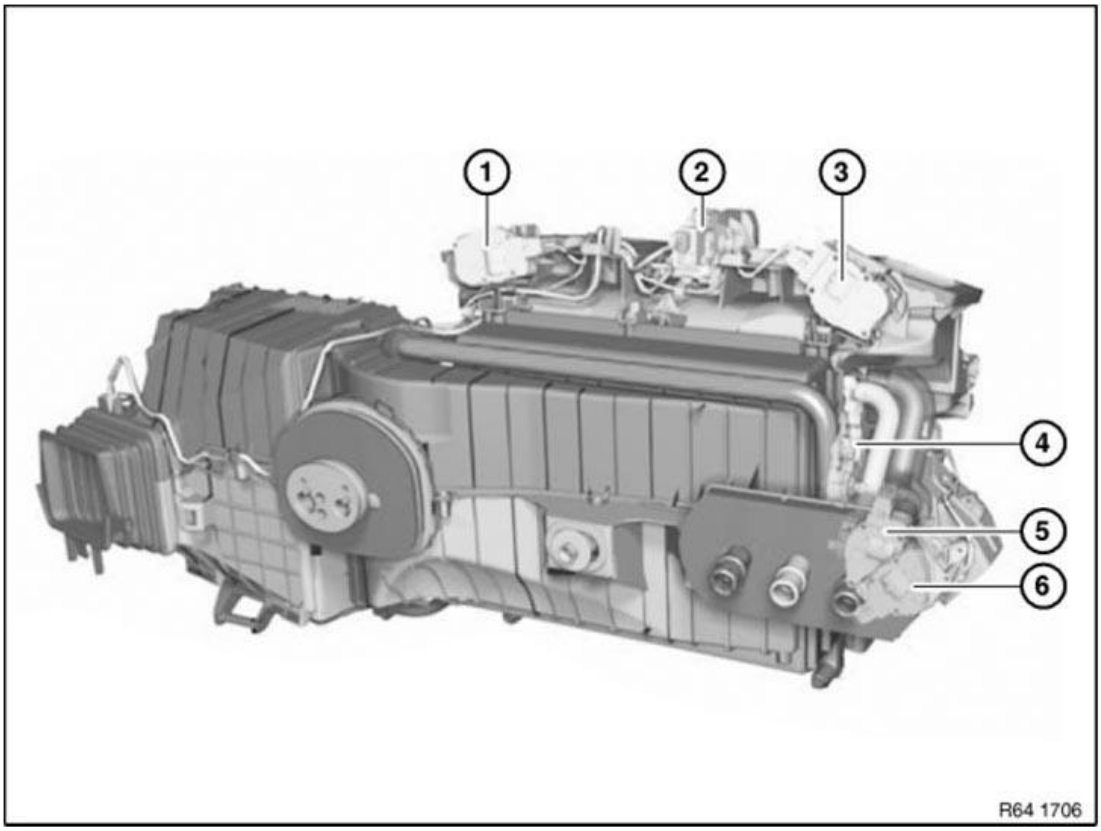


Fig. 4: Identifying Servodrive Position
Courtesy of BMW OF NORTH AMERICA, INC.

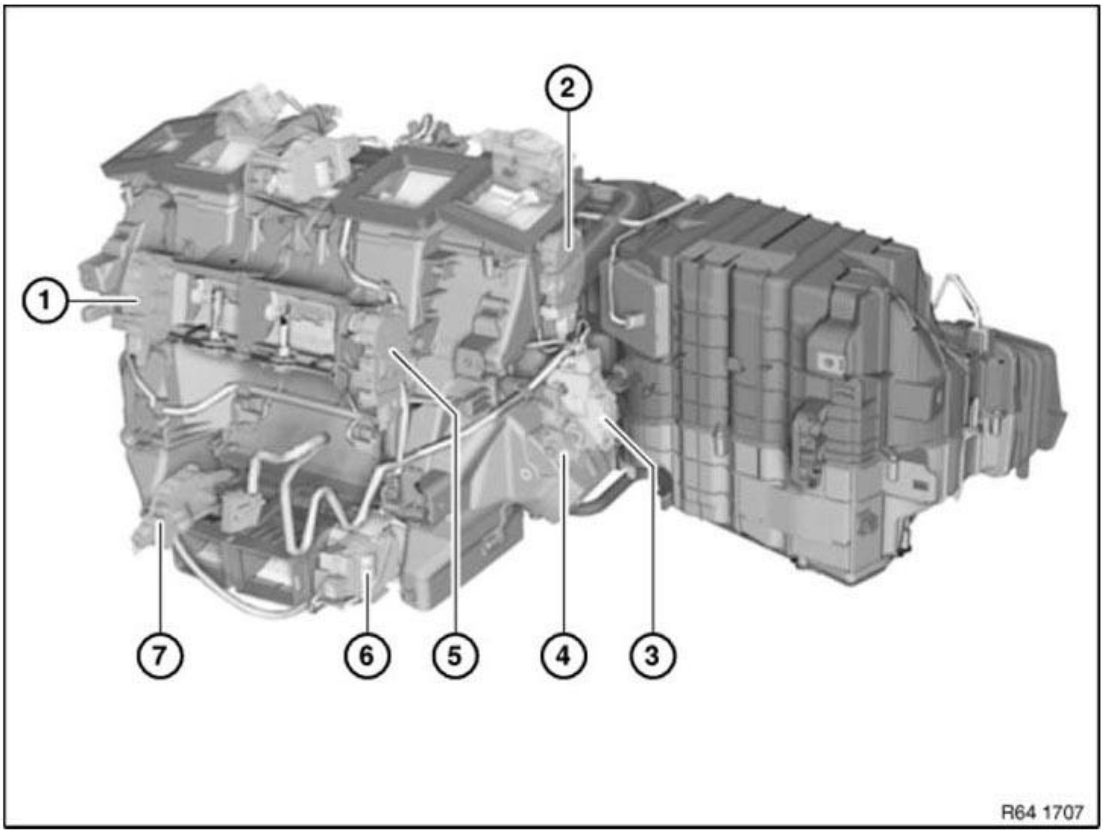
64 11.. OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER



1 Actuator drive, ventilation flap, outer right
2 Actuator drive, defrosting flap
3 Actuator drive, ventilation flap, outer left
4 Actuator drive, blending flap, left
5 Actuator drive, footwell flap, rear cabin, left
6 Actuator drive, footwell flap, left

Fig. 5: Identifying Actuator Drives On Heater/Air Conditioner Components
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The High equipment specification heater/air conditioner is pictured!

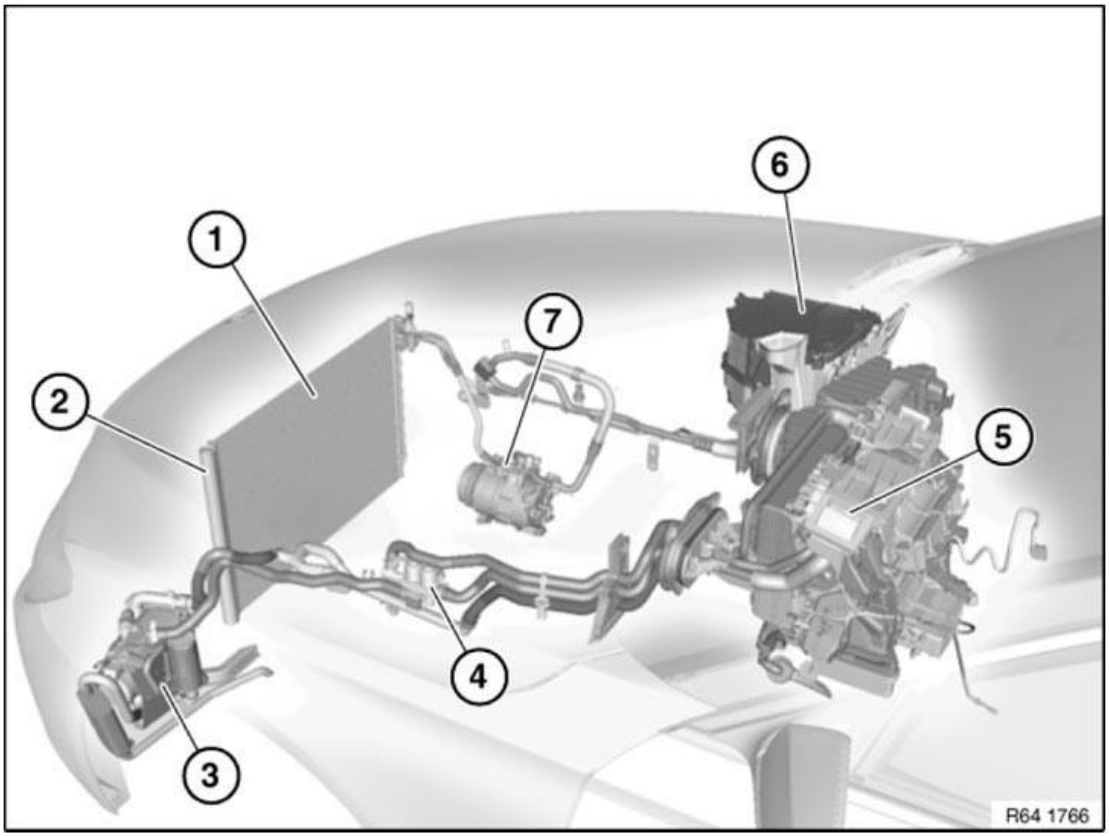


1 Actuator drive of left centre ventilation flap (F01,F02,F03,F07 only)
2 Actuator drive, blending flap, right
3 Actuator drive, footwell flap, right
4 Actuator drive, footwell flap, rear cabin, right
5 Actuator drive of right centre ventilation flap (F01,F02,F03,F07 only)
6 Actuator drive, blending flap, rear cabin, right
7 Actuator drive, blending flap, rear cabin, left

Fig. 6: Identifying Actuator Drives On Heater/Air Conditioner Components
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The High equipment specification heater/air conditioner is pictured!

64 00.. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Condenser for air conditioner
2 Drier insert for air conditioner
3 Independent heater and attachment parts
4 Water valve
5 Heater - A/C system and attachment parts
6 Fan and attachment parts
7 Compressor

Fig. 7: Overview Of Heater And A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 545 REMOVING AND INSTALLING FAN HOUSING FOR HEATER/AIR CONDITIONER FAN

Necessary preliminary tasks

- Remove **RIGHT/REAR SUSPENSION CROSS-BRACE** .
- **REMOVE** auxiliary E box

Unlock plug connection (1) on AUC sensor (2) and disconnect.

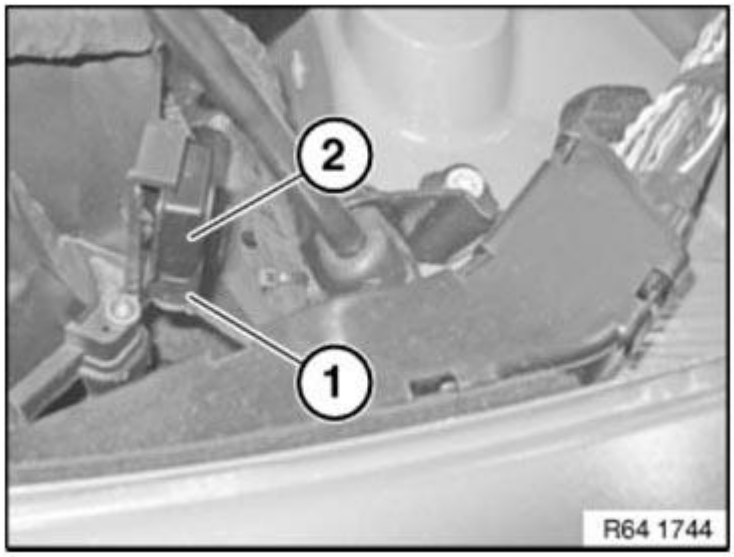


Fig. 8: Identifying Lock Plug Connection On AUC Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on fan housing cover (2).

Lift out fan housing cover.

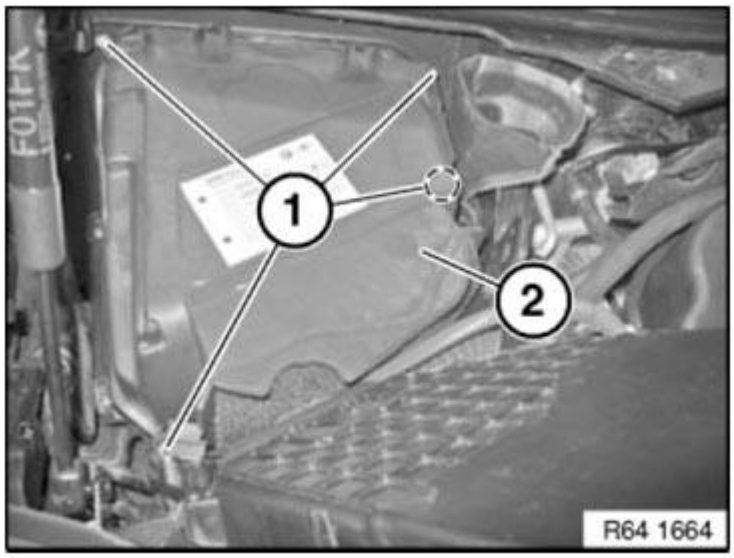


Fig. 9: Identifying Fan Housing Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on fan housing (2).

Unfasten plug connections (3) and disconnect.

Carefully feed out fan housing (2).

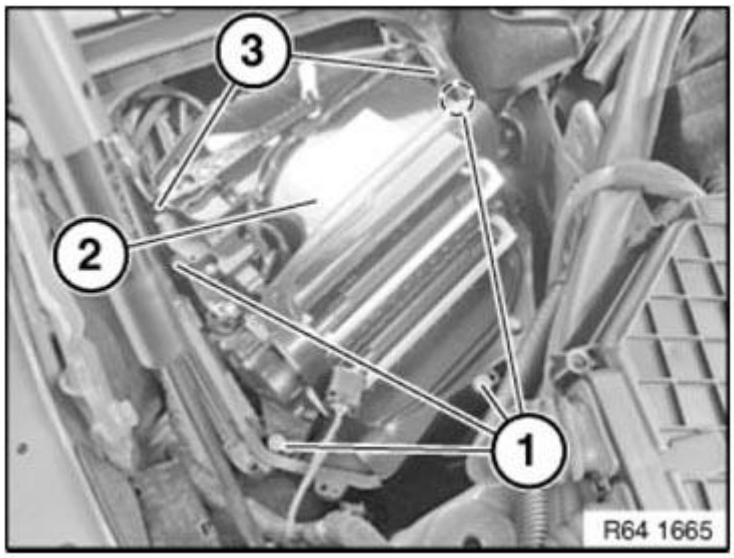


Fig. 10: Identifying Fan Housing Screws And Fasten Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 377 REMOVING AND INSTALLING HEATER/AIR CONDITIONING SYSTEM

Necessary preliminary work

- Remove **RADIO AND A/C CONTROL PANEL**

64 11 973 REMOVING AND INSTALLING OR REPLACING OZONE GENERATOR (BEFORE 09/2010)

NOTE: The ozone generator was installed on vehicles built before 09/2010.

Necessary preliminary work:

- Remove **UPPER INSTRUMENT PANEL STORAGE COMPARTMENT**

Disconnect plug connection (1).

Unlock ozone generator (2) in direction of arrow and remove towards front from filter housing (3).

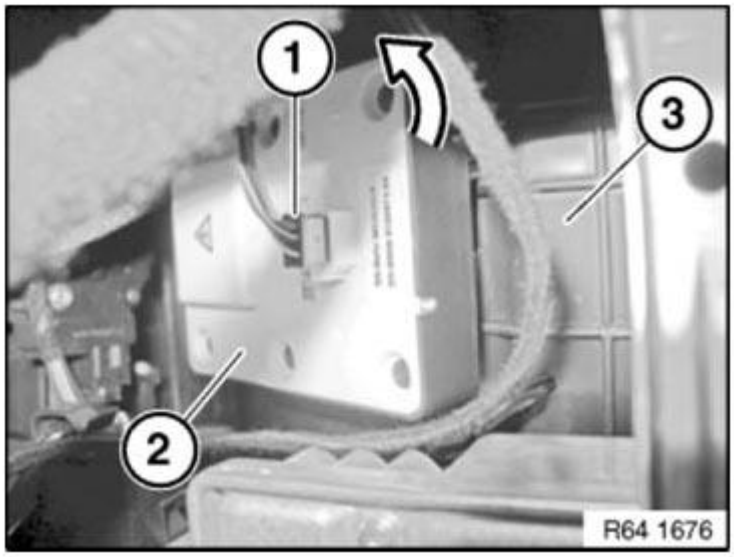


Fig. 11: Disconnecting Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

For purposes of clarity, illustration shows heating/air conditioning unit (1) removed.

Retaining lugs (3) on ozone generator (4) must be correctly engaged in guides on filter housing (3).

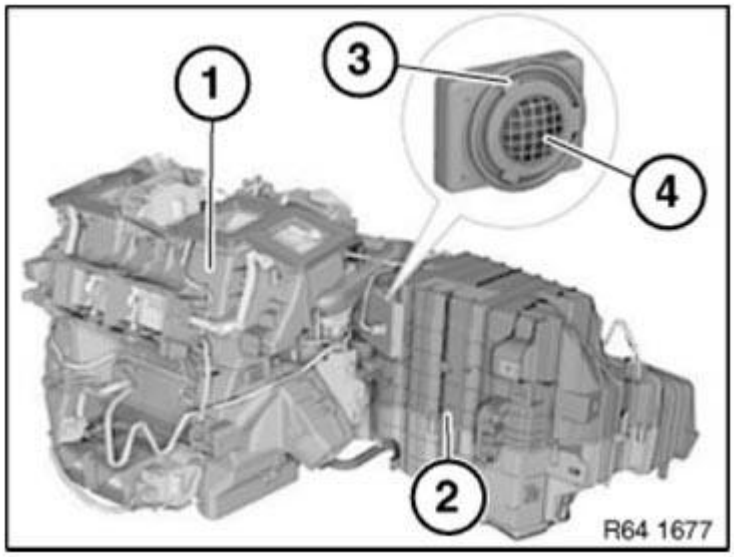


Fig. 12: Identifying Retaining Lugs On Ozone Generator And Filter Housing
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 794 REMOVING AND INSTALLING/RENEWING CONTROLLER FOR REAR CABIN FAN

Necessary preliminary tasks

- Remove **CENTRE ARMREST STORAGE COMPARTMENT**

Unlock catch (1) and at same time slide controller (3) in direction of arrow in downward direction.

Remove controller (3) from rear cabin fan housing (4).

Unfasten plug connection (2) and disconnect.

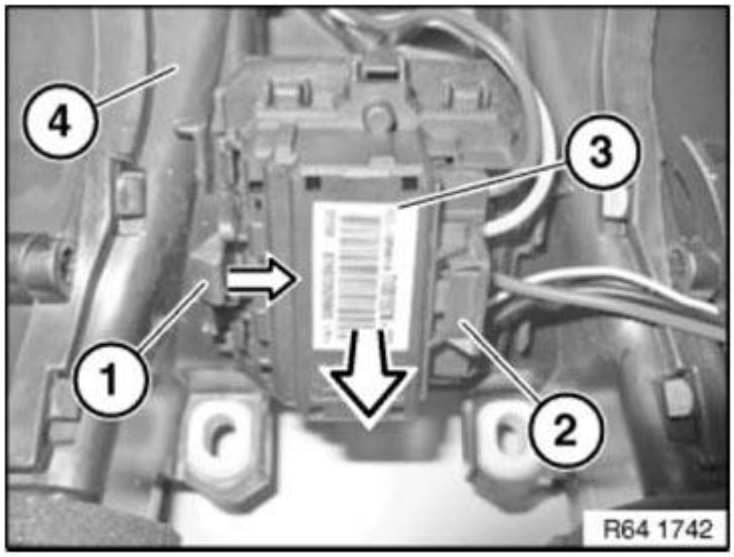


Fig. 13: Removing Controller From Rear Cabin Fan Housing
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 906 REMOVING AND INSTALLING/RENEWING VENTILATION TEMPERATURE SENSOR (CENTER FRESH-AIR GRILLE)

Necessary preliminary tasks

- Remove **CAR INFOTAINMENT COMPUTER**

Disconnect plug connection (1).

Turn temperature sensor (2) on plug socket in direction of arrow as far as it will go.

Remove temperature sensor (2) from center fresh-air grille (3).

Installation:

Pay attention to lead sequence.

Make sure temperature sensor (2) is correctly engaged in middle fresh-air grille (3)

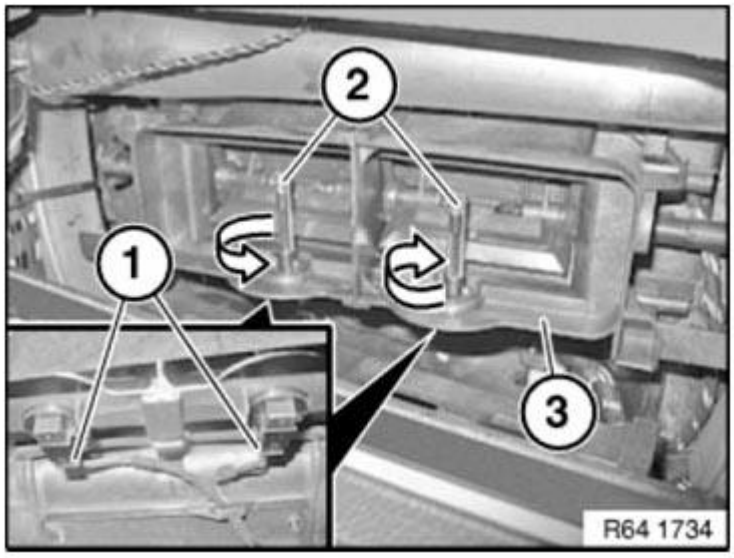


Fig. 14: Turning Temperature Sensor On Plug Socket
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 868 REMOVING AND INSTALLING/REPLACING ACTUATOR DRIVE FOR DEFROSTING FLAP

Necessary preliminary tasks

- Remove **CENTRAL INFORMATION DISPLAY**
- Remove **FRONT SPEAKER CARRIER**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER

Release screws (1).

Remove actuator drive (2) and unlock and disconnect plug connection (3).

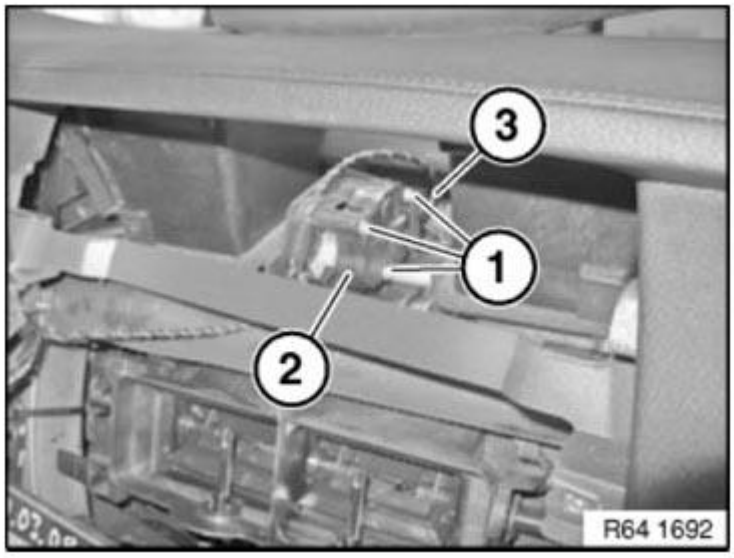


Fig. 15: Identifying Actuator Drive, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and A/C function
- Flap motors
- Re-address flap motors

64 11 262 REMOVING AND INSTALLING/REPLACING AUXILIARY WATER PUMP

Notes

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Recycling

Coolant emerges when coolant lines are detached. Have a suitable collecting container ready.

Catch and dispose of emerging coolant.

Observe country-specific waste disposal regulations.

Necessary preliminary work:

- Remove **FRONT WHEEL ARCH COVER**
- Disconnect coolant hoses.

Unlock spring clamps (1) with special tool **17 2 050** .

Pull off coolant hoses (2) from auxiliary water pump (3).

Unlock associated plug connection and disconnect.

Pull off auxiliary water pump (3) from bracket (4).

Installation note:

Make sure auxiliary water pump (3) is seated correctly in bracket (4).

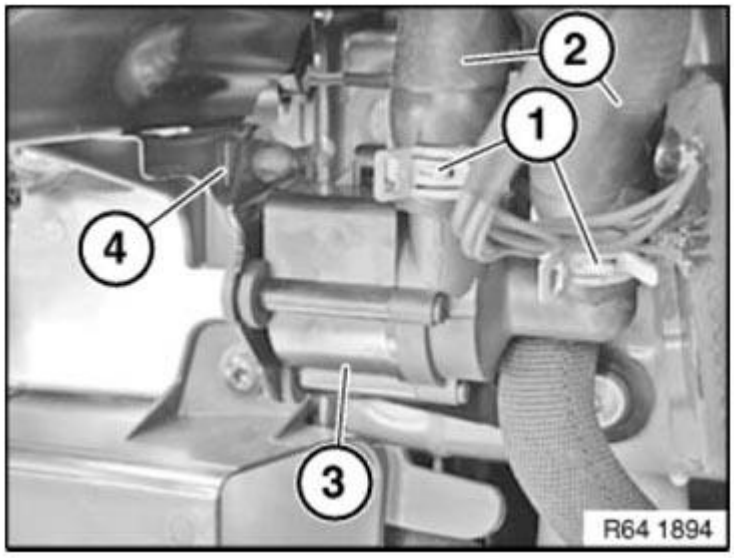


Fig. 16: Identifying Auxiliary Water Pump, Coolant Hoses, Bracket And Spring Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

After Installation note:

- **FILL COOLING SYSTEM**
- **CHECK COOLING SYSTEM FOR LEAKS**

64 11 198 REMOVING AND INSTALLING/REPLACING COMPLETE REAR AIR CONDITIONER

Notes

WARNING: Danger of injury!

Refrigerant circuit is under high pressure!

Follow safety information for handling R 134a tetrafluorethane refrigerant. See SAFETY INSTRUCTIONS FOR HANDLING TETRAFLUORETHANE REFRIGERANT R134A.

Avoid contact with refrigerant and refrigerant fluid.

Follow safety information for HANDLING REFRIGERANT FLUID .

IMPORTANT: Risk of damage!

Restart engine only when air conditioning system has been correctly filled.

Follow NOTES for opening and replacing parts in refrigerant circuit.

If air conditioning system is opened for more than 24 hours:

Replace desiccant insert for A/C system. See REPLACING DESICCANT INSERT FOR AIR CONDITIONING SYSTEM or REPLACING DESICCANT INSERT FOR A/C SYSTEM (CAPACITOR REMOVED).

To ensure that the refrigerant is almost completely drained from the rear air conditioner:

In the diagnosis system under Service functions carry out the instruction for "Draining/filling refrigerant circuit".

Necessary preliminary work:

- Drain off **AIR CONDITIONING SYSTEM**
- Remove **ALL LUGGAGE COMPARTMENT TRIM PANELS** or from 11/2010, remove luggage compartment partition wall

F03 only:

- If necessary, remove cool box

Release screws (1).

Tightening torque **64 53 5AZ** .

Carefully detach refrigerant lines (3)

downwards from expansion valve (2).

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

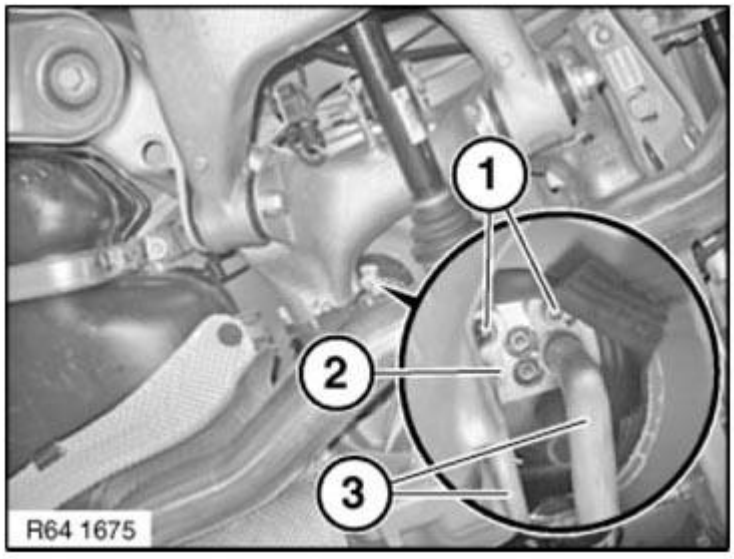


Fig. 17: Identifying Expansion Valve, Refrigerant Lines And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

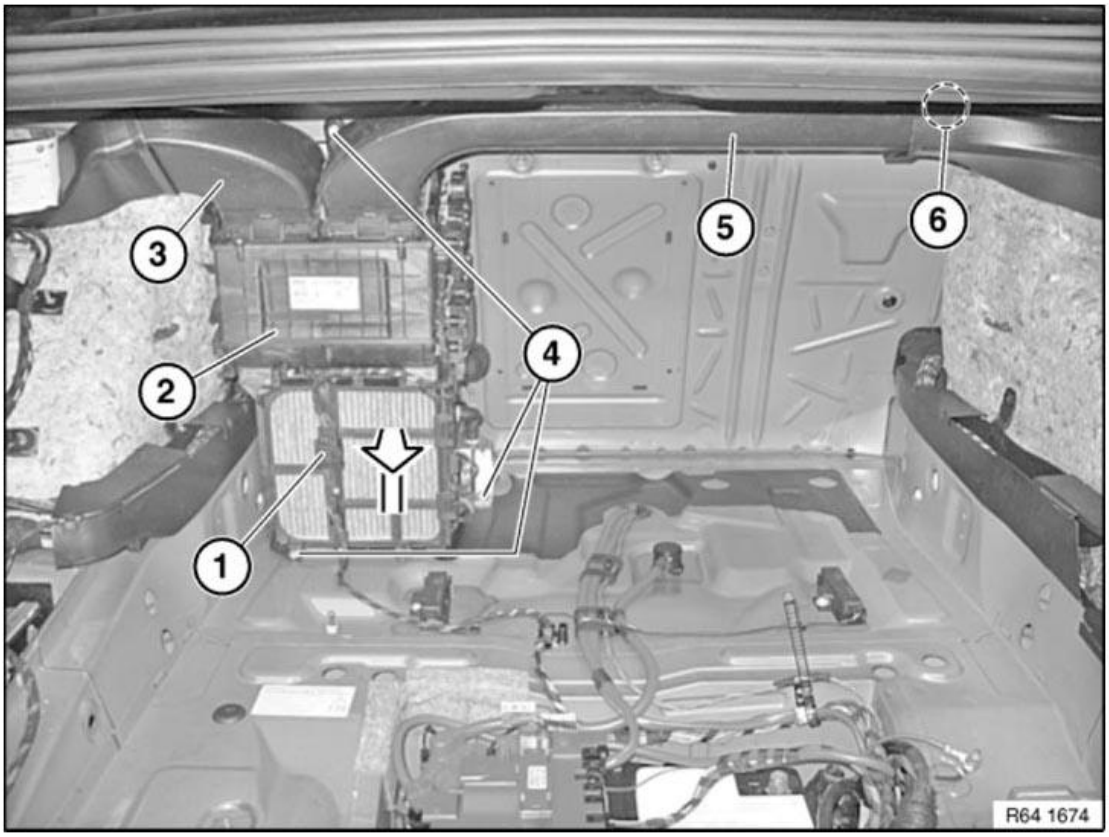


Fig. 18: Removing Rear Air Conditioner
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Release screws (4).

Tightening torque **64 11 1AZ** .

Lift out expanding rivet (6).

Carefully remove rear air conditioner (2) in direction of arrow.

In so doing, feed first air duct (3) then air duct (5) out of respective connecting pieces.

Installation note:

Make sure retaining lug (1) is correctly engaged in guide (2) on rear air conditioner (3).

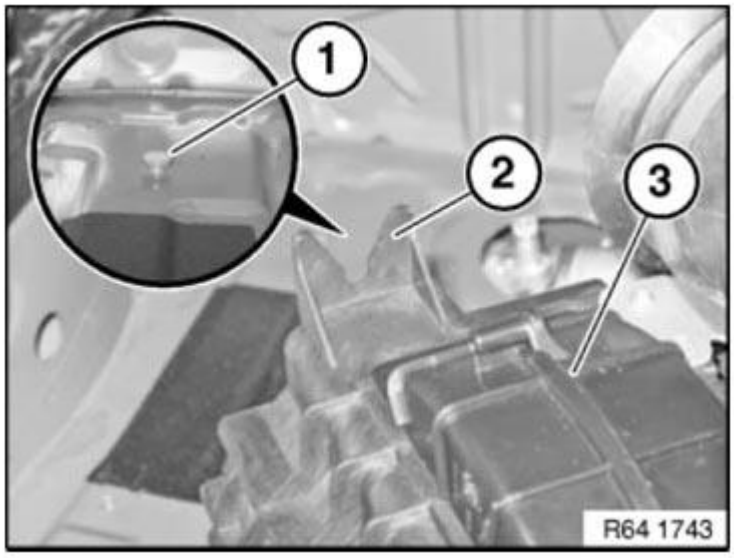


Fig. 19: Identifying Rear Air Conditioner, Retaining Lug And Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Treat burr on punched body passage (2) with underbody protection*.

If necessary, renew sealant* on gaiter (1).

*Sourcing reference: refer to BMW Parts Department.

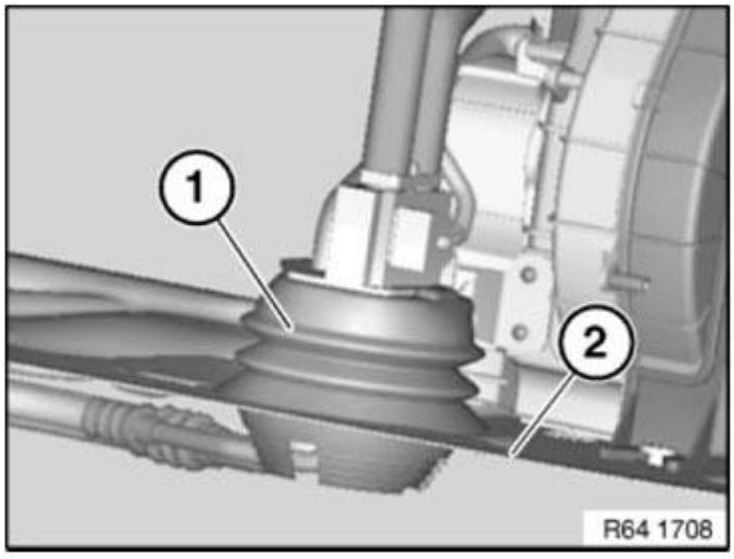


Fig. 20: Identifying Treat Burr On Punched Body Passage And Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **EVACUATE AND FILL HEATING AND AIR CONDITIONING SYSTEM**

Replacement

- Modify **EVAPORATOR**
- Modify **EXPANSION VALVE**
- Modify all actuator drives. See **RIGHT FLAP ACTUATOR DRIVE**; **LEFT FLAP ACTUATOR DRIVE**; **RIGHT BLINDS ACTUATOR DRIVE** and **LEFT BLINDS ACTUATOR DRIVE**.

64 11 395 REMOVING AND INSTALLING/REPLACING CONTROL PANEL FOR REAR CABIN A/C SYSTEM

Necessary preliminary tasks:

- Remove **REAR CENTRE CONSOLE TRIM**

Following operations relate exclusively to replacement.

NOTE: Example graphic on the F01.

Unlock catches (1).

Press out control panel of rear cabin A/C system (3) downwards and remove from center console trim.

Installation:

Catches (1) and (2) must perceptibly snap into corresponding guides.

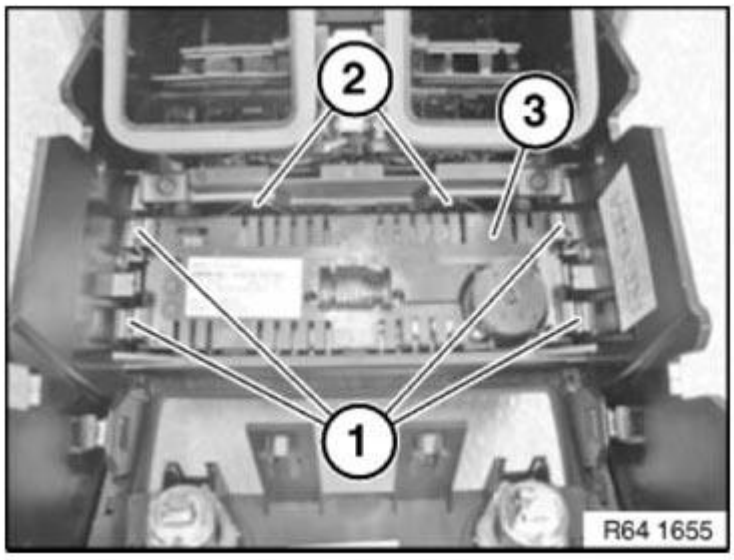


Fig. 21: Identifying Rear Cabin A/C System And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Modify **FAN MOTOR**
- Carry out **VEHICLE PROGRAMMING AND ENCODING**

64 51 530 REMOVING AND INSTALLING/REPLACING EXPANSION VALVE FOR REAR AIR CONDITIONER

Notes

Necessary preliminary tasks:

- Remove **REAR AIR CONDITIONER**

Release screws (1) on flange holder (2).

Installation:

Make sure flange holder (2) is correctly seated in associated guide on rear air conditioner housing.

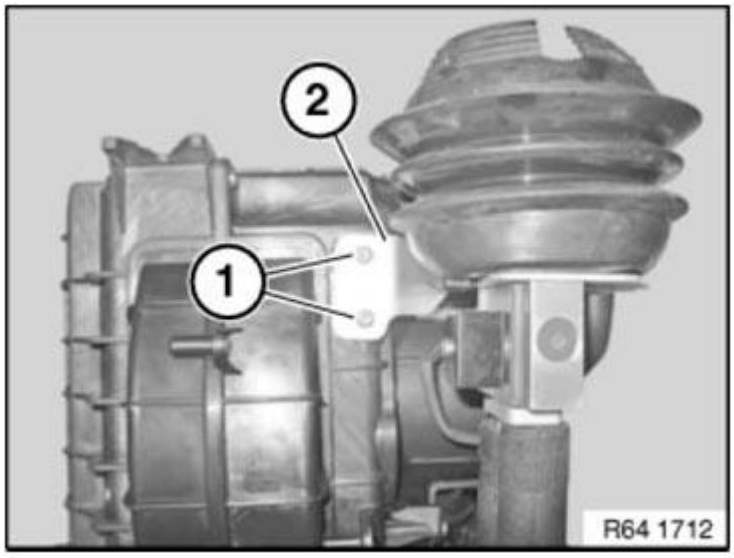


Fig. 22: Identifying Flange Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull condensation water drain hose (1) out of gaiter (4).

Unscrew nuts (2).

Remove flange (3) incl. holder and gaiter (4).

Installation:

Valve openings must be fully exposed and must not be covered either by flange (3) or the flange holder.

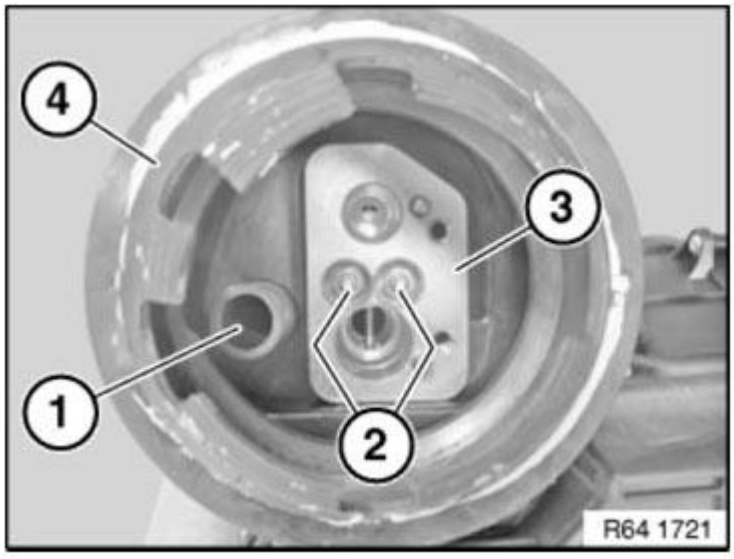


Fig. 23: Identifying Condensation Water Drain Hose, Flange And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and carefully remove expansion valve (2).

Tightening torque **64 53 6AZ** .

Installation:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

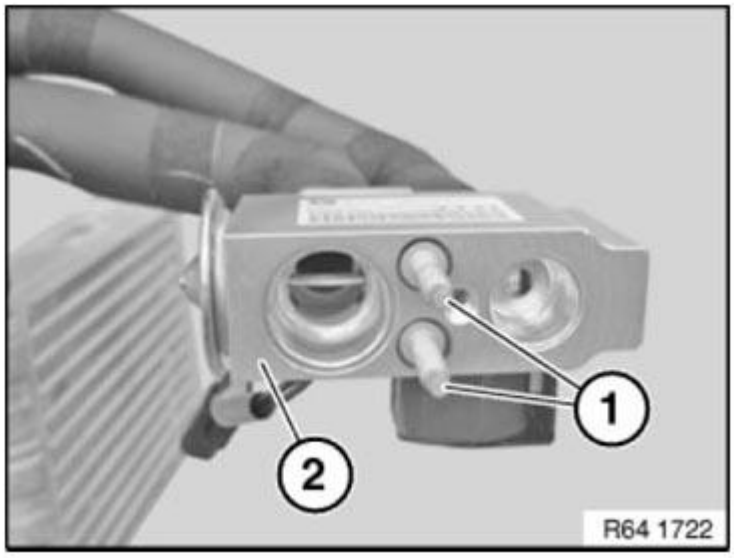


Fig. 24: Identifying Expansion Valve And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 213 REMOVING AND INSTALLING/REPLACING HEATER/AIR CONDITIONER FAN

Necessary preliminary work

- Remove **FAN HOUSING**

Unlock plug connections (2) and (3) and disconnect.

Make sure motor supply lead is correctly laid in cable lead-through (2).

Detach fan housing upper section from fan housing lower section.

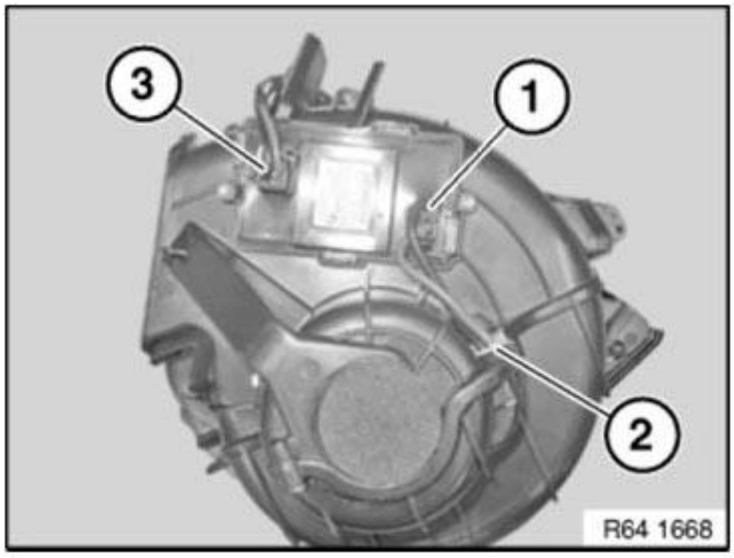


Fig. 25: Identifying Lock Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on fan housing (2).

Release fan housing upper section from lower section.

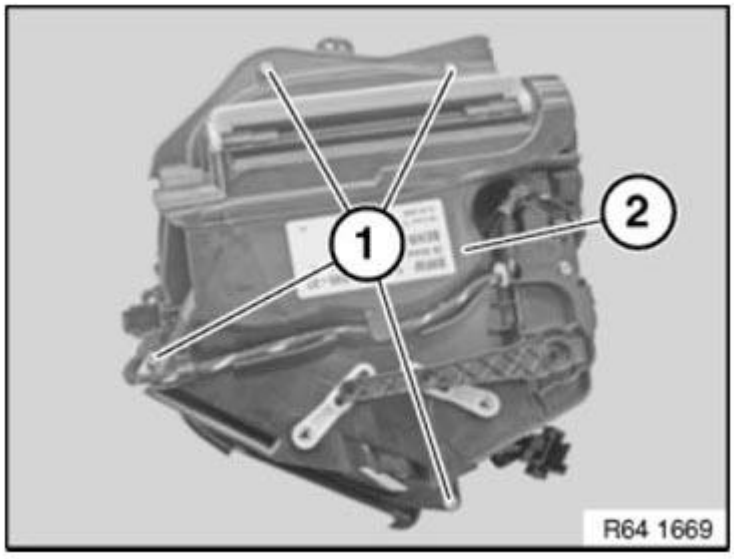


Fig. 26: Identifying Fan Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on fan housing lower section (2).

Release retaining clip (3).

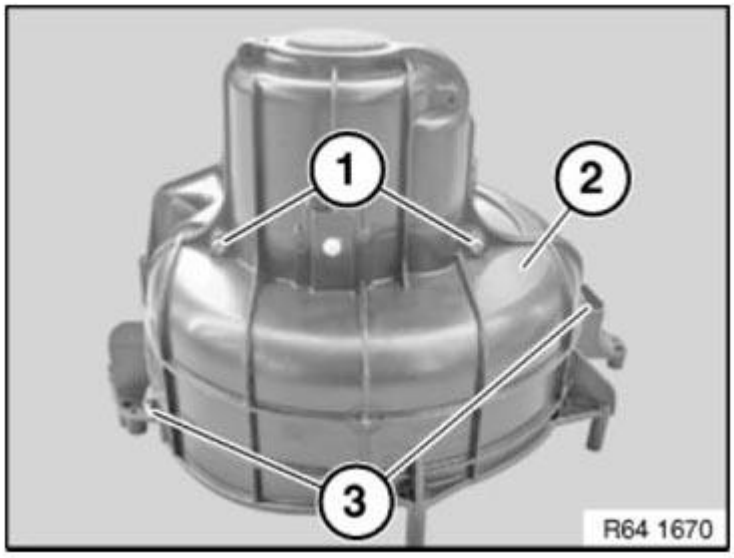


Fig. 27: Identifying Fan Housing Lower Section Screws And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Remove intermediate cover (1) from fan housing lower section (2).

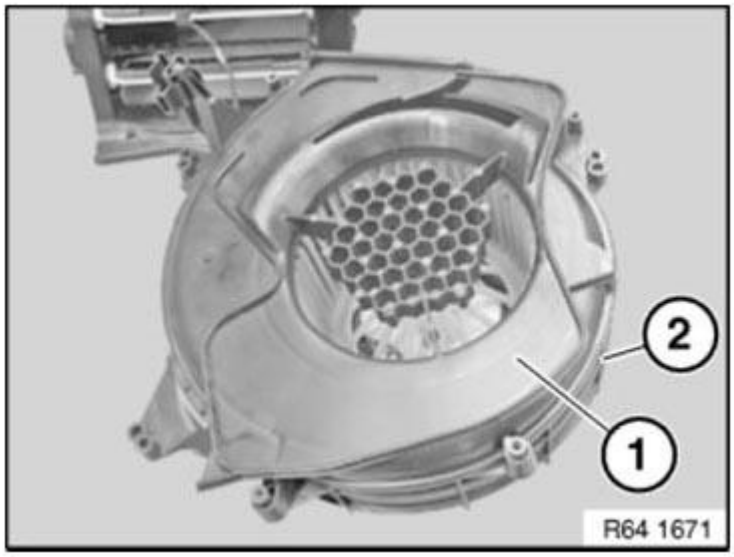


Fig. 28: Identifying Fan Housing Lower Section And Intermediate Cover
Courtesy of BMW OF NORTH AMERICA, INC.

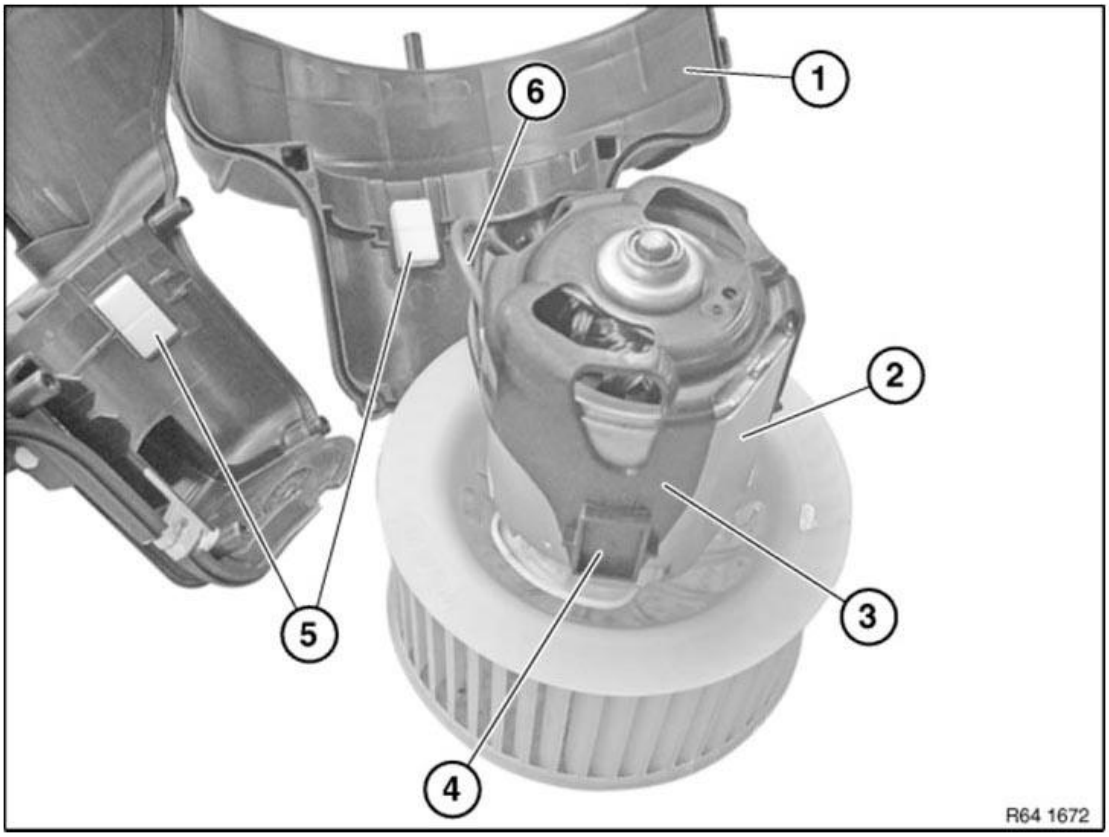


Fig. 29: Identifying Fan Motor Holder, Blower Housing Lower Section And Blower Motor
Courtesy of BMW OF NORTH AMERICA, INC.

Take blower housing lower section (1) apart as pictured and remove blower motor (2).

Installation note:

Fan motor holder (3) must be seated as pictured on fan motor (2).

Fan motor holder (2) must be correctly seated with guides (4) in guide buffers (5).

Make sure fan motor supply lead (6) are correctly laid.

Installation note:

Only on vehicles up to production dates from 09/2009 to 09/2010:

Fill groove of blower housing lower section (1) in the marked area (2) with sealant (BMW Parts Department 8342 0 428 349). Remove excess sealant with brush from groove.

NOTE: Assemble the blower immediately after applying the sealant!

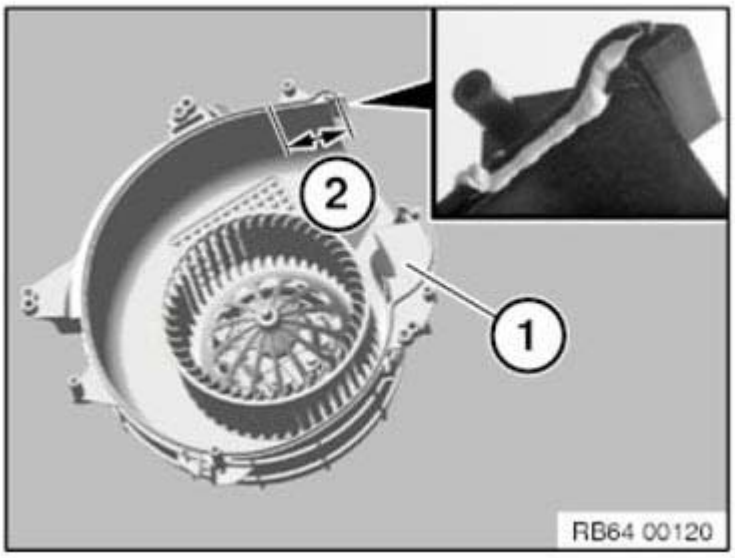


Fig. 30: Identifying Groove Of Blower Housing Lower Section In Marked Area
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 206 REMOVING AND INSTALLING/REPLACING HEATING AND AIR-CONDITIONING UNIT

Notes

WARNING: Danger of injury!

Refrigerant circuit is under high pressure!

Avoid contact with refrigerant and refrigerant fluid.

Read and comply with safety information:

- **Follow safety information for handling R 134a tetrafluorethane refrigerant. See SAFETY INSTRUCTIONS FOR HANDLING TETRAFLUORETHANE REFRIGERANT R134A.**
- **HANDLING REFRIGERANT FLUID**

IMPORTANT: Risk of damage!

Restart engine only when air conditioning system has been correctly filled.

Follow notes for opening and replacing parts in refrigerant circuit.

If air conditioning system is opened for more than 24 hours: Replace DESICCANT INSERT FOR AIR CONDITIONING SYSTEM .

Necessary preliminary work:

- Drain off **AIR CONDITIONING SYSTEM**
- Remove **ACOUSTIC INSULATION FROM BULKHEAD UPPER SECTION**
- Remove **BLOWER HOUSING FOR HEATING AND AIR-CONDITIONING UNIT**
- Remove **LEFT SUSPENSION CROSSBRACE**
- Remove **CARRIER FOR DASHBOARD**
- Disconnect plug connections
- Unclip wiring harness mountings from heating and air-conditioning unit

Recycling

Coolant emerges when coolant lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping coolant.

Observe country-specific waste disposal regulations.

Feed out line penetration (1) towards top.

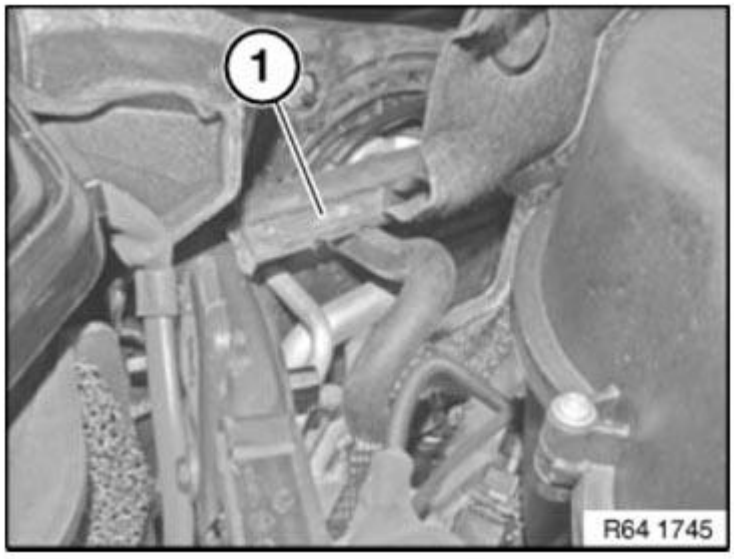


Fig. 31: Identifying Feed Out Line Penetration
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove refrigerant lines (2) with associated seal.

Tightening torque **64 53 1AZ** .

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

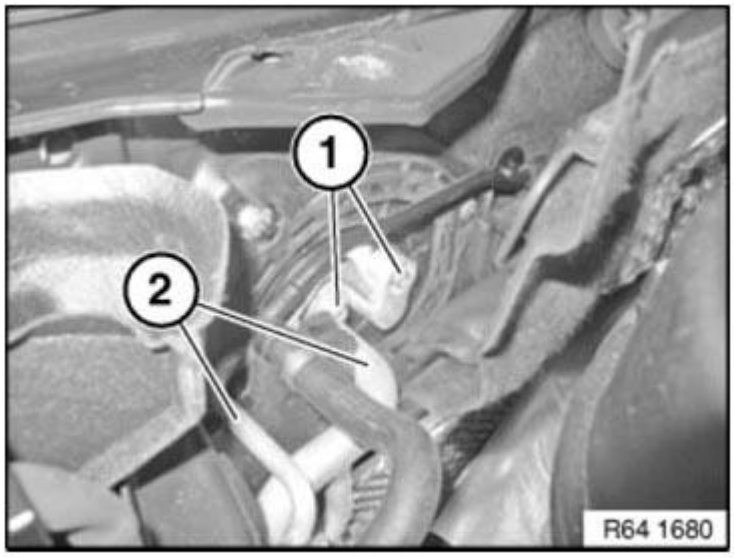


Fig. 32: Identifying Refrigerant Lines And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connections must not be mixed up!

Mark connection sequence of water hoses prior to removal.

Release hose clamps (1) with special tool **17 2 050** and detach coolant hoses (2).

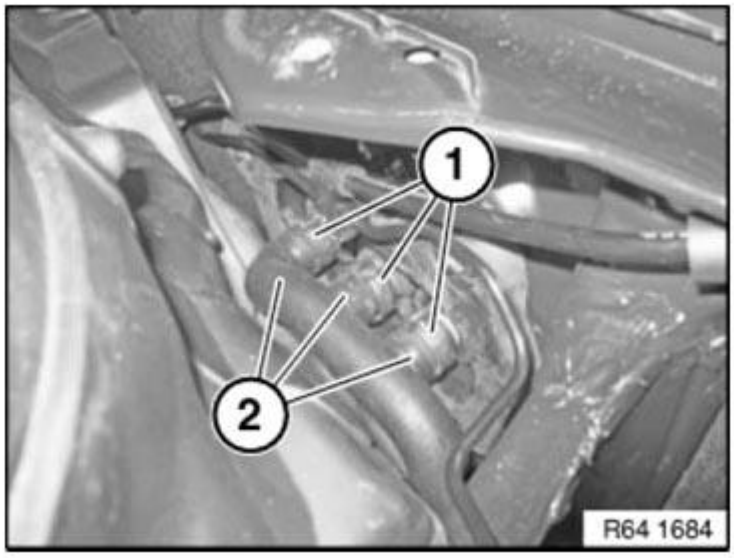


Fig. 33: Identifying Coolant Hoses And Hose Clamps

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Carefully blow out coolant ports on the heat exchanger to remove the remaining coolant.

Close openings or line to heat exchanger with special tool 32 1 270 , to avoid media leak and dirt contamination.

Equipment specification with electric auxiliary heater only:

Release screw (1).

Remove earthing cable for electric auxiliary heater (2) from floor trim panel (3).

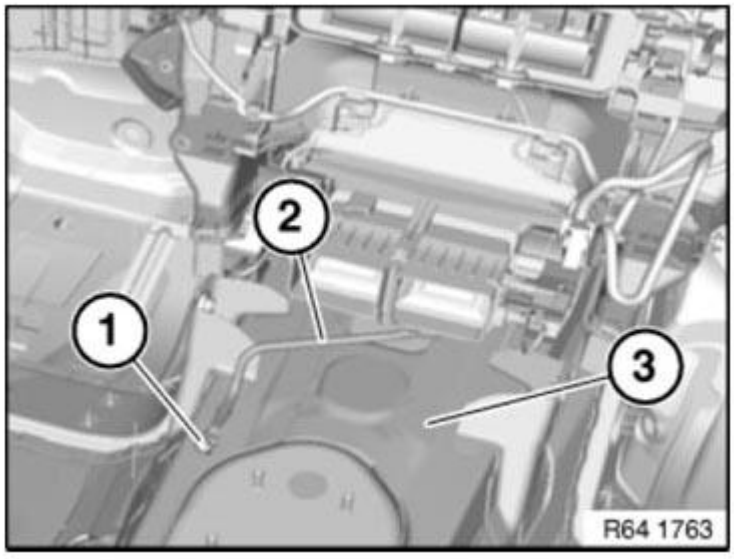


Fig. 34: Identifying Electric Auxiliary Heater Earthing Cable, Floor Trim Panel And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Length of earthing cable (1) must lie between points 2 and 3 and should be 230 mm to 235 mm long.

Run excess cable as shown in item (4).

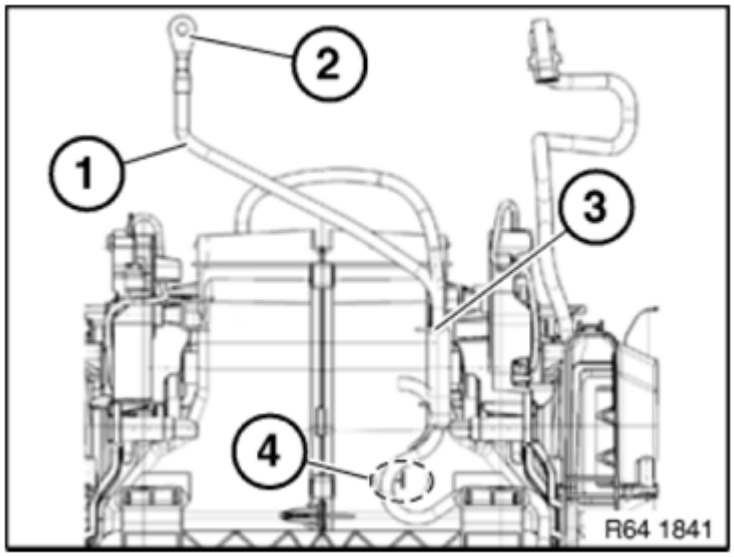


Fig. 35: Identifying Earthing Cable Length And Run Excess Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock retaining lug (1) on gaiter (2).

Lever gaiter (2) out of guides.

Installation note:

Make sure retaining lug (1) and adjacent guides are correctly engaged.

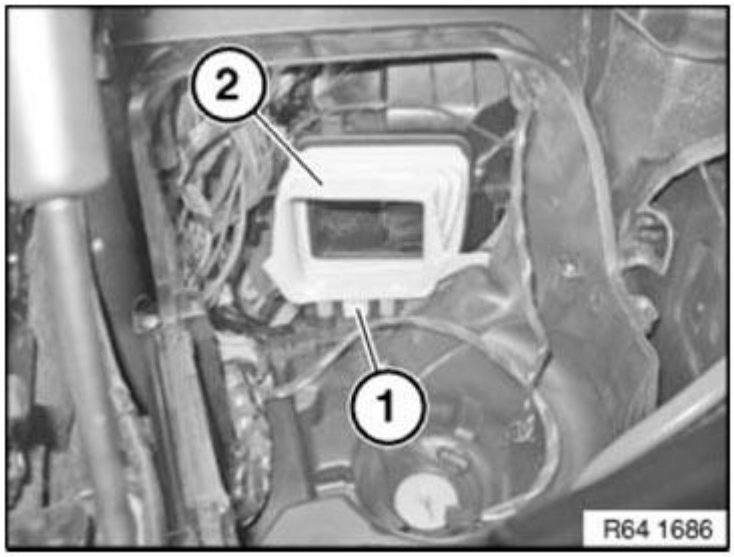


Fig. 36: Identifying Lock Retaining Lug On Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Protect passenger compartment against emerging coolant.

Unclip air ducts (2), left and right towards bottom, from heater/air conditioner (1).

Feed out heating and air-conditioning unit (1) in direction of arrow.

Installation note:

Water drain (3) must be inserted on both sides into outlet channel (4).

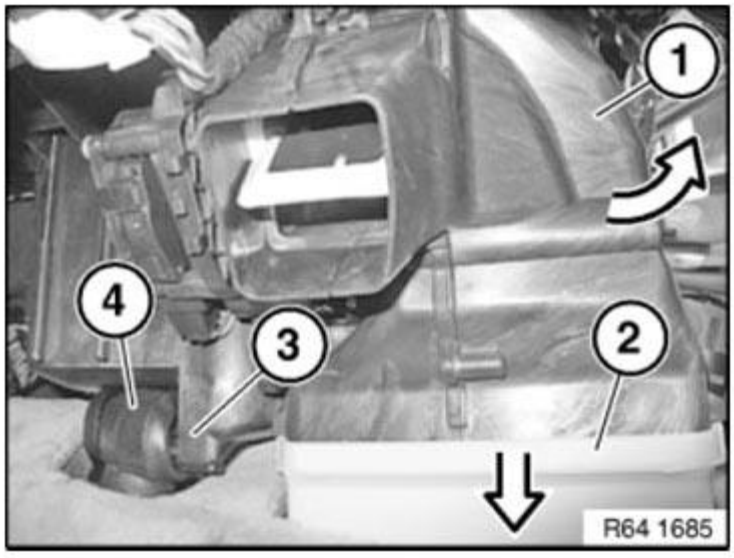


Fig. 37: Feeding Out Heating And Air-Conditioning Unit In Direction
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: In the event of incorrect fitting, there is a risk of leakage in the passenger compartment!

Replacement

- Modify **EVAPORATOR**
- Modify **HEAT EXCHANGER**
- Modify **EXPANSION VALVE**
- Modify all actuator drives. See **RIGHT FLAP ACTUATOR DRIVE**; **LEFT FLAP ACTUATOR DRIVE**; **RIGHT BLINDS ACTUATOR DRIVE** and **LEFT BLINDS ACTUATOR DRIVE**.
- Modify **OZONE GENERATOR** if necessary
- Modify **ELECTRIC AUXILIARY HEATER (FRONT)** if necessary

After installation

- **EVACUATE AND FILL A/C SYSTEM**
- **BLEED AND FILL COOLING SYSTEM**

61 31 321 REMOVING AND INSTALLING/REPLACING RADIO AND A/C CONTROL PANEL

Notes

IMPORTANT: Risk of damage!

A hard disk is installed in the Car Information Computer (CIC).

Carry out mechanical work on the CIC and adjacent components with care.

Avoid subjecting the CIC to vibration/shocks.

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

IMPORTANT: Carry out installation in a dust-free workshop area only.

To avoid damage, do not touch or dirty the display field.

Necessary preliminary work:

- Remove **DECORATIVE STRIP ON INSTRUMENT PANEL IN MIDDLE**

NOTE: Example illustration!

Release screws (1).

Carefully lever out radio and A/C control panel (2) with special tool **00 9 317** at points (3) in direction of arrow.

IMPORTANT: Assign keypad depending on optional equipment.

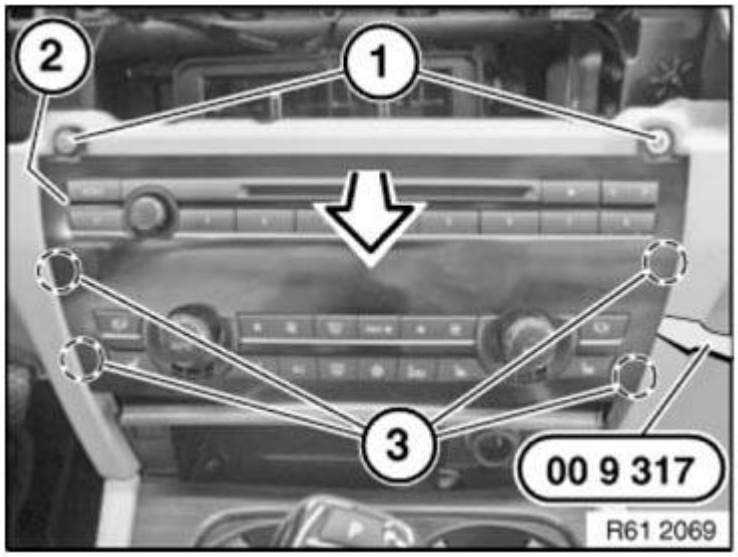


Fig. 38: Removing Radio And A/C Control Panel Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Remove radio and A/C control panel (2).

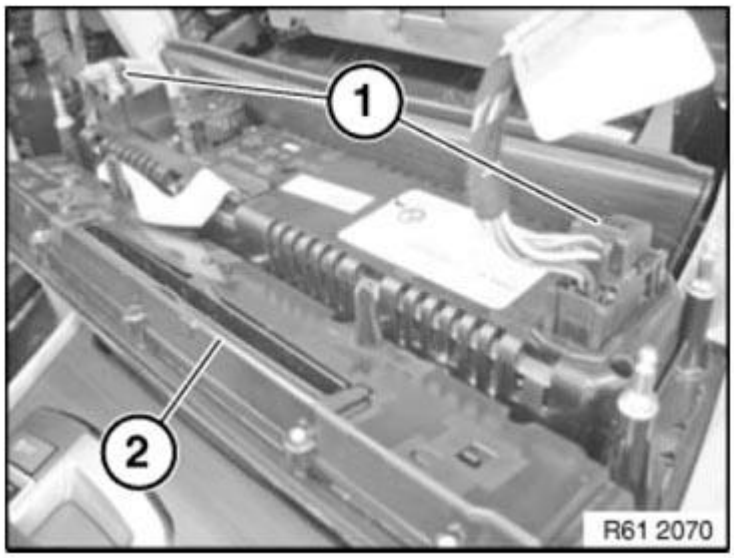


Fig. 39: Identifying Radio And A/C Control Panel And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 263 REMOVING AND INSTALLING/REPLACING REAR COMPARTMENT BLOWER

Necessary preliminary work

- Remove **CENTRE ARMREST**
- Remove **GEAR SELECTOR SWITCH COVER**
- Remove **REAR STORAGE COMPARTMENT**
- If necessary, remove **DVD PLAYER IN REAR CONSOLE**

Unclip cable clips (1) from center console frame (2) on left and right and remove.

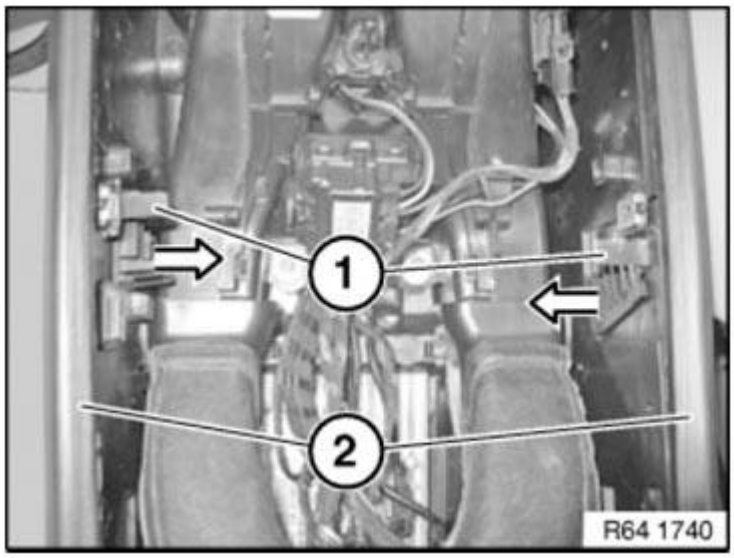


Fig. 40: Removing Cable Clips From Centre Console Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove air ducts (2).

Unlock plug connection (3) and disconnect.

Feed rear compartment blower (4) out of center console.

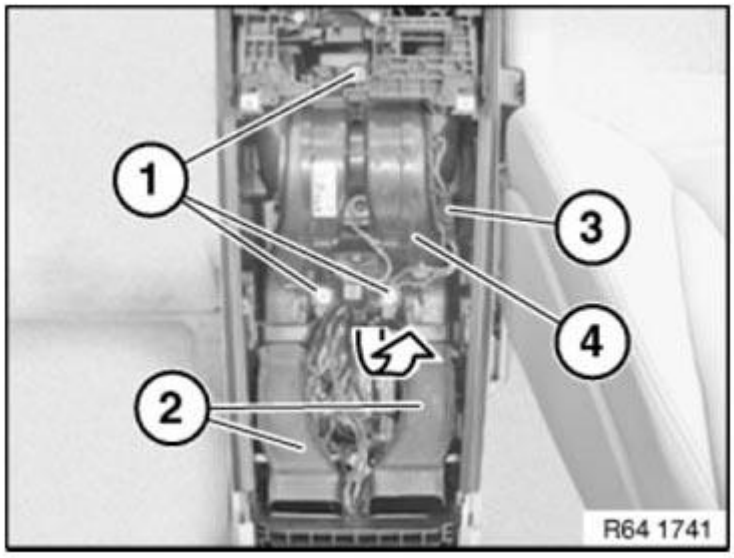


Fig. 41: Removing Air Ducts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Remove **REAR COMPARTMENT BLOWER CONTROLLER** .

64 11 991 REMOVING AND INSTALLING/REPLACING SENSOR FOR AUTOMATIC RECIRCULATED AIR CONTROL (AUC)

Lever out expansion rivets (1).

Feed out cover (2).

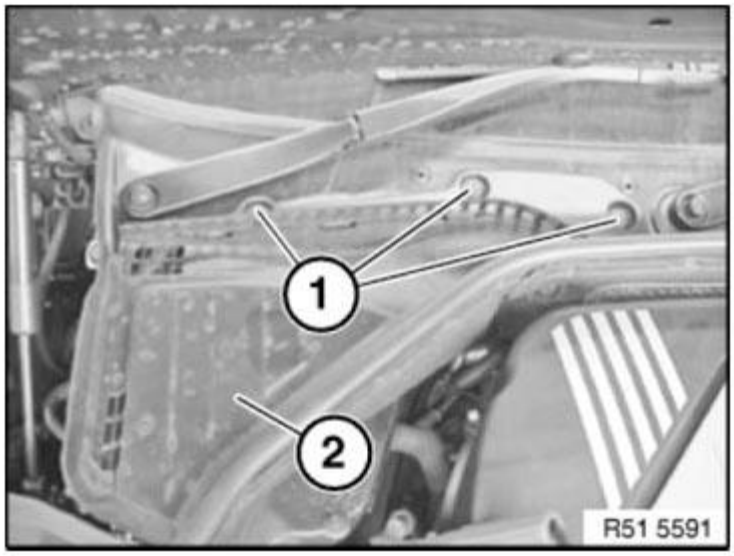


Fig. 42: Identifying Expansion Rivets And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock retaining lug (1) on AUC sensor (2).

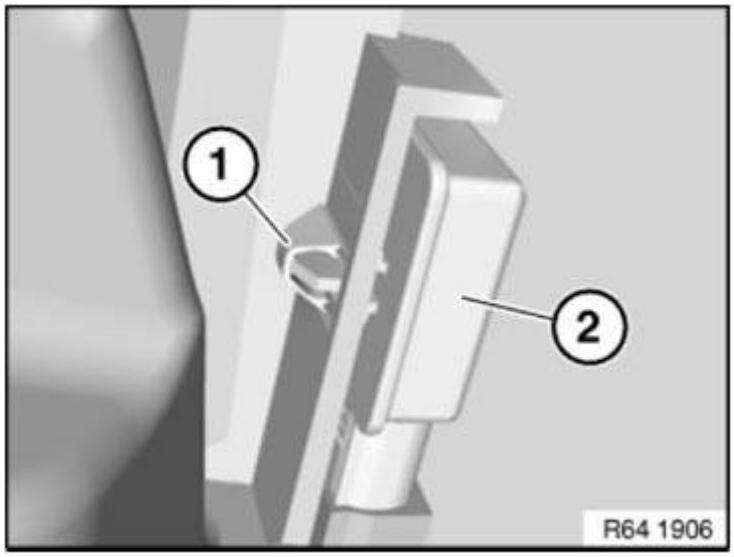


Fig. 43: Identifying Retaining Lug On AUC Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Remove AUC sensor (1) from holder (2) on fan sealing frame cover (3).

Unlock associated plug connection and disconnect.

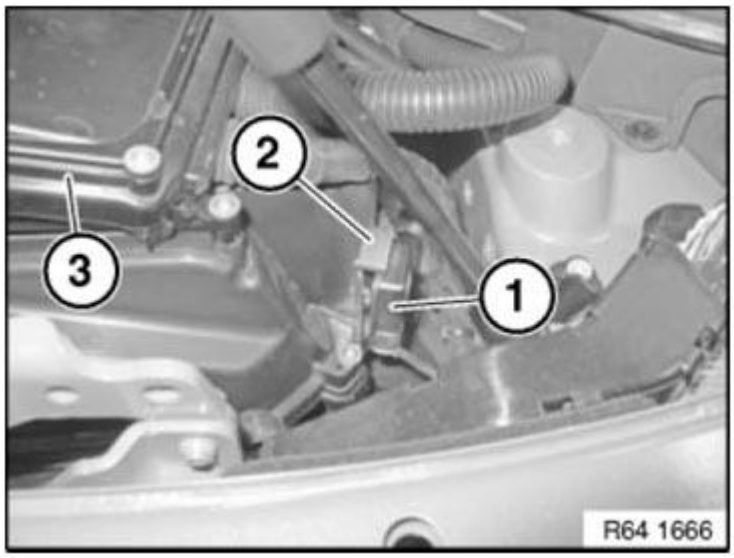


Fig. 44: Identifying AUC Sensor, Holder And Fan Sealing Frame Cover
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 879 REPLACE CONTROL PANEL FOR HEATER/AIR CONDITIONING SYSTEM

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

IMPORTANT: Retrofitting must only be done in the supplied installation cassettes.

Use of supplied gloves is mandatory.

Carry out installation in a dust-free workshop area only.

To avoid damage, do not touch or dirty the display area.

Necessary preliminary work

- Remove **RADIO AND IHKA CONTROLS**

Disconnect plug connection (1).

Release short screw.

Tightening torque **61 31 2AZ** .

Release long screws (2).

Tightening torque **61 31 2AZ** .

Carefully unlock clamps (3).

Pull up and remove IHKA controls (4).

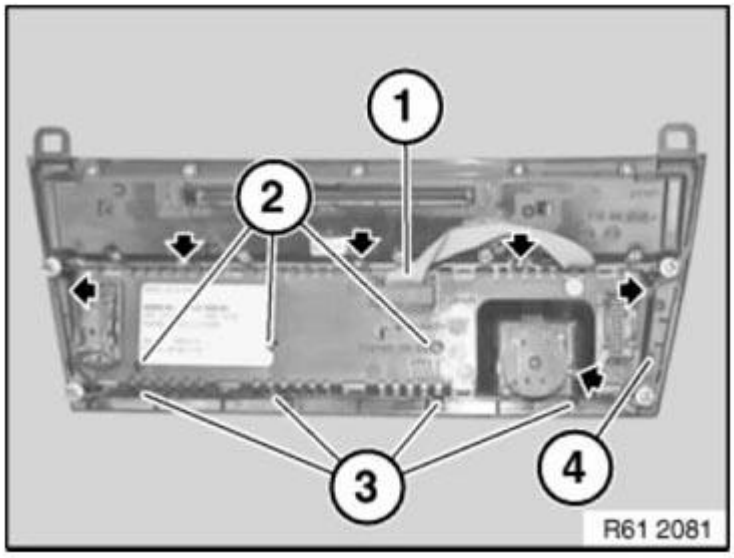


Fig. 45: Locating IHKA Controls, Plug Connection And Long Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Assign buttons of IHKA controls depending on equipment.

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING** .

64 11 819 REPLACING ACTUATOR DRIVE FOR FRESH AIR/RAM AIR

Necessary preliminary work

- **REMOVE AUXILIARY ELECTRONICS BOX**

Unlock plug connection (1) on AUC sensor and disconnect.

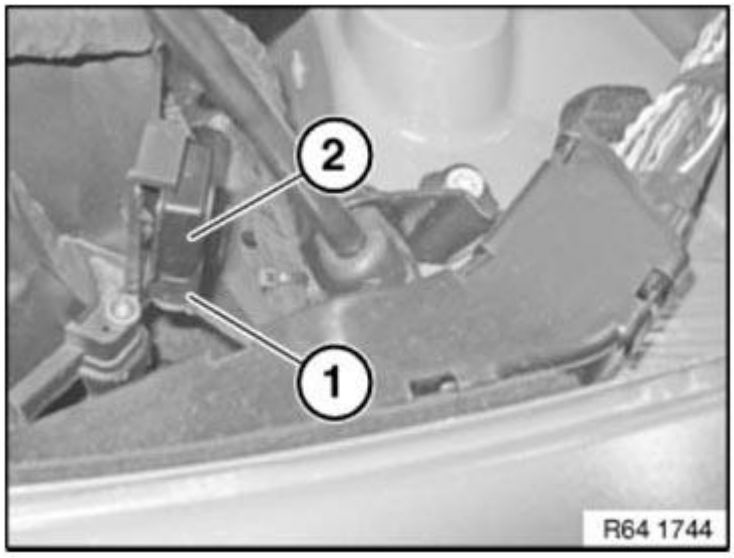


Fig. 46: Identifying Plug Connection On AUC Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on blower housing cover (2).

Lift out blower housing cover.

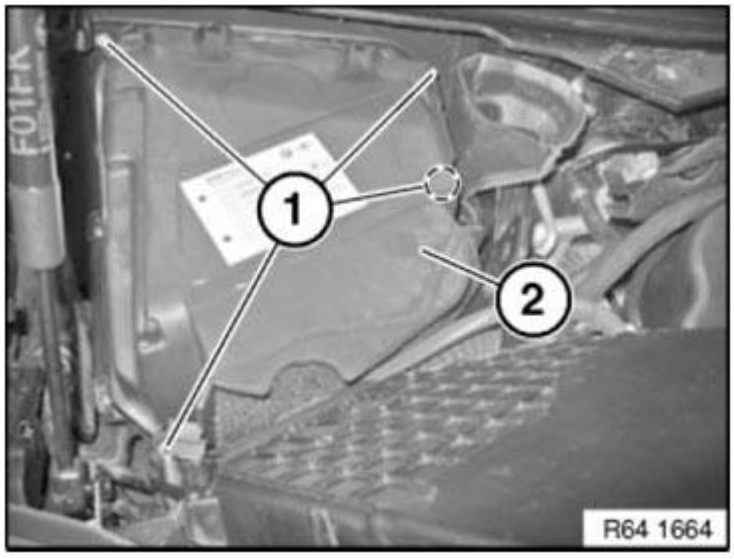


Fig. 47: Identifying Blower Housing Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove actuator drive (2).

Unlock plug connection (3) and disconnect.

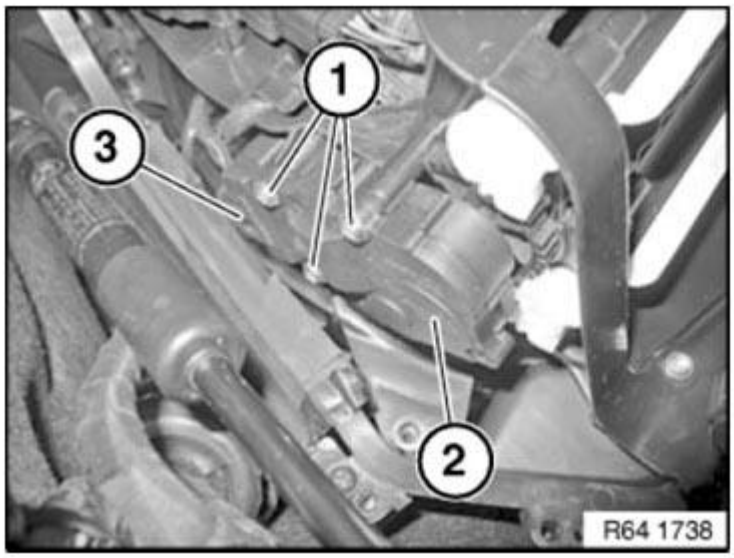


Fig. 48: Identifying Actuator Drive, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Re-address flap motors

64 11 835 REPLACING ACTUATOR DRIVE FOR LEFT BLENDING FLAP

Necessary preliminary tasks

- Remove **INSTRUMENT PANEL TRIM**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER

Release screws (1) and remove grounding cable.

Installation:

Replace screws (1).

Take off holder (2).

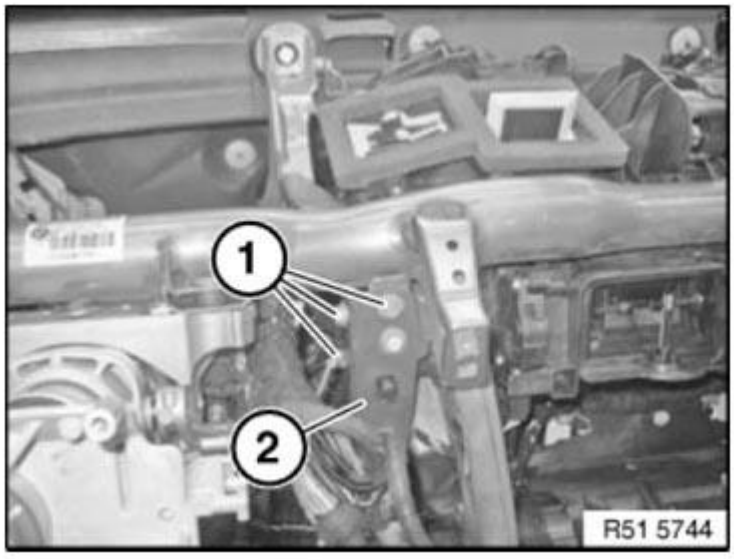


Fig. 49: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip connector piece (1) and slide downwards.

Installation:

Latching of connector piece (1) must be felt.

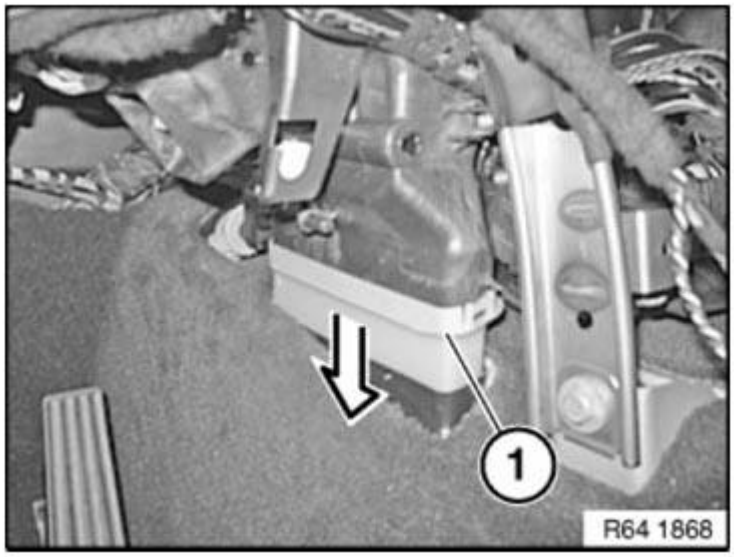


Fig. 50: Unclipping Connector Piece
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Feed out left footwell air outlet duct (2).

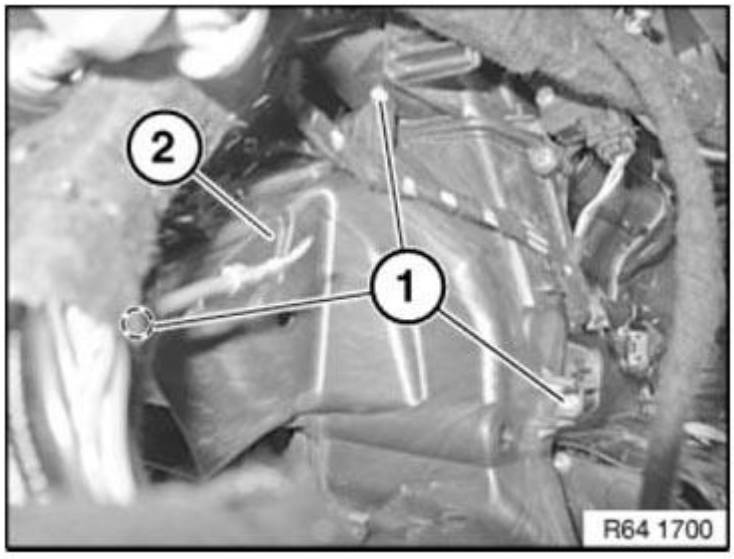


Fig. 51: Identifying Left Footwell Air Outlet Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip deflection arm (1) from deflector (5).

Release screws (4).

Remove actuator drive (2) and unlock and disconnect plug connection (3).

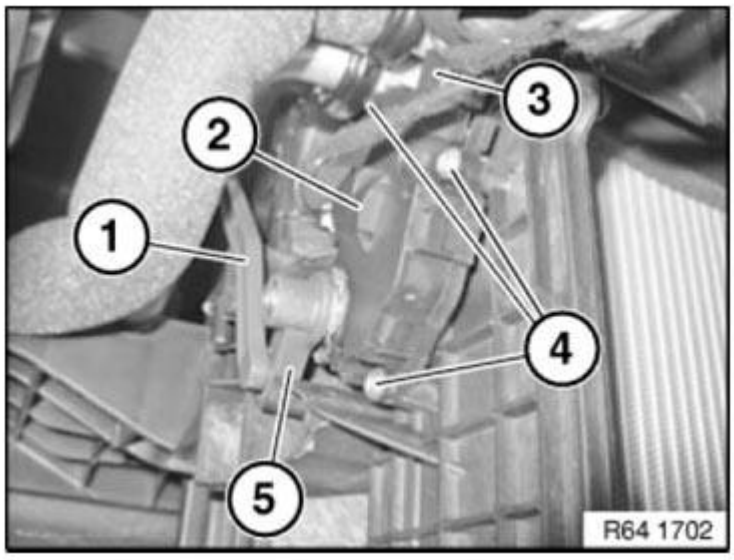


Fig. 52: Identifying Actuator Drive, Plug Connection, Deflection Arm And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and A/C function
- Flap motors
- Re-address flap motors

64 11 840 REPLACING ACTUATOR DRIVE FOR LEFT FOOTWELL FLAP

Necessary preliminary tasks

- Remove **INSTRUMENT PANEL TRIM**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATING AND AIR-CONDITIONING UNIT

Release screws (1) and remove grounding cable.

Installation note:

Replace screws (1).

Take off holder (2).

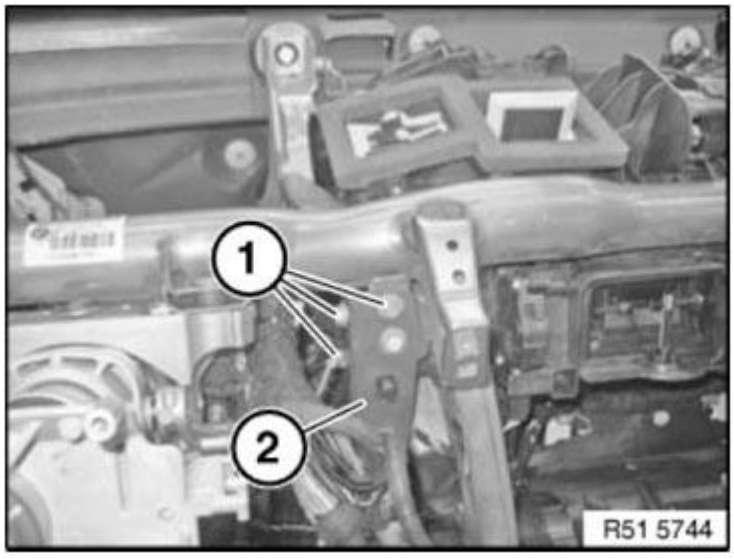


Fig. 53: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip connector piece (1) and slide downwards.

Installation note:

Latching of connector piece (1) must be felt.

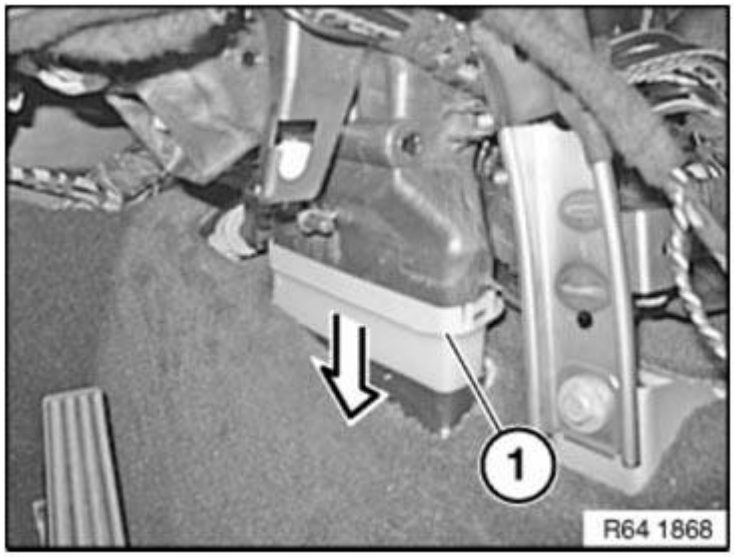


Fig. 54: Unclipping Connector Piece
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Feed out left footwell air outlet duct (2).

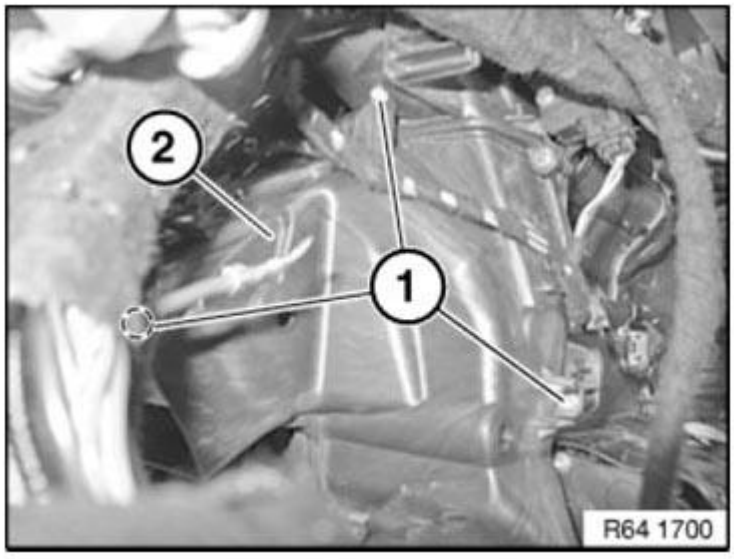


Fig. 55: Identifying Left Footwell Air Outlet Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

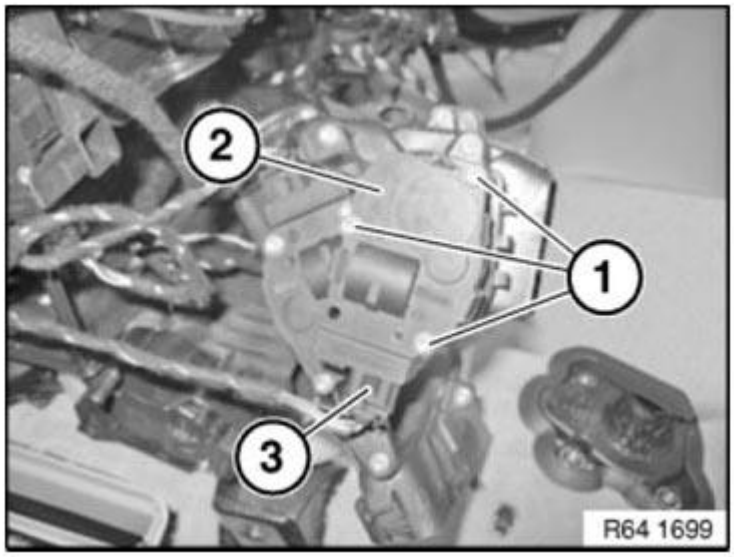


Fig. 56: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Servomotors must be readdressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Readdress flap motors

64 11 822 REPLACING ACTUATOR DRIVE FOR LEFT REAR CABIN BLENDING FLAP

Necessary preliminary tasks

- Remove **INSTRUMENT PANEL TRIM**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER

Release screws (1) and remove grounding cable.

Installation:

Replace screws (1).

Take off holder (2).

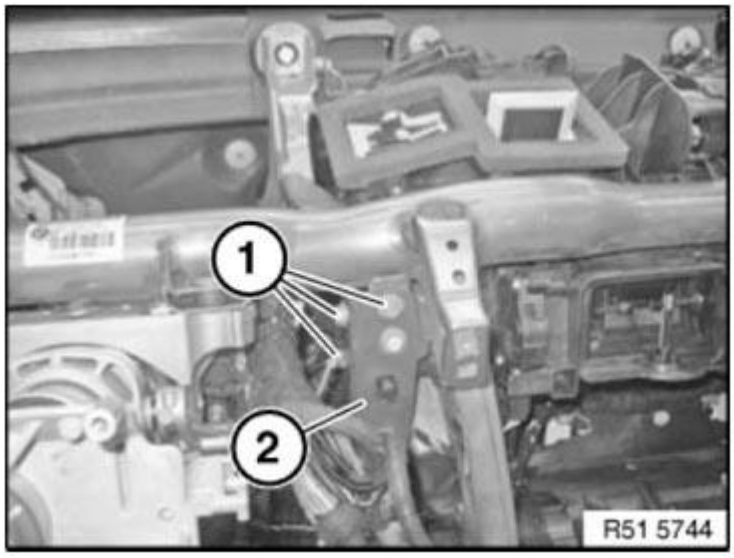


Fig. 57: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip connector piece (1) and slide downwards.

Installation:

Latching of connector piece (1) must be felt.

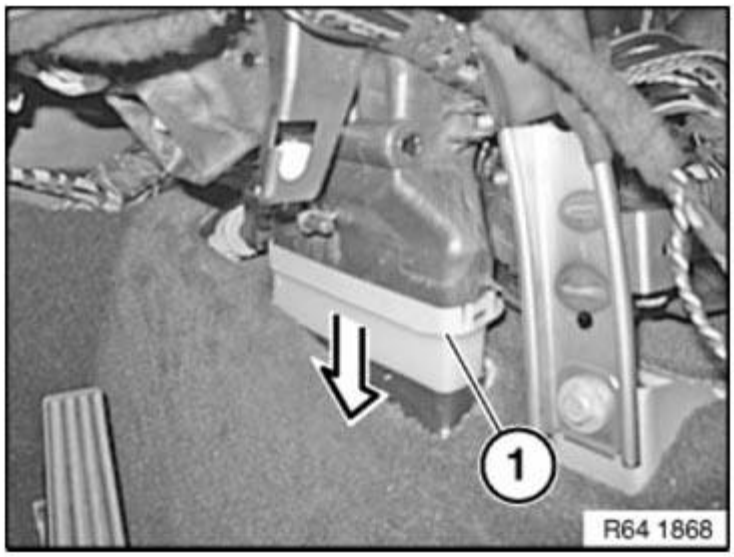


Fig. 58: Unclipping Connector Piece

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Feed out air outlet duct (2)

Installation:

Ensure correct cable routing air outlet duct (2).

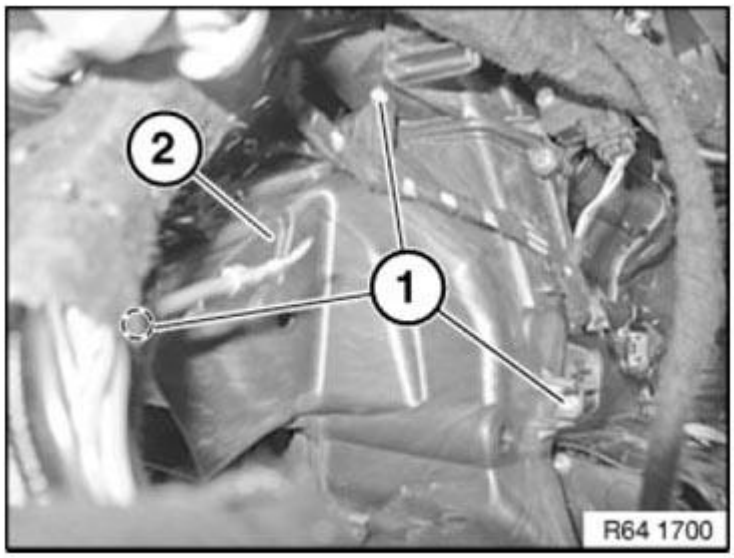


Fig. 59: Identifying Air Outlet Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

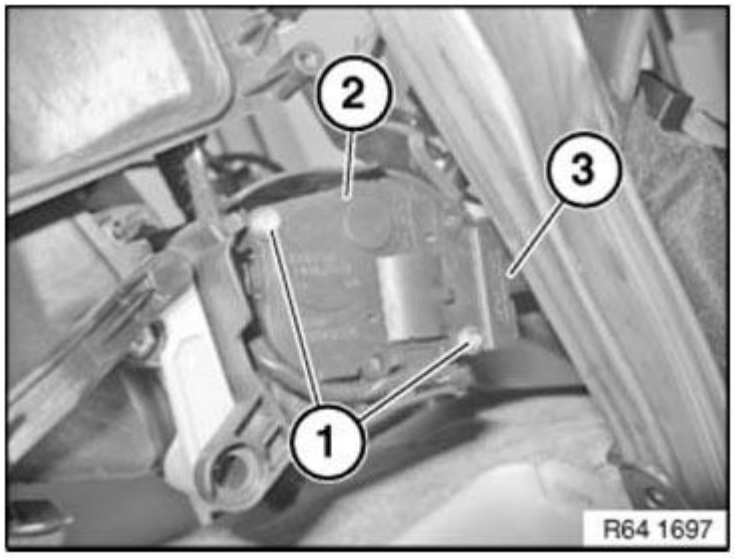


Fig. 60: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and A/C function
- Flap motors
- Re-address flap motors

64 11 857 REPLACING ACTUATOR DRIVE FOR LEFT REAR CABIN FOOTWELL FLAP (HIGH A/C SYSTEM)

Necessary preliminary tasks

- Remove **INSTRUMENT PANEL TRIM**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER

Release screws (1) and remove grounding cable.

Installation:

Replace screws (1).

Take off holder (2).

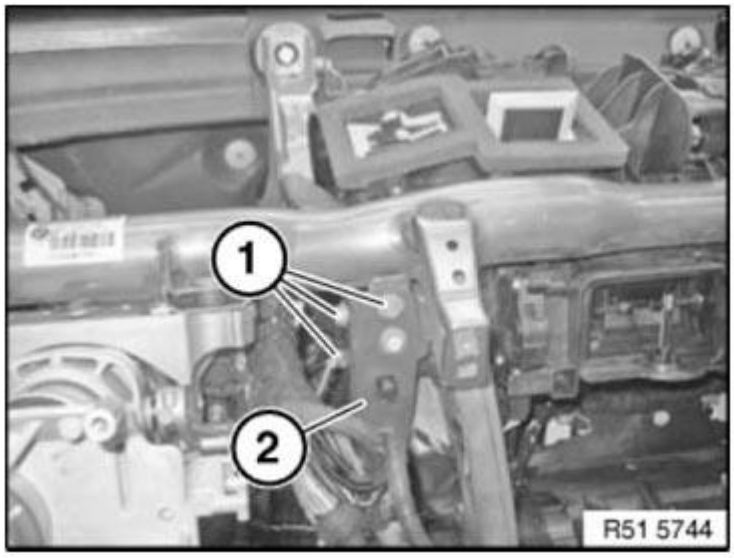


Fig. 61: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip connector piece (1) and slide downwards.

Installation:

Latching of connector piece (1) must be felt.

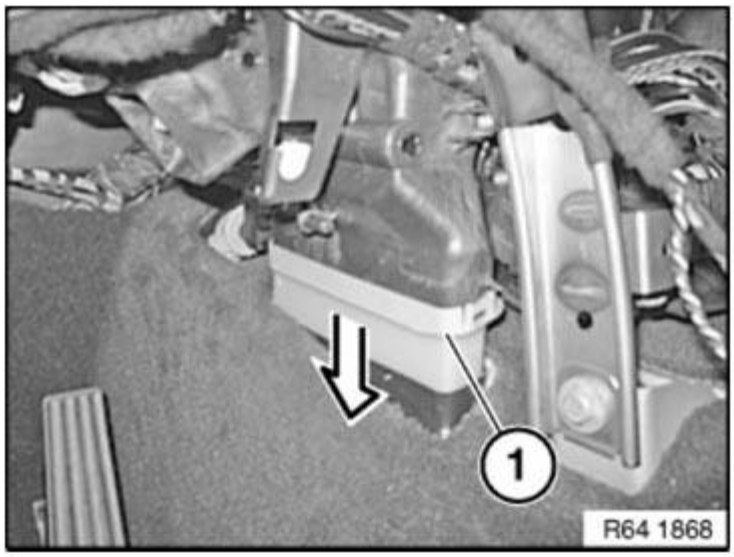


Fig. 62: Unclipping Connector Piece

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove air vent duct (2).

If necessary, unlock and disconnect plug connections on actuator drives.

Installation:

Ensure cable routing along air vent duct (2) is correct

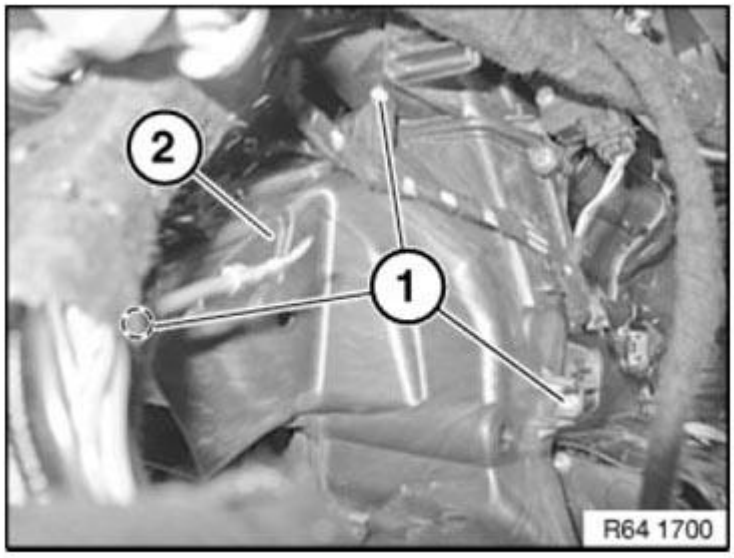


Fig. 63: Identifying Air Vent Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

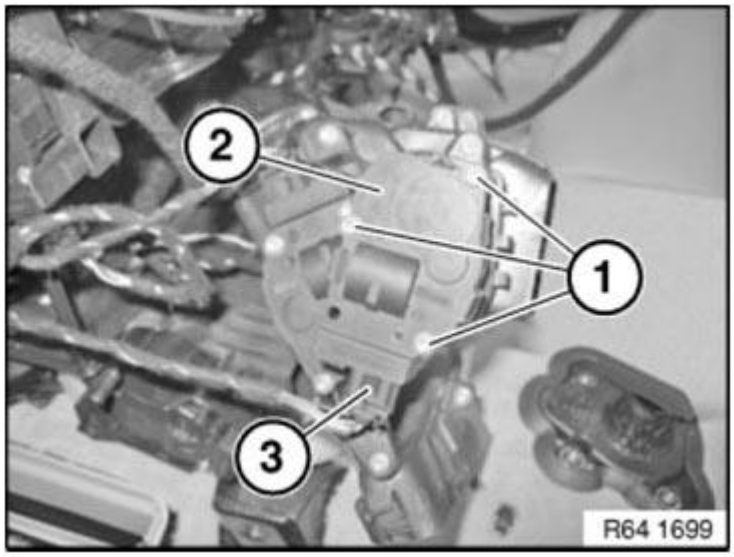


Fig. 64: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

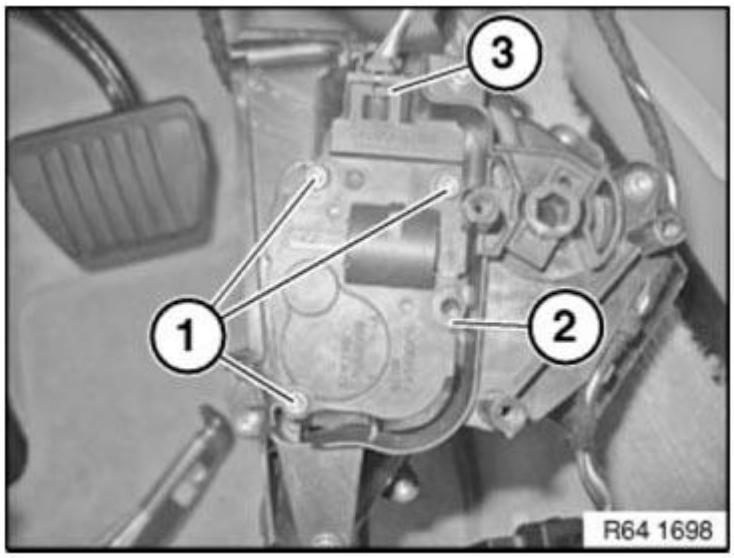


Fig. 65: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and A/C function
- Flap motors
- Re-address flap motors

64 11 830 REPLACING ACTUATOR DRIVE FOR MIDDLE LEFT VENTILATION FLAP (HIGH A/C SYSTEM)

Necessary preliminary tasks

- Remove **CENTRAL INFORMATION DISPLAY**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER

NOTE: For purposes of clarity, picture shows instrument panel removed.

Release screws (1).

Remove servomotor (2) and unlock and disconnect associated plug connection.

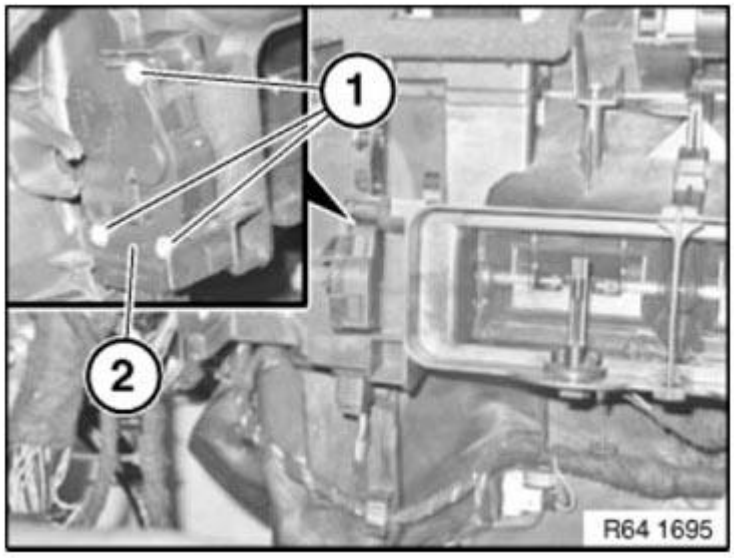


Fig. 66: Identifying Servomotor And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and A/C function
- Flap motors
- Re-address flap motors

64 11 832 REPLACING ACTUATOR DRIVE FOR MIDDLE RIGHT VENTILATION FLAP (HIGH A/C SYSTEM)

Necessary preliminary tasks

- Remove **CENTRAL INFORMATION DISPLAY**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER

Release screws (1).

Remove actuator drive (2).

Unlock plug connection (3) and disconnect.

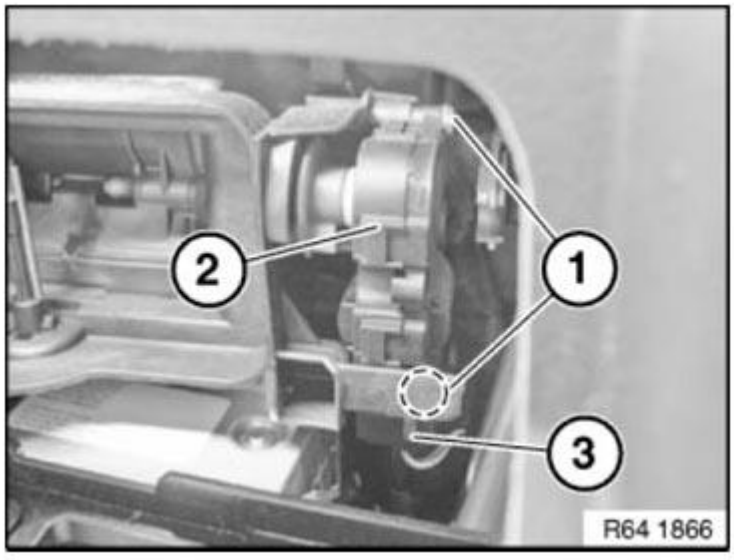


Fig. 67: Identifying Actuator Drive, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and A/C function
- Flap motors
- Re-address flap motors

64 11 827 REPLACING ACTUATOR DRIVE FOR OUTER LEFT VENTILATION FLAP

Necessary preliminary work

- Remove **INSTRUMENT PANEL TRIM**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATING AND AIR-CONDITIONING UNIT

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

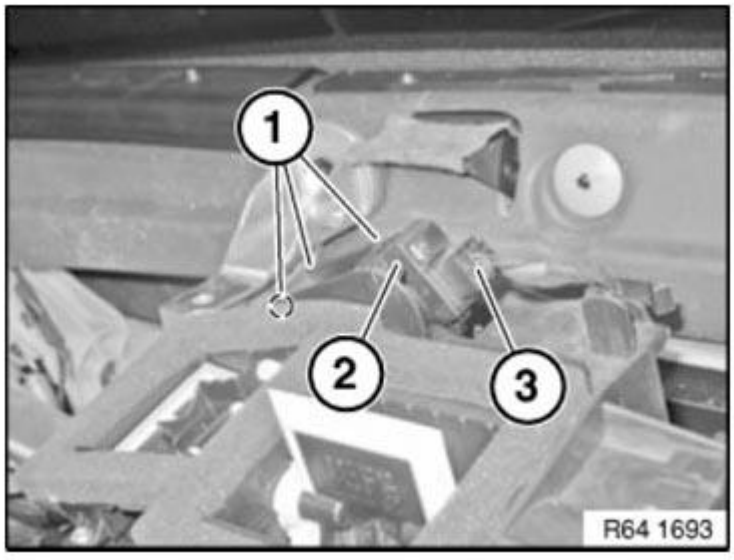


Fig. 68: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be readdressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions

- Body
- Heating and air conditioning function
- Flap motors
- Readdress flap motors

64 11 831 REPLACING ACTUATOR DRIVE FOR OUTER RIGHT VENTILATION FLAP

Necessary preliminary work

- Remove **INSTRUMENT PANEL TRIM**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATING AND AIR-CONDITIONING UNIT

Release screws (1).

Remove actuator drive (2) and unlock and disconnect plug connection (3).

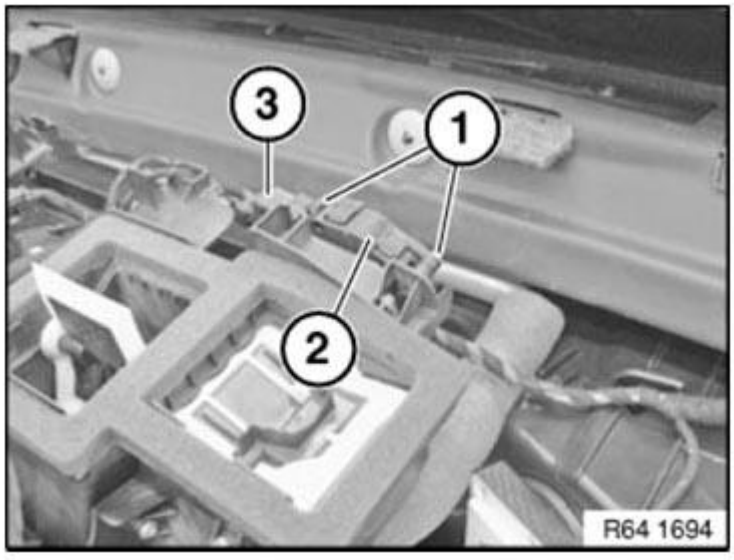


Fig. 69: Identifying Actuator Drive, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be readdressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Readdress flap motors

64 11 865 REPLACING ACTUATOR DRIVE FOR RECIRCULATED AIR FLAP

Necessary preliminary work

- **REMOVE AUXILIARY ELECTRONICS BOX**

Unlock plug connection (1) on automatic air recirculation control sensor (2) and disconnect.

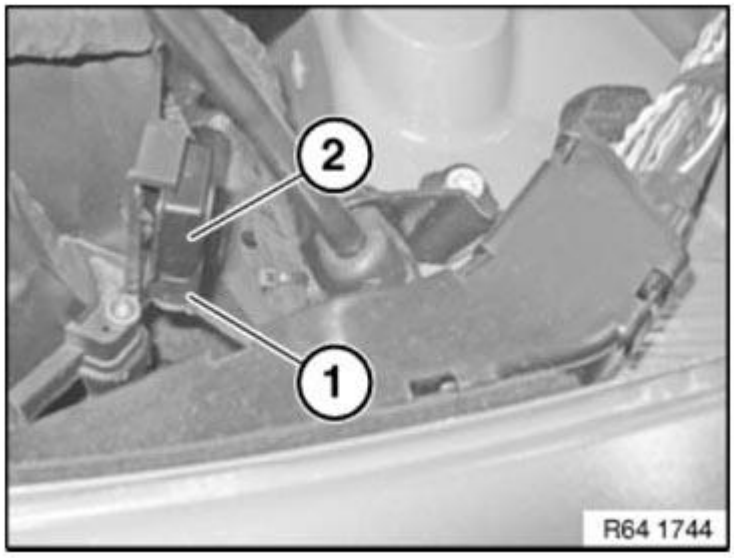


Fig. 70: Identifying Plug Connection On Automatic Air Recirculation Control Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on blower housing cover (2).

Lift out blower housing cover.

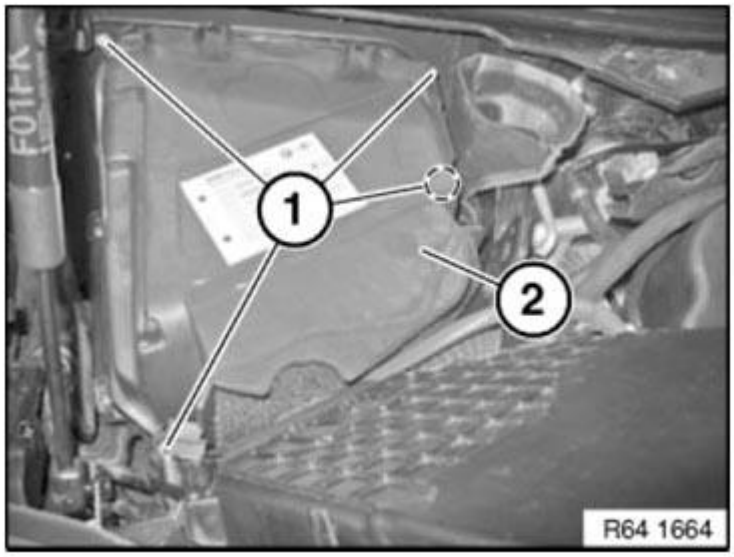


Fig. 71: Identifying Blower Housing Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Unclip relay lever (2) with a suitable tool.

Remove actuator drive (3).

Unlock plug connection (4) and disconnect.

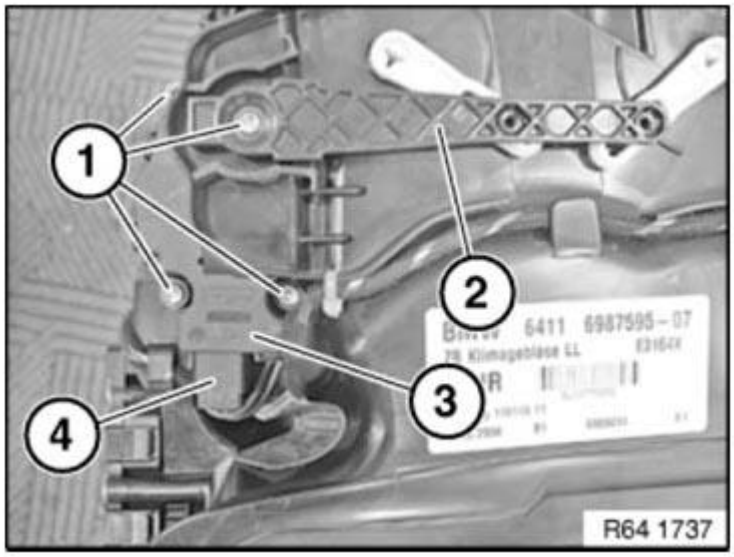


Fig. 72: Identifying Actuator Drive, Relay Lever, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Re-address flap motors

64 11 841 REPLACING ACTUATOR DRIVE FOR RIGHT FOOTWELL FLAP

Necessary preliminary tasks

- Remove **INSTRUMENT PANEL TRIM**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER

Release screws (1).

Take off holder (2).

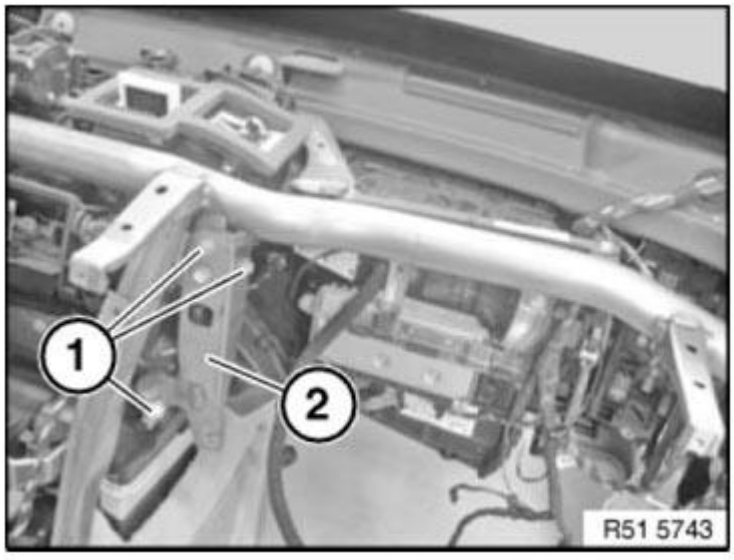


Fig. 73: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip connector piece (1) and slide downwards.

Latching of connector piece (1) must be felt.

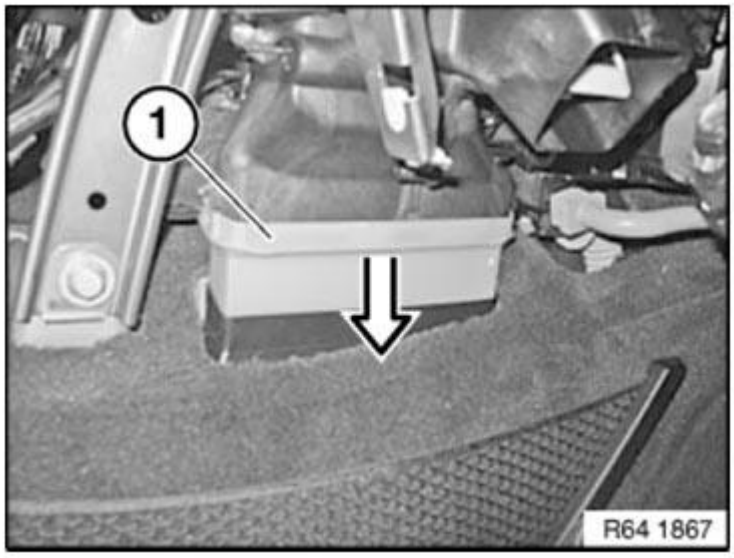


Fig. 74: Unclipping Connector Piece
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Feed out right footwell air outlet duct (2).

If necessary, disconnect plug connections at actuators.

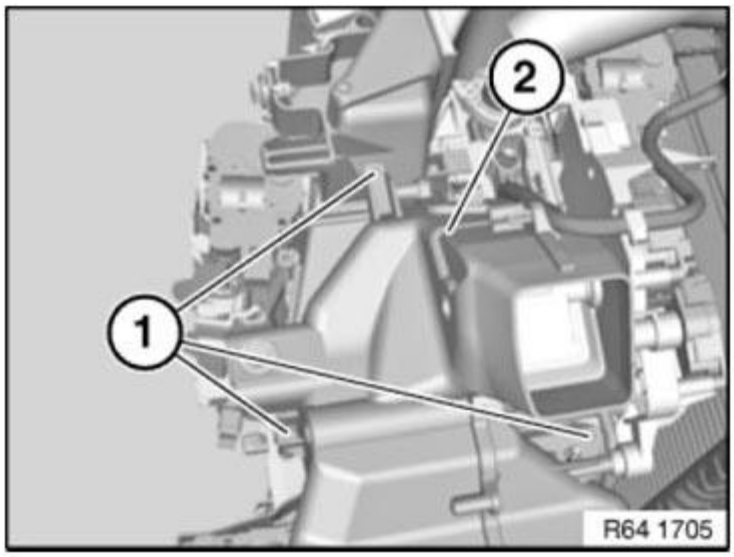


Fig. 75: Identifying Right Footwell Air Outlet Duct And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

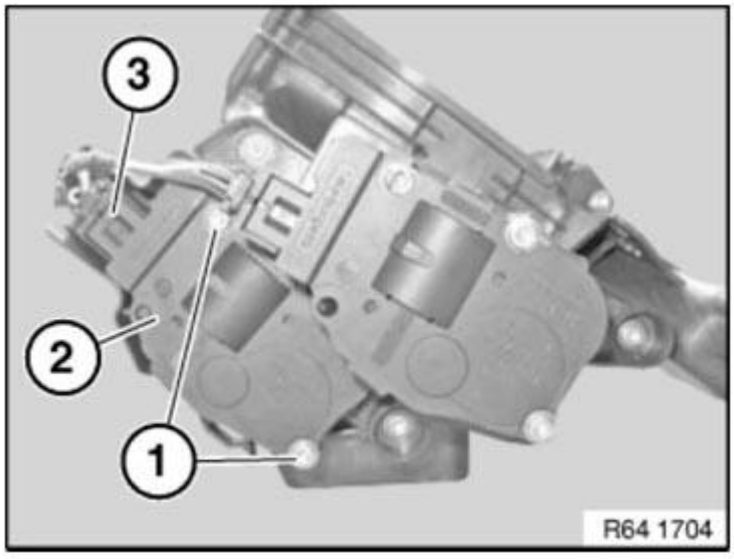


Fig. 76: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and A/C function
- Flap motors
- Re-address flap motors

64 11 823 REPLACING ACTUATOR DRIVE FOR RIGHT REAR CABIN AIR BLENDING FLAP

Necessary preliminary tasks

- Remove **INSTRUMENT PANEL TRIM**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER

Release screws (1).

Installation:

Replace screws.

Take off holder (2).

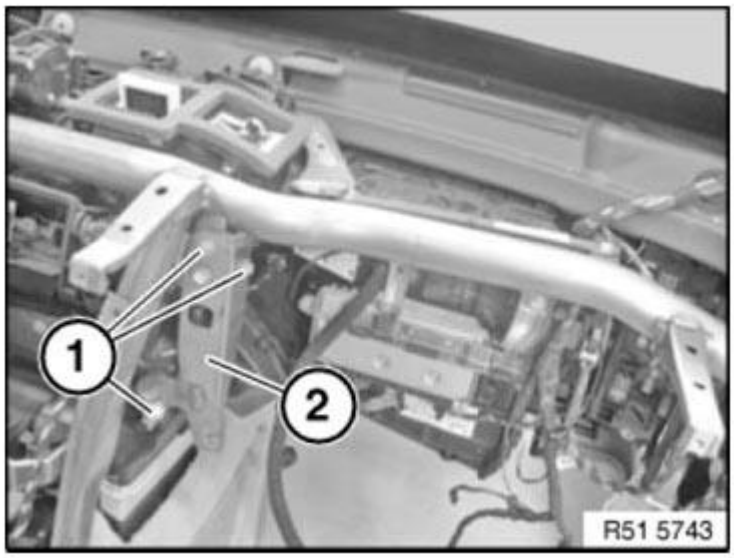


Fig. 77: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip connector piece (1) and slide downwards.

Installation:

Latching of connector piece (1) must be felt.

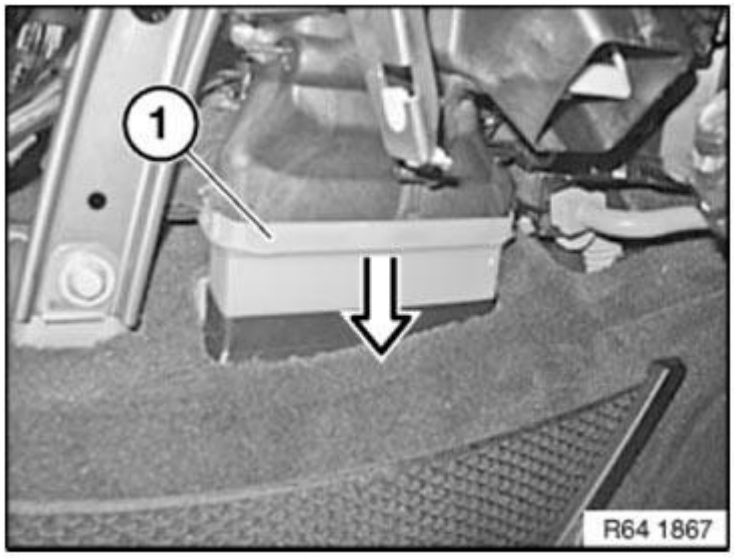


Fig. 78: Unclipping Connector Piece
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove air vent duct (2).

Installation:

Ensure cable routing along air vent duct (2) is correct

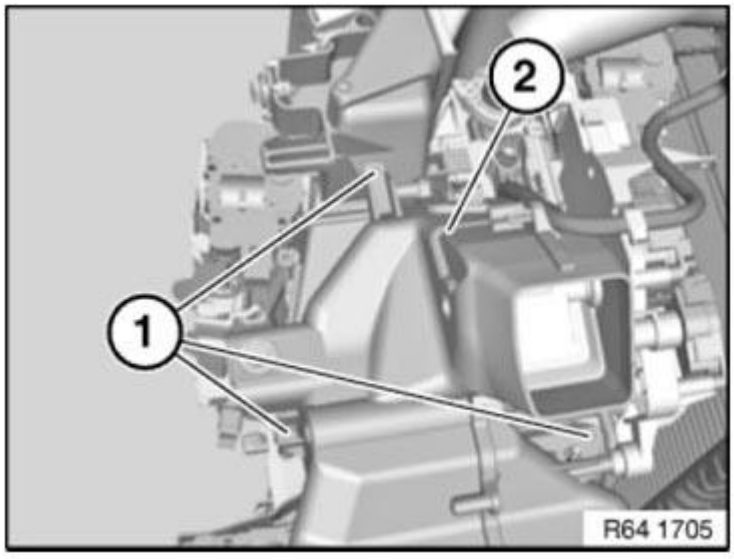


Fig. 79: Identifying Air Vent Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove actuator drive (2) and unlock and disconnect associated plug connection.

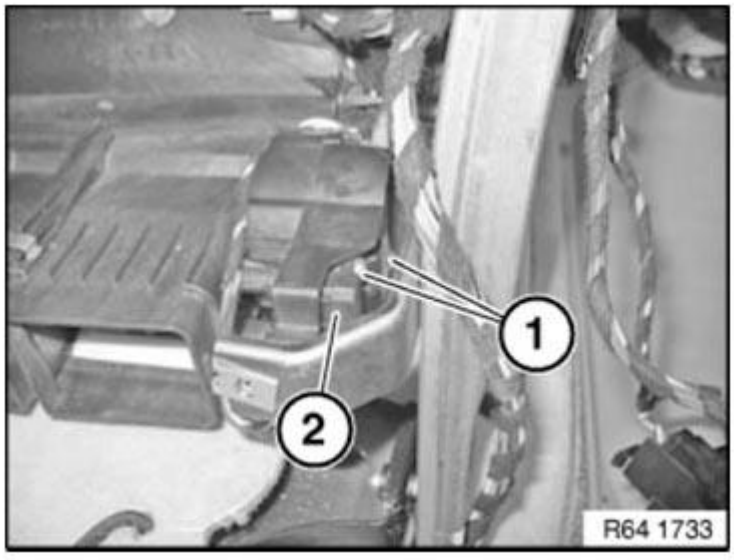


Fig. 80: Identifying Actuator Drive And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and A/C function
- Flap motors
- Re-address flap motors

64 11 858 REPLACING ACTUATOR DRIVE FOR RIGHT REAR CABIN FOOTWELL FLAP (HIGH A/C SYSTEM)

Necessary preliminary tasks

- Remove trim for instrument panel, bottom right. See **5145195 REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT TRIM FOR INSTRUMENT PANEL (US VERSION ONLY)** .

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER

Release screws (1).

Installation:

Replace screws (1).

Take off holder (2).

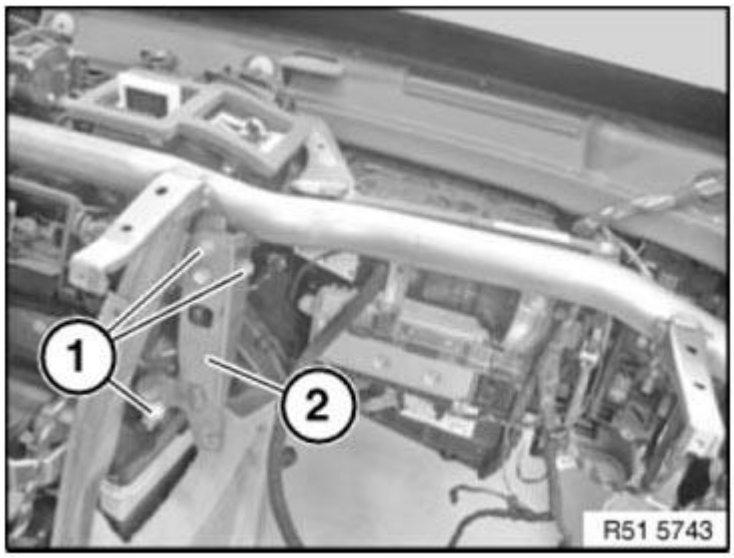


Fig. 81: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip connector piece (1) and slide downwards.

Installation:

Latching of connector piece (1) must be felt.

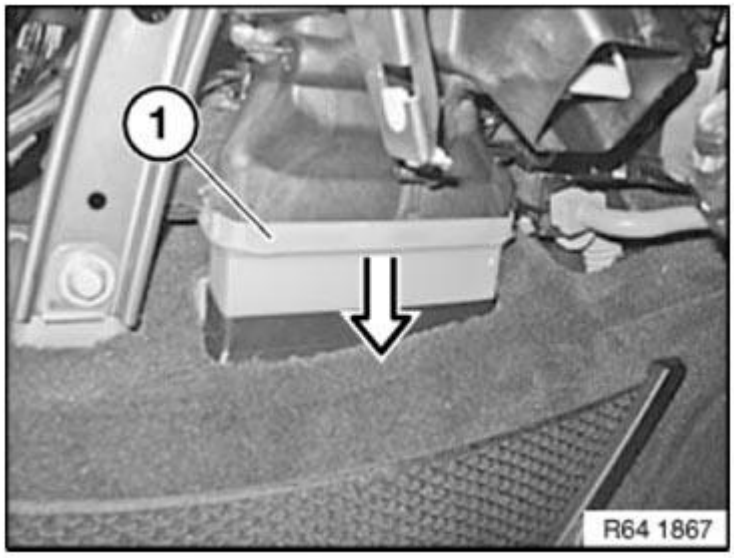


Fig. 82: Unclipping Connector Piece
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove air vent duct (2).

Installation:

Ensure cable routing along air vent duct (2) is correct

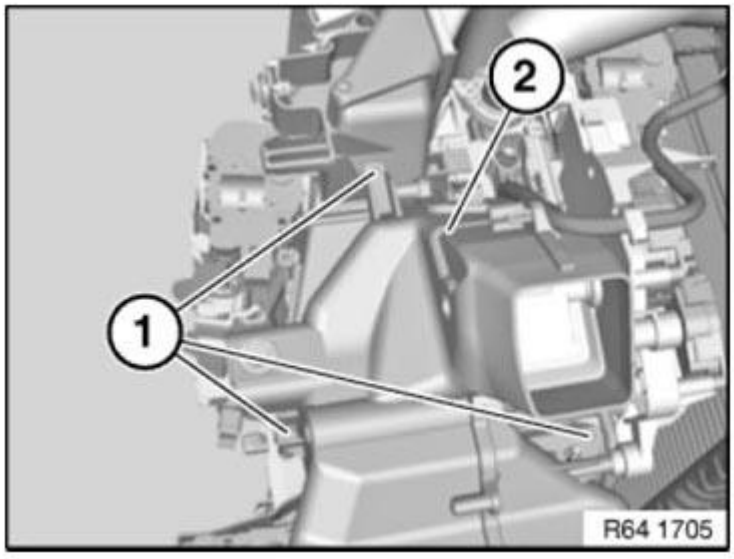


Fig. 83: Identifying Air Vent Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

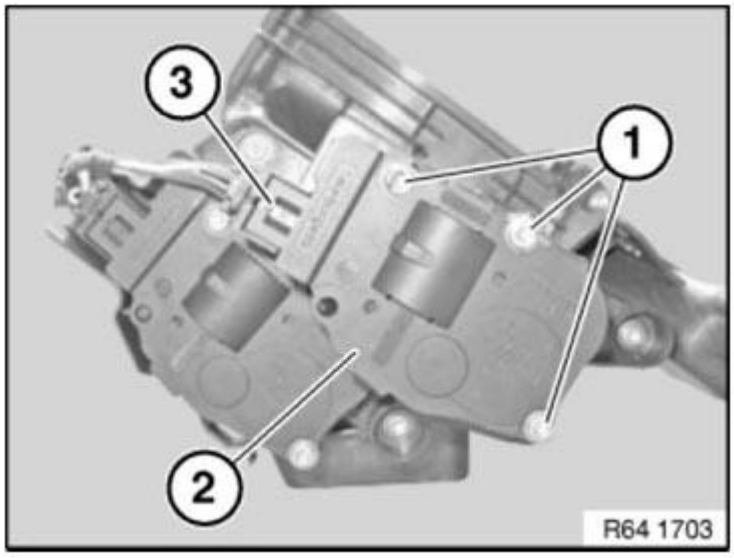


Fig. 84: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and A/C function
- Flap motors
- Re-address flap motors

64 11 837 REPLACING ACTUATOR DRIVE FOR RIGHT STRATIFICATION FLAP

Necessary preliminary work

- Remove **INSTRUMENT PANEL TRIM**

Position of actuator drive:

OVERVIEW OF ACTUATOR DRIVES ON HEATING AND AIR-CONDITIONING UNIT

Disconnect plug connection (1).

Unlock ozone generator (2) in direction of arrow and remove towards front from filter housing (3).

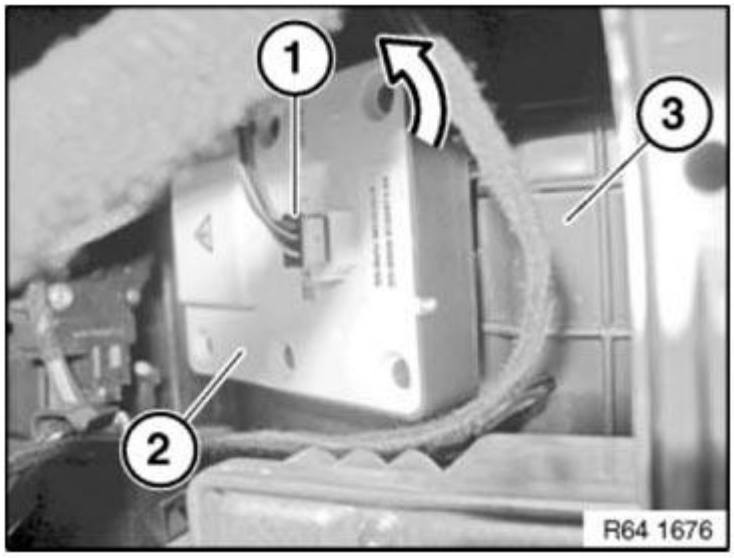


Fig. 85: Disconnecting Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove actuator drive (2) and unlock and disconnect plug connection (3).

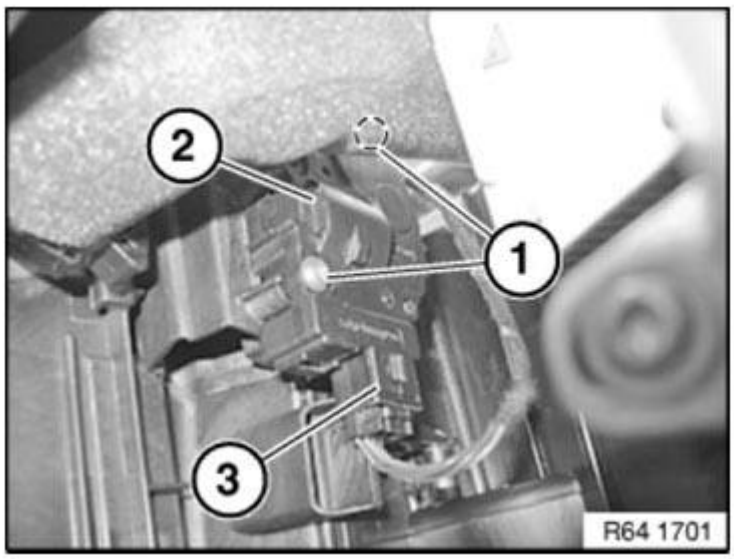


Fig. 86: Identifying Actuator Drive And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Servomotors must be readdressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Readdress flap motors

64 11 216 REPLACING BLOWER FOR AUTOMATIC REAR AIR-CONDITIONING SYSTEM

Necessary preliminary work

- Remove **CONTROLLER FOR REAR AIR CONDITIONING BLOWER**

NOTE: For purposes of clarity, the automatic rear air-conditioning system is shown in the following operations with the component removed.

Pull condensation water drain hose (1) in direction of arrow out of gaiter.

Installation:

Condensation water drain hose must be inserted up to marking in gaiter.

Unfasten plug connection (1) and disconnect.

Snap associated plug housing out of blower cover (3).

Release screws (4).

Remove blower cover (3).

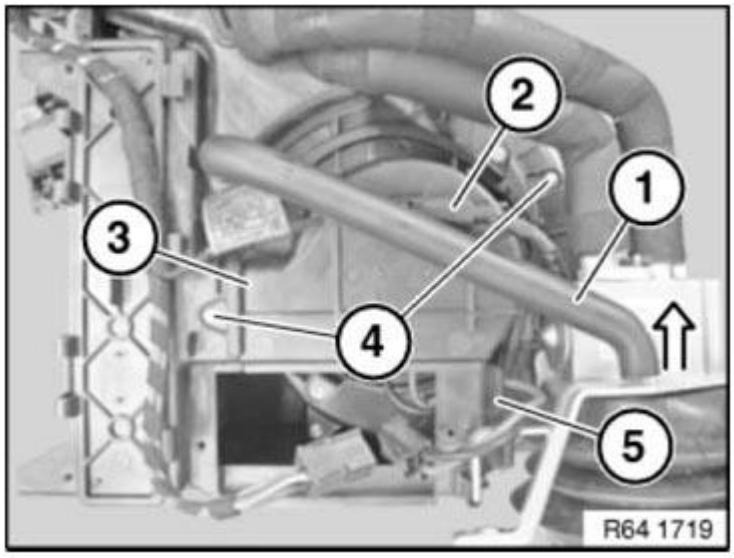


Fig. 87: Pulling Condensation Water Drain Hose In Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out motor supply lead incl. grommet (5).

Release screw (1), snap out blower motor (2) in direction of arrow and remove in upward direction.

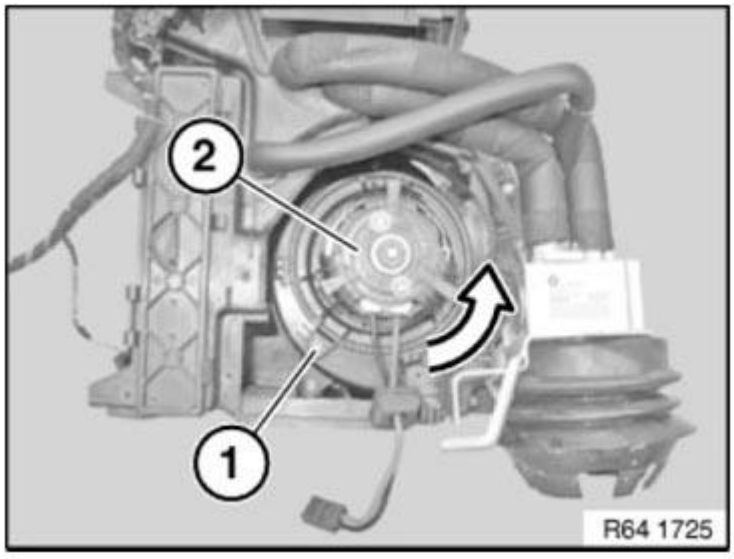


Fig. 88: Removing Blower Motor And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 225 REPLACING CONTROLLER FOR HEATING AND A/C SYSTEM FAN

Necessary preliminary tasks

- Remove **FAN HOUSING FOR HEATER/AIR CONDITIONER**

Unlock plug connections (1) and disconnect.

Release screws (3).

Remove controller (2) towards top.

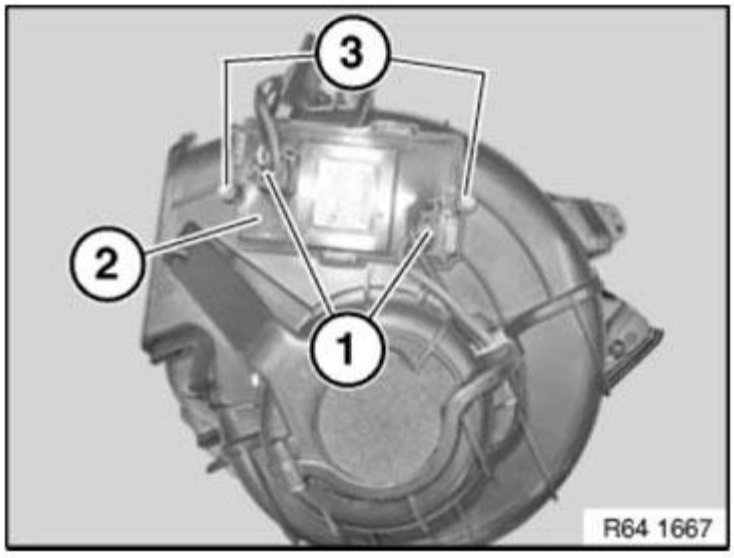


Fig. 89: Identifying Controller, Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 229 REPLACING CONTROLLER FOR REAR AIR CONDITIONING BLOWER

Necessary preliminary work

- Clamp off **NEGATIVE BATTERY CABLE**
- Remove **ALL LUGGAGE COMPARTMENT TRIM PANELS** or from 11/2010, remove luggage compartment partition wall

NOTE: For purposes of clarity, picture shows component removed.

Release plug connections (1) and disconnect.

Unfasten screws (2).

Remove controller (3).

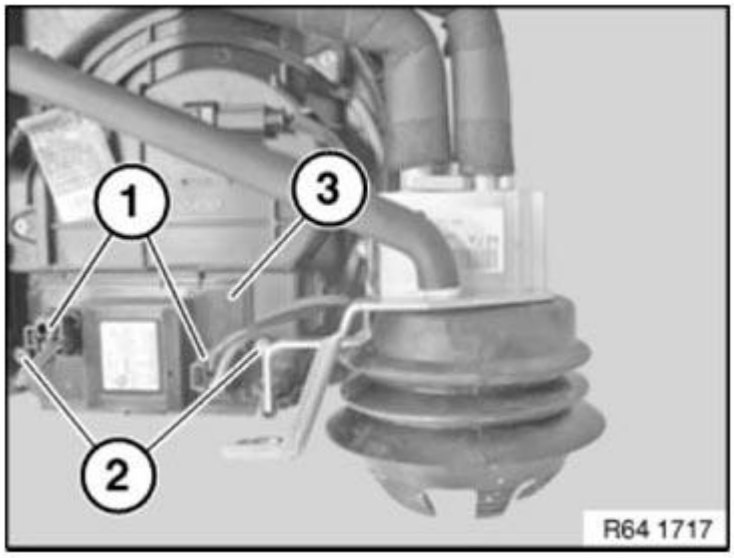


Fig. 90: Identifying Controller, Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 943 REPLACING EVAPORATOR TEMPERATURE SENSOR

Necessary preliminary work

- Remove trim panel for pedal assembly. See **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (US ONLY)**

NOTE: For purposes of clarity, picture shows heating and air-conditioning unit removed.

Disconnect plug connection (1) from evaporator temperature sensor.

Pull evaporator temperature sensor with flat-nose pliers out of heating and air-conditioning unit housing (1).

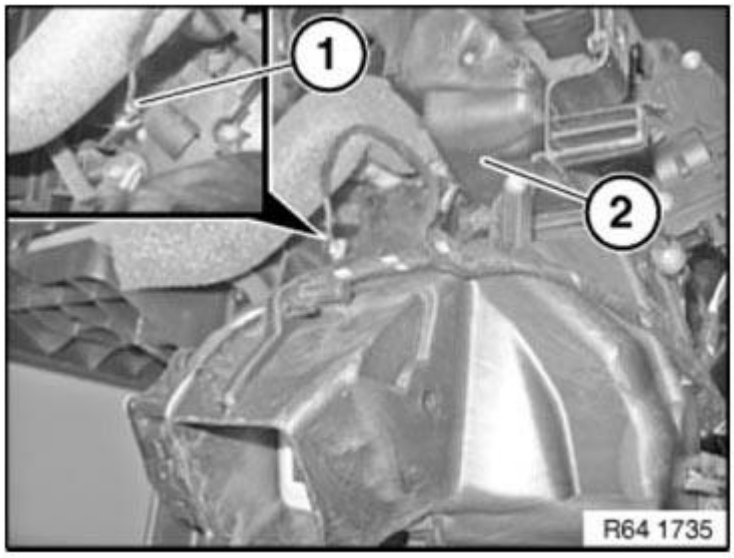


Fig. 91: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 208 REPLACING HEAT EXCHANGER

Necessary preliminary work

- Remove **INSTRUMENT PANEL TRIM**
- Remove **LEFT/REAR SUSPENSION CROSS-BRACE** .
- Remove **BULKHEAD UPPER SECTION SOUND INSULATION**

Recycling

Coolant emerges when coolant lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping coolant.

Observe country-specific waste disposal regulations.

IMPORTANT: Connections must not be mixed up!

Mark connection sequence of coolant hoses prior to removal.

Release hose clamps (1) **17 2 050** with special tool 2 and detach water hoses.

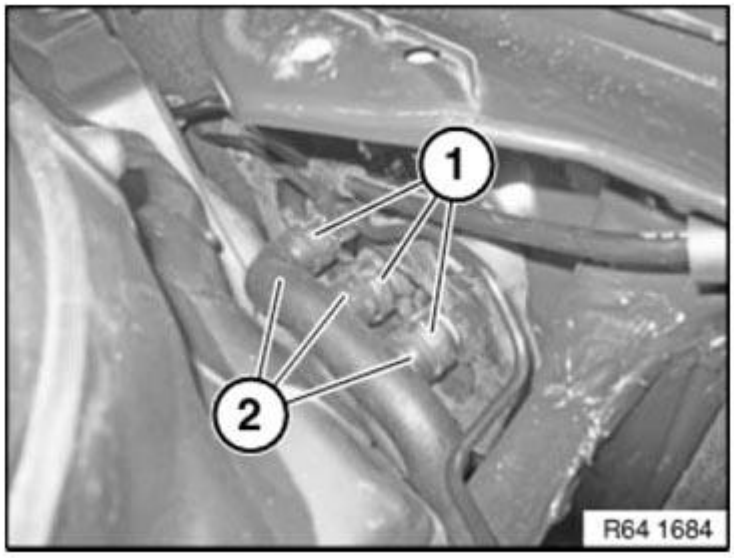


Fig. 92: Identifying Coolant Hoses And Hose Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Carefully blow out coolant ports on the heat exchanger to remove the remaining coolant.

Close openings or line to heat exchanger with special tool 32 1 270 , to avoid media leak and dirt contamination.

Release screws (1).

Installation note:

Replace screws.

Remove cable guide holder (2) from the working area.

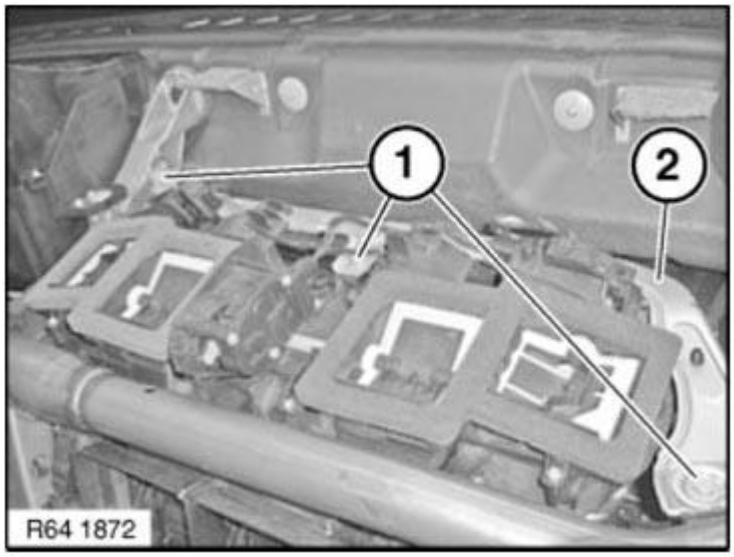


Fig. 93: Identifying Cable Guide Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, picture shows heating and air-conditioning unit removed.

Unclip deflection arm (1) from angle positioning lever (2).

Installation note:

Deflection arm (1) must snap audibly into place!

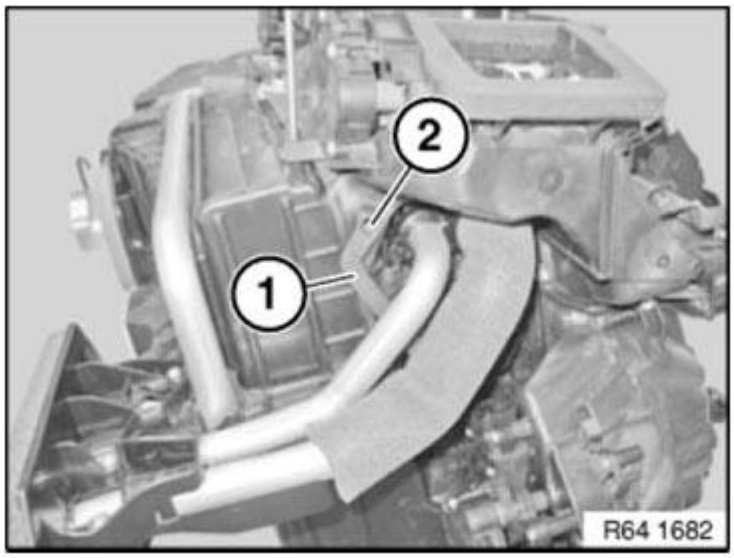


Fig. 94: Identifying Deflection Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Unlock and disconnect plug connections on upper distributor housing (2).

Remove upper distributor housing (2).

Installation note:

Make sure filter housing guide lugs (3) are correctly seated in associated guide tabs on upper distributor housing (2).

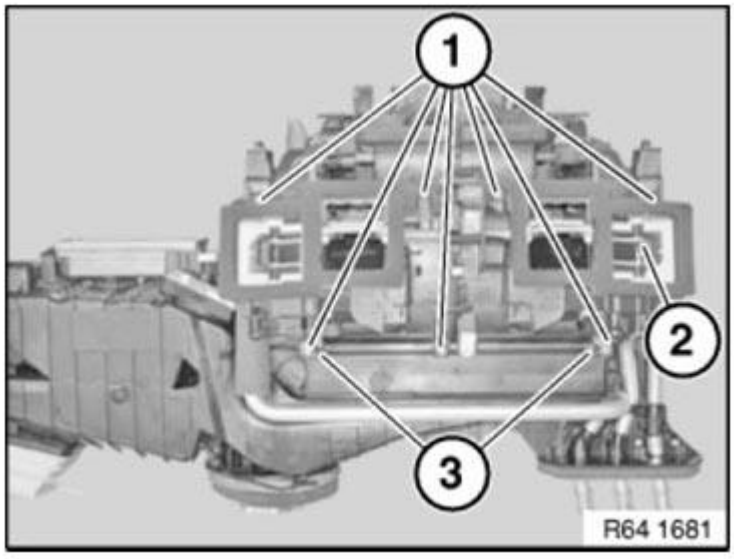


Fig. 95: Identifying Upper Distributor Housing And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip pipe clamps(1).

IMPORTANT: Risk of contamination!

Escaping coolant must not get into the passenger compartment.

Remove water pipes (2).

Remove heat exchanger in direction of arrow.

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to install sealing rings without damaging them.

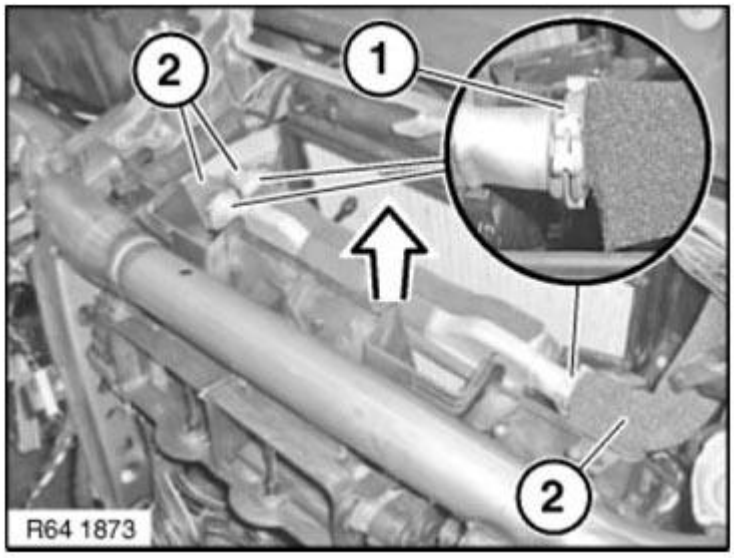


Fig. 96: Removing Heat Exchanger And Water Pipes
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

BLEED AND FILL COOLING SYSTEM .

64 11 532 REPLACING HEAT EXCHANGER (HEATING UNIT REMOVED)

Notes

Unclip deflection arm (1) from angle positioning lever (2).

Installation:

Deflection arm (1) must snap audibly into place!

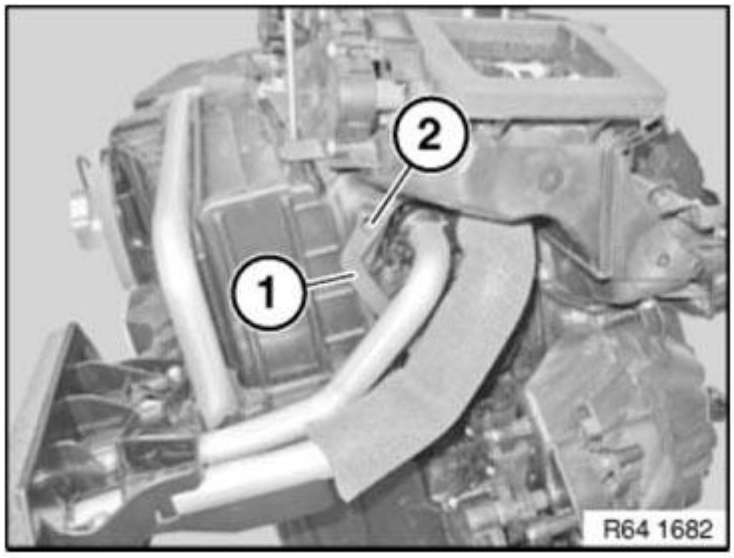


Fig. 97: Identifying Deflection Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Unlock and disconnect plug connections on upper distributor housing (2).

Remove upper distributor housing (2).

Installation:

Make sure filter housing guide lugs (3) are correctly seated in associated guide tabs on upper distributor housing (2).

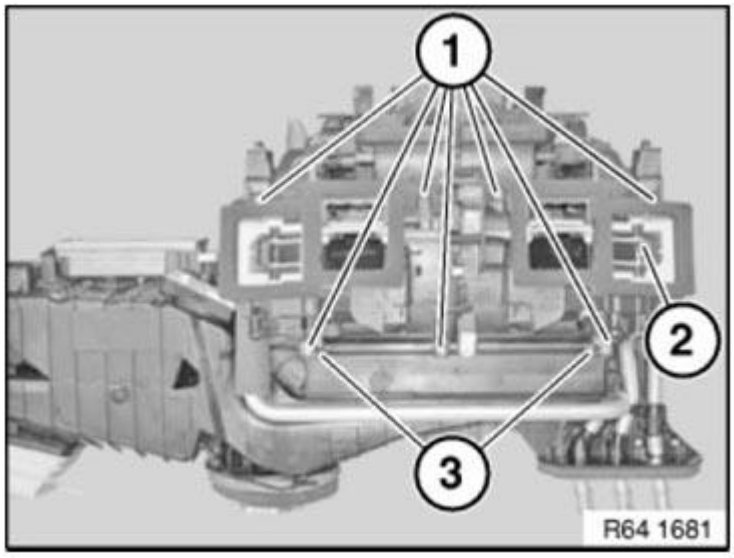


Fig. 98: Identifying Upper Distributor Housing And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove heat exchanger (2) in direction of arrow from filter housing (3).

Installation:

Heat exchanger must be pushed correctly into designated guides on filter housing (3).

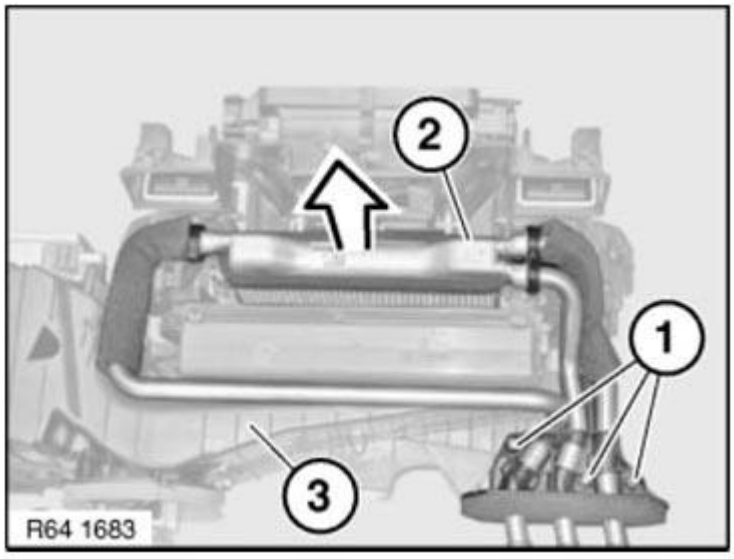


Fig. 99: Removing Heat Exchanger From Filter Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Open pipe clamps (1) with a suitable tool in direction of arrow.

Remove pipes (2).

Installation:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

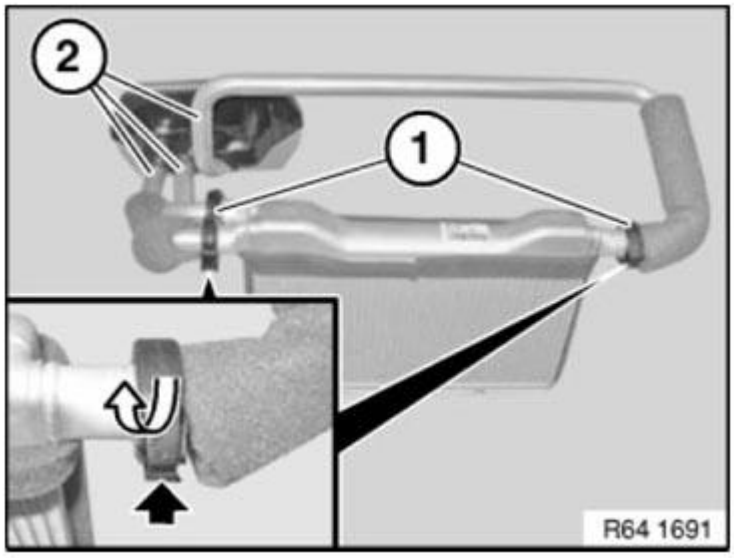


Fig. 100: Opening Pipe Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 902 REPLACING INTERIOR TEMPERATURE SENSOR BLOWER (A/C CONTROL PANEL)

Necessary preliminary work

- Remove **RADIO AND IHKA CONTROLS**

Release screws (1).

Tightening torque **61 31 2AZ** .

NOTE: Use special tool 00 9 450 to tighten screws.

Remove fan (2) from IHKA controls (3).

Installation note:

Make sure pins (4) are correctly located on fan (2).

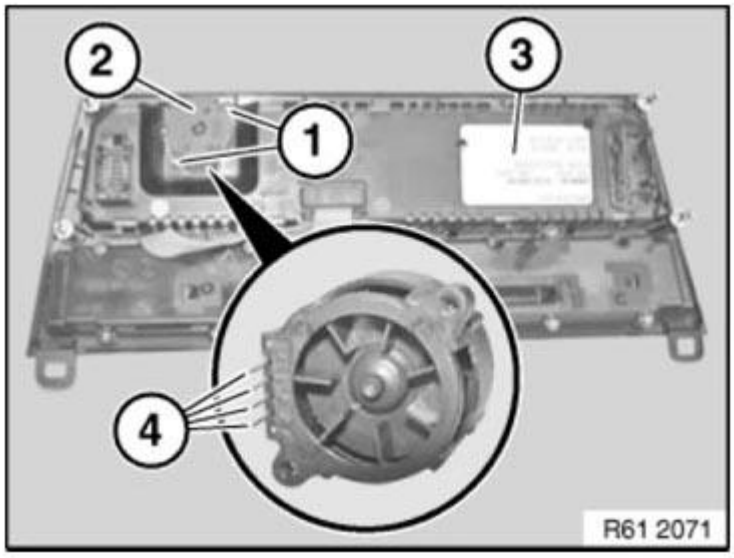


Fig. 101: Identifying Fan Pins, IHKA Controls And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 889 REPLACING INTERIOR TEMPERATURE SENSOR BLOWER (REAR AIR CONDITIONING CONTROL UNIT)

Necessary preliminary work

- Remove **REAR CENTRE CONSOLE TRIM**

Release screws (1).

Tightening torque **61 31 2AZ** .

Remove fan (2) from IHKA controls (3).

Installation note:

Use special tool **00 9 450** to tighten screws.

Make sure pins (4) are correctly located on fan (2).

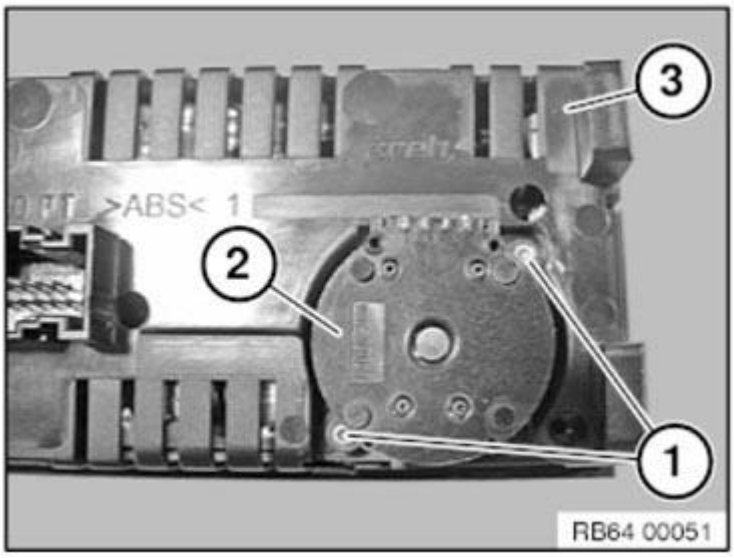


Fig. 102: Identifying Fan, IHKA Controls And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

64 11... REPLACING REAR PASSENGER COMPARTMENT A/C CONTROL PANEL FAN MOTOR

Necessary preliminary work:

- Remove **REAR PASSENGER COMPARTMENT A/C CONTROL PANEL**

Release screws (1).

Remove fan motor (3) from A/C control panel (2).

Installation note:

Make sure pins (4) are correctly seated on fan motor (3).

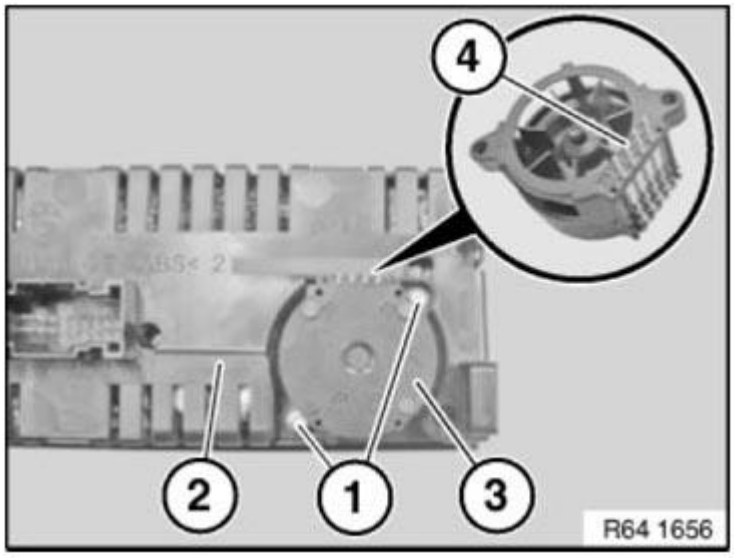


Fig. 103: Identifying A/C Control Panel With Screws, Pin And Fan Motor
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 786 REPLACING LEFT BLINDS ACTUATOR DRIVE

Necessary preliminary work

- Remove **ALL LUGGAGE COMPARTMENT TRIM PANELS** or from 11/2010, remove luggage compartment partition wall

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

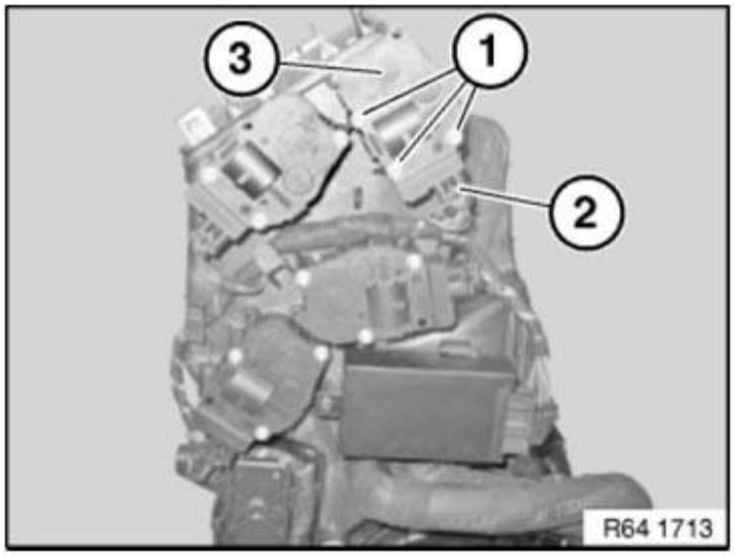


Fig. 104: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 788 REPLACING LEFT FLAP ACTUATOR DRIVE

Necessary preliminary work

- Remove **ALL LUGGAGE COMPARTMENT TRIM PANELS** or, from 11/2010 luggage compartment partition wall

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

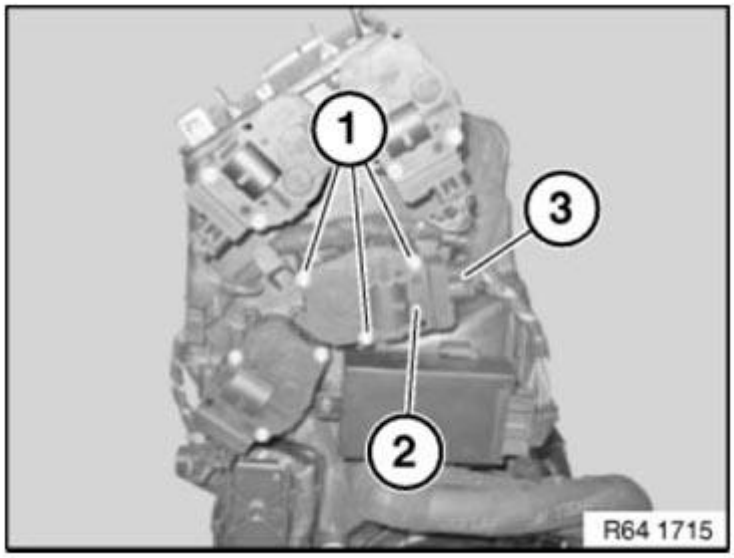


Fig. 105: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 180 REPLACING REAR AIR CONDITIONING CONTROL UNIT

Necessary preliminary tasks

- Remove all luggage compartment trim panels. See **5147243 REMOVING AND INSTALLING/REPLACING ALL LUGGAGE COMPARTMENT TRIMS (WITHOUT SKI BAG)** or **5147244 REMOVING AND INSTALLING/REPLACING ALL LUGGAGE COMPARTMENT TRIMS (WITH SKI BAG)** .
- If necessary, remove cool box

Unfasten plug connection (1) and disconnect.

Release screw (2).

Remove control unit (3).

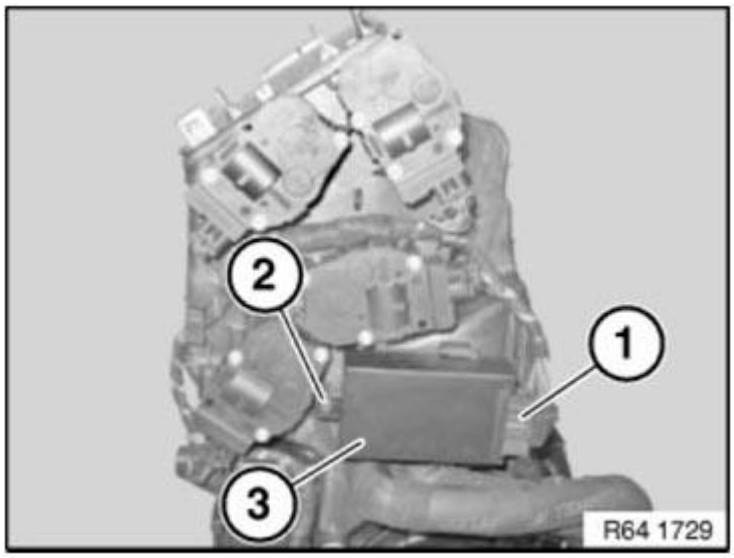


Fig. 106: Identifying Plug Connection, Control Unit And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

64 11... REPLACING REAR PASSENGER COMPARTMENT A/C CONTROL PANEL FAN MOTOR

Necessary preliminary work

- Remove **REAR PASSENGER COMPARTMENT A/C CONTROL PANEL**

Release screws (1).

Remove fan motor (3) from A/C control panel (2).

Installation note:

Make sure pins (4) are correctly seated on fan motor (3).

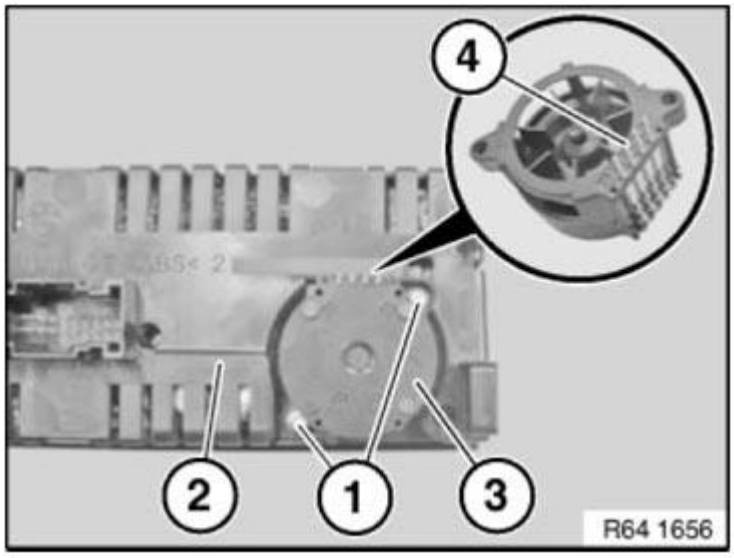


Fig. 107: Identifying Fan Motor Pins And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 787 REPLACING RIGHT BLINDS ACTUATOR DRIVE

Necessary preliminary work

- Remove **ALL LUGGAGE COMPARTMENT TRIM PANELS** or from 11/2010, remove luggage compartment partition wall

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

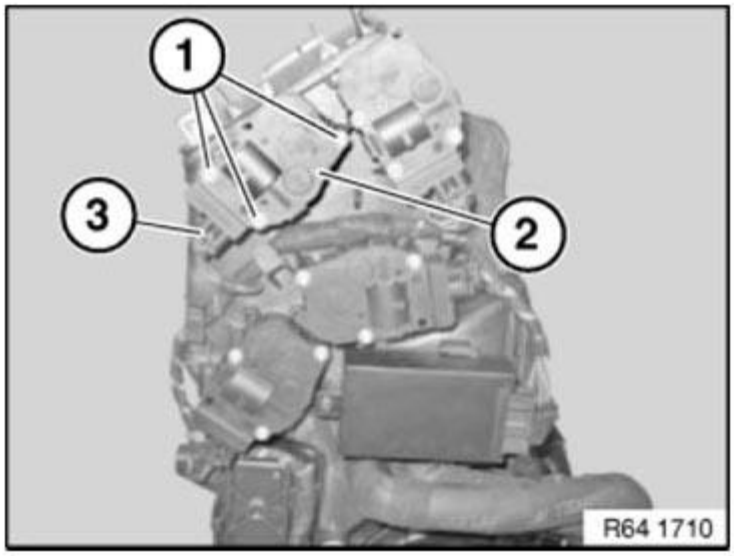


Fig. 108: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 789 REPLACING RIGHT FLAP ACTUATOR DRIVE

Necessary preliminary work

- Remove **ALL LUGGAGE COMPARTMENT TRIM PANELS** or, from 11/2010 remove luggage compartment partition wall

Release screws (1).

Remove servomotor (2) and unlock and disconnect plug connection (3).

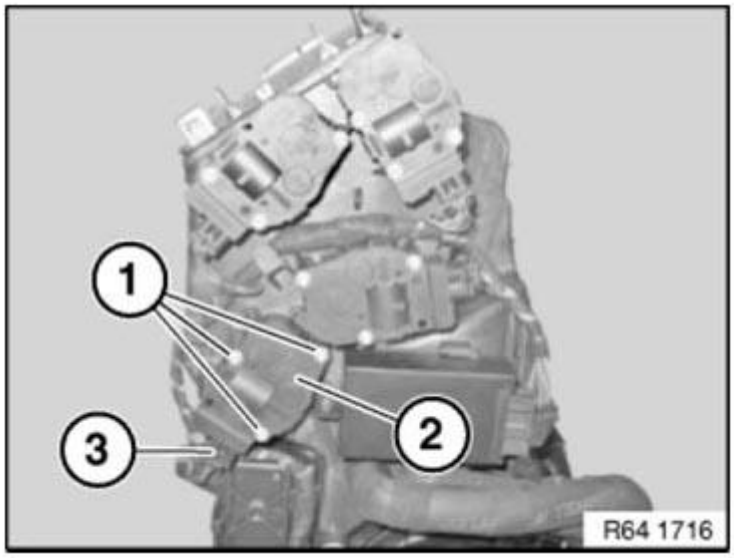


Fig. 109: Identifying Servomotor, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 951 REPLACING TEMPERATURE SENSOR FOR HEATER

Necessary preliminary work

- Remove **CAR INFOTAINMENT COMPUTER**

Unclip temperature sensor (1) and disconnect associated plug connection.

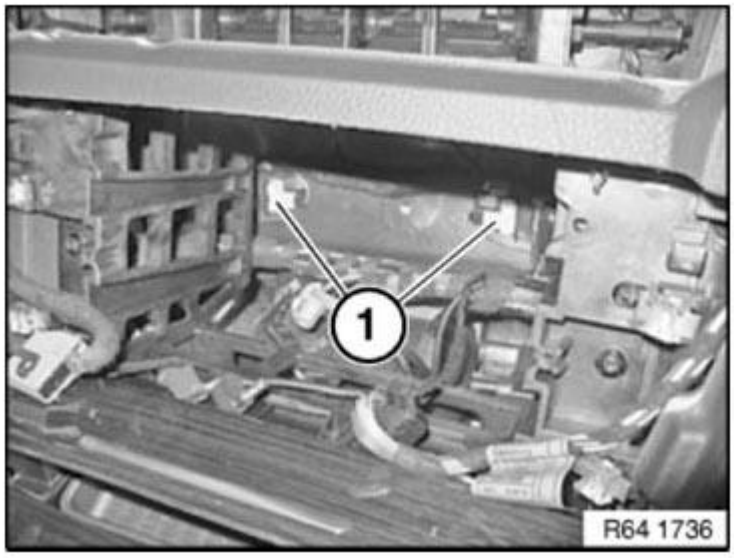


Fig. 110: Identifying Temperature Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 273 REPLACING WATER VALVE FOR HEATER (N63)

Notes

WARNING: Scalding hazard!

Work on the cooling system may only be carried out when it has cooled down.

NOTE: Clamp off coolant hoses on water valve.

Recycling

Coolant emerges when coolant lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping coolant.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks

- Remove **LEFT INTAKE FILTER HOUSING**
- Remove **LEFT SUSPENSION CROSS-BRACE**

NOTE: For purposes of clarity, graphic shows engine removed.

Release hose clips (1) with special tool **17 2 050** and remove coolant hoses.

Disconnect plug connection (2).

Pull water valve (3) upwards out of holders.

Installation:

Do **not** mix up connections of coolant hoses.

Replace damaged coolant hoses.

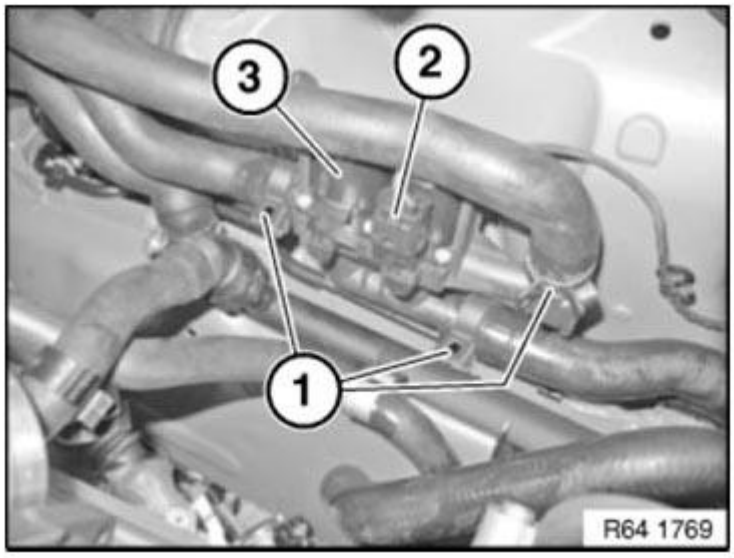


Fig. 111: Identifying Water Valve, Plug Connection And Hose Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure rubber mount (1) and guide lug (2) are securely seated in holders (3) on wheel arch body.

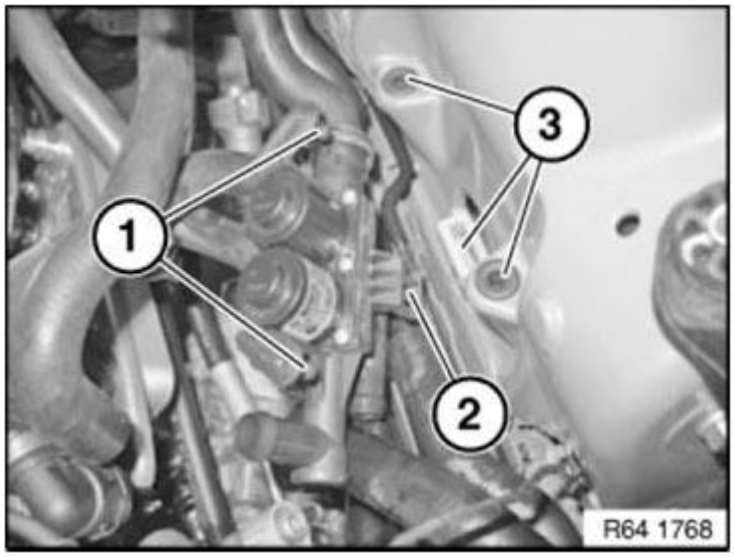


Fig. 112: Identifying Wheel Arch Body Holders, Rubber Mount And Guide Lug
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and vent cooling system and check for leaks. See **VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT** .

6412 AUXIL. HEATER WITH CONTROL ELEMENTS

64 12... INITIALIZING TELESTART HANDHELD TRANSMITTER

NOTE: The Telestart hand-held transmitter must be initialized when:

- **Hand-held transmitter is replaced**
- **Car Access System control unit is replaced**

The auxiliary heating is switched on under an ambient temperature of approx. 15°C with the hand-held transmitter and at a preselected switch-on time.

Heating can be activated directly in the Central Information Display at any ambient temperature. To do so, go to the parking function menu under direct operation and mark the auxiliary heating box.

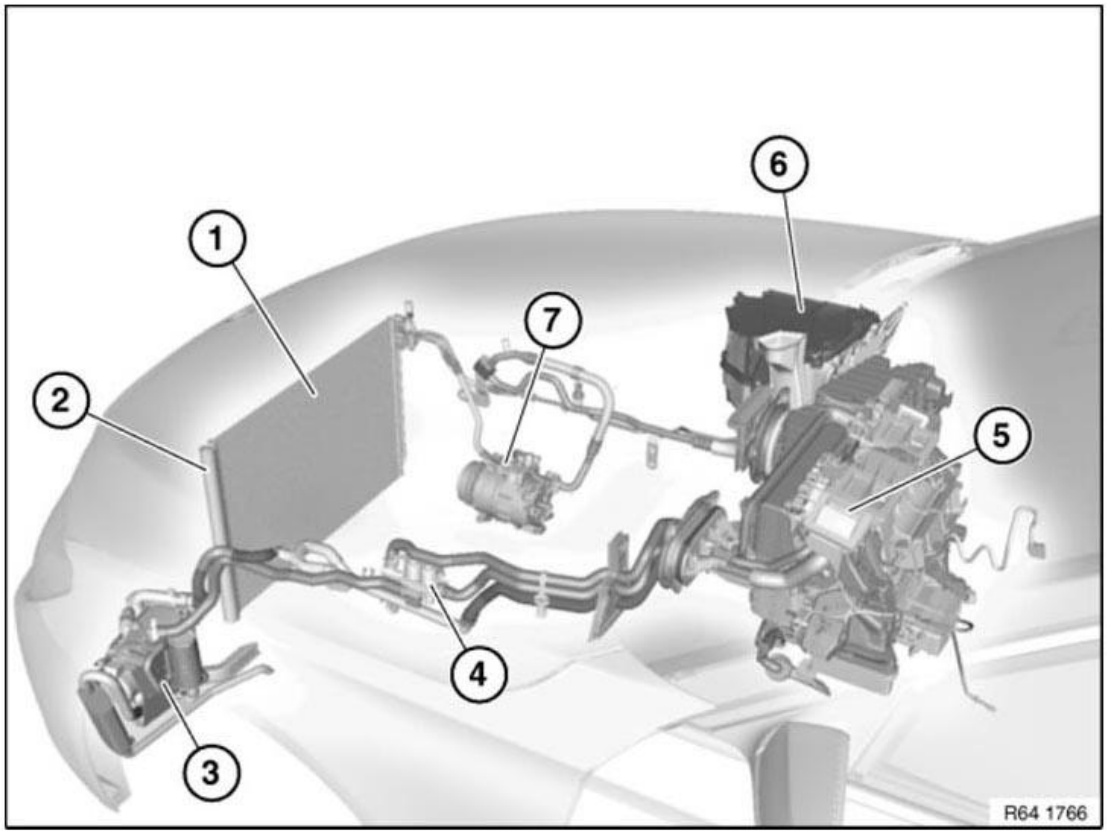
NOTE: Initialization can only be carried out with the BMW diagnosis system.

Follow instructions and specifications in test module.

Service functions:

- Complete vehicle
- Body
- Air conditioning function
- Telestart transmitter
- Initialization

64 00.. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Condenser for air conditioner
2 Drier insert for air conditioner
3 Independent heater and attachment parts
4 Water valve
5 Heater - A/C system and attachment parts
6 Fan and attachment parts
7 Compressor

Fig. 113: Identifying Heater And A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 12 021 REMOVING AND INSTALLING COMPLETE INDEPENDENT HEATER

WARNING: Risk of scalding!

Only perform the following repair work on an engine that has cooled

down.

Follow Notes for Repair Work on Cooling System: See DRAINING AND ADDING COOLANT ; VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT and CHECKING COOLING SYSTEM FOR WATERTIGHTNESS .

NOTE: Clamp off coolant hoses on independent heater.

Recycling

Fuel escapes when fuel line is detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Remove **FRONT WHEEL ARCH COVER (FRONT SECTION)**
- Remove **FRONT UNDERBODY PROTECTION**

Release screws (1).

Remove lower left cover (2).

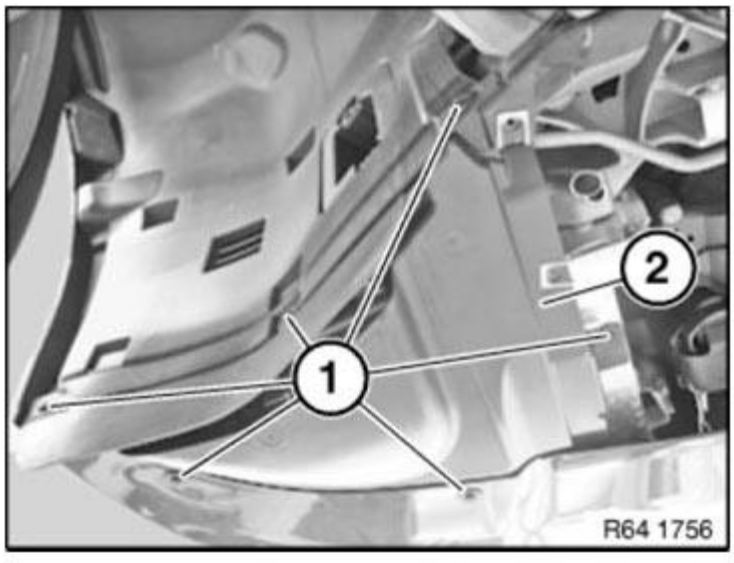


Fig. 114: Identifying Lower Left Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release spring clamps (1) and detach coolant hoses.

Installation note:

Top Up Coolant and Bleed Cooling System: See **DRAINING AND ADDING COOLANT** .

Unlock and detach fuel line (2).

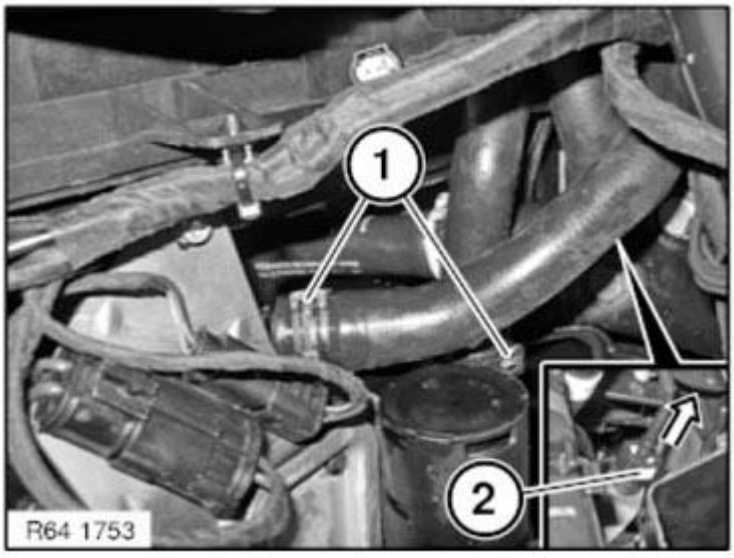


Fig. 115: Identifying Fuel Line And Spring Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Release plug connections (1) and disconnect.

Unfasten screws (2).

Lower independent heater (3).

Installation note:

Make independent heater (3) is correctly seated.

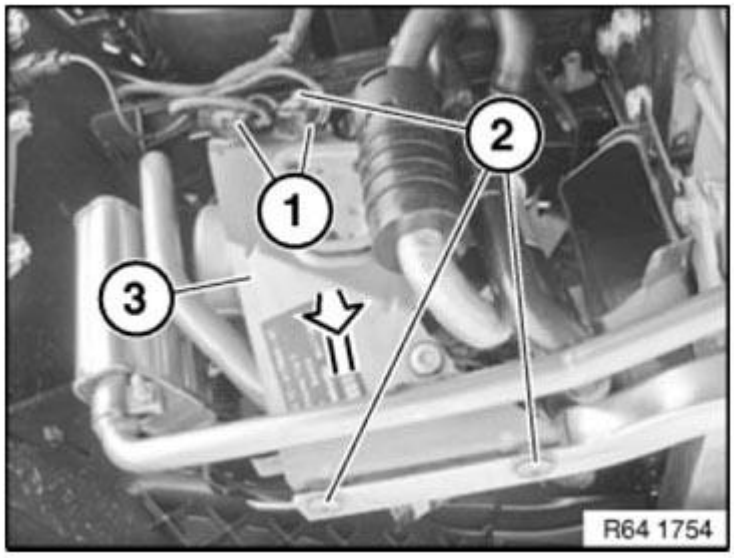


Fig. 116: Disconnecting Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release spring strap (1) and detach coolant hose (3).

Remove independent heater (3).

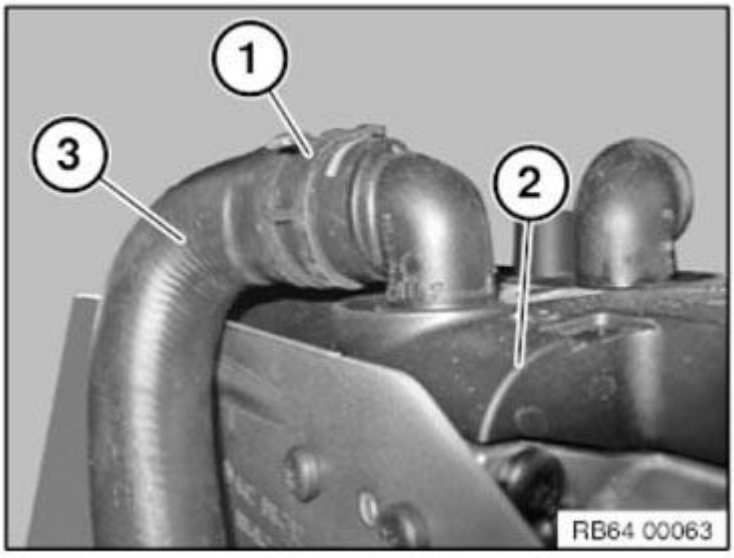


Fig. 117: Identifying Independent Heater, Spring Strap And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

64 12 600 REMOVING AND INSTALLING OR REPLACING FUEL PUMP

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Undo screw (1) and remove cover (2) in direction of arrow.

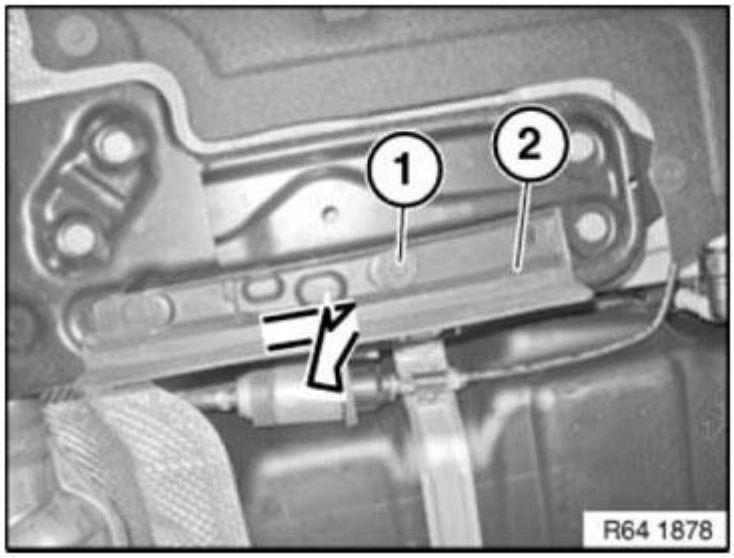


Fig. 118: Removing Cover And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove fuel pump (2) in direction indicated by arrow.

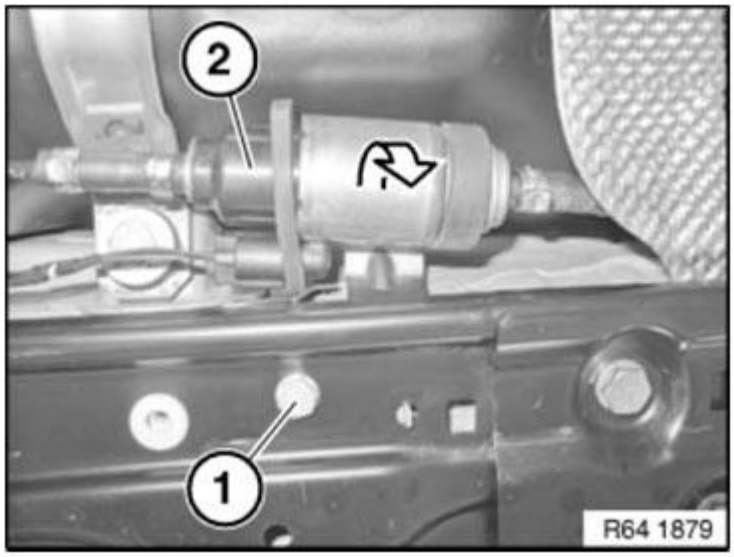


Fig. 119: Removing Fuel Pump And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Close lines with special tool 32 1 270 to prevent the emergence of media and dirt contamination.

Unfasten plug connection (1) and disconnect.

Release hose clamps (2) and detach fuel hoses.

Pull retaining tabs (3) apart and remove fuel pump (4).

Installation note:

Observe direction of flow of fuel pump (4).

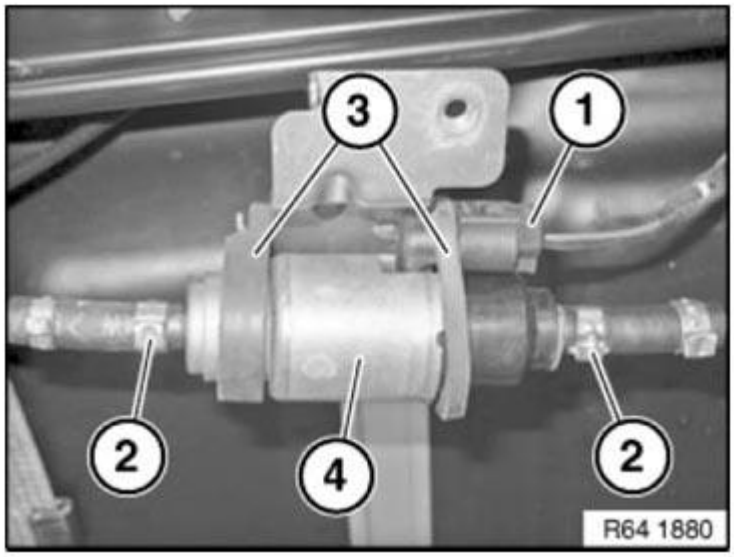


Fig. 120: Identifying Fuel Pump, Plug Connection And Hose Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

64 12 089 REMOVING AND INSTALLING OR REPLACING MUFFLER/SILENCER

Necessary preliminary work

- Remove **FRONT UNDERBODY PROTECTION**

NOTE: Graphic similar.

Release screws (1).

Remove left underbody cover (2).

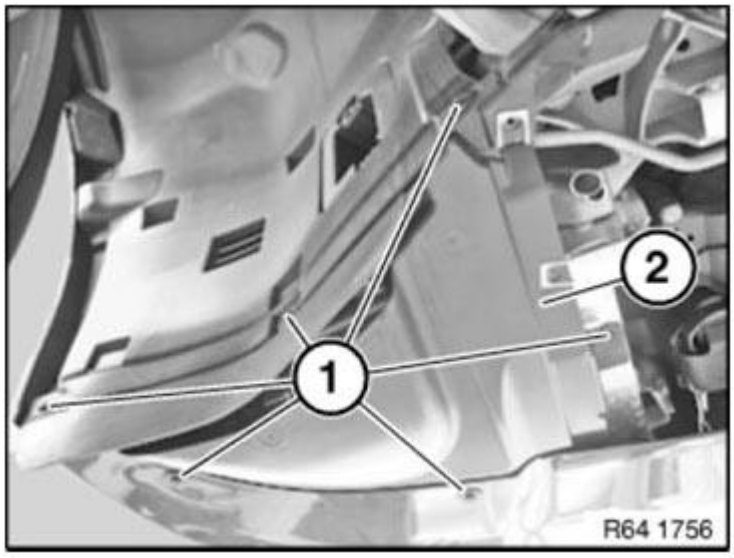


Fig. 121: Identifying Left Underbody Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Undo screw (1)

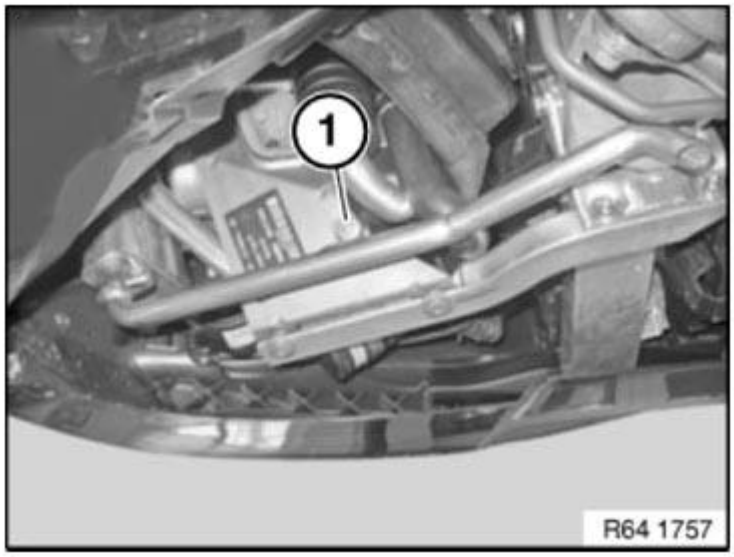


Fig. 122: Identifying Muffler/Silencer Screw
Courtesy of BMW OF NORTH AMERICA, INC.

For purposes of clarity, picture shows component removed.

Release nut (1) and screw (2).

Remove muffler/silencer (3) in direction of arrow.

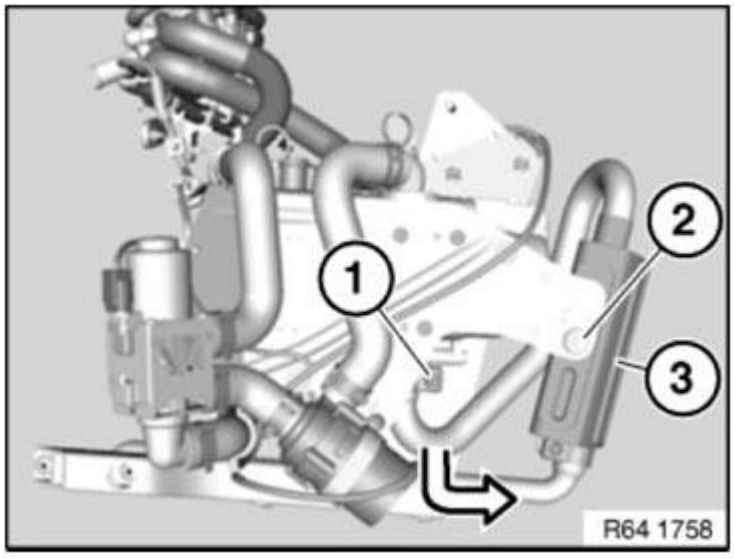


Fig. 123: Removing Muffler/Silencer Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove **EXHAUST PIPE**

64 12 580 REMOVING AND INSTALLING/REPLACING EXHAUST PIPE

Necessary preliminary work

- Remove **FRONT UNDERBODY PROTECTION**

NOTE: Graphic similar.

Release screws (1).

Remove lower left cover (2).

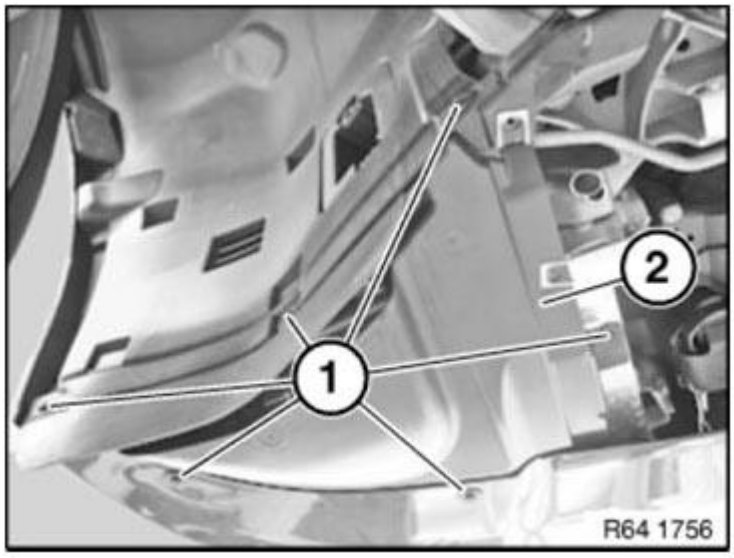


Fig. 124: Identifying Lower Left Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Release screw (2).

Withdraw exhaust pipe (3) in direction of arrow from silencer (4).

Installation note:

Make sure exhaust pipe (3) is correctly seated.

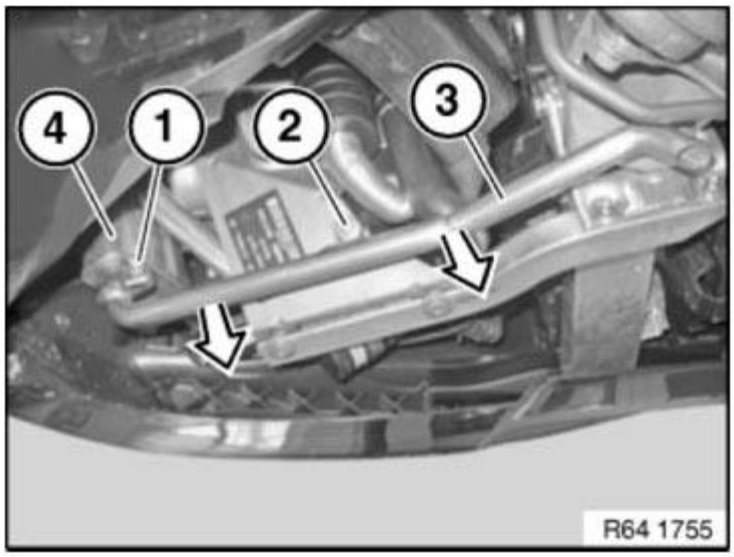


Fig. 125: Removing Exhaust Pipe From Silencer

Courtesy of BMW OF NORTH AMERICA, INC.

64 12 577 REPLACING CHANGEOVER VALVE FOR INDEPENDENT/AUXILIARY HEATING

WARNING: Risk of scalding!

Only perform the following repair work on an engine that has cooled down.

FOLLOW NOTES FOR REPAIR WORK ON COOLING SYSTEM .

Necessary preliminary work:

- **COMPLETELY REMOVE THE INDEPENDENT HEATER.**

IMPORTANT: Risk of damage!

Observe marked coolant flow direction.

NOTE: Mark position of coolant hoses prior to dismantling.

Release spring clamps (1) and detach coolant hoses.

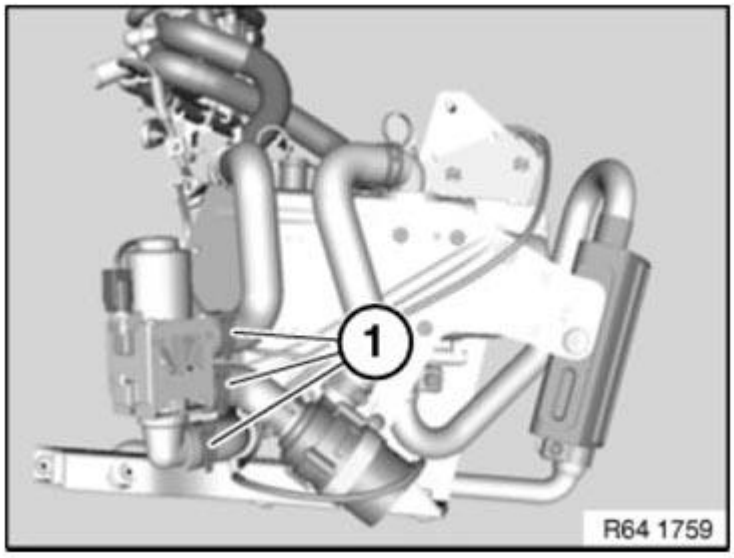


Fig. 126: Identifying Coolant Hoses And Spring Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten connector connection (1) and disconnect.

Unfasten screws (2).

Remove changeover valve for independent/auxiliary heating (3).

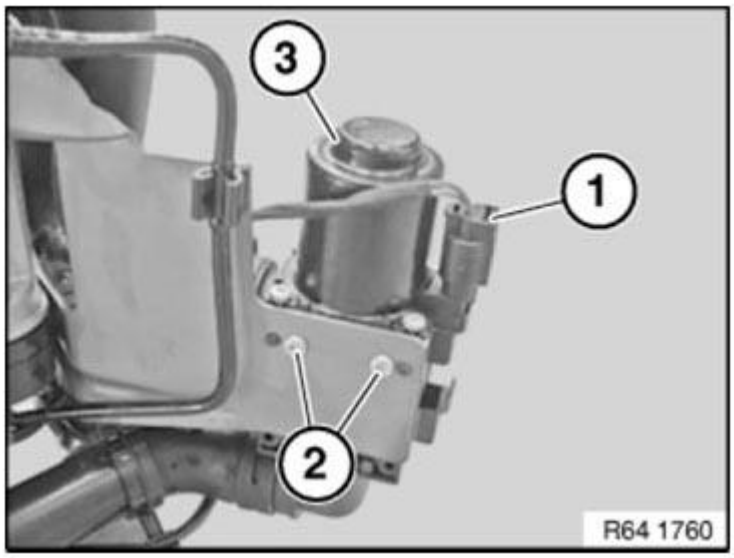


Fig. 127: Identifying Independent/Auxiliary Heating Changeover Valve And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

TOP UP COOLANT AND VENT COOLING SYSTEM .

64 12 670 REPLACING ELECTRIC AUXILIARY HEATER - FRONT-

Necessary preliminary tasks

- Remove **HEATING ELEMENT**

Heater/air conditioner shown in removed state.

Unclip plug housing (1) from holder.

Feed positive lead (2) out of holders.

Installation:

Make sure positive lead (2) is correctly laid.

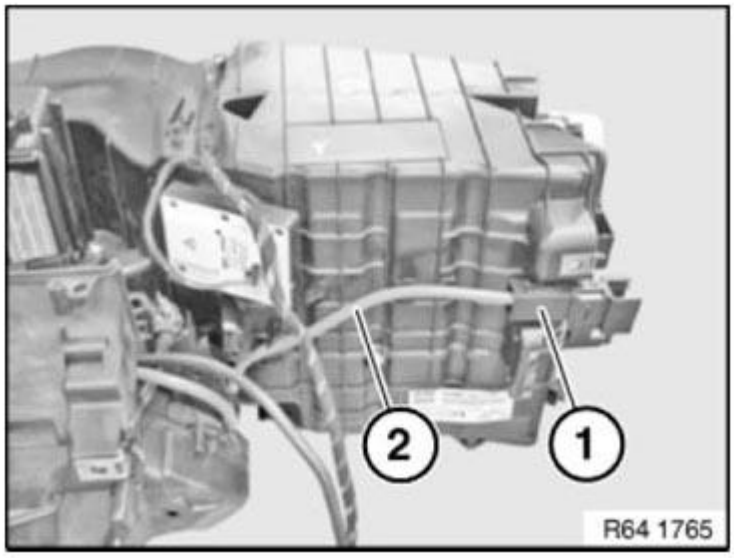


Fig. 128: Identifying Plug Housing And Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Pull electric auxiliary heater (1) upwards out of heating unit housing (2).

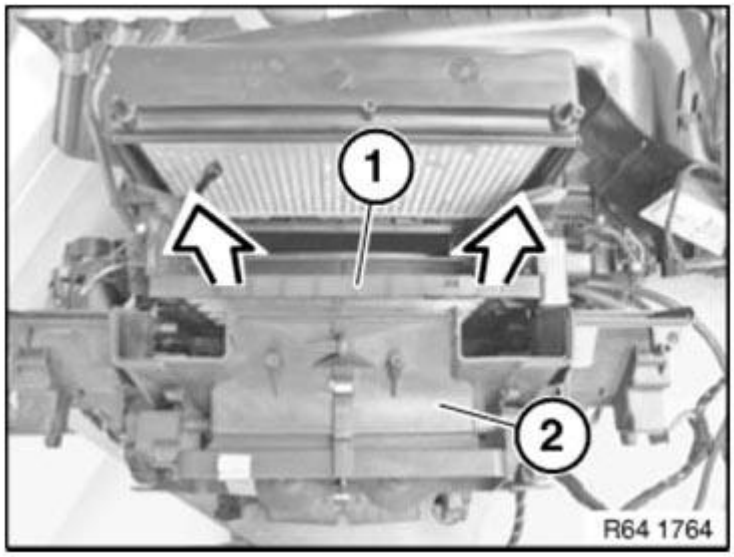


Fig. 129: Pulling Electric Auxiliary Heater Of Heating Unit Housing
Courtesy of BMW OF NORTH AMERICA, INC.

64 12 673 REPLACING LEFT OR RIGHT ELECTRIC AUXILIARY HEATER - REAR CABIN

Necessary preliminary work

- Move driver's seat or front passenger seat to "front" and "top" position

For purposes of clarity, pictures show driver's seat removed.

Unclip cover (1) in direction of arrow.

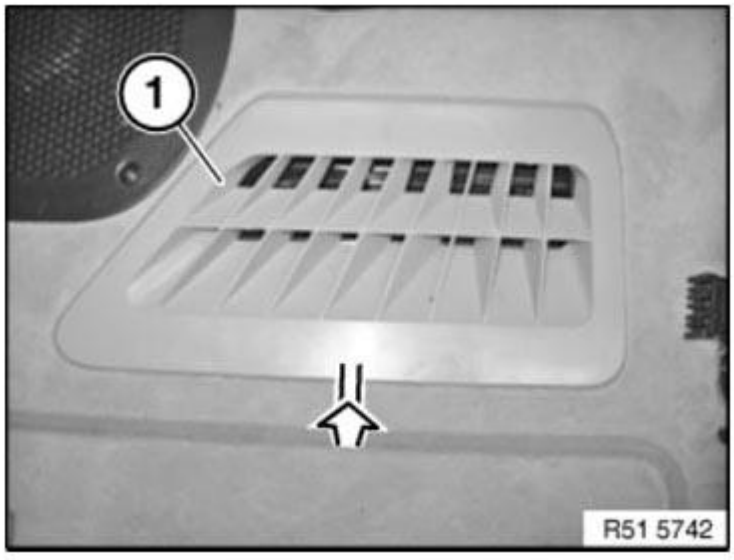


Fig. 130: Unclipping Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release plastic nut (1).

Partially feed out rear cabin air duct (2) in direction of arrow.

Installation note:

Ensure that air duct (2) is correctly seated.

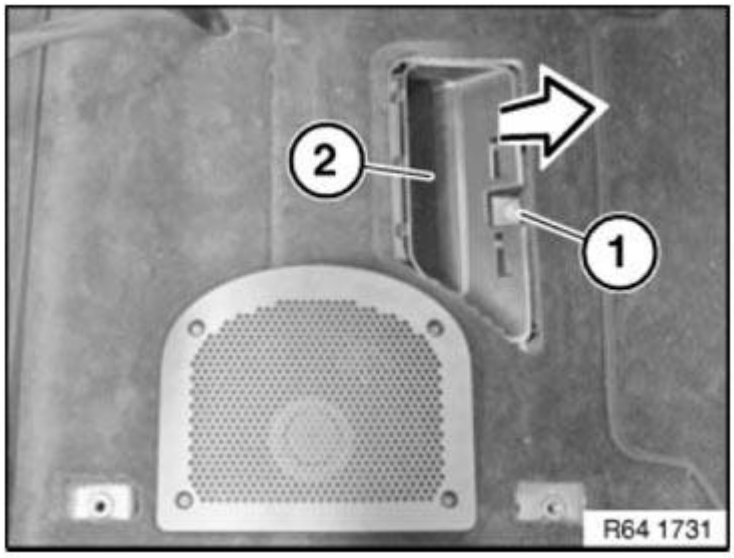


Fig. 131: Removing Rear Cabin Air Duct And Plastic Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug

connections (1) on electric auxiliary heater (2).

Unlock and disconnect plug connection (3) on temperature sensor.

Pull out air duct (4) completely.

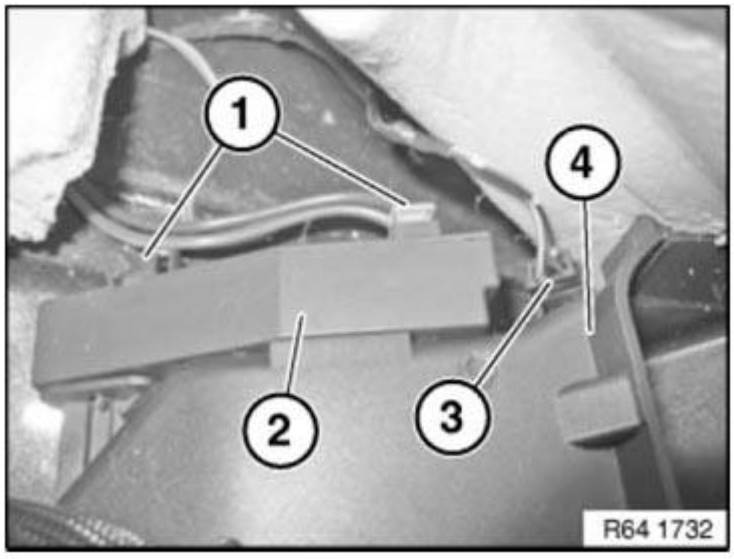


Fig. 132: Identifying Electric Auxiliary Heater, Air Duct And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Remove **TEMPERATURE SENSOR FOR ELECTRIC AUXILIARY HEATER** .

IMPORTANT: On vehicles with production date up to 05/2010 it is essential in the case of spare parts to observe the part number of the auxiliary heater!

The following part numbers may no longer be installed in vehicles with production dates **from** 05/2010!

- 9 194 713 (auxiliary heater, left)
- 9 194 714 (auxiliary heater, right)
- 9 158 583 (auxiliary heater, left)
- 9 158 584 (auxiliary heater, right)
- 9 181 331 (auxiliary heater, left)
- 9 181 332 (auxiliary heater, right)

These part numbers may **not** be combined with other part numbers!

In this case, **both** auxiliary heaters must be replaced!

64 12 681 REPLACING TEMPERATURE SENSOR FOR LEFT OR RIGHT ELECTRIC AUXILIARY HEATING - REAR PASSENGER COMPARTMENT

Necessary preliminary work

- Remove **REAR PASSENGER COMPARTMENT ELECTRIC AUXILIARY HEATING**

NOTE: Picture for example purposes.

Unlock temperature sensor (1) by turning and remove.

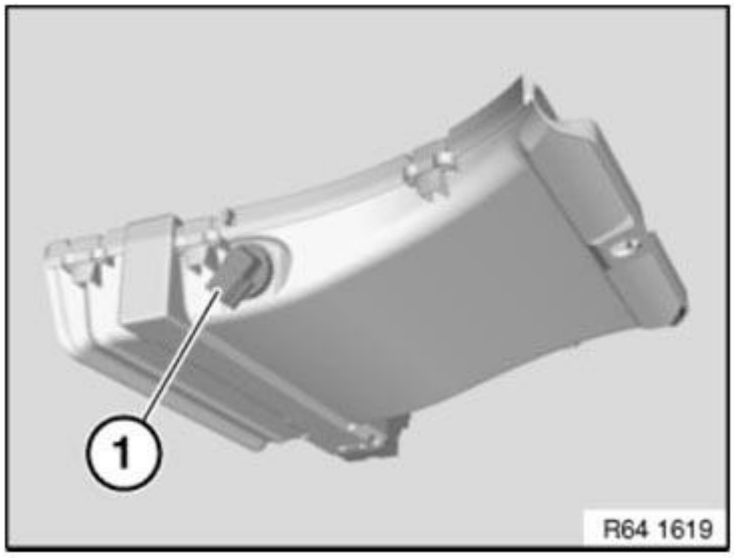


Fig. 133: Identifying Temperature Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

64 12 570 REPLACING TURBOCHARGER COOLANT PUMP FOR AUXILIARY HEATING

WARNING: Risk of burning!

Repair work on the cooling system may only be carried out when it has cooled down.

Recycling

Coolant emerges when coolant lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of emerging coolant.

Observe country-specific waste disposal regulations.

NOTE: Clamp off coolant hoses.

Necessary preliminary work

- Remove **FRONT UNDERBODY PROTECTION**
- Remove **ORNAMENTAL GRILLE IN BUMPER TRIM ON LEFT**

NOTE: Graphic similar.

Release screws (1).

Remove lower left cover (2).

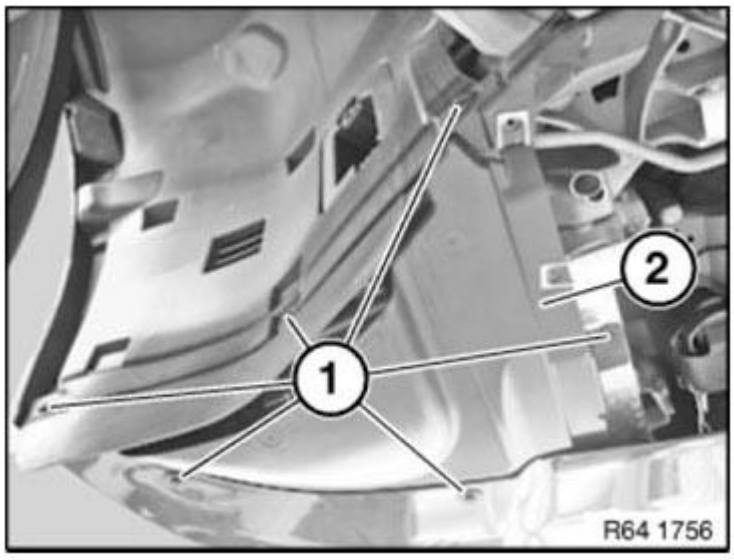


Fig. 134: Identifying Lower Left Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Release spring clamps (2) and detach coolant hoses.

Release screw (3) and remove retaining bracket.

Remove turbocharger coolant pump (4).

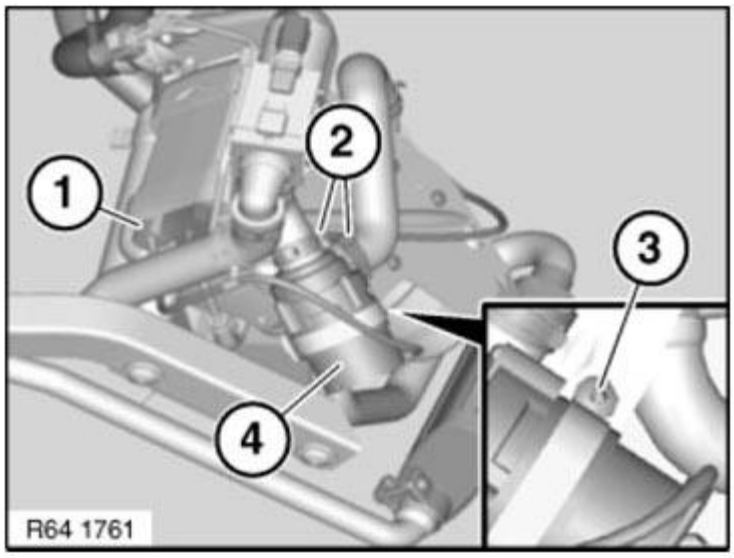


Fig. 135: Identifying Turbocharger Coolant Pump, Plug Connection, Spring Clamps And Screw

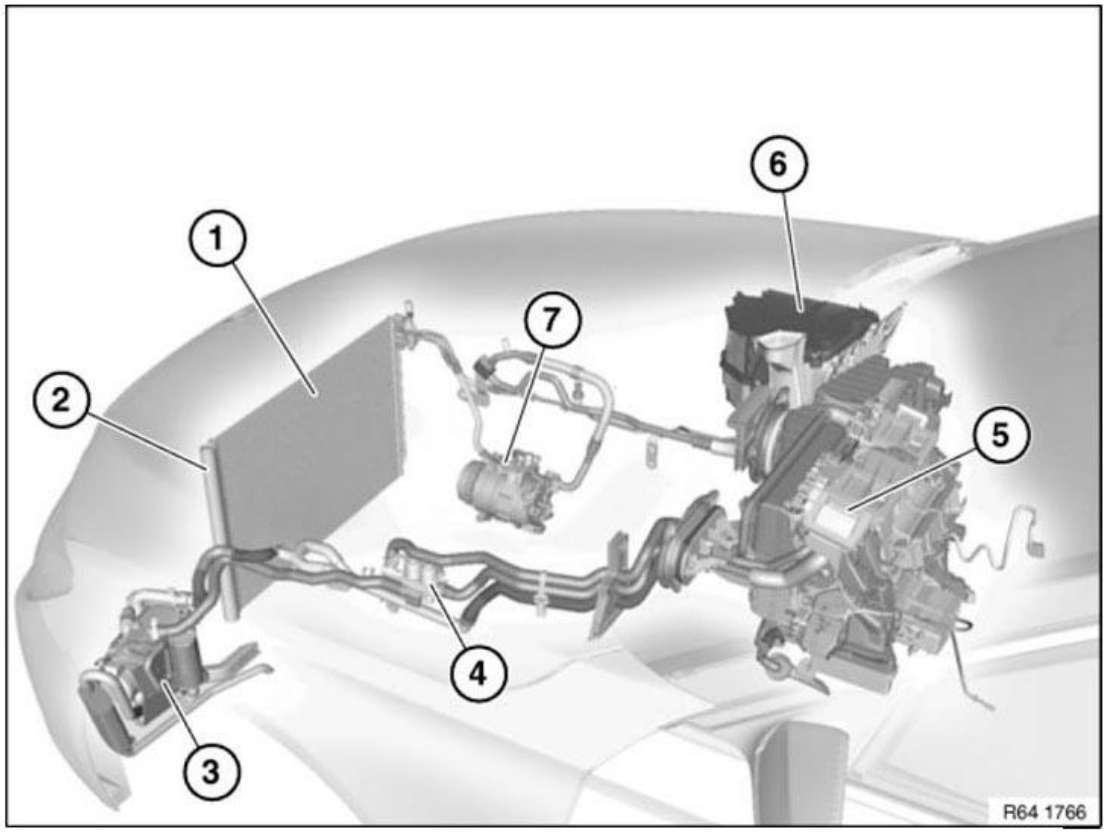
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **FILL AND BLEED COOLING SYSTEM AND CHECK FOR WATERTIGHTNESS** .

6422 NOZZLES AND OUTLETS

64 00.. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Condenser for air conditioner
2 Drier insert for air conditioner
3 Independent heater and attachment parts
4 Water valve
5 Heater - A/C system and attachment parts
6 Fan and attachment parts
7 Compressor

Fig. 136: Overview Of Heater And A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 22 137 REMOVING AND INSTALLING OR REPLACING LEFT FRESH-AIR GRILLE

Necessary preliminary tasks

- Remove **DECORATIVE STRIP ON INSTRUMENT PANEL ON LEFT**

NOTE: Example graphic on the F01.

Release screws (1).

Pull out left fresh-air grille (2) towards front and unlock and disconnect plug connection behind.

Remove left fresh-air grille (2).

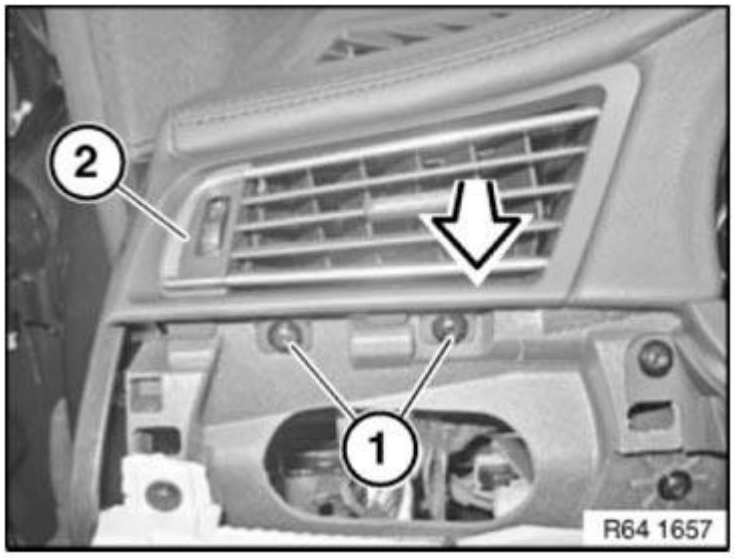


Fig. 137: Removing Left Fresh-Air Grille And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) of fresh-air grille (2) must not be damaged.

Make sure fresh-air grille (2) is correctly seated on fresh-air duct behind.

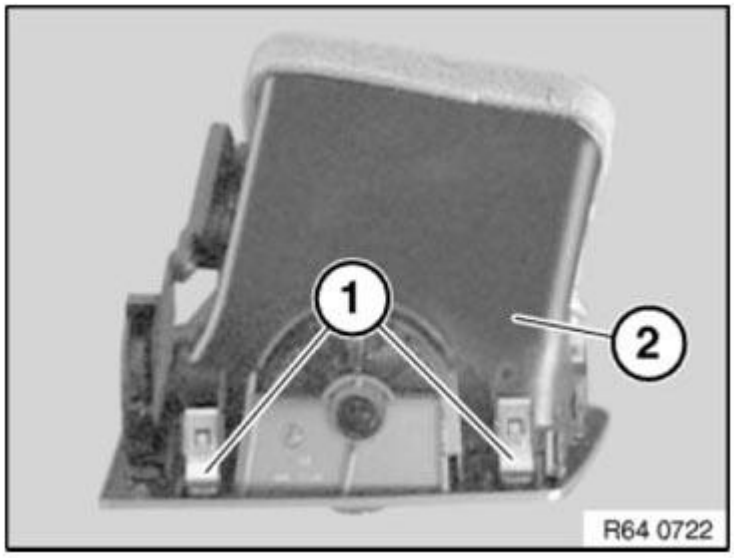


Fig. 138: Identifying Fresh-Air Grille And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

64 22 190 REMOVING AND INSTALLING/RENEWING REAR COMPARTMENT FRESH-AIR GRILLE (BASIC A/C SYSTEM)

Installation

- Remove **REAR CENTRE CONSOLE TRIM**

NOTE: Example graphic on the F01.

Release screws (1).

Snap out retainers (2) and press out fresh-air grille (4) towards front.

Remove fresh-air grille (4) from center console trim (3).

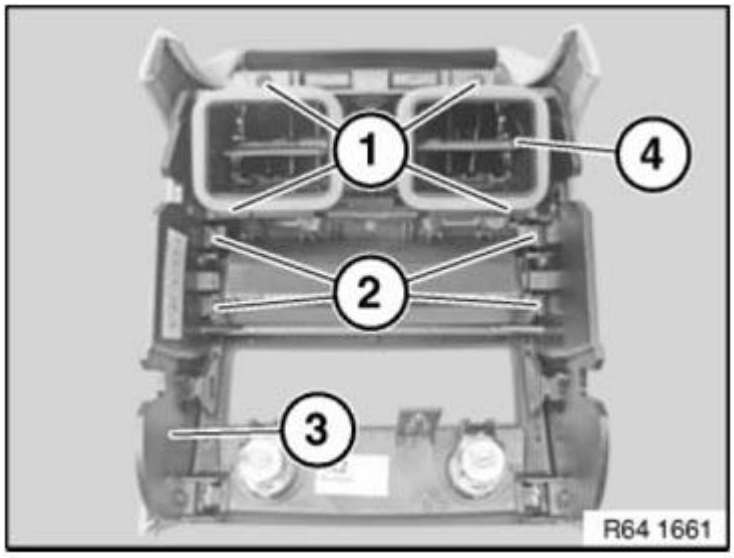


Fig. 139: Identifying Fresh-Air Grille, Centre Console Trim And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Retaining lugs and retainers must be correctly seated in associated guides and must not be damaged.

64 22 165 REMOVING AND INSTALLING/REPLACING CENTER FRESH AIR GRILLE

Necessary preliminary work

F01, F02, F03, F12, F13:

- Remove **DECORATIVE STRIP ON DASHBOARD IN MIDDLE**

F07, F10, F11, F18:

- Remove decorative strip on dashboard on right

IMPORTANT: Proceed with care so as to avoid damaging the fresh air grille.

NOTE: Picture for example purposes only!

Replacement

Release screws at marked points at top and bottom.

Remove center fresh air grille (1).

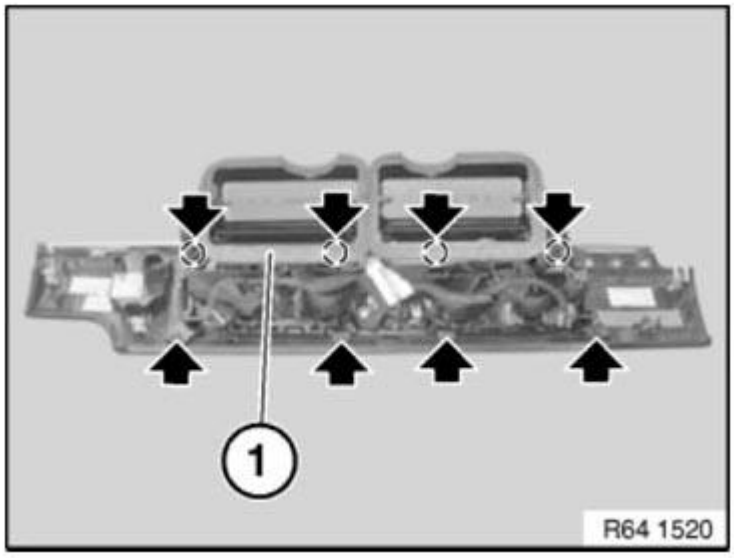


Fig. 140: Locating Centre Fresh Air Grille
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Modify **SWITCH FOR HAZARD WARNING SYSTEM/CENTRAL LOCKING**

64 22... REMOVING AND INSTALLING/REPLACING FRESH-AIR GRILLE ON LEFT OR RIGHT B-PILLAR

Necessary preliminary tasks

- Remove **PANEL FOR DOOR PILLAR (BOTTOM)**

Release screws (2) and feed out fresh-air grille (3) on panel for door pillar (1) in direction of arrow.

Installation:

Retaining lug (4) must be correctly engaged in associated guide.

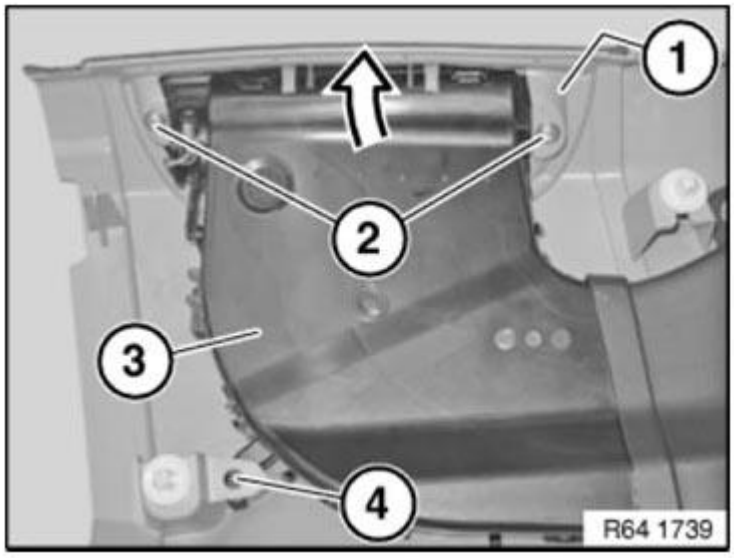


Fig. 141: Removing Fresh-Air Grille On B-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

64 22 720 REMOVING AND INSTALLING/REPLACING HEADLINING FRESH AIR GRILLE

Unclip fresh air grille (1) from headlining (2) in direction of arrow.

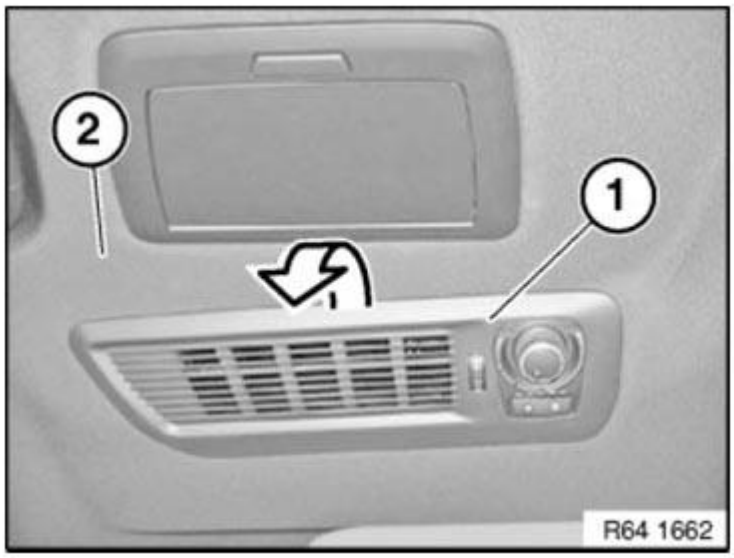


Fig. 142: Removing Fresh Air Grille From Headlining
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach plug connections (1 and 3).

Installation:

Make sure lines are correctly laid.

If necessary, replace adhesive tape fastening.

If necessary, replace retaining clasps.

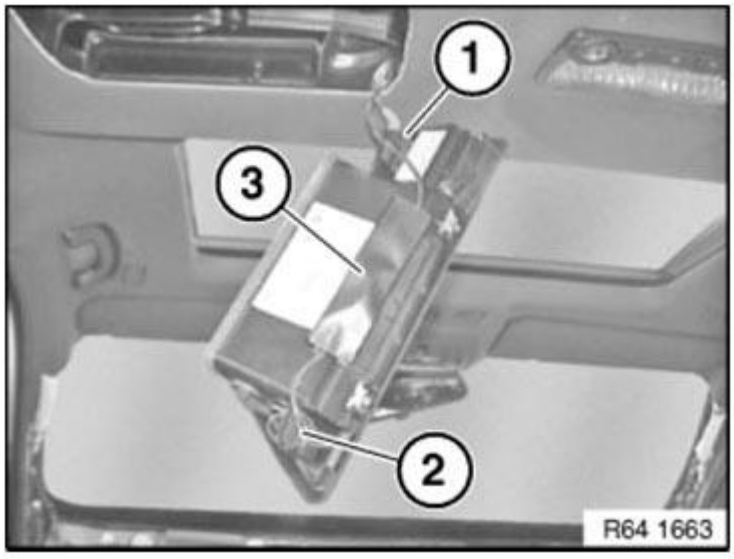


Fig. 143: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Remove heater - A/C controls in rear passenger compartment.

64 22 191 REMOVING AND INSTALLING/REPLACING REAR CABIN FRESH-AIR GRILLE (HIGH A/C SYSTEM)

Necessary preliminary tasks

- Remove **REAR A/C SYSTEM CONTROL PANEL**

NOTE: Example graphic on the F01.

Release screws (1).

Carefully press rear cabin fresh-air grille (2) forwards out of center console trim (3).

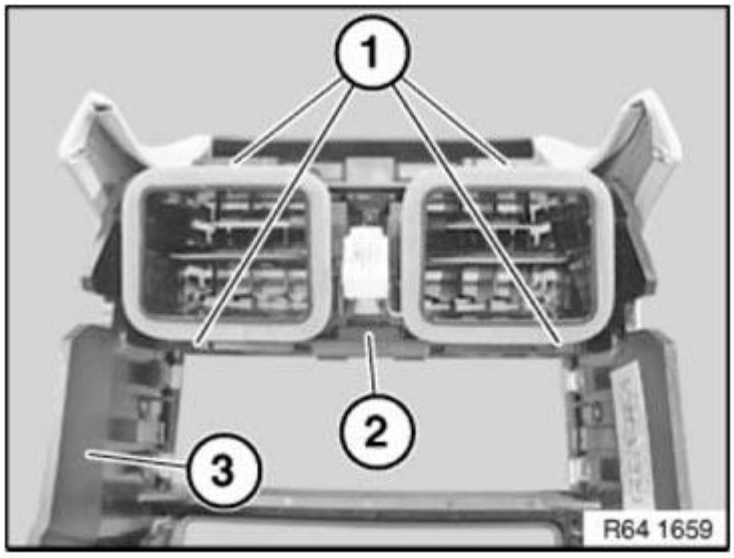


Fig. 144: Identifying Rear Cabin Fresh-Air Grille And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Retaining lugs (1) must be correctly seated in associated guides (2) and must not be damaged.

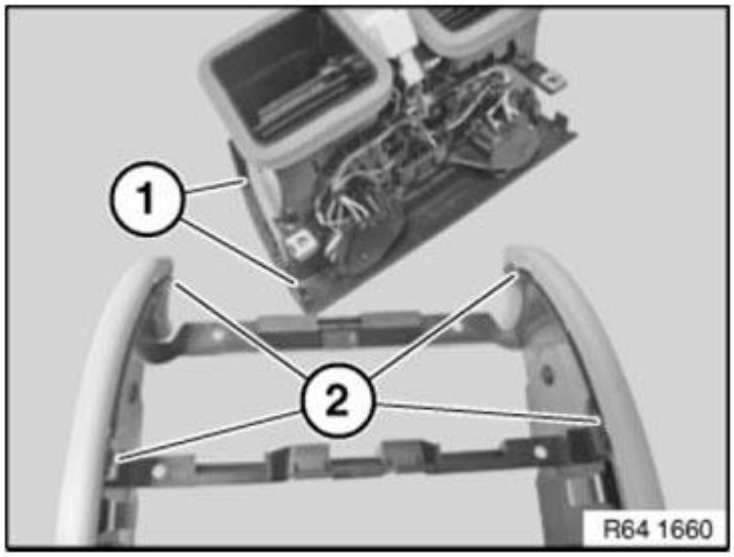


Fig. 145: Identifying Guides And Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

64 22 138 REMOVING AND INSTALLING/REPLACING RIGHT FRESH-AIR GRILLE

- Remove **DECORATIVE STRIP ON INSTRUMENT PANEL ON RIGHT**

Release screw (2) and gently pull glovebox housing (1) forwards.

Release screws (3).

Pull out right fresh-air grille (4) towards front and unlock and disconnect plug connection behind.

Remove right fresh-air grille (4).

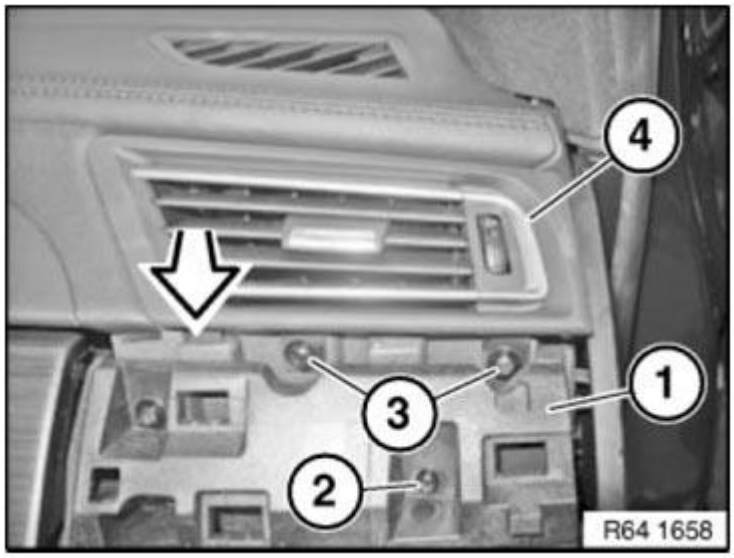


Fig. 146: Removing Right Fresh-Air Grille And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Catches (1) of fresh-air grille (2) must not be damaged.

Make sure fresh-air grille (2) is correctly seated on fresh air duct behind.

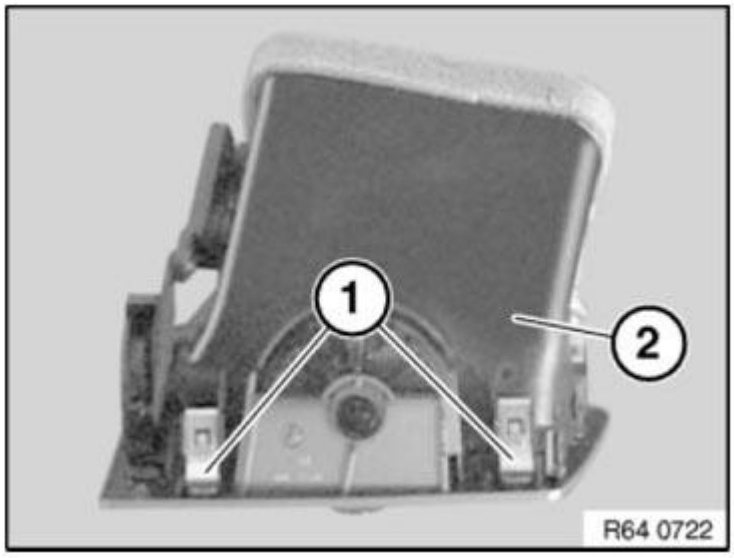
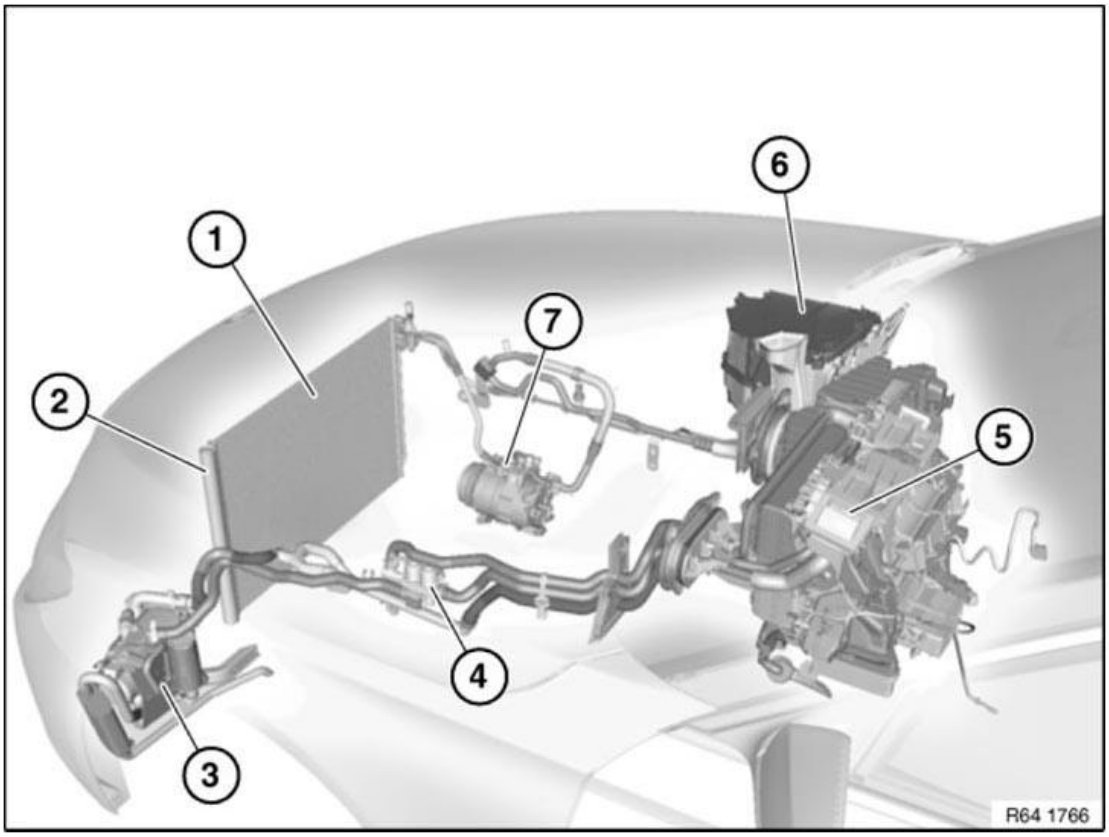


Fig. 147: Identifying Fresh-Air Grille And Catches
Courtesy of BMW OF NORTH AMERICA, INC.

6431 MICROFILTER

64 00.. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Condenser for air conditioner
2 Drier insert for air conditioner
3 Independent heater and attachment parts
4 Water valve
5 Heater - A/C system and attachment parts
6 Fan and attachment parts
7 Compressor

Fig. 148: Overview Of Heater And A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 31 010 REPLACING MICROFILTER FOR INTERIOR VENTILATION

IMPORTANT: Risk of damage!

A/C system must not be operated without the prescribed filter element.

Note on cleaning

Spray microfilter housing from inside with BMW pollen filter housing cleaner* (observe instructions for use).

Comply **WITH NOTES AND INSTRUCTIONS ON HANDLING CLEANING AGENTS** !

Wipe away excess liquid.

This kills off germs, bacteria and fungi that cause smells.

The smell that results on the plastic parts of the microfilter housing is eliminated.

*BMW part number: 0 447 913

Necessary preliminary work

- Remove lower instrument panel trim. See **5145195 REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT TRIM FOR INSTRUMENT PANEL (US VERSION ONLY)** .

Release screws (1) on filter housing (2).

Remove microfilter cover (3) in direction of arrow.

Installation note:

Microfilter cover (3) must be correctly engaged in guides on filter housing (2).

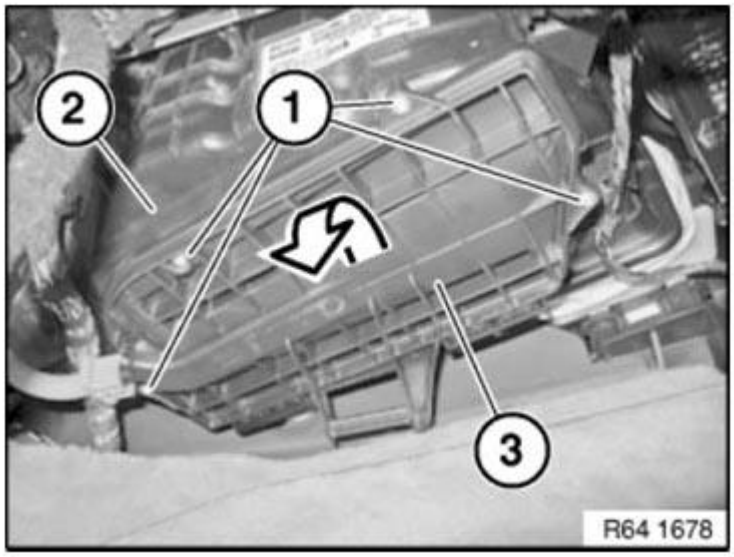


Fig. 149: Removing Microfilter Cover On Filter Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Remove microfilter (1) at tabs in direction of arrow from filter housing (2).

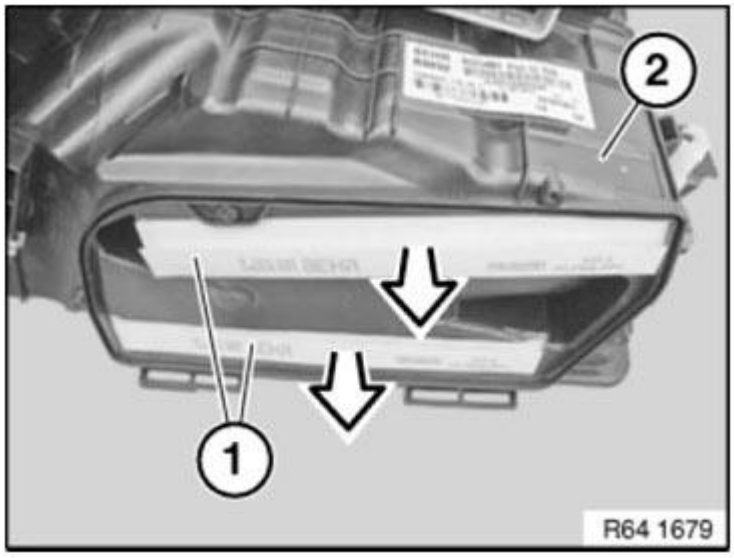


Fig. 150: Removing Microfilter From Filter Housing
Courtesy of BMW OF NORTH AMERICA, INC.

64 31 020 REPLACING REAR A/C SYSTEM MICROFILTER

IMPORTANT: Risk of damage!

Air conditioning must not be operated without the prescribed filter element.

Follow manufacturer's instructions.

Necessary preliminary work

- from 11/2010, **only** remove luggage compartment partition wall
- **Otherwise** remove **ALL LUGGAGE COMPARTMENT TRIM PANELS**

Remove side cover (1) in direction of arrow.

Remove microfilter (2).

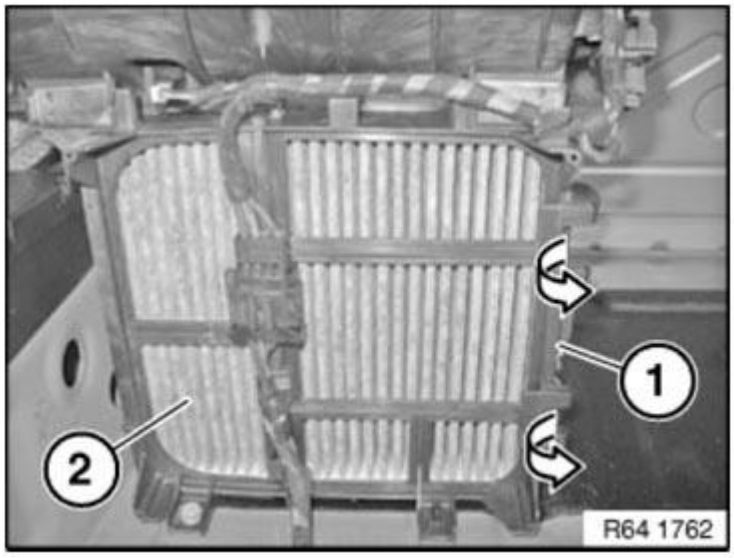


Fig. 151: Removing Microfilter To Side Cover
Courtesy of BMW OF NORTH AMERICA, INC.

6450 AIR CONDITIONING SYSTEM

64 50... A/C PERFORMANCE TEST (R 134A)

Observe the following conditions prior to the A/C performance test

1. Provision of a diagnosis system. Safeguard electrical system integrity by checking the fault memory (no faults in the fault memory).
2. Provide a thermometer with separate gauge.
3. Perform the test in a suitable workshop area with an ambient temperature between 20°C and 30°C.

Re 1:

Connect diagnosis system to vehicle and display evaporator temperature.

Re 2:

Position a thermometer with a separate gauge approx. 5 cm below the roof liner at the height of the B-pillar. Lay gauge outwards out of passenger compartment.

Re 3:

Heat passenger compartment:

- "A/C button" is not activated during the heating process
- Close all windows and doors.

- Set air recirculation function.
- In A/C menu (CID) in Air distribution index tab: select 100 % footwell for driver and front passenger and 100 % defrosting for driver (this applies here to driver and front passenger)
- Maximum temperature setting (28°C)
- Maximum blower speed (adjust 9 pixels from 9 possible on front A/C control panel)
- Run engine at approx. 2000 RPM until operating temperature is reached, then idle speed.

Air-conditioning performance test

Turn on A/C compressor via "A/C button" at a vehicle interior temperature of 50°C.

Vehicles with MAX-AC button ("MAX"):

- Activation of MAX-AC (= maximum cooling power)

Vehicles without MAX-AC button ("MAX"):

- Set maximum cooling power by means of following steps:
  - Temperature setting = 16°C
  - Blower setting 9 pixels of 9 possible
  - Stratification maximum cold (4 blue bars)

Evaporator sensor temperature must be < or = 15°C after 3-4; minutes at approx. 2000 RPM.

DRAW OFF A/C SYSTEM if this temperature is not reached. Measure amount of refrigerant drawn off.

If drawn-off quantity does not correspond to specified fill quantity, supplement refrigerant and repeat test. See **AIR CONDITIONING SYSTEM, AMOUNT OF REFRIGERANT** .

If capacity is correct, continue troubleshooting by pressure measurement.

64 50 010 DRAWING OFF, EVACUATING AND FILLING HEATING AND AIR CONDITIONING SYSTEM (R 134A)

WARNING: Only persons in possession of a professional certificate of competence for the maintenance and repair of heating and air conditioning systems are authorized to carry out repair work on the refrigerant circuit. This certificate must be presented by 04/07/2010 at the latest. (applies only to EU countries; follow country-specific regulations in non-EU countries)

Refrigerant circuit is under high pressure!

- **If the protective caps on the filling valves are difficult to open, there is a danger of injury from leaking valve inserts.**

Repair work may only be carried out on a depressurized refrigerant circuit!

- **Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service station.**

Avoid contact with refrigerant and refrigerant fluid.

- **Follow safety information for handling R 134a tetrafluorethane refrigerant. See SAFETY INSTRUCTIONS FOR HANDLING TETRAFLUORETHANE REFRIGERANT R134A.**
- **Follow safety information for HANDLING REFRIGERANT FLUID .**

IMPORTANT: Risk of damage!

Only BMW-approved R134a refrigerant may be used. Refer to HVAC SYSTEM -- OPERATING FLUIDS .

Restart engine only when air conditioning system has been correctly filled.

Only F02/F03/F04:

To ensure a virtually complete draining of refrigerant from the automatic rear air-conditioning system or the hybrid battery cooling system:

In the diagnosis system under Service functions carry out the instructions for "Draining/filling refrigerant circuit".

IMPORTANT: Risk of damage!

Carefully move the climate service station!

Comply with the operating instructions and maintenance intervals for the service station!

The climate service station contains highly sensitive components, such as scales. These components will be damaged due to improper handling, such as fast driving over a bump. This will result in a significant reduction of the measuring accuracy when drawing off and filling.

IMPORTANT: The vehicle must be parked on the ground during all draw-off, evacuation and filling procedures!

Filling a raised vehicle will result in insufficient filling levels.

NOTE: **In case of complaints, carry out a heating and air conditioning performance test!**

If the system fails the test, draw off, evacuate and fill the heating and air conditioning system in accordance with the operating instructions of the relevant service station.

Notes for drawing off heating and air conditioning system:

To help separation of refrigerant and refrigerant fluid, run engine at low speed (800-1200 RPM) and with air conditioning turned on for a few minutes.

The limits the entrainment of refrigerant fluid while it is drawn off.

Drawn-off refrigerant fluid must be changed and reintroduced via the A/C service station.

Recycling

Dispose of drawn-off refrigerant fluid as hazardous waste.

Observe country-specific waste disposal regulations.

Notes for evacuating off heating and air conditioning system:

Before each filling, evacuate the refrigerant system.

Observe an evacuation time of **at least 30 minutes**

The evacuation procedure removes all traces ambient air, water vapor and any other gases present from the heating and air conditioning system. This enables subsequent system filling with refrigerant.

If the vacuum does not remain stable when the system is off, run the procedure for leaks in the refrigerant circuit.

Notes for filling heating and air conditioning system:

Before filling with refrigerant, replace the refrigerant fluid entrained during drawing off.

Also top up any lost fluid as indicated in the **REFRIGERANT REFERENCE CHART**

Loss of R134a refrigerant

REFRIGERANT REFERENCE CHART indicates the permitted loss of Refrigerant after a specific period of time. There is no leak. Refrigerant fluid may not be topped up.

REFRIGERANT FLUID TOP UP CHART indicates the amount of refrigerant fluid must be topped up with an unapproved loss of refrigerant due to a leak after a specific period time.

Different cases:

a. Loss of refrigerant per **REFRIGERANT REFERENCE CHART is not exceeded**
   - Top up lost R134a refrigerant
   - It is **not permitted** to top up to refrigerant fluid

b. Loss of refrigerant per **REFRIGERANT REFERENCE CHART** is exceeded
   - Top up lost R134a refrigerant
   - Refrigerant fluid must be topped up **additionally** per **REFRIGERANT FLUID TOP UP CHART**

REFRIGERANT FLUID LEVEL CHART

Table 1: Number of years since last filling	0 - 1	1 - 2	2 - 3	3 - 4	4 -
Permissible loss [g --> no need to top up refrigerant fluid	< or = 30	< or = 60	< or = 90	< or = 120	< or = 1

REFRIGERANT FLUID LEVEL CHART

Table 2: Number of years since last filling	**R134a loss of coolant [g]**	**Top up quantity refrigerant fluid**
0 - 1	- <120	0
	120 - 150	10
	>150	20
1 - 2	- <180	0
	180 - 210	10
	>210	20
2 - 3	- <240	0
	240 - 270	10
	>270	20
3 - 4	- <300	0
	300 - 330	10
	>330	20
4 - 5	- <360	10
	>360	20

Follow **NOTES FOR OPENING AND REPLACING PARTS** in refrigerant circuit.

Depending on the type of component replaced on the heating and air conditioning system, it may be necessary to top up the refrigerant fluid, even if no measurable losses have occurred during drawing off. Follow the notes provided by the heating and air conditioning system manufacturer, taking account of the tolerances (and inaccuracies) indicated in the operating instructions of the relevant service station.



Fig. 152: Identifying Heating And Air Conditioning System Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Information on the required refrigerant capacity for the entire heating and air conditioning system is contained on the type plate (1) in the engine compartment.

If necessary, refer to the Technical Data for capacity. See **AIR CONDITIONING SYSTEM, AMOUNT OF REFRIGERANT** .

Installation note

Reseal refrigerant filler necks on vehicle with sealing caps.

64 50... INSTRUCTIONS FOR HANDLING R 134A REFRIGERANT

Work on the refrigerant circuit may only be carried out by experts!

Avoid all contact with liquid or gaseous R 134a. Wear safety goggles and gloves when working on the refrigerant circuit.

- Follow **SAFETY INSTRUCTIONS** for handling R134a refrigerant.

WARNING: Although R 134a at normal temperature is non-toxic, non-flammable and not explosive in air in any mixture ratio, it is still essential to follow various safety precautions.

As a gas, R 134a is colorless, odorless and heavier than air. If it enters the atmosphere, this may result in an imperceptible danger of asphyxiation or in cardiac palpitations, especially in workshop pits. Ventilate rooms adequately; if necessary, turn on installed extractor systems.

Store charged refrigerant pressure flasks in a place where they are not exposed to direct sunlight or any other heat source (max. 45°C). Also avoid exposing them to mechanical stress (e.g. by dropping).

Do not weld or solder on to filled A/C systems or in rooms into which R 134a may have leaked. Exposure to flames or high temperatures (> or = 50°C) may give rise to toxic decomposition products (fluorine gas). For this reason, do not smoke either.

In the event of fire, carbon dioxide (CO2), extinguishing powder and a sprayed water jet are deemed to be suitable extinguishant. Cool reservoirs at risk with a sprayed water jet (risk of bursting!).

If the protective caps on the filling valves are difficult to open, there is a risk of injury from leaking valve inserts (high pressure).

The filled refrigerant circuit of the A/C system is subject to excess pressure. Before carrying out repairs on the A/C system, it is absolutely essential to draw off the refrigerant.

- Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service station.

R 134a must be drawn off, cleaned and returned to the A/C system using an A/C service station following the relevant operating instructions.

For a properly functioning A/C system, it is essential to have the greatest possible levels of cleanliness when working on the A/C system and the longest possible evacuation (at least 30 minutes dehumidification from refrigerant circuit) before each filling of the A/C system.

R 134a absorbs moisture very easily. Therefore, seal off opened pipes, condenser, evaporator, compressor and dryer flask immediately with plugs.

- If an A/C system has been completely drained by leakage, accident or repair, the **DESICCANT INSERT** must be replaced as excessive moisture may have entered the system.

With exchange parts, the plugs may only be removed immediately before the lines are connected. In the event of warranty claims, the used parts must be provided with plugs to be able to determine the cause of the damage.

Installation note

After each refill of an A/C system, check that the protective caps of the filler valves are hand-tight. They serve as additional seals.

64 52... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- **Avoid contact with refrigerant and refrigerant fluid**
- **Follow safety information for handling R134A refrigerant. See INSTRUCTIONS FOR HANDLING R 134A REFRIGERANT**
- **Follow safety information for HANDLING REFRIGERANT FLUID**

IMPORTANT:

- **Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)**

  They must not be coated.

  Use special tool 00 9 030 to install sealing rings without damaging them.

- **Open the refrigerant circuit for as short of a period as possible.**
- **Close all components and lines in the refrigerant circuit and return parts immediately following the removals at openings with special tool 32 1 270 to prevent penetration of moisture or foreign objects.**
- **If the refrigerant circuit was closed at the openings with special tool 32 1 270 but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.**

I. Part replacement as preliminary work fur further repair work and part replacement based on gradual leakage

(minor leak, e.g. hairline crack)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 10 ml
  - Capacitor: 20 ml
  - Desiccant insert/dryer flask: 20 ml
  - Each replaced refrigerant line: 10 ml
  - Capacitor with integrated dryer: 40 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

II. Part replacement due to sudden leak

(major leak, e.g. pipe break due to accident)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to

components replaced:

- Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
- Evaporator: 35 ml
- Capacitor: 35 ml
- Desiccant insert/dryer flask: 55 ml
- Each replaced refrigerant line: 35 ml
- Capacitor with integrated dryer: 55 ml
- Safety pressure switch and seals: no additional refrigerant fluid

- **EVACUATE AND FILL** A/C system

64 53...INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

See **64 53...INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS** .

64 50... LEAK DETECTION WITH FORMING GAS

NOTE: Leak detection with forming gas replaces the leak detection that is prohibited in EU countries using UV.

Observe national regulations in all other countries!

IMPORTANT: Compliance with the manufacturer's operating instructions provided in the equipment case is absolutely mandatory!

Read and comply with the manufacturer's operating instructions provided with the special tool particularly with regard to accident prevention, health protection and environmental protection.

Only the basic procedure is described in the following!

IMPORTANT: Wear personal protective clothing/equipment!

NOTE: Determine the customer's use behavior prior to leak detection!

Certain user behaviors can lead to a loss of refrigerant from the refrigerant circuit even if there is no leak. This may occur if the customer has not used the air conditioning for a period of more than six months. This may cause O-rings to harden and refrigerant may escape. In this case, it will be sufficient to top up the refrigerant circuit and switch the air conditioning on for approximately 10 minutes while the engine is running.

Necessary preliminary work

NOTE: Use gas detector set Loktrace KA 1000, order number: 81 34 2 210 336

- If components of the refrigerant circuit are contaminated, clean the engine compartment. Otherwise, the sensor head of the leak detector will become contaminated.
- Remove drive belt from A/C compressor
- **DRAIN OFF AIR CONDITIONING SYSTEM**
- Fill the air conditioning system with forming gas.
- Set pressure to 5 bar.

To reach components of the refrigerant circuit with the leak detector, it may be necessary to remove the following parts, depending on the vehicle:

- Covers
- Trim panels
- Air duct
- Intake silencer
- Bulkheads

With some vehicles, the air flaps of the automatic air flap control (LKS) must be opened.

IMPORTANT: Always perform the leak detection with a pressure of 5 bar at first!

This is absolutely necessary to find certain leaks, such as in the area of the O-rings.

If no leak is detected, repeat the leak detection with 10 bar.

IMPORTANT: The leak detection may not be performed more than 3 hours after filling the refrigerant circuit with forming gas!

Forming gas consists of 95% nitrogen and 5% hydrogen. The leak detector will detect hydrogen. If this is leaking from the refrigerant circuit even though the pressure remains, the leak detection bears no results.

IMPORTANT: Risk of damage!

Maximum approved pressure: 10 bar

Do not start the engine during the entire procedure!

Notes for handling the leak detector:

1. Sensor head must always stand vertical to the surface to be tested.
2. Sensor head must always be aligned to the center of the point to be tested. Slowly guide the sensor head around the point (e.g. connection point, sealing surface, etc.).
3. The optimal distance (A) between sensor head and surface to be checked must permanently be approximately 1 mm, maximum distance (B) at points that are difficult to access approximately 5 mm.
4. Test speed may not exceed 2 cm per second.

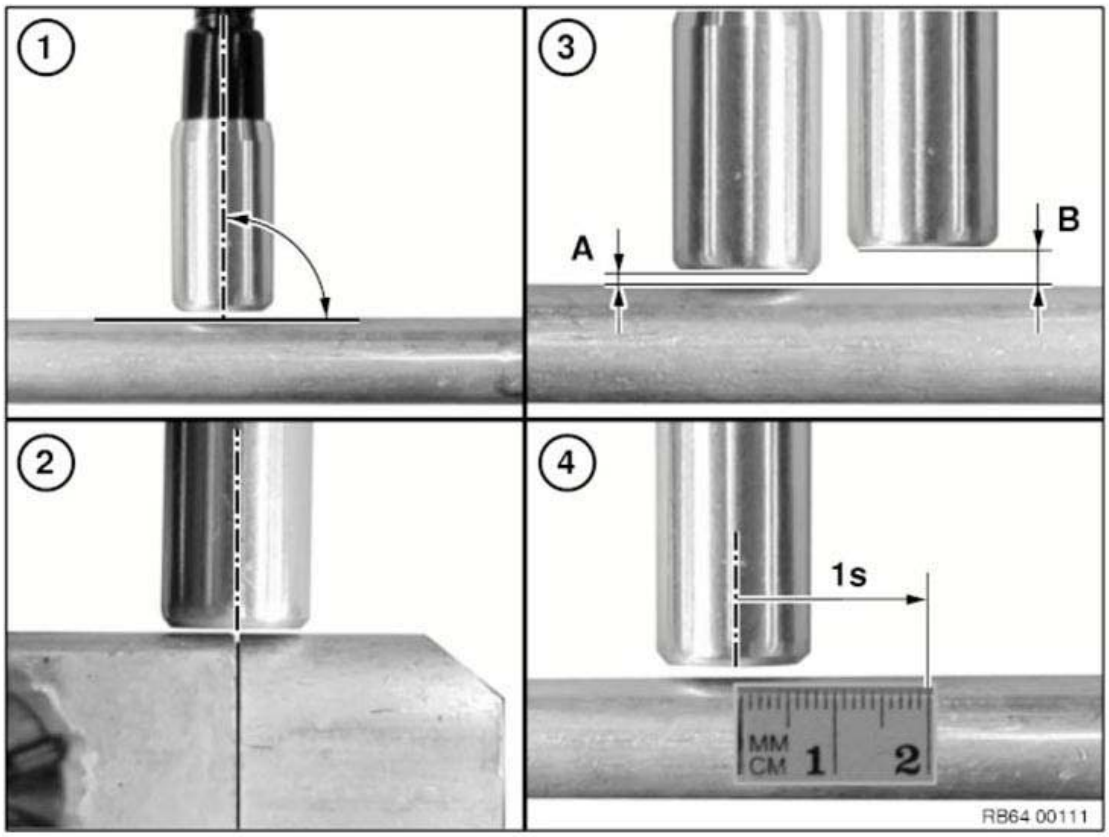


Fig. 153: Checking Refrigerant Leak Detection
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the leak detector indicates a leak, remove the sensor head from the leak for approximately 10 seconds. Then check if the leak is still indicated at the same point. Repeat the procedure up to three times to ensure that a leak is actually present at this point.

NOTE: If a leak is detected in the refrigerant circuit, the remaining points must also be tested!
Multiple leaks may be present in the refrigerant circuit.

NOTE: Replace the leaking component. Relieve the pressure from the refrigerant circuit prior to replacement.

IMPORTANT: Compliance with the instructions above is absolutely mandatory! Non-compliance will significantly reduce the efficiency of leak detection!

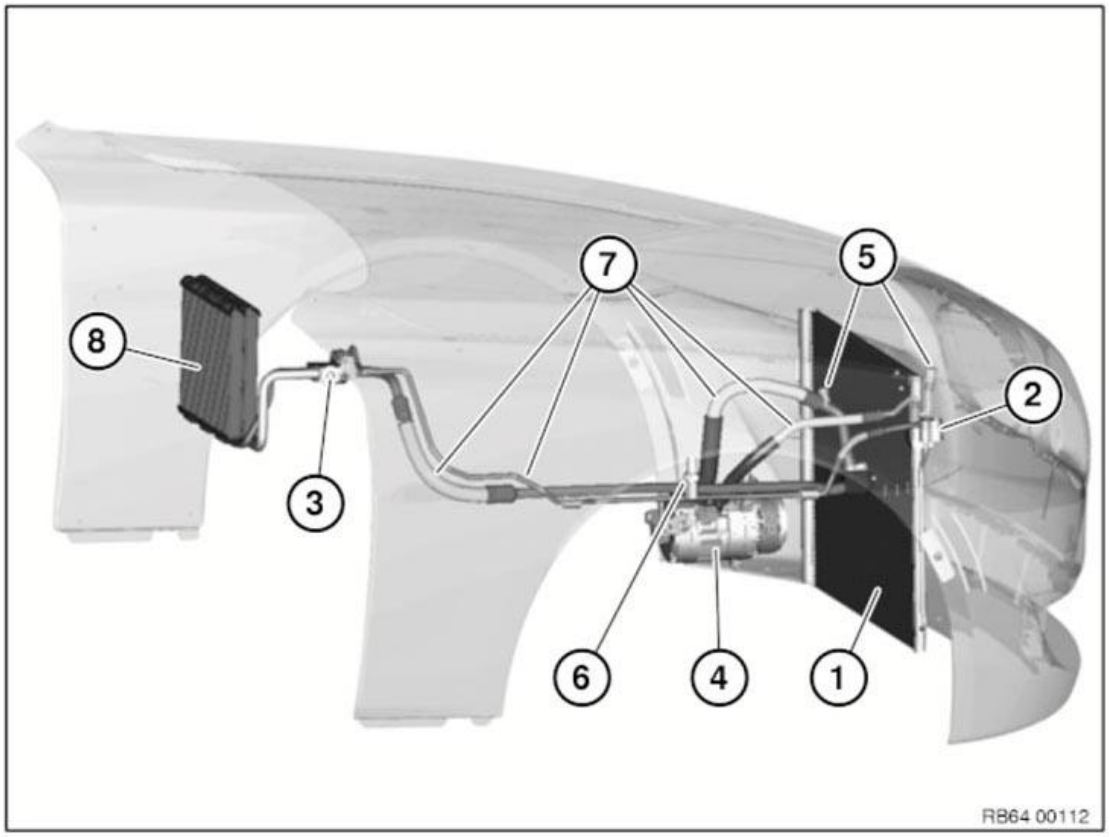


Fig. 154: Overview Of Air Conditioning Compressor System Components
Courtesy of BMW OF NORTH AMERICA, INC.

Overview of points to be checked in test sequence:

1. Capacitor
2. Connection point capacitor - refrigerant line
3. Expansion valve
4. Air conditioning compressor
5. Filler neck high pressure and low pressure
6. Refrigerant pressure sensor
7. Lines
8. Evaporator

1. **Capacitor:**

   Damage caused by stone chipping, etc. is the most frequent cause of capacitor leaks (1):

1. Visual inspection in the area of the ornamental grille (2) and air inlet grille, center (3).
2. Check damaged points first.
3. Check the remainder of the capacitor.

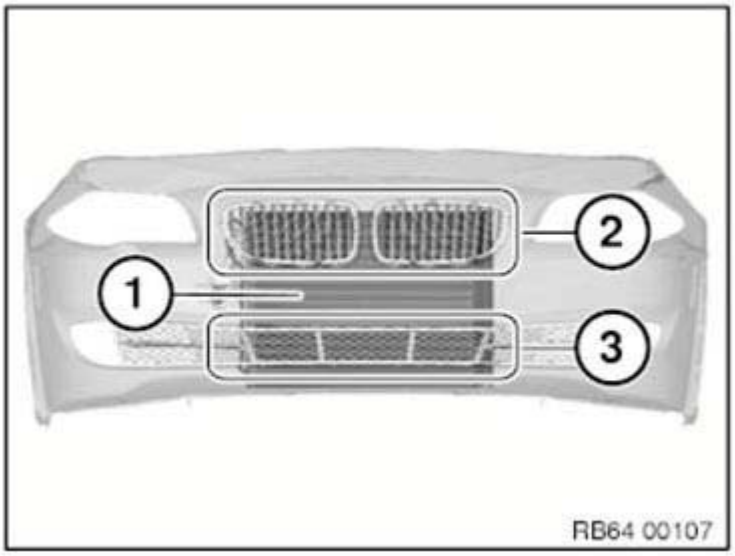


Fig. 155: Identifying Ornamental Grille And Capacitor Leaks
Courtesy of BMW OF NORTH AMERICA, INC.

2. **Connection point capacitor - refrigerant line**

Check the connection point between the connection at the capacitor (1) and refrigerant lines (2).

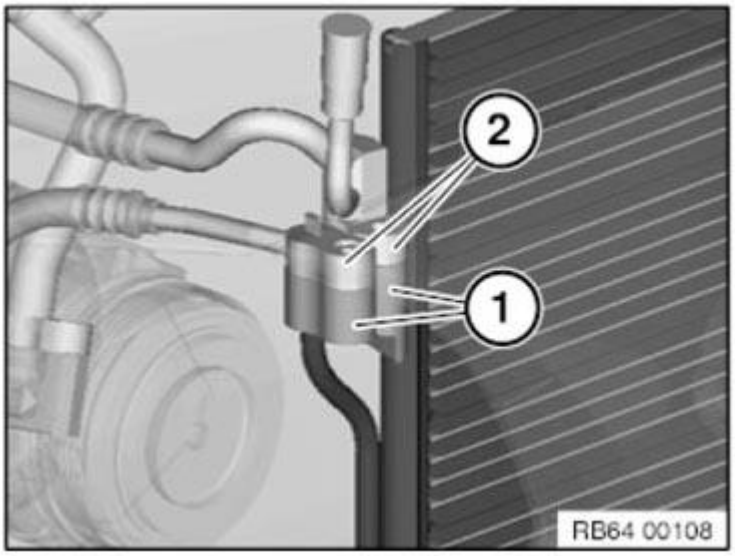


Fig. 156: Identifying Capacitor And Refrigerant Lines
Courtesy of BMW OF NORTH AMERICA, INC.

3. **Expansion valve:**

   Check the connection point between the expansion valve (1) and refrigerant lines (2).

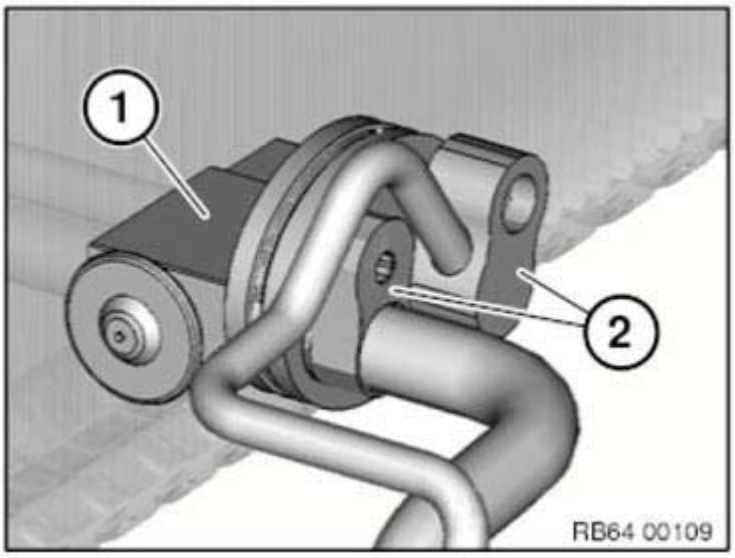


Fig. 157: Identifying Expansion Valve And Refrigerant Lines
Courtesy of BMW OF NORTH AMERICA, INC.

4. **A/C compressor:**

   Check the following components on the A/C compressor:

   1. High-pressure connection
   2. Low pressure connection
   3. Pressure relief valve
   4. Radial shaft seal of the magnetic coupling: Turn the magnetic coupling several times by hand during the leak detection.

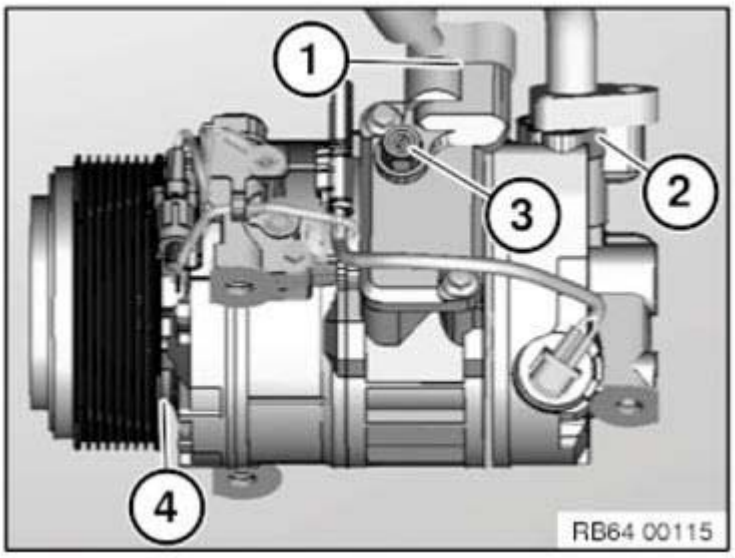


Fig. 158: Identifying A/C Compressor
Courtesy of BMW OF NORTH AMERICA, INC.

5. **Filler neck**

   Blow out the filler neck (1) prior to testing.

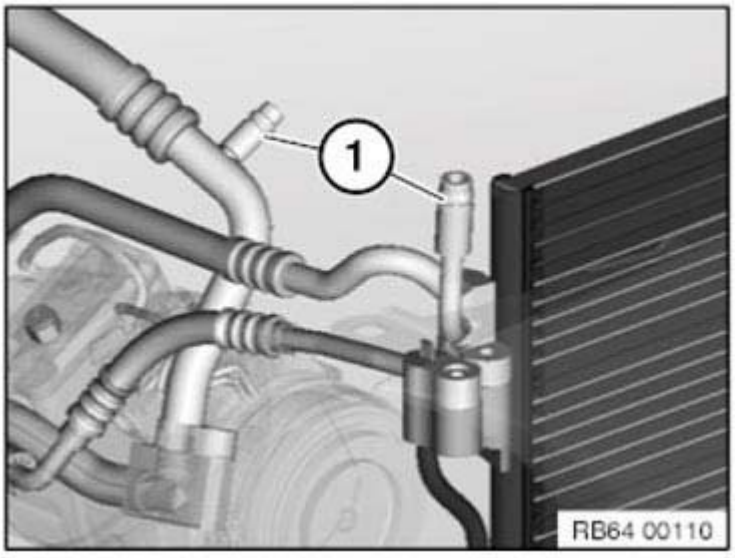


Fig. 159: Identifying Filler Neck
Courtesy of BMW OF NORTH AMERICA, INC.

6. **Refrigerant pressure sensor**

   Check the sealing surface between the refrigerant pressure sensor (1) and the refrigerant line (2).

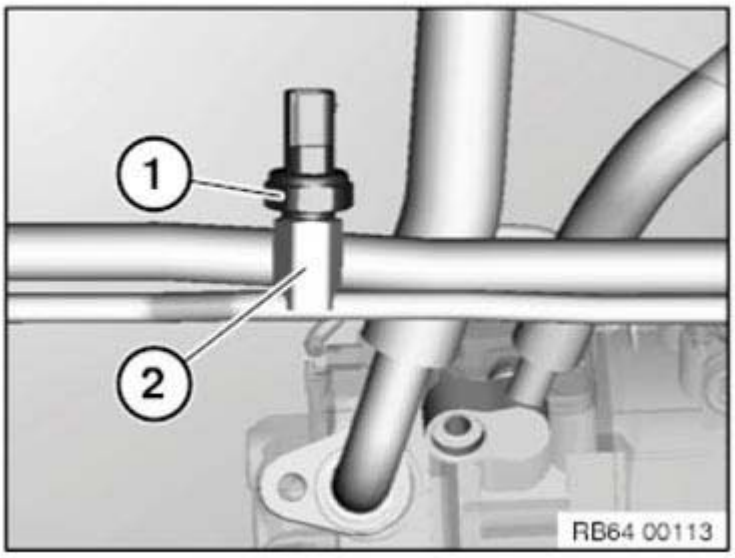


Fig. 160: Identifying Refrigerant Pressure Sensor And Refrigerant Line
Courtesy of BMW OF NORTH AMERICA, INC.

7. **Refrigerant lines:**
    1. Perform visual inspection
    2. Check damaged points first.
    3. Check bending points at points marked with an arrow. Leaks occur especially frequently at these points.
    4. Check the remainder of the refrigerant line.

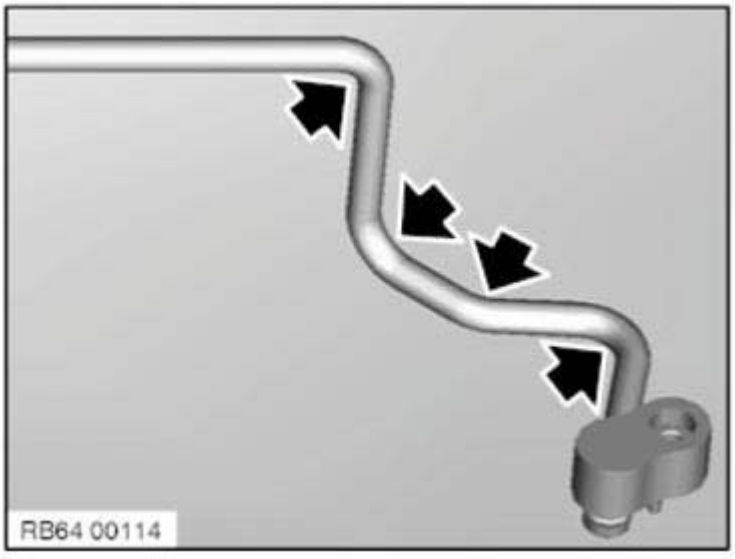


Fig. 161: Locating Refrigerant Lines
Courtesy of BMW OF NORTH AMERICA, INC.

8. **Evaporator:**

   Compliance with the following settings is **absolutely** required:

   - Air recirculation function On
   - Lowest blower speed
   - Lowest temperature
   - Set the air distribution to ventilation (air may only flow out of the **center** fresh air grille)

   Position the sensor head (1) as shown at the fresh air grille (2) and slowly move it from inside out. Carry out this operation on the left and right fresh air grilles.

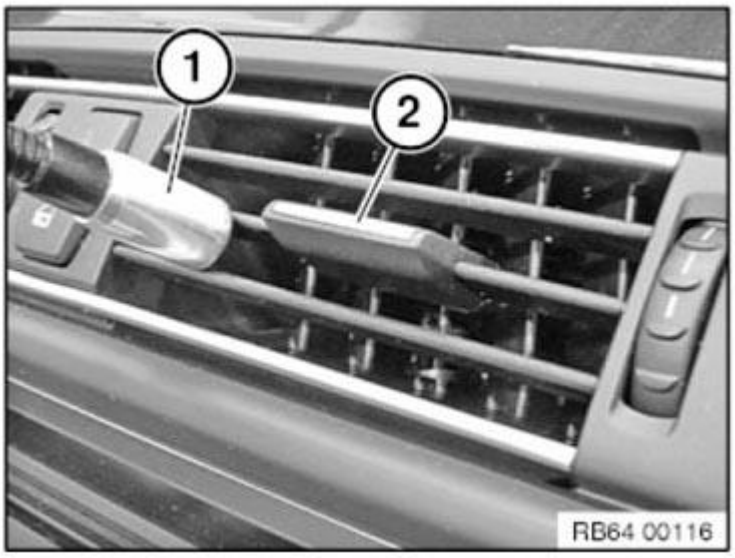


Fig. 162: Identifying Fresh Air Grille
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Some vehicles have an expansion valve directly next to the fresh air intake for the passenger compartment.

In this case the expansion valve must be covered!

Following the completed leak detection:

- **EVACUATE AND FILL HEATING AND AIR CONDITIONING SYSTEM**

64 50... LEAK DETECTION WITH ULTRAVIOLET ADDITIVES (UV ADDITIVES) (BMW LEAK-TESTING CASE)

IMPORTANT: The UV leakage detection procedure is not permitted in EU countries!

Observe national regulations in all other countries!

IMPORTANT: **It is absolutely essential to read and comply with the equipment manufacturer's operating instructions use provided in the equipment case!**

Read and comply with the manufacturer's operating instructions provided with the special tool particularly with regard to accident prevention, health protection and environmental protection.

Use only BMW-approved UV additives (e.g. TRACER).

Only the basic procedure is described in the following!

WARNING: **Avoid contact with refrigerant.**

Follow safety precautions when handling refrigerant. See SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT OIL.

IMPORTANT: **Ultraviolet lamp gets very hot in the radiation area!**

Do not use the ultraviolet lamp without the filter glass.

Eyes and skin will suffer damage if the ultraviolet lamp is used without the filter glass.

When using the ultraviolet lamp, wear the safety goggles provided in the case.

NOTE:

- **Fill the hose system of the hand pump completely with UV additive PRIOR to use**
- **The UV additive may be used exclusively for BMW-approved refrigerant fluids**
- **Do not operate the air conditioning system while the hand pump is connected or in use**
- **The air conditioning system must always be filled with an adequate amount of refrigerant to enable the leak-detecting agent to be properly distributed**

Necessary preliminary work

Before actually testing for leaks, check the entire refrigerant circuit using the UV leak detection lamp to ensure that no UV additive is already in the area of the refrigerant circuit.

Leak areas which have already been detected by UV light must carefully cleaned with the cleaning agent provided in the case.

On initial use:

Connect hand pump (1) to additive cartridge (2) and hose piece (3).

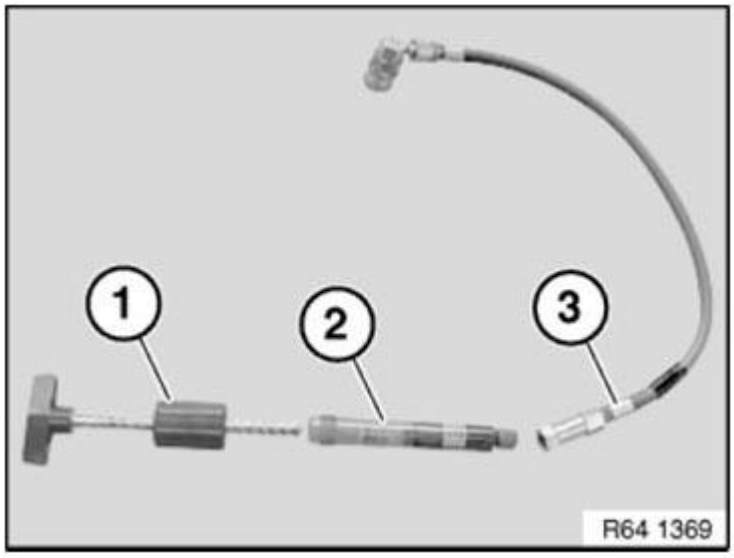


Fig. 163: Identifying Hand Pump To Additive Cartridge And Hose Piece
Courtesy of BMW OF NORTH AMERICA, INC.

On initial use:

Attach vent valve (1) to quick-release coupling (2).

Turn handle (3) on hand pump to advance the plunger until a small amount of UV additive emerges. This vents the hose system.

IMPORTANT: The entire hand pump with hose system must not be disassembled again once the filling work has been completed.

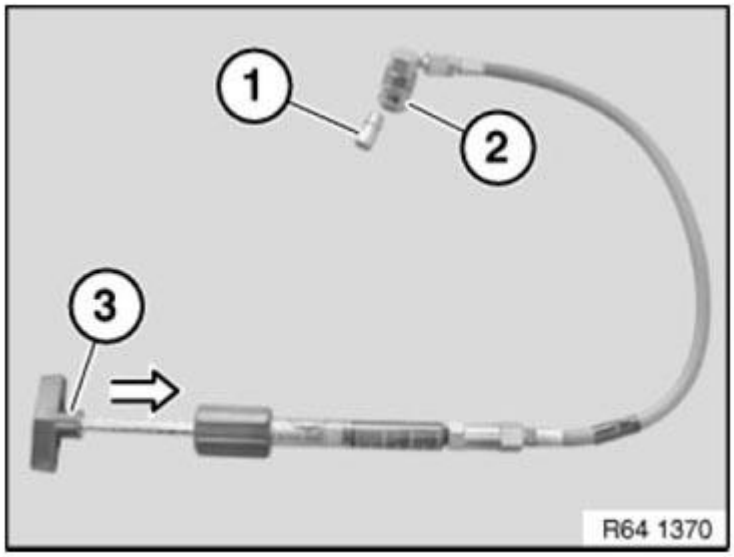


Fig. 164: Attaching Vent Valve To Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Attach quick-release coupling (1) to low-pressure connection (2) of air conditioning system.

Turn handle on hand pump (3) until the required amount of UV additive is added.

The quantity of UV additive to be added is dependent on the amount of refrigerant in the refrigerant circuit. See **AIR CONDITIONING SYSTEM, AMOUNT OF REFRIGERANT** .

- Air conditioning systems with refrigerant filling up to 900 g: one graduation mark (4) on additive cartridge
- Air conditioning systems with refrigerant filling in excess of 900 g: two graduation marks (4) on additive cartridge

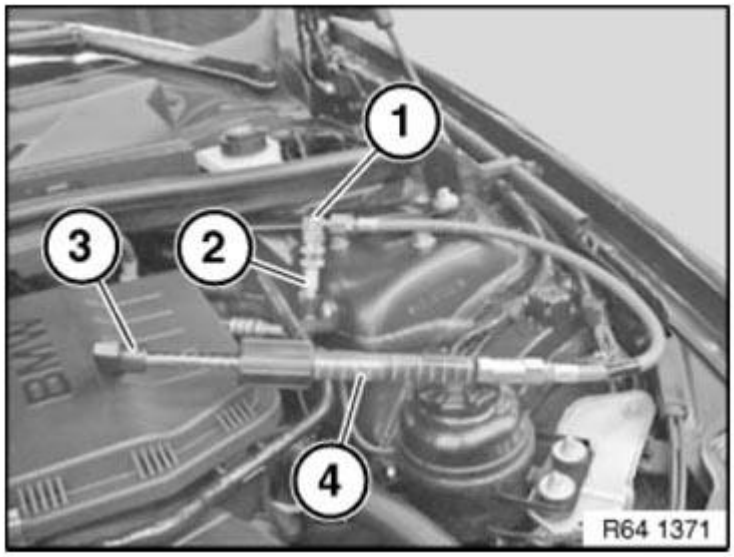


Fig. 165: Identifying Quick-Release Coupling To Low-Pressure Connection
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After filling, remove quick-release coupling (1) and if necessary use the cleaning agent contained in the special tool case to clean up the UV additive.

Further tasks

- Start engine
- Run air conditioning system at highest setting for 5 - 10 minutes in order to ensure adequate distribution of dye in the system
- Turn off engine.
- Check all air conditioning system components for possible leaks
- Possible leakage is lit up green when the UV leak-detecting lamp and UV-absorbing safety goggles are used

Complete accompanying information label (1) with the relevant data and attach in an easily visible position next to the filling capacity information label (2).

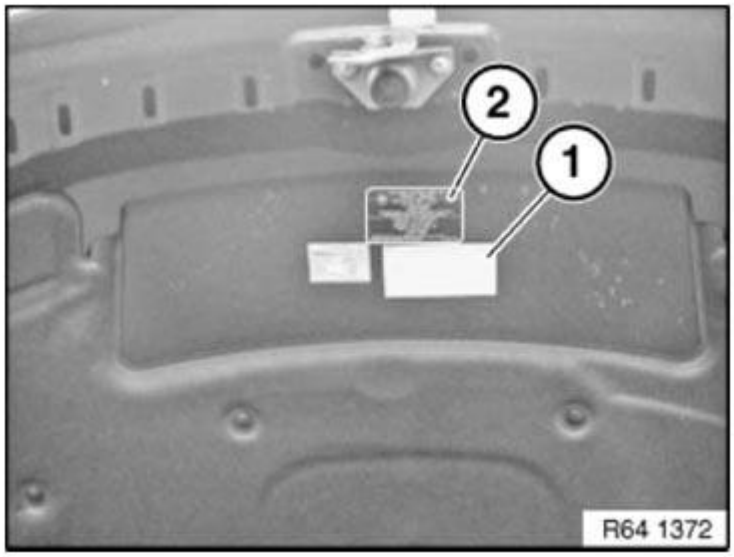
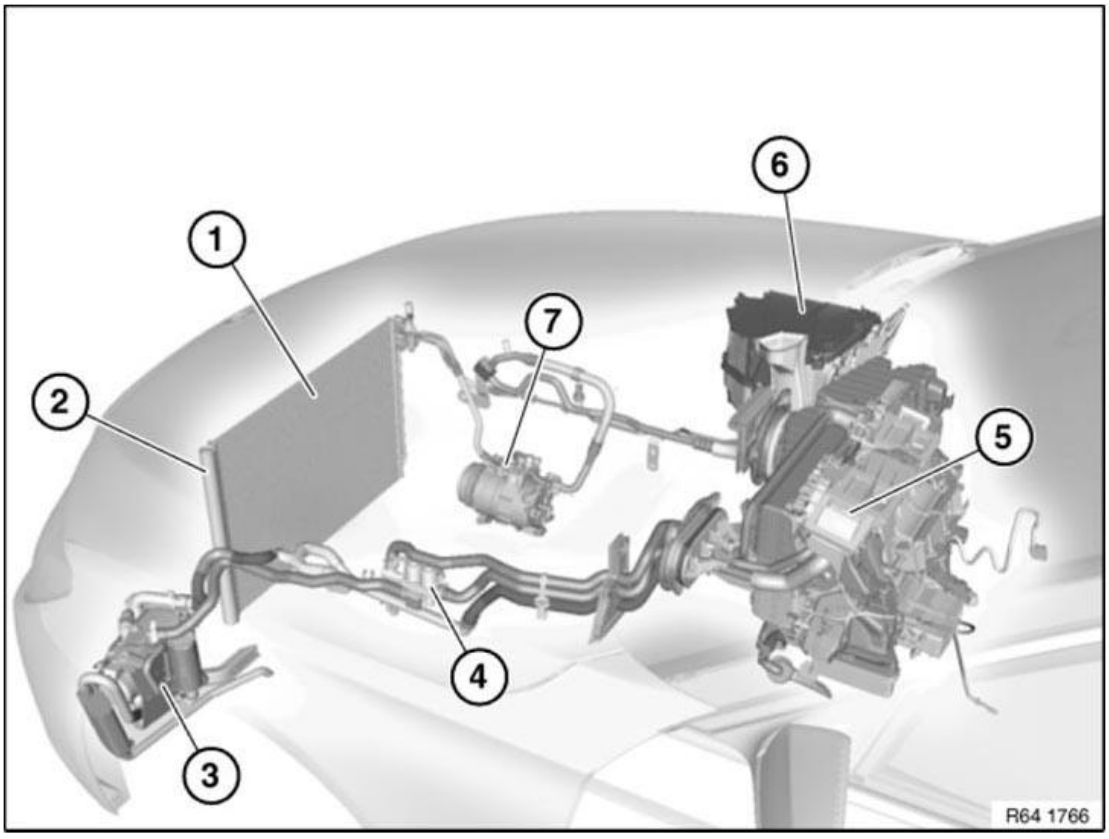


Fig. 166: Identifying Complete Accompanying Information Label And Filling Capacity Information Label
Courtesy of BMW OF NORTH AMERICA, INC.

64 00.. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Condenser for air conditioner
2 Drier insert for air conditioner
3 Independent heater and attachment parts
4 Water valve
5 Heater - A/C system and attachment parts
6 Fan and attachment parts
7 Compressor

Fig. 167: Overview Of Heater And A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 50... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT OIL

WARNING: Risk of injury!

Refrigerant circuit is under high pressure! Work on the refrigerant circuit may only be carried out by experts !

Draw off refrigerant without fail BEFORE all repair work on the refrigerant circuit.

The refrigerant circuit is depressurized AFTER drawing off!

- **Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service unit.**

Read and comply with the relevant operating instructions for the A/C service unit used.

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Do not smoke!
- Observe country-specific safety regulations.

First aid measures

- **If swallowed:** Do NOT induce vomiting, unless expressly instructed to do so by medical personnel. Do not administer anything to an unconscious person through their mouth. Consult a doctor immediately if larger quantities of this substance are swallowed. Loosen tight-fitting items of clothing (e.g. collar, tie, belt or similar).
- **Eye contact:** Remove contact lenses if worn. In the event of eye contact, rinse eyes for at least 15 minutes with plenty of water. **It is essential to use WARM WATER. Consult a doctor.**
- **Skin contact:** In the event of skin contact, rinse immediately with plenty of water. Remove contaminated clothes and shoes. Wash affected clothes before wearing again. Clean shoes thoroughly before reusing. **Call for a doctor.**
- **After inhalation:** If inhaled, take the person affected outside into fresh air immediately and keep them under supervision. **Call for a doctor.** If breathing difficulties are experienced, administer additional oxygen. If the person affected stops breathing, administer the kiss of life.

IMPORTANT: Refrigerant is hygroscopic and must therefore be stored in suitable containers that are sealed airtight!

Refrigerant oil is non-combustible and non-explosive at normal temperatures. Nevertheless, the following points must be observed:

- **Do not store in the vicinity of flames, heat sources or strongly oxidizing materials**
- **Suitable extinguishants are carbon dioxide (CO_2) dry extinguishant and foam**

Recycling

Catch and dispose of emerging refrigerant oil.

Observe country-specific waste disposal regulations.

Absorb escaping refrigerant oil with fluid-binding material.

Notify the relevant authorities if larger amounts of refrigerant oil are discharged into aboveground water supplies, drainage systems or subsoil.

64 50... SAFETY INSTRUCTIONS FOR HANDLING TETRAFLUORETHANE REFRIGERANT R134A

WARNING: Risk of injury!

Refrigerant circuit is under high pressure! Work on the refrigerant circuit may only be carried out by experts!

Draw off refrigerant without fail BEFORE all repair work on the refrigerant circuit.

The refrigerant circuit is depressurized AFTER drawing off.

- **The pressure gauge on the A/C service unit must be checked for the actual pressure drop prior to repair work.**

It is absolutely essential to read and observe the relevant operating instructions for the A/C service unit used!

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Do not smoke!
- Observe country-specific safety regulations.

First aid measures

- **Eye contact:** In the event of contact with the eyes, rinse immediately with plenty of running water and consult an ophthalmologist.
- **Skin contact:** In the event of contact with skin, remove affected clothing immediately and rinse with plenty of water.
- **After inhalation:** If refrigerant vapors are inhaled in greater concentrations, remove the person affected to an area of fresh air and keep them under supervision. Call for a doctor. If breathing problems are experienced, breathe additional oxygen. If the person affected is breathing with difficulty or has stopped breathing, incline the person's head at the neck and administer the kiss of life.

6451 AC HOUSING EVAPORATOR, SWITCHING ELEMENTS

64 51 001 CLEANING EVAPORATOR

WARNING: When handling cleaning agent, observe following protective measures:

Wear protective rubber gloves and protective goggles.

If cleaning agent comes into contact with eyes or skin, wash immediately with lots of water.

Comply with NOTES AND INSTRUCTIONS ON HANDLING CLEANING AGENTS.

A new spray lance was developed for professional cleaning and disinfection of the evaporator of the heating and air conditioning system. Course dirt contamination and bacteria can only be effectively eliminated with this spray lance. See **SPRAYING LANCE FOR AIR CONDITIONING**.

IMPORTANT: To avoid dirtying vehicle interior:

- **Close all air vents**
- **Heater - A/C system must be switched to air recirculation function**
- **Cover carpet in work area**

Recycling: Carry out the cleaning operation in a suitable washing bay as the emerging cleaning agent escapes through the drain openings in the transmission tunnel.

After completing cleaning, allow car to drip-dry for approx. 5 minutes.

Necessary preliminary tasks:

- Remove **REAR UNDERBODY PROTECTION**
- Remove **MICROFILTER FOR PASSENGER COMPARTMENT VENTILATION**

NOTE: Cleaning procedure must be performed in two steps with special tool 2 222 502.

STEP 1:

Insert special tool 2 222 502 in the rear opening of the microfilter housing (1) at position (2) as shown in **Fig. 168**.

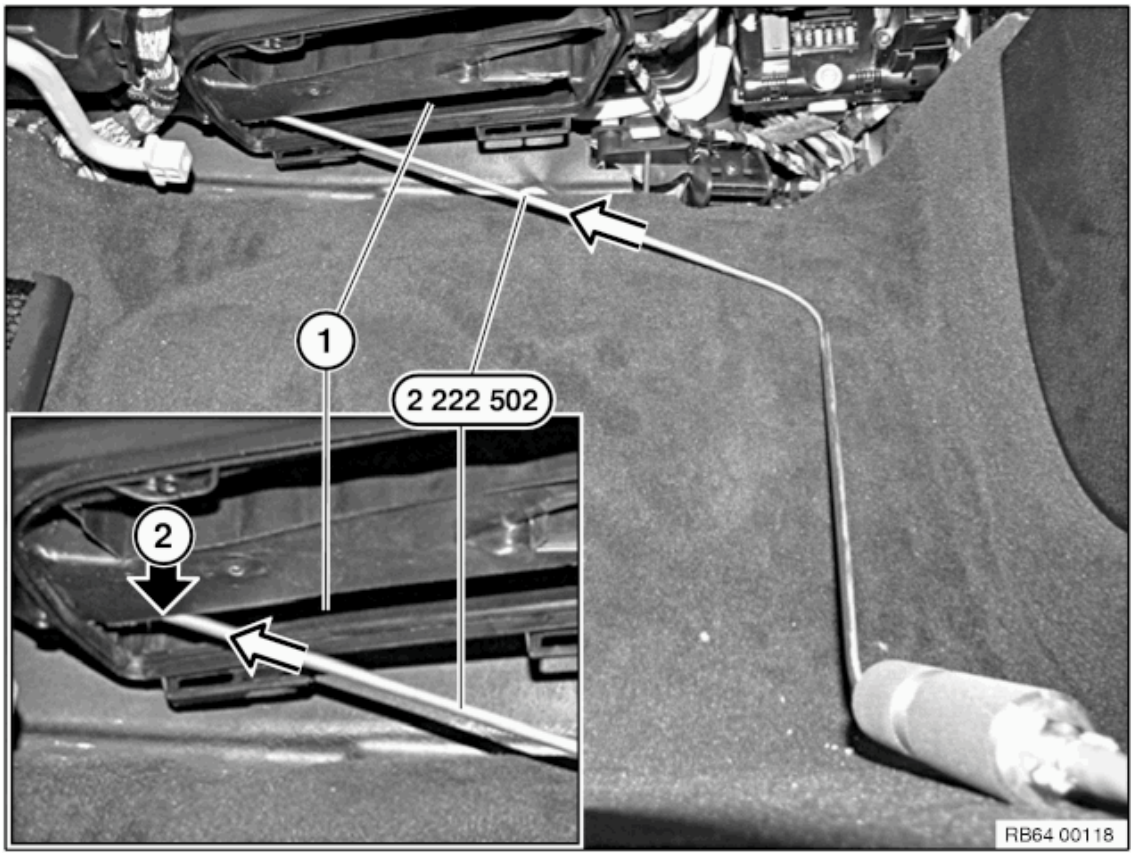


Fig. 168: Inserting Special Tool 2 222 502
Courtesy of BMW OF NORTH AMERICA, INC.

Move special tool 2 222 502 from top downwards (A) up to stop.

At the same time, press special tool 2 222 502 at position (1) in the direction of the arrow against the microfilter housing.

Spray approximately half of the cleaning agent. Then pull the special tool 2 222 502 out of the microfilter housing.

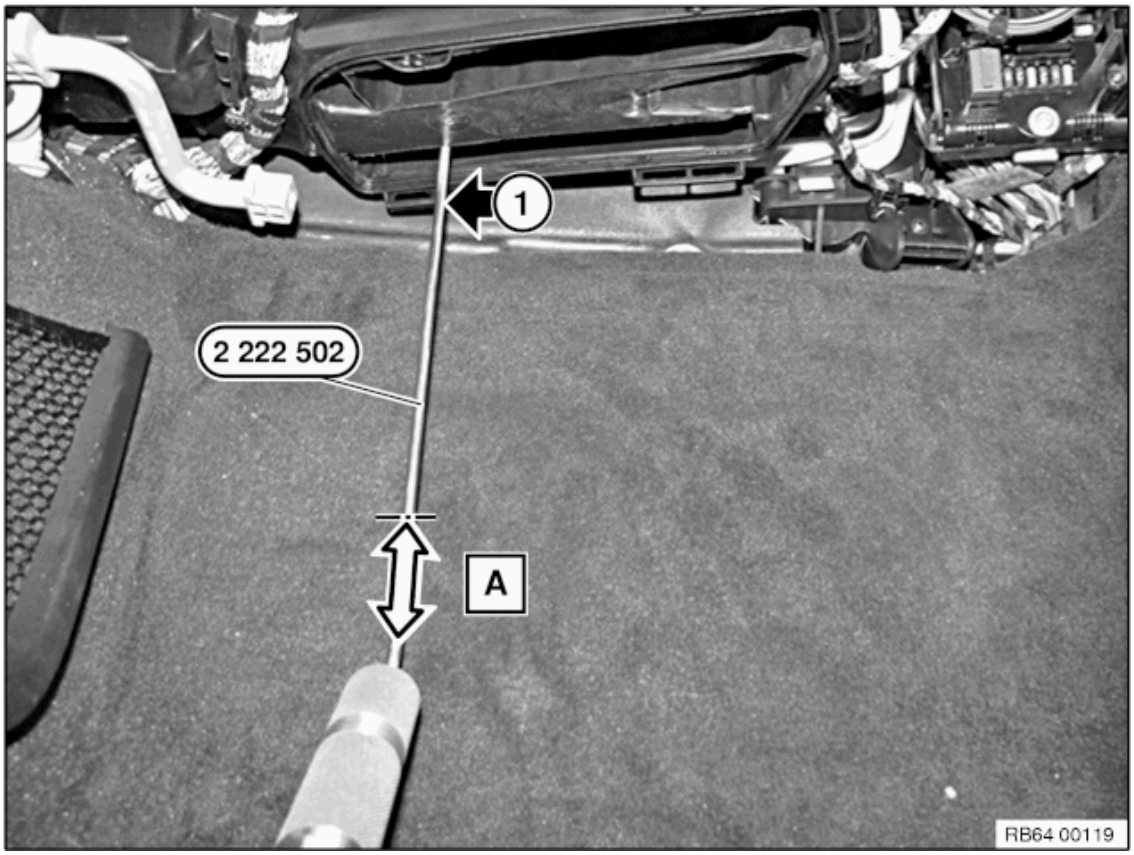


Fig. 169: Spraying Half Of Cleaning Agent
Courtesy of BMW OF NORTH AMERICA, INC.

Step 2: Insert special tool 2 222 502 in the rear opening of the microfilter housing (2) at position (1) as shown in **Fig. 170**.

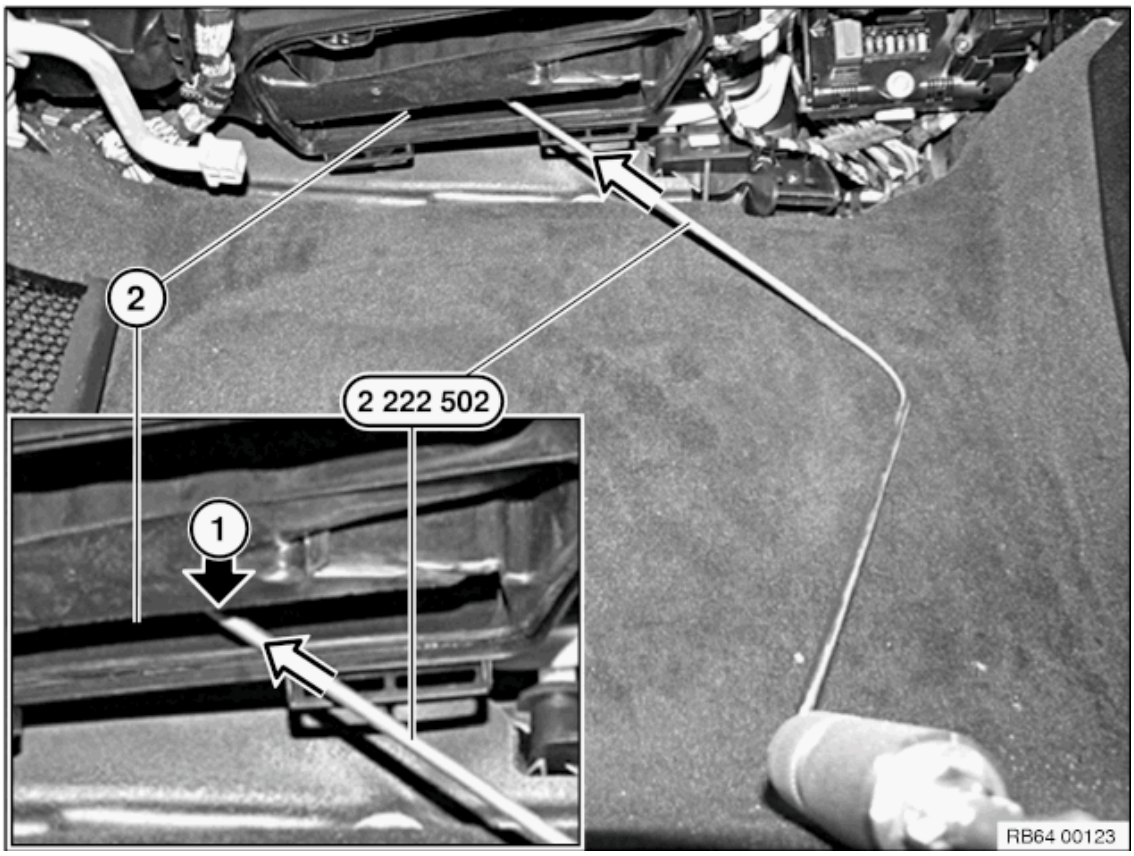


Fig. 170: Inserting Special Tool 2 222 502
Courtesy of BMW OF NORTH AMERICA, INC.

Move special tool 2 222 502 from top downwards (A) up to stop.

At the same time, press special tool 2 222 502 at position (1) in the direction of the arrow against the microfilter housing.

Spray the remaining half of the cleaning agent. Then pull the special tool 2 222 502 out of the microfilter housing.

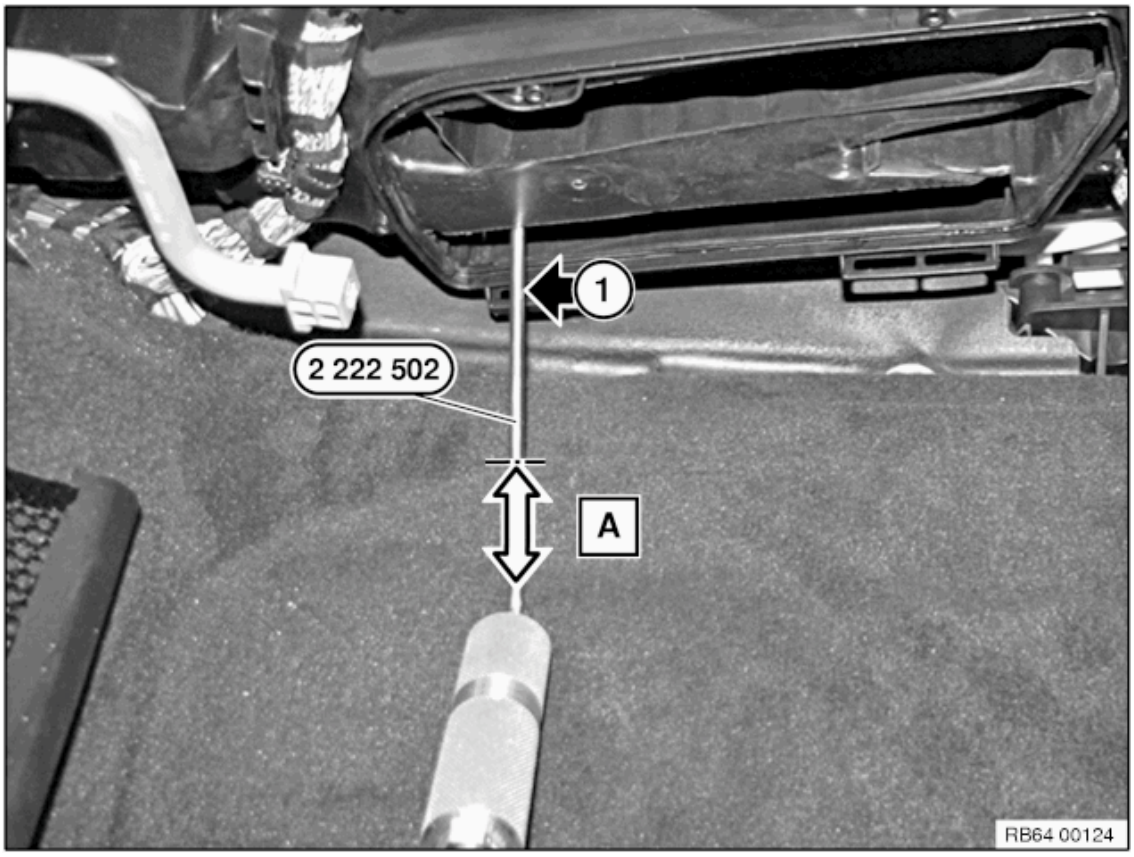


Fig. 171: Spraying Remaining Half Of Cleaning Agent
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Set heating - A/C system to footwell ventilation and fresh-air mode. Open side windows/doors.**

Start the vehicle and let the heating and air conditioning system run for at least 5 minutes at maximum blower output.

In order to eliminate the last remnants of cleaning agent, repeat this process shortly before handover to the customer.

Spraying lance for air conditioning

Special tool 2 222 502

The spraying lance has a special form that is adapted specifically to the air conditioning unit.

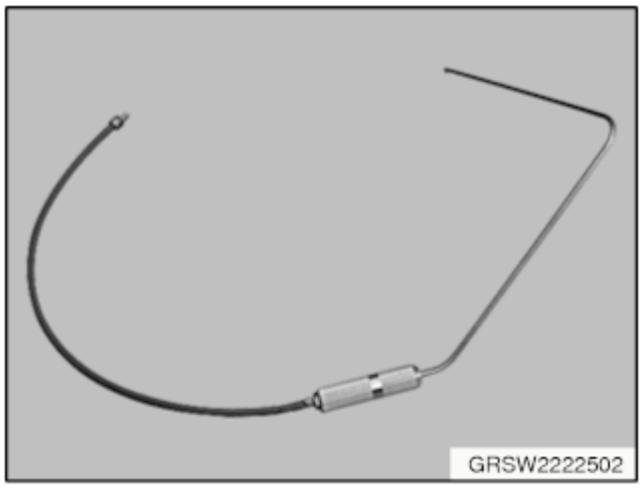


Fig. 172: Identifying Spraying Lance (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

The spraying lance is used in combination with the HRS spray gun (order number 81 45 9 429 217).

The Seku Aircond cleaning agent can no longer be ordered; instead, air conditioner cleaner (order number 83 19 0 447 911) is now available.

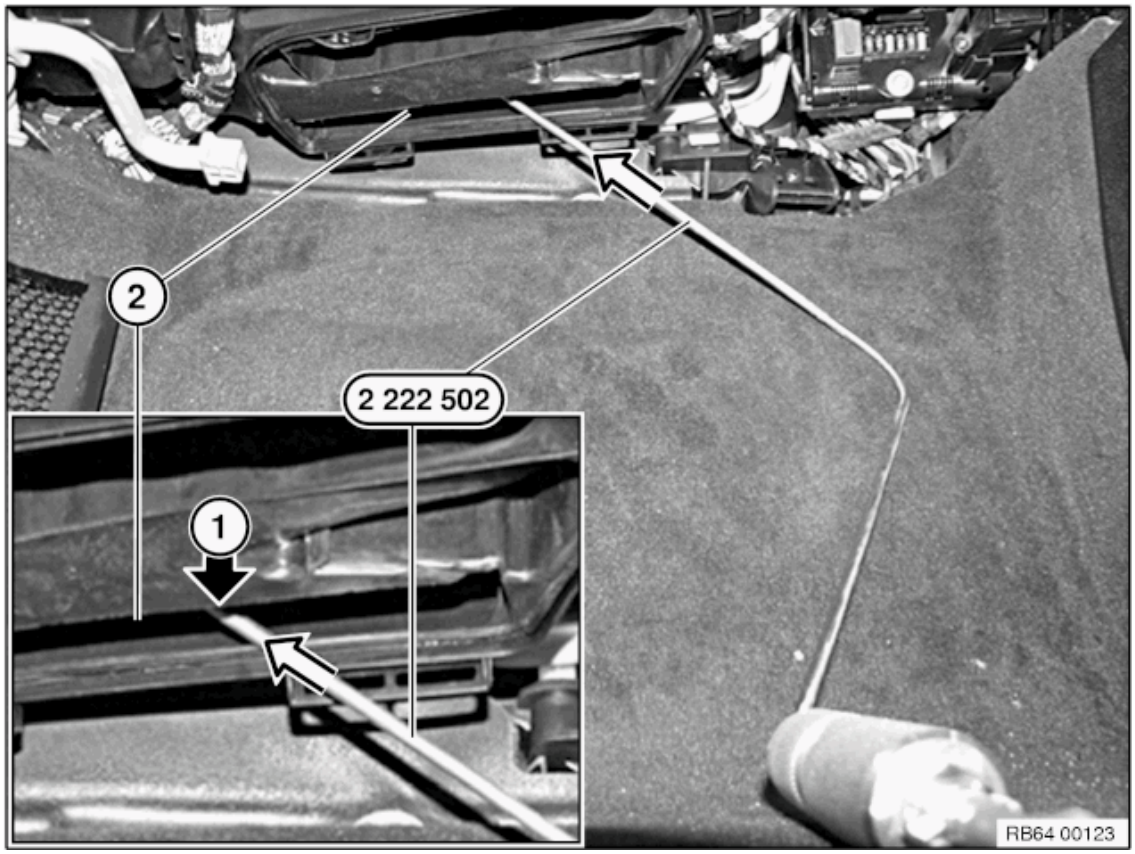


Fig. 173: Identifying Spraying Lance (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

64 52... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- **Avoid contact with refrigerant and refrigerant fluid**
- **Follow safety information for handling R134A refrigerant. See INSTRUCTIONS FOR HANDLING R 134A REFRIGERANT.**
- **Follow safety information for HANDLING REFRIGERANT FLUID**

IMPORTANT:

- **Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)**

  They must not be coated.

  Use special tool 00 9 030 to install sealing rings without damaging them.

- **Open the refrigerant circuit for as short of a period as possible.**
- **Close all components and lines in the refrigerant circuit and return parts immediately following the removals at openings with special tool 32 1 270 to prevent penetration of moisture or foreign objects.**
- **If the refrigerant circuit was closed at the openings with special tool 32 1 270 but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.**

I. Part replacement as preliminary work fur further repair work and part replacement based on gradual leakage

(minor leak, e.g. hairline crack)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 10 ml
  - Capacitor: 20 ml
  - Desiccant insert/dryer flask: 20 ml
  - Each replaced refrigerant line: 10 ml
  - Capacitor with integrated dryer: 40 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

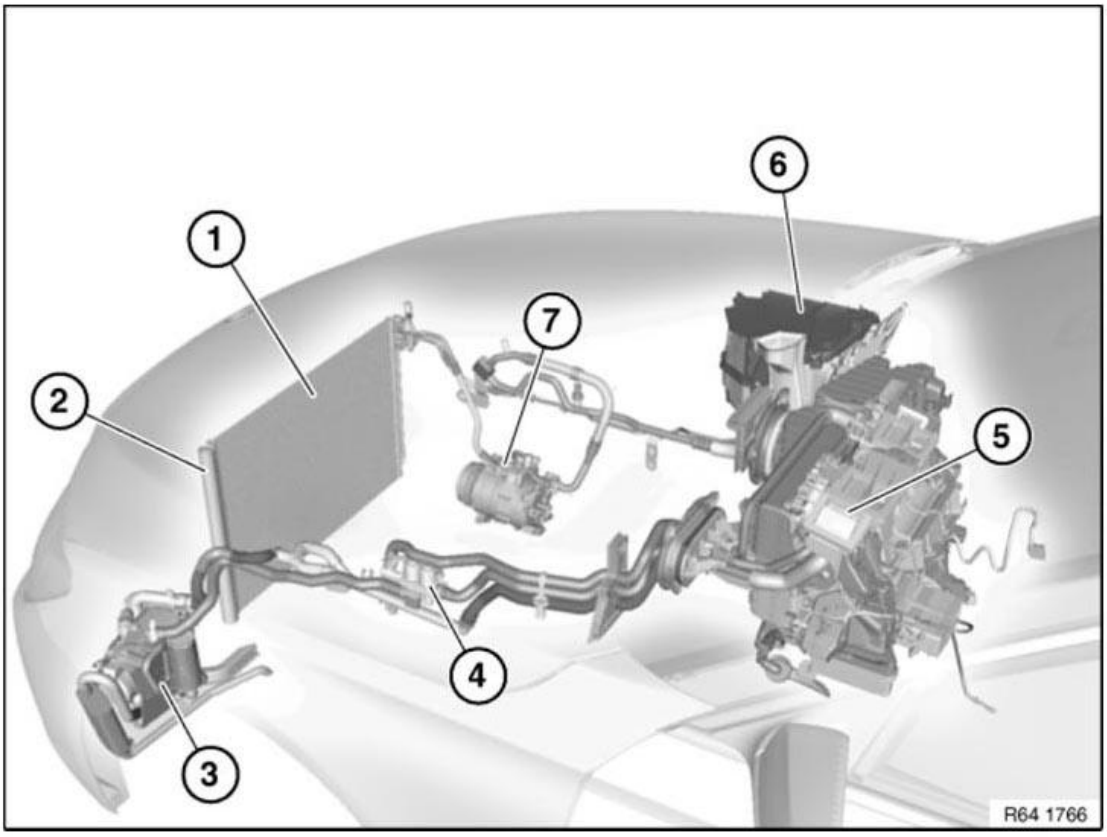
II. Part replacement due to sudden leak

(major leak, e.g. pipe break due to accident)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 35 ml
  - Capacitor: 35 ml
  - Desiccant insert/dryer flask: 55 ml
  - Each replaced refrigerant line: 35 ml
  - Capacitor with integrated dryer: 55 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

64 00.. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Condenser for air conditioner
2 Drier insert for air conditioner
3 Independent heater and attachment parts
4 Water valve
5 Heater - A/C system and attachment parts
6 Fan and attachment parts
7 Compressor

Fig. 174: Overview Of Heater And A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 51 525 REMOVING AND INSTALLING OR REPLACING EXPANSION VALVE

Notes

WARNING: Danger of injury!

Refrigerant circuit is under high pressure!

Avoid contact with refrigerant and refrigerant fluid.

Read and comply with safety information:

- **Follow safety information for handling R 134a tetrafluorethane refrigerant. See SAFETY INSTRUCTIONS FOR HANDLING TETRAFLUORETHANE REFRIGERANT R134A.**

- **HANDLING REFRIGERANT FLUID**

IMPORTANT: Risk of damage!

Restart engine only when air conditioning system has been correctly filled.

Follow NOTES for opening and replacing parts in refrigerant circuit.

If air conditioning system is opened for more than 24 hours: Replacing DESICCANT INSERT for air conditioning system

Necessary preliminary work

- **DRAWING OFF, EVACUATING AND FILLING THE HEATING AND AIR CONDITIONING SYSTEM** are not included in the time value given for this job item
- Remove **SOUND INSULATION FROM BULKHEAD UPPER SECTION**

Feed out line penetration (1) towards top.

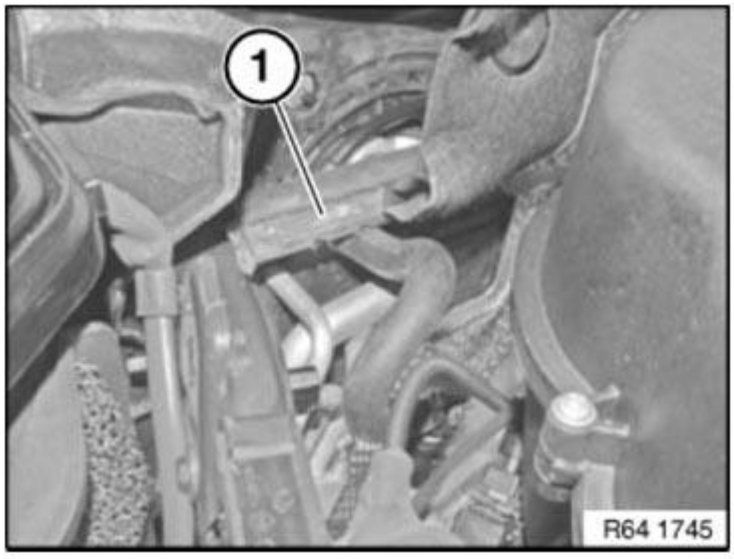


Fig. 175: Identifying Line Penetration
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove refrigerant lines (2) with associated seal.

Tightening torque **64 53 1AZ** .

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to install sealing rings without damaging them.

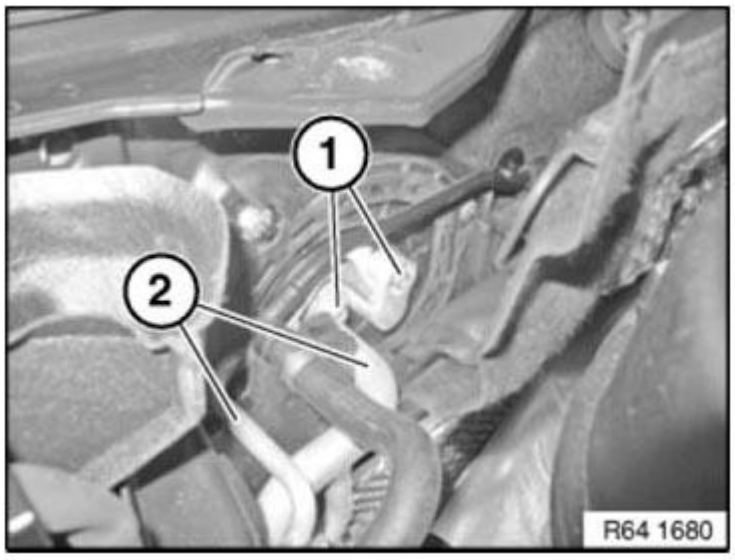


Fig. 176: Identifying Refrigerant Lines And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

F02/F03 Automatic rear air-conditioning system only:

Release screw (1).

Tightening torque **64 53 7AZ** .

Remove refrigerant line (2) with associated seal.

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to install sealing rings without damaging them.

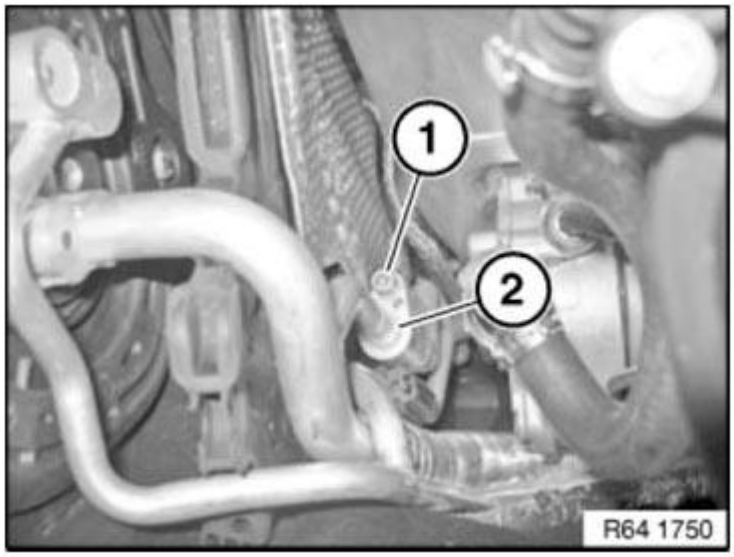


Fig. 177: Identifying Refrigerant Line And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **64 53 9AZ** .

Remove sealing plate (2) by maneuvering upwards.

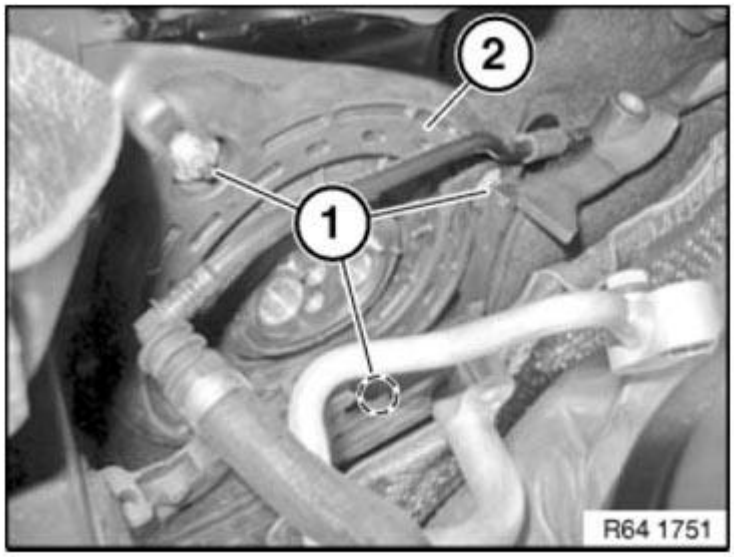


Fig. 178: Identifying Sealing Plate And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out foam material (1).

Unfasten screws (2).

Tightening torque **64 53 2AZ** .

Carefully remove flange (3) with expansion valve behind.

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

Flange (3) must be correctly seated on expansion valve.

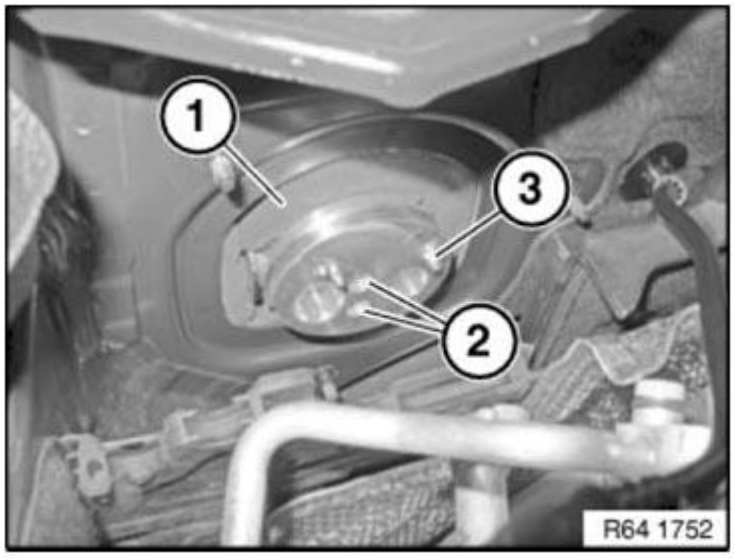


Fig. 179: Identifying Flange And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **EVACUATE AND FILL A/C SYSTEM**

64 51 591 REMOVING AND INSTALLING/RENEWING EVAPORATOR

Notes

NOTE: **Non-coated evaporators were installed in connection with ozone generator on vehicles built before 09/2010.**

A coated evaporators without an ozone generator is installed on vehicles built after 09/2010.

The evaporators must not be confused!

Refer to EPC for part number!

Necessary preliminary work

- Remove **REMOVING AND INSTALLING/REPLACING HEATING AND AIR-CONDITIONING UNIT**
- Remove **HEAT EXCHANGER**

Release screws (1) on filter housing (2).

Remove microfilter cover (3) in direction of arrow.

Installation note:

Microfilter cover (3) must be correctly engaged in guides on filter housing (2).

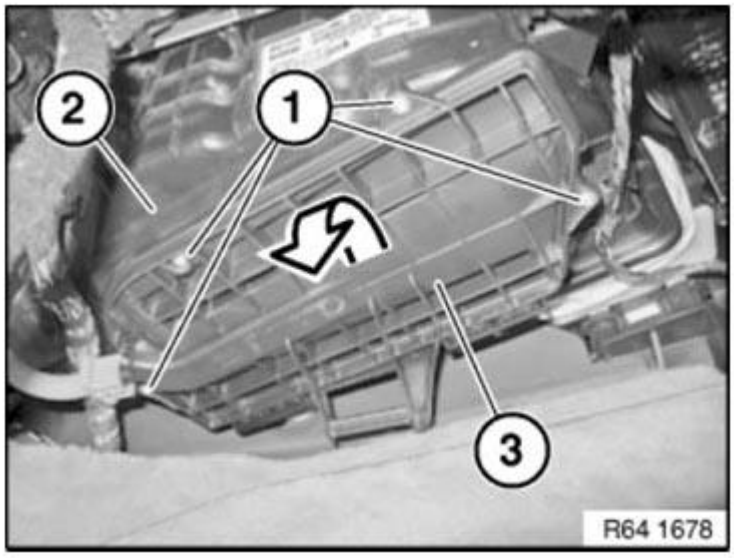


Fig. 180: Removing Microfilter Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove microfilter (1) at tabs in direction of arrow from filter housing (2).

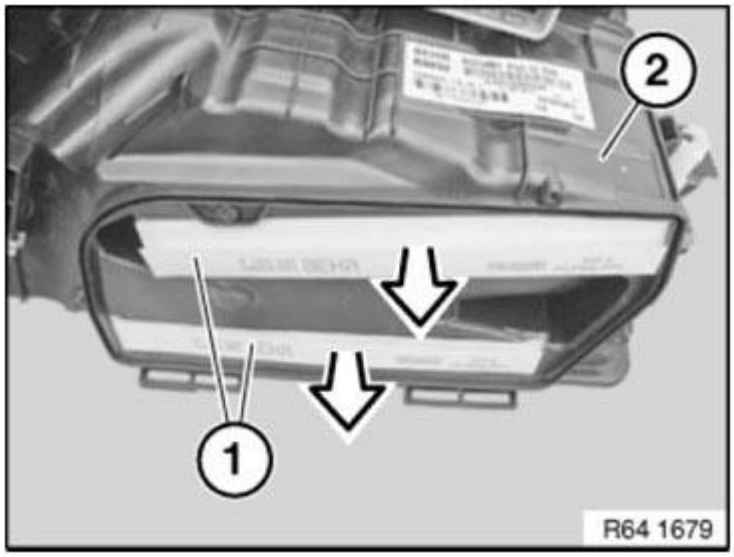


Fig. 181: Removing Microfilter From Filter Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove distributor housing lower section (2).

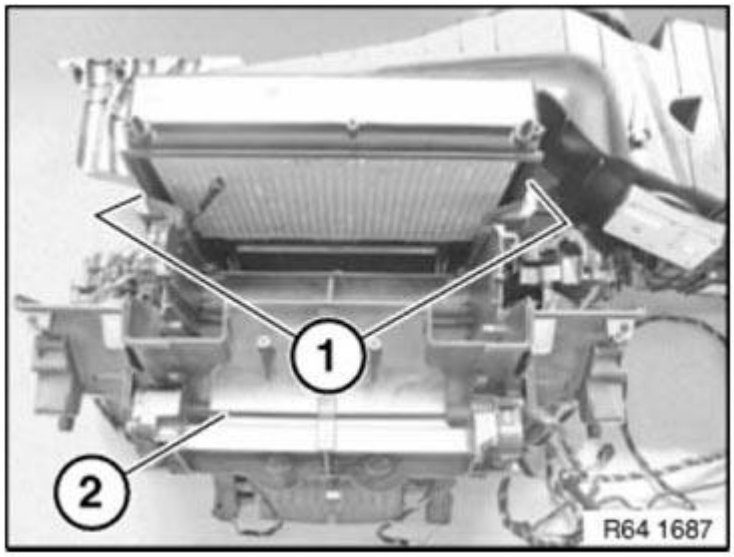


Fig. 182: Identifying Distributor Housing Lower Section And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on airbag control unit (2).

Remove airbag control unit (2).

Release all screws on filter housing upper section (2) and remove towards top.

Installation note:

In case of equipment specification with rear air conditioner, ensure correct cable routing of shut-off valve (4).

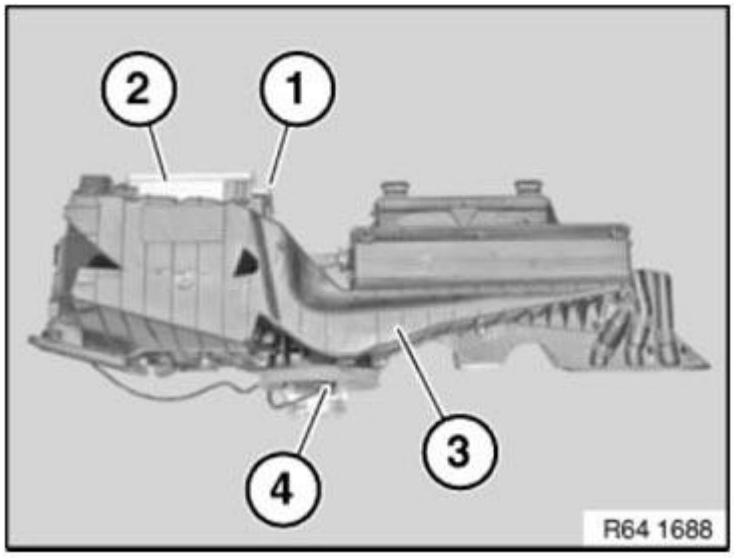


Fig. 183: Identifying Airbag Control Unit And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove evaporator (1) in direction of arrow from distributor housing (2) and set down securely.

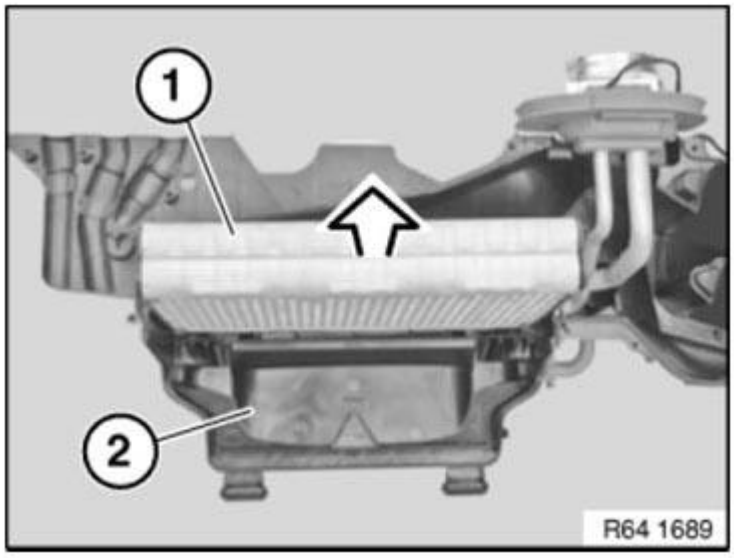


Fig. 184: Removing Evaporator From Distributor Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Release screws (1) and remove flange (2) with expansion valve (3).

Tightening torque **64 53 2AZ** .

Installation note:

Ensure that seals are correctly seated.

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

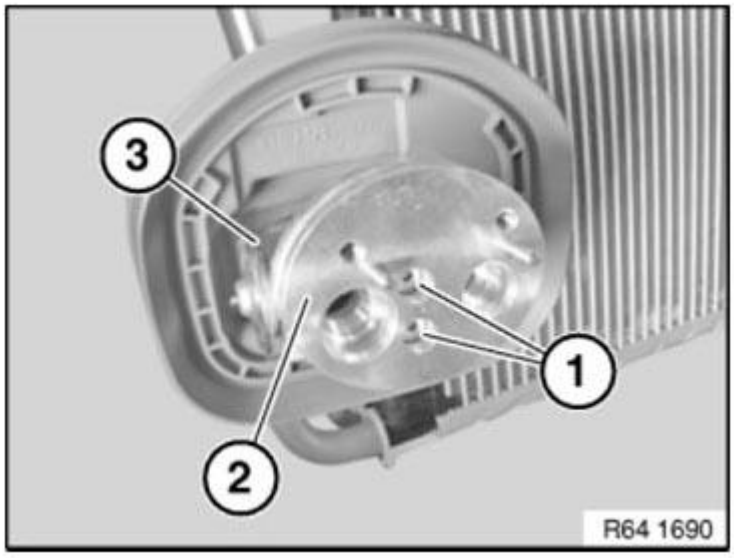


Fig. 185: Identifying Expansion Valve, Flange And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

64 51 600 REMOVING AND INSTALLING/REPLACING EVAPORATOR FOR REAR AIR CONDITIONER

Necessary preliminary tasks

- Remove **REAR AIR CONDITIONER**
- **REMOVE RIGHT FLAP ACTUATOR DRIVE**

Release screws (1) on flange holder (2).

Installation:

Make sure flange holder (2) is correctly seated in designated guide on rear air conditioner housing.

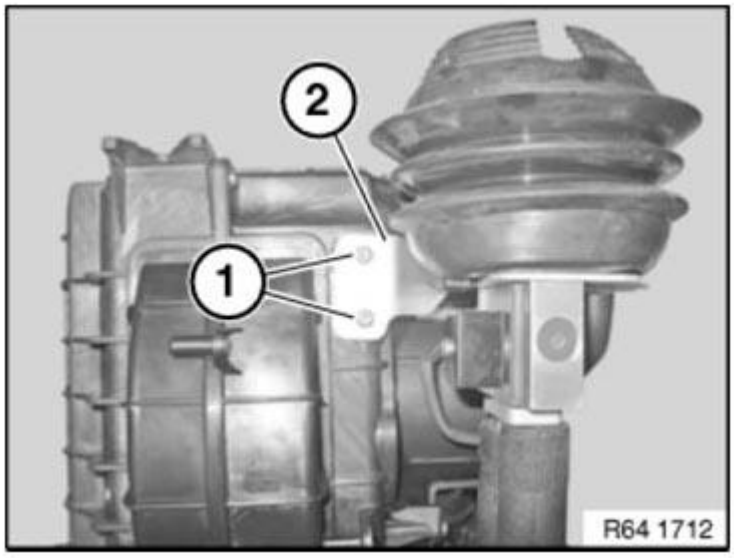


Fig. 186: Identifying Flange Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unclip associated plug housing from blower motor cover (2).

Unlock plug connection (3) and disconnect.

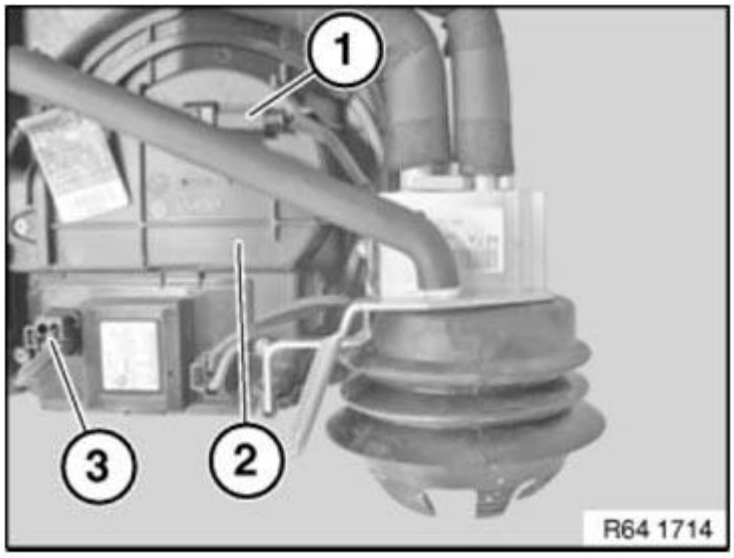


Fig. 187: Identifying Blower Motor Cover And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Slide retaining clasps (1) in direction of arrow and remove.

Unlock plug connections (2) and disconnect.

Snap plug housing (3) out of filter housing and remove.

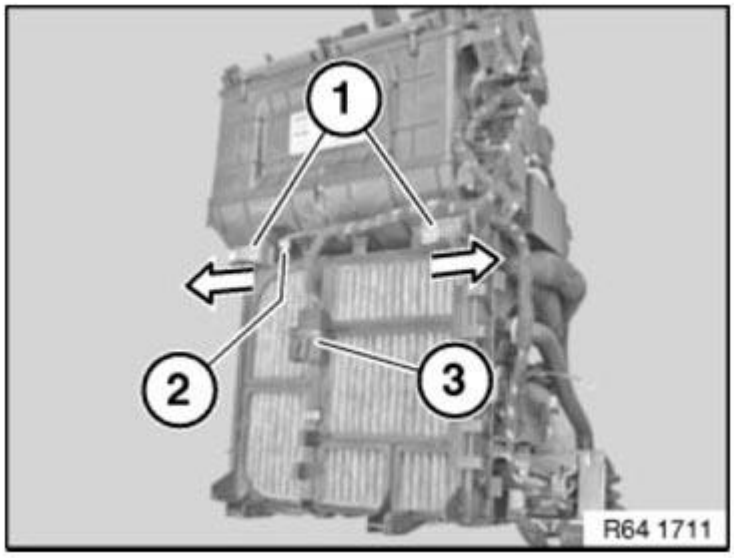


Fig. 188: Sliding Retaining Clasps
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove upper housing section (2) from lower housing section.

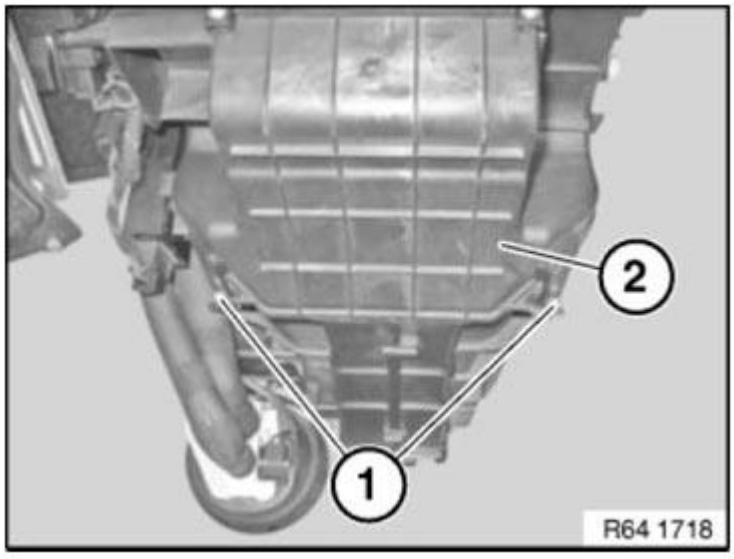


Fig. 189: Identifying Upper Housing Section And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Pull condensation water drain hose (2) out of gaiter (3).

Remove evaporator housing (4).

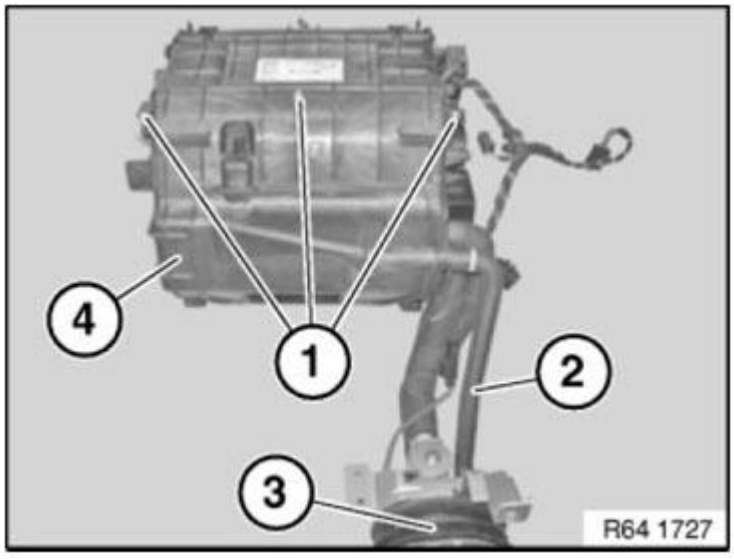


Fig. 190: Identifying Condensation Water Drain Hose And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove evaporator (1) in direction of arrow out of upper housing section (2).

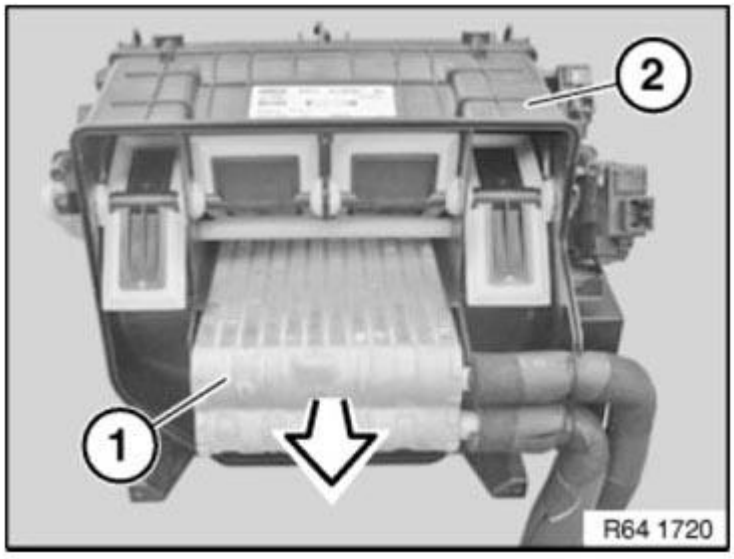


Fig. 191: Removing Evaporator Of Upper Housing Section
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Remove **EXPANSION VALVE**

64 51 530 REMOVING AND INSTALLING/REPLACING EXPANSION VALVE FOR REAR AIR CONDITIONER

Necessary preliminary tasks

- Remove **REAR AIR CONDITIONER**

Release screws (1) on flange holder (2).

Installation:

Make sure flange holder (2) is correctly seated in associated guide on rear air conditioner housing.

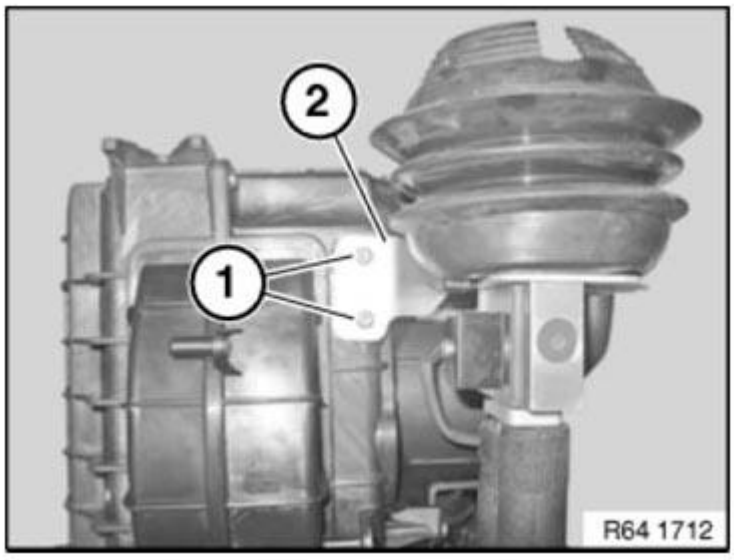


Fig. 192: Identifying Flange Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull condensation water drain hose (1) out of gaiter (4).

Unscrew nuts (2).

Remove flange (3) incl. holder and gaiter (4).

Installation:

Valve openings must be fully exposed and must not be covered either by flange (3) or the flange holder.

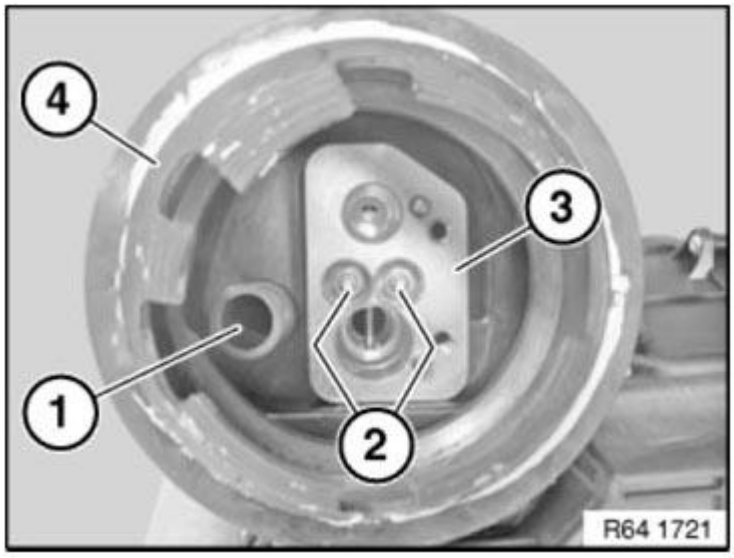


Fig. 193: Identifying Condensation Water Drain Hose, Flange And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and carefully remove expansion valve (2).

Tightening torque **64 53 6AZ** .

Installation:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

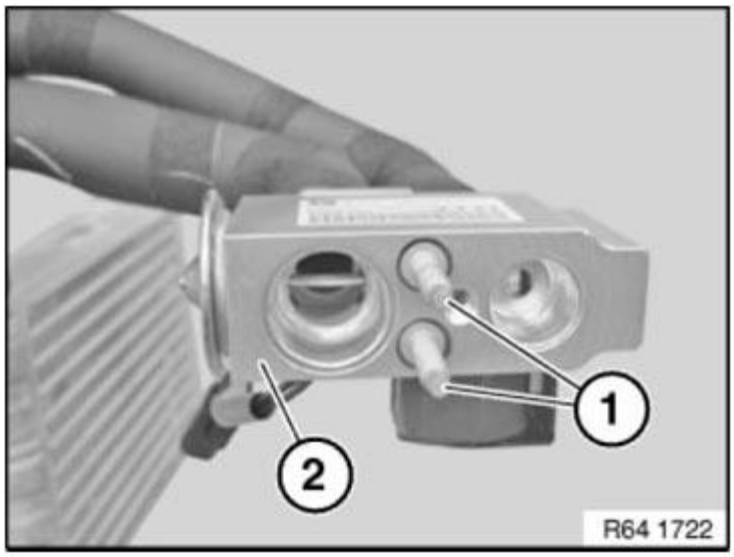


Fig. 194: Identifying Expansion Valve And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

6452 COMPRESSOR

64 52... INSTRUCTIONS FOR COMPRESSOR REPLACEMENT

Notes

IMPORTANT: Compressors with plastic belt pulleys:

- **Avoid impacts/knocks to plastic belt pulley (caused by tools, contact with base).**
- **Return faulty compressors in their original packaging only.**

In the event of mechanical compressor failure and the resulting ingress of chips into the refrigerant circuit, replace desiccant insert for A/C system. See REPLACING DESICCANT INSERT FOR AIR CONDITIONING SYSTEM or REPLACING DESICCANT INSERT FOR A/C SYSTEM (CAPACITOR REMOVED).

IMPORTANT: When starting up a new compressor for the first time, it is absolutely essential to carry out the following initial operation (breaking-in) procedure:

- **Switch on Air conditioning system**
- **Set all air vents in instrument panel to "OPEN"**
- **Start engine and let it stabiles at idle speed**
- **Set blower output to min. 75% of max. blower output**
- **Switch on Air conditioning system and run for at least 2 minutes at idle speed (risk of damage at increased engine speed!)**

When evacuating the air conditioning system, refrigerant fluid is also extracted and collected in the oil separator of the A/C service station.

After evacuation, the refrigerant must be filtered in the A/C service station as the oil separator could still contain a liquid refrigerant/oil mixture. The cleaning operation gasifies the refrigerant completely and only the previously bound refrigerant fluid remains in the oil separator. Measure and note down this quantity of refrigerant fluid.

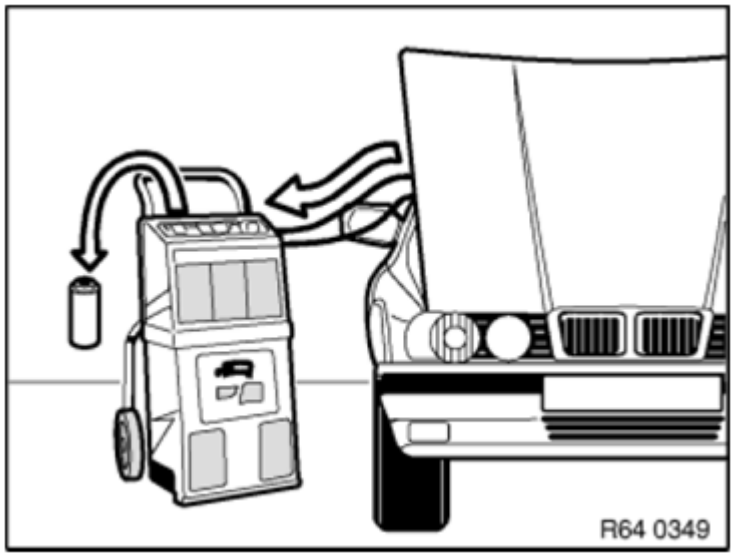


Fig. 195: Connecting Special Tools To Evacuating Air Conditioning System
Courtesy of BMW OF NORTH AMERICA, INC.

- **REFER TO "DRAWING OFF AIR CONDITIONING SYSTEM"**

Transfer the refrigerant fluid remaining in the previous compressor via the filler plug completely into a measuring cup.

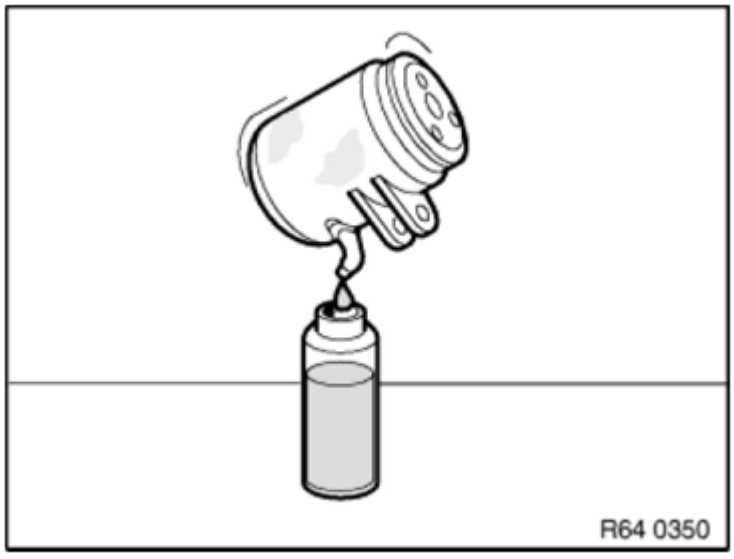


Fig. 196: Draining Refrigerant Fluid
Courtesy of BMW OF NORTH AMERICA, INC.

Measure the amount of refrigerant fluid collected from the previous compressor.

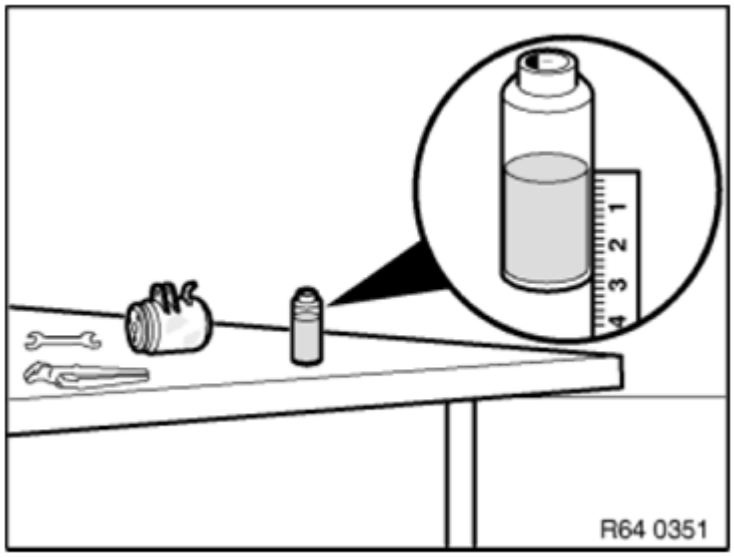


Fig. 197: Measuring Amount Of Refrigerant Fluid
Courtesy of BMW OF NORTH AMERICA, INC.

The new compressor is filled at the factory with refrigerant fluid. Open filler plug and pour entire contents of compressor into a clean collecting vessel.

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

Tightening torque **64 52 2AZ** .

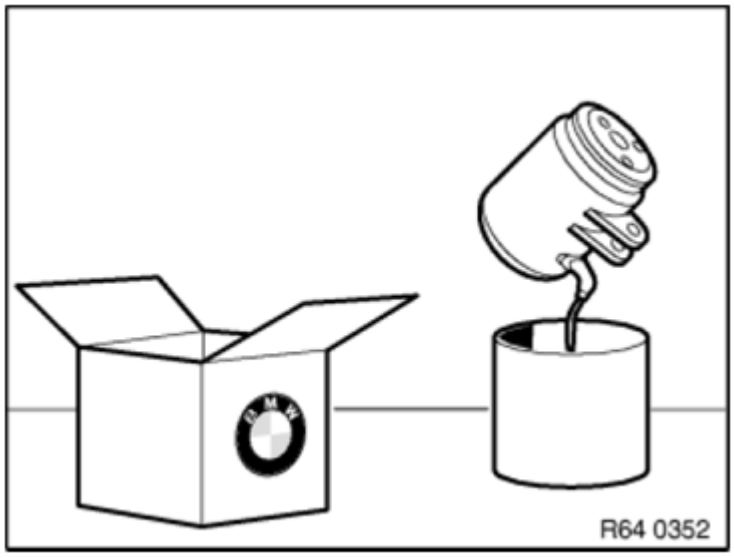


Fig. 198: Pouring Entire Contents Of Compressor Into Clean Collecting Vessel
Courtesy of BMW OF NORTH AMERICA, INC.

From the new compressor, pour the same amount of refrigerant fluid (as drained from the previous compressor) + 10 g extra into a clean measuring cup and pour again into the new compressor.

Remaining refrigerant fluid can be poured into A/C service station tank.

- **REFER TO "EVACUATING AIR CONDITIONING SYSTEM"** .

Otherwise the excess refrigerant fluid must be disposed of correctly.

On account of its hygroscopic properties, refrigerant fluid must not be stored in open containers.

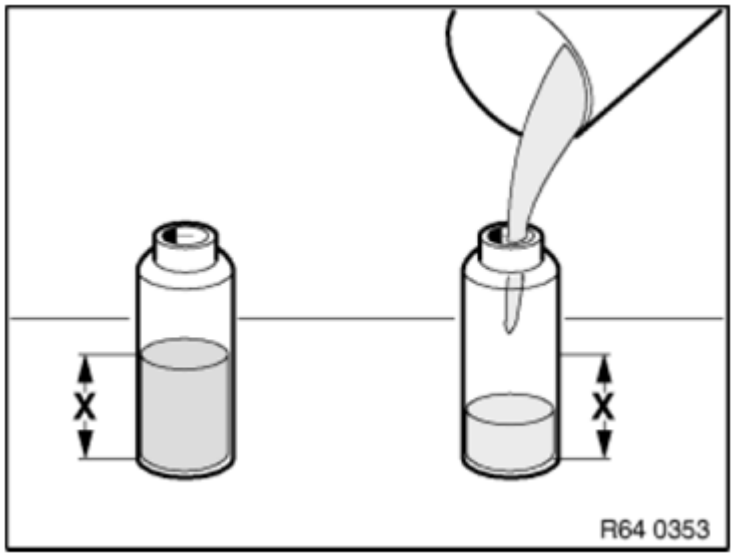


Fig. 199: Pouring Amount Of Refrigerant Fluid Into Measuring Cup
Courtesy of BMW OF NORTH AMERICA, INC.

The refrigerant fluid drawn off from the oil separator of the A/C service station and from the previous compressor must not be reused and must be correctly disposed of.

Observe country-specific waste disposal regulations.

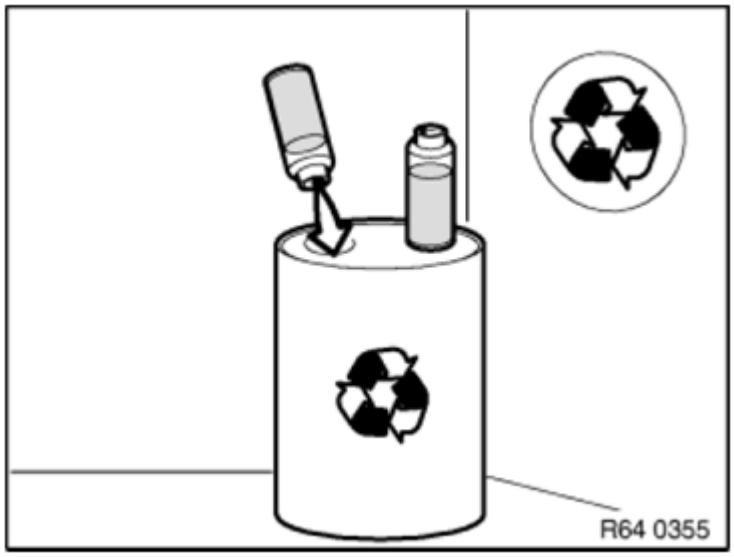


Fig. 200: [Recycling Refrigerant Fluid]
Courtesy of BMW OF NORTH AMERICA, INC.

After installing the new compressor, it is essential before filling the Air conditioning system to pour the same amount of the previously drawn off refrigerant fluid into the system again,

- **REFER TO "FILLING AIR CONDITIONING SYSTEM"**

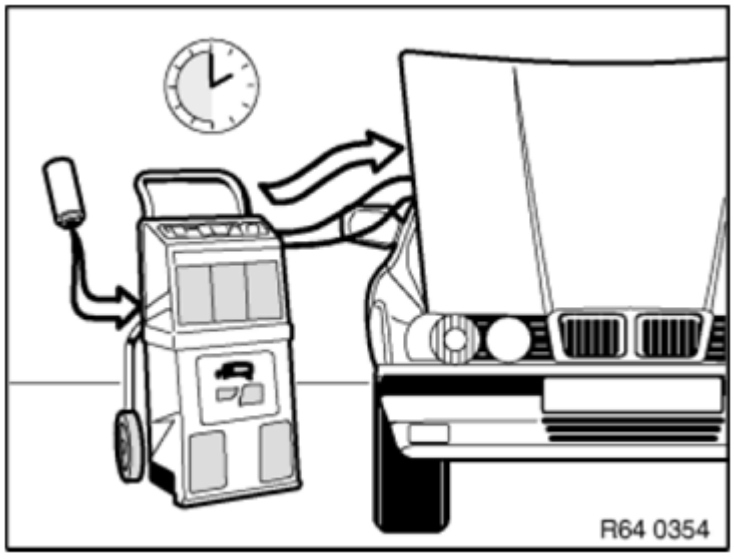


Fig. 201: Connecting Special Tools To Evacuating Air Conditioning System
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If air conditioning system is opened for more than 24 hours:

- Replace desiccant insert for A/C system. See **REPLACING DESICCANT INSERT FOR AIR CONDITIONING SYSTEM** or **REPLACING DESICCANT INSERT FOR A/C SYSTEM (CAPACITOR REMOVED)**.

64 52... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- **Avoid contact with refrigerant and refrigerant fluid**
- **Follow safety information for handling R134A refrigerant. See INSTRUCTIONS FOR HANDLING R 134A REFRIGERANT.**
- **Follow safety information for HANDLING REFRIGERANT FLUID**

IMPORTANT:

- **Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)**

  They must not be coated.

  Use special tool 00 9 030 to install sealing rings without damaging them.

- **Open the refrigerant circuit for as short of a period as possible.**
- **Close all components and lines in the refrigerant circuit and return parts immediately following the removals at openings with special tool 32 1 270 to prevent penetration of moisture or foreign objects.**
- **If the refrigerant circuit was closed at the openings with special tool 32 1 270 but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.**

I. Part replacement as preliminary work fur further repair work and part replacement based on gradual leakage

(minor leak, e.g. hairline crack)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 10 ml
  - Capacitor: 20 ml
  - Desiccant insert/dryer flask: 20 ml
  - Each replaced refrigerant line: 10 ml
  - Capacitor with integrated dryer: 40 ml

    - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

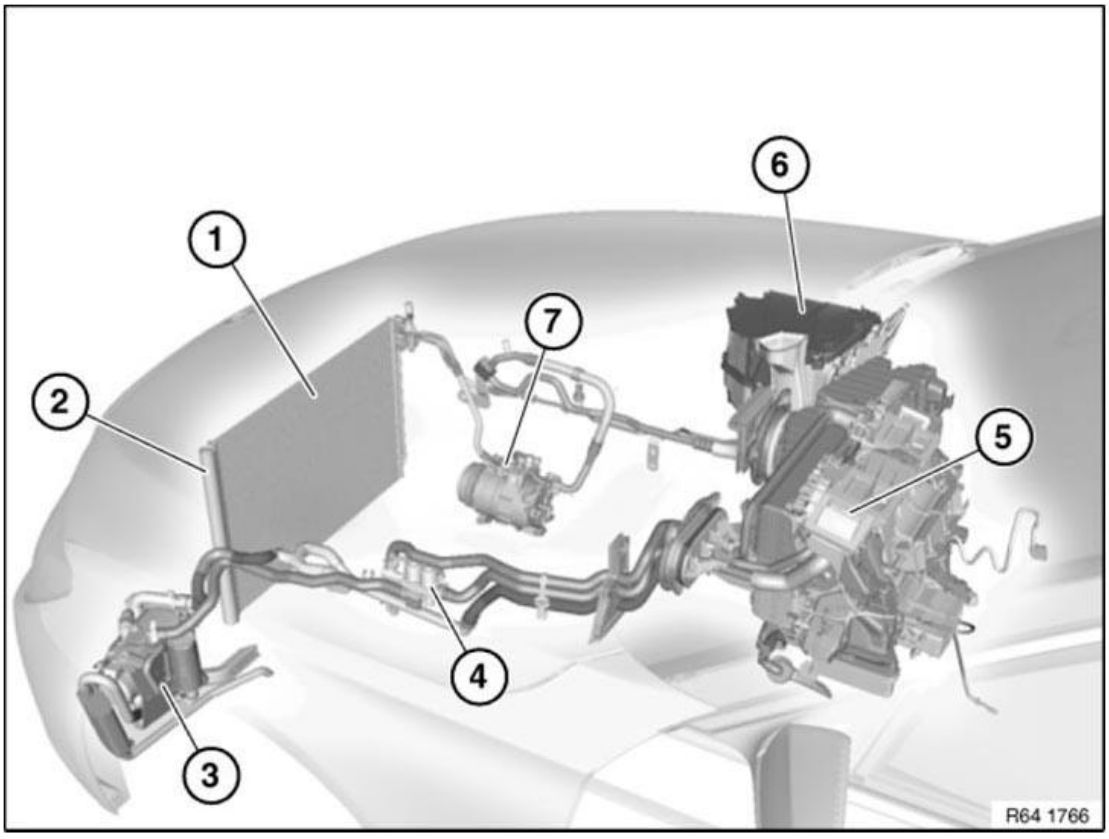
II. Part replacement due to sudden leak

(major leak, e.g. pipe break due to accident)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
    - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
    - Evaporator: 35 ml
    - Capacitor: 35 ml
    - Desiccant insert/dryer flask: 55 ml
    - Each replaced refrigerant line: 35 ml
    - Capacitor with integrated dryer: 55 ml
    - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

64 00.. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Condenser for air conditioner
2 Drier insert for air conditioner
3 Independent heater and attachment parts
4 Water valve
5 Heater - A/C system and attachment parts
6 Fan and attachment parts
7 Compressor

Fig. 202: Overview Of Heater And A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 52 523 REMOVING AND INSTALLING/REPLACING A/C SYSTEM COMPRESSOR (N63)

Notes

WARNING: Danger of injury!

Refrigerant circuit is under high pressure!

Follow safety instructions for handling R 134A refrigerant. See INSTRUCTIONS FOR HANDLING R 134A REFRIGERANT.

Avoid contact with refrigerant and refrigerant fluid.

Follow safety information for HANDLING REFRIGERANT FLUID .

IMPORTANT: Risk of damage!

Restart engine only when air conditioning system has been correctly filled.

Read and comply with NOTES on compressor replacement.

Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.

If air conditioning system is opened for more than 24 hours:

Replace DESICCANT INSERT for air conditioning system.

Necessary preliminary work

- **DRAIN OFF AIR CONDITIONING SYSTEM**
- Remove air conditioning **COMPRESSOR DRIVE BELT**
- Remove **FRONT RIGHT WHEEL ARCH COVER**
- Remove **STEERING ASSEMBLY COVER**

Unfasten screws (2).

Tightening torque **64 53 3AZ.**

Remove lines (3) from capacitor (1).

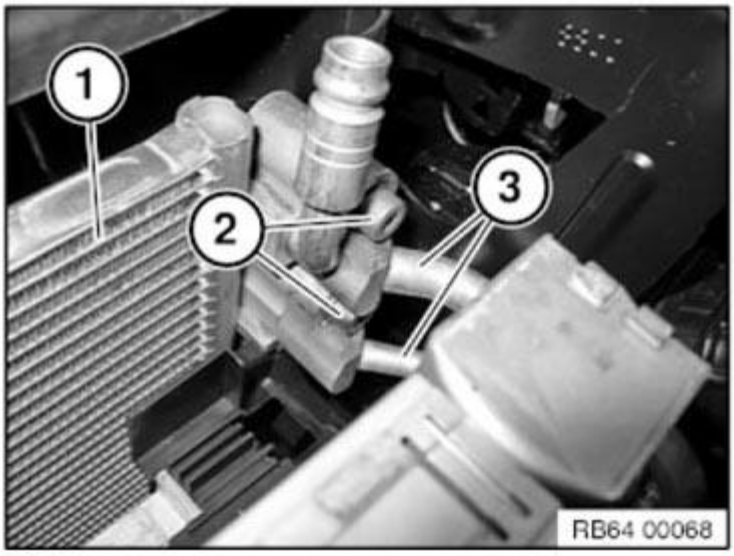


Fig. 203: Identifying Capacitor, Lines And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Cover cooling fins with aluminium sheet (2) or similar material.

NOTE: This prevents the cooling fins from being damaged when the compressor is removed later.

ARS expandable hose (1) is only tied up in the case of the equipment specification with Dynamic Drive.

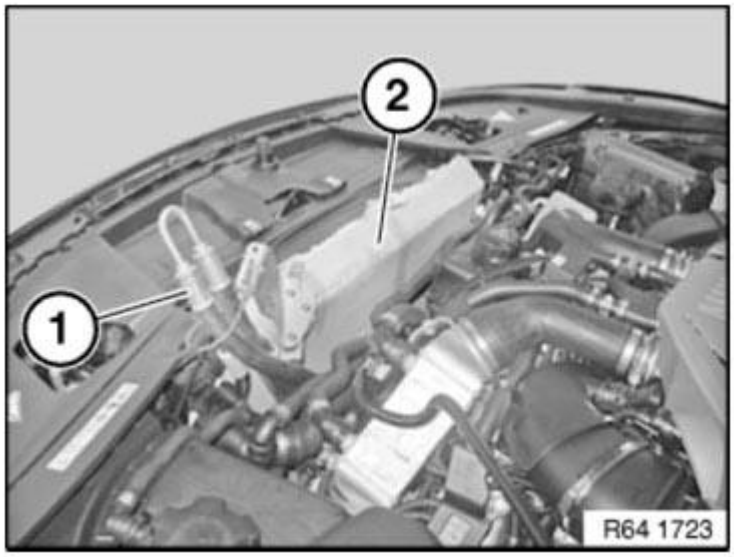


Fig. 204: Identifying ARS Expandable Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove both retaining brackets of anti-roll bar (2).

Carefully lower anti-roll bar.

Tightening torque **31 35 1AZ** .

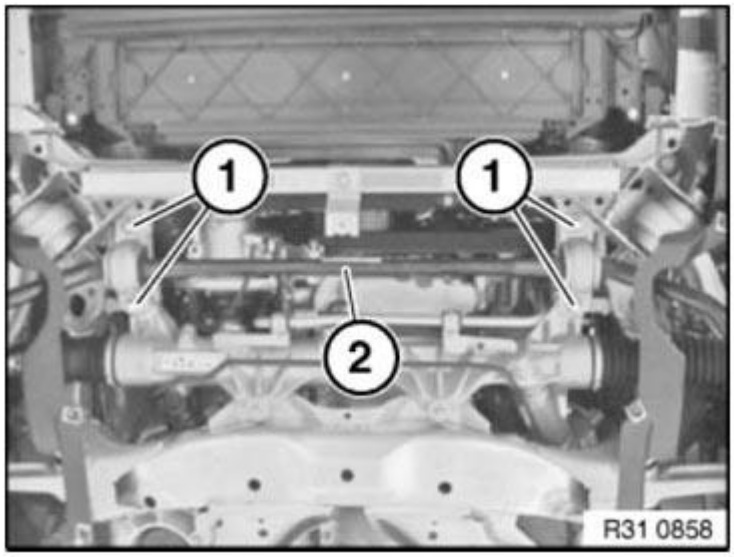


Fig. 205: Identifying Anti-Roll Bar And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **64 52 03AZ** .

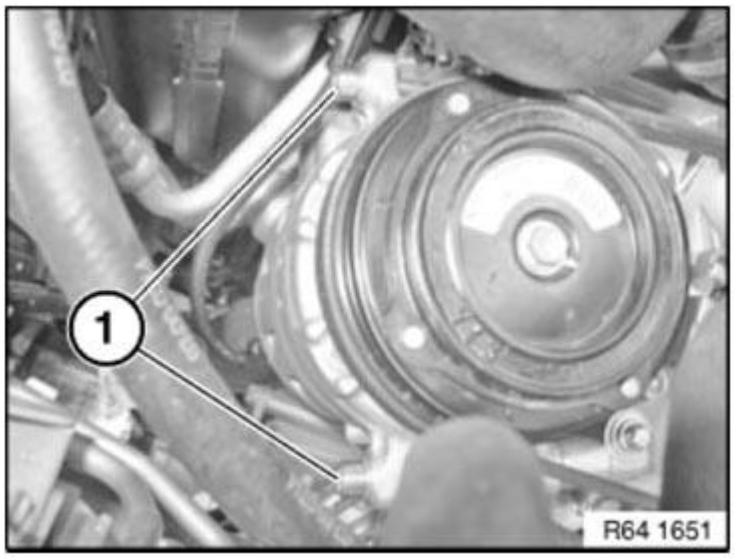


Fig. 206: Identifying Compressor Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Seal openings or lines on compressor with special tool 32 1 270 to prevent escape of media and dirt contamination.

NOTE: Secure compressor (5) against falling.

Release screw (1).

Tightening torque **64 52 03AZ** .

Disconnect plug connection (2).

Lower compressor (5).

Release screws (3) and (4) and remove refrigerant lines.

Tightening torque **64 52 01AZ** .

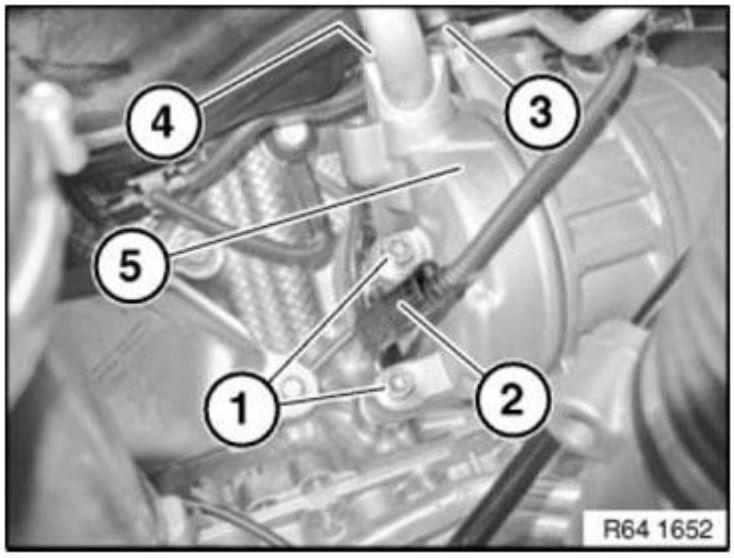


Fig. 207: Identifying Refrigerant Lines, Compressor And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

Have another person pull the radiator forward.

Carefully feed out compressor upwards.

After installation

- **EVACUATE AND FILL AIR CONDITIONING SYSTEM**

64 52 524 REMOVING AND INSTALLING/REPLACING HEATING AND AIR CONDITIONING SYSTEM COMPRESSOR (N63, WITH DYNAMIC DRIVE)

Notes

WARNING: Danger of injury!

Refrigerant circuit is under high pressure!

Follow safety information for handling R134a tetrafluorethane refrigerant. See SAFETY INSTRUCTIONS FOR HANDLING TETRAFLUORETHANE REFRIGERANT R134A.

Avoid contact with refrigerant and refrigerant fluid.

Follow safety information HANDLING refrigerant fluid.

IMPORTANT: Risk of damage!

Restart engine only when air conditioning system has been correctly filled.

Read and comply with NOTES on replacing compressor.

Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.

If air conditioning system is opened for more than 24 hours:

Replace DESICCANT INSERT FOR HEATING AND AIR CONDITIONING SYSTEM

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

DANGER OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Do not draw off hydraulic fluid (risk of contamination).

Seal off line connections with special tool 32 1 270 .

Recycling

Catch and dispose of hydraulic fluid in a suitable expansion tank.

IMPORTANT: Pressure line and connections of hydraulic system must be provided with

suitable seal plugs 32 1 270 immediately after dismantling.

Necessary preliminary work

- **DRAWING OFF, EVACUATING AND FILLING THE HEATING AND AIR CONDITIONING SYSTEM** are not included in the time value given for this job item
- Remove air conditioning **COMPRESSOR DRIVE BELT**
- Remove **FRONT RIGHT WHEEL ARCH COVER**
- Remove **STEERING ASSEMBLY COVER**

NOTE: The following operations are required to improve accessibility to the compressor.

Release screw (1) on ARS/AFS return line (2).

Tightening torque **32 41 19AZ** .

Unscrew nut (3).

Turn ARS and AFS return line (2) out of working area to one side.

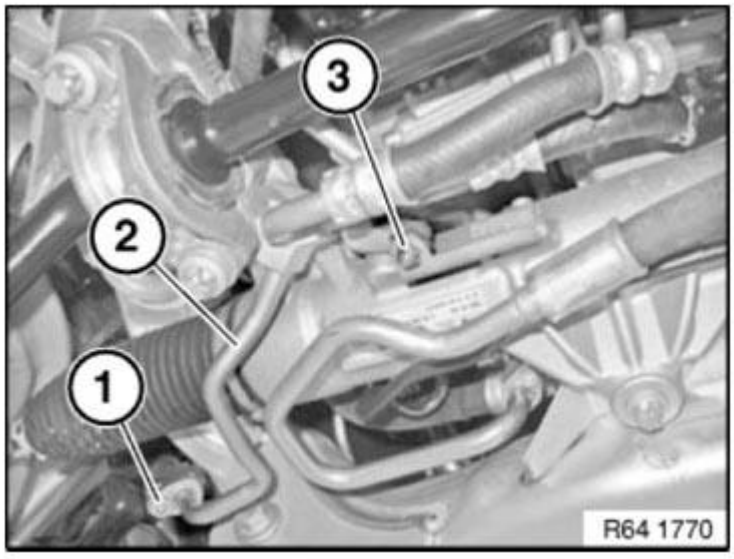


Fig. 208: Identifying ARS/AFS Return Line And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Unfasten screws (2).

Tightening torque **37 11 2AZ** .

Carefully lower active anti-roll bar (3).

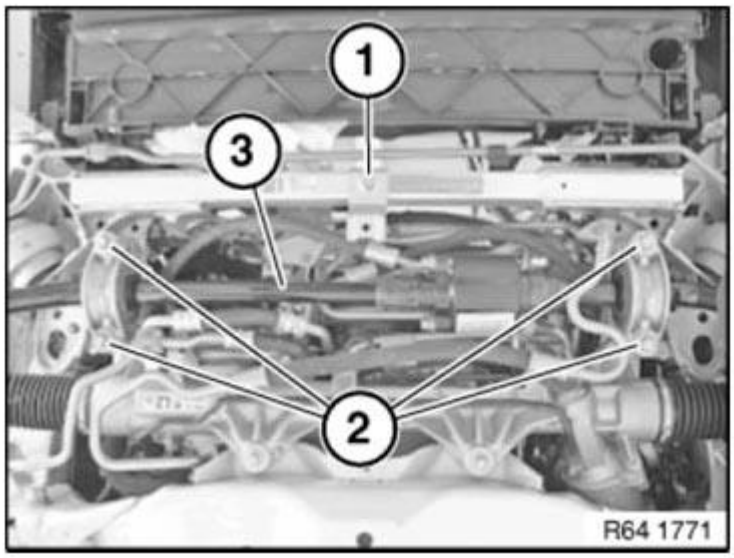


Fig. 209: Identifying Lower Active Anti-Roll Bar And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Take off holder (2).

Take ARS expandable hose (3) out of working area and tie up.

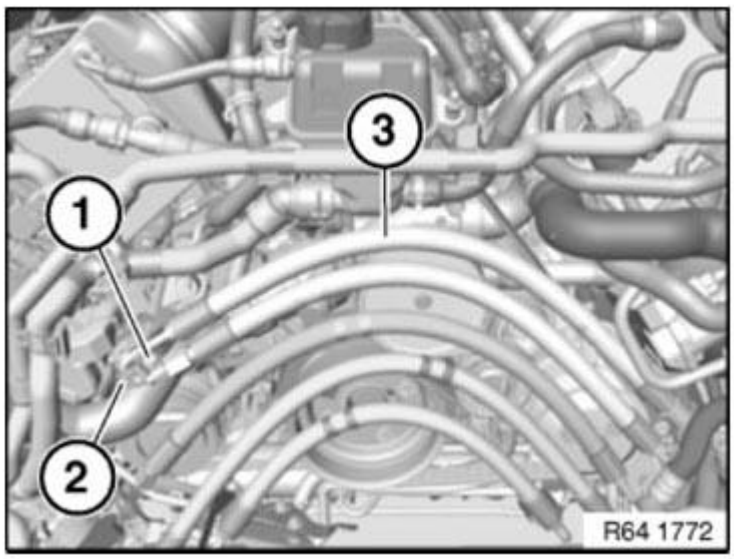


Fig. 210: Identifying ARS Expandable Hose And Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **37 13 11AZ** .

Release screw (2) on holder.

Take ARS expandable hose (3) out of working area and tie up.

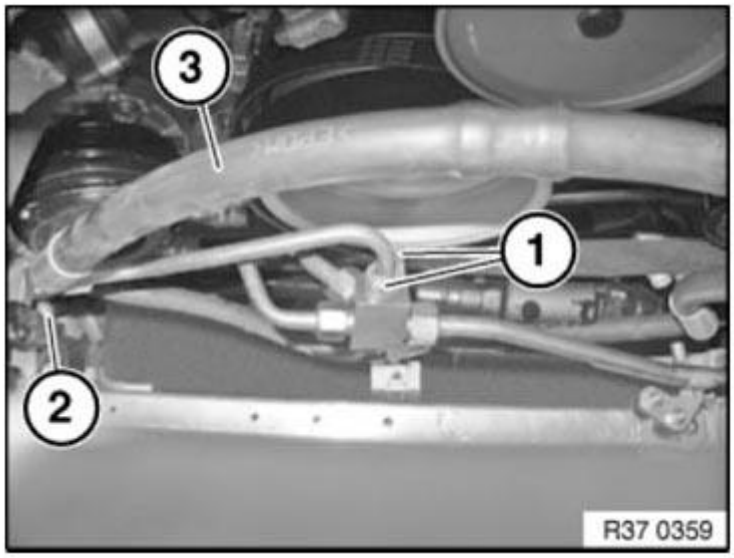


Fig. 211: Identifying ARS Expandable Hose And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Tie up ARS expansion hoses (1) as described in previous operations.

Cover cooling fins with aluminium sheet (2) or similar material.

This prevents the cooling fins from being damaged when the compressor is removed later.

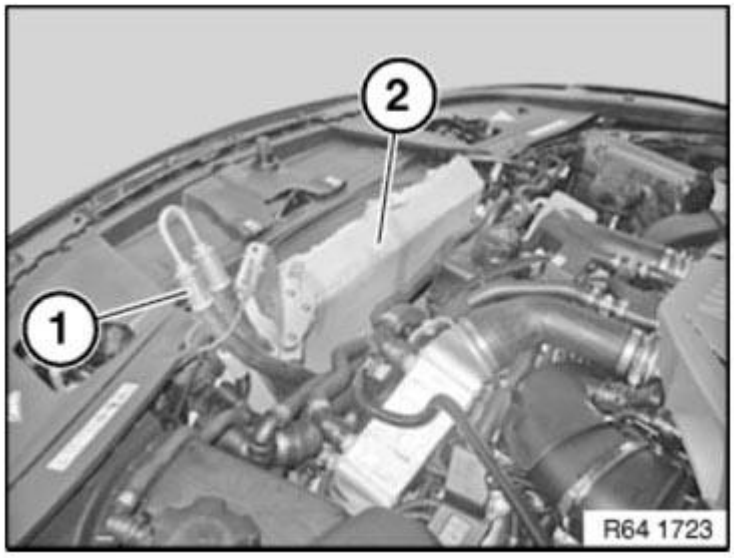


Fig. 212: Identifying ARS Expansion Hoses And Aluminium Sheet
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The following operations describe how to remove the heating and air conditioning system compressor.

For purposes of clarity, the compressor is shown without the surrounding assemblies!

Release screws (1).

Tightening torque **64 52 03AZ** .

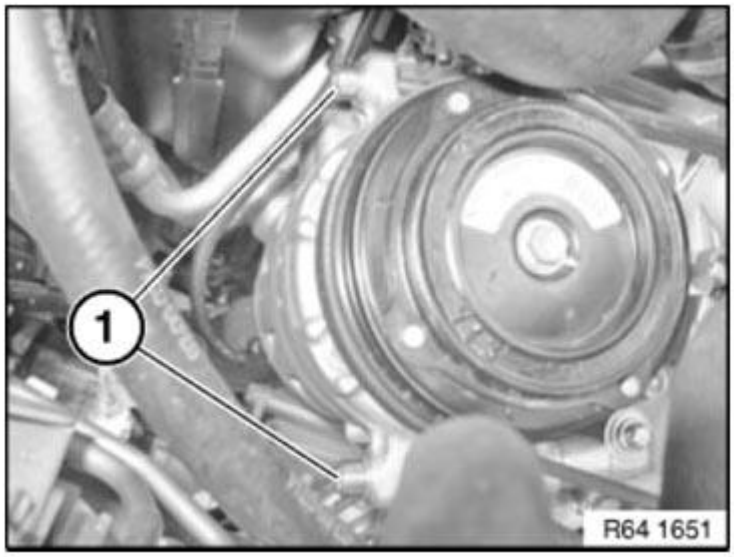


Fig. 213: Identifying Compressor Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Seal openings or lines on compressor with special tool 32 1 270 to prevent escape of media and dirt contamination.

Secure compressor (5) against falling.

Release screws (1).

Tightening torque **64 52 03AZ** .

Disconnect plug connection (2).

Lower compressor (5).

Release screws (3) and (4) and remove refrigerant lines.

Tightening torque **64 52 01AZ** .

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to install sealing rings without damaging them.

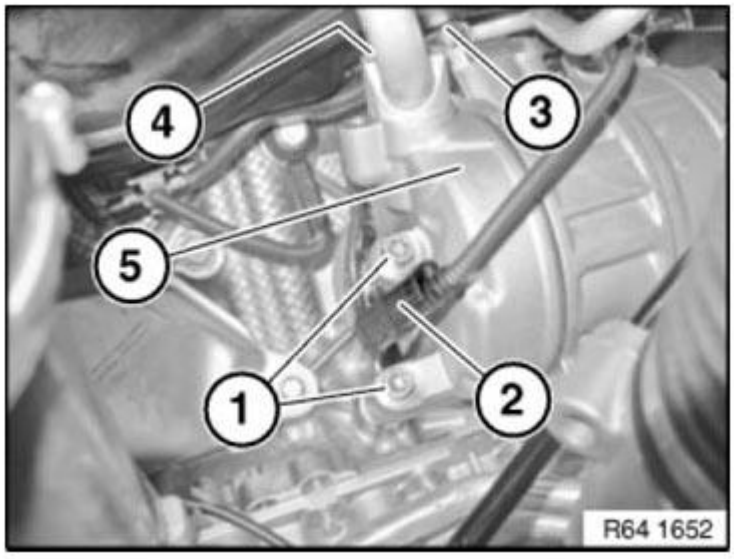


Fig. 214: Identifying Refrigerant Lines, Compressor And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Have another person pull the radiator forward.

Carefully feed out compressor upwards.

After Installation note

- **EVACUATE AND FILL HEATING AND AIR CONDITIONING SYSTEM**
- Check line connections for tightness
- **BLEED HYDRAULIC STEERING**
- **START-UP** with test run of Dynamic Drive

6453 CONDENSER AND DRYER WITH LINES

64 53... INSTRUCTIONS FOR DESICCANT INSERT REPLACEMENT

A desiccant insert that is in a correctly functioning, sealed A/C system does not have to be changed at regular service-inspection intervals.

The desiccant bottle or desiccant insert must be replaced in the event of

- the refrigerant being fouled by chips (e.g. mechanical damage to the compressor due to clamping)
- a leaking A/C system or loss of refrigerant
- the refrigerant circuit being open for a period exceeding 24 hours (e.g. during a repair)

64 52... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- **Avoid contact with refrigerant and refrigerant fluid**
- **Follow safety instructions for handling R 134A refrigerant. See INSTRUCTIONS FOR HANDLING R 134A REFRIGERANT.**
- **Follow safety information for HANDLING REFRIGERANT FLUID**

IMPORTANT:

- **Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)**

  They must not be coated.

  Use special tool 00 9 030 to install sealing rings without damaging them.

- **Open the refrigerant circuit for as short of a period as possible.**
- **Close all components and lines in the refrigerant circuit and return parts immediately following the removals at openings with special tool 32 1 270 to prevent penetration of moisture or foreign objects.**
- **If the refrigerant circuit was closed at the openings with special tool 32 1 270 but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.**

I. Part replacement as preliminary work fur further repair work and part replacement based on gradual leakage

(minor leak, e.g. hairline crack)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 10 ml
  - Capacitor: 20 ml
  - Desiccant insert/dryer flask: 20 ml
  - Each replaced refrigerant line: 10 ml
  - Capacitor with integrated dryer: 40 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

II. Part replacement due to sudden leak

(major leak, e.g. pipe break due to accident)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 35 ml
  - Capacitor: 35 ml
  - Desiccant insert/dryer flask: 55 ml
  - Each replaced refrigerant line: 35 ml
  - Capacitor with integrated dryer: 55 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

64 53...INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

See **64 53...INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND**

RADIATOR/COOLERS .

64 53 761 INTAKE PIPE FROM CONNECTING PIECE TO AUTOMATIC REAR AIR-CONDITIONING SYSTEM

Notes

WARNING: Risk of injury!

Refrigerant circuit is under high pressure!

Follow safety instructions for handling R 134A refrigerant. See INSTRUCTIONS FOR HANDLING R 134A REFRIGERANT.

Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling REFRIGERANT OIL .

IMPORTANT: Observe SAFETY INSTRUCTIONS for raising the vehicle

Risk of damage!

Restart engine only when air conditioning system has been correctly filled.

Follow **INSTRUCTIONS** for opening and replacing parts in refrigerant circuit.

If air conditioning system is opened for more than 24 hours:

Replace desiccant insert for A/C system. See **REPLACING DESICCANT INSERT FOR AIR CONDITIONING SYSTEM** or **REPLACING DESICCANT INSERT FOR A/C SYSTEM (CAPACITOR REMOVED)**.

To ensure that the refrigerant is almost completely drained from the rear heater - A/C system:

In the diagnosis system under Service functions carry out the instruction for "Draining/filling refrigerant circuit".

Necessary preliminary work

- **DRAWING OFF, EVACUATING AND FILLING THE AIR CONDITIONING SYSTEM** are not included in the time value given for this work operation
- Remove **ENTIRE EXHAUST SYSTEM**
- Remove heat shield at rear.
- Remove **UNDERBODY PANELLING**

Slacken nut (1).

Take off holder (2).

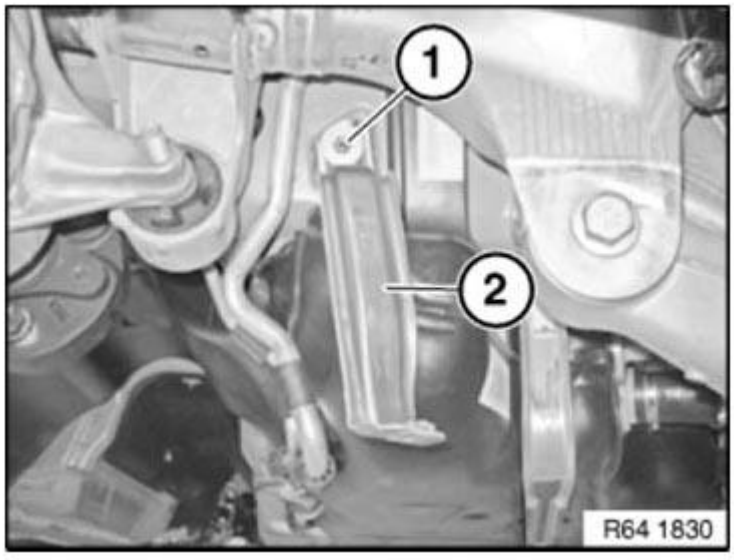


Fig. 215: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Support rear axle support with a suitable tool and secure against falling down.

Slacken screws (1) on right compression strut (2), do not unscrew fully.

Tightening torque **33 33 2AZ** .

Slacken screw (3) (do not unscrew fully).

Tightening torque **33 33 1AZ** .

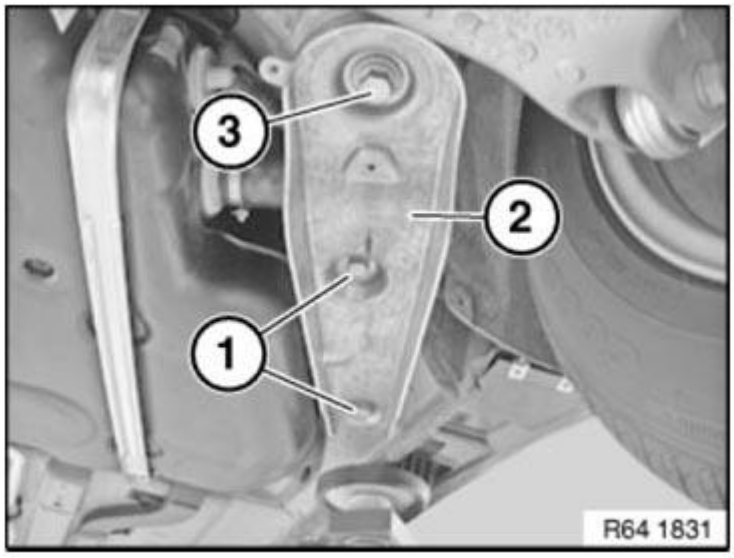


Fig. 216: Identifying Right Compression Strut And Slacken Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1) on rear axle support at rear right (2), do not unscrew fully.

Tightening torque **33 33 1AZ** .

Gently lower rear axle at rear right to make it easier to feed out refrigerant lines later.

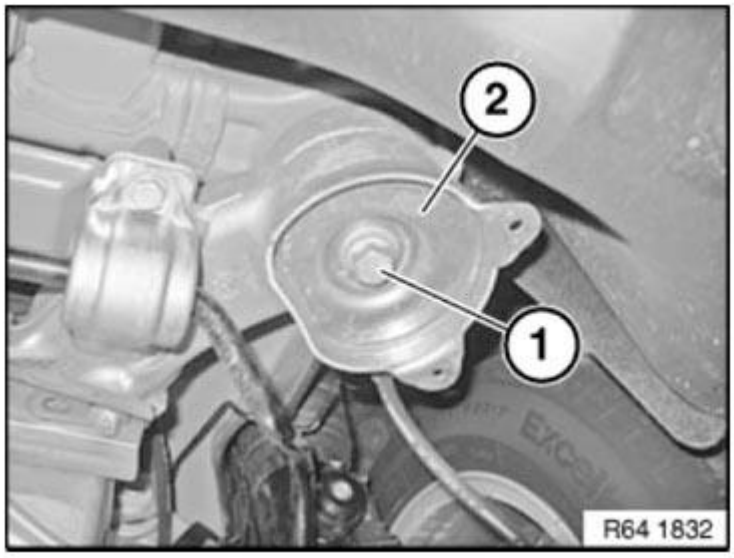


Fig. 217: Identifying Slacken Screws On Rear Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and open respective clamp (1).

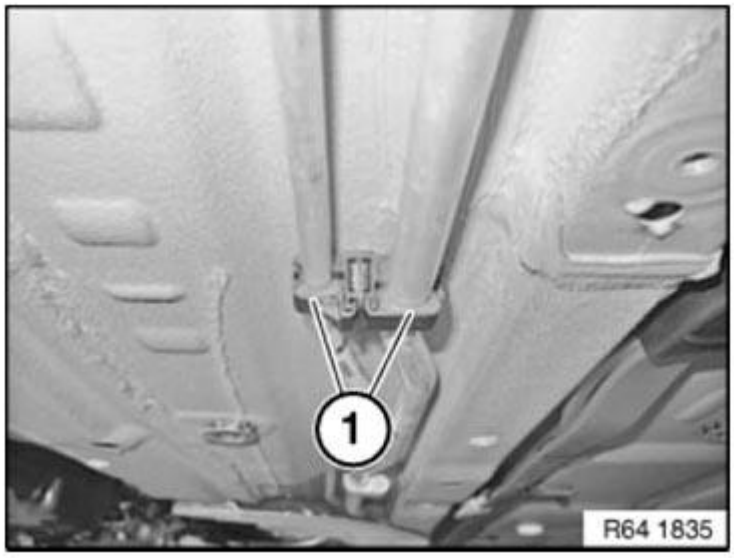


Fig. 218: Identifying Respective Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Disconnect suction line (2) from suction line (3).

Installation:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

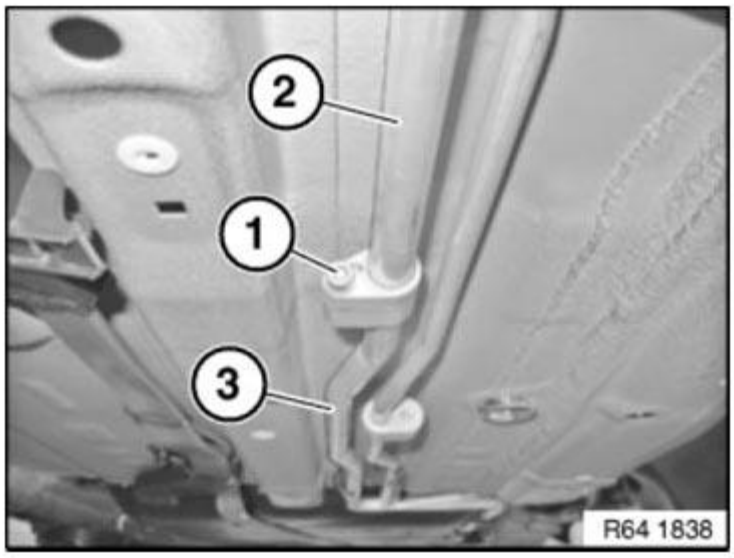


Fig. 219: Identifying Suction Line And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Slide bump stop (1) on suction line (2) out of holder.

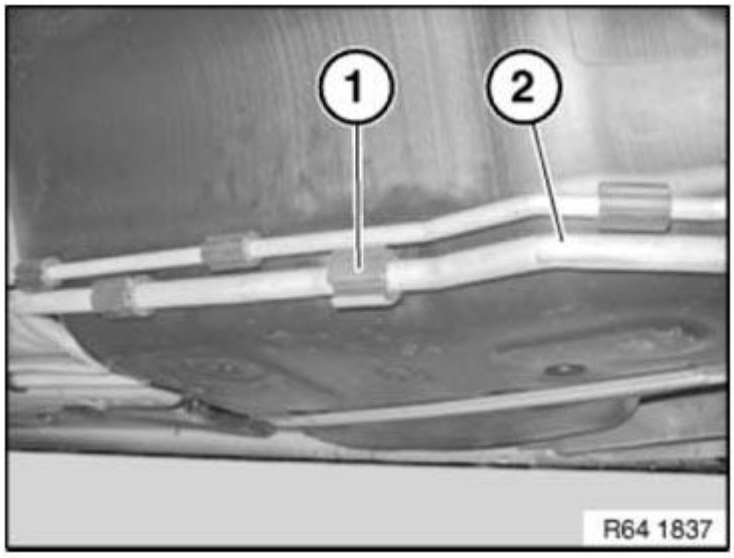


Fig. 220: Identifying Bump Stop On Suction Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release corresponding screw (1) on expansion valve (2).

Tightening torque **64 53 5AZ** .

Carefully detach respective refrigerant line (3) in downward direction.

Installation:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

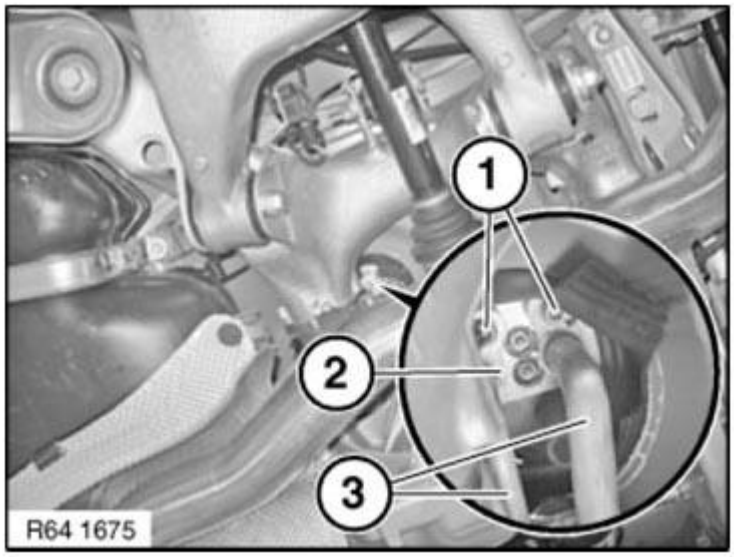


Fig. 221: Identifying Corresponding Screw On Expansion Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and open respective clamp (1).

Feed out corresponding refrigerant line (2) between vehicle underbody and rear axle support (3).

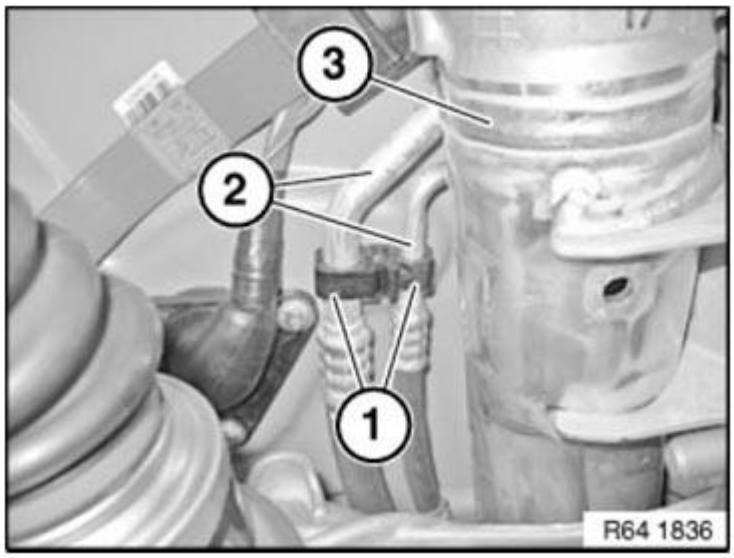
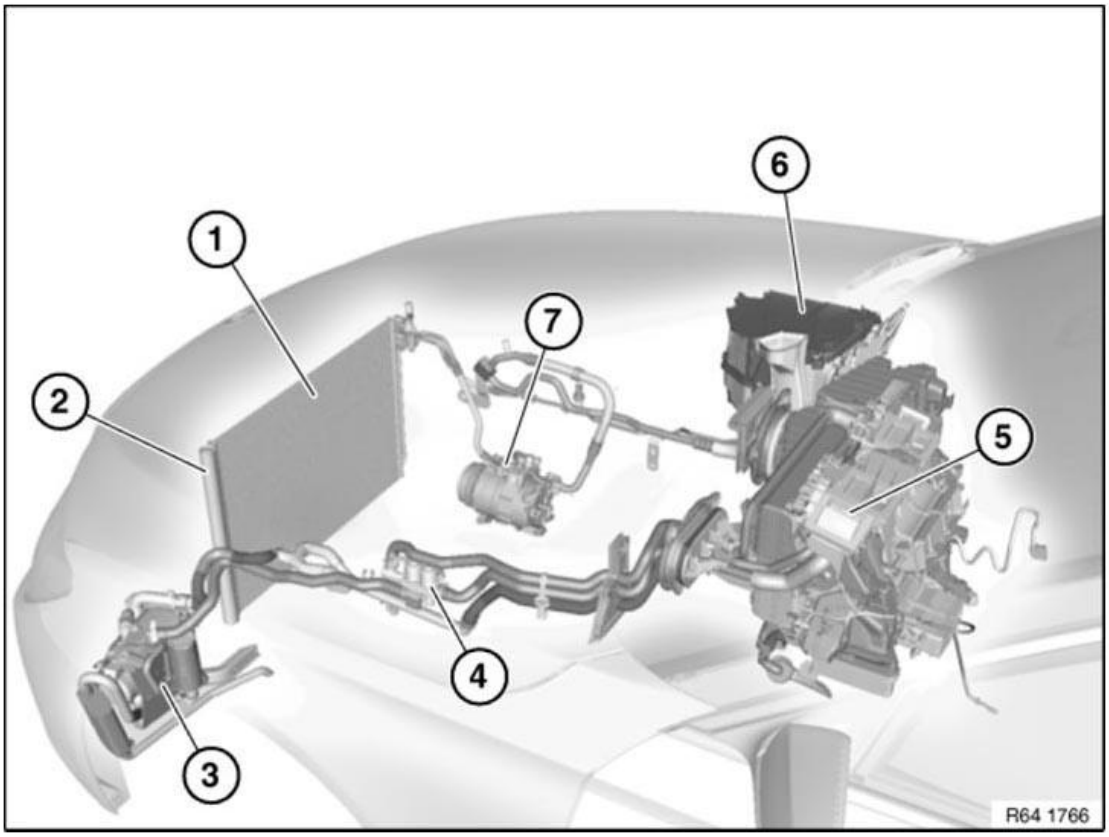


Fig. 222: Identifying Rear Axle Support And Corresponding Refrigerant Line
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Evacuate and fill **AIR CONDITIONING SYSTEM**

64 00.. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Condenser for air conditioner
2 Drier insert for air conditioner
3 Independent heater and attachment parts
4 Water valve
5 Heater - A/C system and attachment parts
6 Fan and attachment parts
7 Compressor

Fig. 223: Overview Of Heater And A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 53 761 PRESSURE LINE FROM CONNECTING PIECE TO REAR HEATER - A/C SYSTEM

Notes

WARNING: Risk of injury!

Refrigerant circuit is under high pressure!

Follow safety instructions for handling R 134A refrigerant. See INSTRUCTIONS FOR HANDLING R 134A REFRIGERANT.

Avoid contact with refrigerant and refrigerant oil.

Follow safety instructions for handling REFRIGERANT OIL .

IMPORTANT: Observe SAFETY INSTRUCTIONS for raising the vehicle

Risk of damage!

Restart engine only when A/C system has been correctly filled.

Follow **INSTRUCTIONS** for opening and replacing parts in refrigerant circuit.

If A/C system is opened for more than 24 hours:

Replace desiccant insert for A/C system. See **REPLACING DESICCANT INSERT FOR AIR CONDITIONING SYSTEM** or **REPLACING DESICCANT INSERT FOR A/C SYSTEM (CAPACITOR REMOVED)**.

To ensure that the refrigerant is almost completely drained from the rear air conditioner:

In the diagnosis system under Service functions carry out the instruction for "Draining/filling refrigerant circuit".

Necessary preliminary tasks

- **DRAWING OFF, EVACUATING AND FILLING THE A/C SYSTEM** are not included in the time value given for this work operation
- Remove **ENTIRE EXHAUST SYSTEM**
- Remove heat shield at rear.
- Remove **UNDERBODY PANELLING**

Slacken nut (1).

Take off holder (2).

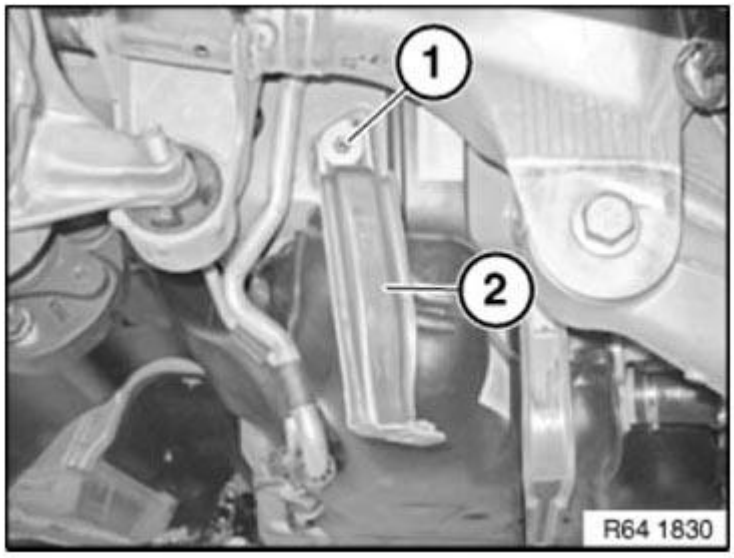


Fig. 224: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Secure rear axle support against falling out.

Slacken screws (1) on right compression strut (2), do not unscrew fully.

Tightening torque **33 33 2AZ** .

Slacken screw (3) (do not unscrew fully).

Tightening torque **33 33 1AZ** .

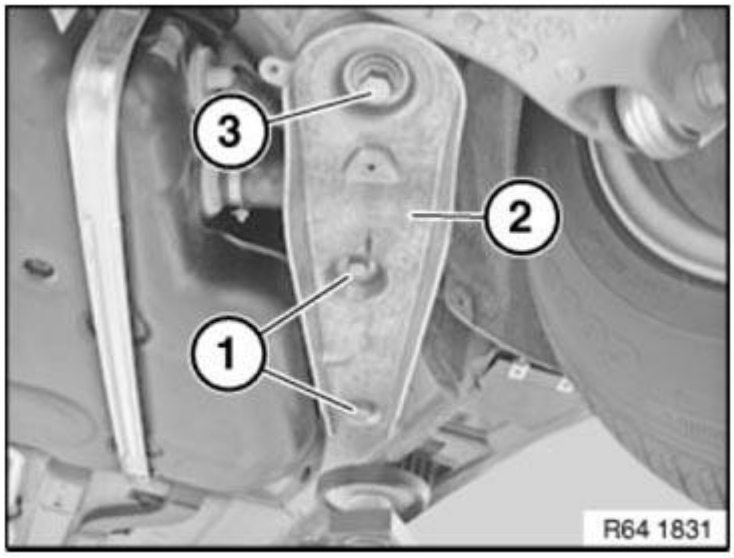


Fig. 225: Identifying Right Compression Strut And Slacken Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1) on rear axle support at rear right (2), do not unscrew fully.

Tightening torque **33 33 1AZ** .

Gently lower rear axle at rear right to make it easier to feed out refrigerant lines later.

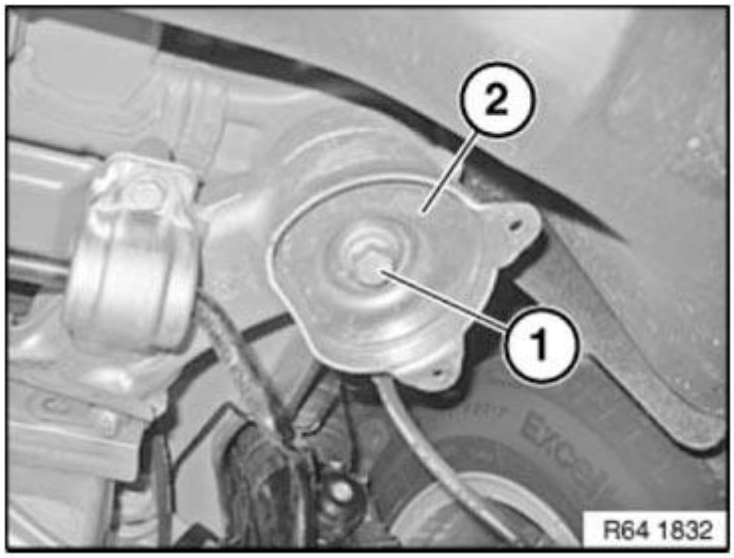


Fig. 226: Identifying Rear Axle Support And Slacken Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and open respective clamp (1).

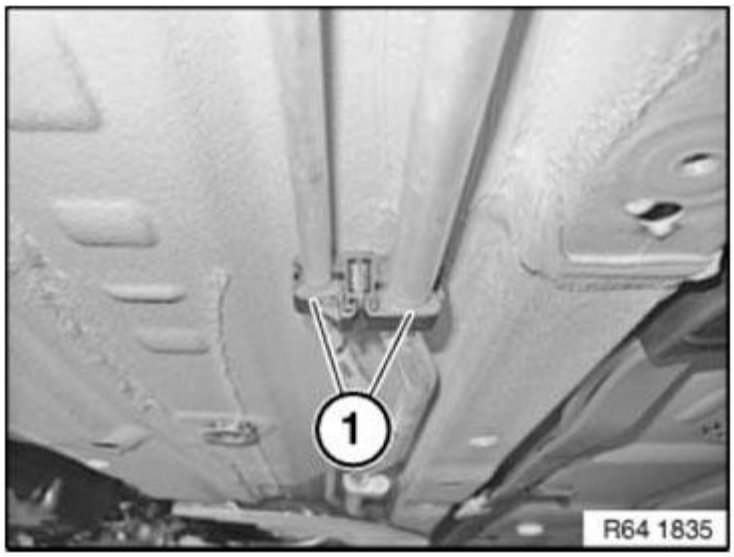


Fig. 227: Identifying Respective Clamp

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Disconnect pressure line (2) from pressure line (3).

Installation:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

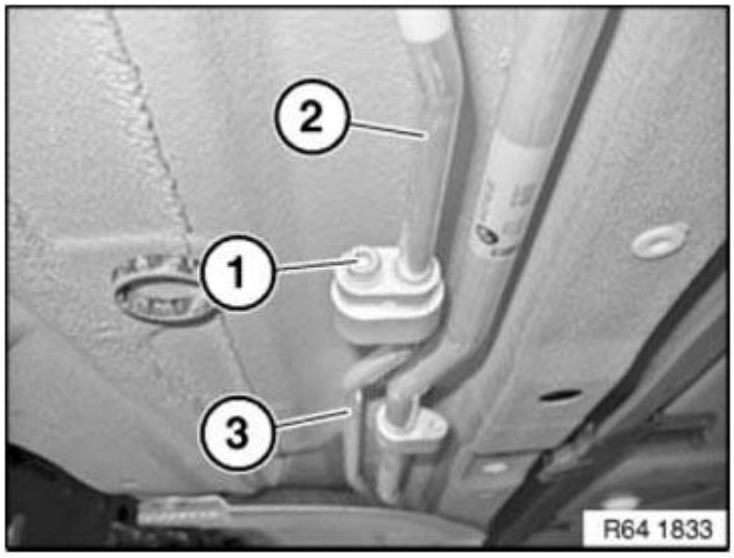


Fig. 228: Identifying Pressure Line And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip pressure line (1) from holder (2).

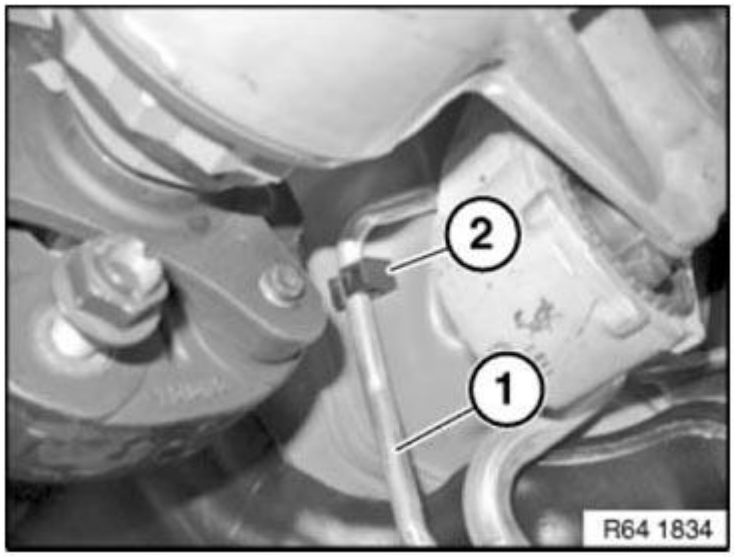


Fig. 229: Identifying Pressure Line And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release corresponding screw (1).

Tightening torque **64 53 5AZ** .

Carefully detach respective refrigerant line (3) downwards from expansion valve (2).

Installation:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

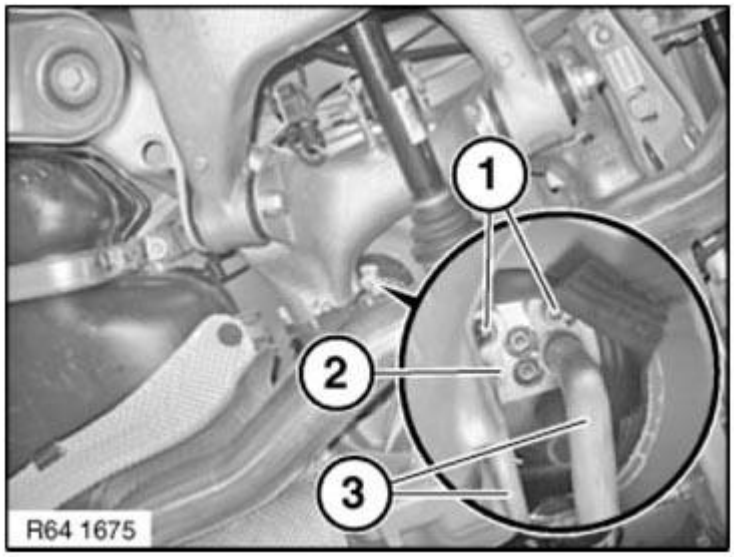


Fig. 230: Identifying Respective Refrigerant Line And Expansion Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and open respective clamp (1).

Feed out corresponding refrigerant line (2) between vehicle underbody and rear axle support (3).

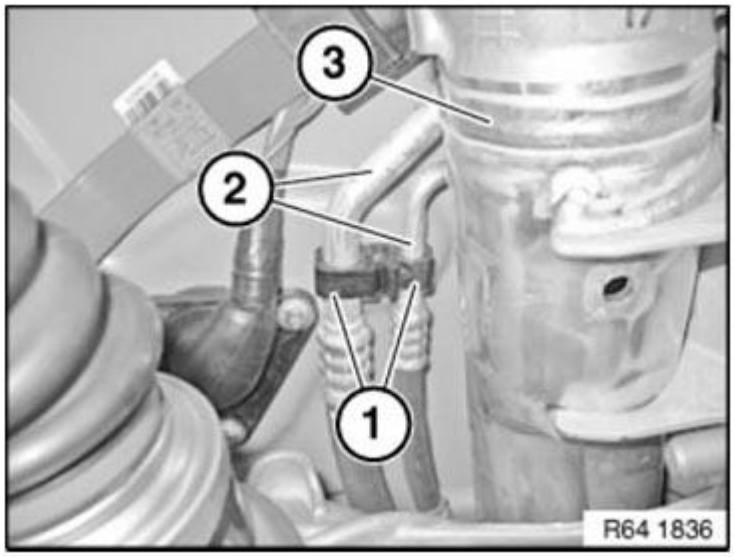


Fig. 231: Identifying Corresponding Refrigerant Line And Rear Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Evacuate and fill **A/C SYSTEM**

64 53 551 REMOVING AND INSTALLING/REPLACING CAPACITOR FOR THE HEATING AND AIR CONDITIONING SYSTEM (N63)

Notes

WARNING: Danger of injury!

Refrigerant circuit is under high pressure!

Follow safety information for handling R134a tetrafluorethane refrigerant. See SAFETY INSTRUCTIONS FOR HANDLING TETRAFLUORETHANE REFRIGERANT R134A.

Follow SAFETY INFORMATION for handling refrigerant fluid.

Avoid contact with refrigerant and refrigerant fluid.

IMPORTANT: Risk of damage!

Restart engine only when air conditioning system has been correctly filled.

Follow NOTES for opening and replacing parts in refrigerant circuit.

If air conditioning system is opened for more than 24 hours: Replace DESICCANT INSERT FOR A/C SYSTEM

Necessary preliminary work

- **DRAIN OFF AIR CONDITIONING SYSTEM**
- Remove **TOP FRONT CONNECTION**

Unclip fan cowl (1) at clamps (2) on left and right, feed out in upward direction and loosen from cooler package cover.

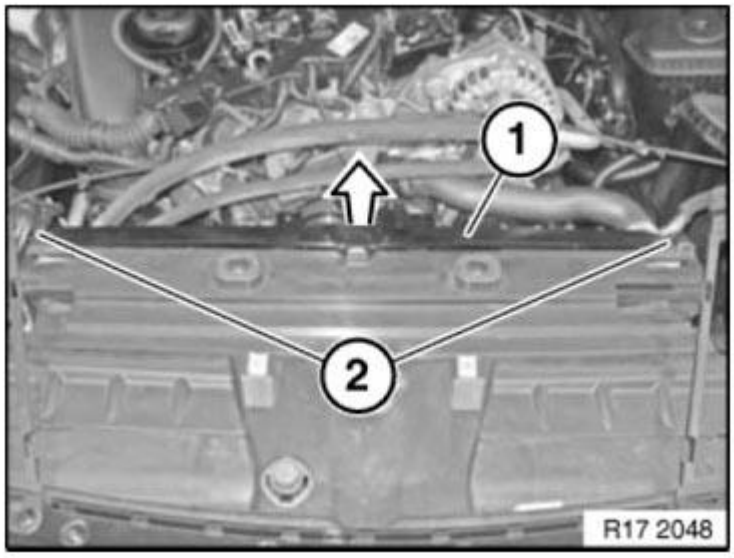


Fig. 232: Identifying Fan Cowl And Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on left and right from cover (3).

Tightening torque **17 10 1AZ** .

Release screws (2) behind sealing lip.

Tightening torque **17 10 1AZ** .

Lift out cover (3).

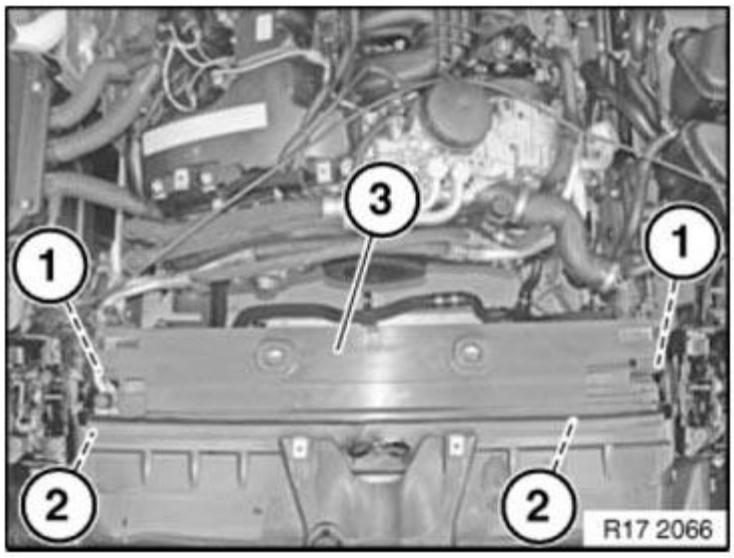


Fig. 233: Identifying Cover And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **64 53 3AZ** .

Remove heating and air conditioning lines (2) in direction of arrow and place to one side.

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to install sealing rings without damaging them.

Lift out capacitor (3).

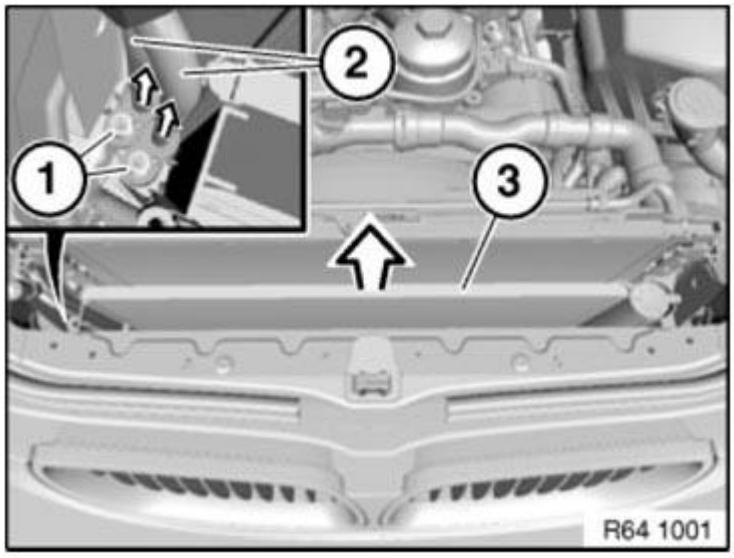


Fig. 234: Identifying Air Conditioning Lines And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **EVACUATE AND FILL HEATING AND AIR CONDITIONING SYSTEM**

64 53 518 REPLACING DESICCANT INSERT FOR A/C SYSTEM (CAPACITOR REMOVED)

Notes

WARNING: **Danger of injury!**

Refrigerant circuit is under high pressure!

Follow safety instructions for handling R 134A refrigerant. See INSTRUCTIONS FOR HANDLING R 134A REFRIGERANT.

Avoid contact with refrigerant and refrigerant fluid.

Follow safety instructions for handling REFRIGERANT FLUID .

IMPORTANT: Risk of damage!

Restart engine only when A/C system has been correctly filled.

Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.

If air conditioning system is opened for more than 24 hours:

replace desiccant insert for air conditioning system

Follow **INSTRUCTIONS ON REPLACING DESICCANT INSERT** .

Remove protective cap (1) from capacitor for the heating and air conditioning system (2).

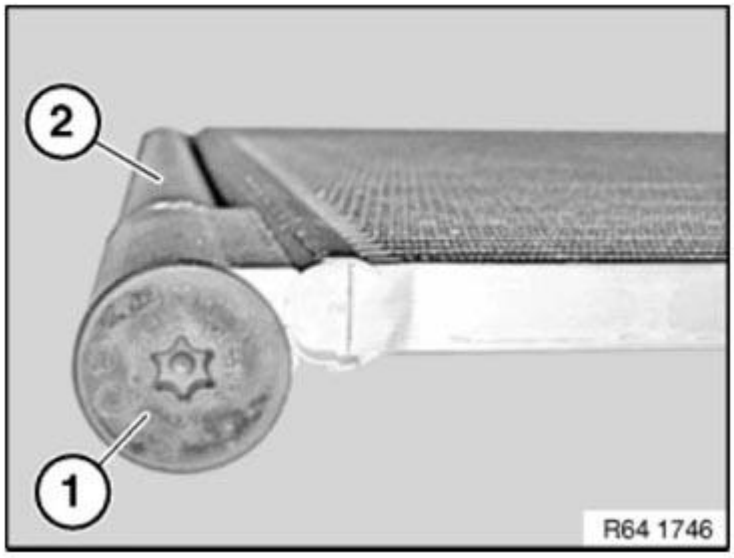


Fig. 235: Identifying Air Conditioning System And Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Press sealing cap (1) inwards and remove circlip (2).

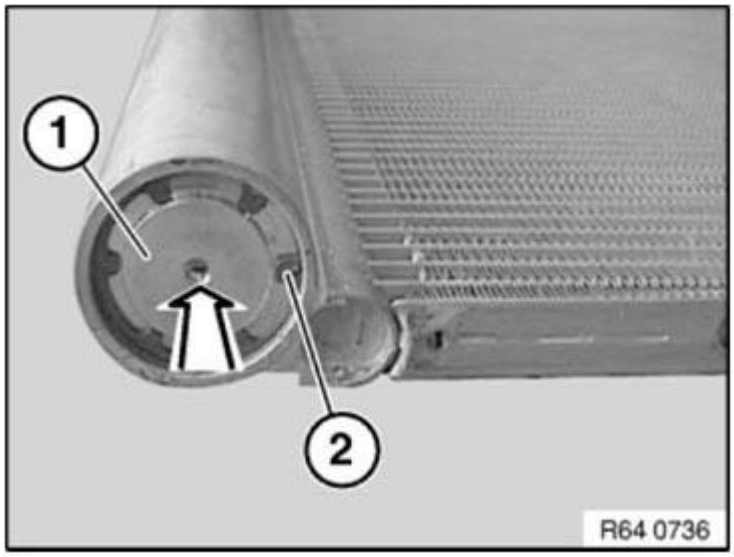


Fig. 236: Pressing Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Remove the sealing cap (2) from capacitor of the heating and air conditioning system (3) with an inserted screw (1).

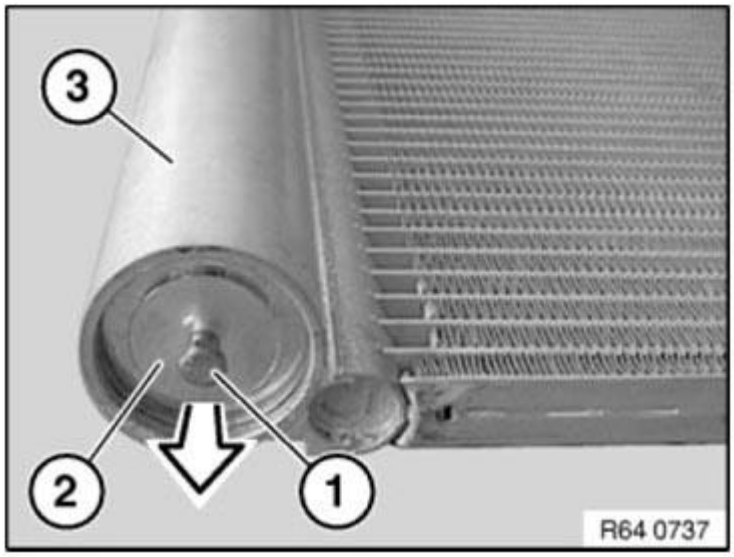


Fig. 237: Removing Air Conditioning System From Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

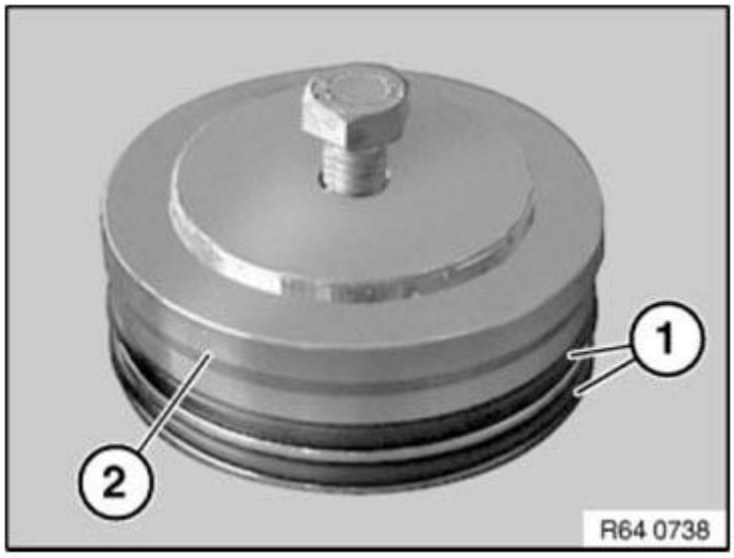


Fig. 238: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Remove desiccant insert for heating and air conditioning system (1) in direction of arrow from capacitor of the heating and air conditioning system (2).

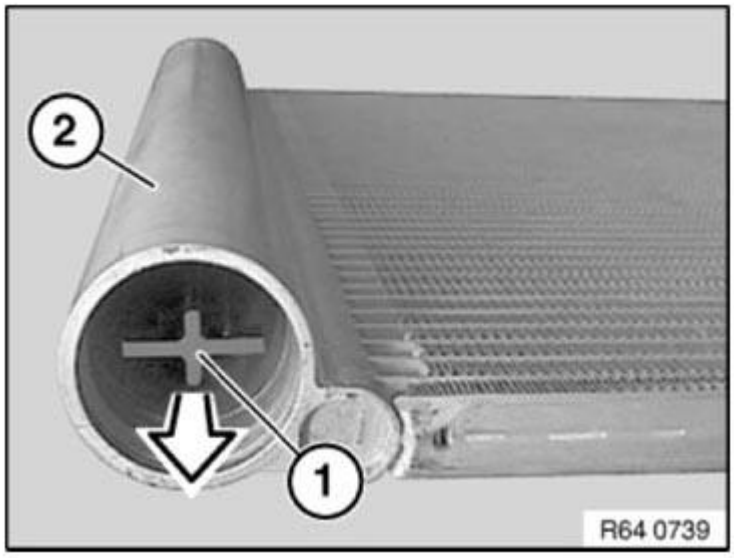


Fig. 239: Removing Heating And Air Conditioning System
Courtesy of BMW OF NORTH AMERICA, INC.

64 53 517 REPLACING DESICCANT INSERT FOR AIR CONDITIONING SYSTEM

Notes

WARNING: Danger of injury!

Refrigerant circuit is under high pressure!

Follow safety information for handling R134a tetrafluorethane refrigerant. See SAFETY INSTRUCTIONS FOR HANDLING TETRAFLUORETHANE REFRIGERANT R134A.

Follow safety information for HANDLING REFRIGERANT FLUID .

Avoid contact with refrigerant and refrigerant fluid.

IMPORTANT: Risk of damage!

Restart engine only when air conditioning system has been correctly filled.

Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.

If air conditioning system is opened for more than 24 hours: replace desiccant insert for air conditioning system

Follow **INSTRUCTIONS ON REPLACING DESICCANT INSERT** .

Necessary preliminary work

- **DRAIN OFF AIR CONDITIONING SYSTEM**
- Remove **UNDERBODY PROTECTION** .

NOTE: Pictured in removed state.

The condenser does not need to be removed for the following operations!

Remove protective cap (1) from capacitor (2).

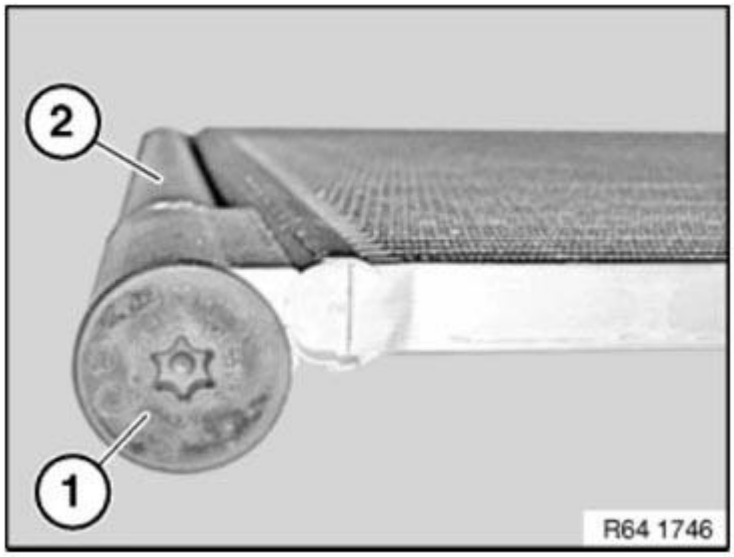


Fig. 240: Identifying Protective Cap And Capacitor
Courtesy of BMW OF NORTH AMERICA, INC.

Press sealing cap (1) inwards and remove circlip (2).

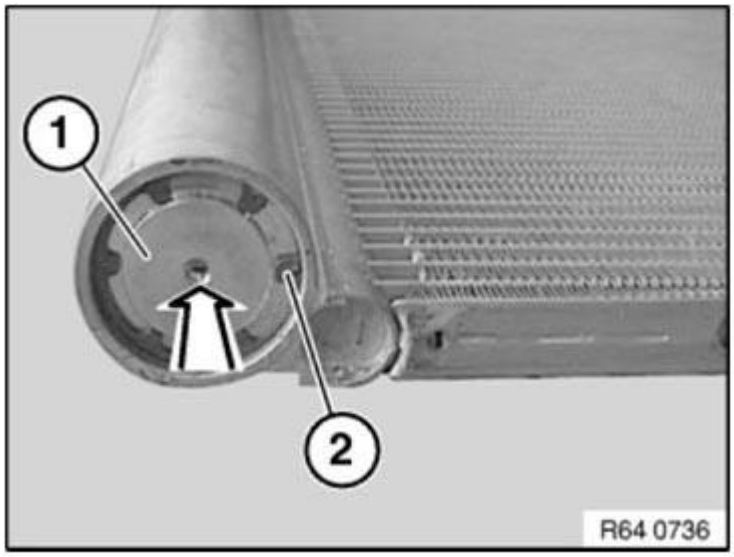


Fig. 241: Pressing Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

With assistance of a screwed-in screw (1), remove sealing cap from capacitor (3).

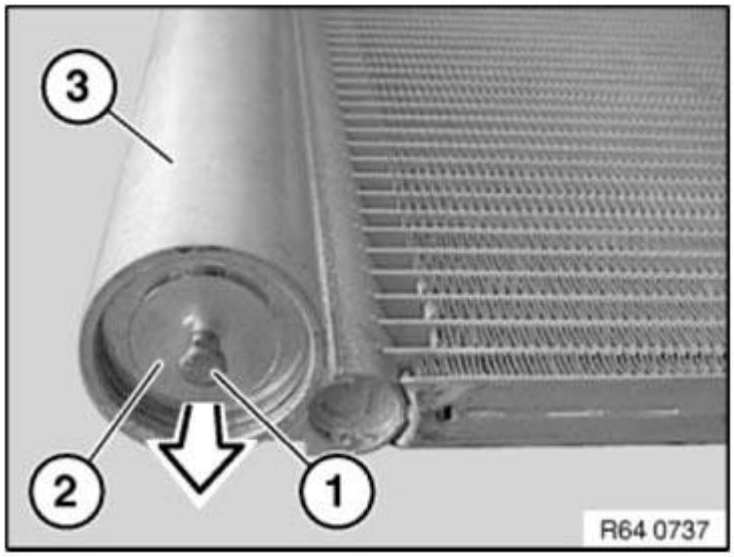


Fig. 242: Removing Sealing Cap From Capacitor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing rings.

Use special tool **00 9 030** to mount sealing rings without damaging them.

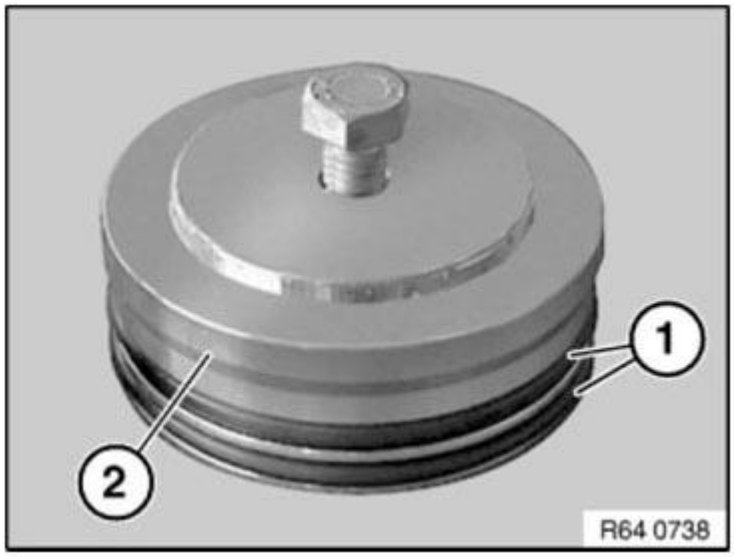


Fig. 243: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Removal is made more difficult if bridge (2) is damaged!

Carefully pull out desiccant insert (1) with a pair of wide pliers on bridge (2).

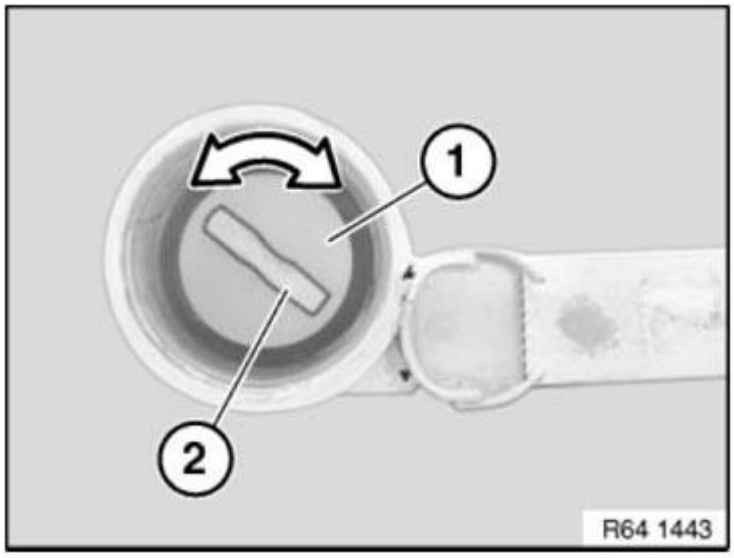


Fig. 244: Pulling Out Desiccant Insert With Wide Pliers On Bridge
Courtesy of BMW OF NORTH AMERICA, INC.

64 53 521 REPLACING SAFETY PRESSURE SWITCH (N63)

WARNING: Danger of injury!

Refrigerant circuit is under high pressure!

Avoid contact with refrigerant and refrigerant fluid.

Read and comply with safety information:

- **Follow safety information for handling R134a tetrafluorethane refrigerant. See SAFETY INSTRUCTIONS FOR HANDLING TETRAFLUORETHANE REFRIGERANT R134A.**
- **HANDLING REFRIGERANT FLUID**

IMPORTANT: Risk of damage!

Restart engine only when air conditioning system has been correctly filled.

Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.

If air conditioning system is opened for more than 24 hours: replace desiccant

insert for A/C system. See REPLACING DESICCANT INSERT FOR AIR CONDITIONING SYSTEM or REPLACING DESICCANT INSERT FOR A/C SYSTEM (CAPACITOR REMOVED).

Necessary preliminary work

- **DRAIN OFF AIR CONDITIONING SYSTEM**
- Disconnect **BATTERY EARTH LEAD**
- Remove **RIGHT SUSPENSION CROSSBRACE**
- Remove engine intake duct on right.

Release screws (1).

Tightening torque **12 90 2AZ** .

Remove electronics box cover (2).

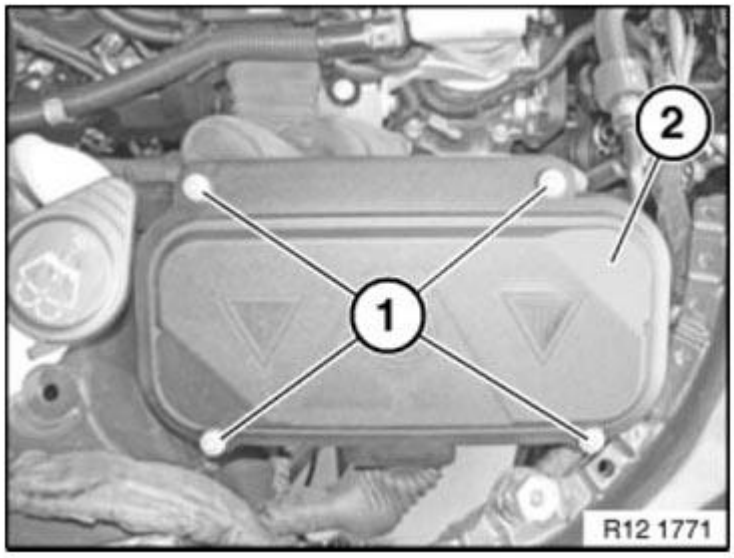


Fig. 245: Identifying Electronics Box Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip and unplug all connectors (1) from control units.

Unclip grommet hold-down device (2) and remove.

Detach rubber grommets (3) from electronics box.

Place wiring harnesses to the side.

Installation note:

Make sure grommets are is correctly seated (watertightness).

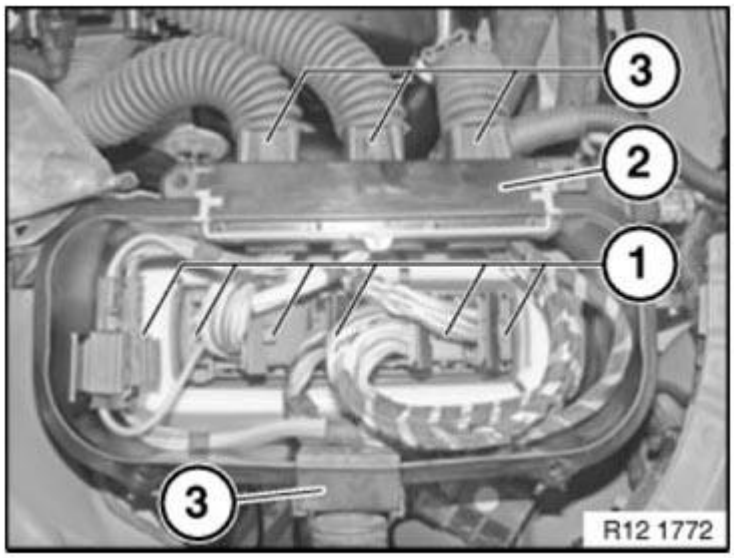


Fig. 246: Identifying Rubber Grommets And Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove lead (2) from connecting piece.

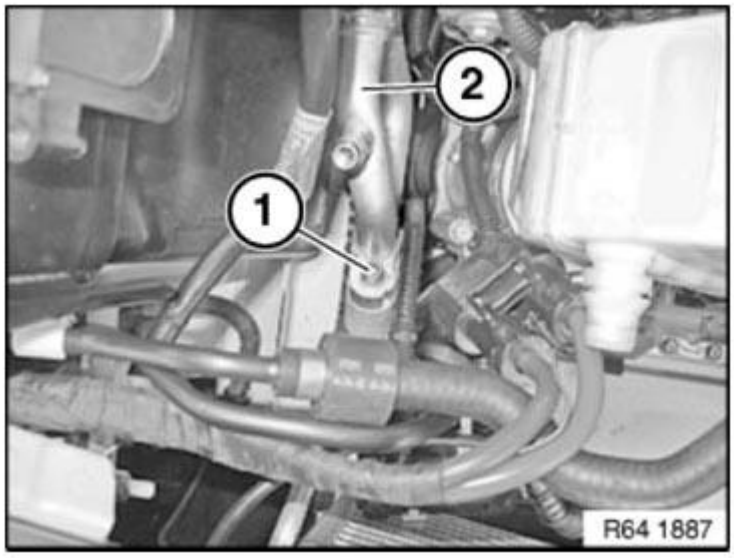


Fig. 247: Identifying Lead And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Release safety pressure switch (2).

Tightening torque **64 53 8AZ** .

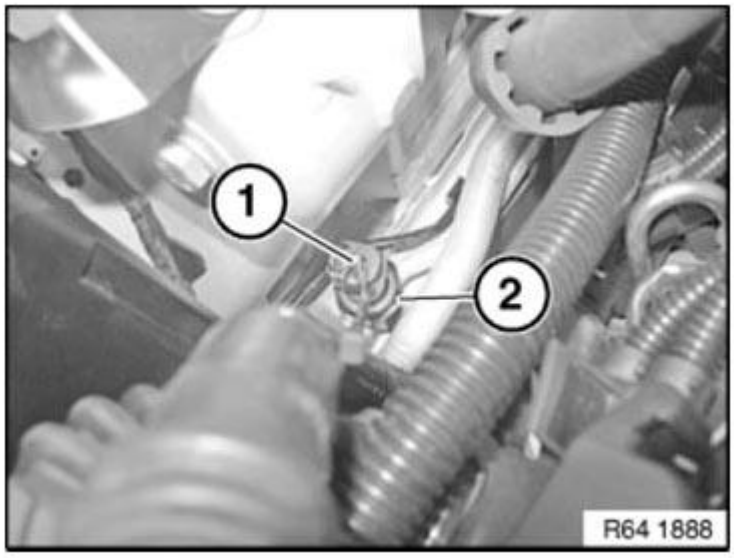


Fig. 248: Identifying Safety Pressure Switch And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **EVACUATE AND FILL AIR CONDITIONING SYSTEM**

ACCESSORIES AND BODY, CAB

Instruments - Repair

6211 INSTRUMENT CLUSTER

62 11 280 REMOVING AND INSTALLING/REPLACING INSTRUMENT CLUSTER

Notes

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION).

Necessary preliminary work

- Disconnect **BATTERY GROUND CABLE**
- Disconnect both negative battery cables atF03
- Move steering column completely towards rear
- If necessary, tape off cover to protect against damage

Insert special tool **64 1 030** in each case in second slot, on left and right, of instrument cluster (2).

Feed special tool **64 1 030** into clamp (1) and pull downward.

Feed out instrument cluster (2) in direction of arrow.

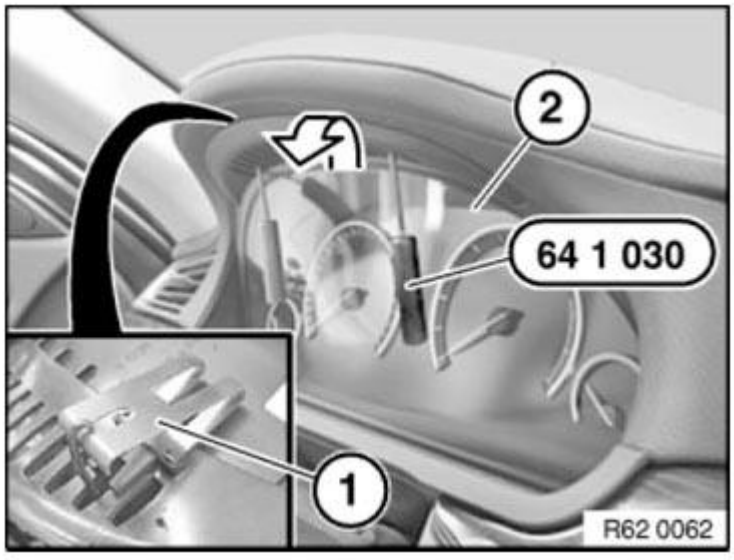


Fig. 1: Removing Instrument Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) and remove instrument cluster (2).

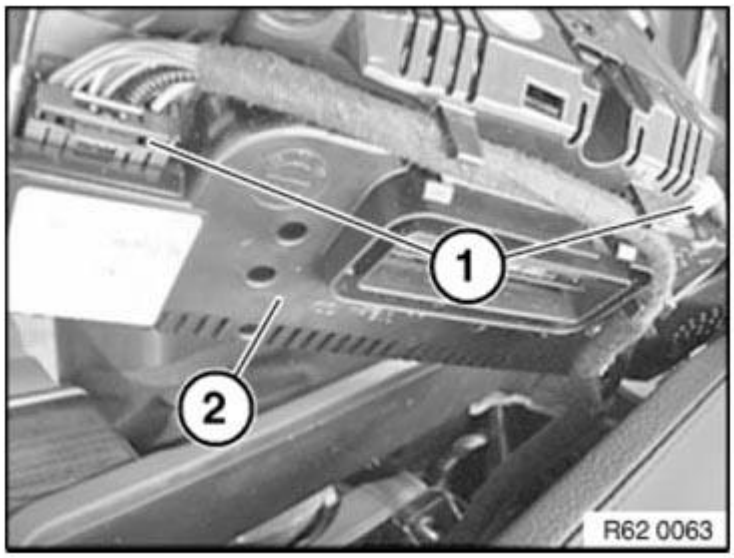


Fig. 2: Identifying Cluster With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Retaining tabs (1) of dashboard (2) must be exactly seated in mountings of dashboard.

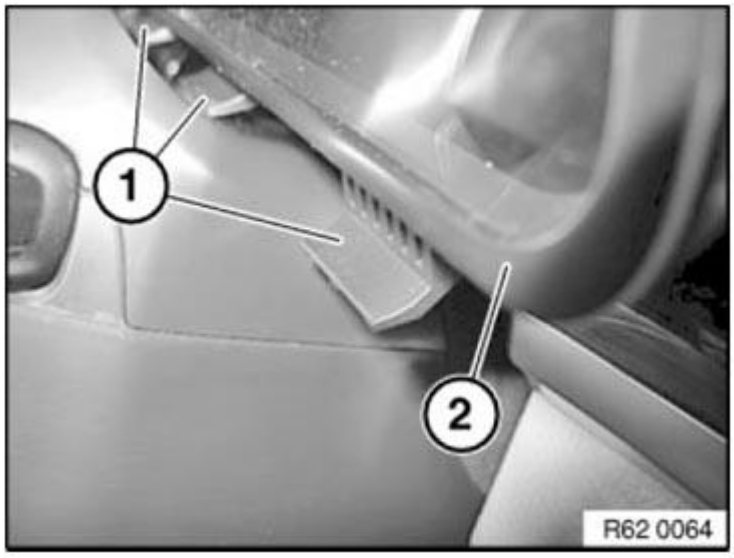


Fig. 3: Identifying Dashboard With Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out **VEHICLE PROGRAMMING/ENCODING** .

Check values for Condition Based Service **(CBS)** and correct if necessary.

If necessary, adjust **HEAD-UP DISPLAY** .

6230 HEAD-UP DISPLAY

62 30 517 ADJUSTING HEAD-UP DISPLAY

NOTE: **Vehicles with head-up displays are fitted with special windscreens.**

These windscreens are marked with the letters "HUD" on the outside at the bottom right below the seal (1) .

Prior to adjustment, fold seal (1) back and make sure that a correct windscreen is fitted.

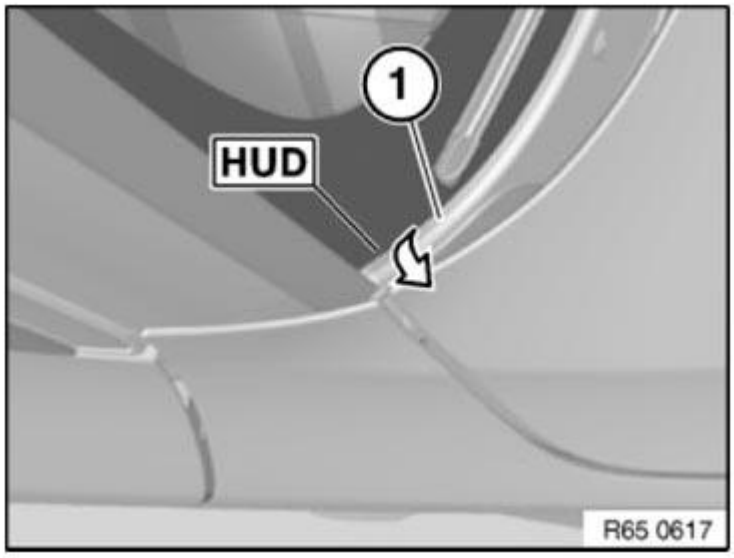


Fig. 4: Folding Seal Back
Courtesy of BMW OF NORTH AMERICA, INC.

Connect vehicle to BMW diagnosis system.

Select service function under following path:

- Service function
- Body
- Head-Up Display
- Adjusting head-up display

NOTE: **The geometric representation of the Head - Up Display can be adjusted with the service function.**

62 30... GENERAL NOTES ON THE HEAD-UP DISPLAY

NOTE: **A special windscreen must be fitted to ensure that the Head-Up Display image can be projected correctly.**

This windscreen comprises three sections. An outer and an inner glass pane are connected by a wedge-shaped plastic film.

The wedge shape prevents double projection of the Head-Up Display.

When the windscreen is replaced, the vehicle identification number and parts catalogue must be consulted to ascertain whether the windscreen in question is suitable for Head-Up Display.

Example of the display with a conventional windscreen:

With a conventional windscreen, the projected image is reflected on the inner and outer glass pane, producing a double image.



Fig. 5: Identifying Example Of Double Image With Conventional Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Windscreens for Head-Up Display are marked with the letters "HUD" on the outside at the bottom right below the seal (1).**

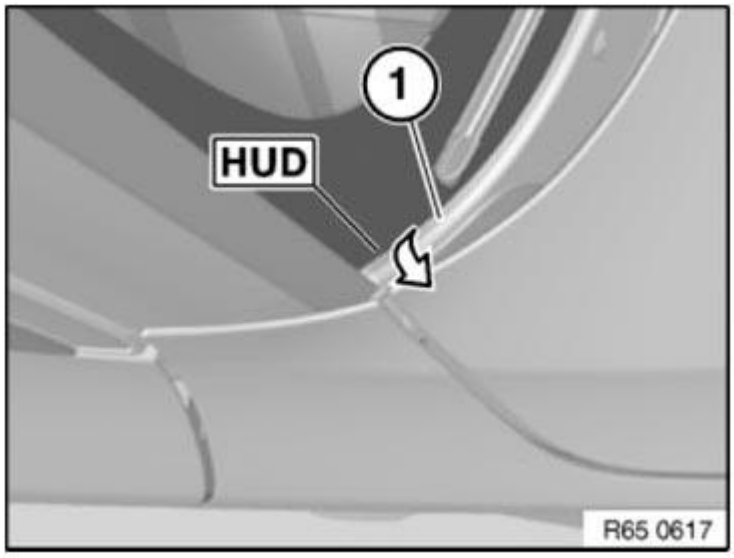


Fig. 6: Locating Area Marked With Letters HUD On Outside At Bottom Right Below Seal
Courtesy of BMW OF NORTH AMERICA, INC.

62 30 010 REMOVING AND INSTALLING/RENEWING HEAD-UP DISPLAY

IMPORTANT: Read and comply with notes on protection against electrostatic discharge (ESD PROTECTION) .

IMPORTANT: Comply with notes and instructions on HANDLING OPTICAL FIBRES .

Risk of damage!

Do not scratch lens of head-up display.

Necessary preliminary work

- Remove **INSTRUMENT PANEL TRIM**

Release screw (1) on carrier housing (2) at bottom.

Tightening torque **62 30 1AZ** .

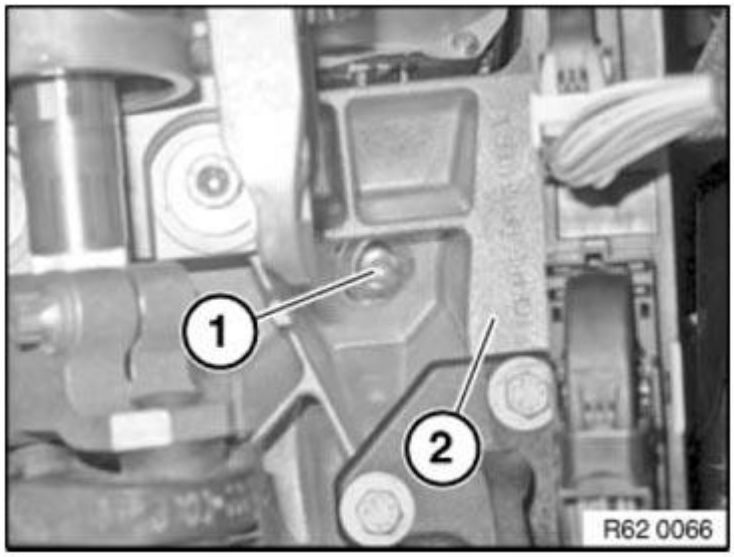


Fig. 7: Identifying Carrier Housing With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sound insulation (1) from head-up display (4).

Disconnect plug connections (2).

Release screws (3).

Tightening torque **62 30 1AZ** .

Carefully feed out head-up display (4) in upward direction.

Installation note:

Clean lens of head-up display.

Adjust **HEAD-UP DISPLAY** .

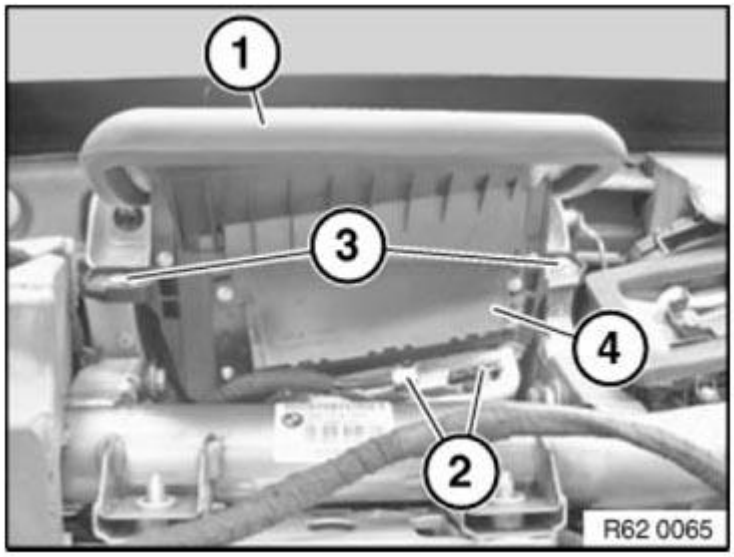


Fig. 8: Identifying Sound Insulation From Head-Up Display And Plug Connection With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out **VEHICLE PROGRAMMING/ENCODING** .

62 30 005 REMOVING AND INSTALLING/REPLACING COVER FOR HEAD-UP DISPLAY

Notes

Lever out trim for Head-Up Display (1) with special tool **00 9 317** at mounting points (2).

Feed cover for Head-Up Display (1) in direction of arrow out of instrument panel trim (2) and remove.

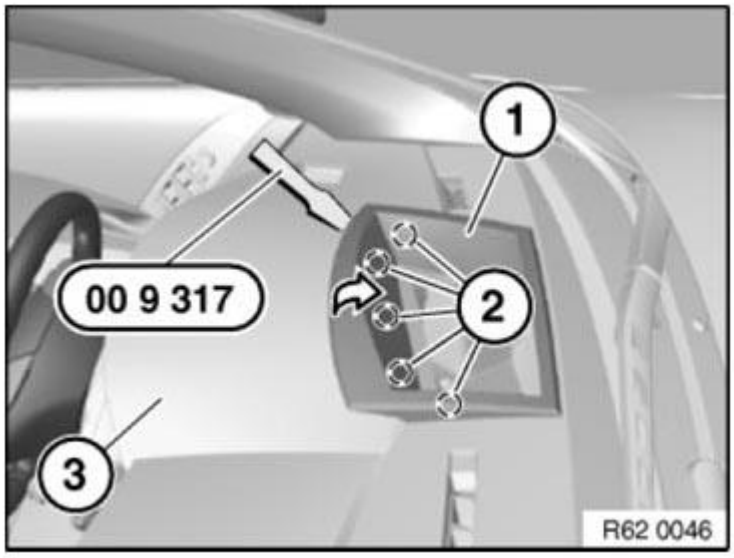


Fig. 9: Removing Head-Up Display Using Special Tool 00 9 317
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure retaining lugs (1) and (2) and sleeve (3) of cover for Head-Up Display (4) are correctly seated.

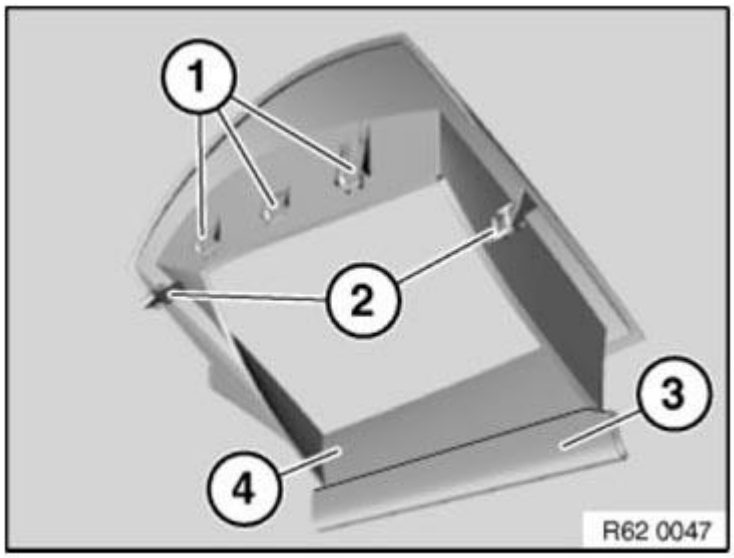


Fig. 10: Identifying Lugs, Sleeve Of Cover And Head-Up Display
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Instruments - Special Tools

62 INSTRUMENTS

621190 ADAPTER

0493028 621190 Adapter MW

Note: (Adapter 15/20-pin) only for oil service - Replaced by 62 1 140, July 94

Storage Location

I 106

621300 ADAPTER

0493042 621300 Adapter MW

Note: For instrument panel

Storage Location

Y2

SI number

02 03 89 (038)

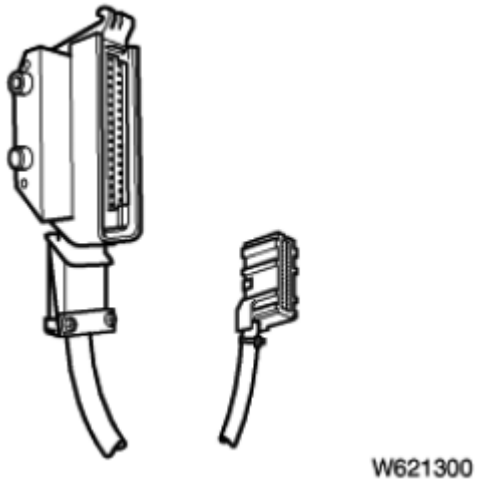


Fig. 1: Identifying Adapter (621300)
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Instruments - Tightening Torques

HEAD-UP DISPLAY

62 30 HEAD-UP DISPLAY

TIGHTENING TORQUE SPECIFICATION - HEAD-UP DISPLAY

	Type	Thread	Tightening specifications	Dimension
1AZ Head - up display to support frame Screw	F01/F02/F04	M6		7.10 Nm
	F07/F10/F11/F12/F13/F18/F25	M6		7.60 Nm

SUSPENSION

Integrated Suspension Systems - Repair

3700 GENERAL

37 12 012 CARRYING OUT RIDE HEIGHT ADJUSTMENT

NOTE: Ride height adjustment must be carried out after the following work:

- **Removal/replacement of ride height sensor or its control rod (only necessary for vehicles with air suspension or vehicles with VDC)**
- **Replacement of wiring harness**
- **Replacement of air supply system control unit (F01/F02/F04/F07/F11)**
- **Replacement of vertical dynamics management control unit**
- **Replacement of ICM control unit (Integrated Chassis Management)**

Connect BMW diagnosis system.

Switch the ignition on.

Carry out ride height adjustment (menu item: "Service function").

IMPORTANT: Following ride height adjustment, for vehicles with:

- **Run Flat Indicator: initialize RUN FLAT INDICATOR**
- **Tyre Pressure Monitor: RESETTING TYRE PRESSURE MONITOR**

37 00... CHECKING AIR SPRINGS FOR DAMAGE

NOTE: If a vehicle has been driven with depressurized air springs, the air springs must always be replaced.

Checking air spring strut on rear axle:

Necessary preliminary work

- Undo **AIR SPRING STRUT** on wheel carrier

  Do **not** release air spring strut in the upper wheel arch!

Air spring strut is damaged:

- if pressing the lower spring strut eye moves the lower section of the spring strut (gaiter) in longitudinal

direction toward the spring strut upper section (see illustration)

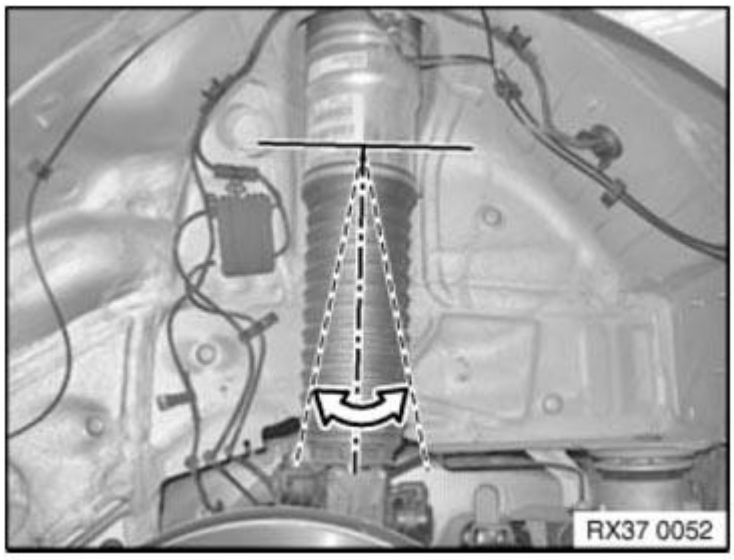


Fig. 1: Movement Of Lower Spring Strut Eye
Courtesy of BMW OF NORTH AMERICA, INC.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**

- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

37 10 001 INITIAL OPERATION WITH TEST RUN OF DYNAMIC DRIVE

NOTE: The Service function Initial operation of Dynamic Drive must be carried out after:

- **Work on the Dynamic Drive system which involved opening hydraulic lines**
- **Replacement/Programming/Coding Dynamic Drive control unit (ICM - V - High)**

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Using contaminated equipment to add fluid may introduce dirt particles into the fluid reservoir and significantly reduce the service life of the ARS and power steering system. Do not use any filler funnels or similar!
Use only Pentosin CHF11S from original containers!
The fill level may only be checked or adjusted when the engine is stopped!
Adjust fill level if possible in middle between 20° and 80°C.
Ensure that the cap is fully screwed in prior to the fill level check.

NOTE: To avoid mix-ups when filling with hydraulic fluid, mark the fluid reservoirs or their caps with identification marks.

CHF Pentosin CHF11S



Fig. 2: Identifying CHF Pentosin CHF11S
Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding hydraulic circuit

1. Thoroughly clean fluid reservoir and its immediate surroundings with cap closed
2. Check and correct fill level

NOTE: The fill level must not be above the "MAX" mark (80°C) with the engine at normal operating temperature.

When filling observe temperature indication of dipstick.

Hydraulic fluid: see **OPERATING FLUIDS** .

3. Start engine
4. Turn steering wheel left and right twice in each case up to full lock; if necessary, top up hydraulic fluid (e.g. if hydraulic system is completely drained)
5. Move steering wheel to straight-ahead position and turn off engine
6. Check and correct fill level with engine stopped
7. Check reworked components on hydraulic system for leaks

Performing initial operation with test run

WARNING: Risk of injury!
Vehicle executes heavy rolling motions during initial operation! Therefore observe the following instructions without fail:

- Do not allow any persons to remain in the vehicle or directly on the vehicle
- Keep the vehicle doors closed.
- Maintain a safety distance around the vehicle of 1 meter to persons, objects, walls etc.
- Vehicle must be standing horizontally with all wheels on a firm surface
- Do not under any circumstances carry out initial operation on a lifting platform, wheel alignment analyzer or similar!
- Avoid heavy loads

1. Check load; if necessary, remove load from the vehicle
2. Bring engine up to operating temperature
3. Connect vehicle to DIS or MoDiC
4. Start initial operation in SERVICE FUNCTIONS. Follow instructions in Diagnosis and Information System.
5. Check fill level again with engine stationary and if necessary top up oil to 80° mark.

37 00.. NOTES IN THE EVENT OF VEHICLE INCLINATION

System-related causes (no faults)

-
  - Control tolerance when "Ignition off", but vehicle is awake (e. g. hazard warning switch is lit): ± 7 mm (applies from integration level 10-06-500 or CAF 4.5.4-> Read out SVK; earlier versions ± 15 mm) relative to nominal ride-level height (attention: at the front axle, the control variable is the mean value of the right and left ride height).
  - Control tolerance when "Ignition on": +/- 7 mm relative to nominal ride-level height (attention: at the front axle, the mean value of the right and left ride height applies).
  - When the doors are open, an automatic level correction does not take place (an active control procedure is aborted). Level changes are performed via buttons even if the doors are open
  - If a strong external force acts on the vehicle during a control procedure (rapid loading and unloading), the control procedure may be interrupted; it is resumed either when driving (>30 km/h) or by pressing the ride height selection switch (down->up)
  - Vehicle inclination can only be checked on level and horizontal ground. For technical reasons, it is not possible to adjust all wheel stations to the nominal ride-level height on uneven ground. For example, if the one wheel of the vehicle is on the curb, the resulting inclination is not corrected. The self-levelling suspension behaves like a standard steel suspension in this case.
  - Active wheel relief mode: To relieve a depressurized tire, the vehicle is inclined using the air suspension. The vehicle is inclined beginning at "Ignition on". This mode is linked to the type pressure monitor and is not closed until the tire pressure monitor ceases to sense a tire pressure loss

The air in the spring struts is warmed by the engine heat and damper work and expands. This raises the vehicle. During a journey, ride height changes due to temperature changes in the air suspension struts are corrected. When the vehicle is stationary and switched off, these temperature effects may lead to ride height changes and inclinations that are not (cannot) be corrected. When the engine is hot, an after-heating effect that occurs after

the vehicle is parked, especially at the consumer shutdown, causes the vehicle to be raised slightly and then, in the cooling-down period, to be lowered again. In extreme cases, the vehicle can be lowered by up to 50 mm at the front axle due to this temperature effect. After the vehicle is parked, the self-levelling suspension performs three control procedures in the first 48 h in which, depending on system availability, an attempt is made to reduce inclinations by raising or lower the vehicle to a horizontal level. The self-levelling suspension may lower the vehicle by up to 40 mm below the normal level. For technical reasons, inclinations in vehicles that have been parked for lengthy periods cannot be avoided in air suspension systems. Workshops are not able to check the control functions in parked vehicles due to the system complexity.

Checking the ride height adjustment

- Adjust the vehicle to the normal level
- Read out the ride heights FL, FR, RL, RR via the diagnosis system
- Measure the ride height of the vehicle
- Compare the measured ride height with the nominal value
- Ride height = measured value - nominal value
- If the deviation from the nominal value >3 mm, perform the ride height adjustment with the aid of the diagnosis system

Possible causes of mechanical faults

- Sensor linkage reversed (sensor arms must always face outward, rear axle: connector faces inward). Refer to repair instructions
- Sensor bracket twisted (holder in centering bore? Holder must be flush with rear axle support or spring bracket)
- Sensor linkage torn or bent
- Leakage (see check below)

Possible causes of electrical faults

- Water in the connector (corroded contacts) -> exchange the sensor and connector. Sensor signal is corrupted by voltage drop. Gradual process
- Short circuit (detected by control unit and output as fault message)

Leakage check

Larger leaks can be found using the following procedure. Smaller leaks are considerably more difficult to find if the effects of temperature change and axle strain are to be ruled out. Specifications stipulate that the leak may equal up to 2 mm per day (constant temperature, vehicle standing on skid pads -> no axle strain).

- Position the vehicle in a room with largely constant temperature (± 3°C) for approx. 10 -12 h and adjust to the normal level. Do NOT set the parking brake!
- If the vehicle ride-level height deviates from the nominal ride-level height by more than ± 10 mm, adjust the vehicle to the nominal level again (ignition on, door open - --> all doors closed, adjust level, ignition off; let the engine run in emergencies only and only for a very brief time. Do not get into the vehicle.)

- Place the EHC control unit into production mode via the diagnosis and information system (deactivated level controller)
- Measure and note down the ride heights
- Leave the vehicle standing for another 10 -12 h (constant temperature, do not move the vehicle, do not get in or out or make any other load changes)
- Measure and note down the ride heights
- If the ride heights are lower than the initial measurement by more than 10 mm at one or more wheel stations, it can be concluded that there is a leak. Leaks may occur at the air lines, the pneumatic connecting elements and the spring strut.
- After completion of the leakage test, deactivate production mode again.

37 00... NOTES ON AIR SPRING SYSTEM

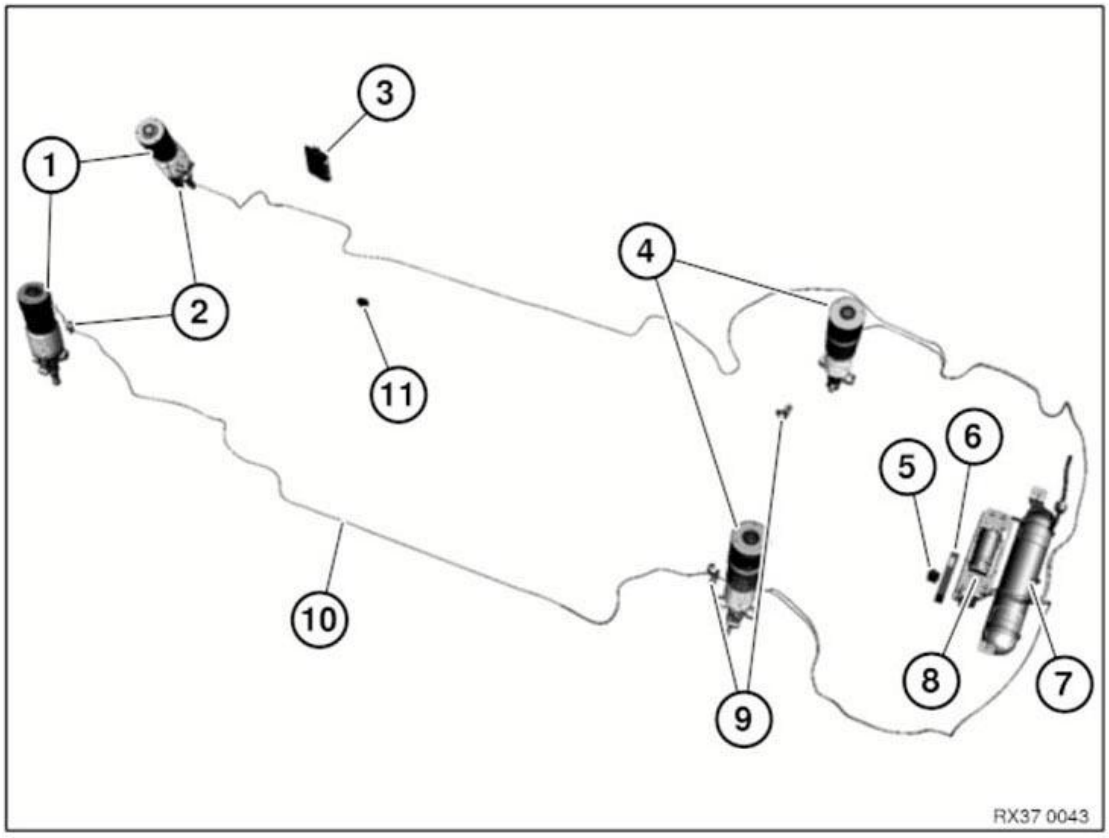
Components/pipes

IMPORTANT: Maintain the highest possible standards of cleanliness around the pipe connections when dismantling and assembling components/pipes. Even the tiniest dirt particles on the pipe connections or damage to the pipes can result in leaks in the air spring system!
Do not kink, twist or crush lines.

Pipe connections must be sealed off with adhesive tape immediately after they have been removed. The adhesive tape may only be removed shortly before the connection is reinstalled.

Check air spring strut/air spring for damage.

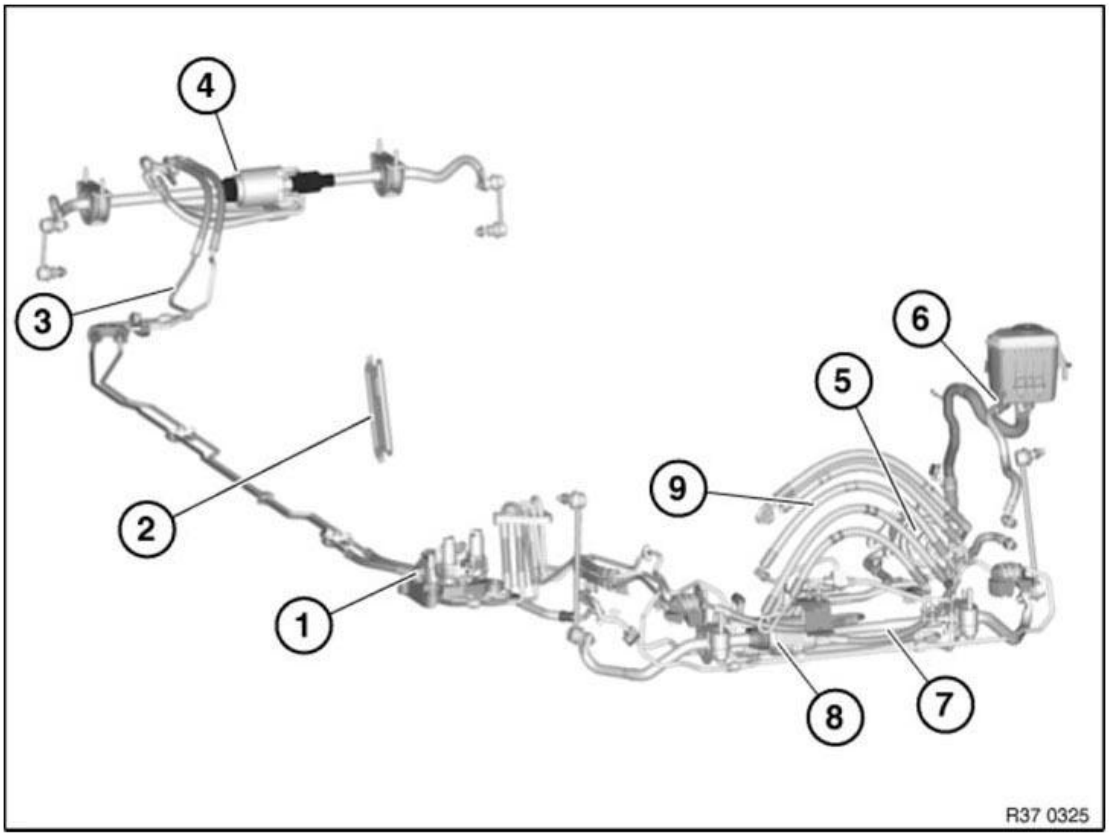
37... OVERVIEW OF 2-AXLE RIDE-HEIGHT CONTROL



1	Air suspension strut, front left and right	7	Pressure accumulator for air suspension
2	Ride height sensor, front left and right	8	Air supply system with solenoid valve manifold
3	Vertical Dynamics Management (VDM) control unit	9	Ride height sensor, rear left and right
4	Air suspension strut, rear left and right	10	Air lines
5	Relay, air supply unit	11	Ride-height control switch
6	Electronic ride-height control (EHC) control unit		

Fig. 3: Identifying 2-Axle Ride-Height Control System Components
Courtesy of BMW OF NORTH AMERICA, INC.

37.... OVERVIEW OF DYNAMIC DRIVE (ARS)



1	Valve block	8	Pressure relief valves
2	Control unit	9	Multi-chamber expansion hose
3	Pipes		
4	Active stabiliser bar, rear		
5	Auxiliary steering pump		Troubleshooting
6	Level sensor (on fluid reservoir)		If necessary, carry out initial Dynamic Drive operation
7	Active stabiliser bar, front		

Fig. 4: Identifying Dynamic Drive (ARS) System Components
Courtesy of BMW OF NORTH AMERICA, INC.

37 13... OVERVIEW OF DYNAMIC DRIVE (ARS) PRESSURE LINES, FRONT AXLE

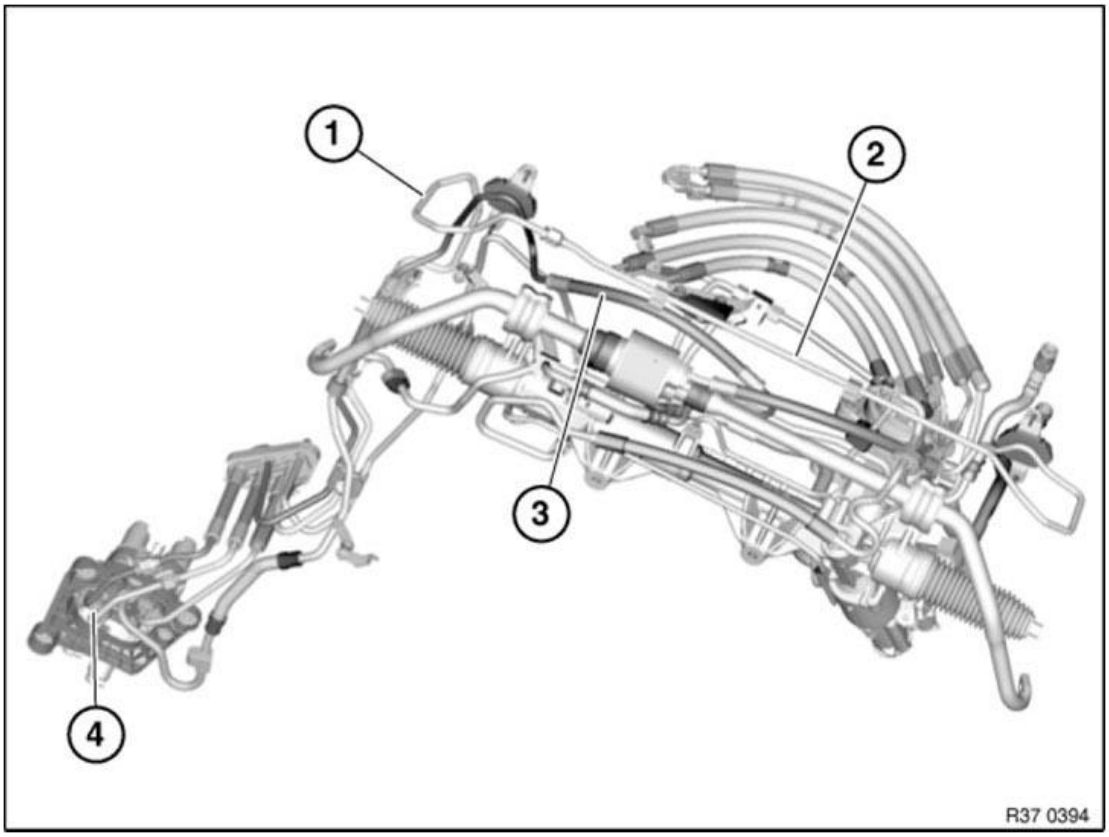


Fig. 5: Identifying Dynamic Drive (ARS) Pressure Lines - Front Axle
Courtesy of BMW OF NORTH AMERICA, INC.

ARS PRESSURE LINES REFERENCE CHART

No.	Designation
1	**Pressure line** , valve block VA1
2	**Pressure line** , oscillating motor VA1
3	**Pressure line** , oscillating motor VA2
4	Valve block **Pressure line** , (short, rear-wheel drive only)

37 13... OVERVIEW OF DYNAMIC DRIVE (ARS) PRESSURE LINES, REAR AXLE

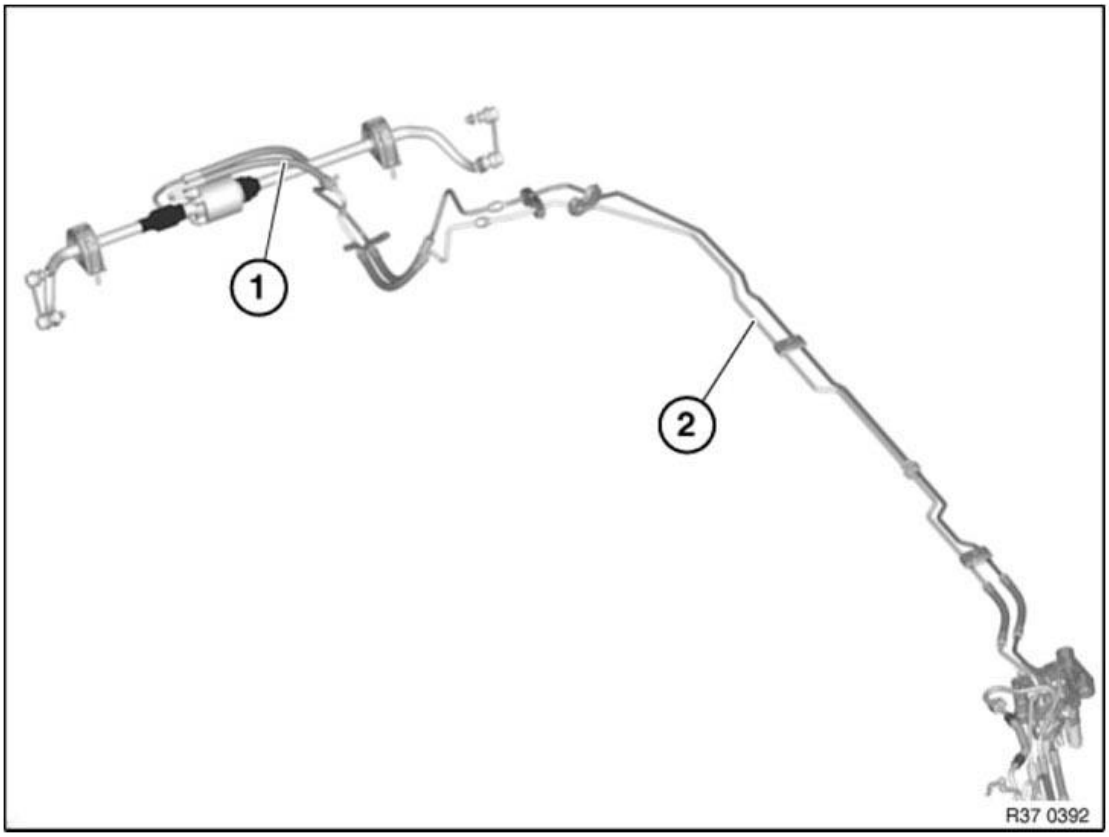
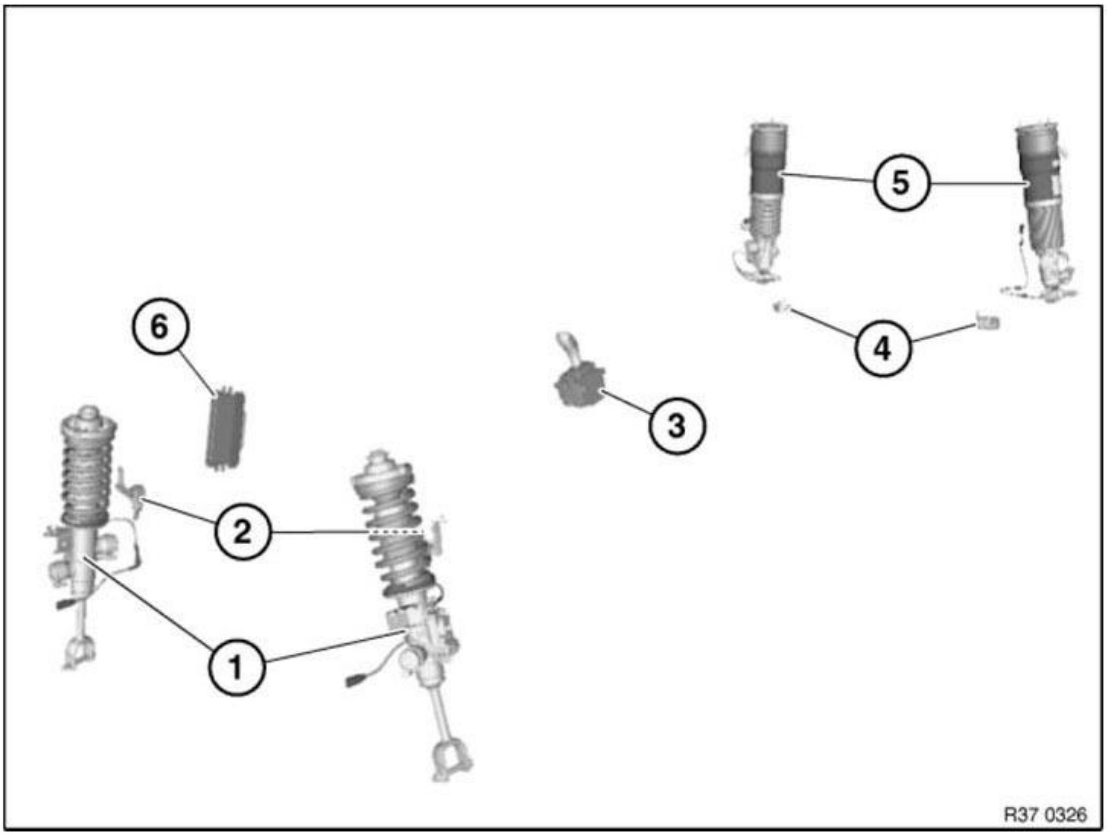


Fig. 6: Identifying Dynamic Drive (ARS) Pressure Lines - Rear Axle
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING WITH ARS LINES REFERENCE CHART

No.	Designation
1	**Pressure lines** , oscillating motor HA1/HA2
2	**Pressure lines** , underfloor HA1/HA2

37.... OVERVIEW OF VERTICAL DYNAMICS MANAGEMENT (VDM)



1	Spring strut, front	6	Control unit
2	Ride-height sensors, front		
3	Operating unit (next to gear selector switch)		
4	Ride-height sensors, rear		Carry out ride-height calibration
5	Spring strut, rear		

Fig. 7: Identifying Vertical Dynamics Management (VDM)System Components
Courtesy of BMW OF NORTH AMERICA, INC.

37 13... OVERVIEW OF LINES, STEERING WITH ARS

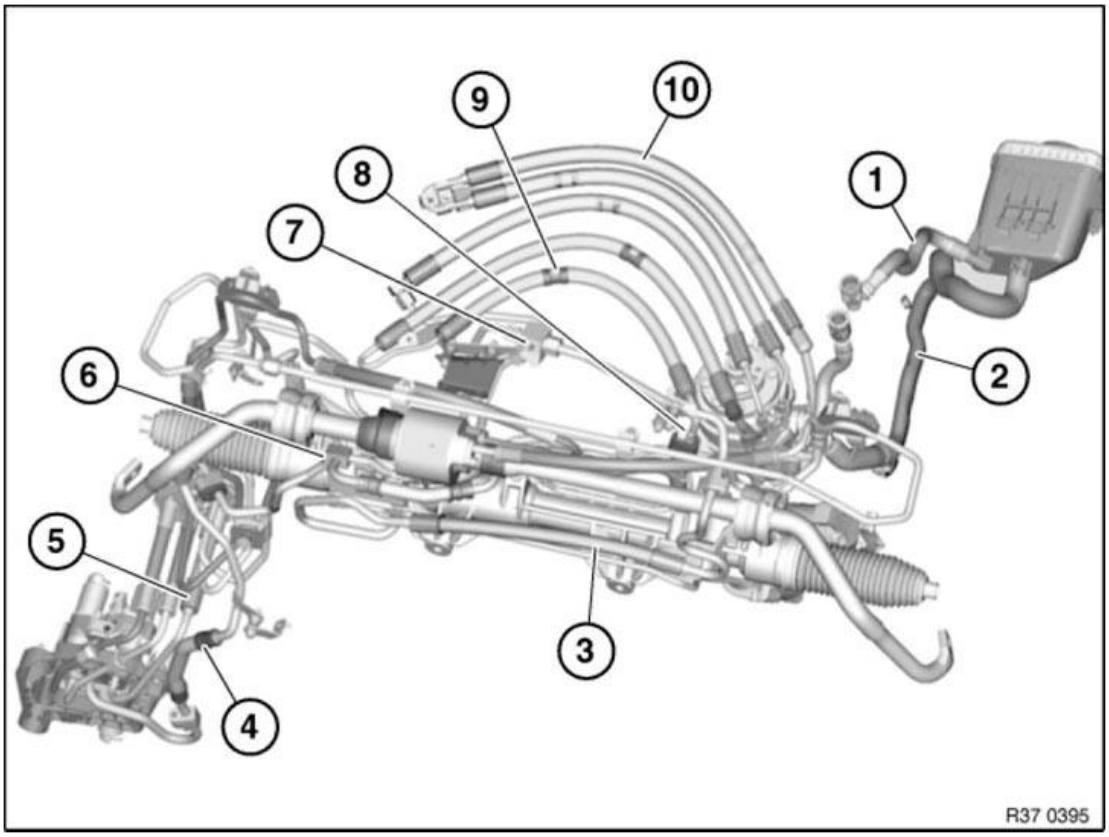
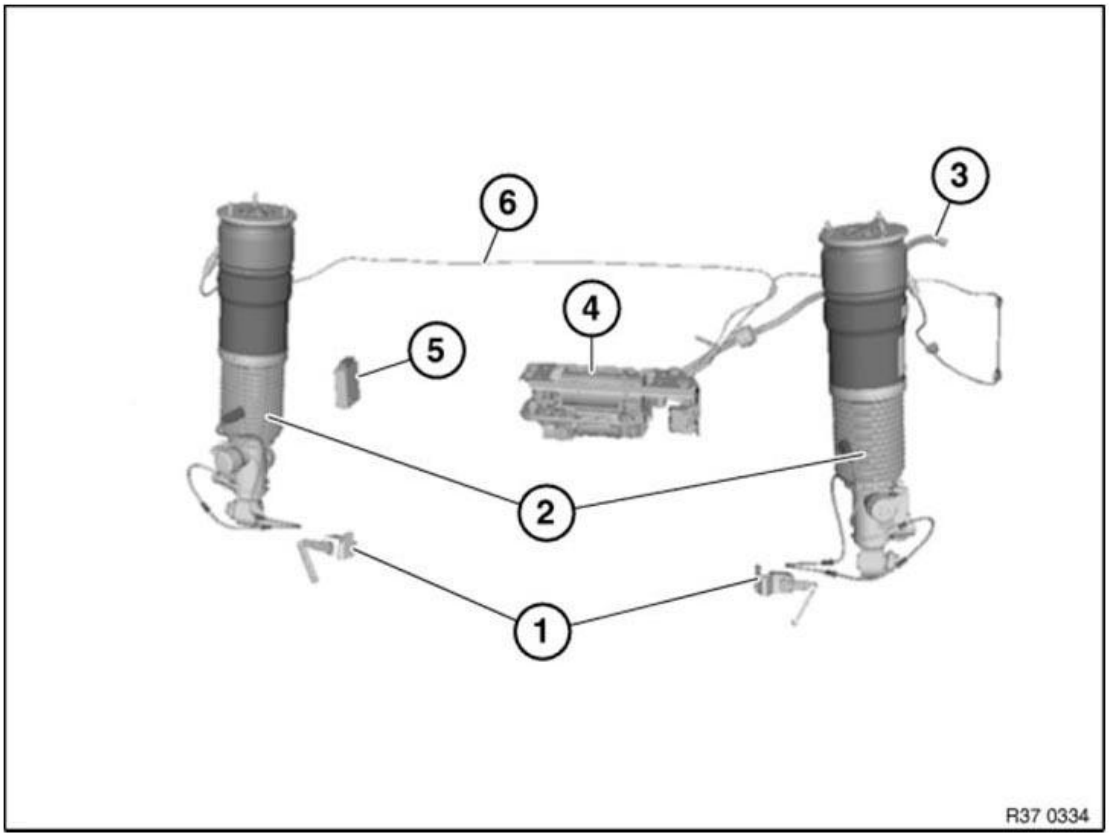


Fig. 8: Overview Of Lines, Steering With ARS
Courtesy of BMW OF NORTH AMERICA, INC.

ARS PRESSURE LINE REFERENCE CHART

No.	Designation
1	**Return line**
2	**Suction line**
3	**ARS expansion hose part 3**
4	**ARS return line**
5	**ARS expansion hose part 2**
6	**ARS+AFS return**
7	**ARS expansion hose part 4**
8	**Expansion hose part 2**
9	**Expansion hose part 1**
10	**ARS expansion hose part 1**

37..... OVERVIEW OF RIDE-HEIGHT CONTROL SYSTEM



1 Ride-height sensors, rear
2 Air spring strut — Troubleshooting
3 Ventilation line
4 Air supply unit
5 Control unit
6 Air line — Carry out ride-height calibration

Fig. 9: Identifying Ride-Height Control System Components
Courtesy of BMW OF NORTH AMERICA, INC.

37..... PERFORMING VERTICAL ACCELERATION SENSOR ADJUSTMENT (VERTICAL DYNAMICS MANAGEMENT)

NOTE: Vertical acceleration sensor adjustment must be performed after replacement of the spring strut/shock absorber with damper satellites.

Connect vehicle to BMW diagnosis system.

Select and perform vertical acceleration sensor adjustment under Service functions.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

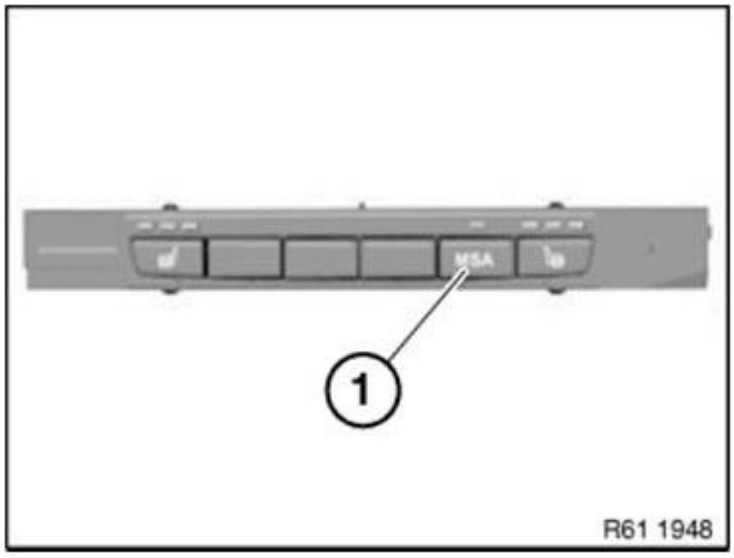


Fig. 10: Identifying Automatic Engine Start/Stop Switch (MSA)
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

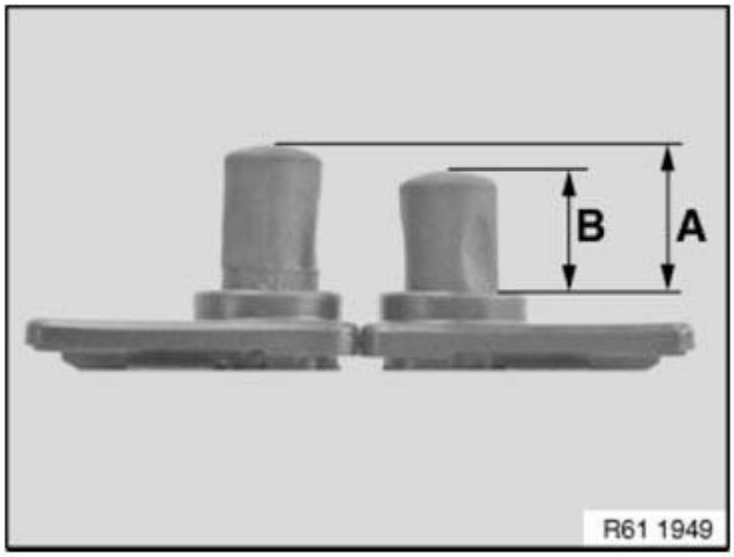


Fig. 11: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

37 10 001 START-UP WITH TEST RUN OF DYNAMIC DRIVE (EPS STEERING GEAR)

NOTE: **The Service function Initial operation of Dynamic Drive must be carried out after:**

- **Work on the Dynamic Drive system which involved opening hydraulic lines**
- **Replacement/Programming/Coding Dynamic Drive control unit (ICM - V - High)**

IMPORTANT: **Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.**

Using contaminated auxiliary materials to add fluid may introduce dirt particles into the oil reservoir and significantly reduce the service life of ARS. Do not use any filler funnels or similar!

Use only Pentosin CHF11S from original containers!

The fill level may only be checked or adjusted when the engine is stopped!

Adjust fill level if possible in middle between 20° and 80°C.

Ensure that the cap is fully screwed in prior to the fill level check.

NOTE: **To avoid mix-ups when filling with hydraulic fluid, mark the fluid reservoirs or their caps with identification marks.**

CHF Pentosin CHF11S



Fig. 12: Identifying CHF Pentosin CHF11S
Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding hydraulic circuit

1. Thoroughly clean oil reservoir and its immediate surrounding area with lid closed.
2. Top up hydraulic fluid or set fluid level correctly.

NOTE: **The fill level is dependent on the oil temperature. Check fill level at an oil temperature between 20 ° and 80 °C.**

With engine at normal operating temperature, do not exceed "MAX" marking of 80 °C (1).

Do not drop below "Min. marking 20 °C" (2).

Hydraulic fluid: see OPERATING FLUIDS .

3. Start engine, run briefly and then switch off.
4. Check and correct fill level with engine stopped.

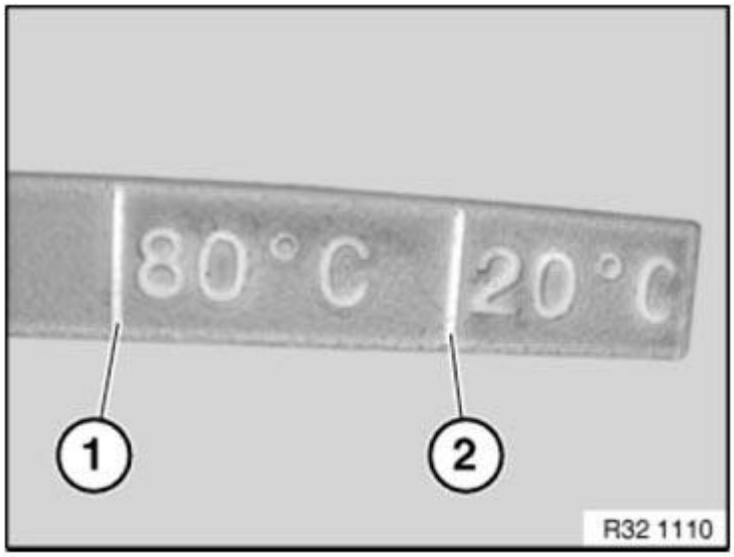


Fig. 13: Identifying Maximum And Minimum Temperature Marking Of Fluid Level
Courtesy of BMW OF NORTH AMERICA, INC.

Performing initial operation with test run

Danger of injury!

Vehicle executes heavy rolling motions during start-up! Therefore observe the following specifications without fail:

- Do not allow any persons to remain in the vehicle or directly on the vehicle.

- Keep the vehicle doors closed.
- Maintain a safety distance around the vehicle of 1 meter to persons, objects, walls etc.
- Vehicle must be standing horizontally with all wheels on a firm surface.
- Do not under any circumstances carry out start-up on a vehicle hoist, wheel alignment analyzer or similar!
- Avoid heavy loads.

1. Check load; if necessary, remove load from the vehicle.
2. Bring engine up to operating temperature.
3. Connect the BMW diagnosis system to the vehicle.
4. Start initial operation in SERVICE FUNCTIONS. Follow instructions in Diagnosis and Information System.
5. Check fill level again with engine stationary and if necessary top up oil to 80° mark.

3711 FRONT CONTROL AND SUSPENSION ELEMENTS

37 11 030 REMOVING AND INSTALLING FRONT LEFT OR RIGHT SPRING STRUT

Necessary preliminary work

- Remove **FRONT WHEEL**
- Remove upper wishbone from swivel bearing. See **REMOVING AND INSTALLING/REPLACING TOP LEFT WISHBONE** or **REMOVING AND INSTALLING/REPLACING TOP RIGHT WISHBONE** .
- Remove **ANTI-ROLL BAR LINK FROM SPRING STRUT**

IMPORTANT: Risk of damage!
Secure spring strut against falling out.

Release screws (1).

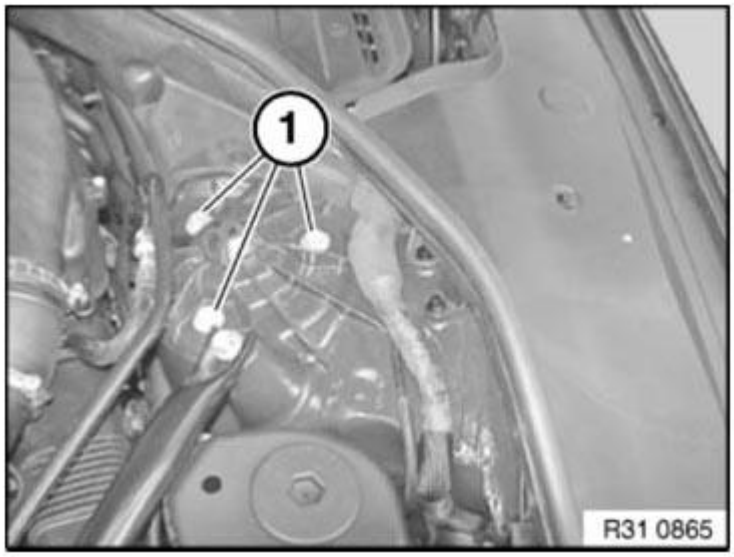


Fig. 14: Identifying Spring Strut Release Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Turn support bearing in direction of travel up to stop in clockwise direction and tighten.

Clean contact surface in spring strut dome.

Tightening torque **31 31 1AZ** .

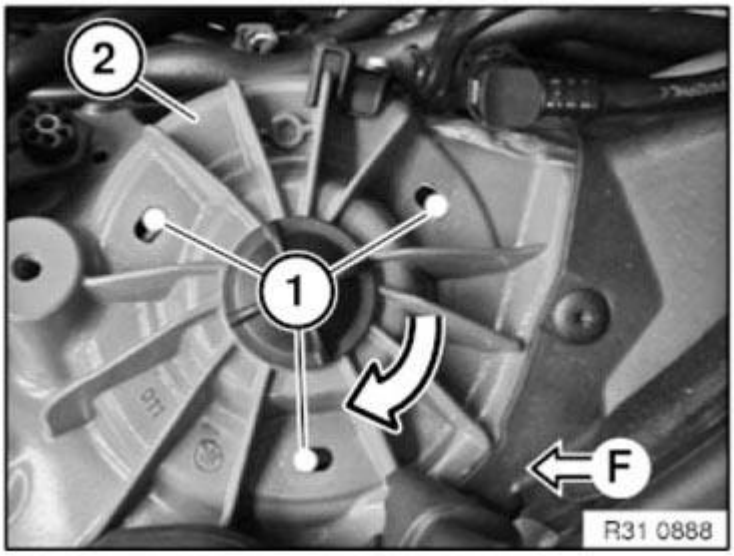


Fig. 15: Turning Support Bearing In Direction Of Travel Up
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect feed line (2) from mounting.

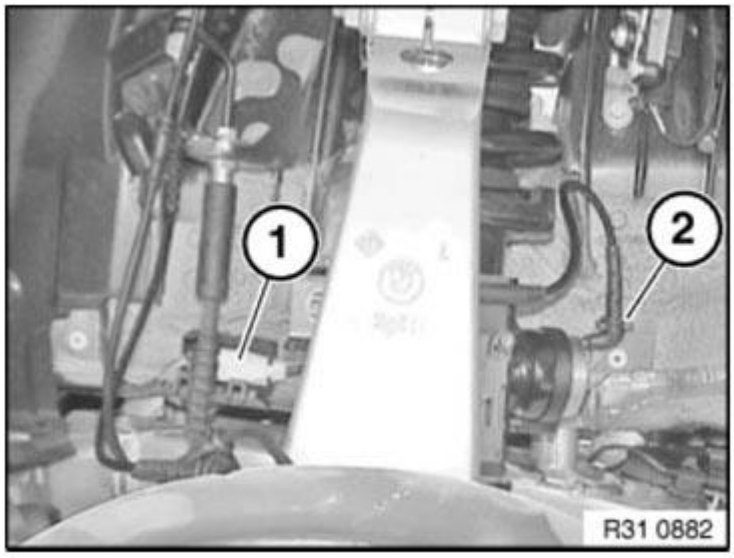


Fig. 16: Identifying Feed Line And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove screw.

Release spring strut from wishbone (2).

Installation note:

Replace self-locking nut.

F03: Replace screw and nut

Note direction of insertion of screw.

Adhere to the assembly sequence.

Tightening torque **31 12 7AZ** .

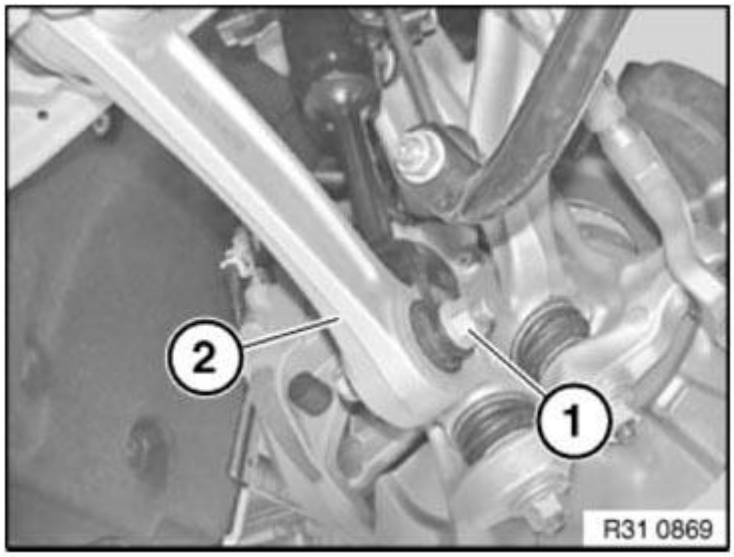


Fig. 17: Identifying Spring Strut With Mounting Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove spring strut downwards out of wheel arch.

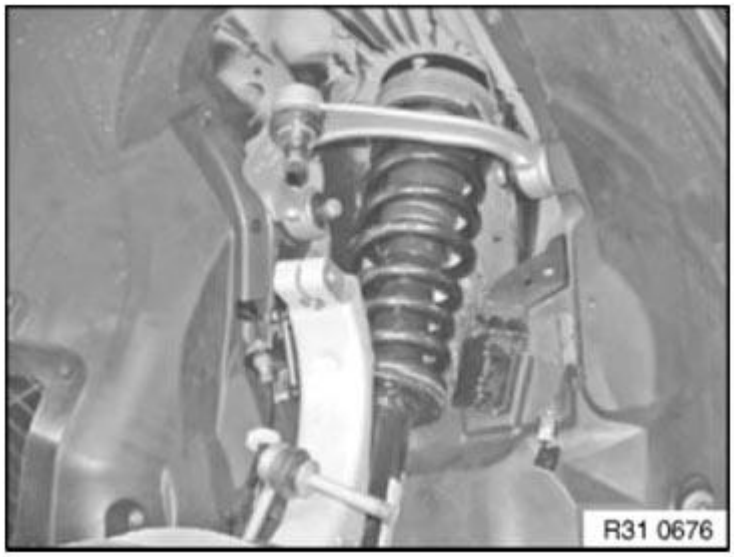


Fig. 18: Identifying Front Spring Strut With Springs And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

37 11 010 REMOVING AND INSTALLING/REPLACING FRONT ACTIVE ANTI-ROLL BAR

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off line connections with seal plug. 32 1 270

NOTE: A film of grease on the roller bearing in no way impairs the operability of the anti-roll bar.

In all warranty cases you must always provide a fault memory printout, even where there is no fault entry, with the defective component.

Necessary preliminary work

- Remove front underbody protection
- Remove stiffening plate (F12/F13 only)
- Remove **BOTH ANTI-ROLL BAR LINKS FROM ANTI-ROLL BAR**

Release screws (1) on left and right and partly remove trim panel (2).

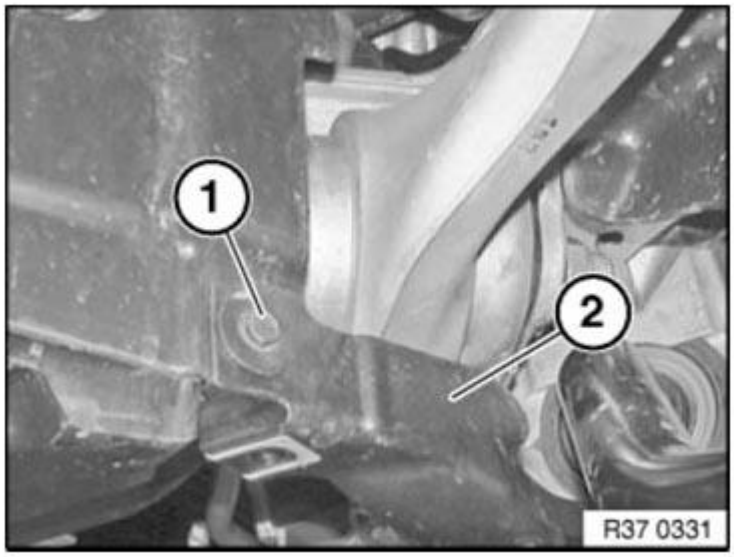


Fig. 19: Identifying Trim Panel With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Hydraulic lines and connections on anti-roll bar must be fitted with suitable seal connectors 32 1 270 immediately after dismantling!

Release screws (1) and (2) and remove pressure lines from swivel motor.

Tightening torque **37 13 4AZ** .

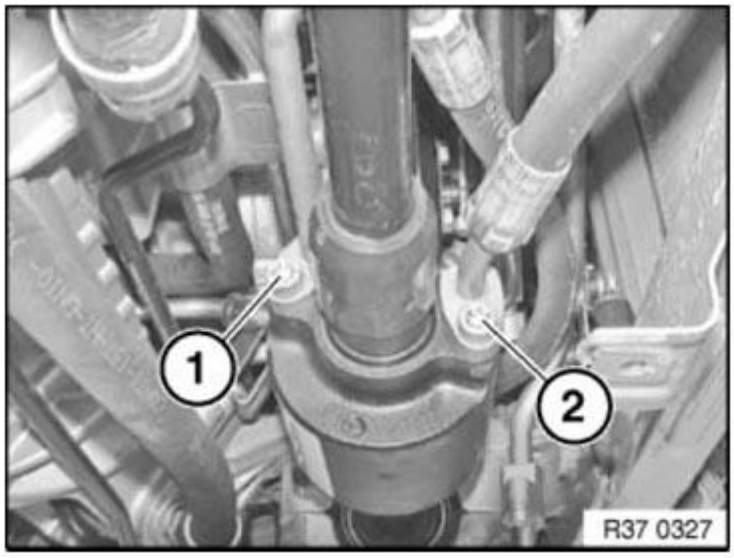


Fig. 20: Identifying Pressure Lines Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **37 11 2AZ** (short screw).

Tightening torque **32 00 1AZ** (long screw).

Remove retaining brackets.

Remove anti-roll bar with rubber mounts sideways.

Installation note:

Replace bolts.

Observe different screw lengths.

(Long screw is fitted in direction of travel at rear)

Replacement: Remove both rubber mounts from anti-roll bar.

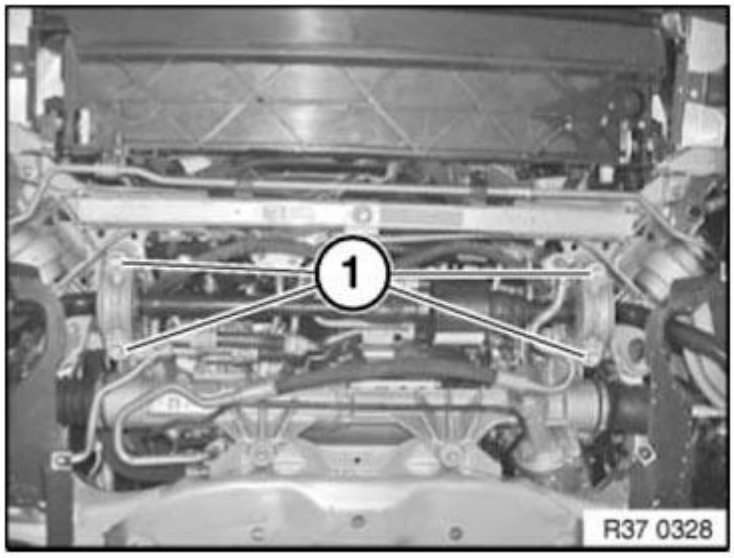


Fig. 21: Identifying Front Active Anti-Roll Bar Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rubber sealing lips (2) must be situated as pictured between retaining brackets!

Installation note:

Check roller bearing (2) for damage, replace anti-roll bar if necessary (slight discharge of grease OK).

Keep facing for rubber mount on roller bearing clean and free from oil and grease during installation.

Check rubber mount for damage, replace if necessary.

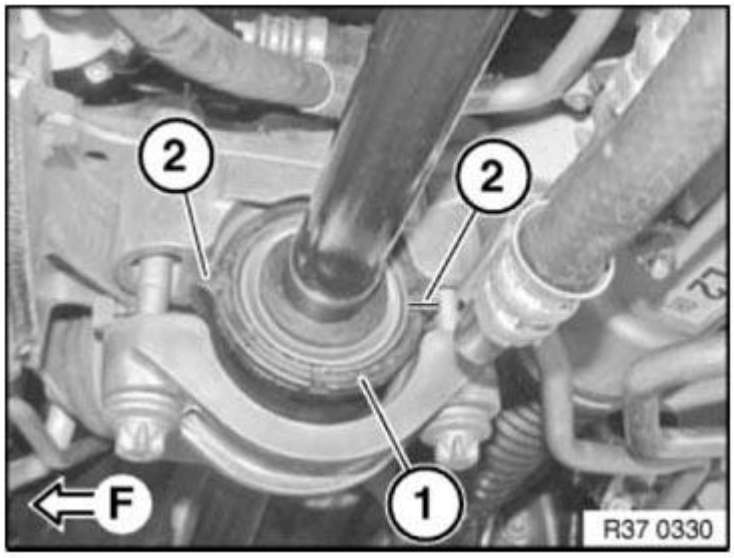


Fig. 22: Identifying Roller Bearing With Rubber Sealing Lips
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the seal plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leak tightness
- Start up **DYNAMIC DRIVE**

31 31 032 REPLACING FRONT LEFT OR RIGHT COIL SPRING

Notes

IMPORTANT: Both coil springs on the relevant axle must be replaced only in the event of corrosion breakage!

The coil spring is allocated in the Electronic Parts Catalogue (EPC) under the menu item "Spring table" after the vehicle identification number has been entered and the relevant optional equipment of the car has been selected.

WARNING: Prior to each use of special tool 31 3 340 , it is essential to read the associated Owner's Handbook fully!
All the safety information and instructions contained in the Owner's Handbook must be strictly observed!

Failure to observe these safety precautions and instructions increases the risk of serious physical injury, damage to your health and damage to property and equipment!

IMPORTANT:

1. **Prior to each use, check the special tools for defects, modifications and operational reliability.**
2. **Damaged/modified special tools must not be used!**
3. **No changes or modifications may be made to the special tools!**
4. **These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.**
5. **Keep special tools dry, clean and (down to the spindle) free from grease.**
6. **Impact screwdrivers are prohibited!**
7. **Do not compress coil spring to full extent.**

Necessary preliminary work

- Remove **FRONT SPRING STRUT**

Relieve tension on coil spring and remove from special tools 31 3 351.

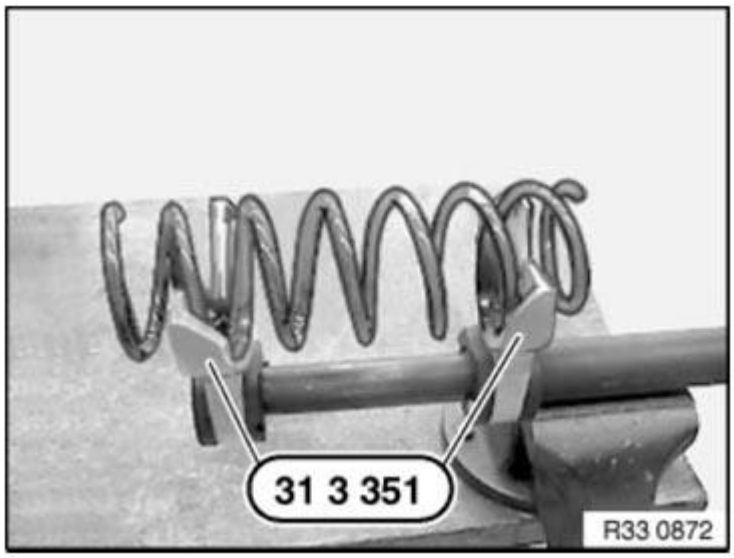


Fig. 23: Removing Coil Spring From Special Tool (31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To be able to align the support bearing to the spring-strut bore when assembling the spring strut (see illustration), the spring in the spring tensioner must be positioned correctly!

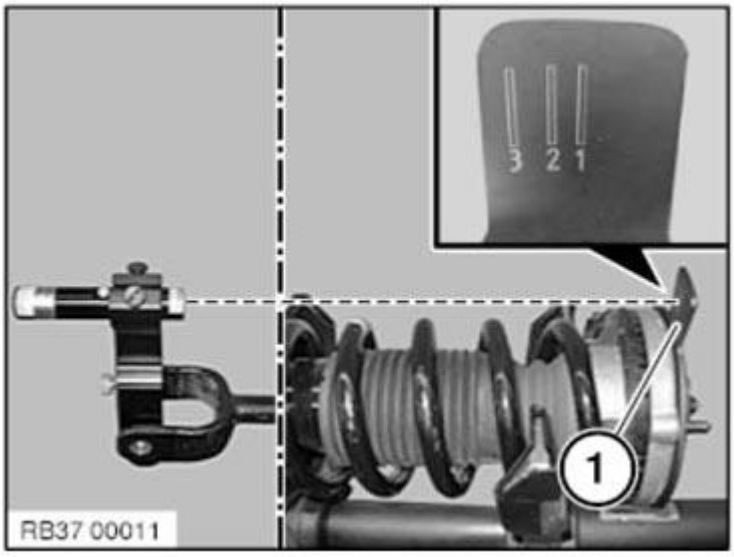


Fig. 24: Positioning Spring With Mounted Support Bearing And Gauge (83 30 2 210 780) In Spring

Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

- The spring coil with the largest diameter must be positioned against the support bearing
- The upper coil spring end must be in contact with the limit position of the spring pad!
- Position the spring with mounted support bearing and gauge 83 30 2 210 780 in the spring tensioner so that the marks (1) are positioned vertically toward the top.

Position the gauge on the support bearing:

Right support bearing:

In vehicles to 04/2010, position mark **"RIGHT A"** on arrow at support bearing

In vehicles from 04/2010, position mark **"RIGHT B"** on arrow at support bearing

Left support bearing:

Position mark **"LEFT"** on arrow at support bearing

See also **REPLACING SPRING STRUT!**

WARNING: Do not compress coil spring to full extent.
Coils of coil spring must be located completely in recesses of special tools 31 3 351!

Tension coil spring.

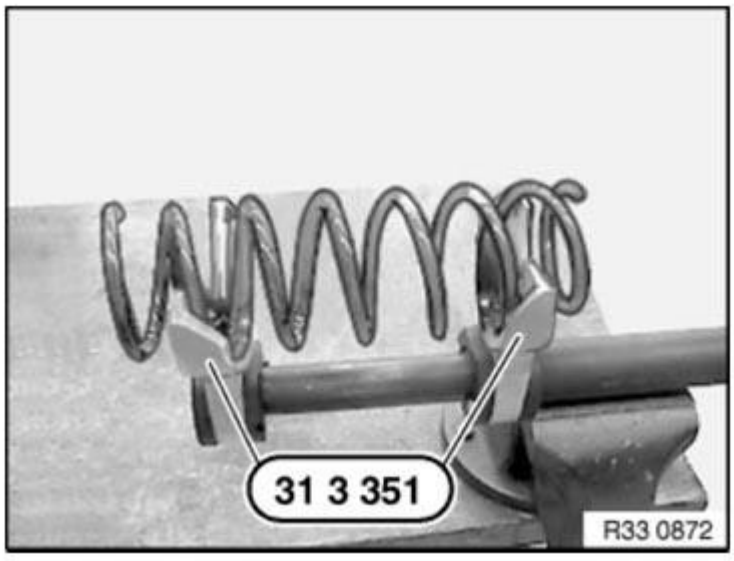


Fig. 25: Identifying Coil Spring With Special Tool (31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Further assembly:

See **REPLACING FRONT LEFT OR RIGHT SPRING STRUT**

37 11 032 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

Notes

WARNING: Prior to each use of special tool 31 3 340 , it is essential to read the associated Owner's Handbook fully!
All the safety information and instructions contained in the Owner's Handbook must be strictly observed!
Failure to observe these safety precautions and instructions increases the risk of serious physical injury, damage to your health and damage to property and equipment!

IMPORTANT:

1. **Prior to each use, check the special tools for defects, modifications and operational reliability.**
2. **Damaged/modified special tools must not be used!**
3. **No changes or modifications may be made to the special tools!**
4. **These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.**
5. **Keep special tools dry, clean and (down to the spindle) free from grease.**
6. **Impact screwdrivers are prohibited!**
7. **Do not compress coil spring to full extent.**

Necessary preliminary work

- Remove **FRONT SPRING STRUT**

Removing

Clamp special tool 31 3 341 in vice.

Fit special tools 31 3 351 from above on special tool 31 3 341 until retaining bolts (1) can be felt and heard to snap into place.

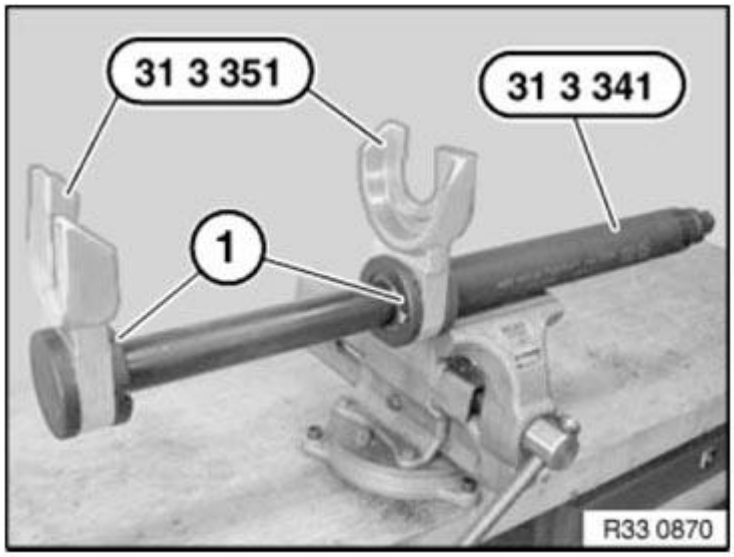


Fig. 26: Identifying Retaining Bolts With Special Tools (31 3 341 And 31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert spring strut into spring tensioner in such a way that anti-roll bar link fixture (1) is horizontally positioned to left or right.

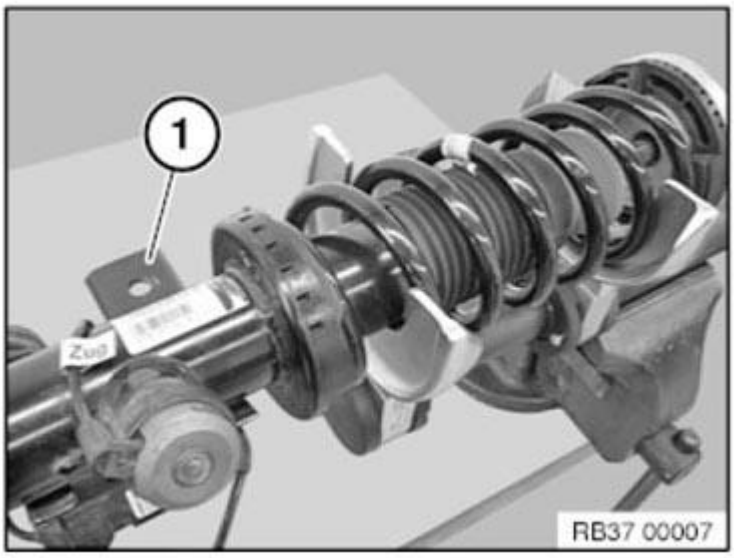


Fig. 27: Identifying Anti-Roll Bar Link Fixture
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Coils of coil spring must be located completely in recesses of special tools 31 3 351!

Compress coil spring until stress on piston rod is relieved.

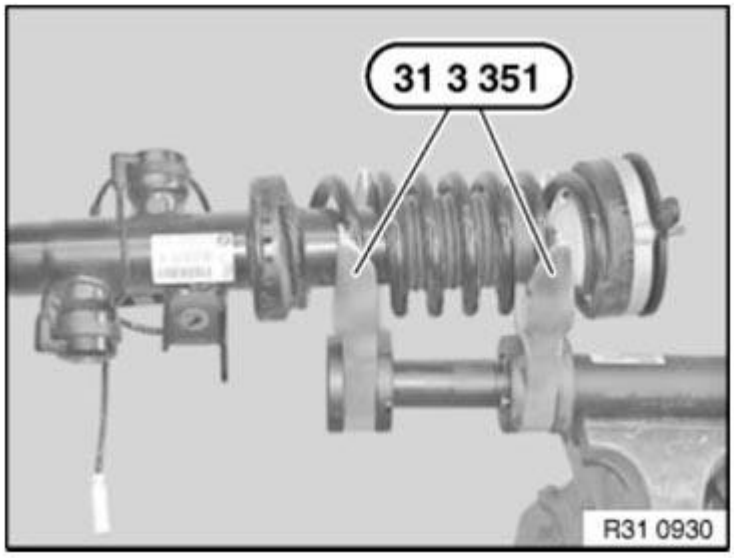


Fig. 28: Compress Coil Spring Using Special Tool (31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut with special tool 33 0 040 Socket.

Check support bearing and spring pad for damage and replace if necessary.

Remove shock absorber, auxiliary damper, protective tube and spring pad from tensioned coil spring, examine and replace if necessary.

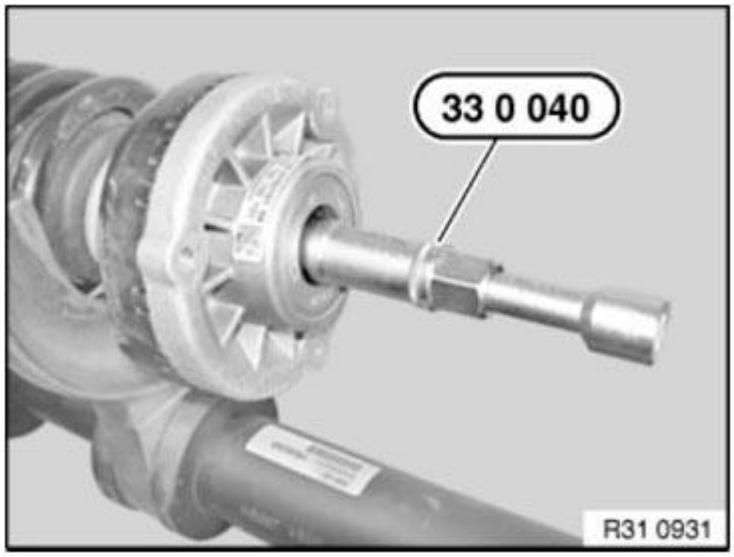


Fig. 29: Releasing Nut Using Special Tool (33 0 040)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When mounting, spring strut and support bearing must aligned using special

tool 83 30 2 210 778!

The following procedure must be followed.

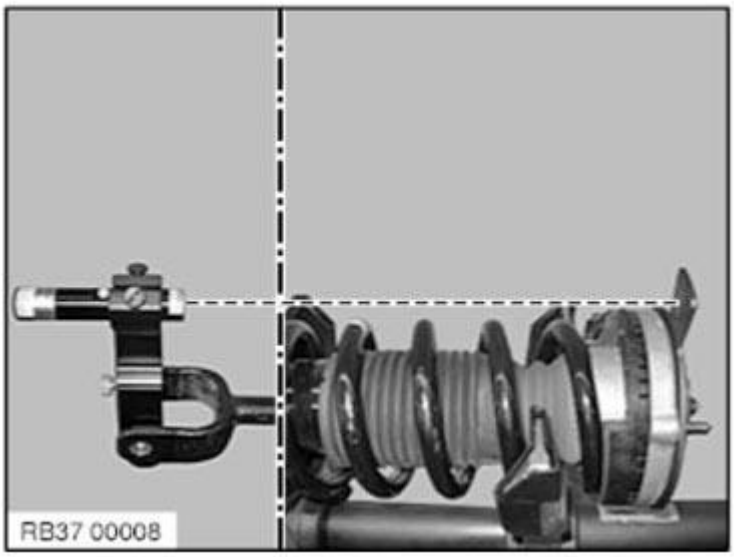


Fig. 30: Aligning Spring Strut And Support Bearing Using Special Tool (83 30 2 210 778)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert shock absorber in tensioned coil spring.

Slide auxiliary damper, protective tube and spring pad onto piston rod.

IMPORTANT: Lower end of coil spring must rest against spring pad (1).

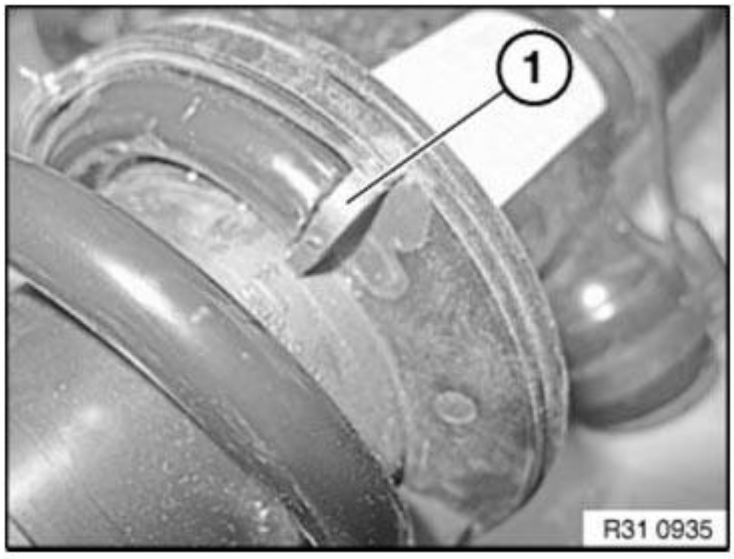


Fig. 31: Identifying Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fit support bearing and align with end of coil spring.

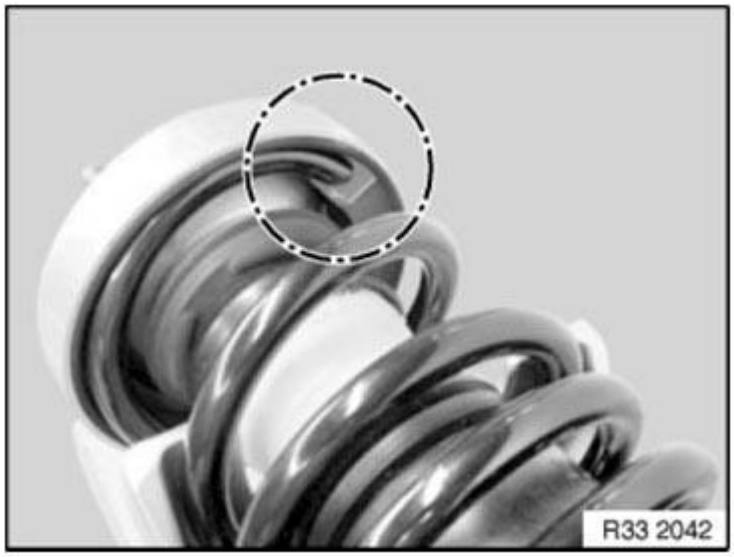


Fig. 32: Identifying Support Bearing And Coil Spring Alignment Area
Courtesy of BMW OF NORTH AMERICA, INC.

Use special tool 33 0 040 Socket. to attach support bearing.

Replace nut!

Tightening torque **31 31 2AZ** .

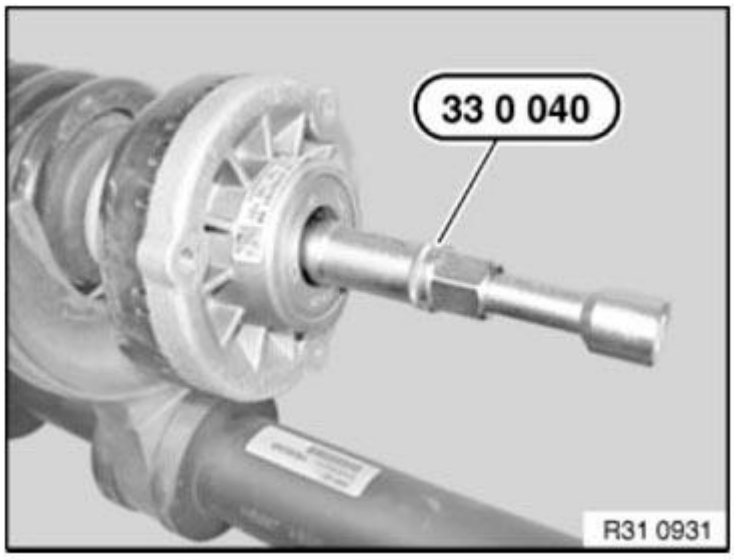


Fig. 33: Attaching Support Bearing Using Special Tool (33 0 040)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!
Adjusting device emits laser beam!
Do not look into the beam!
Laser class 2
To EN60825-1 : 1994
P < or = 1 mW

Align laser (1) with prism mirror (2)!

- Mount laser (1) in damper eyelet
- Mount prism mirror (2) vertically onto spring strut!

  The prism mirror must be mounted on a clean, smooth surface. Do not mount prism mirror on label or weld beads!

  Laser beam must face mirror!

- Adjust the laser with adjusting screw (3) in such a way that the laser beam is projected onto mark (4) via the mirror.
- Remove prism mirror **->After this, the laser adjustment must not be changed at the adjusting screw (3)!**

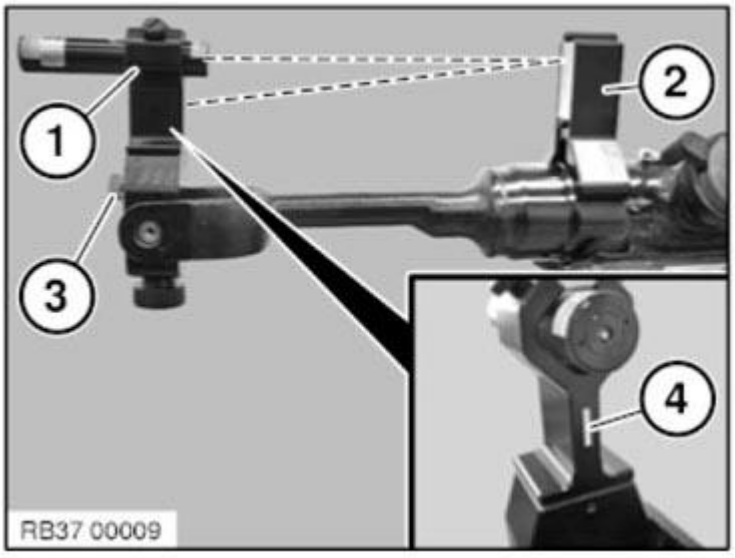


Fig. 34: Aligning Laser With Prism Mirror
Courtesy of BMW OF NORTH AMERICA, INC.

Align spring strut and support bearing with each other

Mount gauge 83 30 2 210 780 onto support bearing!.

Right spring strut:

Vehicles built before 04/2010: Position mark (1) **"RIGHT A"** on arrow (2) on support bearing.

On vehicles from 04/2010: Position mark (1) **"RIGHT B"** on arrow (2) on support bearing.

Left spring strut:

Position mark (1) **"LEFT"** on arrow (2) on support bearing.

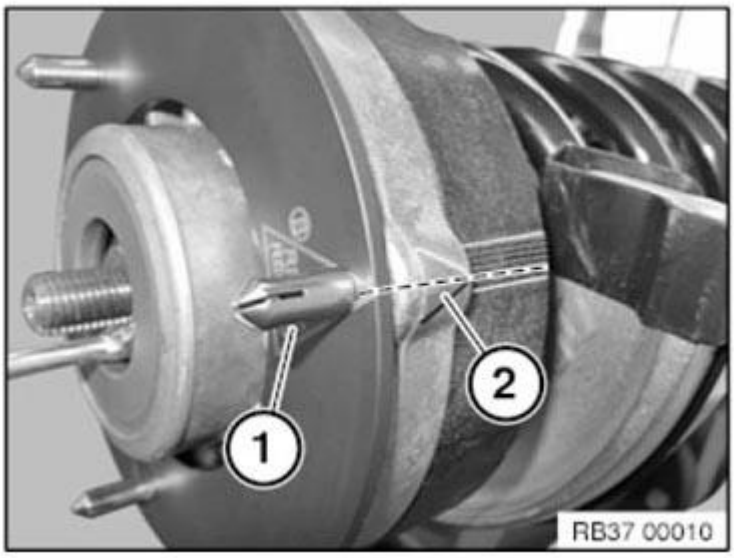


Fig. 35: Identifying Marking Position On Support Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Align spring strut with support bearing or with corresponding mark on gauge (1) using laser beam and relieve tension.

IMPORTANT: After the spring tension is relieved, the laser beam must point to the specified mark of gauge (1).
Failure to observe this requirement will result in substantial impairment of handling characteristics.

Vehicles built before 04/2010: Position laser beam on mark **"3"** of gauge.

On vehicles from 04/2010: Position laser beam on mark **"2"** of gauge.

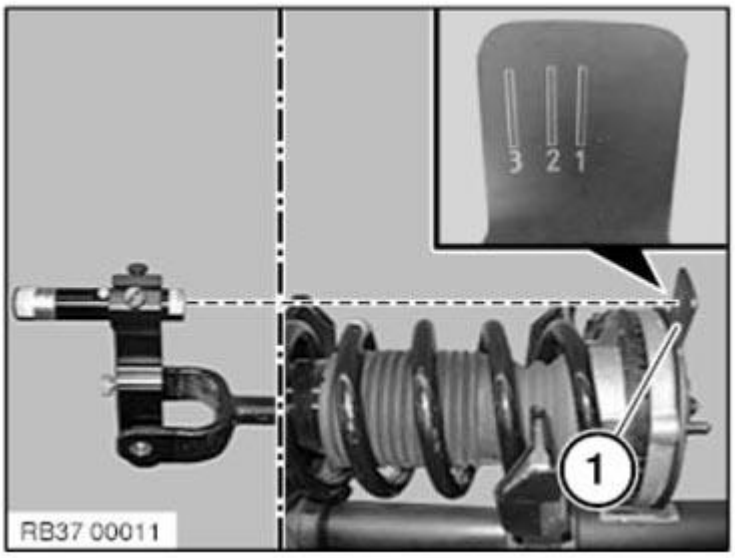


Fig. 36: Aligning Spring Strut With Support Bearing Or With Mark On Gauge Using Laser Beam
Courtesy of BMW OF NORTH AMERICA, INC.

Relieve spring tension.

37 11 020 REPLACING PRESSURE RELIEF VALVES FOR ACTIVE ANTI-ROLL BAR AT FRONT

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Remove defective pressure relief valves only immediately before installing new pressure relief valves.

NOTE: Replace pressure relief valves in pairs only.
When returning pressure relief valves in warranty cases, seal them with the sealing caps from the new pressure relief valves.

Necessary preliminary work

- Remove **FRONT UNDERBODY PROTECTION**
- Remove stiffening plate (F12/F13 only)
- Loosen and lower the **ANTI-ROLL BAR** on the front axle support (all-wheel drive vehicle only)

IMPORTANT: Before releasing, it is essential to remove corrosion and dirt from the area around the pressure relief valves!

NOTE: Pressure relief valve consists of filter cartridge (1) and fitting (2).

Unclip filter cartridge (1) and release fitting (2).

Tightening torque **37 11 2AZ** .

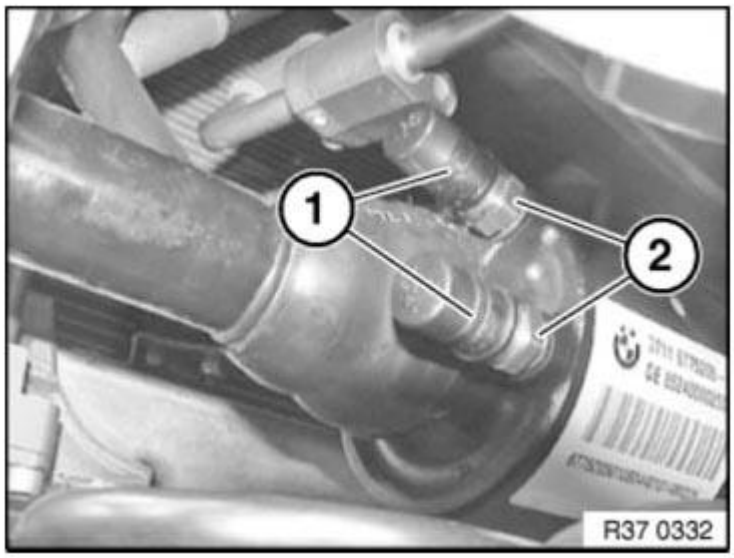


Fig. 37: Identifying Pressure Relief Valve Filter Cartridge And Fitting
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Install first fitting (2) and then filter cartridge (1).

Remove both protective caps (of red rubber with tensioning strap).

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check newly installed pressure relief valves for tightness
- Start up **DYNAMIC DRIVE** .

3712 REAR CONTROL AND SUSPENSION ELEMENTS

37 12 012 CARRYING OUT RIDE HEIGHT ADJUSTMENT

NOTE: Ride height adjustment must be carried out after the following work:

- **Removal/replacement of ride height sensor or its control rod (only necessary for vehicles with air suspension or vehicles with VDC)**

- **Replacement of wiring harness**
- **Replacement of air supply system control unit (F01/F02/F04/F07/F11)**
- **Replacement of vertical dynamics management control unit**
- **Replacement of ICM control unit (Integrated Chassis Management)**

Connect BMW diagnosis system.

Switch the ignition on.

Carry out ride height adjustment (menu item: "Service function").

IMPORTANT: Following ride height adjustment, for vehicles with:

- **Run Flat Indicator: initialize RUN FLAT INDICATOR**
- **Tyre Pressure Monitor: RESETTING TYRE PRESSURE MONITOR**

37 00... CHECKING AIR SPRINGS FOR DAMAGE

NOTE: If a vehicle has been driven with depressurized air springs, the air springs must always be replaced.

Checking air spring strut on rear axle:

Necessary preliminary work

- Undo **AIR SPRING STRUT** on wheel carrier

  Do **not** release air spring strut in the upper wheel arch!

Air spring strut is damaged:

- if pressing the lower spring strut eye moves the lower section of the spring strut (gaiter) in longitudinal direction toward the spring strut upper section (see illustration)

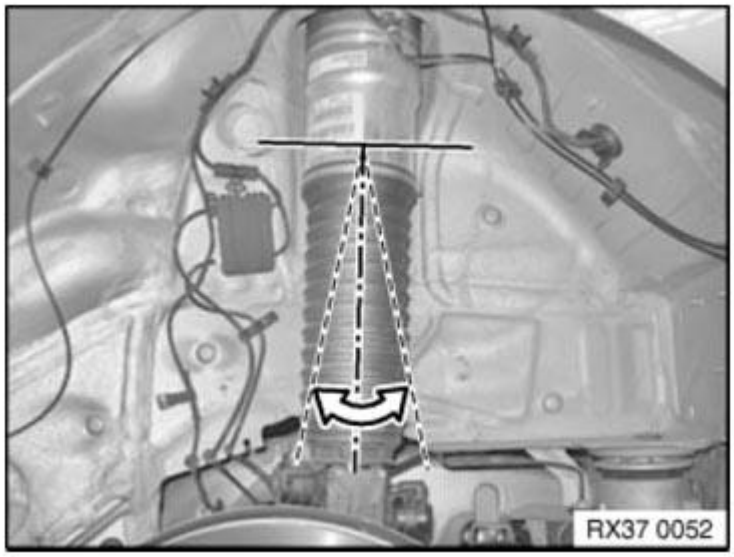


Fig. 38: Movement Of Lower Spring Strut Eye
Courtesy of BMW OF NORTH AMERICA, INC.

37 12 001 CHECKING FUNCTION OF SELF-LEVELLING SUSPENSION SYSTEM

Carry out error search with BMW diagnosis system; if necessary, refer to Troubleshooting on self-levelling suspension system.

37 12 070 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT AIR SPRING STRUT

WARNING: Danger of injury!
Drain the air suspension system before carrying out any work on the air supply system, air pipes and air spring struts! Risk of injury if this instruction is not complied with!

Risk of damage!

Extreme cleanliness must be ensured in the connection area of the pipes during removal and installation. Even the smallest of dirt particles can cause leakage in the air suspension system.

NOTE: Read and comply with NOTES ON AIR SUSPENSION SYSTEM .

In a warranty case you must always provide a fault memory printout, even where there is no fault entry, with the defective part.

Necessary preliminary tasks

- Deactivating air spring system:
  - Raise vehicle on lifting platform.

- Remove ignition key
- Pull out fuse for air spring system in luggage compartment at rear right

- Remove **REAR WHEEL ARCH COVER**
- Remove rear parcel shelf. See **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR STORAGE SHELF** or **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR STORAGE SHELF WITH ROLLER SUNBLIND** .
- Release carbon canister on right wheel arch. See **REMOVING AND INSTALLING/REPLACING CARBON CANISTER (US VERSION)** .

WARNING: Danger of injury!
Do not disassemble the air spring strut! Air spring strut is still under a certain residual pressure even after the pipe is disconnected.

IMPORTANT: Risk of damage!
Do not kink, twist or crush pipes.

Carefully slacken banjo bolt (1) on air spring strut (2) until the sound of escaping air can be heard.

Tightening torque **37 12 1AZ** .

NOTE: Wait roughly 2 minutes until the pressure on the left side and/or right side of the air spring system is completely reduced (hissing sound stops).

Only fully release banjo bolt (1) after pressure has completely reduced.

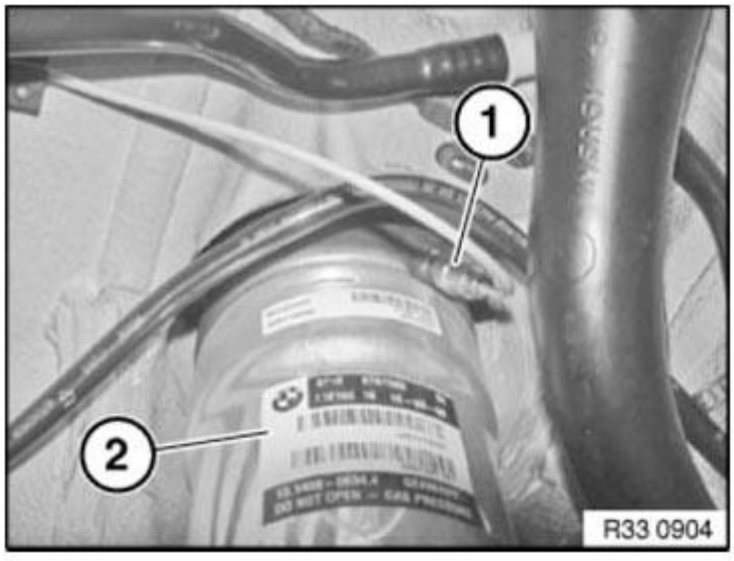


Fig. 39: Identifying Air Spring Strut With Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

- Check banjo bolt(s) for dirt, clean if necessary.
- Carefully screw in banjo bolt(s) by hand to avoid damaging the thread and with it the air spring strut.

Unfasten plug connection (1) and disconnect.

Unclip line from holder.

Installation note:

Check holder for damage and replace if necessary.

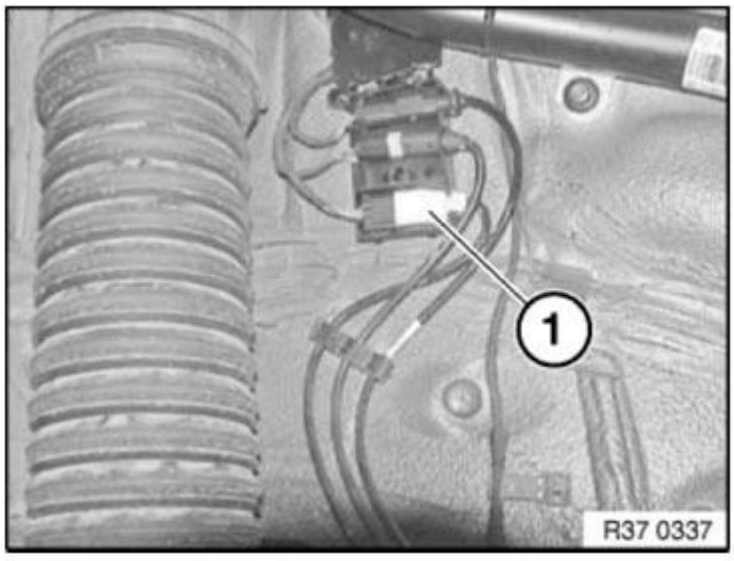


Fig. 40: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Fold acoustic insulation (1) upwards. See **REMOVING AND INSTALLING/REPLACING CARBON CANISTER (US VERSION)** .

Unscrew nuts (2). See **REMOVING AND INSTALLING/REPLACING CARBON CANISTER (US VERSION)** .

Tightening torque **37 12 4AZ** .

Installation note:

Replace self-locking nuts.

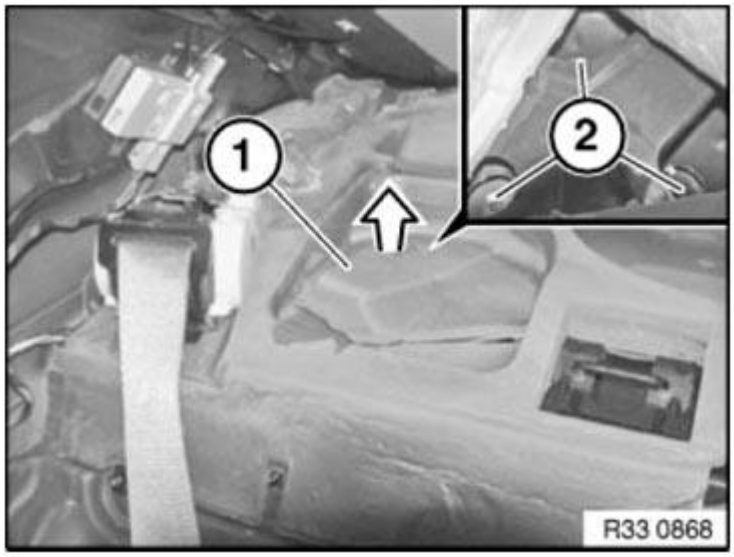


Fig. 41: Folding Acoustic Insulation Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw.

Tightening torque **37 12 5AZ** .

Press air spring strut off wheel carrier and remove towards bottom.

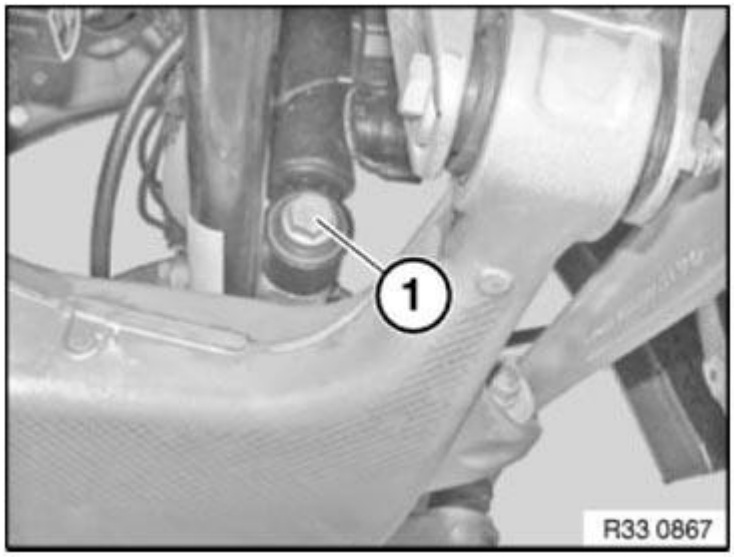


Fig. 42: Identifying Air Spring Strut Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **Activate and fill air spring system**
  - Insert fuse in corresponding slot in fuse box
  - Set vehicle down on its wheels
  - Start engine
  - Air spring struts are automatically filled

37 12 1090 REMOVING AND INSTALLING REAR LEFT OR RIGHT SPRING STRUT

See **REMOVING AND INSTALLING REAR LEFT OR RIGHT SPRING STRUT** .

37 12 220 REMOVING AND INSTALLING/REPLACING REAR ACTIVE ANTI-ROLL BAR

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Risk of burning!

This repair work may only be carried out on an exhaust system which has cooled down.

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with seal plugs. 32 1 270

NOTE: A film of grease on the roller bearing in no way impairs the operability of the anti-roll bar.
In all warranty cases you must always provide a fault memory printout, even where there is no fault entry, with the defective component.

Necessary preliminary work

- Remove **LEFT REAR WHEEL**
- Remove trailing link on rear axle (F07 only)
- Remove **ANTI-ROLL BAR LINK ON BOTH SIDES FROM ANTI-ROLL BAR**
- Remove **COVER FOR EXHAUST SYSTEM** (F01/F02 only).
- Loosen the back of the **EXHAUST SYSTEM** and lower the back part of the exhaust system (all except N57)
- Remove cross reinforcement on rear axle (F07 only)

IMPORTANT: Hydraulic lines and connections must be provided with suitable seal plugs 32 1 270 immediately after dismantling!

Release screws (1) and remove pressure lines from swivel motor.

Tightening torque **37 13 4AZ** .

Seal pressure lines and connections of swivel motor with clean seal plugs **32 1 270** .

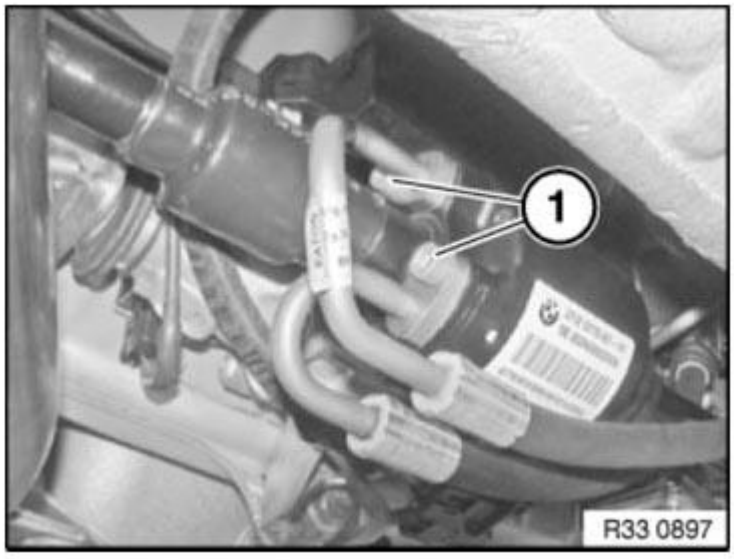


Fig. 43: Identifying Swivel Motor Pressure Line Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release left and right screws (1).

Tightening torque **37 12 2AZ** .

Remove anti-roll bar from rear axle support and feed out at side.

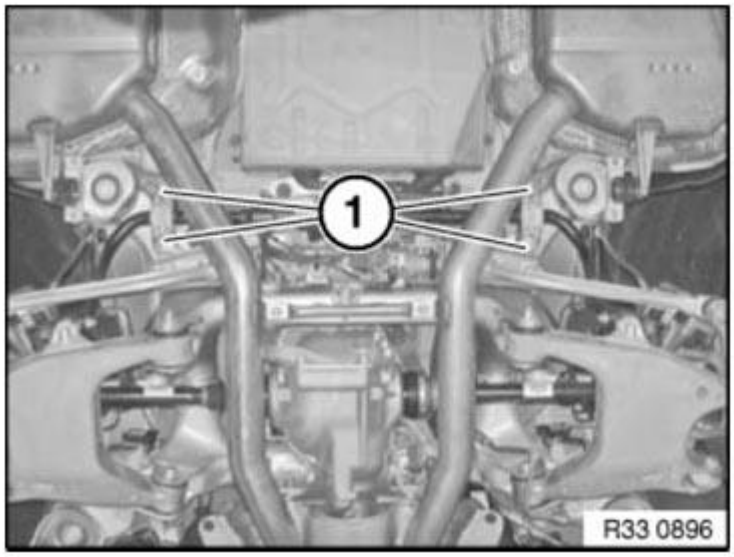


Fig. 44: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check roller bearing on both sides for damage, replace anti-roll bar if necessary (slight discharge of grease OK).

Keep facing for rubber mount on roller bearing clean and free from oil and grease during installation.

Check rubber mount (1) for damage, replace if necessary.

Note installation position of separation point (2).

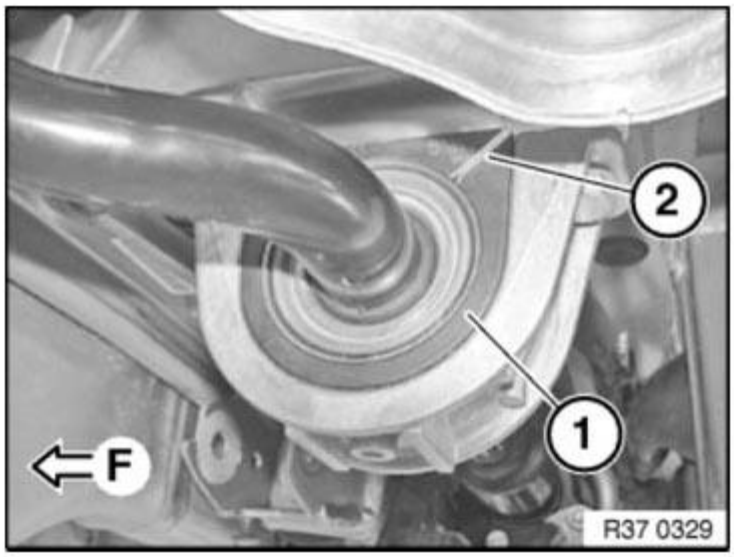


Fig. 45: Identifying Rubber Mount With Installation Position

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the seal plugs of the line to be fitted are removed.

When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.

Do not replace sealing rings on hydraulic lines.

Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leak tightness
- If necessary, start up **DYNAMIC DRIVE OPERATION**

37 12 092 REPLACING REAR LEFT OR RIGHT SPRING STRUT

See **REPLACING REAR LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER** .

37 12... REPLACING PIPES FOR AIR SPRINGS

WARNING: Risk of injury!
Drain the air spring system before carrying out any work on the air supply unit, air pipes and air springs! Danger of injury if this instruction is not complied with!

Risk of damage!

Extreme cleanliness must be ensured in the connection area of the pipes during removal and installation. Even the smallest of dirt particles can cause leakage in the air spring system.

NOTE: Read and comply with NOTES ON AIR SPRING SYSTEM .

Necessary preliminary tasks

- Pull out fuse for air supply unit in luggage compartment at rear right
- Remove rear left and right **WHEEL ARCH COVERS**
- Remove rear **BUMPER TRIM**

Draining air spring system:

Carefully slacken screw connection of pipe (1) until the sound of escaping air can be heard.

NOTE: Wait approx. 2 minutes until the pressure on the left and/or right sides has decreased completely (hissing stops)

Tightening torque **37 12 1AZ** .

Installation:

Install new **SCREWED CONNECTION** .

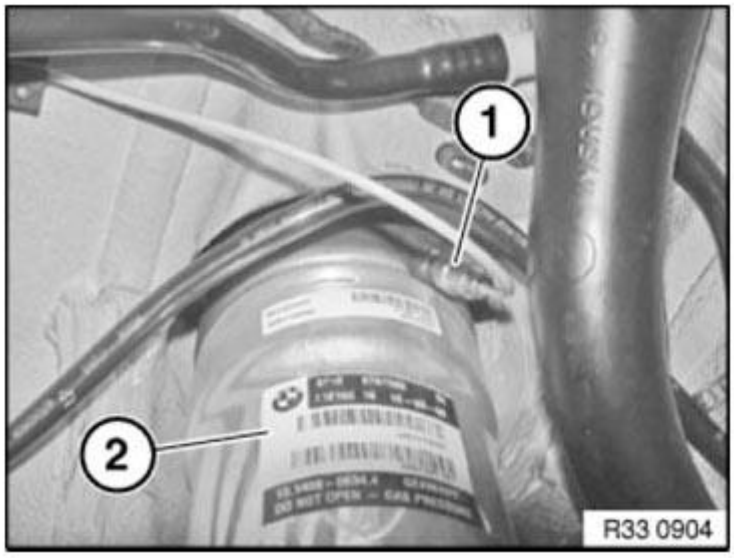


Fig. 46: Identifying Draining Air Spring System With Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Removing panel from air supply unit on underbody at rear:

Unscrew nuts (1).

Release screws (2).

Lever out expander rivets (3) and remove panel (4) from air supply unit.

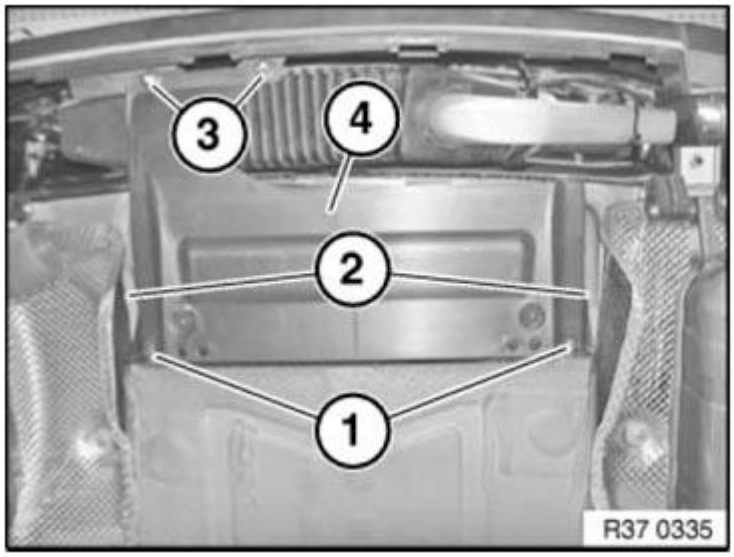


Fig. 47: Identifying Air Supply Panel With Nuts, Screws And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not kink, twist or crush new pipes.
To avoid leaks in the air spring system, it is essential to avoid scratches on pipes in particular in the connection area!

Line, air spring, left: "Red"

Line, air spring, right: "Blue"

Pipes must have sufficient clearance to adjoining components!

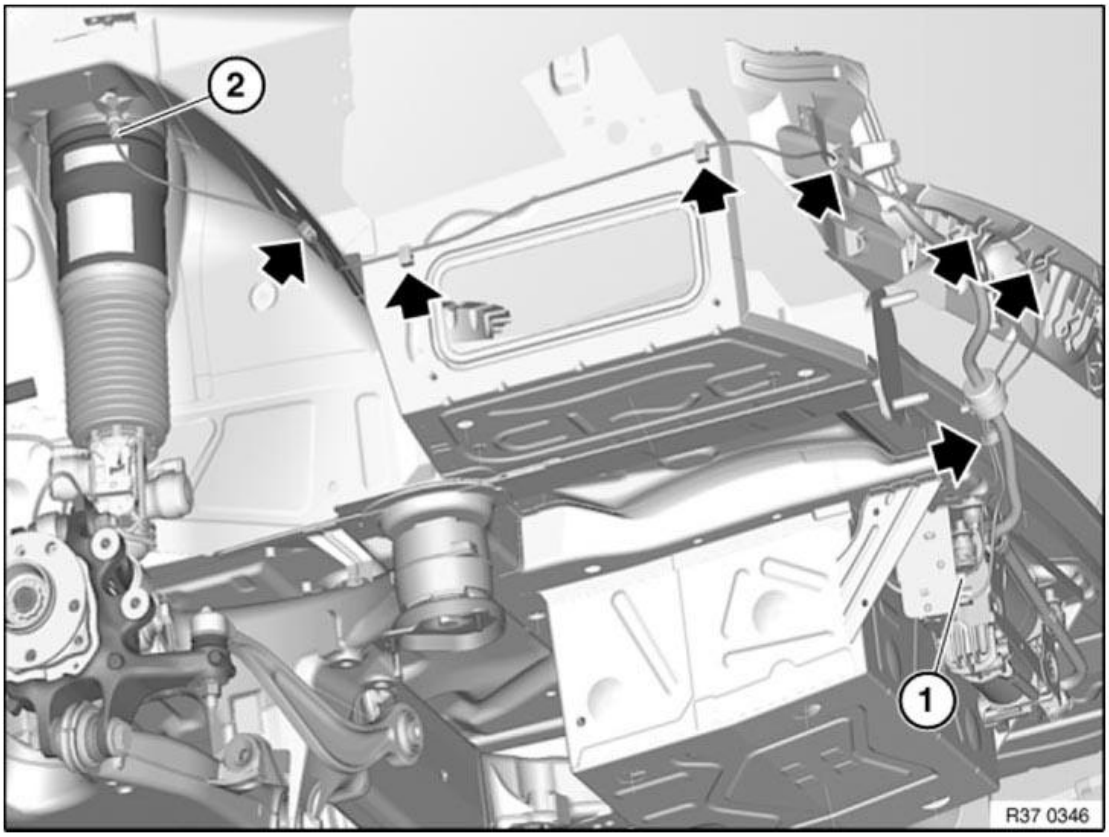


Fig. 48: Identifying Air Supply Unit And Air Spring Strut With Pipe Holders (Red Pipe)
Courtesy of BMW OF NORTH AMERICA, INC.

Pipe routing, left (red pipe)

Detach pipe from air supply unit (1) and air spring strut (2).

Then seal air supply unit and air spring strut with adhesive tape.

Unclip pipe from holder (see arrows).

Installation:

Install new **SCREWED CONNECTIONS** .

Carefully screw in banjo bolts by hand to avoid damaging the plastic threads and with it the air supply unit.

Tightening torque **37 12 1AZ** .

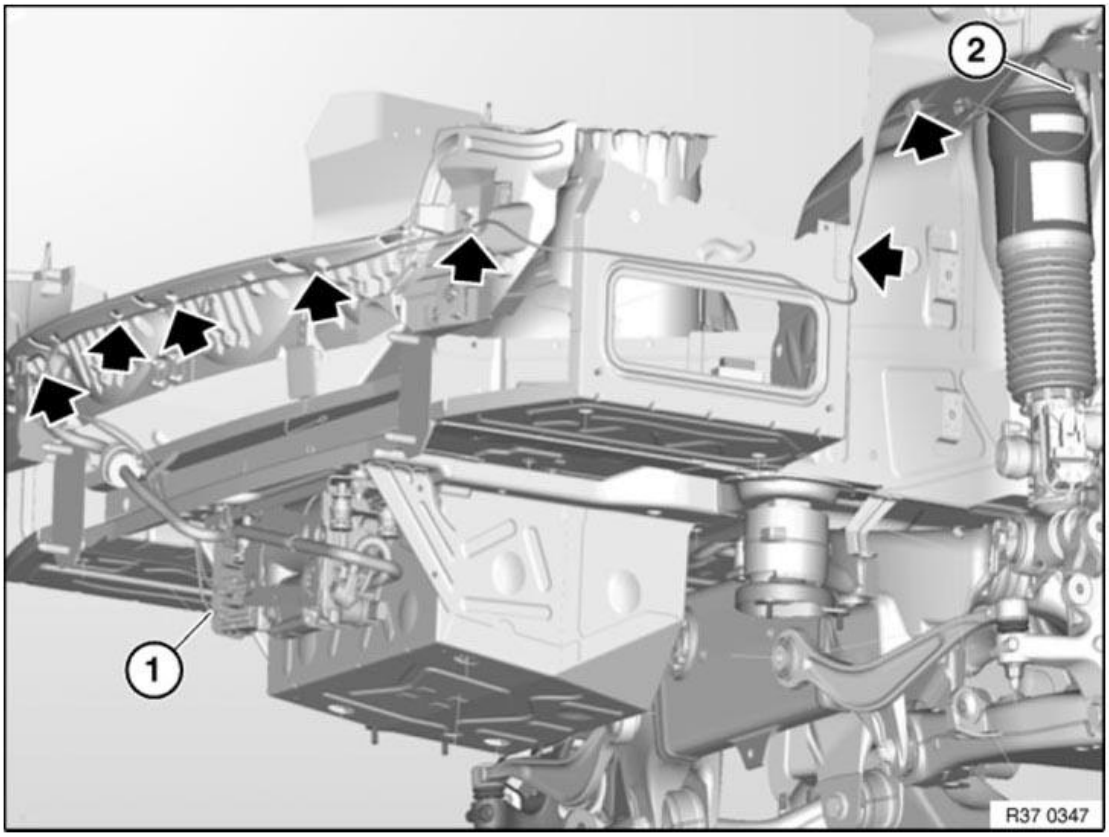


Fig. 49: Identifying Air Supply Unit And Air Spring Strut With Pipe Holders (Blue Pipe)
Courtesy of BMW OF NORTH AMERICA, INC.

Pipe routing, right (blue pipe).

Detach pipe from air supply unit (1) and air spring strut (2).

Then seal air supply unit and air spring strut with adhesive tape.

Unclip pipe from holder (see arrows).

Installation:

Install new **SCREWED CONNECTIONS** .

Carefully screw in banjo bolts by hand to avoid damaging the plastic threads and with it the air supply unit.

Tightening torque **37 12 1AZ** .

After installation

- **Activating and filling air spring system:**
  - Insert fuse in corresponding slot in fuse box

- Set vehicle down on its wheels
- Start engine
- Air spring struts are automatically filled

37 12... REPLACING VENTILATION LINE FOR AIR SUPPLY UNIT

Necessary preliminary tasks

- Remove **REAR BUMPER TRIM**

Detach ventilation line (1) in direction of arrow from air supply unit.

Unclip ventilation line (1) from holders.

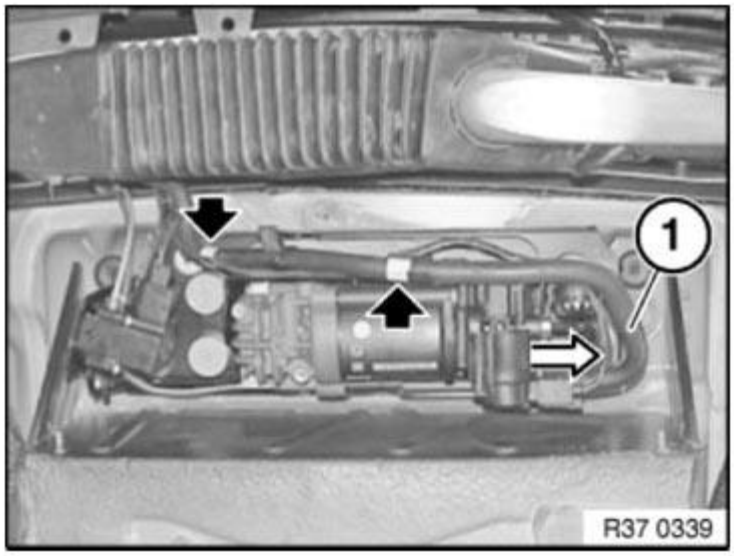


Fig. 50: Detach Air Supply Unit Ventilation Line
Courtesy of BMW OF NORTH AMERICA, INC.

Remove air filter (3) from holder (4).

Unclip ventilation line (1) from holders.

Pull ventilation line (1) in direction of arrow out of bumper trim (2).

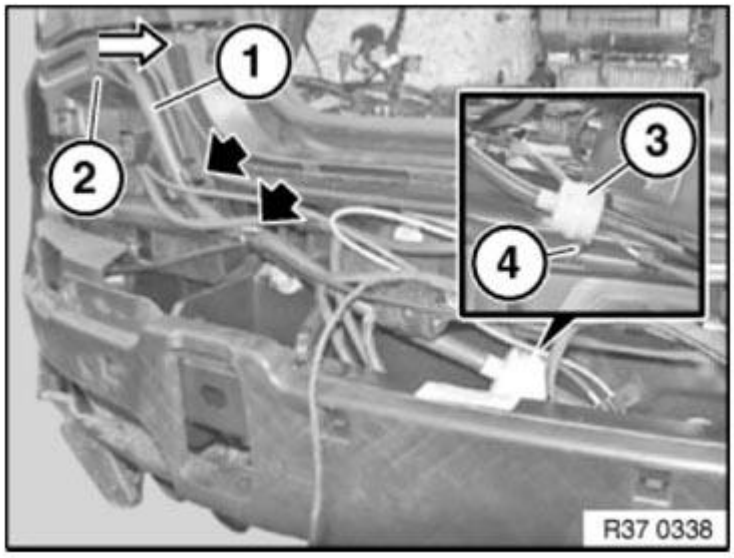


Fig. 51: Pulling Ventilation Line Out Of Bumper Trim
Courtesy of BMW OF NORTH AMERICA, INC.

3713 CONNECTING LINES

37 13... NOTES ON FITTING A NEW PIPE OR A SCREW CONNECTION

IMPORTANT: Do not kink, twist or crush lines.
Do not disassemble screw connection!

Fitting new screw connection

Insert complete new screw connection consisting of toothed ring (1), banjo bolt (2) and assembly plug (3) into air spring/pipe connection of air supply unit.

Tightening torque **37 12 3AZ** .

Remove assembly plug (3).

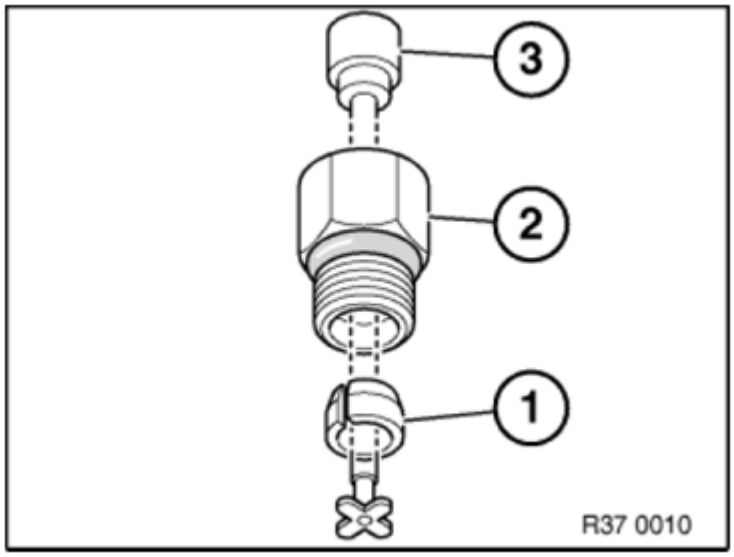


Fig. 52: Identifying Toothed Ring, Banjo Bolt And Assembly Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Slide new pipe (1) into banjo bolt (2) up to marking.

Check installation position of pipe (1) by pulling back slightly.

NOTE: The toothed ring (3) has engaged correctly when the pipe (1) cannot be pulled back.

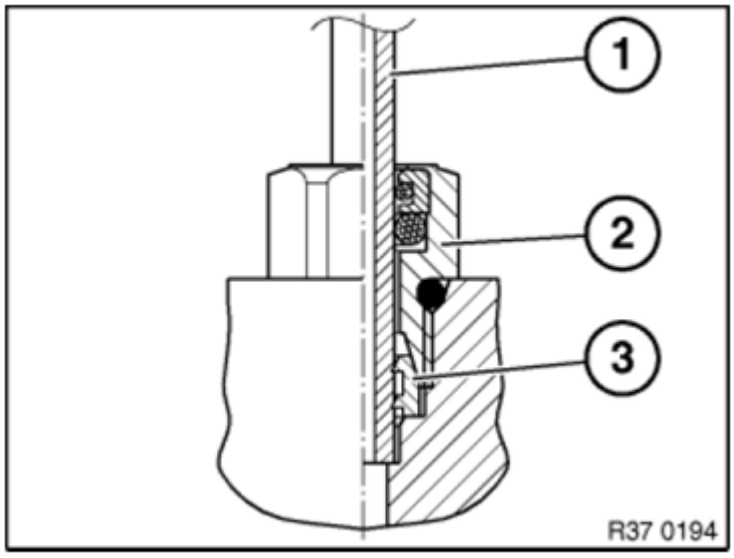


Fig. 53: Identifying Pipe, Toothed Ring And Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Fitting new pipes

IMPORTANT: To avoid leaks in the air spring system, it is essential to avoid scratches on pipes in particular in the connection area!

37 13... OVERVIEW OF DYNAMIC DRIVE (ARS) PRESSURE LINES, FRONT AXLE

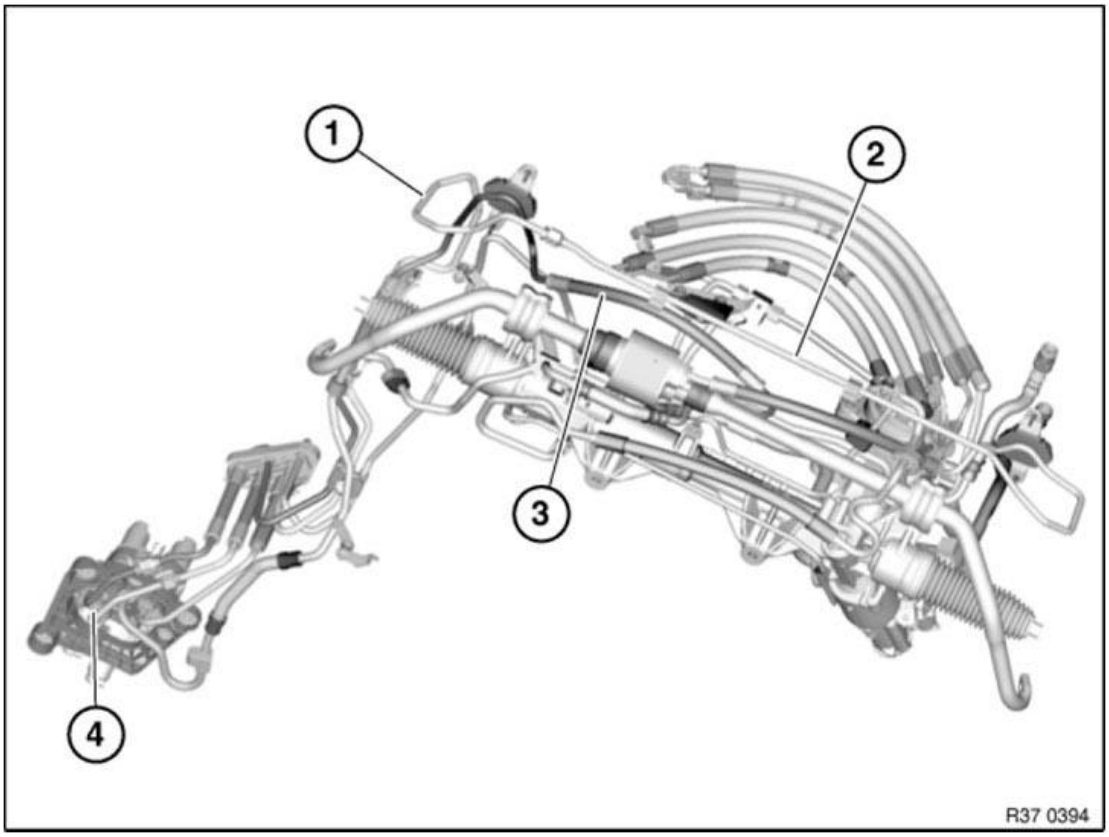


Fig. 54: Identifying Dynamic Drive (ARS) Pressure Lines (Front Axle)
Courtesy of BMW OF NORTH AMERICA, INC.

PRESSURE LINES REFERENCE CHART

No.	Designation
1	**Pressure line** , valve block VA1
2	**Pressure line** , oscillating motor VA1
3	**Pressure line** , oscillating motor VA2
4	Valve block **pressure lines** (short, rear-wheel drive only)

37 13... OVERVIEW OF DYNAMIC DRIVE (ARS) PRESSURE LINES, REAR AXLE

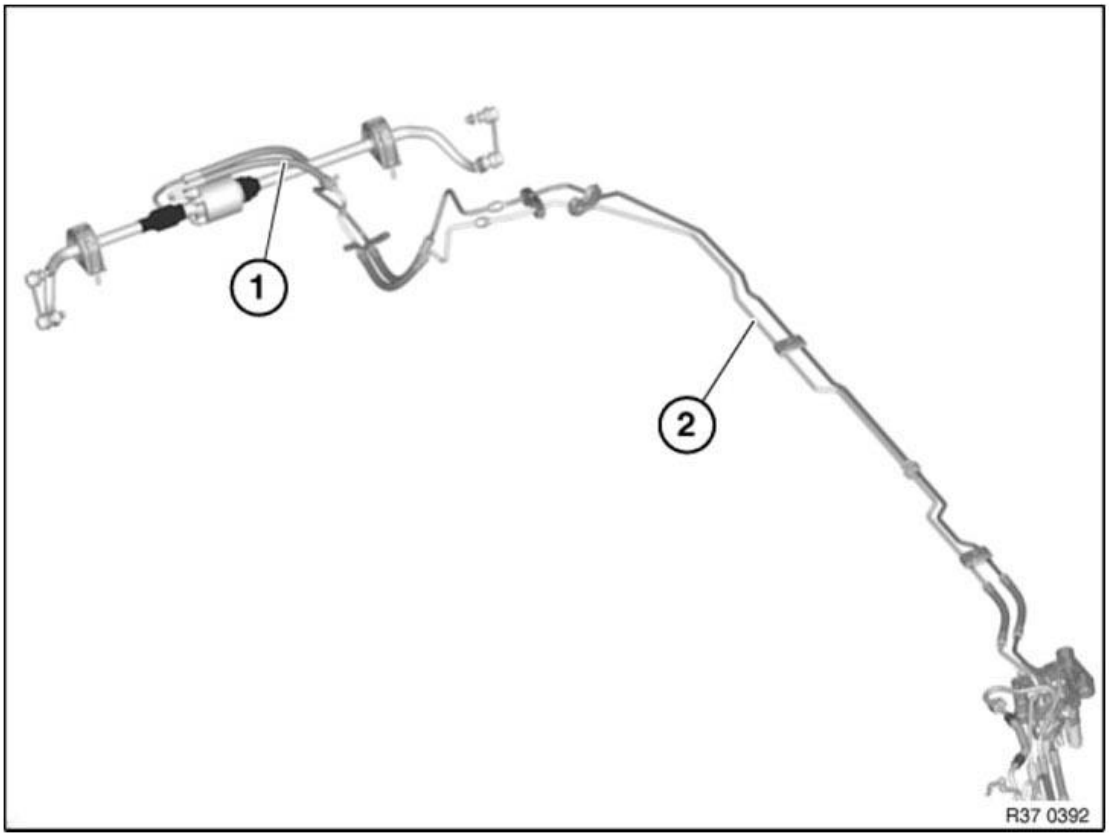


Fig. 55: Identifying Dynamic Drive (ARS) Pressure Lines (Rear Axle)
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING WITH ARS LINES REFERENCE CHART

No.	Designation
1	**Pressure lines** , oscillating motor HA1/HA2
2	**Pressure lines** , underfloor HA1/HA2

37 13... OVERVIEW OF LINES, STEERING WITH ARS

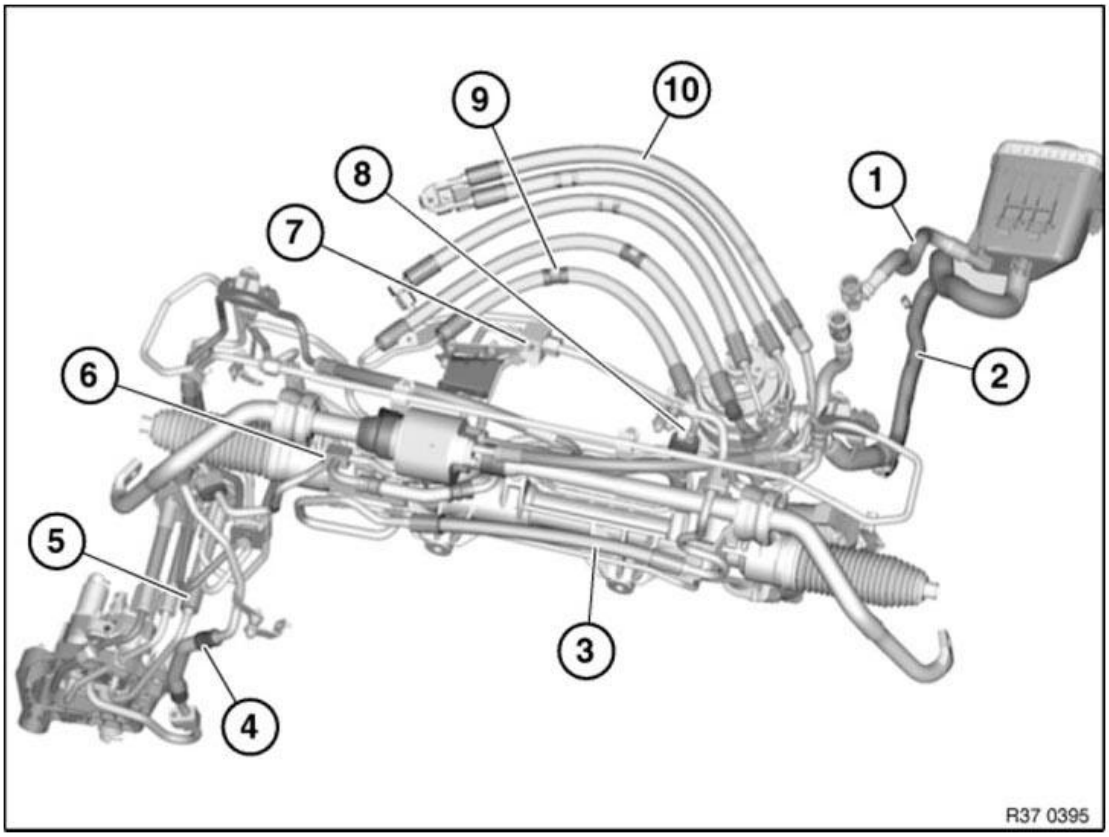


Fig. 56: Identifying Pressure Lines, Hoses, Steering With ARS
Courtesy of BMW OF NORTH AMERICA, INC.

PARTS REFERENCE CHART

No.	Designation
1	**Return line**
2	**Suction line**
3	**ARS expansion hose part 3**
4	**ARS return line**
5	**ARS expansion hose part 2**
6	**ARS+AFS return**
7	**ARS expansion hose part 4**
8	**Expansion hose part 2**
9	**Expansion hose part 1**
10	**ARS expansion hose part 1**

32 41 431 REMOVING AND INSTALLING/RENEWING DYNAMIC DRIVE EXPANSION HOSE PART 2 (IN FRONT WHEEL ARCH)

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin! RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Remove right **FRONT WHEEL**
- Remove **FRONT RIGHT WHEEL ARCH COVER REAR SECTION**
- Remove **UNDERBODY PROTECTIVE PLATE**
- Remove **STIFFENING PLATE** (N74 only)
- Remove right **STEERING ASSEMBLY COVER**
- Remove right **UNDERBODY PANELLING**

IMPORTANT: Pressure line and connection on valve block must be fitted with suitable sealing plugs immediately after removal!

Release screws (2) and tie lines to one side.

Tightening torque **37 13 3AZ** .

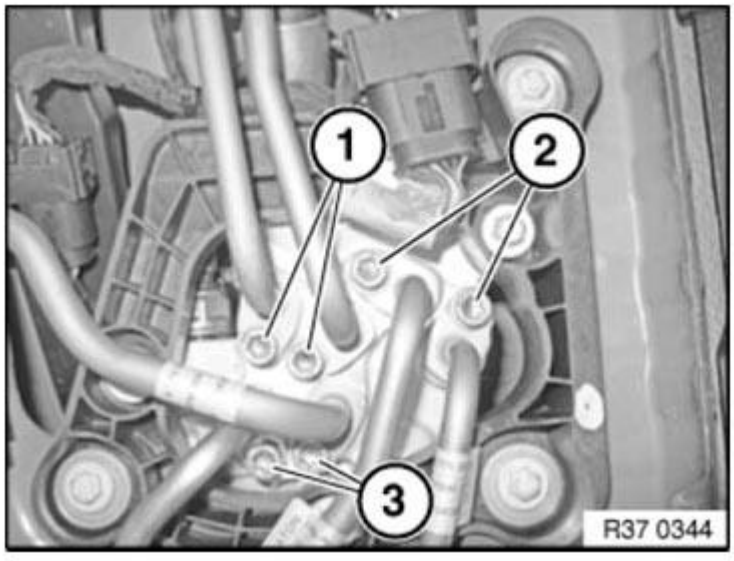


Fig. 57: Identifying Tie Lines Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) for pressure line on valve block.

Tightening torque **37 13 3AZ** .

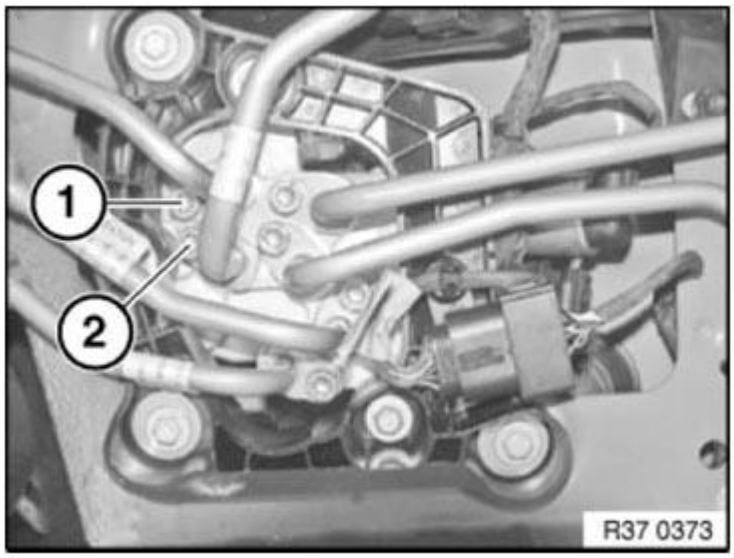


Fig. 58: Identifying Pressure Lines Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove rubber damper (1).

Installation:

Make sure pressure lines are laid without tension and with sufficient spacing to adjoining components.

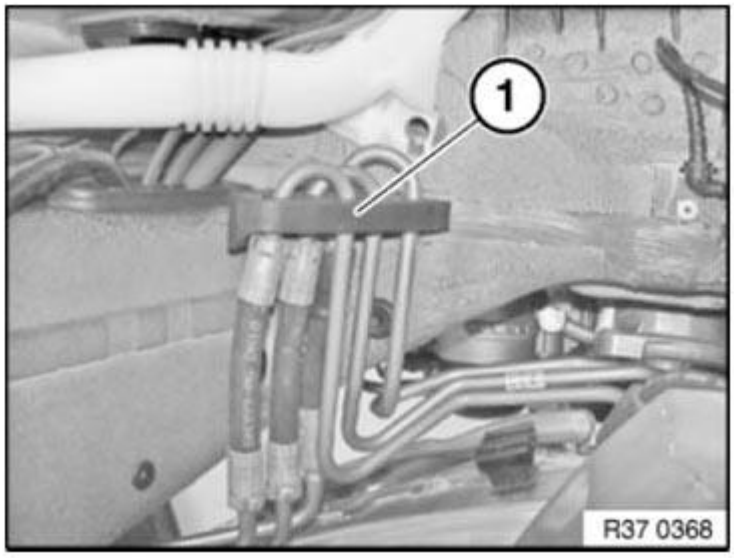


Fig. 59: Identifying Rubber Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) from line flange in engine compartment.

Remove pressure line towards rear.

Tightening torque **37 13 8AZ** .

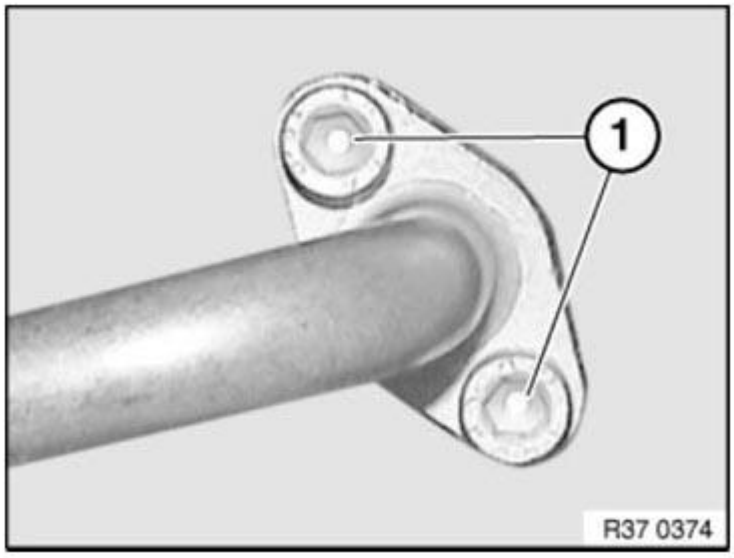


Fig. 60: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.

When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 435 REMOVING AND INSTALLING/RENEWING DYNAMIC DRIVE IN THE WHEEL ARCH

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off line connections with seal plug. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable expansion tank.

Necessary preliminary work

- Remove front right wheel arch cover. See **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (FRONT SECTION)** and **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (REAR SECTION)** .
- Remove **UNDERBODY PROTECTION**
- Remove right **STEERING ASSEMBLY COVER**
- Release front right **UNDERBODY PANELLING**

IMPORTANT: Pressure lines must be closed off with suitable seal plugs 32 1 270 immediately after removal!

Release screw (1) for return line.

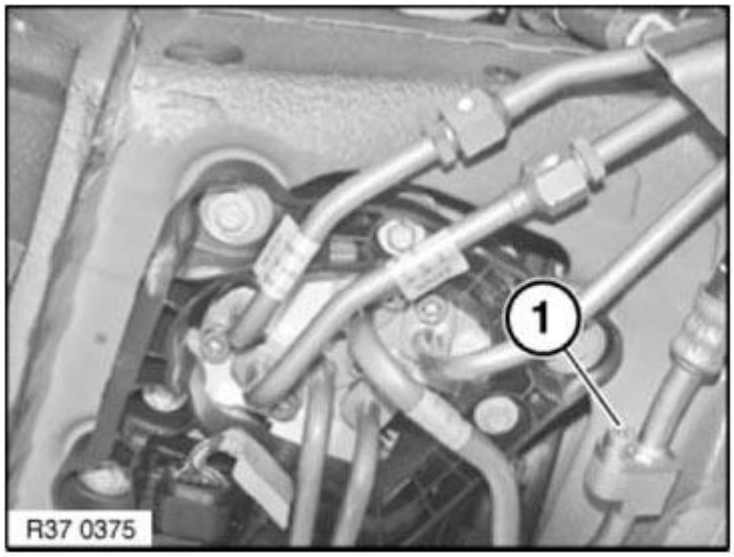


Fig. 61: Identifying Return Line Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

IMPORTANT: When tightening the screw connection (1), apply counter support with wrench (3) at the line (2)!
Non-compliance will result in damage to the line (2)!
Tightening torque 37 13 12AZ .

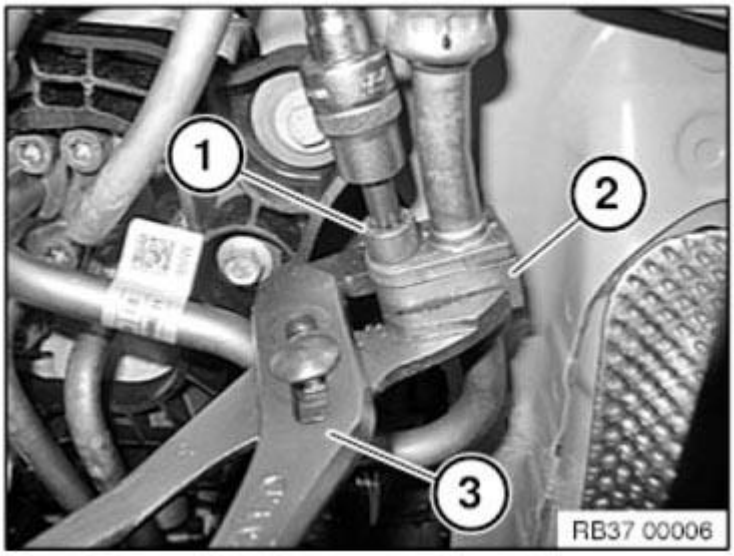


Fig. 62: Applying Counter Support With Wrench During Tightening Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release line clips (1) and (2) from front axle support.

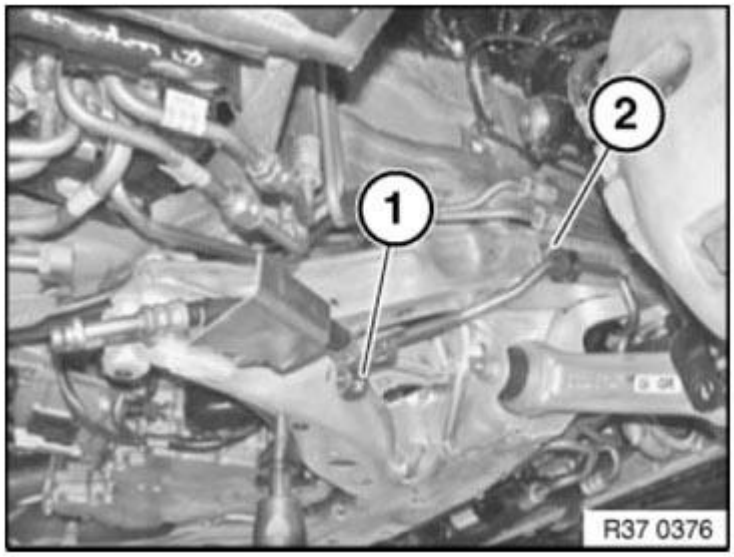


Fig. 63: Identifying Front Axle Support Line Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) in area of lower wishbone.

Tightening torque **37 13 8AZ** .

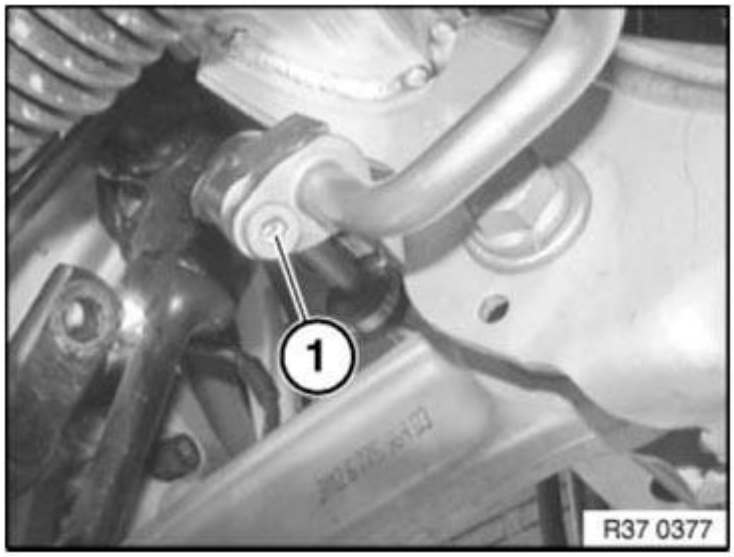


Fig. 64: Identifying Screw In Lower Wishbone Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the seal plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.

Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leak tightness
- Perform **INITIAL OPERATION OF ARS**

37 13 120 REMOVING AND INSTALLING/RENEWING PRESSURE LINE FOR VA1 SWIVEL MOTOR

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable expansion tank.

Necessary preliminary work

- **LOWER FRONT AXLE SUPPORT**

IMPORTANT: Pressure line and connections must be closed off with suitable seal plugs 32 1 270 immediately after removal!

Release banjo bolt (1).

Tightening torque **37 13 5AZ** .

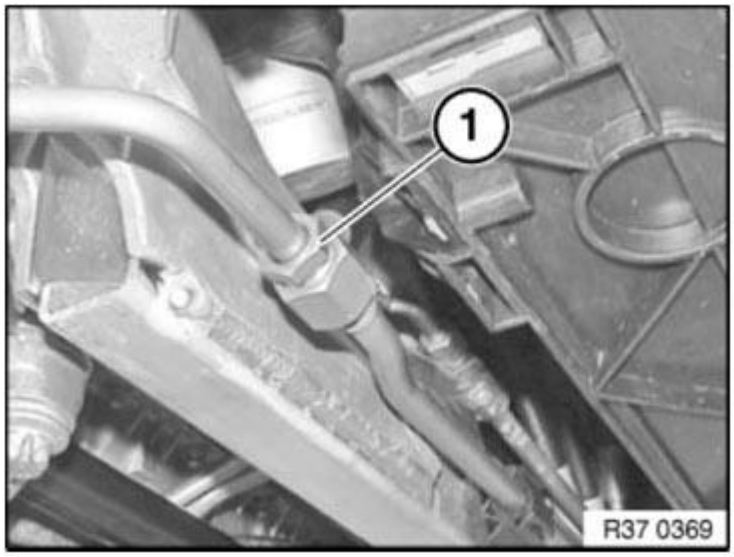


Fig. 65: Identifying Banjo Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) from line clip on front axle support on left.

Tightening torque **37 13 7AZ** .

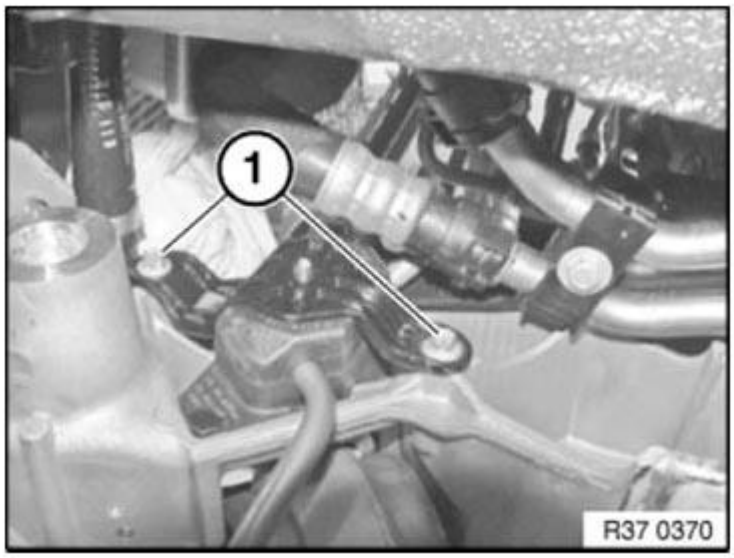


Fig. 66: Identifying Pressure Line Clips Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock holder (1) on front axle support at front and detach hydraulic line.

Installation note:

Replace damaged holders.

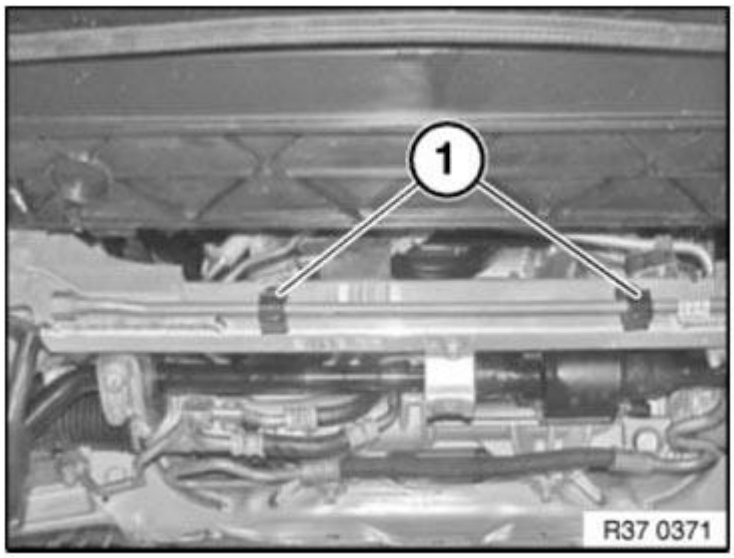


Fig. 67: Identifying Front Axle Support Holder
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, release holders (1) and (2) of transmission fluid cooler lines in wheel arch on left.

Tightening torque **17 22 3AZ** .

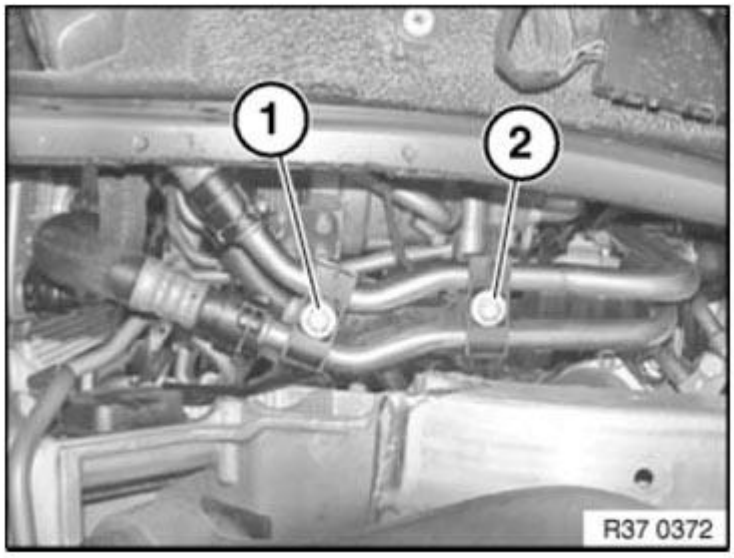


Fig. 68: Identifying Transmission Fluid Cooler Lines Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove pressure line.

Tightening torque **37 13 4AZ** .

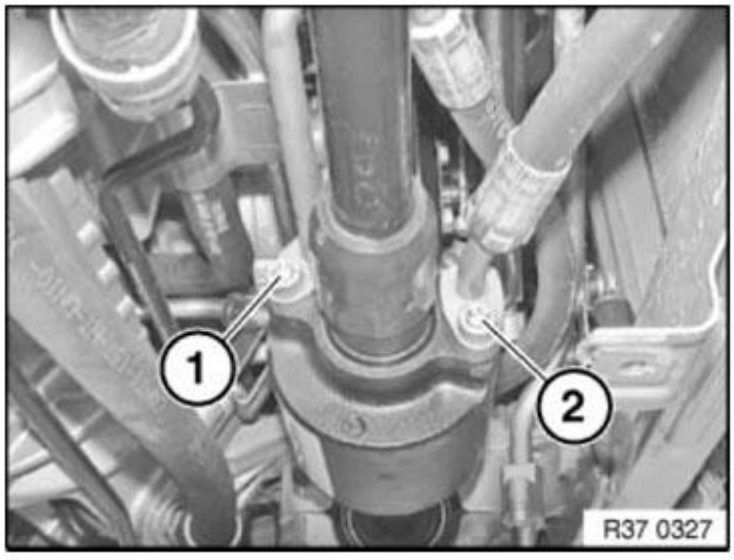


Fig. 69: Identifying Pressure Line Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the seal plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for tightness
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

37 13 127 REMOVING AND INSTALLING/RENEWING PRESSURE LINES FOR VALVE BLOCK (SHORT)

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic

system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Remove **FRONT RIGHT WHEEL ARCH COVER REAR SECTION**
- Release front right **UNDERBODY PANELLING**

IMPORTANT: Pressure lines and connections on valve block must be fitted with suitable sealing plugs immediately after removal!

Release screws (2) for pressure lines on valve block.

Tightening torque **37 13 3AZ** .

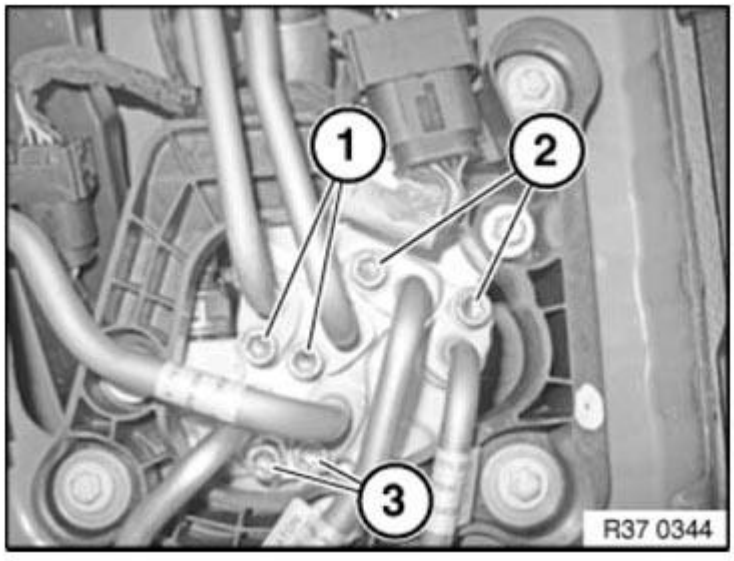


Fig. 70: Identifying Valve Block Pressure Line Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw connections (1) and (2) and detach line.

Tightening torque **37 13 5AZ** .

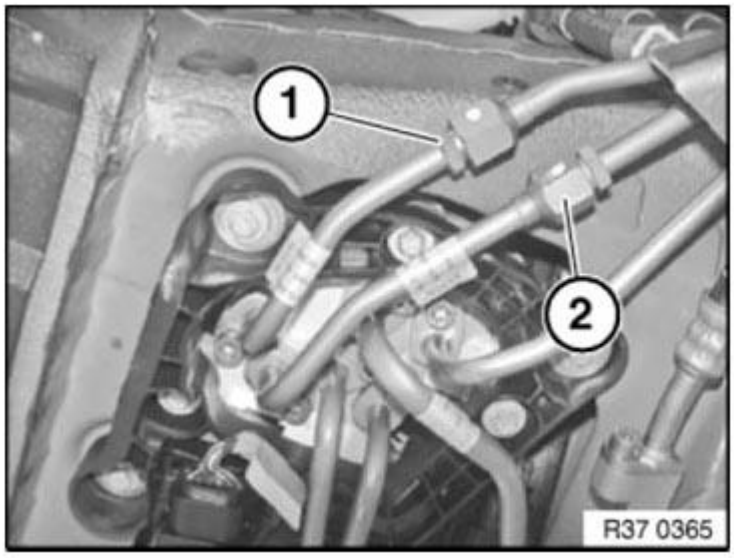


Fig. 71: Identifying Valve Block Pressure Line Screws Connections
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 432 REMOVING AND INSTALLING/REPLACING ARS EXPANSION HOSE PART 3

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION**

IMPORTANT: Pressure line and connections must be provided with suitable plugs immediately after removal!

Release screws from line flange (1) and (2) and remove line.

Tightening torque **37 13 8AZ** .

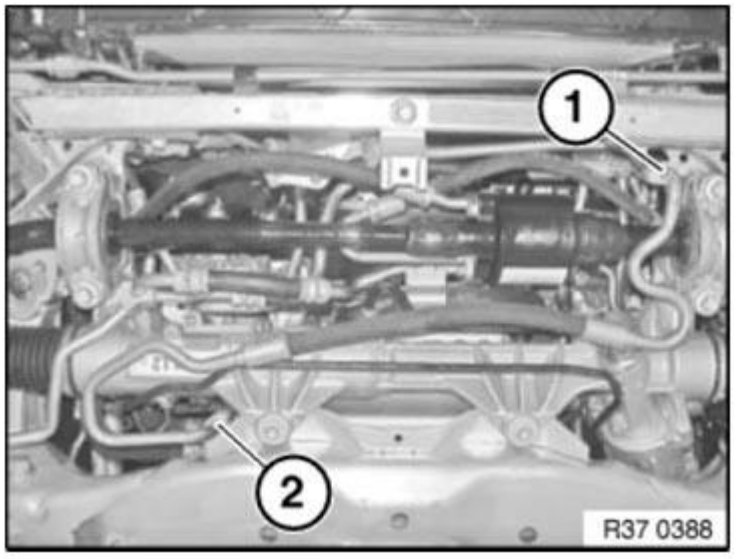


Fig. 72: Identifying Pressure Line Flanges
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 433 REMOVING AND INSTALLING/REPLACING ARS EXPANSION HOSE PART 4

Notes

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

**IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270**

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

IMPORTANT: Pressure line and connections must be provided with suitable plugs 32 1 270 immediately after removal!

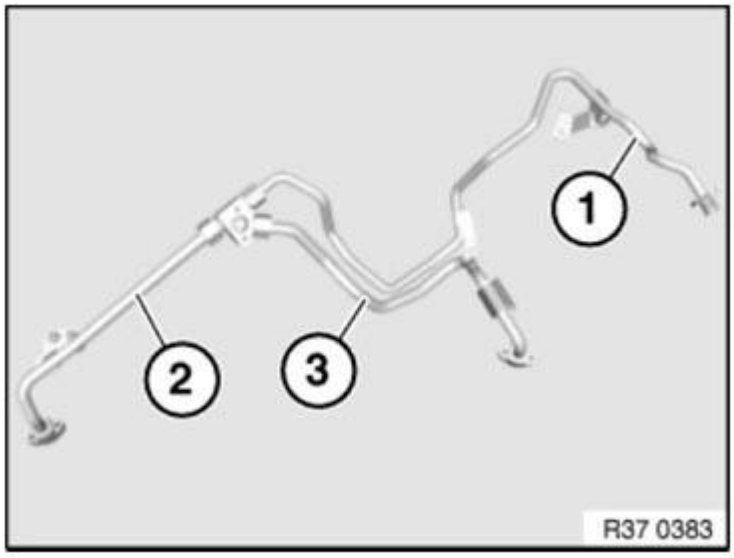


Fig. 73: Identifying ARS Expansion Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

ARS expansion hose part 4 overview:

PARTS REFERENCE CHART

1	Line 1
2	Line 2
3	Line 3

Removing line 1:

Necessary preliminary tasks

- Lower **FRONT AXLE SUPPORT**

Release screws (1) from line flange in engine compartment.

Replace sealing ring.

Tightening torque **37 13 8AZ** .

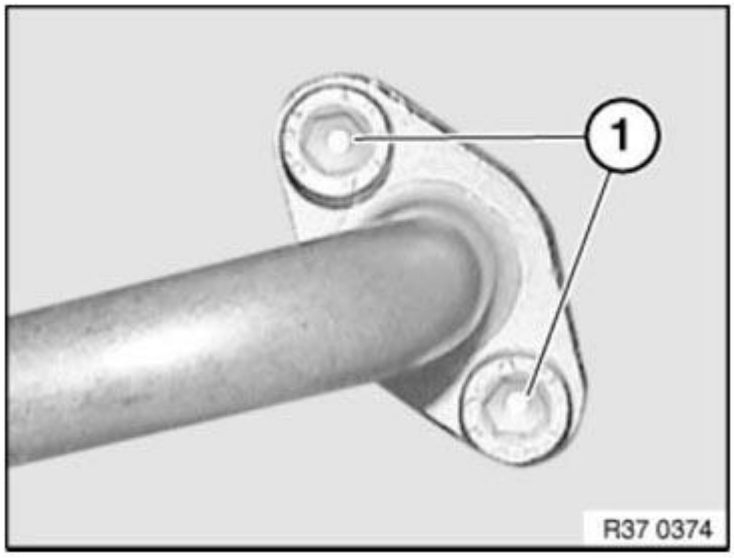


Fig. 74: Identifying Engine Compartment Line Flange Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) from holder of oil cooler line over front axle carrier.

Release holder in front axle carrier (see arrow) of pressure line (2).

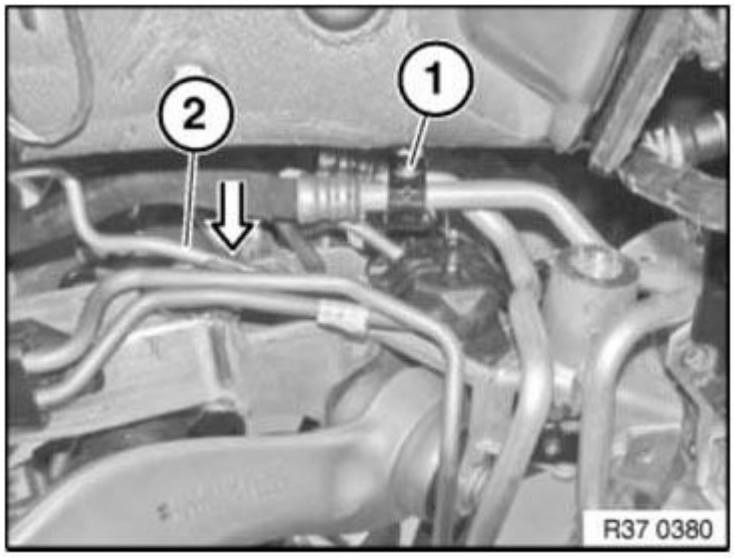


Fig. 75: Releasing Front Axle Carrier Pressure Line Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw connection (1) on T-piece.

Tightening torque **37 13 5AZ** .

Feed out line through wheel arch.

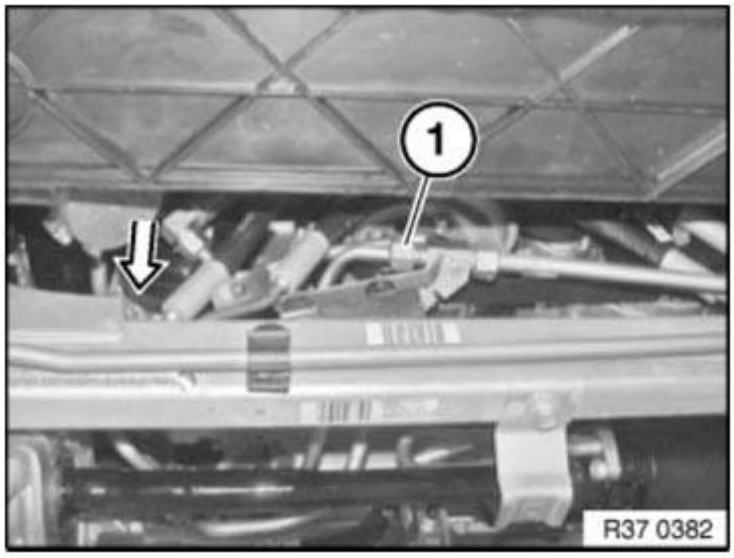


Fig. 76: Removing Underbody Protection
Courtesy of BMW OF NORTH AMERICA, INC.

Removing line 2:

Necessary preliminary tasks

- Remove **UNDERBODY PROTECTION**
- Release **ACTIVE STABILIZER** from front axle carrier and tie up
- Remove front pressure line from active stabilizer
- Remove **ARS EXPANSION HOSE PART 3**

Release both nuts (1) from line holder.

Release screw connection (2) and remove line.

Tightening torque **37 13 5AZ** .

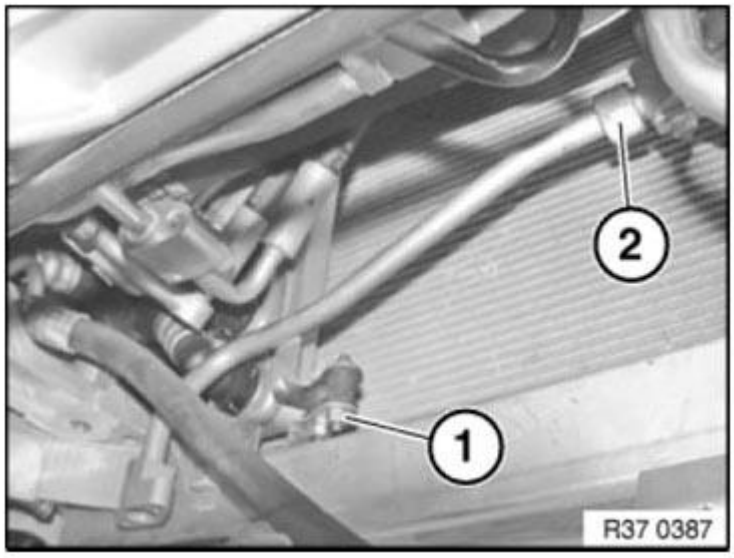


Fig. 77: Identifying Pressure Line Nut And Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Removing line 3:

Necessary preliminary tasks

- Remove **UNDERBODY PROTECTION**
- Remove **ACTIVE STABILIZER** from front axle carrier and hang up
- Remove front pressure line from active stabilizer
- Remove **ARS EXPANSION HOSE PART 3**

Unfasten screw fitting (1).

Tightening torque **37 13 5AZ** .

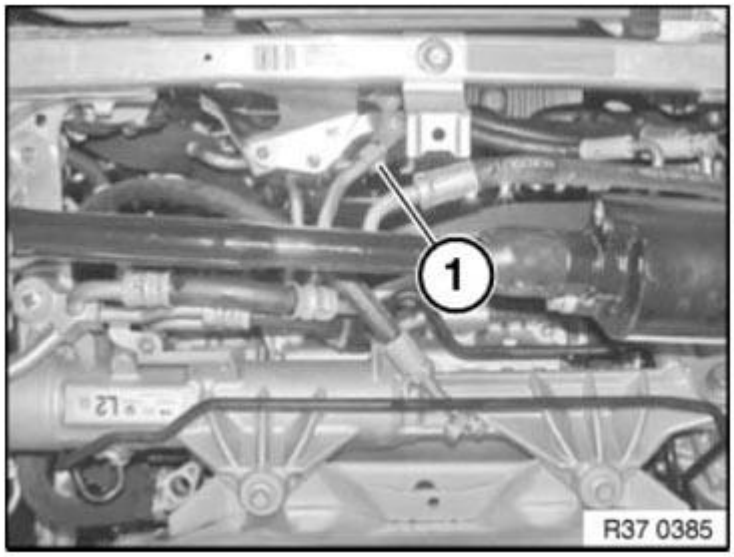


Fig. 78: Identifying Screw Fitting
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on line holder.

Feed out line upwards to remove.

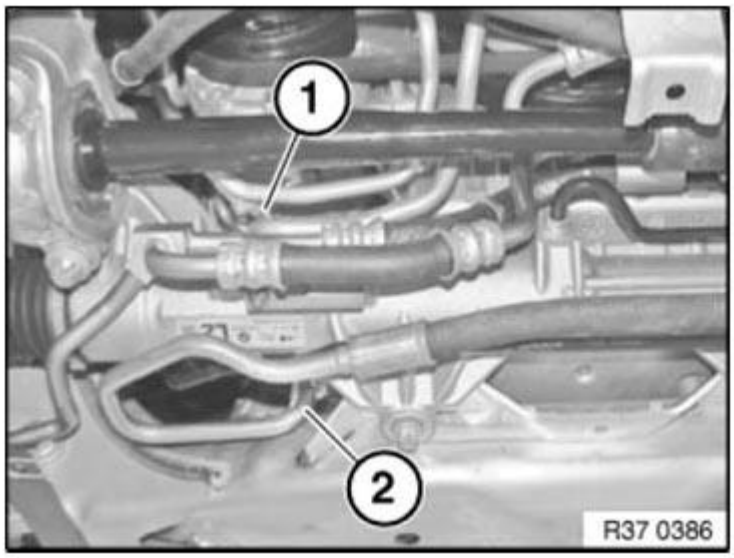


Fig. 79: Identifying Line Holder Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.

When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.

Do not replace sealing rings on hydraulic lines.

Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

REMOVING AND INSTALLING/REPLACING DYNAMIC DRIVE RETURN FROM SEPARATION POINT TO COOLING LOOP

See **REMOVING AND INSTALLING/REPLACING DYNAMIC DRIVE RETURN FROM SEPARATION POINT TO COOLING LOOP** .

32 41 435 REMOVING AND INSTALLING/REPLACING DYNAMIC DRIVE RETURN IN FRONT RIGHT WHEEL ARCH

See **REMOVING AND INSTALLING/RENEWING DYNAMIC DRIVE IN THE WHEEL ARCH** .

37 13 121 REMOVING AND INSTALLING/REPLACING PRESSURE LINE FOR VALVE BLOCK VA1

Notes

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

**IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off line connections with seal plug. 32 1 270**

Recycling

Catch and dispose of hydraulic fluid in a suitable collecting vessel.

Necessary preliminary work

- Remove right **FRONT WHEEL**
- Remove front right wheel arch cover. See **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (FRONT SECTION)** and **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (REAR SECTION)** .

- Remove **UNDERBODY PROTECTION**
- Remove **STIFFENING PLATE** if necessary (only all-wheel drive vehicles and 760i)
- Remove right **STEERING ASSEMBLY COVER**
- Release front right **UNDERBODY PANELLING**

IMPORTANT: Pressure line and connection on valve block must be fitted with suitable seal plugs 32 1 270 immediately after removal!

Rear-wheel drive only:

Release screw connections (1) and (2).

Tightening torque **37 13 5AZ** .

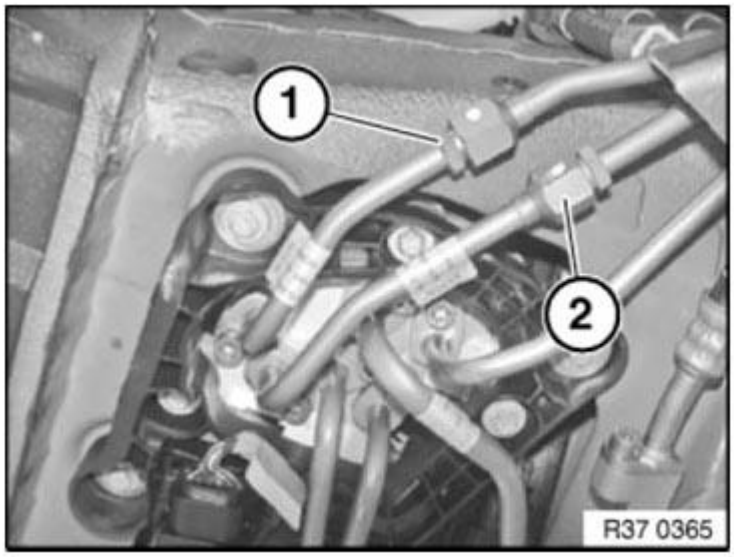


Fig. 80: Identifying Pressure Line Screw Connections (Rear-Wheel Drive Only)
Courtesy of BMW OF NORTH AMERICA, INC.

All-wheel drive vehicles only:

Release screw (1).

Tightening torque **37 13 3AZ** .

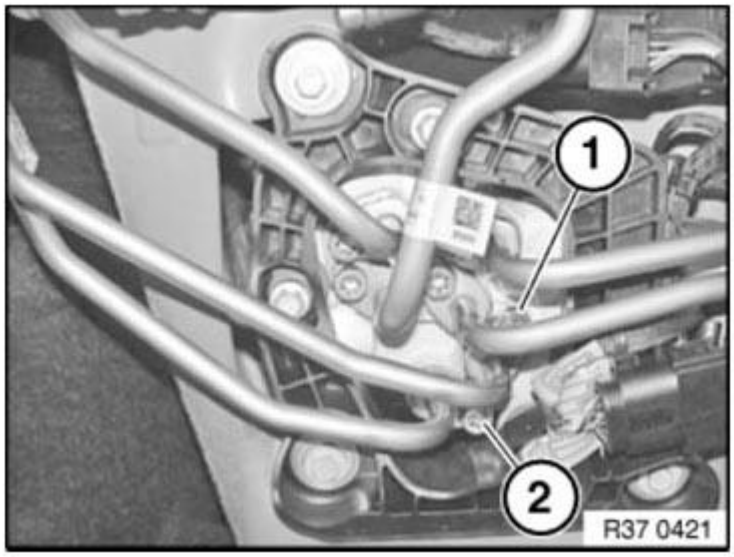


Fig. 81: Identifying Pressure Line Screws (All-Wheel Drive Only)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock holder (1).

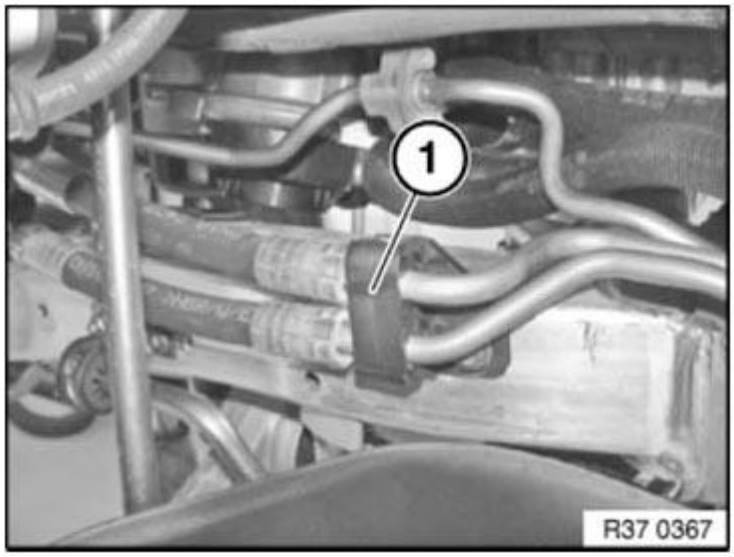


Fig. 82: Identifying Pressure Line Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Rear-wheel drive only:

Feed both pressure lines out of spacer.

All-wheel drive vehicles only:

Release line clip on front axle support

Installation note:

Check installation position.

Make sure pressure lines are laid without tension.

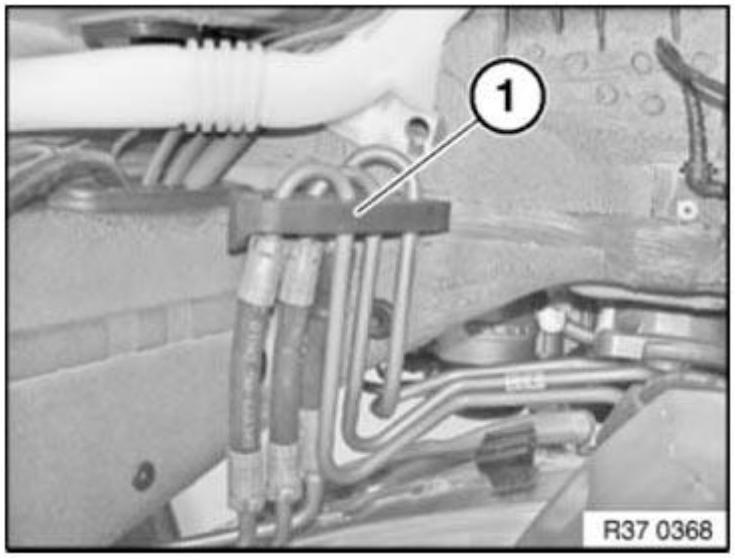


Fig. 83: Identifying Pressure Line Spacer
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screw connection (1).

Remove pipe.

Tightening torque **37 13 5AZ** .

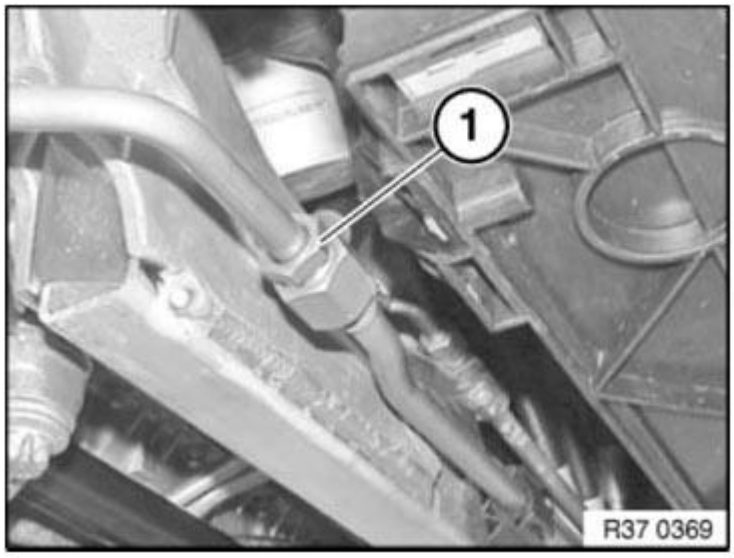


Fig. 84: Identifying Pressure Pipe Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the seal plugs of the line to be fitted are removed.

After installation

- Fill and bleed **HYDRAULIC SYSTEM** (F01/F02/F07)
- Check line connections for leak tightness
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

37 13 132 REMOVING AND INSTALLING/REPLACING PRESSURE LINES FOR OSCILLATING MOTOR (HA1/HA2)

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin! RISK OF INJURY if oil comes into contact with eyes and skin!

Scalding hazard!

This work may only be carried out on an exhaust system which has cooled down.

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling:

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- **LOWER REAR AXLE**

Up to 08/09:

Release banjo bolts (1).

Tightening torque **37 13 5AZ** .

Hydraulic lines must be provided with suitable sealing plugs immediately after removal! **32 1 270**

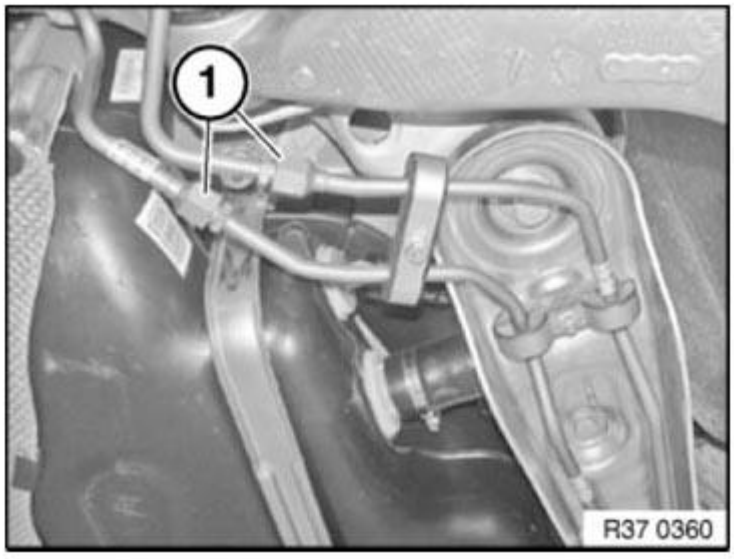


Fig. 85: Identifying Oscillator Motor Pressure Line Banjo Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Build date from 08/09:

Release screw connections (1) and (2).

Tightening torque **37 13 12AZ** .

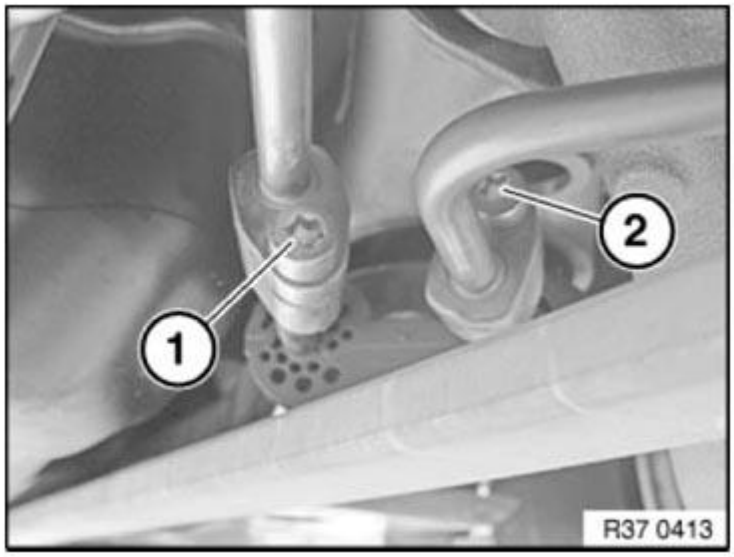


Fig. 86: Identifying Oscillator Motor Pressure Line Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) from holder on rear axle carrier.

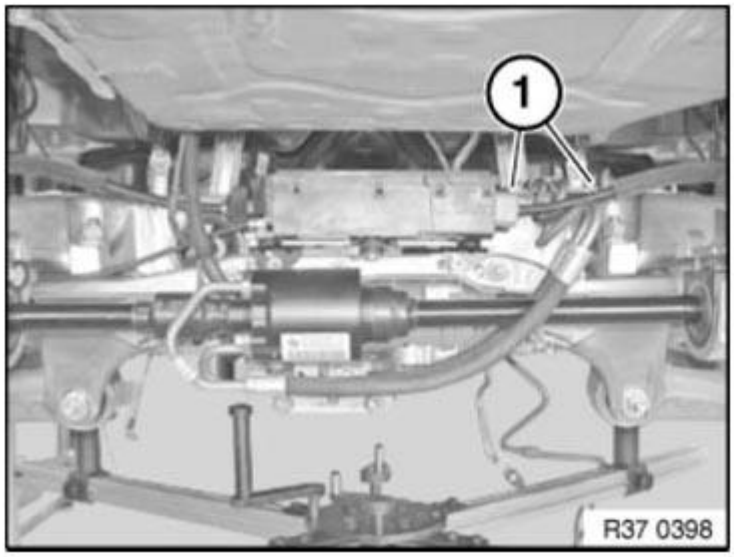


Fig. 87: Identifying Holder Screws On Rear Axle Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove pressure lines from oscillating motor.

Pressure lines and connections on oscillating motor must be fitted with suitable sealing plugs immediately after removal! **32 1 270**

Tightening torque **37 13 4AZ** .

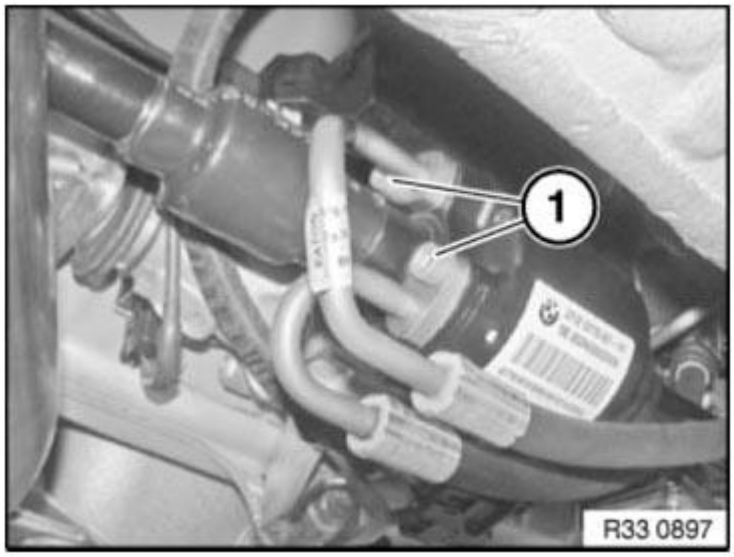


Fig. 88: Identifying Oscillator Motor Pressure Line Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 436 REMOVING AND INSTALLING/REPLACING RETURN LINE FOR POWER STEERING WITH ARS (N63)

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Seal off line connections with plugs 32 1 270 .

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Lower **FRONT AXLE SUPPORT**

IMPORTANT: Pressure line and connection on valve block must be fitted with suitable sealing plugs 32 1 270 immediately after removal!

Release screw (1).

Tightening torque **37 13 8AZ** .

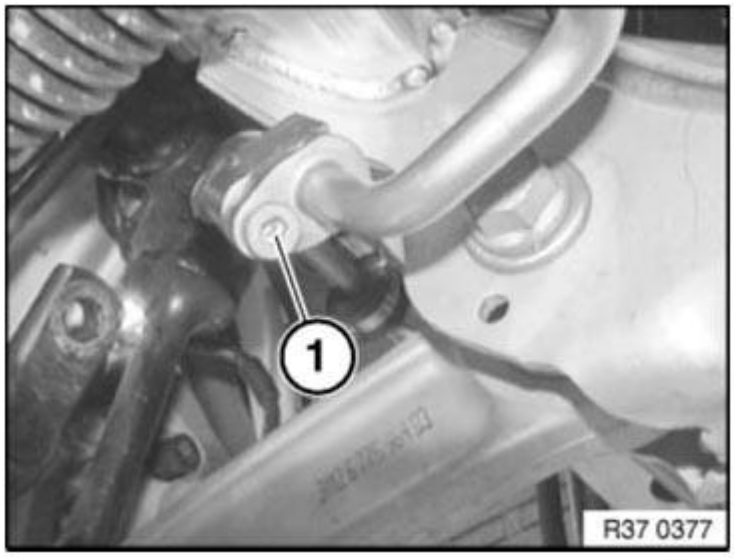


Fig. 89: Identifying Power Steering With ARS Return Line Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder (1).

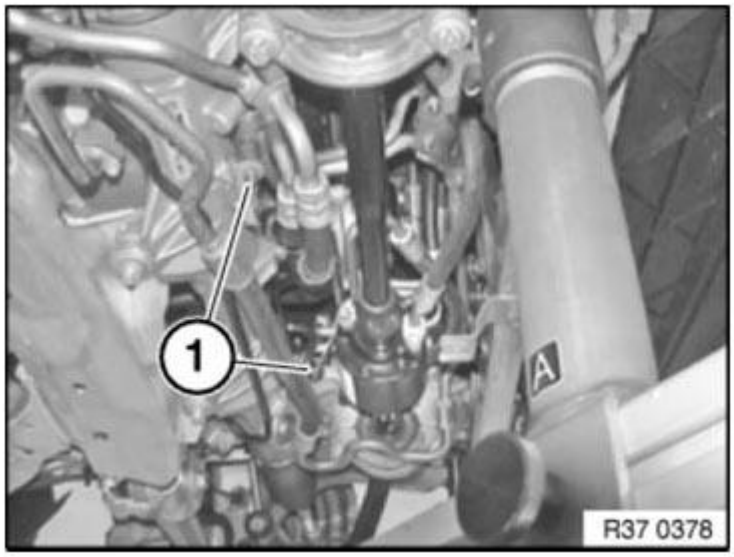


Fig. 90: Identifying Power Steering With ARS Return Line Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) for hydraulic line on steering gear.

Tightening torque **32 41 5AZ** .

Remove hydraulic line.

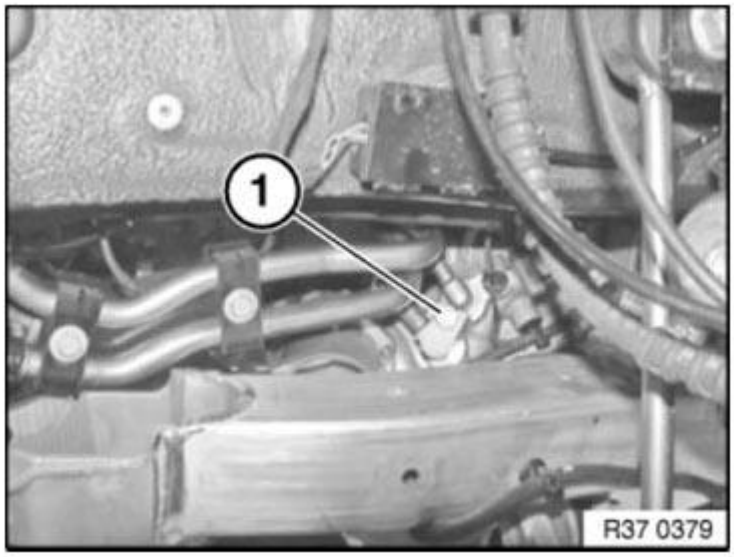


Fig. 91: Identifying Hydraulic Line Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock return line on cooling loop and disconnect.

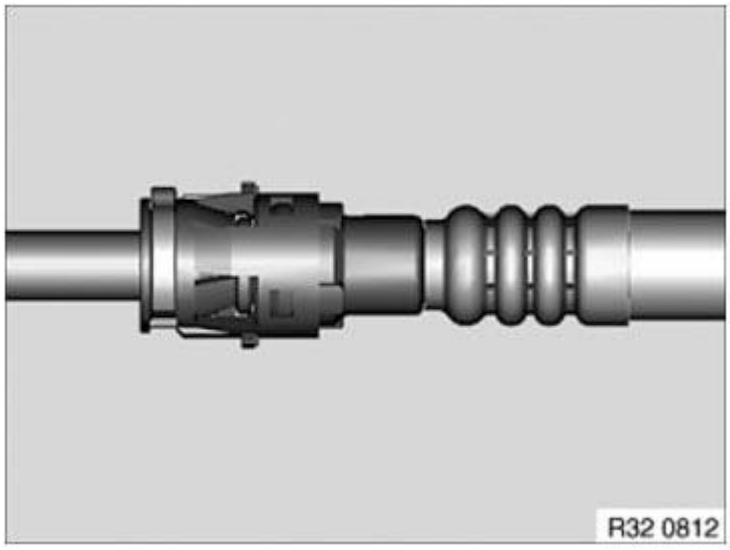


Fig. 92: Identifying Return Line On Cooling Loop
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

37 13 130 REMOVING AND INSTALLING/REPLACING UNDERFLOOR PRESSURE LINES FOR OSCILLATING MOTOR (HA1/HA2)

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Remove **RIGHT UNDERBODY PANELLING**

IMPORTANT: Pressure lines and connections on valve block must be fitted with suitable sealing plugs immediately after removal! 32 1 270

Release screws (1) for hydraulic lines on valve block.

Tightening torque **37 13 3AZ** .

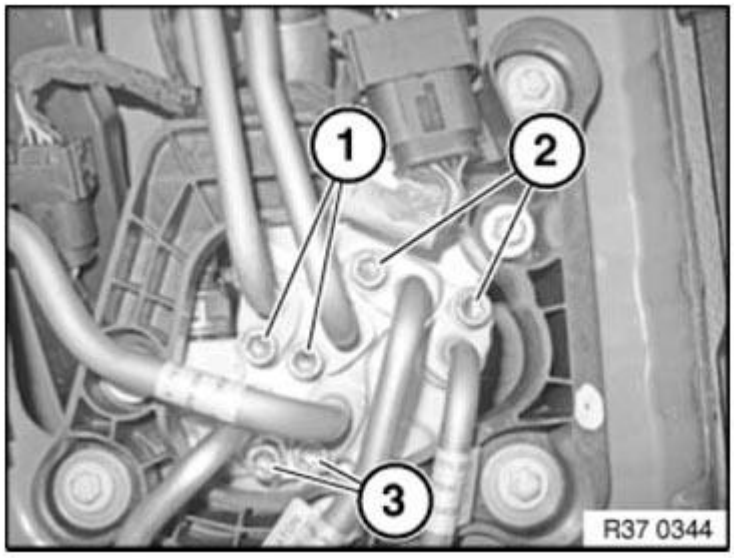


Fig. 93: Identifying Valve Block Hydraulic Line Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation position of spacers (1) and (2). Failure to do so may result in noises/rattling!

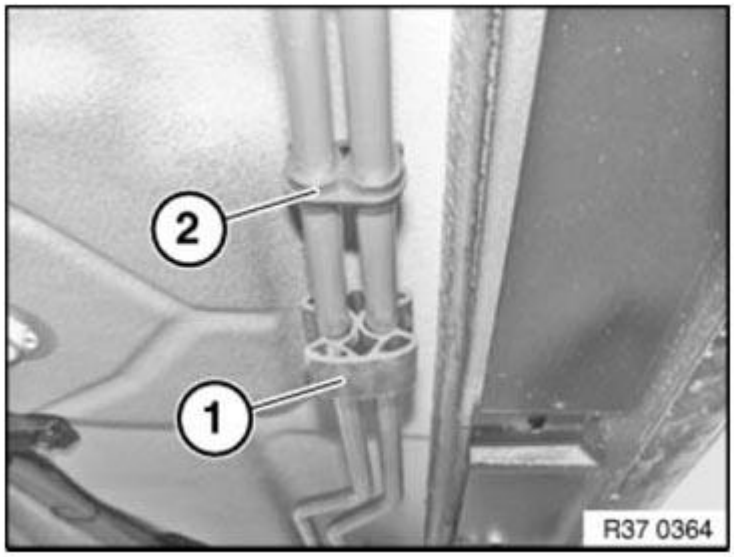


Fig. 94: Identifying Valve Block Hydraulic Line Spacer
Courtesy of BMW OF NORTH AMERICA, INC.

Open holder (1) and remove pressure lines.

Installation:

If necessary, replace damaged holders.

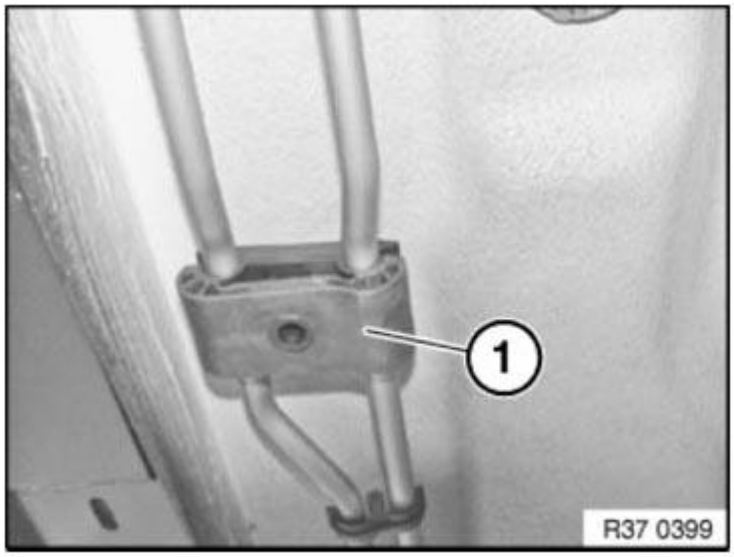


Fig. 95: Identifying Oscillator Motor Underfloor Pressure Line Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Up to build date 08/09:

Release banjo bolts (1).

Tightening torque **37 13 5AZ** .

Hydraulic lines must be provided with suitable sealing plugs **32 1 270** immediately after removal!

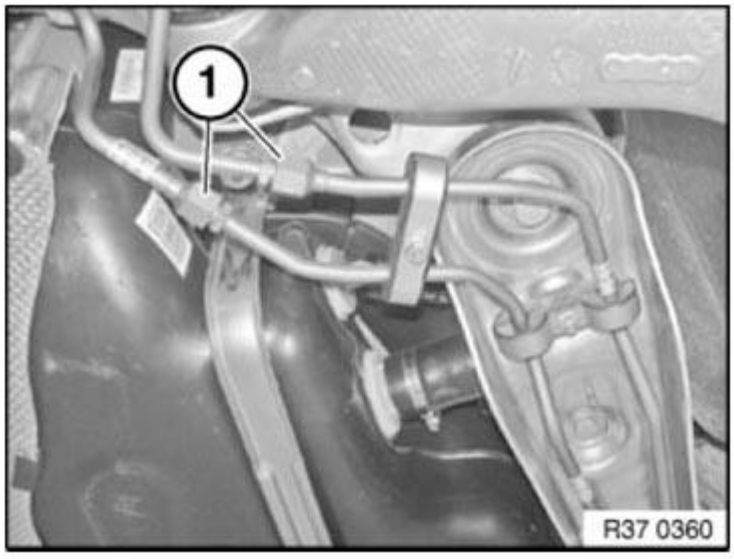


Fig. 96: Identifying Oscillator Motor Underfloor Hydraulic Line Banjo Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Build date from 08/09:

Release screw connections (1) and (2).

Tightening torque **37 13 12AZ** .

Hydraulic lines must be provided with suitable sealing plugs **32 1 270** immediately after removal!

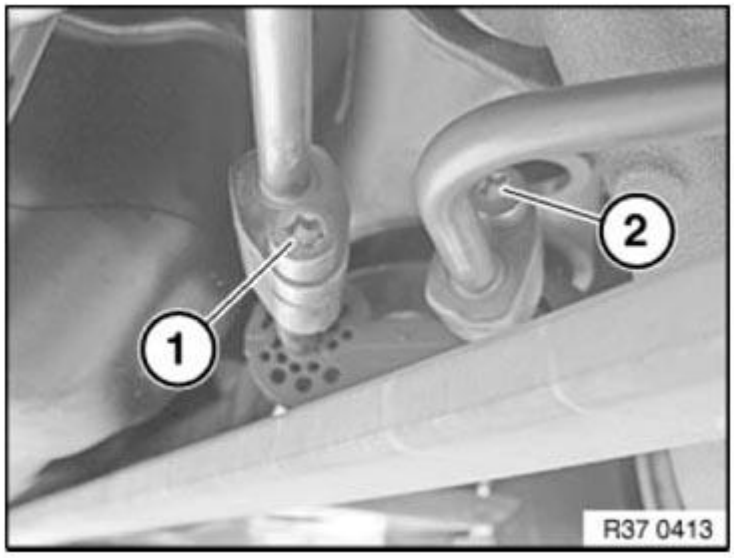


Fig. 97: Identifying Oscillator Motor Underfloor Pressure Line Screw Connections
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

37 13 125 REMOVING AND REFITTING/REPLACING PRESSURE LINE ON SWIVEL MOTOR VA2

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off line connections with seal plug. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable expansion tank.

Necessary preliminary work

- Remove front right wheel arch cover. See **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (FRONT SECTION)** and **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (REAR SECTION)** .
- **LOWER FRONT AXLE**

IMPORTANT: Pressure line and connection on valve block must be fitted with suitable seal plugs 32 1 270 immediately after removal!

Unfasten screw connection (1).

Tightening torque **37 13 5AZ** .

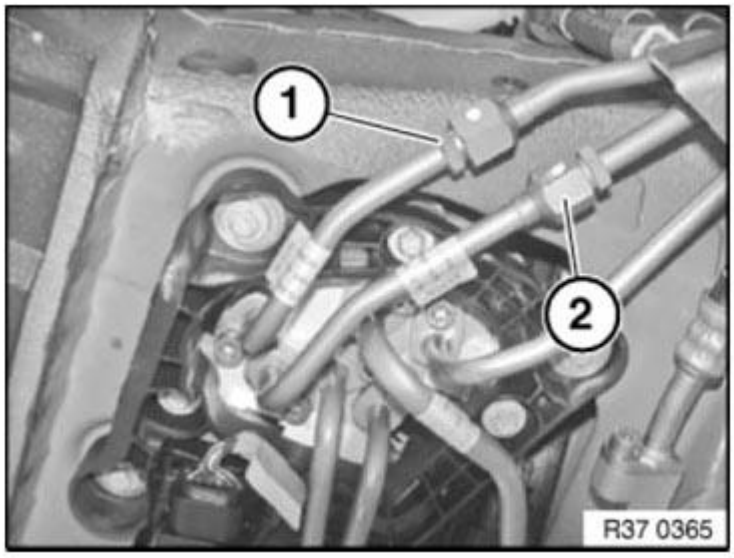


Fig. 98: Identifying Swivel Motor Pressure Lines Screws Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plastic holder (1) and disengage line.

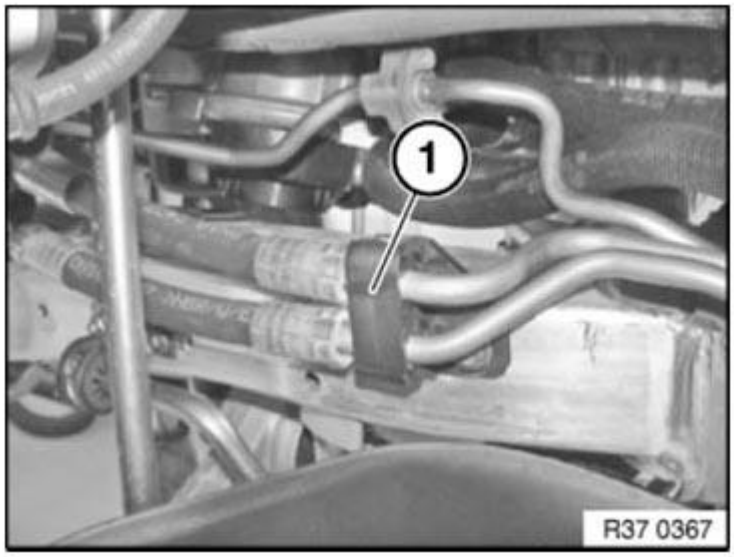


Fig. 99: Identifying Swivel Motor Pressure Lines Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) from line clip on front axle support and remove clip.

Tightening torque **37 13 7AZ** .

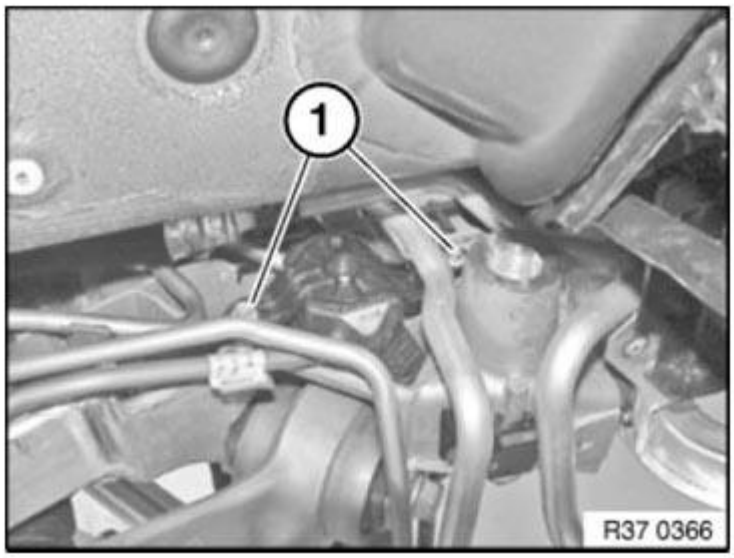


Fig. 100: Identifying Front Axle Support Pressure Line Clip Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Remove pipe.

Tightening torque **37 13 4AZ** .

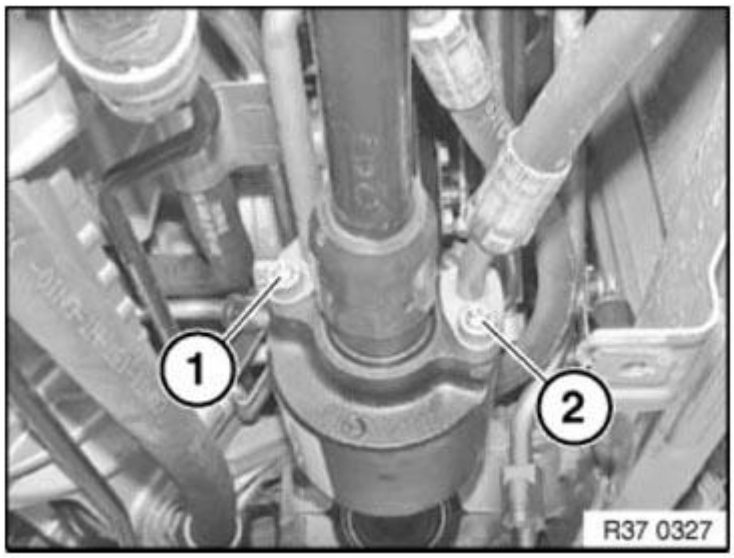


Fig. 101: Identifying Swivel Motor Pressure Lines Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation position of rubber spacer (1).
Make sure pressure lines are laid without tension.

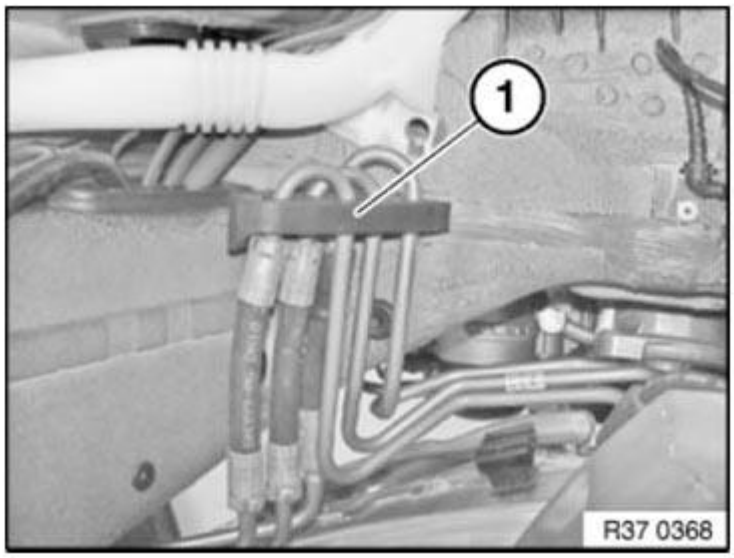


Fig. 102: Identifying Rubber Spacer
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the seal plugs of the line to be fitted are removed.

When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for tightness
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 430 REPLACING ARS EXPANSION HOSE PART 1 (FROM VANE PUMP TO EXPANSION HOSE) N63

Notes

WARNING: **DANGER OF POISONING if oil is ingested/absorbed through the skin!**
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: **Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.**
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

IMPORTANT: **Pressure line and connections must be provided with suitable plugs 32 1 270 immediately after removal!**

Necessary preliminary tasks

- Remove left **FRONT WHEEL**
- Remove front **UNDERBODY PROTECTION**
- Remove left steering assembly **COVER**
- Remove **FAN COWL** with electric fan
- Release and disengage front **ACTIVE STABILIZER BAR**
- Remove pressure lines from active stabilizer bar. See **REMOVING AND INSTALLING/RENEWING PRESSURE LINE FOR VA1 SWIVEL MOTOR** and **REMOVING AND REFITTING/REPLACING PRESSURE LINE ON SWIVEL MOTOR VA2**.

Release screw connection (1) on power steering pump and detach line.

Tightening torque **37 13 10AZ** .

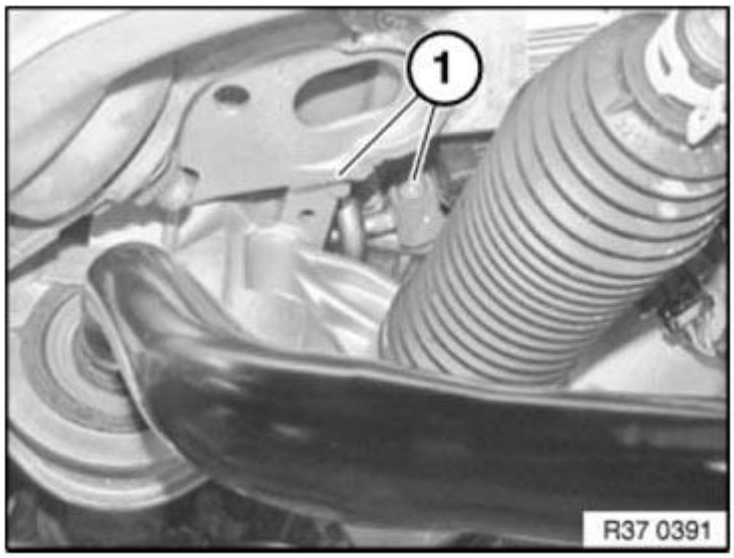


Fig. 103: Identifying Screw Connection On Power Steering Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder (1) on power steering pump.

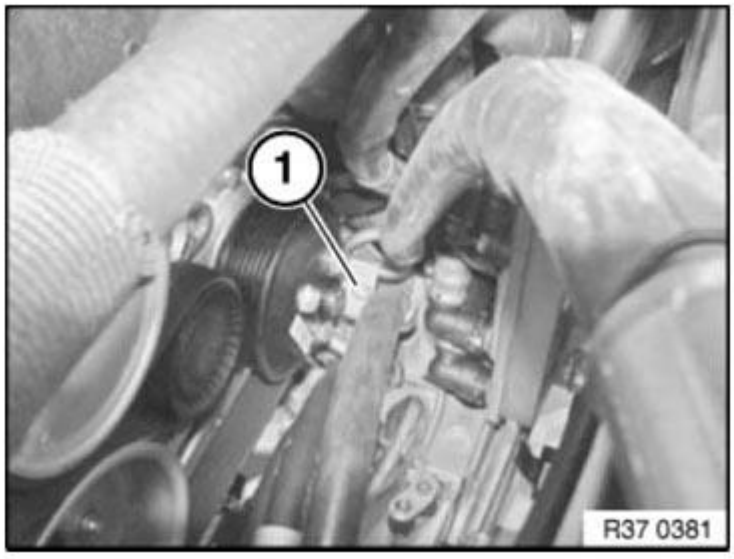


Fig. 104: Identifying Holder On Power Steering Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder (1).

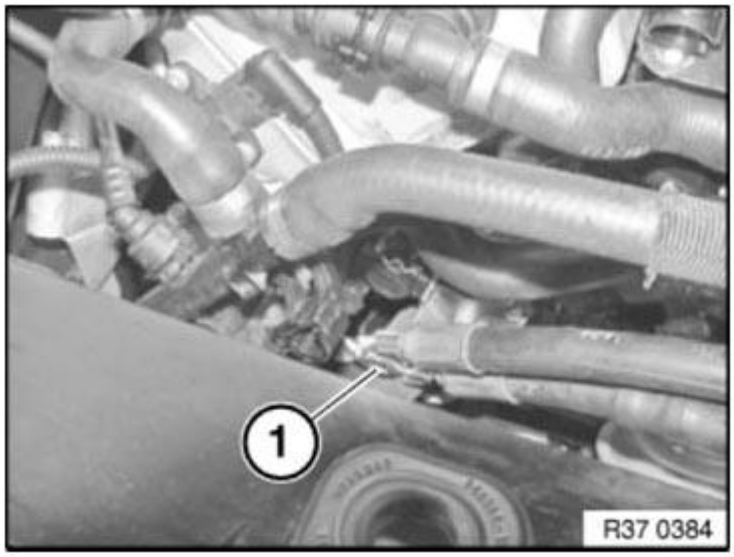


Fig. 105: Identifying Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw connection (1) on T-piece and remove expansion hose (3) towards top.

Tightening torque **37 13 11AZ** .

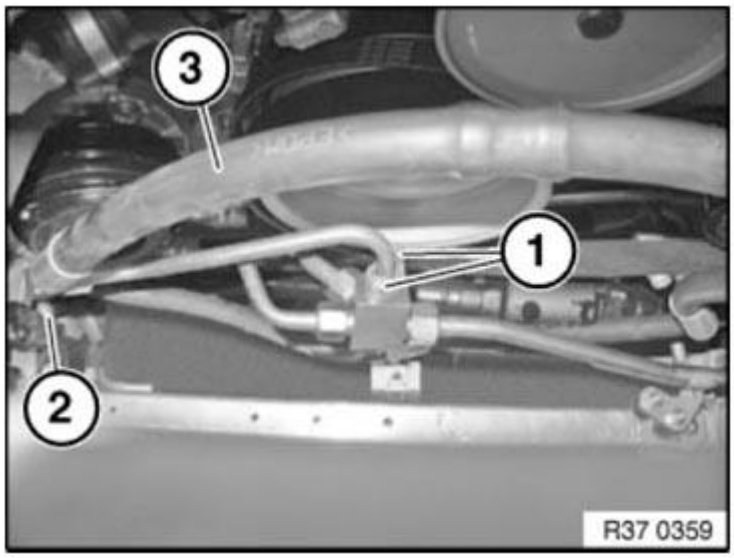


Fig. 106: Identifying Screw Connection On T-Piece And Expansion Hose
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.

Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 420 REPLACING EXPANSION HOSE PART 1 (WITH ARS) (FROM VANE PUMP) N63

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

IMPORTANT: Pressure line and connections must be provided with suitable plugs 32 1 270 immediately after removal!

Necessary preliminary tasks

- Remove left **FRONT WHEEL**
- Remove front **UNDERBODY PROTECTION**
- Remove left steering assembly **COVER**
- Release and disengage front **ACTIVE STABILIZER**
- Remove pressure lines from active stabilizer bar. See **REMOVING AND INSTALLING/RENEWING PRESSURE LINE FOR VA1 SWIVEL MOTOR** and **REMOVING AND REFITTING/REPLACING PRESSURE LINE ON SWIVEL MOTOR VA2**.

Release screw connection (1) on power steering pump and detach line.

Tightening torque **37 13 10AZ** .

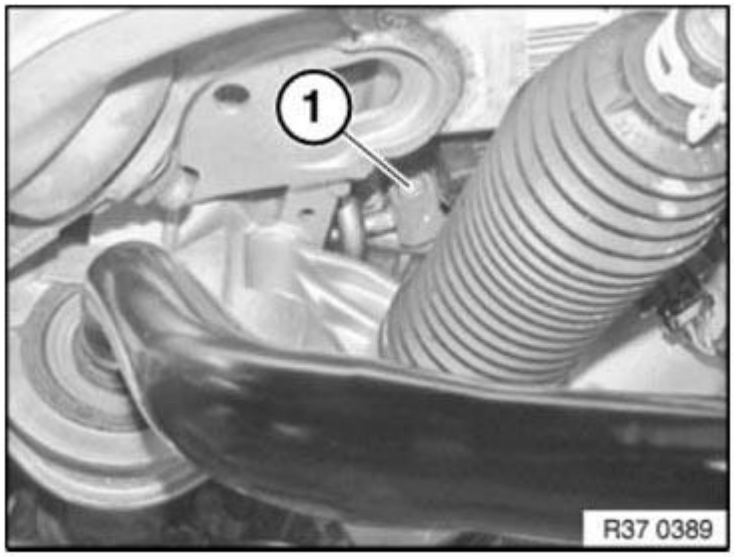


Fig. 107: Identifying Screw Connection On Power Steering Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw connection for flange (1).

Tightening torque **37 14 8AZ** .

Release pipe holder (2).

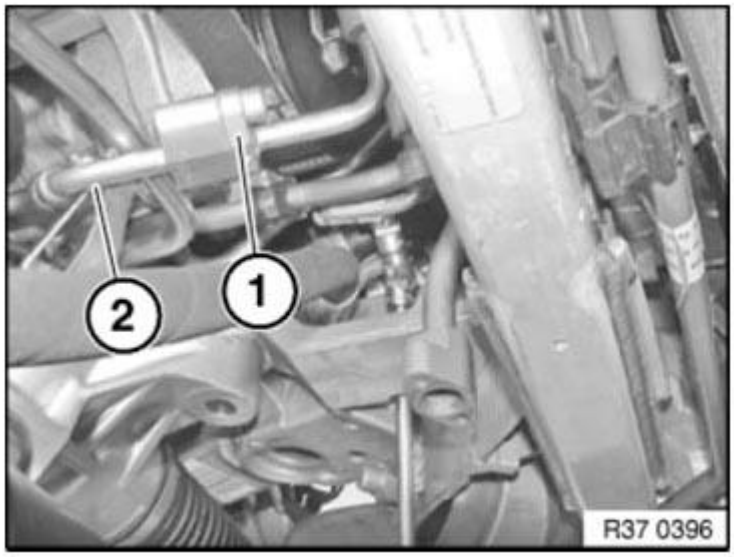


Fig. 108: Identifying Pipe Holder And Flange Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder (1) and remove line.

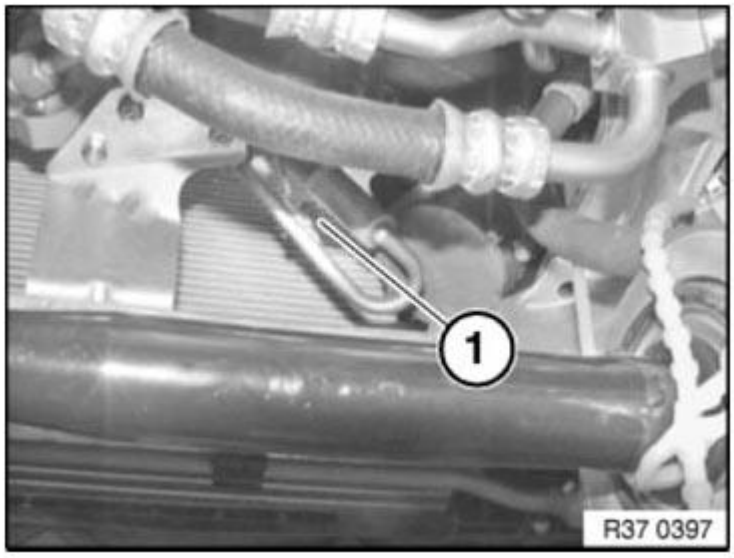


Fig. 109: Identifying Holder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 421 REPLACING EXPANSION HOSE PART 2 (WITH ARS) (FROM T-PIECE TO POWER STEERING GEAR) N63

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Lower **FRONT AXLE SUPPORT**

IMPORTANT: Pressure line and connections must be provided with suitable plugs 32 1 270 immediately after removal!

Release screw (1) from line flange.

Tightening torque **37 13 8AZ** .

Release holder (2).

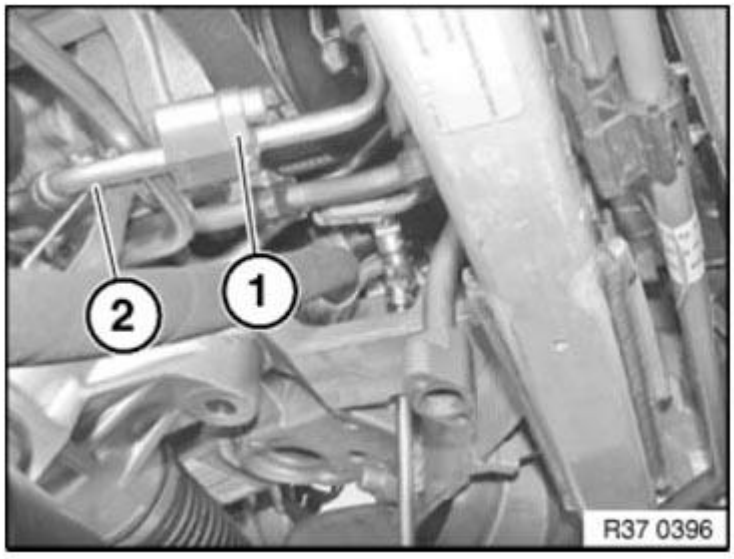


Fig. 110: Identifying Line Flange Mounting Screws With Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release block screw connection (1) on steering gear.

Tightening torque **32 41 5AZ** .

Remove hydraulic line.

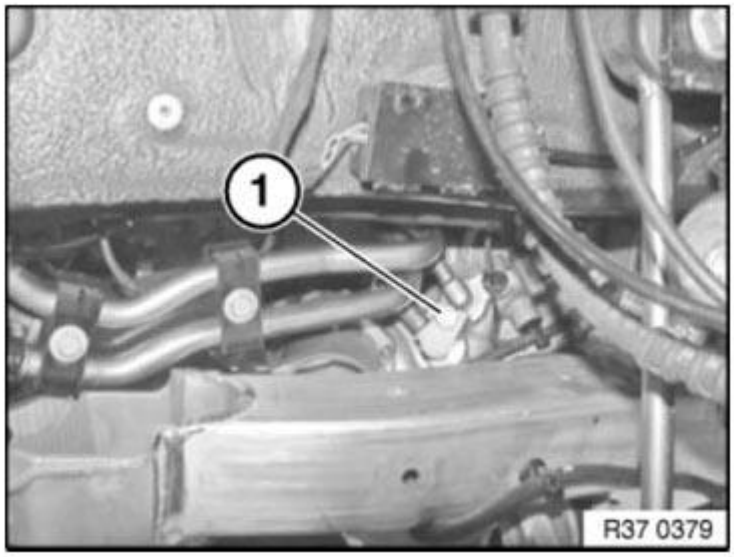


Fig. 111: Identifying Block Screw Connection On Steering Gear
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

37 13 127 REMOVING AND INSTALLING/RENEWING PRESSURE LINES FOR VALVE BLOCK (SHORT)

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Remove **FRONT RIGHT WHEEL ARCH COVER REAR SECTION**
- Release front right **UNDERBODY PANELLING**

To prevent the oil reservoir from running empty, disconnect return line with special tool **13 3 010** .

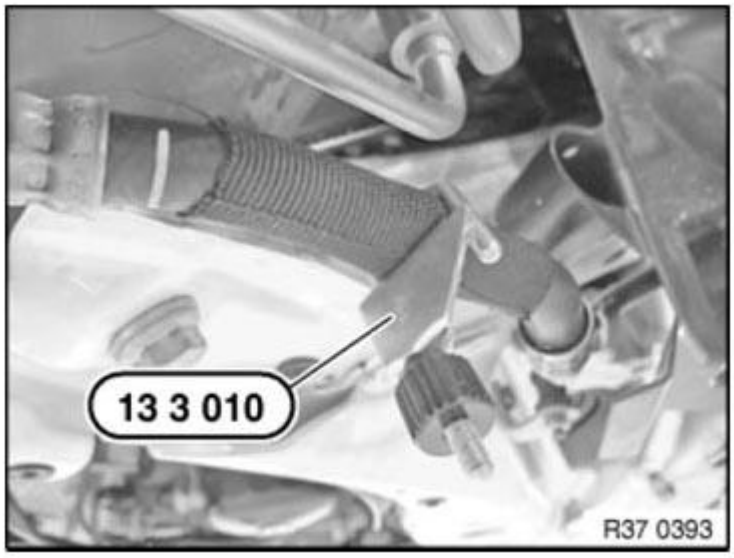


Fig. 112: Disconnecting Return Line Using Special Tool (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pressure lines and connections on valve block must be fitted with suitable seal plugs immediately after dismantling!

Release screw (1) and (2) of return line and pull off return line (3).

Tightening torque **37 13 13AZ** .

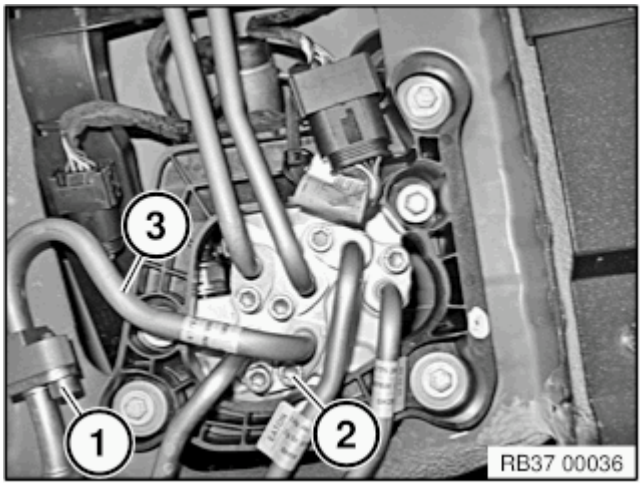


Fig. 113: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Attention:

When tightening screw connection (1), counter support line (2) with pliers (3).

Non-compliance will result in damage to the line (2)!

Tightening torque **37 13 14AZ** .

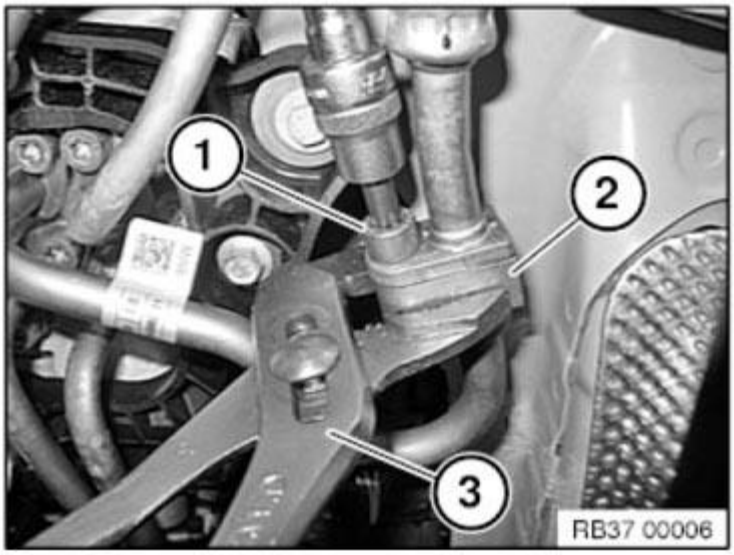


Fig. 114: Applying Counter Support With Wrench During Tightening Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the

line to be fitted are removed.

When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.

Do not replace sealing rings on hydraulic lines.

Replace affected line if sealing ring is damaged.

After installation:

- Fill and bleed **HYDRAULIC SYSTEM**
- Check pipe connections for leaks
- Perform **INITIAL OPERATION OF ARS**

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

3714 ELECTRICAL COMPONENTS

37 10 001 INITIAL OPERATION WITH TEST RUN OF DYNAMIC DRIVE

NOTE: The Service function Initial operation of Dynamic Drive must be carried out after:

- Work on the Dynamic Drive system which involved opening hydraulic lines
- Replacement/Programming/Coding Dynamic Drive control unit (ICM - V - High)

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Using contaminated equipment to add fluid may introduce dirt particles into the fluid reservoir and significantly reduce the service life of the ARS and power steering system. Do not use any filler funnels or similar!
Use only Pentosin CHF11S from original containers!
The fill level may only be checked or adjusted when the engine is stopped!
Adjust fill level if possible in middle between 20° and 80° C.
Ensure that the cap is fully screwed in prior to the fill level check.

NOTE: To avoid mix-ups when filling with hydraulic fluid, mark the fluid reservoirs or their caps with identification marks.

CHF Pentosin CHF11S



Fig. 115: Identifying CHF Pentosin CHF11S
Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding hydraulic circuit

1. Thoroughly clean fluid reservoir and its immediate surroundings with cap closed
2. Check and correct fill level

NOTE: The fill level must not be above the "MAX" mark (80°C) with the engine at normal operating temperature.
When filling observe temperature indication of dipstick.
Hydraulic fluid: see OPERATING FLUIDS .

3. Start engine
4. Turn steering wheel left and right twice in each case up to full lock; if necessary, top up hydraulic fluid (e.g. if hydraulic system is completely drained)
5. Move steering wheel to straight-ahead position and turn off engine
6. Check and correct fill level with engine stopped
7. Check reworked components on hydraulic system for leaks

Performing initial operation with test run

WARNING: Risk of injury!
Vehicle executes heavy rolling motions during initial operation! Therefore observe the following instructions without fail:

- **Do not allow any persons to remain in the vehicle or directly on the**

vehicle

- **Keep the vehicle doors closed.**
- **Maintain a safety distance around the vehicle of 1 meter to persons, objects, walls etc.**
- **Vehicle must be standing horizontally with all wheels on a firm surface**
- **Do not under any circumstances carry out initial operation on a lifting platform, wheel alignment analyzer or similar!**
- **Avoid heavy loads**

1. Check load; if necessary, remove load from the vehicle
2. Bring engine up to operating temperature
3. Connect vehicle to DIS or MoDiC
4. Start initial operation in SERVICE FUNCTIONS. Follow instructions in Diagnosis and Information System.
5. Check fill level again with engine stationary and if necessary top up oil to 80° mark.

37 14 055 REMOVING AND INSTALLING/REPLACING VERTICAL DYNAMICS MANAGEMENT CONTROL UNIT (VDM WITH DYNAMIC DRIVE)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove ignition key
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **SIDE TRIM PANEL FROM FOOTWELL ON RIGHT A-PILLAR**

Fold carpet in footwell at bottom right to one side.

Release screws (1).

Tightening torque **37 14 6AZ** .

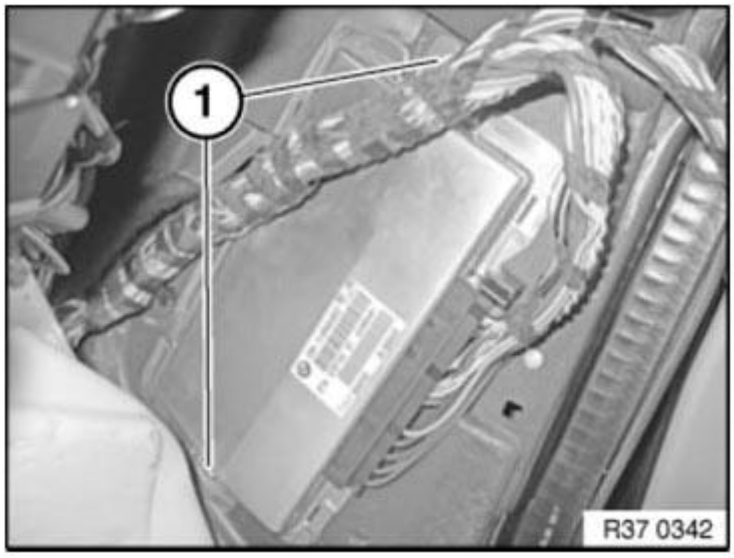


Fig. 116: Identifying Footwell Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) in direction of arrow and disconnect.

Remove control unit.

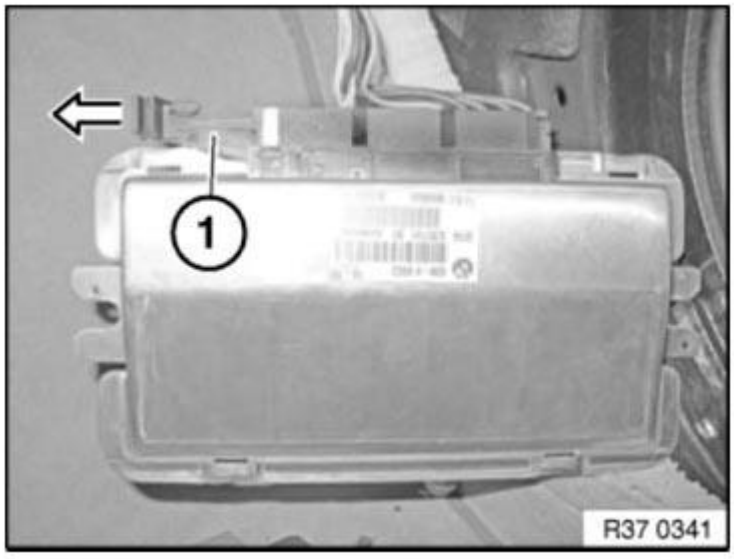


Fig. 117: Unlocking Control Unit Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Replacement only: Carry out **PROGRAMMING/ENCODING**

37 14 057 REMOVING AND INSTALLING/REPLACING VERTICAL DYNAMICS MANAGEMENT CONTROL UNIT (VDM)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove ignition key
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **SIDE TRIM PANEL** from footwell on right A-pillar

Fold carpet in footwell at front right to one side.

Unscrew nuts (1).

Tightening torque **37 14 6AZ** .

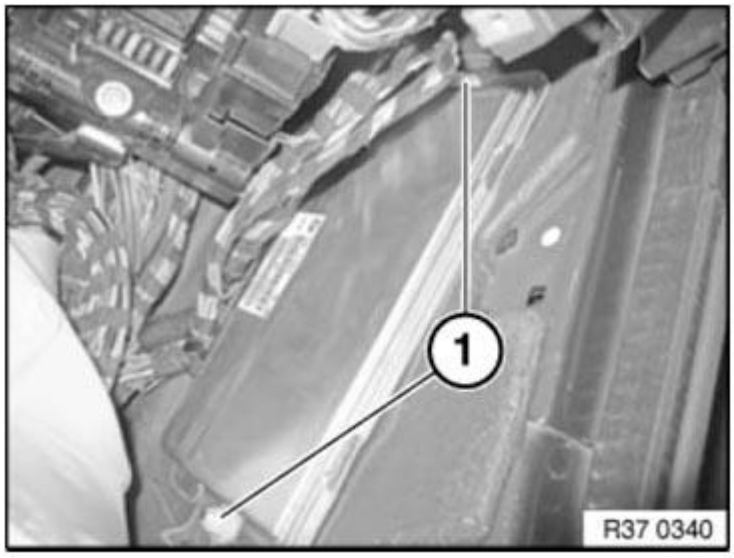


Fig. 118: Identifying Footwell Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) in direction of arrow and disconnect.

Remove control unit.

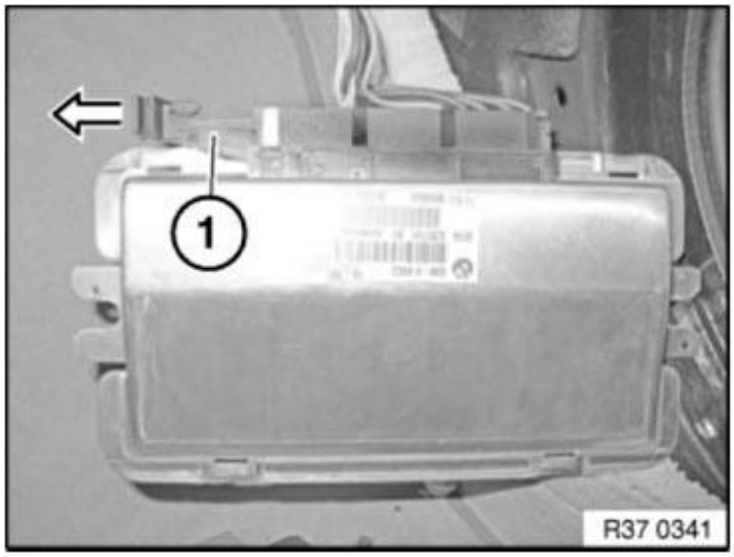


Fig. 119: Unlocking Vertical Dynamics Management Control Unit Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Replacement only: Carry out **PROGRAMMING/ENCODING**

37 14 525 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR AIR SUPPLY SYSTEM

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove ignition key
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **RIGHT LUGGAGE COMPARTMENT TRIM PANEL**

Unlock plug connections (2) and disconnect.

Remove control unit (1).

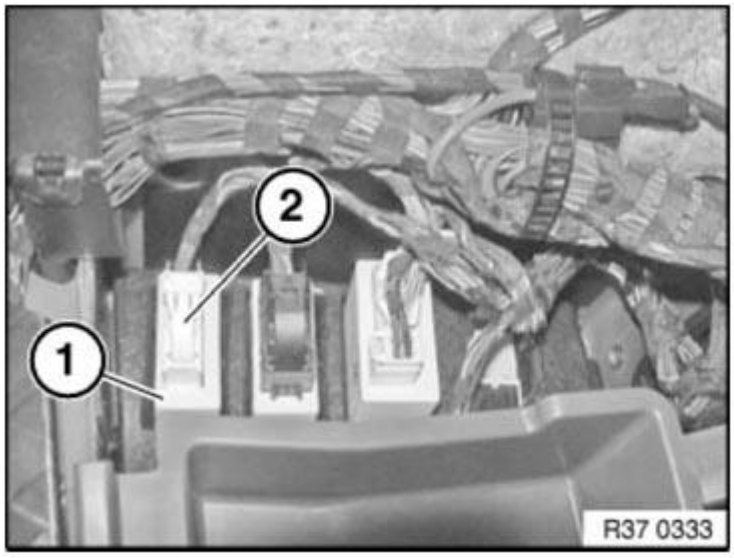


Fig. 120: Identifying Air Supply Control Unit With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Replacement only: Carry out **PROGRAMMING/CODING**
- Replacement only: Carry out **RIDE-HEIGHT CALIBRATION**

33 34 060 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR REAR AXLE SLIP CONTROL

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- **REMOVE BATTERY**

Unlock plug connection (1) on control unit (2) and disconnect.

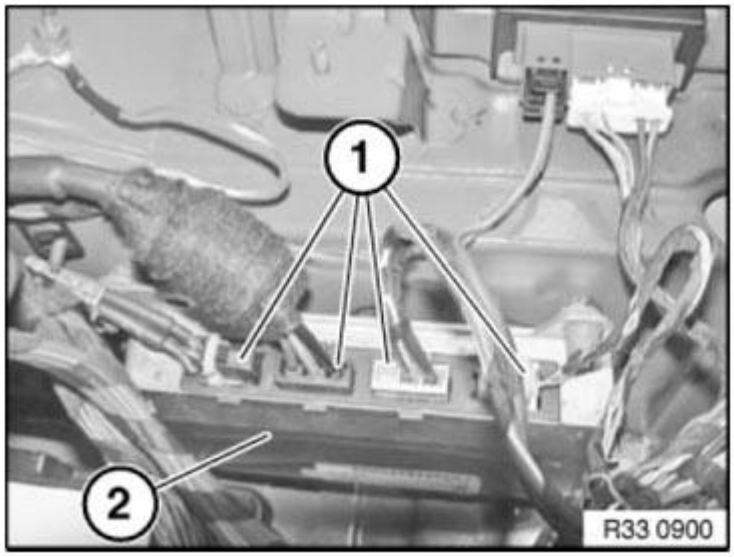


Fig. 121: Identifying Rear Axle Slip Control Unit With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove control unit (2).

Tightening torque **33 34 5AZ** .

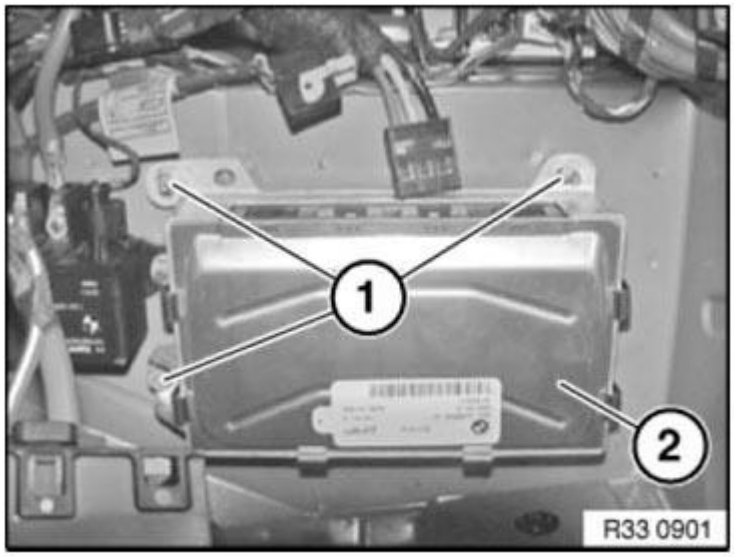


Fig. 122: Identifying Rear Axle Slip Control Unit With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Replacement only: Carry out **PROGRAMMING/ENCODING**

37 14 515 REPLACING FRONT LEFT OR RIGHT RIDE-HEIGHT SENSOR

IMPORTANT: Observe SAFETY INSTRUCTIONS for raising the vehicle

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Unfasten plug connection (1) and disconnect.

Release nut (2) and disconnect jointed rod.

Tightening torque **37 14 4AZ** .

Release screw (3) and remove ride-height sensor (4).

Tightening torque **37 14 2AZ** .

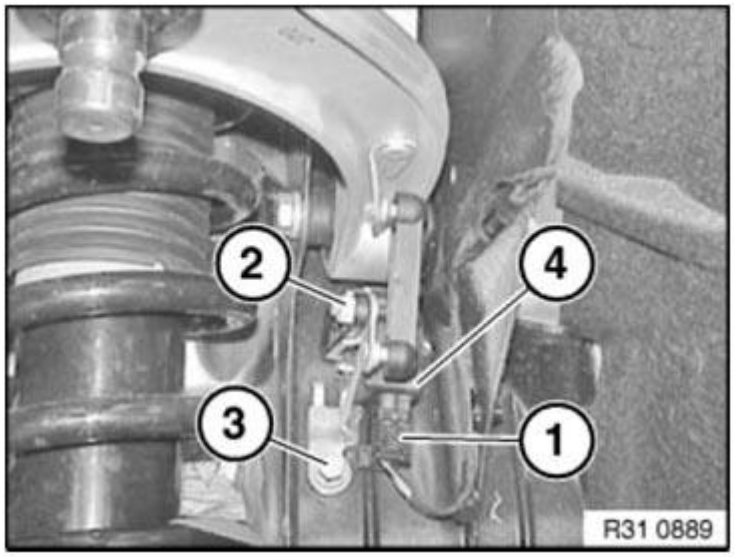


Fig. 123: Identifying Front Left/Right Ride-Height Sensor Plug Connections With Mounting Nuts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1). Remove bracket (2) from ride-height sensor.

Tightening torque **37 14 3AZ** .

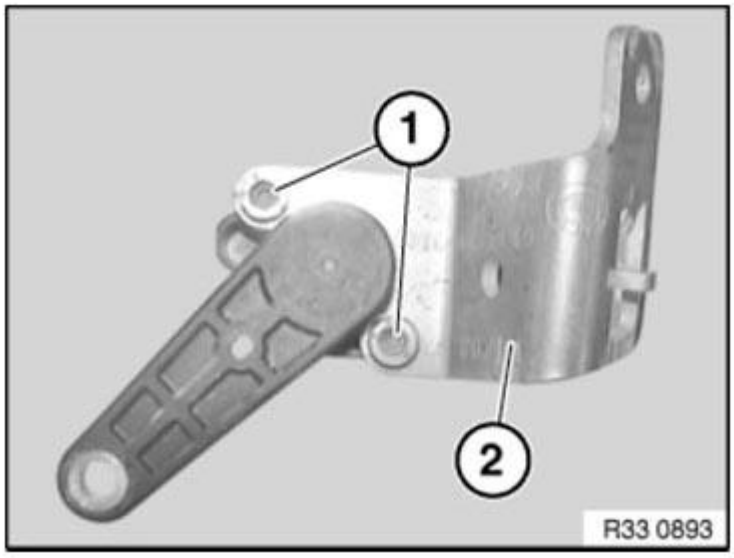


Fig. 124: Identifying Front Left/Right Ride-Height Sensor Plug Connections With Brackets And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out **RIDE-HEIGHT CALIBRATION**
- Check **HEADLIGHT ADJUSTMENT** , correct if necessary

37 14 515 REPLACING REAR LEFT OR RIGHT RIDE HEIGHT SENSOR

IMPORTANT: Observe SAFETY INFORMATION for raising the vehicle

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Unfasten plug connection (1) and disconnect.

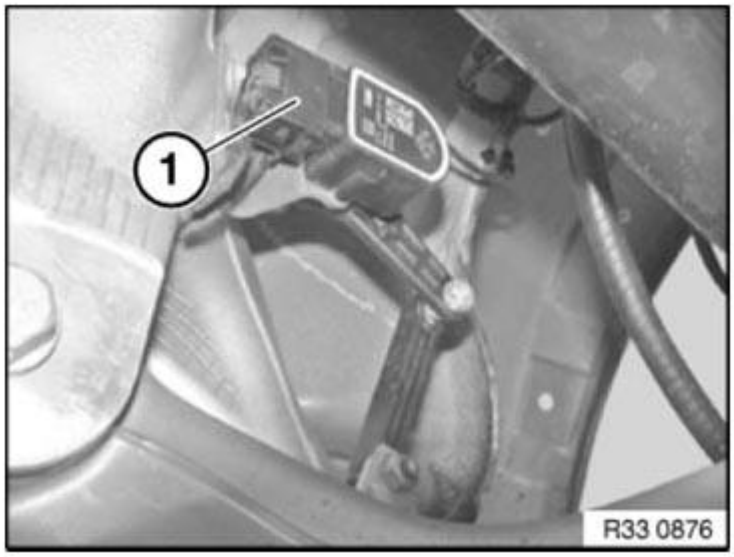


Fig. 125: Identifying Rear Left/Right Ride-Height Sensor Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (2) and disconnect jointed rod.

Tightening torque **37 14 4AZ** .

Installation note:

Sensor lever (3) must point from ride height sensor to respective rear wheel.

Replace self-locking nut.

Release screws (1) and remove ride-height sensor (3).

Tightening torque **37 14 2AZ** .

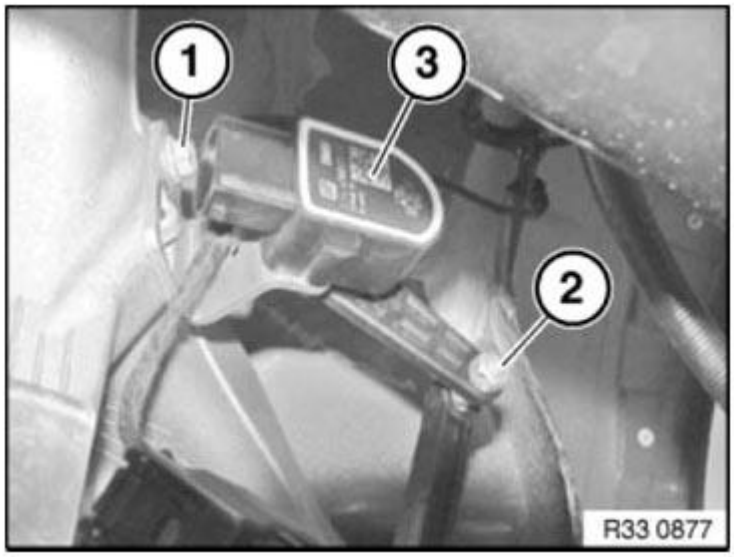


Fig. 126: Identifying Ride-Height Sensor Plug Connections With Mounting Nuts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Release screws (1). Remove holder (2) from ride-height sensor.

Tightening torque **37 14 3AZ** .

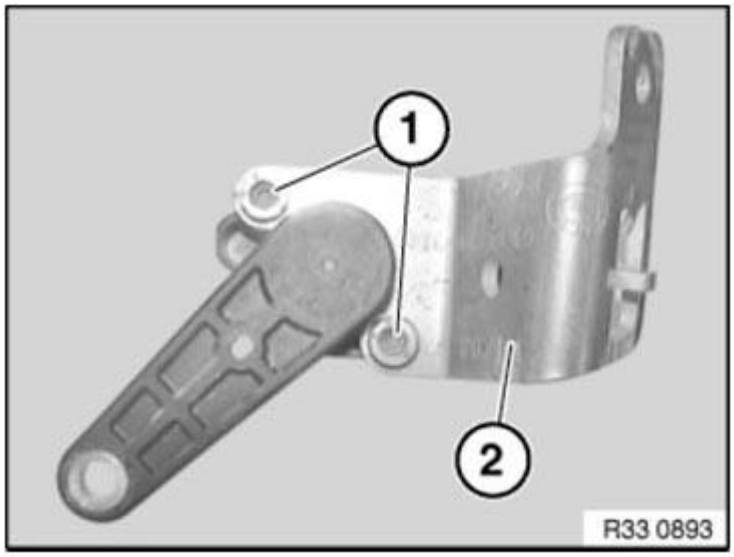


Fig. 127: Identifying Ride-Height Sensor With Mounting Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out **RIDE HEIGHT ADJUSTMENT**
- Check **HEADLIGHT SETTING** , correct if necessary

37 10 001 START-UP WITH TEST RUN OF DYNAMIC DRIVE (EPS STEERING GEAR)

See **START-UP WITH TEST RUN OF DYNAMIC DRIVE (EPS STEERING GEAR)**.

3715 ELECTRONIC DAMPING FORCE ADJUSTMENT

37 14 055 REMOVING AND INSTALLING/REPLACING VERTICAL DYNAMICS MANAGEMENT CONTROL UNIT (VDM WITH DYNAMIC DRIVE)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove ignition key
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **SIDE TRIM PANEL FROM FOOTWELL ON RIGHT A-PILLAR**

Fold carpet in footwell at bottom right to one side.

Release screws (1).

Tightening torque **37 14 6AZ** .

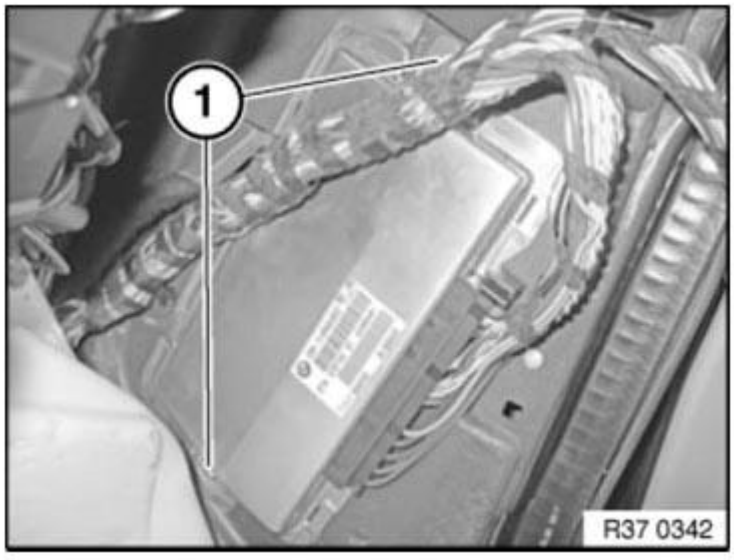


Fig. 128: Identifying Footwell Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) in direction of arrow and disconnect.

Remove control unit.

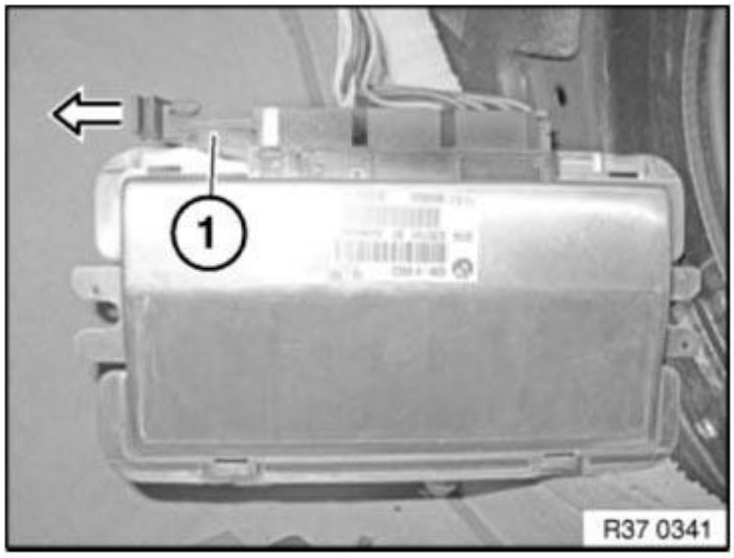


Fig. 129: Unlocking VDM (With Dynamic Drive) Control Unit Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Replacement only: Carry out **PROGRAMMING/ENCODING**

37 14 057 REMOVING AND INSTALLING/REPLACING VERTICAL DYNAMICS MANAGEMENT CONTROL UNIT (VDM)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove ignition key
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **SIDE TRIM PANEL** from footwell on right A-pillar

Fold carpet in footwell at front right to one side.

Unscrew nuts (1).

Tightening torque **37 14 6AZ** .

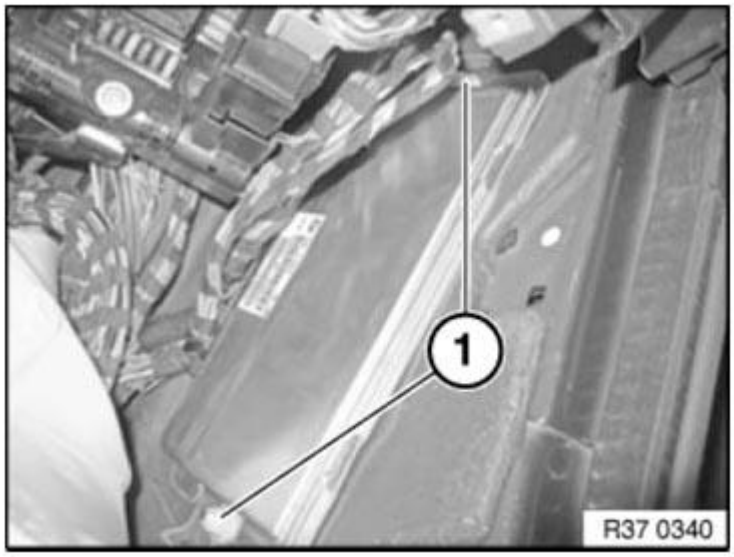


Fig. 130: Identifying Footwell Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) in direction of arrow and disconnect.

Remove control unit.

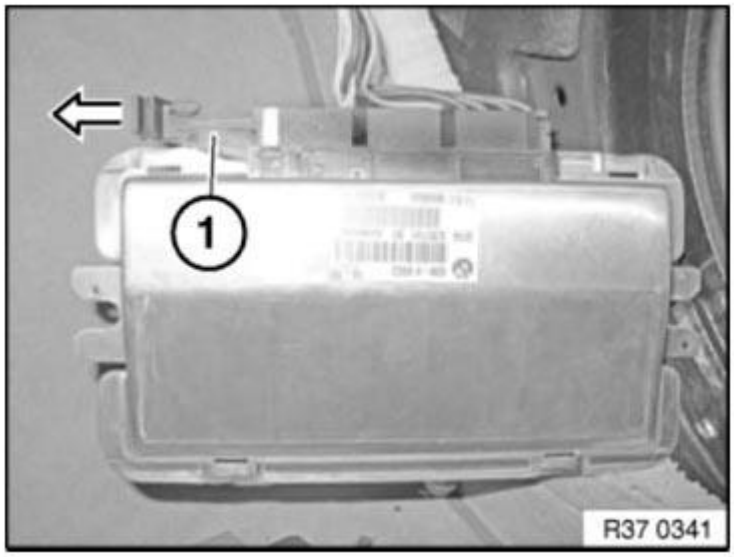


Fig. 131: Unlocking VDM Control Unit Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Replacement only: Carry out **PROGRAMMING/ENCODING**

3722 PUMP ASSEMBLY WITH CONTAINER

37 20 001 REMOVING AND INSTALLING/REPLACING DYNAMIC DRIVE VALVE BLOCK

Notes

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

**IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).**

NOTE: In all warranty cases you must always provide a fault memory printout, even where there is no fault entry, with the defective component. In addition, the valve block openings must be sealed with the protective caps (of the new part).

Necessary preliminary work

- Partially remove **FRONT RIGHT WHEEL ARCH COVER (REAR SECTION)**
- Remove **RIGHT UNDERBODY PANELLING**

Disconnect return line with special tool **13 3 010** .

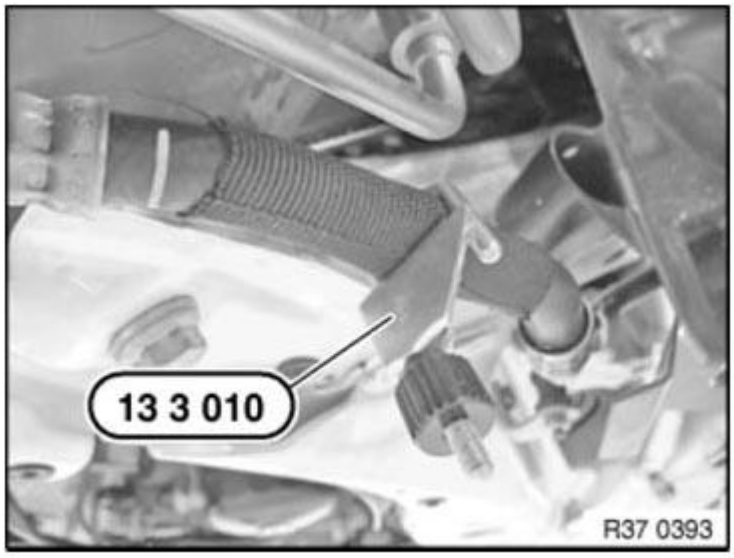


Fig. 132: Disconnecting Return Line Using Special Tool (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve block on front right vehicle underbody

Release control lines (1) to rear axle swivel motor on valve block.

Release control lines (2) to FA swivel motor on valve block.

Release supply and return lines (3) to valve block.

Allow hydraulic fluid to drain off through opened connections and dispose of properly.

Tightening torque **37 13 1AZ - 3AZ**

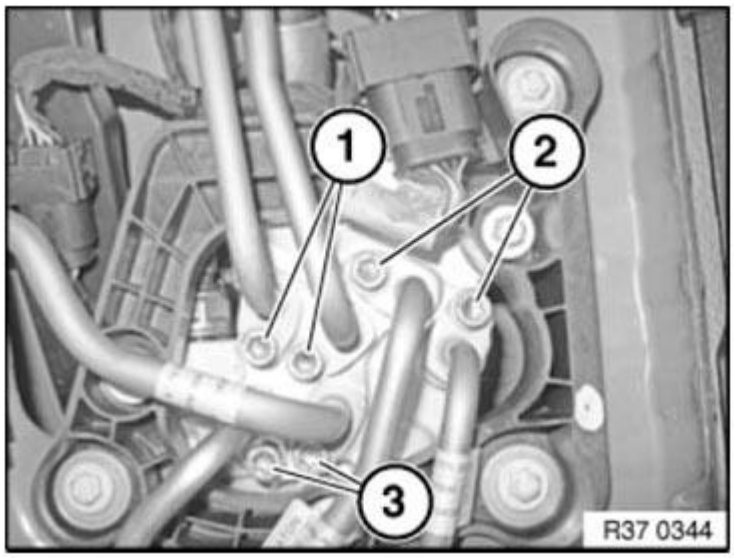


Fig. 133: Identifying Control Lines, Supply Lines And Return Lines On Valve Block
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Hydraulic line and connection on valve block must be fitted with suitable seal plugs immediately after removal! 32 1 270

Disconnect plug connections (1) and (2).

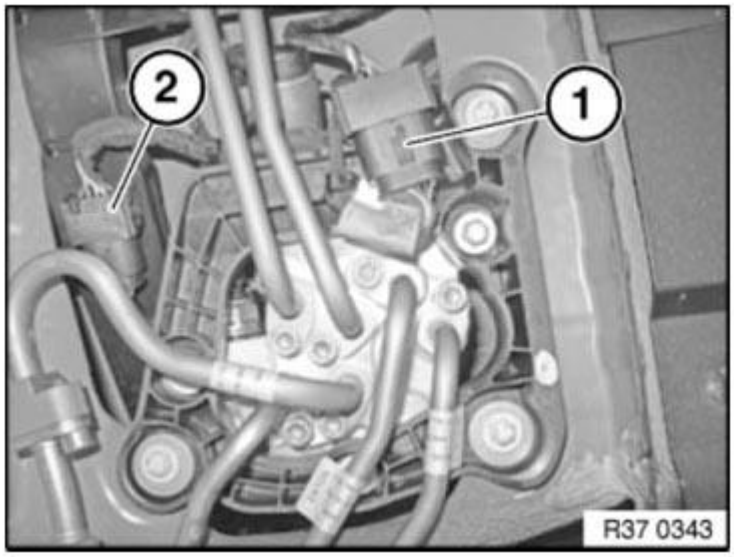


Fig. 134: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip wiring harness.

Release screws (1) and remove valve block.

Tightening torque **37 14 7AZ** .

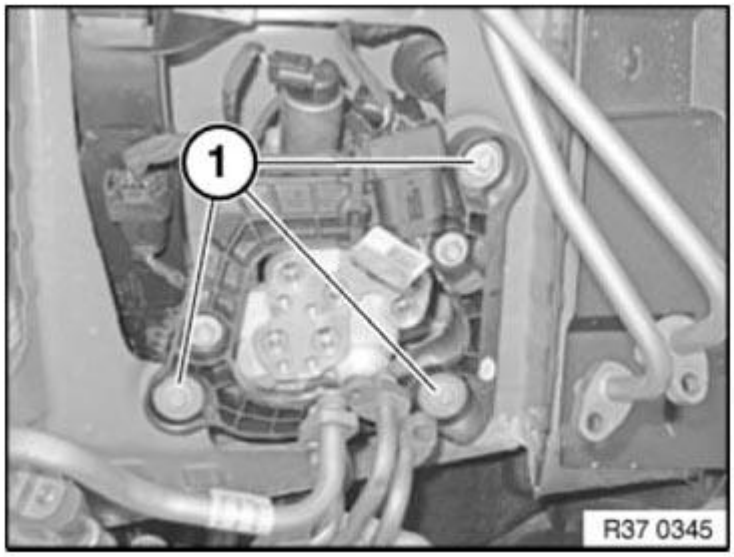


Fig. 135: Identifying Valve Block Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the seal plugs of the line to be fitted are removed.

When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.
Check seating and position of holders and line clips, correcting if necessary.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for tightness
- If necessary, carry out **INITIAL DYNAMIC DRIVE OPERATION**

37 22 540 REPLACING AIR SUPPLY SYSTEM

IMPORTANT: Risk of injury!
Drain the air spring system before carrying out any work on the air supply unit, air pipes and air spring struts! Danger of injury if this instruction is not complied with!

Risk of damage!

Extreme cleanliness must be ensured in the connection area of the pipes during removal and installation. Even the smallest of dirt particles can cause leakage in the air spring system.

NOTE: Read and comply with NOTES ON AIR SPRING SYSTEM .

Necessary preliminary tasks

- **Deactivating air spring system:**
  - Raise vehicle on lifting platform.
  - Remove ignition key
  - Pull out fuse for air spring system in luggage compartment at rear right

IMPORTANT: Do not kink, twist or crush lines.

Unscrew nuts (1).

Release screws (2).

Lever out expander rivets (3) and remove panel (4).

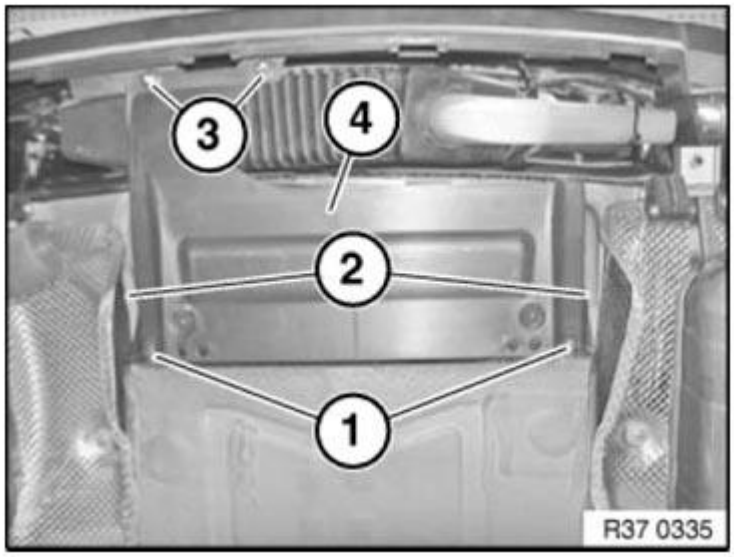


Fig. 136: Identifying Airsupply Unit Panel With Screws, Nuts And Expander Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

- Unlock plug connections (1/2) and disconnect.

  Carefully slacken banjo bolt (3) and (4) until the sound of escaping air can be heard

  NOTE: Wait roughly 2 minutes until the pressure on the left side and/or right side of the air spring system is completely reduced (hissing sound stops).

  Line (3), air spring strut, left: Blue

  Line (4), air spring strut, right: Red

- Only fully release banjo bolt(s) after pressure has completely reduced

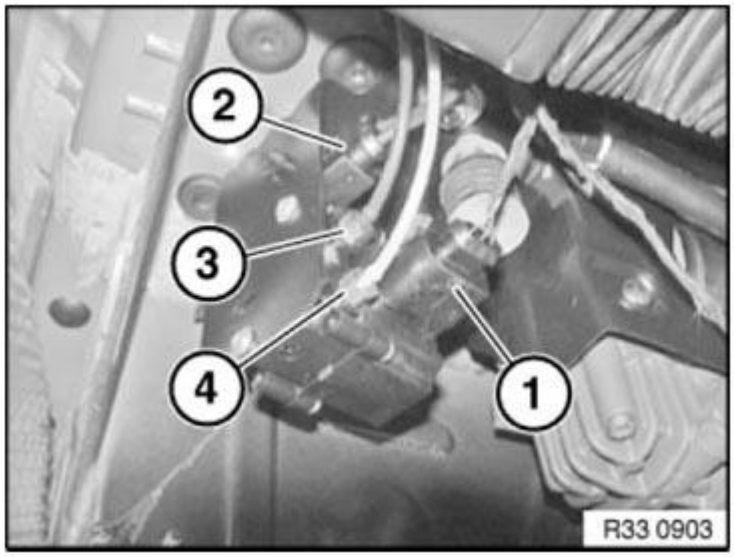


Fig. 137: Identifying Plug Connections And Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Replacement: Remove and dispose of screw connections on new air supply unit!

  Reuse screw connections on lines.

- Check banjo bolts for dirt, clean if necessary.
- Carefully screw in banjo bolts by hand to avoid damaging the plastic threads and with it the air supply unit.

  Tightening torque **37 12 1AZ** .

Unfasten plug connector (1) and disconnect.

Disconnect ventilation line (2).

Release nuts (3) and remove air supply unit.

Tightening torque **37 22 1AZ** .

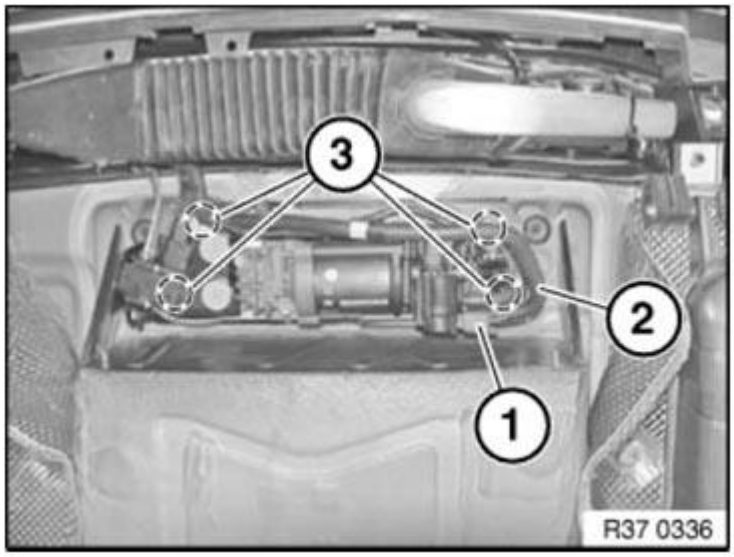


Fig. 138: Identifying Air Supply Unit Plug Connector, Ventilation Line And Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Activating and filling air spring system:

- Insert fuse in corresponding slot in fuse box
- Set vehicle down on its wheels
- Start engine
- Air spring system is automatically filled

37 12... REPLACING VENTILATION LINE FOR AIR SUPPLY UNIT

Necessary preliminary tasks

- Remove **REAR BUMPER TRIM**

Detach ventilation line (1) in direction of arrow from air supply unit.

Unclip ventilation line (1) from holders.

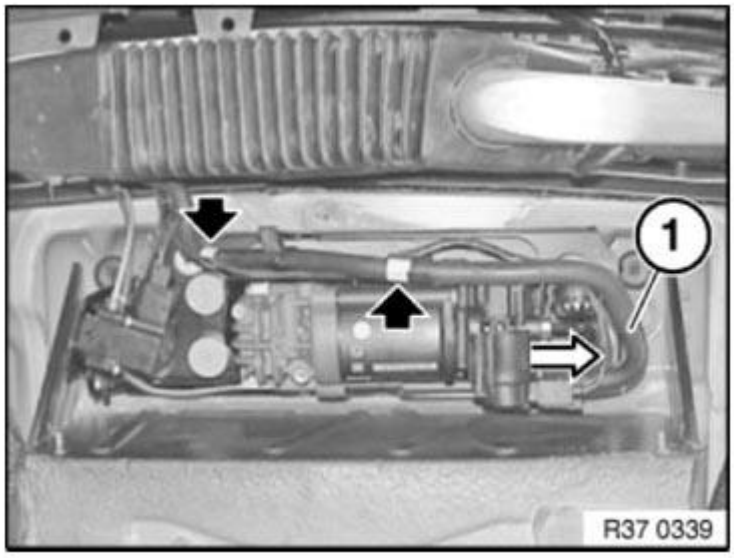


Fig. 139: Locating Air Supply Unit Ventilation Line
Courtesy of BMW OF NORTH AMERICA, INC.

Remove air filter (3) from holder (4).

Unclip ventilation line (1) from holders.

Pull ventilation line (1) in direction of arrow out of bumper trim (2).

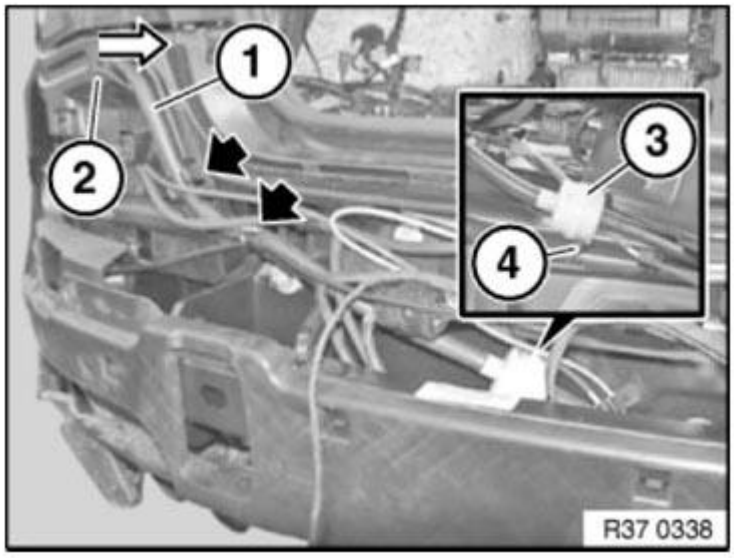


Fig. 140: Pulling Air Supply Unit Ventilation Line Out Of Bumper Trim
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Lights - Repair

6310 LAMP SETTINGS

63 10 542 ADJUST NON-DAZZLE HIGH-BEAM HEADLIGHT

WARNING: Danger of injury!

Laser radiation at headlight adjustment aid.

Do not look into the beam!

NOTE: The high-beam headlight must be adjusted to prevent dazzle in the following cases:

- **After removing and installing/replacing the headlight**
- **After customer complaint regarding low-beam behavior of headlights**

Necessary preliminary work:

- Adjust **HEADLIGHTS**.

NOTE: There are two ways to adjust the high-beam headlight to prevent dazzle:

1. **With electronic headlight adjuster "MAHA Lite 3"**
2. **With headlight adjustment aid**

The following operations describe the adjustment using the headlight adjustment aid:

Prerequisites for adjusting the high-beam headlight to prevent glare using the headlight adjustment aid:

- Position vehicle in front of vertical surface, e. g. a wall (1), as shown.
- Distance (A): 4 - 10 m
- Dim lighting is helpful.
- Have a tape measure and black adhesive tape (maximum width of 2 cm) ready.

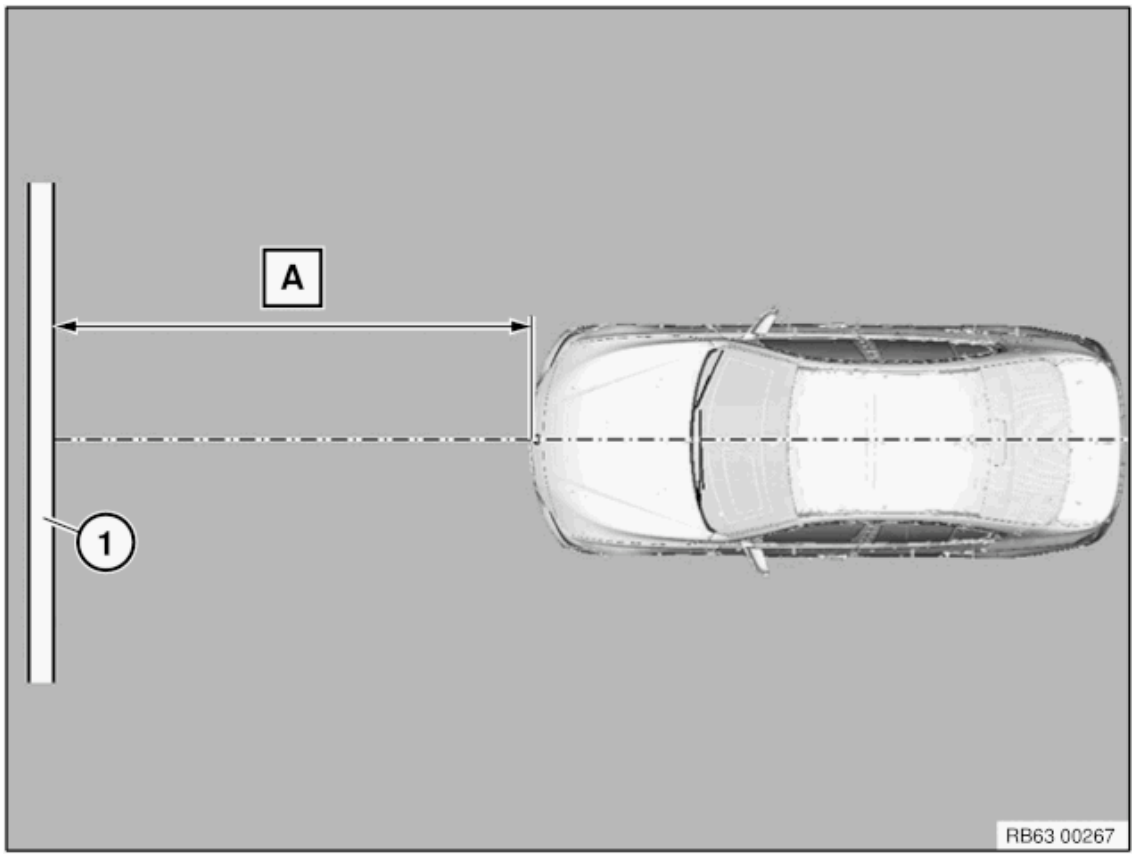


Fig. 1: Identifying Distance From Wall
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Headlight adjustment aid (2 299 574) and mountings (2) are labelled (see middle graphic):

- **Headlight adjustment aid (2 299 574) has label A, B, C, D with the associated numbers 1-5.**
- **Mountings (2) are labelled A, B, C, D.**

Position of mounting (2) on headlight adjustment aid (2 299 574) is specified:

- Here by way of example mounting (B) at B4.

Prepare the headlight adjustment aid (2 299 574) as shown:

- Insert rods (1) into mountings (2) with identification (A, B) and clamp:
- Insert rods (3) into mountings (2) with identification (C, D) and clamp:
- Position front mountings (C, D) with rods (3) on headlight adjustment aid (2 299 574) as follows:
  - Mounting (C) at C5
  - Mounting (D) at D5

- Position rear mountings (A, B) with rods (1) on headlight adjustment aid (2 299 574) as follows:
  - Mounting (A) at A4
  - Mounting (B) at B4
- Attach laser (4) to the headlight adjustment aid (2 299 574). To switch on the laser (4), push up the flap in front of the laser (4).

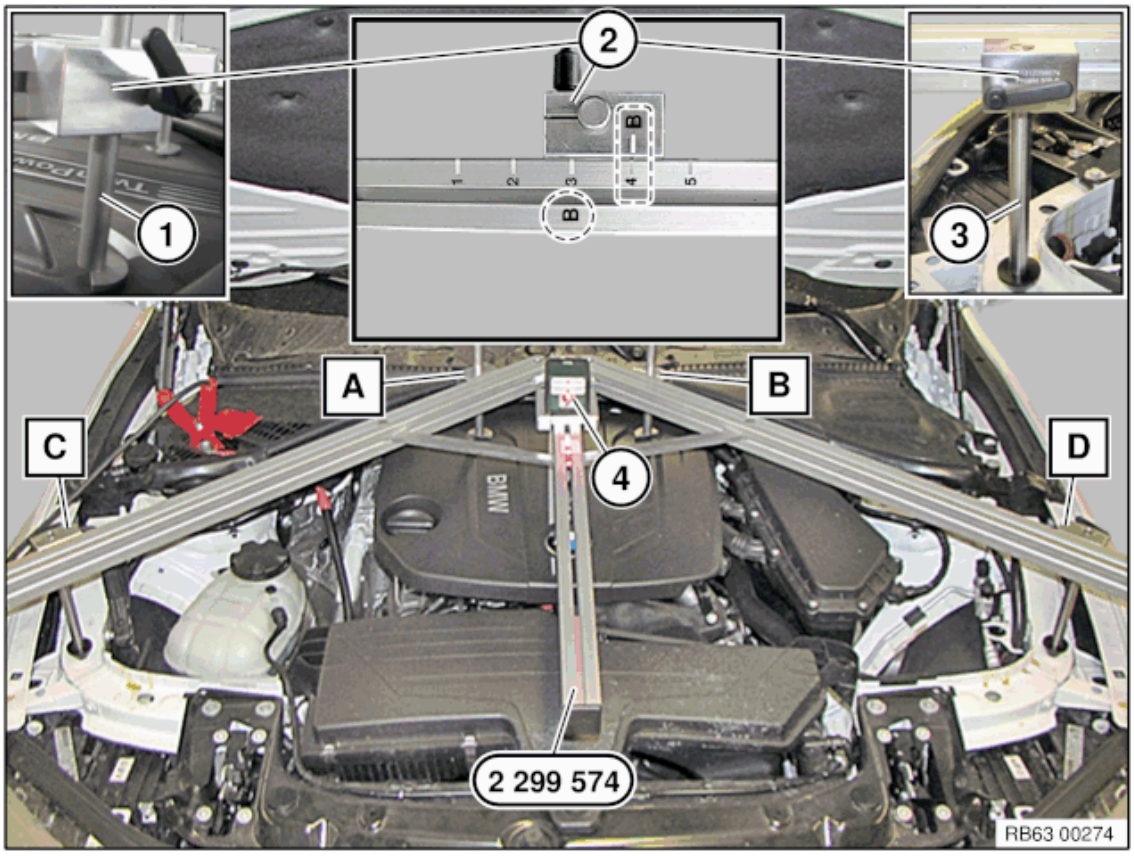


Fig. 2: Preparing Headlight Adjustment Aid
Courtesy of BMW OF NORTH AMERICA, INC.

Position headlight adjustment aid (2 299 574) at marked openings (1) in engine compartment as shown.

Align headlight adjustment aid (2 299 574) with longitudinally adjustable rods (2) using bubble level (3).

NOTE: The height of the headlight adjustment aid (2 299 574) has no influence on the setting.

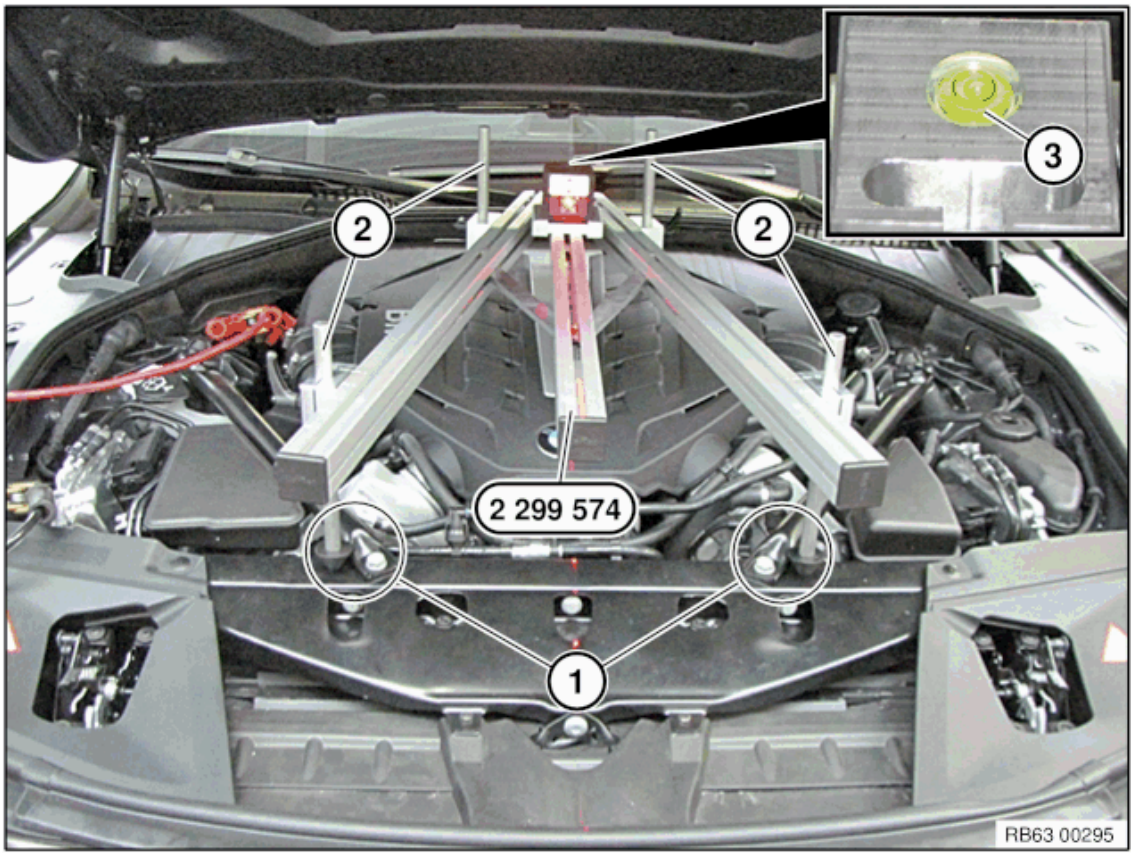


Fig. 3: Positioning And Aligning Headlight Adjustment Aid
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the high-beam headlight is correctly set to prevent dazzle, the laser beam is at the height of the middle of the vehicle.

To do so, position tool (4) for example laterally to bead (3) as shown. Bead (3) represents the middle of the vehicle. Laser beam (1) must strike tool (4) at the point of intersection with bead (2).

If not, correct the alignment of the headlight adjustment aid (2 299 574).

Switch on ignition.

Switch on the low-beam headlight (high-beam headlight is switched on by the procedure).

Perform test procedure via path:

- Body
- Lights
- Adjust non-dazzle high-beam headlight

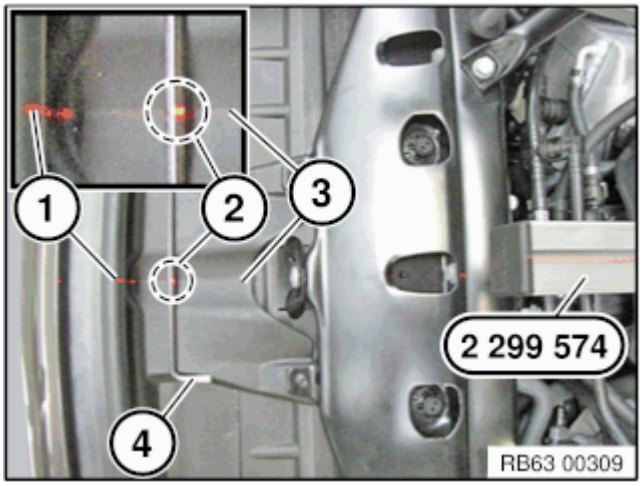


Fig. 4: Identifying Correct Laser Beam Position
Courtesy of BMW OF NORTH AMERICA, INC.

The figure shows various photos after the headlight adjustment aid (2 299 574) is set up:

1. Laser beam
2. Low-beam headlight
3. High-beam headlight **without** procedure
4. High-beam headlight **with** procedure

IMPORTANT: Do not adjust the high-beam headlight to prevent dazzle without the procedure.

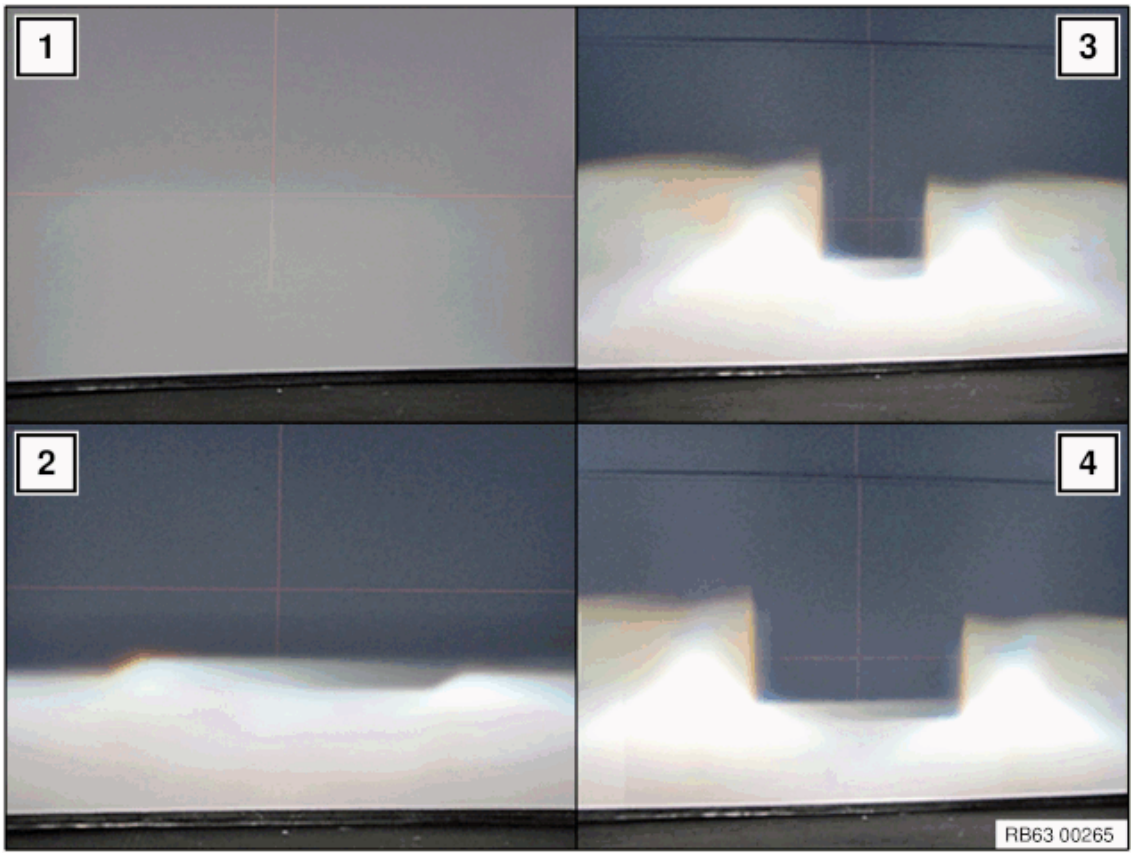


Fig. 5: Identifying Views Of Low/High Beam Headlights And Laser Beam After Headlight Adjustment Aid Is Set Up
Courtesy of BMW OF NORTH AMERICA, INC.

Check the dazzle-free high-beam headlight setting as follows:

1. Visibly mark the vertical line from the laser beam (3) on the wall using adhesive tape, for example.
2. Measure distance (A) from line (3) both to the left and right. Visibly mark distance (A) on the wall using adhesive tape, for example (1, 4).

   Vehicle with xenon headlights:

   Distance (A): 71 cm

   Distance (B): 142 cm

   Vehicle with LED headlights:

   Distance (A): 74 cm

   Distance (B): 148 cm

3. The light-dark boundary of the left high-beam headlight (2) without low-beams must be at marking (1).

4. The light-dark boundary of the right high-beam headlight (5) without low-beams must be at marking (4).

NOTE: The figure shows the correctly adjusted high-beam headlight.

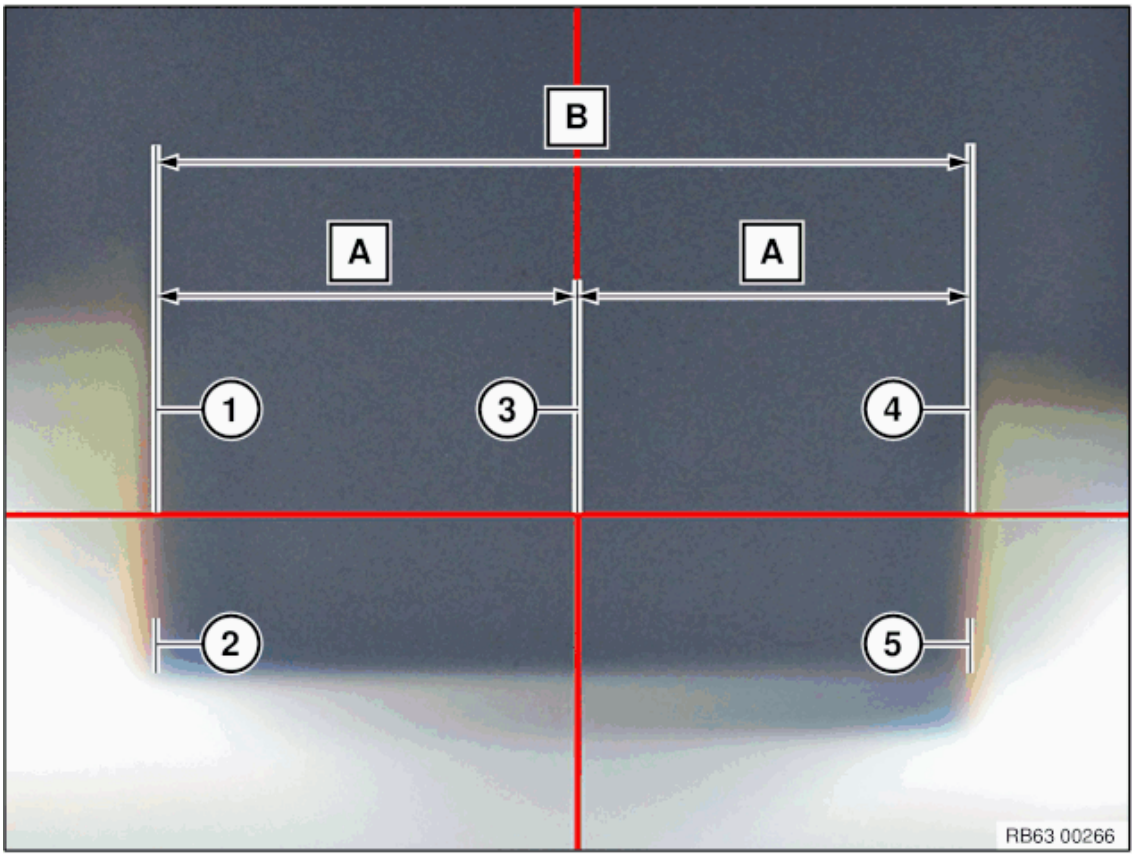


Fig. 6: Checking Dazzle-Free High-Beam Headlight Setting
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust the dazzle-free high-beam headlight on the headlight (1) using screw (2).

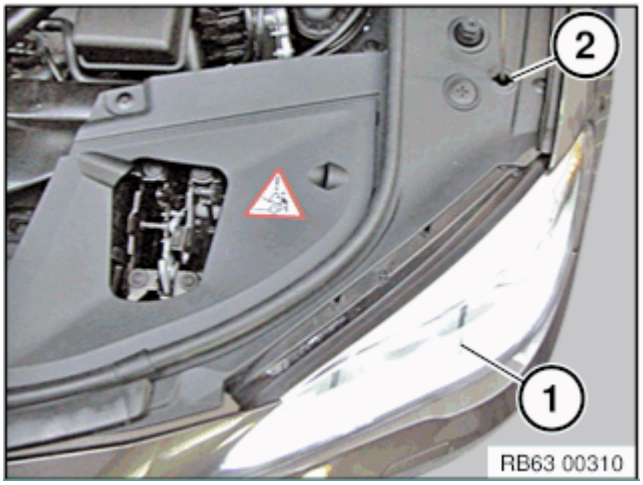


Fig. 7: Adjusting Dazzle-Free High-Beam Headlight On Headlight Using Screw
Courtesy of BMW OF NORTH AMERICA, INC.

63 10 022 ADJUSTING DYNAMIC LIGHT SPOT HEADLIGHT

WARNING: Danger of injury!

Laser radiation at headlight adjustment aid.

Do not look into the beam!

NOTE: Dynamic Light Spot headlight must be adjusted in the following cases:

- **After removing and installing/replacing the Dynamic Light Spot headlight**
- **After removing and installing/replacing the front bumper panel**
- **In the event of customer complaints about the lighting performance**

NOTE: There are 2 ways of adjusting the Dynamic Light Spot headlight:

1. **With electronic headlight adjuster "MAHA Lite 3"**
2. **With headlight adjustment aid**

The following operations describe the adjustment using the headlight adjustment aid:

Requirements for adjusting the Dynamic Light Spot headlight with headlight adjustment aid:

- Comply with **TEST REQUIREMENTS FOR HEADLIGHTS VERTICAL AIM ADJUSTMENT**.
- Position vehicle in front of vertical surface, e. g. a wall (1), as shown.
- Distance (A): 4 - 10 m
- Dim lighting is helpful.
- Have a tape measure and black adhesive tape (maximum width of 2 cm) ready.

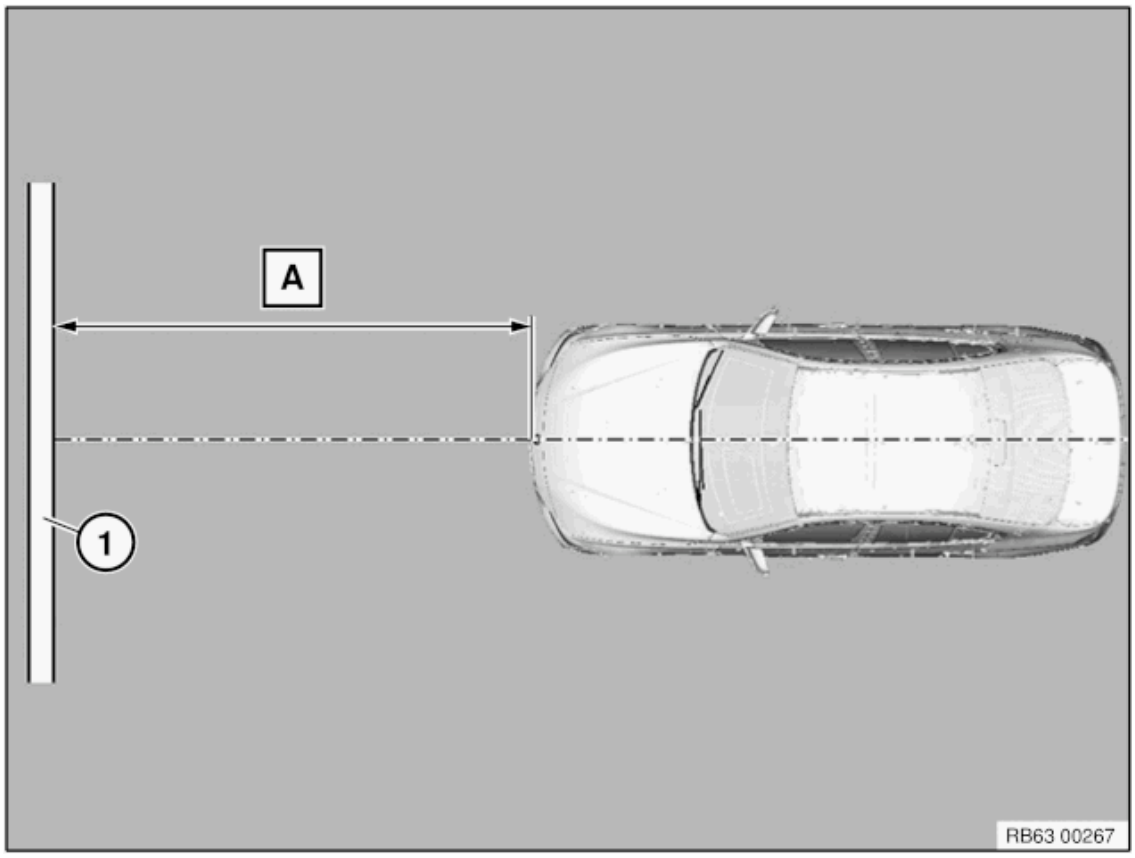


Fig. 8: Identifying Distance From Wall
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Headlight adjustment aid (2 299 574) and mountings (2) are labelled (see middle graphic):**

- **Headlight adjustment aid (2 299 574) has label A, B, C, D with the associated numbers 1-5.**
- **Mountings (2) are labelled A, B, C, D.**

Position of mounting (2) on headlight adjustment aid (2 299 574) is specified:

- Here by way of example mounting (B) at B4.

Prepare the headlight adjustment aid (2 299 574) as shown:

- Insert rods (1) into mountings (2) with identification (A, B) and clamp:
- Insert rods (3) into mountings (2) with identification (C, D) and clamp:
- Position front mountings (C, D) with rods (3) on headlight adjustment aid (2 299 574) as follows:
  - Mounting (C) at C5
  - Mounting (D) at D5

- Position rear mountings (A, B) with rods (1) on headlight adjustment aid (2 299 574) as follows:
  - Mounting (A) at A4
  - Mounting (B) at B4
- Attach laser (4) to the headlight adjustment aid (2 299 574). To switch on the laser (4), push up the flap in front of the laser (4).

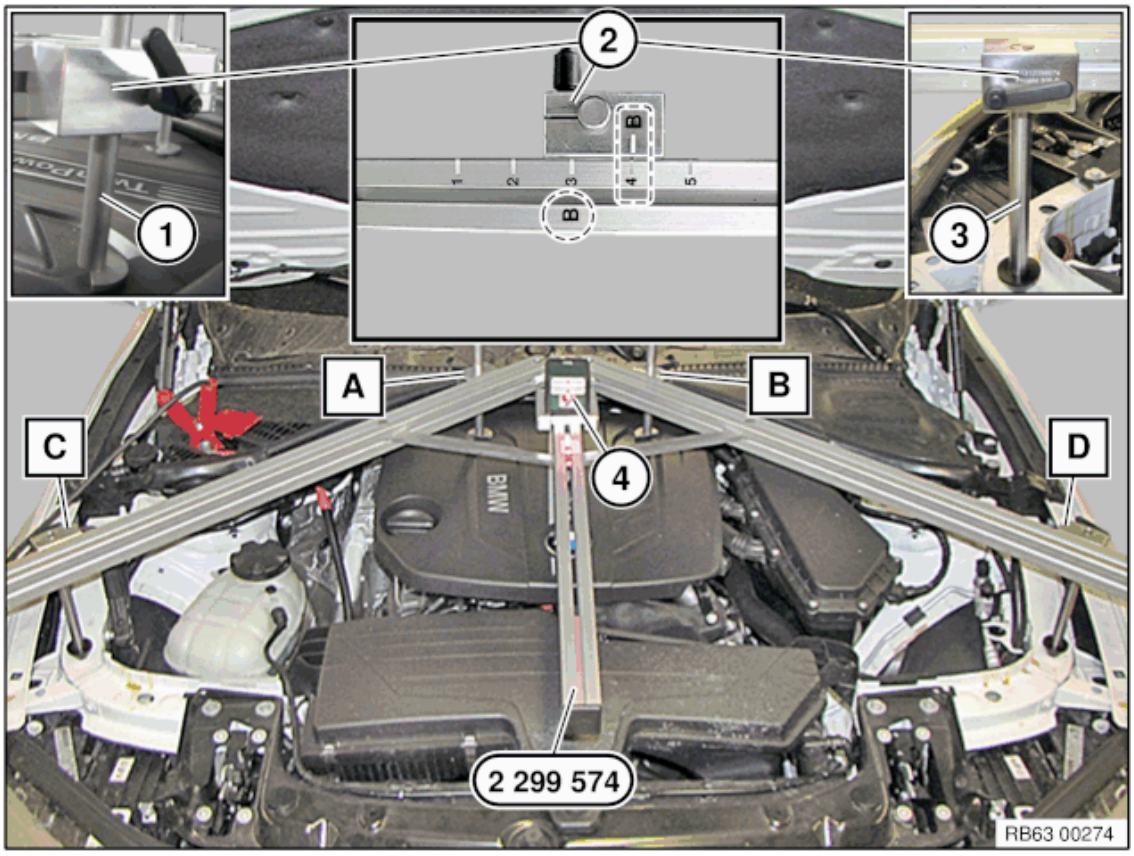


Fig. 9: Preparing Headlight Adjustment Aid
Courtesy of BMW OF NORTH AMERICA, INC.

Position headlight adjustment aid (2 299 574) at marked openings (1) in engine compartment as shown.

Align headlight adjustment aid (2 299 574) with longitudinally adjustable rods (2) using bubble level (3).

NOTE: The height of the headlight adjustment aid (2 299 574) is not specified.

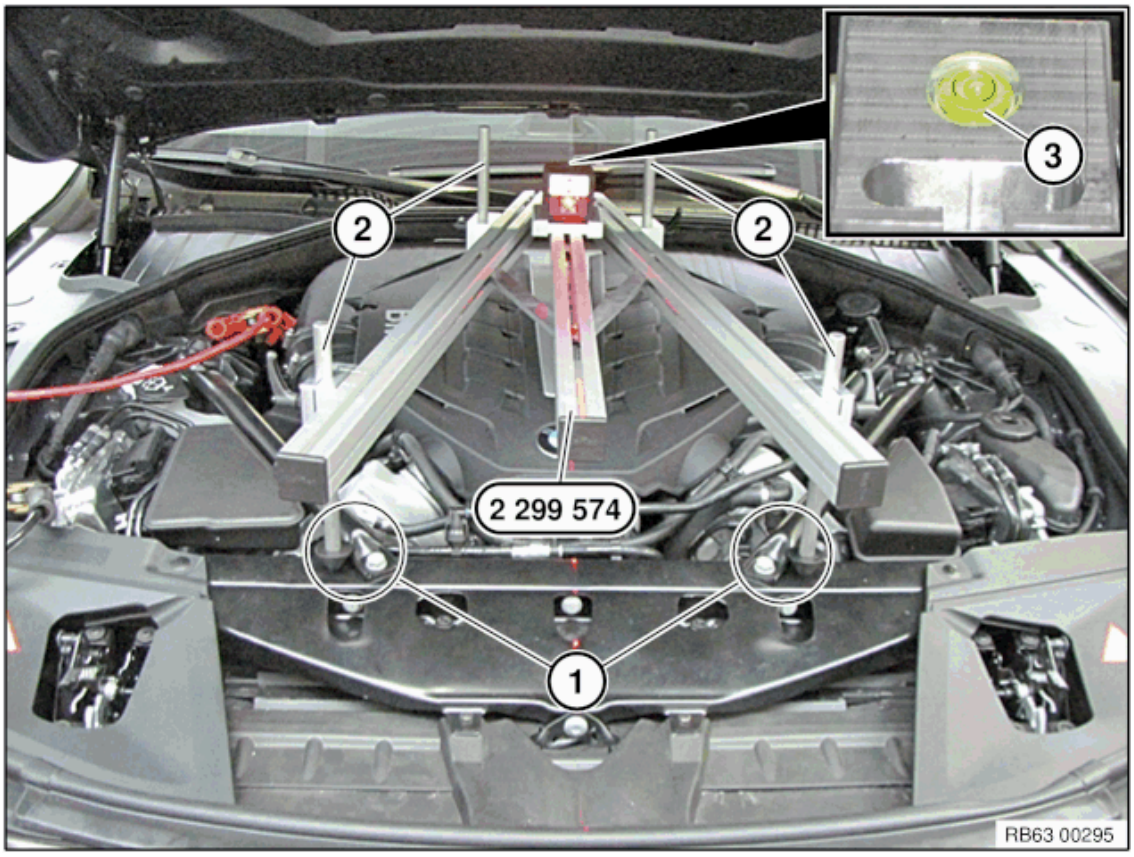


Fig. 10: Positioning And Aligning Headlight Adjustment Aid
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To correctly adjust the Dynamic Light Spot headlight, ensure that the laser beam strikes the middle of the vehicle.

To do so, position tool (4) for example laterally to bead (3) as shown. Laser beam (1) must strike tool (4) at the point of intersection with bead (2).

If not, correct the alignment of the headlight adjustment aid (2 299 574).

Switch on ignition.

Switch on the low-beam headlight (high-beam headlight is switched on by the procedure).

Perform test procedure via path:

- Body
- Lights
- Adjust non-dazzle high-beam headlight

IMPORTANT: Dynamic Light Spot headlight must not be adjusted without the test procedure!

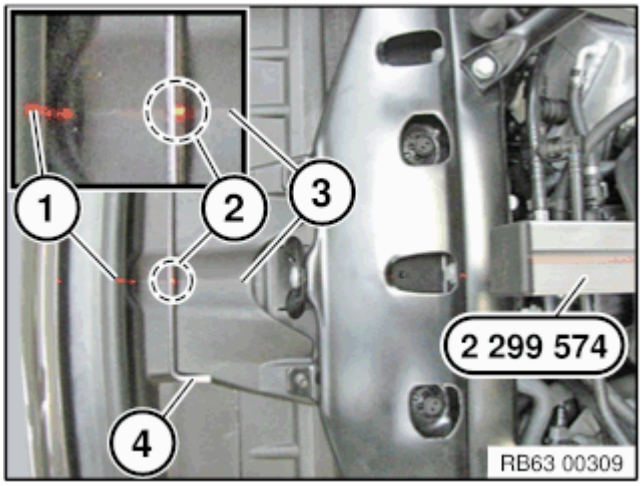


Fig. 11: Identifying Correct Laser Beam Position
Courtesy of BMW OF NORTH AMERICA, INC.

Determining distances:

Measure and note down distance (A) between middle of Dynamic Light Spot headlight (3) and floor (2).
Measure and note down distance (B) between laser beam (1) and floor (2) on the vehicle.

Determine and note down distance (C):

Distance (C) = distance (B) - distance (A)

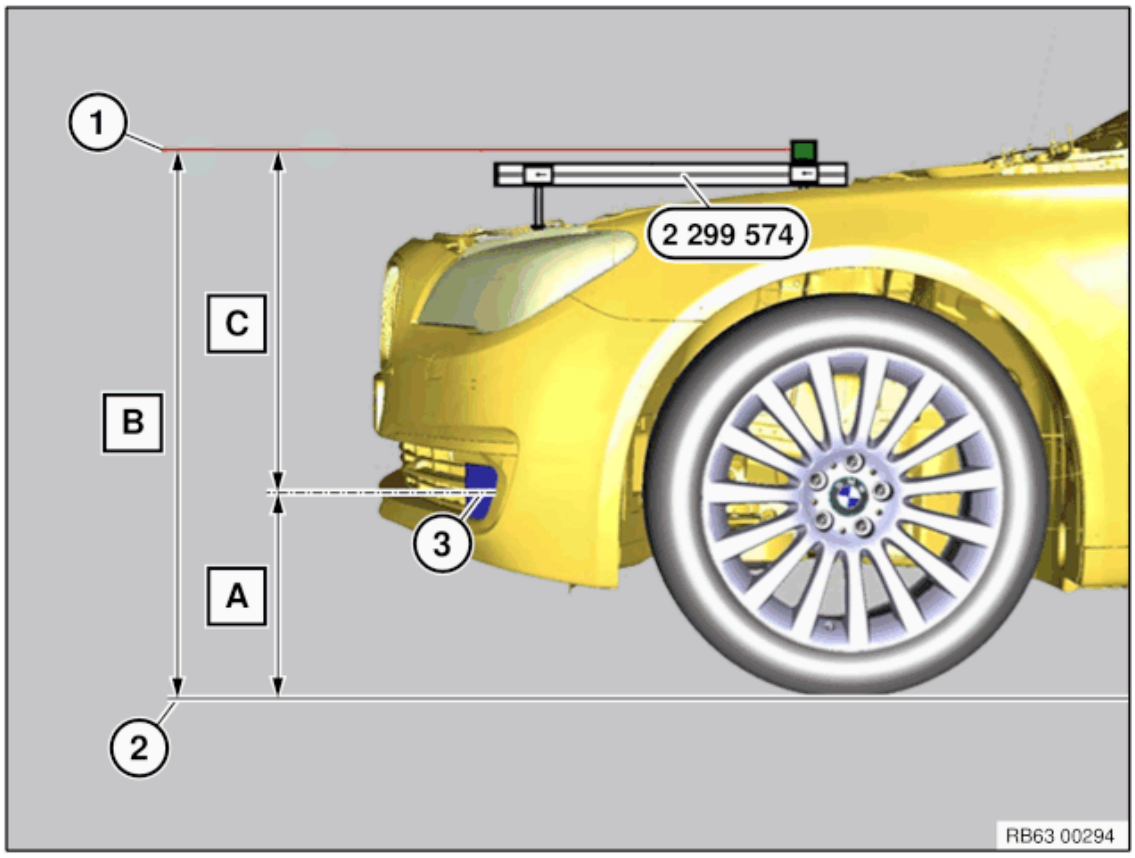


Fig. 12: Determining Distances
Courtesy of BMW OF NORTH AMERICA, INC.

Attach adhesive tape markings (3, 4, 5 shown in black in the graphic) to the wall:

1. Mark vertical laser beam (1) for example with adhesive tape (3) to wall (distance from floor (6) approx. 20 cm).
2. Measure distance (B) = 75 cm at top and bottom ends of adhesive tape (3) on both sides and mark. Connect markings with adhesive tape (4).
3. Measure distance (C) from the previous operation from the horizontal laser beam (2) on both sides downwards and mark with adhesive tape (5).

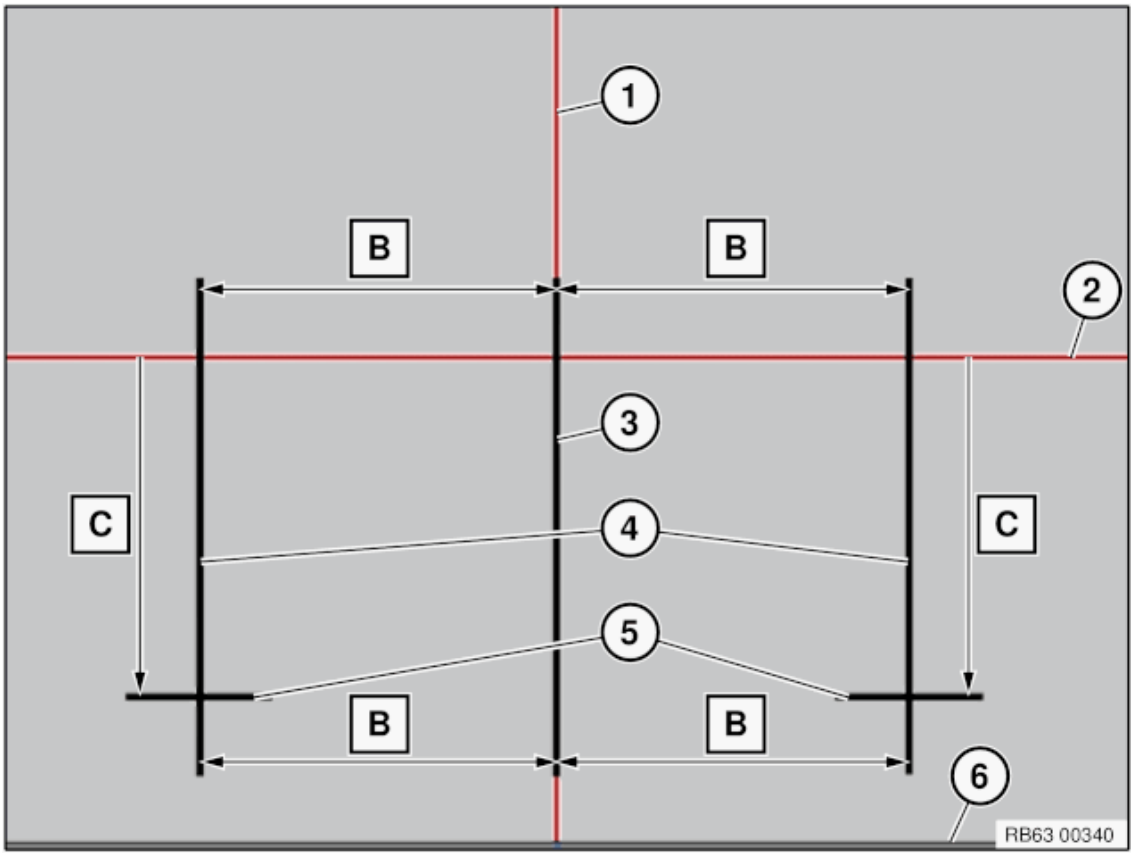


Fig. 13: Measuring Distances
Courtesy of BMW OF NORTH AMERICA, INC.

Check adjustment of Dynamic Light Spot headlight as follows:

Light pattern of the Dynamic Light Spot headlight must be within the area (1) on both sides.

Here 1/3 of the light pattern must be above and 2/3 below line (2).

NOTE: The adjustment is checked on the left and right sides separately.

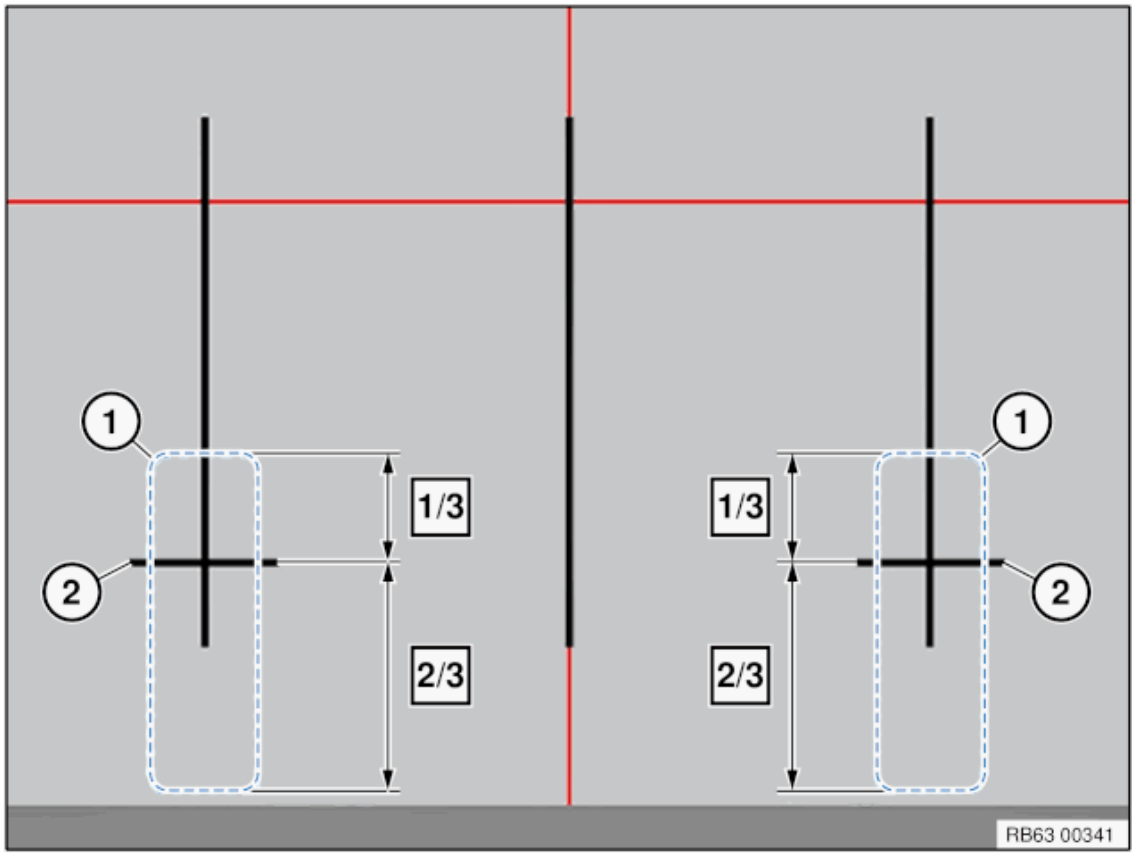


Fig. 14: Checking Adjustment Of Dynamic Light Spot Headlight
Courtesy of BMW OF NORTH AMERICA, INC.

Examples of light patterns:

Dynamic Light Spot headlight, left side:

1. Incorrect adjustment: horizontally too high, vertically too far right
2. Correct adjustment

Dynamic Light Spot headlight, right side:

3. Incorrect adjustment: horizontally too high, vertically correct
4. Correct adjustment

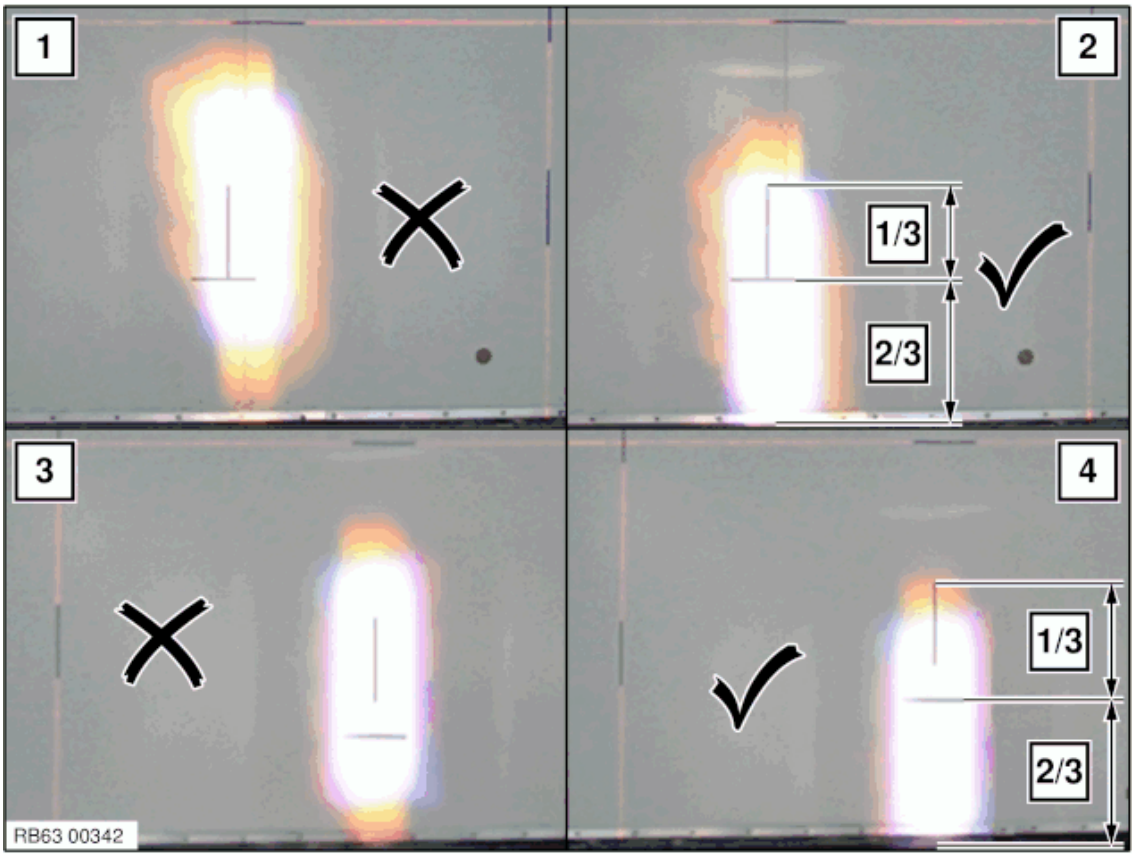


Fig. 15: Identifying Examples Of Light Patterns
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, adjust Dynamic Light Spot headlight (3) with screws (1, 2).

NOTE: Upper screw (1) is for height adjustment.

Lower screw (2) is for lateral adjustment.

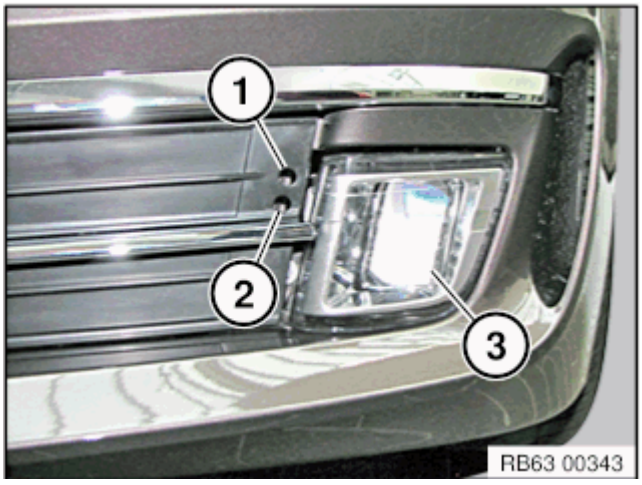


Fig. 16: Adjusting Dynamic Light Spot Headlight With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

63 10 014 ADJUSTING FOG LIGHTS

Comply with **TEST PRECONDITIONS FOR HEADLIGHT ADJUSTMENT** .

Necessary preliminary tasks

- Remove **TRIM GRILLE IN BUMPER TRIM**

IMPORTANT: Do not damage adjusting screw when adjusting fog lamp.

Adjust fog lamp (1) at adjusting screw (2).

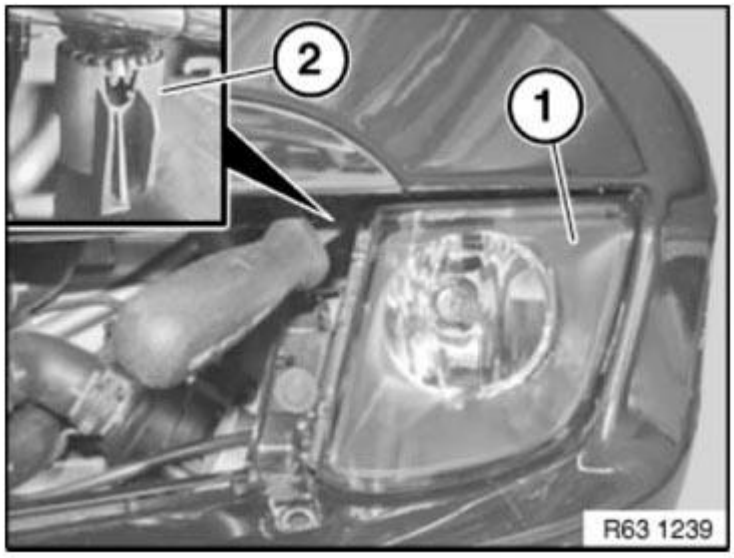


Fig. 17: Adjusting Fog Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

63 10 004 ADJUSTING HEADLIGHTS

OBSERVE TEST PRECONDITIONS FOR ADJUSTING HEADLIGHTS .

IMPORTANT: Do not damage adjusting screws when adjusting headlights.

Remove cover (1) and turn sealing cap (2) in direction of arrow and remove.

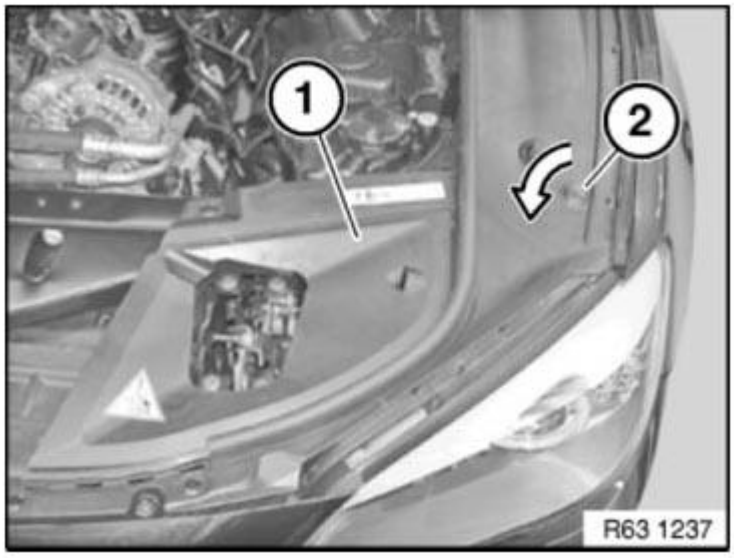


Fig. 18: Turning Sealing Cap To Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Carry out headlight adjustment at adjusting screws below openings (1) and (2).

1. Adjustment screw primarily for vertical adjustment
2. Adjusting screw primarily for lateral adjustment

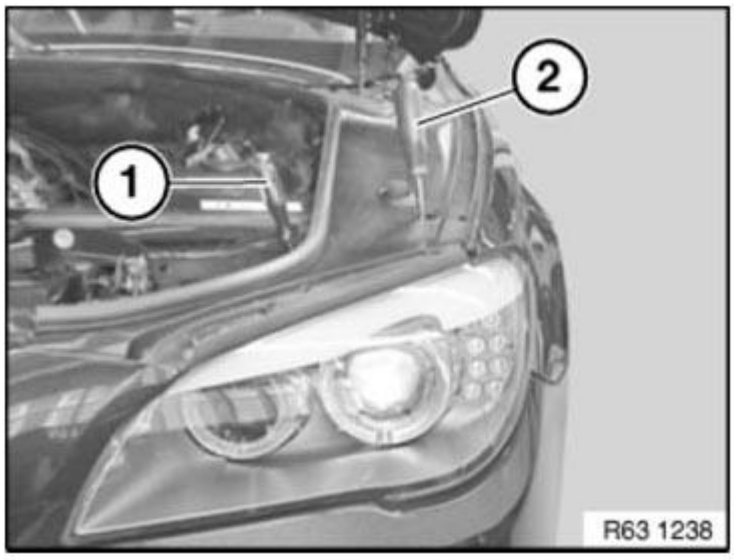


Fig. 19: Identifying Vertical Adjustment And Lateral Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

63 10... RIGHT/LEFT-HAND TRAFFIC - MEASURES FOR AVOIDING DAZZLING EFFECT OF HEADLIGHTS

Necessary preliminary work

- Adjust **HEADLIGHT**

F01/F02/F03/F04

- The masking films (BMW Parts Department) must be used for this purpose.

F10/F11/F18/F07

- **Headlights to 03/11:**
  - Headlight is **equipped** with a manual adjustment for right/left-hand traffic. **It does not need to be adjusted according to current guidelines.**
- **Headlights from 03/11 and spare part headlights:**
  - Headlight is **not equipped** with a manual adjustment for right/left-hand traffic.

NOTE:

- **In vehicles in which the headlights cannot be adjusted or masked for right/left-hand traffic and which are equipped with adaptive headlights, the vehicle may not be driven in right/left-hand traffic with light switch setting (A) because otherwise the adaptive headlights may blind oncoming traffic.**

63 10... TEST REQUIREMENTS FOR HEADLIGHTS VERTICAL AIM ADJUSTMENT

- Car parked on level ground.
- Replace faulty glass and mirrors and blackened light bulbs.
- Check tire pressure and correct if necessary.
- Apply load equivalent to one person on driver's seat (approx. 75 kg).
- Vehicle with full fuel tank or appropriate additional weight in luggage compartment.
- Correct adjustment of headlights in relation to engine hood (gap dimensions).
- Manual headlight vertical aim control: Turn handwheel to 0 position.
- Automatic headlight vertical aim control: Wait approx. 30 seconds after switching on lights.
- Version with xenon headlights: Wait 80 seconds after switching on lights. During this time, do not move the vehicle and avoid vibrations.
- Align headlight aimer with vehicle longitudinal axis and parallel to parking surface. Set marking line (M) on aimer to distance (e). Scale graduations on aimer are equal to a gradient in cm at a distance of 10 meters.

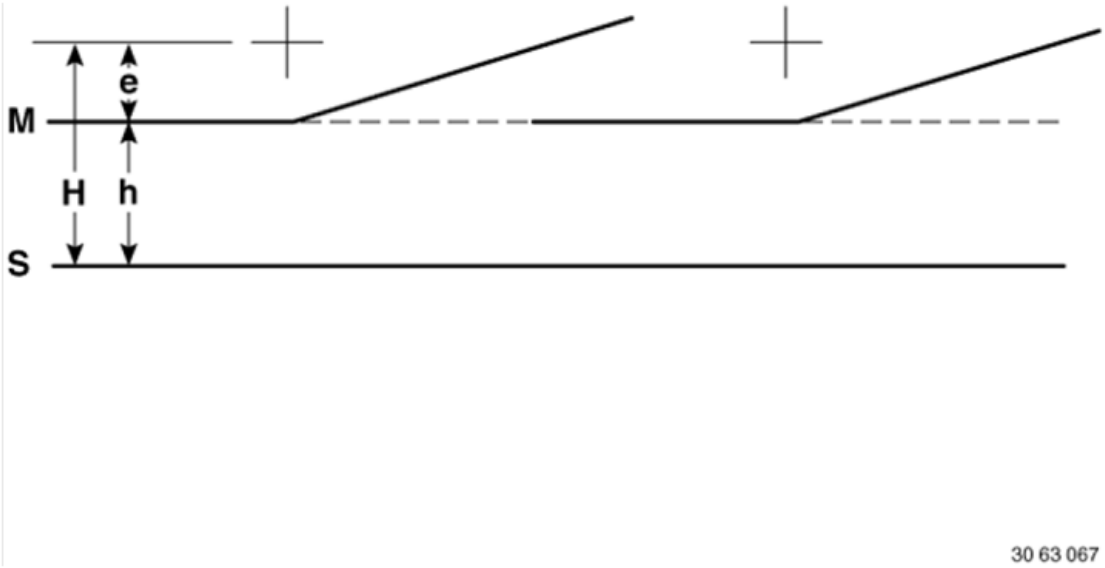


Fig. 20: Identifying Marking Line On Headlights Vertical Aim Distance
Courtesy of BMW OF NORTH AMERICA, INC.

Light/dark boundary of headlights in headlight aimer

e Adjustment dimension, headlights:

- as per type plate on headlight housing in % (e.g.: 1.0 % = 10 cm/10 m = 10 on headlight aimer).

Adjustment dimension, fog lights:

- all vehicles 2.0 % = 20 cm/10 m = 20 on headlight aimer.

H Height of center of headlight above parking surface.
h H - e = height of marking line above parking surface

\+ Central mark = center point of high-beam headlight.

M Marking line of headlamp aimer
S Parking surface of vehicle and headlight aimer

Adjustment dimension (e) is only valid for EUR. Observe differing national regulations.

6311 FRONT LIGHTS

63 11... INSTALLING HEADLIGHT REPAIR KIT

Necessary preliminary work:

- Remove **HEADLIGHT**.

NOTE: Damaged retaining tabs (1, 2, 3) can be replaced with the repair kit.

Replacement of headlight is not required!

If necessary, use screws from BMW Parts Department 7 225 228 repair kit.

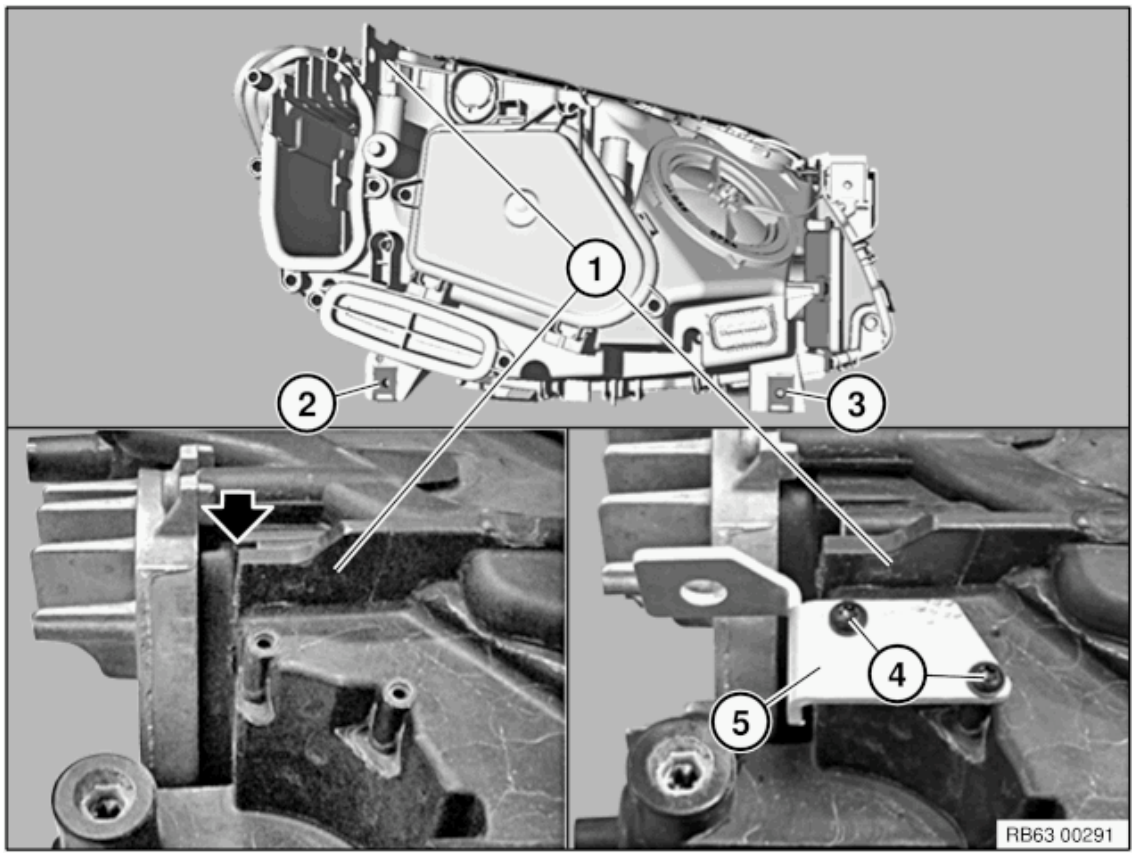


Fig. 21: Identifying Headlight Holder, Screws, And Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Retaining tab 2 of first image:

Remove damaged retaining tab (1) as shown.

Fit holder (3) and secure with screws (4).

Slide clamp (2) onto holder (3).

Retaining tab 3 of first image:

Remove damaged retaining tab (5) as shown.

Fit holder (7) and secure with screws (8).

Slide clamp (6) onto holder (7).

NOTE: If necessary, drill out screw holes in holder.

After installation:

- **ADJUST HEADLIGHTS**

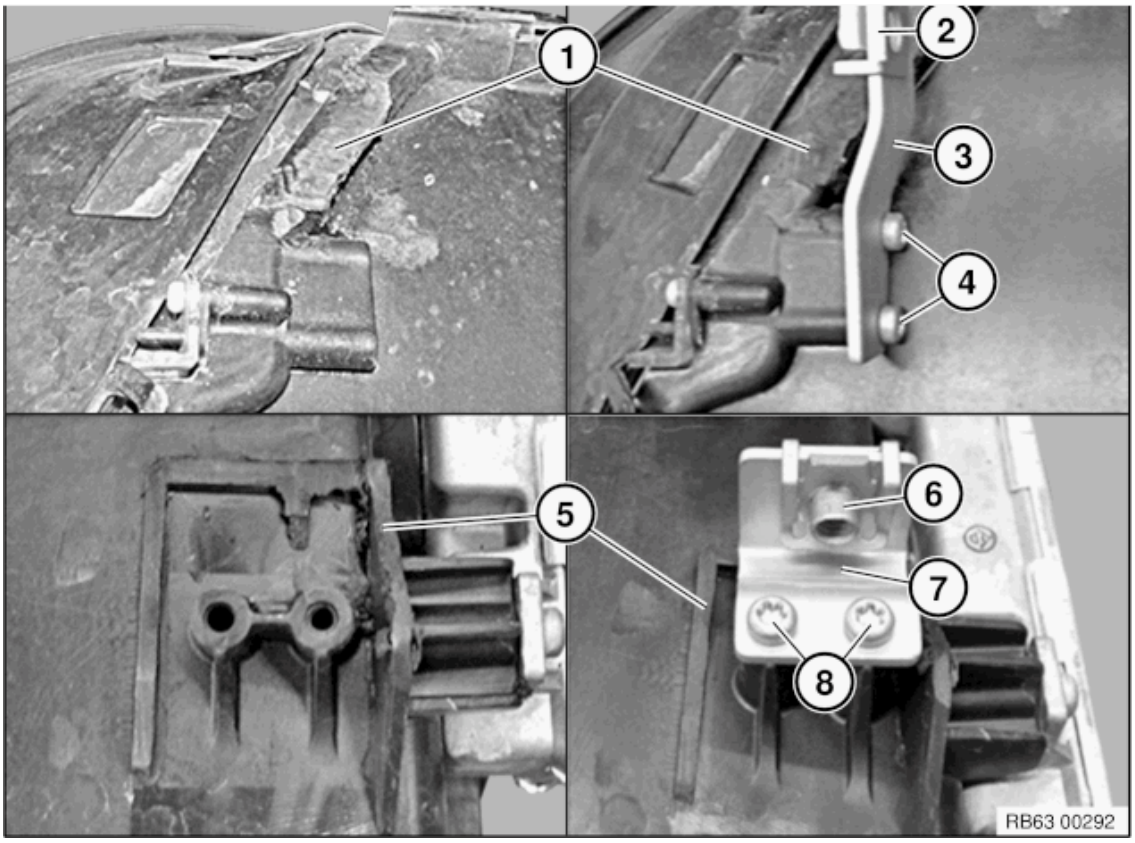


Fig. 22: Removing Damaged Retaining Tabs And Installing Holder With Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

63 11 573 REMOVING AND INSTALLING/REPLACING LED TECHNOLOGY OF HEADLIGHT DRIVER MODULE ON RIGHT

Operation is described in:

REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT DRIVER MODULE (LED HEADLIGHT)

63 11 570 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT DRIVER MODULE (LED HEADLIGHT)

Necessary preliminary work:

- Remove **HEADLIGHT WITH LED TECHNOLOGY**

Release screws (1) and pull headlight driver module (2) out of headlight. Tightening torque: 1, 65 Nm.

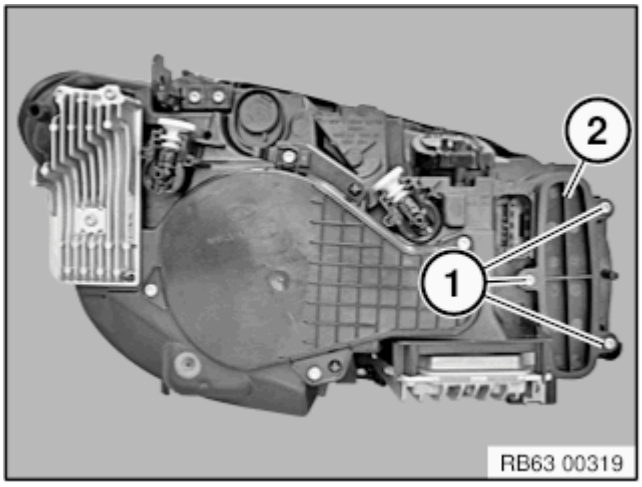


Fig. 23: Identifying Headlight Driver Module And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Gasket (1) must not be damaged and must be installed free from grease.

Guides (2) must not be damaged or missing.

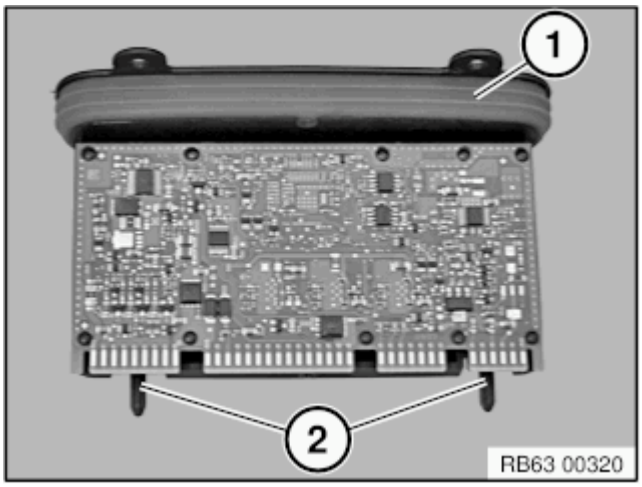


Fig. 24: Identifying Gasket And Guides
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle **PROGRAMMING/CODING** .

63 11 855 REPLACING LED FAN AT RIGHT (MIDDLE)

Operation is described in:

REPLACING LEFT LED FAN (MIDDLE)

63 11 850 REPLACING LED FAN AT RIGHT (OUTSIDE)

Operation is described in:

REPLACING LEFT LED FAN (MIDDLE)

63 11 845 REPLACING LEFT LED FAN (MIDDLE)

Necessary preliminary work:

- Remove **HEADLIGHT WITH LED TECHNOLOGY**

Open screw lock (1).

Release screw (2) and take out protective cap (3).

Tightening torque: 1, 5 Nm

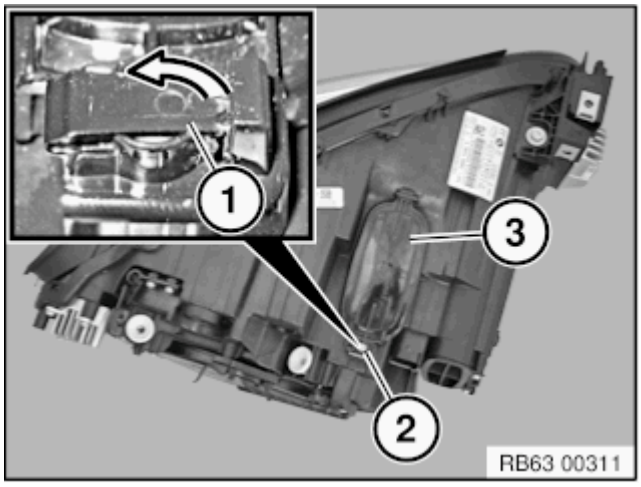


Fig. 25: Identifying Screw Lock, Screw, And Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Gasket (1) must not be damaged and must be installed free from grease.

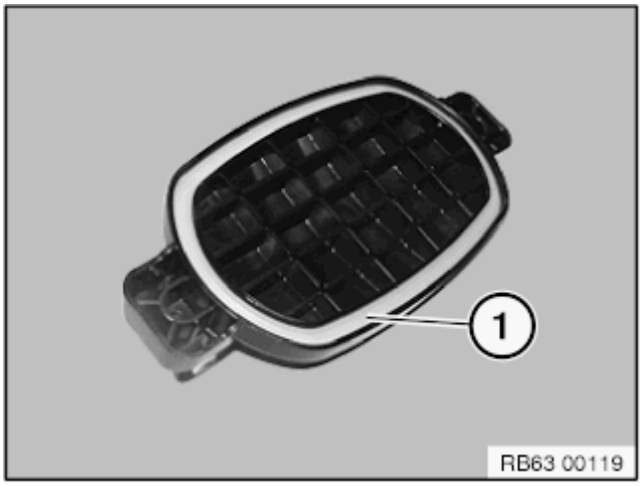


Fig. 26: Identifying Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Open screw lock (1).

Release screws (2) and remove protective cap (3).

Tightening torque: 1, 5 Nm

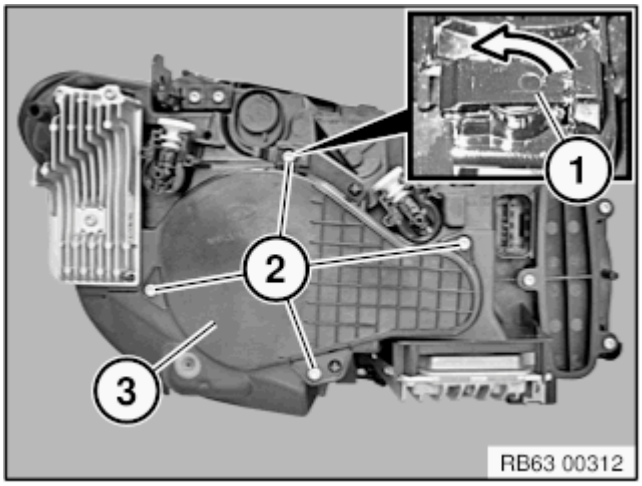


Fig. 27: Opening Screw Lock To Release Screws And Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check seal (1). Replace protective cap (2) if necessary.

IMPORTANT: Risk of damage due to moisture penetration!

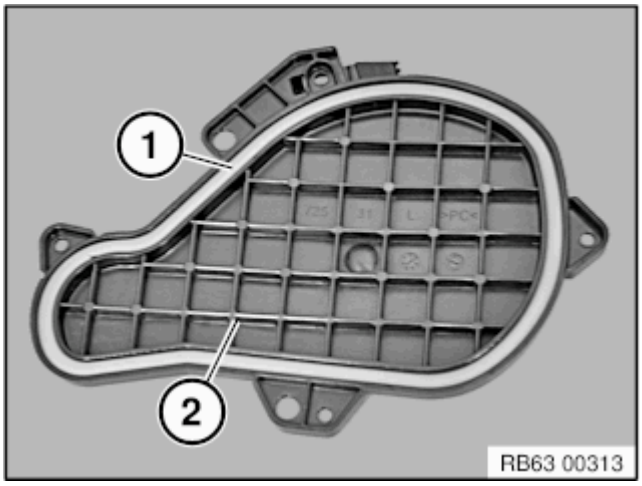


Fig. 28: Identifying Protective Cap Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Press connector (1) together (arrow) and disengage inwards into the light housing.

IMPORTANT: Risk of damage!

Do not bend pins of connector (1)!

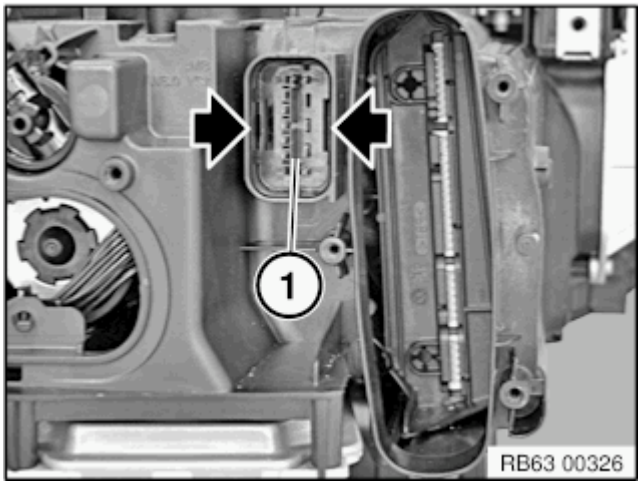


Fig. 29: Disengaging Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable clip (1) with a suitable tool from the inner light housing (2).

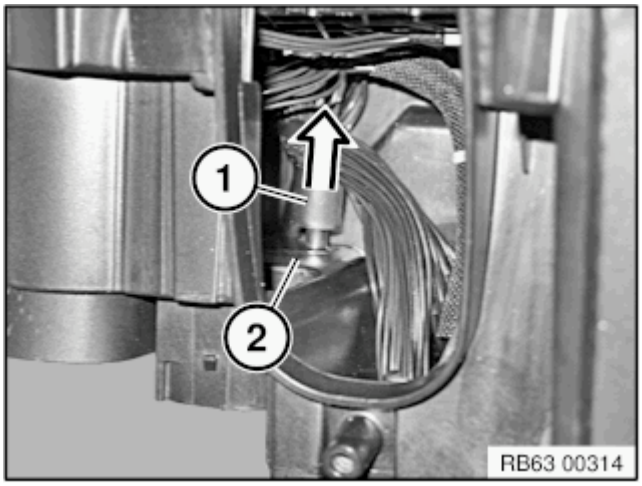


Fig. 30: Releasing Cable Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on LED fan through top opening with special tool 2 296 785.

Tightening torque: 1, 5 Nm

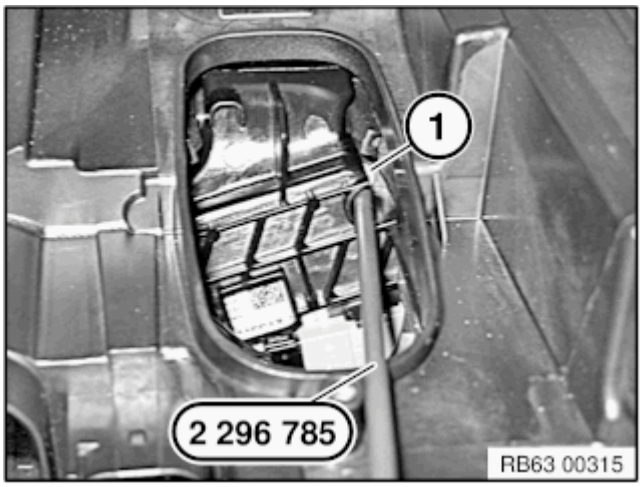


Fig. 31: Releasing Screw On LED Fan Through Top Opening Using Special Tool 2 296 785
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connection (1) and disconnect.

Release screw (2) on LED fan through bottom opening with special tool 2 296 785.

Tightening torque: 1, 5 Nm

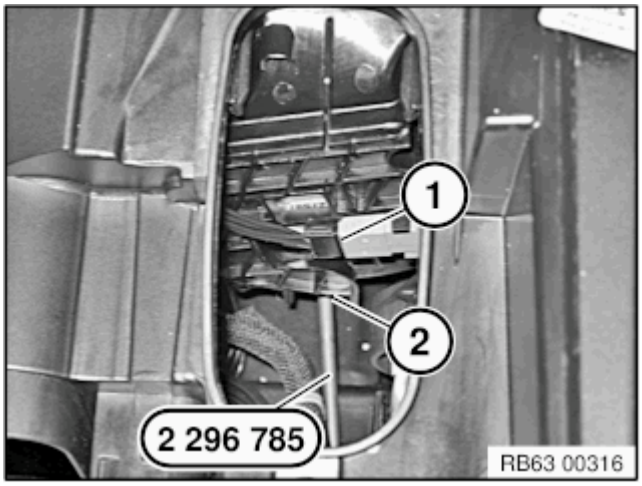


Fig. 32: Releasing Screw On LED Fan Through Bottom Opening With Special Tool 2 296 785
Courtesy of BMW OF NORTH AMERICA, INC.

Turn LED fan (1) through 90° and remove through top opening.

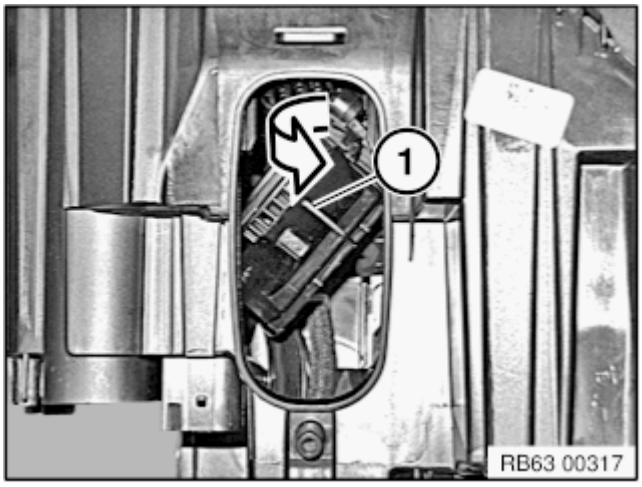


Fig. 33: Removing LED Fan
Courtesy of BMW OF NORTH AMERICA, INC.

Release catches (1) on LED fan (2) and remove LED fan (2) from air duct (3).

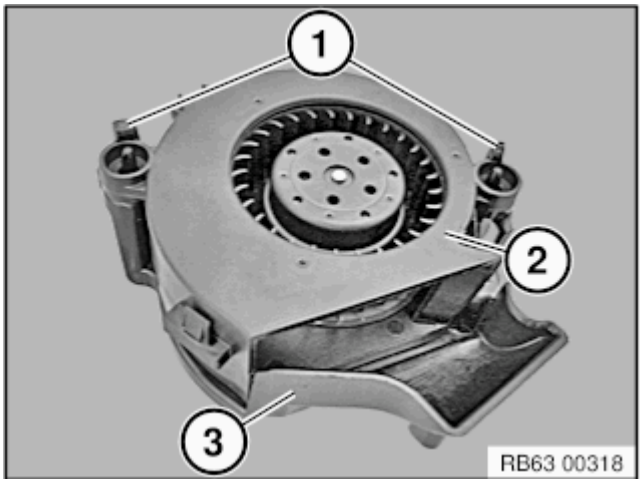


Fig. 34: Identifying LED Fan, Catches, And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

63 11 840 REPLACING LEFT LED FAN LEFT (OUTER)

Necessary preliminary work:

- Remove **HEADLIGHT WITH LED TECHNOLOGY**

Open screw lock (1).

Release screws (2) and remove protective cap (3).

Tightening torque: 1, 5 Nm

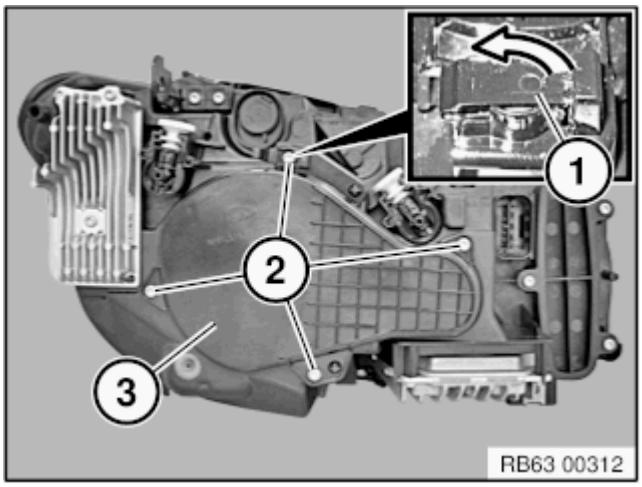


Fig. 35: Opening Screw Lock To Release Screws And Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check seal (1). Replace protective cap (2) if necessary.

IMPORTANT: Risk of damage due to moisture penetration!

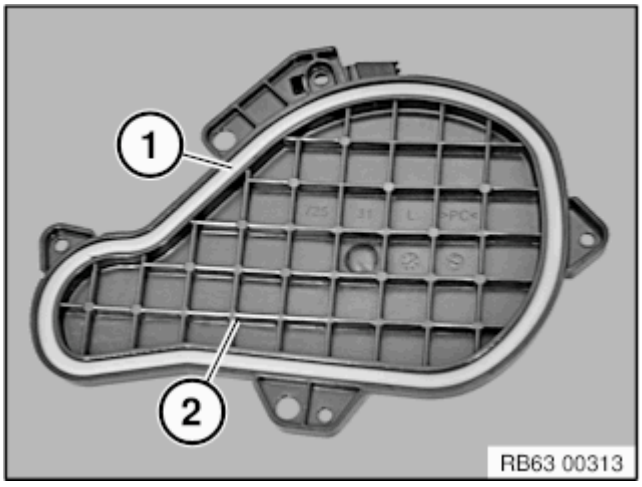


Fig. 36: Identifying Protective Cap Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connection (1) and disconnect.

Unfasten screws (2).

Tightening torque: 1, 5 Nm

Remove LED fan (3).

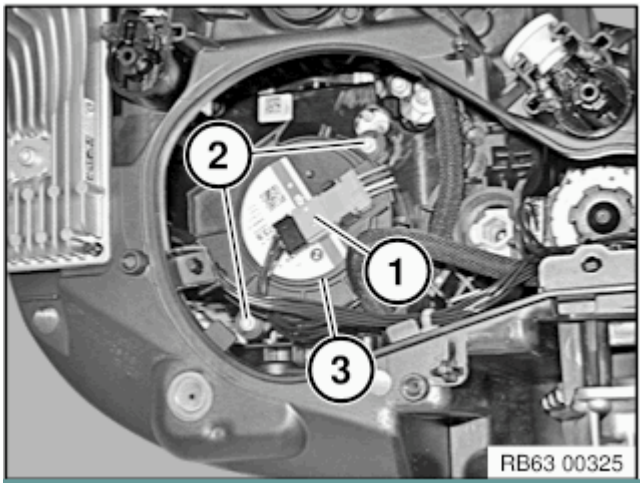


Fig. 37: Identifying LED Fan, Screws, And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

63 11 800 REPLACING LEFT LED MAIN LIGHT MODULE LEFT

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION).

Necessary preliminary work:

- Remove **HEADLIGHT WITH LED TECHNOLOGY**

Release screws (1).

Tightening torque: 1, 65 Nm

Remove LED main light module (2).

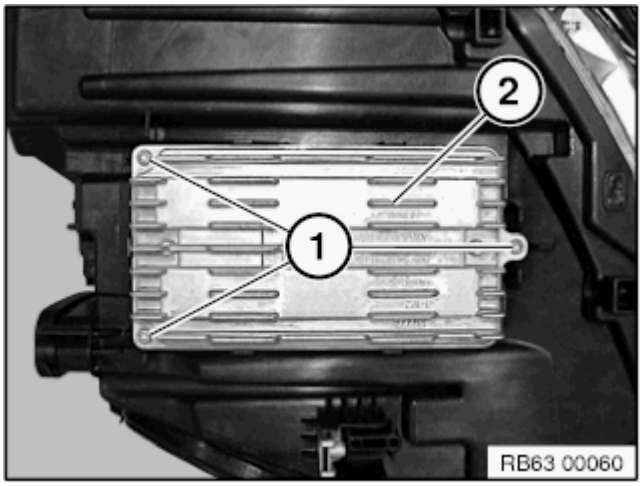


Fig. 38: Identifying LED Main Light Module And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Gasket (1) for LED main light module (2) must not be damaged and must be installed free from grease.

Make sure LED main light module (2) is correctly installed.

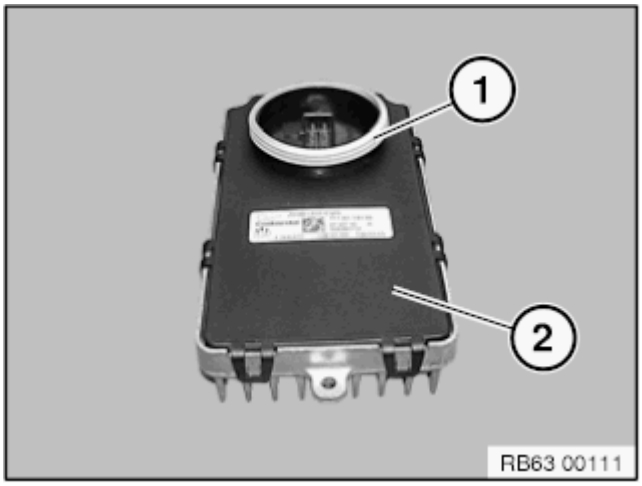


Fig. 39: Gasket For LED Main Light Module
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle **PROGRAMMING/CODING** .

63 11 820 REPLACING LEFT CORNERING LIGHT LED MODULE

Necessary preliminary work:

- Remove **HEADLIGHT WITH LED TECHNOLOGY**

Release screws (1).

Tightening torque: 1, 65 Nm

Remove LED module (2).

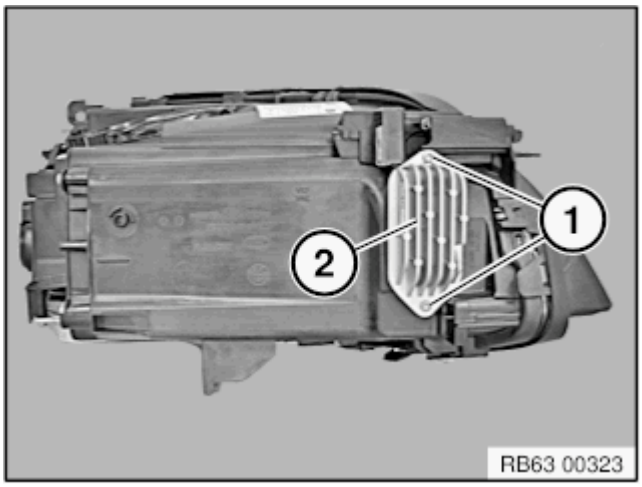


Fig. 40: Identifying LED Module And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove reflector (2) and disconnect plug connection underneath.

Remove LED module (3).

Installation note:

Seal (4) for LED module (3) must not be damaged and must be installed free from grease.

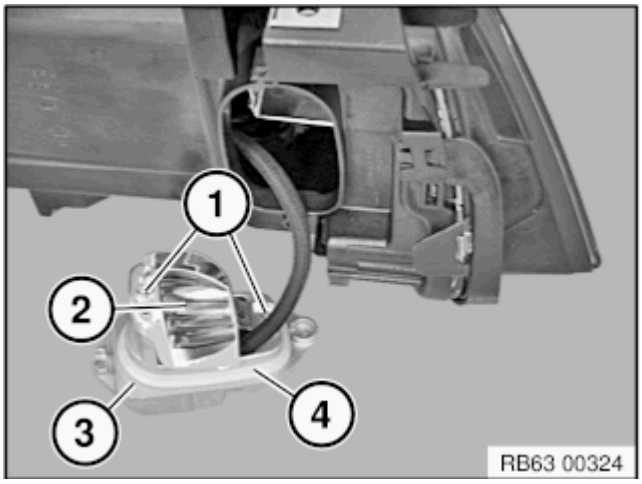


Fig. 41: Identifying LED Module, Seal, Reflector, And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

63 11 805 REPLACING RIGHT LED MAIN LIGHT MODULE

Operation is described in:

REPLACING LEFT LED MAIN LIGHT MODULE LEFT

63 11 825 REPLACING RIGHT CORNERING LIGHT LED MODULE

Operation is described in:

REPLACING LEFT CORNERING LIGHT LED MODULE

6312 HEADLIGHTS

63 12... HEADLIGHT FOGGING FAULT PATTERN

NOTE: Certain weather conditions can lead to fogging on the inside of the headlight lens.

This is not necessarily a fault that requires replacement of the headlight.

(A): Permissible fogging. Headlight does not need to be replaced.

(B): Impermissible fogging. Replace the headlight.



Fig. 42: Identifying Permissible And Impermissible Fogging
Courtesy of BMW OF NORTH AMERICA, INC.

63 11... INSTALLING HEADLIGHT REPAIR KIT

See **INSTALLING HEADLIGHT REPAIR KIT**

63 99... NOTES FOR REPLACING THE PROTECTIVE CAP OF THE HEADLIGHT

IMPORTANT: Risk of damage!

Damaged seals on the protective caps will lead to moisture penetration into the headlight.

This will in turn cause porous cable insulations and malfunctioning of the headlight.

When working on the headlight system, check the protective cap seals.

Replace the protective cap in the event of damage!

Example: screwed protective cap

Seal (1) on protective cap (2).

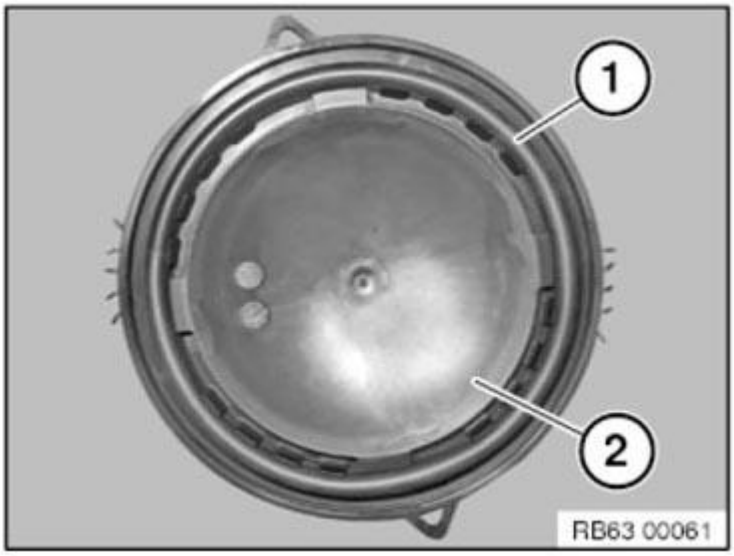


Fig. 43: Identifying Seal On Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Example: latchable protective cap

Seal (1) on protective cap (2).

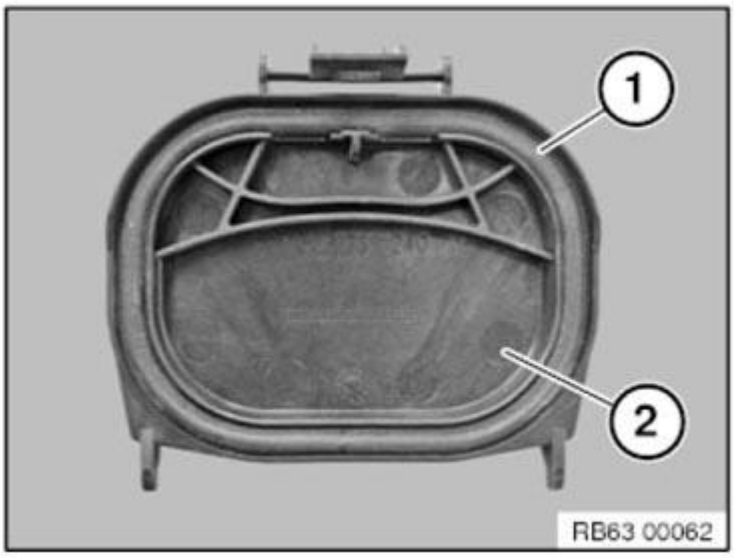
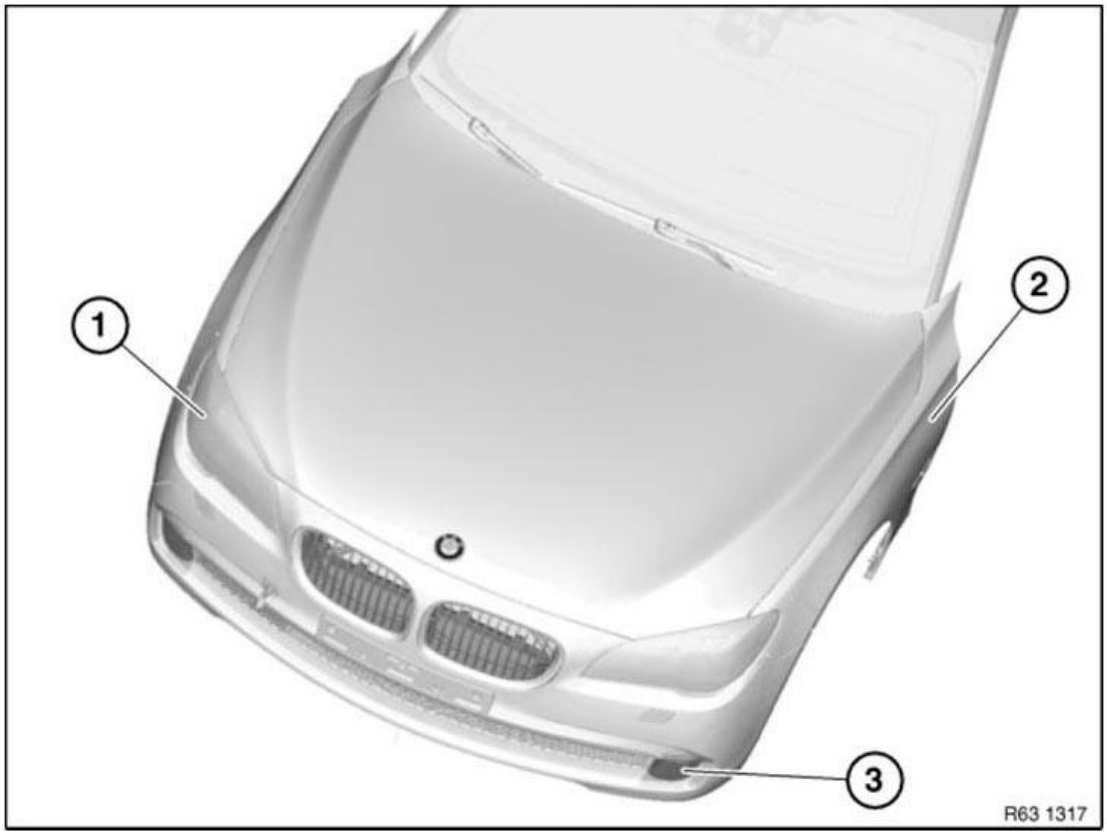


Fig. 44: Identifying Seal On Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

63 12.. OVERVIEW OF HEADLIGHTS, FOG LIGHTS AND AUXILIARY TURN INDICATOR/TRIM



1 Remove left headlight
2 Remove left fog light
3 Auxiliary turn indicator/trim, front left

Fig. 45: Identifying Headlights, Fog Lights And Auxiliary Turn Indicator/Trim
Courtesy of BMW OF NORTH AMERICA, INC.

63 12 140 REMOVING AND INSTALLING (REPLACING) LEFT HEADLIGHT - LED TECHNOLOGY

- Remove **FRONT BUMPER TRIM**
- Vehicles with auxiliary radiator:

  Remove **FRONT WHEEL ARCH COVER**

Lever out expanding rivets (1) on engine compartment lid seal (2).

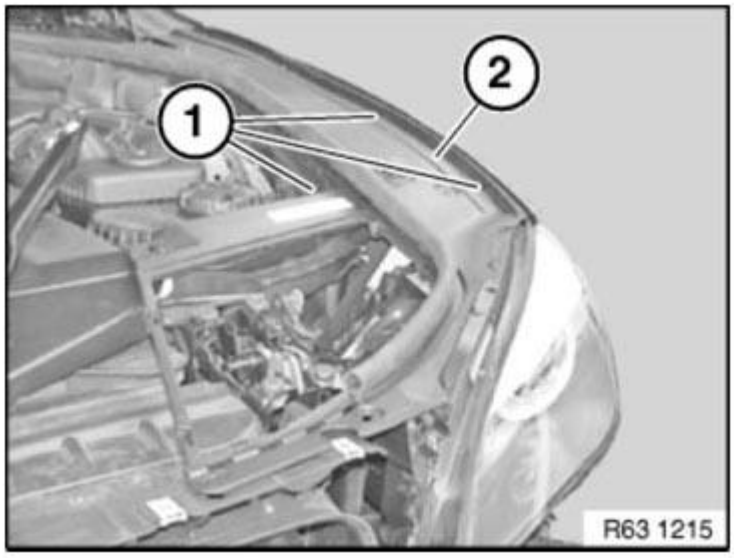


Fig. 46: Identifying Expanding Rivets On Engine Compartment Lid Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Remove seal for engine compartment lid (2) on left.

Release screws (1) on headlight (3) at top.

Tightening torque: 4, 0 Nm

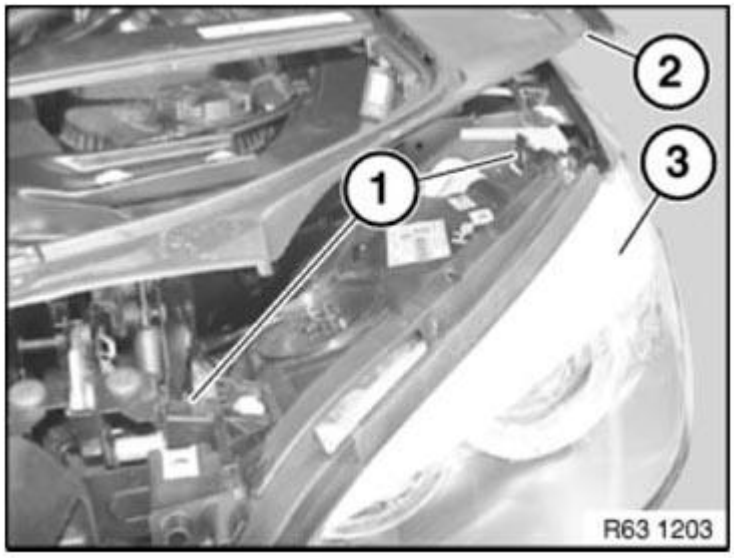


Fig. 47: Identifying Engine Compartment Lid Seal And Headlight Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on headlight (2) at bottom.

Tightening torque: 4, 0 Nm

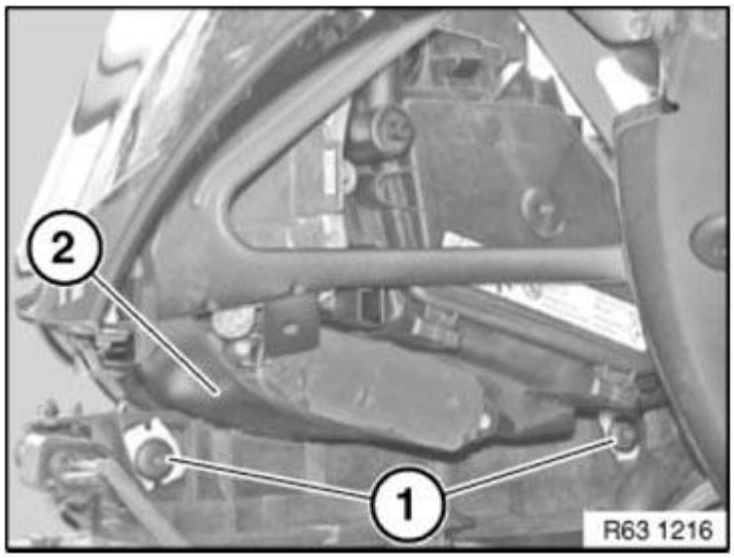


Fig. 48: Identifying Headlight Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out headlight (1) in direction of arrow slightly.

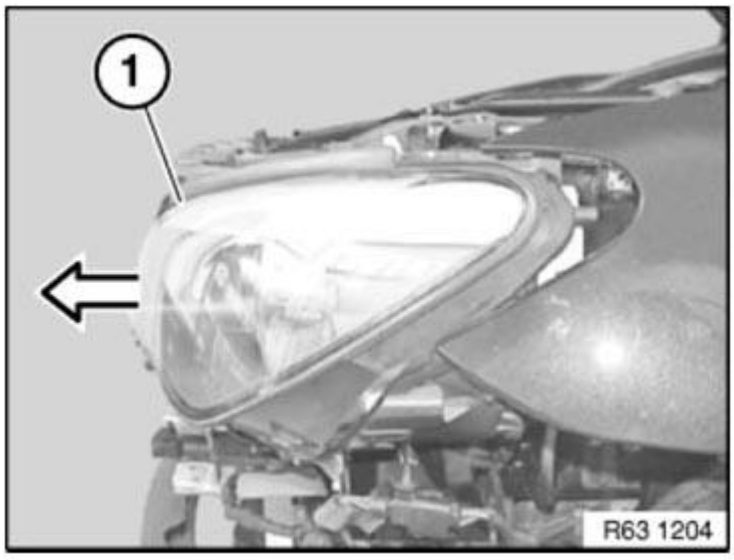


Fig. 49: Pulling Out Headlight In Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on headlight (2) and remove headlight.

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS).

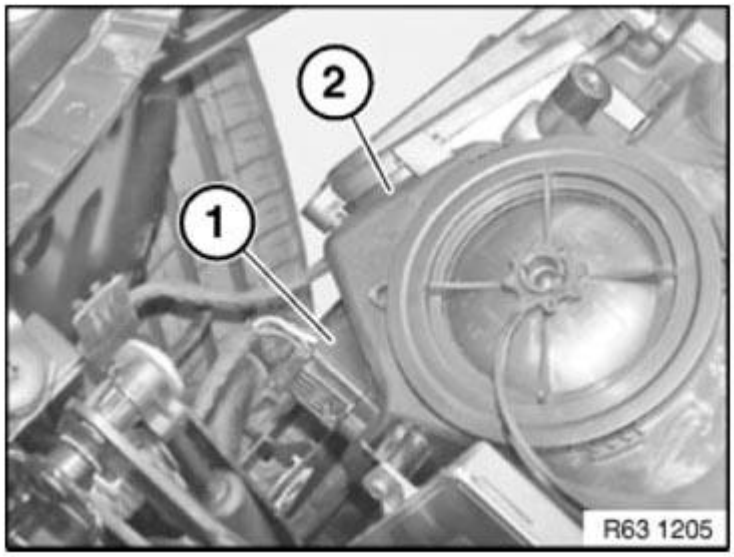


Fig. 50: Identifying Plug Connection On Headlight
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

- Remove **HEADLIGHT DRIVER MODULE**
- Remove **LED MAIN LIGHT MODULE**
- Remove **LED CORNERING LIGHT MODULE**
- Remove **TURN INDICATOR INSERT**

Installation note:

ADJUST headlight.

63 12 143 REMOVING AND INSTALLING (REPLACING) RIGHT HEADLIGHT - LED TECHNOLOGY

Operation is described in:

REMOVING AND INSTALLING (REPLACING) LEFT HEADLIGHT - LED TECHNOLOGY

63 12 015 REMOVING AND INSTALLING OR REPLACING LEFT HEADLIGHT (ADAPTIVE HEADLIGHT)

Operation is described in:

Removing and installing **LEFT HEADLIGHT**

63 12 010 REMOVING AND INSTALLING OR REPLACING LEFT HEADLIGHT (XENON HEADLIGHT)

WARNING: Version with xenon lighting system:

Danger to life due to high voltage! Therefore disconnect all components from voltage supply before removal.

Work on the entire xenon lighting system (ignition device, control unit and bulb) may only be carried out by qualified personnel.

Necessary preliminary work

- Remove **FRONT BUMPER TRIM**
- **Vehicles with auxiliary radiator:**

  Remove **FRONT WHEEL ARCH COVER**

  Lever out expanding rivets (1) on engine compartment lid seal (2).

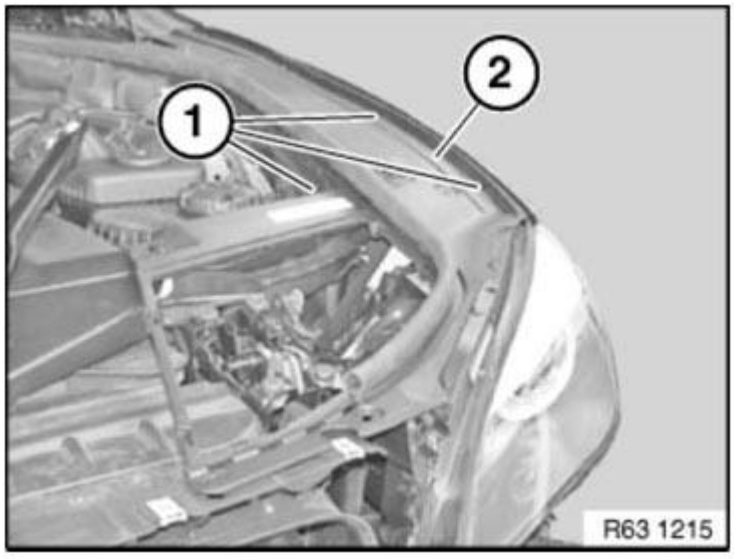


Fig. 51: Identifying Expanding Rivets On Engine Compartment Lid Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Remove seal for engine compartment lid (2) on left.

Release screws (1) on headlight (3) at top.

Tightening torque **63 12 1AZ** .

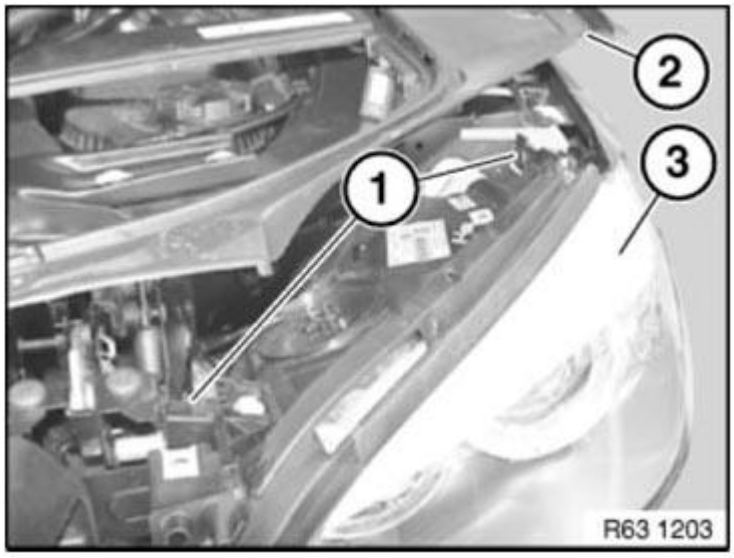


Fig. 52: Identifying Engine Compartment Lid Seal And Headlight Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on headlight (2) at bottom.

Tightening torque **63 12 1AZ** .

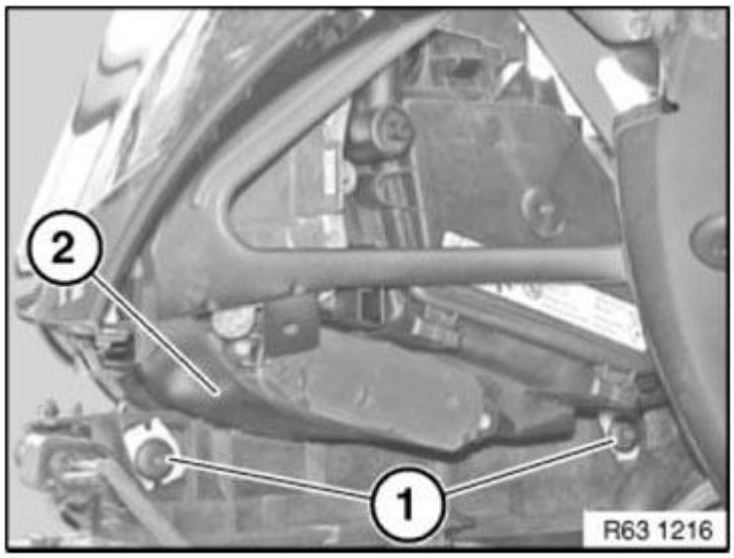


Fig. 53: Identifying Headlight Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out headlight (1) in direction of arrow slightly.

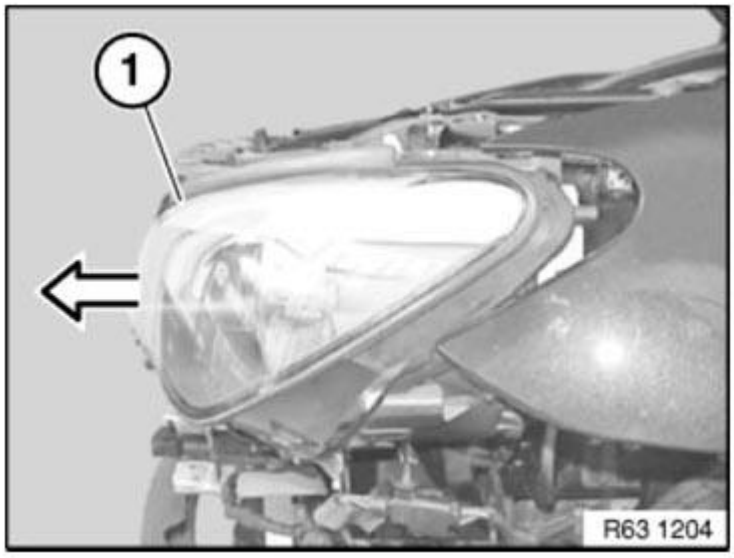


Fig. 54: Pulling Out Headlight In Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on headlight (2) and remove headlight.

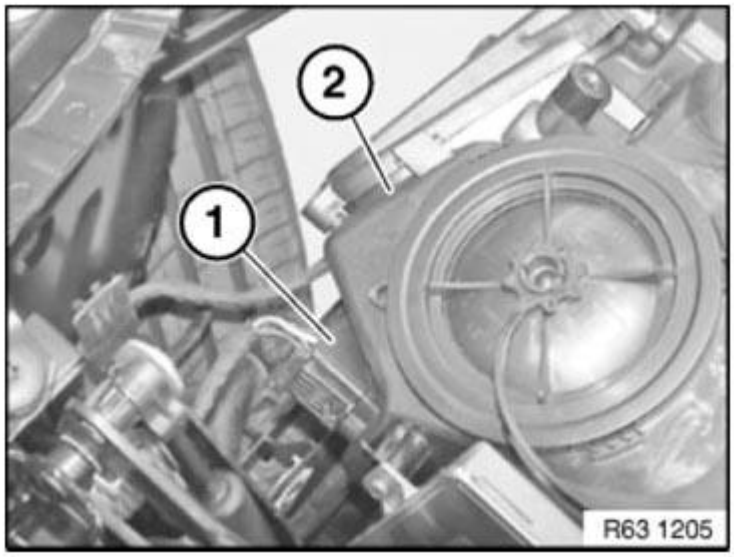


Fig. 55: Identifying Plug Connection On Headlight
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Replacement

- If necessary, remove bulbs

Note **BULB TYPE** .

Replacement only

- Remove **IGNITION DEVICE FOR XENON HEADLIGHT**
- Remove **CONTROL UNIT FOR XENON HEADLIGHT**
- Remove **XENON LIGHT MODULE**
- Remove **TURN INDICATOR INSERT**
- If necessary, **REMOVE CORNERING LIGHT**
- **For F07/F10/F11:**

  Remove bulbs for front left side lights (LED module)

Installation note:

ADJUST headlight.

63 17 075 REMOVING AND INSTALLING RIGHT FOG LAMP

Operation is described in:

Removing and installing **LEFT FOG LAMP** .

63 12 012 REMOVING AND INSTALLING RIGHT HEADLIGHT (XENON HEADLIGHT)

Operation is described in:

Removing and installing **LEFT HEADLIGHT**

63 11 573 REMOVING AND INSTALLING/REPLACING LED TECHNOLOGY OF HEADLIGHT DRIVER MODULE ON RIGHT

Operation is described in:

REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT DRIVER MODULE (LED HEADLIGHT)

63 11 550 REMOVING AND INSTALLING/REPLACING HEADLIGHT DRIVER MODULE

WARNING: Version with xenon lighting system: Danger to life due to high voltage! Therefore disconnect all components from voltage supply before removal.

Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks

- Remove **FRONT LEFT WHEEL ARCH TRIM**

Release screws (1) on headlight (2).

Tightening torque **63 12 3AZ** .

Remove headlight driver module (3) in direction of arrow.

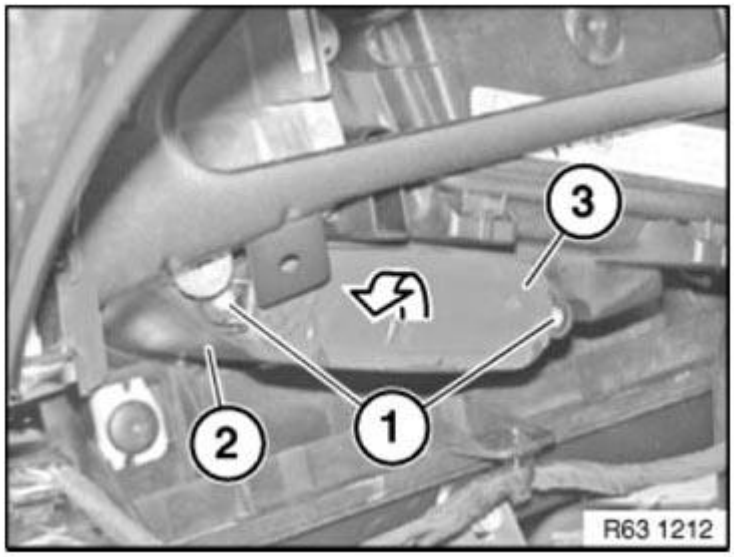


Fig. 56: Removing Headlight Driver Module
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connection (1) and disconnect in direction of arrow from headlight driver module (2).

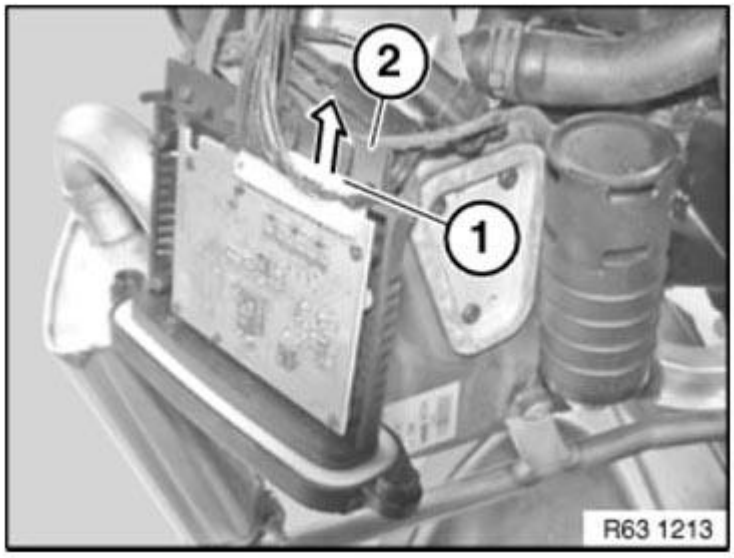


Fig. 57: Unlocking Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

When fitting, make sure headlight driver module (1) is correctly seated on sealing sleeve (2).

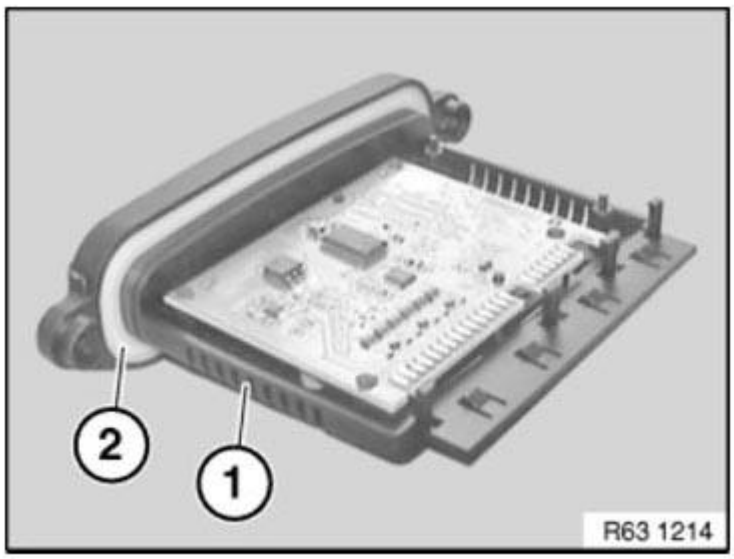


Fig. 58: Identifying Headlight Driver Module On Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Teach in headlight driver module (1) via vehicle diagnosis.

- Service functions
- Body
- Lights
- Learning turn signal indicator

67 16 011 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT VERTICAL AIM ADJUSTER

WARNING: Version with xenon headlights:

Danger to life due to high voltage!

Therefore disconnect all components from voltage supply before removal.

Work on the entire xenon lighting system (control unit, ignition unit with lamp) may only be carried out by specialist personnel.

Necessary preliminary work

- Remove headlight. See **REMOVING AND INSTALLING OR REPLACING LEFT HEADLIGHT (XENON HEADLIGHT)** or **REMOVING AND INSTALLING OR REPLACING LEFT HEADLIGHT (ADAPTIVE HEADLIGHT)**.

Release screws (1) on cover (2) and remove from headlight (3).

Tightening torque **63 12 4AZ** .

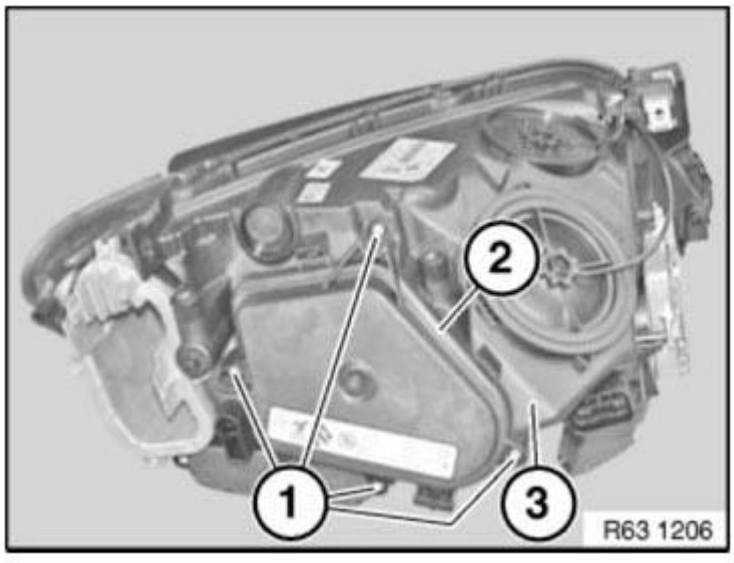


Fig. 59: Identifying Headlight And Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Disconnect plug connection (2).

Snap headlight vertical aim adjuster (3) out of mounting.

NOTE: Opening cover (4) makes it easier to feed in and engage vertical aim adjuster (3).

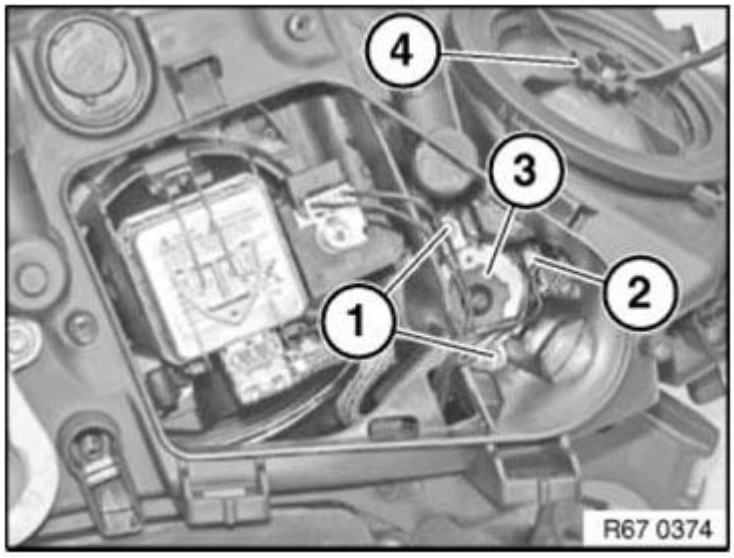


Fig. 60: Identifying Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Engage ball head of vertical aim adjuster (1) in mounting (2).

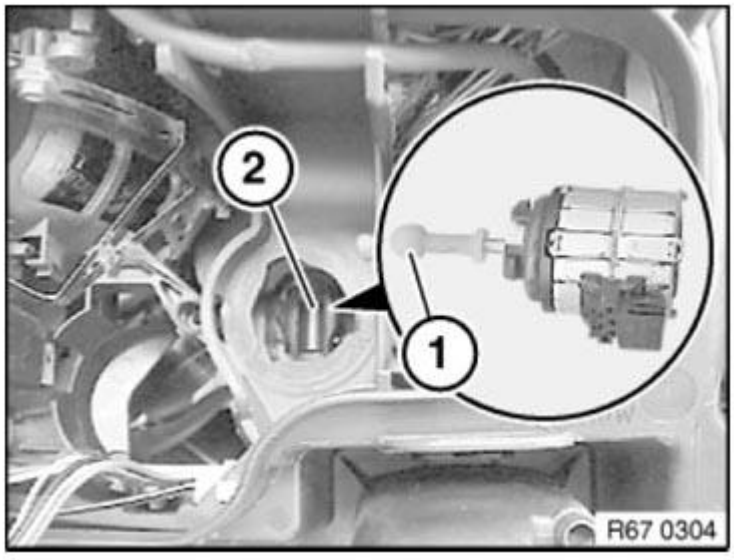


Fig. 61: Identifying Ball Head Of Vertical Aim Adjuster In Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **ADJUST HEADLIGHTS**

63 12 017 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT (ADAPTIVE HEADLIGHT)

Operation is described in:

Removing and installing **LEFT HEADLIGHT**

67 16 016 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT VERTICAL AIM ADJUSTER

Operation is described in:

REMOVING AND INSTALLING LEFT HEADLIGHT VERTICAL AIM ADJUSTER

63 13 082 REMOVING AND INSTALLING/REPLACING RIGHT TURN INDICATOR INSERT

Operation is described in:

Removing and installing/replacing **LEFT TURN INDICATOR INSERT**

63 99 146 REPLACING BULB FOR FRONT RIGHT SIDE LIGHT (XENON HEADLIGHT)

Operation is described in:

Replacing **BULB FOR SIDE LIGHT, FRONT LEFT**

63 99 161 REPLACING BULB FOR FRONT RIGHT TURNING LIGHT

Operation is described in:

Replacing **BULB FOR FRONT LEFT TURNING LIGHT**

63 99 076 REPLACING BULB FOR LEFT XENON HEADLIGHT (WITH IGNITION UNIT)

Operation is described in:

Replacing **IGNITION UNIT FOR LEFT XENON HEADLIGHT**

63 99 077 REPLACING BULB FOR RIGHT XENON HEADLIGHT (WITH IGNITION UNIT)

Operation is described in:

Replace **IGNITION UNIT FOR LEFT XENON HEADLIGHT** .

63 12 860 REPLACING CONTROL UNIT FOR LEFT XENON HEADLIGHT

WARNING: Version with xenon lighting system: Danger to life due to high voltage! Therefore disconnect all components from voltage supply before removal.

Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Comply with notes and instructions on handling EXTERIOR LIGHTS .

Necessary preliminary tasks

- Remove **LEFT HEADLIGHT**

Release screws (1).

Tightening torque **63 12 5AZ** .

Remove control unit for xenon headlight (2) upwards from headlight (3).

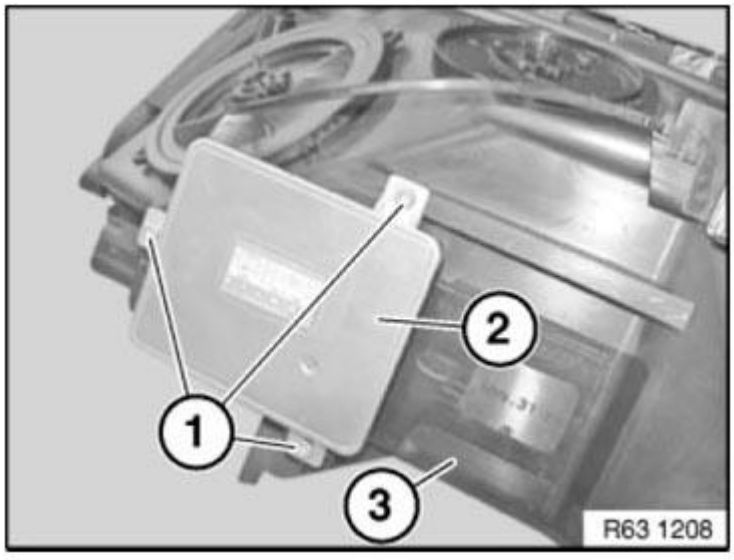


Fig. 62: Identifying Headlight And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing control unit for xenon headlight (1), make sure sealing sleeve (2) is correctly seated.

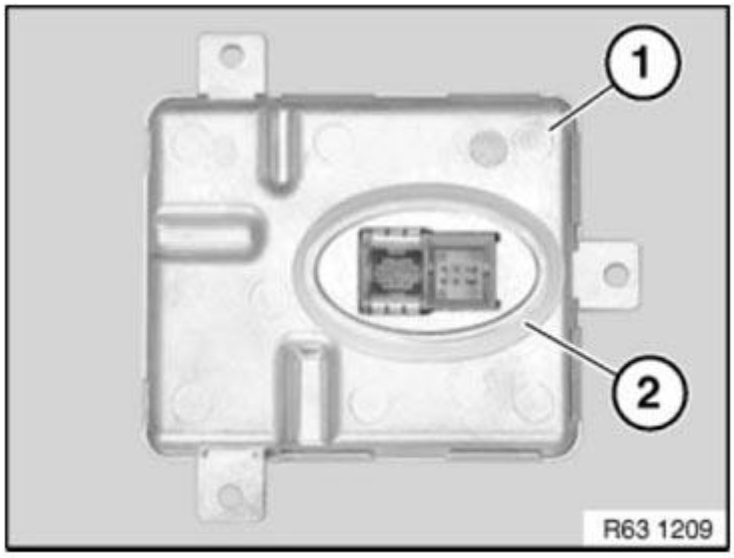


Fig. 63: Identifying Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

63 12 861 REPLACING CONTROL UNIT FOR RIGHT XENON HEADLIGHT

Operation is described in:

Replacing **CONTROL UNIT FOR LEFT XENON HEADLIGHT**

63 12 870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT

WARNING: Version with xenon headlights: Danger to life due to high voltage! Therefore disconnect all components from voltage supply before removal.

Work on the entire xenon lighting system (ignition device, control unit and bulb) may only be carried out by qualified personnel.

Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS)

Necessary preliminary work

- Remove **LEFT HEADLIGHT**

Release screws (1) on cover (2) and remove from headlight (3).

Tightening torque **63 12 4AZ** .

Installation note:

The housing cover must be locked correctly.

Check seal.

Replace the housing cover, if necessary.

Observe **NOTES FOR REPLACING THE PROTECTIVE CAP** .

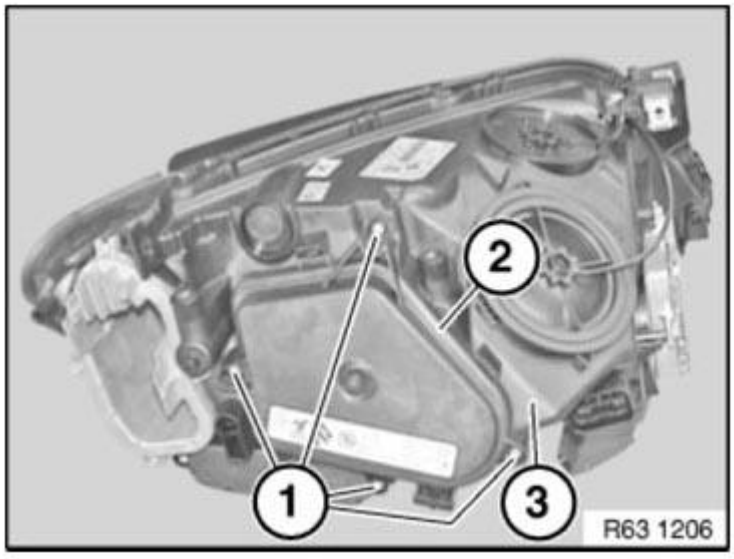


Fig. 64: Identifying Headlight And Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on ignition unit with bulb (3).

Unlock retainer (2) and remove ignition unit with bulb (3) in direction of arrow.

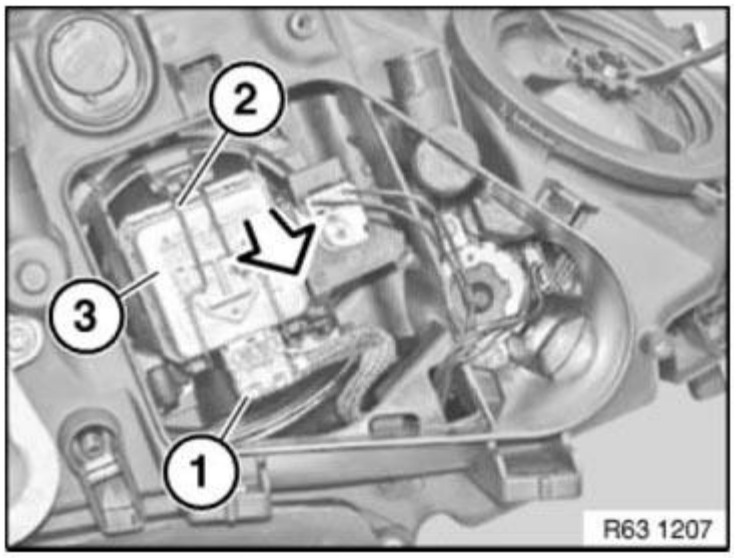


Fig. 65: Disconnecting Plug Connection On Ignition Unit With Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 12 871 REPLACING RIGHT IGNITION UNIT FOR RIGHT XENON HEADLIGHT

Operation is described in:

Replacing **IGNITION UNIT FOR LEFT XENON HEADLIGHT**

6313 TURN SIGNAL INDICATOR LIGHTS

63 17 075 REMOVING AND INSTALLING RIGHT FOG LAMP

Operation is described in:

Removing and installing **LEFT FOG LAMP** .

63 13 200 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT AUXILIARY TURN INDICATOR

Notes

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Slide front auxiliary turn indicator (1) with special tool 00 9 341 in upward direction and fold out in direction of arrow.

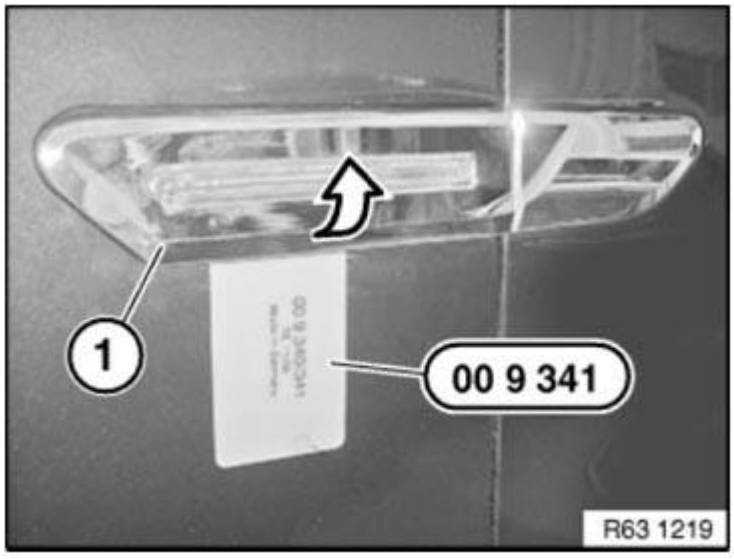


Fig. 66: Sliding Front Auxiliary Turn Indicator Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1). Remove front auxiliary turn indicator (2).

Installation:

Make sure guides (3) and catch (4) are correctly installed.

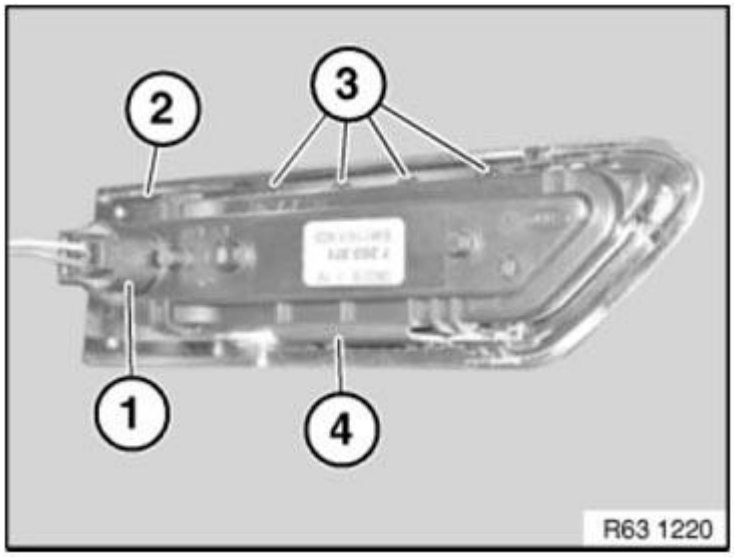


Fig. 67: Identifying Front Auxiliary Turn Indicator And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

63 13 220 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT AUXILIARY TURN INDICATOR TRIM

Notes

Slide front auxiliary turn indicator trim (1) with special tool 11 4 471 in upward direction and fold out in direction of arrow.

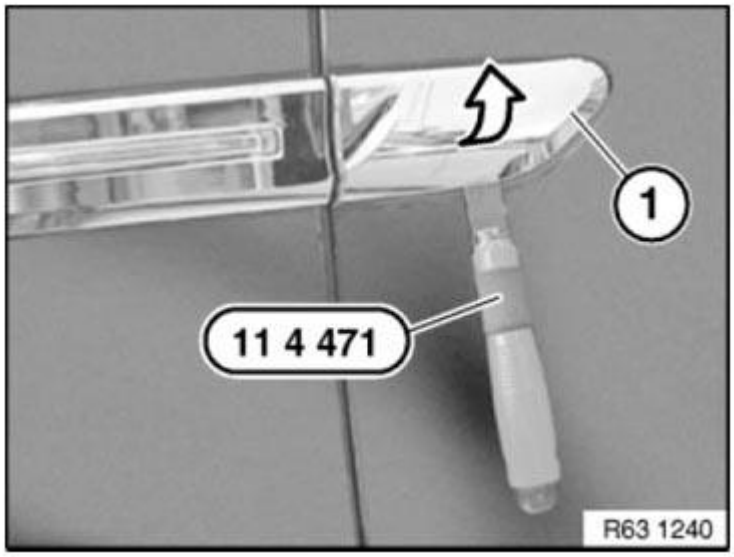


Fig. 68: Sliding Front Auxiliary Turn Indicator Trim Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure guides (1) and catch (2) are correctly installed.

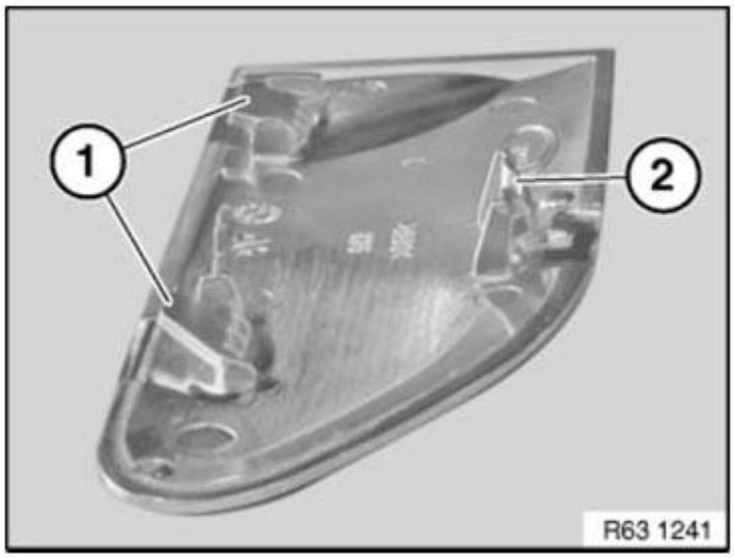


Fig. 69: Identifying Guides And Catch
Courtesy of BMW OF NORTH AMERICA, INC.

63 13 250 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT SIDE REPEATER MIRROR (FROM 07/2012)

Necessary preliminary work:

- Remove **EXTERIOR MIRROR ON FRONT DOOR**
- Remove **RETAINING RING ON EXTERIOR MIRROR**

Release plug connection (1) on central connector (2) and disconnect.

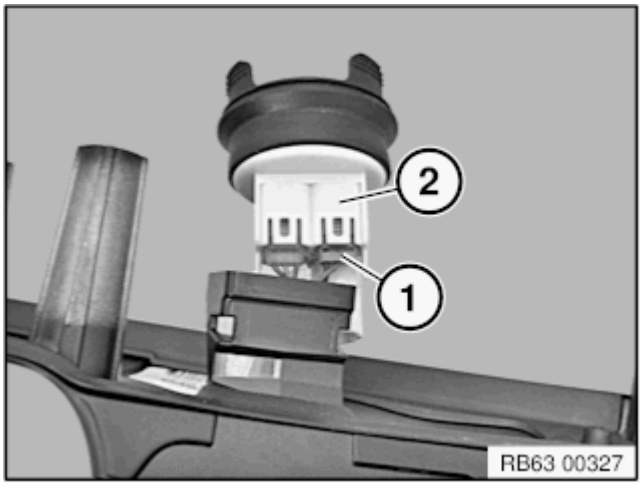


Fig. 70: Identifying Plug Connection On Central Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out cable (1).

Feed side repeater (3) in direction of arrow out of mirror housing (2).

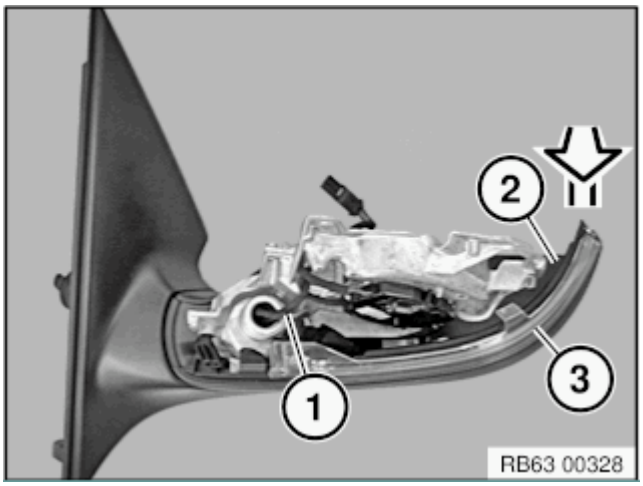


Fig. 71: Identifying Side Repeater, Mirror Housing, And Cable
Courtesy of BMW OF NORTH AMERICA, INC.

63 13 080 REMOVING AND INSTALLING/REPLACING LEFT TURN INDICATOR INSERT

Necessary preliminary tasks

- Remove **LEFT HEADLIGHT**

Release screws (1) on headlight.

Tightening torque **63 12 6AZ** .

Remove turn indicator insert (2) from headlight (3) towards top.

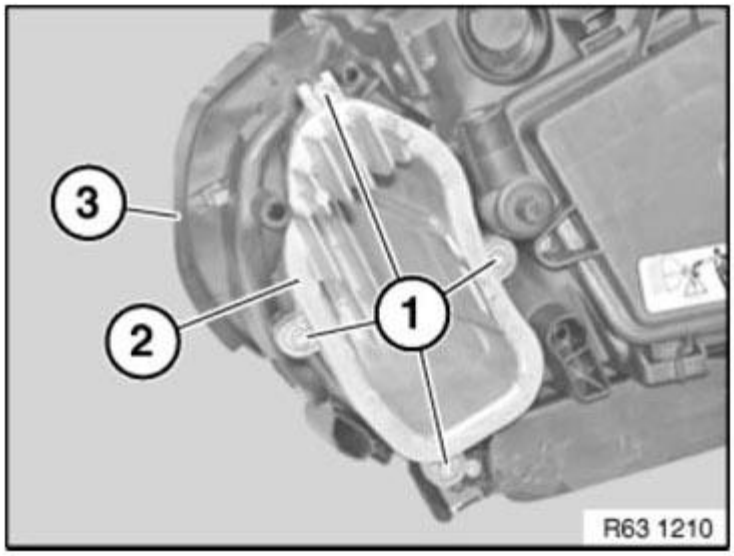


Fig. 72: Identifying Headlight Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on turn indicator insert (2).

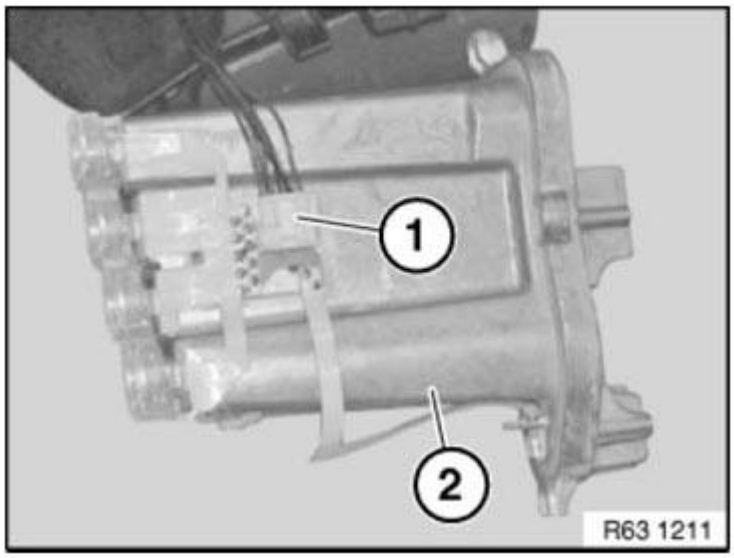


Fig. 73: Identifying Plug Connection On Turn Indicator Insert

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Teach in turn indicator insert (2) via vehicle diagnosis.

- Service functions
- Body
- Lights
- Learning turn signal indicator

63 13 080 REMOVING AND INSTALLING/REPLACING LEFT TURN INDICATOR INSERT (LED HEADLIGHT)

Necessary preliminary tasks

- Remove **HEADLIGHT**

Release screws (1) on headlight.

Tightening torque **63 12 6AZ** .

Pull turn indicator insert (2) out of headlight.

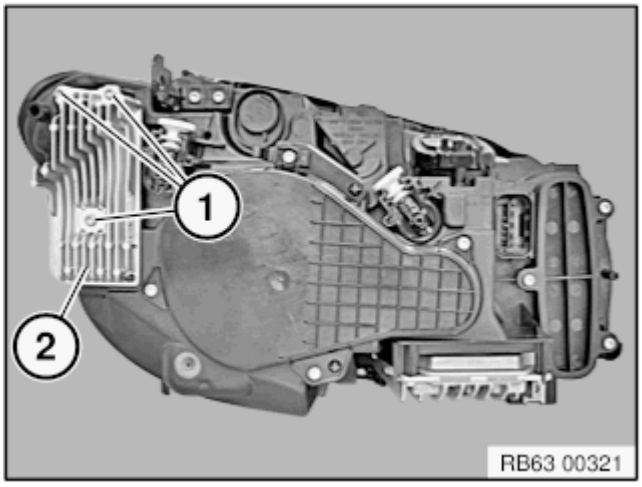


Fig. 74: Identifying Turn Indicator Insert And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on turn indicator insert (2).

Installation note:

Seal (3) and guides (4) on turn indicator insert (2) must not be damaged or missing.

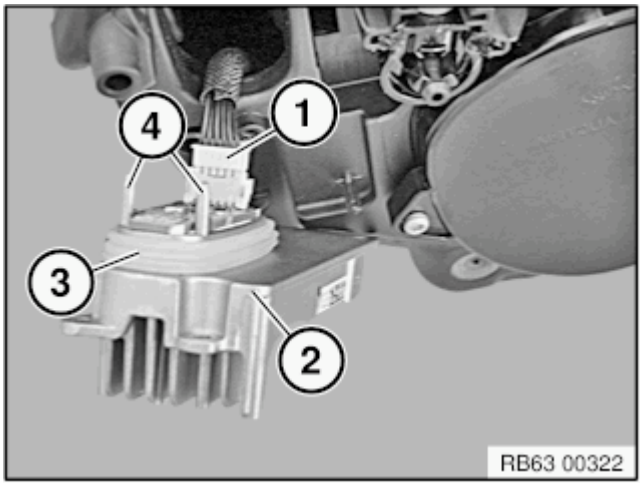


Fig. 75: Identifying Turn Indicator Insert, Connector, Seal, And Guides
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Teach in turn indicator insert (2) via vehicle diagnosis.

- Service functions
- Body
- Lights
- Learning turn signal indicator

63 13 082 REMOVING AND INSTALLING/REPLACING RIGHT TURN INDICATOR INSERT

Operation is described in:

Removing and installing/replacing **LEFT TURN INDICATOR INSERT**

63 13 082 REMOVING AND INSTALLING/REPLACING RIGHT TURN INDICATOR INSERT (LED HEADLIGHT)

Operation is described in:

REMOVING AND INSTALLING/REPLACING LEFT TURN INDICATOR INSERT (LED HEADLIGHT)

6314 CLEARANCE AND SIDE MARKER LAMPS

63 14 120 REMOVING AND INSTALLING/REPLACING REAR REFLECTOR (ON REAR BUMPER TRIM)

Unclip reflector (1) from bumper trim (2) in area (3).

Pull reflector (1) out of guide and detach towards rear from bumper trim (2).

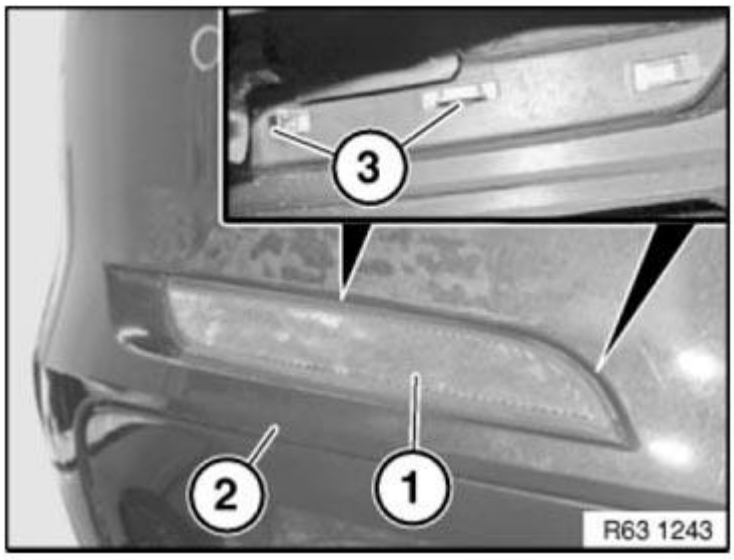


Fig. 76: Identifying Reflector And Bumper Trim In Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) and guide (2) on rear reflector must not be damaged.

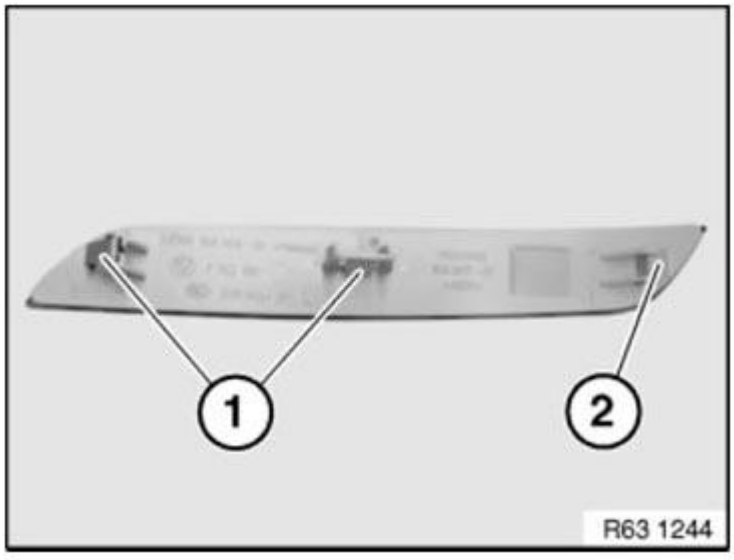


Fig. 77: Identifying Rear Reflector Catches And Guide
Courtesy of BMW OF NORTH AMERICA, INC.

63 14 060 REMOVING AND INSTALLING/REPLACING THE FRONT LEFT OR RIGHT SIDE MARKER

Necessary preliminary work:

- Partially remove **FRONT WHEEL ARCH COVER** (front section)

NOTE: Minimum object temperature of side marker and bumper panel = 18 °C.

If this temperature is not achieved, the components must be preheated.

Release expanding rivets (1) and pull air duct (2) in direction of arrow out of guide (3).

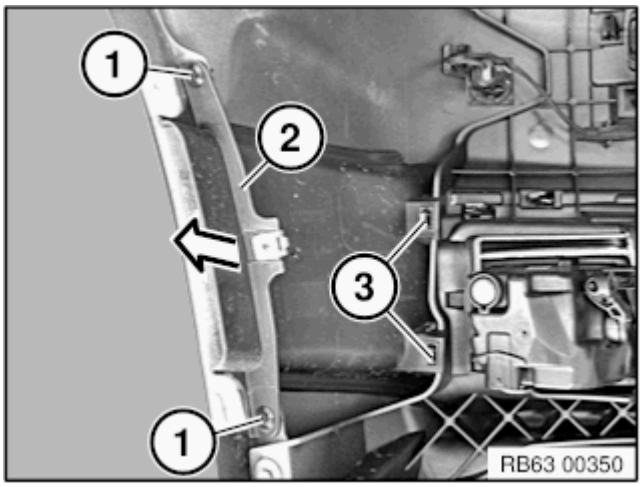


Fig. 78: Identifying Air Duct, Guide, And Expanding Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Remove side marker:

NOTE: The side marker (1) cannot be used again.

Carefully preheat side marker (1) in area (3) using hot air blower and use special tool **00 9 325** to release it from the bumper panel (2).

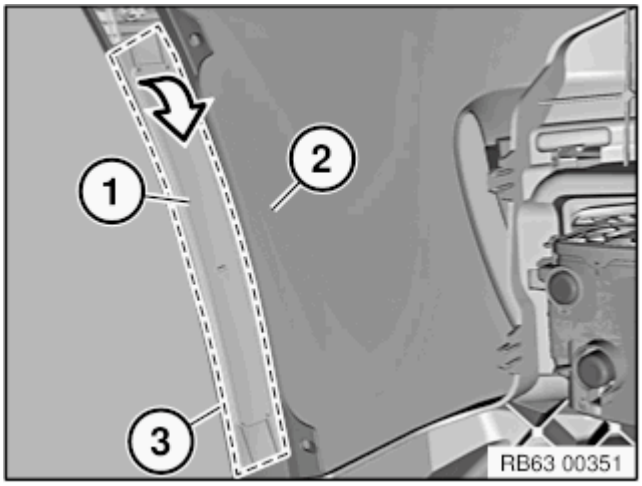


Fig. 79: Removing Side Marker
Courtesy of BMW OF NORTH AMERICA, INC.

Clean bumper panel:

To clean use a lint-free disposable cloth or a clean cleaning cloth.

Clean bonding surface of bumper panel using spirits.

Air drying time at least 1 minute.

Do not touch bonding surface any more.

Install side marker:

Release liner* (1) and lightly press side marker (2) to side wall.

Check position and realign, if necessary.

The minimum contact pressure is achieved by firmly pressing your thumbs or the balls of your hands over the entire joining area (holding time approx 1 second).

Firm thumb pressure approx. 35 N/cm.

* Liner is protective film at new side marker.

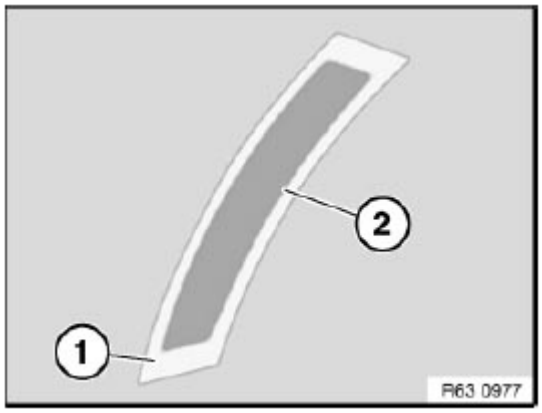


Fig. 80: Identifying Side Marker Onto Bumper Trim
Courtesy of BMW OF NORTH AMERICA, INC.

6317 FOG LIGHTS, AUXILIARY LIGHTS

63 17 200 REMOVING AND INSTALLING (REPLACING) LEFT HEADLIGHT FOR TARGET ILLUMINATION

NOTE: The time value of this job item does not include adjustment of the headlight for target illumination!

ADJUSTMENT OF HEADLIGHT FOR TARGET ILLUMINATION must be carried out after removal and installation!

IMPORTANT: Follow notes on HANDLING LED LIGHTS (HIGH-PERFORMANCE LED)

Necessary preliminary work:

- Remove **ORNAMENTAL GRILLE IN BUMPER PANEL**

Release screw (1).

Tightening torque **63 12 7AZ**

Remove headlight for target illumination (2) out of bumper panel in direction of arrow.

Unlock associated plug connection and disconnect.

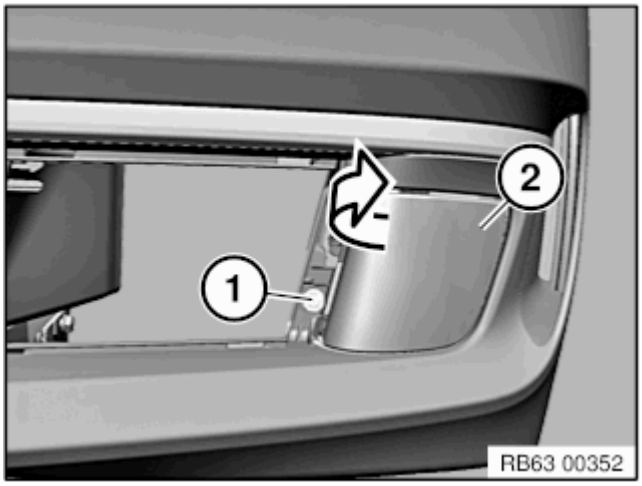


Fig. 81: Removing Headlight For Target Illumination Out Of Bumper Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out **VEHICLE PROGRAMMING/CODING**
- **ADJUST** headlights for targeted illumination

63 17 205 REMOVING AND INSTALLING (REPLACING) RIGHT-HAND TARGETED ILLUMINATION HEADLIGHT

Operation is described in:

REMOVING AND INSTALLING (REPLACING) LEFT HEADLIGHT FOR TARGET ILLUMINATION

63 17 070 REMOVING AND INSTALLING LEFT FRONT FOG LAMP

NOTE: The time value of this job does not include adjustment of the FOG LAMPS !

Necessary preliminary tasks

- **REMOVE** trim grille in bumper trim

Release screw (1).

Tightening torque **63 12 7AZ** .

Remove fog lamp (2) in direction of arrow.

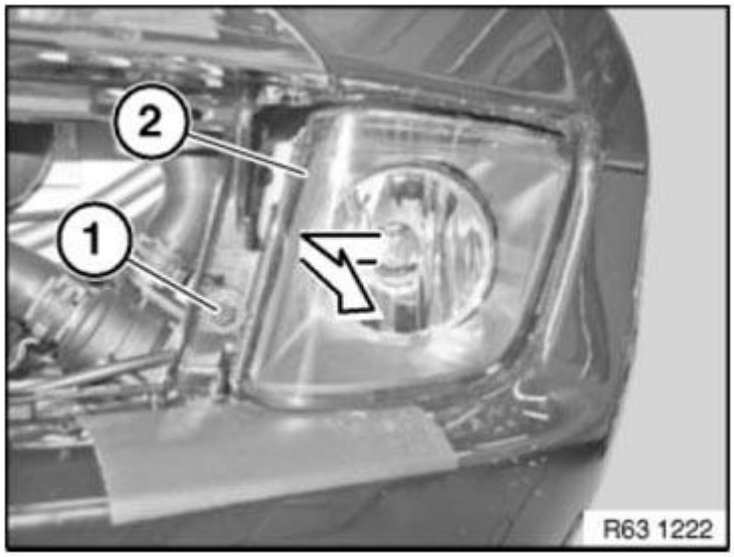


Fig. 82: Removing Fog Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS)

Disconnect plug connection (1) on fog lamp (2).

Remove fog lamp (2).

Replacement

- If necessary, turn bulb holder in direction of arrow and remove from fog lamp (2).

  Note **BULB TYPE**

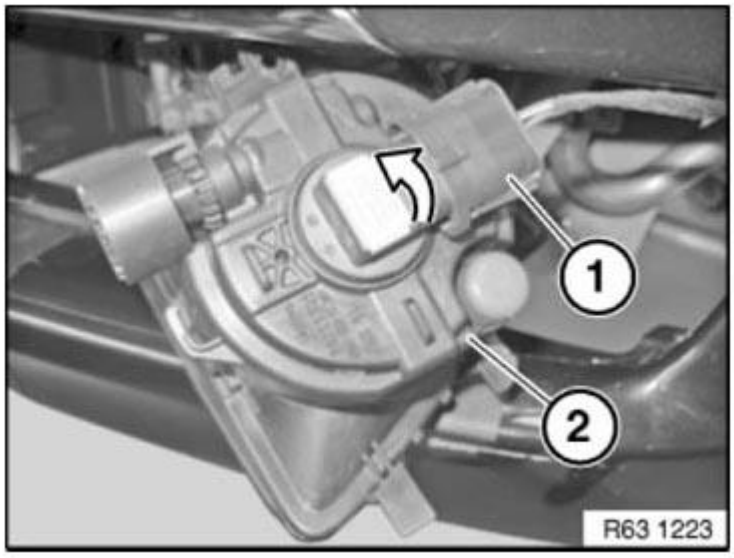


Fig. 83: Turning Bulb Holder From Fog Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

63 17 075 REMOVING AND INSTALLING RIGHT FOG LAMP

Operation is described in:

Removing and installing **LEFT FOG LAMP** .

63 17 071 REPLACING LEFT FOG LAMP

WARNING: **Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .**

Operation is described in:

Removing and installing **LEFT FOG LAMP** .

Adjust **FRONT FOG LAMPS** .

63 17 076 REPLACING RIGHT FOG LAMP

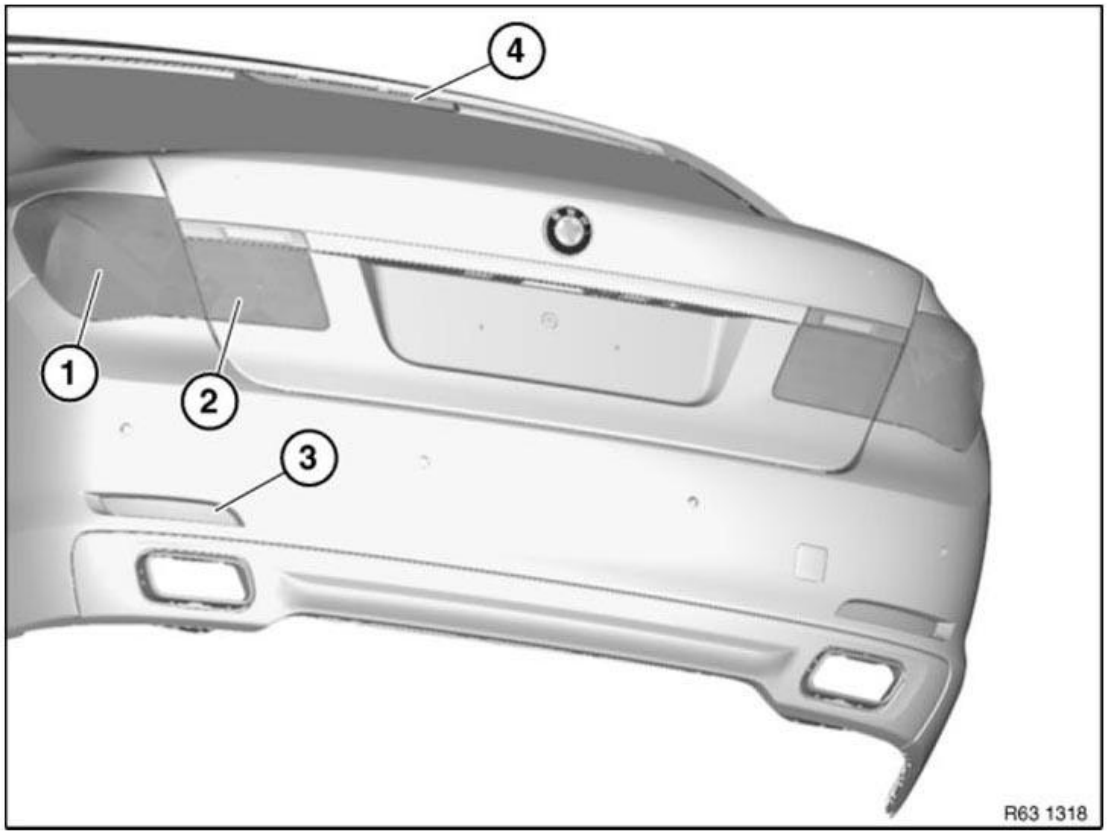
WARNING: **Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .**

Operation is described in:

Removing and installing **LEFT FOG LAMP** .

6321 REAR LIGHT CLUSTER

63 21.. OVERVIEW OF REAR LIGHTS



1 Rear light, left (side panel)
2 Rear light, left (on tail panel)
3 Reflector, rear
4 Additional brake light

Fig. 84: Identifying Rear Light Cluster Components
Courtesy of BMW OF NORTH AMERICA, INC.

63 21 176 REMOVING AND INSTALLING/RENEWING CHROME TRIM ON LEFT OR RIGHT REAR LIGHT

Necessary preliminary tasks

- Remove **PANEL FOR TAILGATE**
- Remove left rear light

Release screws (1).

Remove chrome trim (2) from rear light (3).

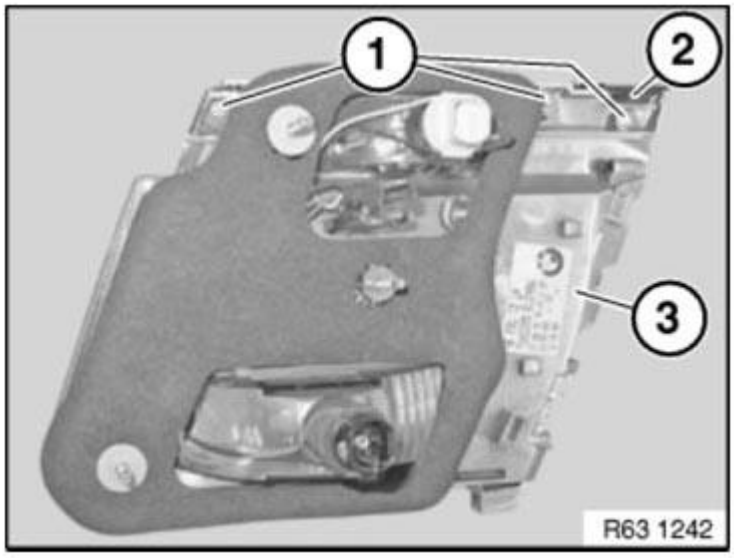


Fig. 85: Identifying Rear Light With Chrome Trim And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

63 21 180 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR LIGHT (IN SIDE PANEL)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT WHEEL ARCH TRIM ON LEFT** .

Release nuts (1) and nut (2).

Tightening torque, **63 21 1AZ** .

Disconnect plug connection (3).

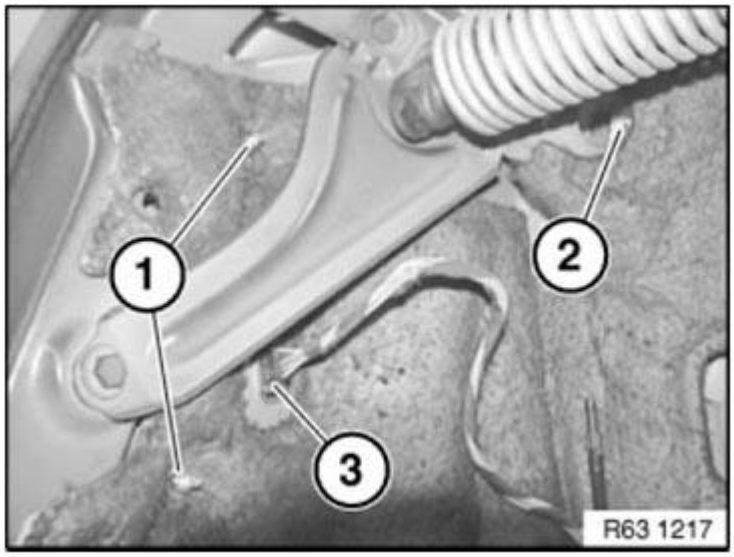


Fig. 86: Identifying Plug Connection And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove left rear light (1) in direction of arrow.

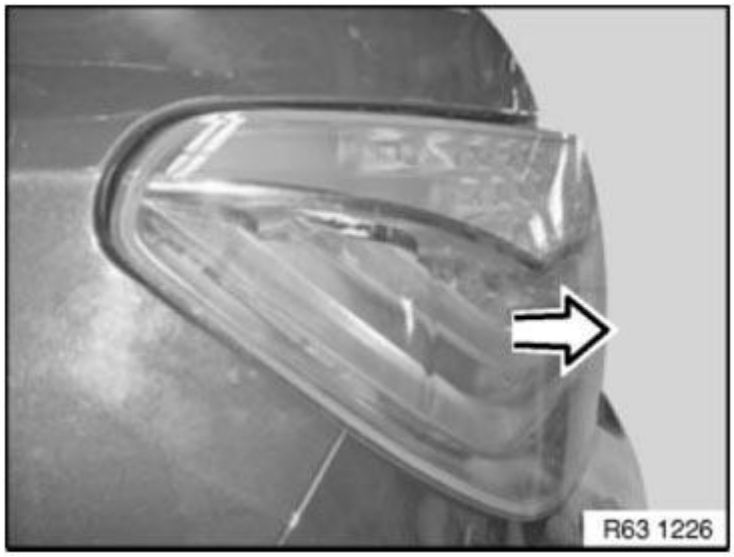


Fig. 87: Removing Left Rear Light
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure sealing frame (1) for rear light (2) is correctly seated.

If necessary, replace **SEALING FRAME** (1).

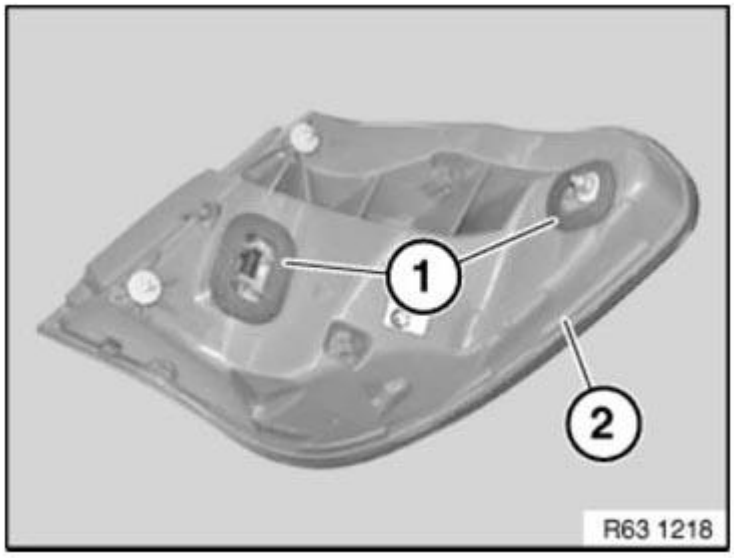


Fig. 88: Identifying Rear Light And Sealing Frame
Courtesy of BMW OF NORTH AMERICA, INC.

63 21 170 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT REAR LIGHT (ON TAILGATE)

Necessary preliminary tasks:

- Remove **COMPLETE REAR CENTER TRIM**

Unscrew nuts (1).

Disconnect plug connection (2).

Remove rear light (3).

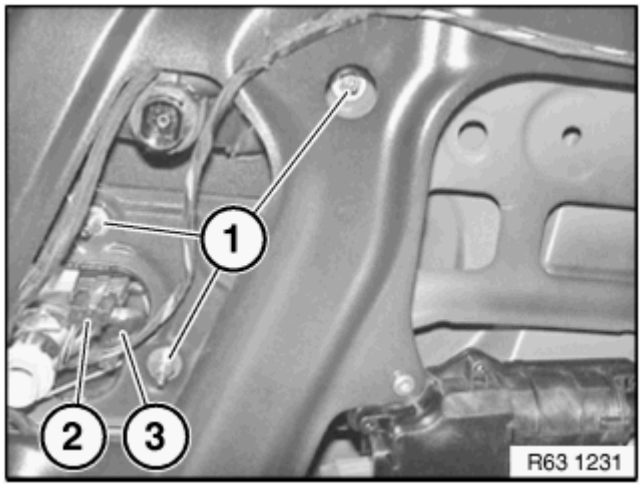


Fig. 89: Identifying Rear Light, Connector, And Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove **BULBS** .

If necessary, replace **CHROME TRIM**.

64 11... REPLACING REAR PASSENGER COMPARTMENT A/C CONTROL PANEL FAN MOTOR

Necessary preliminary work

- Remove **REAR PASSENGER COMPARTMENT A/C CONTROL PANEL**

Release screws (1).

Remove fan motor (3) from A/C control panel (2).

Installation note:

Make sure pins (4) are correctly seated on fan motor (3).

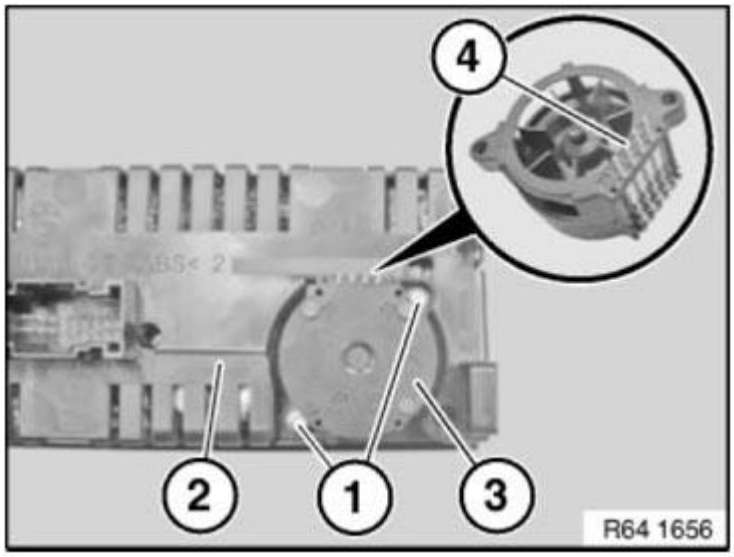


Fig. 90: Identifying A/C Control Panel, Fan Motor And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

63 21 104 REPLACING SEALING FRAME FOR LEFT OR RIGHT REAR LIGHT (ON REAR LID)

Necessary preliminary tasks

- Remove and install left or right rear light

Detach sealing frame (1) in direction of arrow from rear light (2).

Installation:

Make sure sealing frame (1) is correctly bonded all round on rear light (2).

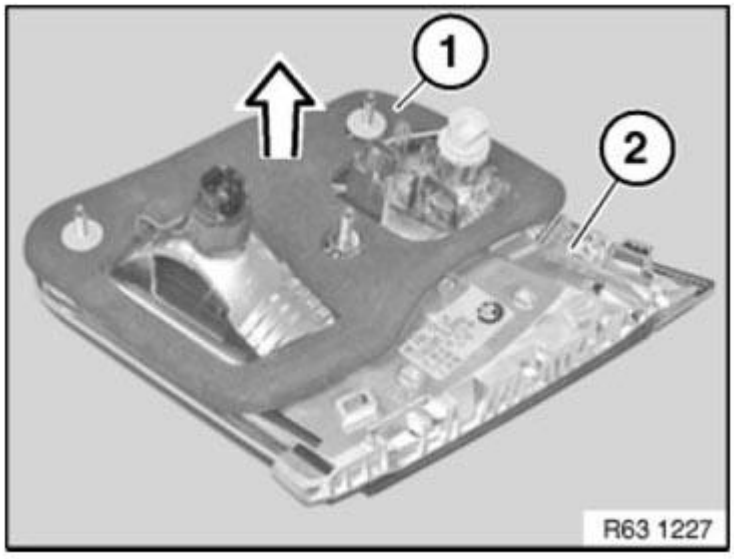


Fig. 91: Removing Sealing Frame From Rear Light
Courtesy of BMW OF NORTH AMERICA, INC.

63 21 101 REPLACING SEALING FRAME FOR LEFT OR RIGHT REAR LIGHT (ON SIDE PANEL)

Necessary preliminary tasks

- Remove and install left or right **REAR LIGHT**

Detach sealing frame (1) from rear light (2).

Installation:

Make sure sealing frame (1) is correctly bonded all round on rear light (2).

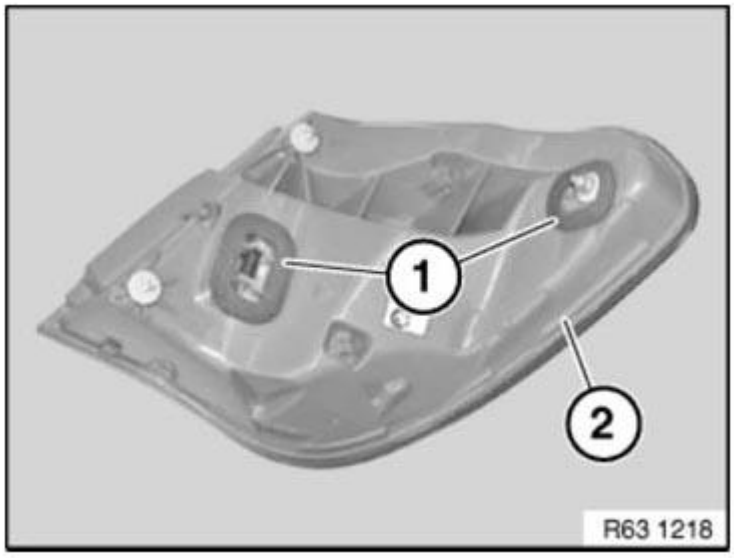


Fig. 92: Identifying Rear Light And Sealing Frame
Courtesy of BMW OF NORTH AMERICA, INC.

6325 BRAKE LIGHTS

63 25 000 REMOVING AND INSTALLING/RENEWING AUXILIARY BRAKE LIGHT

Remove supplementary brake light cover (1) in direction of arrow from molded roofliner (2).

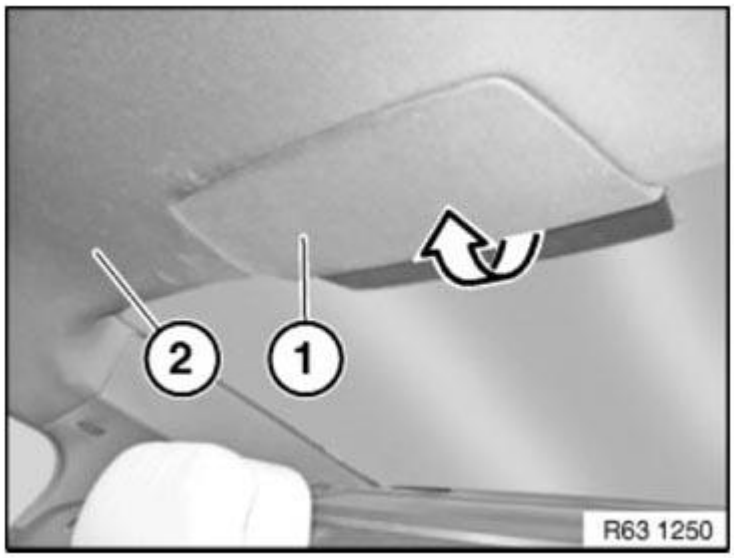


Fig. 93: Removing Supplementary Brake Light Cover From Molded Roofliner
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Guides (1) and catches (2) must not be damaged.

Make sure cover is correctly seated on supplementary brake light (3).

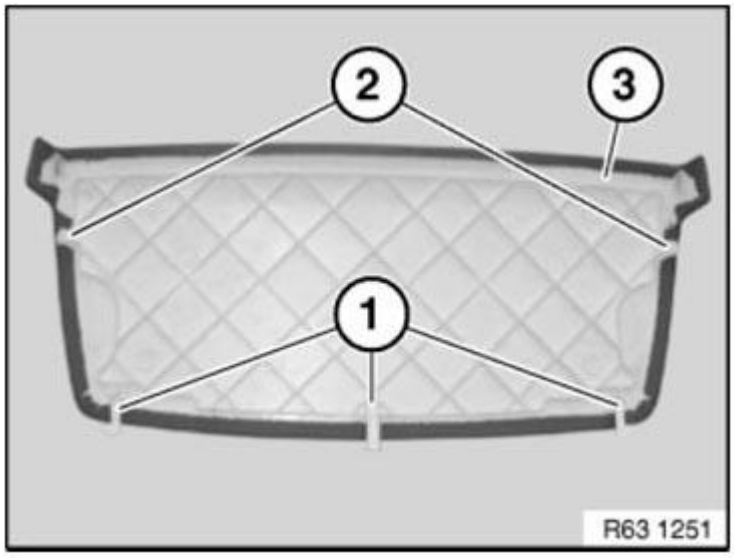


Fig. 94: Identifying Supplementary Brake Light With Catches And Guides
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

If necessary, unclip plug connections (2) on supplementary brake light (4).

Unlock slide (3) on both sides and remove supplementary brake light (4) in direction of arrow from rear window (5).

Installation:

Make sure supplementary brake light (4) is correctly positioned in rear window (5).

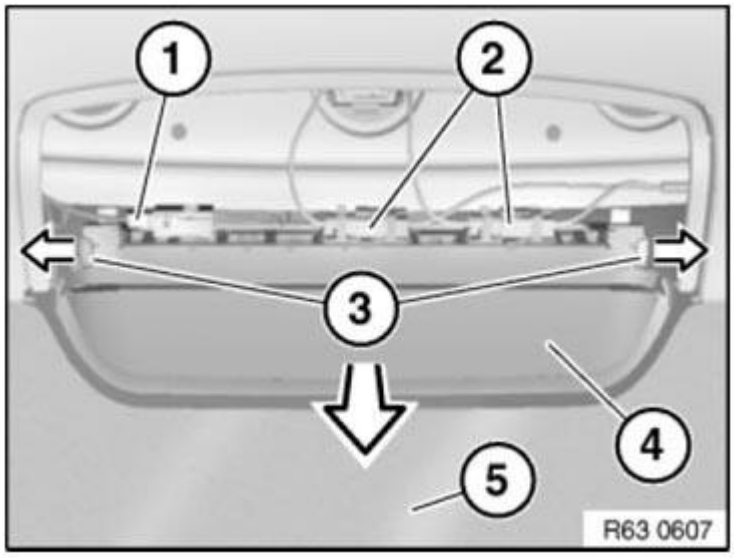


Fig. 95: Removing Supplementary Brake Light From Rear Window
Courtesy of BMW OF NORTH AMERICA, INC.

6331 INTERIOR LIGHTS

63 31 020 REMOVING AND INSTALLING/RENEWING FOOTWELL LIGHT

Lever footwell light (1) in direction of arrow out of panel for pedals (2).

Disconnect plug connection behind and remove footwell light (1).

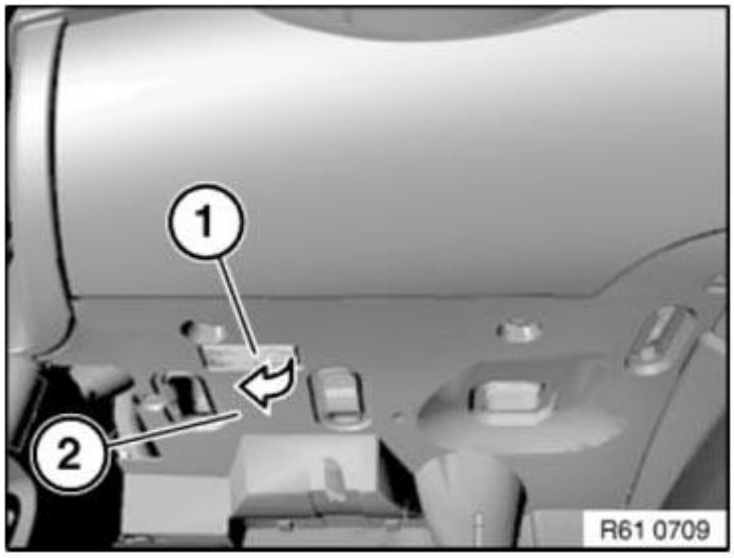


Fig. 96: Removing Footwell Light
Courtesy of BMW OF NORTH AMERICA, INC.

Lever footwell light (1) in direction of arrow out of door trim (2).

Disconnect plug connection behind and remove footwell light (1).

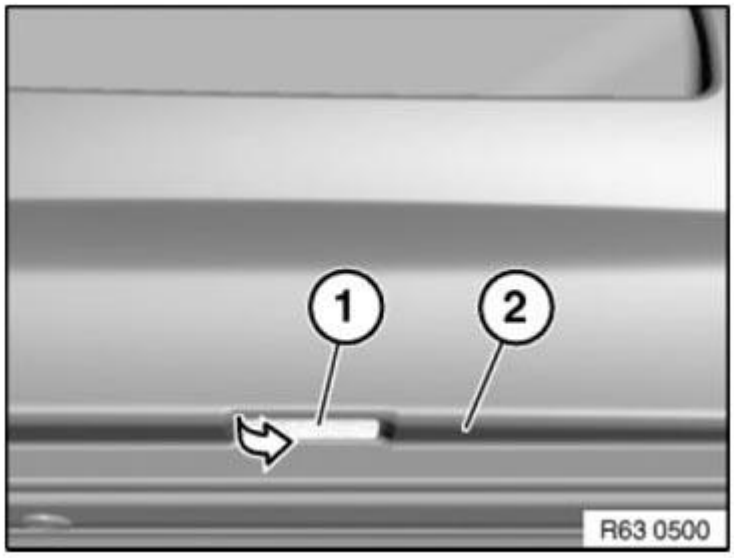


Fig. 97: Removing Footwell Light
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Replacement:

If necessary, remove bulb.

Note **BULB TYPE** .

63 31 080 REMOVING AND INSTALLING/RENEWING LUGGAGE COMPARTMENT LIGHT

NOTE: Open luggage compartment lid.

Lever out luggage compartment light (1) in direction of arrow.

Disconnect plug connection underneath and remove luggage compartment lamp (1).

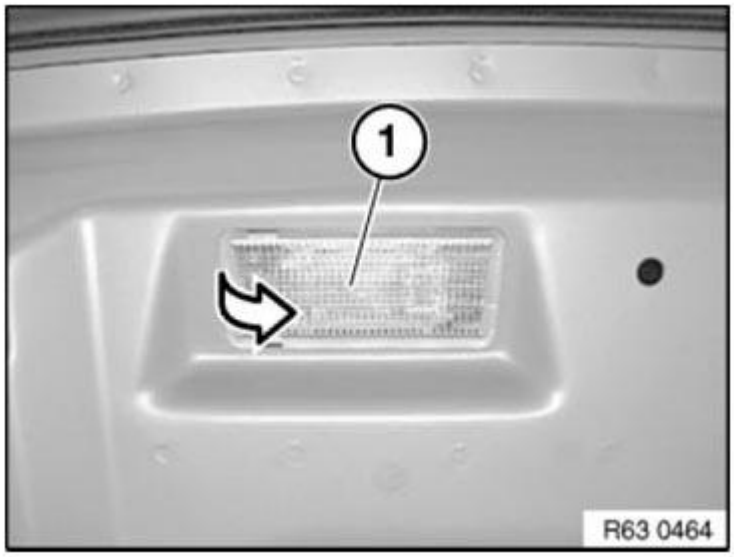


Fig. 98: Removing Luggage Compartment Light
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Replacement

- If necessary, remove bulb.

  Note **BULB TYPE** .

63 31 176 REMOVING AND INSTALLING/REPLACING LED FOR CENTER ARMREST STORAGE COMPARTMENT

Necessary preliminary tasks

- Remove **CENTER ARMREST STORAGE COMPARTMENT**

Release cable tie (1).

Press LED (2) out of center armrest storage compartment (3).

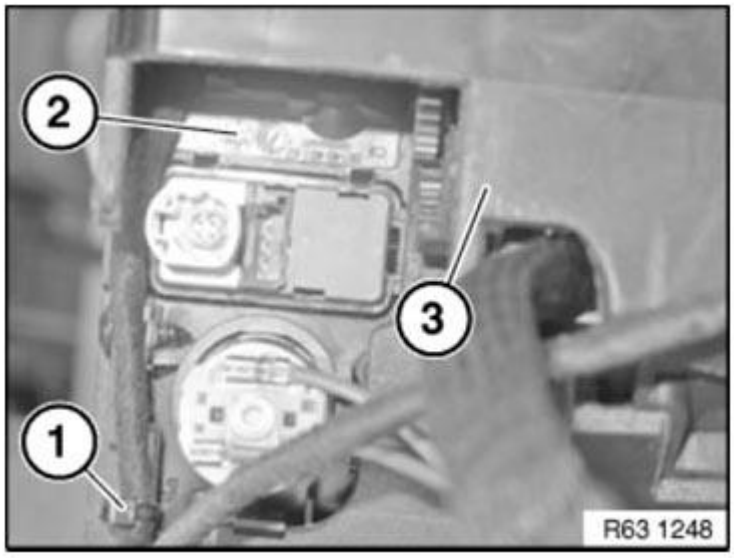


Fig. 99: Identifying LED, Cable Tie And Center Armrest Storage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

Detach trim (1) from LED (2).

Remove LED (2) from center armrest storage compartment (3).

Installation:

Make sure trim (1) is correctly seated on LED for center armrest storage compartment (2).

Make sure electrical lead is correctly laid.

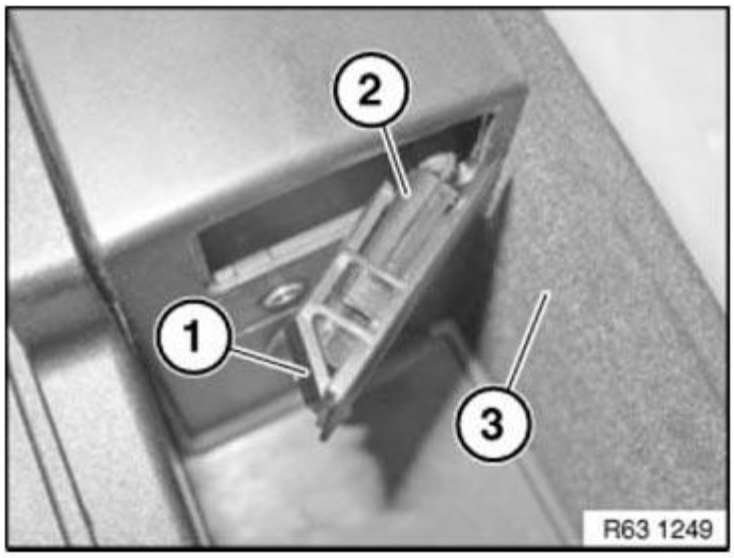


Fig. 100: Identifying LED And Center Armrest Storage Compartment

Courtesy of BMW OF NORTH AMERICA, INC.

63 31 003 REMOVING AND INSTALLING/REPLACING COMPLETE INTERIOR ROOF LIGHT (REAR)

Notes

Carefully lever out interior roof light (1) in direction of arrow with special tool **00 9 317** .

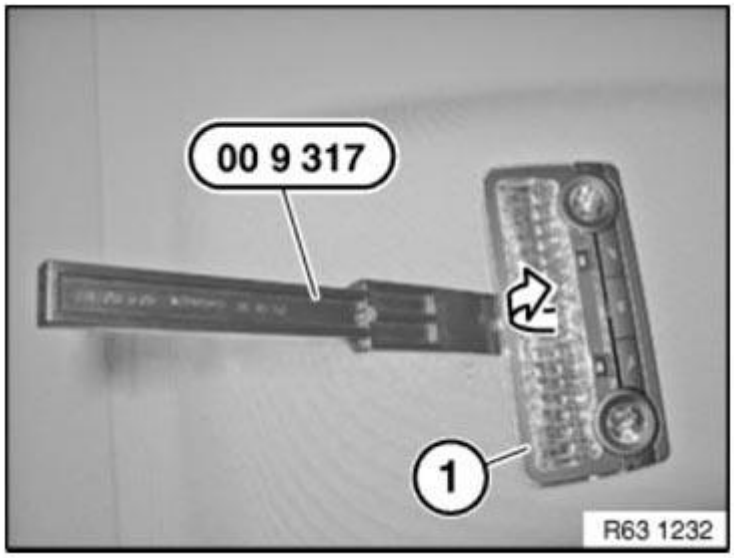


Fig. 101: Removing Interior Roof Light Using Special Tool 00 9 317
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove roof light (2).

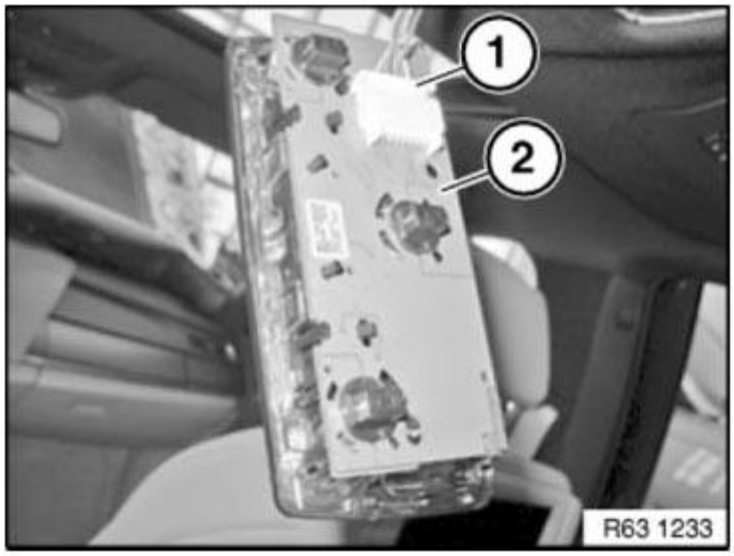


Fig. 102: Identifying Plug Connection And Roof Light
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Replacement:

- If necessary, remove bulbs

  Note **BULB TYPE**

63 31 020 REMOVING AND INSTALLING/REPLACING FOOTWELL LIGHT (ON FLOOR TRIM PANEL, REAR)

Notes

Lever out footwell light (1) with special tool **64 1 020** in direction of arrow.

Disconnect plug connection behind and remove footwell light (1).

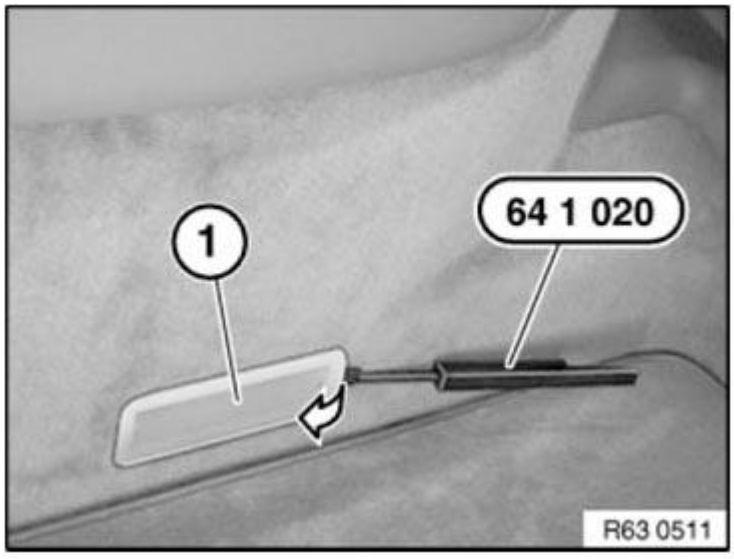


Fig. 103: Removing Footwell Light Using Special Tool 64 1 020
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Replacement

If necessary, remove **BULB** .

63 31 150 REMOVING AND INSTALLING/REPLACING GLOVEBOX LIGHT

NOTE: Graphic is similar.

Lever out glove box light (1) in direction of arrow.

Disconnect plug connection and remove glove box light (1).

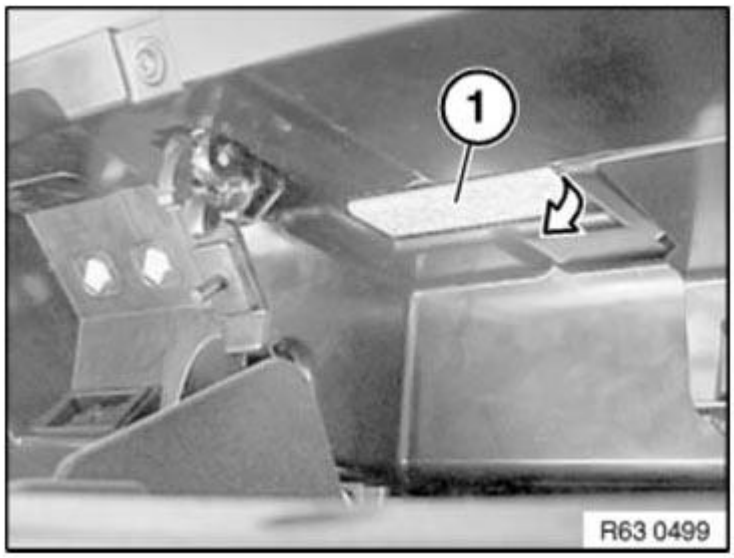


Fig. 104: Removing Glove Box Light
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Replacement:

- If necessary, remove bulbs

  Note **BULB TYPE** .

63 31 085 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT LAMP (ON REAR LID)

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Lever out luggage compartment lamp (1) at openings (2) in direction of arrow.

Disconnect plug connection underneath and remove luggage compartment lamp (1).

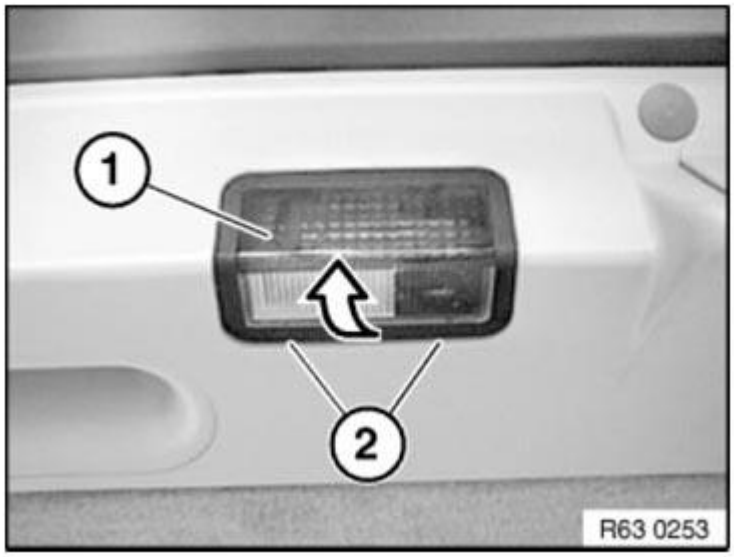


Fig. 105: Removing Luggage Compartment Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- If necessary, remove bulbs
- Note **BULB TYPE** .

63 31 050 REMOVING AND INSTALLING/REPLACING MAKE-UP MIRROR LIGHT

Lever out mirror light (1) at rear in direction of arrow.

Disconnect plug connection underneath and remove mirror plate light (1).

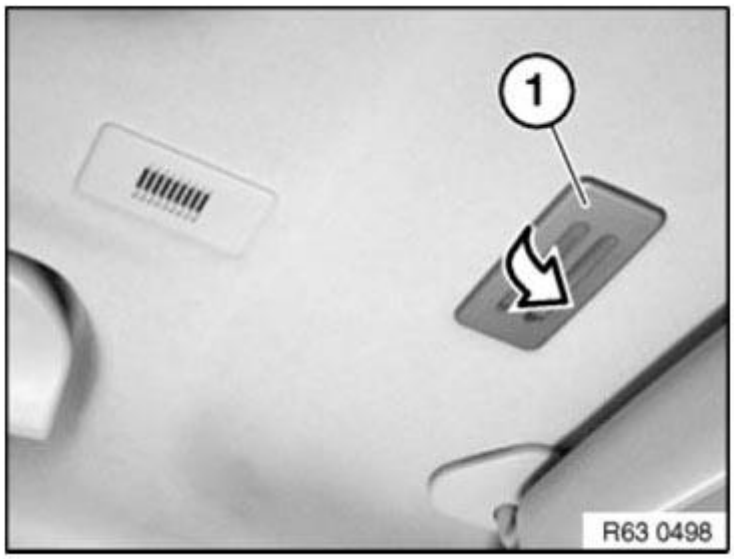


Fig. 106: Removing Mirror Light
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Replacement

- If necessary, remove bulb.

  Note **BULB TYPE** .

63 31 180 REPLACING LED FOR FRONT DOOR TRIM PANEL LIGHT (LEFT OR RIGHT)

Necessary preliminary tasks

- Remove **FRONT LEFT DOOR TRIM PANEL**

Unlock LED for front door trim panel (1) from holder (2).

Detach LED for front door trim panel (1).

Installation

Make sure LED for front door trim panel (1) is correctly seated in holder (2).

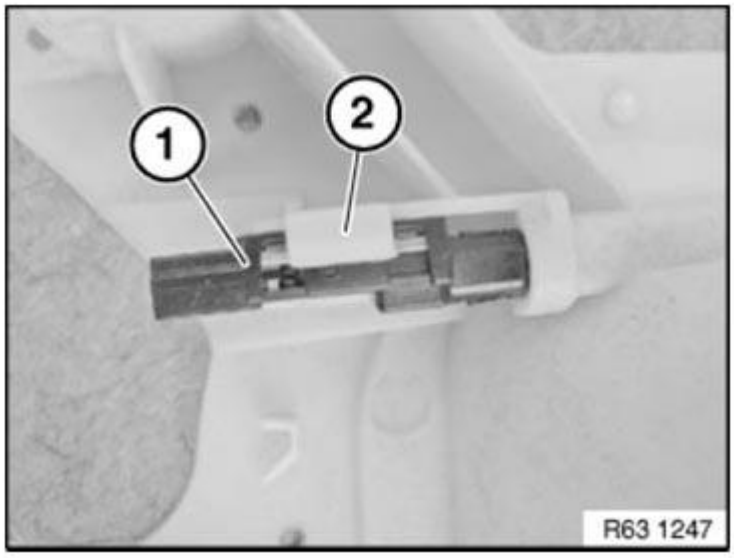


Fig. 107: Identifying LED For Front Door Trim Panel And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 182 REPLACING LED FOR FRONT INSIDE DOOR OPENER (LEFT OR RIGHT)

Necessary preliminary tasks

- Remove **FRONT LEFT DOOR TRIM PANEL**

Turn LED for front inside door opener (1) in direction of arrow 45° clockwise and remove towards top.

Installation:

Make sure LED for front inside door opener (1) is correctly seated.

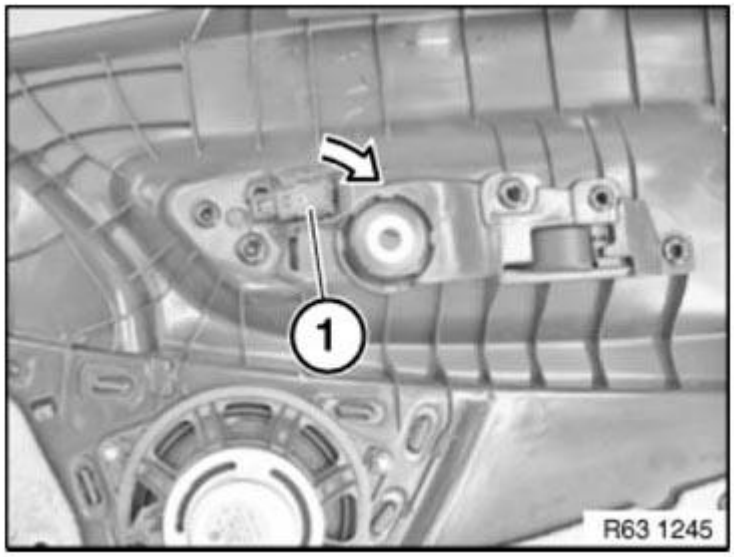


Fig. 108: Turning LED For Front Inside Door Opener
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 191 REPLACING LED FOR REAR DOOR TRIM PANEL LIGHT (LEFT OR RIGHT)

Necessary preliminary tasks

- Remove **REAR LEFT DOOR TRIM PANEL**

Operation is described in:

Replacing **LED FOR FRONT DOOR TRIM PANEL LIGHT**

63 31 193 REPLACING LED FOR REAR INSIDE DOOR OPENER (LEFT OR RIGHT)

Necessary preliminary tasks

- Remove door trim panel. See **5142000 REMOVE AND INSTALL LEFT OR RIGHT REAR DOOR TRIM PANEL** .

Pull out LED for rear inside door opener (1) in direction of arrow.

Slide lighting cable (2) upwards in direction of arrow from holder (3).

Detach LED for rear inside door opener (1) from light cable (2).

Installation:

Make sure LED for rear inside door opener (1) is correctly seated.

Make sure light cable (2) is correctly seated in holder (3).

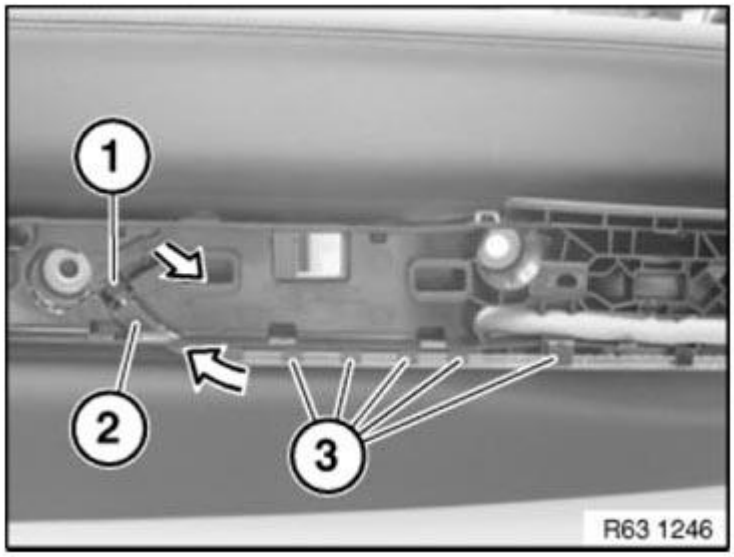


Fig. 109: Sliding Lighting Cable From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 452 REPLACING LIGHT BULB FOR LUGGAGE COMPARTMENT LIGHT (ON TAILGATE)

IMPORTANT: Follow notes for HANDLING LIGHT BULBS (INTERIOR LIGHTS).

Necessary preliminary tasks:

Remove **LUGGAGE COMPARTMENT LIGHT**

Lever out luggage compartment light (1) at recesses (2) in direction of arrow.

Disconnect plug connection underneath and remove luggage compartment light (1).

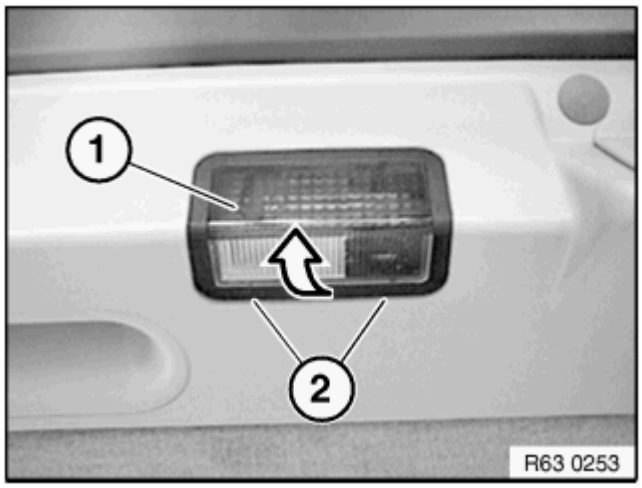


Fig. 110: Removing Luggage Compartment Light
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- If necessary, convert bulbs.
- Note **BULB TYPE** .

Remove cover (1) in direction of arrow.

Remove bulb underneath.

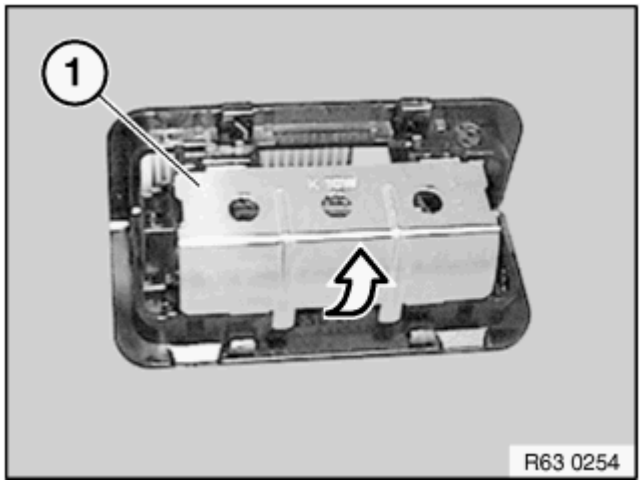


Fig. 111: Removing Cover To Access Bulb
Courtesy of BMW OF NORTH AMERICA, INC.

6399 LIGHT BULBS

63 99... FOLLOW NOTES ON HANDLING LED LIGHTS (HIGH-PERFORMANCE LED)

WARNING: All LEDs with visible light have a certain secondary risk potential due to their dazzling effect:

If possible, do not look directly into the LED radiation without eye protection - and above all not for extended periods.

After looking into bright LED sources, temporary visual impairment and after-images (not a sign of eye damage) may occur, leading to irritations, annoyance, visual impairment or even accidents.

Especially looking direct and intentionally into "white" and "blue" LEDs from close proximity can lead to retinal damage after only a short period.

If dazzling effects persist or in case of other complaints, consult a eye specialist.

IMPORTANT: To avoid short circuits, disconnect LED lamps from the power supply before replacing them (lighting system and ignition off).

63 99... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)

WARNING: Xenon headlamps: Danger to life due to high voltage!

Work on the entire xenon lighting system (ignition device, control unit and bulb) may only be carried out by qualified personnel.

WARNING: Halogen lamps are under pressure:

To avoid injury, wear protective goggles and gloves.

IMPORTANT: To avoid short circuits, disconnect bulbs from the power supply before replacing them (lighting system and ignition off).

Do not touch the glass bulbs in new light bulbs as even the smallest amount of dirt will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's instructions without fail.

63 99 X02 INSTRUCTIONS FOR REPLACING LIGHT BULBS (INTERIOR LIGHTS)

IMPORTANT: To avoid short circuits, disconnect bulbs from the power supply before replacing them (lighting system and ignition off).

Do not touch the glass bulbs in new lights bulbs as even the slightest contamination will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's instructions without fail.

63 99... NOTES FOR REPLACING THE PROTECTIVE CAP OF THE HEADLIGHT

IMPORTANT: Risk of damage!

Damaged seals on the protective caps will lead to moisture penetration into the headlight.

This will in turn cause porous cable insulations and malfunctioning of the headlight.

When working on the headlight system, check the protective cap seals.

Replace the protective cap in the event of damage!

Example: screwed protective cap

Seal (1) on protective cap (2).

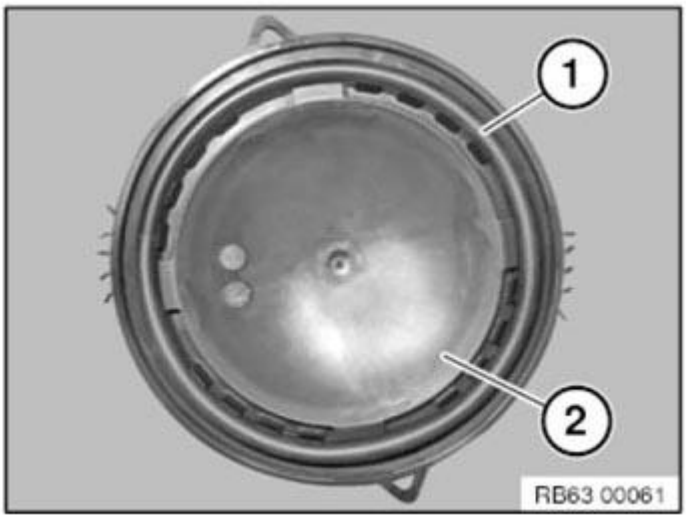


Fig. 112: Identifying Seal On Protective Cap (Screwed Protective Cap)
Courtesy of BMW OF NORTH AMERICA, INC.

Example: latchable protective cap

Seal (1) on protective cap (2).

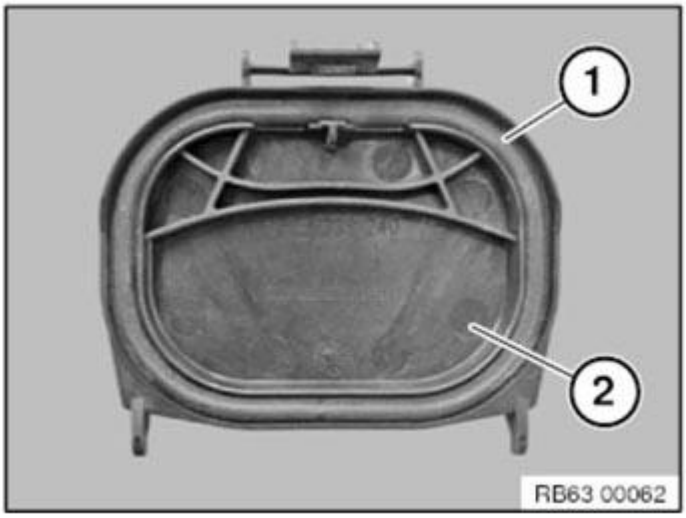


Fig. 113: Identifying Seal On Protective Cap (Latchable Protective Cap)
Courtesy of BMW OF NORTH AMERICA, INC.

63 17 075 REMOVING AND INSTALLING RIGHT FOG LAMP

Operation is described in:

Removing and installing **LEFT FOG LAMP** .

63 13 080 REMOVING AND INSTALLING/REPLACING LEFT TURN INDICATOR INSERT

Necessary preliminary tasks

- Remove **LEFT HEADLIGHT**

Release screws (1) on headlight.

Tightening torque **63 12 6AZ** .

Remove turn indicator insert (2) from headlight (3) towards top.

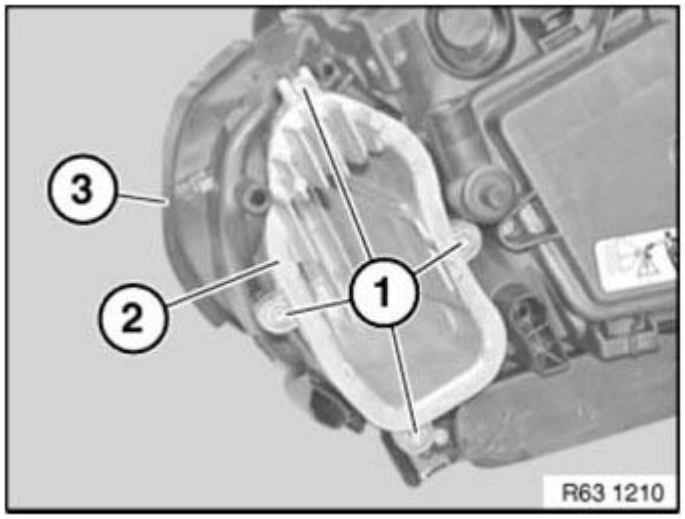


Fig. 114: Identifying Headlight Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on turn indicator insert (2).

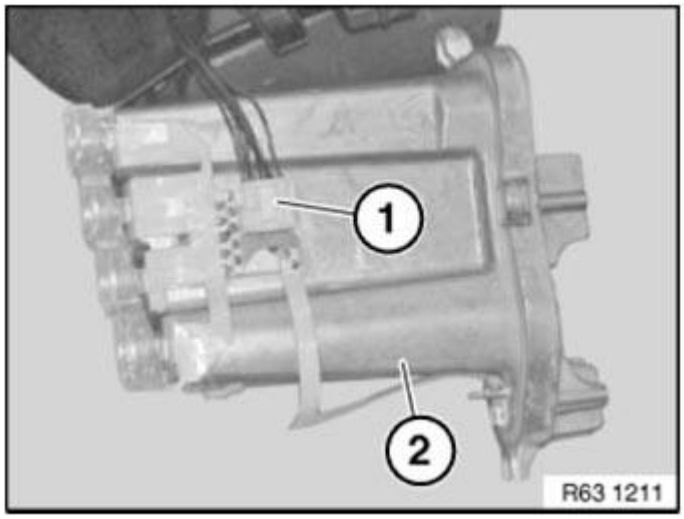


Fig. 115: Identifying Plug Connection On Turn Indicator Insert
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Teach in turn indicator insert (2) via vehicle diagnosis.

- Service functions
- Body
- Lights
- Learning turn signal indicator

63 13 082 REMOVING AND INSTALLING/REPLACING RIGHT TURN INDICATOR INSERT

Operation is described in:

Removing and installing/replacing **LEFT TURN INDICATOR INSERT**

63 99 147 REPLACING BOTH BULBS FOR FRONT SIDE LIGHTS

Operation is described in:

Replacing **BULB FOR SIDE LIGHT, FRONT LEFT**

63 99 162 REPLACING BOTH BULBS FOR FRONT TURNING LIGHTS

Operation is described in:

Replacing **BULB FOR FRONT LEFT TURNING LIGHT**

63 99 431 REPLACING BULB FOR FRONT CEILING LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Necessary preliminary work

- Remove **ROOF SWITCH CLUSTER**

Turn bulb in direction of arrow and remove.

Installation note:

Note **BULB TYPE** .

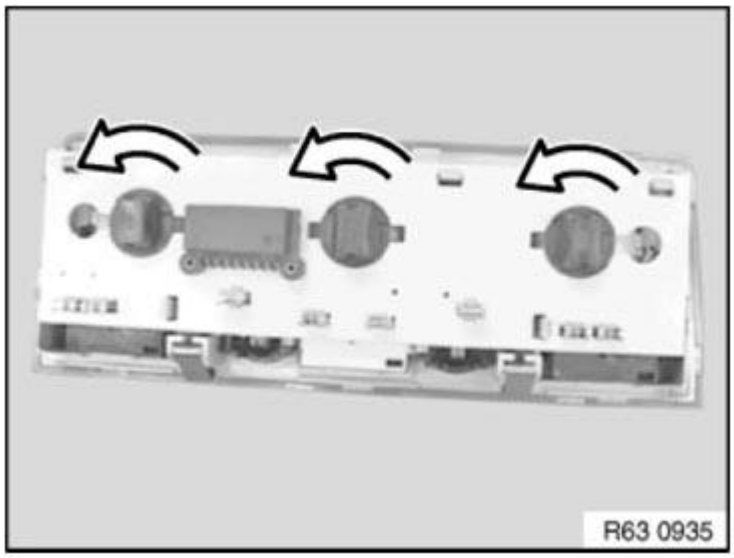


Fig. 116: Removing Front Ceiling Light Bulb
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 145 REPLACING BULB FOR FRONT LEFT SIDE LIGHT (XENON HEADLIGHT)

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Turn cover (1) in direction of arrow and remove.

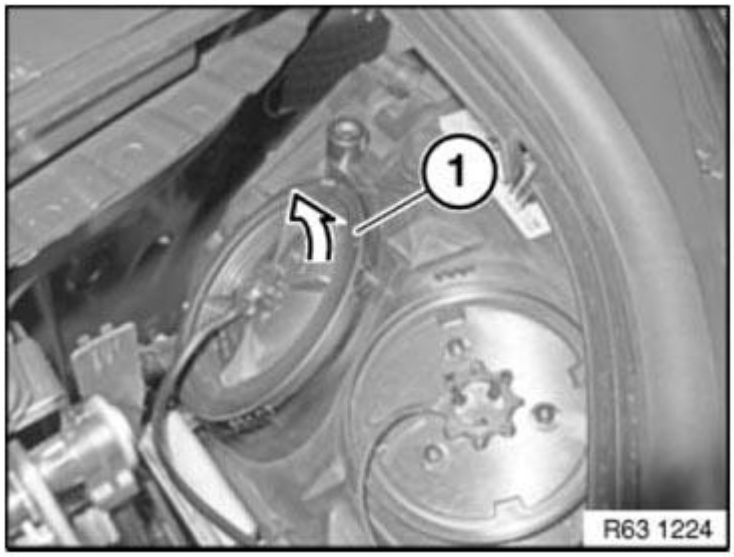


Fig. 117: Removing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) from bulb (2).

Turn bulb (2) in direction of arrow and remove from headlights (3).

Installation:

Holder with bulb for side lights (2) must be correctly seated in mounting.

Note **BULB TYPE** .

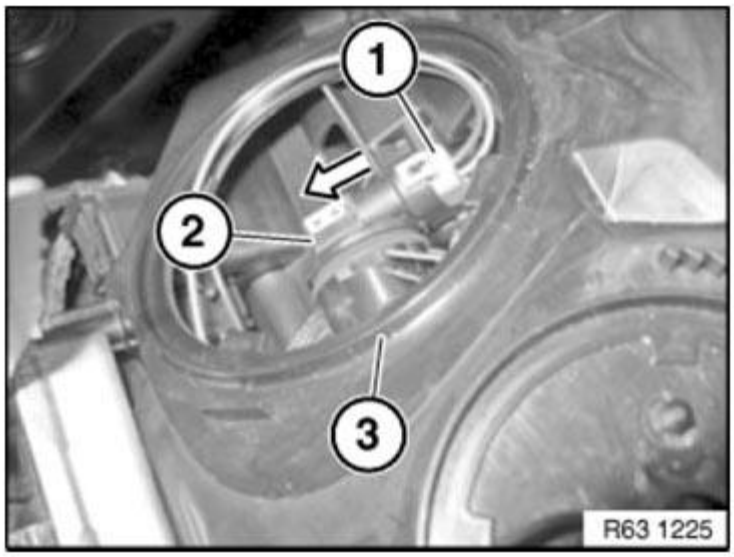


Fig. 118: Removing Handling Light Bulb

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 160 REPLACING BULB FOR FRONT LEFT TURNING LIGHTS

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Remove cover (1) from left engine compartment lid seal mounting.

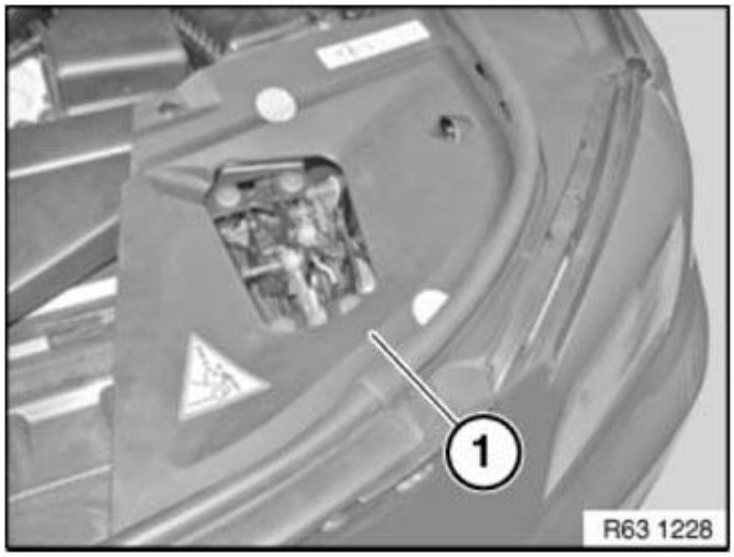


Fig. 119: Identifying Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Turn protective cap (1) on headlights (2) in direction of arrow and remove.

Installation note:

Protective cap (1) must be correctly engaged.

Check seal.

Replace protective cap (1) if necessary.

Observe **NOTES FOR REPLACING THE PROTECTIVE CAP** .

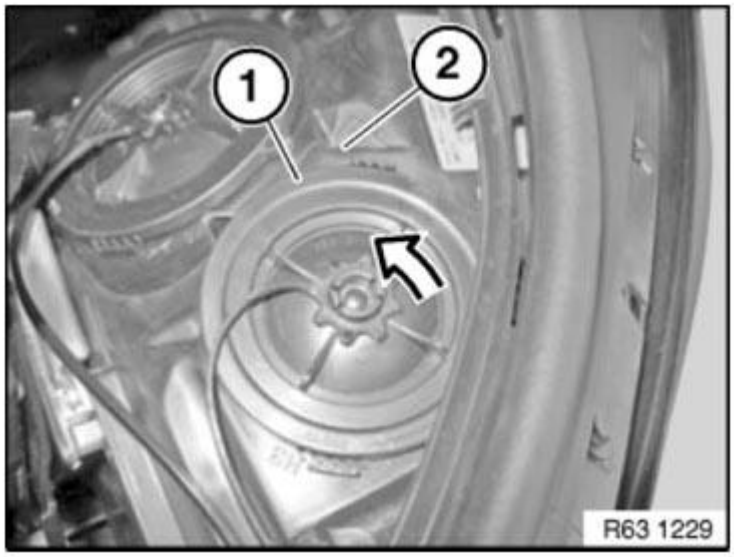


Fig. 120: Removing Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and unlock retainer (2).

Remove bulb (3) in direction of arrow.

Replacement:

Note **BULB TYPE** .

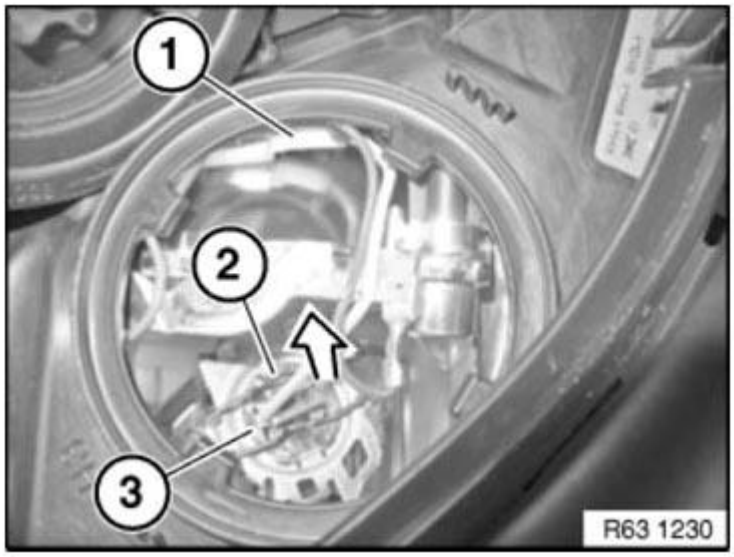


Fig. 121: Removing Handling Light Bulb
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 146 REPLACING BULB FOR FRONT RIGHT SIDE LIGHT (XENON HEADLIGHT)

Operation is described in:

Replacing **BULB FOR SIDE LIGHT, FRONT LEFT**

63 99 161 REPLACING BULB FOR FRONT RIGHT TURNING LIGHT

Operation is described in:

Replacing **BULB FOR FRONT LEFT TURNING LIGHT**

63 99 076 REPLACING BULB FOR LEFT XENON HEADLIGHT (WITH IGNITION UNIT)

Operation is described in:

Replacing **IGNITION UNIT FOR LEFT XENON HEADLIGHT**

63 99 432 REPLACING BULB FOR REAR CEILING LIGHT

WARNING: **Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .**

Necessary preliminary tasks

- Remove **REAR CEILING LIGHT**

Turn bulb in direction of arrow and remove.

Installation:

Note **BULB TYPE** .

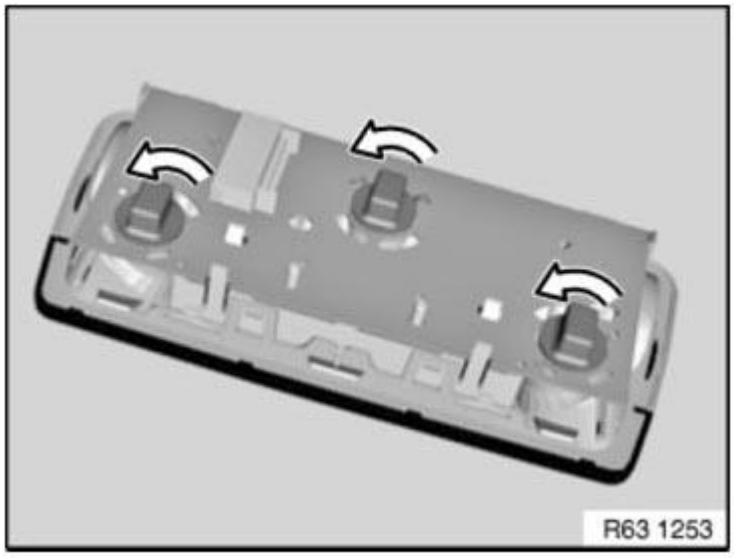


Fig. 122: Removing Rear Ceiling Light Bulb
Courtesy of BMW OF NORTH AMERICA, INC.

63 99... REPLACING BULB FOR REAR MAKE-UP MIRROR

Necessary preliminary tasks

- Remove **MAKE-UP MIRROR**

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Unclip holders (1) from make-up mirror (2).

Carefully remove cover (3) towards top.

Installation:

Make sure cover (3) is correctly seated.

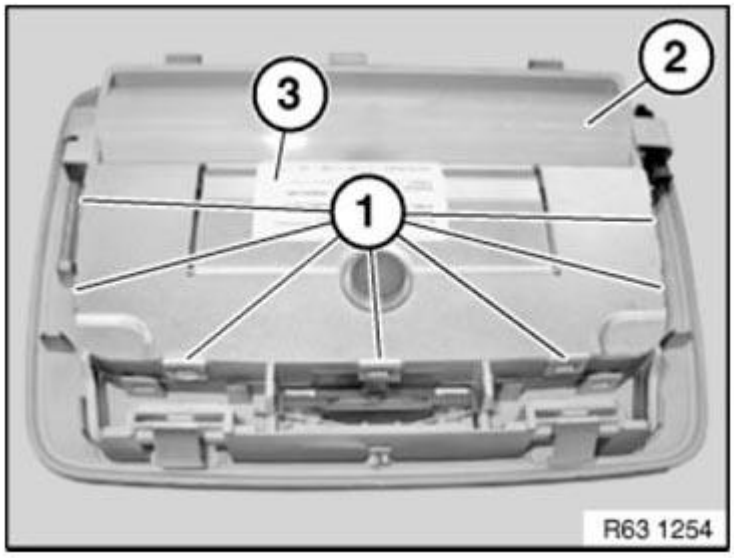


Fig. 123: Identifying Make-Up Mirror With Holder And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off bulbs (1) in direction of arrow.

Installation:

Note **BULB TYPE** .

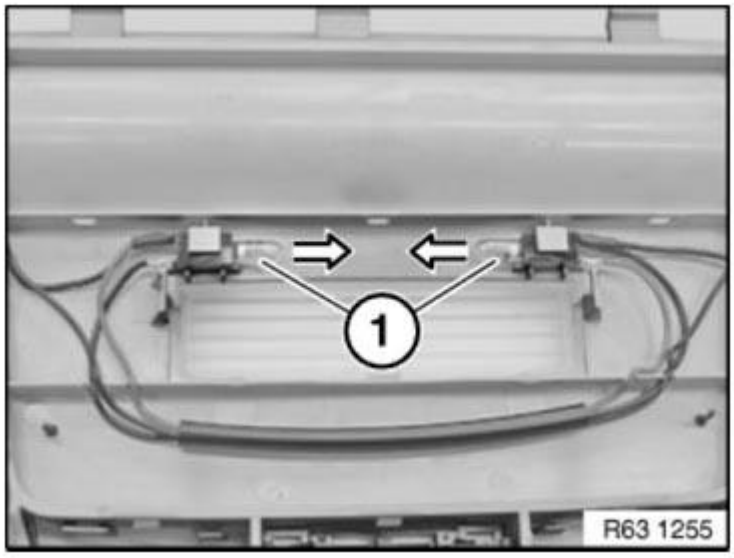


Fig. 124: Pulling Bulb
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 077 REPLACING BULB FOR RIGHT XENON HEADLIGHT (WITH IGNITION UNIT)

Operation is described in:

Replace **IGNITION UNIT FOR LEFT XENON HEADLIGHT** .

63 99 312 REPLACING BULB(S) FOR LEFT OR RIGHT REAR LIGHT (REAR LID)

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Necessary preliminary tasks

- Remove **PANEL FOR TAILGATE**

NOTE: Rear light (3) shown removed for purposes of clarity.

Pull bulb holder (1) or bulb holder (2) out of rear light (3) and change corresponding bulb.

NOTE:

1. **Bulb for rear fog light**
2. **Bulb for reversing light**

Installation:

Note **BULB TYPE** .

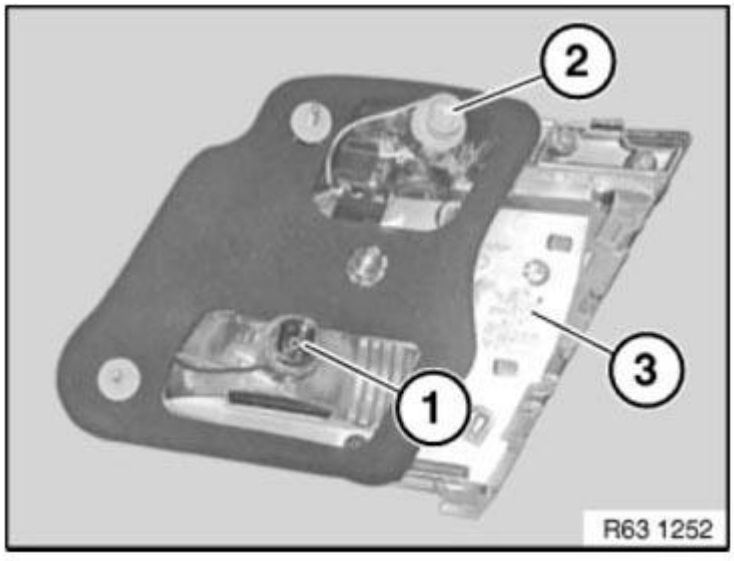


Fig. 125: Identifying Bulb Holders With Rear Light
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 210 REPLACING HALOGEN BULB FOR LEFT FOG LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Necessary preliminary tasks

- **REMOVE** trim grille in bumper trim

Unfasten plug connection (1) and disconnect.

Turn bulb holder (2) in direction of arrow and remove from fog light (3).

Installation:

Note **BULB TYPE** .

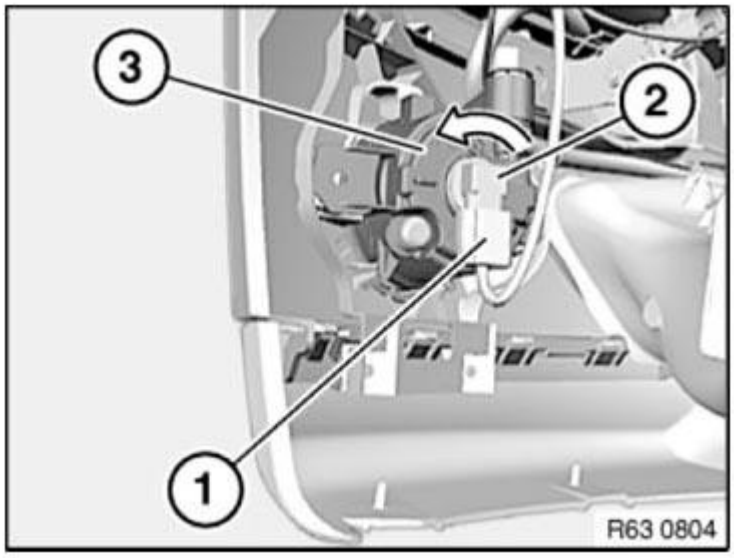


Fig. 126: Removing Fog Light Bulb Holder
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 211 REPLACING HALOGEN BULB FOR RIGHT FOG LAMP

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Operation is described in:

Removing and installing **LEFT FOG LAMP** .

63 17 071 REPLACING LEFT FOG LAMP

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Operation is described in:

Removing and installing **LEFT FOG LAMP** .

Adjust **FRONT FOG LAMPS** .

63 17 076 REPLACING RIGHT FOG LAMP

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Operation is described in:

Removing and installing **LEFT FOG LAMP** .

63 12 870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT

WARNING: Version with xenon headlights:

Danger to life due to high voltage! Therefore disconnect all components from voltage supply before removal.

Work on the entire xenon lighting system (ignition device, control unit and bulb) may only be carried out by qualified personnel.

Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS)

Necessary preliminary work

- Remove **LEFT HEADLIGHT**

Release screws (1) on cover (2) and remove from headlight (3).

Tightening torque **63 12 4AZ** .

Installation note:

The housing cover must be locked correctly.

Check seal.

Replace the housing cover, if necessary.

Observe **NOTES FOR REPLACING THE PROTECTIVE CAP** .

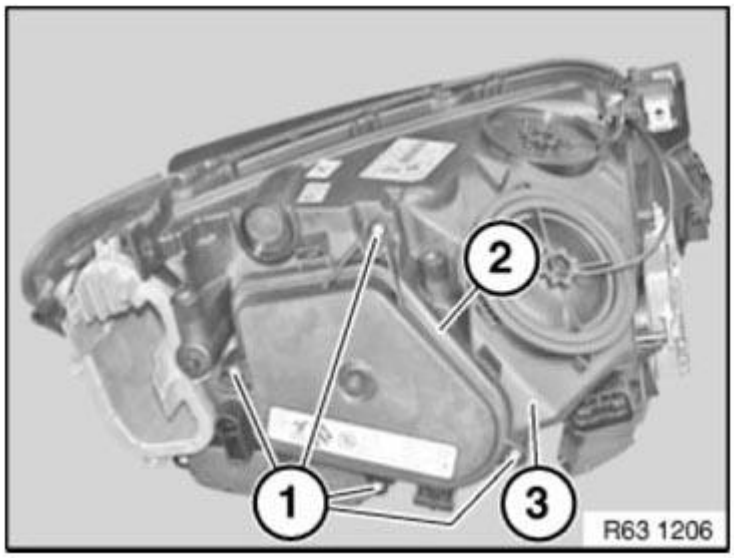


Fig. 127: Identifying Headlight With Screws On Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on ignition unit with bulb (3).

Unlock retainer (2) and remove ignition unit with bulb (3) in direction of arrow.

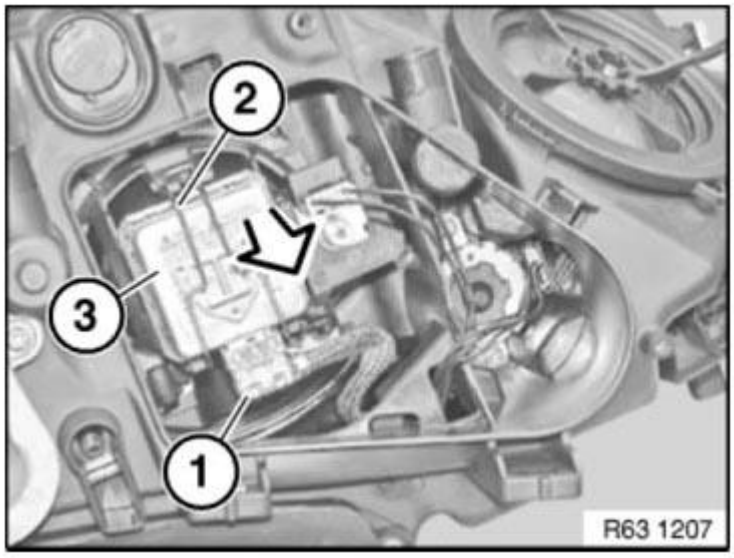


Fig. 128: Removing Ignition Unit With Bulb
Courtesy of BMW OF NORTH AMERICA, INC.

63 12 871 REPLACING RIGHT IGNITION UNIT FOR RIGHT XENON HEADLIGHT

Operation is described in:

Replacing **IGNITION UNIT FOR LEFT XENON HEADLIGHT**

63 12 870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT

See **REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT**.

ACCESSORIES AND BODY, CAB

Paintwork - Repair

99 PAINTWORK

99 00... GENERAL INSTRUCTIONS ON PAINTWORK

General instructions and classification of paint stages are described on the KSD-CD (notes-general information on flat rate unit data, passenger car explanation for FR specifications for painting).

For further information, please refer to BMW Painting Handbook.

The marked area serves as the starting point for painting. This area may differ from the illustration for technical painting reasons.

Touching-up areas are taken into account.

Special procedure for matte paintwork:

Matte paintwork cannot be touched up since the painted surface cannot be polished.

For further information, see also the BMW painting handbook and the Aftersales Assistance Portal.

41 00... INFORMATION/WARNING LABELS

Missing or damaged information/warning labels (e.g. tire inflation pressure) must be replaced.

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- Store cleaning agents/paints only in a secure cabinet.
- Keep cleaning agents/paints away from naked flames and other sources of ignition.
- Protect cleaning agents/paints from high temperatures and direct sunlight.
- Always keep an eye bath on hand, change the water regularly (once a month).

IMPORTANT: Observe following instructions before use:

- Manufacturer's instructions (on container/packaging)
- Hazard warnings (on container/packaging)
- Manufacturer's instructions on package insert
- Material safety data sheet of manufacturer
- Product information in EPC
- National market regulations

IMPORTANT: Observe following instructions during use:

- Do not eat, drink or smoke while working with these products.
- Avoid direct contact with skin and eyes.
- Wear personal protective clothing/equipment.
- Ensure that all enclosed areas are well ventilated or extract fumes directly.
- Immediately change working clothes soiled with cleaning agent/paint.
- After finishing work, wash your hands and apply protective skin cream.

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

36 00... INFORMATION/RECOMMENDATIONS AND REPAIR METHODS FOR ALUMINIUM WHEELS

Cosmetic repairs of aluminium wheels using ColorSystem

Recommendations and repair methods for aluminium wheels are described in the ASAP system from the following sources:

- Aftersales Assistance Portal (BMW)
- Service/Technology (BMW)
- ColorSystem (BMW)

  - Repair recommendations for aluminium wheels (BMW)

99 00... MISCELLANEOUS PAINTING

Follow **GENERAL INSTRUCTIONS ON PAINTING** .

Engine compartment, complete

Carry over the area shown symmetrically to the other side of the car.

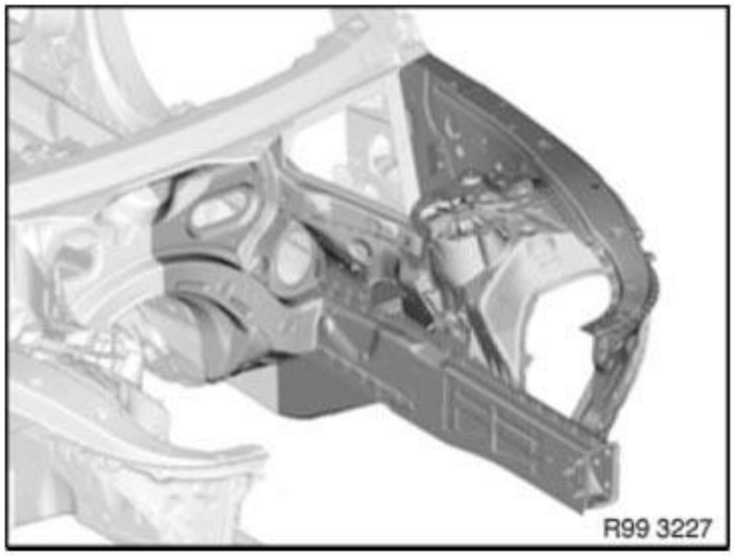


Fig. 1: Identifying Paint Applying Areas On Engine Compartment, Complete
Courtesy of BMW OF NORTH AMERICA, INC.

Engine bulkhead

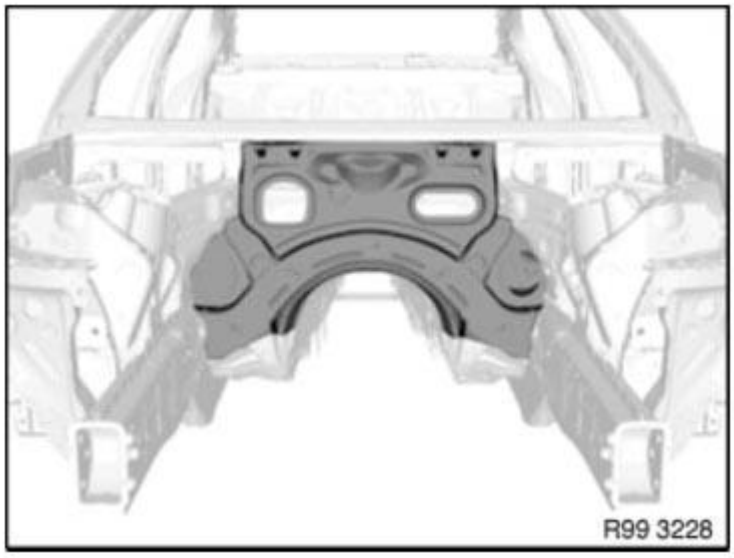


Fig. 2: Identifying Engine Compartment Partition Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Engine support (partial replacement before spring strut dome)

Inner side shown

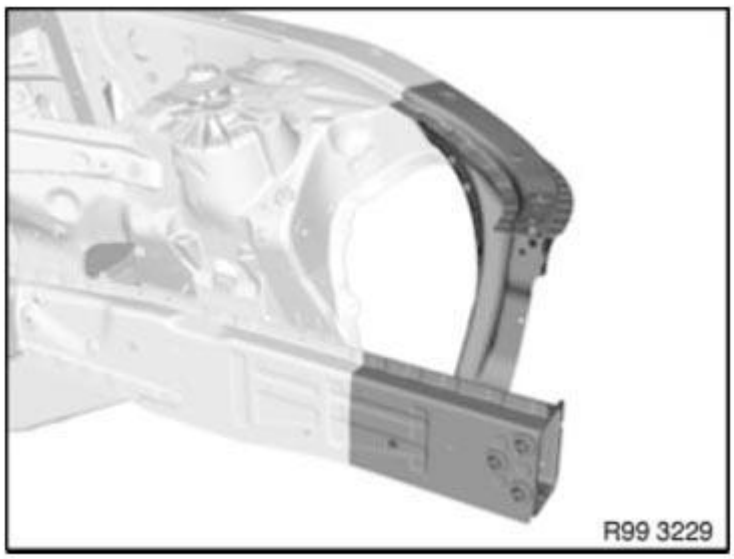


Fig. 3: Identifying Engine Carrier (Inner Side) Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Engine support (partial replacement before spring strut dome)

Outer side shown

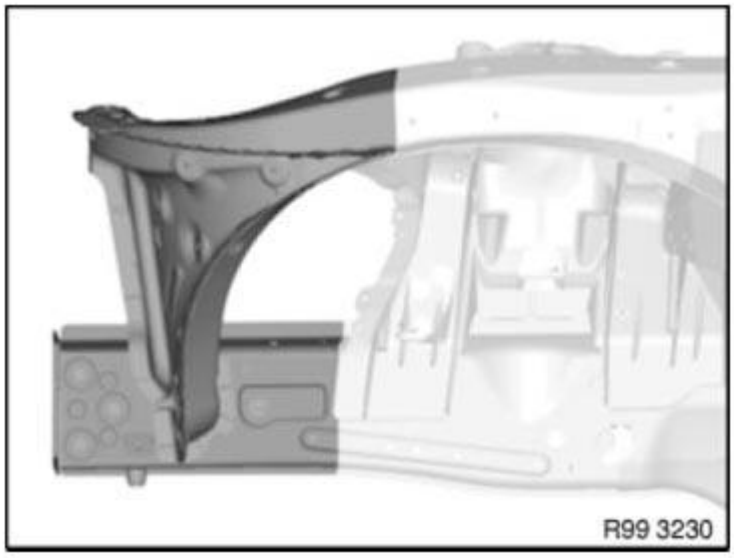


Fig. 4: Identifying Engine Carrier (Outer Side) Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Engine support (inside only)

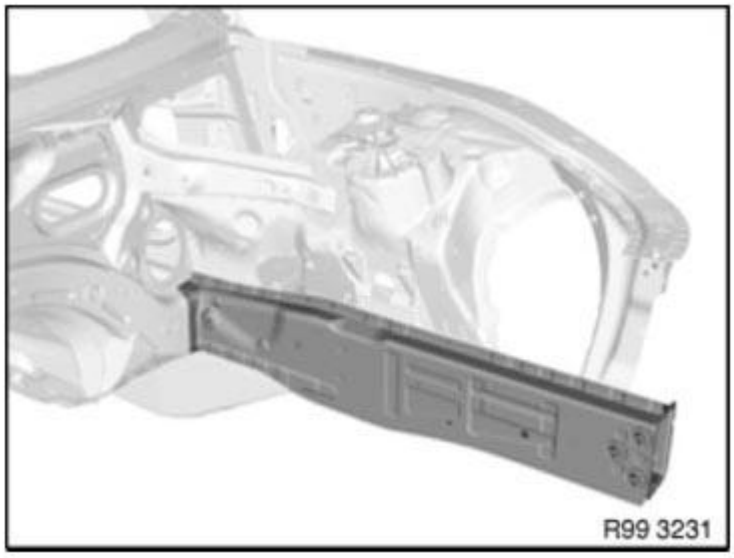


Fig. 5: Identifying Engine Carrier (Inside Side) Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel arch, front, complete

Inner side shown

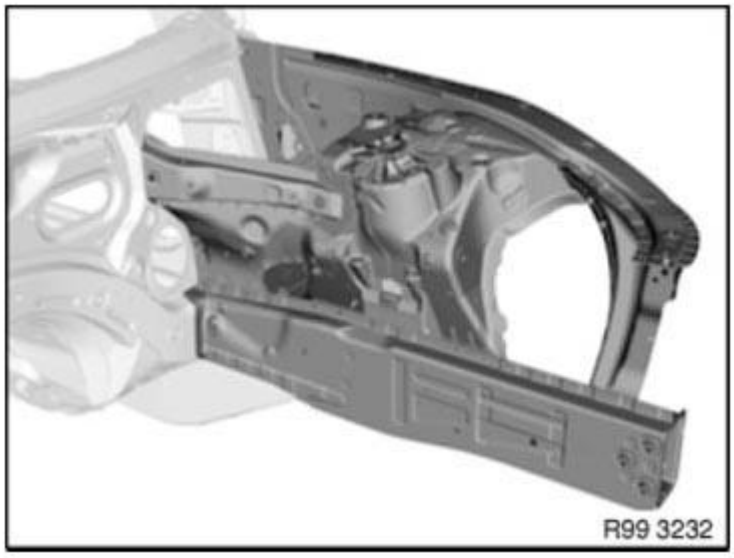


Fig. 6: Identifying Front Wheel Arch (Inner Side) Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel arch, front, complete

Outer side shown

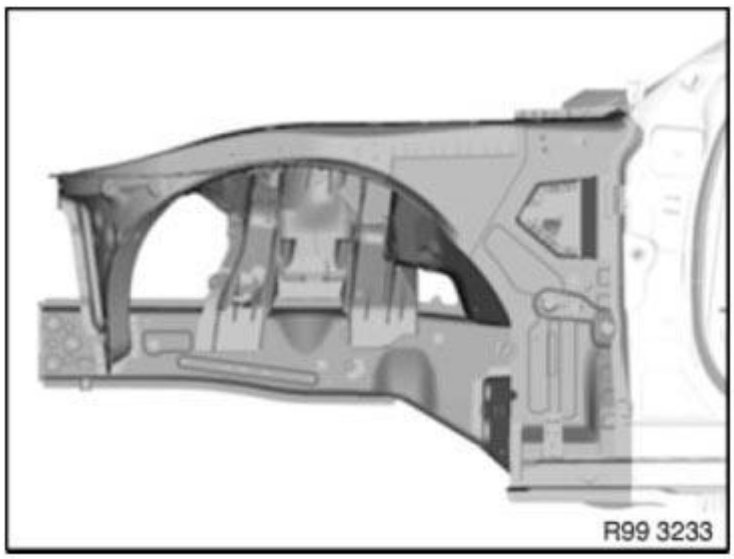


Fig. 7: Identifying Front Wheel Arch (Outer Side) Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Luggage compartment floor

Carry over the area shown symmetrically to the other side of the car.

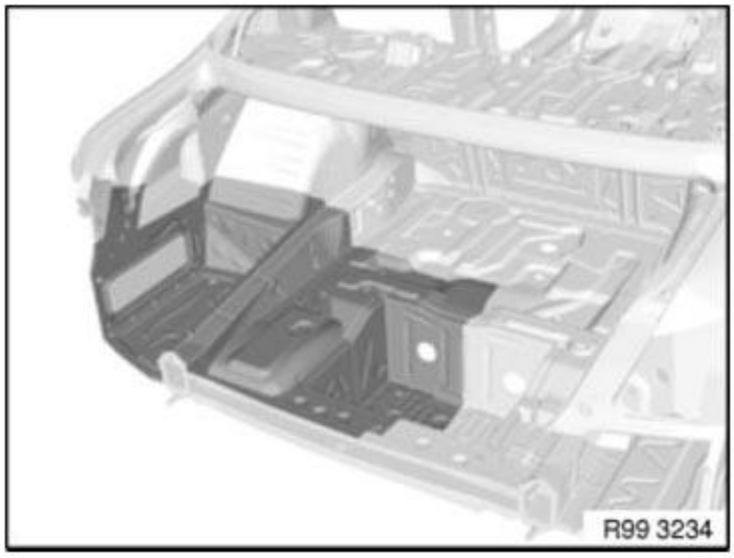


Fig. 8: Identifying Luggage Compartment Floor Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

61 00... NOTES ON HANDLING THE HIGH PRESSURE CLEANER

WARNING: Only used a high pressure cleaner approved by BMW!

Only instructed persons aged over 16 years may work using a high pressure cleaner.

Check the high pressure cleaner and electrical wiring for visible damage.

Only use at a suitable location.

IMPORTANT: Pay attention to following hazard warnings:

- **Danger of injury due to water jet**
- **Contact with hazardous substances in spray**
- **Risk of skidding on wet floor**
- **Risk of stumbling due to hoses and cables**
- **Comply with NOTES AND INSTRUCTIONS ON HANDLING CLEANING AGENTS !**
- **Risk of scalding when cleaning with hot water**
- **On electric or hybrid cars, the safety instructions for handling with hybrid cars are to be complied with**

WARNING: The following personal protective equipment is to be used:

- **Safety goggles/face guard**
- **Suitable gloves**
- **Apron**
- **Rubber boots**
- **Ear protectors**
- **Safety shoes**

IMPORTANT: Notes on washing a vehicle with a high pressure cleaner:

- **Do not wash directly on gaskets and control units during engine washes.**
- **A minimum distance of 30 cm must be adhered to for tires and tire valves.**
- **A minimum distance of 30 cm must be adhered to for the soft top and painted parts.**
- **Do not use if engine is still hot.**
- **Do not exceed maximum water temperature of 60 degrees.**
- **Do not spray directly onto cameras/sensors.**
- **On electric or hybrid cars do not wash on high-voltage components.**

99 00...NOTES ON USING TEMPERATURE-CONTROLLED INFRA-RED RADIATORS

When using temperature-controlled infrared radiators, damage to adhesive bonds, paint and vehicle components can occur when drying spatula and filler.

The temperature sensors in the infrared radiator only operate reliably on large, even surfaces.

On small surfaces such as C-pillars or sills, often only a colder, adjacent area is measured.

This leads to actual surface temperatures of up to 130°C, even if only 70°C is set on the infrared radiator.

When the rear side walls are partially replaced by bonding and riveting, these high temperatures can lead to a visible pattern in the area of the joint.

Remedy:

Check the surface temperatures on small component surfaces during the drying process with an external **TEMPERATURE SENSOR**.

The general rule is: The surface temperatures must not exceed 85°C.

Infrared lamp and infrared temperature measuring device

An infrared lamp with stand and an infrared temperature measuring device are required for hardening the 2-component metallic filler for the glue and rivet repair method.

This equipment guarantees hardening of the 2-component metallic filler quickly and professionally in three work stages.

This equipment is essential to prevent adhesion problems and/or visible caving during application of the 2-component metallic filler.

The infrared lamp dries the filler, and the temperature measuring device monitors and checks the three-stage drying process of the 2-component metallic filler.

Order through BMW part ordering channel.

99 00... PAINTWORK (2 AND 3 COATS)

Follow **GENERAL INSTRUCTIONS ON PAINTING.**

The following scopes of work are applicable to 2- and 3-coat paintwork.

Inside mirror

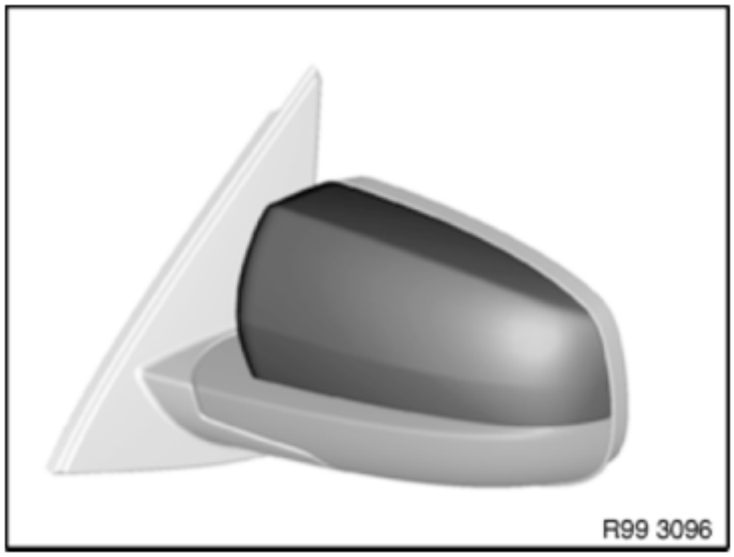


Fig. 9: Identifying Inside Mirror Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Outer door handle

Area specification applies to all paint stages.

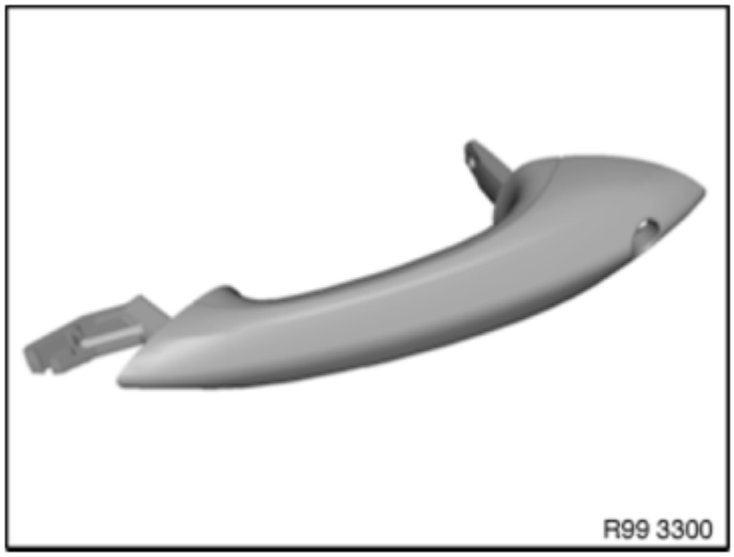


Fig. 10: Identifying Outer Door Handle Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Roof

Area specification applies to all paint stages.

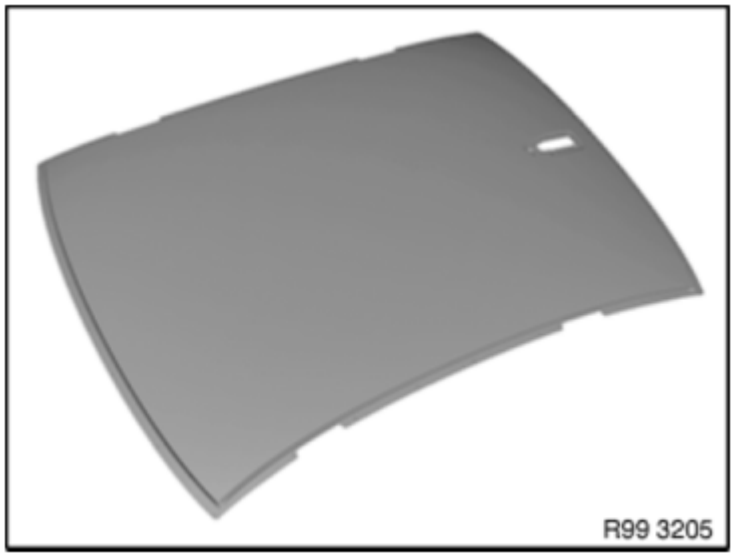


Fig. 11: Identifying Roof Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Trim strip on roof frame

Area specification applies to all paint stages.

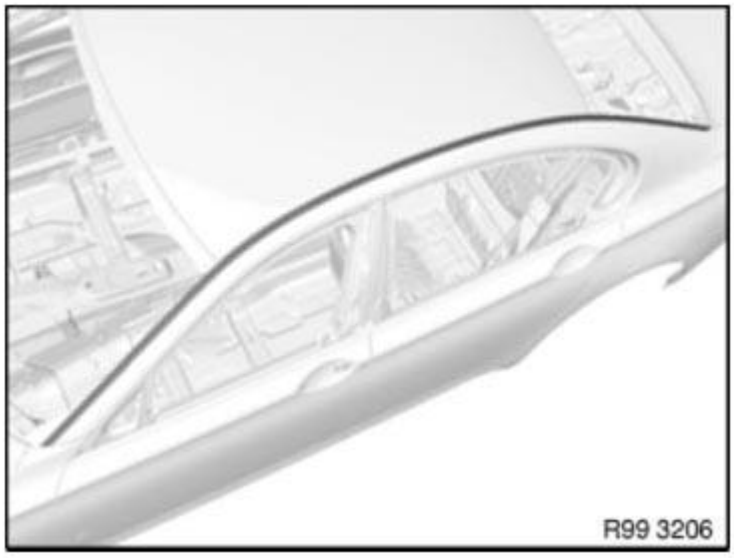


Fig. 12: Identifying Trim Strip On Roof Frame Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Rear cross panel

Area specification applies to all paint stages.

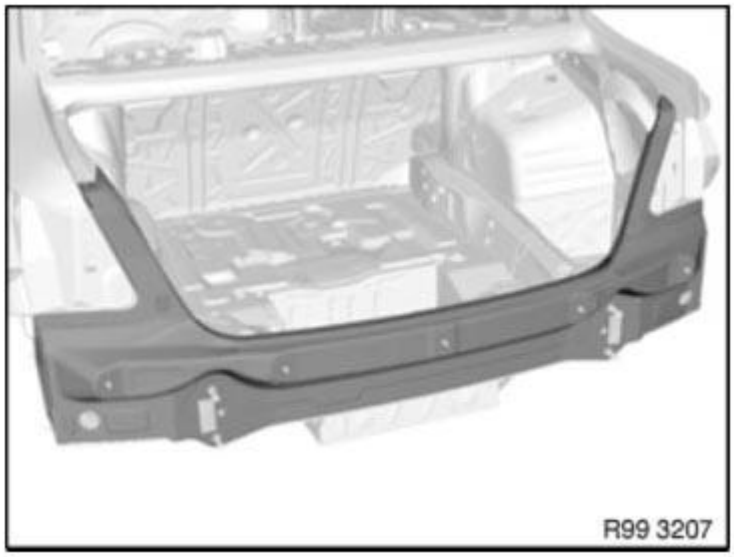


Fig. 13: Identifying Rear Cross Panel Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Side wall, front

Area specification applies to all paint stages.

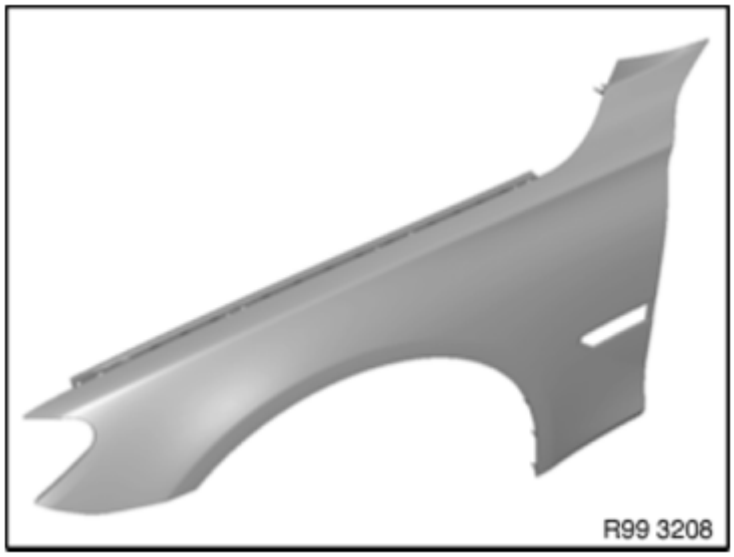


Fig. 14: Identifying Side Wall, Front Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Front door

Area specification applies to paint stage 1.

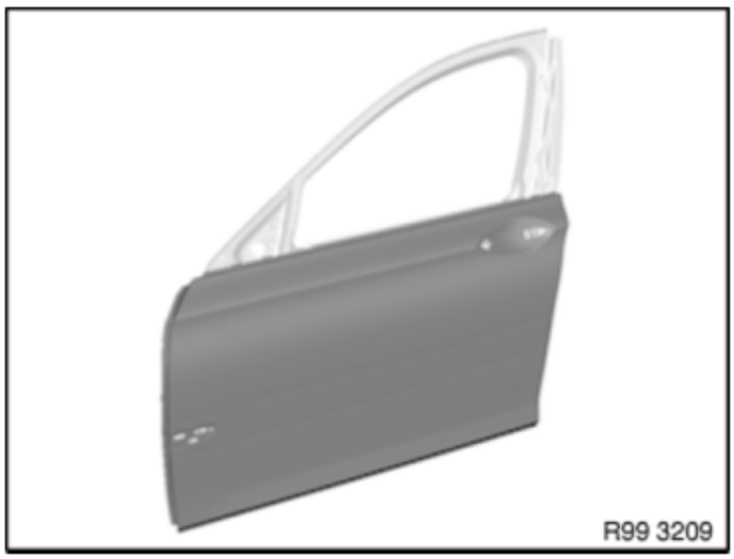


Fig. 15: Identifying Front Door Paint Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Front door

Area specification applies to paint stages 2 and 3.

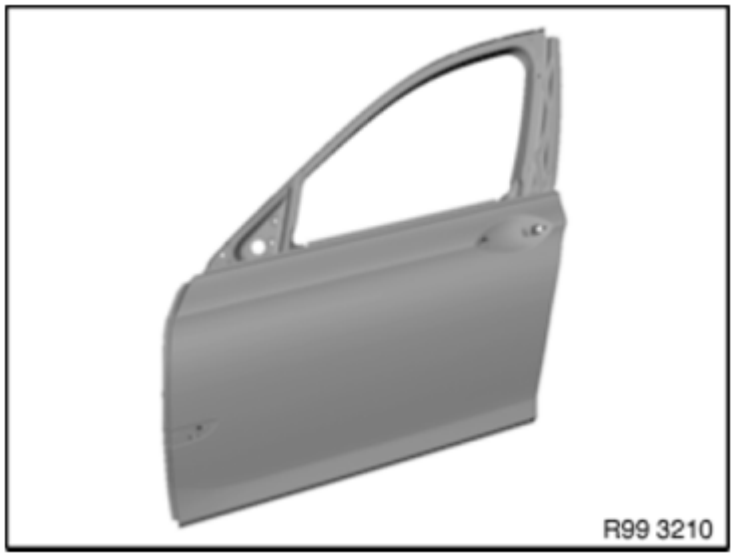


Fig. 16: Identifying Front Door Paint Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Front door

Additional area specification inner plate for paint stages 2 and 3.



Fig. 17: Identifying Front Door Paint Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Rear door

Area specification applies to paint stage 1.

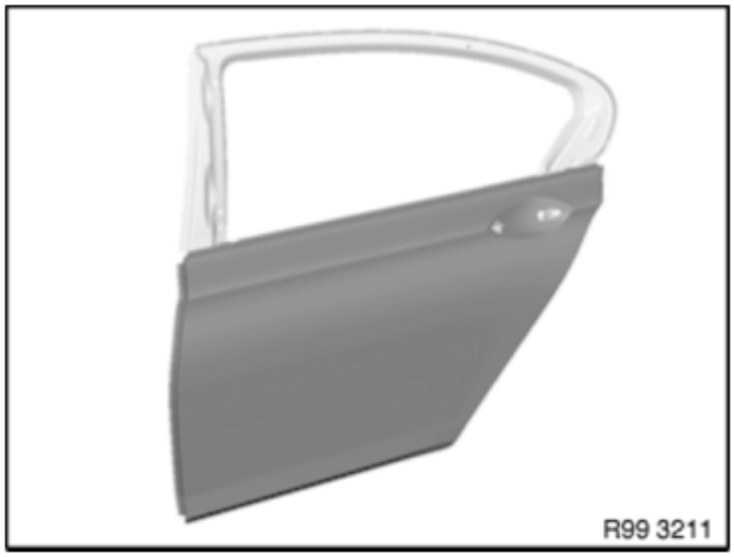


Fig. 18: Identifying Rear Door Paint Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Rear door

Area specification applies to paint stages 2 and 3.

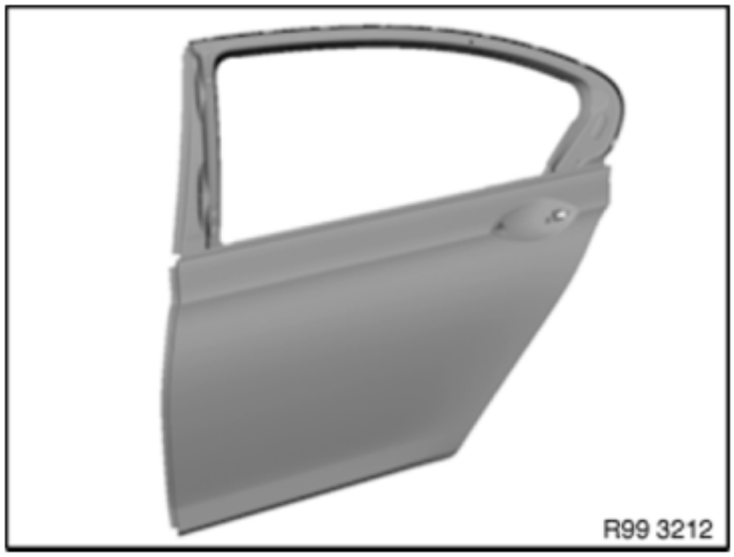


Fig. 19: Identifying Rear Door Paint Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Rear door

Additional area specification inner plate for paint stages 2 and 3.

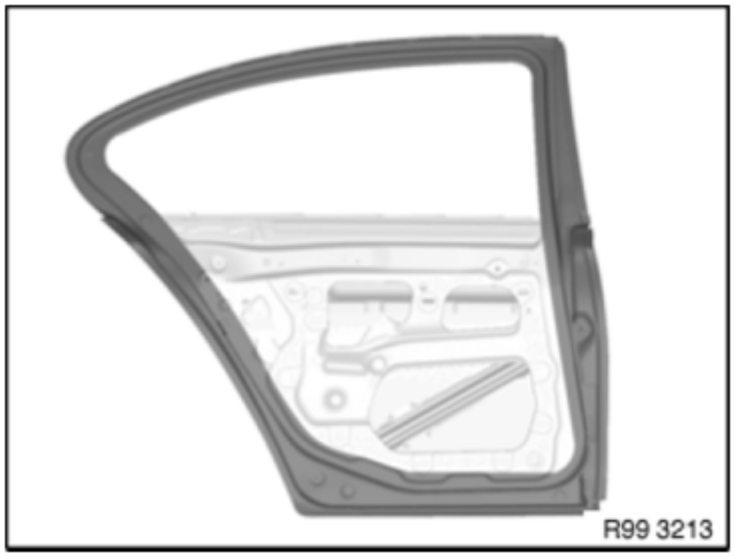


Fig. 20: Identifying Rear Door Paint Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Bonnet

Area specification applies to all paint stages.

Additionally complete inner plate for paint stages 2 and 3.

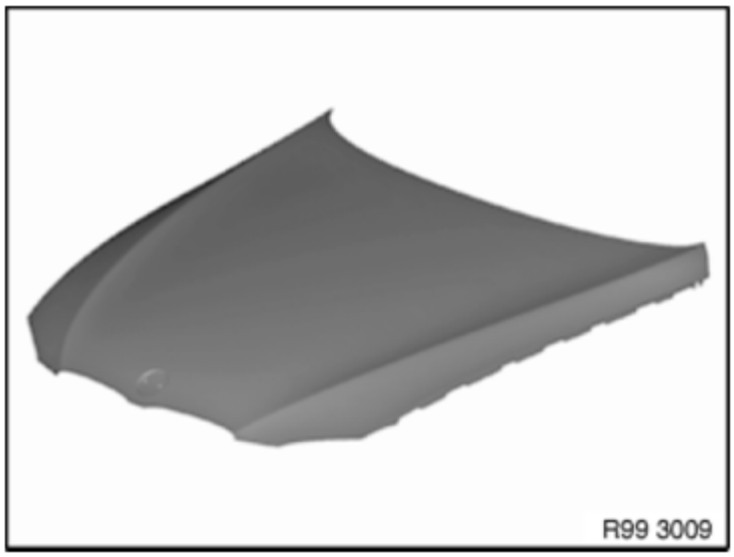


Fig. 21: Identifying Bonnet Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

rear lid

Area specification applies to paint stages 2 and 3.



Fig. 22: Identifying Rear Lid Paint Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

rear lid

Additional area specification inner plate for paint stages 2 and 3.



Fig. 23: Identifying Rear Lid Paint Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Tailgate trim

Area specification applies to paint stage 1.

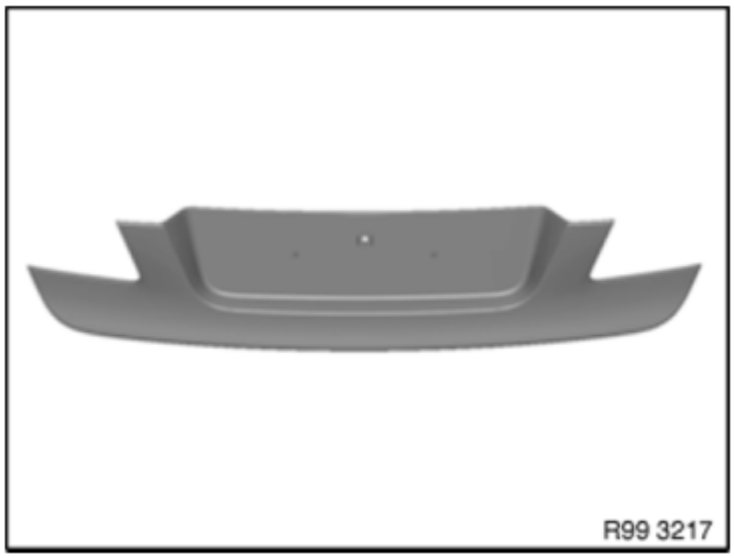


Fig. 24: Identifying Tailgate Trim Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Flap for fuel filler neck

Area specification applies to all paint stages.

Additionally with inner plate for paint stages 2 and 3.

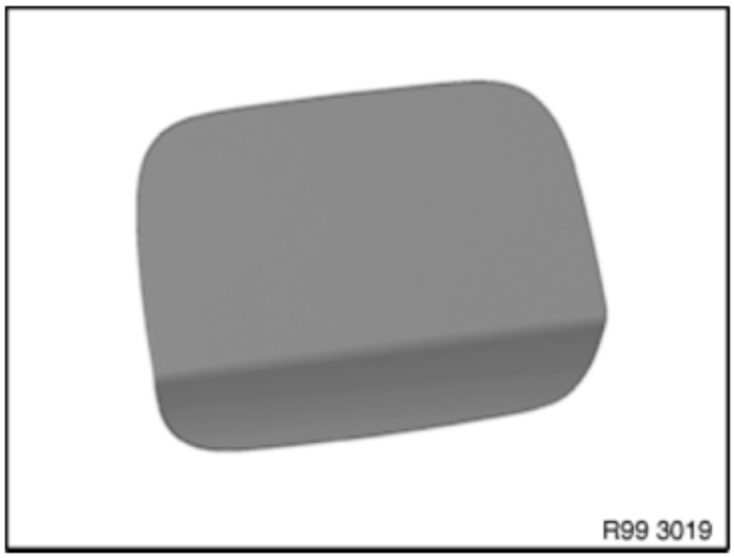


Fig. 25: Identifying Paint Applying Areas On Flap For Fuel Filler Neck
Courtesy of BMW OF NORTH AMERICA, INC.

Trim panel for cover on side member

Area specification applies to all paint stages.

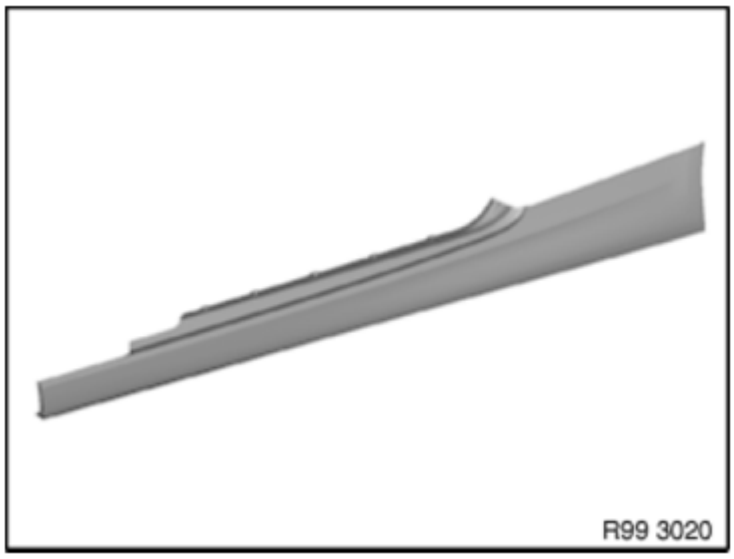


Fig. 26: Identifying Paint Applying Areas On Trim Panel For Cover On Side Member
Courtesy of BMW OF NORTH AMERICA, INC.

Panel, bumper, front

Area specification applies to all paint stages.

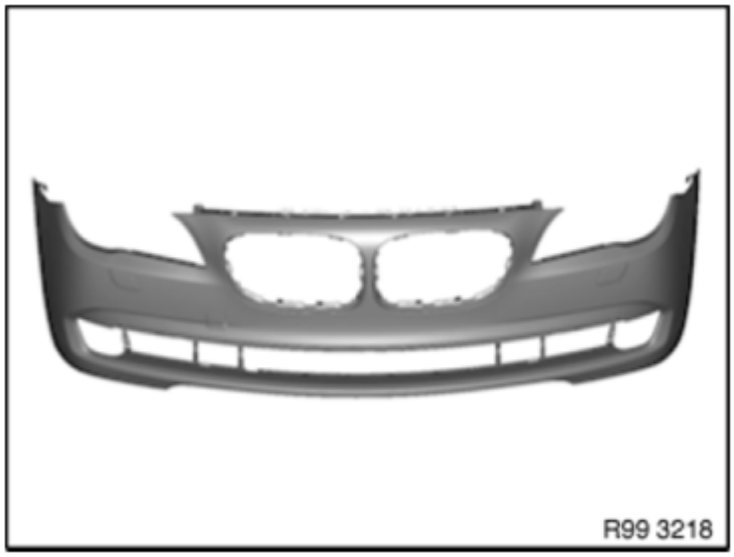


Fig. 27: Identifying Panel, Bumper, Front Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Panel, bumper, rear

Area specification applies to all paint stages.

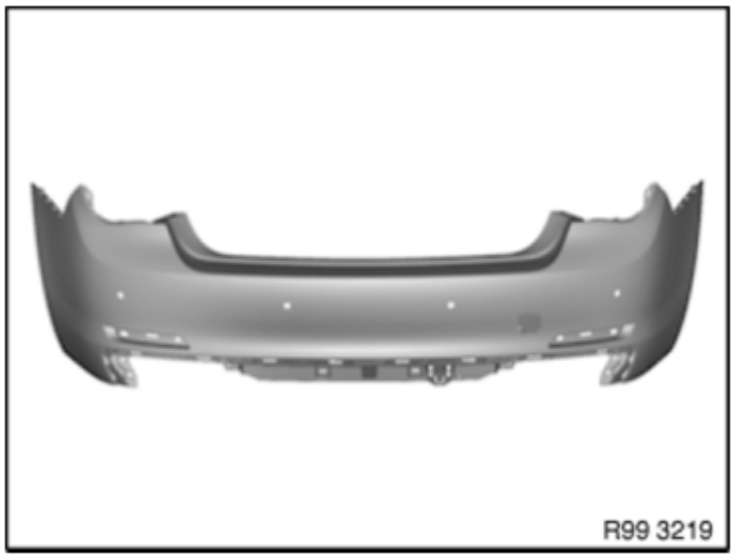


Fig. 28: Identifying Panel, Bumper, Rear Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Rear bumper trim panel cover

Area specification applies to all paint stages.

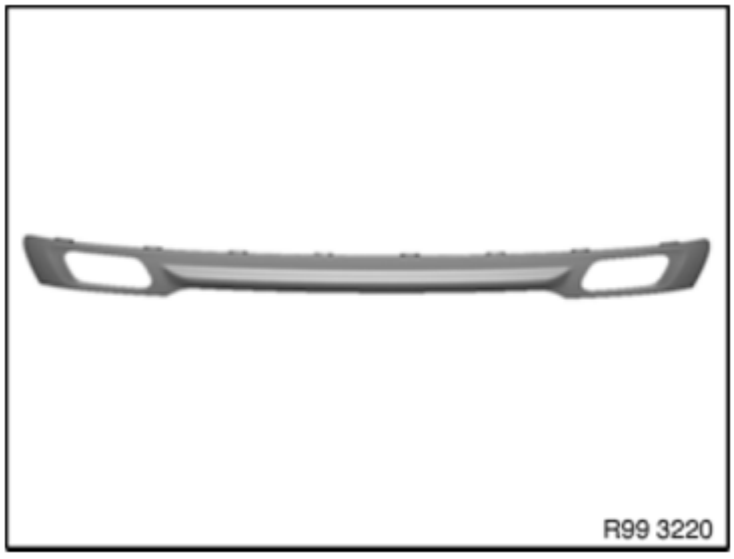


Fig. 29: Identifying Rear Bumper Trim Panel Cover Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Door post, middle

Area specification applies to all paint stages.

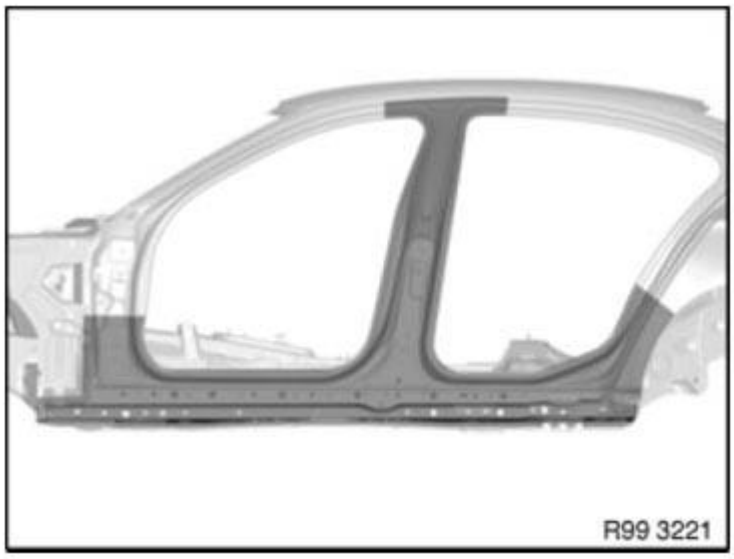


Fig. 30: Identifying Door Post, Middle Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Roof frame

Area specification applies to all paint stages.

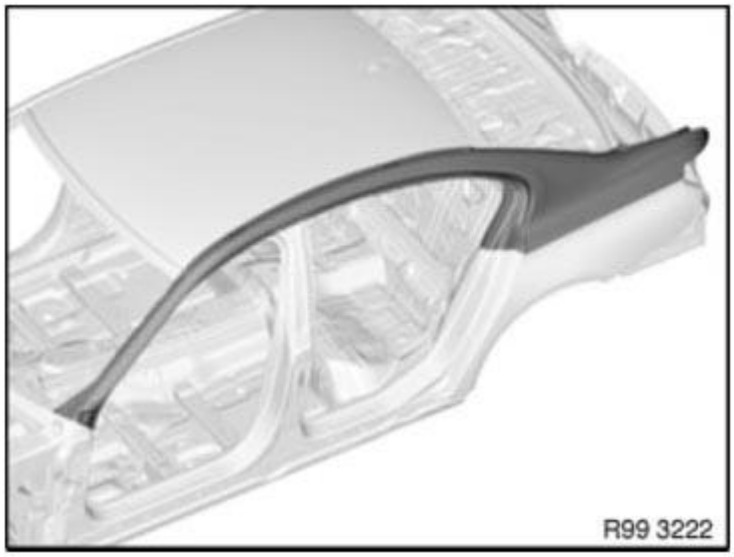


Fig. 31: Identifying Roof Frame Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Roof frame, front

Area specification applies to paint stage 1.

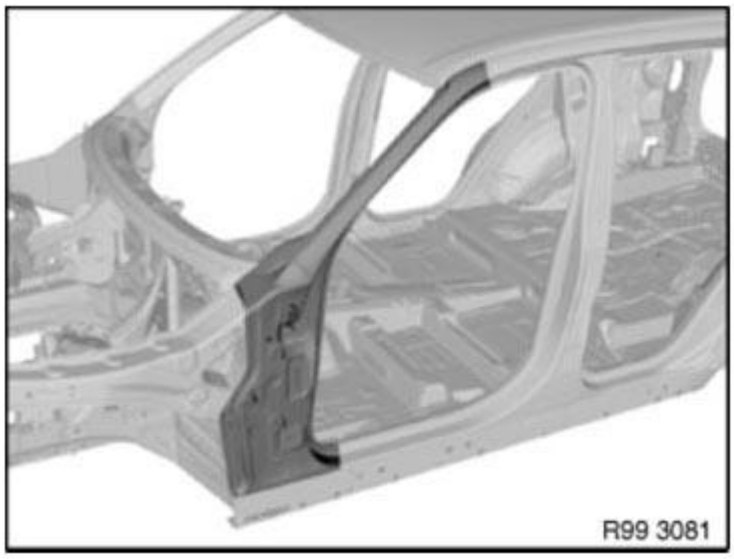


Fig. 32: Identifying Roof Frame, Front Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Roof frame, front

Area specification applies to paint stage 3.

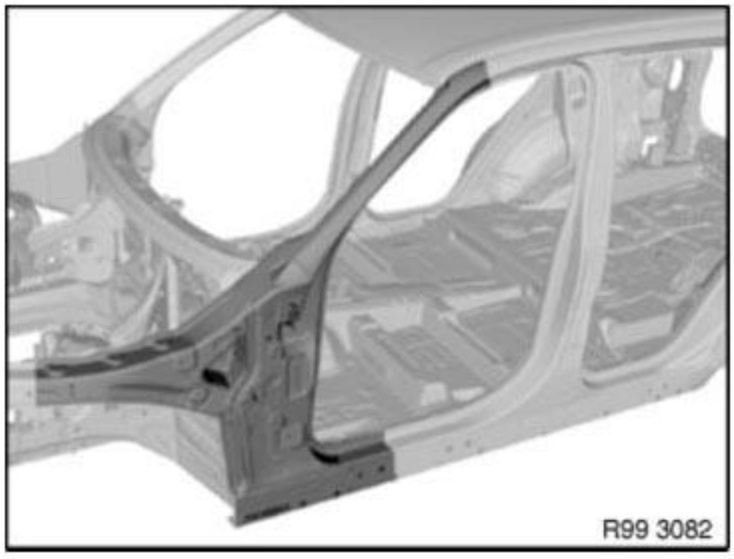


Fig. 33: Identifying Roof Frame, Front Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Rear side panel (up to roof frame, middle)

Area specification applies to paint stage 1.

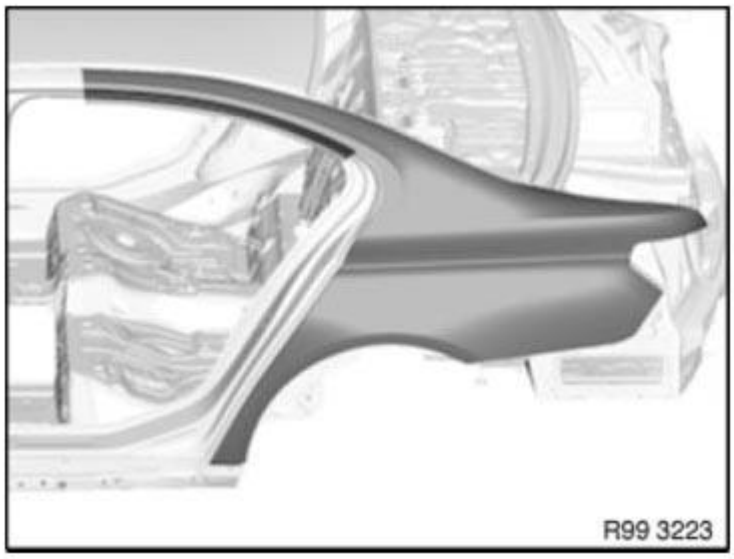


Fig. 34: Identifying Rear Side Panel Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Rear side panel (up to roof frame, middle)

Area specification applies to paint stage 3.

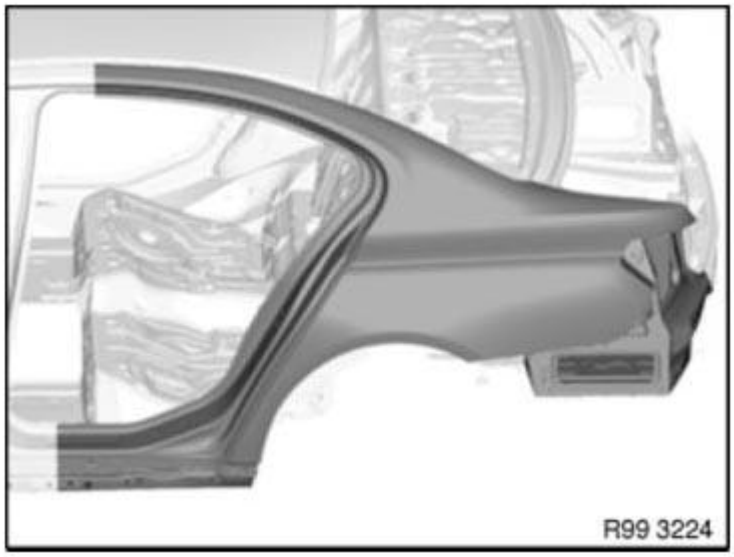


Fig. 35: Identifying Rear Side Panel Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Rear side panel above cutting edge

Area specification applies to all paint stages.

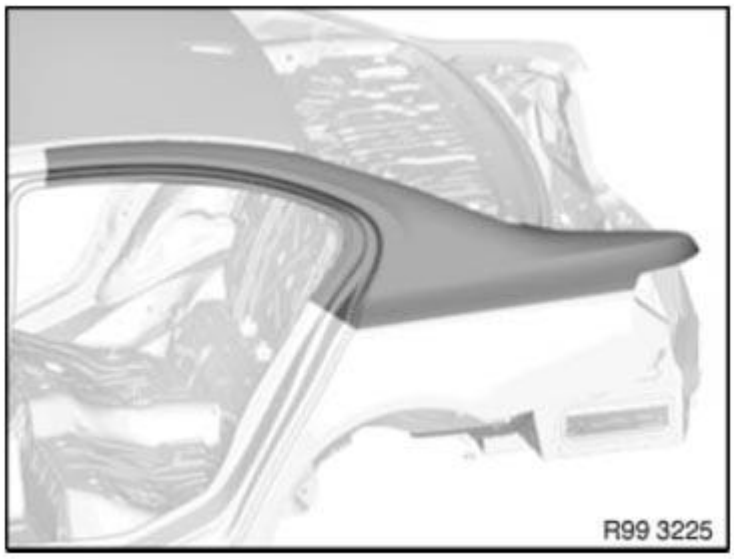


Fig. 36: Identifying Rear Side Panel Above Cutting Edge Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Cover for entrance

Area specification applies to all paint stages.

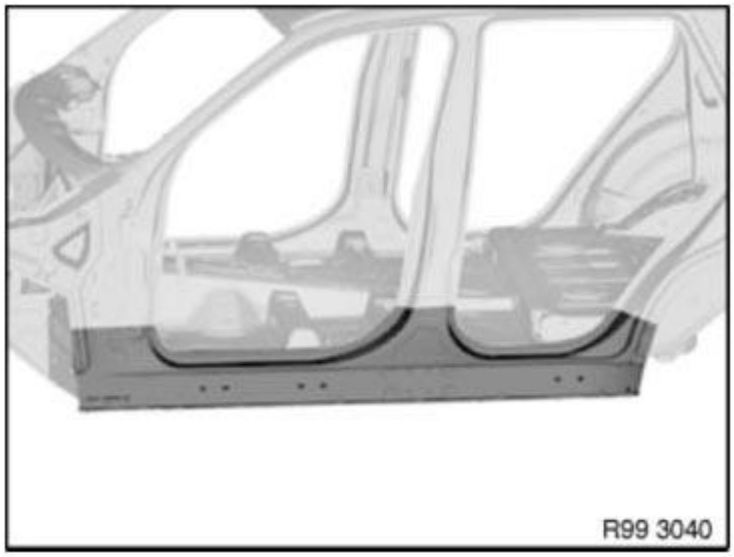


Fig. 37: Identifying Paint Applying Areas On Cover For Entrance
Courtesy of BMW OF NORTH AMERICA, INC.

Rear lid, top

Area specification applies to paint stage 1.



Fig. 38: Identifying Rear Lid, Top Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Rear lid, bottom

Area specification applies to all paint stages.

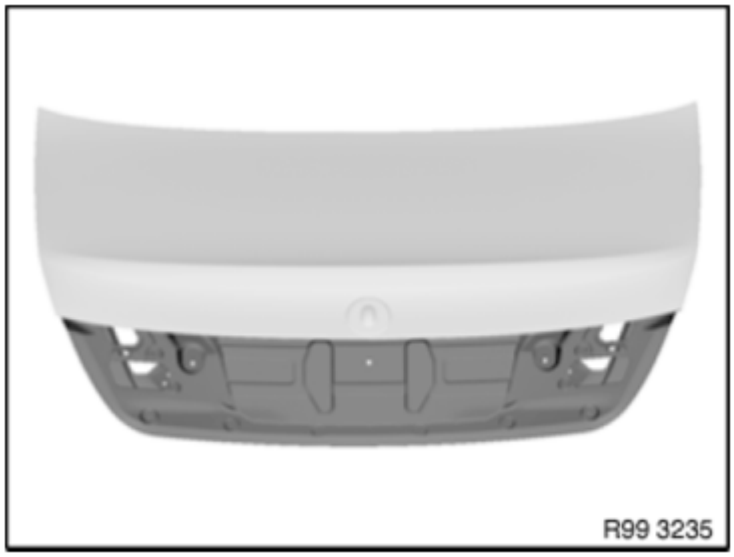


Fig. 39: Identifying Rear Lid, Bottom Paint Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

99 00...TOUCHING UP PAINTWORK DAMAGE

These notes apply to paintwork damage on the body aperture that occurred when detaching bonded window glass.

To ensure long-term corrosion protection, it is absolutely essential to touch up damage to paintwork!

The "BMW Color System" painting handbook forms the basis of these repair instructions and must be observed without fail.

Ground down damage to paintwork on body aperture and touch up with BMW multibase filler.

Grind larger areas or damage down to the bare sheet metal and coat with BMW multibase filler (layer thickness 30 to 40 µm).

Hardening time:

- With infrared, at least 10 minutes
- Without infrared for at least 60 °C, at least 30 minutes
- Without infrared for at least 20 °C, at least 24 hours

If a complete build-up of paint is required in the visible area:

- Tape off primed adhesive flange before applying top coat

IMPORTANT: Observe hardening time of BMW multibase filler otherwise a perfect bond cannot be guaranteed!

BRAKES

Pedals - Operating Fluids

1.0 GENERAL INFORMATION

For lubricating friction points on the pedal assemblies, use Syntheso Glep 1 (BMW Part No. 83 23 9 407 778).

BRAKES

Pedals - Repair

3511 PEDAL MOUNTING BLOCK

35 11 000 REMOVING AND INSTALLING (REPLACING) COMPLETE BEARING SUPPORT FOR FOOT PEDAL

IMPORTANT: After completion of work, carry out function check.

Necessary preliminary work

- Remove **BRAKE SERVO**

Release screws (1).

Remove control units from holder (2). Plugs remain connected.

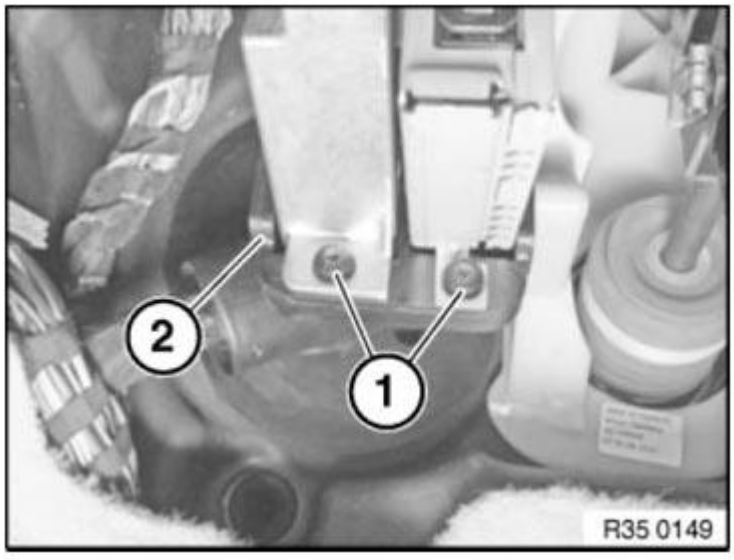


Fig. 1: Identifying Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Installation note:

Replace self-locking nut.

Tightening torque, see 35 11 2AZ in **PEDAL BRACKET** .

Remove bearing support (2).

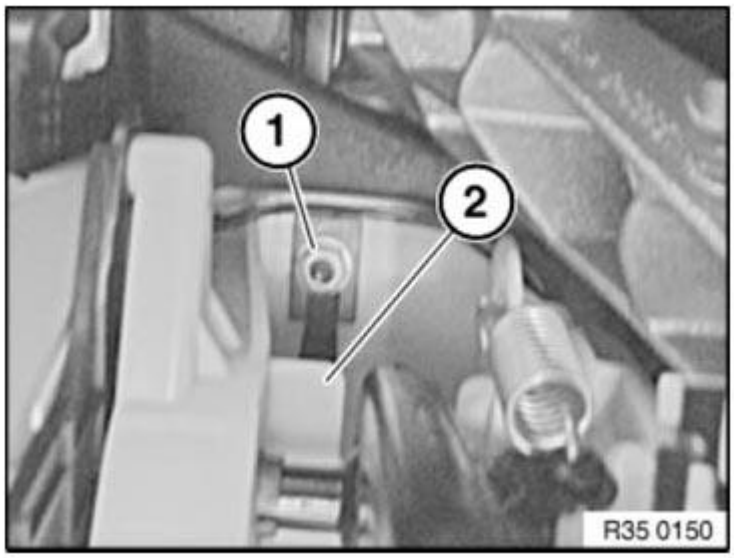


Fig. 2: Identifying Slacken Nut And Bearing Support
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1).

Disconnect plug connection (2).

Replacement

- Modify brake light switch
- Modify holder for control units

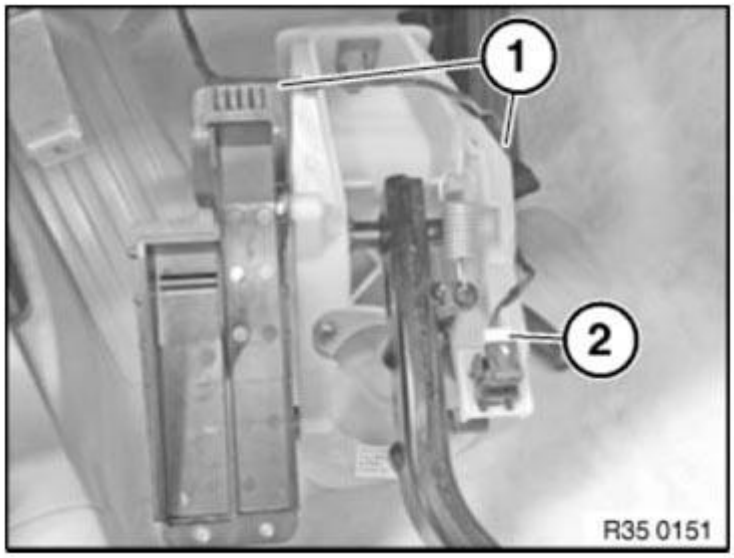


Fig. 3: Identifying Unclip Line And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

35 21 041 REPLACING SPRING FOR BRAKE PEDAL

Necessary preliminary tasks

- Remove **footwell trim** See **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (ECE ONLY)** or **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (US ONLY)** on driver's side

Disconnect return spring (1).

NOTE: Check grommet (2) for damage, replace if necessary.

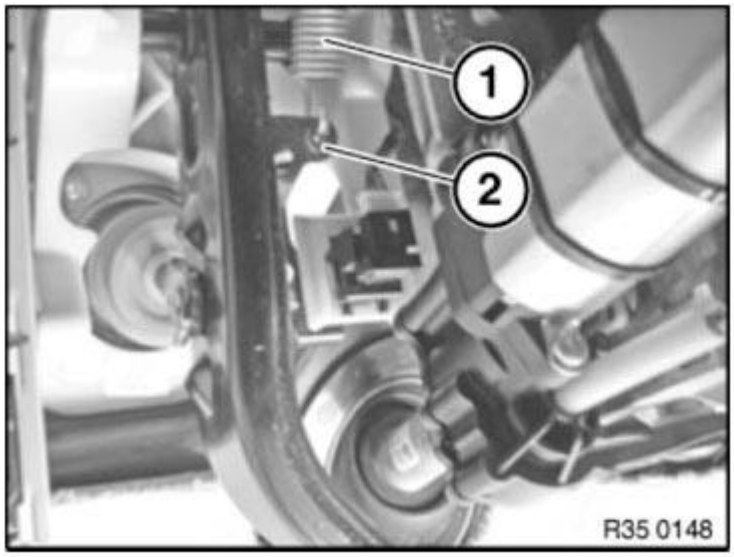


Fig. 4: Identifying Return Spring And Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

3521 BRAKE PEDAL WITH LINKAGE

35 21 041 REPLACING SPRING FOR BRAKE PEDAL

Necessary preliminary tasks

- Remove **footwell trim** See **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (ECE ONLY)** or **5145184 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (US ONLY)** on driver's side

Disconnect return spring (1).

NOTE: Check grommet (2) for damage, replace if necessary.

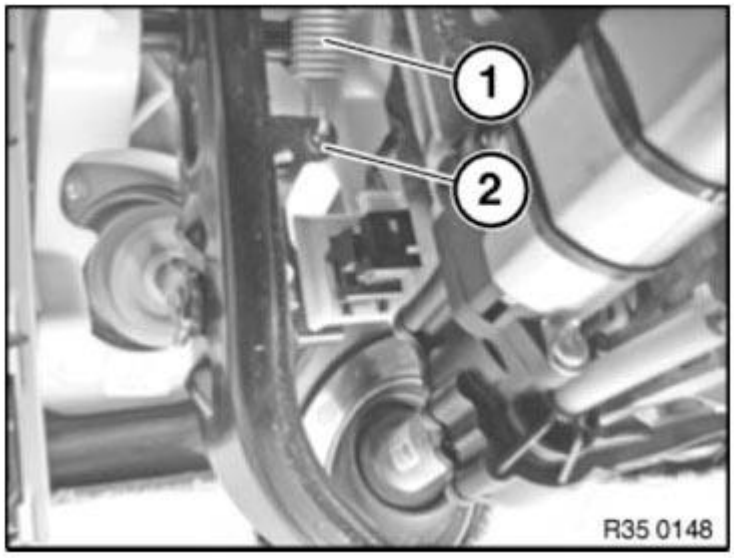


Fig. 5: Identifying Return Spring And Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

3540 ACCELERATOR PEDAL ACTUATION

35 40 001 REMOVING AND INSTALLING OR REPLACING ACCELERATOR PEDAL MODULE

Take off cap.

Release screw.

Pull accelerator pedal module upwards out of fixture.

Installation note:

Tightening torque, see **35 40 1AZ** .

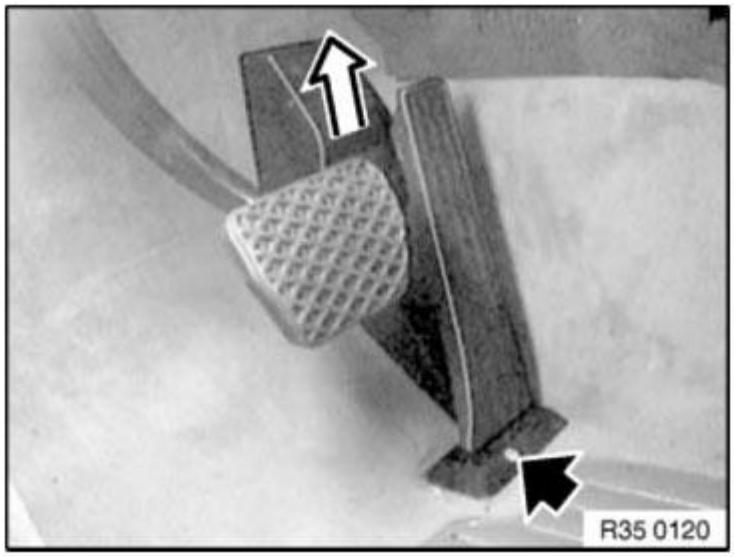


Fig. 6: Pulling Accelerator Pedal Module
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off connector (1).

Remove accelerator pedal module.

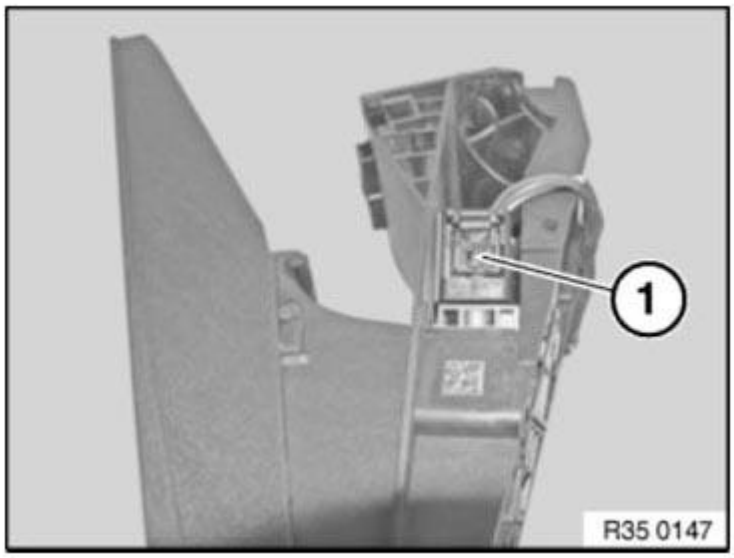


Fig. 7: Identifying Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Accelerator pedal module can only be replaced completely with adapter plate.

BRAKES

Pedals - Tightening Torques

FOOT CONTROLS

35 40 FOOT CONTROLS

TIGHTENING TORQUE SPECIFICATION - FOOT CONTROLS

		Type	Thread	Tightening specifications	Value
1AZ	Accelerator pedal module to body	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25			8 Nm

PARKING BRAKE

34 41 PARKING BRAKE

TIGHTENING TORQUE SPECIFICATION - PARKING BRAKE

		Type	Thread	Tightening specifications	Value
1AZ	Spring clip to wheel carrier	F01, F02, F03, F04, F07	M6		8 Nm
2AZ	Support Duo-Servo to wheel carrier, rear	F01, F02	M10		60 Nm
		F03, F04, F07	M8		28 Nm
3AZ	Bracket, parking brake, to rear axle support	F01, F02, F03, F04, F07	M8		19 Nm
4AZ	Parking brake actuator unit to bracket	F01, F02, F03, F04, F07		Sheet metal screw	4 Nm
5AZ	Union nut, parking brake Bowden cables, to actuator unit	F01, F02, F03, F04, F07		WAF 27	6 Nm
6AZ	EMF actuator to brake caliper	F10, F11, F12, F18, F25		Replace bolts	11 ± 1 Nm
7AZ	Parking brake control unit to body	F10, F11, F12, F18		Replace plastic nuts	2.5 Nm

PEDAL BRACKET

35 11 PEDAL BRACKET

TIGHTENING TORQUE SPECIFICATION - PEDAL BRACKET

		Type	Thread	Tightening specifications	Value
1AZ	Bearing support to brake	F01, F02, F03, F04, F07,	M8	Replace self-locking nut. Retighten on brake booster	24

	booster and body	F10, F11, F12, F18, F25		after 10 min.	Nm
2AZ	Bearing support to bracket, top	F01, F02, F03, F04, F07, F10, F11, F12, F18, F25	M8	Replace self-locking nut.	24 Nm

DRIVELINE/AXLES

Propeller Shaft - Repair

2600 PROPELLER SHAFT, GENERAL

2600... PROPELLER SHAFT DEFLECTION ANGLES

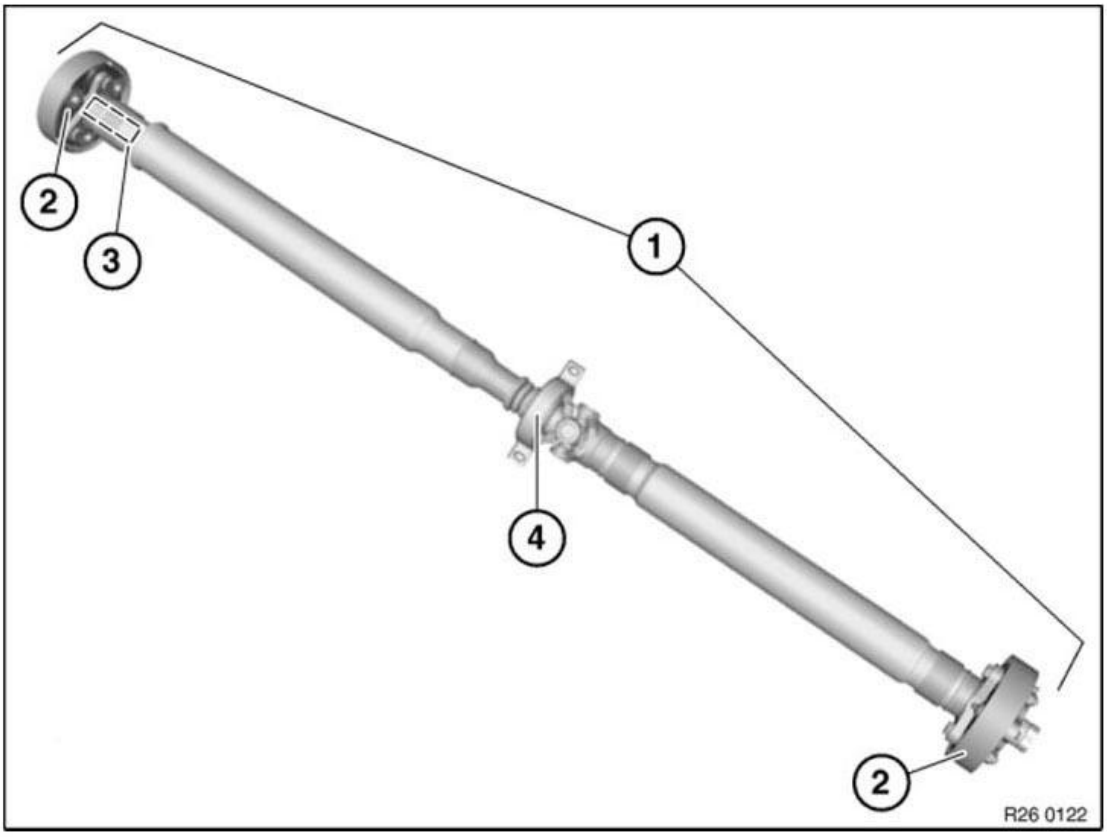
IMPORTANT: Specifications on propeller shaft deflection angles are only possible on request with the vehicle identification number of the problem vehicle via PuMA.

2600... PROPELLER SHAFT DEFLECTION ANGLES

IMPORTANT: Specifications on propeller shaft deflection angles for the F series are only possible on request with the vehicle identification number of the problem vehicle via PuMA.

2611 PROPELLER SHAFT ASSEMBLY

2611... OVERVIEW OF PROPELLER SHAFT



1 Complete propeller shaft 3 Centring mount
2 Flexible disc 4 Centre mount

Fig. 1: Overview Of Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

2611000 REMOVING AND INSTALLING COMPLETE PROPELLER SHAFT (FLEXIBLE DISC AT REAR)

Necessary preliminary work

- Remove complete **EXHAUST SYSTEM**
- Remove heat shields
- F03: Remove underbody panelling

IMPORTANT: Adhere without fail to installation and screw-fastening sequence.

installation sequence:

1. Join output shaft to transmission
2. Join output shaft to rear axle final drive
3. Join center mount

Screw-fastening sequence:

1. Flexible disc to transmission
2. Flexible disc to rear axle final drive
3. Centre mount

Release screws.

Installation note:

- Replace ZNS bolts and self-locking nuts.
- Grip mounting bolts of flexible disc at nuts and tighten down by way of bolts.

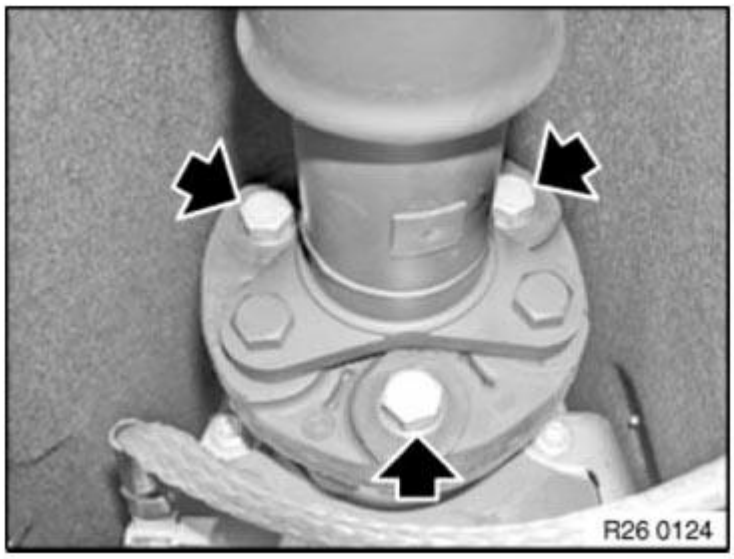


Fig. 2: Identifying Flexible Disc Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten down screws/bolts to specified torque.

Secure angle of rotation special tool **00 9 120** with magnets **00 9 130** to vehicle underbody and screw down further according to angle of rotation.

Tightening torque, see 26 11 1AZ under **PROPELLER SHAFT. COMPLETE** .

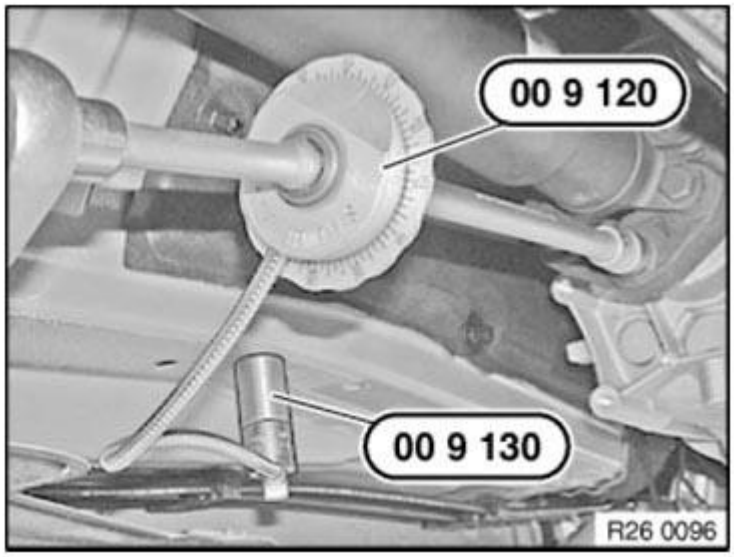


Fig. 3: Securing Angle Of Rotation Special Tool (00 9 120) With Magnets (009130 Magnet) To Vehicle Underbody
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The three-hole flange to the rear axle final drive is balanced with the propeller shaft.

The three-hole flange and propeller shaft must be reassembled in the same position.

Mark three-hole flange (1), flexible disc (2) and propeller shaft (3) in one plane.

Tightening torque, see 26 11 3AZ under **PROPELLER SHAFT. COMPLETE** .

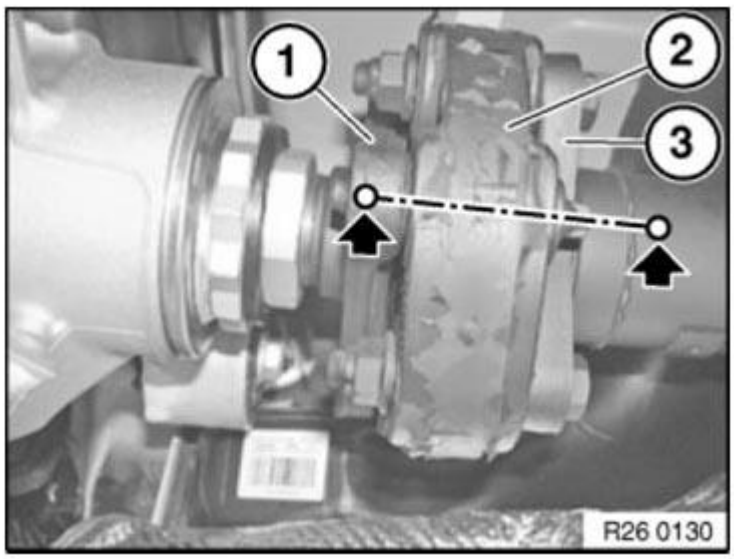


Fig. 4: Locating Mark Three-Hole Flange, Flexible Disc And Propeller Shaft In One Plane

Courtesy of BMW OF NORTH AMERICA, INC.

Release flexible disc screws at rear.

Installation note:

Replace ZNS bolts.

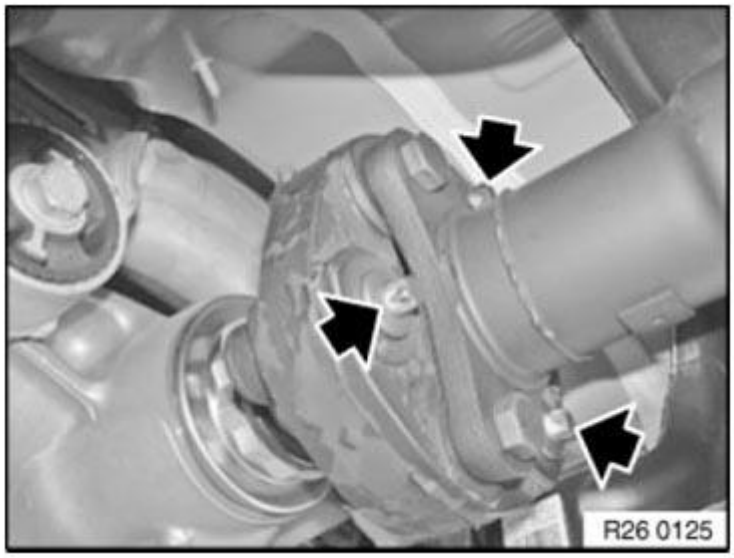


Fig. 5: Locating Flexible Disc Screws At Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screws/bolts to specified torque.

Secure angle of rotation special tool **00 9 120** with magnets **00 9 130** to vehicle underbody and screw down further according to angle of rotation.

Tightening torque, see 26 11 3AZ under **PROPELLER SHAFT. COMPLETE** .

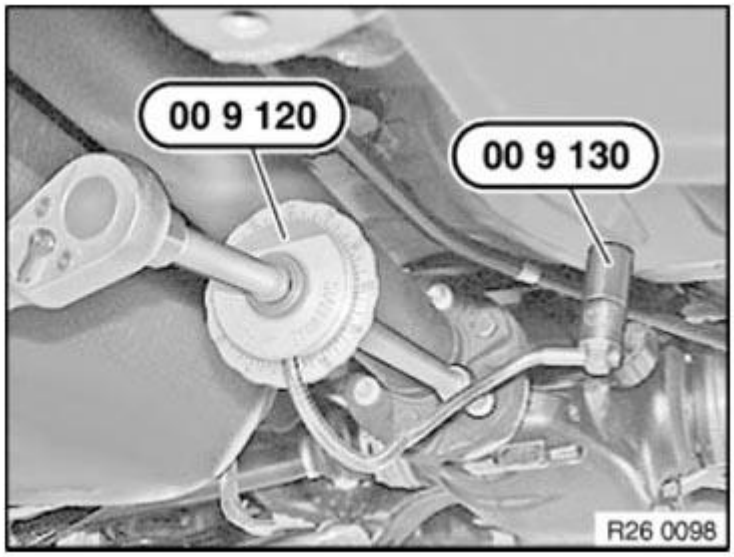


Fig. 6: Securing Angle Of Rotation Special Tool (00 9 120) With Magnets (009130 Magnet) To Vehicle Underbody
Courtesy of BMW OF NORTH AMERICA, INC.

N63 engine.

Release screws (1).

Remove panel (2).

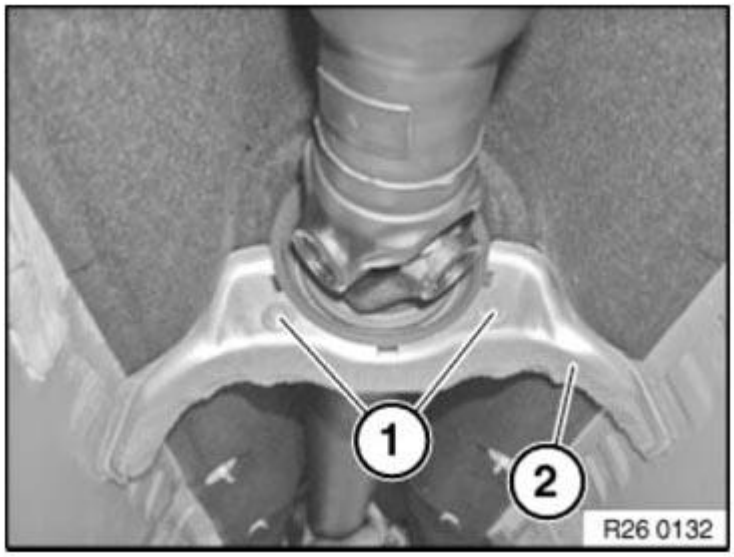


Fig. 7: Identifying Panel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Grip propeller shaft at center mount and release screws.

Tightening torque, see 26 11 5AZ under **PROPELLER SHAFT. COMPLETE** .

Detach propeller shaft from transmission output flange and remove towards bottom.

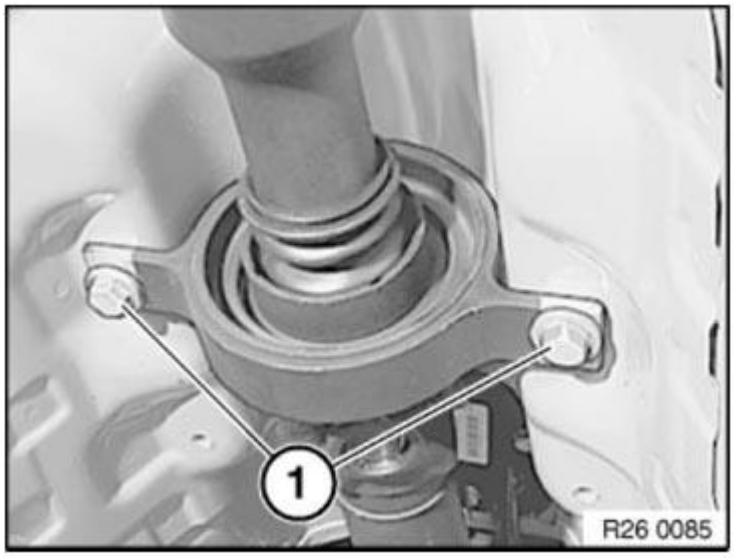


Fig. 8: Identifying Centre Mount Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

With N53, N54, N55, N57 engines

propeller shaft center bearing (1) is identified with the labelling TOP.

Propeller shaft center bearing (1) must be installed with the labelling facing upward in transmission tunnel.

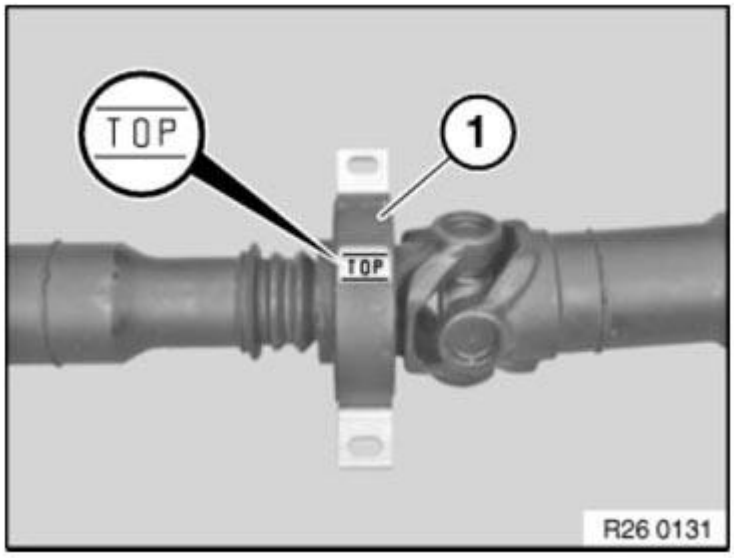


Fig. 9: Identifying Propeller Shaft Centre Bearing With Labelling Top
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check front and rear centering bearing.

If necessary, replace damaged **centering bearing** See **2611090 REMOVING AND INSTALLING/REPLACING FRONT CENTERING MOUNT FOR PROPELLER SHAFT** or **2611090 REMOVING AND INSTALLING/REPLACING REAR CENTERING MOUNT FOR PROPELLER SHAFT**.

Grease front centering bearing.

- Grease: See **DRIVESHAFT - OPERATING FLUIDS** .

IMPORTANT: Rear plastic centering mount must not be greased.

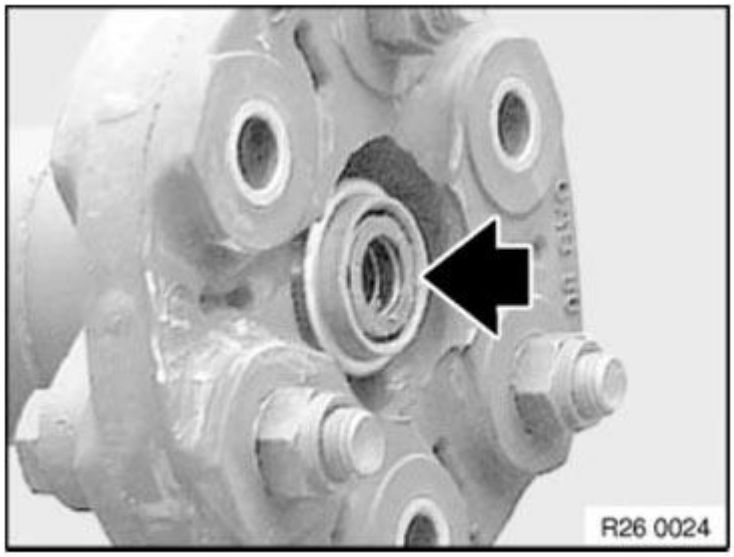


Fig. 10: Locating Propeller Shaft Centering Mount
Courtesy of BMW OF NORTH AMERICA, INC.

2611100 REMOVING AND INSTALLING THREE-HOLE FLANGE

Notes

IMPORTANT: It is absolutely necessary to replace the sunk nut!
The sunk nut already has a screw locking.
After the propeller shaft has been screwed into the rear axle final drive (sunk nut), a hardening time of at least 2 hours is absolutely necessary.
The hardening time may be extended at lower temperatures!
Failure to comply with these instructions may cause serious damage!

Necessary preliminary work

- Remove **PROPELLER SHAFT**

Since the three-hole flange, the flexible disc and the propeller shaft are balanced as a single unit, the balance quality of the propeller shaft, flexible disc and three-hole flange may be compromised slightly when the three-hole flange is replaced.

IMPORTANT: Before removing propeller shaft:
The three-hole flange and the propeller shaft must be reassembled in the same position.
Mark three-hole flange (1), flexible disc (2) and propeller shaft (3) in one plane.

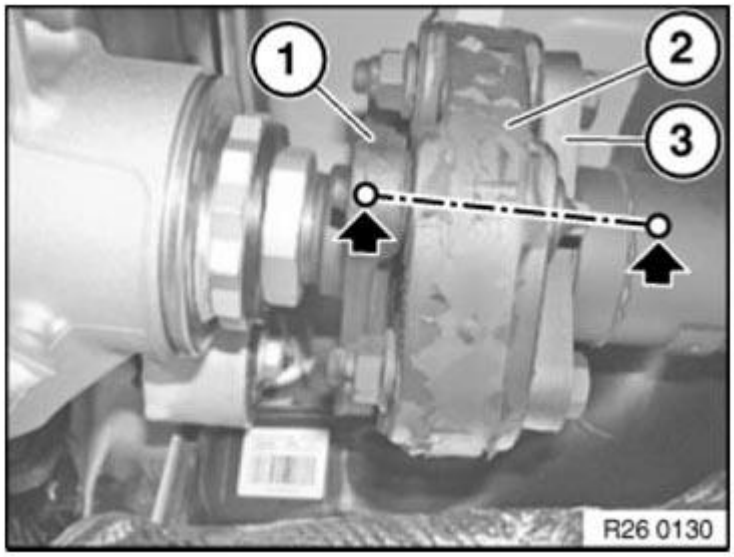


Fig. 11: Marking Three-Hole Flange, Flexible Disc And Propeller Shaft In One Plane
Courtesy of BMW OF NORTH AMERICA, INC.

Release insert nut against direction of travel **in clockwise direction** with special tool **33 5 040** and **33 5 070** .

Grip with special tool **23 0 020** .

Release three-hole flange (1) from bevel pinion.

Tightening torque, see 26 11 6AZ under **PROPELLER SHAFT. COMPLETE** .

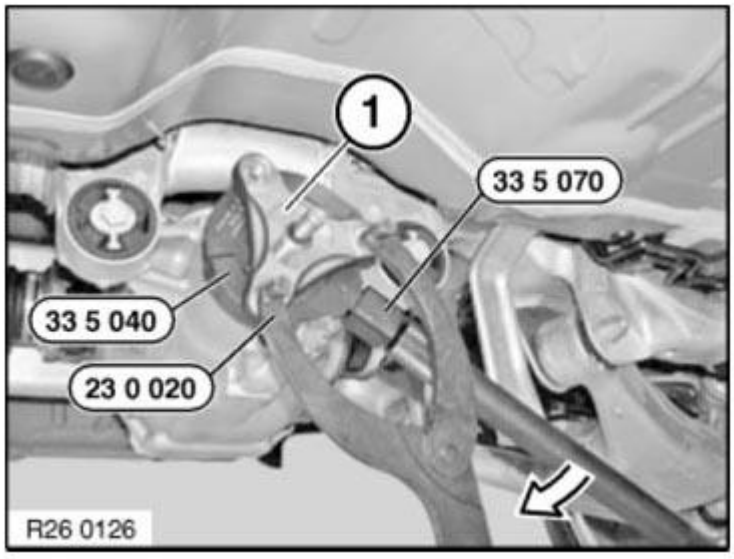


Fig. 12: Removing Three-Hole Flange From Bevel Pinion Using Special Tool 23 0 020
Courtesy of BMW OF NORTH AMERICA, INC.

Remove retaining clip (1) and gasket (2).

Installation note:

Retaining clip and gasket must be replaced.

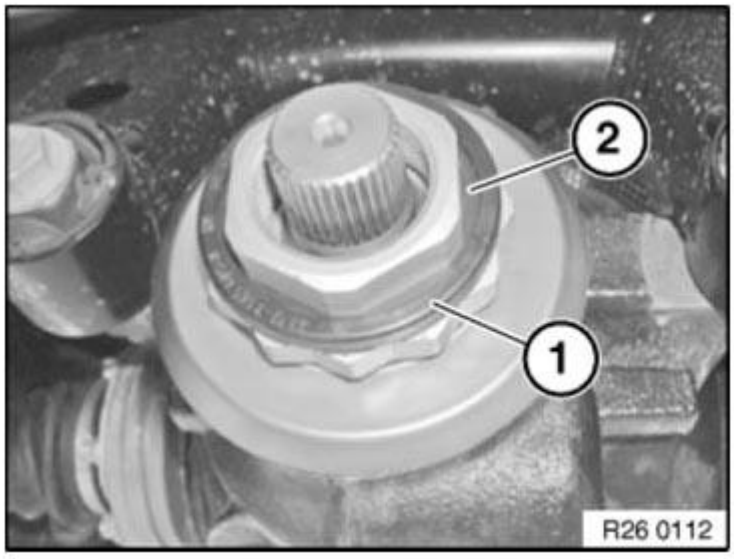


Fig. 13: Identifying Clip And Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Remove insert nut (1).

Installation note:

Insert nut must be replaced.

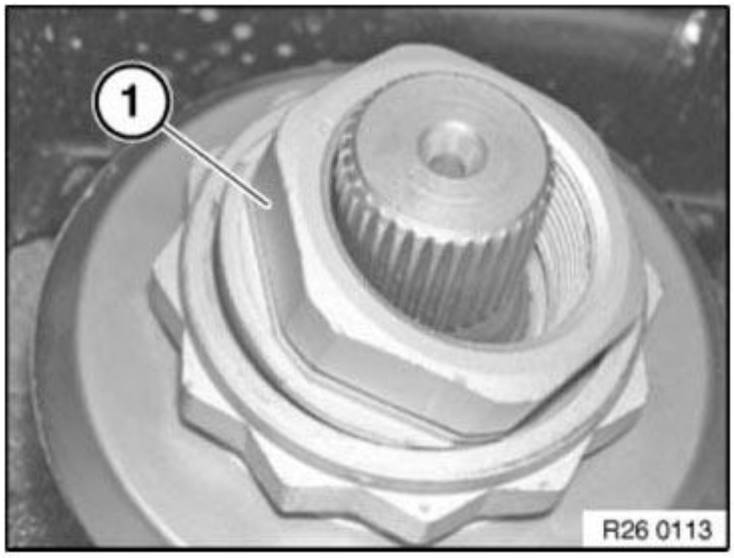


Fig. 14: Identifying Insert Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Before installing three-hole flange:

Clean insert collar (1) on flange nut and gearing on bevel pinion (2).

Fill insert collar (1) with grease.

Grease: See **DRIVESHAFT - OPERATING FLUIDS** .

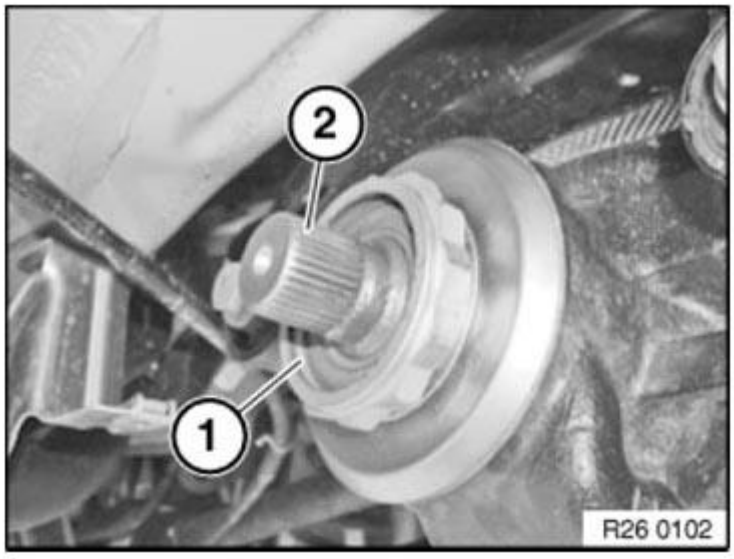


Fig. 15: Identifying Collar And Bevel Pinions
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Thread of flange hub must not be contaminated with grease.

Clean thread (1) of flange hub to remove adhesive residues.

Clean hub teeth (2), then coat with grease.

Grease: See **DRIVESHAFT - OPERATING FLUIDS** .

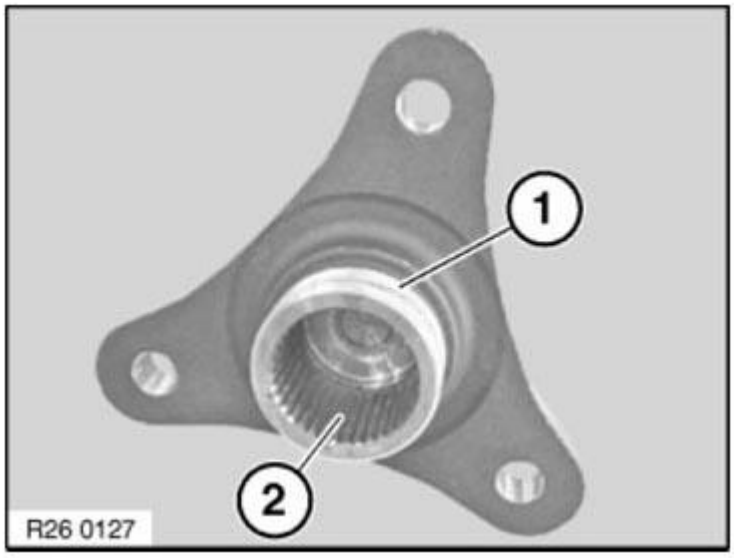


Fig. 16: Identifying Thread Of Flange And Hub Teeth
Courtesy of BMW OF NORTH AMERICA, INC.

Place flange nut (1) with seal in insert collar of flange nut.

Install retaining clip (2).

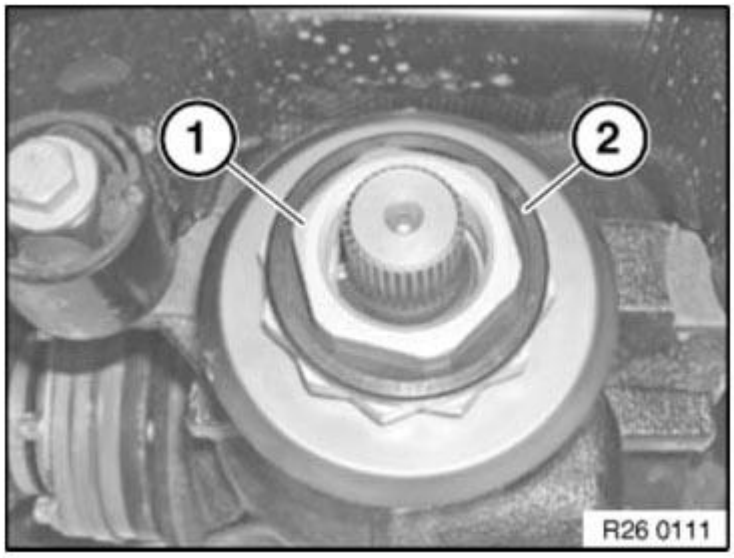


Fig. 17: Identifying Flange Nut With Seal And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The bihexagonal flange nut must not be used for bracing.

Failure to comply with this instruction may result in serious damage to the rear axle final drive.

IMPORTANT: Insert nut must be screwed into place within 5 minutes. Tightening torque, see 26 11 6AZ under 26 11 PROPELLER SHAFT. COMPLETE .

Slide drive flange (1) to the limit position onto insert nut and secure.

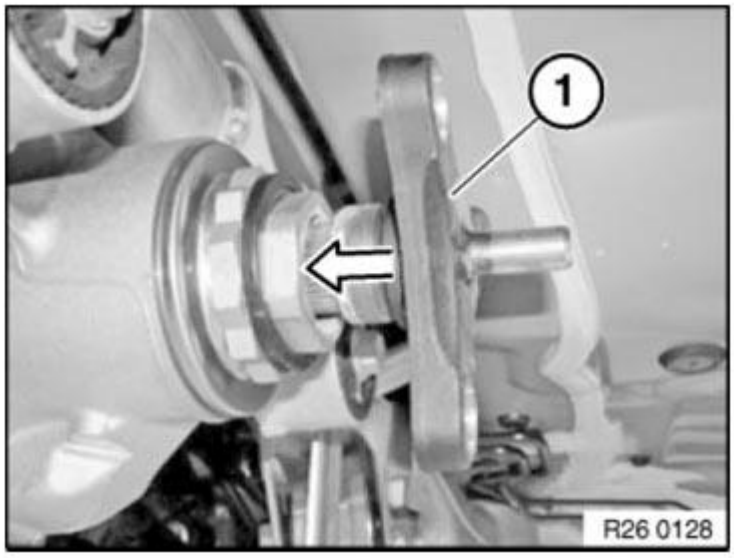


Fig. 18: Sliding Drive Flange Onto Nut
Courtesy of BMW OF NORTH AMERICA, INC.

2611090 REMOVING AND INSTALLING/REPLACING FRONT CENTERING MOUNT FOR PROPELLER SHAFT

Necessary preliminary work

- Remove **PROPELLER SHAFT** .

Completely fill centering bore hole (1) with viscous grease.

Drive special tool **11 1 310** with a plastic hammer into centering bore hole.

The centering bearing (1) is forced out of the propeller shaft by the pressure on the grease filling.

If necessary, top up grease repeatedly.

NOTE: To drive out the bearing, you can also fill the centering bore hole with water instead of grease.

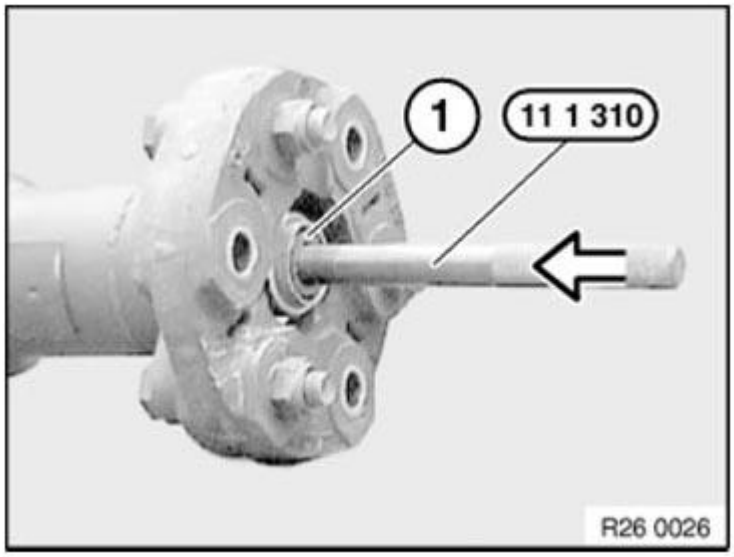


Fig. 19: Driving Special Tool (111310) With A Plastic Hammer Into Centering Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Remove grease or water from mount bore.

Drive in centering mount (1) with special tools **11 2 030** and **00 5 500** into propeller shaft (observe protrusion).

Grease centering mount.

- Grease: See **DRIVESHAFT - OPERATING FLUIDS** .

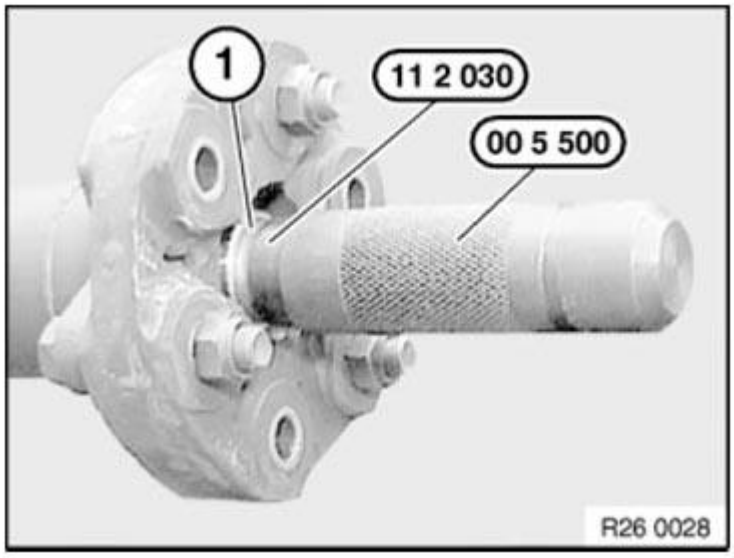


Fig. 20: Installing Centering Mount Using Special Tools (11 2 030 And 00 5 500)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Observe protrusion A = 4^{+2} mm of centering (1).

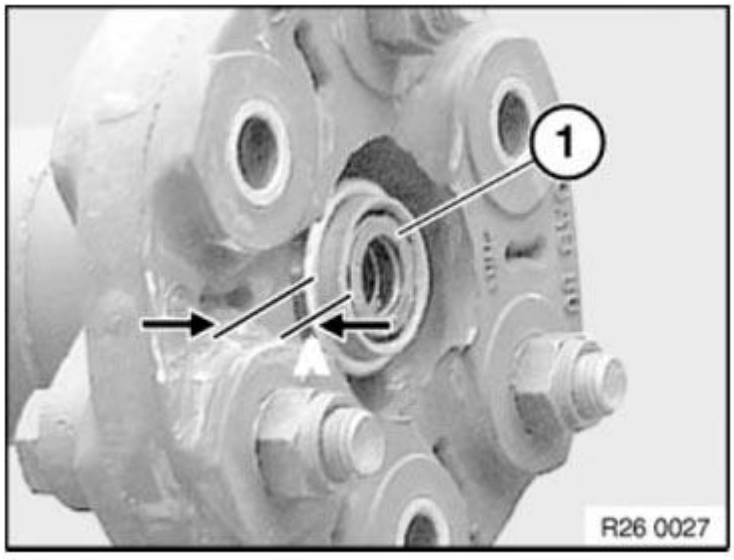


Fig. 21: Observing Protrusion Of Centering
Courtesy of BMW OF NORTH AMERICA, INC.

2611090 REMOVING AND INSTALLING/REPLACING REAR CENTERING MOUNT FOR PROPELLER SHAFT

Necessary preliminary work

- Remove **PROPELLER SHAFT** .

Completely fill centering bore hole (1) with viscous grease.

Drive special tool **11 1 310** with a plastic hammer into centering bore hole.

The centering bearing (1) is forced out of the propeller shaft by the pressure on the grease filling.

If necessary, top up grease repeatedly.

NOTE: To drive out the bearing, you can also fill the centering bore hole with water instead of grease.

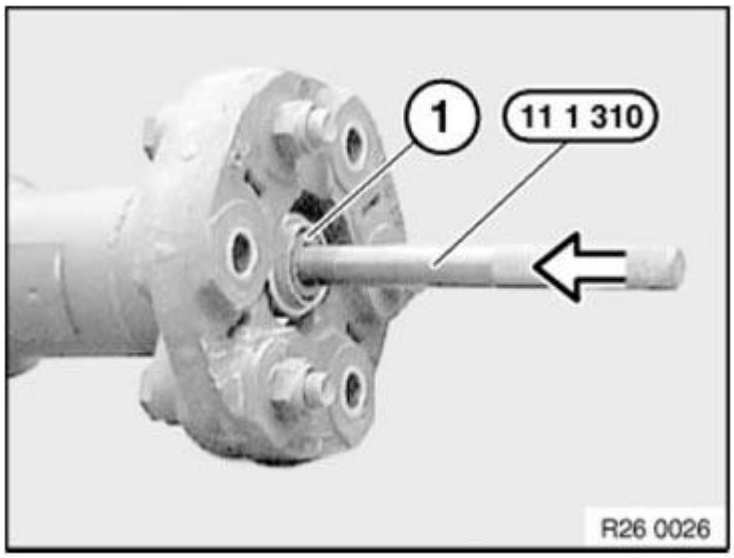


Fig. 22: Driving Special Tool (111310) With A Plastic Hammer Into Centering Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Grease or water must be removed from the bearing bore.

Drive in centering mount (1) with special tools **11 2 030** and **00 5 500** into propeller shaft (observe protrusion).

IMPORTANT: Plastic centering mount must not be greased.

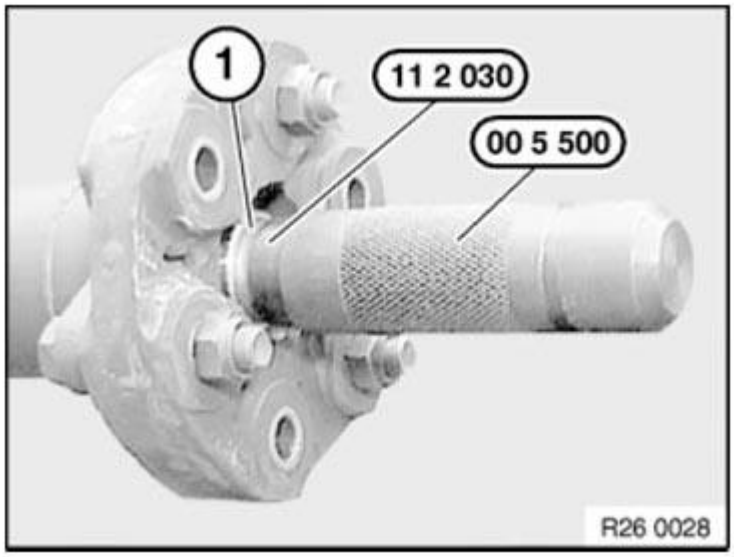


Fig. 23: Installing Centering Mount Using Special Tool 11 2 030 And 5 500
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Observe protrusion A = 4^{+2} mm of centering (1).

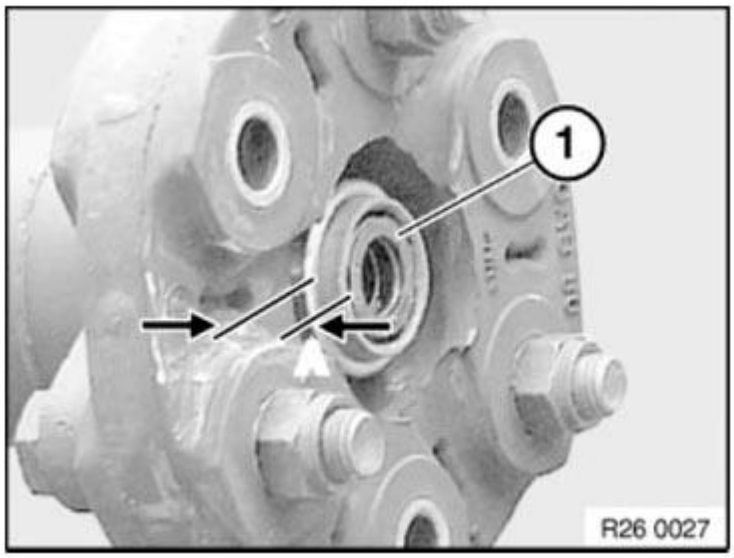


Fig. 24: Observing Protrusion Of Centering
Courtesy of BMW OF NORTH AMERICA, INC.

2611020 REPLACING CENTER MOUNT GAITER

Necessary preliminary work

- Remove **PROPELLER SHAFT** .

NOTE: The propeller shaft is balanced.
The front and rear propeller shafts must be reassembled in the same position.
Detach gaiter (1) from groove (2).

Mark front propeller shaft (3) and rear propeller shaft (4) in one plane.

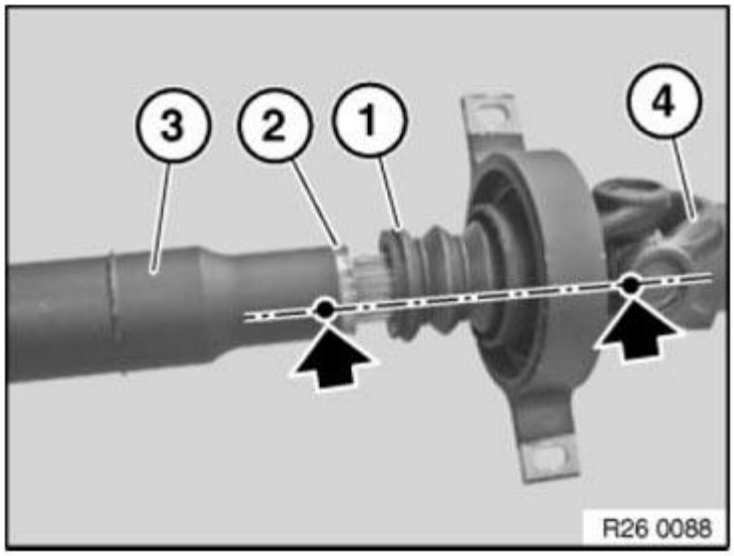
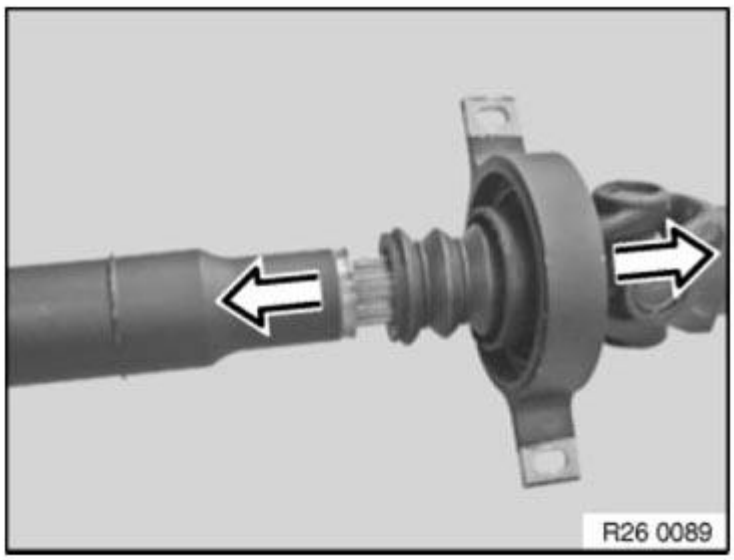


Fig. 25: Marking Front Propeller Shaft And Rear Propeller Shaft In One Plane
Courtesy of BMW OF NORTH AMERICA, INC.

Pull apart propeller shaft.



Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If necessary, insert new clamping ring (1) into front propeller shaft (2).

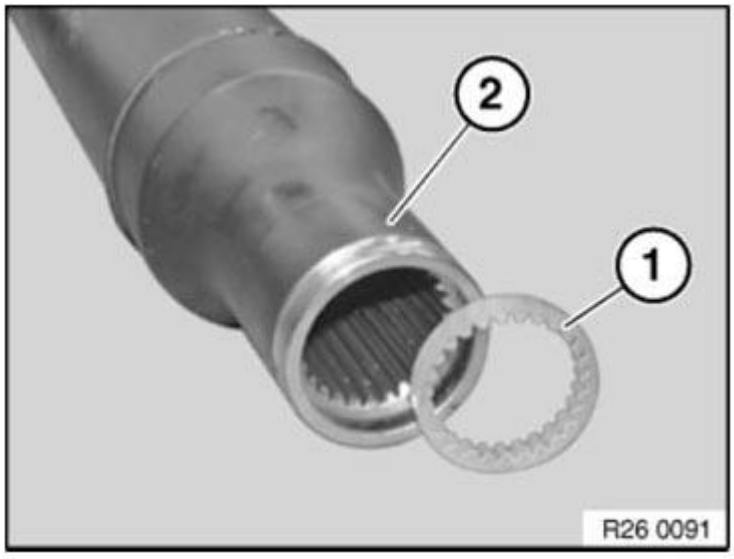


Fig. 27: Identifying Front Propeller Shaft With Clamping Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release gaiter (1) with screwdriver from groove (2) and pull off over longitudinal splines.

Installation note:

Apply an even coating of grease to longitudinal splines on shaft.

See **DRIVESHAFT - OPERATING FLUIDS** .

Observe markings and force front propeller shaft onto longitudinal splines (markings must be flush).

Push gaiter (1) during installation into groove (2) and make sure it is firmly fitted.

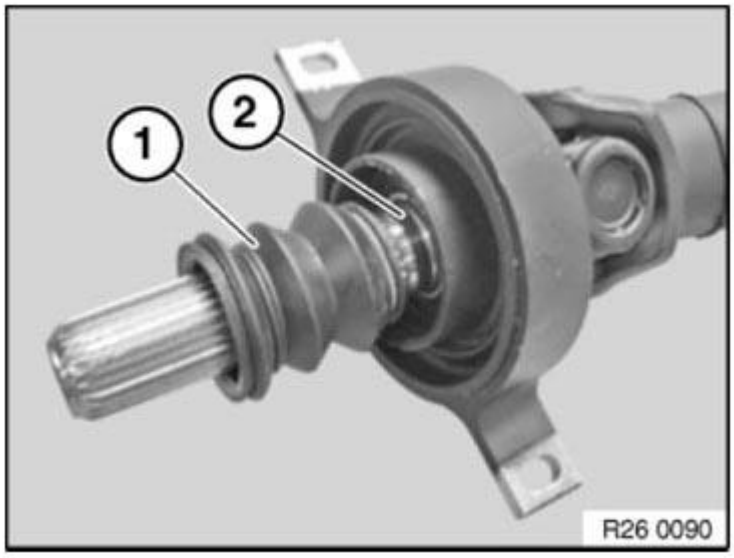


Fig. 28: Identifying Gaiter And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

2611051 REPLACING FLEXIBLE DISC FOR FRONT PROPELLER SHAFT

Necessary preliminary work

- Remove **PROPELLER SHAFT** at transmission and center bearing.

NOTE: To protect universal joints, tie back propeller shaft in area of center mount.

Release screws and remove flexible disc (1) from propeller shaft.

IMPORTANT: Replace ZNS bolts and self-locking nuts.

Tightening torque and angle of rotation, see 26 11 2AZ under **PROPELLER SHAFT COMPLETE** .

Installation note:

- During installation arrows (2) on circumference of flexible disc must point to flange arms (3).

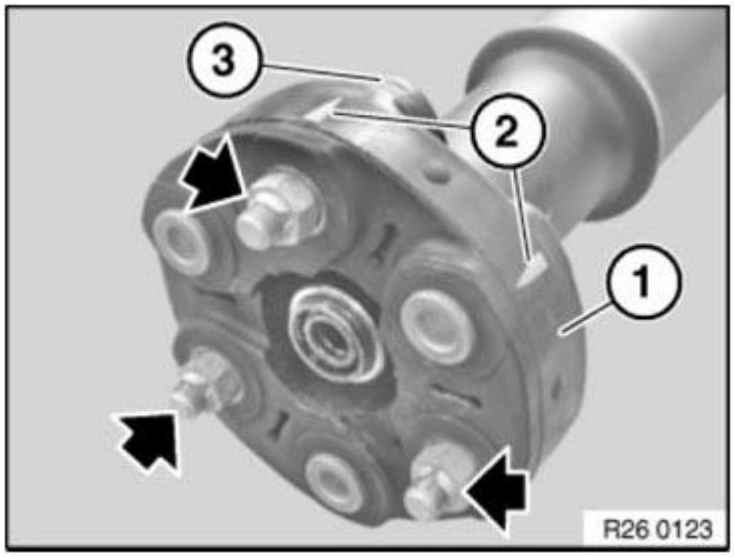


Fig. 29: Locating Screws Of Flexible Disc
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check centering mount.

Replace damaged **CENTERING MOUNT** .

Grease centering mount. See **DRIVESHAFT - OPERATING FLUIDS** .

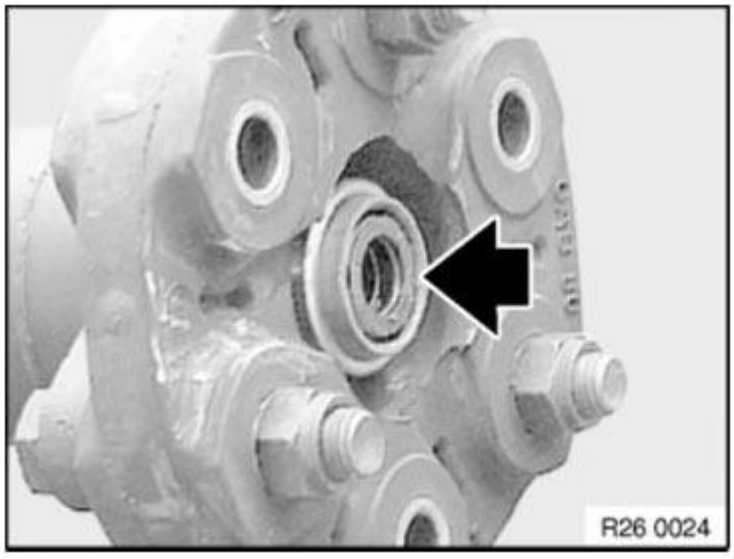


Fig. 30: Locating Propeller Shaft Centering Mount
Courtesy of BMW OF NORTH AMERICA, INC.

2611052 REPLACING FLEXIBLE DISC FOR REAR PROPELLER SHAFT

Necessary preliminary work

- Remove **PROPELLER SHAFT** from rear axle final drive and center mount

NOTE: To protect universal joints, tie back propeller shaft in area of center mount.

IMPORTANT: Before removing propeller shaft:
The three-hole flange to the rear axle final drive is balanced with the propeller shaft.
The three-hole flange and the propeller shaft must be reassembled in the same position.
Mark three-hole flange (1), flexible disc (2) and propeller shaft (3) in one plane.

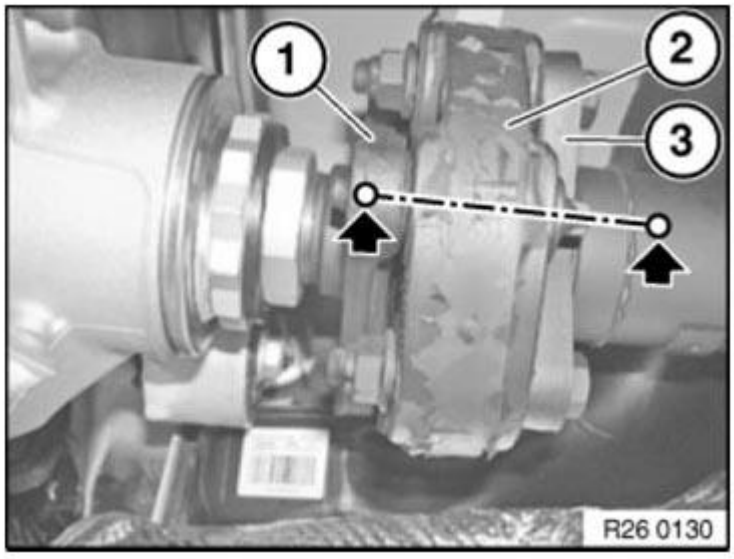


Fig. 31: Marking Three-Hole Flange, Flexible Disc And Propeller Shaft In One Plane
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove flexible disc (1) from propeller shaft.

IMPORTANT: Replace ZNS bolts and self-locking nuts.

Tightening torque and angle of rotation, see 26 11 4AZ under **PROPELLER SHAFT. COMPLETE** .

Installation note:

- During installation arrows (2) on circumference of flexible disc must point to flange arms (3).

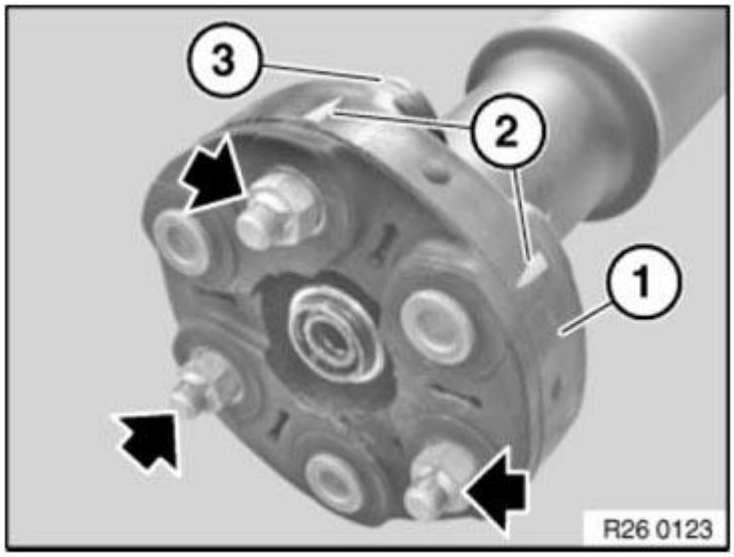


Fig. 32: Locating Flexible Disc Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check centering mount.

Replace damaged **CENTERING MOUNT** .

IMPORTANT: Plastic centering mount must not be greased.

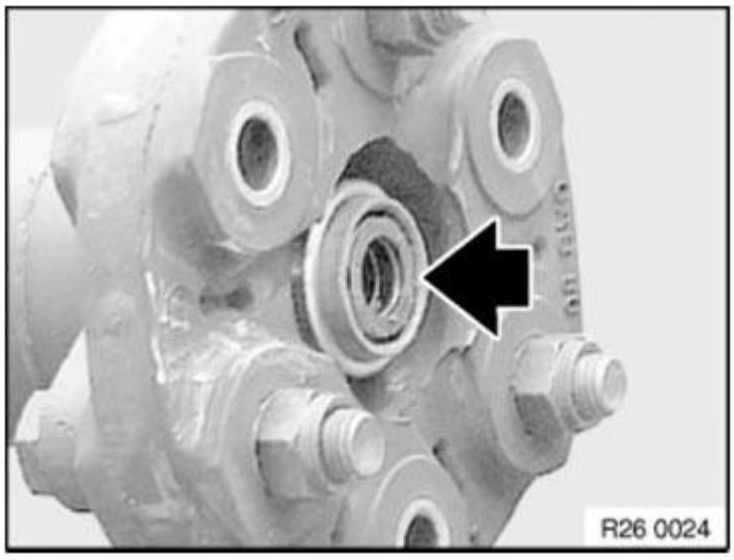


Fig. 33: Locating Propeller Shaft Centering Mount
Courtesy of BMW OF NORTH AMERICA, INC.

2612 CENTER CONSOLE ASSEMBLY

2611020 REPLACING CENTER MOUNT GAITER

Necessary preliminary work

- Remove **PROPELLER SHAFT** .

NOTE: The propeller shaft is balanced.
The front and rear propeller shafts must be reassembled in the same position.
Detach gaiter (1) from groove (2).

Mark front propeller shaft (3) and rear propeller shaft (4) in one plane.

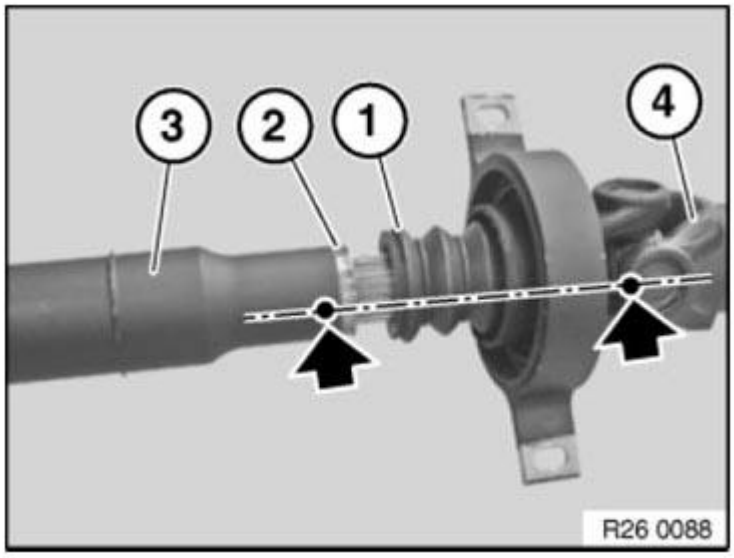


Fig. 34: Marking Front Propeller Shaft And Rear Propeller Shaft In One Plane
Courtesy of BMW OF NORTH AMERICA, INC.

Pull apart propeller shaft.

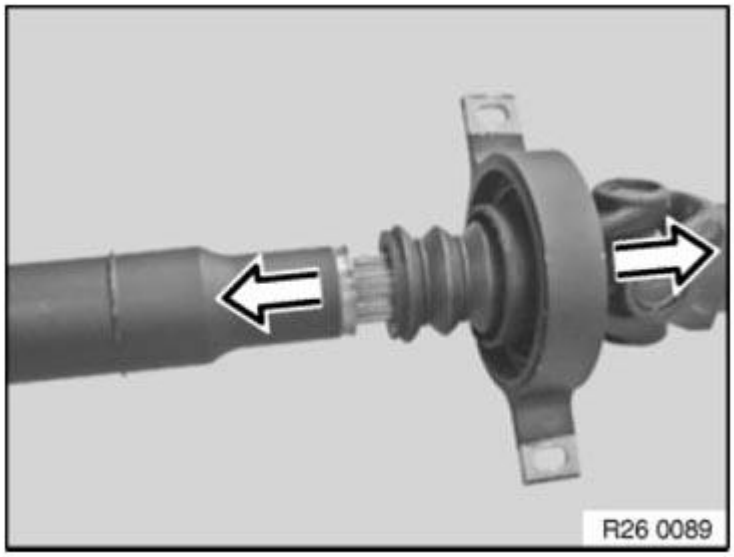


Fig. 35: Pulling Propeller Shaft Apart
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If necessary, insert new clamping ring (1) into front propeller shaft (2).

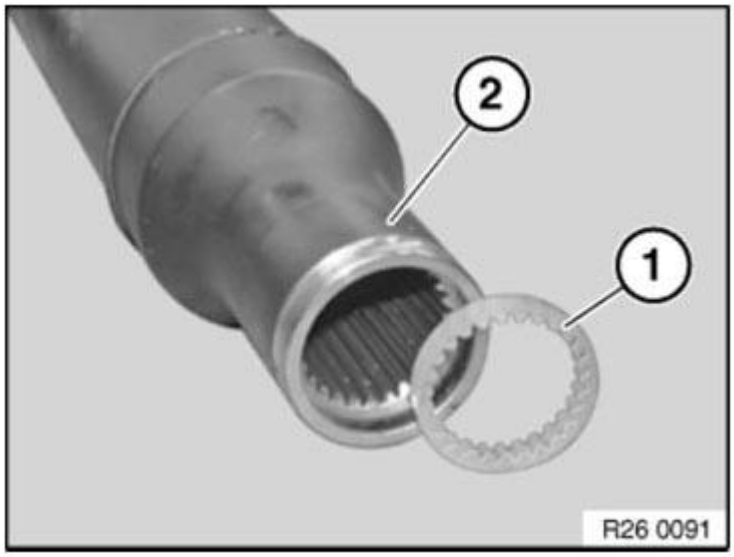


Fig. 36: Identifying Front Propeller Shaft With Clamping Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release gaiter (1) with screwdriver from groove (2) and pull off over longitudinal splines.

Installation note:

Apply an even coating of grease to longitudinal splines on shaft.

See **DRIVESHAFT - OPERATING FLUIDS** .

Observe markings and force front propeller shaft onto longitudinal splines (markings must be flush).

Push gaiter (1) during installation into groove (2) and make sure it is firmly fitted.

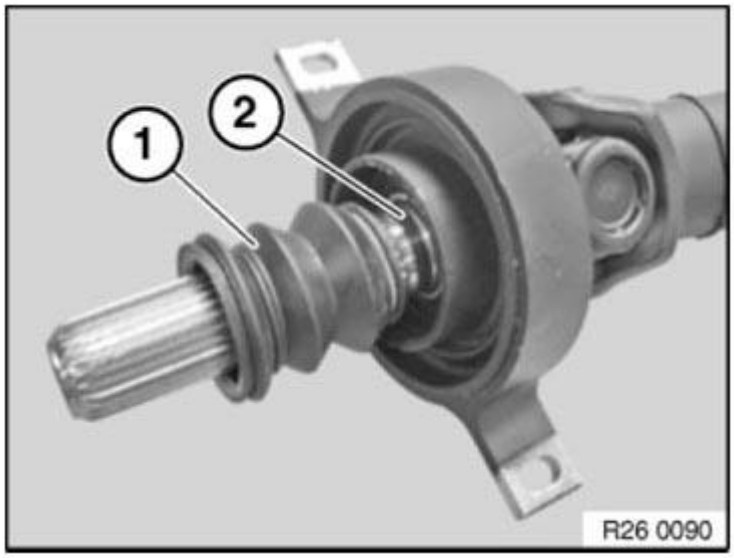


Fig. 37: Identifying Gaiter And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

2612001 REPLACING COMPLETE PROPELLER SHAFT CENTER BEARING

Necessary preliminary work

- Remove **PROPELLER SHAFT** .

NOTE: The propeller shaft is balanced.
The front and rear propeller shafts must be reassembled in the same position.

Detach gaiter (1) from groove (2).

Mark front propeller shaft (3) and rear propeller shaft (4) in one plane.

Installation note:

Make sure gaiter (1) is securely fitted in groove (2).

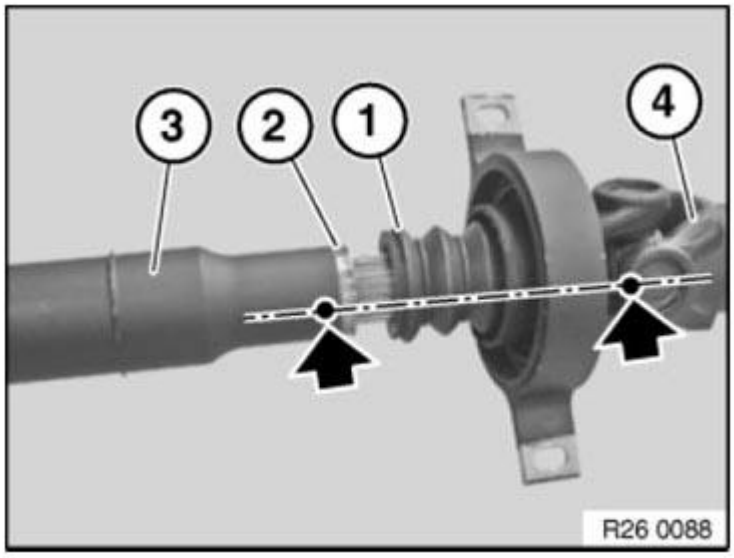


Fig. 38: Marking Front Propeller Shaft And Rear Propeller Shaft In One Plane
Courtesy of BMW OF NORTH AMERICA, INC.

Pull apart propeller shaft.

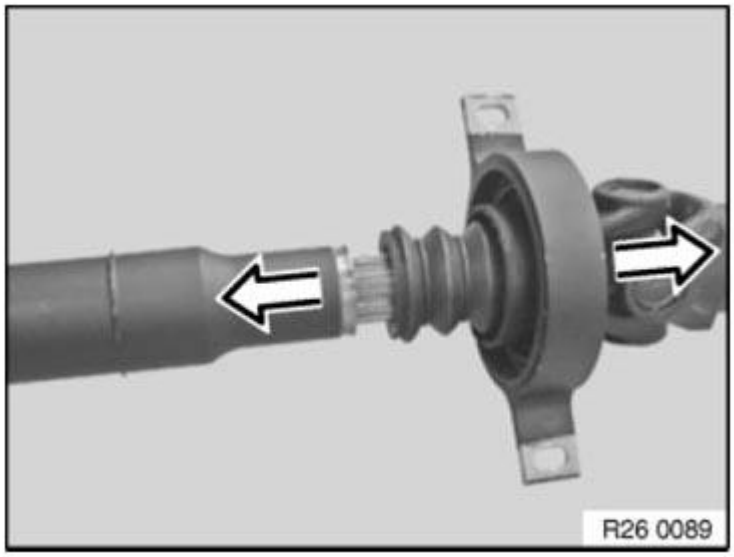


Fig. 39: Pulling Propeller Shaft Apart
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If necessary, insert new clamping ring (1) into front propeller shaft (2).

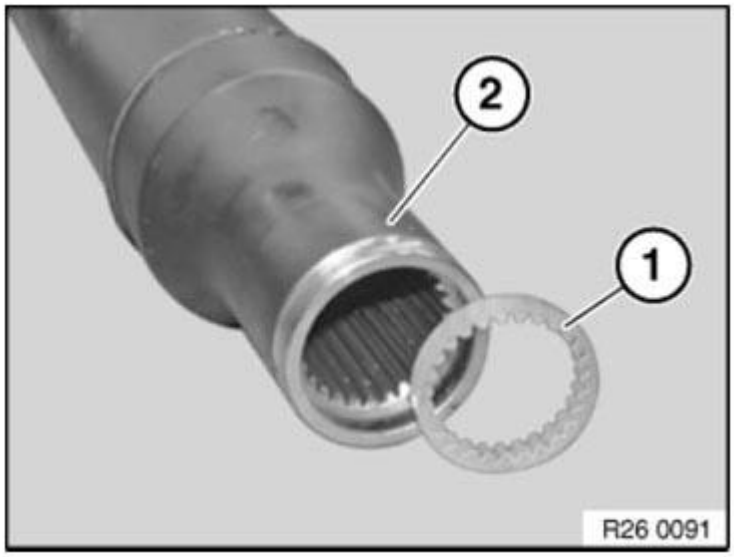


Fig. 40: Identifying Front Propeller Shaft With Clamping Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release gaiter (1) with screwdriver from groove (2) and pull off over longitudinal splines.

Installation note:

Apply a coating of grease to longitudinal splines on shaft.

See **DRIVESHAFT - OPERATING FLUIDS** .

Push gaiter (1) during installation into groove (2) and make sure it is firmly fitted.

Observe markings and force front propeller shaft onto longitudinal splines (markings must be flush).

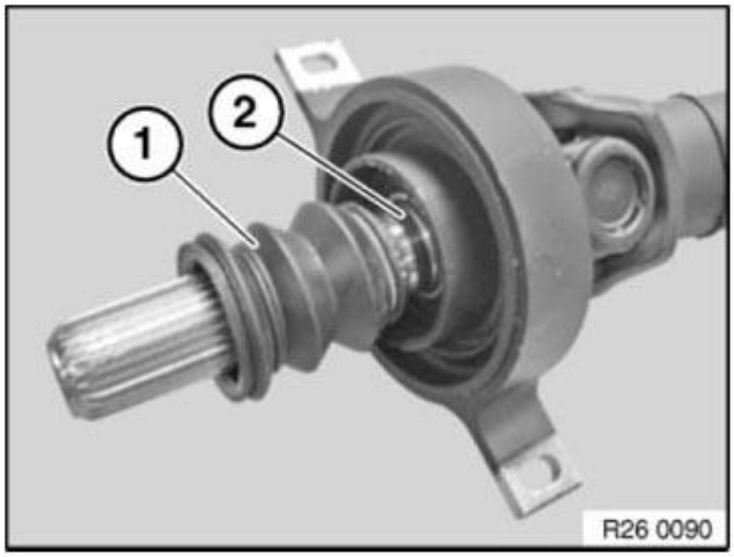


Fig. 41: Identifying Gaiter And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool **00 7 500** between center mount (1) and universal joint (2).

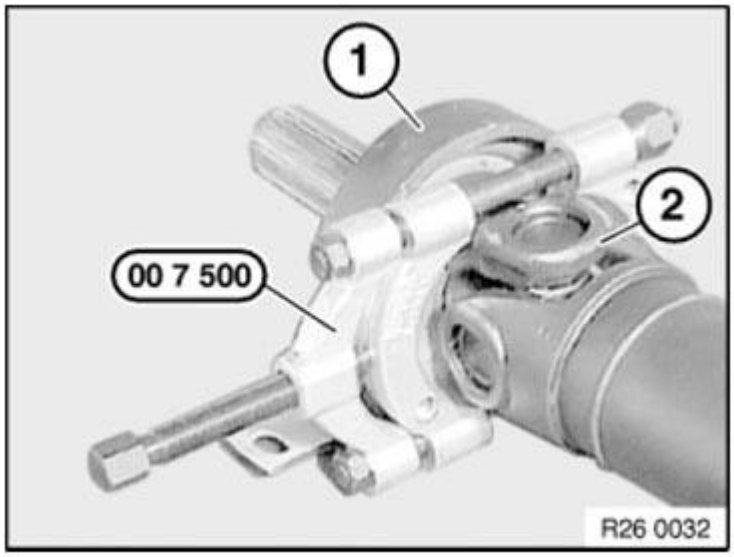


Fig. 42: Installing Special Tool (00 7 500) Between Centre Mount And Universal Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Using a hydraulic press, force center mount (1) off propeller shaft (2).

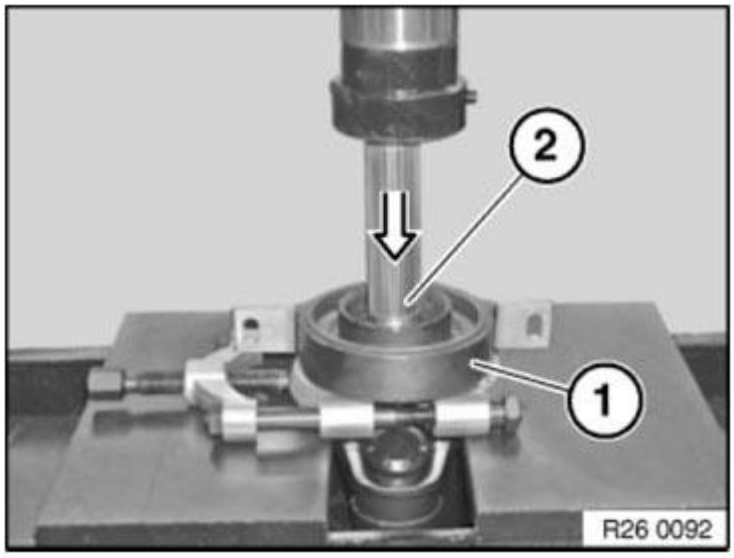


Fig. 43: Forcing Centre Mount Off Propeller Shaft Using Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.

Force new center mount (1) onto propeller shaft. Collar (2) must point in direction of travel towards front propeller shaft. Drive center mount to limit position with special tool **33 1 020** .

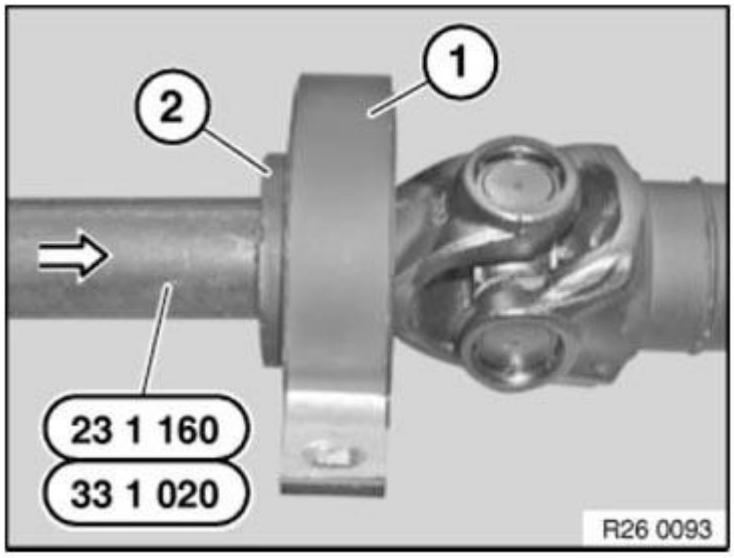


Fig. 44: Forcing Centre Mount Onto Propeller Shaft Collar Using Special Tool (33 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

2612011 REPLACING GROOVED BALL BEARING IN PROPELLER SHAFT CENTER BEARING

Necessary preliminary work

- Replace **PROPELLER SHAFT CENTRE BEARING**

Press grooved ball bearing using special tool **23 1 160** out of center mount (1).

NOTE: Illustration shows E46.

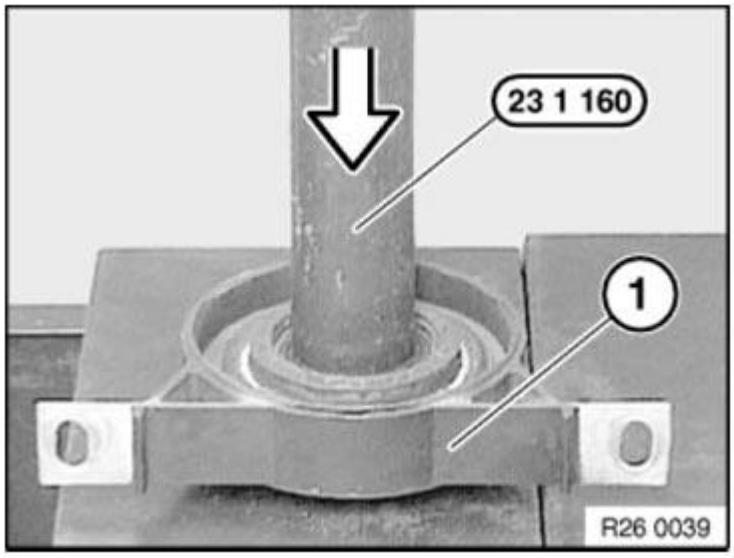


Fig. 45: Pressing Grooved Ball Bearing Using Special Tool (23 1 160)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat rubber-coated bearing seat of center mount (2) with Circolight.

Circolight, refer to BMW Parts Department.

Use special tools 33 3 202/33 3 203 to press grooved ball bearing (1) into center mount (2).

NOTE: Illustration shows E46.

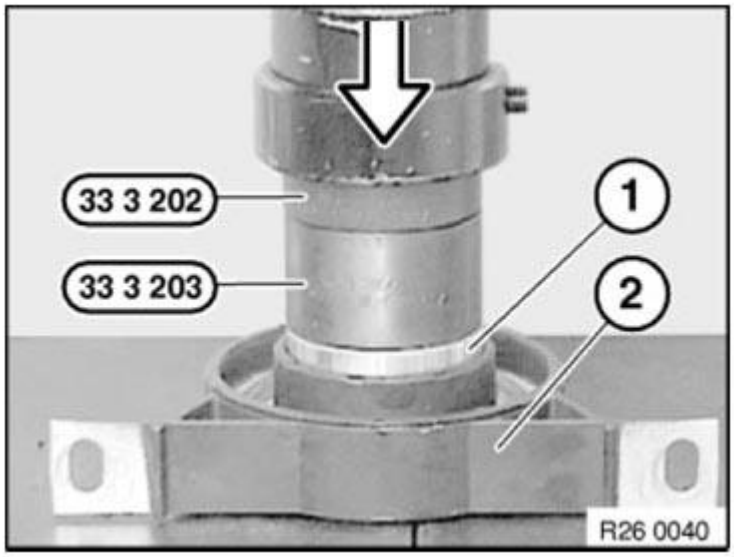


Fig. 46: Pressing Deep Groove Ball Bearing Into Centre Mount Using Special Tools (33 3 202/33 3 203)
Courtesy of BMW OF NORTH AMERICA, INC.

DRIVELINE/AXLES

Propeller Shaft - Tightening Torques

2611-02 PROPELLER SHAFT COMPLETE

26 11 PROPELLER SHAFT. COMPLETE

TIGHTENING TORQUE SPECIFICATION - PROPELLER SHAFT

	Type	Thread	Tightening specifications	Dimension
1AZ Front flexible disc to transmission output flange ZNS screws and nuts All versions			Replace bolts and nuts Jointing torque and angle of rotation must be observed without fail Tightening via screw	
	F01/F02/F03/F07/F10/F11/F12/F13/F18/F25	M12-10.9	Jointing torque Angle of rotation	55 Nm 90 °
2AZ Front flexible disc to propeller shaft ZNS screws and nuts All versions			Replace bolts and nuts Jointing torque and angle of rotation must be observed without fail Tighten via nut	
	F01/F02/F03/F07/F10/F11/F12/F13/F18/F25	M12-10.9	Jointing torque Angle of rotation	55 Nm 90 °
3AZ Flexible disc, rear, to transmission drive flange (inserted) ZNS screws and nuts All versions			Replace bolts and nuts Jointing torque and angle of rotation must be observed without fail Tightening via screw	
	F01/F02/F03/F07/F10/F11/F12/F13/F18	ASA M12-10.9	Jointing torque Angle of rotation	55 Nm 90 °
Flexible disc, rear, to propeller shaft			Replace bolts and nuts Jointing torque and angle of rotation must	

4AZ	ZNS screws and nuts All versions			be observed without fail Tighten via nut	
		F01/F02/F03/F07/F10/F11/F12/F13/F18	M12-10.9	Jointing torque Angle of rotation	55 Nm 90 °
5AZ	Centre mount to body	F01/F02/F03/F07/F10/F11/F12/F13/F18/F25			21 Nm
6AZ	Drive flange, rear axle final drive (insert nut to propeller shaft/three-hole flange)	F01/F02/F03/F07/F10/F11/F12/F13/F18		Replace insert nut! Allow min. 2 hours hardening time Jointing torque Loosen the insert nut through 90° Tightening torque	 120 Nm 85 Nm
7AZ	Front propeller shaft to transfer box/front axle differential	F01/F02/F07/F10/F25		Replace screws Jointing torque and angle of rotation must be observed without fail Jointing torque Angle of rotation	 20 Nm 45 °

SUSPENSION

Rear Axle - Tightening Torques

ANTI-ROLL BAR

33 55 ANTI-ROLL BAR

TIGHTENING TORQUE SPECIFICATION - ANTI-ROLL BAR

		Type	Thread	Tightening specifications	Dimension
1AZ	Retaining bracket, anti-roll bar to rear axle support	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M10	Replace screws.	56 Nm
		F25	M8	Screw renew.	34 Nm
2AZ	Anti-roll bar link on anti-roll bar/swinging arm	F01/F02/F03/F04/F07/F10/F11/F12/F18/F25	M10	Replace nuts.	56 Nm
		F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M12	Replace nuts. Jointing torque Angle of rotation	45 Nm 45°
3AZ	Vibration absorber to anti-roll bar bracket	F07/F10/F11/F12			19 Nm
4AZ	Anti-roll bar link to wheel carrier	F25	M10	Replace screw.	56 Nm

HANDLEBARS AND STRUTS

33 32 HANDLEBARS AND STRUTS

TIGHTENING TORQUE SPECIFICATION - HANDLEBARS AND STRUTS

		Type	Thread	Tightening specifications	Dimension
1AZ	Swinging arm/crossmember to rear axle support, front	F01/F02/F04/F07/F10/F11/F12/F13/F18	M14	Replace screw and nut. **TIGHTEN DOWN IN NORMAL POSITION** . Jointing torque Angle of rotation	 165 Nm 90 °
		F03	M16	Replace screw and nut.	250 Nm
				Replace nut. **TIGHTEN**	

2AZ	Swinging arm to rear axle support, rear	F01/F02/F04/F07/F10/F11/F12/F13/F18	M14	**DOWN IN NORMAL POSITION** .	175 Nm
		F03	M18	Replace nut. **TIGHTEN DOWN IN NORMAL POSITION** . .	
				Jointing torque	100 Nm
				Angle of rotation	180 °
3AZ	Swinging arm to wheel carrier, rear	F01/F02/F04/F07/F10/F11/F12/F13/F18	M16	Replace nut. **TIGHTEN DOWN IN NORMAL POSITION** .	265 Nm
		F03	M18	Replace nut. **TIGHTEN DOWN IN NORMAL POSITION** .	
				Jointing torque	360 Nm
				Angle of rotation	180 °
4AZ	Swinging arm/integral link	F01/F02/F04/F07/F10/F11/F12/F13/F18	M14	Replace screw and nut.	
				Jointing torque	165 Nm
				Angle of rotation	45 °
		F03	M16	Replace screw and nut.	250 Nm
5AZ	Integral link to wheel carrier	F01/F02/F04/F07/F10/F11/F12/F13/F18	M12		108 Nm
		F03	M16		250 Nm
6AZ	Toe arm to bearing support/to Integral Active Steering	F01/F02/F04/F07/F10/F11/F12/F13/F18	M12	Replace screw and nut. **TIGHTEN DOWN IN NORMAL POSITION** .	
				Jointing torque	100 Nm
				Angle of rotation	90 °
		F03	M14	Replace screw and nut. **TIGHTEN DOWN IN NORMAL POSITION** .	
				Jointing torque	125 Nm

				Angle of rotation	90 °
7AZ	Toe arm to wheel carrier	F01/F02/F04/F07/F10/F11/F12/F13/F18	M14	Replace nut.	165 Nm
		F03	M14		110 Nm
8AZ	Wishbone to rear axle support	F01/F02/F04/F07/F10/F11/F12/F13/F18	M14	Replace nut. **TIGHTEN DOWN IN NORMAL POSITION** .	175 Nm
		F03	M18	Replace nut. **TIGHTEN DOWN IN NORMAL POSITION** .	280 Nm
9AZ	Wishbone to wheel carrier	F01/F02/F04/F07/F10/F11/F12/F13/F18	M14	Replace screw and nut. **TIGHTEN DOWN IN NORMAL POSITION** . Jointing torque Angle of rotation	 90 Nm 180 °
		F03	M18	Replace screw and nut. **TIGHTEN DOWN IN NORMAL POSITION** . Jointing torque Angle of rotation	 200 Nm 180 °
10AZ	Heat shield to toe arm	F01/F02	M5	Replace nut.	6.8 Nm
11AZ	Toe link bearing bracket to rear axle support	F01/F02/F04/F07/F10/F11/F12/F13/F18	M14	Replace screws and nuts.	165 Nm

INTEGRAL ACTIVE STEERING

33 34 INTEGRAL ACTIVE STEERING

TIGHTENING TORQUE SPECIFICATION - INTEGRAL ACTIVE STEERING

	Type	Thread	Tightening specifications	Dimension
1AZ	Integral active steering to rear axle support (Torx screw)	F01/F02/F07/F10/F11/F12/F13/F18	M14		165 Nm

2AZ	Integral active steering to rear axle support (bottom)	F01/F02/F07/F10/F11/F12/F13/F18	M12	Jointing torque Angle of rotation	100 Nm 90 °
3AZ	Integral active steering to rear axle support (press-in stud)	F01/F02/F07/F10/F11/F12/F13/F18	M14		165 Nm
4AZ	Grounding strap to integral active steering	F01/F02/F07/F10/F11/F12/F13/F18	M6		8 Nm
5AZ	Control unit, integral active steering, to body	F01/F02/F07/F10/F11/F12/F13/F18	M6		5.7 Nm

REAR AXLE SUSPENSION

33 33 REAR AXLE SUSPENSION

TIGHTENING TORQUE SPECIFICATION - REAR AXLE SUSPENSION

		Type	Thread	Tightening specifications	Dimension
1AZ	Rear axle support with rubber mounts to body	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M14		165 Nm
		F25	M12	Replace screws. Assembly torque rotation angle	 100 Nm 90°
2AZ	Compression strut, front, to body	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M10	Replace screws. Jointing torque Angle of rotation	56 Nm 45°
		F25	M12		100 Nm
3AZ	Rear compression strut to body	F03	M10	Replace screws. Jointing torque Angle of rotation	56 Nm 45°

REAR AXLE FINAL DRIVE SUSPENSION

33 17 REAR AXLE FINAL DRIVE SUSPENSION

TIGHTENING TORQUE SPECIFICATION - REAR AXLE FINAL DRIVE SUSPENSION

	Type	Thread	Tightening specifications	Dimension
Rear axle final drive to	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M12	**FOLLOW REPAIR INSTRUCTION** . Replace screws.	

1AZ	rear axle support, front			Jointing torque Angle of rotation	100 Nm 90 °
		F25	M12	Repair instructions!	100 Nm
2AZ	Rear axle final drive to rear axle support, rear	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M14	**FOLLOW REPAIR INSTRUCTION** . Replace nut.	175 Nm
		F25	M14	Repair instructions! Mother renew.	165 Nm
3AZ	Vibration absorber on front right rear axle final drive	F11	M14	Replace nut.	56 Nm

REAR AXLE GEARBOX HOUSING WITH LID

33 11 REAR AXLE GEARBOX HOUSING WITH LID

TIGHTENING TORQUE SPECIFICATION - REAR AXLE GEARBOX HOUSING WITH LID

	Type	Thread	Tightening specifications	Dimension
1AZ Housing Covers	F01/F02/F07/F10/F11/F12/F13/F18	M12	205 AL 225 AL	140 Nm
	F03/F04	M10	235 K 235 L	90 Nm
	F25	M10	188LW	55 Nm
2AZ Oil filler plug with O-ring	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18/F25	M22	Replace oil filler plug with O-ring	60 Nm

SHOCK ABSORBERS

33 52 SHOCK ABSORBERS

TIGHTENING TORQUE SPECIFICATION - SHOCK ABSORBERS

	Type	Thread	Tightening specifications	Dimension
1AZ Support bearing to body	F01/F02/F03/F04/F10/F12/F13/F18	M8	Replace nuts.	28 Nm
	F07/F11	M8	Replace screws.	28 Nm
	F25	M8	Replace screws. Jointing torque and angle of rotation must be observed without	

				fail. Jointing torque Angle of rotation	 25 Nm 45 °
2AZ	Support bearing flange to shock absorber	F01/F02/F04/F07/F10/F11/F12/F13/F18	M12	Replace nut.	27 Nm
		F25	M12	Replace nut.	34 Nm
3AZ	Shock absorber to wheel carrier	F01/F02/F04/F10/F12/F13/F18	M16	Replace screw. **TIGHTEN DOWN IN NORMAL POSITION** .	250 Nm
4AZ	Shock absorber to swinging arm	F07/F11	M14	Replace screw. **TIGHTEN DOWN IN NORMAL POSITION** .	165 Nm
5AZ	Spring strut to camber rod	F25	M14	Replace screw and nut. Jointing torque and angle of rotation must be observed without fail. Jointing torque Angle of rotation	 100 Nm 90 °

WHEEL BEARINGS

33 41 WHEEL BEARINGS

TIGHTENING TORQUE SPECIFICATION - WHEEL BEARINGS

	Type	Thread	Tightening specifications	Dimension
1AZ Output shaft to wheel bearing	F01/F02/F03/F04/F07/F10/F11/F12/F13/F18	M27	Replace collar nut.	420 Nm
	F25	M27	Replace collar nut. Jointing torque and angle of rotation must be observed without fail. Jointing torque Angle of rotation	 100 Nm 45 °
2AZ Wheel bearing to wheel carrier	F01/F02/F04/F07/F10/F11/F12/F13/F18/F25	M12	Replace screws.	100 Nm

DRIVELINE/AXLE

Rear Axle - Operating Fluids

1.0 GENERAL INFORMATION ON FINAL DRIVE OIL

Final Drive oil or hypoid gear lubricant must conform with the following requirements because of the high loads which occur on the profiles of the hypoid gear teeth:

- Load carrying capacity.
- Sufficient protection against seizure.
- Good wear protection.
- Optimal friction and temperature behavior.
- Seal compatibility.
- Aging resistance.

These and other properties are already contained in brand-name hypoid gear lubricants because of the high content of EP additives (EP = extreme pressure).

OIL ADDITIVES

The factory has **not approved** oil additives for hypoid gear lubricants.

All final drives are designed in such a manner that they do not require any type of oil additives. Any type of additives is fundamentally rejected by the factory. BMW NA cannot accept any liability for follow-up damage resulting from the use of additives.

2.0 APPROVED FINAL DRIVE OILS FOR FRONT AND REAR AXLE FINAL DRIVES WITH AND WITHOUT LIMITED SLIP OR VISCOUS COUPLING

Mineral based final drive oils are no longer recommended due to the release of synthetic final drive oils for all vehicles with or without limited slip differentials.

Limited Slip Differentials

With the introduction of the Z3 roadster a new synthetic final drive oil for all vehicles with a multi-plate limited-slip differential has been released. The new BMW final drive oil SAF-XJ will replace the old final drive oil SAF-XLS.

The SAF-XLS final drive oil is not to be used in the final drive of the Z3 roadster.

Use only the SAF-XJ in the final drive of the Z3 roadster.

NOTE: If a non-limited slip differential oil is used in a limited slip differential a whining

or chattering sound can be heard on very tight turns and will eventually result in a failure of the differential.

BMW PARTS NUMBER SPECIFICATION

Description	Quantity	Part Number
BMW Synthetic Final Drive Oil (with multi-plate Limited Slip Differential)	55 liter drum (SAF-XJ)	83 22 1 470 080

Motorsport Vehicles:

All E46 M3, E60 M5, E63/E64 M6 and E85 M roadster and M coupe require SAF-XJ Fluid.

Non Limited Slip Differentials

BMW PARTS NUMBER SPECIFICATION

Description	Quantity	Part Number
BMW Synthetic Final Drive Oil **(without multi-plate limited slip differential, or with viscous differential lock (325iX/iXA)**	55 liter drum (SAF-XO)	83 22 9 407 768

3.0 FINAL DRIVE OIL FOR BMW M1 MOTORSPORT COUPE

The final drive of a BMW M1 is integrated in the manual transmission and oil supply is accomplished with a mutual oil filling.

Use reputable brand SAE 80 manual transmission oil conforming with specifications MIL-L-2105 A or API-GL 4.

4.0 OIL CHANGE INTERVALS

Maintenance requirements per the vehicle's Service Booklet or the respective Service Maintenance Checklist.

Replacement final drives: same as for new vehicles.

All models as of 9/97 production are factory-filled with synthetic rear axle oil having a lifetime service rating. No oil changes are required for the life of the vehicle.

5.0 CARS WITHOUT SERVICE INDICATOR (INCLUDING BMW M1)

First oil change at 600 miles

Further oil changes at 18,000 miles

Special rule for BMW 530i, 528i (E 12):

1st oil change at 600 miles after final drive replacement

2nd oil change at 4,500 miles after final drive replacement

Further oil changes at 9,000 miles intervals, beginning at 9,000 miles.

6.0 CARS WITH SERVICE INDICATOR

BREAK-IN PROCEDURES

Drive the car with changing engine speeds and road speeds during the first 1,200 miles/2,000 km, but never faster than 2/3rds of maximum speed in a selected gear. Avoid using full throttle and kick-down positions of the accelerator pedal during this period.

BMW PARTS NUMBER SPECIFICATION

BMW M3/M5/M6	Up to 1,200 miles max. engine speed 5500 RPM Generally avoid full-throttle position of the accelerator.

These break-in procedures are, of course, also applicable to replacement final drives.

7.0 OUTPUT SHAFTS

The joints of output shafts have permanent grease lubrication and require no servicing. The amount of joint grease required after repairing is supplied in the "dust cover repair kit".

8.0 WHEEL BEARINGS

Ball Bearings E24 (Since 5/82), E28, E30, E31, E32 And All Following

Bearing unit is lubricated for its service life, cannot be disassembled and does not require subsequent lubrication.

Grooved Ball Bearings E12, E21, E23, E24 Before 5/82

Grease type: Retinax A (former BMW Part No. 81 22 9 407 710)

CRC Part No. SL 3131

9.0 DIFFERENTIAL HOUSING FINAL DRIVE COVERS AND HOUSING

On 735i/iL, 750iL, M6 and M5 (E28) models, the attaching bolts are to be installed with Hylogrip/Loctite 270 (green) thread sealant (former BMW Part No. 81 22 9 400 086).

BMW PARTS NUMBER SPECIFICATION

Wurth	Part No. 8932700

Loctite	Part No. 21438

SUSPENSION

Rear Axle - Repair

3300 GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

33 00... INFORMATION ON REPLACING SHOCK ABSORBERS

Situation

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Effect

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.

Exception: On all M-GmbH models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

33 00... INSTRUCTIONS (CHASSIS COMPONENTS MADE OF ALUMINIUM)

Due to the chemical and corrosion characteristics of aluminium, always comply with the following points when handling aluminium components:

- Do not bring into contact with battery acid!
- Do not clean with wire brushes made of brass or iron! Always use wire brushes with stainless steel bristles!
- Do not expose to flying sparks when grinding/separating! Cover components!
- Do not strike with steel welding splashes! Cover components!
- Do not expose to temperatures > 80°C, even for brief periods! Temperatures in paint facilities do not have the same impact

00..... LIFTING VEHICLE USING A VEHICLE HOIST

WARNING: Danger to life!
Read and follow operating instructions for lifting platform.
Do not exceed carrying capacity of lifting platform.

NOTE: The lifting platform must comply with the relevant statutory accident prevention regulations and be serviced according to the manufacturer's instructions.

IMPORTANT: Risk of damage!
Before driving onto a lifting platform, make sure there is sufficient ground clearance between the lifting platform and the car.
The vehicle may only be raised with the lifting platform at the four jacking points.

Necessary preliminary tasks

- If necessary, remove jacking points from equipment pack and insert from below into openings in front

and rear sill areas

IMPORTANT: Risk of damage!
Align support plates (2) of lifting platform arms to jacking points (1) in such a way that no adjoining components are touched and thereby damaged.

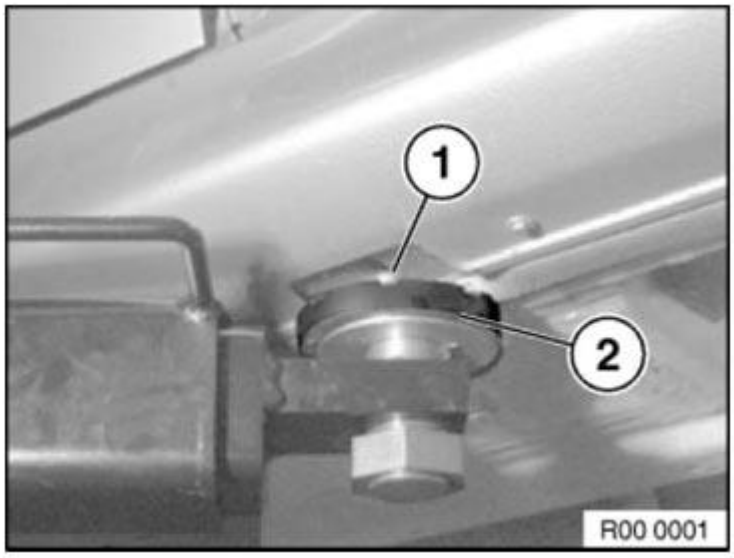


Fig. 1: Identifying Support Plates And Jacking Points
Courtesy of BMW OF NORTH AMERICA, INC.

31 33... MEASURING VEHICLE RIDE HEIGHT

Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to wheel arch lower edge (1).

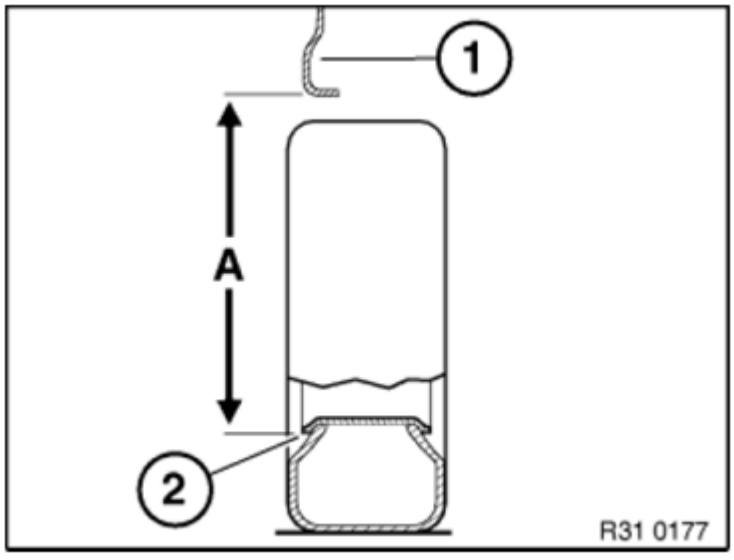
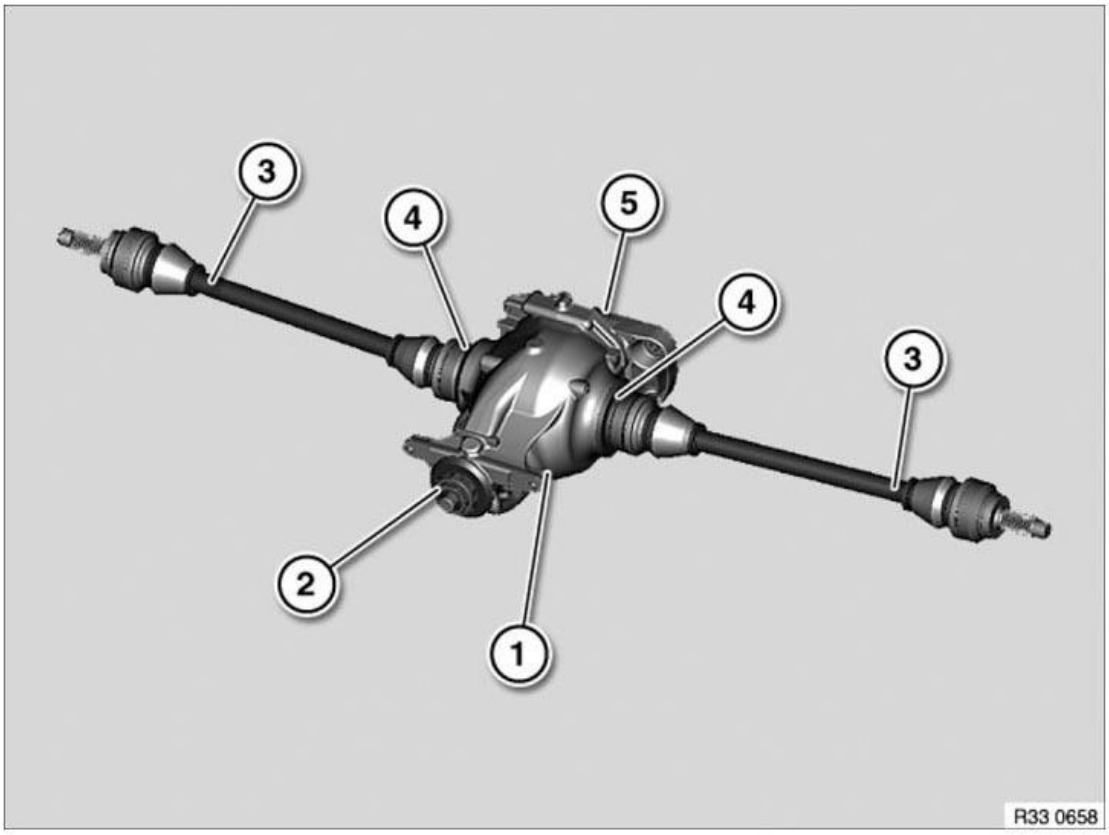


Fig. 2: Measuring Actual Ride Height, Rim Flange And Wheel Arch Lower Edge
Courtesy of BMW OF NORTH AMERICA, INC.

41 00...NOTES ON REPAIRING THREADS

See **NOTES ON REPAIRING THREADS** .

33..... OVERVIEW OF REAR AXLE FINAL DRIVE/OUTPUT SHAFTS

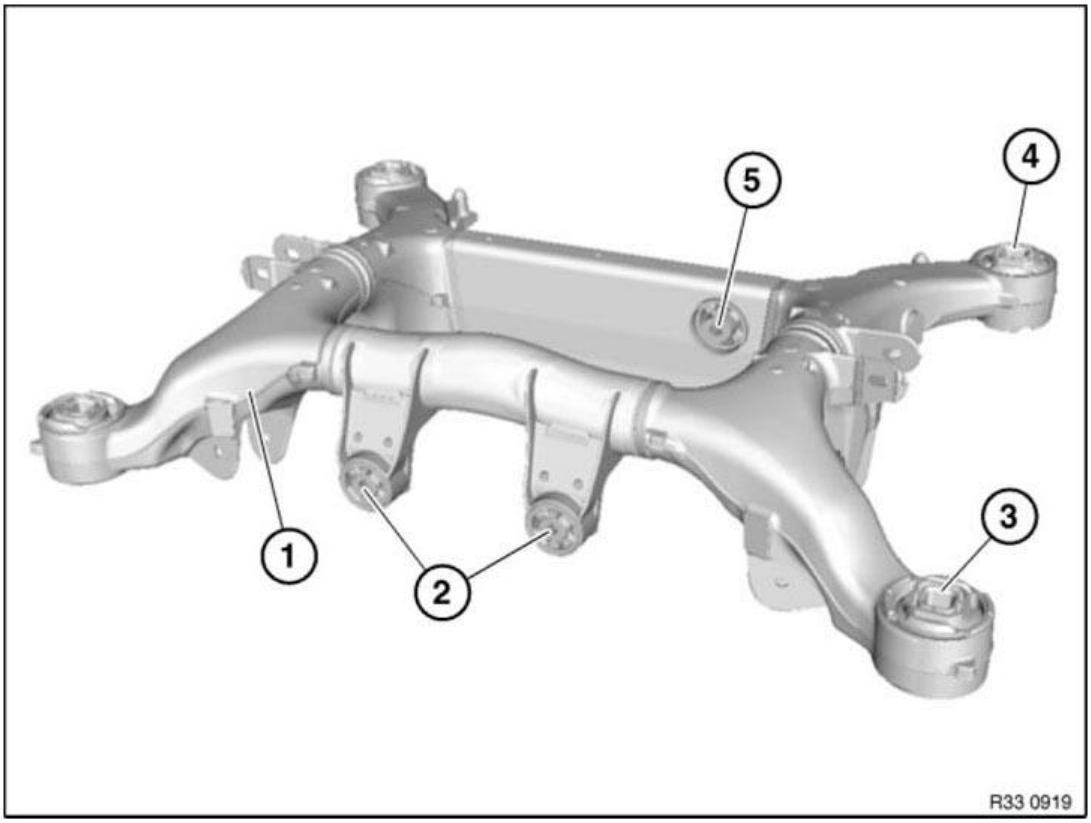


Safety instructions & general information

1 Rear axle final drive
2 Shaft seal
3 Output shaft (left/right)
4 Shaft seal
5 Cover (incl. cover gasket)

Fig. 3: Identifying Rear Axle Final Drive/Output Shafts Components
Courtesy of BMW OF NORTH AMERICA, INC.

33.... OVERVIEW OF REAR AXLE SUPPORT WITH RUBBER MOUNTS

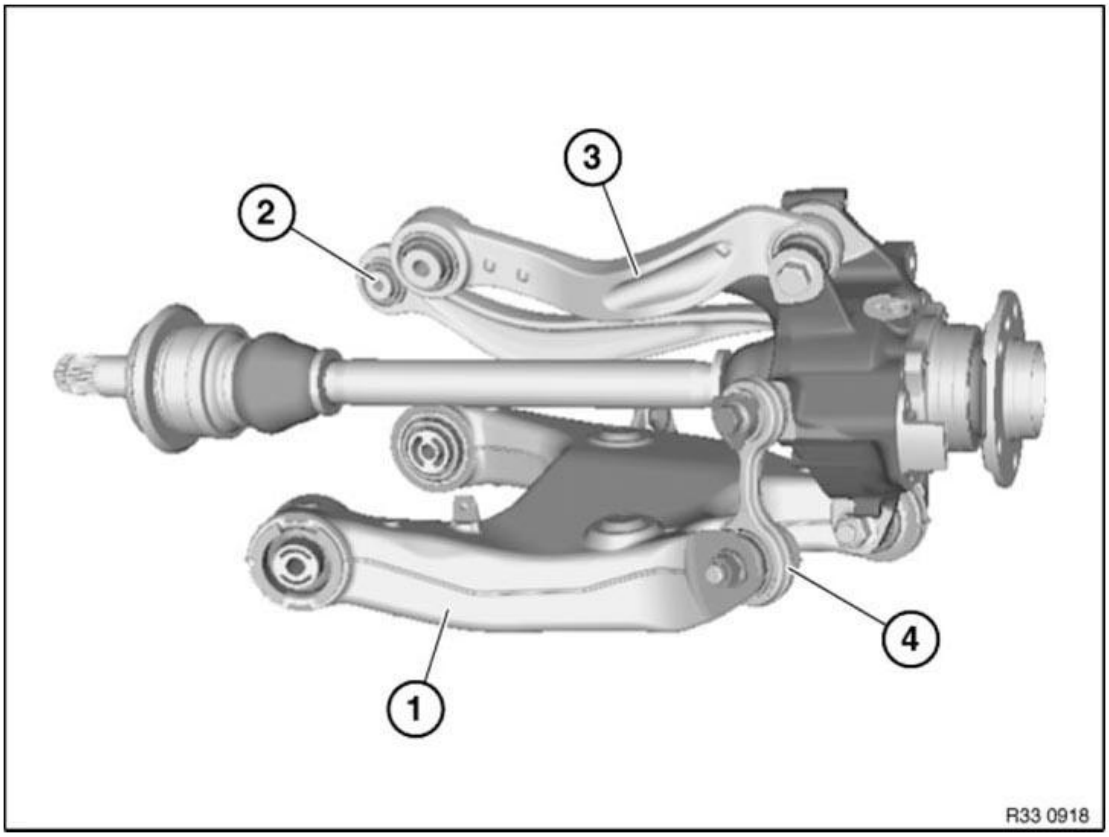


Safety precautions & general information

1	Rear axle support	4	Rear axle support rubber mount, rear
2	Rear final drive unit rubber mount, front	5	Rear final drive unit rubber mount, rear
3	Rear axle support rubber mount, front		

Fig. 4: Identifying Rear Axle Support With Rubber Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

33.... OVERVIEW OF STEERING LINKS



Safety precautions & general information

1 Swinging arm
2 Toe arm
3 Control arm
4 Integral link

Fig. 5: Identifying Swinging Arm, Toe Arm And Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

00..... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

1. **Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.**
2. **Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!**
3. **Check the rubber plate on the trolley jack prior to each use, replacing if necessary.**

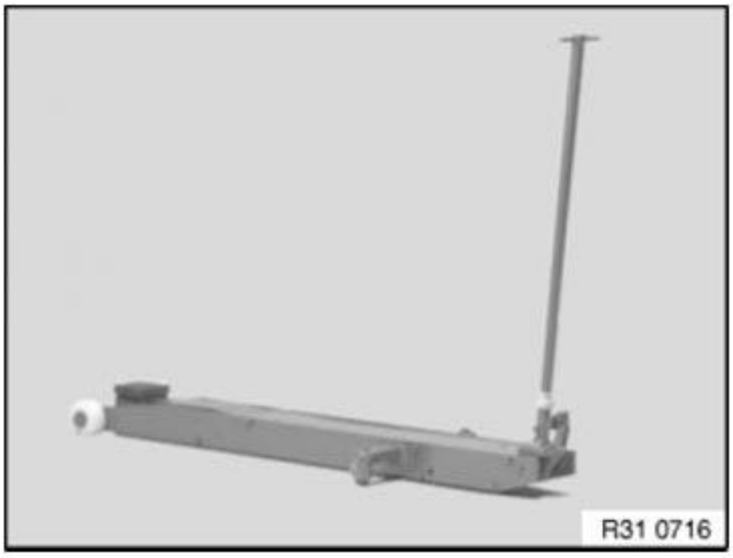


Fig. 6: Identifying Trolley-Jack With Rubber Plate Contact Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: All-wheel drive vehicles may only be raised with the stiffening plate mounted on the front axle (1)!
Raising directly on the front axle support without stiffening plate is not permissible!

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

1. Car jacking point
2. Side car jacking points
3. Rear axle final drive

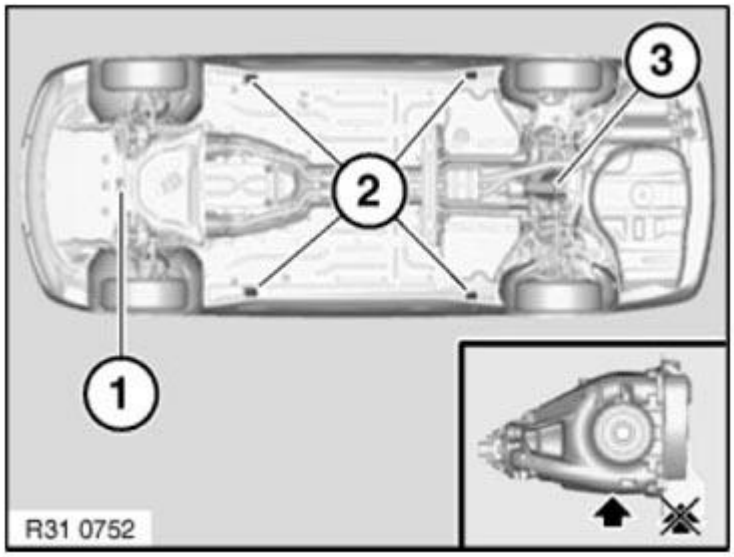
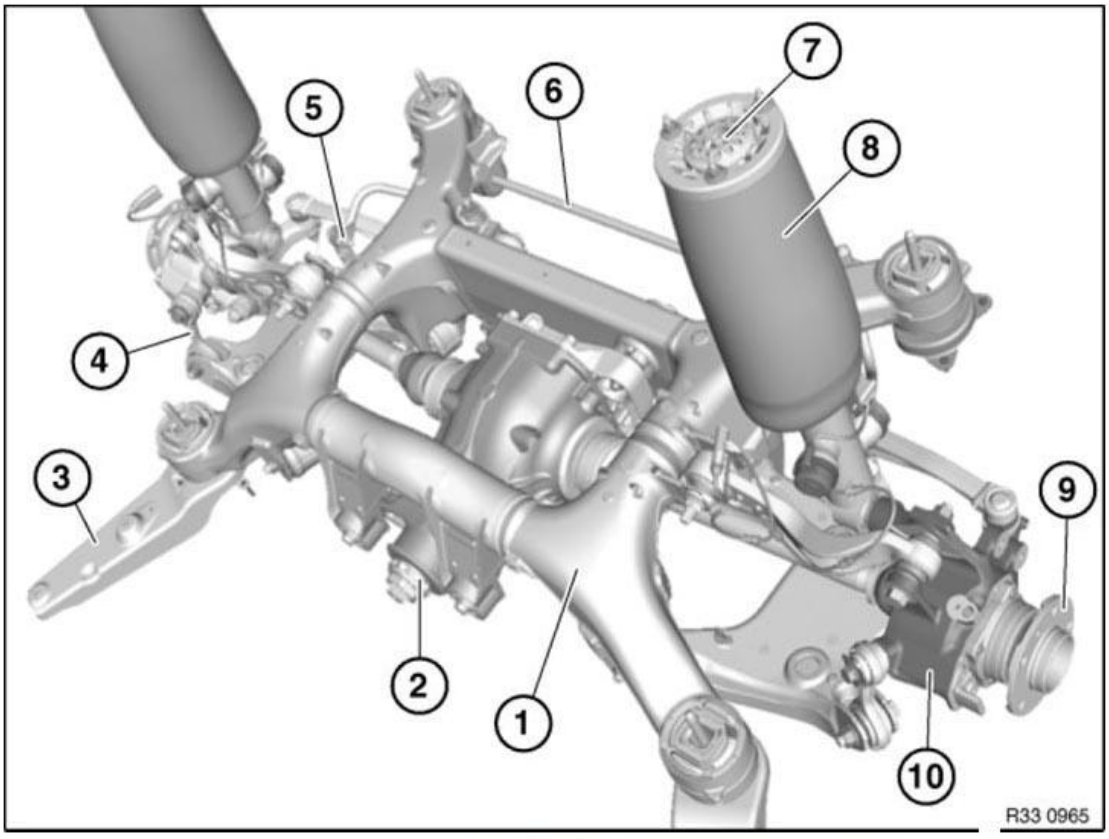


Fig. 7: Identifying Jacking Points
Courtesy of BMW OF NORTH AMERICA, INC.

Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

33... REAR AXLE LAYOUT



Safety precautions & general information

1 Overview, rear axle support with rubber mount
2 Overview of rear differential/output shafts
3 Compression strut, front
4 Overview of steering links
5 Anti-roll bar link
6 Anti-roll bar / rubber mount
7 Shock absorber / support bearing
8 Coil spring
9 Wheel bearing / drive flange
10 Wheel carrier

Fig. 8: Rear Axle Layout
Courtesy of BMW OF NORTH AMERICA, INC.

33 00... REAR AXLE: WHEEL ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

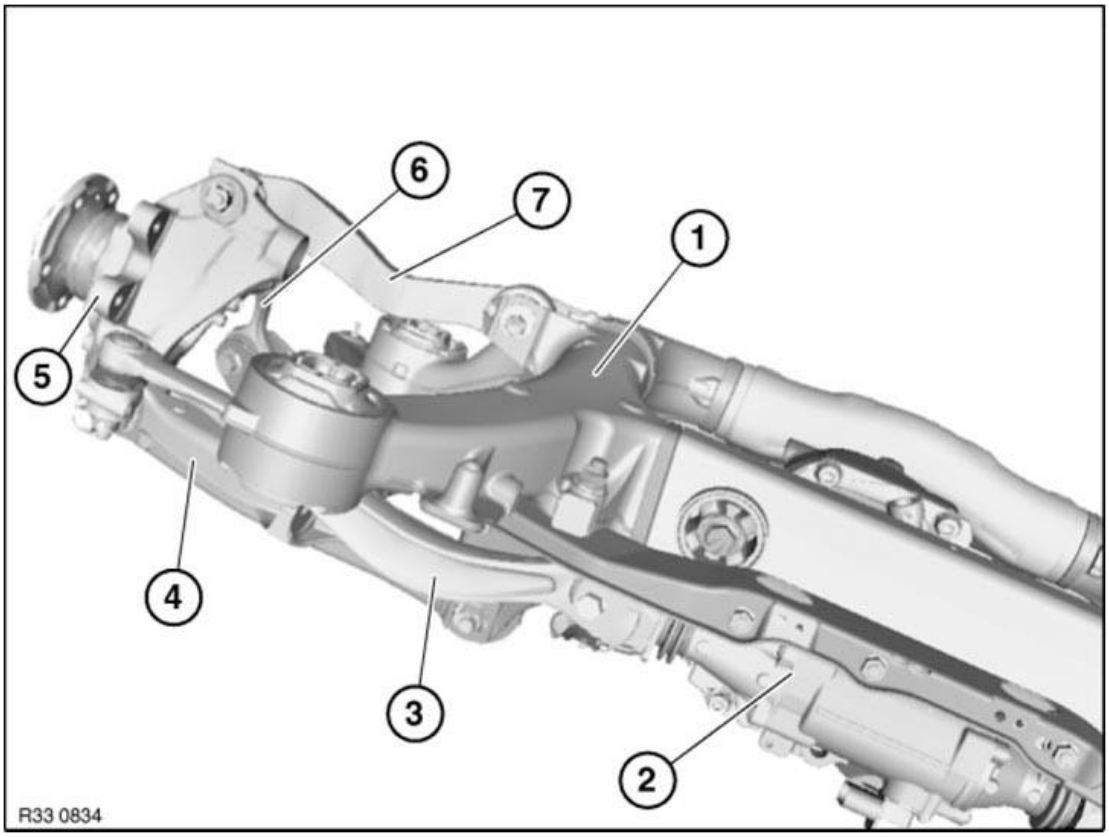


Fig. 9: Identifying Rear Axle Support, HSR Actuator, Toe Arm, Swinging Arm, Wheel Carrier, Integral Link, And Wishbone
Courtesy of BMW OF NORTH AMERICA, INC.

Graphic F01/F02.

A **WHEEL ALIGNMENT CHECK** must be carried out after the following work:

- Release the following screw connection:
  - Swinging arm, front/rear, to rear axle support
  - Swinging arm to integral link/wheel carrier
  - Guide arm to rear axle support/HSR unit
  - Wishbone to rear axle support/wheel carrier
- Replacement of following parts:
  1. Rear axle support
  2. HSR actuator
  3. Toe arm
  4. Swinging arm
  5. Wheel carrier
  6. Integral link

7. Wishbone

33 00... REAR AXLE: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

A **WHEEL/CHASSIS ALIGNMENT CHECK** must be carried out after the following work:

Release the following screw connection:

- Swinging arm, front/rear, to rear axle support
- Swinging arm to integral link / wheel carrier
- Guide arm to rear axle support / HSR unit
- Wishbone to rear axle support / wheel carrier

Replacement of following parts:

1. Rear axle support
2. HSR actuator
3. Toe arm
4. Swinging arm
5. Wheel carrier
6. Integral link
7. Wishbone

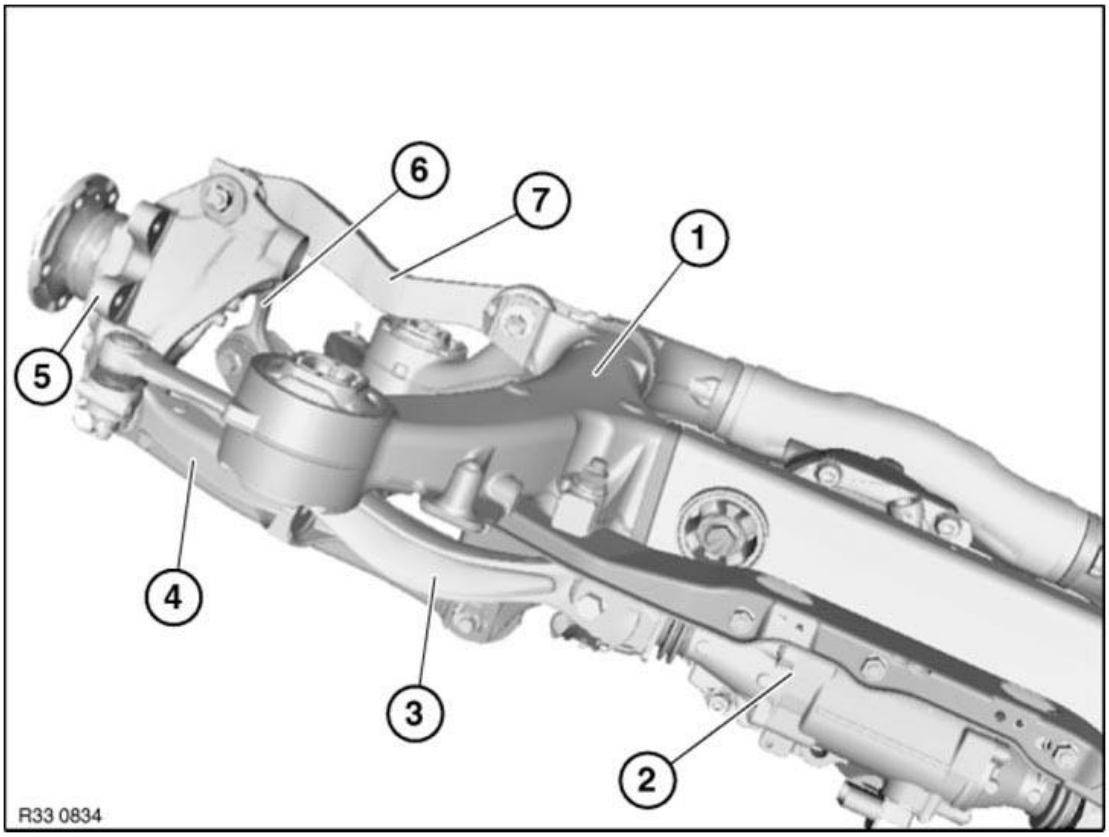


Fig. 10: Identifying Rear Axle Support, HSR Actuator, Toe Arm, Swinging Arm, Wheel Carrier, Integral Link, And Wishbone
Courtesy of BMW OF NORTH AMERICA, INC.

41 00... REPAIR SOLUTION FOR STRAIGHT SHANK/HEXAGON RIVET NUT

Protection measures!

- Wear safety goggles
- Wear protective gloves

IMPORTANT: To prevent the material from tapering, do not drill out the rivet head.

1. Carefully spot-drill rivet head with a larger drill bit/countersink

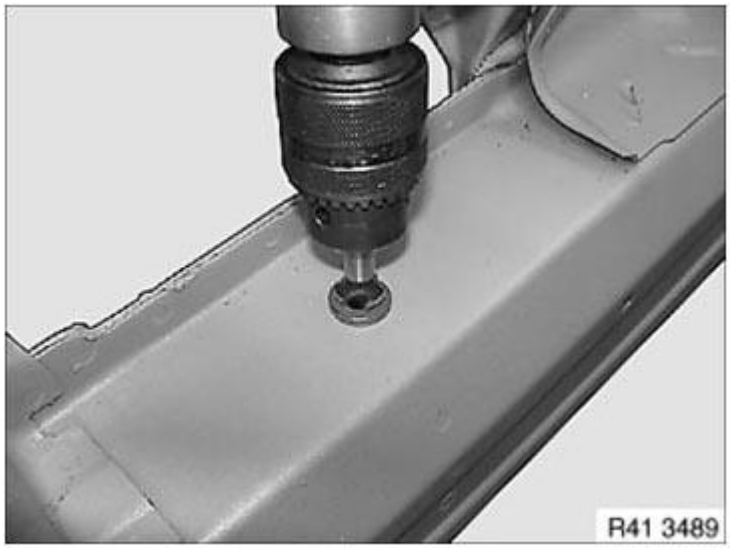


Fig. 11: Drilling Rivet Head Using Larger Drill Bit
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid paint work damage

2. Knock rivet head away with a chisel



Fig. 12: Knocking Rivet Head Using Chisel
Courtesy of BMW OF NORTH AMERICA, INC.

3. Drive through rivet shank into cavity, remove if necessary



Fig. 13: Identifying Rivet Shank
Courtesy of BMW OF NORTH AMERICA, INC.

4. Clean component, eliminate paint work damage if necessary



Fig. 14: [Identifying Cleaning Component]
Courtesy of BMW OF NORTH AMERICA, INC.

If the rivet shank can be removed:

IMPORTANT: To avoid corrosion, stop chips by means of cavity sealing. Follow INSTRUCTIONS ON CORROSION PROTECTION .

5. Preserving cavity



Fig. 15: Preserving Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

If the rivet shank cannot be removed:

WARNING: Risk of injury!
Observe NOTES ON CAVITY FOAM .

IMPORTANT: To avoid corrosion and rattling noises, stop chips and rivet nut shank with cavity foam.
Remove foam remnants with isohexane (benzine).

5. Stop rivet shank by means of specific foaming
6. Set rivet nut with hand rivet gun



Fig. 16: Setting Rivet Nut Using Hand Rivet Gun
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Fit rivet nut as quickly as possibly, ideally before the cavity foam hardens.

Hexagon/straight shank rivet nut (up to thread M8) with hand rivet gun ZS308

IMPORTANT: Follow manufacturer's operating instructions.
Make sure rivet nut correctly contacts component.

NOTE: According to the manufacturer, the pictured tool is suitable up to an M8 thread (see After Sales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Workshop Equipment Shop or www.bmwgroup-wep.com).

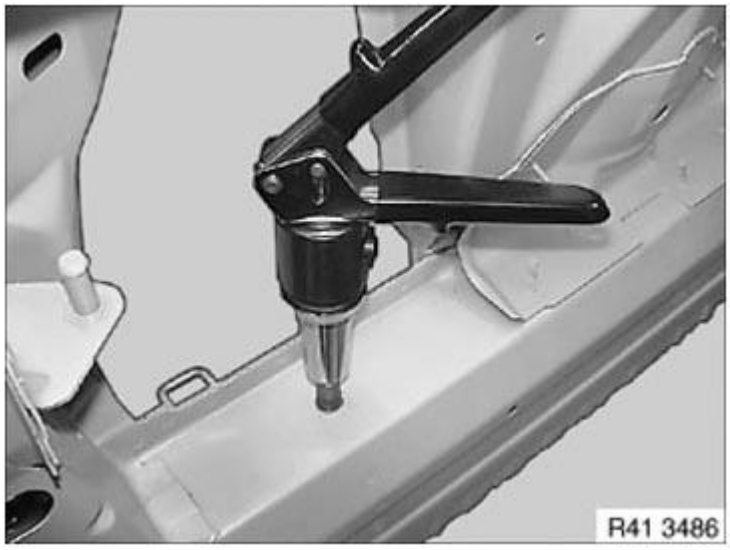


Fig. 17: Setting Rivet Nut Using Hand Rivet Gun (ZS308)
Courtesy of BMW OF NORTH AMERICA, INC.

Hexagon/straight shank rivet nut (up to thread M12) with hand rivet gun MB512

IMPORTANT: Follow manufacturer's operating instructions.
Make sure rivet nut correctly contacts component.

NOTE: According to the manufacturer, the pictured tool is suitable up to an M12 thread (see After Sales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Workshop Equipment Shop or www.bmwgroup-wep.com).

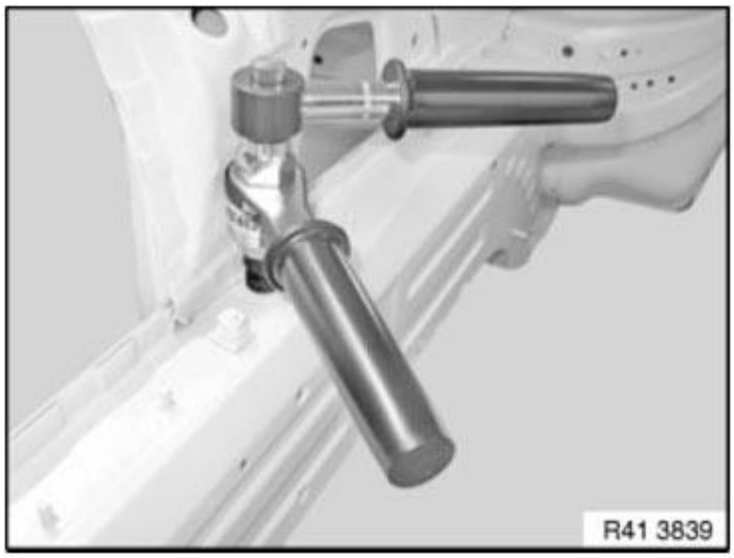


Fig. 18: Setting Rivet Nut Using Hand Rivet Gun (MB512)

Courtesy of BMW OF NORTH AMERICA, INC.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.

- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

3310 FINAL DRIVE

00 11... CHECKING/TOPPING UP OIL LEVEL IN REAR AXLE FINAL DRIVE

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Risk of damage!

To avoid serious damage to the rear axle final drive, it is essential to use only APPROVED OILS in the rear axle final drive.

Open screw plug (1).

Tightening torque **33 11 2AZ**

Check oil level.

If necessary, pour in final drive oil up to lower edge of opening for oil filler plug (1).

Installation note:

Replace screw plug (1) with O-ring.

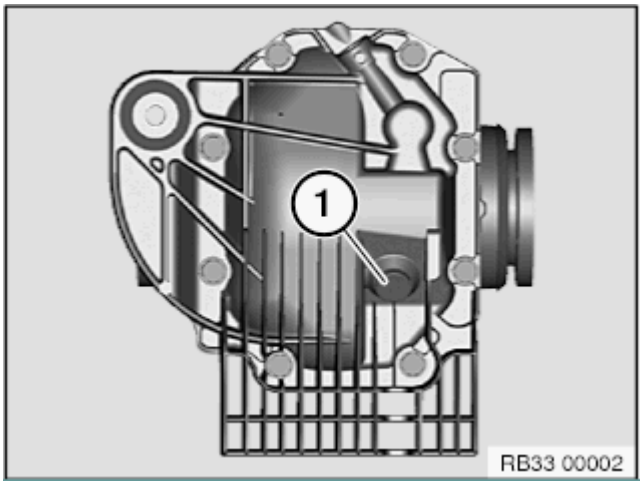


Fig. 19: Locating Oil Filler Plug

Courtesy of BMW OF NORTH AMERICA, INC.

33 10... REAR AXLE FINAL DRIVE: ASSIGNMENT TO MODEL SERIES

REAR AXLE FINAL DRIVE MODEL SERIES

Model series	Engine	Rear axle final drive	Remarks
F01	N54	205AL	
	N63	225AL	
	N57	225AL	
	N74	235L	
F02	N54	205AL	
	N63	225AL	
	N74	235L	
F04	N63	235L	
F07	N57	225AL	
	N55	205AL	
	N63	225AL	
F10/F11/F18	N52/N53/N55/N47	205AL	
	N57	225AL	
	N63	225AL	
F12/F13	N55	205AL	
	N63	225AL	
F25	N47/N52/N55/N57/	188LW	

33 10 010 REMOVING AND INSTALLING/REPLACING REAR DIFFERENTIAL

Notes

WARNING: Danger of injury!

Rear axle final drive must be lashed with tensioning strap 33 5 206 to prevent it falling out when the output shafts are forced off.

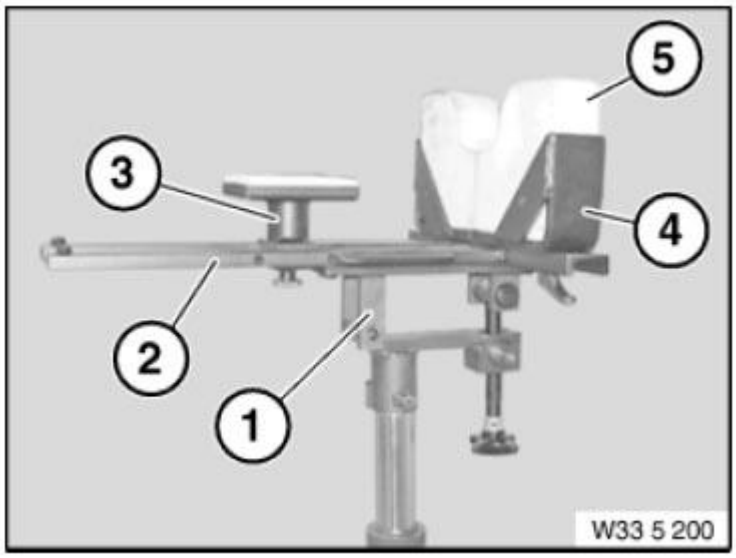


Fig. 20: Identifying Tensioning Strap 33 5 206
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When removing/reinstalling the rear axle final drive, both OUTPUT SHAFT RADIAL SHAFT SEALS and the circlip on both output shafts must be replaced.

After completing repair work, **CHECK TRANSMISSION OIL LEVEL**.

Necessary preliminary work

- Remove **PROPELLER SHAFT ON FINAL DRIVE** .
  - Disconnect propeller shaft at rear axle differential.
  - Release center mount.
  - Tie up propeller shaft to underbody.

IMPORTANT: Bending the propeller shaft by an excessive angle can cause premature damage to the joint/propeller shaft!

Position special tool **33 5 200** on workshop jack.

Support rear axle final drive **33 5 200** with special tool.

Lash rear axle final drive with tensioning strap 33 5 206 to special tool **33 5 200** .

IMPORTANT: Tensioning strap 33 5 206 must be pass through between output shafts and rear axle final drive cover!

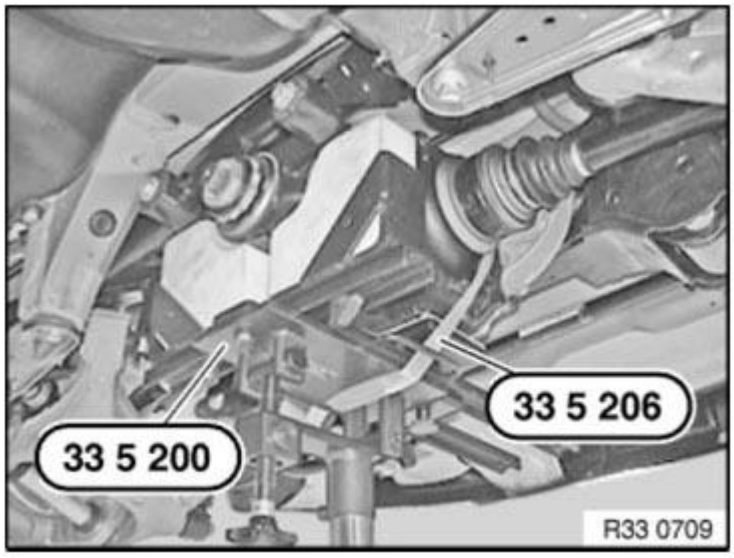


Fig. 21: Supporting Rear Axle Final Drive Using Special Tools (33 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Special tools 33 5 120 and 33 5 125 must be inserted in all-round slot (1) on output shaft!

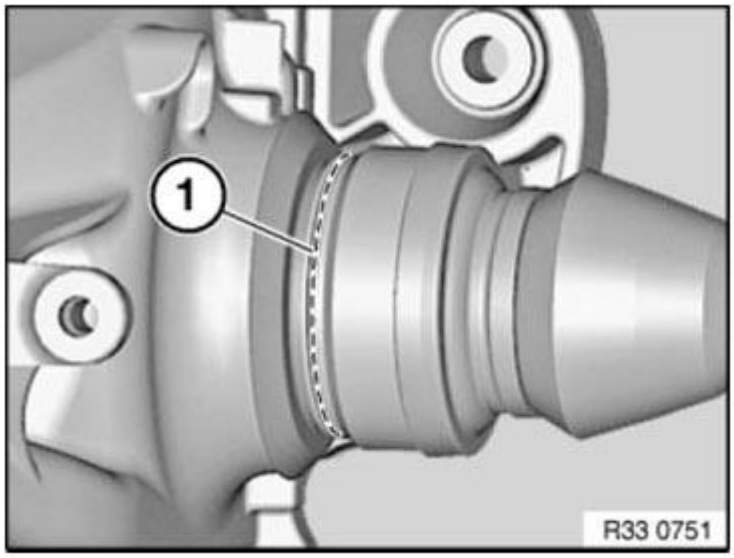


Fig. 22: Identifying All-Round Slot Using Special Tool 33 5 120 And 33 5 125
Courtesy of BMW OF NORTH AMERICA, INC.

Press **only left output shaft** out of rear axle final drive with jerking and jolting motions using special tool 33 5 123, 33 5 121, 33 5 124 / 33 5 126.

Here, synchronizing key of bolt 33 5 122 must rest on rear axle final drive.

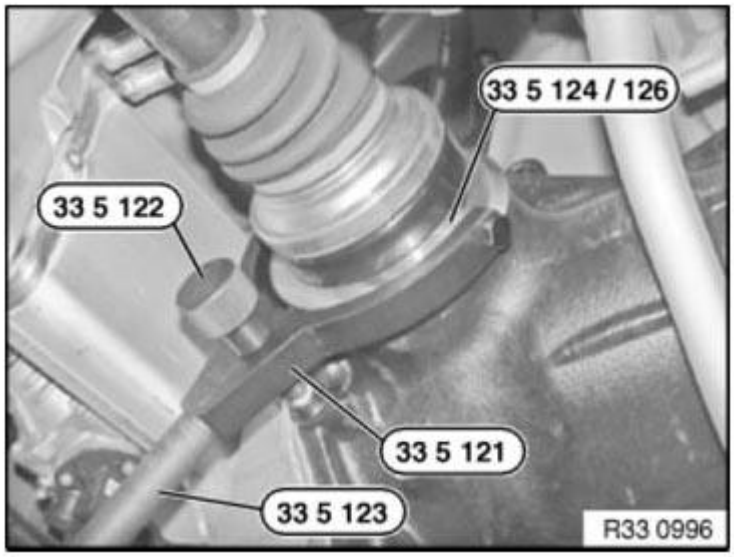


Fig. 23: Pressing Left Output Shaft Using Special Tool (33 5 123) And (33 5 121)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **33 17 1AZ** .

Installation note:

Adhere to the installation sequence in order to prevent distortion of the rear axle final drive during installation and thereby avoid potential complaints about noise.

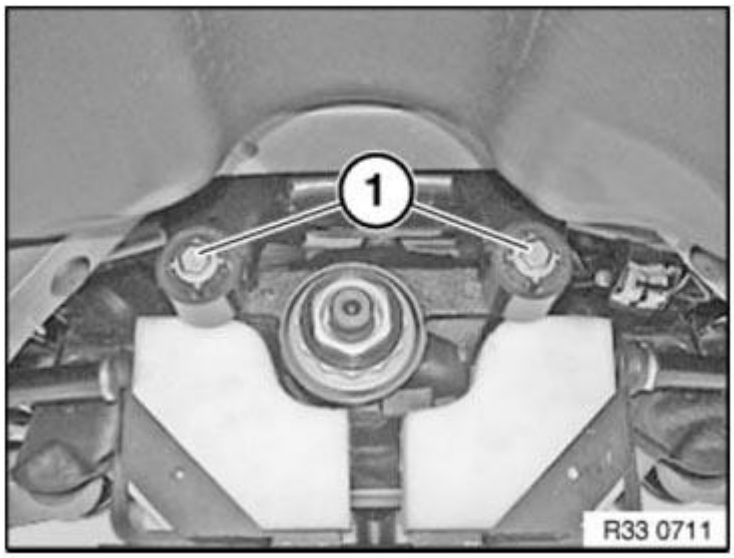


Fig. 24: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut and remove bolt (1).

Tightening torque **33 17 2AZ** .

Installation note:

Adhere to the installation sequence in order to prevent distortion of the rear axle final drive during installation and thereby avoid potential complaints about noise.

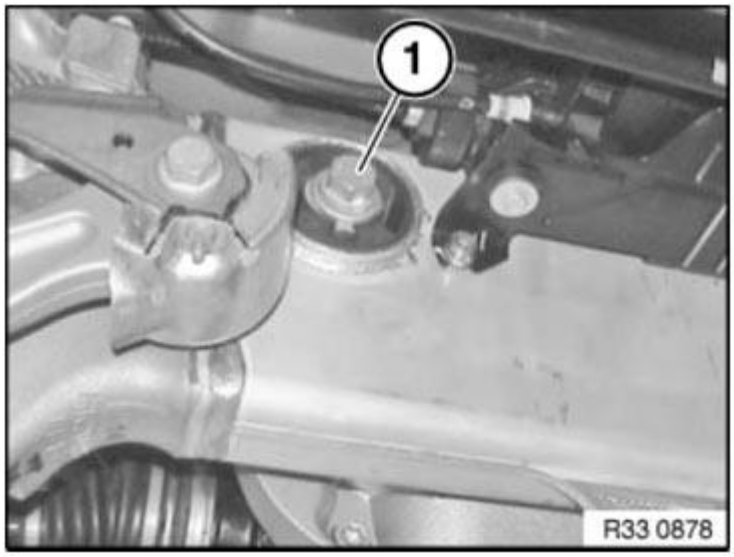


Fig. 25: Identifying Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Lower rear axle final drive with special tool **33 5 200** .

IMPORTANT: Risk of damage!
Output shafts must not under any circumstances rest on swinging arms.

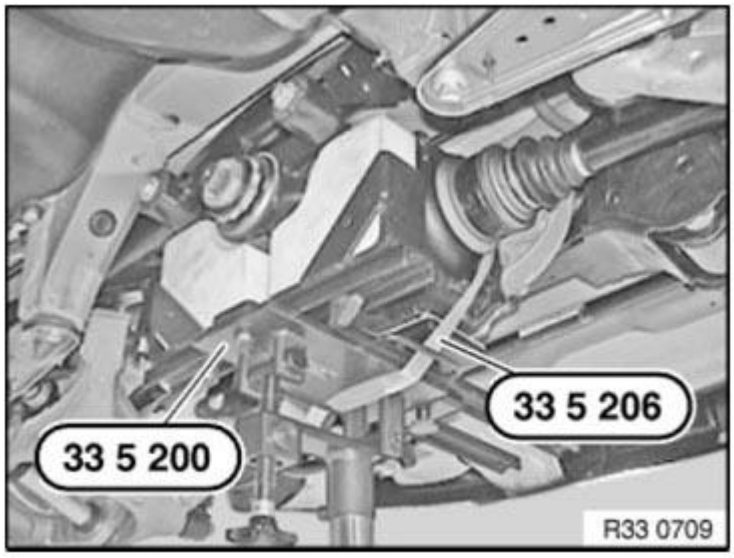


Fig. 26: Installing Lower Rear Axle Final Drive Using Special Tool (33 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on left spring strut.

Remove spring strut from wheel carrier.

Tightening torque, **33 52 3AZ** .

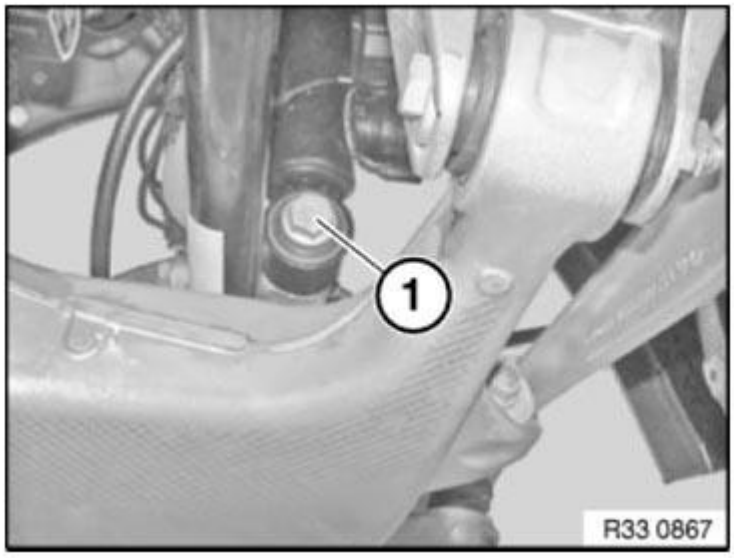


Fig. 27: Identifying Spring Strut Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Output shafts must not under any circumstances rest on swinging arms.

Secure special tool **31 5 220** with wheel studs to left drive flange.

Press wheel carrier min. approx. 12 cm upwards.

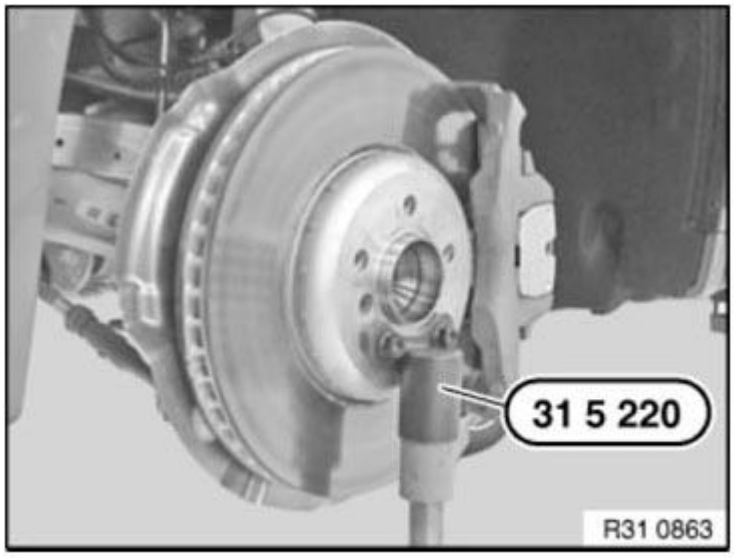


Fig. 28: Securing Special Tool (31 5 220) With Wheel Studs On Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

Press (tilt) rear axle final drive on right upwards.

Feed out left output shaft in downward direction and tie up.

Swing rear axle final drive towards left side.

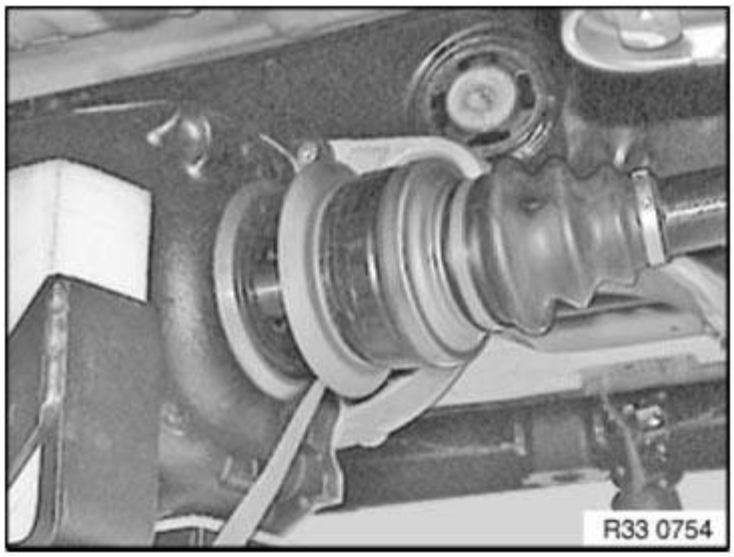


Fig. 29: Removing Left Output Shaft

Courtesy of BMW OF NORTH AMERICA, INC.

Press **right output shaft** out of rear axle final drive with jerking and jolting motions using special tool 33 5 123, 33 5 121, 33 5 124/33 5 126. Here, synchronizing key of bolt 33 5 122 must rest on rear axle final drive.

Feed out output shaft and tie up.

Remove rear axle final drive.

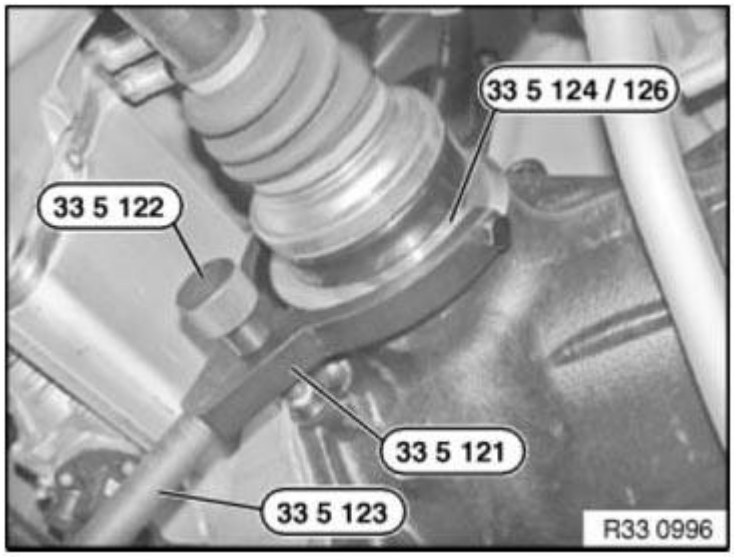


Fig. 30: Pressing Rear Axle Final Drive Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: High installation forces indicate that the output shaft spline teeth are damaged or deformed!
Check gearing, replace damaged parts if necessary.
Check dust plate (1) for damage, renew if necessary.
Replace circlip (2).
Coat highlighted contact surface (3) of output shaft with APPROVED FINAL DRIVE OIL .

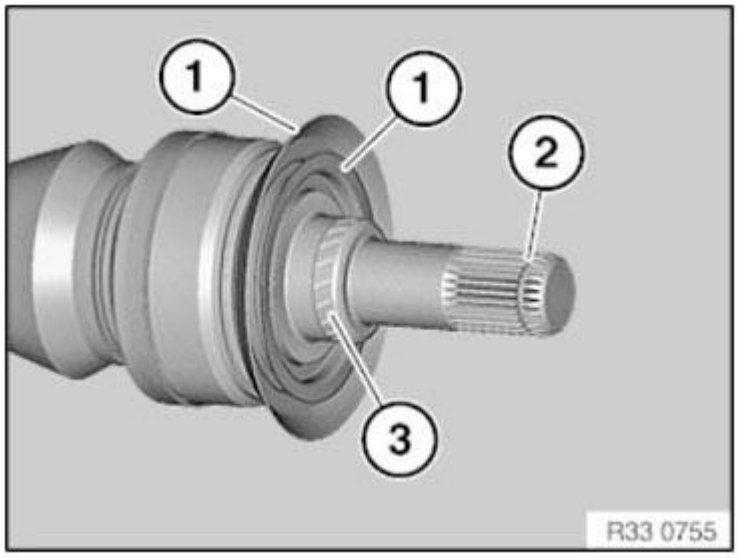


Fig. 31: Identifying Disculpate, Circlip And Coat Highlighted Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Insert output shaft into rear axle final drive.

Pull out assembly protection ring at lug (1) until one of the two predetermined breaking points gives.

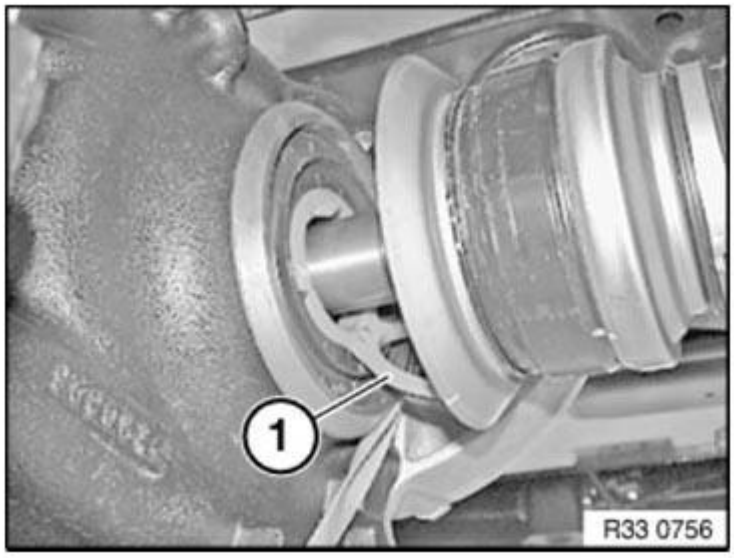


Fig. 32: Identifying Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Drive output shaft into rear axle final drive using special tool 33 5 125 / 33 5 127 and a rubber mallet.

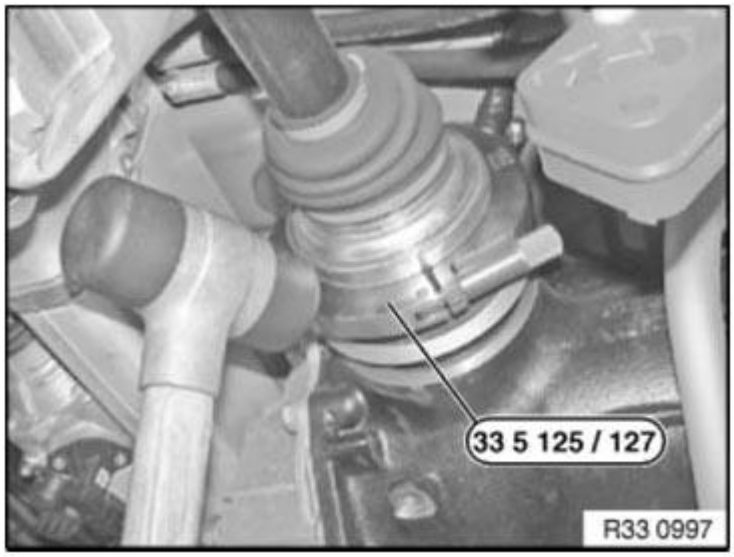


Fig. 33: Installing Output Shaft Into Rear Axle Final Drive Using Special Tool (33 5 125) And (33 5 127)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation sequence

1. Install rear axle final drive with workshop jack and special tool **33 5 200** in rear axle support
2. Insert bolts (1) (do not tighten down)
3. Insert bolt from rear and replace nut (2) (do not tighten down)
4. Release tensioning strap, lower special tool **33 5 200** and move away
5. Tighten down screws (1)

   Tightening torque **33 17 1AZ** .

6. Tighten nut (2)

   Tightening torque **33 17 2AZ** .

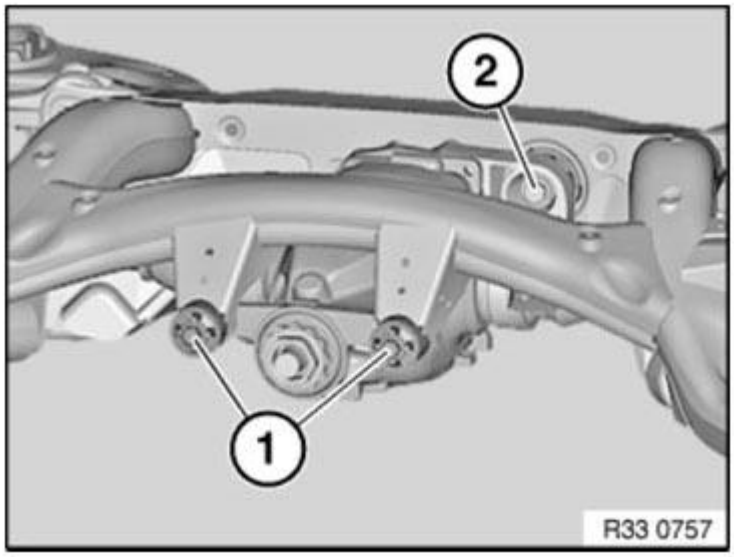


Fig. 34: Identifying Nuts And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check **TRANSMISSION OIL LEVEL**, correct if necessary.

33 11 151 REPLACING SHAFT SEAL FOR DRIVE FLANGE LEFT OR RIGHT

Necessary preliminary tasks

- Remove **REAR AXLE FINAL DRIVE**

Use special tools **00 5 010** and **32 1 060** /33 1 308 to remove radial shaft seal

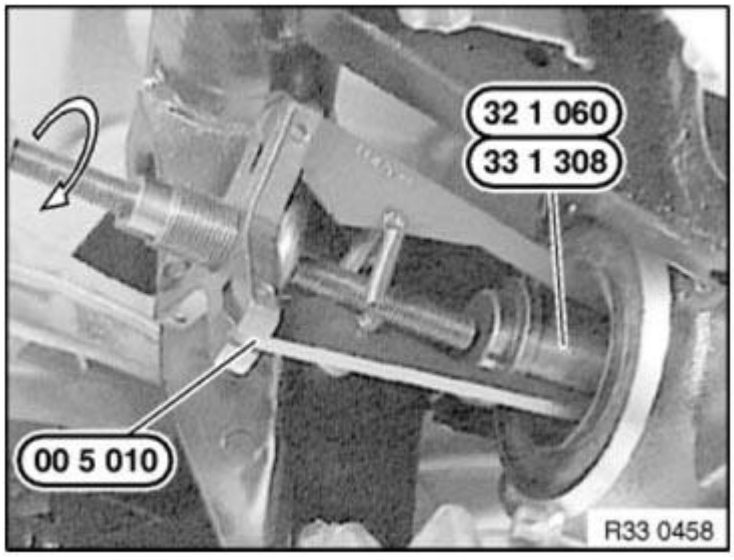


Fig. 35: Removing Radial Shaft Seal Using Special Tools (00 5 010) And (32 1 060)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing new shaft seal

NOTE: The installation protective ring (1) serves to protect the sealing lips on radial shaft seal (2) when the output shaft is being installed.

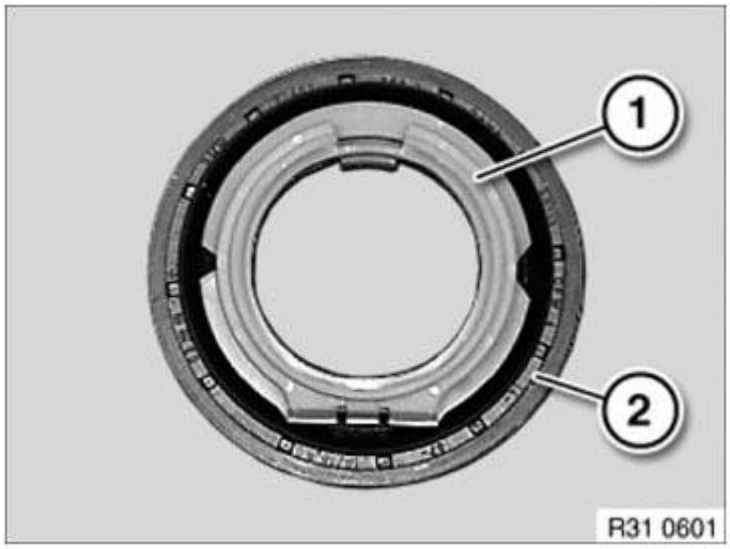


Fig. 36: Identifying Protective Ring And Sealing Lips On Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Installation protective ring (1) must not slip out of radial shaft seal!

Coat housing of sheet metal flange of radial shaft seal with **APPROVED FINAL DRIVE OIL** .

Drive in radial shaft seal as far as it will go with following special tools (depending on rear axle final drive/outer diameter).

33 5 130

33 5 140

Remove special tool.

Open installation protective ring (1).

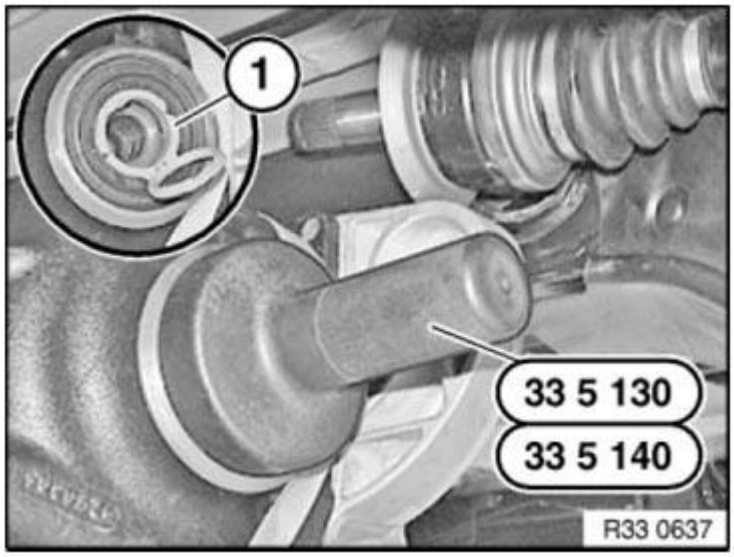


Fig. 37: Installing Radial Shaft Seal Using Special Tools (33 5 130) And (33 5 140)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: High installation forces indicate that the output shaft spline teeth are damaged or deformed!
Check gearing, replace damaged parts if necessary.
Check dust plate (1) for damage, renew if necessary.
Replace circlip (2).
Coat highlighted contact surface (3) of output shaft with APPROVED FINAL DRIVE OIL .

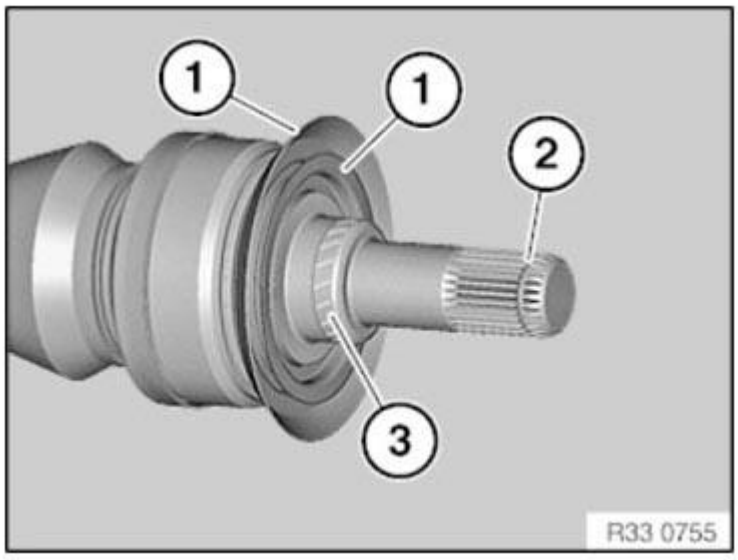


Fig. 38: Identifying Dust Plate, Circlip And Coat Highlighted Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Insert output shaft into rear axle final drive.

Pull out assembly protection ring at lug (1) until one of the two programmed rupture points gives.

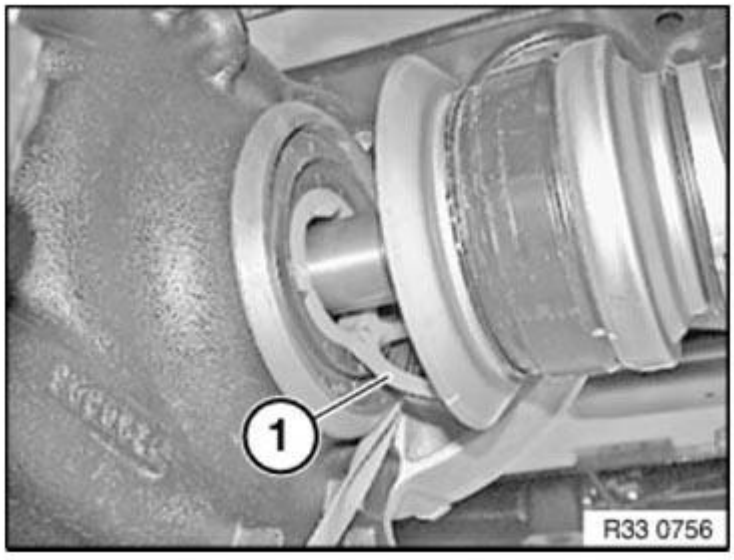


Fig. 39: Identifying Lug
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check **FINAL DRIVE OIL LEVEL** , correct if necessary

3311 FINAL DRIVE WITH COVER

00 11... CHECKING/TOPPING UP OIL LEVEL IN REAR DIFFERENTIAL

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

**IMPORTANT: Risk of damage!
To avoid serious damage to the rear axle differential, it is essential to use only APPROVED OILS in the rear axle differential.**

Undo oil filler plug (1).

Check oil level.

If necessary, pour in rear differential oil up to lower edge of opening for oil filler plug (1).

Installation:

Replace oil filler plug (1) with O-ring.

Tightening torque **33 11 2AZ** .

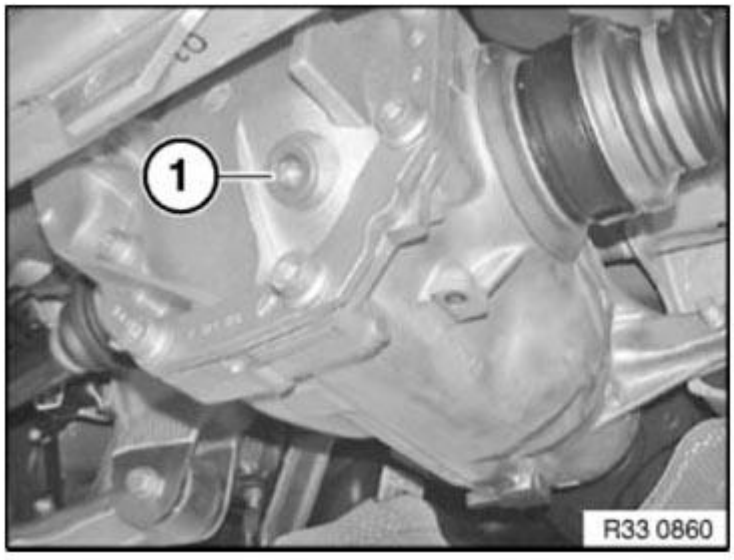


Fig. 40: Identifying Oil filer Plug
Courtesy of BMW OF NORTH AMERICA, INC.

33 11... REMOVING AND INSTALLING/REPLACING VIBRATION ABSORBER

Vibration absorber to anti-roll bar, right:

Release screws (1).

Tightening torque **33 55 3AZ** .

Remove vibration absorber (2).

Installation note:

Replace screw.

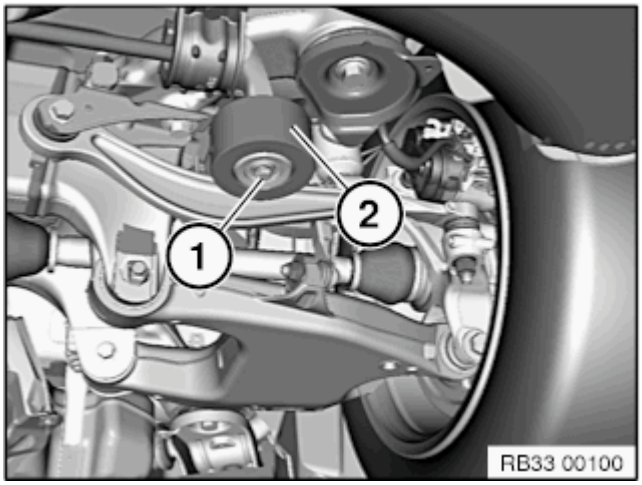


Fig. 41: Identifying Vibration Absorber To Anti-Roll Bar (Right) And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Vibration absorber to rear axle differential, front right:

Slacken nut (1).

Tightening torque **33 17 3AZ** .

Remove vibration absorber (2).

Installation note:

Replace nut.

First, screw the rear axle differential to the rear axle support with the specified tightening torque.

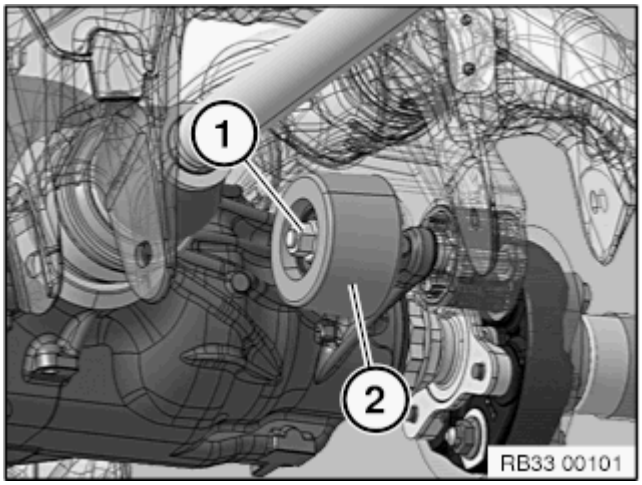


Fig. 42: Identifying Vibration Absorber To Rear Axle Differential (Front Right) And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Vibration absorber to rear axle differential:

Release screw (1).

Tightening torque **33 11 3AZ** .

Remove vibration absorber (2).

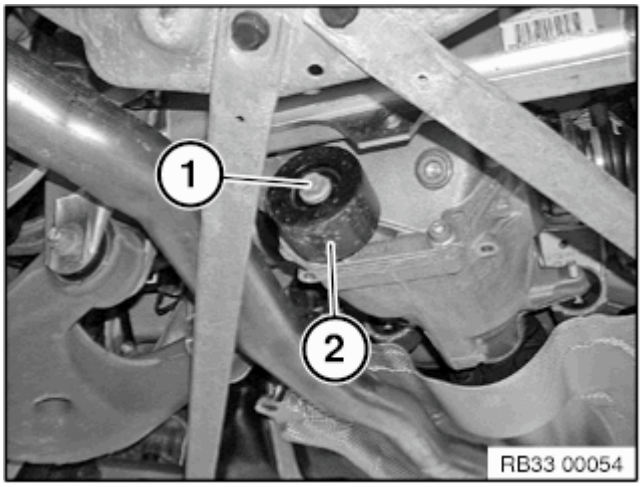


Fig. 43: Identifying Vibration Absorber To Rear Axle Differential And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Vibration absorber to rear axle support, front:

Release screws (1).

Tightening torque **33 33 4AZ** .

Remove vibration absorber (2).

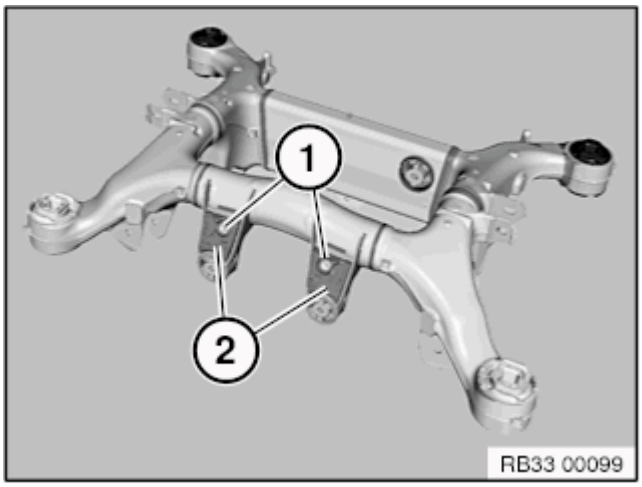


Fig. 44: Identifying Vibration Absorbers To Rear Axle Support (Front) And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Vibration absorber to rear adapter:

Release screw (1).

Tightening torque **33 11 10AZ** .

Remove vibration absorber (2).

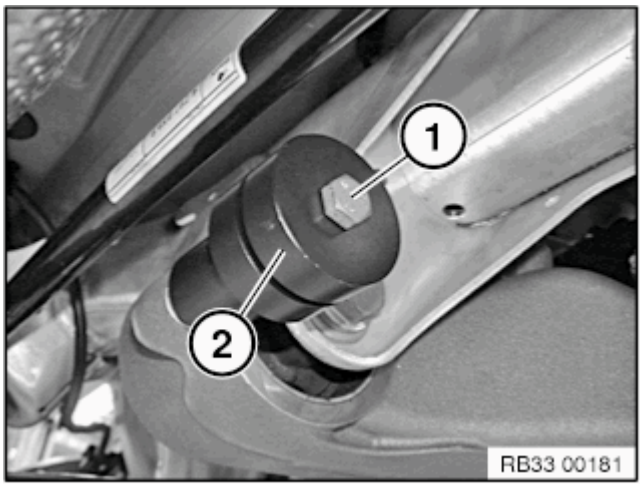


Fig. 45: Identifying Vibration Absorber To Rear Adapter And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Vibration absorber to front adapter:

Support rear axle differential. Slacken nut (1).

Tightening torque **33 17 1AZ** .

Remove screw and vibration absorber (2).

Installation note:

Replace nut (1) and screw.

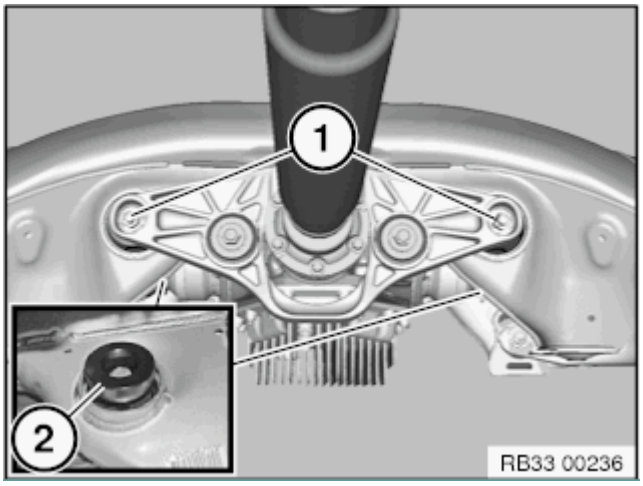


Fig. 46: Identifying Vibration Absorber To Front Adapter And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

33 11 271 REPLACING COVER GASKET ON REAR DIFFERENTIAL (205AL/225AL) AT REAR

IMPORTANT: In event of oil loss, always check rear axle final drive for traces of wear and damage.

Necessary preliminary work

- Catch or draw off final drive oil.
- Remove **REAR AXLE FINAL DRIVE** .

NOTE: Read and comply with REAR DIFFERENTIAL: ASSIGNMENT TO MODEL SERIES.

IMPORTANT: To avoid leaks from the rear axle final drive lid, do not use a paper gasket in vehicles with liquid sealing compounds!
To prevent the final drive oil from foaming over, make sure that no remnants of the liquid sealing compound are pressed into the rear axle final drive housing.

Release screws (1).

Tightening torque **33 11 1AZ** .

Remove lid.

Installation note:

If necessary, remove remnants of liquid sealing compound with scraper.

Clean sealing surface on lid and rear axle final drive.

Use Loctite 5970 liquid seal from BMW Parts Department.

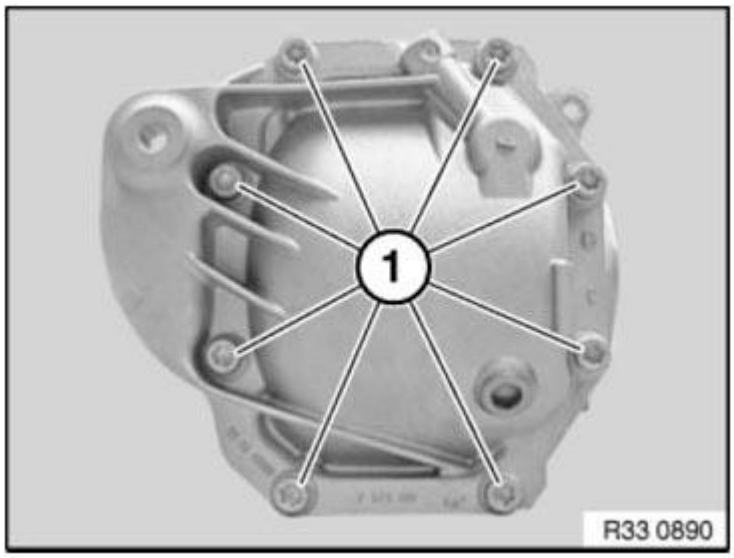


Fig. 47: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Add **FINAL DRIVE OIL** .

33 11 271 REPLACING COVER GASKET ON REAR AXLE FINAL DRIVE AT REAR (235L)

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: In event of oil loss, always check rear differential for traces of wear and damage.

To avoid leaks from the rear differential cover, do not use a paper gasket in vehicles with liquid sealing compounds!

To prevent the differential oil from foaming over, make sure that no traces of the liquid gasket are pressed into the housing.

Necessary preliminary work

- Drain and catch final differential oil.
- Remove **REAR AXLE FINAL DRIVE**.

NOTE: Read and comply with REAR DIFFERENTIAL: ASSIGNMENT TO MODEL SERIES.

Release screws (1).

Tightening torque (M10x50) **33 11 1AZ** .

Unfasten screws (2).

Tightening torque (M10x25) **33 11 1AZ** .

Remove cover.

If necessary, remove remnants of liquid sealing compound with scraper.

Clean sealing face on cover and rear differential.

Installation note:

If a paper gasket was fitted, a paper gasket or liquid sealing compound can be used.

The liquid sealing compound can be found in BMW Electronic Parts Catalogue.

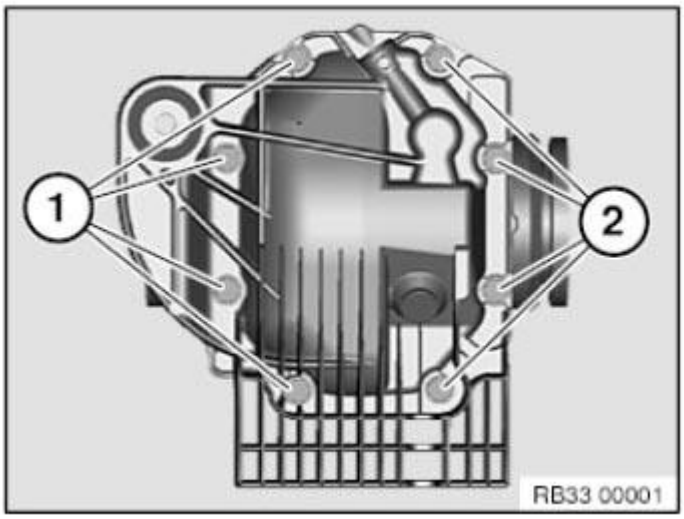


Fig. 48: Identifying Rear Differential Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Add **FINAL DRIVE OIL**.

33 11 151 REPLACING SHAFT SEAL FOR DRIVE FLANGE LEFT OR RIGHT

Necessary preliminary tasks

- Remove **REAR AXLE FINAL DRIVE**

Use special tools **00 5 010** and **32 1 060** /33 1 308 to remove radial shaft seal

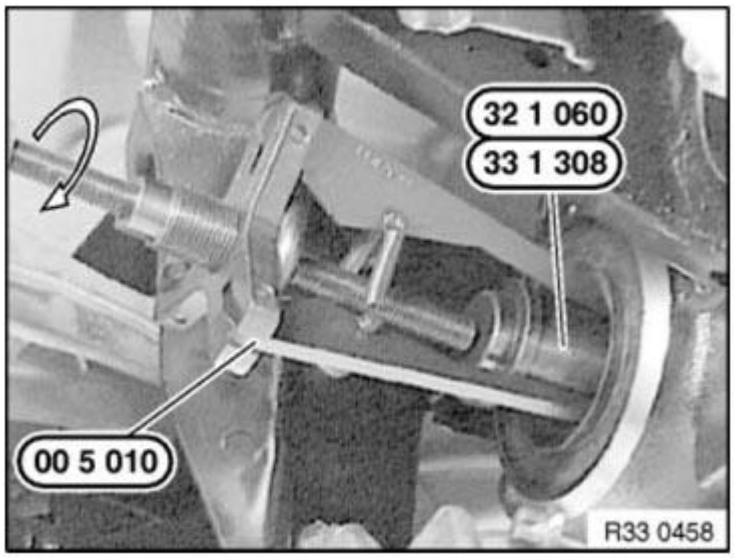


Fig. 49: Removing Radial Shaft Seal Using Special Tools (32 1 060) And (33 1 308)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing new shaft seal

NOTE: The installation protective ring (1) serves to protect the sealing lips on radial shaft seal (2) when the output shaft is being installed.

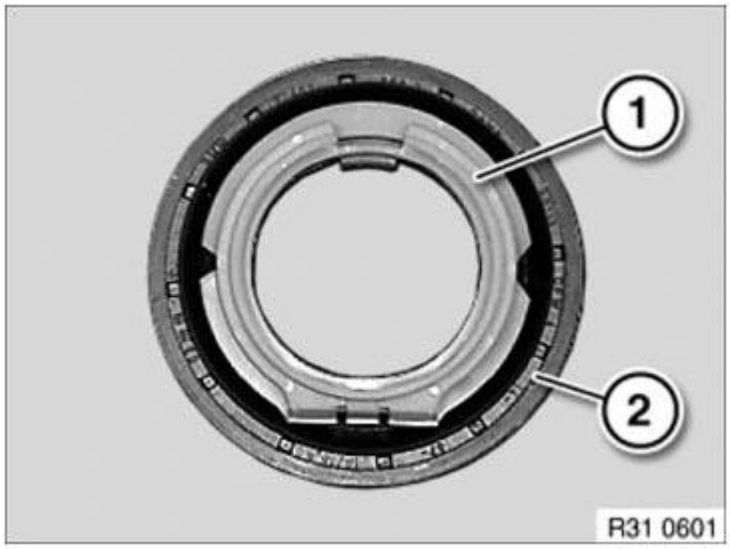


Fig. 50: Identifying Protective Rings And Sealing Lips On Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Installation protective ring (1) must not slip out of radial shaft seal!

Coat housing of sheet metal flange of radial shaft seal with **APPROVED FINAL DRIVE OIL** .

Drive in radial shaft seal as far as it will go with following special tools (depending on rear axle final drive/outer diameter).

33 5 130

33 5 140

Remove special tool.

Open installation protective ring (1).

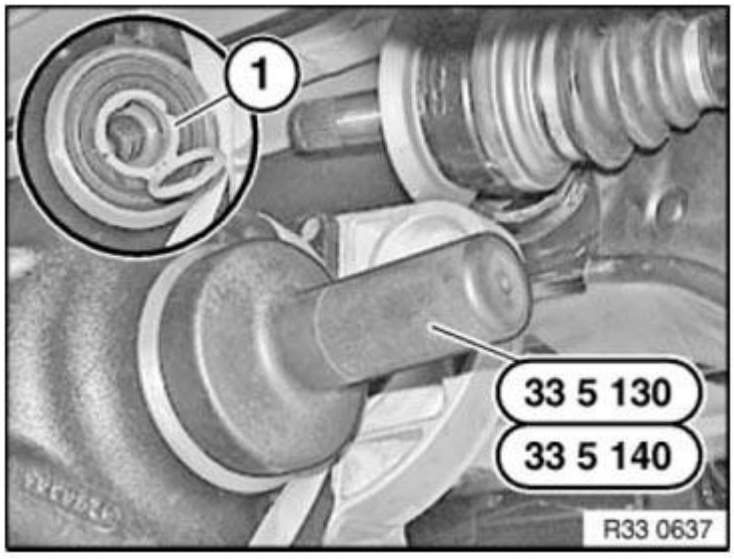


Fig. 51: Installing Radial Shaft Seal Using Special Tools (33 5 130) And (33 5 140)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: High installation forces indicate that the output shaft spline teeth are damaged or deformed!
Check gearing, replace damaged parts if necessary.
Check dust plate (1) for damage, renew if necessary.
Replace circlip (2).
Coat highlighted contact surface (3) of output shaft with APPROVED FINAL DRIVE OIL .

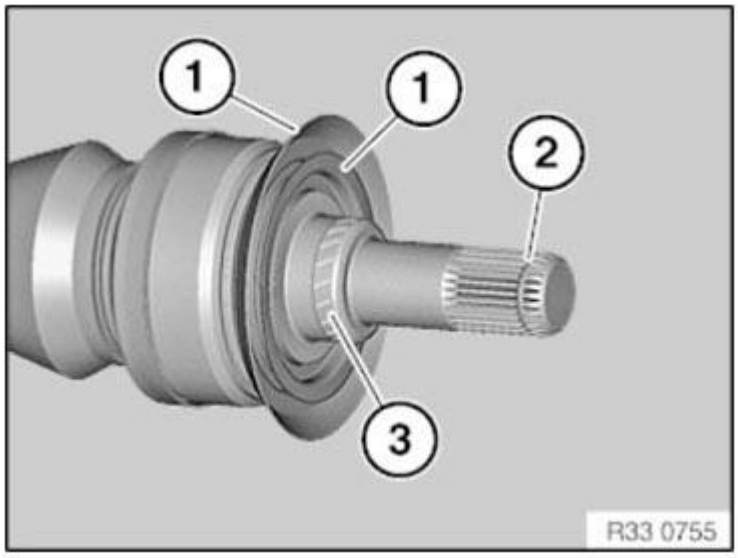


Fig. 52: Identifying Dust Plate, Circlip And Coat Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Insert output shaft into rear axle final drive.

Pull out assembly protection ring at lug (1) until one of the two programmed rupture points gives.

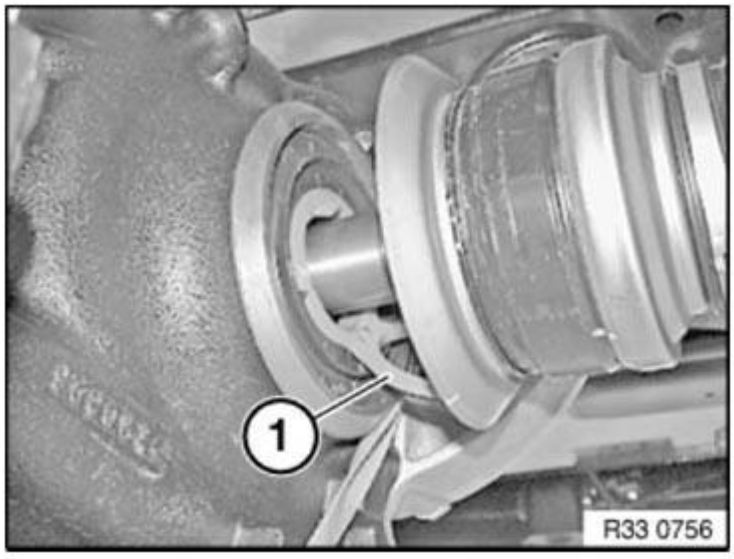


Fig. 53: Identifying Lug
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check **FINAL DRIVE OIL LEVEL** , correct if necessary

33 11 021 REPLACING SHAFT SEAL FOR DRIVE FLANGE ON REAR DIFFERENTIAL (INSERTED PROPELLER SHAFT)

Notes

IMPORTANT: Use only APPROVED OILS .
Failure to comply with this instruction will result in serious damage to the rear axle final drive!

Necessary preliminary tasks

- Remove **THREE-HOLE FLANGE**

Remove retaining clip (1) and insert nut (2) with diaphragm seal.

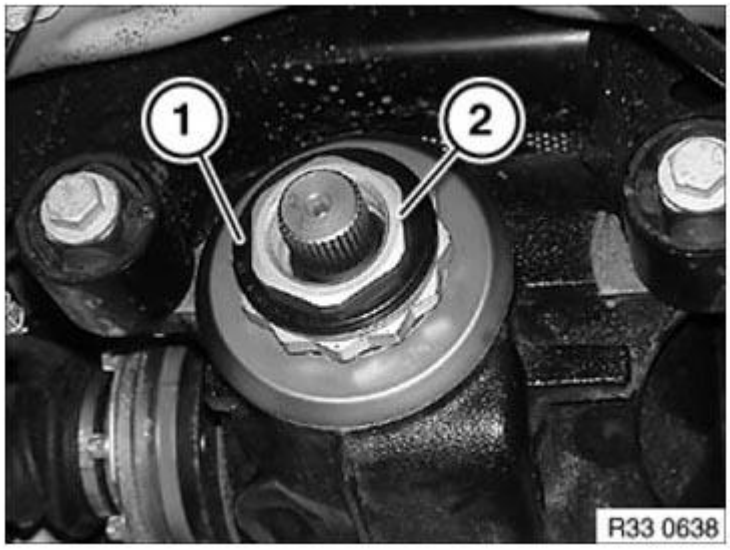


Fig. 54: Identifying Retaining Clip And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Mark position of flange nut (1) to bevel pinion (2).

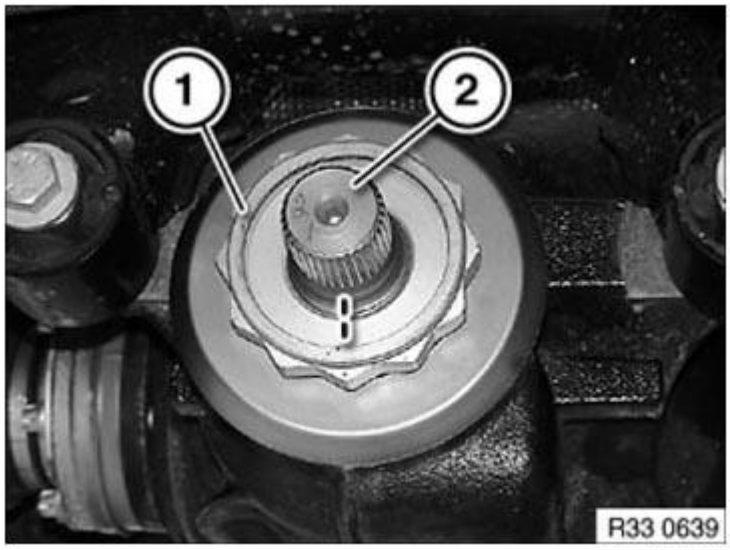


Fig. 55: Identifying Flange Nut And Bevel Pinion
Courtesy of BMW OF NORTH AMERICA, INC.

Release flange nut with special tools **33 5 050** and **33 5 070** by gripping bevel pinion with special tools 33 5 060 and **33 5 070** .

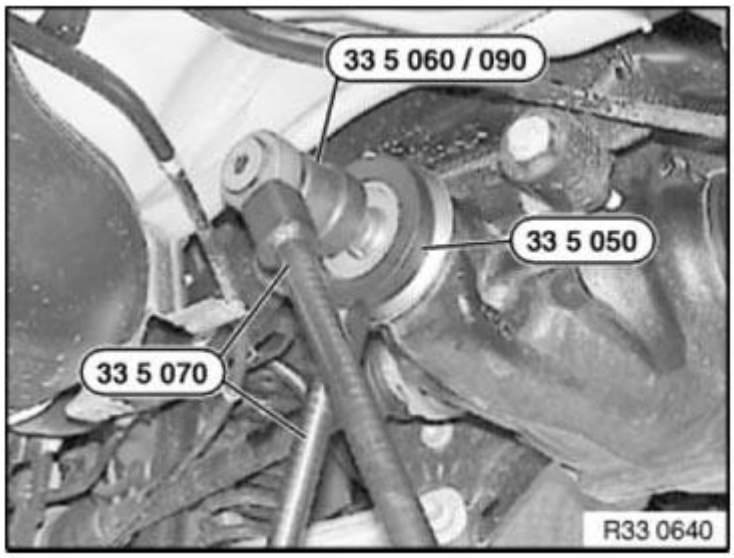


Fig. 56: Gripping Bevel Pinion Using Special Tools (33 5 060) And (33 5 070)
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out radial shaft seal with special tool **00 5 010** .

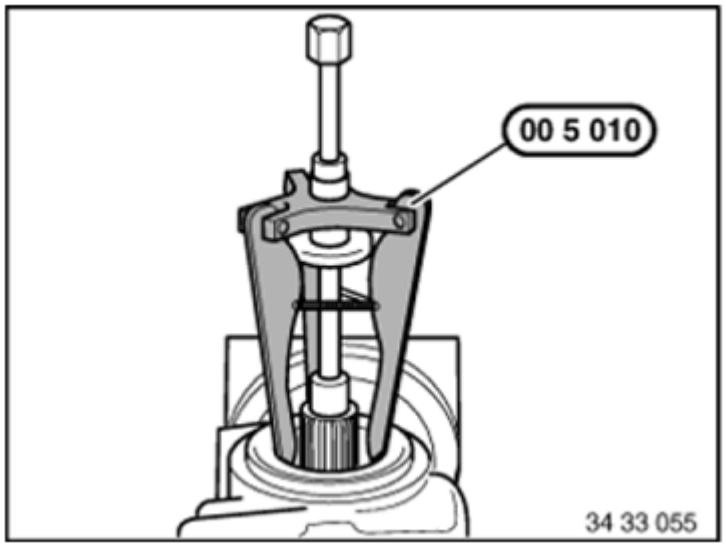


Fig. 57: Pulling Radial Shaft Seal Using Special Tool (00 5 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat sealing lips of new radial shaft seal and sealing surface of bevel pinion with final drive oil.

Drive in radial shaft seal with special tool **33 5 080** .

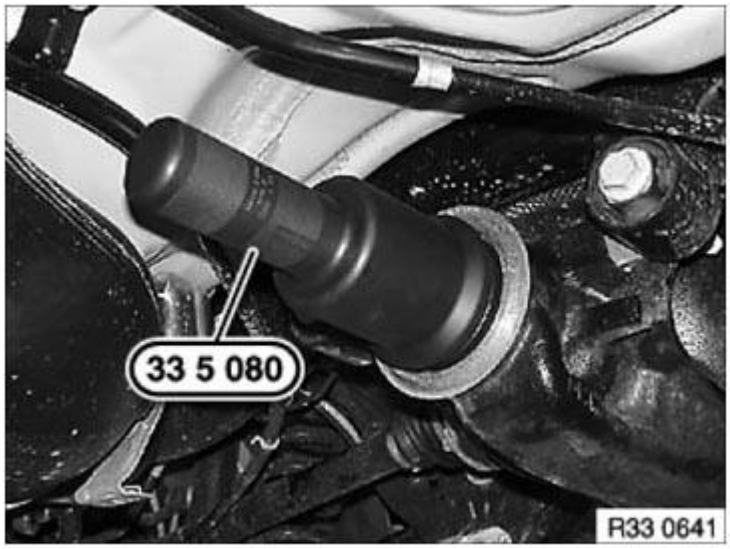


Fig. 58: Installing Radial Shaft Seal Using Special Tool (33 5 080)
Courtesy of BMW OF NORTH AMERICA, INC.

Clean bevel pinion thoroughly to remove remnants of screw locking agent.

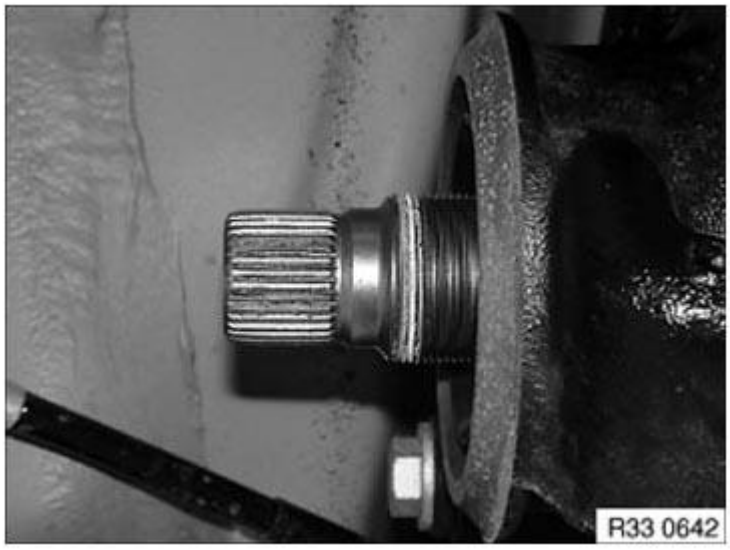


Fig. 59: Cleaning Bevel Pinion
Courtesy of BMW OF NORTH AMERICA, INC.

Check dust plate for damage, replace if necessary.

IMPORTANT: Clean flange nut thoroughly to remove remnants of grease and screw locking agent.
Pack collar insert (1) of flange nut with grease.
Apply a thin coating of grease to shaded area (2) of flange nut.
Coat at least four thread turns of flange nut with "DREI BOND adhesive type 1385".

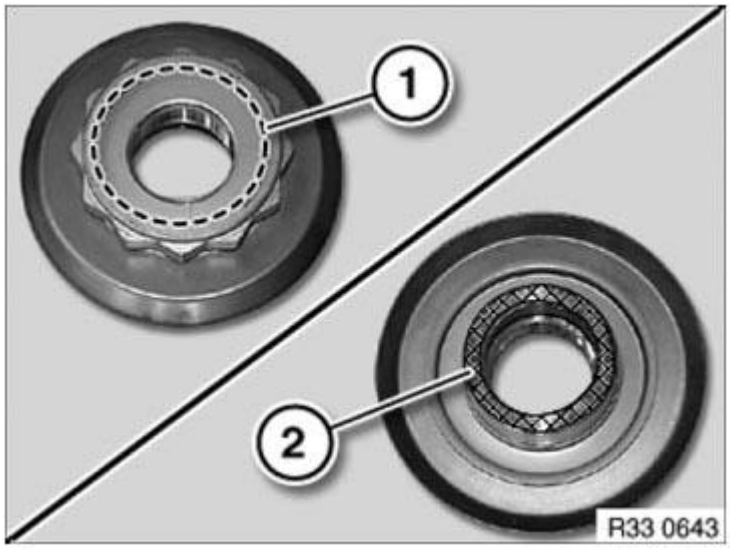


Fig. 60: Identifying Pack Collar Insert And Grease Shaded Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: In order to avoid damaging the rear axle final drive, do not under any circumstances tighten down the flange nut (1) beyond the marker point of the bevel pinion (2).

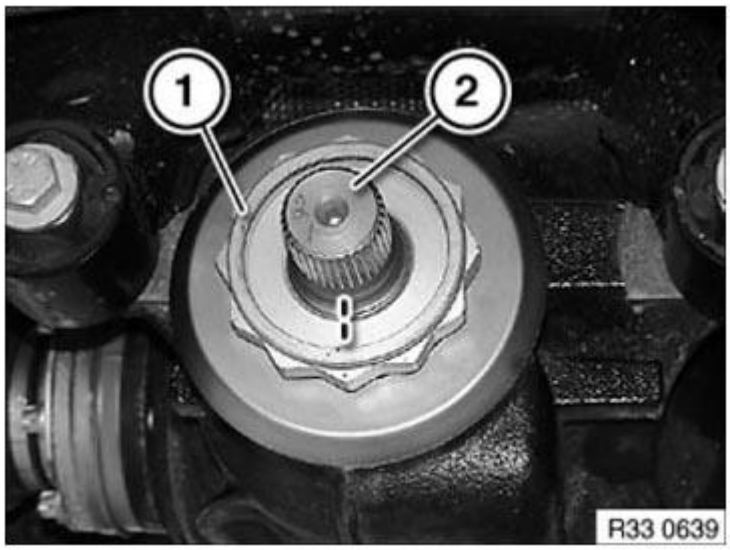


Fig. 61: Identifying Flange Nut And Bevel Pinion
Courtesy of BMW OF NORTH AMERICA, INC.

Place insert nut (2) with diaphragm seal in flange nut.

Install retaining clip (1).

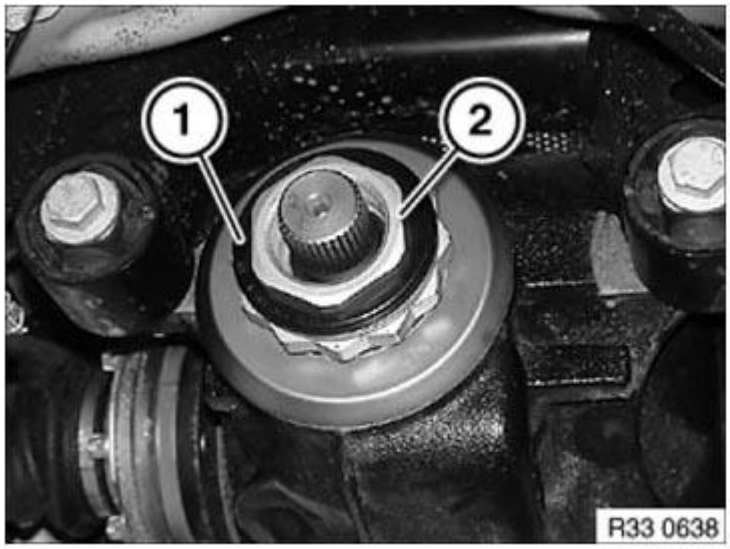


Fig. 62: Identifying Insert Nut And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check **FINAL DRIVE OIL LEVEL** , correct if necessary.

3317 FINAL DRIVE MOUNTING

33 11... REMOVING AND INSTALLING/REPLACING VIBRATION ABSORBER

See **REMOVING AND INSTALLING/REPLACING VIBRATION ABSORBER**.

33 17 004 REPLACING ALL FRONT RUBBER MOUNTS FOR REAR FINAL DRIVE UNIT MOUNTING

Notes

IMPORTANT: To ensure that the rear axle rubber mounts are securely seated in the rear axle support, observe a waiting period of 2 hours after pressing in the rubber mounts or before driving the vehicle for the first time.
Failure to comply with this requirement may cause the rubber mounts to drift in the rear axle support!

Necessary preliminary tasks

- Remove **REAR AXLE FINAL DRIVE**

Pull out rubber mount with special tools 33 0 026, 33 0 027, 33 0 022 and 33 0 021.

NOTE: Use ratchet ring spanner 33 5 105.

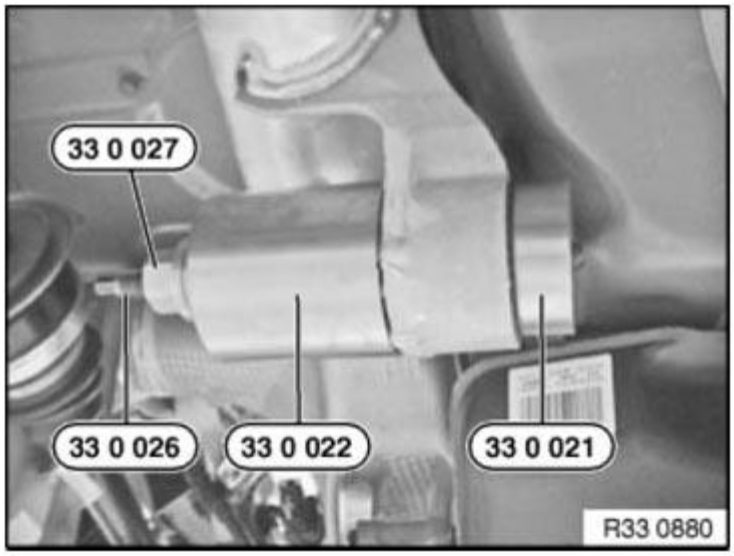


Fig. 63: Pulling Rubber Mount Using Special Tools

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Coat bearing bushing in rear axle carrier and rubber mount (1) with Circo Light (refer to BMW Parts Service).

Align rubber mount (1) by means of notch (2).

Protrusion (3) points to rear final drive unit.

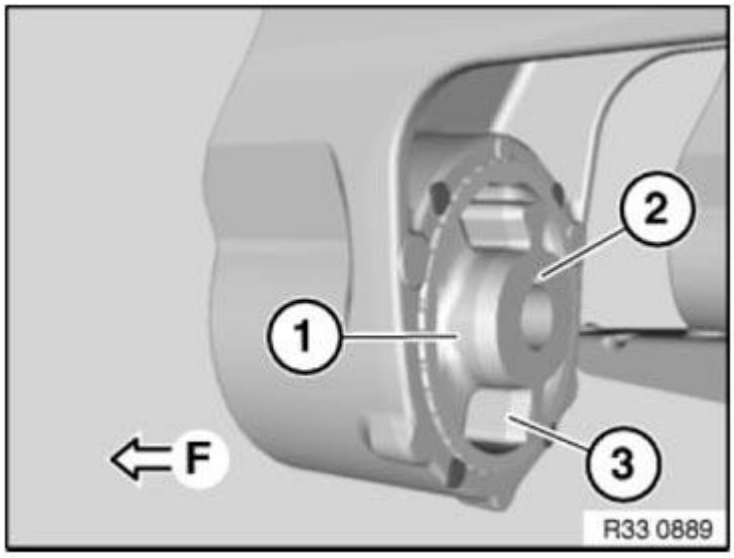


Fig. 64: Identifying Rubber Mount, Notch And Protrusion
Courtesy of BMW OF NORTH AMERICA, INC.

Insert rubber mount (1) in special tool 33 0 025.

Pull on rubber mount (1) with special tools 33 0 026, 33 0 027, 33 0 024 and 33 0 023 as far as it will go.

NOTE: Use ratchet ring spanner 33 5 105.

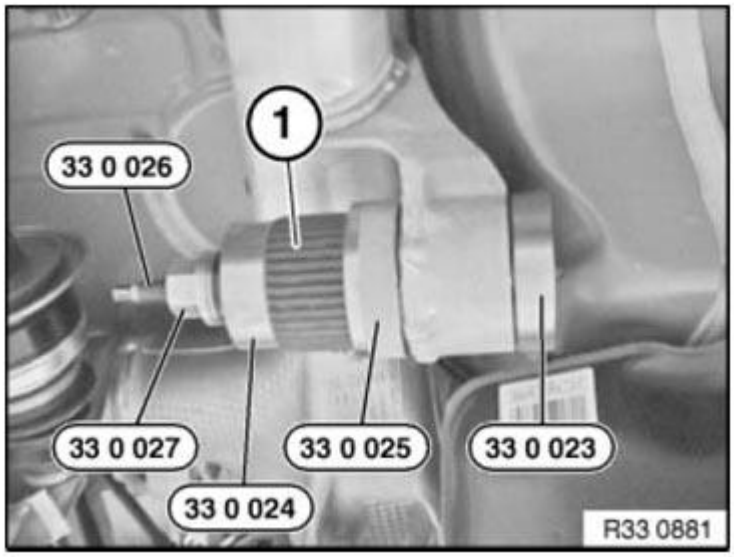


Fig. 65: Inserting Rubber Mount In Special Tool (33 0 025)
Courtesy of BMW OF NORTH AMERICA, INC.

33 17 005 REPLACING RUBBER MOUNT FOR REAR DIFFERENTIAL MOUNTING AT REAR

Notes

IMPORTANT: To ensure that the rear axle rubber mounts are securely seated in the rear axle support, observe a waiting period of 2 hours after pressing in the rubber mounts or before driving the vehicle for the first time.
Failure to comply with this requirement may cause the rubber mounts to drift in the rear axle support!

Necessary preliminary tasks

- Remove **REAR AXLE FINAL DRIVE**

Pull out rubber mount with special tools 33 0 031, 33 0 032, 33 0 035 and 33 0 036.

NOTE: Make sure special tool 33 0 031 contacts rear axle support correctly.

Use ratchet ring spanner 33 5 105.

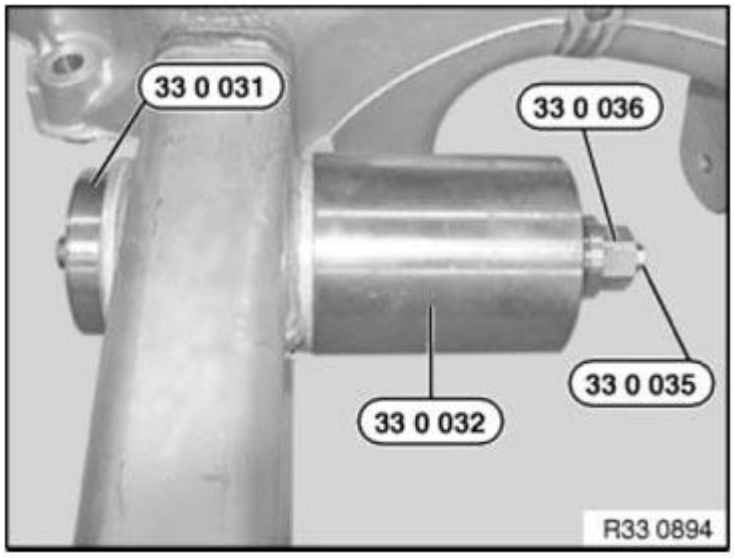


Fig. 66: Pulling Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Coat bearing bushing in rear axle carrier and new rubber mount (3) with Circo Light (refer to BMW Parts Service).

Align rubber mount (3) by means of notch (1).

Protrusion (2) points in direction of travel.

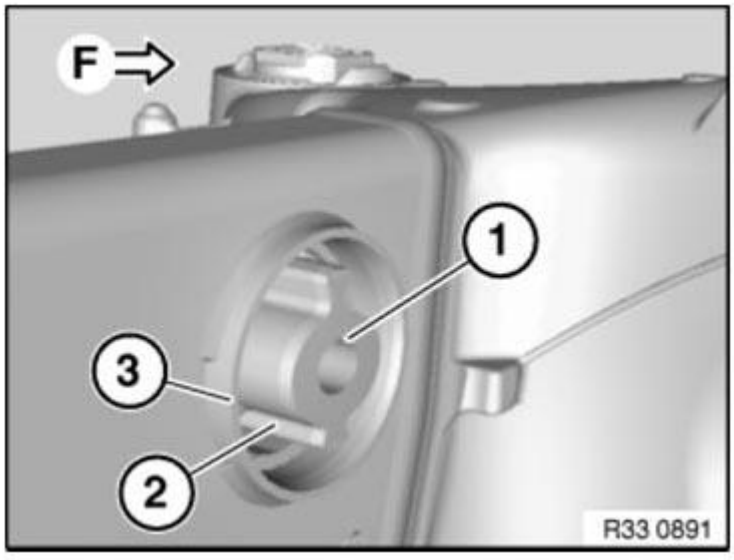


Fig. 67: Identifying Rubber Mount, Notch And Profusion
Courtesy of BMW OF NORTH AMERICA, INC.

Pull on rubber mount (1) with special tools 33 0 033, 33 0 034, 33 0 035 and 33 0 036 as far as it will go.

NOTE: Make sure special tools 33 0 033 and 33 0 034 contact rear axle support correctly.

Use ratchet ring spanner 33 5 105.

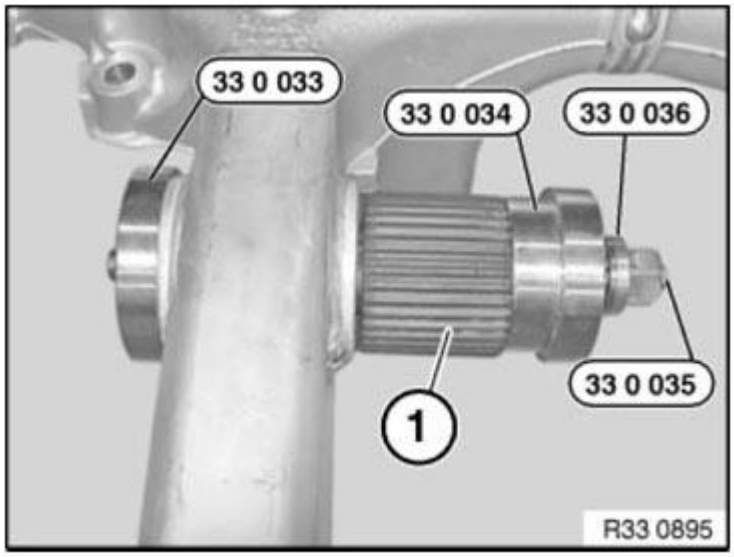


Fig. 68: Pulling Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

3321 OUTPUT SHAFTS

33 21... PRESSING OUTPUT SHAFT OUT OF DRIVE FLANGE AND DRAWING IN

Necessary preliminary work

- Remove **REAR WHEEL** .
- Remove **REAR AXLE FINAL DRIVE** .

IMPORTANT: Always place a new circlip on the output shaft reinstalling!

IMPORTANT: Expand anti-twist lock sufficiently to avoid damaging thread when releasing collar nut (1).

Activate parking brake and release collar nut (1).

Tightening torque **33 41 1AZ**

Installation note:

Lightly oil gearing on shaft journal.

No oil permitted on thread of shaft journal or collar nut.

Renew collar nut (1) and secure by positive peening at flat areas of output shaft.

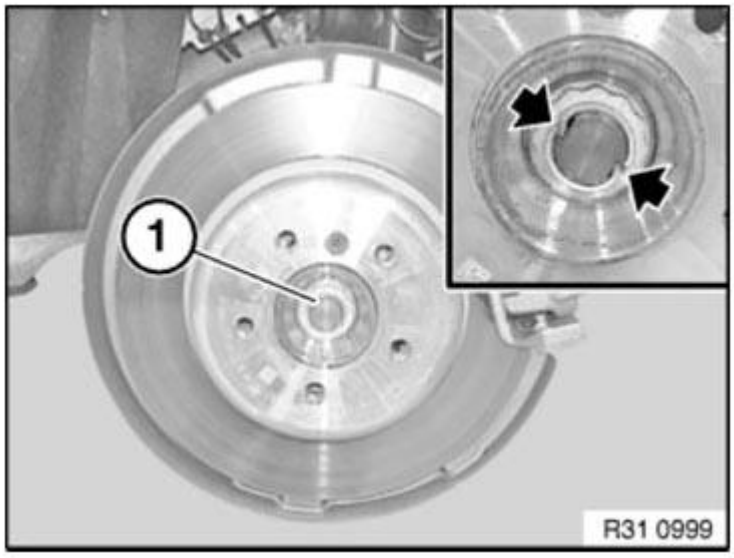


Fig. 69: Identifying Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Use **special tool, see BMW Workshop Catalogue.**

- Hydraulic unit - 81 64 2 155 744
- Adapter kit 1 - 81 64 2 155 745
- Adapter kit 2 - 81 64 2 155 746

The following work steps describe pressing out the output shaft

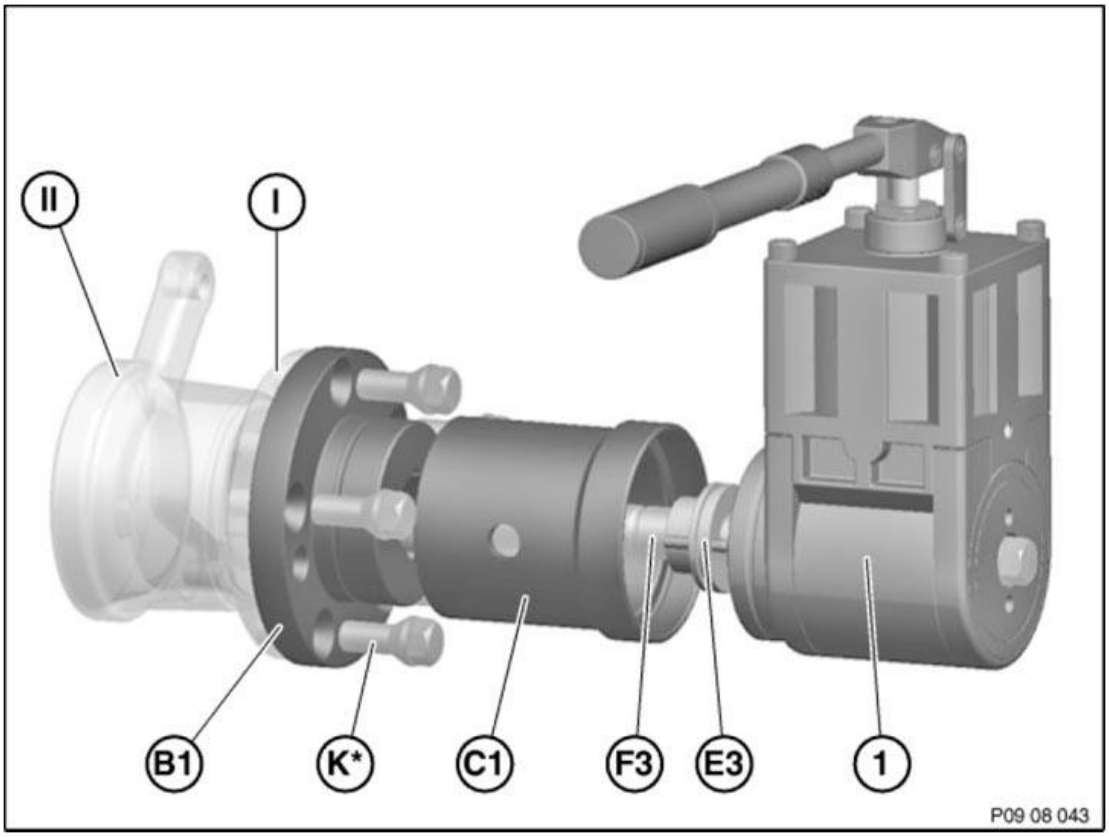


Fig. 70: Pressing Output Shaft From Drive Flange Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

The following tools are required to press out the output shaft from the drive flange, see graphic for arrangement:

Vehicle components

VEHICLE COMPONENTS

I	Drive flange hub
II	Wheel carrier/swivel bearing

Required components for all models and types

REQUIRED COMPONENTS FOR ALL MODELS AND TYPES

1	Hydraulic unit
E3	Washer M24
F3	Spindle M24 (length 270 mm)
C1	Holding sleeve
K1	Screws M12 x 1.5
K2	Screws M14 x 1.5
B1	Adapter

- Secure output shaft against falling out.
- Press out output shaft with hydraulic unit.

The following work steps describe drawing in the output shaft

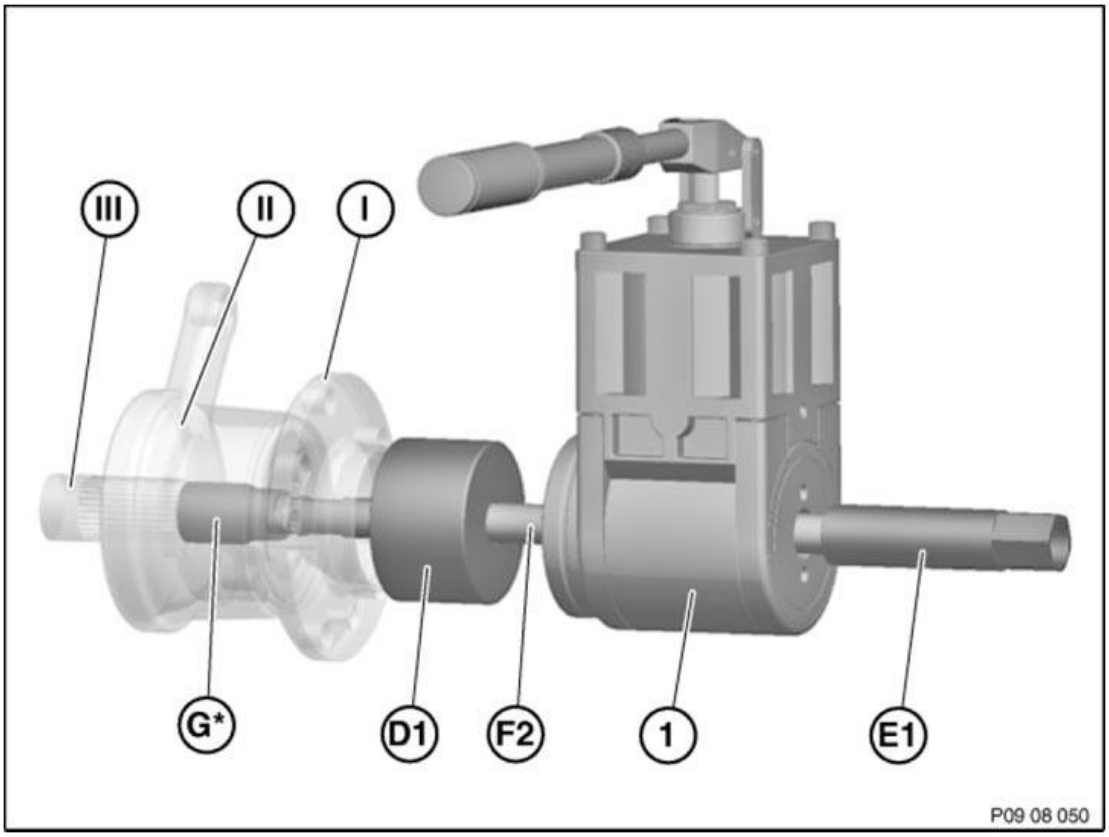


Fig. 71: Installing Output Shaft From Drive Flange Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

The following tools are required to fit the output shaft in the drive flange, see graphic for arrangement:

Vehicle components

VEHICLE COMPONENTS

I	Drive flange hub
II	Wheel carrier/swivel bearing
III	Output shaft

Required components for all models and types

REQUIRED COMPONENTS FOR ALL MODELS AND TYPES

1	Hydraulic unit
E1	Holding sleeveM24

D1	Washer
F2	Spindle M24/M20 (length 335 mm)

Components specific to model and type (thread diameter, output shaft)

ADAPTER SPECIFICATIONS

G1	Adapter M22 x 1.5 to M20
G2	Adapter M24 x 1.5 to M20
G3	Adapter M27 x 1.5 to M20

Draw in output shaft with hydraulic unit.

Tighten collar nut (1), activate parking brake for this purpose.

Tightening torque **33 41 1AZ** .

Installation note:

Renew collar nut (1), apply a light coating of oil to collar nut contact surface and tighten.

No oil permitted on thread of shaft journal or collar nut.

Secure collar nut (1) by positive peening at flat areas of output shaft.

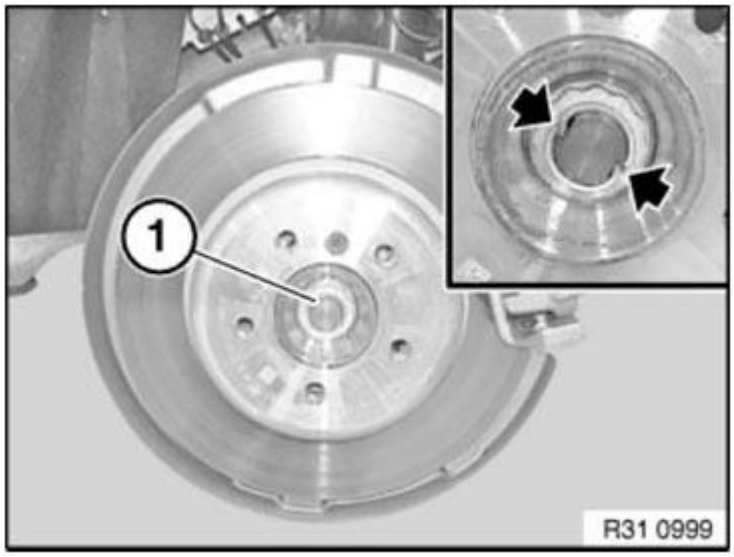


Fig. 72: Identifying Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

33 21 000 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT OUTPUT SHAFT

IMPORTANT: When reinstalling, place a new circlip on the output shaft!
The RADIAL SHAFT SEAL FOR THE OUTPUT SHAFT should be replaced every time the output shaft is removed and installed.
Observe SAFETY INFORMATION for raising the vehicle

Remove **REAR WHEEL** .

IMPORTANT: Expand anti-twist lock sufficiently to avoid damaging thread when releasing collar nut.

Release collar nut (1), activate parking brake for this purpose.

Tightening torque **33 41 1AZ**

Installation note:

Lightly oil gearing on shaft journal.

No oil permitted on thread of shaft journal or collar nut.

Replace collar nut and secure by means of positive peening on flat areas of output shaft.

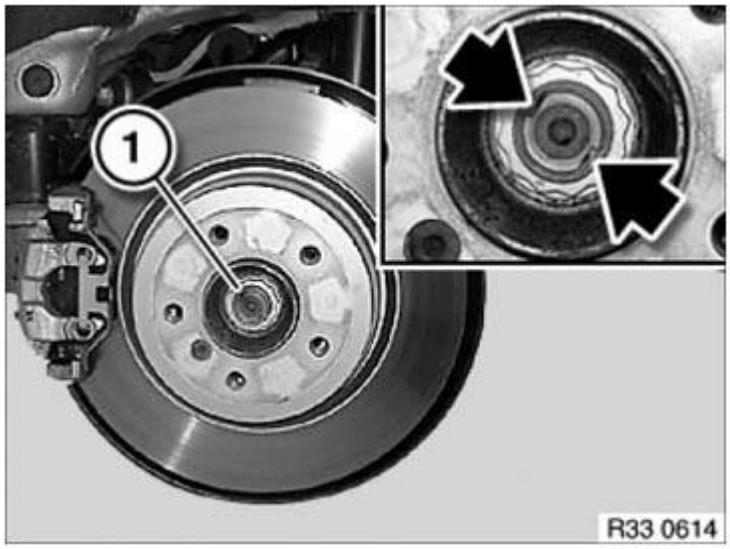


Fig. 73: Identifying Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **REAR AXLE FINAL DRIVE** .

IMPORTANT: Secure output shaft against falling out.
Do not damage dust plates (1, 2) when setting down output shaft.

Press **OUTPUT SHAFT OUT OF DRIVE FLANGE** and remove towards center of vehicle.

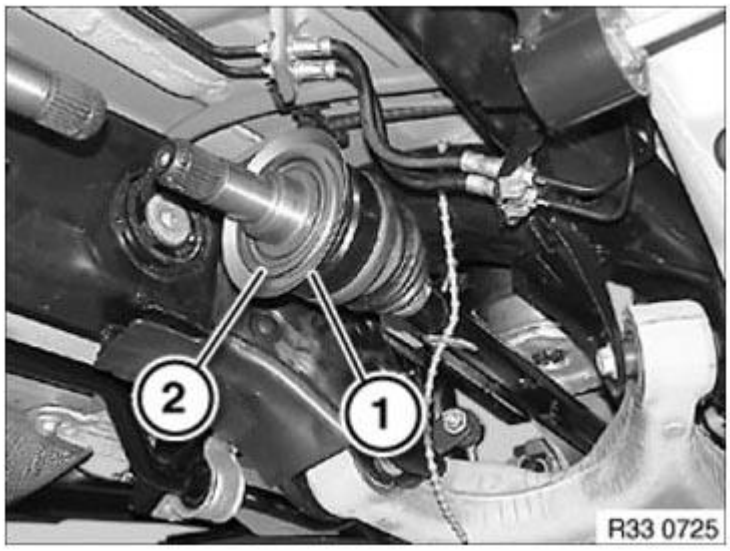


Fig. 74: Identifying Dust Plates
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

High installation forces indicate that the output shaft spline teeth are damaged or deformed!

Check gearing, replace damaged components.

Check dust plate (1) for damage, renew if necessary.

Circlip (2) must be replaced.

Coat contact surface (3) of output shaft with **APPROVED FINAL DRIVE OIL** .

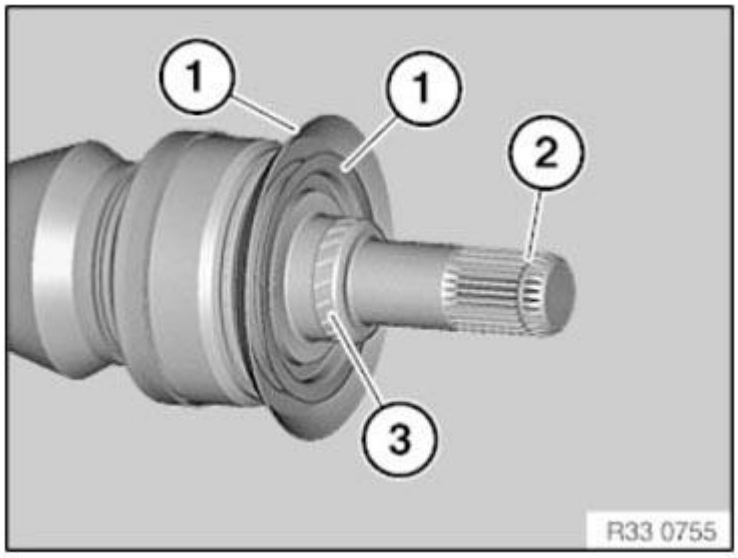


Fig. 75: Identifying Dust Plate, Circlip And Coat Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check **FINAL DRIVE OIL LEVEL** , correct if necessary.

3331 REAR SUB-FRAME

33 31 503 LOWERING/RAISING REAR AXLE SUPPORT

Notes

IMPORTANT: Before lowering rear axle support:
Observe SAFETY INSTRUCTIONS on raising the vehicle.
In order to avoid damage to lifting platform, perform weight compensation on vehicle.
Load luggage compartment with sand bags.

Necessary preliminary tasks

- Remove **REAR WHEELS**
- F03 only: Remove underguard, side
- Remove **EXHAUST SYSTEM**
- Remove **PROPELLER SHAFT** from rear axle
- Expose **CABLE FOR EMERGENCY RELEASE UP TO REAR AXLE CARRIER**
- Release and disconnect **PLUG CONNECTION ON ACTUATING UNIT (EMF)**
- **REMOVE BOTH BRAKE CALLIPERS ON WHEEL CARRIER** and tie back

- Unclip lines for pulse generator and brake pad wear sensor from brackets
- Unlock and disconnect plug connection on both ride height sensors
- Remove **BOTH SPRING STRUTS FROM WHEEL CARRIER**

Engage 31 5 251 with a 2nd person helping completely on workshop jack **00 2 030** .

Insert special tools 31 5 255 in telescopic supports of a profile rail pair.

NOTE: In a profile rail pair two profile rails are connected to each by toothing.

Insert special tools 31 5 253 in telescopic supports of other profile rail pair.

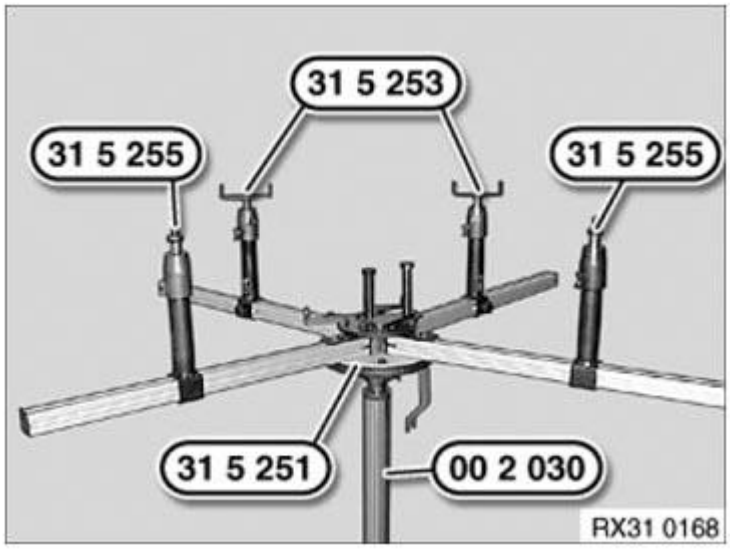


Fig. 76: Inserting Special Tools (31 5 255) In Telescopic Supports Of Profile Rail Pair
Courtesy of BMW OF NORTH AMERICA, INC.

Version without Dynamic Drive:

The jacking points on the left side are shown.

Align special tool 31 5 255 with opening in rear suspension subframe.

Align special tool 31 5 253 with cross-member arms on rear suspension subframe.

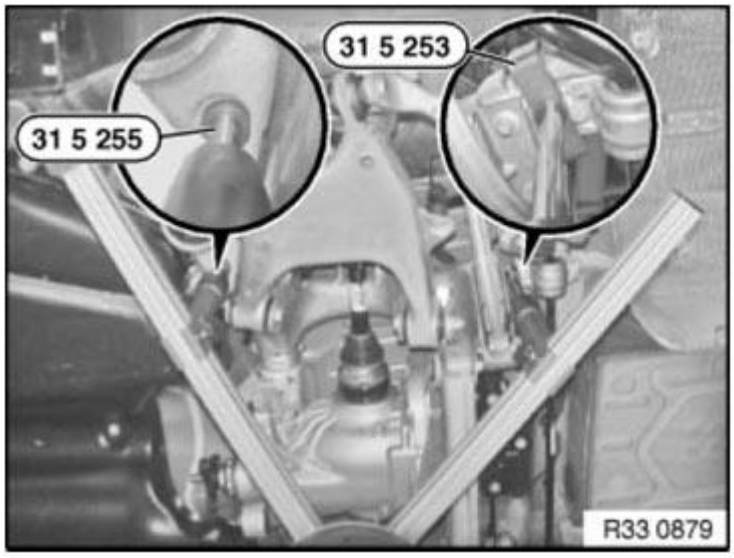


Fig. 77: Aligning Rear Suspension Subframe Using Special Tool (31 5 255) And (31 5 253)
Courtesy of BMW OF NORTH AMERICA, INC.

Version with Dynamic Drive and Integral Active Steering:

Schematic diagram of rear mounting point (link side) for special tool 31 5 253.

The front mounting point for special tool 31 5 255 is identical - version without Dynamic Drive.

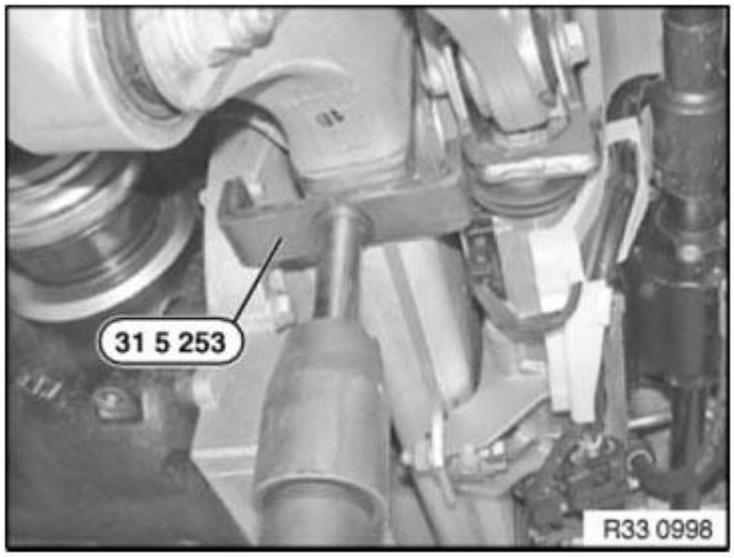


Fig. 78: Schematic Diagram Of Rear Mounting Point For Special Tool (31 5 253)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (4).

Tightening torque **33 33 1AZ** .

Installation:

Arrow (1) on stop plate (2) must point in direction of travel!

Remove **FRONT COMPRESSION STRUTS** (3).

Carefully lower rear axle carrier.

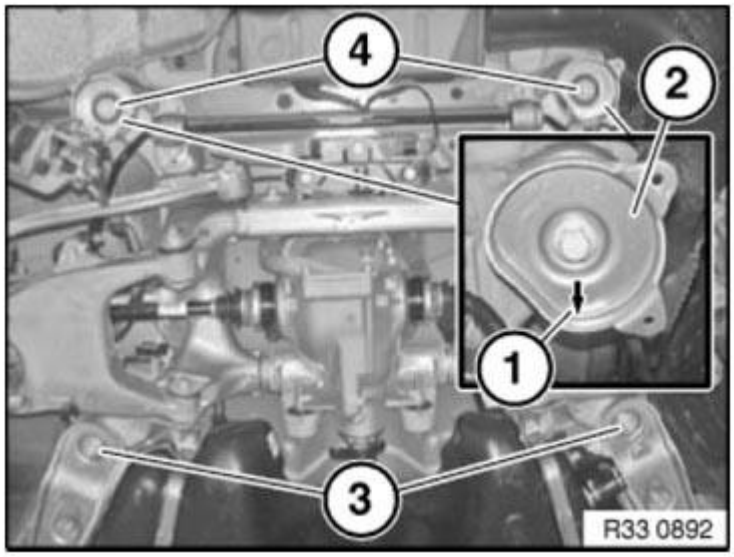


Fig. 79: Identifying Arrow, Front Compression Strut, Screws And Stop Plate
Courtesy of BMW OF NORTH AMERICA, INC.

F03 only:

Remove **FRONT COMPRESSION STRUTS** (1).

Remove rear tension struts (2) and carefully lower rear axle carrier.

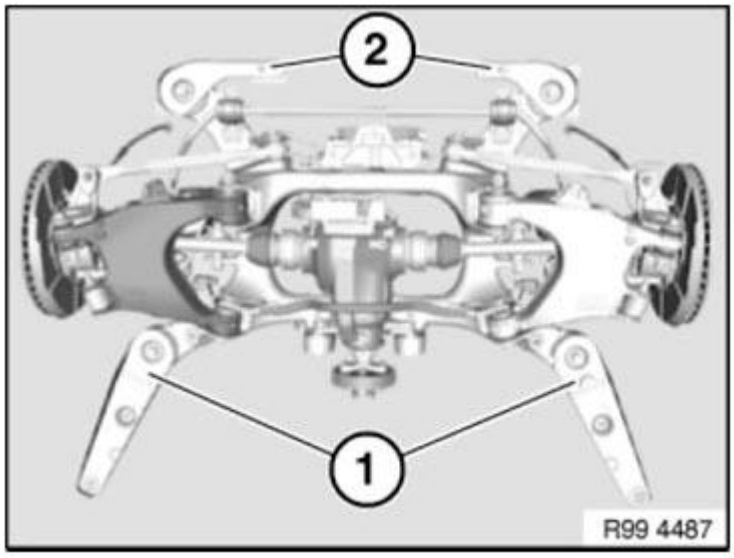


Fig. 80: Identifying Front Tension Struts And Rear Tension Struts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **ADJUST PARKING BRAKE**

33 31 000 REMOVING AND INSTALLING COMPLETE REAR AXLE SUPPORT

Notes

IMPORTANT: Before removing rear axle support:
In order to avoid damage to vehicle hoist, perform weight compensation on vehicle.
Load luggage compartment with sand bags.

Necessary preliminary work

- Remove **REAR WHEELS**
- Remove **EXHAUST SYSTEM**
- Remove **PROPELLER SHAFT** from rear axle
- Expose **CABLE FOR EMERGENCY RELEASE UP TO REAR AXLE SUPPORT**
- Disconnect **PLUG CONNECTION ON ACTUATOR UNIT (PARKING BRAKE)**
- Unclip lines for pulse sensor and brake pad wear sensor
- If necessary, disconnect **PRESSURE LINES** to swivel motor at active stabilizer
- Disconnect plug connection at both ride height sensors
- Remove **BOTH REAR SHOCK ABSORBERS FROM WHEEL CARRIER**
- **REMOVE BOTH BRAKE CALIPERS ON WHEEL CARRIER** and tie back

Engage special tool 31 5 251 with a 2nd person helping completely on workshop jack **00 2 030** .

Insert special tools 31 5 255 in telescopic supports of a profile rail pair.

NOTE: In a profile rail pair, two profile rails are connected to one another by gearing.

Insert special tools 31 5 253 in telescopic supports of other profile rail pair.

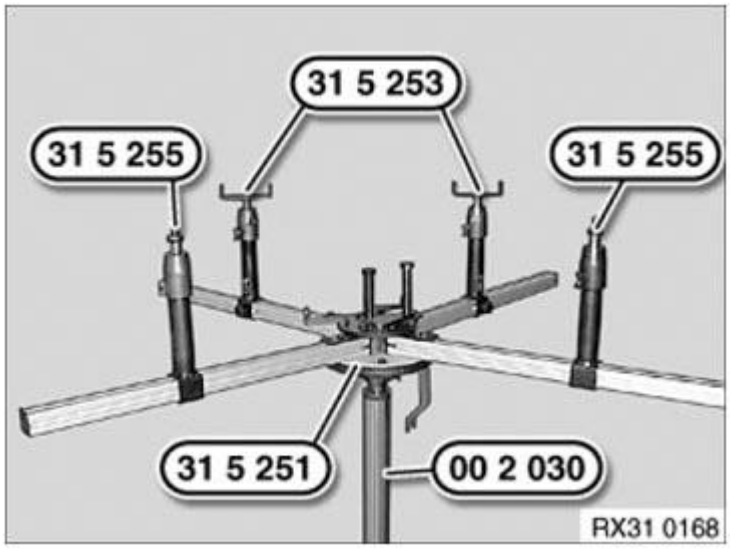


Fig. 81: Inserting Special Tools (31 5 255) In Telescopic Supports Of Profile Rail Pair
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The mounting points on the left side are shown.

Align special tool 31 5 255 to opening in rear axle support.

Align special tool 31 5 253 to cross member arms on rear axle support.

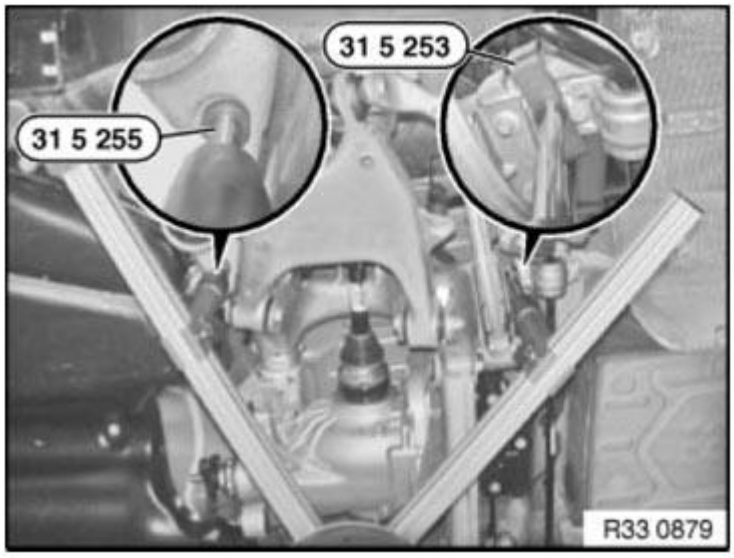


Fig. 82: Aligning Special Tool (31 5 255) And (31 5 253) To Rear Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (4).

Tightening torque **33 33 1AZ** .

Installation note:

Arrow (1) on stop plate (2) must point in direction of travel!

Remove **FRONT COMPRESSION STRUTS** (3).

Carefully lower rear axle support and remove.

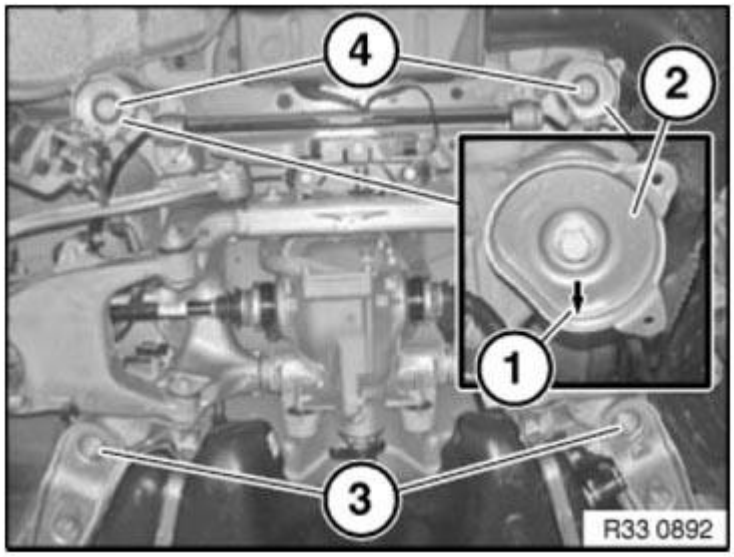


Fig. 83: Identifying Stop Plate Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

After Installation note

- **ADJUSTING PARKING BRAKE**
- If necessary, carry out **COMMISSIONING FOR DYNAMIC DRIVE**

33 31 011 REPLACING REAR AXLE SUPPORT

IMPORTANT: Before removing rear axle support:
In order to avoid damage to vehicle hoist, perform weight compensation on vehicle.
Load luggage compartment with sand bags.

Necessary preliminary work

- Remove **REAR AXLE FINAL DRIVE**
- Remove **REAR AXLE SUPPORT**

Remove brake lines.

Remove anti-roll bar. See **REMOVING AND INSTALLING/REPLACING REAR ACTIVE ANTI-ROLL BAR** or **REMOVING AND INSTALLING/REPLACING REAR ANTI-ROLL BAR**.

Version with Dynamic Drive: Disconnect control lines for swivel motor of rear axle from rear axle support.

Remove **ACTUATOR UNIT (PARKING BRAKE)** .

Remove **RIDE HEIGHT SENSOR(S)** .

Remove **INTEGRAL ACTIVE STEERING**

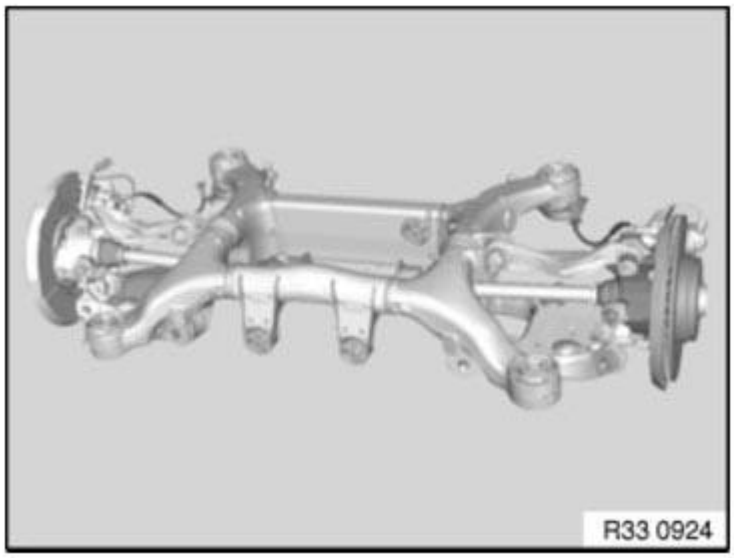


Fig. 84: Identifying Brake Lines, Anti-Roll Bar, Actuator Unit And Ride Height Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Remove both swinging arms on rear axle support. See **REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SWINGING ARM**.

Remove both wishbones on rear axle support. See **REPLACING AN UPPER WISHBONE**.

Remove both toe arms on rear axle support. See **REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TOE ARM**.

Remove both wheel carriers with output shaft, swinging arm and wishbones.

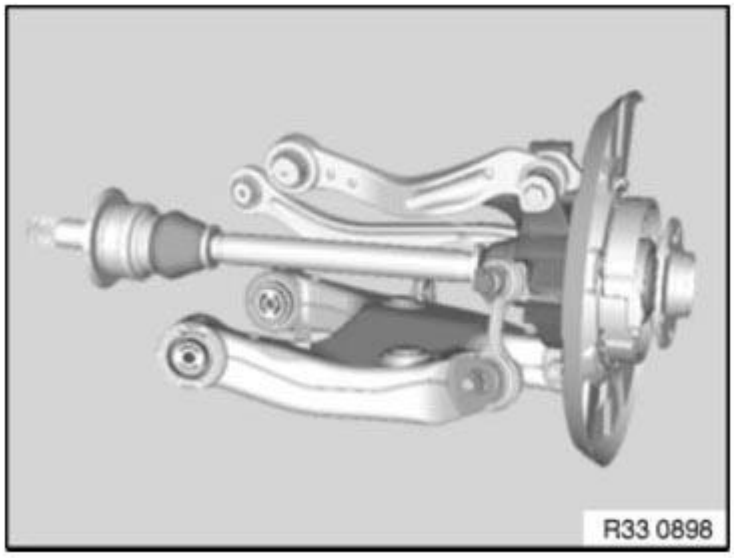


Fig. 85: Identifying Swinging Arms, Wishbones And Toe Arms
Courtesy of BMW OF NORTH AMERICA, INC.

Take rear axle support down from special tool with assistance of a 2nd person and set down on a suitable surface.

Installation note:

Use previous rear axle support as a template for modifying or replacing small parts.

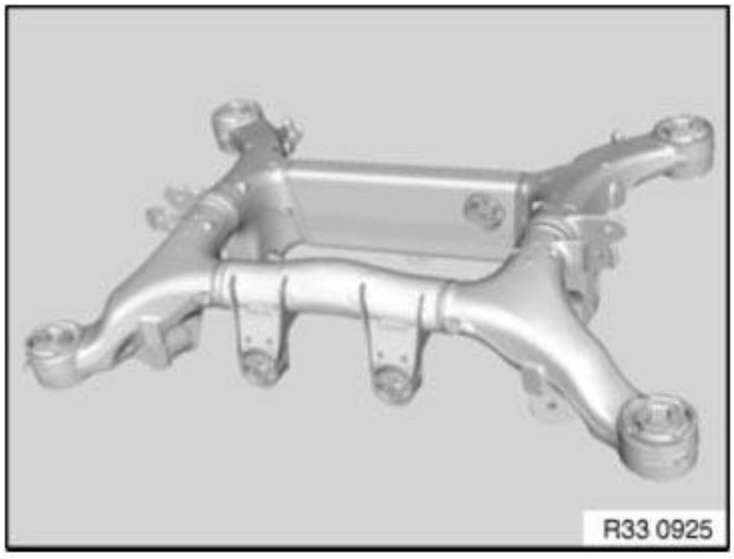


Fig. 86: Identifying Rear Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

After Installation note

- If necessary, run **COMMISSIONING** of Dynamic Drive
- Carry out **RIDE HEIGHT ADJUSTMENT**
- Adjusting **PARKING BRAKE**
- Perform **CHASSIS/WHEEL ALIGNMENT CHECK**

3332 CONTROL ARMS AND STRUTS

33 32 131 REMOVING AND INSTALLING/REPLACING A STEERING STUB/WHEEL CARRIER

Remove **REAR WHEEL** .

IMPORTANT: Expand anti-twist lock sufficiently to avoid damaging thread when releasing collar nut.

Release collar nut (1), activate parking brake for this purpose.

Installation note:

Replace collar nut, oil collar nut/wheel bearing contact surface only and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Tightening torque **33 41 1AZ** .

Secure collar nut by positive peening on flat areas of output shaft.

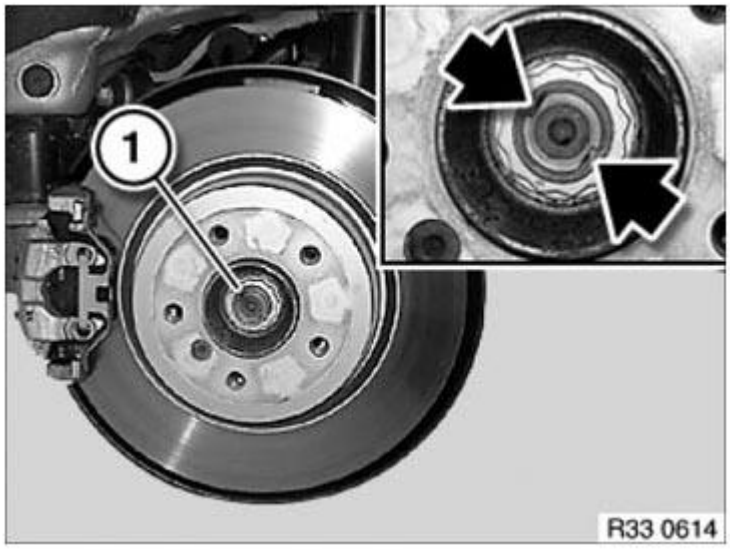


Fig. 87: Identifying Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Only F01/02/F04:

- Remove parking brake shoe expander. See **REMOVING AND INSTALLING/REPLACING EXPANDER FOR PARKING BRAKE SHOES** or **REMOVING AND INSTALLING ACTUATOR UNIT WITH CONTROL UNIT FOR PARKING BRAKE (EMF)** .
- Remove parking brake Bowden cable from wheel carrier.

Remove **WHEEL BEARING** (do not pull out drive flange).

Remove **PULSE SENSOR FROM WHEEL CARRIER** .

Remove **SPRING STRUT FROM WHEEL CARRIER** .

IMPORTANT:

- **Check sensor head and line from pulse sensor prior to installation for external damage, replacing if necessary.**

IMPORTANT: Secure wheel carrier against falling out.

Remove **INTEGRAL LINK** from wheel carrier.

Remove **TOE ARM FROM WHEEL CARRIER** .

Remove **UPPER WISHBONE FROM WHEEL CARRIER** .

Remove wheel carrier.

Replacement:

Modify **BRAKE ANCHOR PLATE/BRAKE GUARD PLATE**

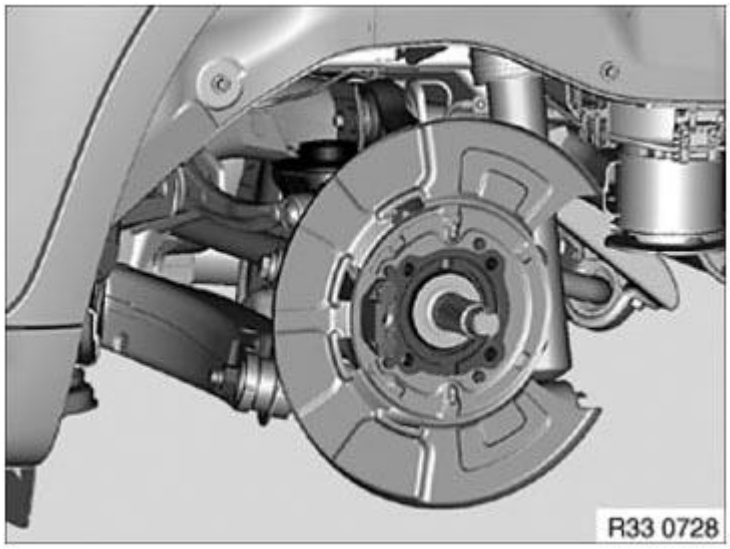


Fig. 88: Identifying Integral Link, Toe Arm, Wheel Carrier, Upper Wishbone And Brake Anchor Plate
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

Only F01/02/F04:

- Activate and fill **AIR SUSPENSION SYSTEM**
- Adjusting **PARKING BRAKE**

F01/F02/F04/F10:

- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD** .

33 32 153 REMOVING AND INSTALLING/REPLACING FRONT COMPRESSION STRUT

IMPORTANT: Observe SAFETY INSTRUCTIONS for raising the vehicle
Driving without compression struts is not permitted!

Release screws of underbody panelling (1).

Remove underbody panelling (1).

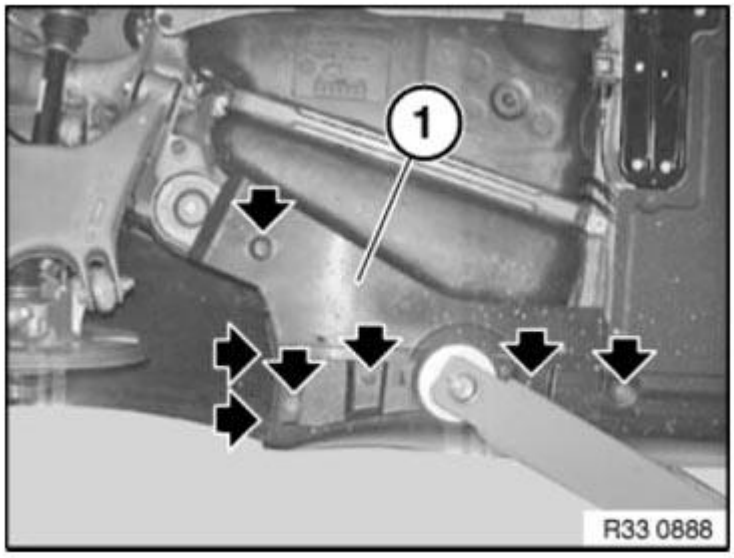


Fig. 89: Identifying Underbody Panelling With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **33 33 2AZ** .

Release screw (2) and remove compression strut (3).

Tightening torque **33 33 1AZ** .

IMPORTANT: Secure rear axle support by inserting screw (2).

Installation:

Check threads for damage; if necessary, repair with **HELICOIL THREAD INSERTS** .

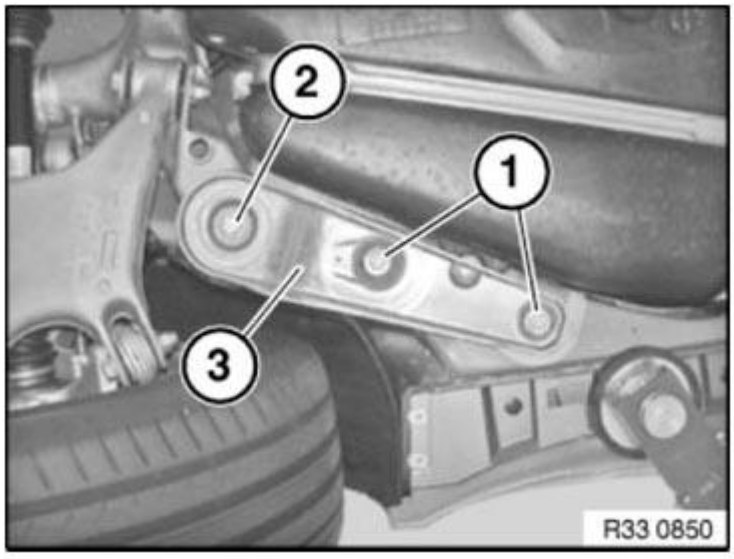


Fig. 90: Identifying Compression Strut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

33 32 051 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ANTIROLL BAR LINK/INTEGRAL LINK

NOTE: If the integral link is detached from the swinging arm, it is necessary after installation to carry out a chassis/wheel alignment check.

Necessary preliminary work

- Remove **REAR WHEEL** .

Release nut (1) and remove screw.

Tightening torque **33 32 4AZ** .

Release screw (2) and remove integral link (3).

Tightening torque **33 32 5AZ** .

Installation note:

Replace screw and nut.

Tighten screw connections in **NORMAL POSITION** .

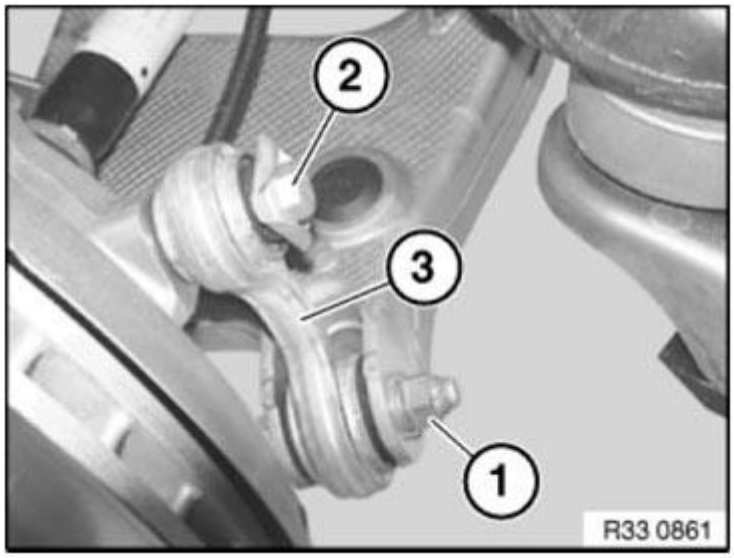


Fig. 91: Identifying Nut, Screw And Integral Link
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD** .

51 75 010 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT STEERING ASSEMBLY COVER

Necessary preliminary work:

- Remove **FRONT UNDERBODY PROTECTION**

Unscrew all bolts.

Lever out expanding rivets (1).

Removing steering assembly cover (2).

If necessary, replace faulty expanding rivets (1).

Make sure steering assembly cover (2) is correctly seated.

Replacement

From April 09 the snap fasteners are discontinued and replaced by a conventional screw connection.

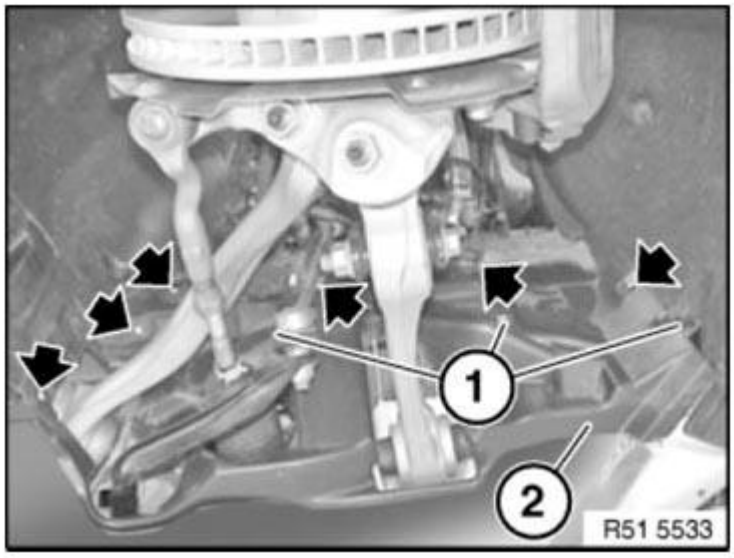


Fig. 92: Identifying Rivets And Steering Assembly Cover
Courtesy of BMW OF NORTH AMERICA, INC.

33 32 064 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SWINGING ARM

NOTE: If the swinging arm is detached from the integral link/wheel carrier or rear axle support, it is necessary after re-installation to carry out a chassis/wheel alignment check.

Necessary preliminary work

- Remove **REAR WHEEL**
- Remove **ANTI-ROLL BAR LINK FROM SWINGING ARM**
- Remove **INTEGRAL LINK FROM SWINGING ARM**

Slacken nut (1).

Tightening torque **37 14 5AZ** .

Remove jointed rod (2) from swinging arm.

Installation note:

Sensor lever (3) must point from ride height sensor to respective rear wheel.

Replace self-locking nut.

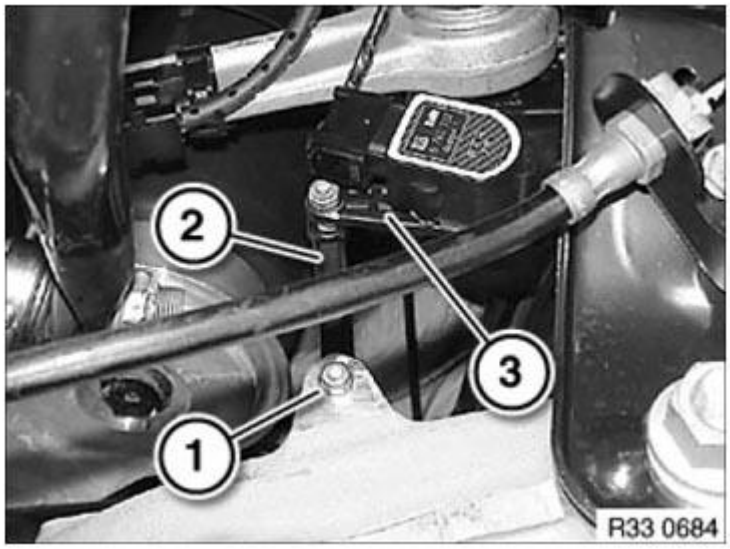


Fig. 93: Identifying Slacken Nut, Jointed Rod And Sensor Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Remove bolt (2) towards rear.

Tightening torque **33 32 3AZ** .

Installation note:

Replace self-locking nut.

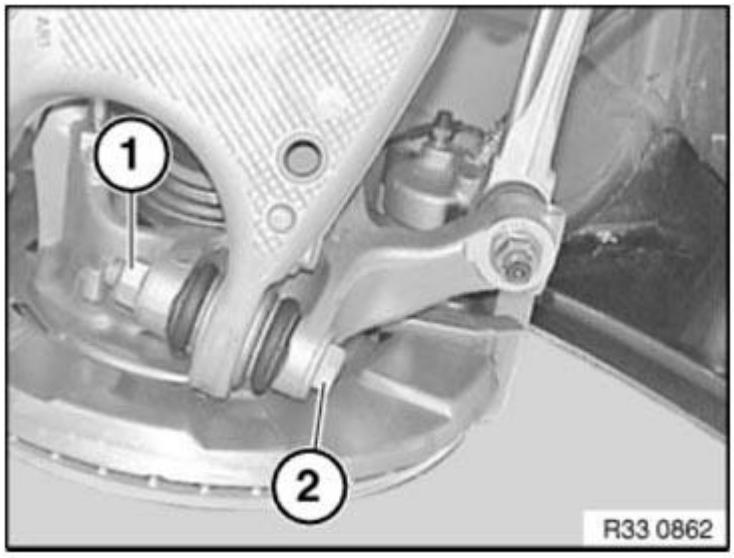


Fig. 94: Identifying Slacken Nut And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Loosen the screw connection swinging arm on rear axle support only with ring installation tool (1) and extension lever (2).
Release torque > 400 Nm
See workshop equipment catalogue for tools:
Ring fitting tool: Order No. 81 64 2 185 817
Extension lever: Order No. 81 64 2 185 816

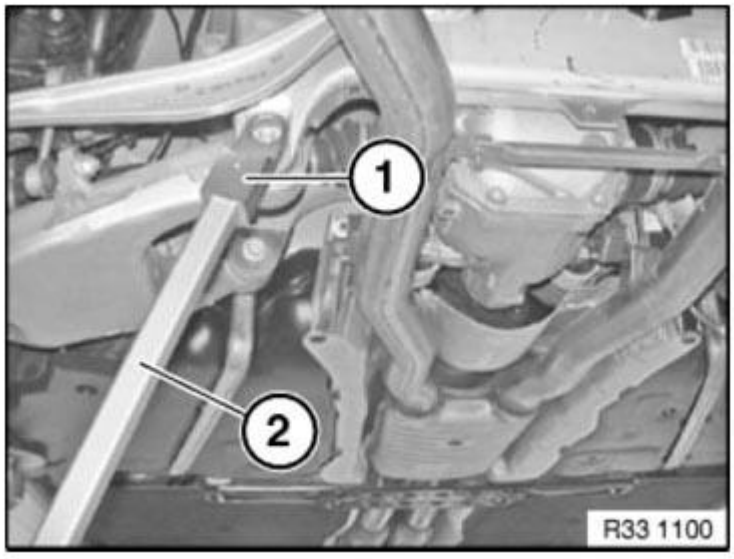


Fig. 95: Identifying Ring Installation Tool And Extension Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove eccentric washer (see magnified area). Pull out eccentric bolt (2).

Tightening torque **33 32 2AZ** .

Installation note:

Note direction of insertion of eccentric bolt (2).

Align eccentric bolt (2) by means of marking to rear axle support.

Reinstall eccentric washer (see magnified area).

Replace self-locking nut.

Tighten bolt connection in **NORMAL POSITION** .

Release nut (3) and remove bolt (4).

Tightening torque **33 32 1AZ** .

Installation note:

Replace nut.

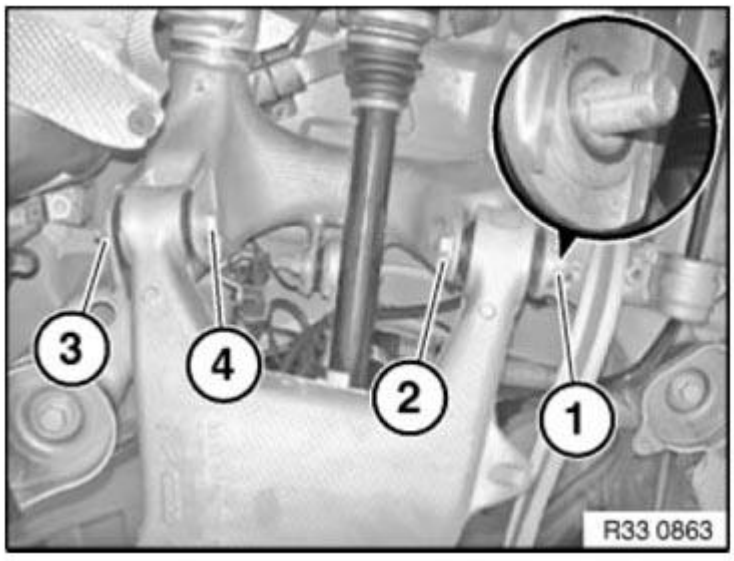


Fig. 96: Identifying Nuts And Eccentric Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten bolt connection in **NORMAL POSITION** .

After installation

- Check that output shaft is correctly seated in rear axle final drive.

- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD** .

51 75... REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TANK COVER

Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Release all screws (2).

Unscrew nut (3).

Feed out tank cover (1) towards rear above tension strut (4).

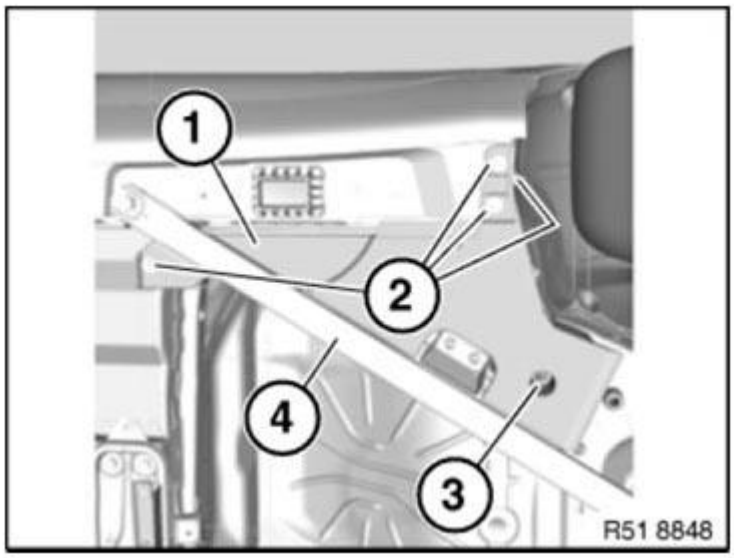


Fig. 97: Identifying Tank Cover, Screws And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

33 32 180 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TOE ARM

NOTE: If the toe arm is detached from the rear axle support, it will be necessary to carry out a wheel alignment procedure after assembly. See KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION or KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD .

Necessary preliminary work

- Remove **REAR WHEEL** .

F01, F02:

Release nut (1) and remove heat shield (2).

Tightening torque **33 32 10AZ** .

Installation note:

Replace self-locking nut.

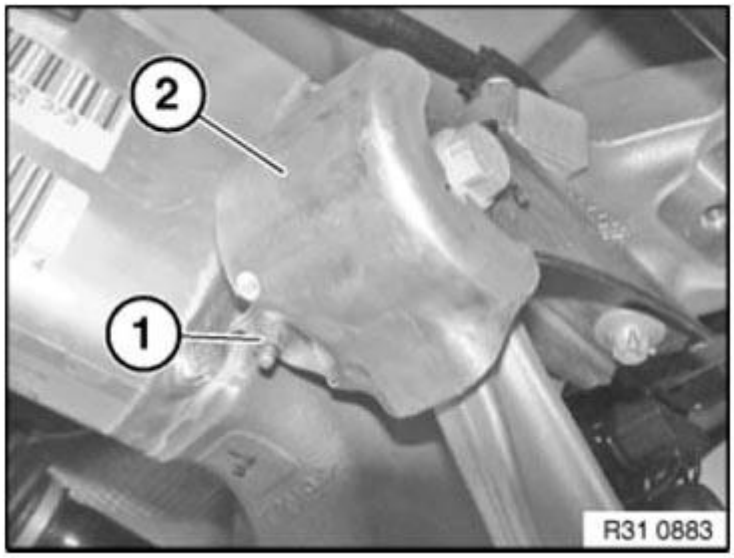


Fig. 98: Identifying Self-Locking Nut And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cable holder (1) from toe arm, if applicable.

Installation note:

Replace faulty cable clips.

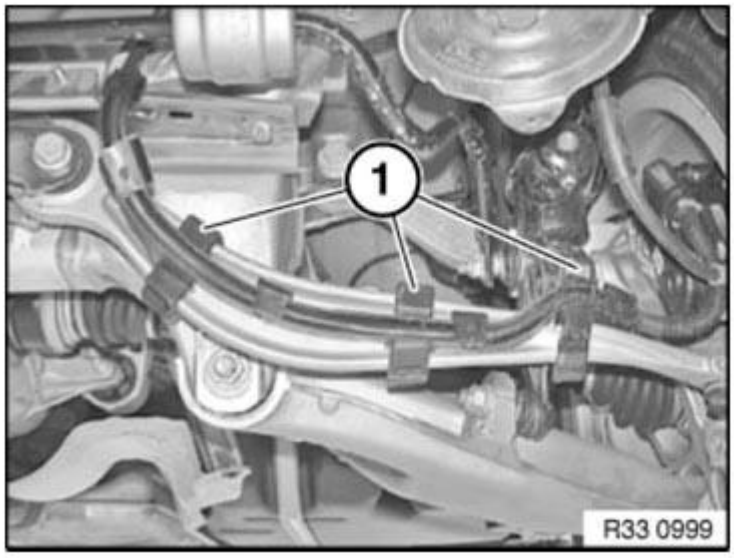


Fig. 99: Identifying Cable Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **33 32 6AZ** .

Pull out bolt (1) and remove toe link (2).

Installation note:

Tighten down screw connection in **NORMAL POSITION** .

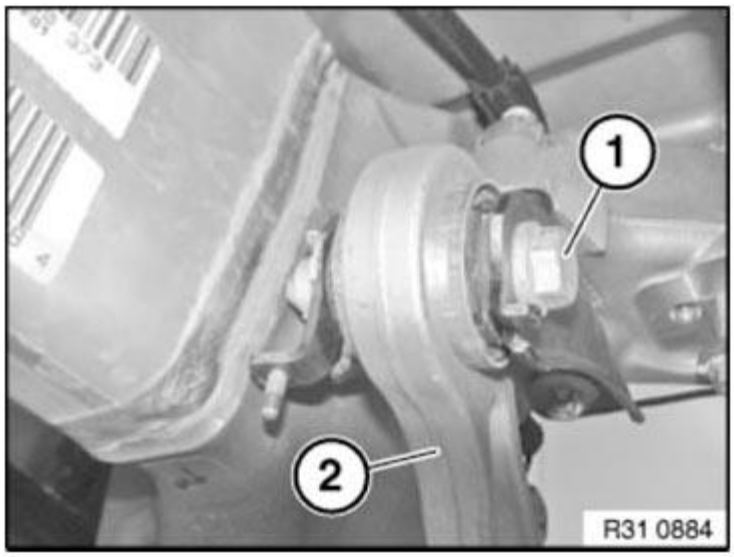


Fig. 100: Identifying Toe Link With Screw And Bolt

Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **33 32 7AZ**

Remove toe link (2) from wheel carrier.

Installation note:

Insert toe link (2) first in wheel carrier.

Keep toe link to wheel carrier connection clean and free from oil and grease.

Replace nut.

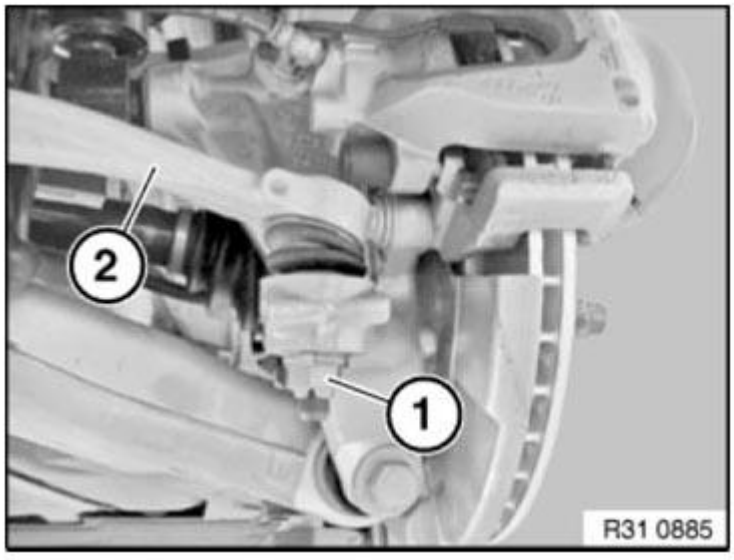


Fig. 101: Identifying Slacken Nut And Toe Link
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD** .

51 71 015 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT UNDERBODY PANELS

Necessary preliminary work

- Remove **REAR UNDERBODY PROTECTION**

Unscrew all bolts.

Remove underbody panelling (1).

Installation note:

Make sure underbody panelling (1) is correctly seated.

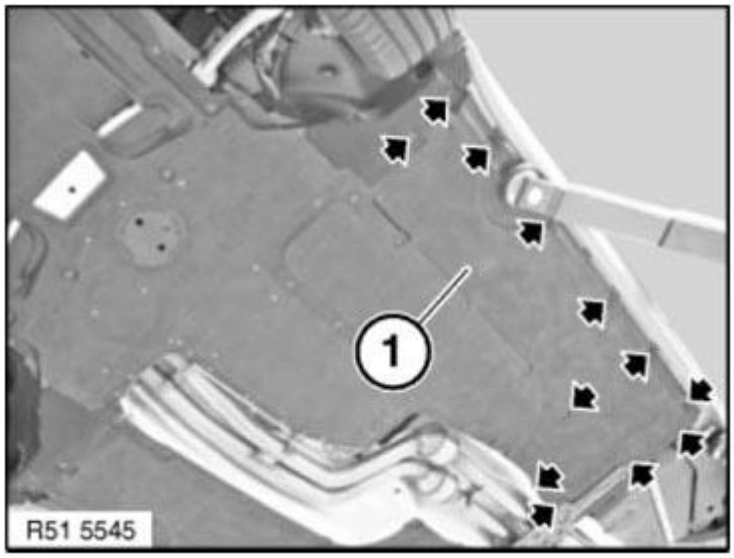


Fig. 102: Identifying Underbody Panelling
Courtesy of BMW OF NORTH AMERICA, INC.

51 75... REMOVING AND INSTALLING/REPLACING LOWER LEFT OR RIGHT COVER (WHEEL ARCH)

Necessary preliminary tasks

- Remove **UNDERBODY PROTECTION** .

Release all screws (1).

Remove cover.

Replacement

From April 09 the snap fasteners are discontinued and replaced by a conventional screw connection.

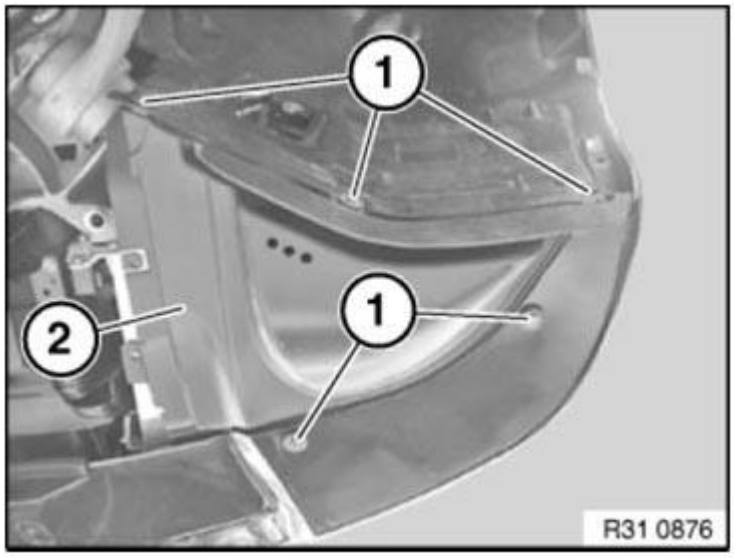


Fig. 103: Identifying Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

33 32 240 REPLACING A BALL JOINT IN LEFT OR RIGHT SWINGING ARM/LOWER WHEEL CARRIER

Necessary preliminary tasks

- Remove **PUSH ROD/INTEGRAL LINK**
- Remove spring strut from wheel carrier
- Vehicle **without** air suspension:
  - Remove spring strut from wheel carrier
- Vehicle **with** air suspension:
  - Deactivate **AIR SPRING SYSTEM**
  - Release air
  - Remove **SPRING STRUT** from wheel carrier
- Remove **SWINGING ARM** from wheel carrier

Secure special tool **31 5 220** with wheel studs to drive flange.

Support axle carrier with special tool **31 5 220** and workshop jack **00 2 030** .

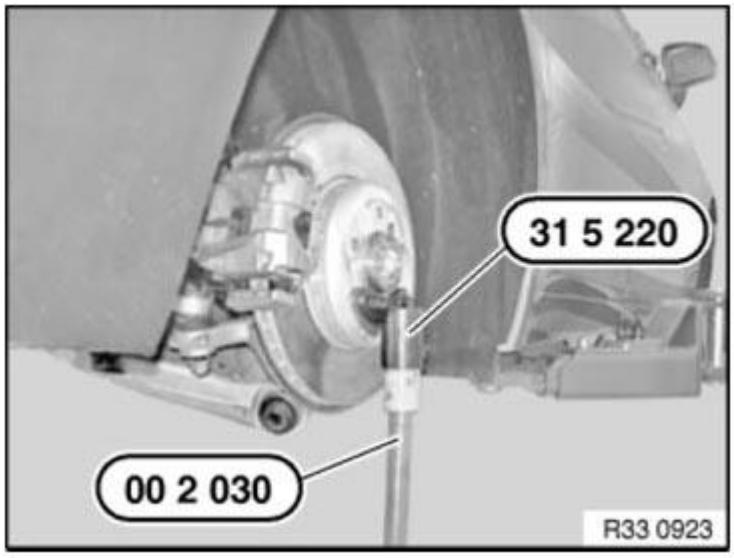


Fig. 104: Supporting Axle Carrier With Special Tool (31 5 220) And Workshop Jack (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove snap ring (1).

Installation:

Install retaining ring (1).

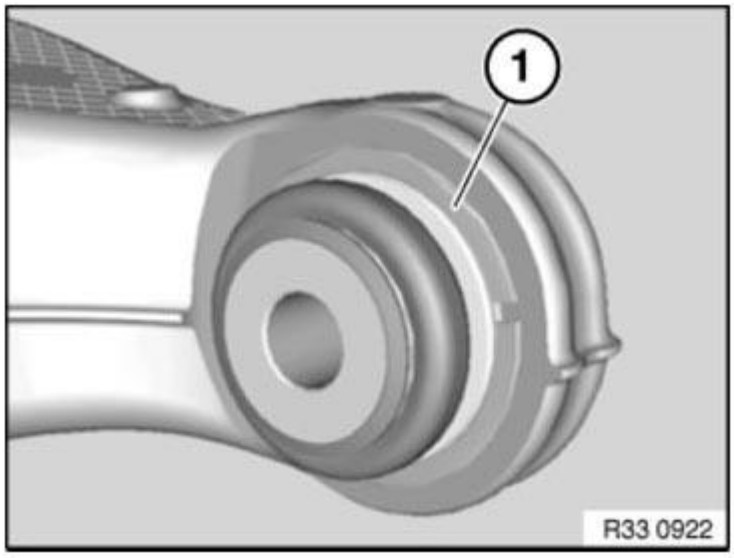


Fig. 105: Identifying Snap Ring And Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out ball joint with special tools 33 4 193, 33 4 191, 33 4 192 and 33 3 333.

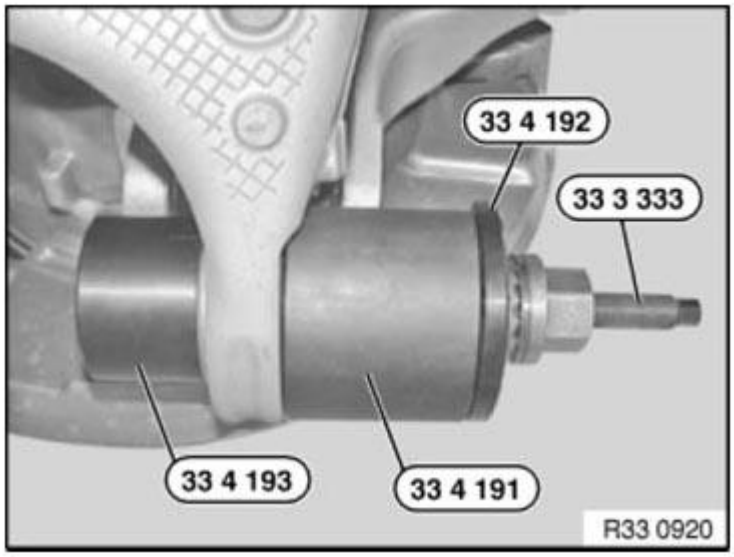


Fig. 106: Pulling Ball Joint Using Special Tools (33 4 193), (33 4 191) And (33 4 192)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit new ball joint (1) with special tools 33 3 333, 33 4 192, 33 4 191 and 33 4 194.

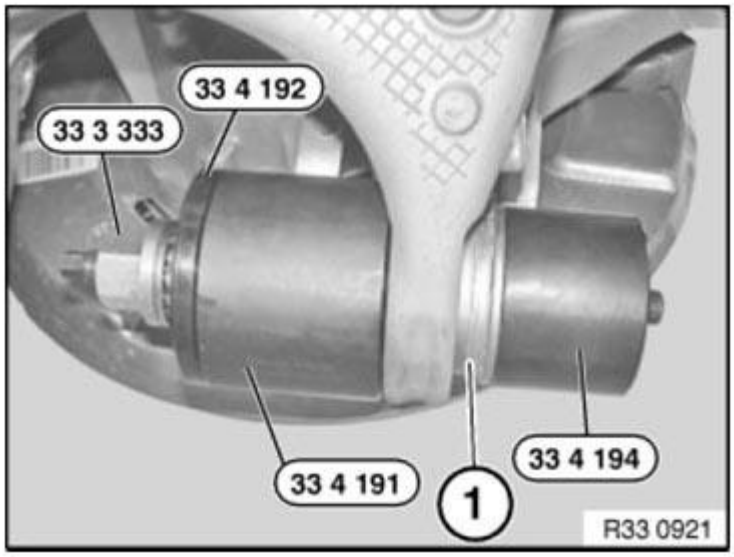


Fig. 107: Installing Ball Joint With Special Tools (33 3 333), (33 4 192) And (33 4 191)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD** .

33 32 071 REPLACING AN UPPER WISHBONE

NOTE: **If the wishbone is detached from the rear axle support/wheel carrier, it will be necessary to carry out a wheel alignment procedure after assembly. See KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION or KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD .**

Necessary preliminary work

- Remove **REAR WHEEL** .

Shown on vehicle at rear right:

Remove holders (1) from wishbone.

Installation note:

Replace defective bracket.

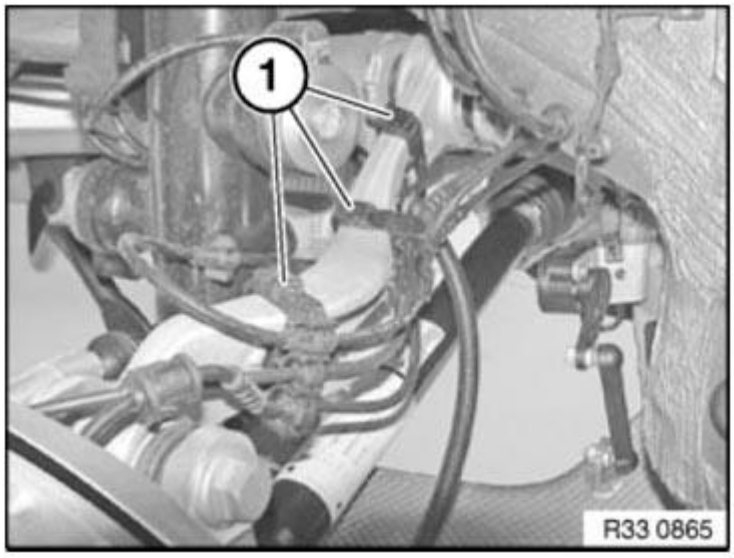


Fig. 108: Identifying Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Undo nut (1) and remove screw (2).

Tightening torque **33 32 9AZ**

Remove wishbone (3) from wheel carrier.

Installation note:

Keep wishbone to wheel carrier connection clean and free from oil and grease.

Replace screw and nut.

Tighten down bolt connection in **NORMAL POSITION** .

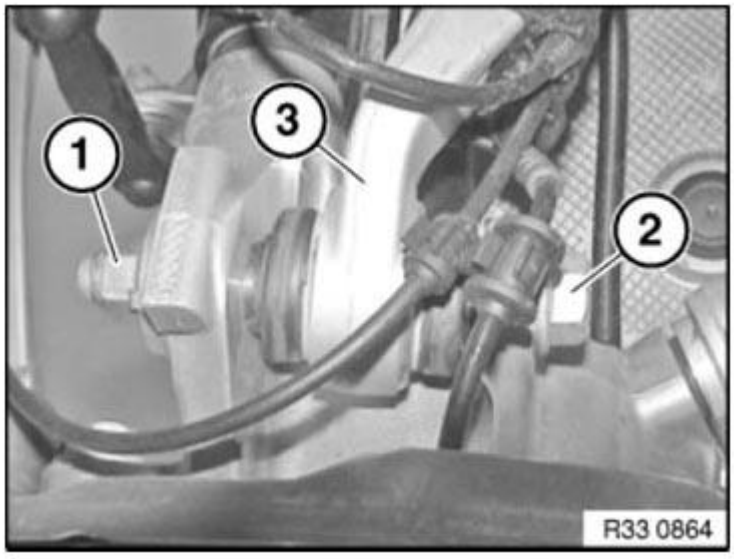


Fig. 109: Identifying Screw, Nut And Wishbone
Courtesy of BMW OF NORTH AMERICA, INC.

Mark position of eccentric adjustment washer to trailing arm to simplify subsequent adjustment of rear axle.

Release nuts (1) and remove eccentric washer.

Tightening torque **33 32 8AZ**

Pull out eccentric screw (2) and remove wishbone.

Installation note:

Note direction of insertion of eccentric screw.

Align eccentric washer and install.

Replace nut.

Tighten down bolt connection in **NORMAL POSITION** .

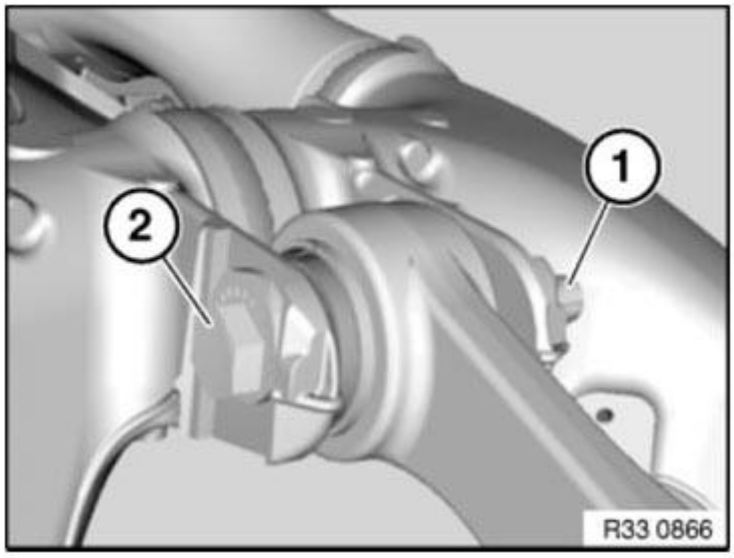


Fig. 110: Identifying Nuts And Eccentric Washer
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD** .

3333 AXLE MOUNTING

33 11... REMOVING AND INSTALLING/REPLACING VIBRATION ABSORBER

See **REMOVING AND INSTALLING/REPLACING VIBRATION ABSORBER**.

33 33 111 REPLACING ALL RUBBER MOUNTS FOR REAR AXLE SUPPORT

Notes

IMPORTANT: Before removing rear axle support:
In order to avoid damage to vehicle hoist, perform weight compensation on vehicle.
Load luggage compartment with sand bags.

Necessary preliminary work

- Remove **REAR AXLE SUPPORT**

IMPORTANT: Risk of damage:
It is mandatory to observe the correct press-out and press-in directions. Failure

to comply with this requirement will result in damage to the rear axle support! To ensure a secure fit of the rear axle rubber mounts in the rear axle support, it is mandatory to observe a waiting period of 2h after pressing in the rubber mounts.

Picture shows F01.

Press-out and press-in directions pictured.

- Front rubber mount (1) is pulled out and in a downward direction.
- Rear rubber mount (2) is pulled out and in an upward direction.

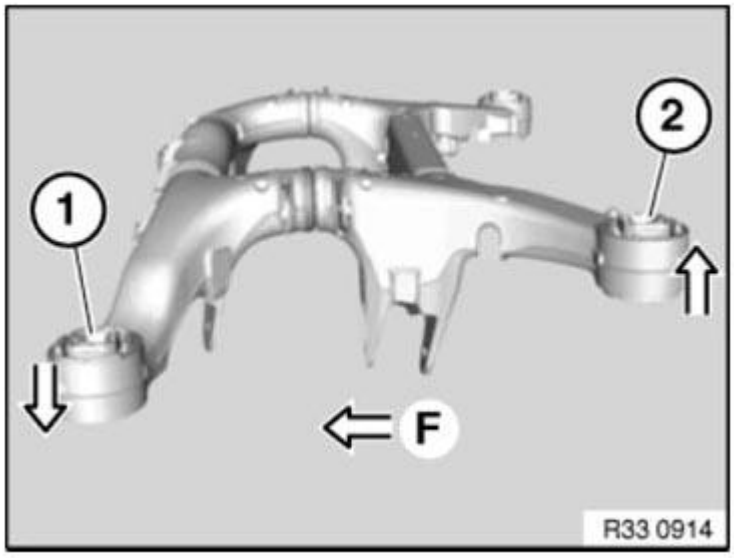


Fig. 111: Identifying Front And Rear Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:
- **Removal and installation are described on the front rubber mount.**

NOTE: **Edges (2) break off when rubber mount (1) is pulled out in the direction of arrow.**

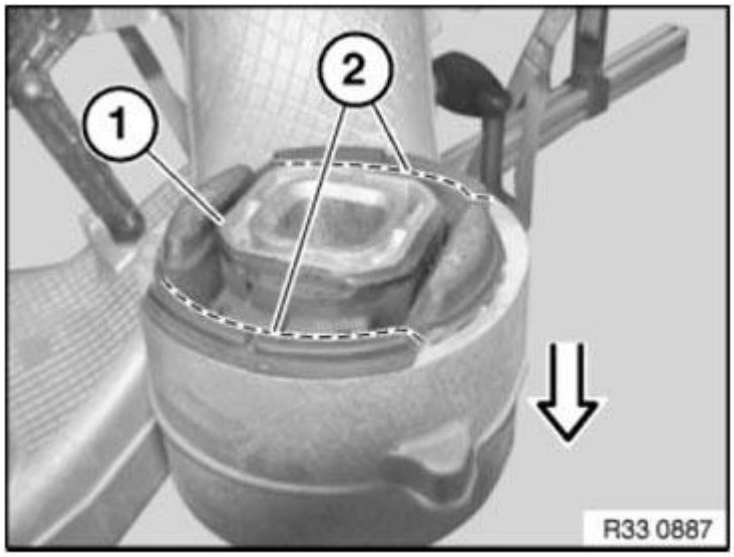


Fig. 112: Identifying Edges And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble special tool **33 4 140** in conjunction with 33 0 011 and 33 0 012.

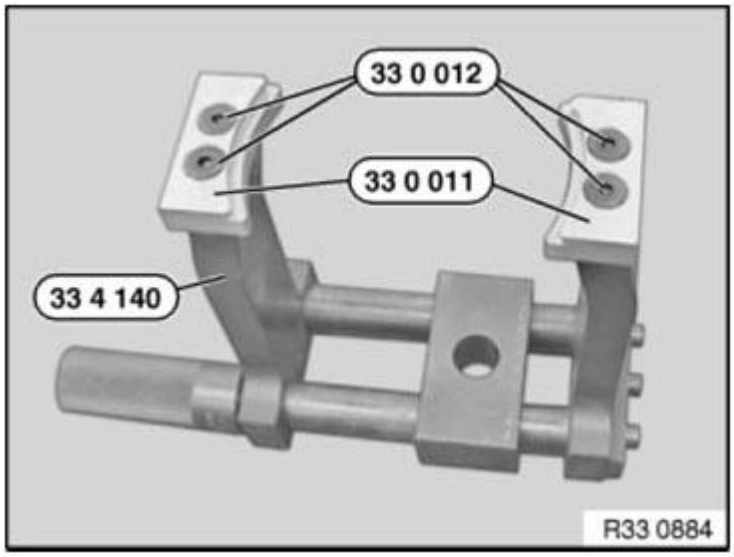


Fig. 113: Assembling Special Tool (33 4 140) In Conjunction With (33 0 011) And (33 0 012)
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw rubber mount using special tools **33 4 140** , 33 0 051, 33 0 052 and 33 0 001 from rear axle support bush.

NOTE: Make sure special tool 33 0 001 is correctly positioned in relation to rubber mount.
Make sure special tool 33 4 140 is correctly supported on rear axle support

bush.

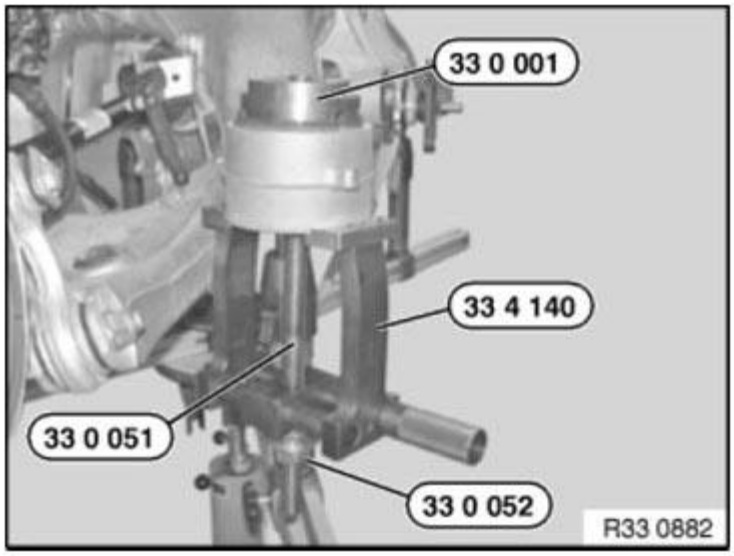


Fig. 114: Removing Rubber Mount Using Special Tools (33 4 140) And (33 0 051)
Courtesy of BMW OF NORTH AMERICA, INC.

Applicable to front rubber mount:

(View of rear axle support from above)

IMPORTANT: Arrow (1) must point on rubber mount (2) in direction of travel.

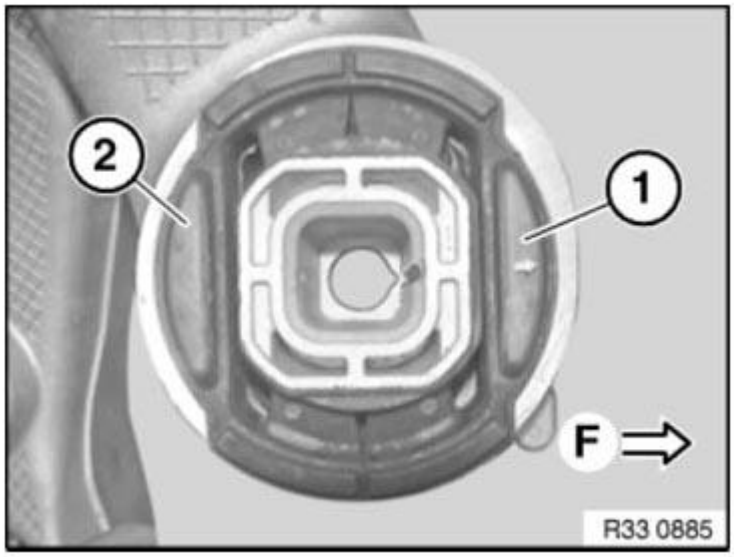


Fig. 115: Identifying Front Rubber Mount Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Applicable to rear rubber mount:

(View of rear axle support from below)

IMPORTANT: Notch (1) and arrow (2) on rubber mount (3) must point in direction of travel.

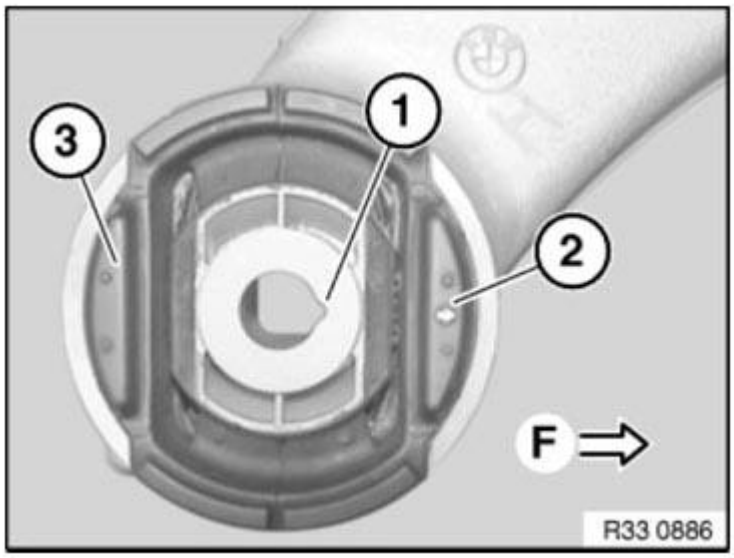


Fig. 116: Identifying Rear Rubber Mount Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Coat rubber mount with Circo Light.

Draw in rubber mount (1) with special tools 33 0 002, **33 4 140** , 33 0 052 and 33 0 051 to the limit position into rear axle support bush.

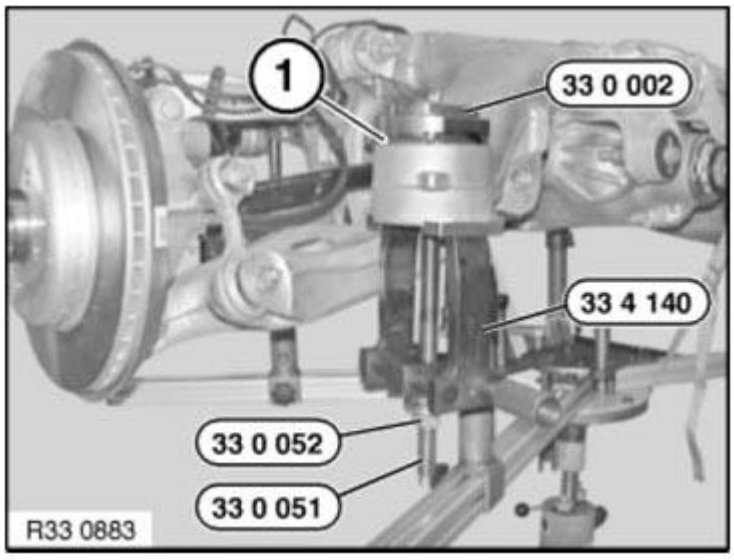


Fig. 117: Installing Rubber Mount Using Special Tools (33 0 002) And (33 4 140)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

For F01/F02/F07 only:

- Activate and fill air suspension system

3334 ACTIVE REAR AXLE KINEMATICS

33 34 070 REMOVING AND INSTALLING/RENEWING INTEGRAL ACTIVE STEERING

Necessary preliminary tasks

- **LOWER REAR AXLE SUPPORT**
- Remove **BOTH TOE ARMS**

IMPORTANT: Screws (1) must not be released during removal!

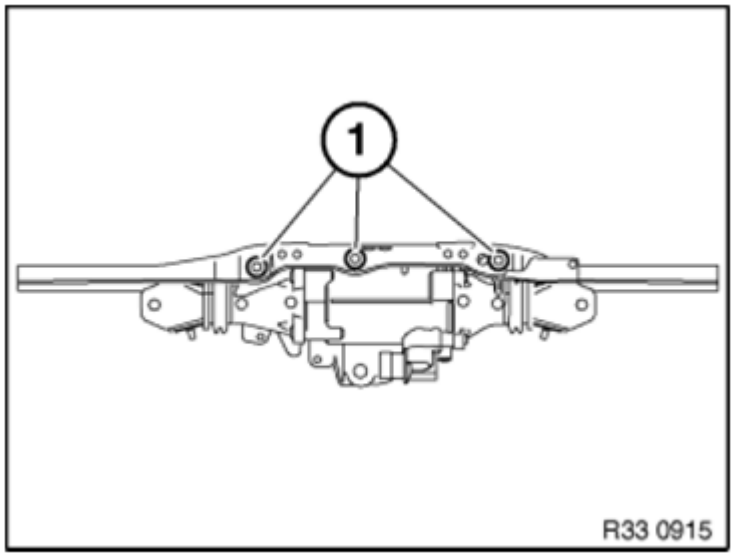


Fig. 118: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug connections (1) from steering.

Release screw (2) and remove earth cable.

Tightening torque **33 34 4AZ** .

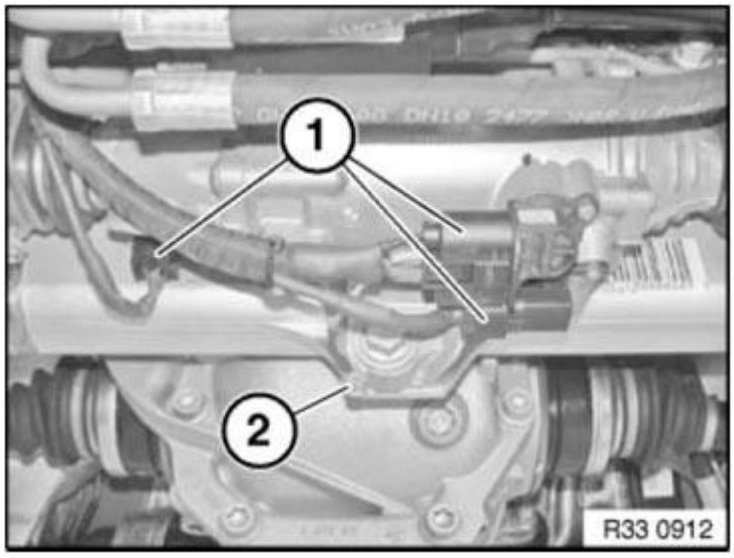


Fig. 119: Identifying Plug Connections And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **33 34 2AZ** .

Release screw (2).

Tightening torque **33 34 1AZ** .

Installation:

Observe assembly sequence to prevent integral active steering from jamming during installation.

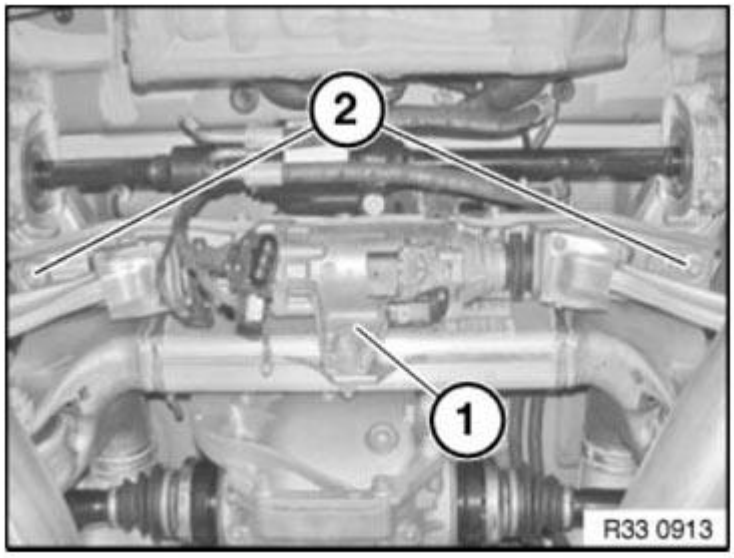


Fig. 120: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) and remove integral active front steering towards bottom.

Tightening torque **33 34 3AZ** .

Installation:

Observe assembly sequence to prevent integral active steering from jamming during installation.

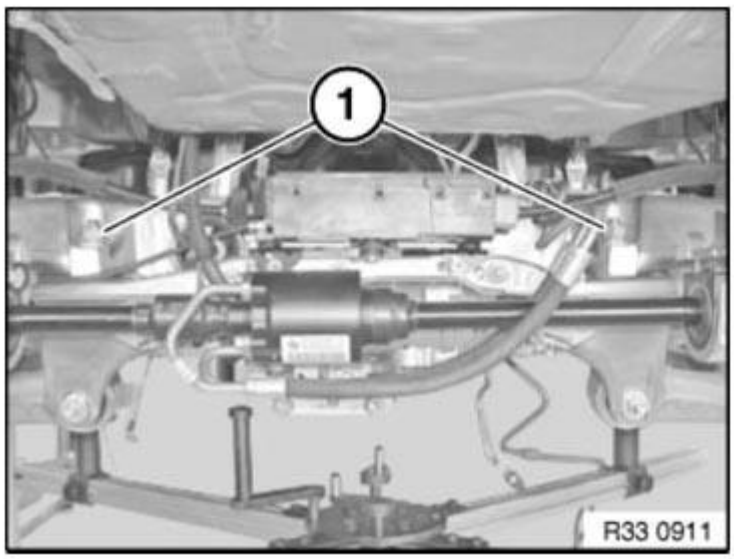


Fig. 121: Identifying Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe assembly sequence.

Tighten bolts of integral active steering on rear axle carrier, see picture.

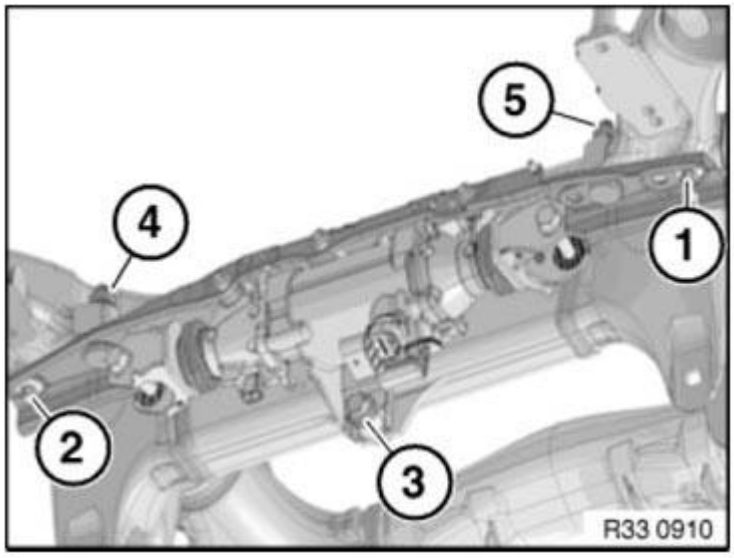


Fig. 122: Identifying Integral Active Steering Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out startup of integral active steering with aid of BMW diagnosis system (see Service function/Deflection test).
- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD** .

33 34 060 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR REAR AXLE SLIP CONTROL

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- **REMOVE BATTERY**

Unlock plug connection (1) on control unit (2) and disconnect.

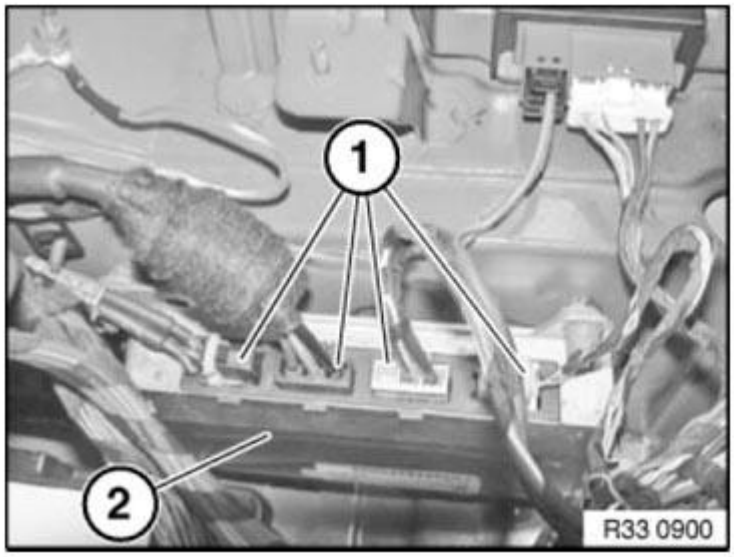


Fig. 123: Identifying Plug Connection And Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove control unit (2).

Tightening torque **33 34 5AZ** .

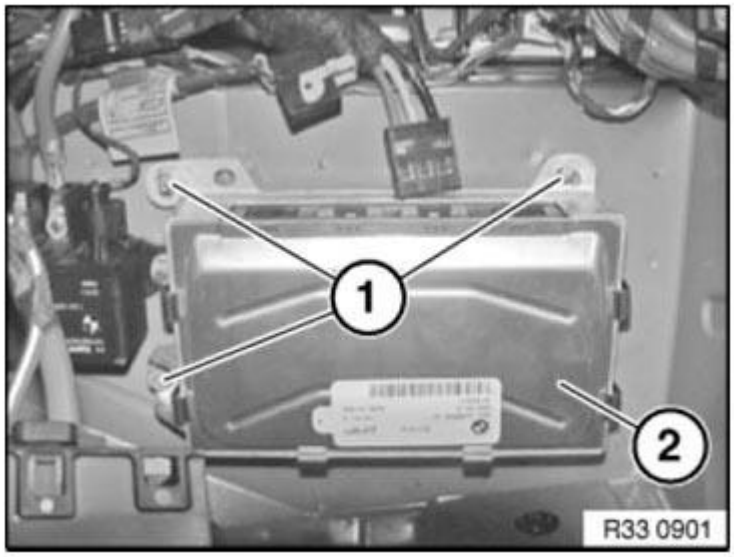


Fig. 124: Identifying Nut And Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Replacement only: Carry out **PROGRAMMING/ENCODING**

3341 WHEEL BEARINGS

33 41... DETACHING WHEEL BEARING INNER RING FROM DRIVE FLANGE (DRIVE FLANGE REMOVED)

Notes

IMPORTANT:

- **Special tool 33 4 409 must not be removed!**

Insert special tool 33 4 408 into special tool 33 4 401.

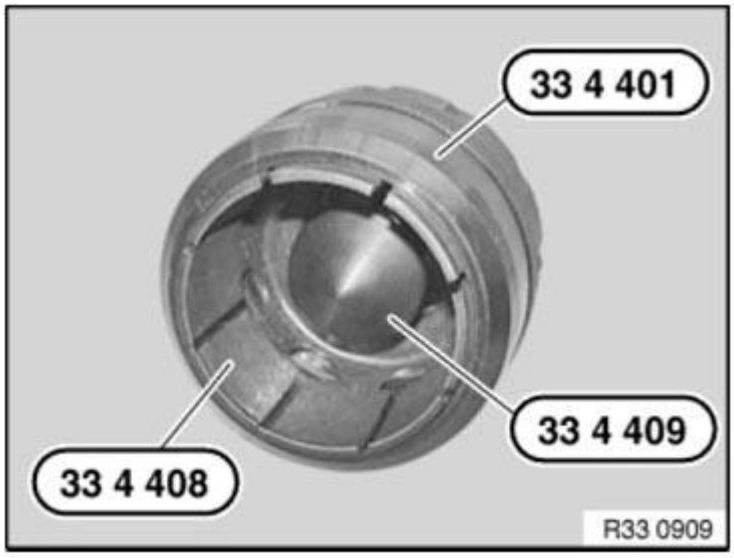


Fig. 125: Positioning Special Tools (33 4 408), (33 4 401) And (33 4 409)
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 33 4 401 in conjunction with 33 4 408 on drive flange.



Fig. 126: Positioning Special Tools (33 4 401) In Conjunction With (33 4 408) On Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

Tension special tool 33 4 401 with spanners 33 4 403 and 33 4 404 together until special tool is resting against wheel bearing inner ring.

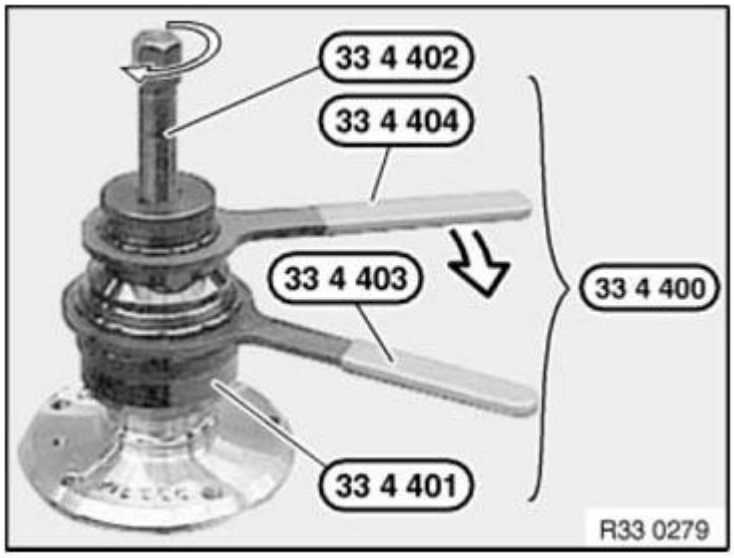


Fig. 127: Tensioning Special Tool (33 4 401) With Spanners (33 4 403) And (33 4 404)
Courtesy of BMW OF NORTH AMERICA, INC.

Use **hydraulic unit and adapter kits, see BMW Workshop Catalogue.**

- Hydraulic unit - 81 64 2 155 744
- Adapter kit 1 - 81 64 2 155 745
- Adapter kit 2 - 81 64 2 155 746

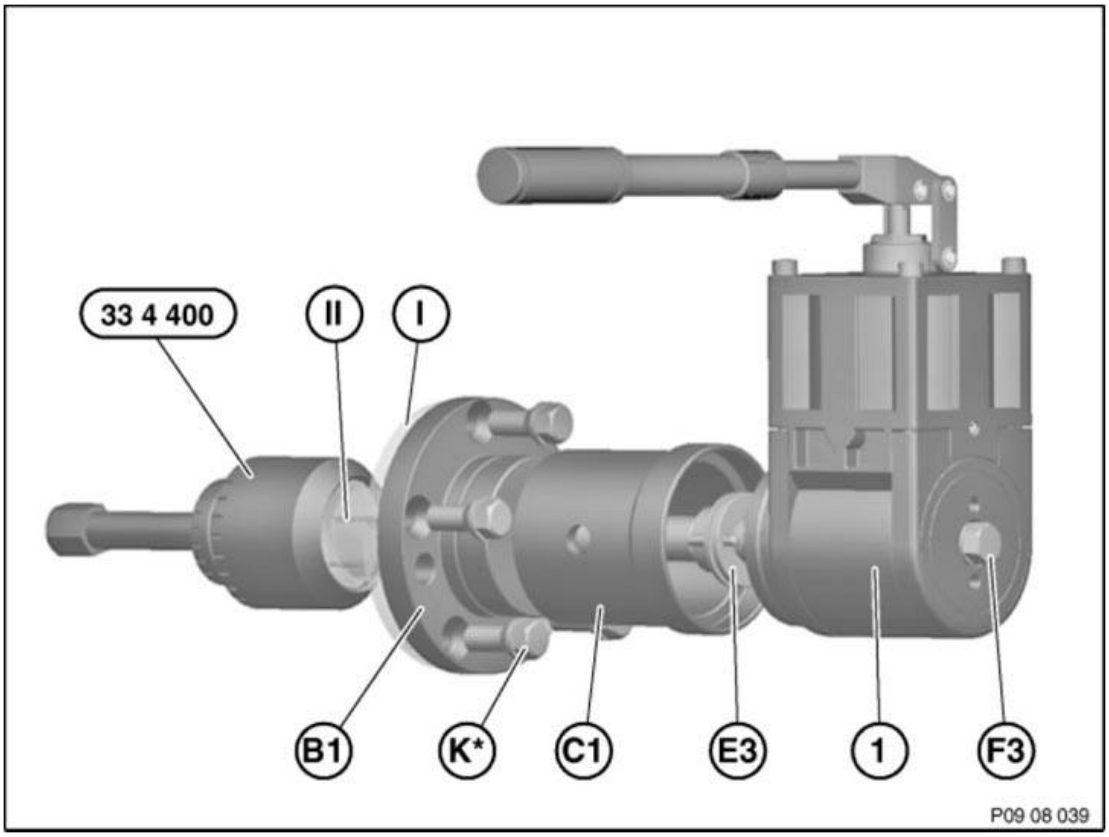


Fig. 128: Detaching Wheel Bearing Inner Ring From Drive Flange Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

- Pressure cylinder of hydraulic unit (1) must be in the initial position.
- Spindle F3 must terminate flush with hydraulic unit (1).
- Assemble special tool, see graphic
- Turn spindle of special tool **33 4 400** as far as it will go.

The following tools are required for detachment, consult graphic for arrangement:

Vehicle components

VEHICLE COMPONENTS

I	Drive flange hub
II	Wheel carrier/swivel bearing

Required components for all models and types

REQUIRED COMPONENTS FOR ALL MODELS AND TYPES

1	Hydraulic unit
F3	Spindle M24 (length 270 mm)

E3	Washer M24
C1	Holding sleeve
K1	Screws M12 x 1.5
K2	Screws M14 x 1.5
B1	Adapter
33 4 400	Special tool

Components specific to model and type

ADAPTER SPECIFICATIONS

K1	Screws M12 x 1.5
K2	Screws M14 x 1.5

Detach wheel bearing inner ring from drive flange.

33 41 000 REPLACING DRIVE FLANGE ON LEFT/RIGHT REAR AXLE SHAFT

Necessary preliminary work

- Remove **REAR WHEEL** .

IMPORTANT: Expand anti-twist lock sufficiently to avoid damaging thread when releasing collar nut.

Activate parking brake and release collar nut.

Tightening torque **33 41 1AZ**

Installation note:

Lightly oil the gearing at the shaft journal.

No oil permitted on thread of shaft journal or collar nut.

Replace the collar nut and secure it by positive peening on flat areas of output shaft.

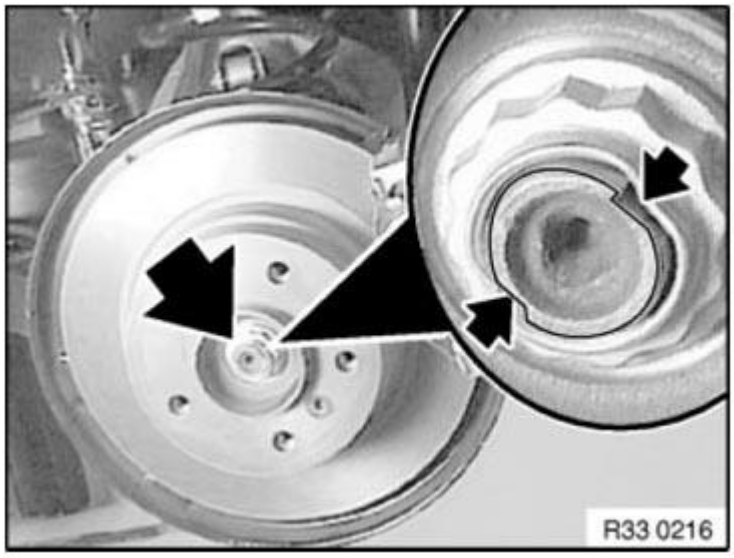


Fig. 129: Identifying Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove **BRAKE DISC** .

only: F01, F02, F03, F04, F07:

Twist roll pins (1) 90° with special tool **34 4 000** and detach.

Only disconnect return spring (2) with brake spring pliers.

Remove brake pads (3).

NOTE: the fitted position of the adjusting screw must not be changed or turned.

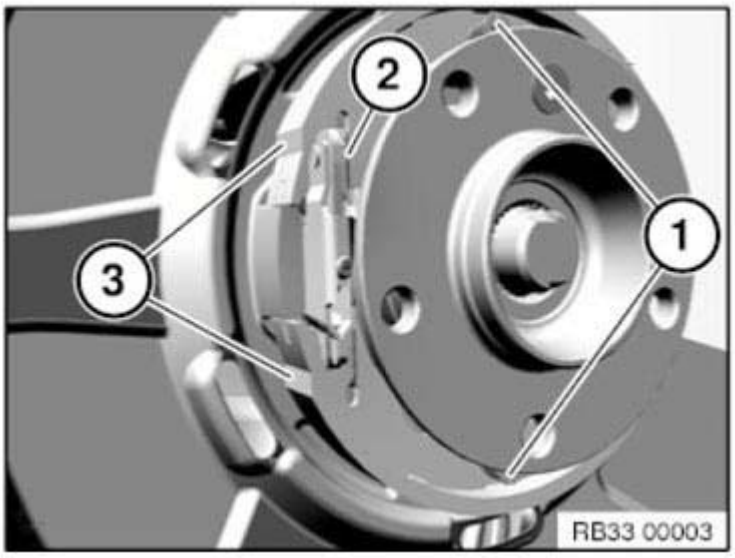


Fig. 130: Identifying Twist Roll Pins, Return Spring And Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

Use the special tool from the BMW workshop catalogue.

- Hydraulic unit - 81 64 2 155 744
- Adapter kit 1 - 81 64 2 155 745
- Adapter kit 2 - 81 64 2 155 746

The following work steps describe detachment of the drive flange

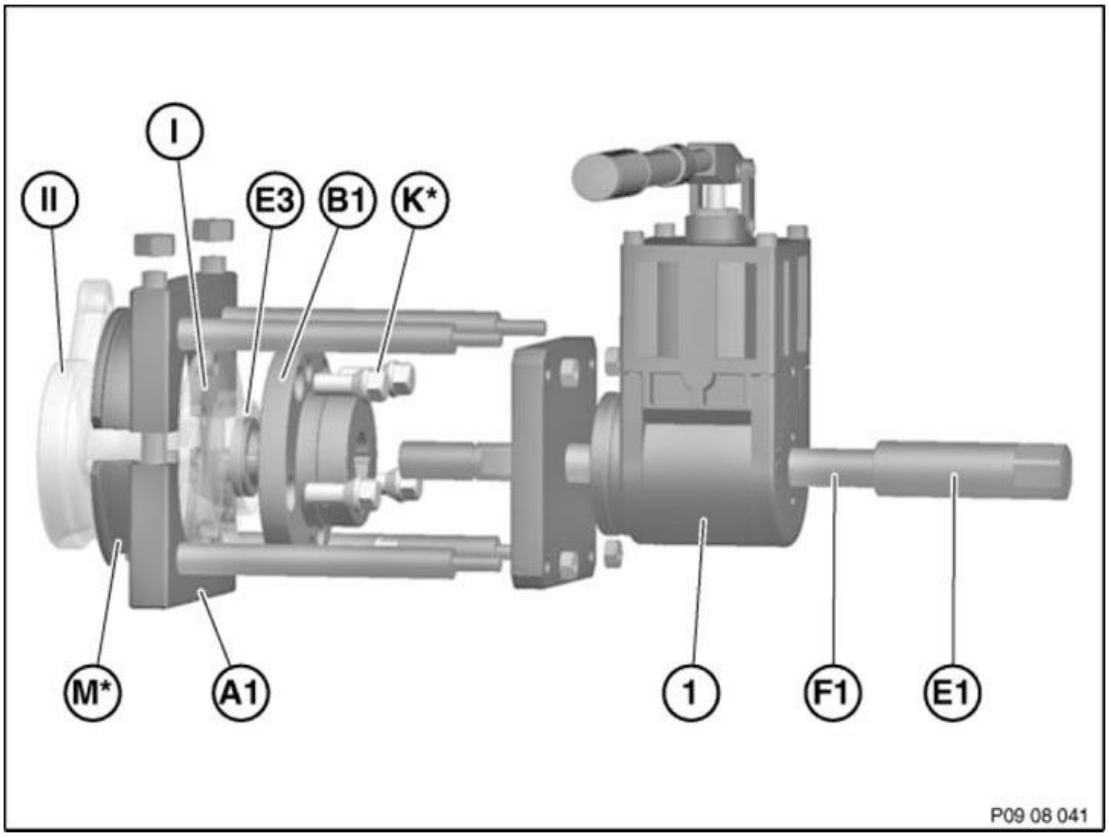


Fig. 131: Detaching Drive Flange Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

The following tools are required to pull the drive flange out of the wheel bearing. For arrangement, see graphic:

Vehicle components

VEHICLE COMPONENTS

I	Drive flange
II	Wheel carrier/swivel bearing

Required components for all models and types

REQUIRED COMPONENTS FOR ALL MODELS AND TYPES

E3	Washer
B1	Adapter
E1	Holding sleeveM24
F1	Spindle M24 (length 425 mm)
1	Hydraulic unit
A1	Device

Components specific to model and type

ADAPTER SPECIFICATIONS

M1	Adapter diameter 100/101 mm
M2	Adapter diameter 88 mm
M3	Adapter diameter 102 mm
M4	Adapter diameter 96 mm
M5	Adapter diameter 90 mm
M6	Adapter diameter 102/113 mm
K1	Screws M12 x 1.5
K2	Screws M14 x 1.5

- Pull out drive flange using the hydraulic tool.

IMPORTANT: Wheel bearing will be destroyed by being pulled out of the drive flange and must be renewed!

The following work steps pulling in the drive flange

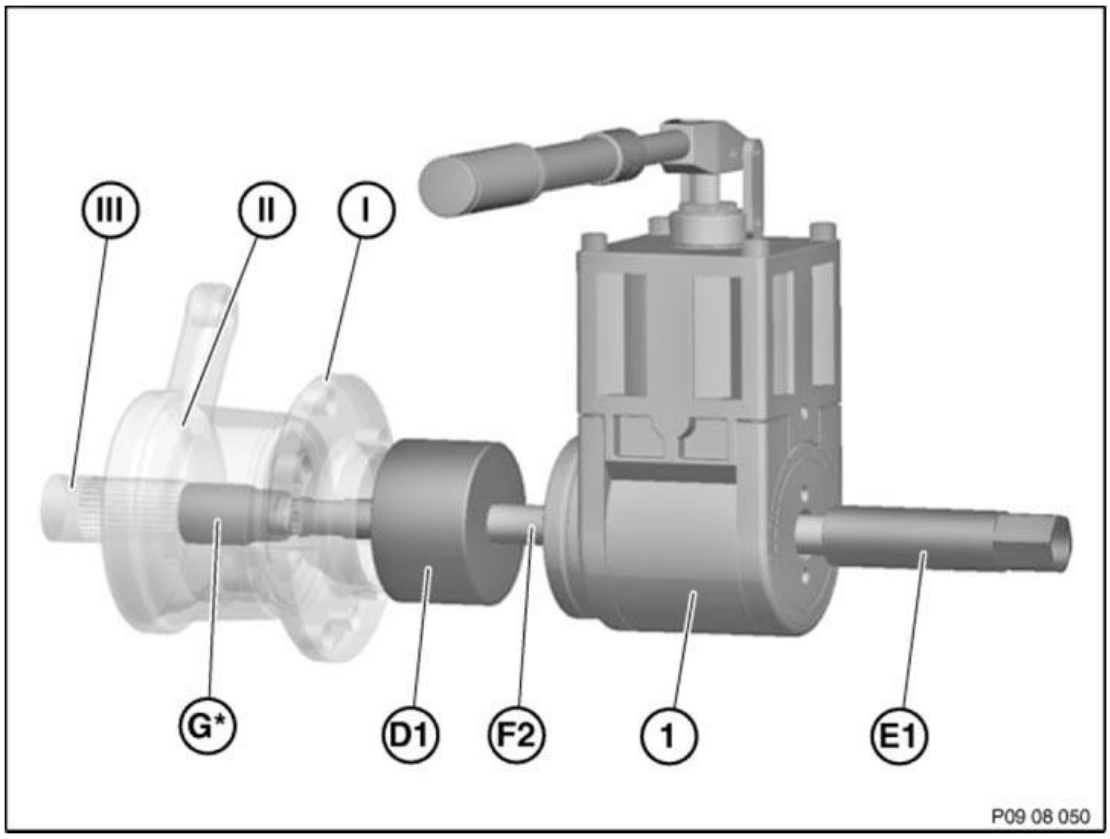


Fig. 132: Pulling Drive Flange Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

The following tools are required to pull the drive flange in. For arrangement, see graphic:

Installation note:

The drive flange and output shaft can be installed in the wheel bearing in one operation.

Vehicle components

VEHICLE COMPONENTS

I	Drive flange hub
II	Wheel carrier/swivel bearing
III	Output shaft

Required components for all models and types

REQUIRED COMPONENTS FOR ALL MODELS AND TYPES

1	Hydraulic unit
E1	Holding sleeveM24
D1	Washer
F2	Spindle M24/M20 (length 335 mm)

Components specific to model and type

ADAPTER SPECIFICATIONS

G1	Adapter M22 x 1.5 to M20
G2	Adapter M24 x 1.5 to M20
G3	Adapter M27 x 1.5 to M20

- Oil drive flange lightly and attach to the output shaft gearing.

  Use a hydraulic tool to draw in the drive flange

Installing **PARKING BRAKE SHOES** . (Only for F01, F02, F03, F04, F07)

Install **BRAKE DISC** .

Activate parking brake and tighten collar nut.

Tightening torque **33 41 1AZ** .

Installation note:

Replace collar nut.

No oil permitted on thread of shaft journal or collar nut.

Secure collar nut by positive peening on flat areas of output shaft.

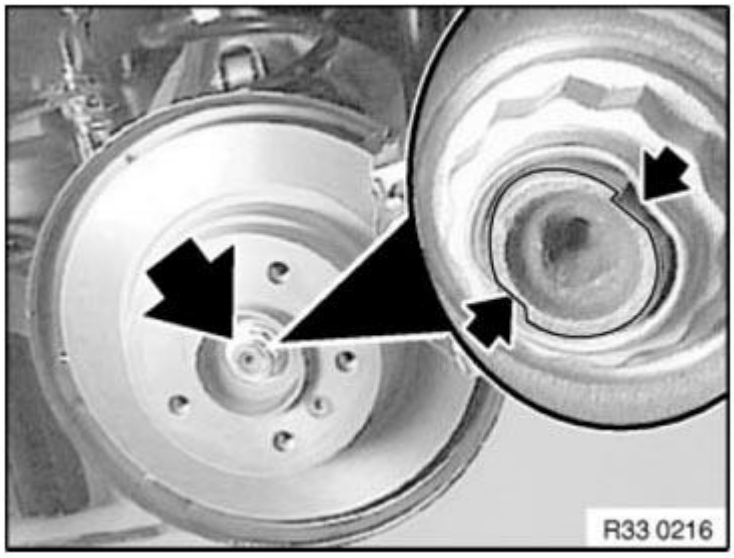


Fig. 133: Identifying Parking Brake Shoes, Brake Disc And Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

Only for F01, F02, F03, F04, F07:

- Adjust **PARKING BRAKE** .

33 41 151 REPLACING LEFT OR RIGHT WHEEL BEARING ON REAR AXLE SHAFT

IMPORTANT: Do not damage multiple impulse ring.

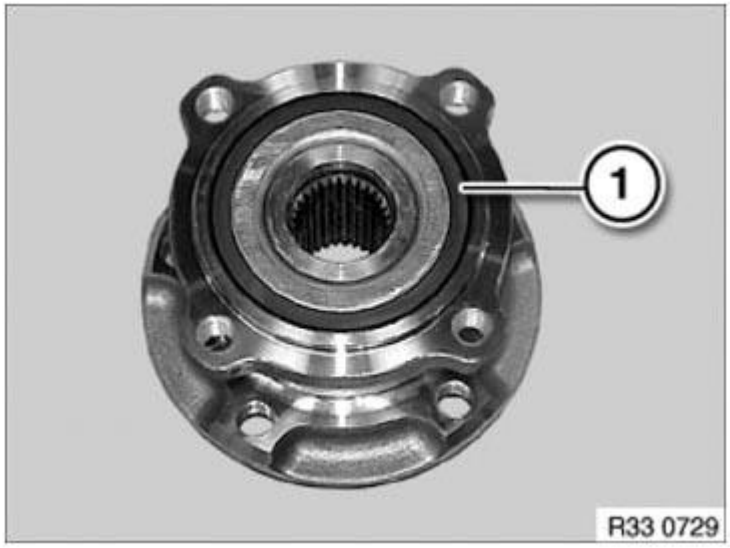


Fig. 134: Identifying Impulse Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary work

- Remove **DRIVE FLANGE FOR REAR AXLE SHAFT** .
- Remove **TOE ARM FROM WHEEL CARRIER** .

(F01/F02/F04/F10/F12/F13/F18)

NOTE:

- **Check brake pads and renew if necessary!**

F07/F11 only:

- Deactivate and drain air spring/suspension system
- Raise the wheel carrier with a workshop lift.

Release screws.

Tightening torque **33 41 2AZ** .

Remove wheel bearing.

Installation note:

Replace screws.

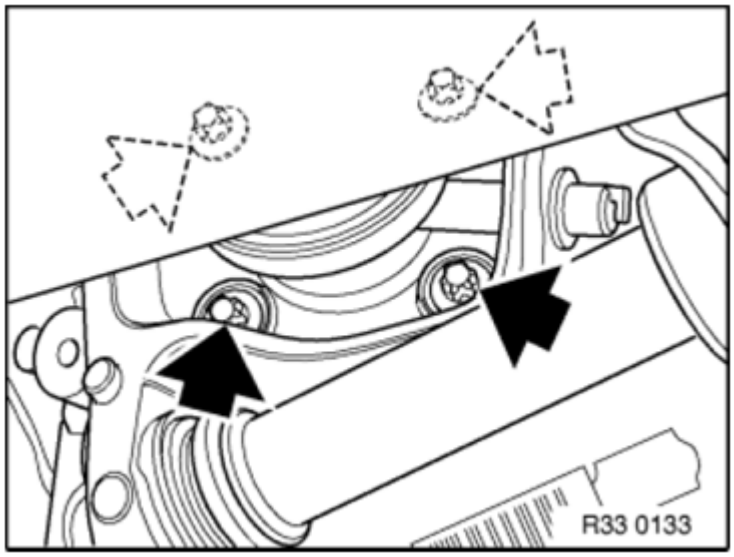


Fig. 135: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Graphic F01:

Installation note:

Keep contact surface (2) of wheel bearing and wheel carrier clean and free from oil and grease.

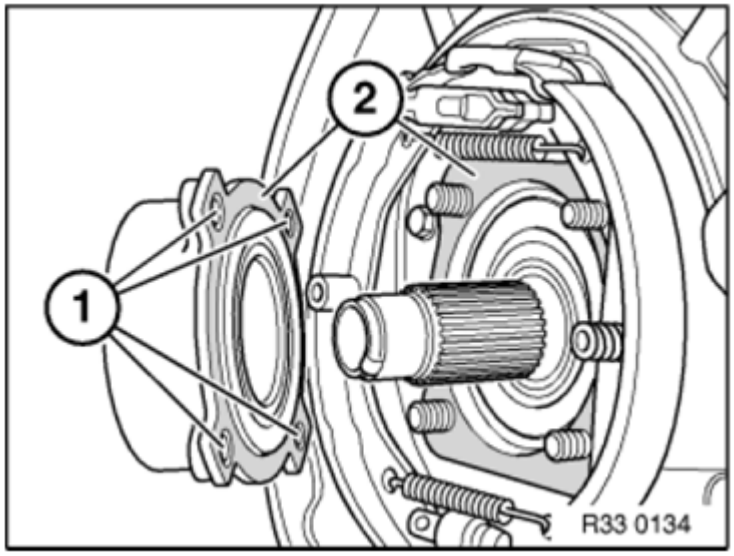


Fig. 136: Identifying Wheel Bearing And Wheel Carrier With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Adjust **PARKING BRAKE** . (F01/F02/F04/F07)
- Activate and fill air spring system (F07/F11)

3352 SHOCK ABSORBER

33 00... INFORMATION ON REPLACING SHOCK ABSORBERS

Situation

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Effect

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.

Exception: On all M - GmbH models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

37 12 1090 REMOVING AND INSTALLING REAR LEFT OR RIGHT SPRING STRUT

Necessary preliminary tasks:

- Remove **REAR WHEEL**
- Remove **WHEEL ARCH COVER**
- Remove **STOWAGE SHELF**

Release screw (1).

Tightening torque **33 52 3AZ** .

IMPORTANT: Secure spring strut shock absorber against falling out.

Remove spring strut shock absorber from wheel carrier and tie up.

Installation:

Replace screw.

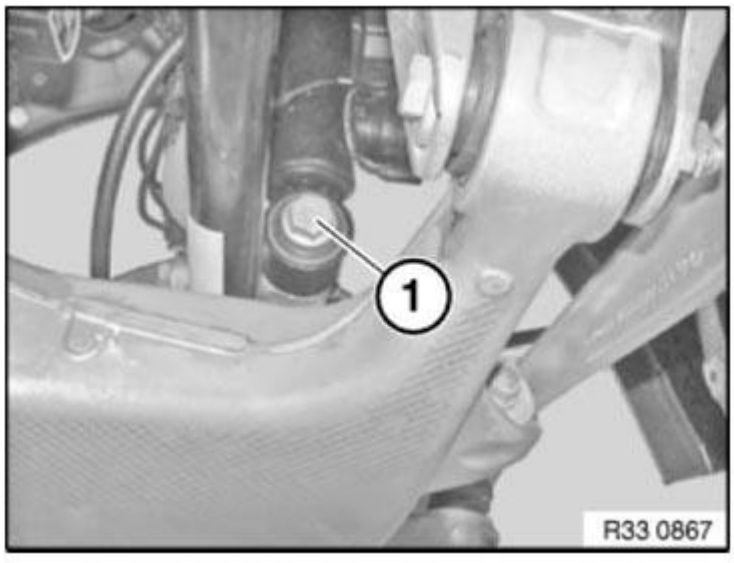


Fig. 137: Identifying Air Spring Strut Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and remove from cable guide (2).

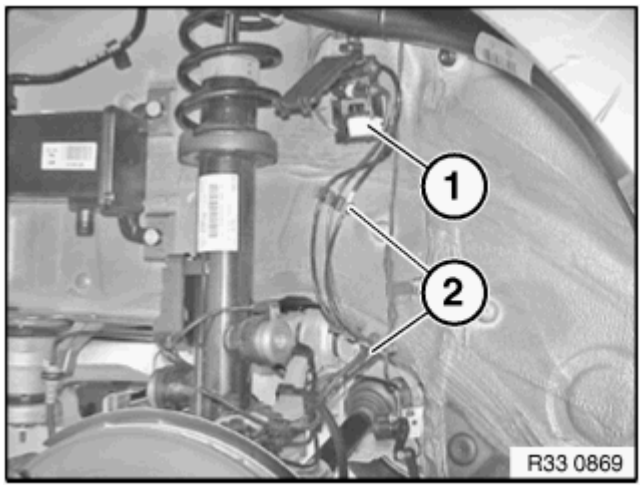


Fig. 138: Identifying Cable Guide And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Fold back sound insulation (1) and release nuts (2).

Tightening torque 33 52 1AZ.

Installation:

Replace self-locking nuts.

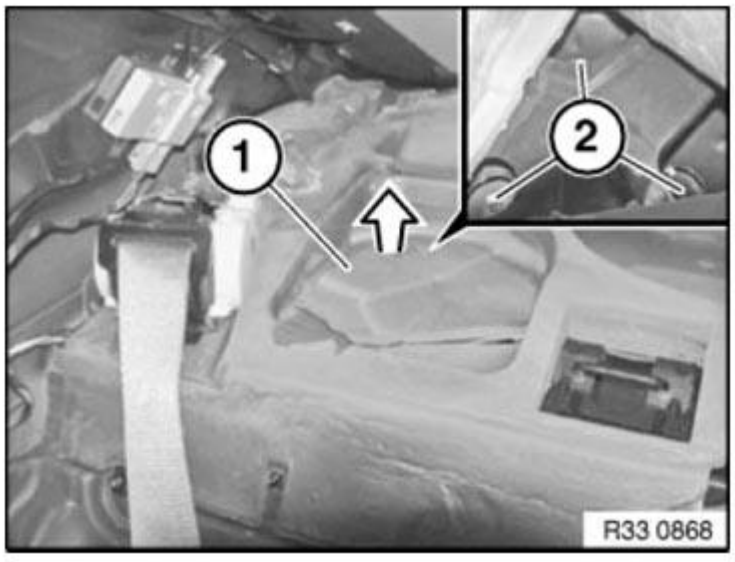


Fig. 139: Folding Acoustic Insulation Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Press wheel carrier downwards, guide spring strut shock absorber downwards between guide arm and control arm and then remove in upwards direction.

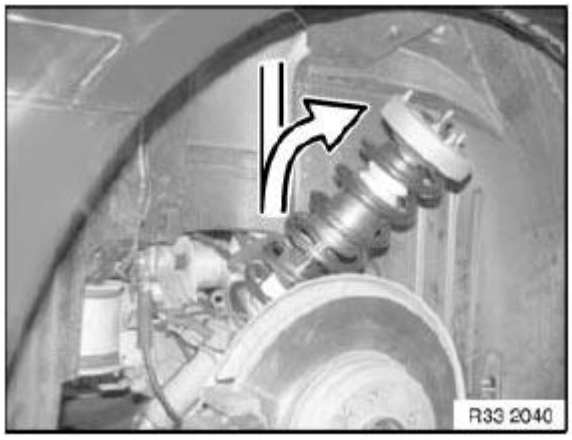


Fig. 140: Removing Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before tightening screw connection, check that spring strut shock absorber pin is correctly positioned in wheel carrier.

37 12 092 REPLACING REAR LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

WARNING: Prior to each use of special tool 31 3 340, it is essential to read the associated Owner's Handbook fully!

All the safety information and instructions contained in the Owner's Handbook must be strictly observed!

Failure to observe these safety precautions and instructions increases the risk of serious physical injury, damage to your health and damage to property and equipment!

IMPORTANT:

1. **Prior to each use, check the special tools for defects, modifications and operational reliability.**
2. **Damaged/modified special tools must not be used!**
3. **No changes or modifications may be made to the special tools!**
4. **These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.**
5. **Keep special tools dry, clean and (down to the spindle) free from grease.**
6. **Impact screwdrivers are prohibited!**
7. **Do not compress coil spring to full extent.**

Necessary preliminary work:

- Remove **REAR SPRING STRUT SHOCK ABSORBER**.

Removing:

Clamp special tool 31 3 341 (spring tensioner) in vice.

Fit special tools 31 3 351 from above on special tool 31 3 341 until retaining bolt (1) can be felt and heard to snap into place.

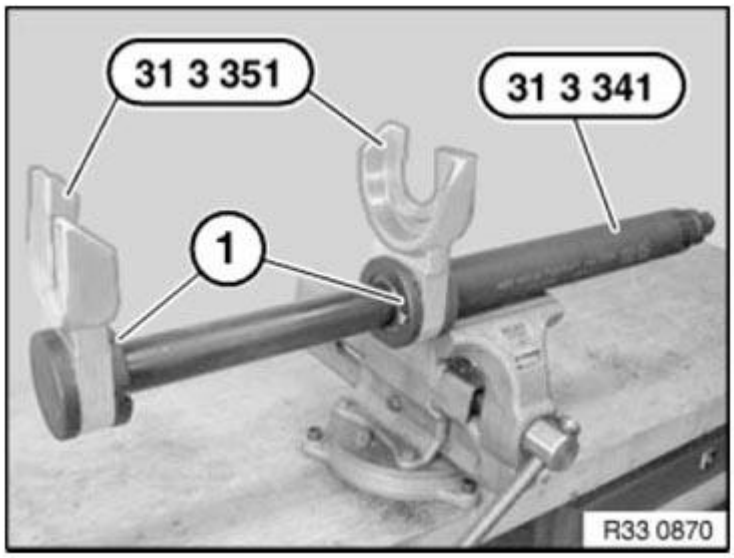


Fig. 141: Identifying Retaining Bolts With Special Tools (31 3 341 And 31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Clean coil spring to remove all coarse dirt and mount on special tools 31 3 351 (holder).

WARNING: Coils of coil spring must be located completely in recesses of special tools 31 3 351 (holder)!

Compress coil spring until stress on piston rod is relieved.

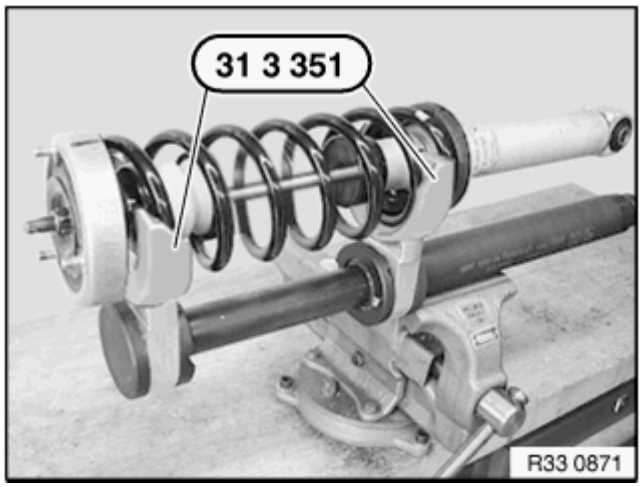


Fig. 142: Compressing Coil Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut with special tool 33 0 040 (socket wrench).

Remove plate and support bearing with spring pad.

Remove shock absorber with support cup, auxiliary damper, protective tube and spring pad sideways from tensioned coil spring.



Fig. 143: Tightening Screws On Strut Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, remove support cup, auxiliary damper (1) with protective tube and spring pad (2) from shock absorber.

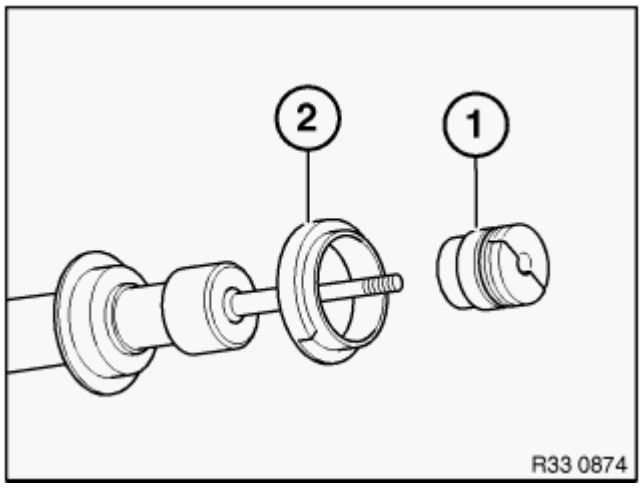


Fig. 144: Identifying Auxiliary Damper And Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Relieve tension on coil spring and remove from special tools 31 3 351 (holder).

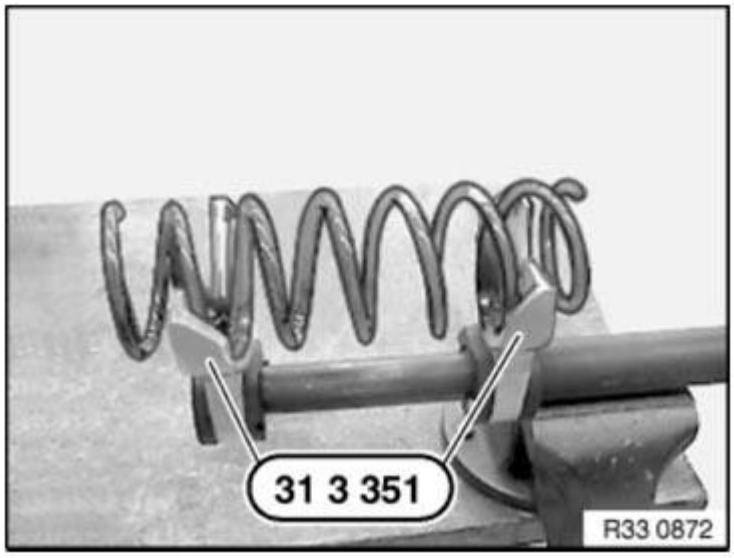


Fig. 145: Identifying Coil Spring With Special Tool (31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

WARNING: Do not compress coil spring to full extent.

Coils of coil spring must be located completely in recesses of special tools 31 3 351 (holder)!

Tension coil spring.

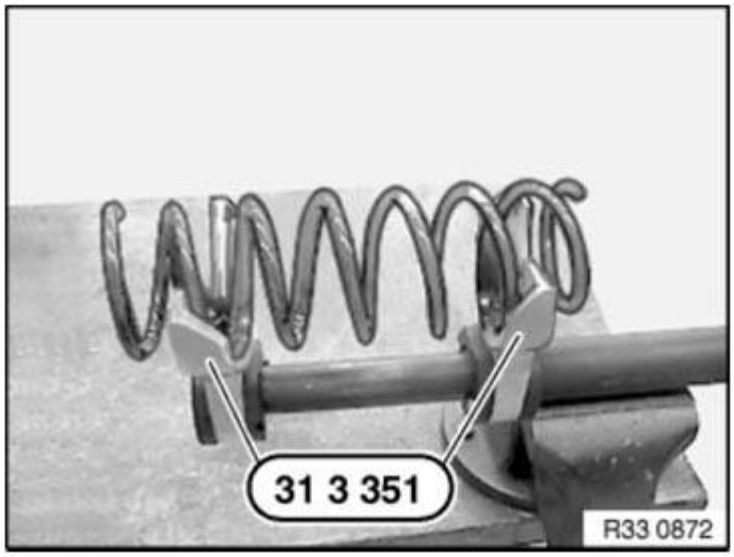


Fig. 146: Identifying Coil Spring With Special Tool (31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Check auxiliary damper (1) with protective tube and spring pad (2) for damage, replace if necessary.

IMPORTANT: Coat contact surface of spring pad (2) to shock absorber with Circo Light.

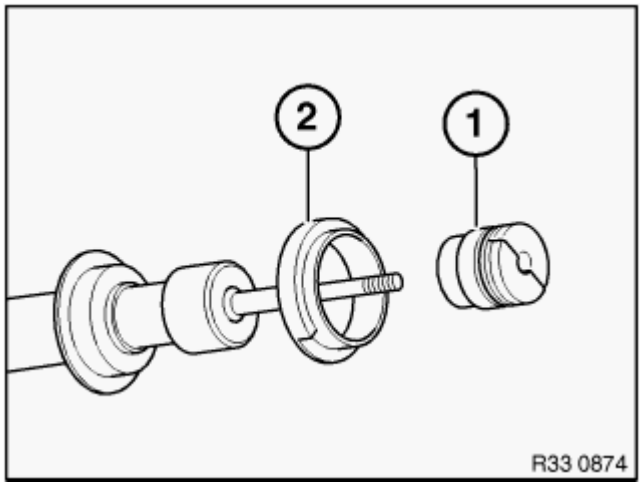


Fig. 147: Identifying Auxiliary Damper And Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Attach support cup to piston rod.

Insert shock absorber in tensioned coil spring.

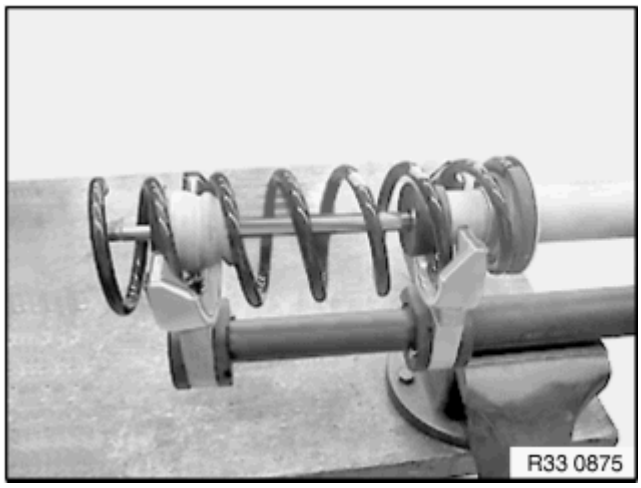


Fig. 148: Inserting Shock Absorber In Tensioned Coil Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Check support bearing for damage, replace if necessary.

Attach support bearing and plate to piston rod.

IMPORTANT: One threaded bolt (1) on the support bearing must be on one plane with the bore in the rubber mount (2) and the opposite side of the bush (3).

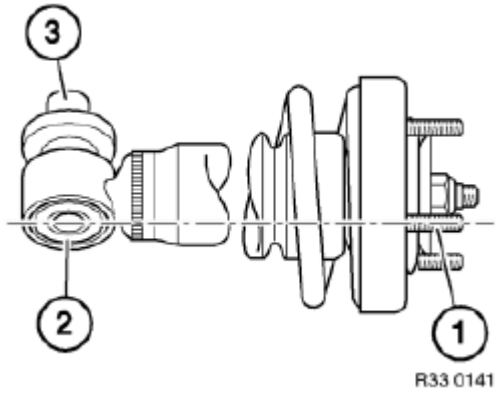


Fig. 149: Identifying Threaded Pin, Rubber Mount And Bush
Courtesy of BMW OF NORTH AMERICA, INC.

Replace nut and tighten down with special tool 33 0 040.

Tightening torque **33 52 2AZ** .



Fig. 150: Tightening Screws On Strut Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Align support bearing by way of spring pad to end of coil spring.

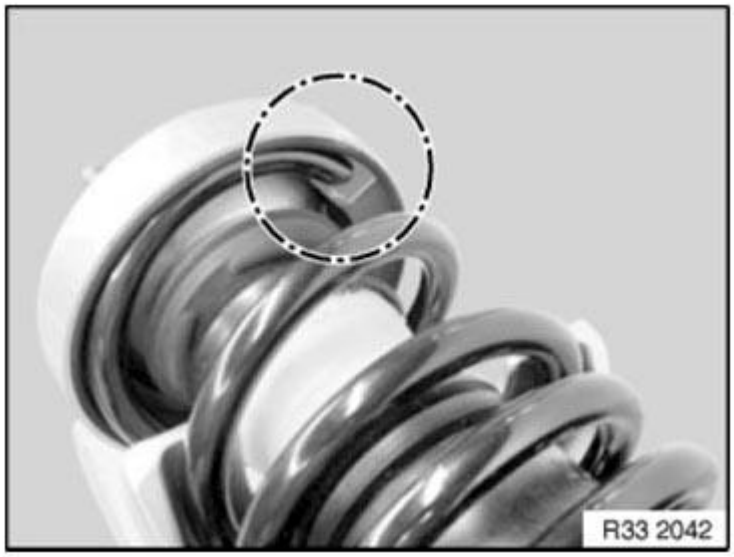


Fig. 151: Identifying Support Bearing And Coil Spring Alignment Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Lower end of coil spring must rest on stop of spring pad!

Relieve tension on coil spring.

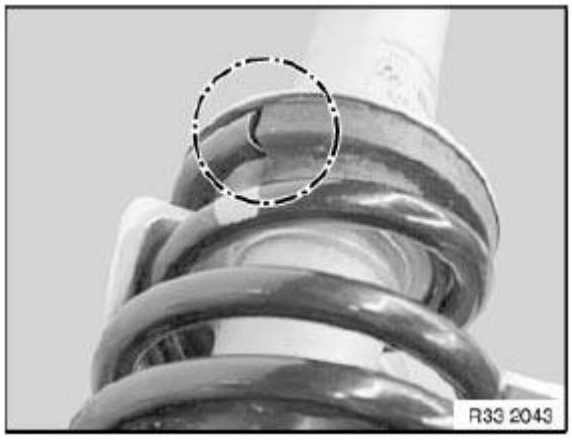


Fig. 152: Identifying Coil Spring Is Correctly Seating Position In Lower Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

- Secure upper spring strut in body.
- Align shock absorber eye to swivel bearing by turning shock absorber.
- Code spring strut with ISID tester and check software version.

33 52 161 REPLACING REAR LEFT OR RIGHT SUPPORT BEARING FOR SPRING STRUT/SHOCK ABSORBER

Installation note:

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

NOTE: **Procedure is described in REPLACING REAR LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER.**

3353 SPRINGS WITH SUSPENSION

33 53 000 REMOVING AND INSTALLING / REPLACING REAR LEFT OR RIGHT COIL SPRING

Installation note:

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

IMPORTANT:

- **Both coil springs on the relevant axle must be replaced in the event of corrosion breakage.**

- **The spring pads at the top and bottom must also be renewed when replacing the coil springs.**

NOTE: **The coil spring is allocated in the BMW Electronic Parts Catalogue (EPC) under the item "Spring table" after the vehicle identification number has been entered and the optional equipments of the car have been selected.**

NOTE: **The process is described in REPLACING REAR LEFT OR RIGHT SPRING STRUT.**

3355 STABILIZER BAR

33 55 000 REMOVING AND INSTALLING/REPLACING REAR ANTI-ROLL BAR

Necessary preliminary tasks

- Remove both **ANTI-ROLL BAR LINKS FROM ANTI-ROLL BAR**

Release screws (1).

Tightening torque **33 55 1AZ** .

Installation:

Replace screws.

Turn anti-roll bar (2) and remove sideways.

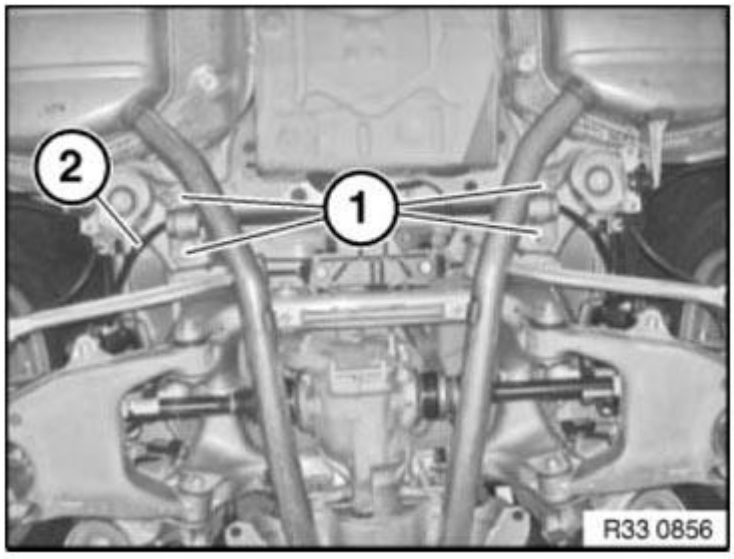


Fig. 153: Identifying Screws And Anti-Roll Bar

Courtesy of BMW OF NORTH AMERICA, INC.

Installation

- Check **BOTH RUBBER MOUNTS FOR DAMAGE** and replace if necessary.
- Pay attention to correct installation position when installing anti-roll bar.
- The bend of the anti-roll bar must point upwards in the anti-roll bar to anti-roll bar link area.

33 11... REMOVING AND INSTALLING/REPLACING VIBRATION ABSORBER

See **REMOVING AND INSTALLING/REPLACING VIBRATION ABSORBER**.

33 55 041 REPLACING ANTI-ROLL BAR LINK FOR ANTIROLL BAR ON LEFT OR RIGHT

IMPORTANT: Observe SAFETY INSTRUCTIONS for raising the vehicle

IMPORTANT: Do not mix up anti-roll bar links

1. **Stabilizer link for active stabilizer**
2. **Anti-roll bar link for conventional anti-roll bar**

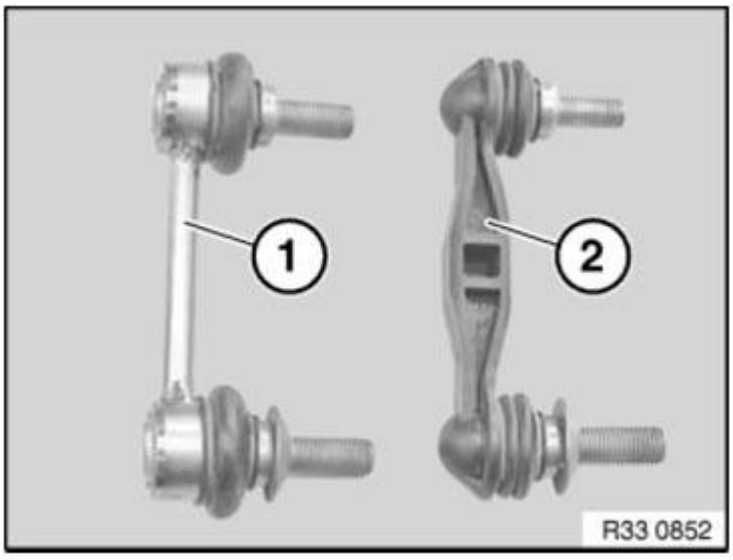


Fig. 154: Identifying Stabilizer And Anti-Roll Bar Link
Courtesy of BMW OF NORTH AMERICA, INC.

Vehicle with ARS

Unscrew nuts (1).

Remove anti-roll bar link (2).

Tightening torque **33 55 2AZ** .

Installation note:

Replace self-locking nuts.

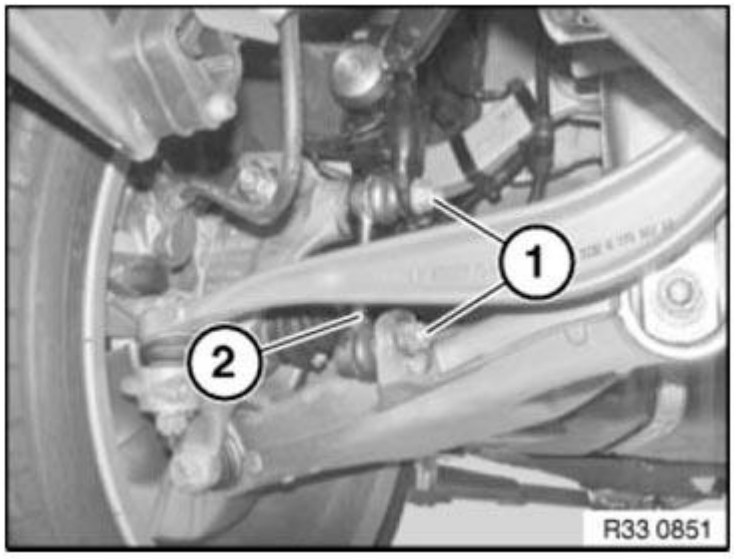


Fig. 155: Identifying Nuts And Anti-Roll Bar Link
Courtesy of BMW OF NORTH AMERICA, INC.

Vehicle without ARS

Slacken nut (1).

Tightening torque **33 55 2AZ** .

Release nut (2) and remove anti-roll bar link (3).

Tightening torque **33 55 2AZ** .

Installation note:

Replace self-locking nuts.

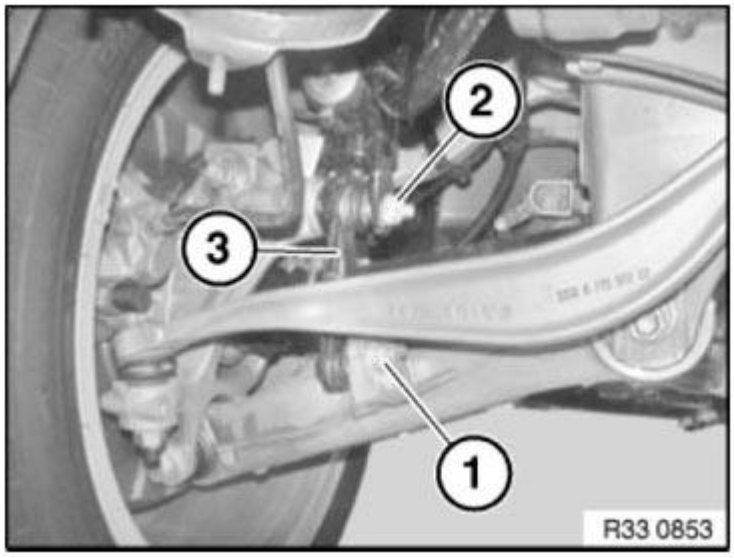


Fig. 156: Identifying Slacken Nut And Anti-Roll Bar Link
Courtesy of BMW OF NORTH AMERICA, INC.

33 55 021 REPLACING BOTH RUBBER MOUNTS FOR STABILIZER MOUNTING

Necessary preliminary tasks

- Remove **STABILIZER FROM REAR AXLE CARRIER**

IMPORTANT: Circo Light must not be used between stabilizer and rubber mount!

Remove retaining bracket (1) and rubber mount (2) from stabilizer.

Installation:

Coat rubber mount with Circo Light to install retaining bracket.

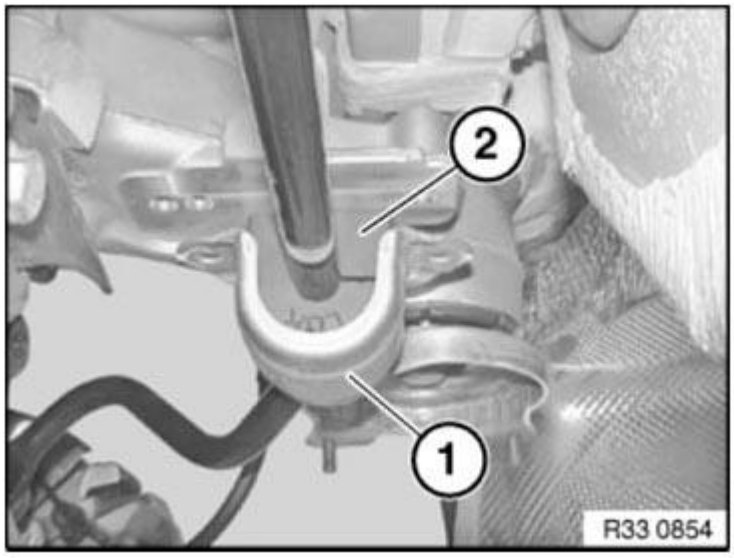


Fig. 157: Identifying Retaining Bracket And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep stabilizer clean and free of oil and grease.

Mount rubber mount (1) by way of slot (2) as pictured on stabilizer.

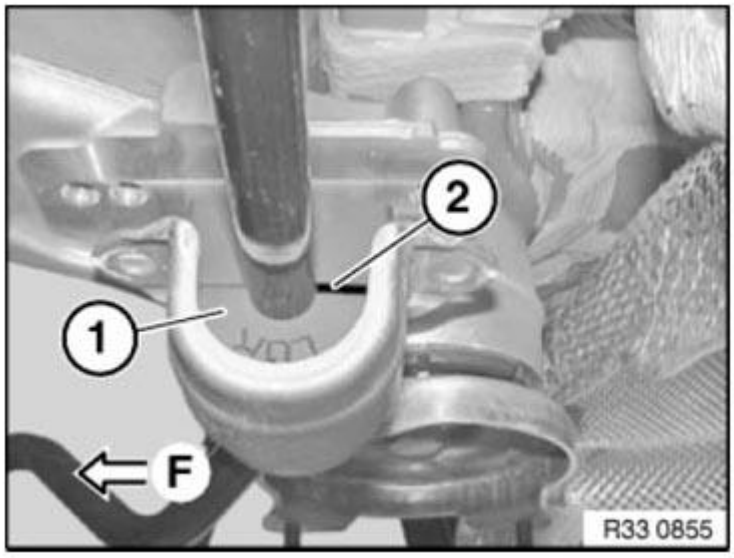


Fig. 158: Identifying Rubber Mount And Slot
Courtesy of BMW OF NORTH AMERICA, INC.

SUSPENSION

Rear Axle - Special Tools

33 REAR AXLE

331030 DEVICE

0492075 331030 Device MW

Replaced by: 0492079

Note: (Fixture) For all rear axle final drives - model year: From 88 - Replaced by 33 1 070.(0 492 079)

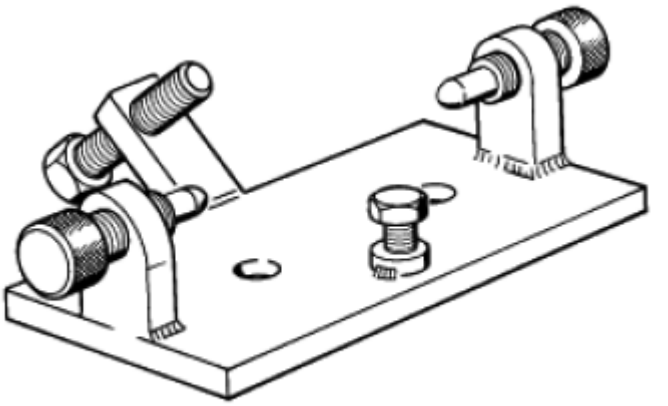


Fig. 1: Identifying Device (331030)
Courtesy of BMW OF NORTH AMERICA, INC.

334130 DEVICE

0492393 334130 Device MW

Note: For removing and installing rubber mount in support tube of rear axle final drive mounting.

SI number

01 01 89 (989)

Consisting of:

1 = 0492394 Plate

NOTE: (Shaped plate, top) For removing

2 = 0492395 Plate

NOTE: (Shaped plate, top) For pulling in

3 = 0492396 Plate

NOTE: (Shaped plate, bottom) For pulling in

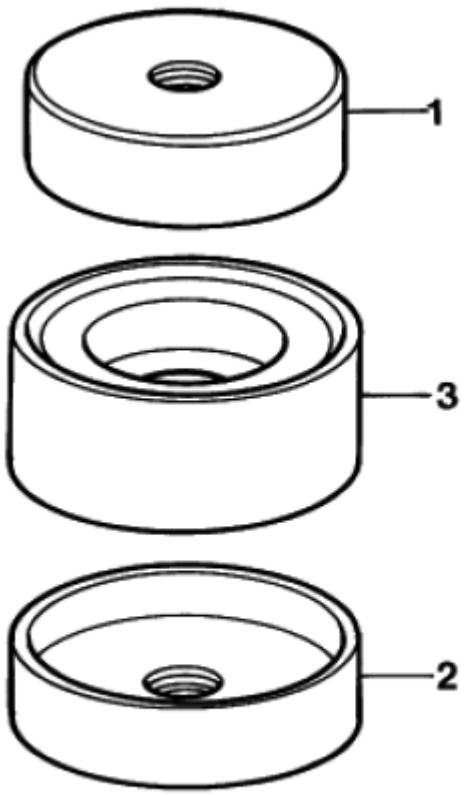


Fig. 2: Identifying Device (334130)
Courtesy of BMW OF NORTH AMERICA, INC.

332110 DEVICE

0492169 332110 Minimum set: Mechanical tools Device MW

Note: (Extraction and pulling device) For removing and installing output shaft in drive flange as well as for removing front wheel bearing unit. Replaced by 33 2 200.(0 496 062)

Storage Location

C13

C38

C14

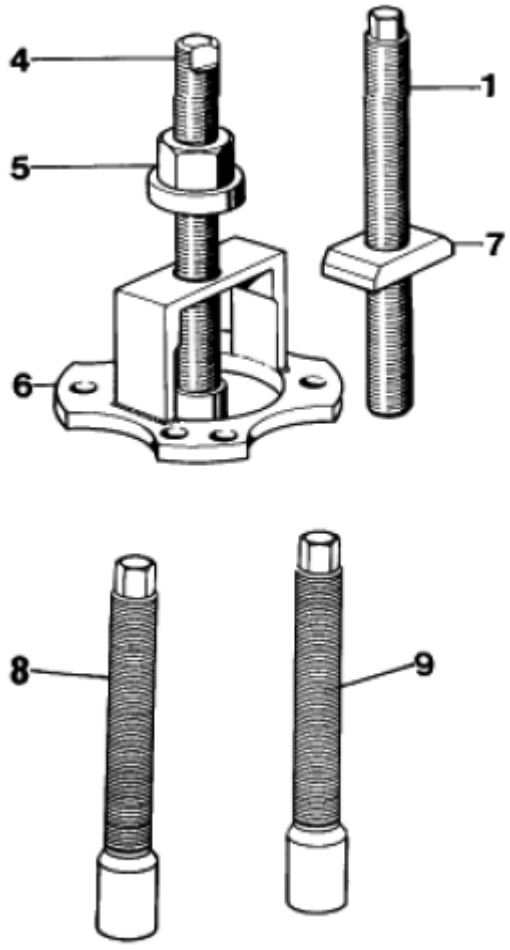
Consisting of:

1 = 0492170 Spindle

NOTE: (Pressure spindle) For pressing out. Series: E30, E31, E32, E36, E38, E39, E46, E53, E65, E66, E67, E83, E85 Replaced by 33 2 203.(0 496 066)

1 = 0492171 Bridge

NOTE: Replaced by 33 2 116.(0 492 175)



W33 2 110

Fig. 3: Identifying Device (332110)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0492172 Shaped part

NOTE: (Shaped part) Model series: E30, E31, E32, E36, E38, E39, E46, E53, E65, E66, E85, RR1 Replaced by 33 2 117.(0 492 176)

7 = 0492176 Shaped part

NOTE: (Shaped part) Model series: E30, E31, E32, E36, E38, E39, E46, E53, E65, E66, E67, E83, E85 Replaced by 33 2 207/0 496 070

8 = 0492177 Spindle

NOTE: (Spindle for installation) Model series: E31, E52, E53, E60, E61, E65, E66, E67, E83 Replaced by 33 2 205.(0 496 068)

9 = 0492178 Spindle

NOTE: For installing/model series: E36, E46 Replaced by 33 2 206.(0 496 069)

4 = 0492173 Spindle

NOTE: For installing/model series: E30 Replaced by 33 2 204/0 496 067

5 = 0492174 Nut

NOTE: (Nut with bearing) Series: E30, E31, E32, E36, E38, E39, E46, E52, E53, E60, E61, E65, E66, E67, E83, E85, RR1 Replaced by 33 2 208/0 496 071

6 = 0492175 Bridge

NOTE: New version 09/98 Model series: E30, E31, E32, E36, E38, E39, E46, E52, E53, E60, E61, E65, E66, E67, E83, E85, E90, RR1 Replaced by 332 201/0 496 063

334100 DEVICE

0492378 334100 Device MW

Note: For extracting and press-fitting the rubber mount in the trailing arm.

SI number

Consisting of:

1 = 0492379 Sleeve

NOTE: (support sleeve) During extraction

2 = 0492380 Sleeve

NOTE: (press-out sleeve)

3 = 0492381 Sleeve

NOTE: (press-in sleeve)

4 = 0492382 Shaped element

NOTE: For press-fitting

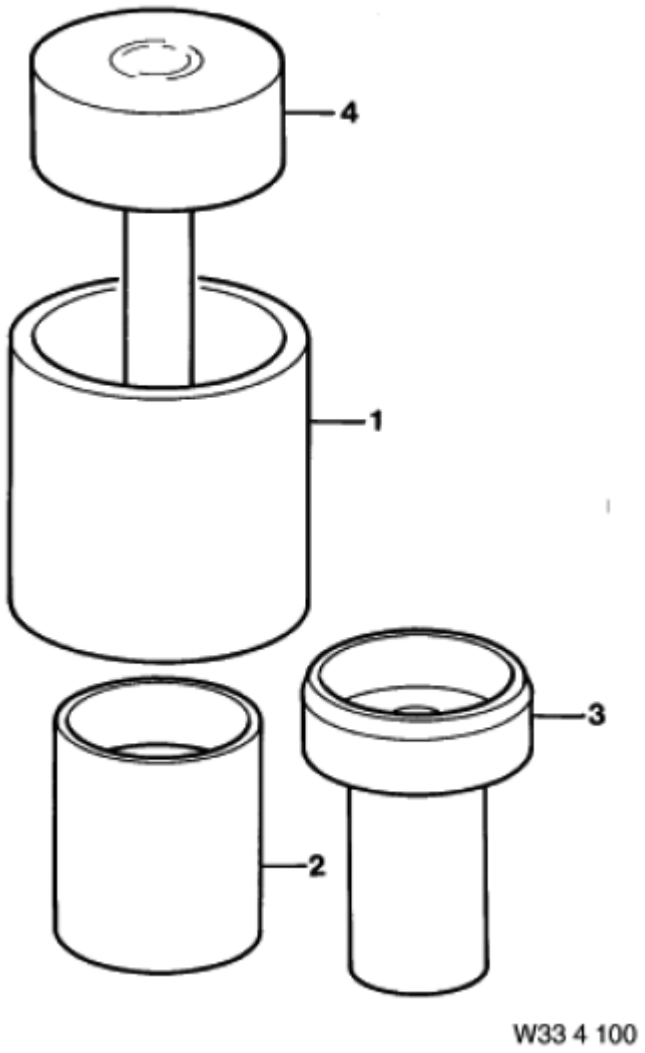


Fig. 4: Identifying Device (334100)
Courtesy of BMW OF NORTH AMERICA, INC.

334110 DEVICE

0492383 334110 Device MW

Note: For removing and installing the rubber mount in the wishbone

SI number

01 01 89 (989)

Consisting of:

1 = 0492384 Sleeve

NOTE: (Support sleeve) For pressing out

2 = 0492385 Sleeve

NOTE: (Press-out sleeve)

3 = 0492386 Sleeve

NOTE: (Press-in sleeve)

4 = 0492387 Shaped element

NOTE: For pressing in

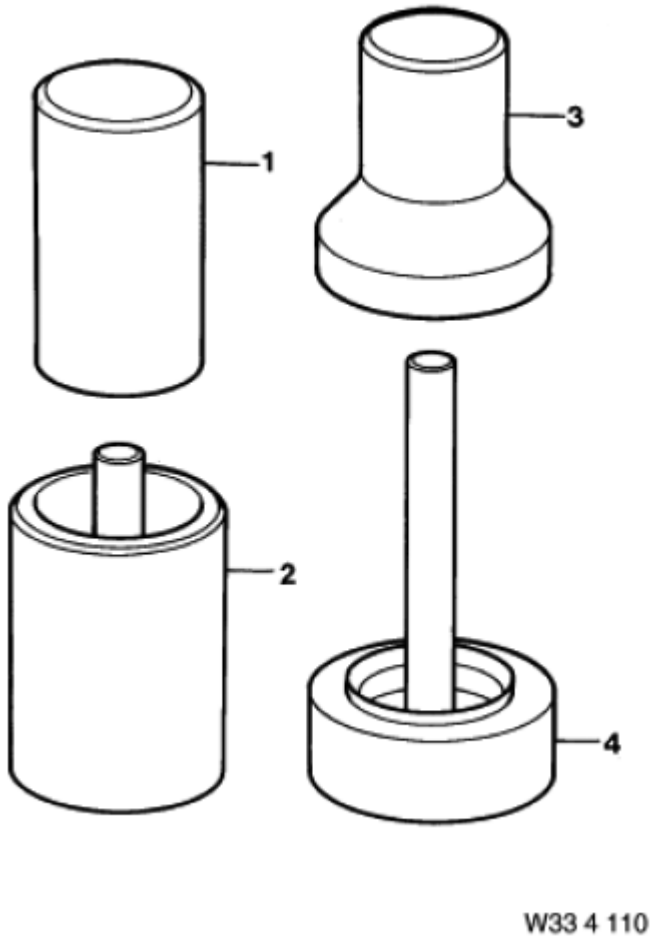


Fig. 5: Identifying Device (334110)
Courtesy of BMW OF NORTH AMERICA, INC.

335120 DEVICE

0495851 335120 Minimum set: Mechanical tools Device MW

Note: For removing and installing output shaft in rear axle final drive.

Storage Location

C22

B22

A22

SI number

01 22 06 (307)

Consisting of:

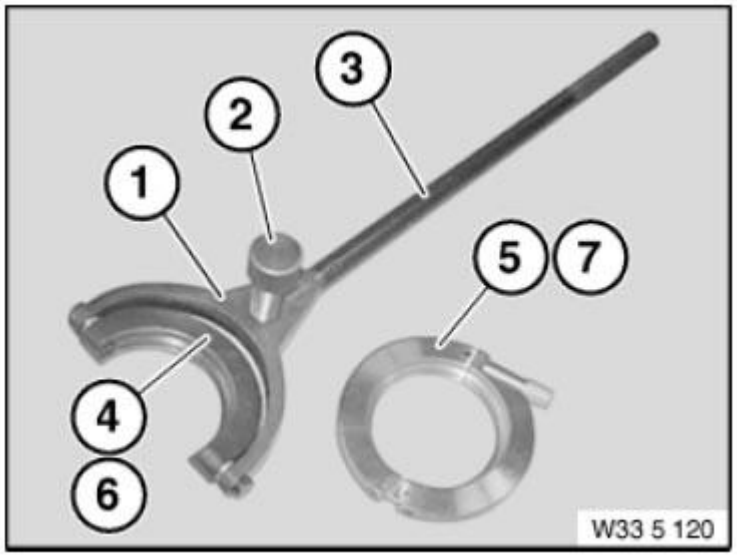


Fig. 6: Identifying Device (335120)
Courtesy of BMW OF NORTH AMERICA, INC.

5 = 0495857 Shaped element

1 = 0495853 Basic body

2 = 0495854 Bolt

NOTE: (Knurled screw with synchronizing key)

3 = 0495855 Rod

4 = 0495856 Shaped element

NOTE: (Shaped element) Shaped element (bearing shell)

7 = 0496795 Shaped part

NOTE: For driving output shaft into rear axle final drive.

6 = 0496765 Shaped part

NOTE: For pressing output shaft out of rear axle final drive.

In conjunction with: 33 5 120

333330 DEVICE

0492322 333330 Minimum set: Mechanical tools Device MW

Note: For removing and installing ball joint and rubber mount in semi-trailing arm

Storage Location

B14

SI number

01 10 90 (288)

Consisting of:

1 = 0492323 Sleeve

NOTE: (Spacer sleeve) For pulling out/series: E36, E46

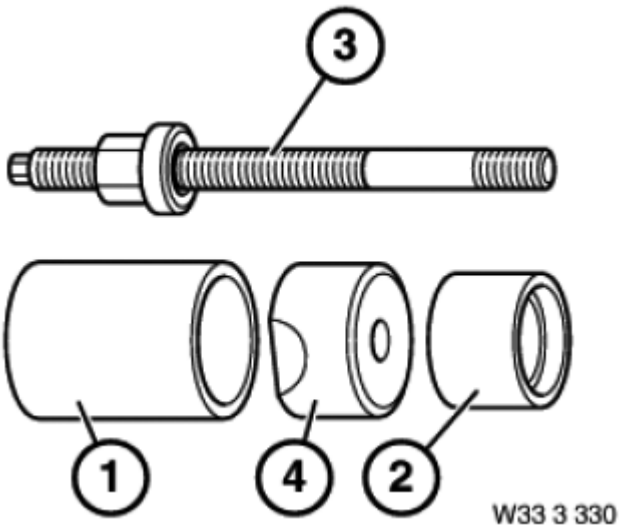


Fig. 7: Identifying Device (333330)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0492324 Sleeve

NOTE: (Extraction sleeve) Series: E36, E46

4 = 0492326 Sleeve

NOTE: (Spacer sleeve) For installing the ball joint, series: E31, E36, E38, E39, E46, E65, E66, E85

3 = 0492325 Spindle

NOTE: (Spindle with thrust nut) Replaced by 33 3 010/0 496 552

332100 DEVICE

0492165 332100 Device MW

Note: For gripping output shafts when press-fitting constant-velocity joint

Storage Location

C23

SI number

01 06 94 (801)

Consisting of:

1 = 0492166 Frame

2 = 0492167 Shell

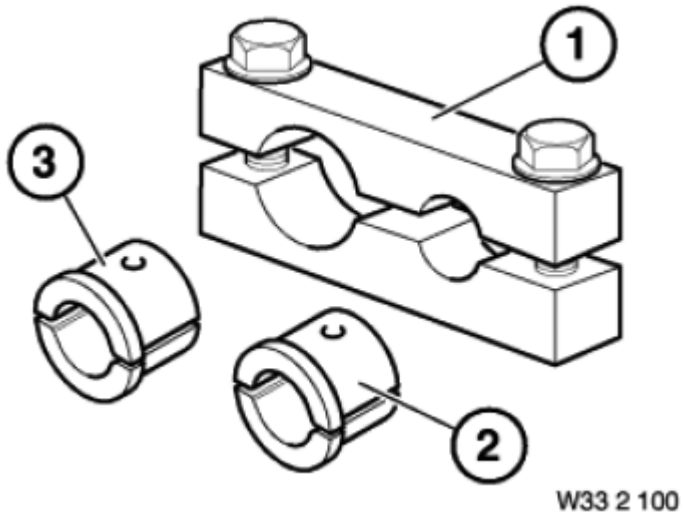


Fig. 8: Identifying Device (332100)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (shells) 2 pcs. Diameter 30 mm - model series: E38/model: 730i

3 = 0492168 Shell

NOTE: (shells) 2 pcs. Diameter 35 mm - model series: all, except E38

334400 DEVICE

0493416 334400 Device MW

Note: For removing inner wheel bearing races on rear axle

SI number

01 05 99 (426)

Consisting of:

1 = 0493816 Basic body

2 = 0493817 Spindle

3 = 0493818 Key

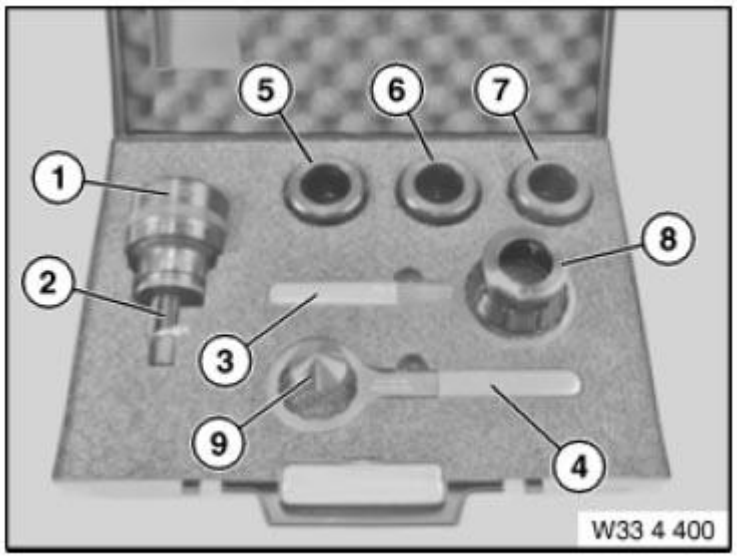


Fig. 9: Identifying Device (334400)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (wrench)

4 = 0493819 Key

NOTE: (wrench)

5 = 0493820 Pliers

NOTE: (clamping ring (45...51 mm))

6 = 0493821 Pliers

NOTE: (clamping ring (50...55 mm))

7 = 0494617 Pliers

NOTE: (clamping ring (55...61 mm)) Model series: E67

8 = 0496538 Ring

NOTE: (clamping ring) Model series: F01, F02 See SI: 01 18 08 (482)

9 = 0496539 Synchronizing key

NOTE: Series: F01, F02 See SI: 01 18 08 (482)

330000 DEVICE

0496389 330000 Device MW

Note: For removing and installing rubber mounts in rear axle support mounting.

Storage Location

B26

SI number

01 18 08 (482)

Consisting of:

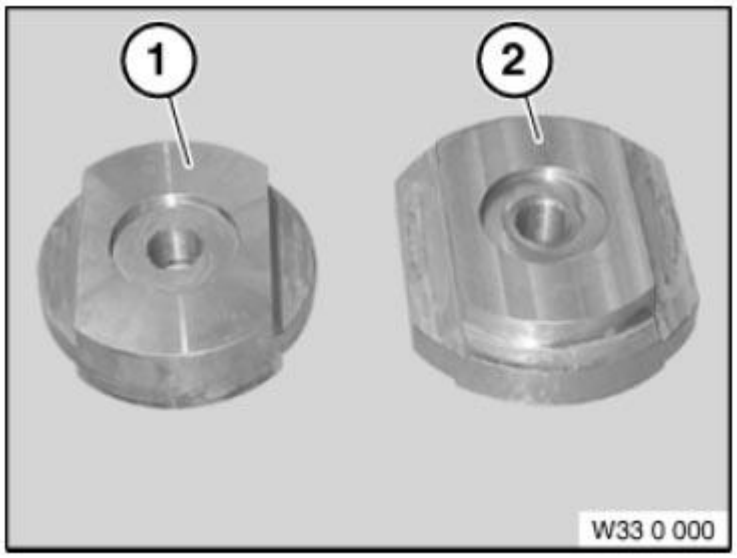


Fig. 10: Identifying Device (330000)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0496397 Washer

NOTE: (Shaped washer) Removing rubber mount. Beginning from 10/2010 only available as tool set 33 0 000 (0496389).

2 = 0496398 Washer

NOTE: (Shaped washer) Installing rubber mount. Beginning from 10/2010 only available

as tool set 33 0 000 (0496389).

330020 DEVICE

0496494 330020 Device MW

Note: For removing and installing rubber mounts in rear axle final drive mounting at front.

SI number

01 18 08 (482)

Consisting of:

1 = 0496500 Washer

NOTE: Removing rubber mount

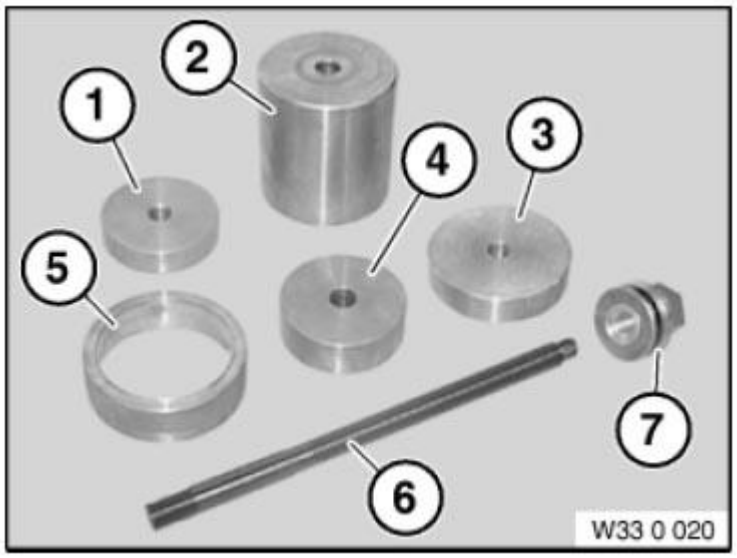


Fig. 11: Identifying Device (330020)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0496501 Bush

NOTE: Removing rubber mount

3 = 0496502 Washer

NOTE: (Shaped washer) Installing rubber mount

4 = 0496503 Washer

NOTE: Installing rubber mount

5 = 0496504 Guide

NOTE: (Guide bush) for pulling in rubber mount

6 = 0496505 Spindle

NOTE: (Spindle M12x1.5) spindle length 205 mm

7 = 0496506 Nut

NOTE: (Nut M12x1.5 with thrust bearing)

330030 DEVICE

0496495 330030 Device MW

Note: For removing and installing rubber mount of rear axle final drive mounting at rear.

SI number

01 18 08 (482)

Consisting of:

1 = 0496507 Washer

NOTE: Removing rubber mount

2 = 0496508 Bush

NOTE: Removing rubber mount

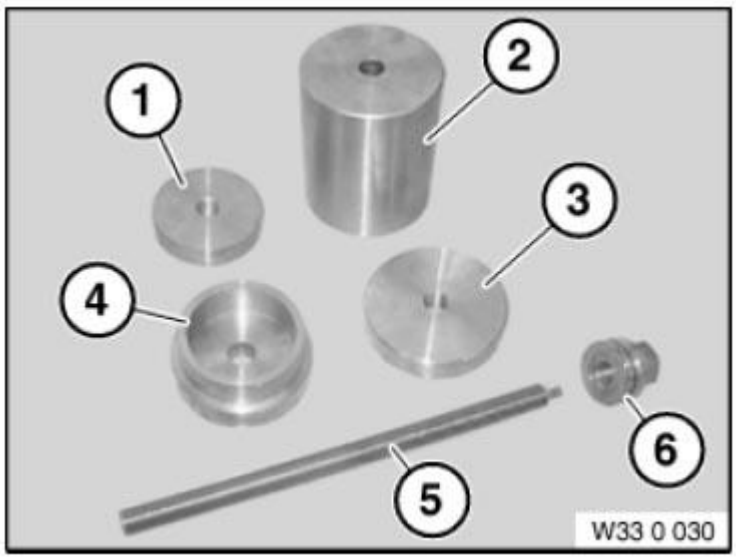


Fig. 12: Identifying Device (330030)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0496509 Washer

NOTE: Installing rubber mount

4 = 0496510 Washer

NOTE: (Shaped washer) Installing rubber mount

5 = 0496511 Spindle

NOTE: (Spindle M14x1.5)

6 = 0496512 Nut

NOTE: (Nut M14x1.5 with thrust bearing)

334120 DEVICE

0492388 334120 Device MW

Note: For removing and installing ball joint mount in wishbone.

SI number

01 01 89 (989)

Consisting of:

1 = 0492389 Shaped element

NOTE: For hanging up when pressing out the ball joint

2 = 0492390 Bush

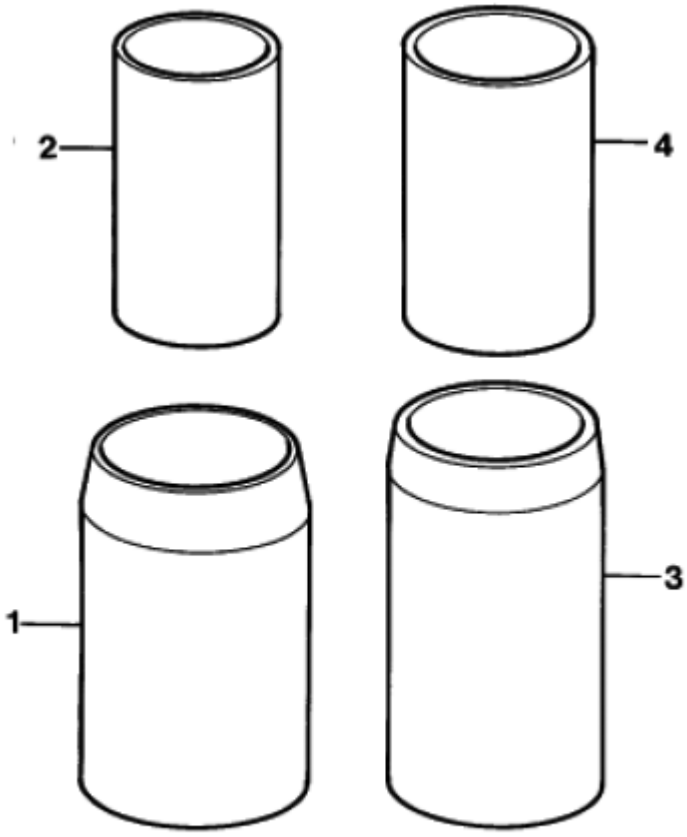
NOTE: (Pressure bushing) For pressing the ball joint out of the wishbone

3 = 0492391 Shaped element

NOTE: For hanging up the wishbone when pressing in the ball joint

4 = 0492392 Bush

NOTE: (Pressure bushing) For pressing the ball joint into the wishbone



W33 4 120

Fig. 13: Identifying Device (334120)
Courtesy of BMW OF NORTH AMERICA, INC.

334140 DEVICE

0492397 334140 Minimum set: Mechanical tools Device MW

Note: For removing rubber mount in rear axle support.

Storage Location

A8

B8

SI number

01 02 99 (417)

Consisting of:

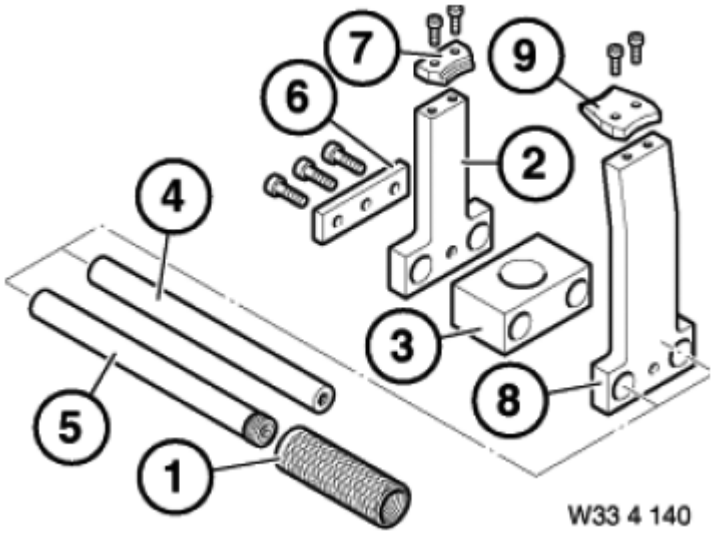


Fig. 14: Identifying Device (334140)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0492398 Tube

NOTE: (threaded pipe)

2 = 0492399 Shaped part

NOTE: (shaped part) 2 pieces Model series: E38, E39, E46

3 = 0492400 Shaped part

NOTE: (Shaped part) Replaced by 31 2 313 (0 495 802)

4 = 0492401 Rod

NOTE: (Guide rod)

5 = 0492402 Rod

NOTE: (guide rod) With thread dog point

6 = 0492403 Plate

NOTE: (locating plate) With screws

= 0492404

7 = 0492404 Synchronizing key

NOTE: (synchronizing key (2 pieces)) With screws - model series: E38, E39, E46

8 = 0492405 Shaped part

NOTE: (shaped part) 2 pieces Model series: E39/2, E65, E67, RR1

9 = 0492406 Synchronizing key

NOTE: (synchronizing key (2 pieces)) With countersunk screw - model series: E39/2, E65, E67, E87

33 5 153 DISC

33 5 153 Disc

SI number

01 22 06 (307)

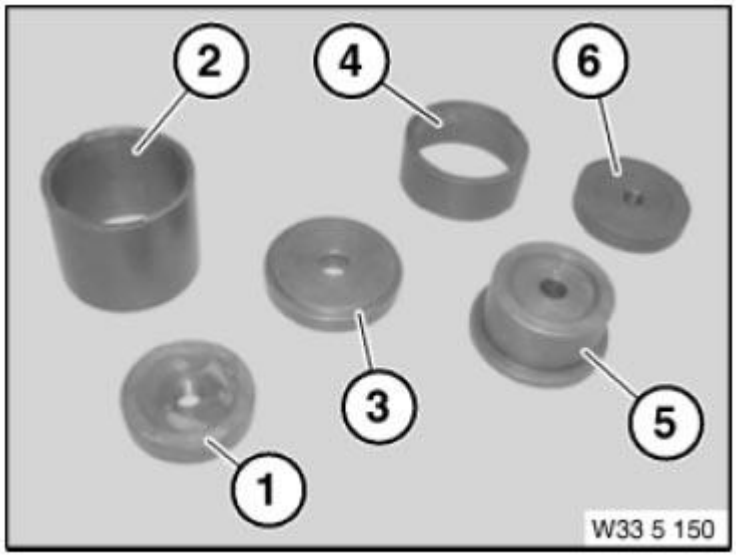


Fig. 15: Identifying Disc (33 5 153)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 156 DISC

33 5 156 Disc

SI number

01 22 06 (307)

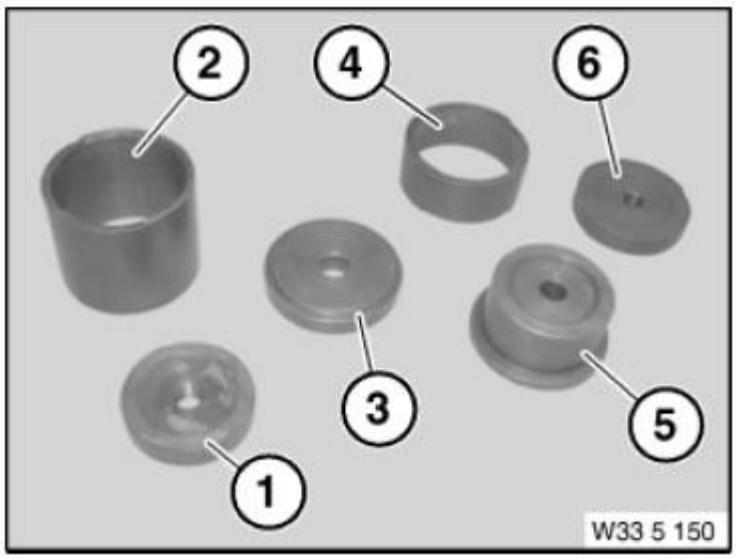


Fig. 16: Identifying Disc (33 5 156)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 151 DISC

33 5 151 Disc

SI number

01 22 06 (307)

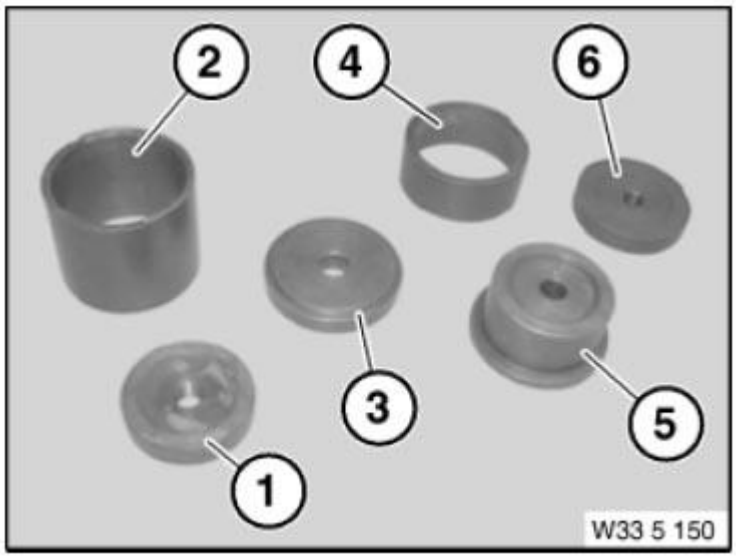


Fig. 17: Identifying Disc (33 5 151)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 155 DISC

33 5 155 Disc

SI number

01 22 06 (307)

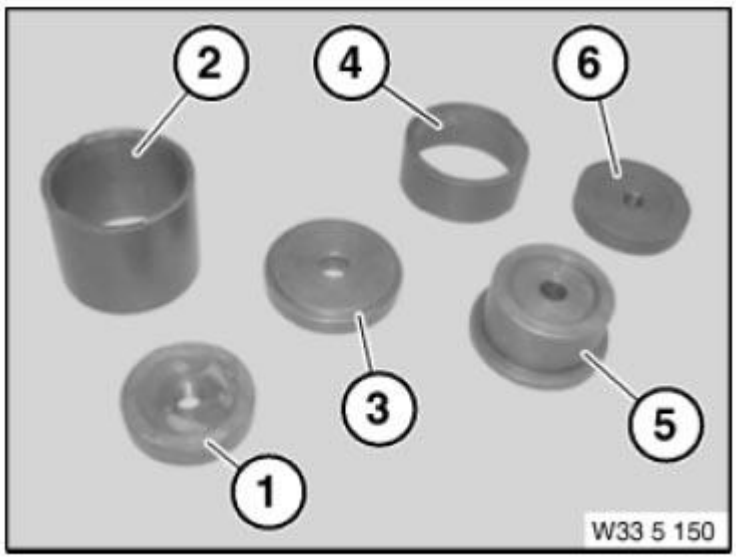


Fig. 18: Identifying Disc (33 5 155)
Courtesy of BMW OF NORTH AMERICA, INC.

335070 EXTENSION

0495554 335070 Minimum set: Mechanical tools Extension MW

Note: (2 pieces) Pullout extension for 33 5 040, 33 5 050, 33 5 060.

Storage Location

A18

B18

SI number

01 21 06 (300)

Consisting of:



Fig. 19: Identifying Extension (335070)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495592 Extension

NOTE: (Extension (1 piece))

331300 EXTRACTOR

0492096 331300 Extractor MW

Note: (Rillex extractor) For bevel pinion and differential case (rear diff)/for installation of camshaft sprocket on crankshaft (M70)/for removing bearing inner race from drive flange (E36, E46)

Storage Location

B6

C6

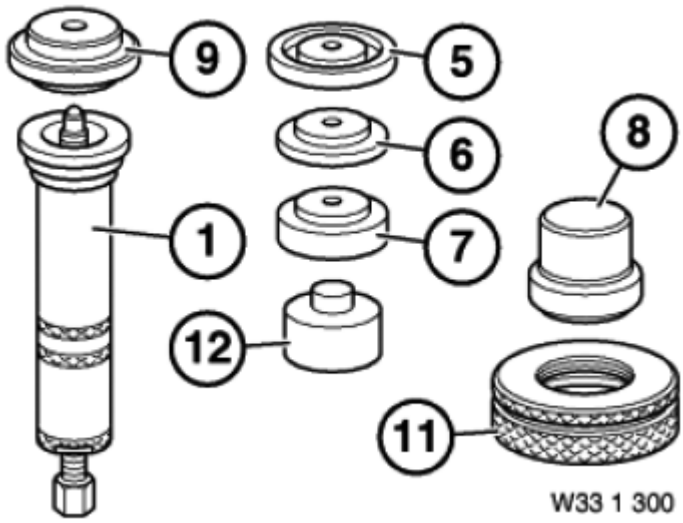


Fig. 20: Identifying Extractor (331300)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

2 = 0492098 Washer

NOTE: (Disc) Replaced by 33 1 311.(0 492 107)

3 = 0492099 Washer

NOTE: (Disc) Replaced by 33 1 311.(0 492 107)

4 = 0492100 Washer

NOTE: (Disc) Replaced by 33 1 311.(0 492 107)

1 = 0492097 Connector

NOTE: (basic body) For transmission S5D 260Z, S5D 310Z and S5D 320Z;

5 = 0492101 Synchronizing key

NOTE: (Synchronizing key (old))

6 = 0492102 Synchronizing key

= 0492103

7 = 0492103 Synchronizing key

8 = 0492104 Synchronizing key

9 = 0492105 Synchronizing key

NOTE: For rear axle final drive and for installation of the camshaft sprocket on the crankshaft (M70)

1 = 0492107 Washer

NOTE: (washer)

2 = 0492108 Synchronizing key

NOTE: For pulling the bearing inner race off the drive flange - Series: E36/5

335200 FIXTURE

0496009 335200 Fixture MW

Note: For holding rear axle final drive during removal and installation.

SI number

01 01 07 (333)

Consisting of:

1 = 0496019 Joint

2 = 0496020 Frame

NOTE: (Main frame)

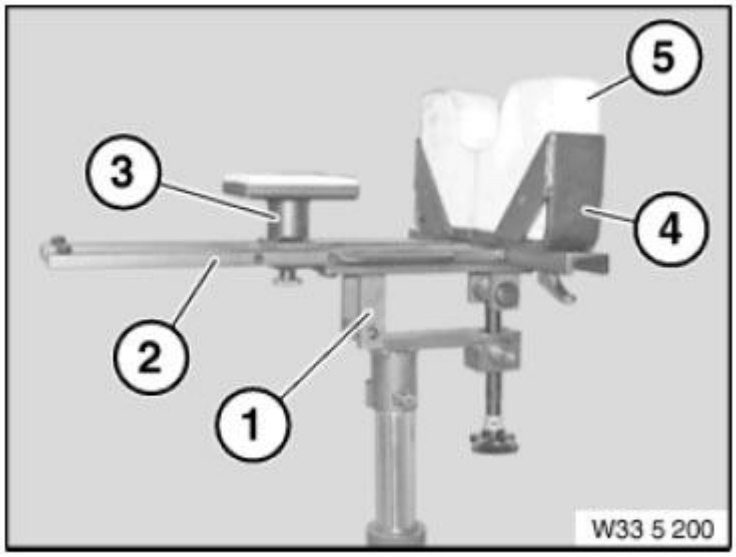


Fig. 21: Identifying Fixture (335200)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0496077 Support

4 = 0496078 Fixture

NOTE: (Fixture for foam material insert)

5 = 0496079 Insert

NOTE: (insert) Foam material insert (1 set = 2 pieces)

5 = 0496080 Belt

NOTE: (Tensioning strap)

33 5 152 HOLDING SLEEVE

33 5 152 Holding sleeve

SI number

01 22 06 (307)

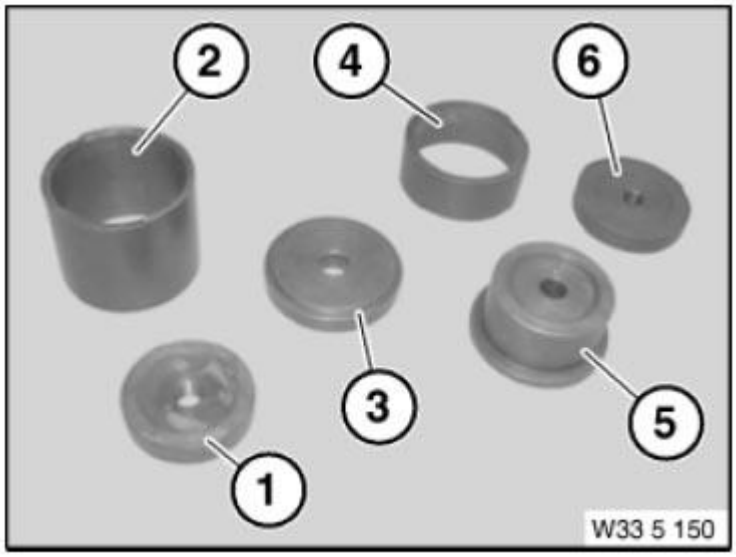


Fig. 22: Identifying Holding Sleeve (33 5 152)
Courtesy of BMW OF NORTH AMERICA, INC.

33 5 154 HOLDING SLEEVE

33 5 154 Holding sleeve

SI number

01 22 06 (307)

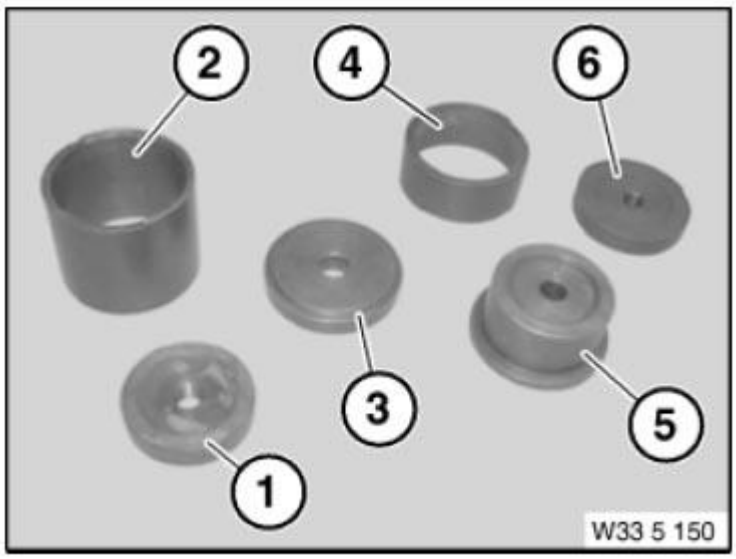


Fig. 23: Identifying Holding Sleeve (33 5 154)
Courtesy of BMW OF NORTH AMERICA, INC.

331100 KEY

0492082 331100 Key MW

Note: (Key) To counter-hold the drive flange - Replaced by universal key

335140 MANDREL

0495862 335140 Minimum set: Mechanical tools Mandrel MW

Note: (drift) For driving output shaft radial seal into rear axle final drive. Rear axle final drive: 215

Storage Location

B21

C21

SI number

01 01 07 (333)

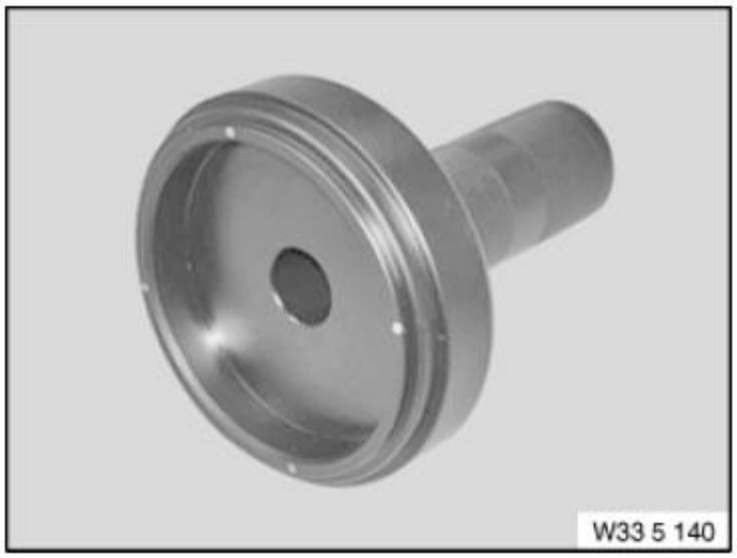


Fig. 24: Identifying Mandrel (335140)
Courtesy of BMW OF NORTH AMERICA, INC.

330150 MANDREL

0496596 330150 Minimum set: Mechanical tools Mandrel MW

Note: (drift) For driving radial shaft seal onto drive flange.

Storage Location

B26

SI number

01 09 09 (532)

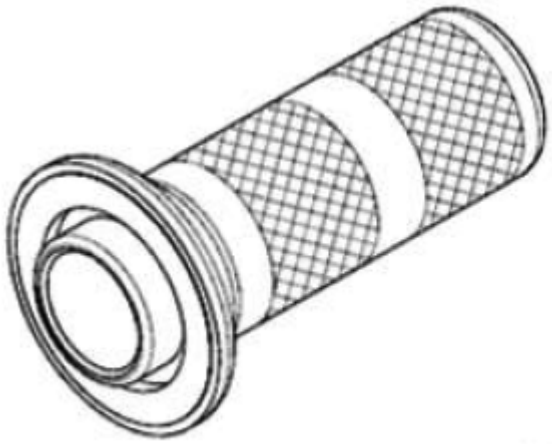


Fig. 25: Identifying Mandrel (330150)
Courtesy of BMW OF NORTH AMERICA, INC.

331180 MANDREL

0492085 331180 Mandrel MW

Replaced by: 0491891

Note: (Drift) Replaced by 31 2 040.(0 491 891)

331210 MANDREL

0492088 331210 Mandrel MW

Replaced by: 0492338

Note: (Drift) For radial seal on output flange - Replaced by 33 3 420.(0 492 338)

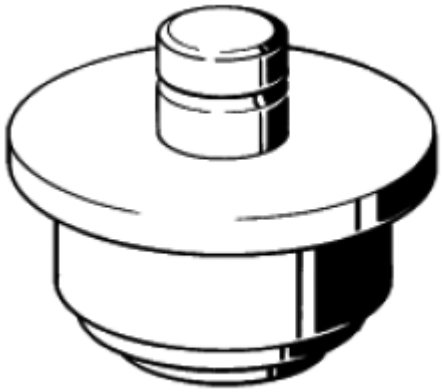


Fig. 26: Identifying Mandrel (331210)
Courtesy of BMW OF NORTH AMERICA, INC.

335130 MANDREL

0495860 335130 Minimum set: Mechanical tools Mandrel MW

Note: For driving the radial shaft seal of the output shaft into the rear axle final drive. Rear axle final drive: 188

Storage Location

C21

SI number

01 22 06 (307)



Fig. 27: Identifying Mandrel (335130)
Courtesy of BMW OF NORTH AMERICA, INC.

333380 MANDREL

0492336 333380 Mandrel MW

Replaced by: 0492338

Note: (Drift) For fitting the radial sealing ring, right-hand output end/Replaced by 33 3 420.(0 492 338)

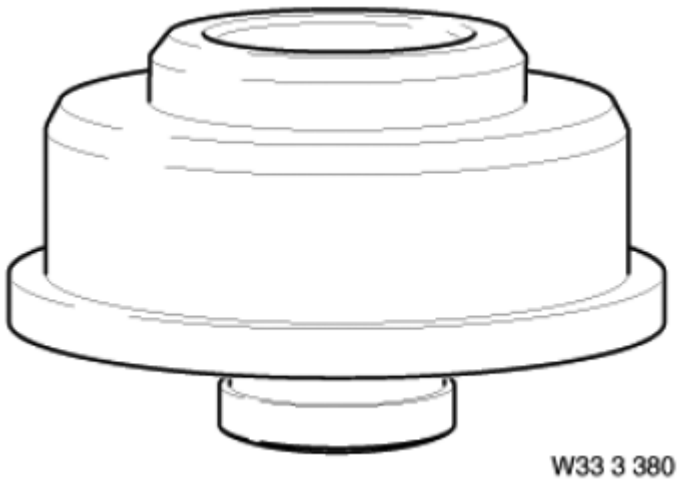


Fig. 28: Identifying Mandrel (333380)
Courtesy of BMW OF NORTH AMERICA, INC.

335080 MANDREL

0495593 335080 Minimum set: Mechanical tools Mandrel MW

Note: For driving in shaft seal on drive shaft.

Storage Location

A16

SI number

01 21 06 (300)



Fig. 29: Identifying Mandrel (335080)
Courtesy of BMW OF NORTH AMERICA, INC.

331170 MANDREL

0492084 331170 Mandrel MW

Replaced by: 0492339

Note: (Drift) For driving the radial seal into the output flange with flange diameter 38 mm - Replaced by 33 3 430.(0 492 339)

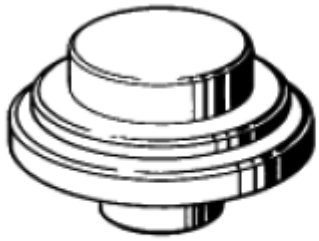


Fig. 30: Identifying Mandrel (331170)
Courtesy of BMW OF NORTH AMERICA, INC.

33 4 426 MOUNTING ADAPTER

33 4 426 Mounting adapter

Note: Locator for E85 Z4 M. SI 01 10 06 (264)

SI number

01 10 06 264

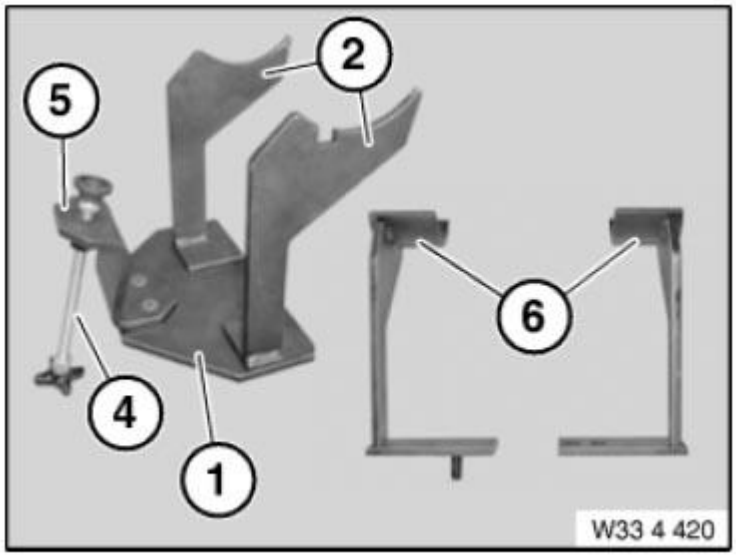


Fig. 31: Identifying Mounting Adapter (33 4 426)
Courtesy of BMW OF NORTH AMERICA, INC.

335040 OPEN-END WRENCH

0495551 335040 Minimum set: Mechanical tools Open-end wrench MW

Note: Open-end spanner SW50 with retaining clip For releasing and tightening down the insert nuts for the screw connection of the propeller shaft on the rear axle final drive.

Storage Location

A18

SI number

01 21 06 (300)

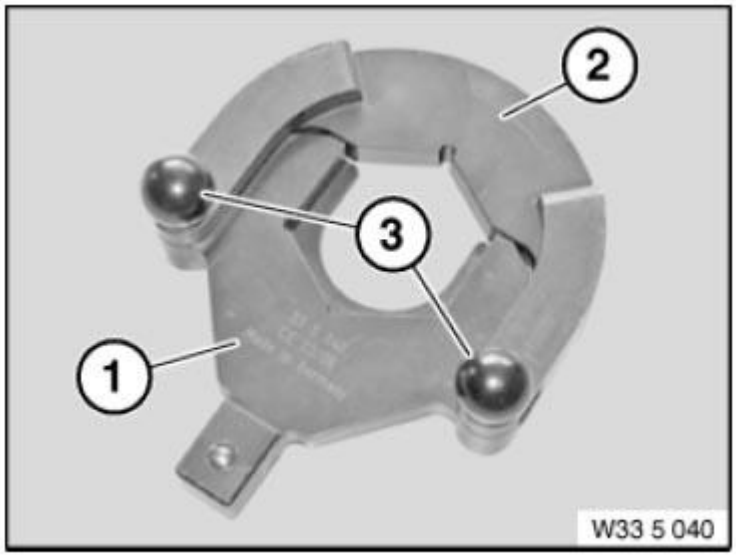


Fig. 32: Identifying Open-End Wrench (335040)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

2 = 0495582 Retaining bracket

3 = 0495583 Pin

NOTE: (Pin with chain (2 x))

1 = 0495581 Basic body

335050 RING SPANNER

0495552 335050 Minimum set: Mechanical tools Ring spanner MW

Note: Multi-tooth ring spanner SW65 For releasing and tightening down flange nut on rear axle final drive.

Storage Location

A18

SI number

01 21 06 (300)

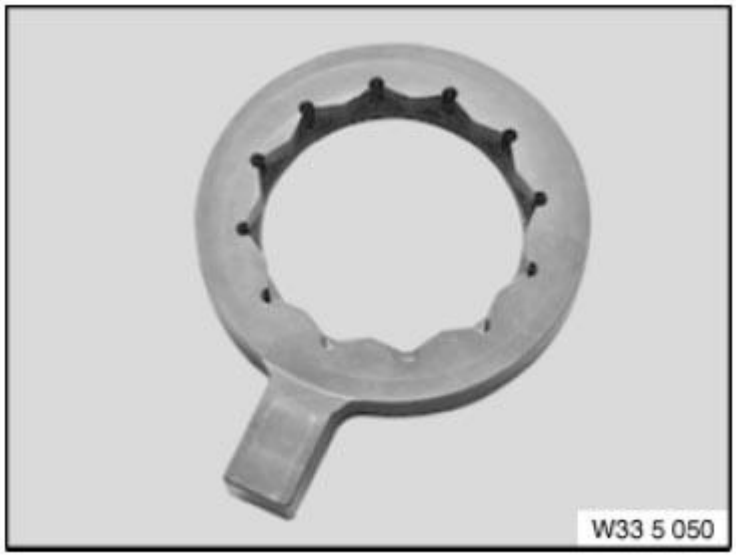


Fig. 33: Identifying Ring Spanner (335050)
Courtesy of BMW OF NORTH AMERICA, INC.

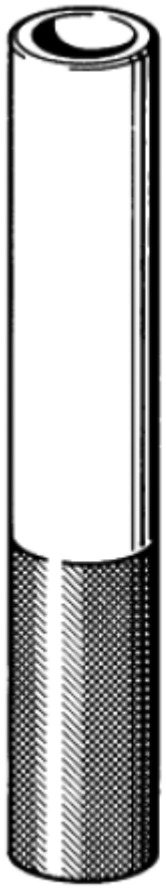
331020 SLEEVE

0492074 331020 Sleeve MW

Note: For fitting tapered roller bearing on drive pinion

Storage Location

C16



W33 1 020

Fig. 34: Identifying Sleeve (331020)
Courtesy of BMW OF NORTH AMERICA, INC.

335090 SOCKET NUT

0495595 335090 Minimum set: Mechanical tools Socket nut MW

Note: Socket nut z37 For counter-holding rear axle gearbox input shaft when releasing and tightening down flange nut.

Storage Location

A25

SI number

01 18 08 (482)



Fig. 35: Identifying Socket Nut (335090)
Courtesy of BMW OF NORTH AMERICA, INC.

335090 SOCKET NUT

0495595 335090 Minimum set: Mechanical tools Socket nut MW

Note: Socket nut z37 For counter-holding rear axle gearbox input shaft when releasing and tightening down flange nut.

Storage Location

A25

SI number

01 18 08 (482)



Fig. 36: Identifying Socket Nut (335090)
Courtesy of BMW OF NORTH AMERICA, INC.

330050 SPINDLE

0496522 330050 Spindle MW

Note: (Spindle with nut) For device 33 0 000, for removing and installing rubber mounts of rear axle support mounting.

Storage Location

C25

B25

SI number

01 18 08 (482)

Consisting of:

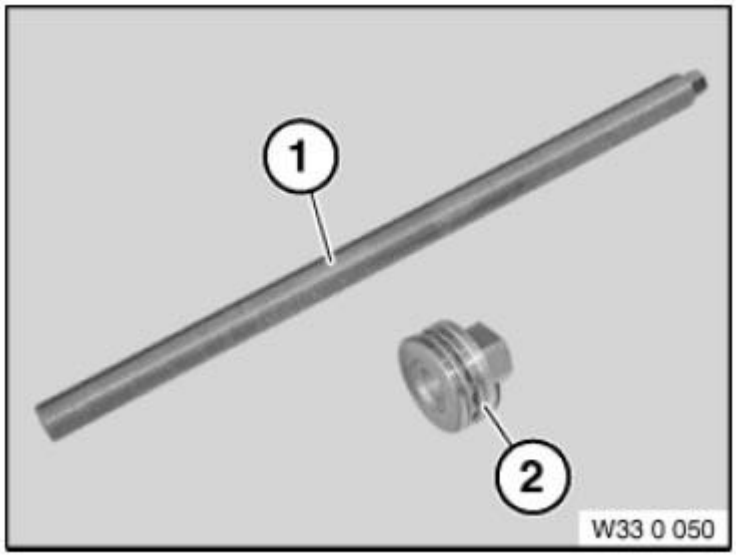


Fig. 37: Identifying Spindle (330050)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0496523 Spindle

NOTE: (Spindle M18x1.5, length 365 mm)

2 = 0496524 Nut

NOTE: (Nut M18x1.5 with thrust bearing)

333010 SPINDLE

0496552 333010 Minimum set: Mechanical tools Spindle MW

Note: (spindle TR12 with nut) For installing and removing rubber mounts, see "In conjunction with".

SI number

01 16 08 (476)

Consisting of:

3 = 0496555 Nut

NOTE: (nut M12x1.5 (high wall))

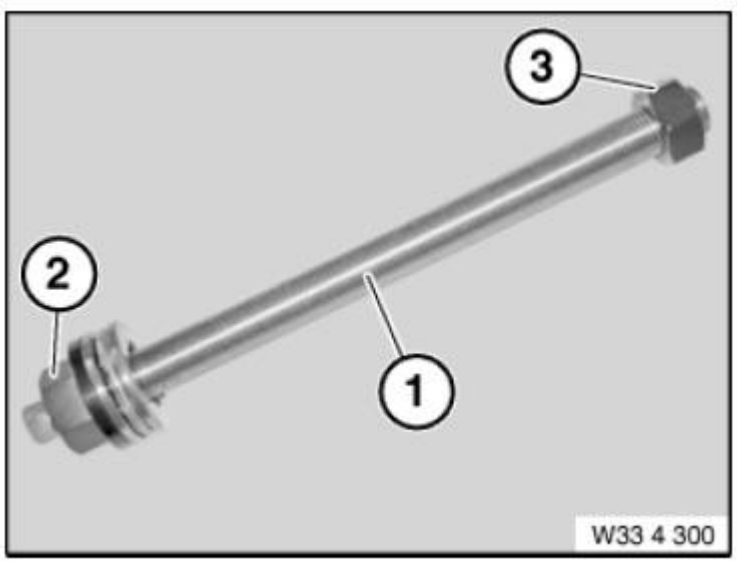


Fig. 38: Identifying Spindle (333010)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0496553 Spindle

NOTE: (spindle TR12)

2 = 0496554 Nut

NOTE: (nut TR12 with thrust bearing)

334300 SPINDLE

0496534 334300 Minimum set: Mechanical tools Spindle MW

Note: (spindle TR20 with nut) For installing and removing rubber mounts, see "In conjunction with".

SI number

01 16 08 (476)

Consisting of:

1 = 0496535 Spindle

NOTE: (spindle TR20 (length 300 mm))

3 = 0496551 Nut

NOTE: (nut TR20)

2 = 0496536 Nut

NOTE: (nut TR20 with thrust bearing)

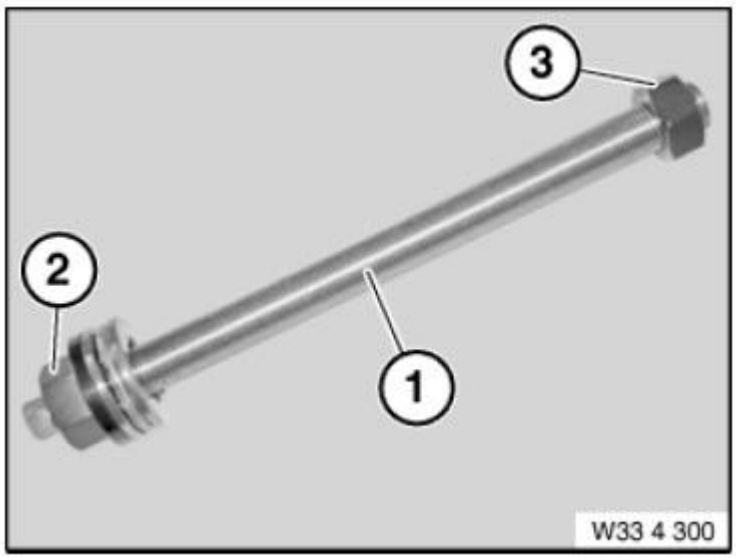


Fig. 39: Identifying Spindle (334300)
Courtesy of BMW OF NORTH AMERICA, INC.

330010 SYNCHRONIZING KEY

0496390 330010 Synchronizing key MW

Note: (Synchronizing key (2 pieces)) For removing and installing rubber mount in rear axle support.

Storage Location

A25

SI number

01 18 08 (482)

Consisting of:

1 = 0496402 Synchronizing key

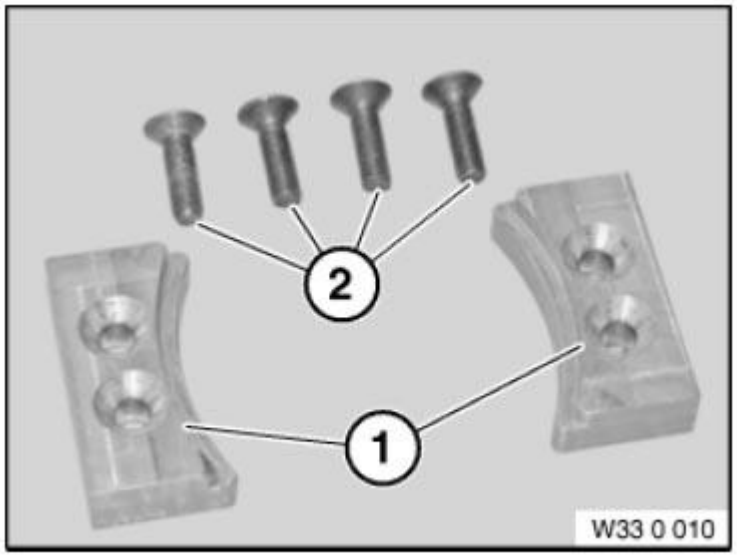


Fig. 40: Identifying Synchronizing Key (330010)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (Synchronizing keys (2 pieces))

2 = 0496403 Bolt

NOTE: (Countersunk screws M6x20 (4 pieces))

33 5 014 THRUST PIECE WITH SPLINED KEY

33 5 014 Thrust piece with splined key

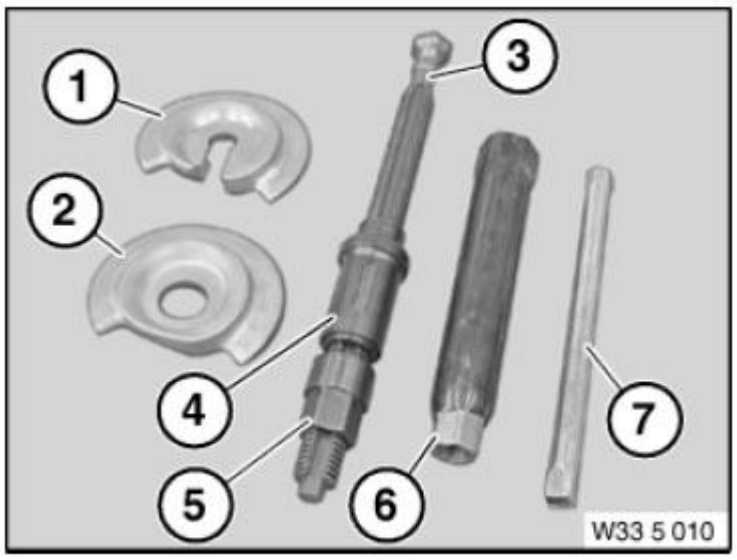


Fig. 41: Identifying Thrust Piece With Splined Key (33 5 014)
Courtesy of BMW OF NORTH AMERICA, INC.

333200 TOOL

0492260 333200 Tool MW

Note: (Press-out/-in tool set) For pressing the rubber mount out of and into the control arm special tools 33 3 202 and 33 3 203 for E87 and E90

Storage Location

B32

SI number

01 05 90 (207)

Consisting of:

1 = 0492261 Bush

NOTE: For accommodating control arm when pressing out rubber mount Series: E31

2 = 0492262 Thrust piece

NOTE: For pressing out rubber mount Series: E31, E46, E85, F01, F02

3 = 0492263 Sleeve

NOTE: (Spacer sleeve) For pressing rubber mount into control arm Series: E31, E46, E85, F01, F02

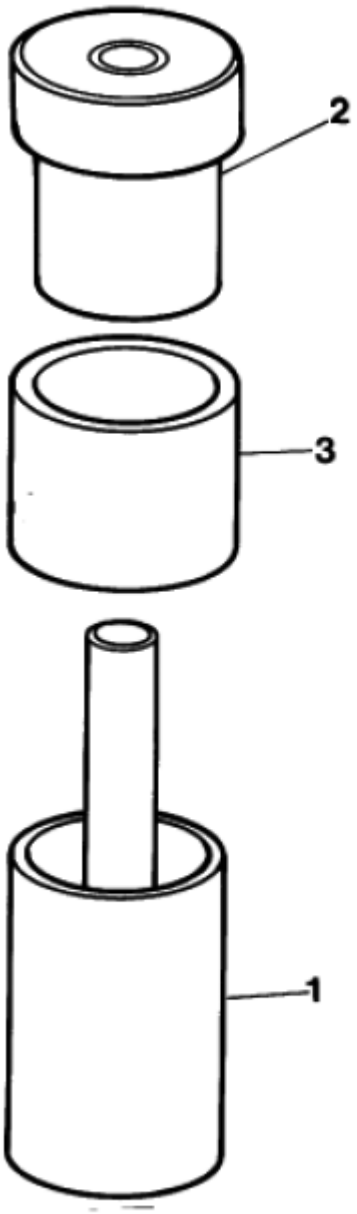


Fig. 42: Identifying Tool (333200)
Courtesy of BMW OF NORTH AMERICA, INC.

334190 TOOL SET

0492431 334190 Minimum set: Mechanical tools Tool set MW

Note: Disks/bushes for removing and installing ball joint on rear wheel carrier

Storage Location

B33

SI number

01 06 94 (801)

Consisting of:

1 = 0492432 Tube

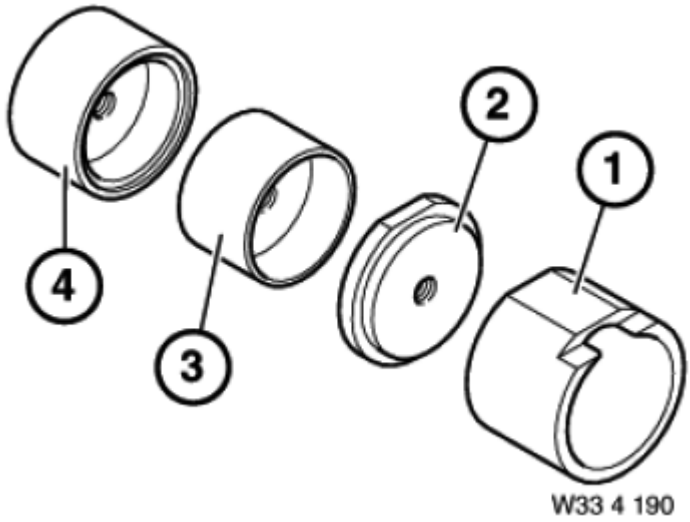


Fig. 43: Identifying Tool Set (334190)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (support tube) For removing and fitting

2 = 0492433 Plate

NOTE: (support plate) For removing and fitting

3 = 0492434 Synchronizing key

NOTE: For removing

4 = 0492435 Synchronizing key

NOTE: For installing

332160 WASHER

0494797 332160 Minimum set: Mechanical tools Washer MW

Note: For removing and installing output shaft in drive flange, front and rear, as well as for removing front wheel bearing unit

Storage Location

C8

B8

SI number

01 17 03 (012)

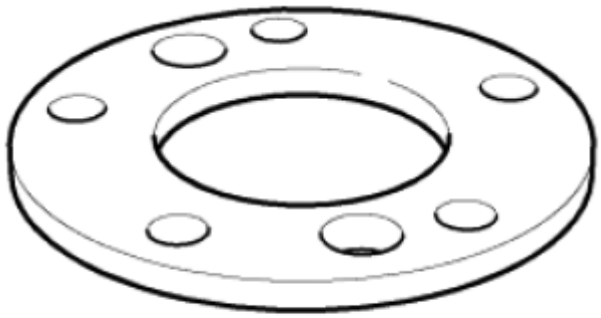


Fig. 44: Identifying Washer (332160)
Courtesy of BMW OF NORTH AMERICA, INC.

SUSPENSION

Rear Axle - Technical Data

GENERAL - TRACK WIDTH

33 00 GENERAL - TRACK WIDTH F01/F02/REAR WHEEL STANDARD SUSPENSION

GENERAL - TRACK WIDTH SPECIFICATION

Track width for normal position and offset (ET)		
o ET25	mm	1660
o ET30	mm	1650
o ET39	mm	1632
o ET 41	mm	1628

33 00 GENERAL - TRACK WIDTH F01/F02/REAR WHEEL 1 AXLE AIR SPRING

GENERAL - TRACK WIDTH SPECIFICATION

Track width for normal position and offset (ET)		
o ET25	mm	
o ET30	mm	1650
o ET39	mm	
o ET 41	mm	

33 00 GENERAL - TRACK WIDTH E92/M3 GTS

GENERAL - TRACK WIDTH SPECIFICATION

Track width for normal position		
19" wheel	mm	1539

REAR AXLE - RIDE HEIGHT

33 00 REAR AXLE - RIDE HEIGHT F01/F02/REAR WHEEL

REAR AXLE - RIDE HEIGHT SPECIFICATION

Ride level height in normal position (attach tape measure to bottom middle of rim flange and measure to lower edge of wheel arch)	
Tolerance ride height in o **NORMAL POSITION** max. ±10 mm o **DESIGN POSITION** max. ±2 mm	

Difference ride height between left/right in ○ **NORMAL POSITION** 10 mm ○ **DESIGN POSITION** 2 mm		
Series steel spring		
17" rim	mm	624
18" rim	mm	636
19" rim	mm	648
20" rim	mm	661
21" rim	mm	673
1 - axle air spring		
17" rim	mm	634
18" rim	mm	646
19" rim	mm	659
20" rim	mm	671
21" rim	mm	683

REAR AXLE FINAL DRIVE

33 10 REAR AXLE FINAL DRIVE 235L

REAR AXLE FINAL DRIVE SPECIFICATION

Use only approved final drive oils (refer to **OPERATING FLUIDS**).		
Refilling oil quantity	liter	1.3
Oil change quantity	liter	1.2

WHEEL BEARINGS

33 41 WHEEL BEARINGS

WHEEL BEARINGS SPECIFICATION

Double-row, angular ball bearing lubricated for service life and not to be disassembled		
Max. axial wheel bearing play	max. mm	0.06... 0.08

RESTRAINTS

Passive Restraints - Repair

7200 GENERAL

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**

- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

72 SAFETY PRECAUTIONS AND GENERAL INFORMATION

Notes on safety

- **SAFETY REGULATIONS** for handling airbag modules, airbag components and pyrotechnical seat belt tensioners

  - >

- **NOTES ON SCRAPPING** vehicles with gas generators

  - >

- **DEACTIVATION/ACTIVATION PYROTECHNICAL COMPONENTS**

  - >

Handling electrical and electronic equipment

- **UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS**

  - >

- **REPAIRING AIRBAG LINES**

- >

- **HANDLING OPTICAL FIBRES**

- >

Check

- **CHECK SEAT BELT**

- >

- **CHECK LIST FOR SEAT BELT**

- >

Airbag system

- Functional description and checking, refer to Diagnosis system

- >

- **DEACTIVATING AIRBAGS**

- >

- **PROCEDURE AFTER AIRBAG DEPLOYMENT** .

- >

Active pedestrian protection AFGS

- **PROCEDURE AFTER ACTUATOR TRIGGERING**

- >

72 00... SAFETY REGULATIONS FOR HANDLING COMPONENTS WITH GAS GENERATORS

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

IMPORTANT: Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury

and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Buckle/belt tensioner
- Head airbag
- Active knee protection
- Active head restraint
- Safety battery terminal

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1.

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Dismantling and installation

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
  - 30 minutes for vehicles up to 9/93;
  - 1 minute for vehicles from 9/93
- In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.

- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75°C.
- Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- Before installing, subject components such as housing, connector pins, etc. of the airbag system (including diagnosis electronics) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the BMW ISTA.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing upwards. Otherwise the generator will be thrown upwards if it is fired.
- Do not point the ignition squib of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.
- When carrying out straightening and welding work with an electric welder:
  - Disconnect battery
  - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module - wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.

7211 SEAT BELTS

72 11... CHECKING AUTOMATIC SAFETY BELT

General considerations when checking seat belts:

The seat belts must be checked after an accident.

For the check, you should start by trying to get information on which seats in the car involved in the accident were occupied. If this is not possible, check all the seat belts in the car and replace them if necessary.

In the event of deformations on the car, you must subject the components of the restraint system affected in this area such as e.g.

- Seat Belts

- Anchor fitting tensioner
- Seatbelt height adjustment
- Belt buckle tensioner
- Triggering sensors
- etc.

to a function check and a visual inspection.

If you are in any doubt as to the unimpaired functional capability of restraint system components, these components must be replaced in the interests of safety!

If a seat belt has to be replaced following an accident (e.g. in the event of a frontal and/or side impact with permanently deformed impact dampers/deformation elements or cross-members), the complete seat belt must be replaced! The complete seat belt comprises:

- Top belt
- Lower strap
- Anchor fitting tensioner
- Seat belt buckle (buckle tensioner)
- Seatbelt height adjustment
- Retaining screws of all components

The following must also be checked and if necessary replaced:

- Seatbelt mountings on the car body
- Seatbelt mountings on the seat
- Seat runners
- Seat structure (frame, etc.)

Alignment tests on the seat and the seat runners are not permitted!

The following explanations and the checklist for the automatic safety belt can provide help.

An unusable seat belt or a seat belt worn in a serious accident should be destroyed immediately after removal to guarantee that it cannot be used again.

Checking automatic reel and seat belt strap:

The automatic reel has two independent activation systems for seat-belt locking.

The first activation system locks the automatic reel when driving quickly around curves, driving in tight curves, on extreme inclinations (vehicle rolls over) and during sharp braking or impact.

To check, the seat backrest must be placed in the upright position and both hands held in a supporting position close to the steering wheel. The brakes are then applied fully while driving on a dry surface and at a road speed equal to twice that of walking speed.

The seat belt must lock.

The second activation system provides additional safety and is controlled by inertia mass.

If the reel locks when the strap is pulled out suddenly, this system is also OK.

In addition, the automatic electric reel (EMA) must eliminate belt slack.

Check whether an attempt was made to eliminate belt slack:

- Enter, close doors and latch seat belt buckle contact
- EMA eliminates belt slack

If belt slack was not eliminated, the procedure described below must be followed:

- Allow vehicle to assume complete sleep mode and repeat the function test.
- All doors must be closed!
- EMA, left, must be installed and connected correctly.
- Work through all fault memory entries before the function test is carried out again.

Replace defective or actuated automatic electric reels.

Automatic reel does not require servicing and must not be opened.

Precondition for complete, problem-free retraction of straps:

- the straps must not be twisted!
- the straps must not be damaged!

When placed to one side, the straps of the front seats must retract fully.

With the straps in the rear seat bench, a small remaining loop is acceptable due to increased friction between the strap and the rear seat bench cover if:

- this remaining loop is fully retracted when the strap is re-guided.

Belt straps should only be cleaned with a luke-warm soap solution or a commercial laundry detergent.

Belt straps must never be cleaned chemically or dyed.

The automatic reel and strap must be replaced in the event of:

1. creases
2. unraveling
3. pinches
4. cracks and tears
5. traces of melting
6. traces of wear on casing of seat belt tongue or on reversing clip.

Checking lower strap (belt buckle tensioner):

To fasten a seat belt, the tongue should insert easily and with a loud click in the lock.

When the "Red button" is pressed, the tongue must be ejected from the lock under spring pressure.

If the lock cover is missing or damaged, the lower strap must be replaced.

Replace the triggered belt buckle tensioner including the complete seat belt with seatbelt height adjustment and retaining screws and check the

- Seatbelt mountings on the car body
- Seatbelt mountings on the seat
- Seat runners
- Seat structure

Criteria for a triggered mechanical belt buckle tensioner:

- very low position of seatbelt buckle (comparisons with new part).

Criteria for a triggered pyrotechnical belt buckle tensioner:

- very low position of seatbelt buckle (comparisons with new part).
- Airbag warning lamp permanently lit: read out airbag system fault memory.

The belt buckle tensioners can be triggered under certain circumstances even when the seat is not occupied. If it is definite that the belt system was not used (seat was not occupied), there is no need to replace the

- upper strap
- attachment parts (belt height adjustment, screws)
- seatbelt mountings on the car body
- Seatbelt mountings on the seat
- Seat runners

after a check.

Checking anchor fitting tensioner:

Replace the triggered anchor fitting tensioner including the complete seat belt with seatbelt height adjustment, lower strap and retaining screws and check the

- Seatbelt mountings on the car body
- Seatbelt mountings on the seat
- Seat runners
- Seat structure

Criteria for a triggered anchor fitting tensioner:

- A triggered anchor fitting tensioner can be recognized from the wrapped belt strap around the shaft.
- Airbag warning lamp permanently lit: read out airbag system fault memory.

72 11... INSPECTION LIST FOR AUTOMATIC SEAT BELT

INSPECTION LIST FOR AUTOMATIC SEAT BELT

Was the automatic seat belt with lower strap replaced after an accident, e.g. frontal and/or oblique impact in which the impact absorbers/deformation elements were permanently deformed? (only while seat belt was fastened)	**No**	**Replace complete automatic seat belt The following must also be checked and replaced, if necessary: seatbelt mountings on the car body seatbelt mountings on the seat seat runners.**
Yes		
Does seat belt lock when pulled out suddenly?	No	Replace automatic seat belt (upper strap).
Does the automatic electric reel eliminate the belt slack?	No	Replace automatic seat belt (upper strap).
Yes		
Yes		
Can the strap be pulled out without jamming?	No	Automatic reel is loose - tighten reel. If fault persists: Return spring broken - replace automatic seat belt (upper strap).
Yes		
Does the strap on the front seat belts retract automatically?	No	Automatic reel is loose - tighten reel.
Does the strap on the rear seat belts retract automatically,		Excessive friction in belt guides - replace automatic seat belt

a small remaining loop is acceptable		(upper strap).
if this remaining loop is fully retracted when the strap is readjusted.		Return spring broken - replace automatic seat belt (upper strap).
Yes		
Does automatic reel make a squeaking noise when belt is fastened or unfastened?	Yes	Excessive friction in belt guides - replace automatic seat belt (upper strap). Reel is loose - tighten reel. Return spring broken - replace automatic seat belt (upper strap).
No		

INSPECTION LIST FOR AUTOMATIC SEAT BELT

Is the plastic casing on the latch free from damage in the area of the belt opening?	**No**	**Replace complete automatic seat belt**
Yes		
Is the fully extended strap free from pinches, burn marks, tears and cuts, folding and unraveling?	No	Replace complete automatic seat belt
Yes		
When the belt is fastened, is the belt tongue ejected by spring force from the buckle when the "red button" is pressed?	No	Replace complete automatic seat belt
Yes		
Does fastened seat belt lock when stopping vehicle quickly on a dry road at a road speed twice as fast as walking speed?	No	Replace complete automatic seat belt
Yes		
Is fully pulled-out belt free of serious dirt and other marks?	No	If dirt and marks cannot be removed with commercially available mild-action detergent, the automatic seat belt (upper strap) must be replaced.
Yes		
In the case of seat-integrated seat belts, is front tongue of reclining mechanism or seat rail free of deformation?	No	Replace both damaged parts and complete automatic-reel seat belt. The following must also be checked and replaced, if

		necessary: seatbelt mountings on the car body seatbelt mountings on the seat seat runners.
Yes		
The automatic seat belt is O.K.!		

72 11 092 REMOVING AND INSTALLING OR REPLACING REAR LEFT OR RIGHT SEAT BELTS

Necessary preliminary work

- Remove rear storage shelf. See **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR STORAGE SHELF** or **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR STORAGE SHELF WITH ROLLER SUNBLIND** .
- Remove rear seat. See **SEATS - REPAIR** .

Removing left or right automatic reel:

Release screw (1).

Tightening torque **72 11 21AZ** .

Installation note:

End fitting is coded against incorrect assembly.

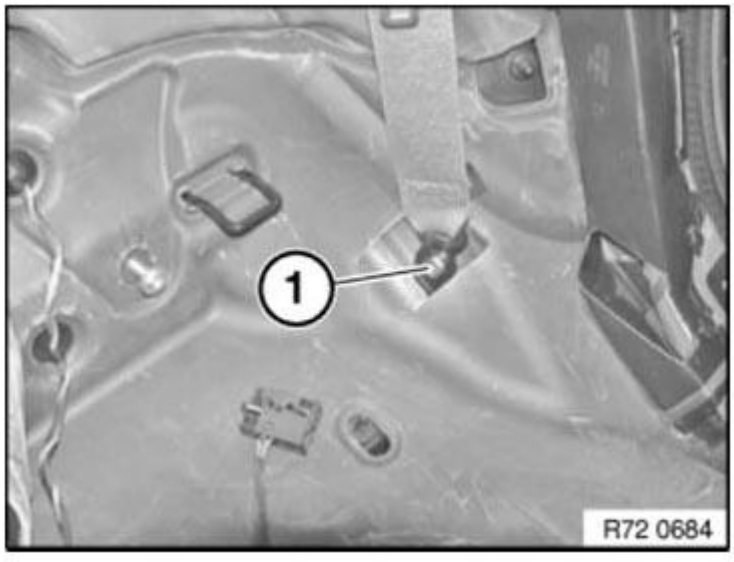


Fig. 1: Identifying Right Seat Belt Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 20AZ** .

Remove automatic reel (2) with end fitting.

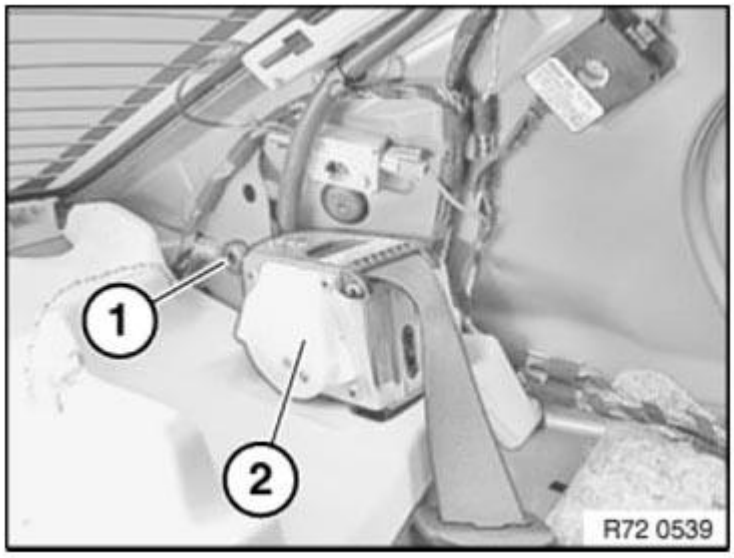


Fig. 2: Identifying Automatic Reel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Pay attention to encoding.

Push inertia reel unit (1) onto body tab (2).

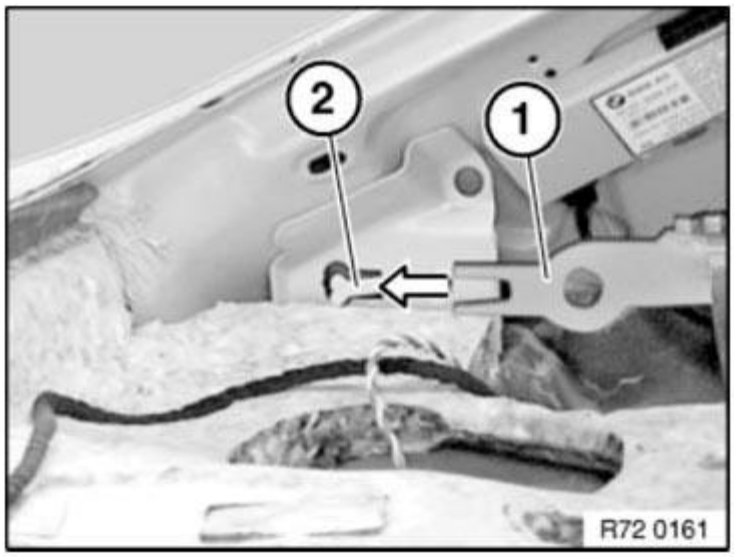


Fig. 3: Pushing Inertia Reel Unit Onto Body Tab

Courtesy of BMW OF NORTH AMERICA, INC.

72 11 050 REMOVING AND INSTALLING/REPLACING FRONT ANCHOR FITTING TENSIONER (DRIVER'S SEAT ONLY)

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt tensioners.

Improper handling can lead to activation of the pyrotechnical seat belt tensioner or side airbag, resulting in injuries.

Switch off ignition!

NOTE: A triggered anchor fitting tensioner can be recognized from the wrapped seat belt strap around the shaft.

If the anchor fitting tensioner has not been triggered, the shaft is visible.

Installation note:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

Necessary preliminary work

- Remove **UPPER RAIL COVER**
- Remove **OUTER COVER**

Cut cable straps.

Installation note:

Replace faulty cable straps.

Plug connection must not be under tension.

UNLOCK AND DISCONNECT plug connection (1).

Release screw (2).

Installation note:

Replace screw (2).

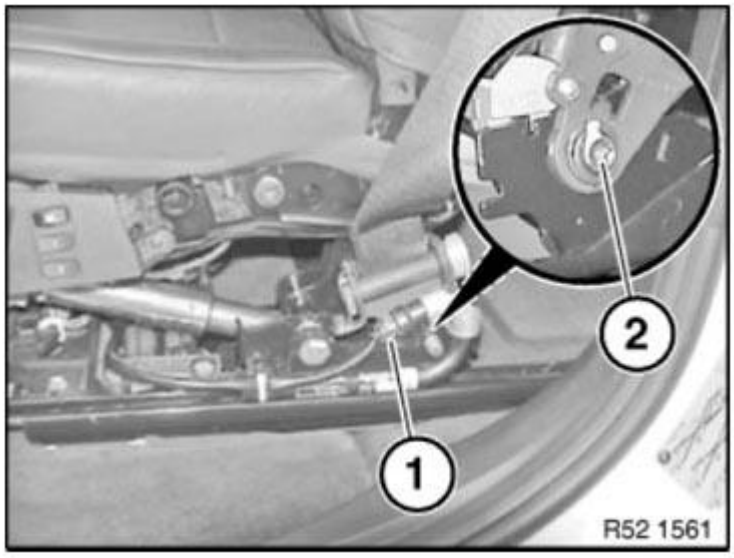


Fig. 4: Identifying Cable Straps Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **72 11 06AZ** .

Remove anchor fitting tensioner.

Release screw (1).

Tightening torque **72 11 07AZ** .

Remove lock washer.

Pull seat belt strap (2) out of end fitting tensioner.

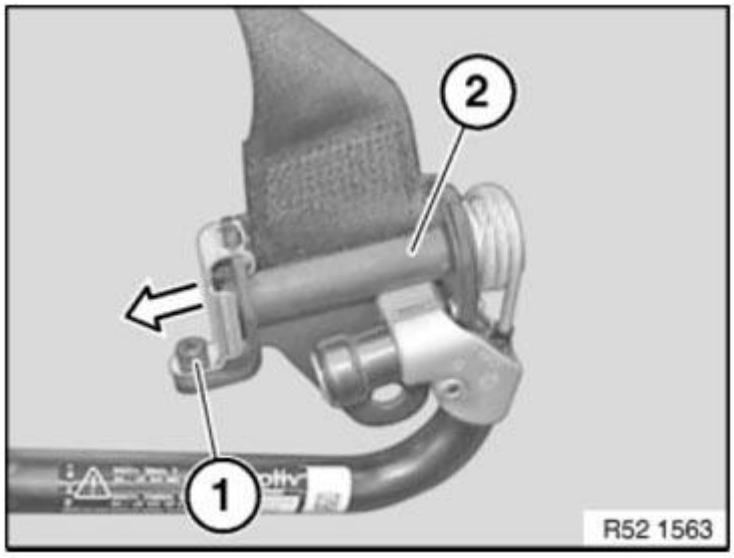


Fig. 5: Pulling Seat Belt Strap Out Of End Fitting Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 033 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT SEAT BELT

Necessary preliminary tasks

- Remove trim panels for door pillar. See **REMOVING AND INSTALLING OR REPLACING TRIM FOR LEFT OR RIGHT DOOR PILLAR (BOTTOM)** and **REMOVING AND INSTALLING OR REPLACING TRIM PANEL ON LEFT OR RIGHT DOOR POST (TOP)** .

Installation

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

Version with anchor fitting tensioner:

Necessary preliminary tasks

- Remove **OUTER COVER**

Release screw (1).

Tightening torque **72 11 07AZ** .

Remove lock washer.

Pull belt strap (2) out of end fitting pretensioner.

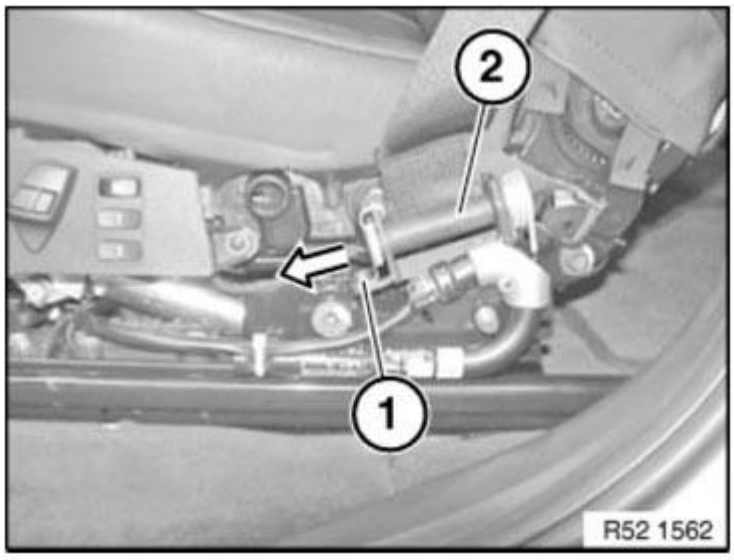


Fig. 6: Pulling Belt Strap Out Of End Fitting Pretensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Version without anchor fitting tensioner:

Move front seat upwards.

Release screw (1) on front seat.

Installation:

Replace screw.

Tightening torque **72 11 02AZ** .

Feed out belt anchor fitting (2).

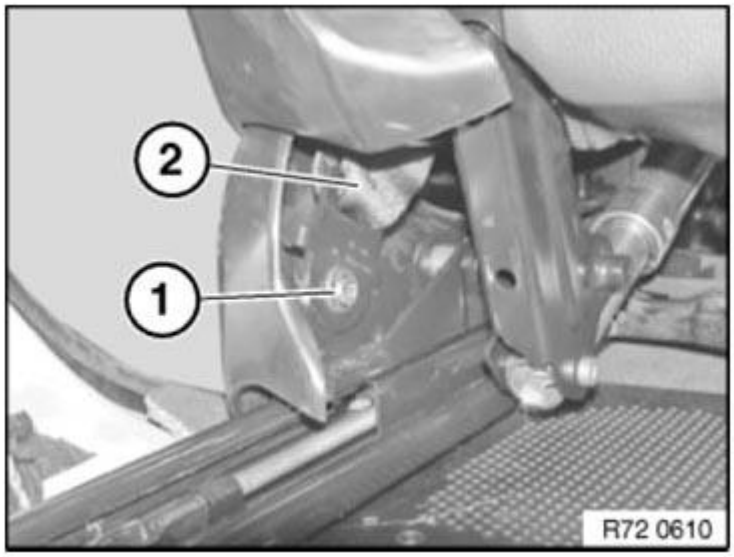


Fig. 7: Identifying Front Seat Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque **72 11 04AZ** .

Remove seat belt guide loop.

Release screws (1).

Installation:

Replace screws (1).

Remove belt deflector.

Tightening torque **72 11 05AZ** .

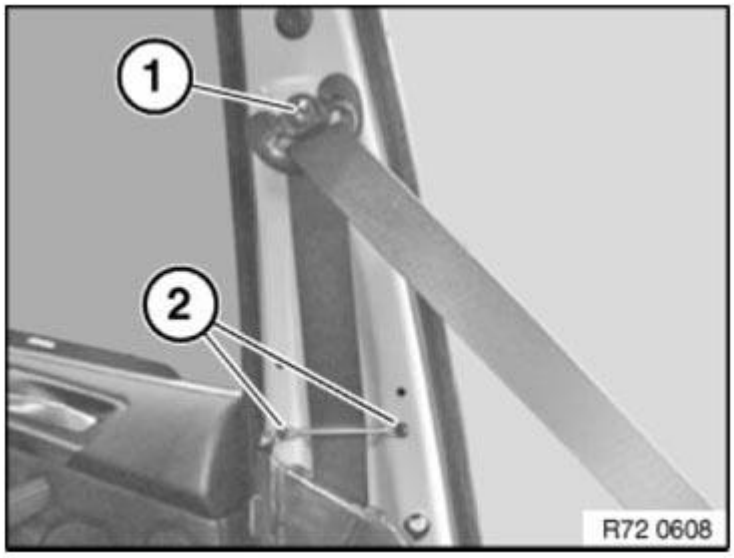


Fig. 8: Identifying Belt Deflector Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Installation:

Replace screw.

Tightening torque **72 11 01AZ** .

Unlock automatic reel (2) and remove from B-pillar.

Installation:

Automatic reel is encoded against incorrect installation (3).

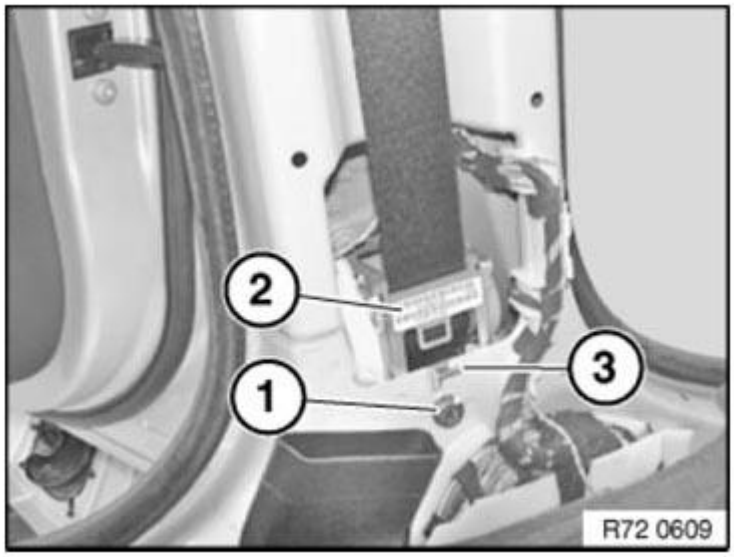


Fig. 9: Identifying Automatic Reel With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Version with electric motor retractor

Release screws (1).

Installation:

Replace screws.

Tightening torque **72 11 01AZ** .

Unlock automatic reel (2) and remove from B-pillar.

Installation:

Retractor mechanism is encoded against incorrect assembly.

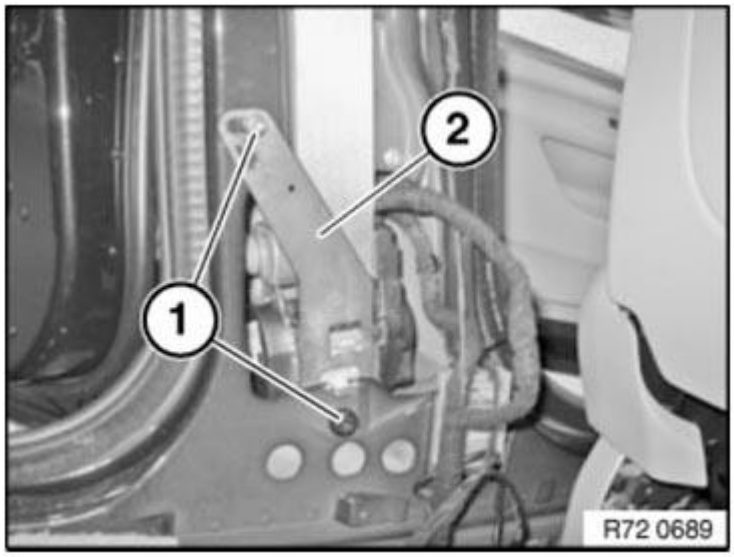


Fig. 10: Identifying Automatic Reel With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove complete seat belt.

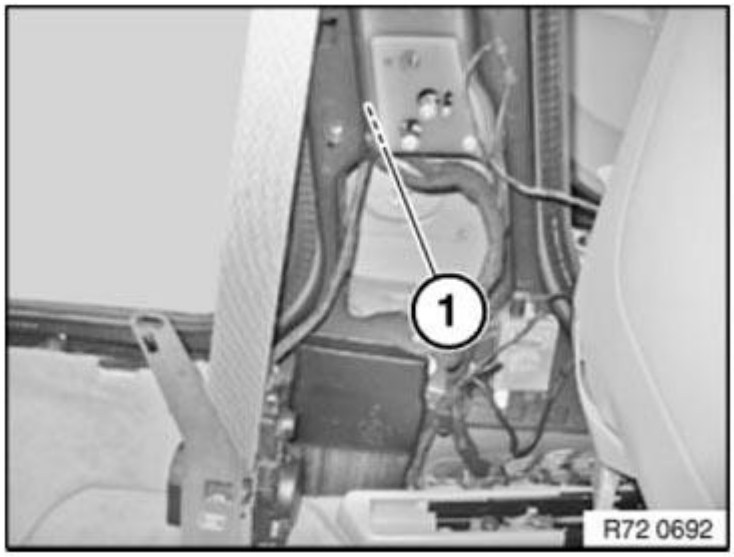


Fig. 11: Identifying Seat Belt Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Carry out **FUNCTION CHECK** .

72 11 070 REMOVING AND INSTALLING/REPLACING FRONT LOWER BELT FITTING (BELT TENSIONER), DRIVER'S SEAT

Necessary preliminary tasks

- Remove **FRONT SEAT, DRIVER'S SIDE**

Installation

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

UNLOCK AND DISCONNECT plug connections (1).

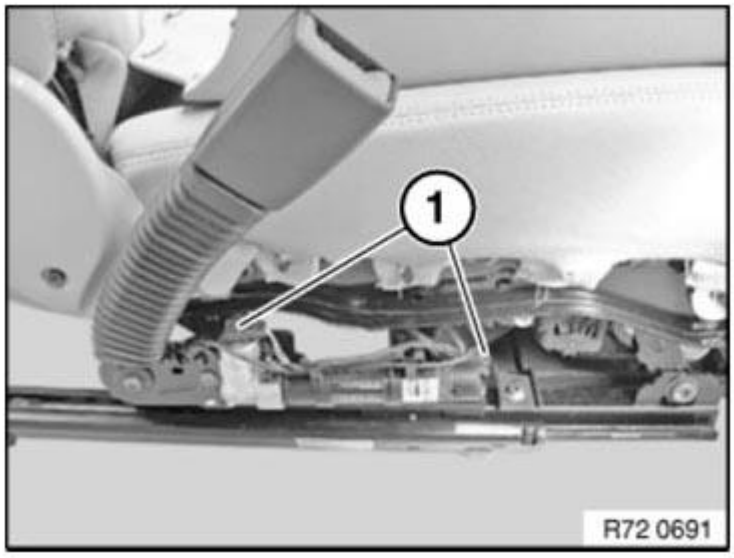


Fig. 12: Identifying Driver's Seat Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Installation:

Replace screw (1).

Tightening torque **72 11 03AZ** .

Remove seat belt tensioner.

Installation:

Belt tensioner is coded against incorrect installation.

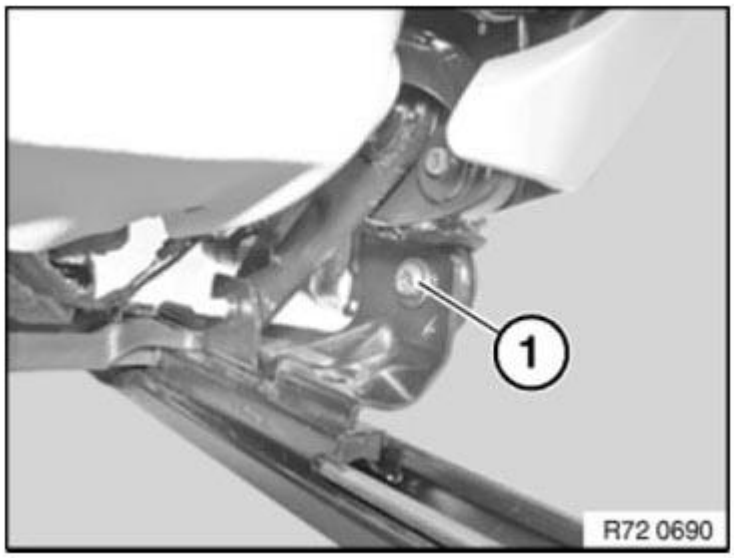


Fig. 13: Identifying Seat Belt Tensioner Screw
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 071 REMOVING AND INSTALLING/REPLACING FRONT LOWER STRAP FITTING (BELT TENSIONER), FRONT PASSENGER SEAT

Necessary preliminary work

- Remove **FRONT PASSENGER SEAT**

Installation note:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

UNLOCK AND DISCONNECT plug connections (1).

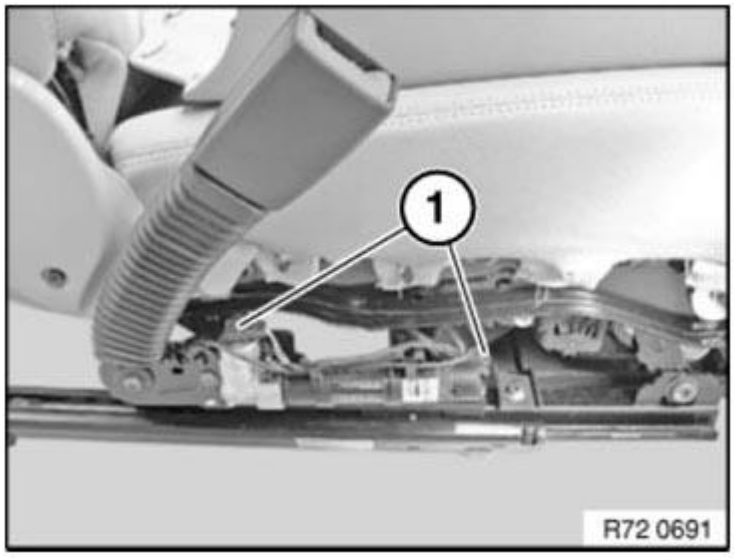


Fig. 14: Identifying Front Passenger Seat Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Installation note:

Replace screw (1).

Tightening torque **72 11 03AZ** .

Remove seat belt tensioner.

Installation note:

Belt tensioner is coded against incorrect assembly.

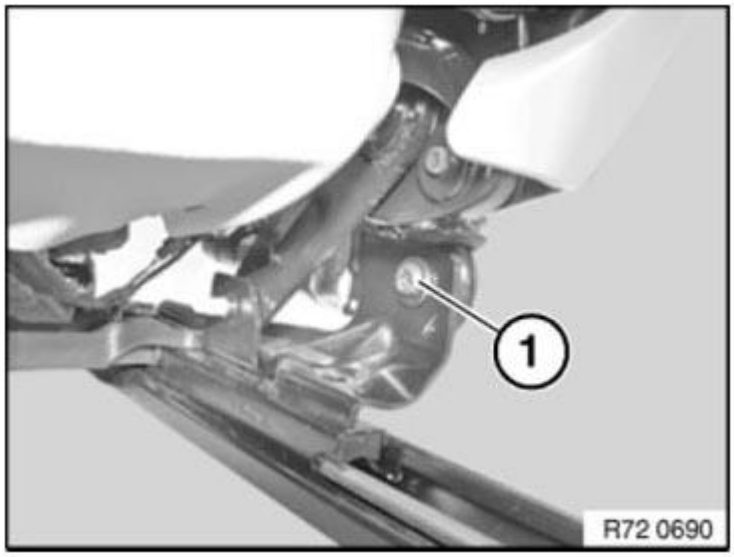


Fig. 15: Identifying Seat Belt Tensioner Screw
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 097 REMOVING AND INSTALLING/REPLACING REAR CENTER LOWER STRAP FITTING

Necessary preliminary work

- Remove rear seat. See **SEATS - REPAIR** .

Release screw (1).

Tightening torque **72 11 22AZ** .

Remove lower strap.

Installation note:

Lower strap fitting is coded to prevent incorrect assembly.

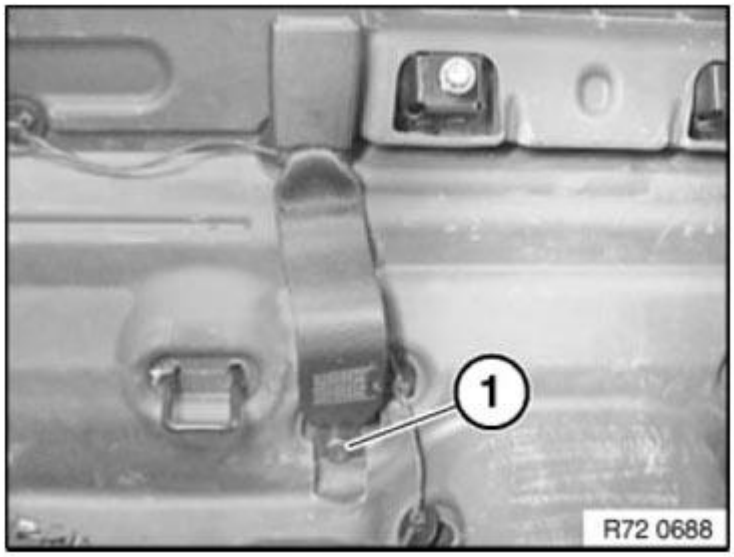


Fig. 16: Identifying Lower Strap Screw
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 101 REMOVING AND INSTALLING/REPLACING REAR CENTER SEAT BELT

Necessary preliminary tasks

- Remove rear seat. See **SEATS - REPAIR** .
- Remove rear window shelf. See **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR STORAGE SHELF** or **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR STORAGE SHELF WITH ROLLER SUNBLIND** .

Release screw (1).

Tightening torque **72 11 21AZ** .

Installation:

End fitting is coded against incorrect assembly.

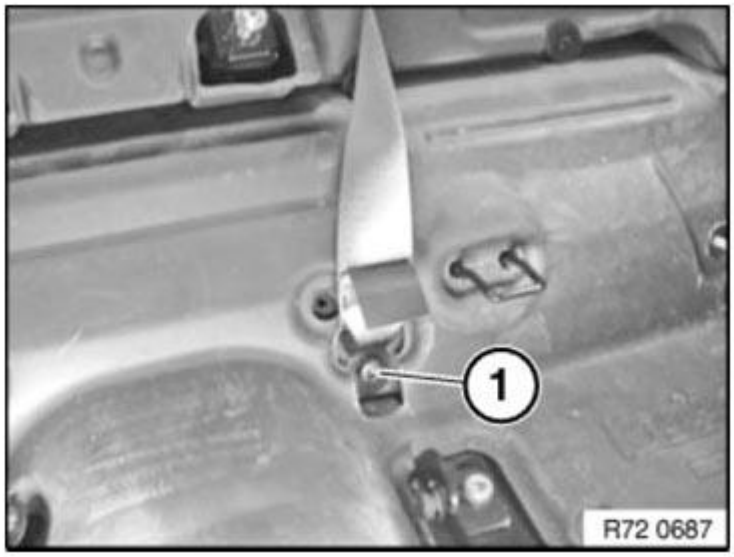


Fig. 17: Identifying Rear Centre Seat Belt Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **72 11 20AZ** .

Remove automatic reel with anchor fitting.

Installation

Automatic reel is coded against incorrect installation.

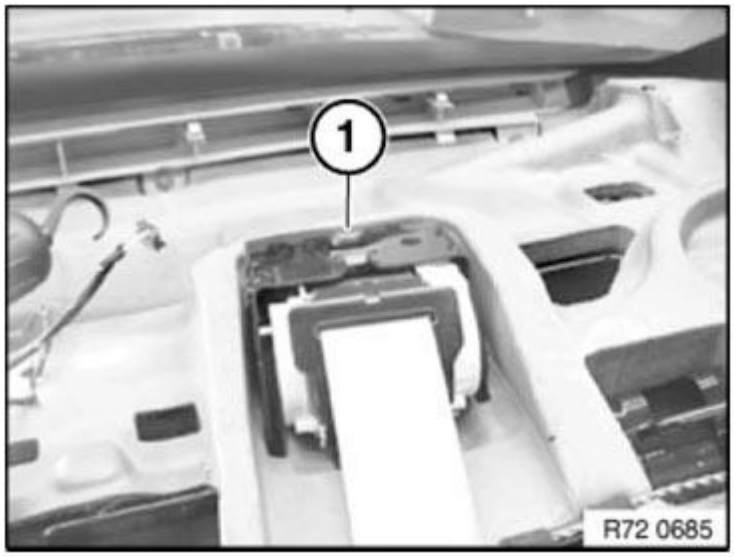


Fig. 18: Identifying Automatic Reel Nut

Courtesy of BMW OF NORTH AMERICA, INC.

72 11 096 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT LOWER BELT FITTING (MFS)

Necessary preliminary tasks

- Remove rear seat. See **SEATS - REPAIR** .

Unfasten plug connection (1) and disconnect.

Release sleeve nut (2).

Tightening torque **72 11 27AZ** .

Remove lower belt fitting.

Installation:

Lower strap fitting is coded to prevent incorrect installation.

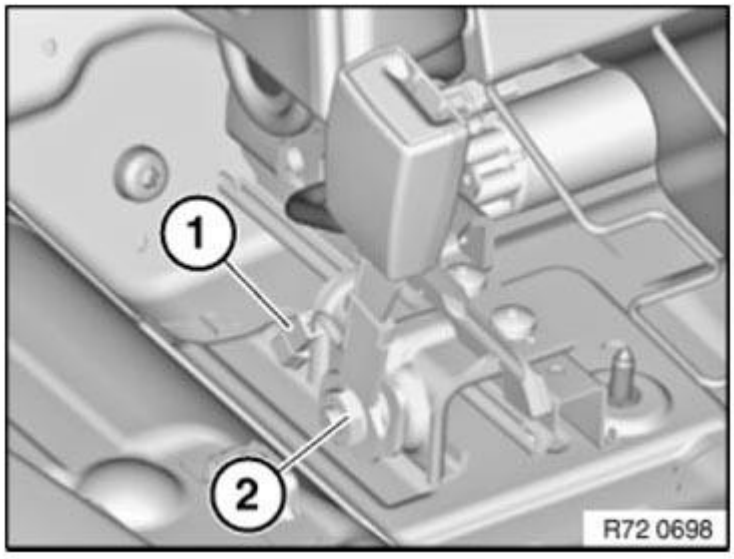


Fig. 19: Identifying Plug Connection And Lower Belt Fitting Nut
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 096 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT LOWER STRAP

Necessary preliminary work

- Remove rear seat. See **SEATS - REPAIR** .

Release screw (1)

Tightening torque **72 11 22AZ** .

Remove lower strap.

Installation note:

Lower strap fitting is coded to prevent incorrect assembly.

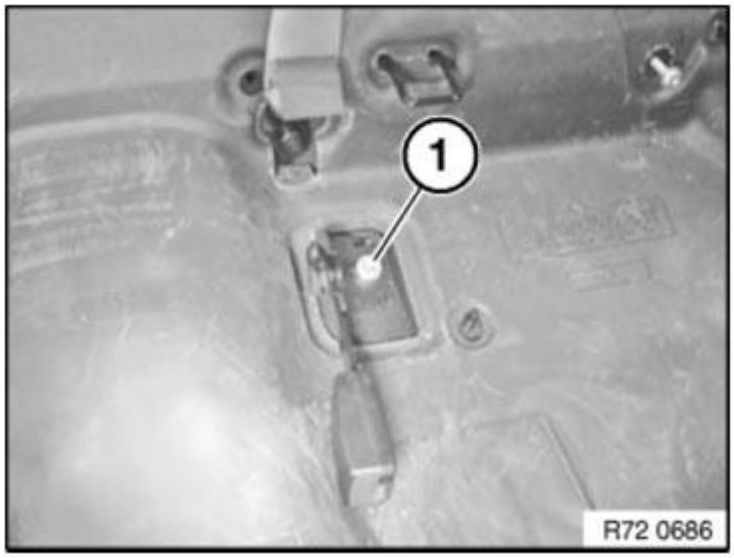


Fig. 20: Identifying Lower Strap Screw
Courtesy of BMW OF NORTH AMERICA, INC.

72 SAFETY PRECAUTIONS AND GENERAL INFORMATION

Notes on safety

- **SAFETY REGULATIONS** for handling airbag modules, airbag components and pyrotechnical seat belt tensioners

  - >

- **NOTES ON SCRAPPING** vehicles with gas generators

  - >

- **DEACTIVATION/ACTIVATION PYROTECHNICAL COMPONENTS**

  - >

Handling electrical and electronic equipment

UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS

- >

- **REPAIRING AIRBAG LINES**

- >

- **HANDLING OPTICAL FIBRES**

- >

Check

- **CHECK SEAT BELT**

- >

- **CHECK LIST FOR SEAT BELT**

- >

Airbag system

- Functional description and checking, refer to Diagnosis system

- >

- **DEACTIVATING AIRBAGS**

- >

- **PROCEDURE AFTER AIRBAG DEPLOYMENT** .

- >

Active pedestrian protection AFGS

- **PROCEDURE AFTER ACTUATOR TRIGGERING**

- >

7212 AIRBAG GENERATOR/AIRBAG UNIT FOR PASS

41 00... AFGS (ACTIVE PEDESTRIAN PROTECTION) PROCEDURE AFTER ACCIDENT

The AFGS system consists of the following components:

- *Satellites (control unit + sensor)*

- Sensors, inside, bumper trim, left/middle/right
- ACSM control unit (Crash Safety Module)

- *Cables and connectors*
- *Engine compartment lid hinges*
  - Actuator
  - Engine compartment lid hinge
- *Engine compartment lid catch*
  - Catch, engine compartment lid
  - Catch, upper section (striker)

In case of a frontal or side collision in the area of the engine compartment lid and/or the A-pillars, check the following components:

Satellites (control unit + sensor)

- Procedure
  - Read fault memory
  - Disconnect battery and observe waiting period
  - Rectify faults
  - Reconnect battery and observe waiting period
  - Delete fault memory
  - Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. interior lights, radio, etc.)
  - Switch on ignition.
  - Clear fault memory and if necessary rectify faults

Cables and connectors

- Procedure
  - Check cables and connectors for damage, replace if necessary.

Procedure if AFGS was activated

Engine compartment lid hinges

- Replace **ACTUATORS**
- **CHECK BOTH HINGES OF THE ENGINE COMPARTMENT LID AND REPLACE IF NECESSARY**

Engine compartment lid catch

- Replace both engine compartment lid catches. See **REMOVING AND INSTALLING/REPLACING**

LEFT ACTIVE ENGINE COMPARTMENT LID LOCK and **REMOVING AND INSTALLING/REPLACING RIGHT ACTIVE ENGINE COMPARTMENT LID LOCK** .

- Check the top sections of the catch and replace if necessary.

Procedure if AFGS was not activated

Engine compartment lid hinges

- Check **BOTH HINGES OF THE ENGINE COMPARTMENT LID** and replace if necessary
- Only if the hinges are faulty, replace the **ACTUATOR** .

Engine compartment lid catch

- Check **BOTH ENGINE COMPARTMENT LID CATCHES** and replace if necessary.
- Check the top section of the catch and replace if necessary.

51 23... CHECK ACTUATOR

Necessary preliminary tasks:

- **REMOVE ACTUATOR**

Check actuator for damage.

CHECK ACTUATOR FOR DAMAGE

Test result	Solution
Housing (1) damaged	Replace actuator
Actuator top section (2) can not be moved by hand	Replace actuator

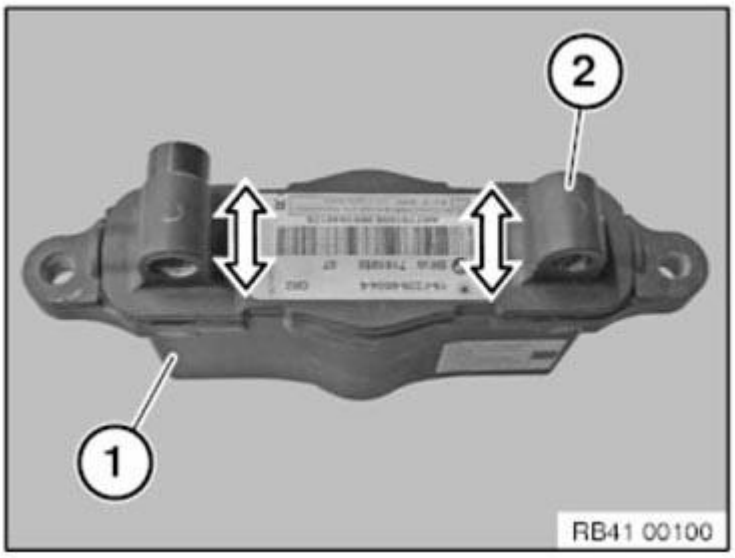


Fig. 21: Removing Actuator
Courtesy of BMW OF NORTH AMERICA, INC.

51 23... CHECKING HOOD/BONNET LOCKS

Necessary preliminary tasks:

- Remove hood/bonnet locks. See **REMOVING AND INSTALLING/REPLACING LEFT ACTIVE ENGINE COMPARTMENT LID LOCK** and **REMOVING AND INSTALLING/REPLACING RIGHT ACTIVE ENGINE COMPARTMENT LID LOCK** .

Check hood/bonnet locks for damage; replace if necessary.

CHECK HOOD/BONNET LOCKS FOR DAMAGE

Test result	Solution
Retaining tabs (1) bent	Replace hood/bonnet lock
Spring (2) scratched or damaged	Replace hood/bonnet lock
Movable parts stiff	Replace hood/bonnet lock

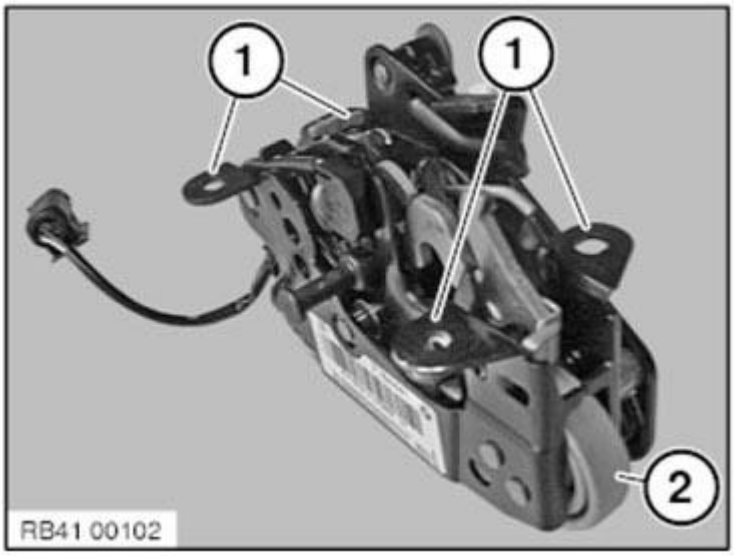


Fig. 22: Identifying Hood/Bonnet Lock
Courtesy of BMW OF NORTH AMERICA, INC.

72 12... DEACTIVATING FRONT PASSENGER AIRBAGS WITH KEY-OPERATED SWITCH

WARNING: The responsibility for deactivation/activation rests with the customer.

Depending on the occupation of the front passenger seat, the front passenger and side airbags must be (de-)activated in accordance with the Owner's Handbook.

The passenger airbag can only be deactivated in accordance with the following instructions if the vehicle is equipped with a suitable key-operated switch!

The key-operated switch can be retrofitted if it is missing and has been ordered as an optional equipment.

Key-operated switch:

- SA 5DA

The following airbags are deactivated simultaneously with the key-operated switch (1):

- Passenger airbag
- Side airbag (passenger side)
- If necessary, knee airbag in US models (passenger side)

The airbags can only be deactivated/reactivated while the vehicle is stationary and with the door open.

IMPORTANT: The head airbag remains active.

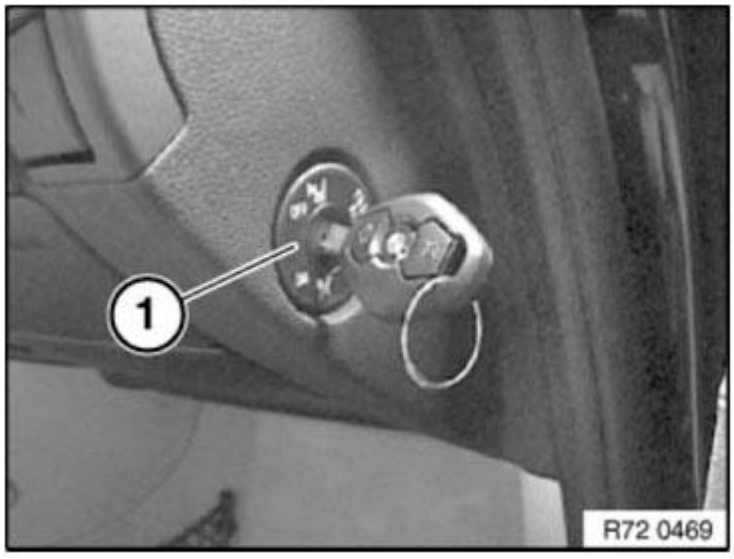


Fig. 23: Identifying Key-Operated Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Deactivation

1. Turn key-operated switch with ignition key to "OFF" position.

   Deactivatable airbags on passenger side out of operation.

   Head airbag on passenger side remains active.

All airbags on driver side remain active.

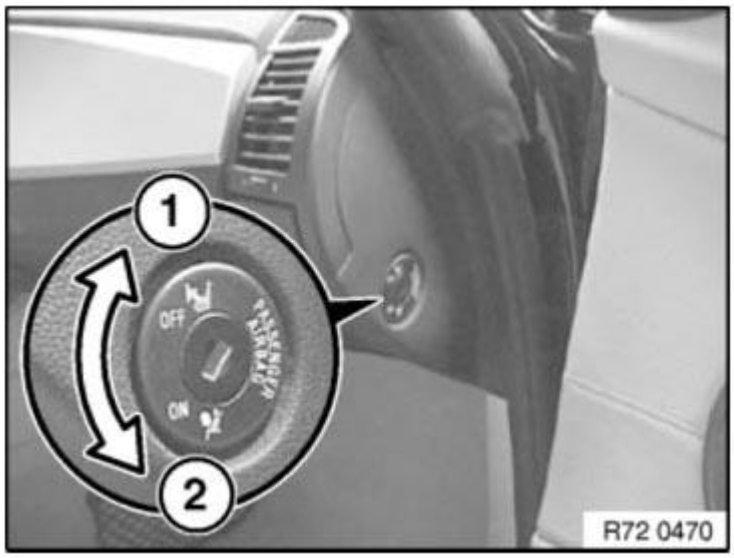


Fig. 24: Identifying Key-Operated Switch ON And OFF Position
Courtesy of BMW OF NORTH AMERICA, INC.

Activation

2. Turn key-operated switch with ignition key to "ON" position.

All the airbags in the vehicle are activated and are triggered in appropriate situations.

Indicator lamp

When the ignition key is turned in the ignition lock, the function of the airbag system is checked and the warning lamp in the center console lights up for several seconds.

1. The warning lamp is permanently ON when the passenger airbags are **deactivated**
2. The warning lamp goes out after a few seconds when the passenger airbags are **activated**

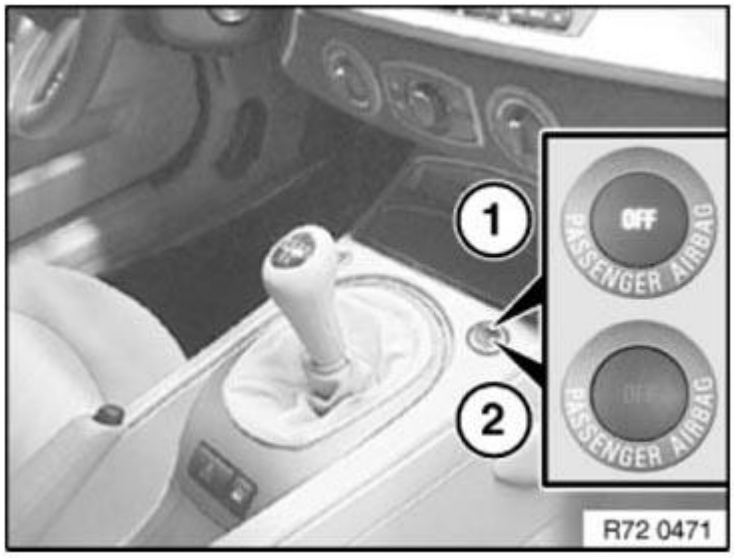


Fig. 25: Identifying Warning Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

72 12... NOTES ON SCRAPPING VEHICLES WITH GAS GENERATORS (AIRBAG SYSTEM)

The gas generator is a pyrotechnical component and is for the most part permanently mounted on the following components:

- Airbag module
  - Driver's/passenger airbag
  - Side airbag
  - Head airbag
  - Knee airbag
- Automatic electric reel
- Belt end fitting tensioner
- Belt buckle tensioner
- Safety battery terminal
- Active head restraint

In accordance with accident prevention regulations and specific national regulations, gas generators must be rendered unusable before they are scrapped. This is necessary because pyrotechnical objects can cause injury if improperly activated (e.g. scrapping with flame cutters).

With vehicles which are scheduled for scrapping, it is always essential prior to draining and further stripping work to ensure that all the gas generators **in the vehicle** are fired. The fired gas generators can then be scrapped together with the vehicle.

Gas generators that have not fired constitute a hazard (also to the environment)!

Firing failure

If correct firing is not possible, the relevant components must be removed and disposed of by special waste disposal companies!

Comply with **SAFETY REGULATIONS for handling airbag system components** .

If a triggering operation has failed:

- Disconnect the triggering device from the battery and
- Wait a few minutes before approaching the vehicle

The components of an airbag system must always be disposed of. Such components must not be sold on as used parts.

Firing

Triggering of the gas generators may only be carried out by expert personnel and under the supervision of a responsible person. Other standard accident prevention regulations (safety goggles, ear defenders etc.) must also be observed.

The gas generators must be fired from the outside in this vehicle which has been earmarked for scrapping. In this process

- the doors must be closed
- the rear lid must be open
- the side windows must be open and
- the sunroof must be open

To fire the gas generators, use the firing device with the appropriate cables (follow instructions).

WARNING: Once gas generators have been fired, observe a ventilation period of 10 minutes with the doors opened. Only then is it permitted to continue work inside the vehicle.

Wear protective goggles and protective gloves when handling a fired gas generator!

The burning of solid fuel will heat up the airbag unit - danger of burning hands!

Wash skin with water after contact with fired gas generators!

72 12... PROCEDURE AFTER AIRBAG TRIGGERING AS RESULT OF AN ACCIDENT

Check and/or replace following components after airbag triggering:

Satellites (control unit + sensor)

Components

- Satellite, A-/B-pillar, left/right
- Satellite, front door
- Satellite, rear seat
- Satellite, driver's/front passenger seat
- Satellite, vehicle center

Procedure

- Inspect visually for mechanical damage
- Read fault memory
- Disconnect battery and observe waiting period
- Rectify faults
- Connect battery and observe waiting period (at least 10 seconds)
- Delete fault memory
- Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. inside lights, radio, etc.)
- Switch on ignition (wait at least 10 seconds)
- Clear fault memory and if necessary rectify faults

Cables and plugs

Components and procedure

- Check cables and plugs for damage, replace if necessary.

  (e. g. corrosion, correct engagement, bent pin)

Belt system

Components

- Retractor mechanism
- Belt buckle tensioner
- Seatbelt height adjustment
- Anchor fitting tensioner

Procedure

- Check components, replace if necessary

Seats

Components

- Seat
- Airbag module
- Active head restraint

Procedure

- Check seats (function check of seat mechanism), replace if necessary
- Check seat screw/bolt connections
- Replace gas generator, active head restraint

  If the severity of the impact has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

  External feature: The triggered head restraint is folded forwards and engaged.

  The repair work can be carried out in the car with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

  The gas generator can be replaced up to 5 times.

- Replace airbag module and seat cover with padding

Driver's airbag

Components

- Airbag module
- Steering Wheel
- Steering column (if damaged)

Procedure

- Check components, replace if necessary
- Replace steering wheel

Front-passenger airbag

Components

- Airbag module
- Trim, instrument panel
- Supporting tube (if damaged)

Procedure

- Check components, replace if necessary

Side airbag, front/rear

Components

- Airbag module
- Door panel
- Door in white
- Seat

Procedure

- Check components; replace if necessary

Head airbag

Components

- Airbag module
- Trim, A-pillar
- Roofliner
- Trim, B-pillar (if damaged)
- Trim, C-pillar (if damaged)
- Connection/mounting (on side frame)

Procedure

- Check components, replace if necessary

Knee airbag

Components

- Panel (driver's side)
- Lower section of glovebox
- Active knee protector (driver's and passenger sides)

Procedure

- Check components, replace if necessary

Passive knee protector

Components

- Panel (driver's side)
- Glovebox incl. knee protector (passenger side)

Procedure

- Check components for damage, replace if necessary
- Check fastening elements

72 12 000 REMOVING AND INSTALLING OR REPLACING AIRBAG MODULE ON FRONT PASSENGER SIDE

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.

Improper, unauthorized operations may result in serious dangers.

Unauthorized persons are strictly prohibited from performing any operations on this system.

WARNING: Read and comply with SAFETY INSTRUCTIONS for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling can lead to airbag deployment and cause injury.

A damaged airbag must be replaced because its protective function is compromised or, in an extreme situation, it can no longer execute its protective function.

Necessary preliminary work

- Disconnect **BATTERY EARTH LEAD**
- Remove **GLOVE BOX WITH HOUSING**

Release screws from holder.

NOTE: The holder does not have to be removed to access the front screws on the airbag module.

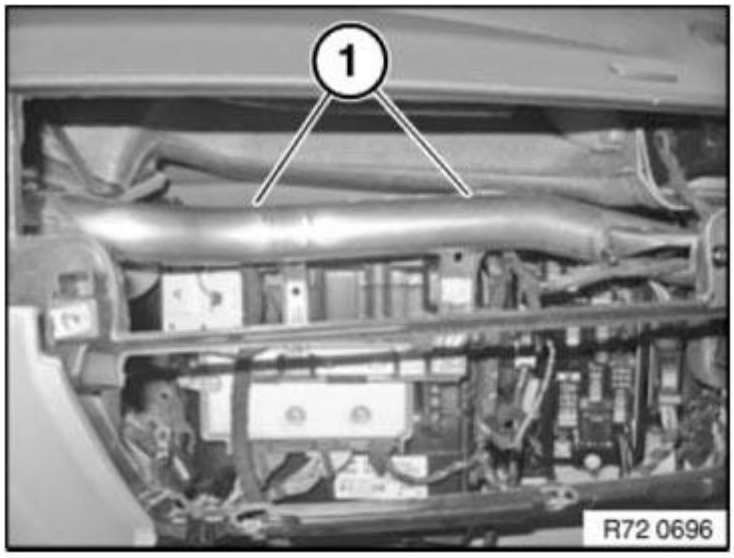


Fig. 26: Identifying Holder Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (2) and disconnect.

Release screw (1).

Swing control unit out of rubber mount and feed out.

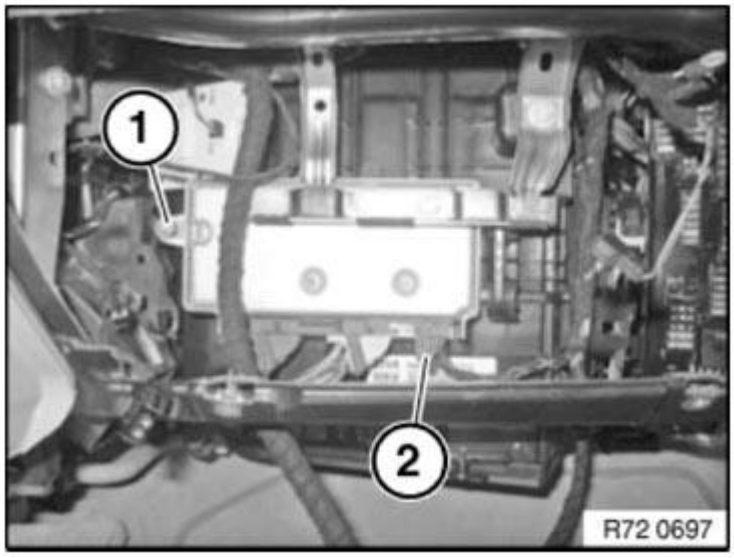


Fig. 27: Identifying Plug Connection And Control Unit Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock **PLUG CONNECTION** (1) and disconnect.

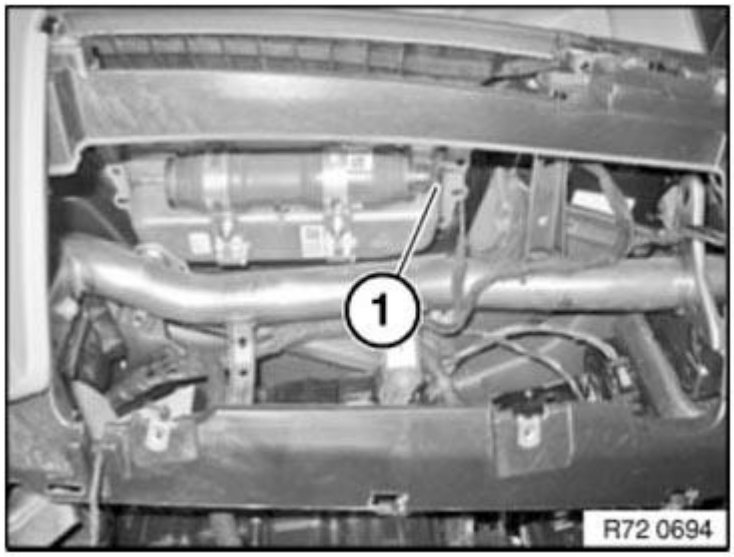


Fig. 28: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release all screws on airbag module.

9 Screw = F01, F02, F03, F04

Tightening torque **72 12 01AZ** .

Remove airbag module from dashboard.

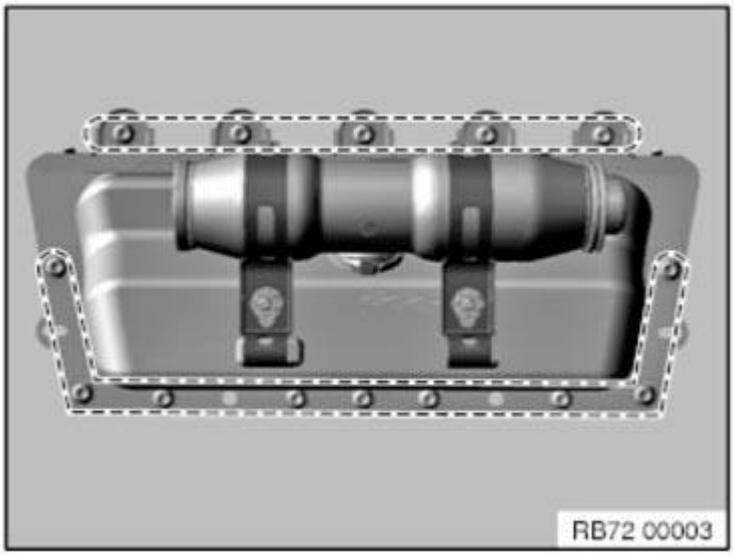


Fig. 29: Identifying Airbag Module Screws
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 060 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT HEAD AIRBAG

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.

Improper, unauthorized operations may result in serious dangers.

Unauthorized persons are strictly prohibited from performing any operations on this system.

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt pretensioners.

Incorrect handling can activate airbag and cause injury.

A damaged head airbag must be replaced.

A damaged head airbag exhibits an impaired protective function and in extreme cases loses its protective function altogether.

Necessary preliminary tasks

- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **HEADLINING**
- Follow **INSTRUCTIONS** for unlocking and locking airbag plug connection

Installation summary, retaining elements, head airbag

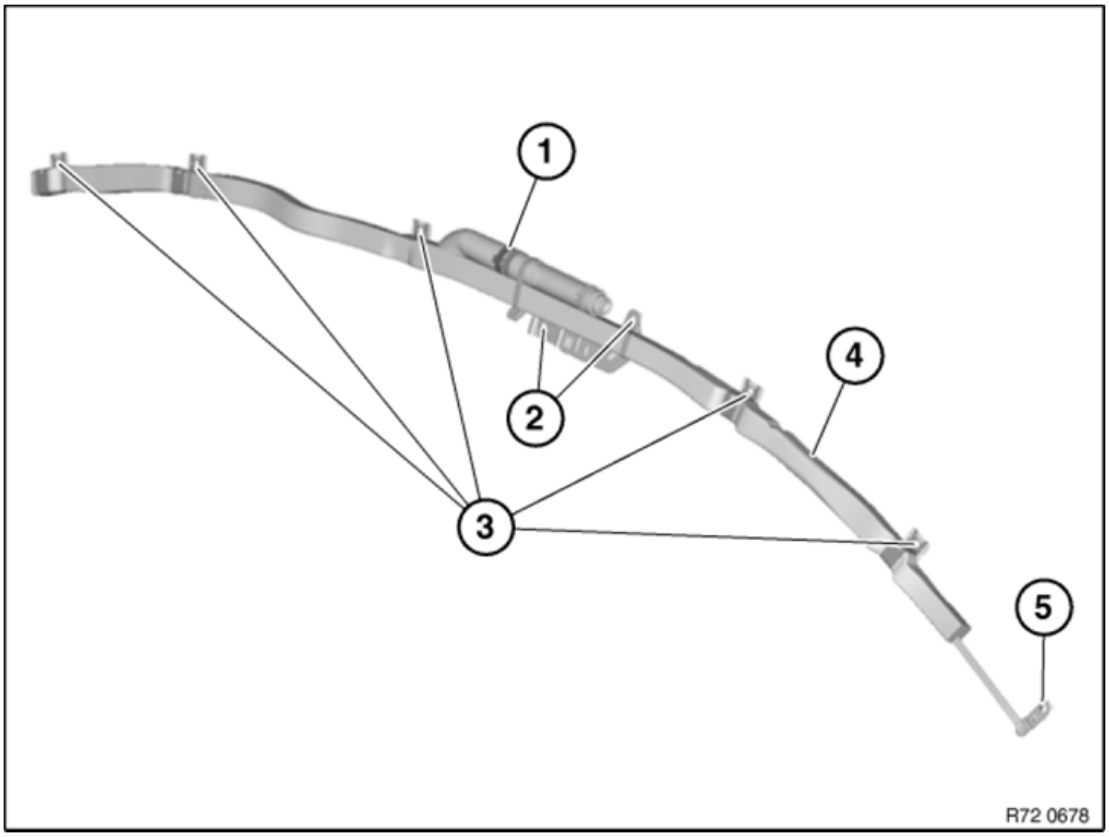


Fig. 30: Identifying Head Airbag Components
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When removing head airbag, do not damage

- **Head airbag**
- **Windscreen**
- **Retaining clips**
- **Trim panels**

Do not damage!

Release screw (1).

Tightening torque **72 12 02AZ** .

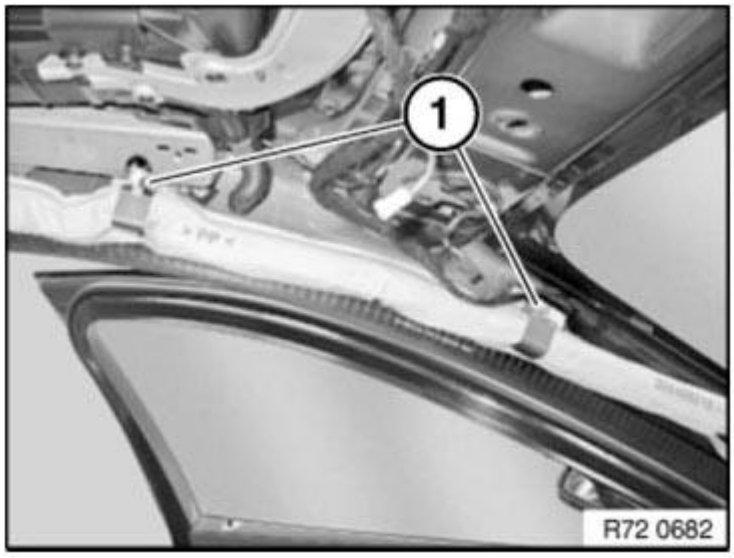


Fig. 31: Identifying Head Airbag Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on A-pillar.

Tightening torque **72 12 02AZ** .

Installation:

End fitting is coded against incorrect assembly.

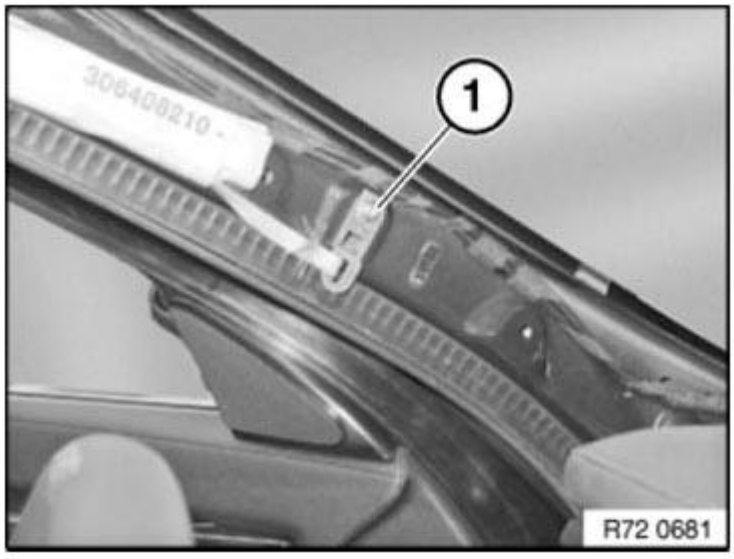


Fig. 32: Identifying A-Pillar Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **72 12 02AZ** .

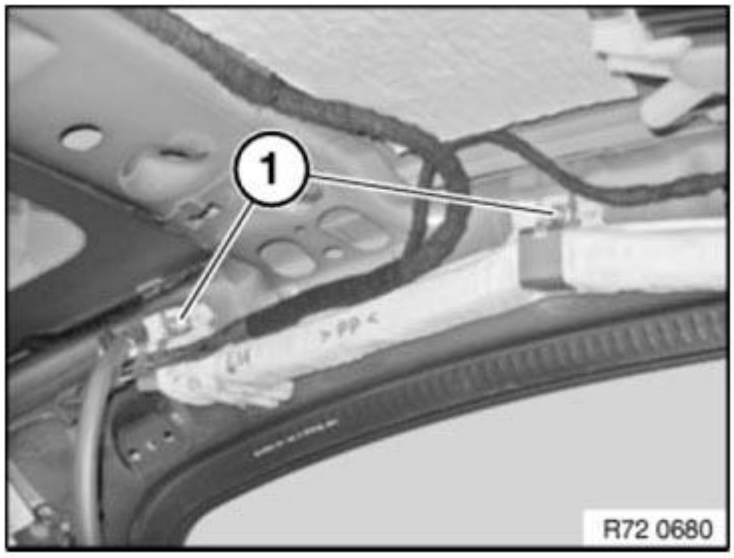


Fig. 33: Identifying A-Pillar Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 12 02AZ** .

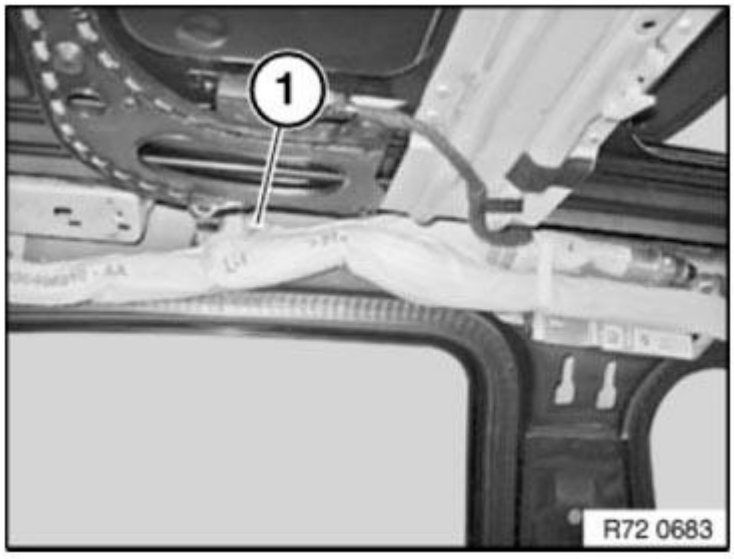


Fig. 34: Identifying A-Pillar Screw
Courtesy of BMW OF NORTH AMERICA, INC.

UNLOCK AND DISCONNECT plug (1) for gas generator.

Unfasten screws (2).

Tightening torque **72 12 02AZ** .

Remove gas generator.

Installation:

Gas generator is coded against incorrect installation.

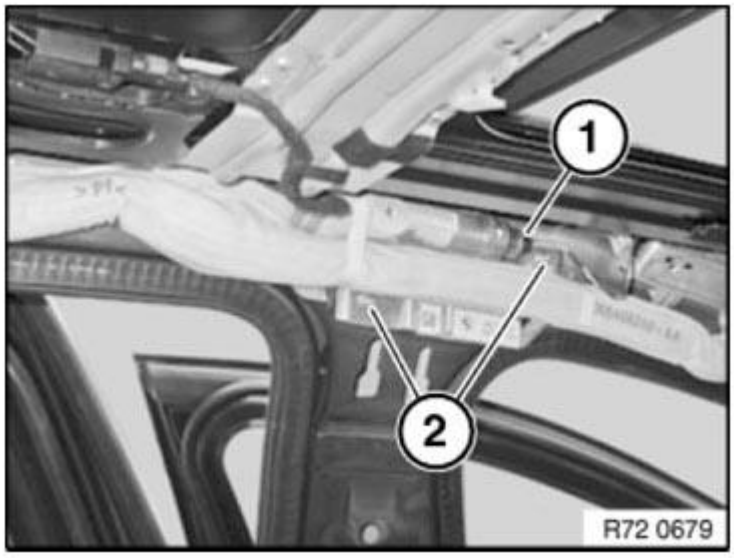


Fig. 35: Identifying Gas Generator Plug And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 050 REMOVING AND INSTALLING SIDE AIRBAG (FRONT SEAT)

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.

Improper, unauthorized operations may result in serious dangers.

Unauthorized persons are strictly prohibited from performing any operations on this system.

WARNING: Observe SAFETY REGULATIONS for handling airbag modules and pyrotechnical seat belt tensioners.

Incorrect handling can lead to airbag deployment and cause injury.

A damaged airbag must be replaced because its protective function is compromised and, in an extreme situation, it can no longer execute its protective function.

Installation note:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

Necessary preliminary work

- Disconnect **BATTERY EARTH LEAD**
- Remove rear panel on front seat. See **REMOVING AND INSTALLING OR REPLACING REAR PANEL ON LEFT OR RIGHT FRONT SEAT BACKREST** (Normal, Electric) or **REMOVING AND INSTALLING/REPLACING BOTH REAR PANELS ON LEFT OR RIGHT FRONT SEAT BACKREST** (Comfort).

Unlock **PLUG CONNECTION** (1) and disconnect.

Unfasten screws (2).

Remove airbag module in direction of arrow.

Installation note:

Replace screws.

Tightening torques **72 12 06AZ** .

Airbag module is coded against incorrect assembly.

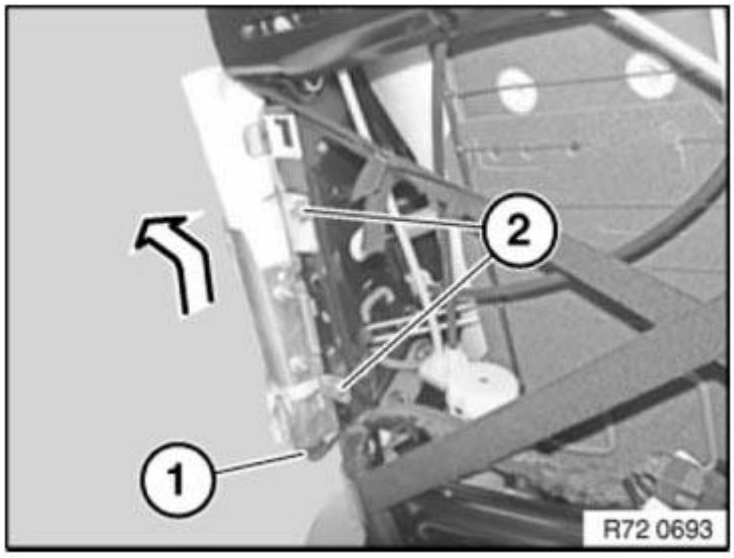


Fig. 36: Removing Airbag Module
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 004 REMOVING AND INSTALLING/REPLACING AIRBAG MODULE FOR DRIVER'S KNEE PROTECTION

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling can activate airbag and cause injury.

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.

Improper, unauthorized operations may result in serious dangers.

Unauthorized persons are strictly prohibited from performing any operations on this system.

Necessary preliminary work

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY**

Release screws (1).

Tightening torque **72 12 03AZ** .

Feed airbag module (2) in direction of arrow out of instrument panel trim and remove.

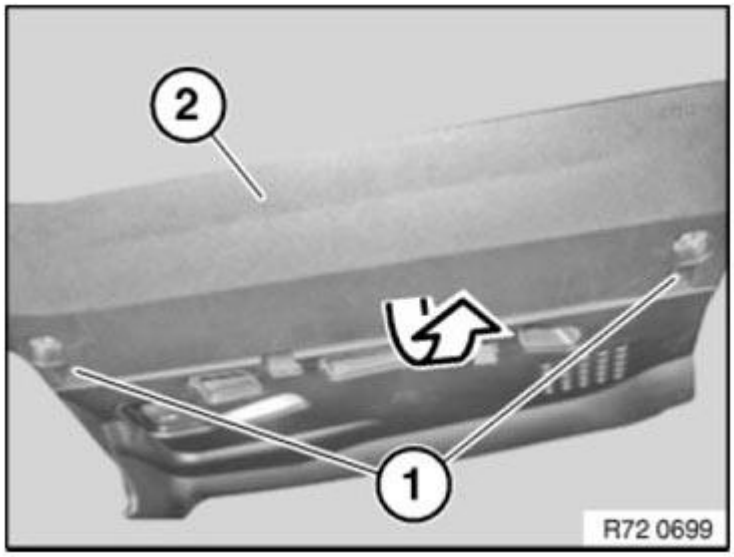


Fig. 37: Removing Airbag Module
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure airbag module (1) is correctly seated in instrument panel trim.

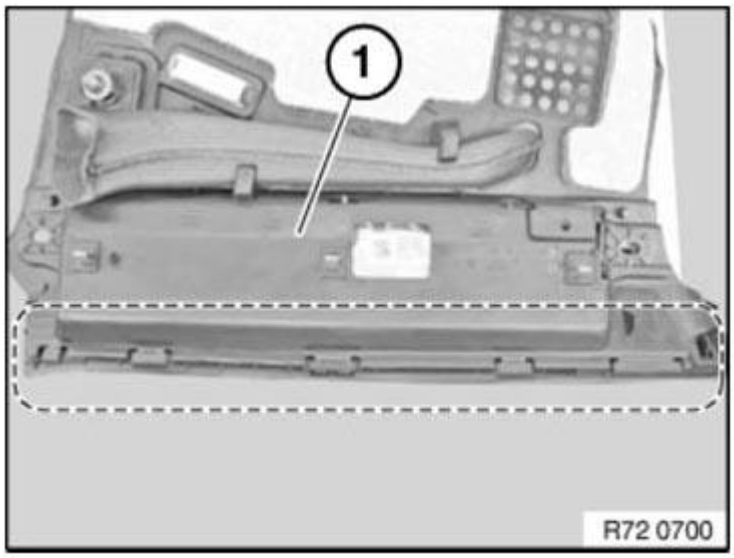


Fig. 38: Identifying Airbag Module
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 006 REMOVING AND INSTALLING/REPLACING AIRBAG MODULE FOR PASSENGER'S KNEE PROTECTION

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag

modules and pyrotechnical belt tensioners.

Incorrect handling can activate airbag and cause injury.

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.

Improper, unauthorized operations may result in serious dangers.

Unauthorized persons are strictly prohibited from performing any operations on this system.

Necessary preliminary work

- Remove **TRIM FOR INSTRUMENT PANEL** , bottom right

Release screws (1).

Tightening torque **72 12 03AZ** .

Feed airbag module (2) in direction of arrow out of instrument panel trim and remove.

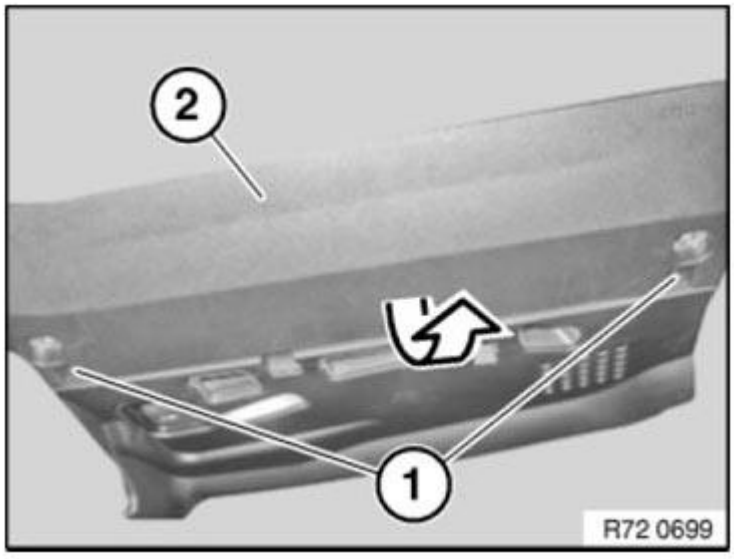


Fig. 39: Removing Airbag Module
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Make sure airbag module (1) is correctly seated in instrument panel trim.

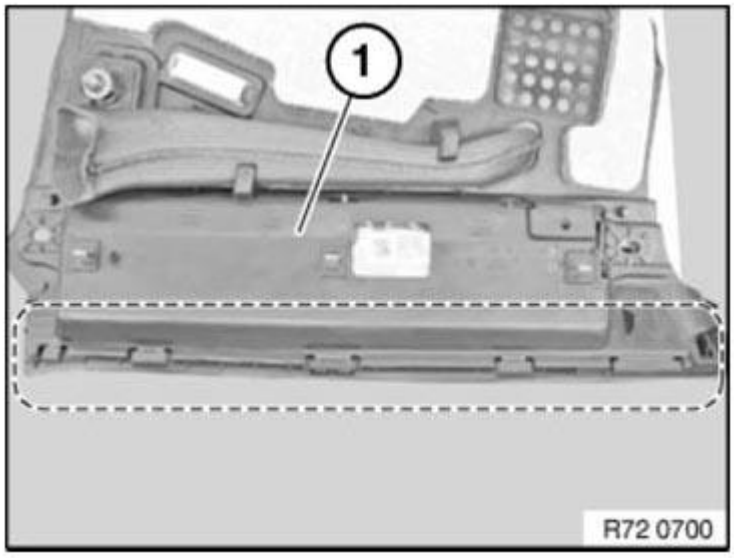


Fig. 40: Identifying Airbag Module
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 400 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ACTUATOR (ACTIVE PEDESTRIAN PROTECTION), VEHICLES UP TO 09/ 2011

WARNING: **Adhere to the following SAFETY INSTRUCTIONS so as to avoid a risk of injury by the actuator.**

The BATTERY NEGATIVE LEAD must be clamped off prior to work on the actuator or engine compartment lid!

Do not exert any force on the actuator.

Incorrect handling may result in triggering of the actuator and thereby cause serious injury.

IMPORTANT: **After the actuator has been installed, retaining screws (1) must be removed!**

The retaining screws are required as aids to fitting the actuator.

If the retaining screws are not removed after the actuator has been installed, active pedestrian protection will not function.

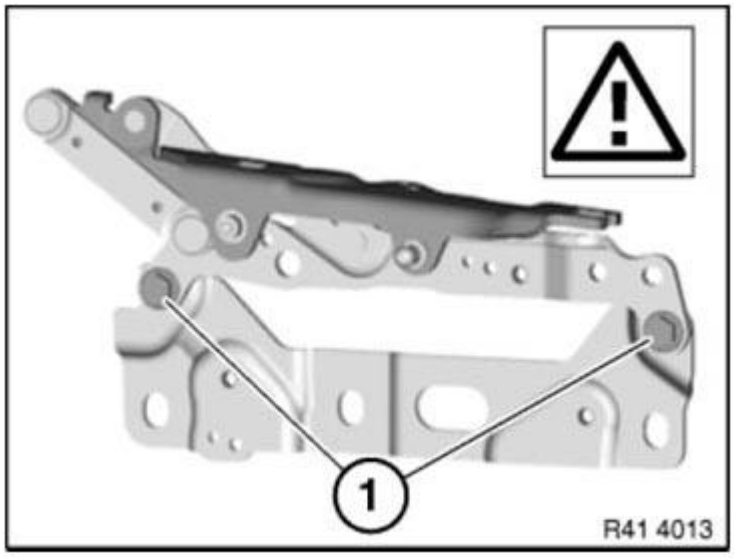


Fig. 41: Identifying Actuator Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure after actuator triggering

Necessary preliminary tasks

Disconnect **BATTERY NEGATIVE LEAD**

Remove **ENGINE COMPARTMENT LID**

Remove **GAS PRESSURE SPRING** .

Removing actuator

Remove resetter (1).

Release screws (2) and slowly raise actuator until plug on underside of actuator is accessible.

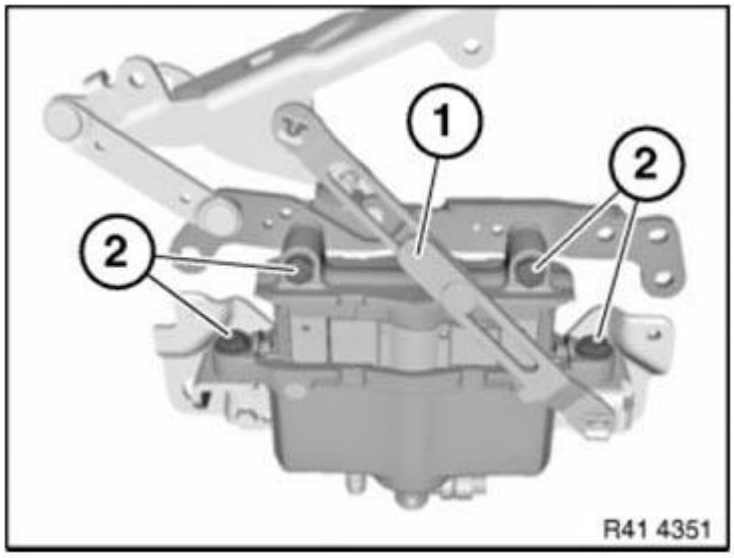


Fig. 42: Identifying Resetter And Actuator Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull lock (1) in direction of arrow.

Then press together plug locks on both sides and detach plug (2).

Installation:

PROCEDURE after actuator triggering.

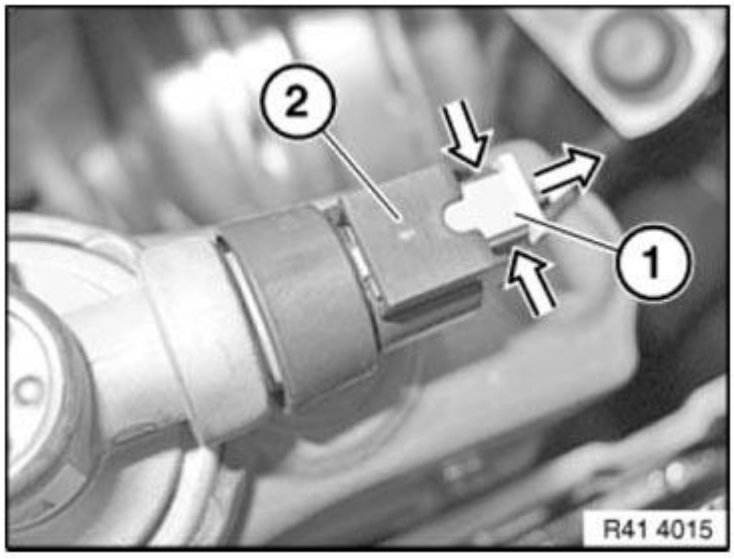


Fig. 43: Pulling Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Installing actuator

Screw hinge upper section to hinge lower section.

To do so, insert M 8 retaining screws (1) and tighten down.

IMPORTANT: After the actuator has been installed, retaining screws (1) must be removed again!

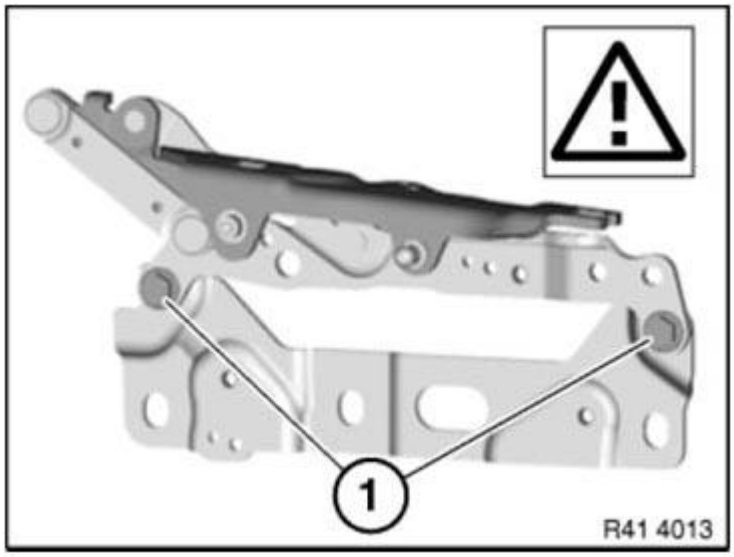


Fig. 44: Identifying Actuator Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Connect plug (1) to actuator.

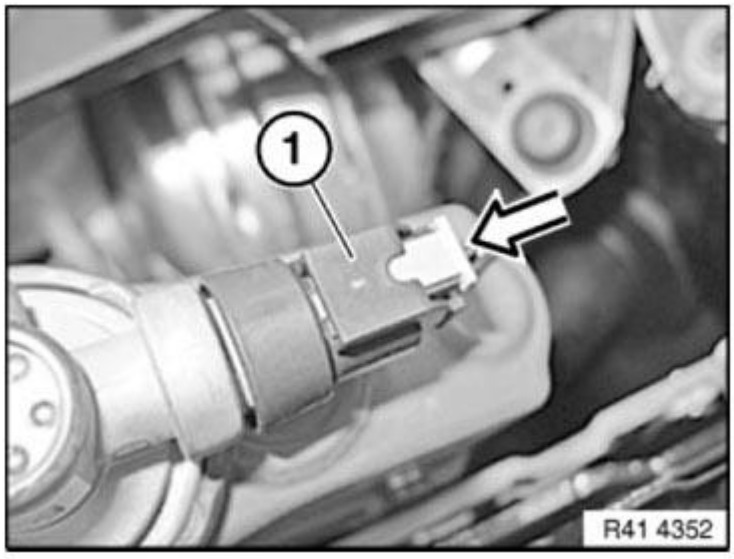


Fig. 45: Connecting Plug To Actuator
Courtesy of BMW OF NORTH AMERICA, INC.

Secure actuator screws (1).

Tighten screws hand-tight only.

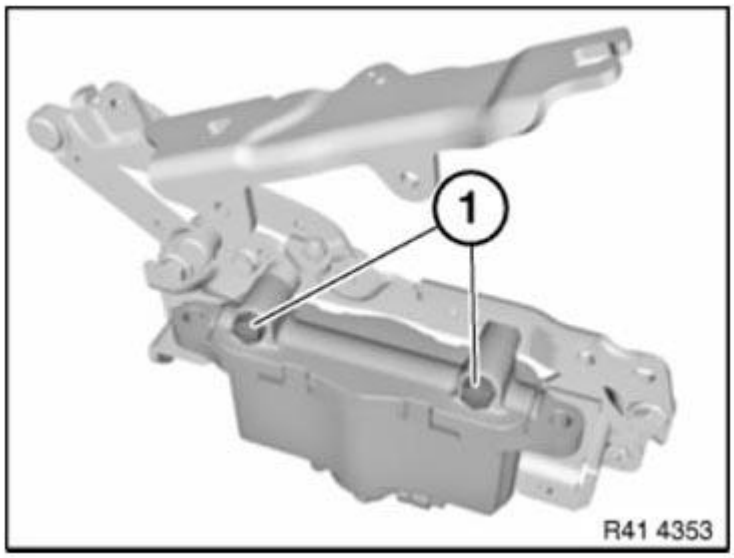


Fig. 46: Identifying Actuator Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (1) and tighten down

Tightening torque **41 61 5AZ** .

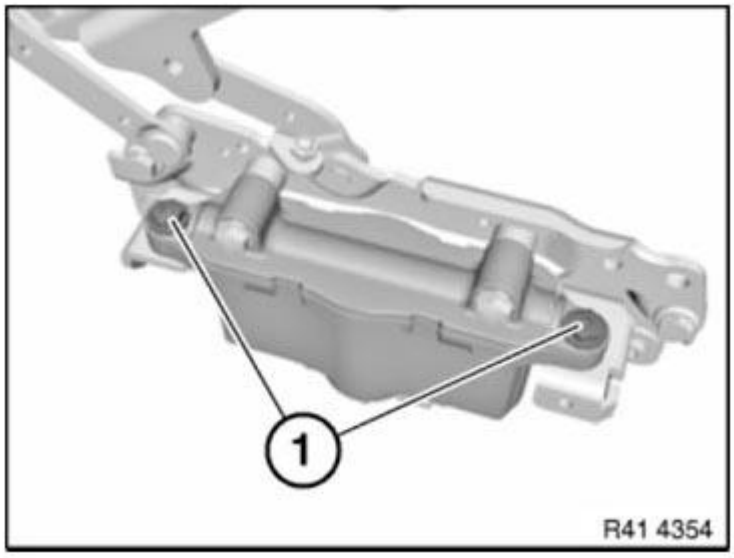


Fig. 47: Identifying Actuator Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screws (1).

Tightening torque **41 61 4AZ** .

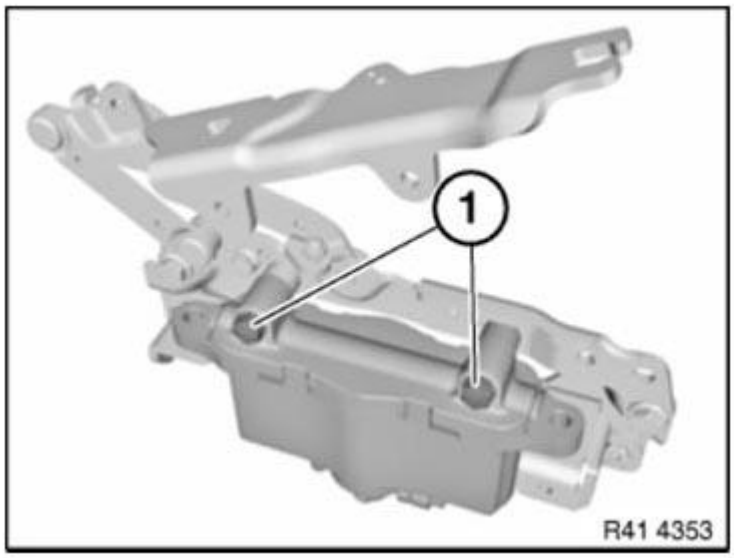


Fig. 48: Identifying Actuator Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Fit resetter (2).

Remove retaining screws (1).

IMPORTANT: After the actuator has been installed, retaining screws (1) must be removed again!

If the retaining screws are not removed after the actuator has been installed, active pedestrian protection will not function.

Seal holes of retaining screws with protective caps.

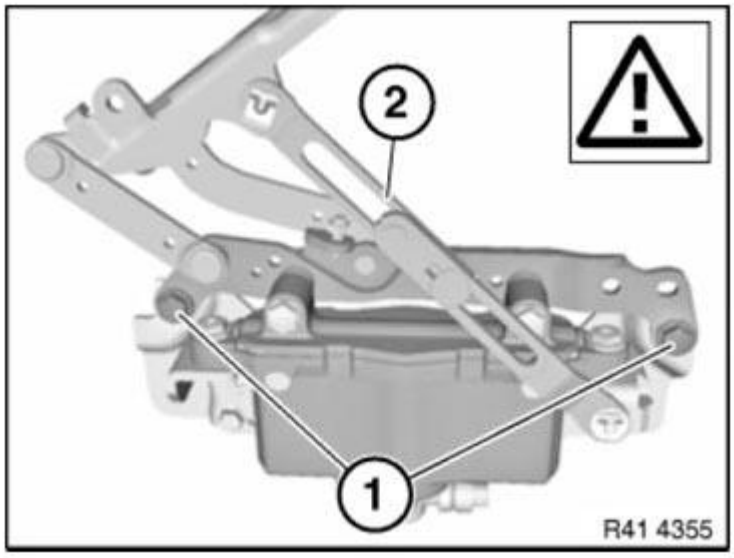


Fig. 49: Identifying Resetter And Actuator Screw
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 061 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HEAD AIRBAG (VERSION WITH SLIDE/TILT SUNROOF)

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.

Improper, unauthorized operations may result in serious dangers.

Unauthorized persons are strictly prohibited from performing any operations on this system.

WARNING: Read and comply with SAFETY INSTRUCTIONS for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling can lead to airbag deployment and cause injury.

A damaged head airbag must be replaced.

A damaged head airbag exhibits an impaired protective function and in extreme cases loses its protective function altogether.

NOTE: Except for the operations for REMOVING HEADLINING , this task is identical to:

- **Removing and installing/replacing left or right HEAD AIRBAG (version without slide/tilt sunroof)**

61 00... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations

HANDLING COMPONENTS OF AIRBAG SYSTEM

INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Procedure for cable repair

In event of non-visible damage to wiring harness

Disconnect plug connection on airbag module or on adapter plug. It is absolutely vital to disconnect the contacts in succession as there is a risk of them being mixed up! Cut through one cable after the other at an appropriate position, do not under any circumstances cut through both cables at the same time. Insulate cables remaining in wiring harness with insulating tape. Now disconnect plug connection on airbag control unit. Unpin contacts. Cut through one cable after the other at an appropriate position and insulate with insulating tape, do not under any circumstances cut through both cables at the same time. Pin contacts of repair cable for airbag control unit in control unit plug, assignment of repair cables is relevant. Lay repair cable in car parallel to existing airbag lead. Now pin in contacts for airbag control unit or contacts of adapter plug, assignment of repair cables is relevant. Cut off excess length of repair cable in proximity (visible area) of airbag module or of adapter plug. Twist open cables. With the connectors and shrink-fit hoses in the Electronic Parts Catalogue (EPC), reconnect the cables with the same cable colors. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

CUTTING OFF AND INSULATING CABLES .

REPAIRING A PLUG CONNECTION USING CONNECTORS .

INSTALLING AND REMOVING CONTACTS .

In event of visible damage

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair lead in car parallel to existing airbag lead up to cutting point. Cut off excess length of repair lead. Twist open cables.

Connect cables with connectors and shrink-fit hoses in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

CUTTING OFF AND INSULATING CABLES .

REPAIRING A PLUG CONNECTION USING CONNECTORS .

INSTALLING AND REMOVING CONTACTS .

52 14 886 REPLACING GAS CARTRIDGE FOR CRASH-ACTIVE HEADREST ON LEFT OR RIGHT (UP TO 09/2010)

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling may result in activation of the crash-active head restraint and thereby cause injuries.

Switch off ignition!

Necessary preliminary work

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **CRASH-ACTIVE HEADREST**

IMPORTANT: The pyrotechnical device may be replaced up to 5 times.

Triggering frequency is denoted on the label on the head restraint carrier.

Labels are available as spare parts.

Starting situation

Head restraint is in the crash position after activation.

NOTE: Pyroactivator can only be removed in the triggered state.

The complete crash-active head restraint must be replaced if the event of a head restraint fault message and an untriggered pyroactivator.



Fig. 50: Identifying Crash-Active Head Restraint
Courtesy of BMW OF NORTH AMERICA, INC.

Removing cover

Raise cover (1) and pull towards rear.

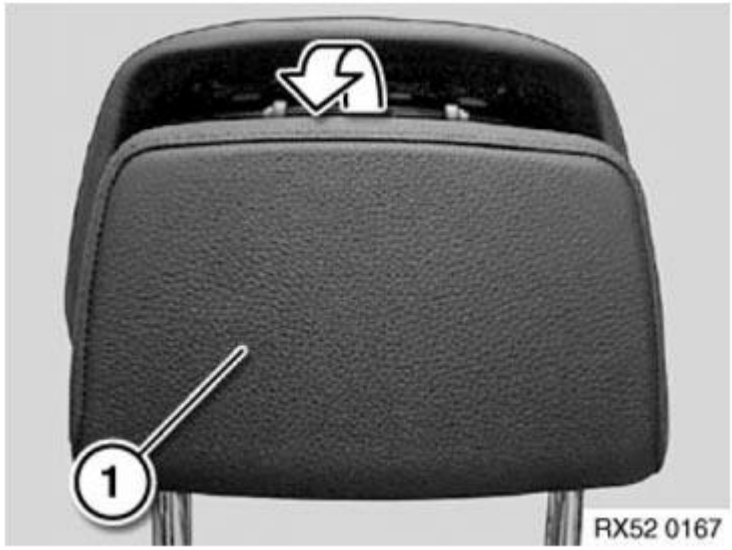


Fig. 51: Pulling Headrest Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Removing pyrotechnical device

Press together bracket (1) for pyrotechnical device at tabs.

Feed out pyrotechnical device.

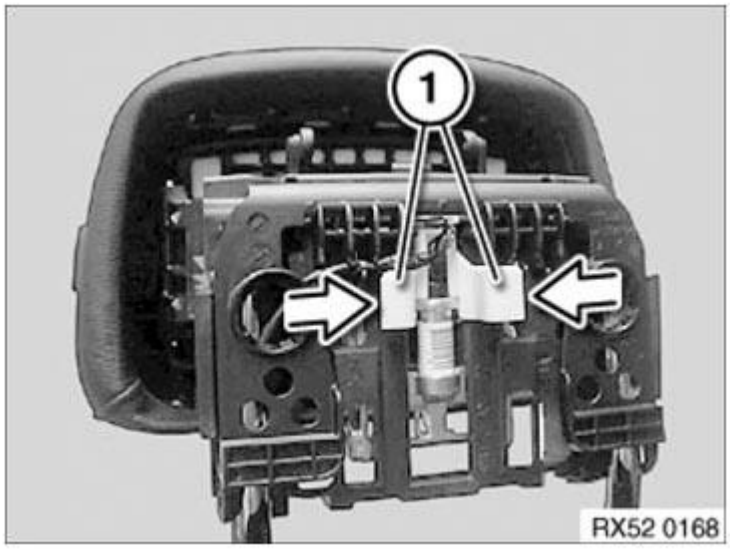


Fig. 52: Pressing Bracket For Pyrotechnical Device At Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Removing pyroactivator

Pull pyroactivator (2) out of mounting (1) for pyrotechnical device.

Unlock **PLUG CONNECTION** (3) and disconnect.

IMPORTANT: Dispose of plastic element and pyroactivator.

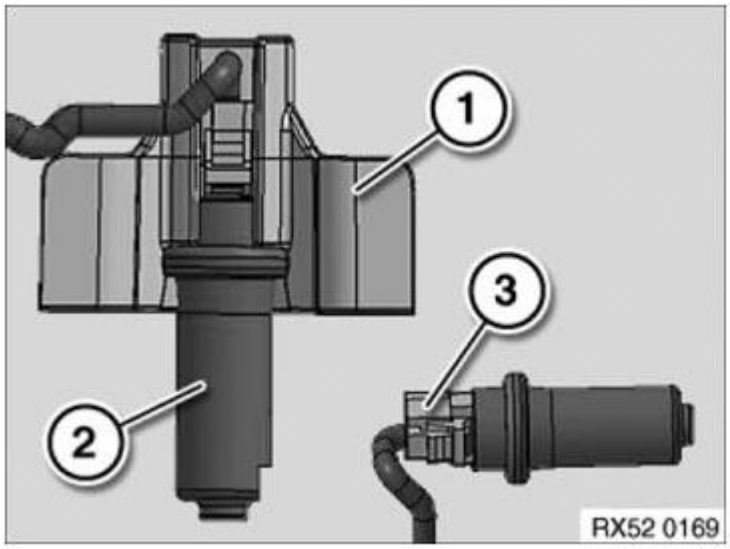


Fig. 53: Identifying Mounting Pyroactivator And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure for installing pyrotechnical device:

Bringing head restraint together - version without button (MFS)

Pull spring catches apart and push head restraint together.

Maintain position.

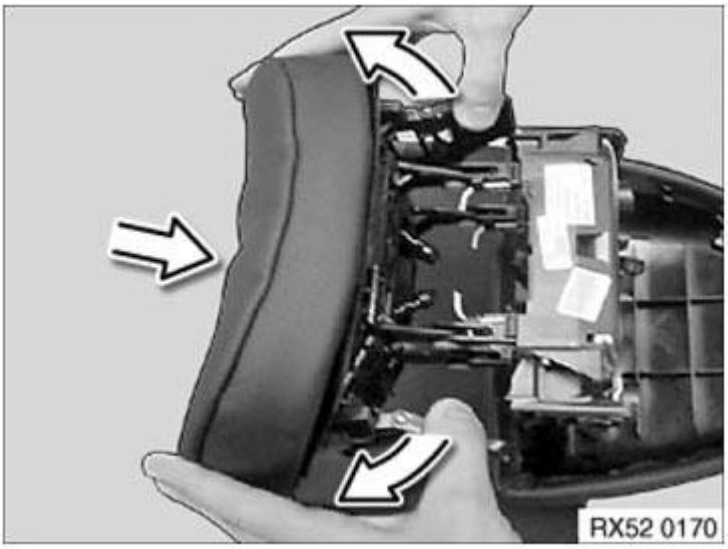


Fig. 54: Pulling Spring Catches Apart And Push Head
Courtesy of BMW OF NORTH AMERICA, INC.

Bringing head restraint together - version with button (Basic)

Press button (1) and push head restraint together.

Maintain position.

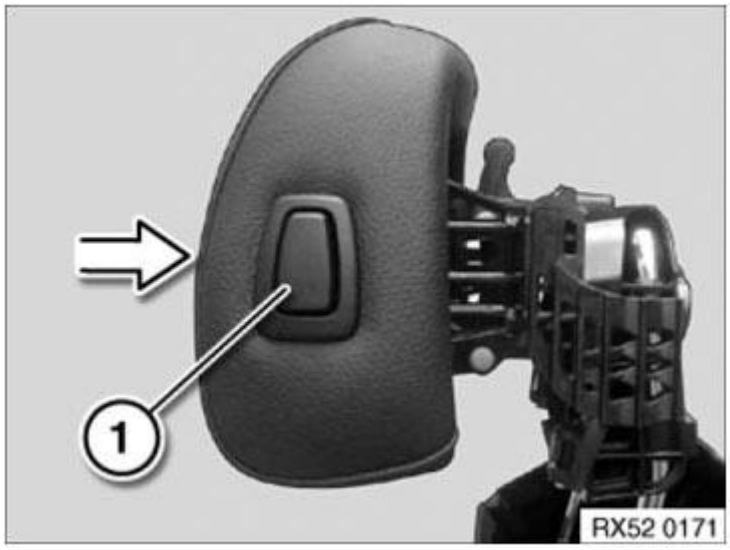


Fig. 55: Pressing Button And Push Head Restraint
Courtesy of BMW OF NORTH AMERICA, INC.

Locking release plate

Hold pushed-together head restraint in position and push release plate (1) upwards up to stop.

Release plate (1) must audibly snap into place.

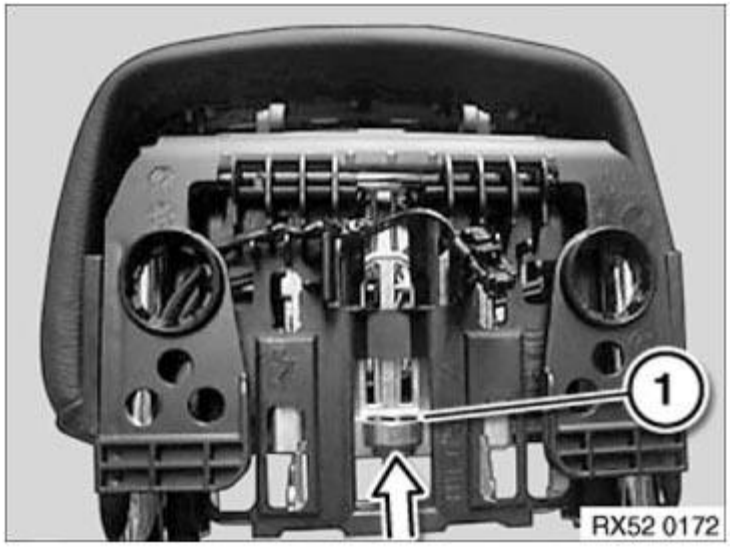


Fig. 56: Pushing Release Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Checking head restraint lock

Check end position of release plate (1).

All four springs must be engaged (snapped into place).

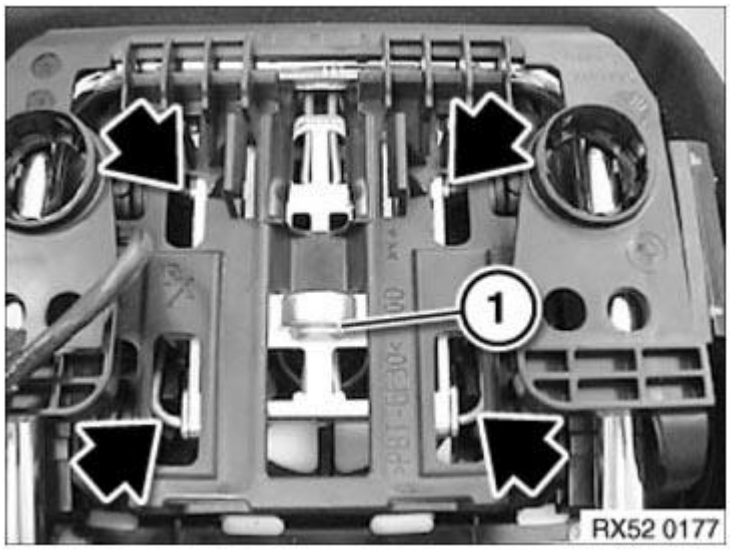


Fig. 57: Checking Head Restraint Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing pyrotechnical device

Connect connector (1) to new pyroactivator (2) and **LOCK** .

Clip pyroactivator (2) into new mounting (3).

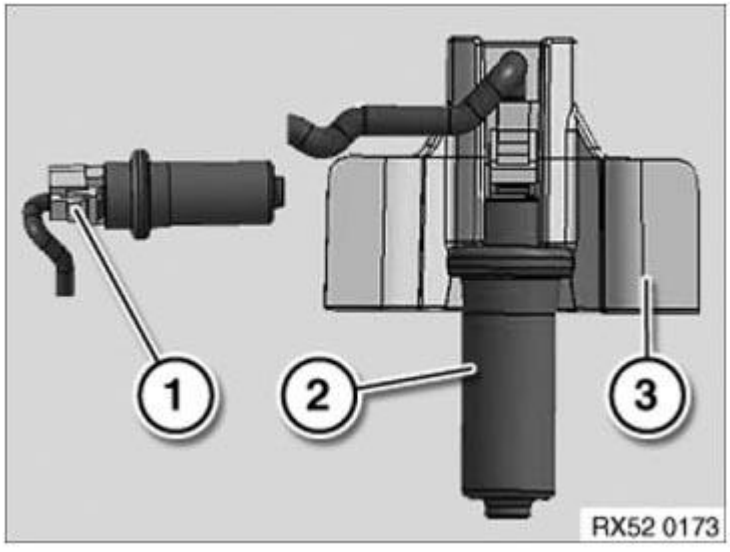


Fig. 58: Identifying Connector, Pyroactivator And Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Installing pyrotechnical device

Press together bracket for pyrotechnical device at tabs.

Insert bracket for pyrotechnical device into release plate and tilt in upward direction.

Bracket for pyrotechnical device must audibly snap into place.

NOTE: Check seating of retaining lugs in bracket.

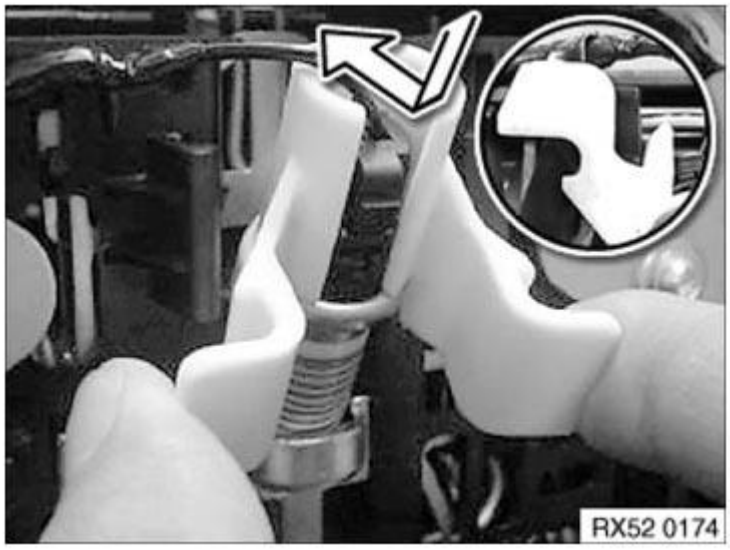


Fig. 59: Pressing Bracket For Pyrotechnical Device
Courtesy of BMW OF NORTH AMERICA, INC.

Laying wiring harness

Secure wiring harness in carrier section with strain relief.

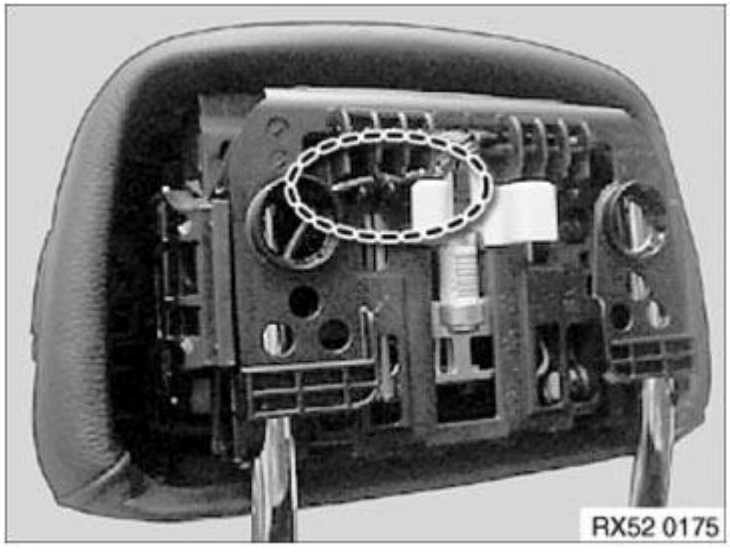


Fig. 60: Identifying Wiring Harness On Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Mounting cover

Clip cover onto carrier section.

Cover must audibly snap into place.



Fig. 61: Mounting Cover Onto Carrier Section
Courtesy of BMW OF NORTH AMERICA, INC.

52 14 886 REPLACING GAS CARTRIDGE FOR CRASH-ACTIVE HEADREST ON LEFT OR RIGHT (FROM 09/2010)

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt tensioners.

Incorrect handling may result in triggering of the crash-active headrest and thereby cause injury.

Switch off the ignition!

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE CABLE**
- Adjust head restraint towards top to maximum extent
- A second person is required for this task

IMPORTANT: Renewal of pyrotechnics may be carried out up to 5 times.

Triggering frequency is denoted on the sticker on the head restraint carrier.

Labels are available as spare parts.

Starting situation:

Head restraint is in the crash position after activation.



Fig. 62: Identifying Head Restraint In Crash Position After Activation
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip the pushbutton (1).

NOTE: Preloaded spring behind pushbutton.

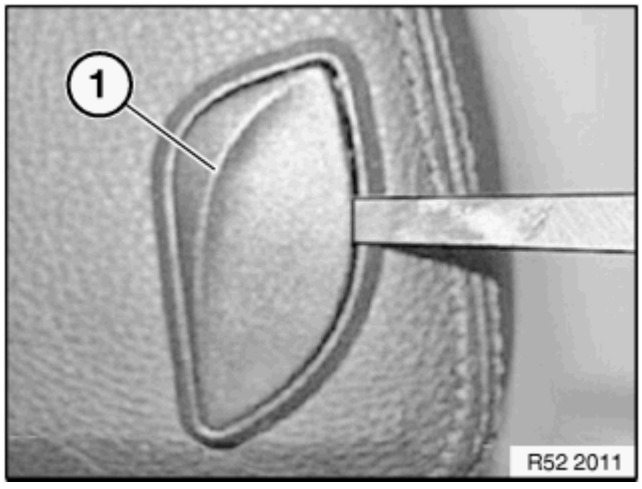


Fig. 63: Unclipping Pushbutton
Courtesy of BMW OF NORTH AMERICA, INC.

Removing cover:

Press the cover (1) at the top and bottom simultaneously and pull towards rear.

First the left-hand side, then the right-hand side.

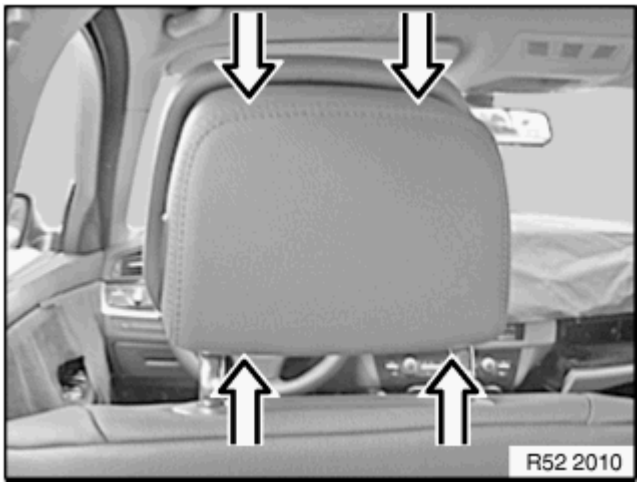


Fig. 64: Removing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnecting the pyrotechnical unit:

Unlock plug connection (1) **AND DISCONNECT**.

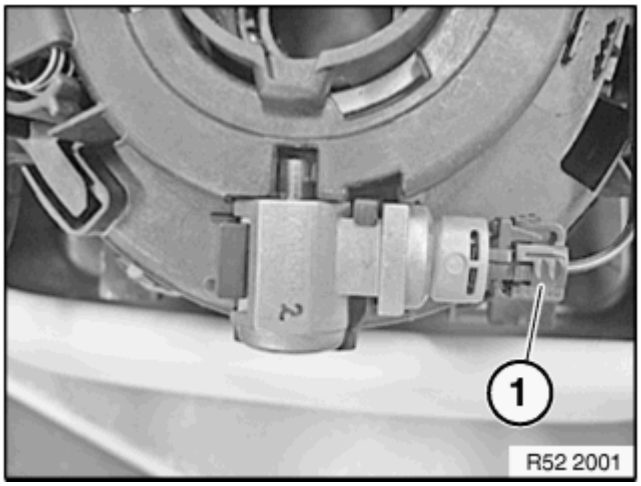


Fig. 65: Identifying Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Removing pyrotechnical unit:

Unclip pyrotechnical unit (1) from the attachment points.

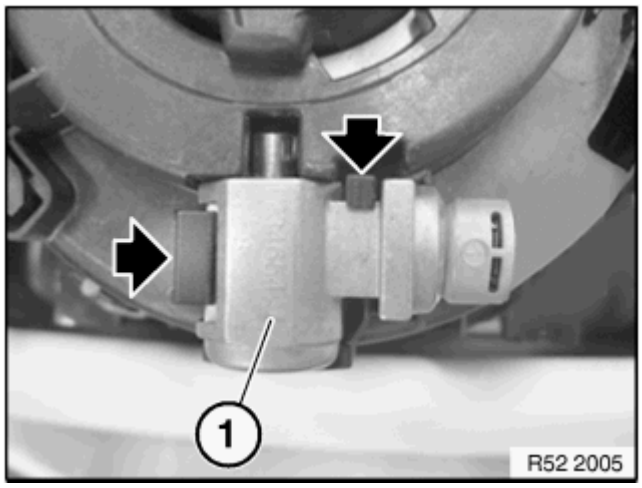


Fig. 66: Identifying Pyrotechnical Unit And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure for installing pyrotechnical unit:

Bringing head restraint together:

Pull out the complete release mechanism for pushbutton with a screwdriver (1).

Hold position of release mechanism.

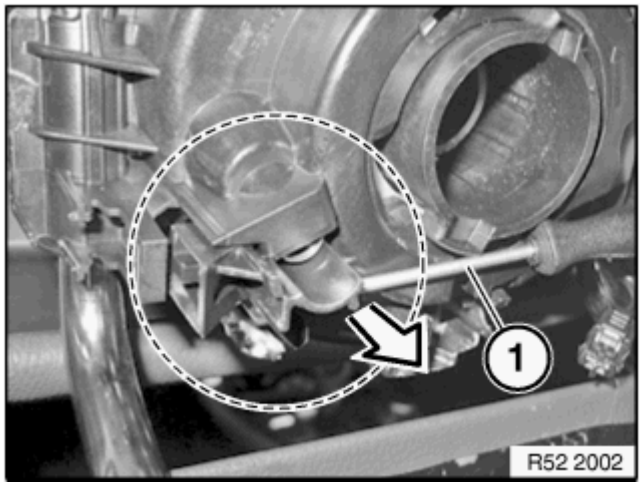


Fig. 67: Pulling Out Complete Release Mechanism For Pushbutton With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A second person is required for this task.

Firmly press the front section of the head restraint (1) towards rear until limit position.

Keep position pressed.

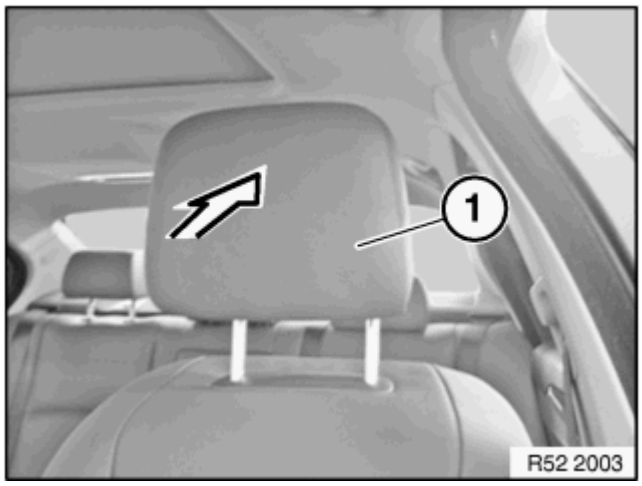


Fig. 68: Pressing Front Section Of Head Restraint Towards Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Press the head restraint until the marked deployment range of the pyrotechnical unit is uncovered.

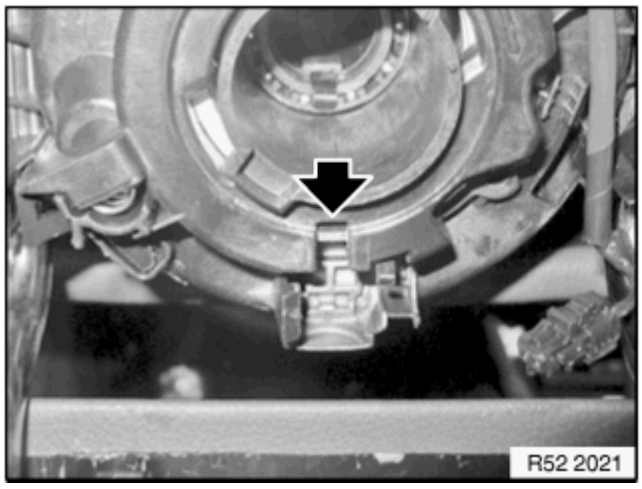


Fig. 69: Identifying Deployment Range
Courtesy of BMW OF NORTH AMERICA, INC.

Inserting the pyrotechnical unit:

Insert cotter pin of pyrotechnical unit (1) in the uncovered area.

Firmly clip in the pyrotechnical unit (1).

Installation note:

Make sure the pyroactivator is correctly seated in the latch mechanism.

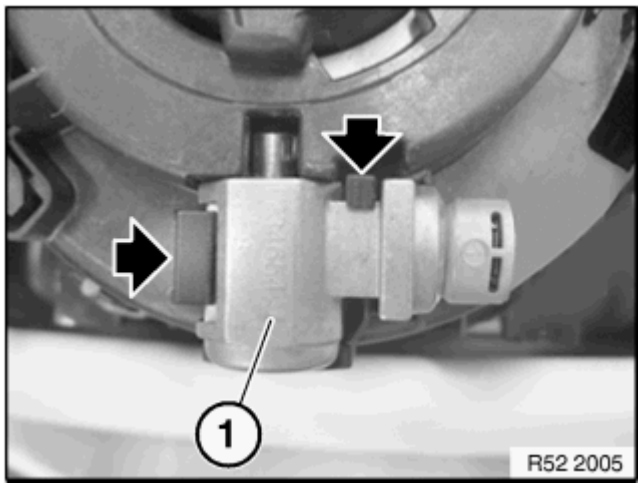


Fig. 70: Inserting Pyrotechnical Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Laying wiring harness:

Secure wiring harness (1) in carrier section with strain relief.

CONNECT AND LOCK plug connection.

Make sure once again that the pyrotechnical unit (1) is correctly seated in the retaining lugs.

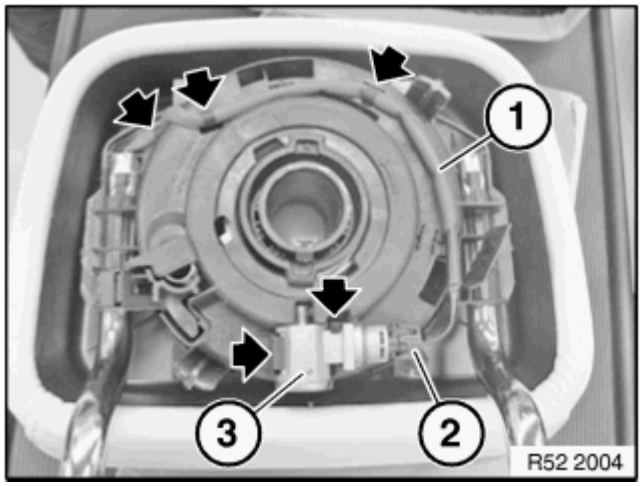


Fig. 71: Laying Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Mounting cover:

Clip cover onto support section.

Fit the cover and listen for it to snap into place on the left and right.

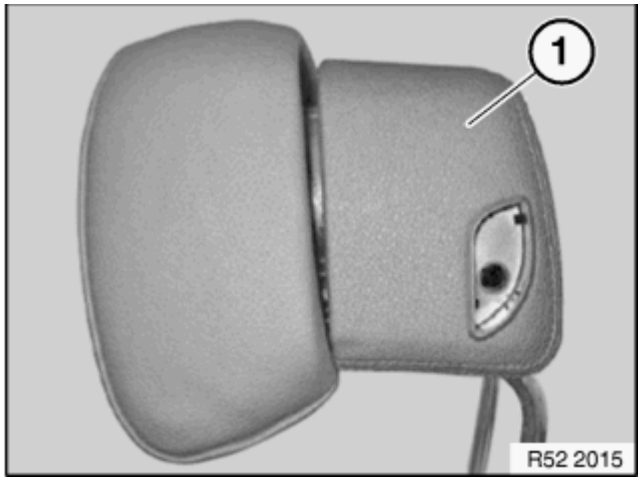


Fig. 72: Installing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Mounting the pushbutton:

Insert the pushbutton with spring.

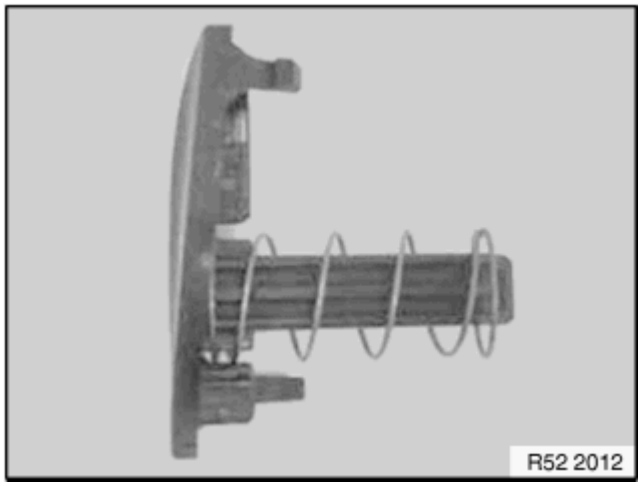


Fig. 73: Installing Pushbutton
Courtesy of BMW OF NORTH AMERICA, INC.

Perform function check:

Check the comfort adjustment.

Installation note:

Correct assembly can be checked by looking at the distance between the front section of the head restraint and the pushbutton.

Move the front section in completely and compare the distance.

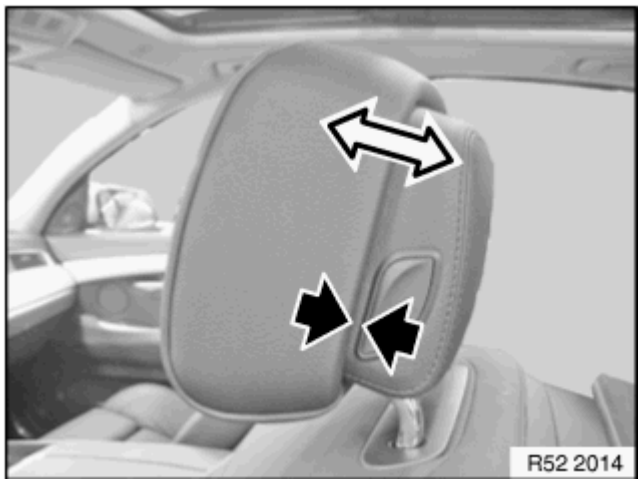


Fig. 74: Performing Function Check
Courtesy of BMW OF NORTH AMERICA, INC.

72 SAFETY PRECAUTIONS AND GENERAL INFORMATION

Notes on safety

- **SAFETY REGULATIONS** for handling airbag modules, airbag components and pyrotechnical seat belt tensioners

  - >

- **NOTES ON SCRAPPING** vehicles with gas generators

  - >

- **DEACTIVATION/ACTIVATION PYROTECHNICAL COMPONENTS**

  - >

Handling electrical and electronic equipment

- **UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS**

  - >

- **REPAIRING AIRBAG LINES**

  - >

- **HANDLING OPTICAL FIBRES**

  - >

Check

- **CHECK SEAT BELT**

  - >

- **CHECK LIST FOR SEAT BELT**

  - >

Airbag system

- Functional description and checking, refer to Diagnosis system

  - >

- **DEACTIVATING AIRBAGS**

  - >

- **PROCEDURE AFTER AIRBAG DEPLOYMENT** .

  - >

Active pedestrian protection AFGS

- **PROCEDURE AFTER ACTUATOR TRIGGERING**

- >

72 00... SAFETY REGULATIONS FOR HANDLING COMPONENTS WITH GAS GENERATORS

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

IMPORTANT: Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)

- Buckle/belt tensioner
- Head airbag
- Active knee protection
- Active head restraint
- Safety battery terminal

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1.

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Dismantling and installation

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
  - 30 minutes for vehicles up to 9/93;
  - 1 minute for vehicles from 9/93
- In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.
- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75°C.
- Airbag system components, including electronic diagnostic components, which have been dropped from

- Before installing, subject components such as housing, connector pins, etc. of the airbag system (including diagnosis electronics) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the BMW ISTA.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing upwards. Otherwise the generator will be thrown upwards if it is fired.
- Do not point the ignition squib of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.
- When carrying out straightening and welding work with an electric welder:
  - Disconnect battery
  - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module - wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.

72 12... UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS

WARNING: READ AND COMPLY WITH safety regulations for handling airbag modules and pyrotechnical belt tensioners.

IMPORTANT: An airbag plug connection must be replaced if it is damaged.

Sourcing reference for airbag repair instructions (with plug connection), refer to BMW Parts Service.

Following versions of plug connections on airbag module/gas generator are possible:

- Airbag plug connection on gas generator/airbag module is offset by 90°
- Airbag plug connection on gas generator/airbag module is straight (3 versions)

Airbag plug connection on gas generator/airbag module offset by 90°

There are two ways of unlocking this airbag plug connection on the gas generator/airbag module:

Method 1:

Simultaneously pull cover (1) upwards at lugs on left and right (2).

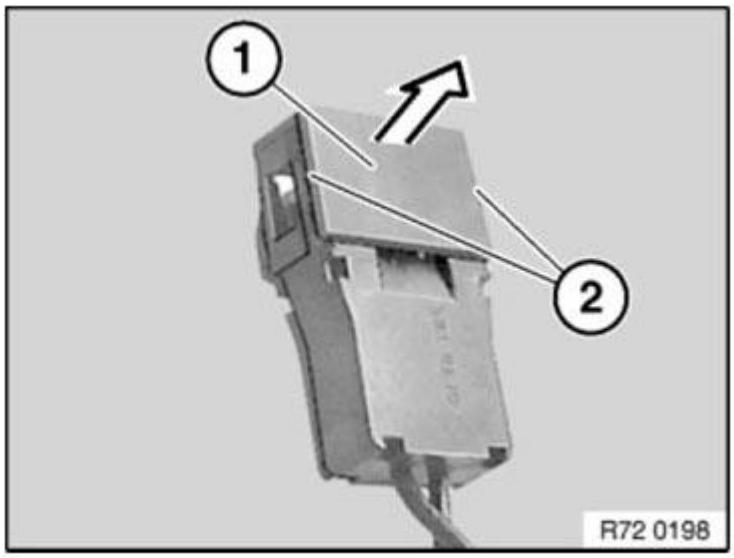


Fig. 75: Pulling Cover At Lugs On Left And Right
Courtesy of BMW OF NORTH AMERICA, INC.

Method 2:

Insert a narrow screwdriver into recess (1) in housing (2).

Carefully pinch cover (3) off (4).

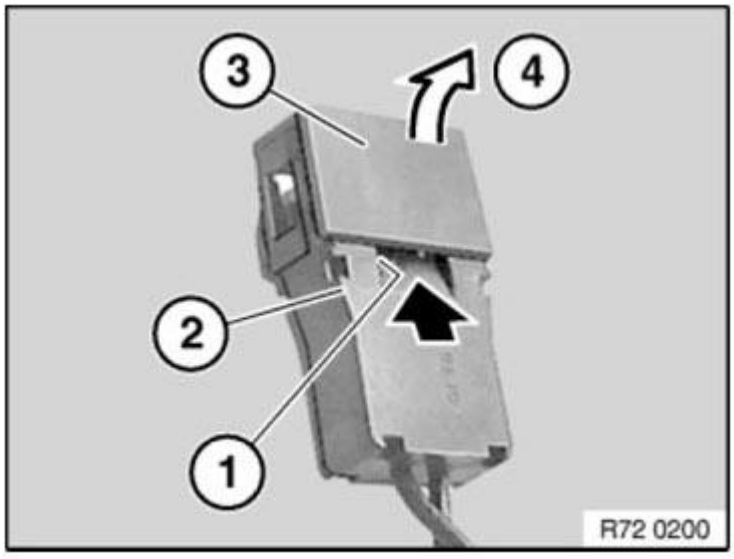


Fig. 76: Pressing Cover Off
Courtesy of BMW OF NORTH AMERICA, INC.

Cover (1) is not positioned higher than housing (2).

The airbag plug connection is unlocked and can now be detached from the gas generator/airbag module.

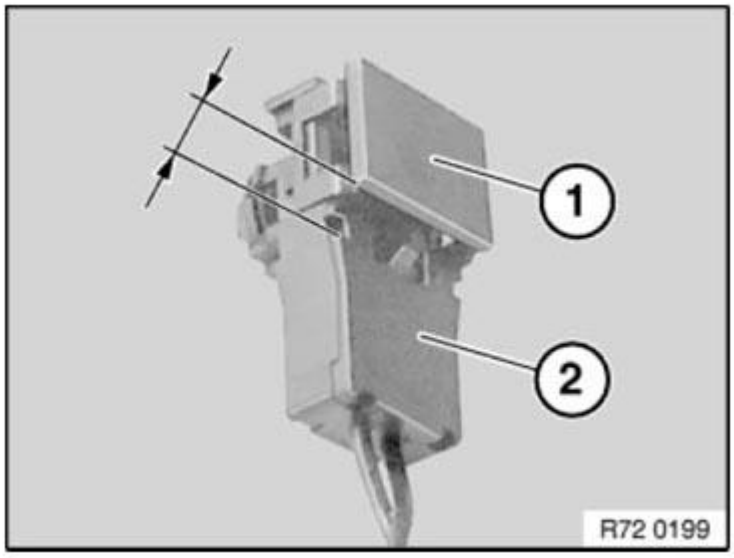


Fig. 77: Identifying Cover And Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

After attaching airbag plug connection to gas generator/airbag module, press cover (1) downwards until it rests flat on housing.

Check that it catches properly.

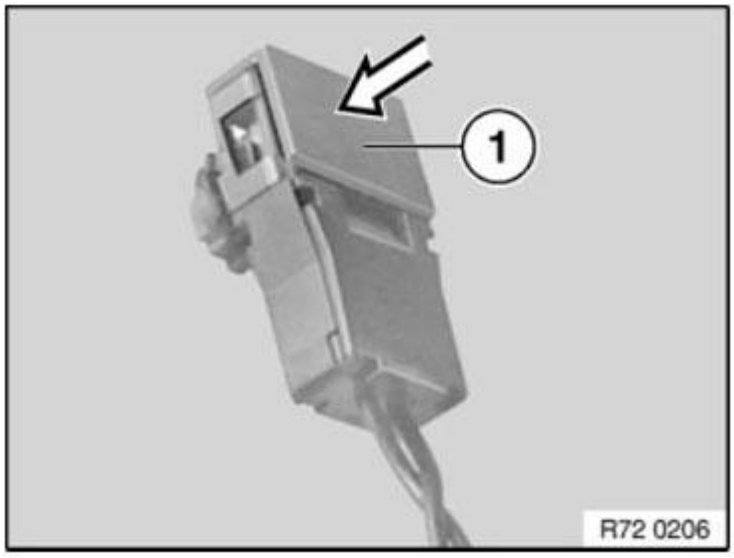


Fig. 78: Pressing Cover On Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Airbag plug connection on gas generator/airbag module is straight (2 versions)

Version 1:

Press locking/unlocking plate (1) at edge (4).

Locking/unlocking plate (1) snaps upwards at opposite edge (3) and releases detent lug (2).

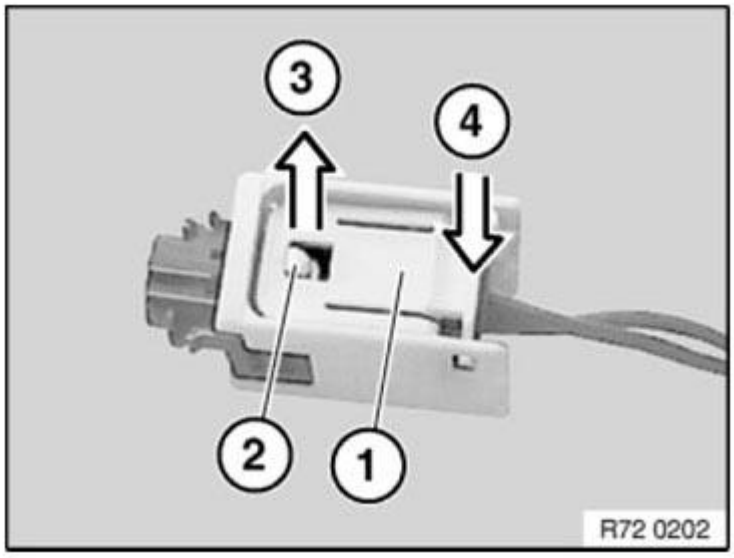


Fig. 79: Pressing Locking/Unlocking Plate At Edge
Courtesy of BMW OF NORTH AMERICA, INC.

The airbag plug connection is unlocked and can now be detached from the gas generator/airbag module.



Fig. 80: Identifying Airbag Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

After attaching airbag plug connection to gas generator/airbag module, check whether detent lug (2) is visible in opening of locking/unlocking plate (1).

Only if the detent lug (2) is visible will the airbag plug connection gas generator/airbag module be correctly engaged.

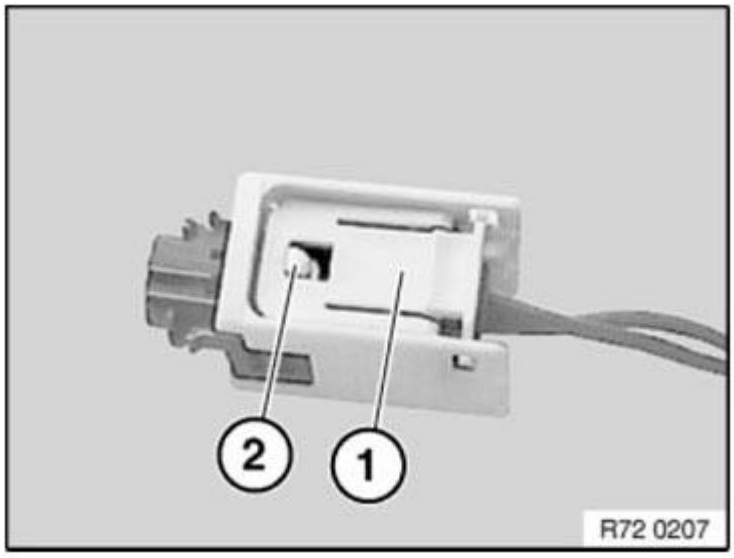


Fig. 81: Identifying Detent Lug And Locking/Unlocking Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Version 2:

Press locking/unlocking plate (1) on edge (3) and pull plug (2) out of plug housing (4).

Installation note:

Only if the detent lug is visible in opening (5) will the gas generator/airbag module plug connection be correctly engaged.

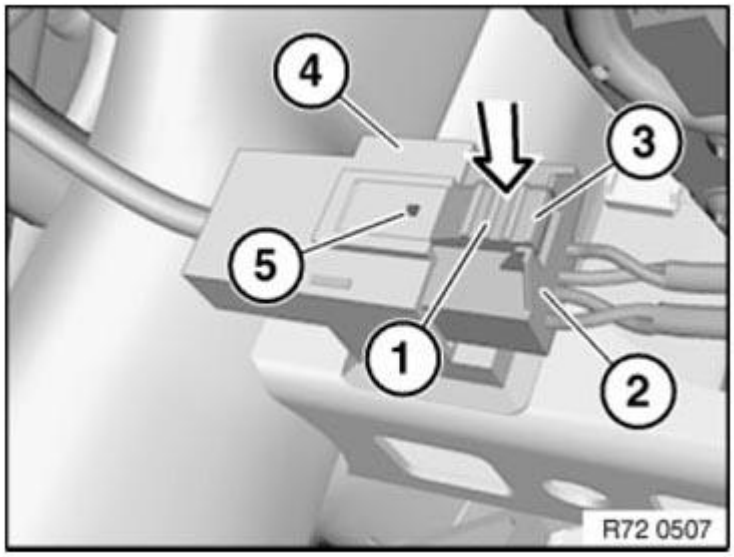


Fig. 82: Pressing Locking/Unlocking Plate On Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Version 3:

Press lock button (1) and pull out plug (2) up to initial engagement position.

Detach plug (2) from firing pellet.

Installation note:

Insert plug connection in initial engagement position in gas generator/airbag module and engage in final engagement position.

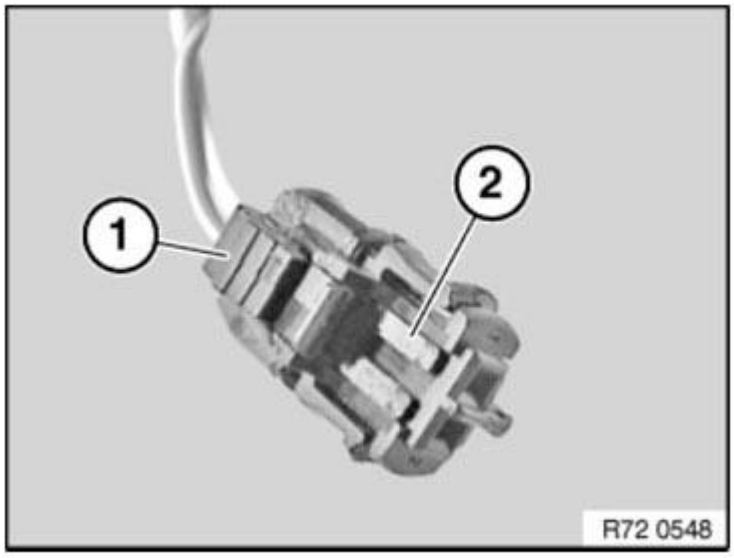


Fig. 83: Identifying Lock Button And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Illustration of version 3 with gas generator:

A. Initial engagement position
B. Final engagement position

1. Lock button
2. Gas generator

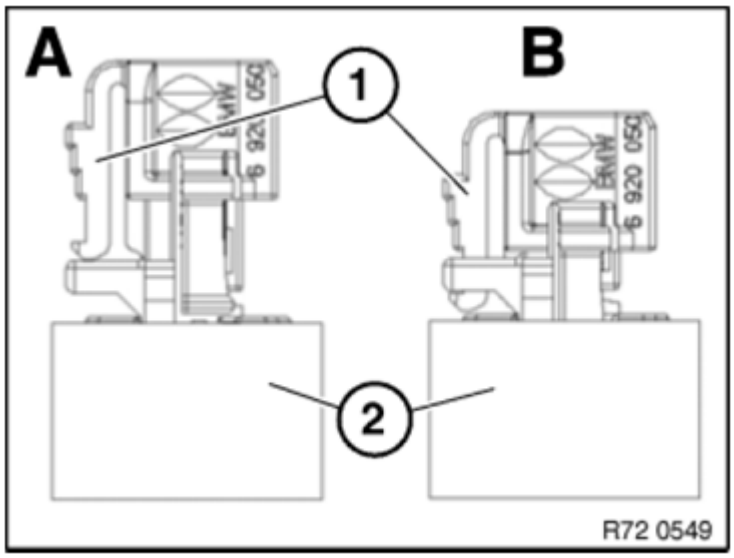


Fig. 84: Identifying Lock Button And Gas Generator
Courtesy of BMW OF NORTH AMERICA, INC.

Version 4 - Crash-active head restraint:

Press locking clip at edge and disconnect plug (1).

Installation note:

Check for correct engagement.

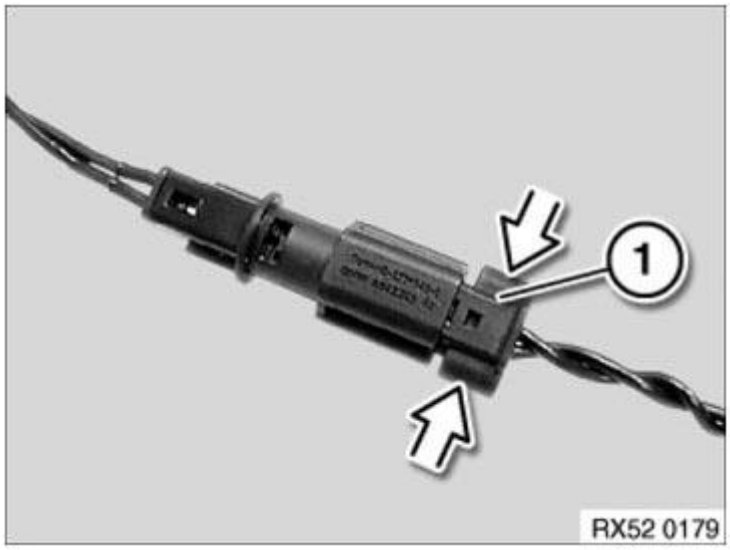


Fig. 85: Pressing Locking Clip
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES & EQUIPMENT

Seats - Operating Fluids

1.0 SEAT LEATHER CARE

"Karneol" leather care cleans the leather upholstery of mild stains or dirt. It also provides conditioners to prevent drying out. Not suitable for suede.

BMW Part No. 81 22 9 400 901.

2.0 PREMIUM LEATHER CARE KIT

BMW Part No. 81 11 024 455.

ACCESSORIES AND BODY, CAB

Seats - Special Tools

52 SEATS

520000 ADAPTER CABLE

0496537 520000 Adapter cable MW

Note: (Adapter cable OC3) OC3 mat in conjunction with ISTA --> action only USA and Canada



Fig. 1: Identifying Adapter Cable (520000)
Courtesy of BMW OF NORTH AMERICA, INC.

520070 HOOK

0494627 520070 Minimum set: Mechanical tools Hook MW

Note: (Release hook) For removing the head restraint guides

Storage Location

B47

A47

SI number

01 08 03 (988)

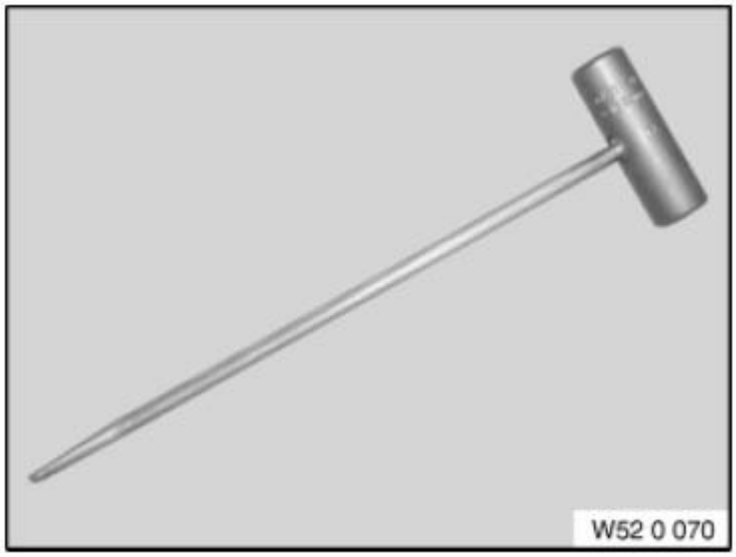


Fig. 2: Identifying Hook (520070)
Courtesy of BMW OF NORTH AMERICA, INC.

520050 PLIERS

0492668 520050 Pliers MW

Note: For securing clamps on seat cover

Storage Location

A13

SI number

52 06 87 (808)



W52 0 050

Fig. 3: Identifying Pliers (520050)
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Seats - Tightening Torques

FRONT SEATS

52 10 FRONT SEATS

TIGHTENING TORQUE SPECIFICATION - FRONT SEATS

		Type	Thread	Tightening specifications	Dimension
1AZ	Seat to floor panel	F01/F02/F03/F04/F07/F10/F11	M 10 (trilobular)	Replace Powerlock screw (self-locking)	43 Nm
		F12/F13	M 10 (trilobular)	Replace Powerlock screw (self-locking)	38 Nm
2AZ	Backrest frame to seat frame	F01/F02/F03/F04/F07/F10/F11	(trilobular)	Replace Powerlok screw	31 Nm
		F12/F13	M 8		24 + 4 Nm
3AZ	Active head restraint - Sliding rails with gas cartridge	F01/F02/F03/F04/F07/F10/F11			8 Nm
4AZ	Support for electrical operating unit	F01/F02/F03/F04/F07/F10/F11			8 Nm
5AZ	Cover to seat	F01/F02/F03/F04/F07/F10/F11			4 Nm
6AZ	Seat rails to seat frame	F01/F02/F03/F04/F07/F10/F11			27 ± 3 Nm
		F12/F13			54 + 4 Nm
7AZ	Adjusting switch to cover	F01/F02/F03/F04/F07/F10/F11			2 Nm
8AZ	Seat angle adjustment to seat mechanism	F01/F02/F03/F04/F07/F10/F11	M8x30		27 ± 3 Nm
9AZ	Seat depth adjustment	F01/F02/F03/F04/F07/F10/F11			3 + 0.5 Nm
		F12/F13			3, 2 + 4 Nm
10AZ	Gearbox for backrest upper section adjustment	F01/F02/F03/F04/F07/F10/F11			2.5 + 0.5 Nm
11AZ	Cushion carrier, seat depth adjustment	F01/F02/F03/F04/F07/F10/F11			6 Nm
12AZ	Belt deflector	F12/F13			3 + 2 Nm

REAR SEAT, ELECTRIC

52 25 REAR SEAT, ELECTRIC

TIGHTENING TORQUE SPECIFICATION - REAR SEAT, ELECTRIC

		Type	Thread	Tightening specifications	Dimension
1AZ	Centre armrest to body	F01/F02/F03/F04			18.5 Nm
2AZ	Screw connection, center armrest	F01/F02/F03/F04			6.5 Nm
3AZ	Fixture, center armrest	F01/F02/F03/F04			2.5 Nm
4AZ	Multifunction seat to partition wall	F01/F02/F03/F04		Hexagon nut and washer assembly, microencapsulated	18.5 Nm
5AZ	Screw connection, base frame, mechanism	F01/F02/F03/F04		Oval-head screw with retainer	18.5 Nm
		F01/F02/F03/F04		Hexagon nut and washer assembly, microencapsulated	18.5 Nm
6AZ	Four-bar lever to rear seat backrest	F01/F02/F03/F04			20 ± 2 Nm
7AZ	Seat rail to seat frame	F01/F02/F03/F04			28 ± 3 Nm
8AZ	Backrest frame to seat frame	F01/F02/F03/F04			20 ± 2 Nm

REAR SEAT, MANUAL

52 24 REAR SEAT, MANUAL

TIGHTENING TORQUE SPECIFICATION - REAR SEAT, MANUAL

		Type	Thread	Tightening specifications	Dimension
1AZ	Rear seat backrest and center armrest to body	F01/F02/F03/F10			18.5 Nm
2AZ	Screw connection, head restraint, middle	F01/F02/F03			6.5 Nm
3AZ	Screw connection, center armrest	F01/F02/F03			6.5 Nm
		F10			10 Nm
4AZ	Fixture, center armrest	F01/F02/F03			2.5 Nm
5AZ	Support structure for center armrest to backrest	F10			6 Nm
6AZ	Ski bag cover to backrest support structure	F01/F02/F03			2.5 Nm
7AZ	Backrest to bodyshell	F11/F12			18.5 Nm
8AZ	Backrest lock to bodyshell	F11/F12			18.5 Nm
9AZ	Screw connection, center mount	F11/F12			18.5 Nm
10AZ	Screw connection, through-loading facility operating unit	F11/F12			1.8 Nm
11AZ	Metal plate, armrest to bodyshell	F11/F12			36 Nm
12AZ	Metal plate, armrest to armrest	F11/F12			38 Nm
13AZ	Mounting, cassette ski bag	F11/F12			7.5 Nm

14AZ	Mounting, cassette ski bag	F11/F12			24 Nm
15AZ	Cover C module to frame ski bag	F11/F12			4 Nm

ACCESSORIES & EQUIPMENT

Sunroof and Convertible Top - Operating Fluids

1.0 CONVERTIBLE TOP MATERIAL

Cleaning Kit consists of three fluids for periodic maintenance of the top's outer surface:

- Car Shampoo

  For cleaning the entire convertible top. Add 2 to 3 capfuls of shampoo to 2.5 gallons of water. Rinse with clean water.

- Glass Cleaner

  Cleans the plastic rear window as well as the vehicle's glass windows. Spray on, wipe off with dry cloth.

- Impregnating Spray

After cleaning the top, apply this spray over a large area about 12 inches from the surface to seal the top against possible leaks.

Convertible Top Cleaning Kit

BMW Part No. 83 12 9 407 806

Impregnating Spray

BMW Part No. 83 12 9 407 802

2.0 CONVERTIBLE TOP REAR (PLASTIC) WINDOW

REAR WINDOW CLEANER

Meguiar's Mirror Glaze Professional Plastic Cleaner #17 removes hairline scratches on the surface.

BMW Part No. 82 14 1 467 128.

REAR WINDOW POLISH

Meguiar's Mirror Glaze Professional Plastic Polish #10 restores and maintains clarity, leaves surface static-free.

BMW Part No. 82 14 1 467 129

CONTACT CEMENT

Attaching soft top material to zip-out rear window trim plastic channel on E30 and E36 convertibles. (former BMW Part No. 81 22 9 407 524)

3M 1357 High Performance Contact Adhesive

3.0 CONVERTIBLE TOP STORAGE LID ADHESIVE

E30 and E36 Convertible top storage lid covering adhesive

3M™ Super Trim Adhesive Yellow Part No. 08090

4.0 CONVERTIBLE TOP SEALING FRAME ADHESIVE

() E36 Z3 Sealing Frame Adhesive

One roll of Bostik 3/4" x 1/8" Butyl Tape, available in cases of 12 rolls from Springfield Paper Specialties.

5.0 CONVERTIBLE TOP HYDRAULIC FLUID

BMW PART NUMBER SPECIFICATION

Model	BMW Part Number
E36/7	54 34 8 410 306
E46	54347117733
E52	54348234324
E85	54347117733
E64	54347717733
E93	54340394395

6.0 SUNROOF

Cassette Lubricant

BMW PART NUMBER SPECIFICATION

Wurth Glide Grease	Part No. 0893898

Loctite 380

5 Series Touring double panel sunroof repairs. (former BMW Part No. 81 22 9 407 394)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8155
Wurth	Part No. 893 4103
Loctite	Part No. 38050

ACCESSORIES AND BODY, CAB

Slide/Tilt Roof - Repair

5410 SUNROOF

54 00... REPAIR INSTRUCTIONS FOR BONDED SEALS

1. General information on handling rubber seal profiles

- If seals reveal partly detached protective film on delivery, they must not be bonded.
- Store seals at 5°C to 40°C.
- If, during the handling, the protective film has come off before bonding, it can still be bonded.
- Bonding at room and object temperature 25° ± 5°C. Temperatures between 40 and 50°C significantly increase initial adhesion.
- Seals, which are subjected to temperatures above 80°C after bonding, will be very difficult to remove.
- Maximum storage time for replacement: 2 years (expiry date must be indicated on the packaging)

2. Damage pattern and repair

2.1 Partially detached bond (rubber-adhesive tape or adhesive tape-paint)

- Up to 120 mm for reworking without auxiliary materials
- Up to 200 mm reworked with pressing-on tools on straight surfaces

a. Cleaning damaged areas:
   - Degrease adhesive area on painted side with solvent (e. g. isohexane or isopropanol, see BMW Parts Department) and remove other residue as well. Never use paint thinner!
   - This will usually partially destroy intact edge adhesive areas.
   - When removing, it is important to wipe off the adhesive area of the adhesive tape with a lint-free disposable cloth. (e.g. Kimtex blue, see BMW Parts Department)
   - Carefully wipe off the adhesive areas.

NOTE: **Use necessary cotton- or fluff-free paper towel once only.**

When using solvent: Observe the air drying time of > 1 minute.

Do not touch the adhesive area after cleaning.

b. Applying adhesive:
   - Apply the adhesive evenly and very thinly to the gasket and then to the painted area.
   - Observe the air drying time of 2-3 minutes.

NOTE: **Use the rubber profile adhesive (Terokal 2444 and thinner R)**

Maximum mixture ratio:

Adhesive: Thinner = 3 : 1

IMPORTANT: **Avoid contact with skin!**

Do not apply adhesive to visible painted surfaces.

c. Pressing on rubber seal:
   - Press down gasket using contact pressure (forced pressure not necessary) for at least 1 minute.

IMPORTANT: **Load can only be applied to the bond after a period of 2 minutes. This waiting time is absolutely essential.**

2.2 Larger defects (mechanical damage and larger separations of seal)

- Complete replacement of rubber seal necessary. See **5412117 REPLACING SEAL FOR GLASS SLIDE/TILT SUNROOF LID**.

a. Peeling off damaged rubber seal:
   - Beginning at the stop, the gasket with the adhesive tape is slowly separated from the paint.

The gasket is slowly pulled off at an angle of approx. 20° while applying constant force.

Pay attention to the constriction of the adhesive tape.

NOTE: **Make sure the connection between adhesive tape and gasket is retained.**

When the adhesive tape separates from the gasket, the adhesive tape remaining on the paint must be fully separated at one location by approx. 10 mm until it is easy to grip.

Pull off the adhesive tape by pulling strongly at an angle of approx. 20°.

When existing gaskets are being peeled off with a hot air blower: Do not damage paintwork.

Do not detach rubber-adhesive tape connection if at all possible.

b. Cleaning bonding surface:
   - Dissolve and wipe away adhesive tape remnants with a disposable cloth soaked in solvent or benzine.

Wear protective gloves.

- Before reapplying adhesive, degrease adhesive area on painted side with solvent (e. g. isohexane or isopropanol) and remove other residue as well. Never use paint thinner!
- Carefully wipe off the adhesive area.

NOTE: Use necessary cotton- or fluff-free paper towel once only.

When using solvent: Observe the air drying time of > 2 minutes.

Do not touch the adhesive area after cleaning.

c. Prepare gasket:

d. Detaching protective film from bonding surface:
   - Pull off the protective film off of the new gasket by approx. 15 cm using the tab.

IMPORTANT: Once the protective film has been removed, do not under any circumstances touch the exposed bonding surface.

e. Applying rubber seal:
   - Attach gasket on roof aperture edge beginning at rear center. Use upper lip as reference edge.

Press on the gasket by hand while pulling off the liner at the same time.

Compress the gasket the corners; never stretch it. (critical area)

NOTE: If positioned incorrectly, the gasket can still be pulled off, repositioned and pressed on again.

Always ensure that you do not touch the bonding surface with your fingers or contaminate it in any way.

f. Establishing sealing joint:
   - Where the beginning and end meet, a mark is created from pressing the loose end onto the beginning of the gasket.
   - Cut off the gasket vertically along the marked line (use sharp knife or special scissors) and press in place.
   - Visually check the pre-bonded gasket.

NOTE: Small areas of gasket can remain stuck to adhesive tape of loose end.

g. Pressing on gasket:
   - Press on the gasket with the hand roller

- Adhesive tape width up to 5 mm Contact pressure approx. 5 N
- Adhesive tape width up to 10 mm Contact pressure approx. 10 N
- Press gasket down firmly with a hand roller. Contact pressure > or = 70 N.

Slide/tilt sunroof gasket only:

NOTE: **Firm thumb pressure has approx. 30 N/cm^2**

3. Checking rubber seal

- Check the bonded gaskets for correct positioning and perfect adhesion. The bonding can be checked by pressing back the sealing lip.
- The force required to peel off the gasket immediately after bonding must be greater than 10 N/cm.

5412 MECHANICAL SUN ROOF COMPONENTS

54 12 003 ADJUSTING GLASS SLIDE/TILT SUNROOF COVER

Ideal setting

- **Distance:**
  - Distance (A) between lid and roof at front and rear must be the same.
  - Insert special tool 00 9 341 between gasket and cover.

This check (sliding in and pulling out the special tool) must be subject to tightness

- **Height:**
  - Front - flush to 1 mm deeper
  - Rear - flush to 1 mm higher

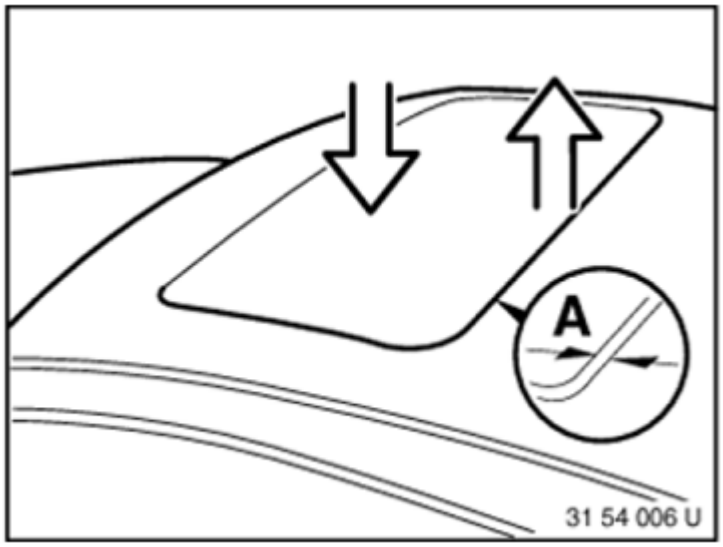


Fig. 1: Identifying Distance Between Lid And Roof At Front And Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting the glass slide/tilt sunroof cover

Remove **GAITER** on left and right.

Close glass slide/tilt sunroof cover again (zero position).

Slacken screws (1) on left/right little by little.

Until glass slide/tilt sunroof cover (2) can still just be moved.

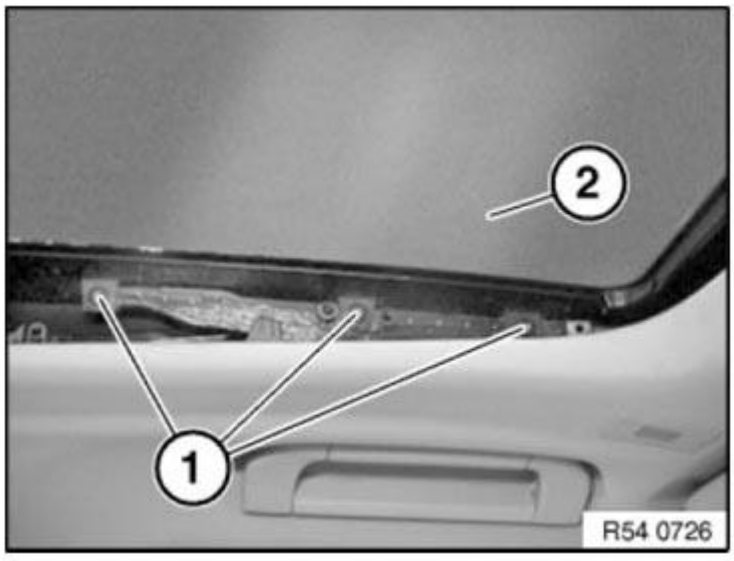


Fig. 2: Identifying Sunroof Cover With Screws

Height adjustment

Adjust height of glass slide/tilt sunroof cover (1) to roof (2) using special tool **00 9 315** (gap dimension wedge).

Press glass slide/tilt sunroof cover at front and rear up or down until ideal position is reached.

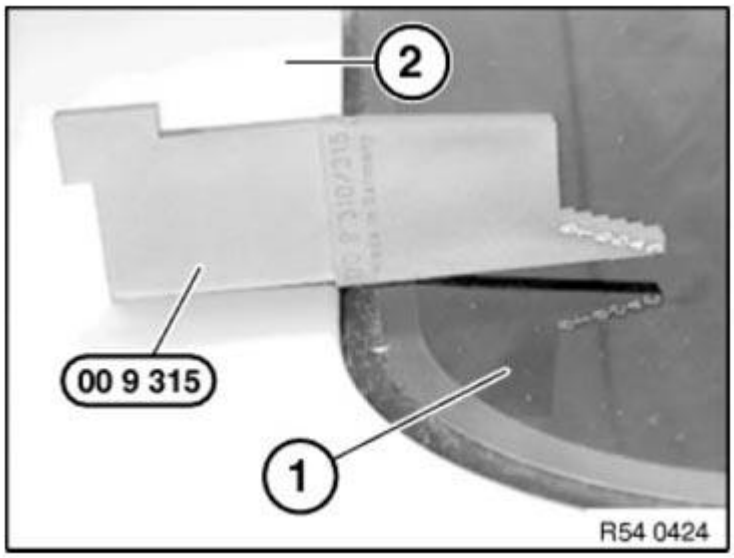


Fig. 3: Adjusting Height Of Glass Slide To Roof Using Special Tool 00
Courtesy of BMW OF NORTH AMERICA, INC.

Distance setting

Slide glass slide/tilt sunroof cover towards front/rear until ideal position is obtained.

When the ideal setting is reached:

- Tighten screws (1)

  Tightening torque: **54 12 2AZ** .

- Check function and adjustment of glass slide/tilt sunroof cover (2).
- Carry out **INITIALIZATION**

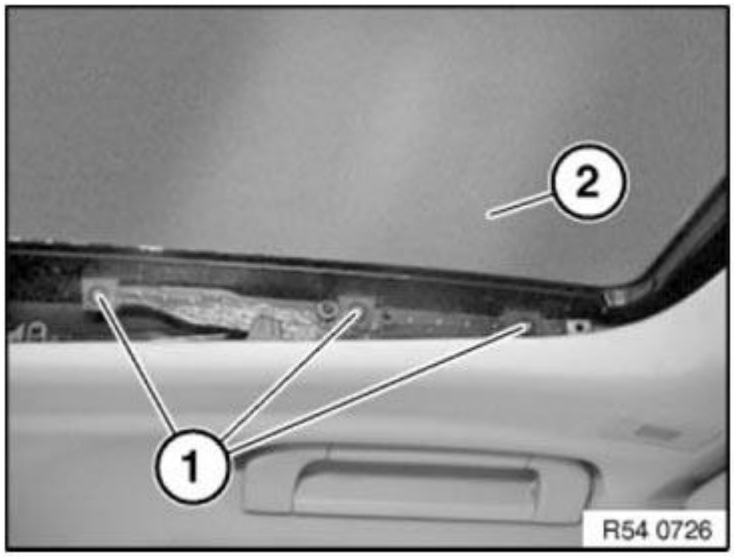


Fig. 4: Identifying Sunroof Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

54 12... OPENING OR CLOSING GLASS SLIDE/TILT SUNROOF (MANUALLY AND IN EVENT OF A TECHNICAL FAULT)

In event of a technical fault in drives:

- Replace drive with gearing at front or rear. See **6761005 REMOVING AND INSTALLING/RENEWING DRIVE WITH GEARBOX (FRONT) FOR ACTUATING SLIDE/TILT SUNROOF** or **6761007 REMOVING AND INSTALLING/REPLACING DRIVE WITH GEARBOX (REAR) FOR ACTUATING SLIDE/TILT SUNROOF (REAR)** .

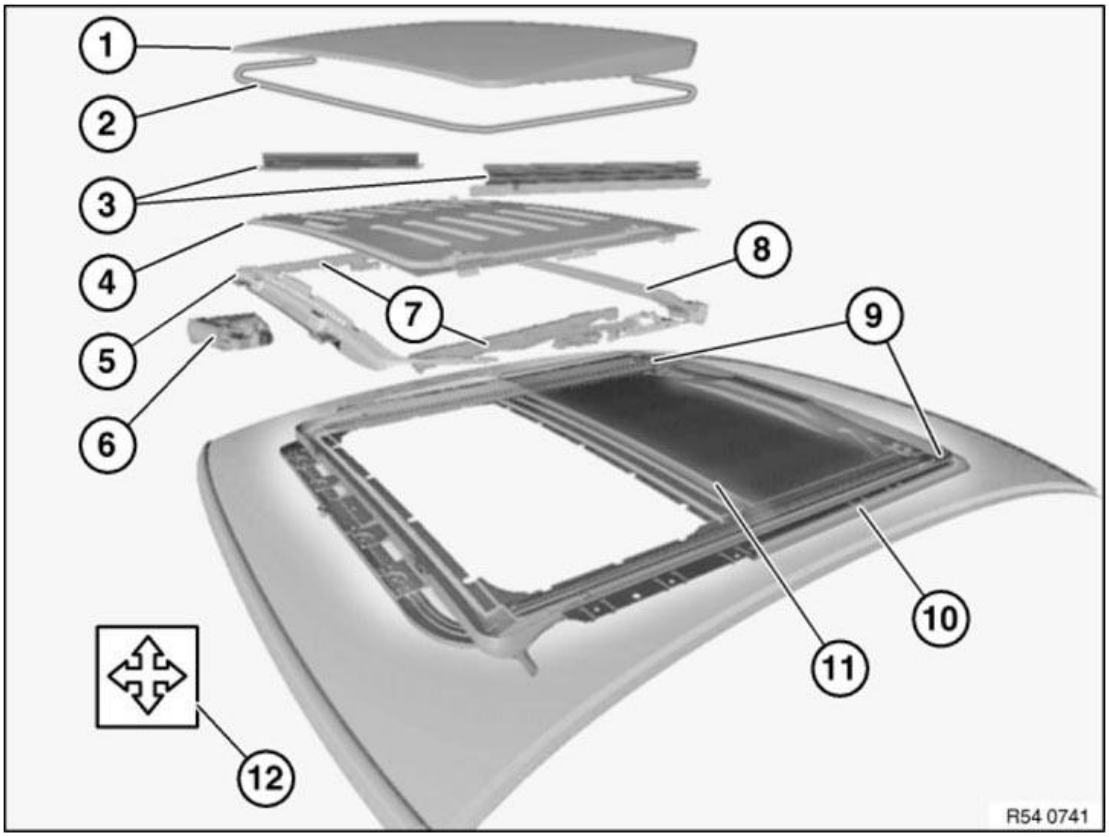
Manually opening or closing:

Necessary preliminary work

- Remove **ROOF SWITCH CLUSTER**

Initiate manual movements of guide element via the drives using an offset hexagon socket key.

54 12... OVERVIEW OF GLASS SLIDE/TILT SUNROOF



1	Glass slide/tilt sunroof cover	7	Mechanism: actuator/spacer
2	Seal for slide/tilt sunroof lid	8	Water gutter
3	Gaiter	9	Corner section, rear
4	Sliding trim	10	Seal for frame
5	Wind deflector	11	Glass slide/tilt sunroof (frame)
6	Drive unit	12	Adjustment, initialization

Fig. 5: Identifying Components Of Glass Slide/Tilt Sunroof
Courtesy of BMW OF NORTH AMERICA, INC.

54 12 211 REMOVING AND INSTALLING COMPLETE GLASS SLIDE/TILT SUNROOF (FRAME)

Necessary preliminary work

- Remove **HEADLINING**

NOTE:

- **Fold back both front seat backrests completely towards rear**
- **Remove glass slide/tilt sunroof with aid of a second person.**

Installation note:

- Powerlok screws must be replaced and must **not** be reused
- Powerlok screws are mechanical screw locks with trilobular threads

Unlock plug connection (1) from front drive and disconnect.

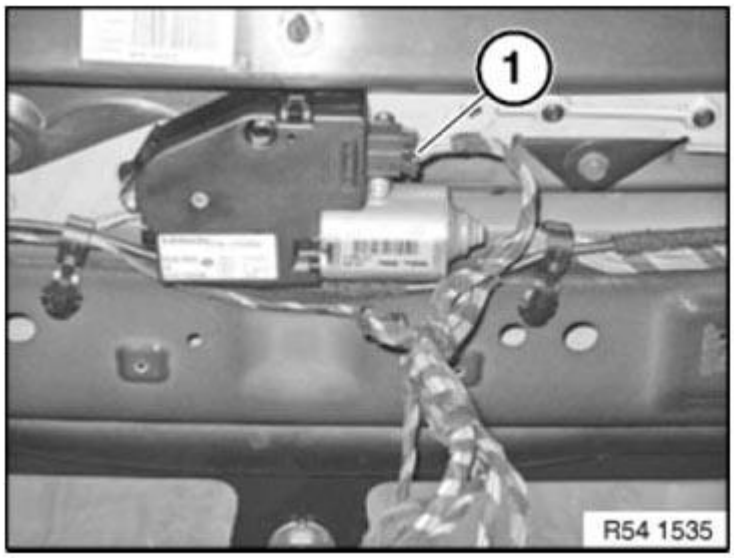


Fig. 6: Identifying Plug Connection Of Front Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Unclip all cable clips.

Installation note:

If necessary, replace cable clips.

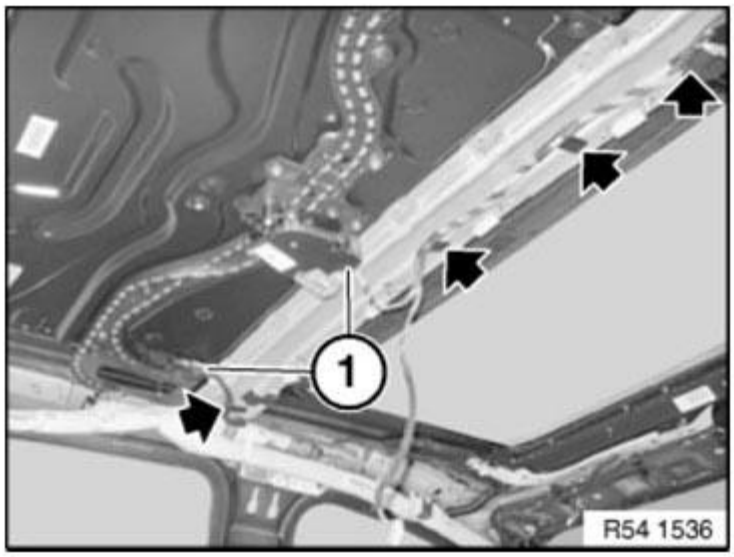


Fig. 7: Locating Cable Clips

Courtesy of BMW OF NORTH AMERICA, INC.

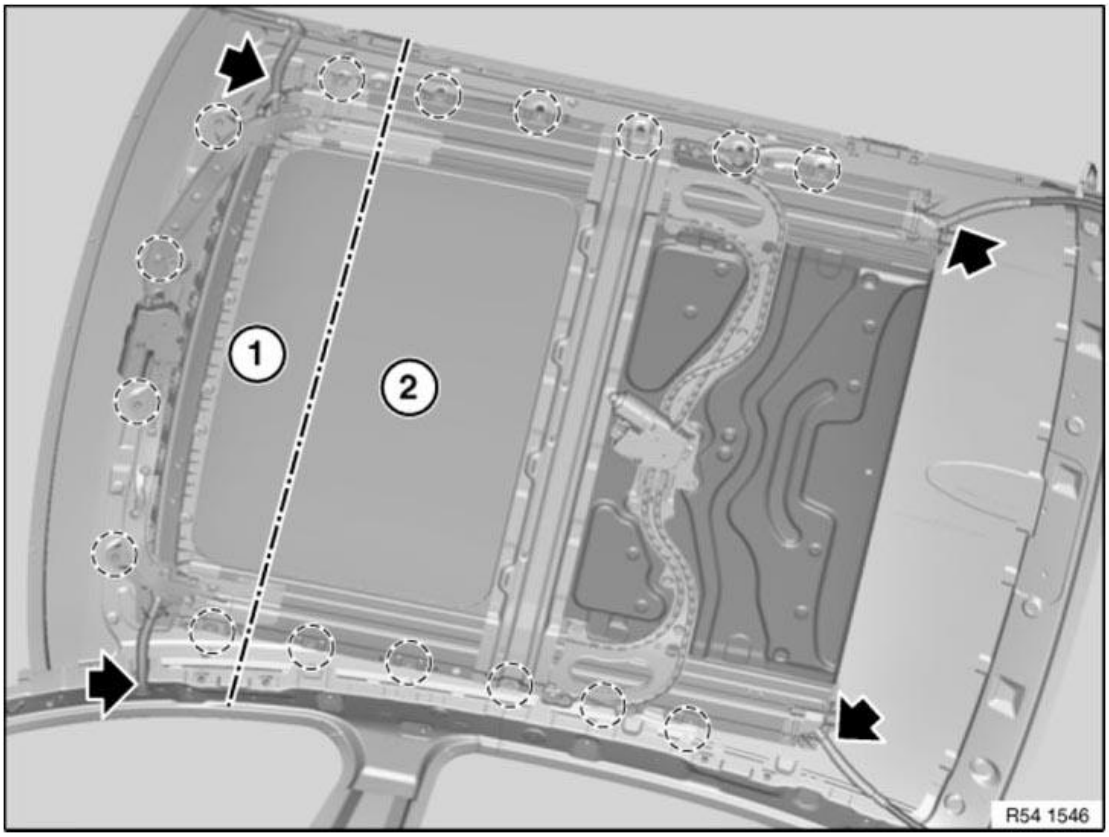


Fig. 8: Locating Front And Rear Drain Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

- Pull off front and rear water drain hoses.
- Helper must hold glass slide/tilt sunroof to prevent it falling out.
- Release screws in marked area and carefully lower glass slide/tilt sunroof.

Installation note:

Screws have different lengths:

In the area (1) = 17 mm

In the area (2) = 23 mm

IMPORTANT: Do not damage any surrounding parts when removing the glass slide/tilt sunroof.

- Carefully remove glass slide/tilt sunroof from vehicle (through rear door).

Installation note:

Replace screws.

To stop squeaking noises, secure all screws (1) prior to installation with plastic washers (2).

If the standard screws can no longer grip, use "repair screws" (have larger threads).

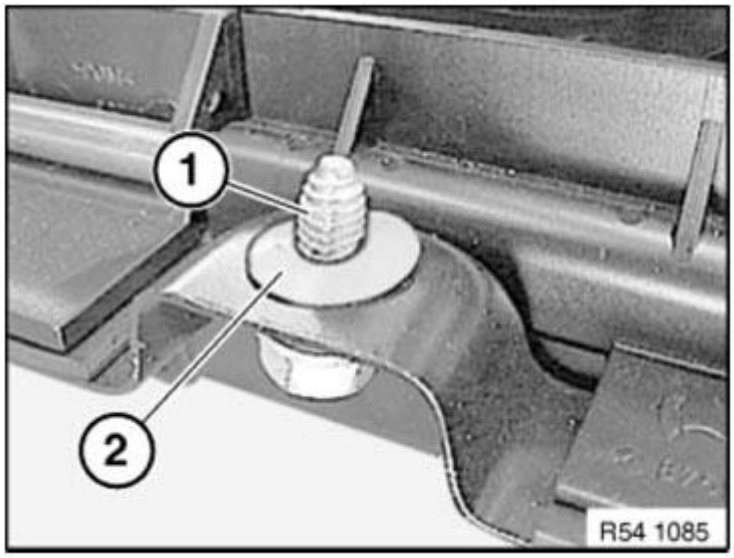


Fig. 9: Identifying Plastic Washers With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

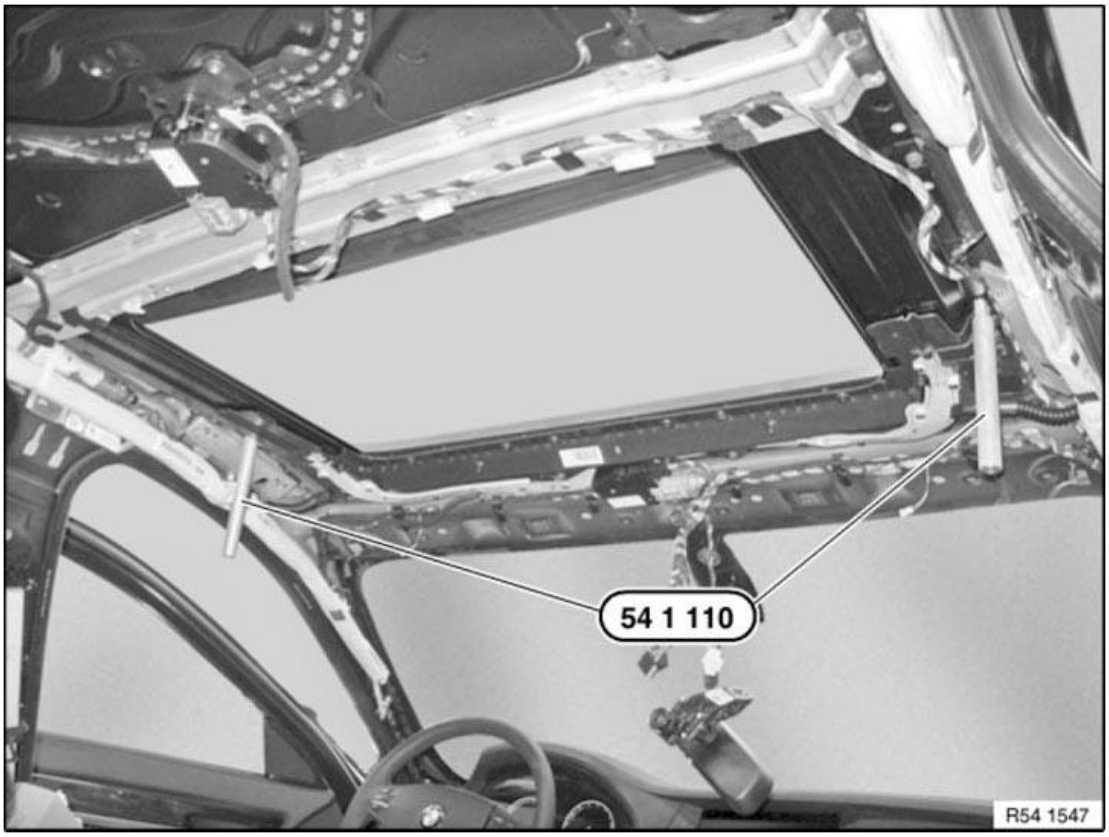


Fig. 10: Identifying Special Tool 54 1 110
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

To align glass slide/tilt sunroof to body aperture, insert screws and tighten loosely.

Glass slide/tilt sunroof must still be able to move in the body aperture.

On account of leaks, glass slide/tilt sunroof must be exactly aligned to body aperture.

Insert special tool **54 1 110** into centering bores up to stop in glass slide/tilt sunroof and body.

Tighten down screws.

Tightening torque **54 12 02AZ** .

IMPORTANT: Do not crush any cables when fitting the glass slide/tilt sunroof.

INITIALIZE glass slide/tilt sunroof.

54 12 115 REMOVING AND INSTALLING GLASS SLIDE/TILT SUNROOF COVER

Necessary preliminary work

- Remove **GAITER** on left and right

Installation note:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

Release left and right screws (1).

Remove glass slide/tilt sunroof cover (2) towards top.

Installation note:

Replace screws (1).

Insert screws (1) but do not tighten down yet.

Adjust and initialize glass slide/tilt sunroof cover. See **ADJUSTING GLASS SLIDE/TILT SUNROOF COVER** and **NOTES ON GLASS SLIDE/TILT SUNROOF (INITIALIZATION/NORMALIZATION/LEARNING OF CHARACTERISTIC CURVE)**.

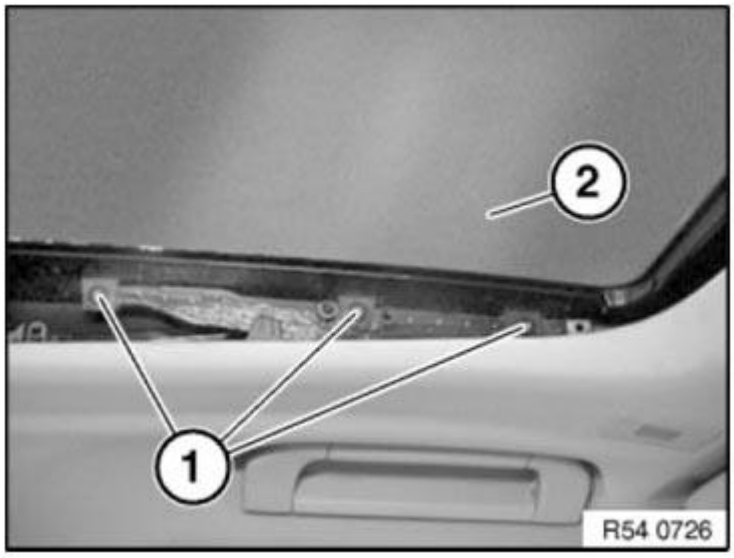


Fig. 11: Identifying Glass Slide/Tilt Sunroof Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

54 12 498 REMOVING AND INSTALLING/RENEWING GASKET FOR WATER GUTTER

Necessary preliminary work

- Remove **GLASS SLIDE/TILT SUNROOF COVER**

Remove gasket (1).

Installation note:

Make sure gasket (1) is correctly mounted.

Centre gasket (1) on left and right and press down.

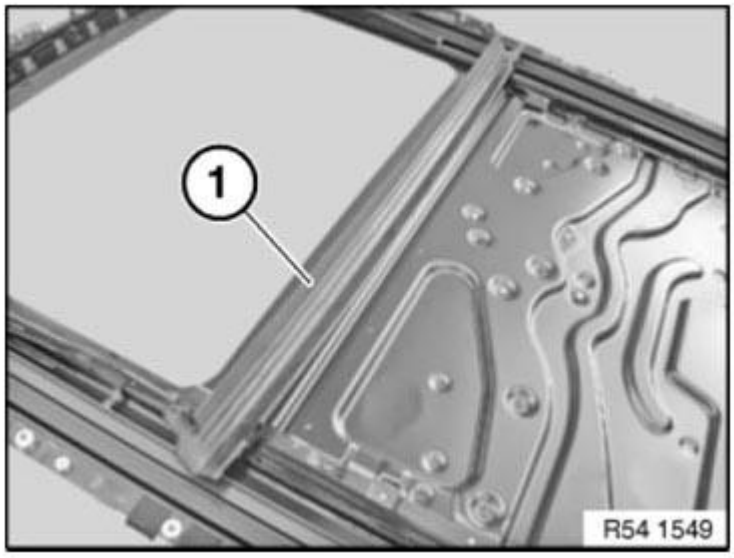


Fig. 12: Identifying Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

54 12 336 REMOVING AND INSTALLING/RENEWING GUIDE ELEMENT PAIR FOR GLASS SLIDE/TILT SUNROOF

Necessary preliminary work

- Remove glass slide/tilt sunroof cover

NOTE: Initiate manual movements of guide element via the drives using an offset Allen key.

Installation note:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of hardening)
- Microencapsulated screws must **not** be retightened

- Clean thread of nut beforehand in event of repeated use

Release screws (1) on left and right.

Installation note:

Replace screw (1).

Tightening torque **54 12 04AZ** .

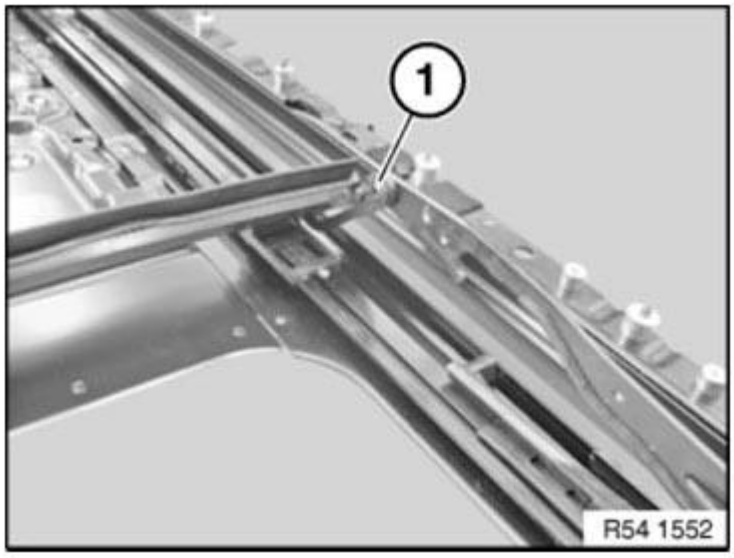


Fig. 13: Identifying Gasket Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Move guide element (1) back until garage is exposed.

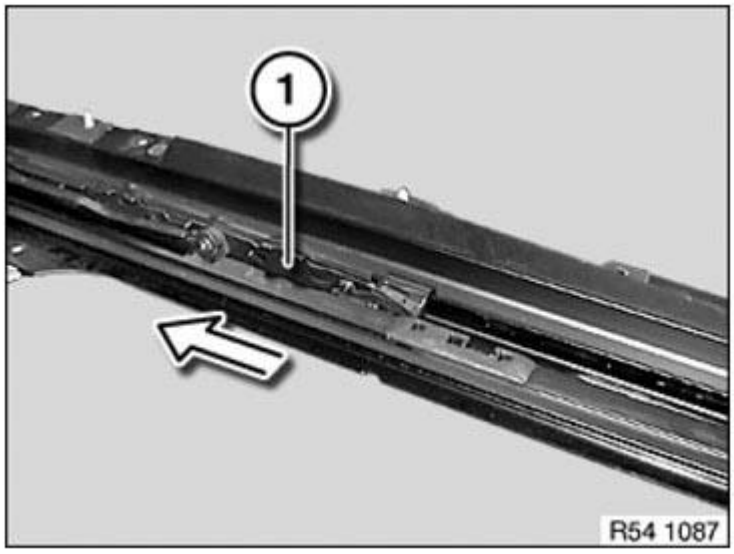


Fig. 14: Moving Guide Element Back
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out garage stop (1) with plastic wedge.

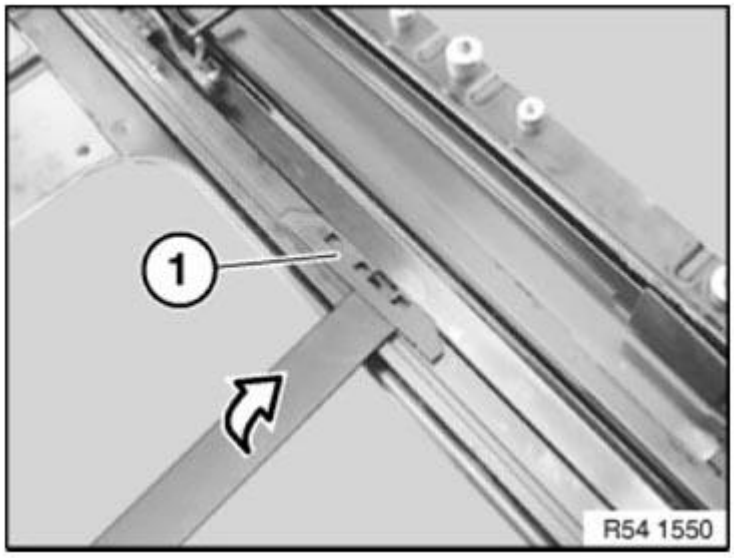


Fig. 15: Lifting Garage Stop With Plastic Wedge
Courtesy of BMW OF NORTH AMERICA, INC.

Move guide element (1) up to recess (2).

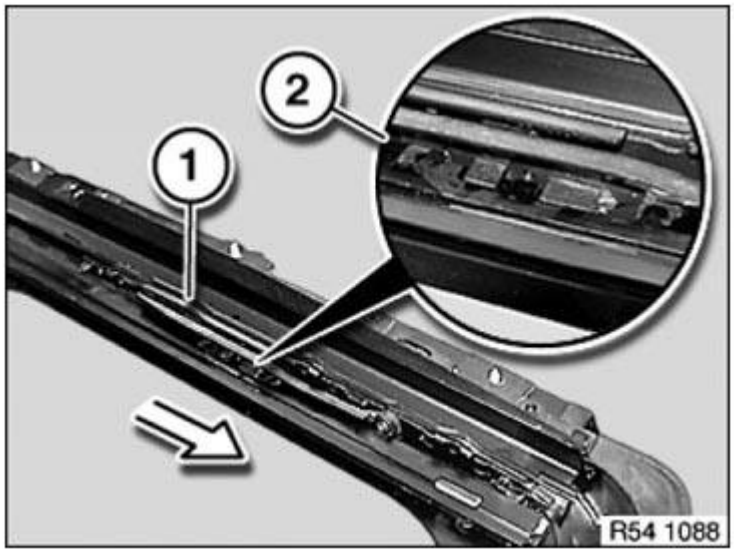


Fig. 16: Moving Guide Element Up To Recess
Courtesy of BMW OF NORTH AMERICA, INC.

Lever control lever (1) out of guide rail and turn.

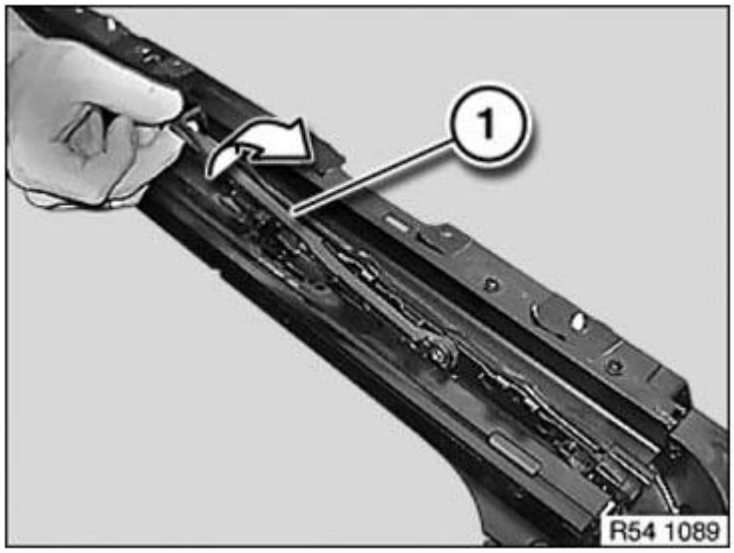


Fig. 17: Turning Lever Control Lever Out Of Guide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Spacer (1) of control lever must be situated in guide channel.

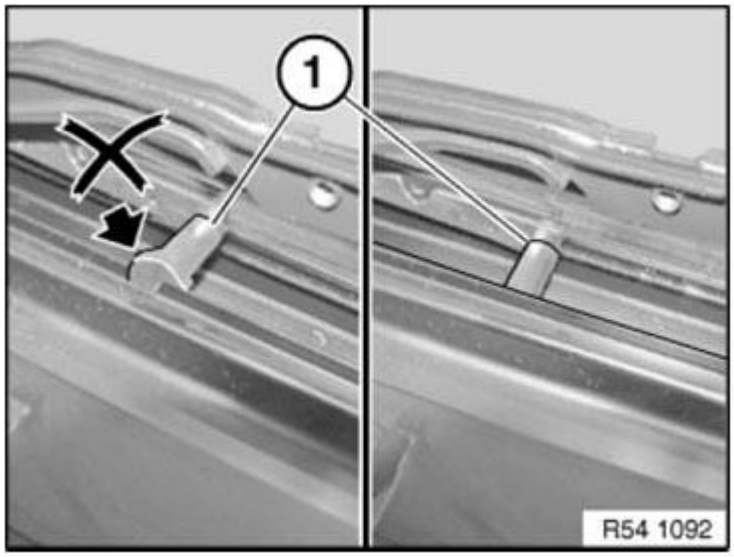


Fig. 18: Locating Spacer Of Control Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Remove control lever from guide element.

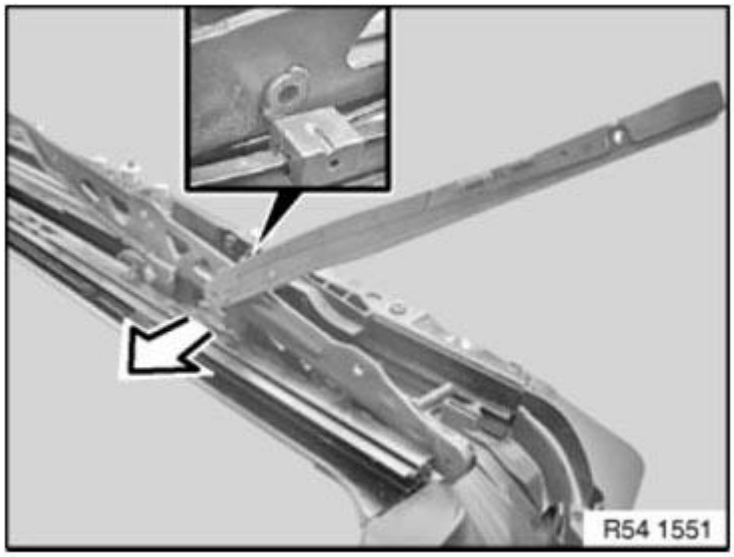


Fig. 19: Removing Control Lever From Guide Element
Courtesy of BMW OF NORTH AMERICA, INC.

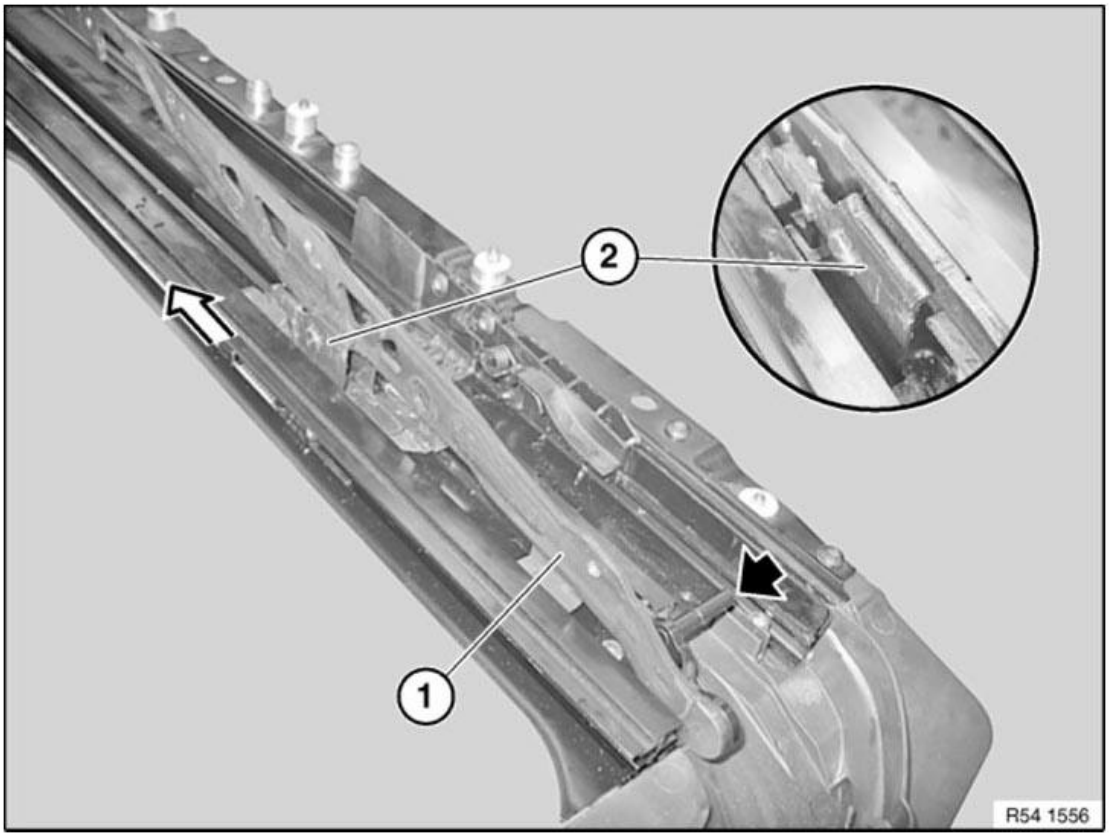


Fig. 20: Moving Drive Carriage
Courtesy of BMW OF NORTH AMERICA, INC.

Grip lid guide element (1) at bolt.

Move drive carriage (2) towards rear until recess in lid guide element is reached.

Reposition lid guide element (1) and remove from drive cable carriage.

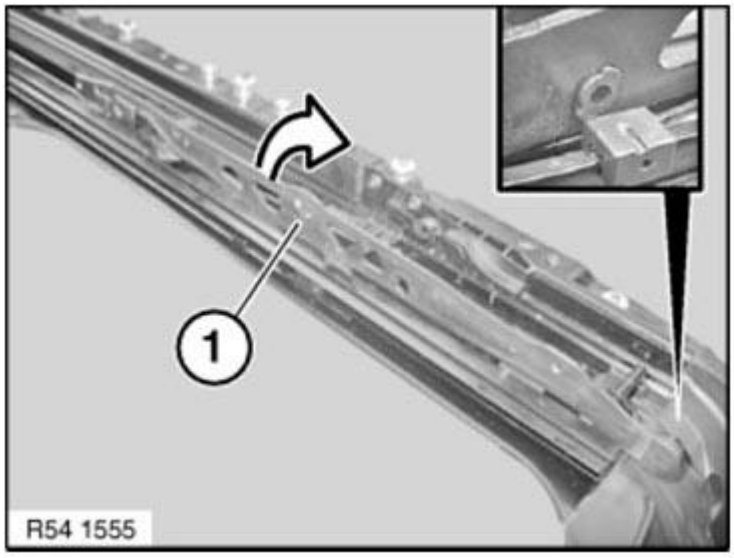


Fig. 21: Removing From Drive Cable Carriage
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Assemble glass slide/tilt sunroof and carry out function check.

INITIALIZE glass slide/tilt sunroof.

54 12 195 REMOVING AND INSTALLING/RENEWING LEFT OR RIGHT WIND DEFLECTOR BEARING

Necessary preliminary work

- Completely open glass slide/tilt sunroof cover
- Remove **WIND DEFLECTOR**

Unlock controller (1) and slide towards rear up to recess.

Remove controller (1) towards top.

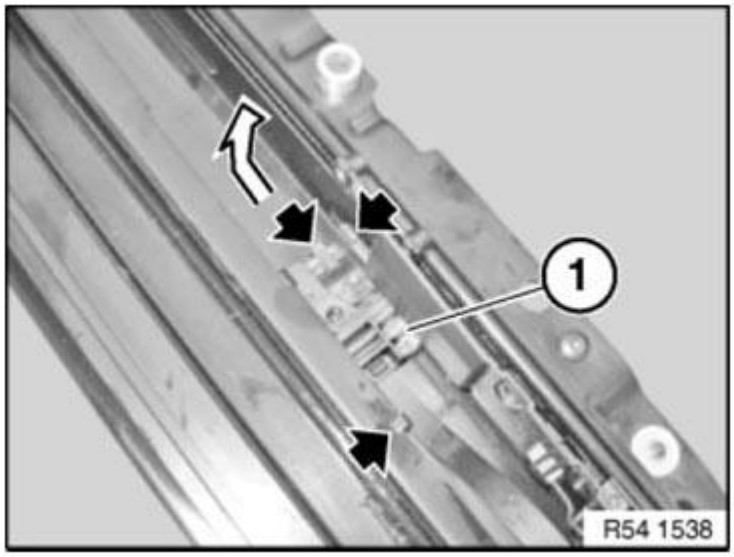


Fig. 22: Removing Controller
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure leaf spring (1) is correctly positioned in guide.

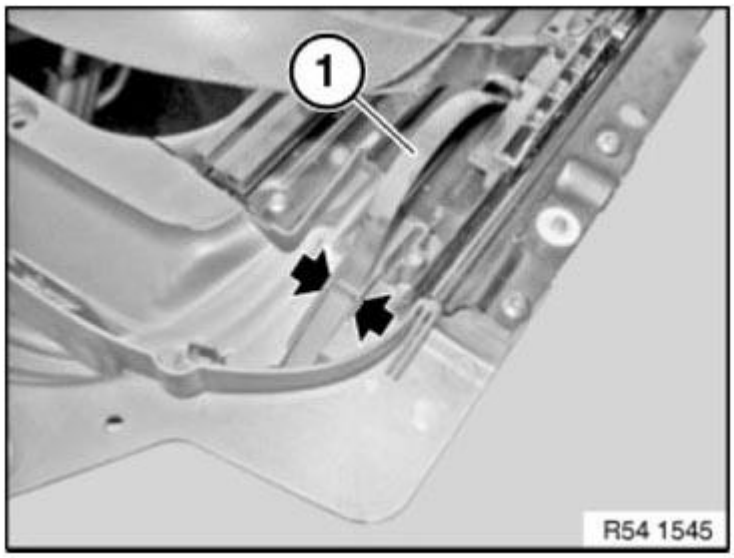


Fig. 23: Locating Leaf Spring Of Guide
Courtesy of BMW OF NORTH AMERICA, INC.

54 12 138 REMOVING AND INSTALLING/RENEWING RAIN GUTTER FOR GLASS SLIDE/TILT SUNROOF

Necessary preliminary tasks

- Remove **GLASS SLIDE/TILT SUNROOF LID** .

NOTE: Initiate manual movements of guide element via the drives using an offset Allen key.

Installation:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

NOTE: Shown removed here for purposes of clarity.

Unclip rain channel (1) at top left and right.

Release screws (2) on left and right.

Tightening torque **54 12 04AZ** .

Slide rain channel with carriage forwards.

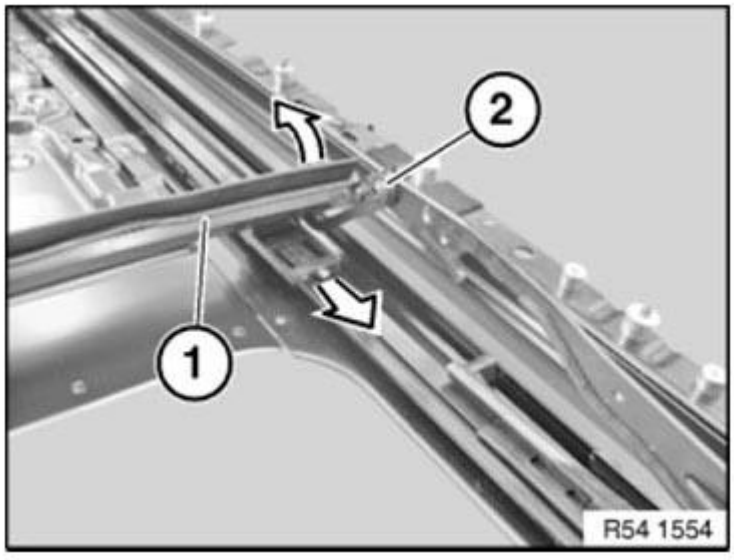


Fig. 24: Removing Rain Channel
Courtesy of BMW OF NORTH AMERICA, INC.

Reposition rain channel and remove towards rear.

Installation:

Make sure rain channel is correctly engaged.

Check function.

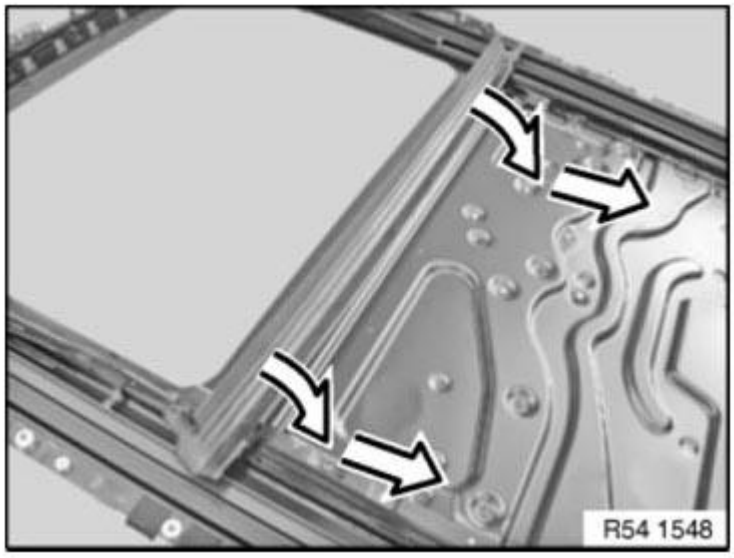


Fig. 25: Removing Rain Channel At Rear
Courtesy of BMW OF NORTH AMERICA, INC.

54 12 136 REMOVING AND INSTALLING/REPLACING SLIDING TRIM FOR GLASS SLIDE/TILT SUNROOF

Necessary preliminary work

- Remove **GLASS SLIDE/TILT SUNROOF COVER**
- Close sliding trim completely

Release screws (1).

Tightening torque **54 12 03AZ** .

Remove sliding strips from guide rail.

Installation note:

Make sure rubber lugs are correctly seated on sliding strips.

Remove sliding trim towards front.

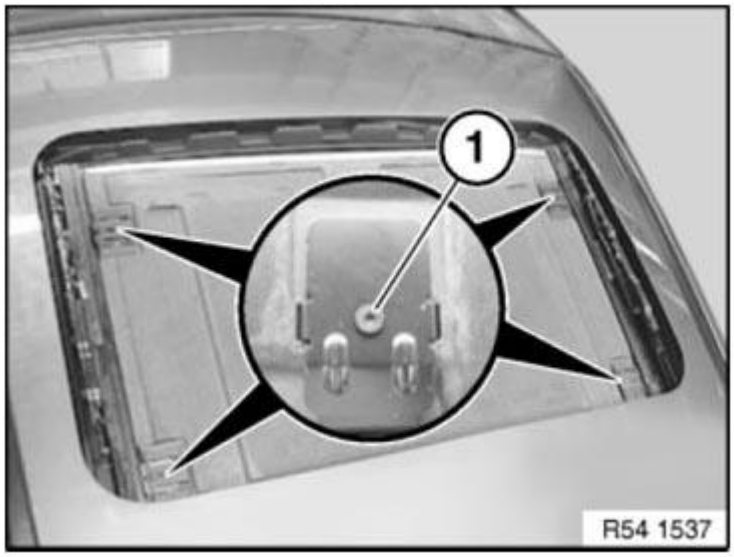


Fig. 26: Identifying Glass Slide/Tilt Sunroof Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Correctly insert front sliding strips into driver (drive cable).

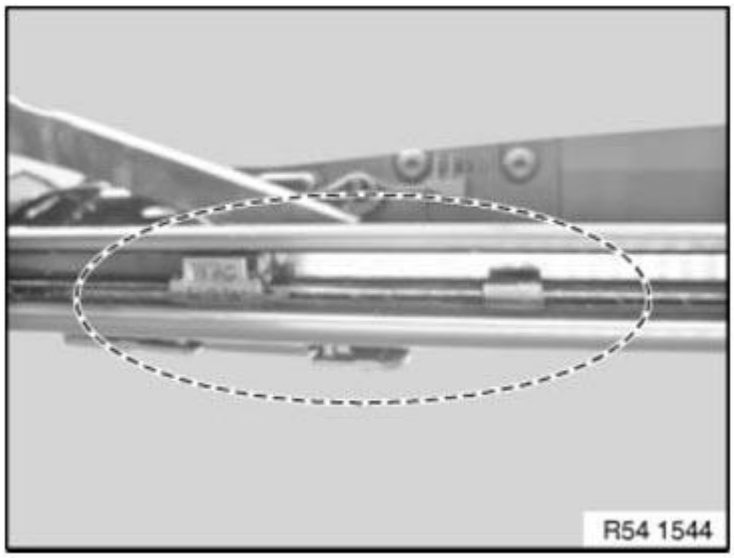


Fig. 27: Identifying Front Sliding Strips
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If sliding trim is difficult to move, apply a light coat of Renolit RHF1 (manufactured by Fuchs) to guide duct.

54 12 497 REMOVING AND INSTALLING/REPLACING WIND DEFLECTOR FOR GLASS SLIDE/TILT SUNROOF

Necessary preliminary tasks

- Completely open glass slide/tilt sunroof lid
- Completely open sliding headlining

Press net welt (1) with screwdriver towards rear and pull out of guide.

Replacement only:

Cut off net from wind deflector to facilitate removal of net welt.

Installation:

Slide net welt (1) with pointed pliers first on left and right into outermost guide.

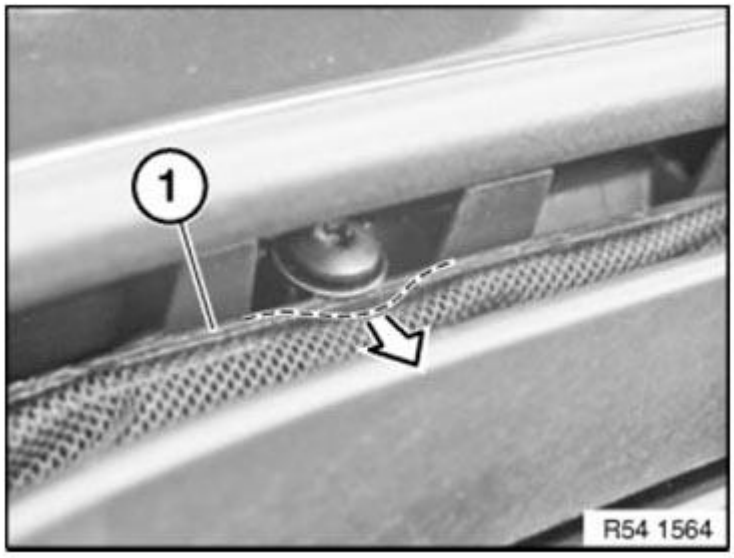


Fig. 28: Pulling Net Belt Out Of Guide Net Welt
Courtesy of BMW OF NORTH AMERICA, INC.

Press controller (1) for wind deflector forwards against spring.

Press wind deflector inwards and disengage from controller.

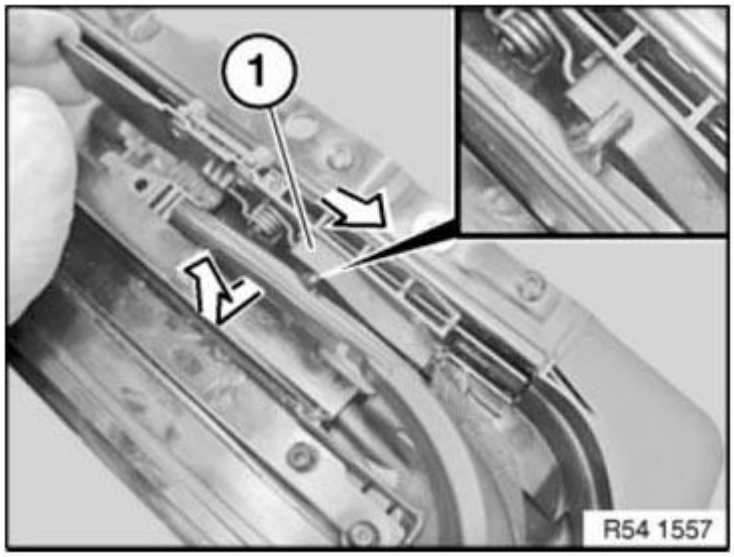


Fig. 29: Pressing Controller For Wind Deflector
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure wind deflector guide is correctly positioned between spring and controller.

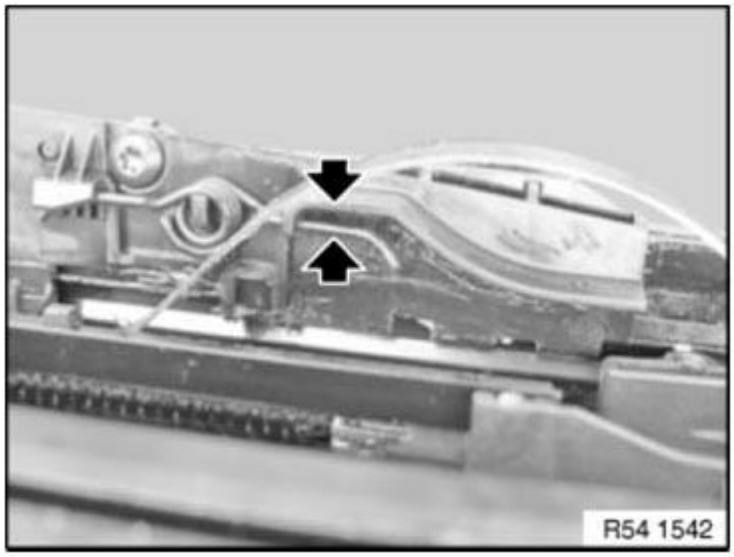


Fig. 30: Locating Wind Deflector Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Reposition wind deflector and remove towards top.

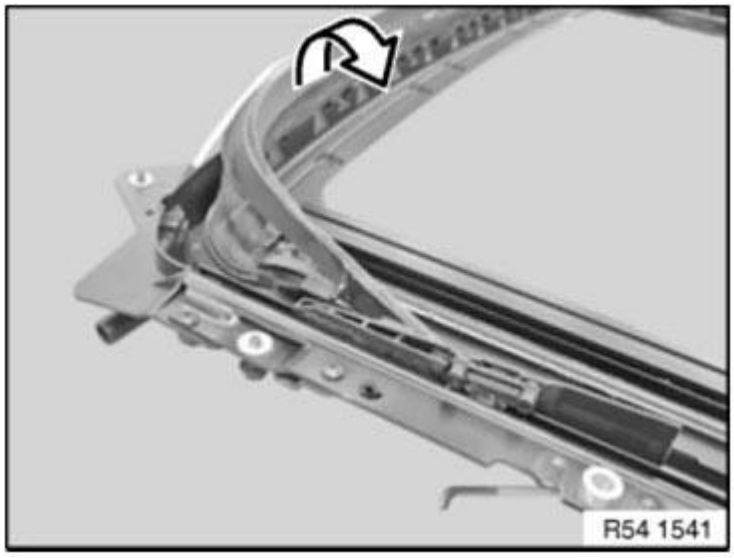


Fig. 31: Removing Wind Deflector
Courtesy of BMW OF NORTH AMERICA, INC.

54 12 193 REPLACING CARRIAGE FOR RAIN CHANNEL ON LEFT AND RIGHT

Necessary preliminary tasks

- Remove **GLASS SLIDE/TILT SUNROOF LID**
- Remove **RAIN CHANNEL**

Lever out garage stop (1) with plastic wedge.

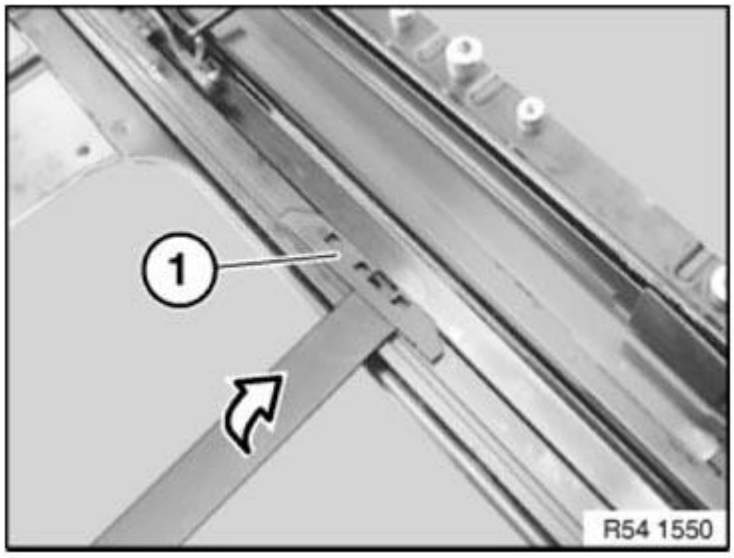


Fig. 32: Removing Garage Stop With Plastic Wedge
Courtesy of BMW OF NORTH AMERICA, INC.

Advance carriage (1) up to opening and lift out.

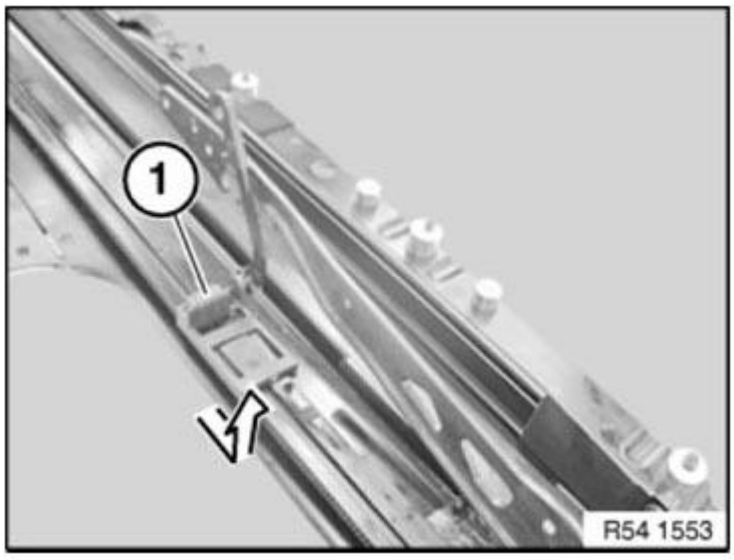


Fig. 33: Lifting Carriage
Courtesy of BMW OF NORTH AMERICA, INC.

54 12... REPLACING COMPLETE LOWER FRAME SECTION

NOTE: The spare part scope comprises the lower frame section without drives, sliding headlining and glass lid.

Necessary preliminary tasks

1. Remove **GLASS SLIDE/TILT SUNROOF LID**
2. Remove **SLIDING HEADLINING**
3. Remove **HEADLINING**
4. Remove drive units with gearing. See **REMOVING AND INSTALLING/RENEWING DRIVE WITH GEARBOX (FRONT) FOR ACTUATING SLIDE/TILT SUNROOF** and **REMOVING AND INSTALLING/REPLACING DRIVE WITH GEARBOX (REAR) FOR ACTUATING SLIDE/TILT SUNROOF (REAR)** .
5. Remove **GLASS SLIDE/TILT SUNROOF**

Installation:

Follow the installation sequence from work steps 5 to 1.

After the operations are completed, the following tasks must be carried out:

- Adjusting **GLASS SLIDE/TILT SUNROOF LID**
- **INITIALIZE** glass slide/tilt sunroof

54 12 015 REPLACING LEFT OR RIGHT GAITER FOR GLASS SLIDE/TILT SUNROOF

IMPORTANT: Handle the gaiter with extreme care throughout the work procedure.

Soft component is highly susceptible to tearing and kinking.

Grip the gaiter by its attachment strip and do not pull on the rubber (risk of damage!).

Glass slide sunroof lid in fan setting:

I. Carefully detach gaiter (1) at top from guide.
II. Twist gaiter (1) out of lower guide.

Installation:

Check that connection strip is firmly seated on guide.

If necessary, replace faulty gaiter.

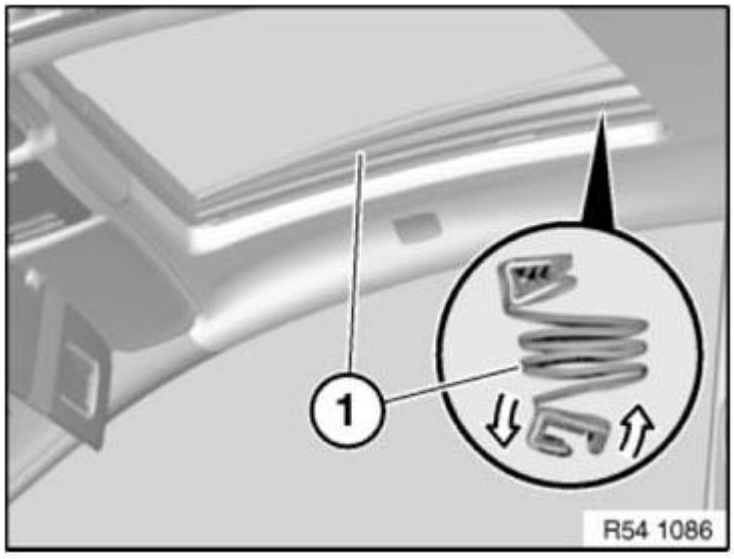


Fig. 34: Twisting Gaiter Out Of Lower Guide
Courtesy of BMW OF NORTH AMERICA, INC.

54 12 499 REPLACING SEAL FOR GLASS SLIDE/TILT SUNROOF FRAME

Necessary preliminary tasks

- Remove complete **GLASS SLIDE/TILT SUNROOF (FRAME)**

Detach seal (1) from slide/tilt sunroof (2).

Installation:

Groove of seal must point outwards.

Place seal gently in position and align limit points parallel to each other.

Press seal (1) firmly on frame (2) and ensure correct seating.

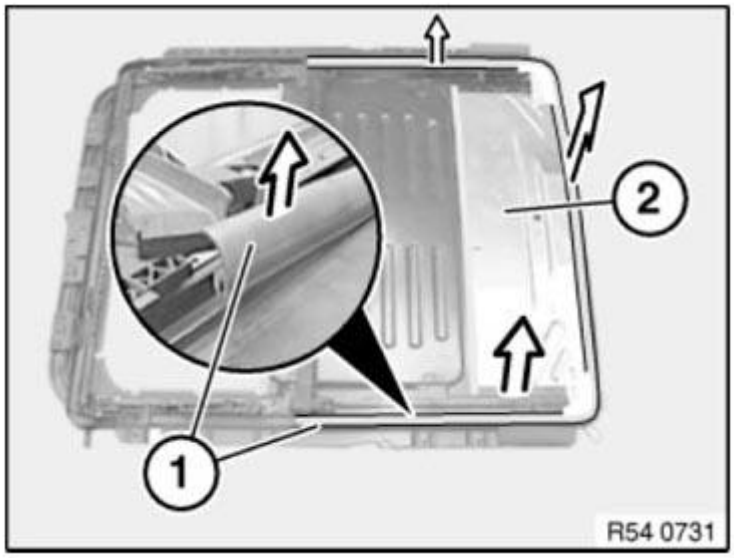


Fig. 35: Removing Seal From Slide/Tilt Sunroof
Courtesy of BMW OF NORTH AMERICA, INC.

54 12 117 REPLACING SEAL FOR GLASS SLIDE/TILT SUNROOF LID

Necessary preliminary tasks

- Follow **REPAIR INSTRUCTIONS** for bonded seals on slide/tilt sunroof
- Open glass lid completely

Start removal at contact edge (rear center):

- Peel off rubber seal
- Clean bonded area

Installation:

Also start at specified point of contact edge for installation:

- Stick on rubber seal in stages
- Establish seal joint

- Press on seal

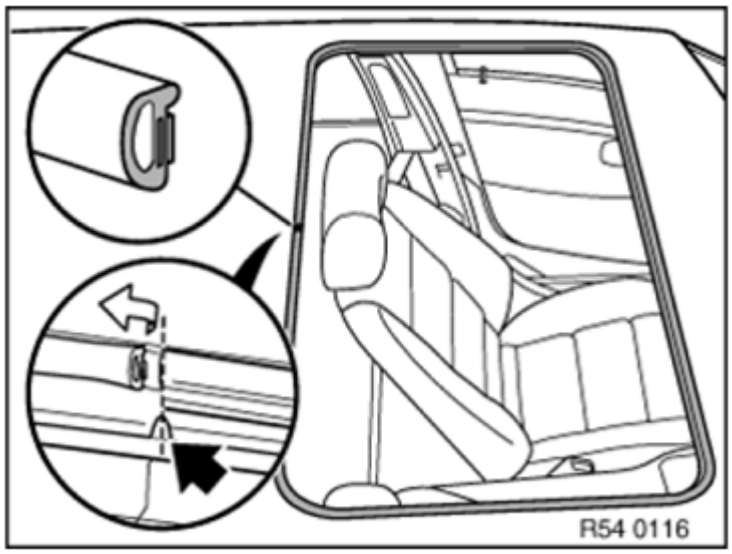


Fig. 36: Removing At Contact Edge (Rear Centre)
Courtesy of BMW OF NORTH AMERICA, INC.

5413 ELECTRICAL SUN ROOF COMPONENTS

54 0... NOTES ON GLASS SLIDE/TILT SUNROOF (INITIALIZATION/NORMALIZE OF CHARACTERISTIC CURVE)

NOTE: Initialization comprises:

- Normalization
- Learning characteristic curve

The mechanical end positions are recorded and stored during normalization.

The characteristic curve is learnt immediately after normalization.

When the characteristic curve is learnt, the mechanical closing forces of the glass sunroof are recorded and stored for correct operation of the anti-trapping mechanism.

Initialization is started and implemented by pressing and holding switch in "Lift" direction.

Initialization depends on installed roof system and software used.

NOTE: Then carry out initialization:

- if the glass sunroof has been mechanically moved by means of the emergency actuator

- in the event of malfunctions, e.g. no one-touch function, no opening or no comfort function possible
- after disengagement of the drive unit
- after work is carried out on the mechanism of the glass sunroof
- after the control unit has been replaced
- after replacement of circumferential gasket

WARNING: The anti-trapping mechanism is not active during initialization.

For correct initialization and function, the following conditions must be met:

- Ignition ON
- at room temperature (23°C ± 5°C)
- No direct solar radiation
- only when vehicle is at a standstill
- Fully charged vehicle battery
- in addition, for US vehicles, let engine run to enable key, if necessary

NOTE: Subsequently described processes relate to a completely closed roof system. However, initialization can be started from any position.

Initialization process

- Move switch in "Lift" direction and hold (roof system moves to "Lift" position)
- In the event of delayed starting or sudden stopping of the glass sunroof, continue pressing the switch in the "Lift" direction

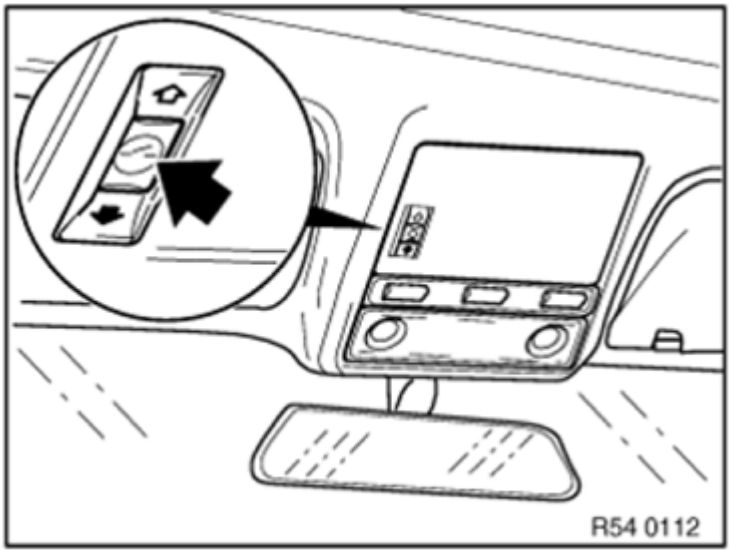


Fig. 37: Locating Switch
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Hold switch depressed for entire process.

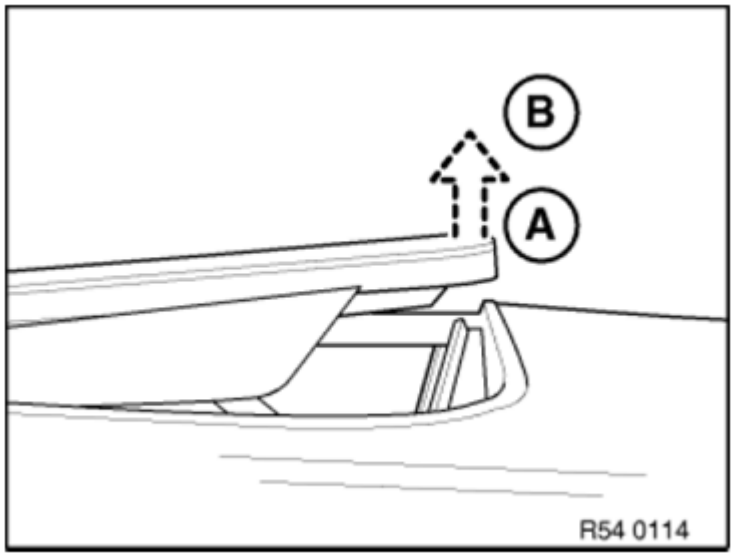


Fig. 38: Lifting Glass Sunroof
Courtesy of BMW OF NORTH AMERICA, INC.

- After reaching the fully raised position (A), keep the switch pressed for approx. 30 seconds further (initialization process starts)
- Glass sunroof moves briefly from lift end position (A) in direction of position (B)
- Shading system (floating headlining) closes completely
- Shading system (floating headlining) opens completely
- Glass sunroof moves to "Closed" position
- Glass sunroof then moves to "Open" end position and immediately back to "Closed" position
- After a brief pause, shading system closes completely

NOTE: Once glass roof and shading system have closed completely, initialization is finished. Switch can be released.

NOTE:

- **If the switch is released in the meantime, the entire procedure must be repeated**
- **On completion of successful initialization, the corresponding messages in the check control and the control display go out**
- **Carry out function check (tip function, anti-trapping protection and, if necessary, comfort function)**

67 61 005 REMOVING AND INSTALLING/RENEWING DRIVE WITH GEARBOX (FRONT) FOR ACTUATING SLIDE/TILT SUNROOF

See **67 61 005 REMOVING AND INSTALLING/RENEWING DRIVE WITH GEARBOX (FRONT) FOR ACTUATING SLIDE/TILT SUNROOF** .

67 61 007 REMOVING AND INSTALLING/REPLACING DRIVE WITH GEARBOX (REAR) FOR ACTUATING SLIDE/TILT SUNROOF (REAR)

See **67 61 007 REMOVING AND INSTALLING/REPLACING DRIVE WITH GEARBOX (REAR) FOR ACTUATING SLIDE/TILT SUNROOF (REAR)** .

5434 MOTOR-OPERATED CONVERTIBLE TOP

51 23... REMOVING/INSTALLING BALL SOCKETS WITH CLIP

WARNING: Danger of injury! When installed, the gas pressurized shock absorber is under preload. Minimize preload as far as possible before removing.

IMPORTANT: Never lift off ball socket with engaged clamp.

Disassembly/assembly:

1. Push on clamp in direction of groove with screwdriver
2. Lift off ball socket from ball pin
3. Slide clamp back
4. Fit ball socket on ball stud and snap into place with force

Installation note:

Replace overstretched clips.

Pack grease into two opposite positions in socket.

The grease spreads after installation on the ball pin all round in the ball socket.

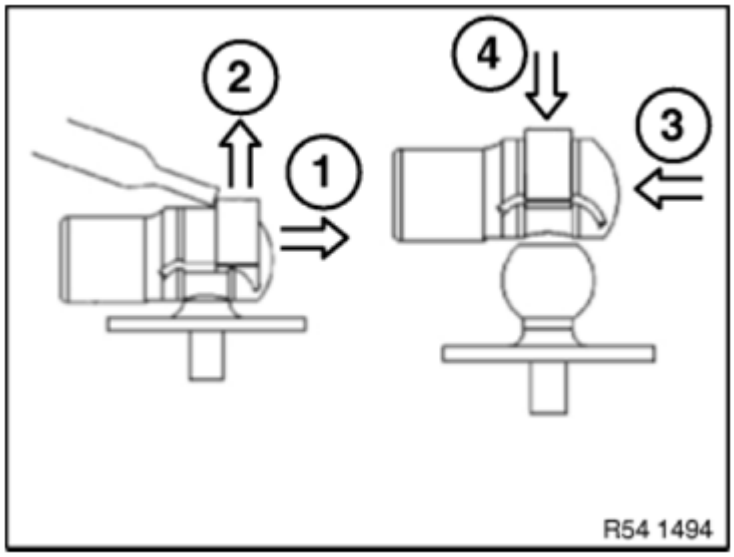


Fig. 39: Removing Ball Socket With Clip
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Slide/Tilt Roof - Special Tools

54 SLIDE/TILT SUNROOF AND CONVERTIBLE TOP

540250 FITTING AID

0496931 540250 Fitting aid MW

SI number

01 13 10 (652)



Fig. 1: Identifying Fitting Aid (540250)
Courtesy of BMW OF NORTH AMERICA, INC.

541110 PIN

0495604 541110 Pin MW

Note: (Centering pins) Contents 2 pieces. For installing (centering) glass slide/tilt sunroof.

Storage Location

C18

SI number

01 15 06 (281)

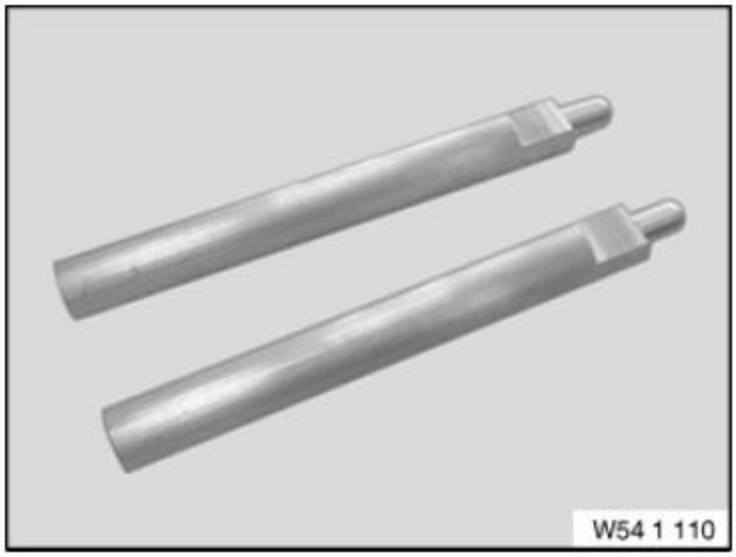


Fig. 2: Identifying Pin (541110)
Courtesy of BMW OF NORTH AMERICA, INC.

541240 TOOL

0494774 541240 Tool MW

Note: (Tool set) For adjusting the slide/tilt sunroof

Consisting of:

1 = 0494795 Key

NOTE: Special Torx for tightening the slide/tilt sunroof screws

2 = 0494796 Template

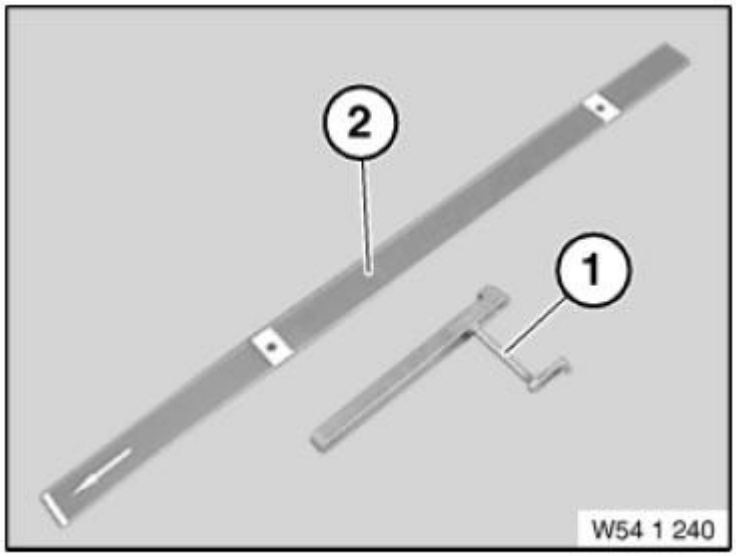


Fig. 3: Identifying Tool (541240)
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Slide/Tilt Roof and Convertible Top - Tightening Torques

ELECTRICAL SLIDE/TILT SUNROOF COMPONENTS

54 13 ELECTRICAL SLIDE/TILT SUNROOF COMPONENTS

TIGHTENING TORQUE SPECIFICATION - ELECTRICAL SLIDE/TILT SUNROOF COMPONENTS

		Type	Thread	Tightening specifications	Dimension
1AZ	Drive to cassette	F01/F02/F07/F10/F11/F18			3 ± 0.5 Nm
		F25			4 Nm

MECHANICAL COMPONENTS, SLIDE/TILT SUNROOF

54 12 MECHANICAL COMPONENTS, SLIDE/TILT SUNROOF

TIGHTENING TORQUE SPECIFICATION - MECHANICAL COMPONENTS, SLIDE/TILT SUNROOF

		Type	Thread	Tightening specifications	Dimension
1AZ	Glass slide/tilt sunroof cover to gate	F01/F02/F04/F10	M5x6 w/washer	Replace screw.	5 ± 0.5 Nm
		F07/F11/F25		Replace screw.	4.5 Nm
2AZ	Slide/tilt sunroof unit to body	F01/F02/F04/F10		Self-locking	7.6 Nm
		F07/F11/F25		Screws, self-tapping	5.4 Nm
3AZ	Floating headlining to sliding rail	F01/F02/F04/F10/F11	M5x6	Observe screwing sequence	2 ± 0.2 Nm
4AZ	Carriage, water channel, to gate	F01/F02/F04/F10			3.8 Nm
5AZ	Panorama glass roof rear section - active and passive elements	F07/F11/F25			5.4 Nm
6AZ	Both floating roof liners to gate	F11			2.0 Nm
7AZ	Stacker for floating roofliner	F11			2.0 Nm
8AZ	Water channel to glass lid mechanism	F11			2.0 Nm
9AZ	Wind deflector to cross member	F25		Tighten screw with special tool 00 9 250 to 0.8 Nm.	0.8 Nm
10AZ	Stop screw	F11			2 Nm

SUSPENSION

Steering and Wheel Alignment - Repair

3200 ELECTRONIC CHASSIS ALIGNMENT

32 00... ADDITIONAL WORK FOR CAMBER CORRECTION

IMPORTANT: Changes in axle geometry caused by accidents must under no circumstances be rectified by camber adjustment!

NOTE: The upper control arm may only be replaced if the camber is outside the specified tolerance after toe adjustment.

Adjust **TOE-IN** .

Check camber values; if necessary, replace upper control arm with over- or under-dimension variant. See **3112002 REMOVING AND INSTALLING/REPLACING TOP LEFT WISHBONE** or **3112003 REMOVING AND INSTALLING/REPLACING TOP RIGHT WISHBONE** .

NOTE: Control arms with + or - marking (see illustration) are camber correction arms:
- Underdimension variant
+ Overdimension variant
These camber correction arms are used to correct the camber values by 30 minutes. To be used only if the tolerance values are exceeded or undershot!

An unmarked control arm is a standard part.

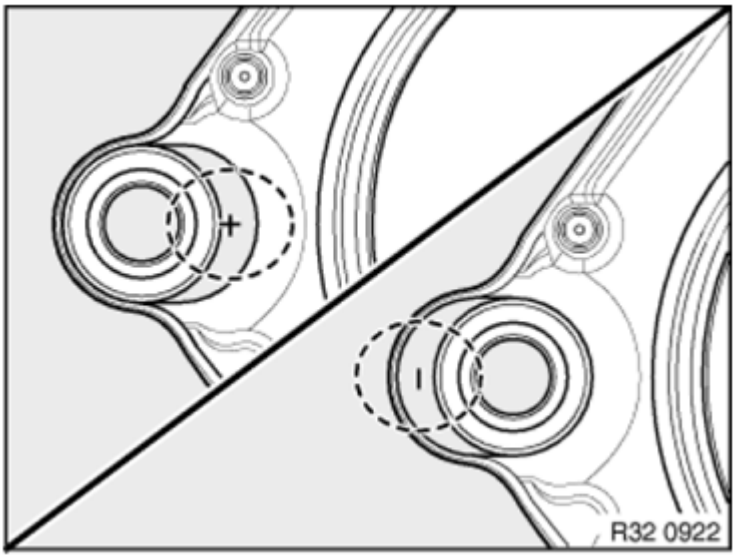


Fig. 1: Identifying Under And Over Variant Dimension On Control Arm

Courtesy of BMW OF NORTH AMERICA, INC.

After Installation note

- Check directional stability of car; if necessary, repeat **TOE-IN** adjustment

32 00 620 ADJUSTING REAR AXLE

IMPORTANT: Altered procedure from previous axle alignment!

Turning the adjusting screw on the swinging arm or on the wishbone always results in a camber and toe change!

Separate camber or toe adjustment is no longer possible!

Specific camber and toe adjustment is only possible with the aid of the following diagram!

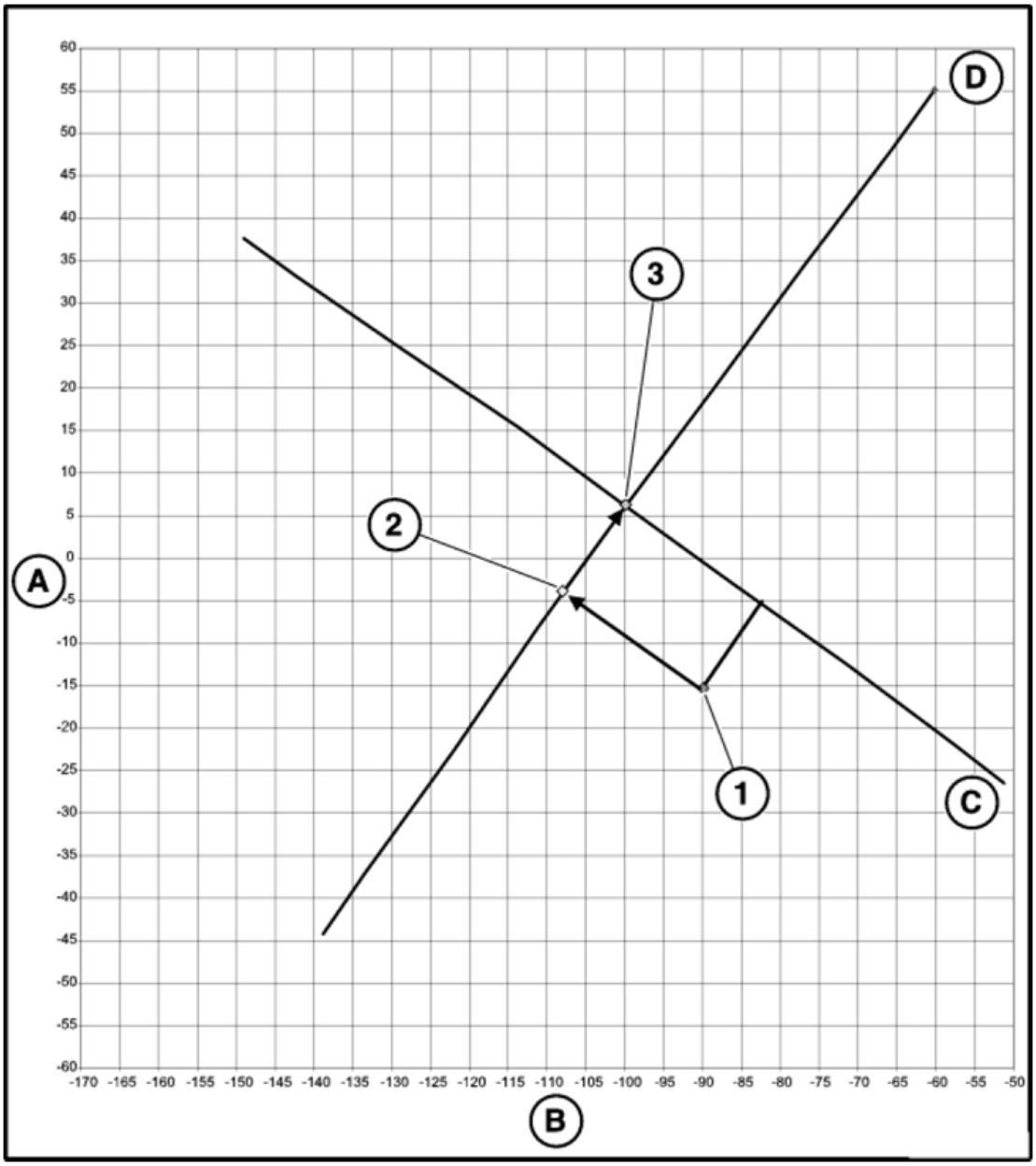
NOTE: Vehicles with Adaptive Cruise Control only:

- **After an adjustment of the rear axle which alters the driving axle, check adjustment of LRR sensor. See ADJUSTING REMOTE SENSOR (LRR SENSOR) .**

Vehicles with rear axle slip angle control only:

- **Carry out adjustment of rear axle only with aid of BMW Diagnosis and Information System**

Procedure, lane/camber adjustment (in design position)



Unit of measurement in diagram: [min]

A	Toe		1	Actual value
B	Camber		2	Intermediate adjustment value
C	Toe / camber value adjustment by wishbone		3	Nominal value in KO position
D	Toe / camber value adjustment by swinging arm			

Fig. 2: Lane/Camber Adjustment Measurements (In Design Position)
Courtesy of BMW OF NORTH AMERICA, INC.

Description using the example value entered at the top of the diagram:

1. Read off actual value (1) for toe/camber on wheel/axle alignment analyzer and enter in diagram

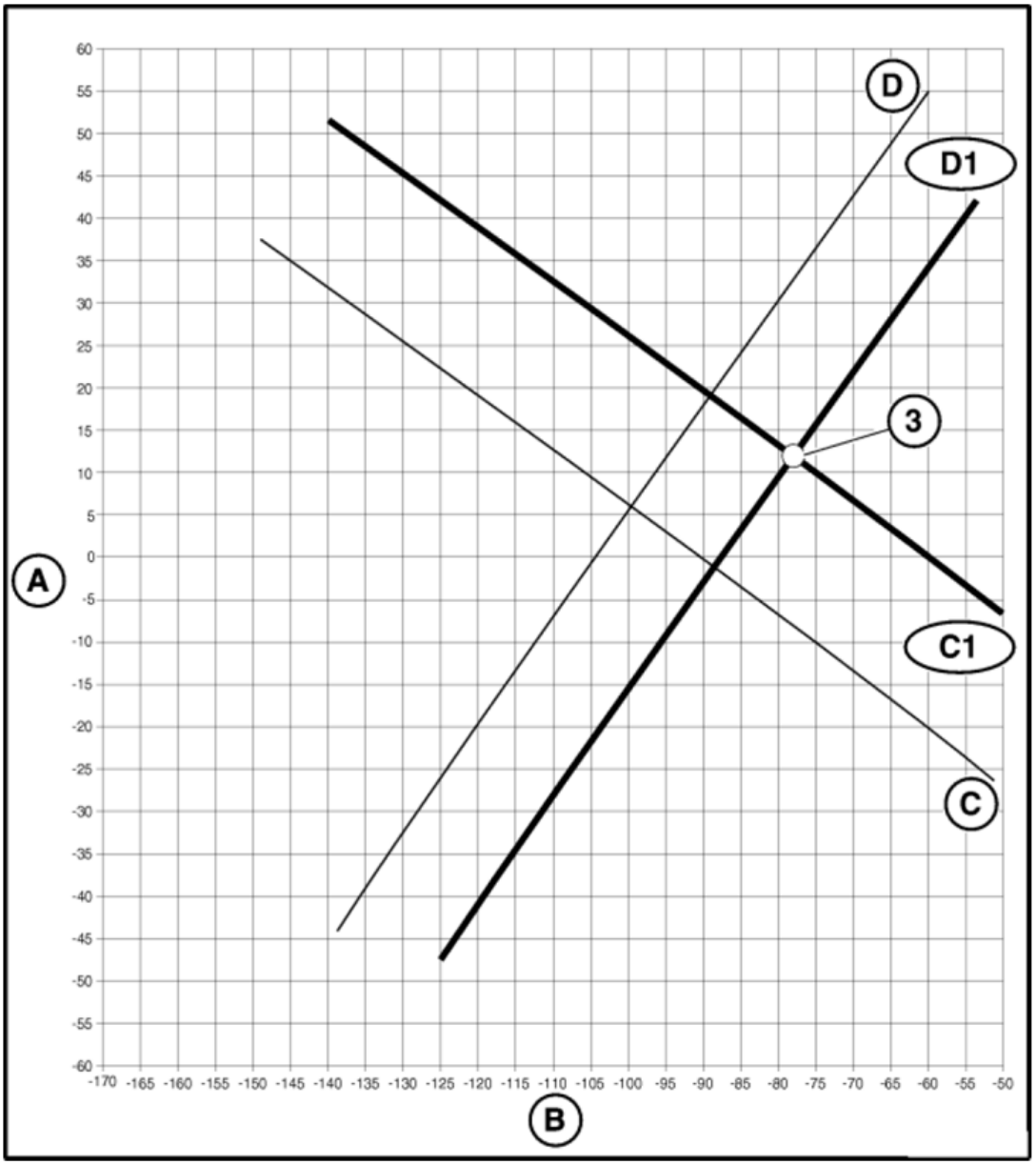
(in example: toe -15', camber -90')

2. Drag parallel line to "Wishbone" line (C) through entered actual value (1)
3. Point of intersection (2) on "Swinging arm" line (D) produces toe/camber intermediate adjustment value

   (in example: toe -4', camber -108')

4. Adjust intermediate adjustment value (2) by turning adjusting screw on wishbone
   - Refer to operation described below "**ADJUSTING ON WISHBONE**"
5. Adjust nominal value (3) for toe/camber by turning adjusting screw on swinging arm (toe/camber value moves on line (D))
   - Refer to operation described below "**ADJUSTING ON SWINGING ARM**"

Procedure, toe/camber adjustment for ride-height-dependent measurement (unloaded)



Unit of measurement in diagram: [min]

A	Toe		3	Specified nominal value from wheel/axle analyser system
B	Camber			
C1	Toe / camber value adjustment by wishbone			
D1	Toe / camber value adjustment by			
	swinging arm			

Fig. 3: Toe/Camber Adjustment Measurements For Ride-Height-Dependent (Unloaded)
Courtesy of BMW OF NORTH AMERICA, INC.

Description of adjustment using the diagram (ride-height-dependent measurement/unladen)

1. Read off nominal value (3) at wheel/axle analyzer and enter in diagram (in example: toe +12'/camber -78')
2. Move lines (D) and (C) in parallel so that the point of intersection of the two lines (D1 and C1) is the entered nominal value
3. Read off actual value (1) for toe/camber on wheel/axle alignment analyzer and enter in diagram
4. Further procedure as when adjusting in design position:
    - Drag parallel line to "Wishbone" line (C 1) through entered actual value
    - Point of intersection on "Swinging arm" line (D1) produces toe/camber intermediate adjustment value
    - Adjust intermediate adjustment value by turning adjusting screw on wishbone
        - Refer to operation described below "**ADJUSTING ON WISHBONE**"
    - Adjust nominal value (1) for toe/camber by turning adjusting screw on swinging arm (toe/camber value moves on line D1)
        - Refer to operation described below "**ADJUSTING ON SWINGING ARM**"

Adjusting on wishbone

Replace nut (1) prior to adjustment and join to 5 Nm.

Turn eccentric screw (2) until intermediate adjustment value is obtained.

Tighten nut (1).

Tightening torque **33 32 7AZ** .

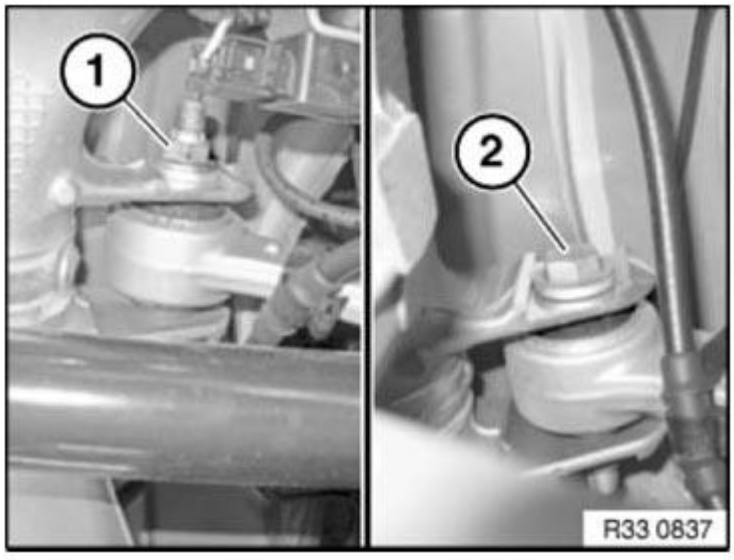


Fig. 4: Identifying Wishbone Nut And Eccentric Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting on swinging arm

Replace nut (1) prior to adjustment and join to 5 Nm.

Turn eccentric bolt (2) to adjust nominal value.

Tighten nut (1).

Tightening torque **33 32 2AZ** .

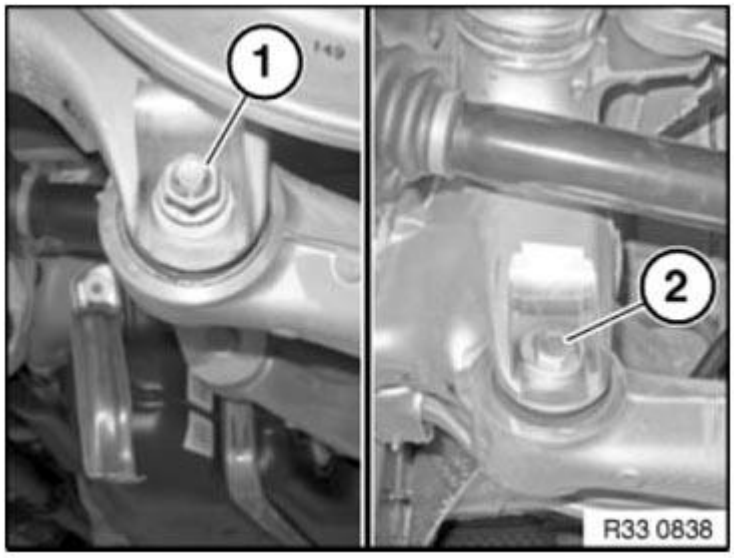


Fig. 5: Identifying Swinging Arm Nut And Eccentric Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Diagram dependence toe/camber adjustment (for printing and entering values)

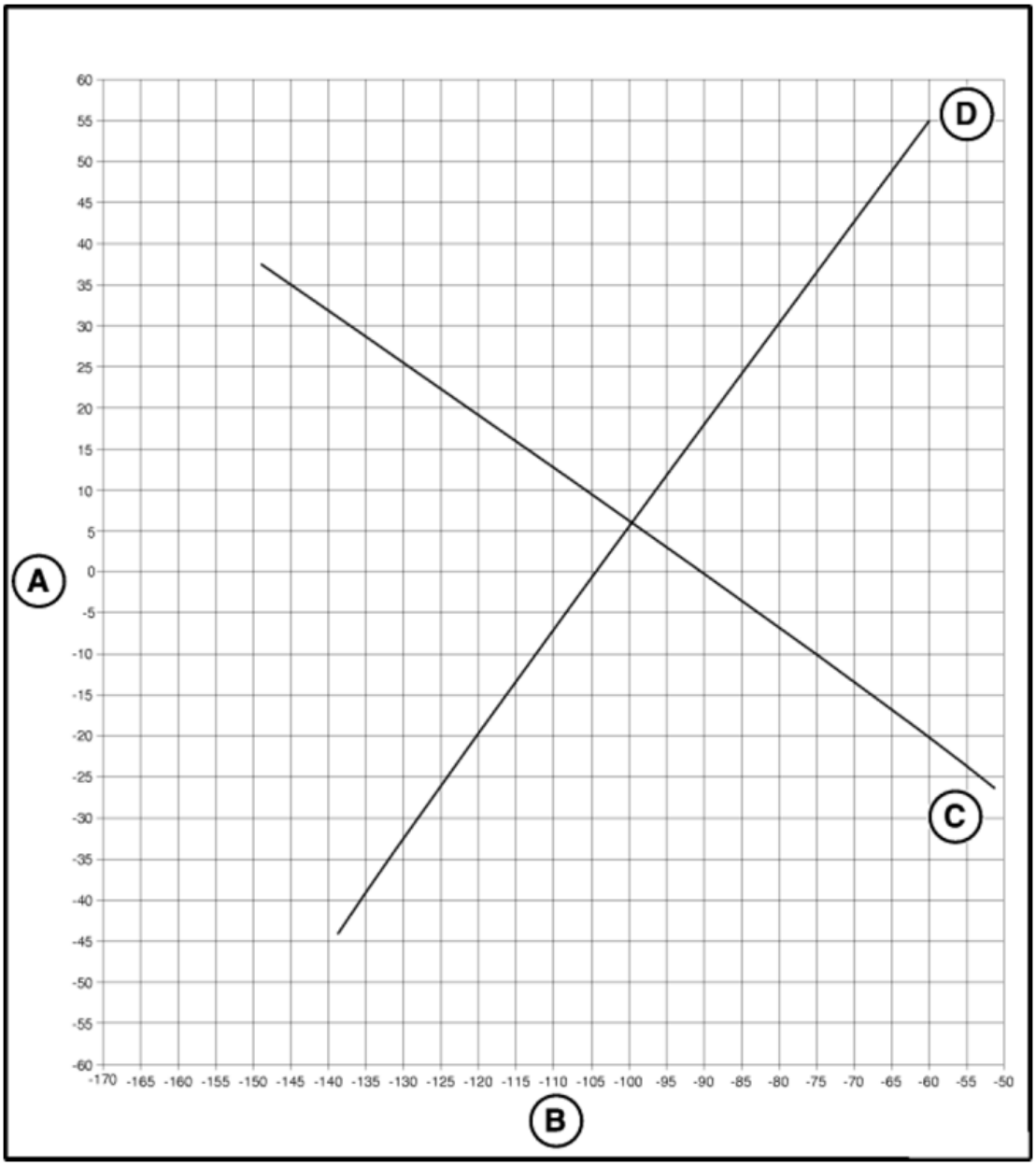


Fig. 6: Diagram Dependence Toe / Camber Adjustment (For Printing And Entering Values)
Courtesy of BMW OF NORTH AMERICA, INC.

32 00 601 ADJUSTING TOE-IN ON FRONT AXLE

NOTE: Camber and toe-in influence each other. Adjust the toe-in first in order to simplify the adjustment procedure.

Version with active steering

- Align steering wheel

- Set total steering angle to "zero" by means of the service function **CARRY OUT INITIAL OPERATION/ADJUSTMENT FOR ACTIVE STEERING**.
- If necessary, secure with steering wheel arrester

Version without active steering

Remove front **UNDERBODY PROTECTION** .

Move steering into straight-ahead driving position by means of markings on cap (1) and steering box (2).

Align steering wheel and secure with steering wheel arrester.

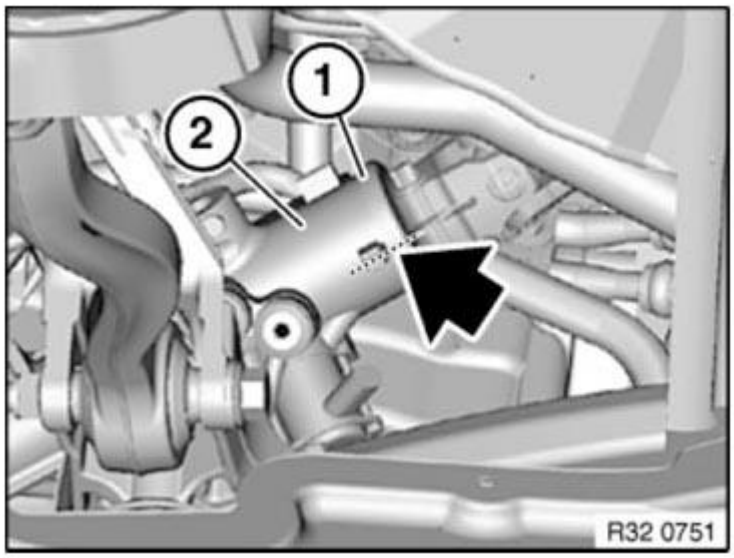


Fig. 7: Locating Straight-Ahead Driving Position Mark On Steering Box Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Clean thread on track rod.

Slacken clamping nut (2), gripping track rod end (1) in the process.

Remove clamp (4).

Turn track rod (3) to adjust toe-in to setpoint value.

Version with active steering: Check total steering angle; if necessary, set to "zero".

Check toe values, repeat adjustment if necessary.

Tighten down clamping nut (2).

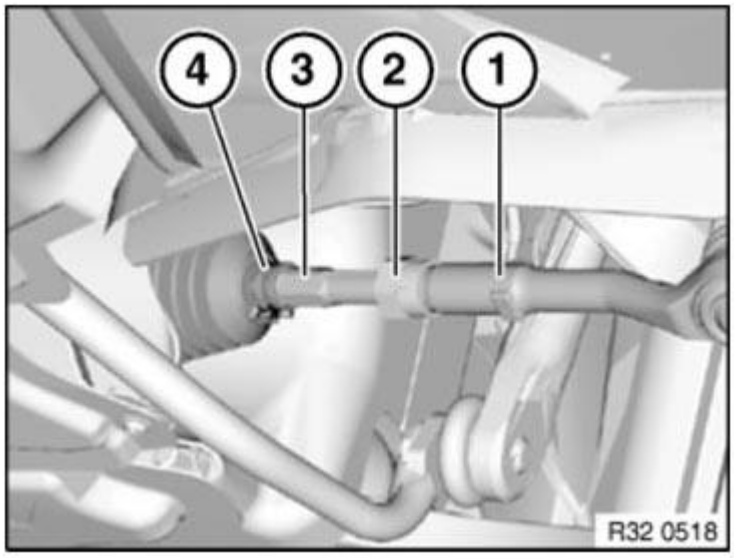


Fig. 8: Identifying Track Rod With Clamping Nut, Track Rod End And Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **32 21 2AZ** .

Fit clamp (4).

After installation

- Check directional stability of vehicle; if necessary, repeat toe-in adjustment

32 10 005 ADJUSTMENT/INITIAL OPERATION FOR ACTIVE FRONT STEERING

NOTE: Adjustment/start-up of the active steering must be carried out:

- **Before adjustment work on the front axle/steering**
- **After work on the steering column**
- **After replacement of following components:**
  - **Active front steering control unit**
  - **ICM control unit**
  - **Steering-column switch cluster (SZL)**
  - **Steering gear**

Connect vehicle to BMW diagnosis system.

Select and carry out initial operation/adjustment for active front steering under Service functions.

61 31 996 CARRYING OUT STEERING ANGLE SENSOR ADJUSTMENT

IMPORTANT: In vehicles with active steering, steering angle sensor adjustment is integrated in the service function INITIAL OPERATION/ADJUSTMENT FOR ACTIVE STEERING and must not be carried out separately!

NOTE: Steering angle sensor adjustment must be carried out:

- **after replacement of following components:**
  - **Steering column switch cluster**

Connect vehicle to BMW diagnosis system.

Select and carry out steering angle sensor adjustment under Service functions.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

31 00... FRONT AXLE + STEERING: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

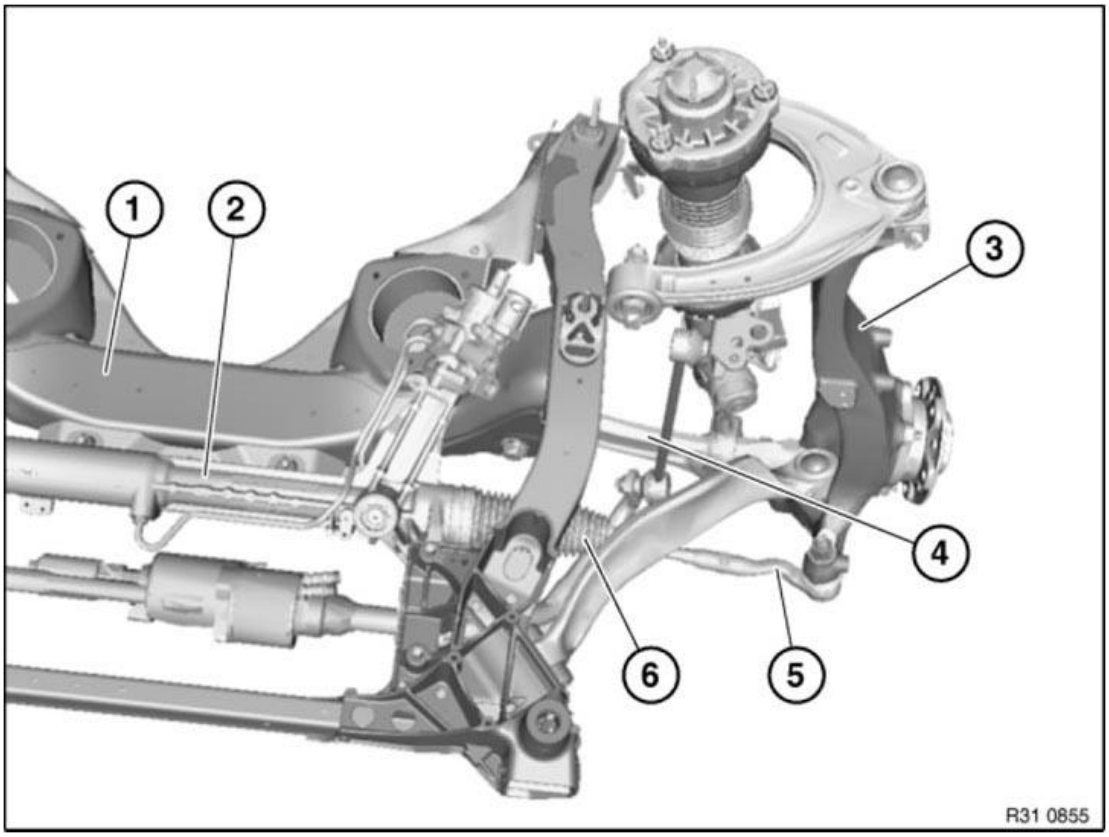


Fig. 9: Identifying Front Axle Support, Steering Gear, Swivel Bearing, Lower Wishbone And Track Rod
Courtesy of BMW OF NORTH AMERICA, INC.

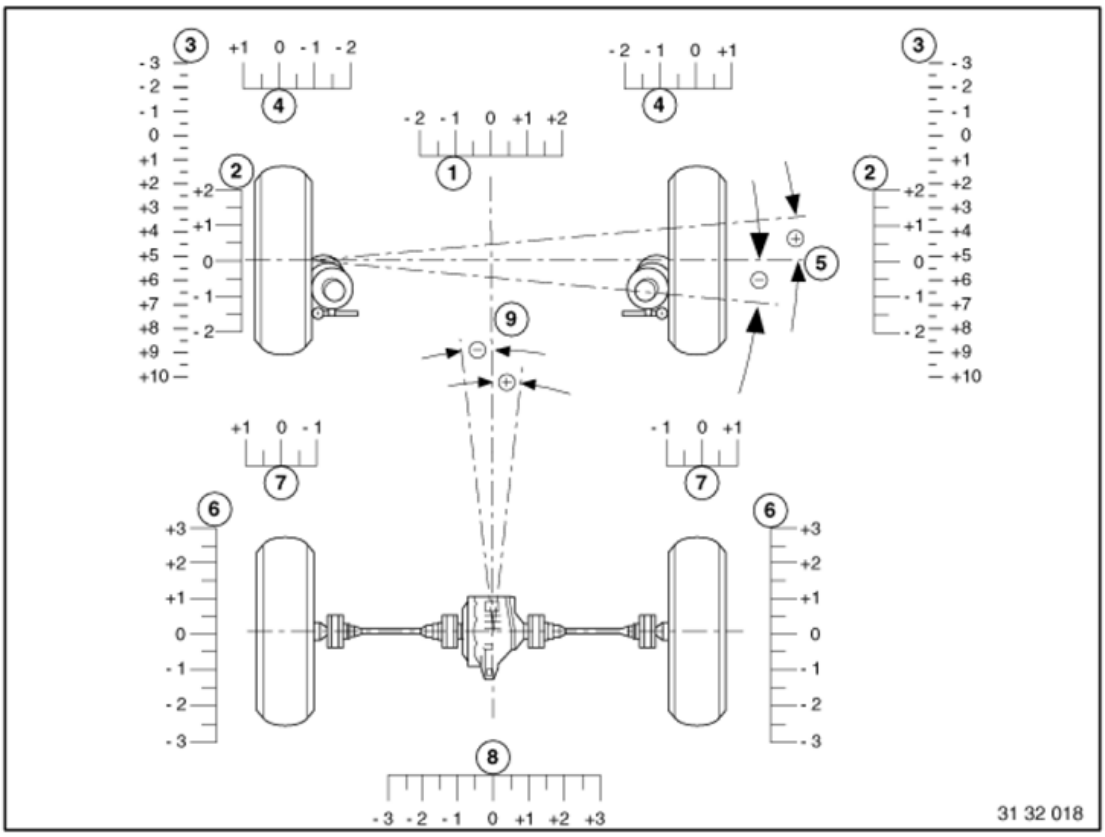
Illustrations show F01/F02:

A **WHEEL/CHASSIS ALIGNMENT CHECK** must be carried out after the following work:

- **Release of following screw/bolt connections:**
  - Steering gear to front axle support (with identification no alignment check required, see **REMOVING AND INSTALLING HYDRAULIC STEERING GEAR** or **REMOVING AND INSTALLING ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR**)
  - Lower wishbone to front axle support
  - Track rod end to track rod
- **Replacement of following parts:**
  1. Front axle support
  2. Steering gear
  3. Swivel bearing
  4. Lower wishbone

5. Track rod end
6. Track rod

32 00... GENERAL CHASSIS AND SUSPENSION DEFINITIONS



1. Toe
2. Camber
3. Caster (with 10° or 20° wheel lock)
4. Toe angle difference (with 20° wheel lock)
5. Wheel misalignment
6. Camber
7. Rear-wheel position
8. Toe
9. Geometrical driving axis

Fig. 10: General Chassis And Suspension Definitions Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

32 00... GENERAL INFORMATION AND DEFINITIONS

Toe angle difference

a Toe difference angle

D Centre point of operating circle

The toe angle difference is the angle adjustment of the inner cornering wheel relative to the outer cornering wheel when negotiating a curve. Steering is designed in such a way that angular position of wheels changes as steering lock progresses.

A correctly adjusted toe angle difference produces equal values for left and right lock with consideration of factory tolerances.

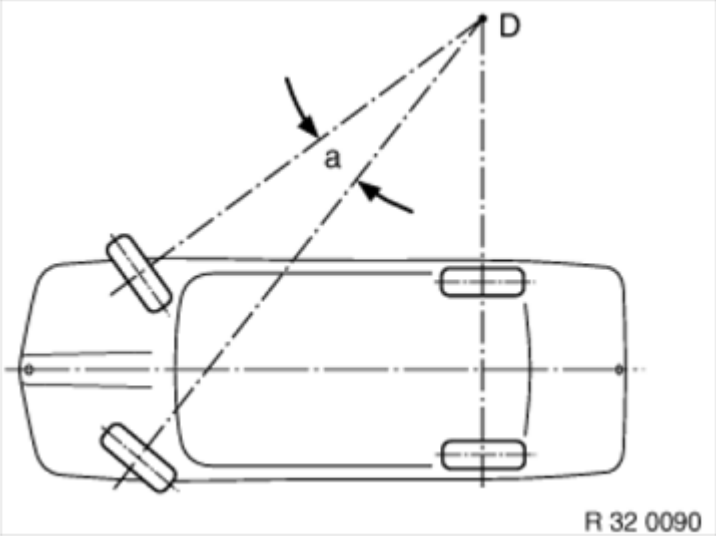


Fig. 11: Identifying Toe Difference Angle From Centre Point Of Operating Circle
Courtesy of BMW OF NORTH AMERICA, INC.

Toe angle difference provides information on corresponding operation of steering trapezoid for left or right steering lock from center position.

Camber

Inclination of the wheel from the perpendicular.

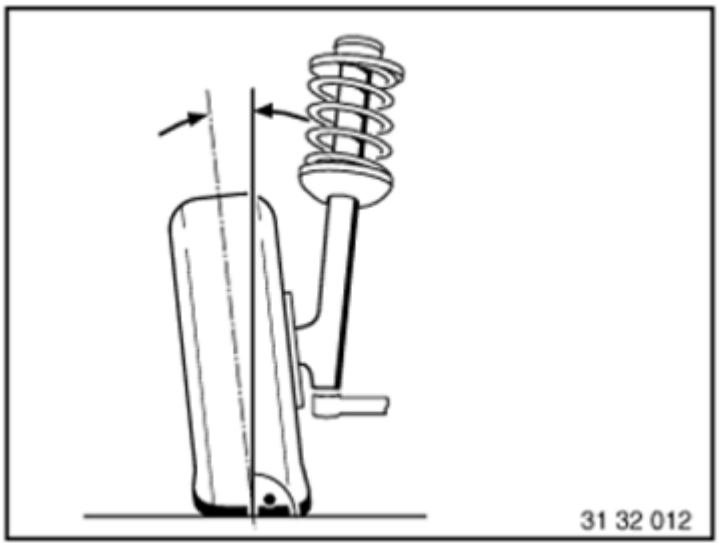


Fig. 12: Identifying Camber (Inclination Of Wheel From Perpendicular)
Courtesy of BMW OF NORTH AMERICA, INC.

Toe

Reduction in distance of front of front wheels to rear of front wheels. The toe-in prevents the wheels from moving apart during driving and thus:

- the wheels from vibrating and grinding
- excessive tire wear
- excessive strain on the steering linkage and its links/joints
- heavy vehicle steering

Measurement is performed in "straight-ahead mode".

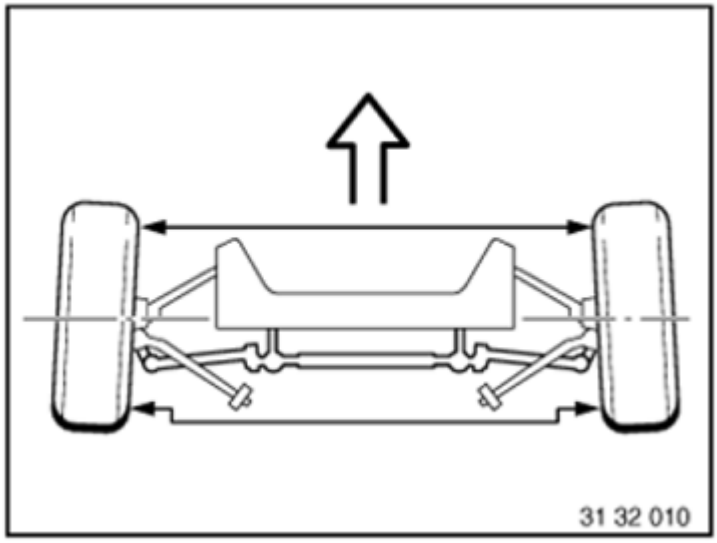


Fig. 13: Identifying Toe-In
Courtesy of BMW OF NORTH AMERICA, INC.

Castor

Is the inclination of the kingpin in the direction of travel viewed from the side. The line through the center point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

Thanks to caster, wheels are pulled and not pushed. In a similar manner to king pin inclination, when driving in curves or around corners, returning forces are reproduced to help return wheels to straight-ahead position.

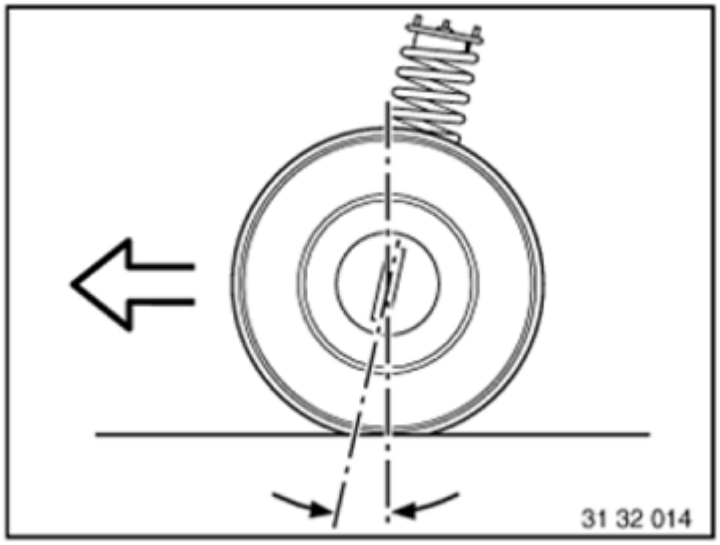


Fig. 14: Identifying Caster
Courtesy of BMW OF NORTH AMERICA, INC.

Geometrical driving axis 1

Is the angle bisector from the total rear-wheel toe.

Front-wheel measurements are taken in reference to this axis.

Symmetrical axis 2

Centre line running through front and rear axles.

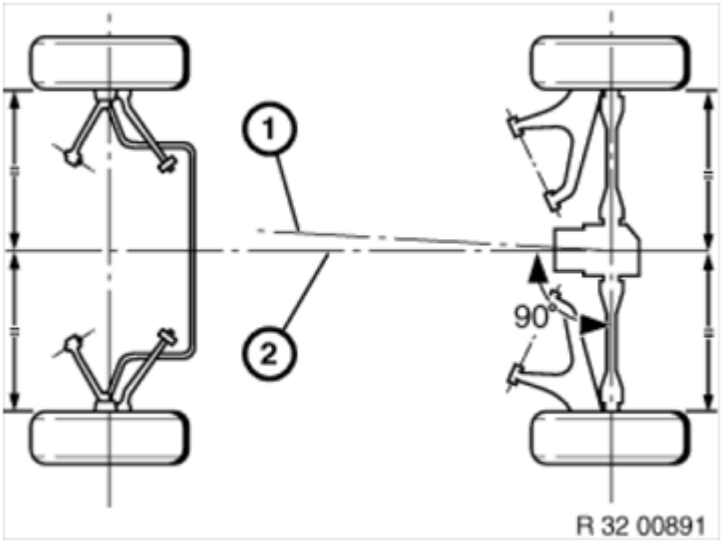


Fig. 15: Identifying Geometrical Driving Axis And Symmetrical Axis
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel misalignment

Angle by which one front wheel is displaced more towards front or rear than the other front wheel. The wheel offset angle is positive when the right wheel is displaced towards the front and negative when it is displaced towards the rear.

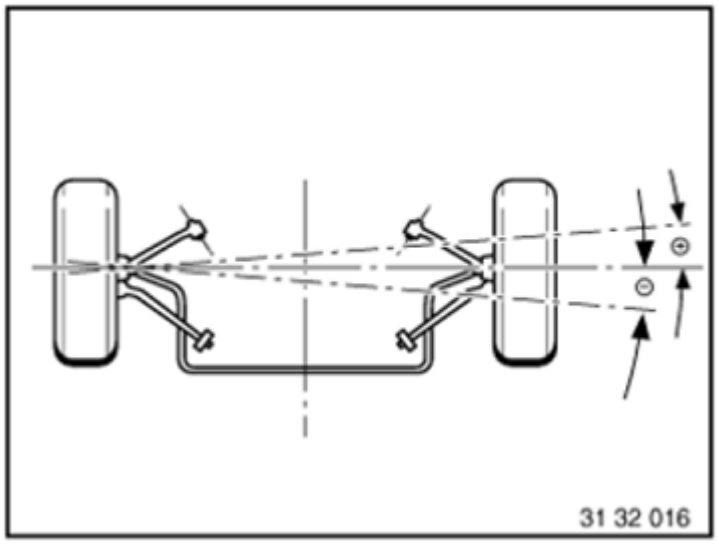


Fig. 16: Identifying Wheel Misalignment
Courtesy of BMW OF NORTH AMERICA, INC.

Kingpin offset/scrub radius

Is the distance from the center of the wheel contact face to the intersection point of the kingpin extension. The line through the center point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

The scrub radius is influenced by camber, kingpin angle and wheel offset of the wheel rim.

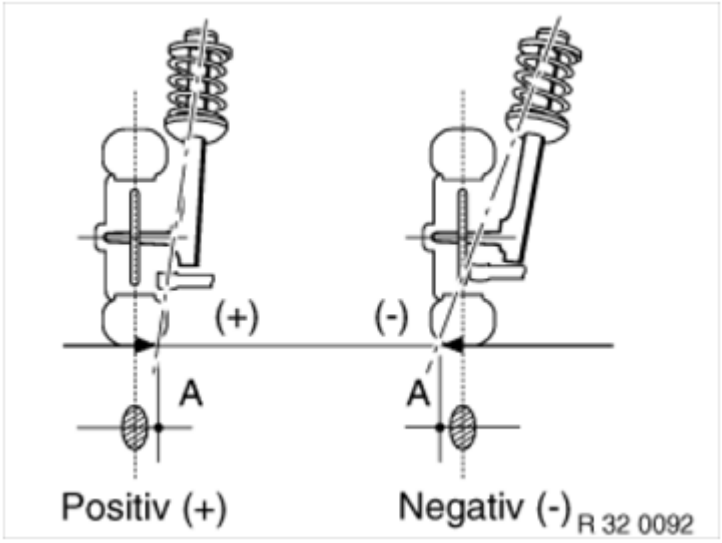


Fig. 17: Identifying Positive And Negative Kingpin Offset
Courtesy of BMW OF NORTH AMERICA, INC.

32 00... IDENTIFICATION OF SUSPENSION WITHOUT LABEL

NOTE: If the front spring strut does not have a label for suspension identification, the type of suspension can be identified from the part number in the Electronic Parts Catalogue.

32 00... INFORMATION ON REPLACING STEERING BOX AFTER ACCIDENT DAMAGE

Situation

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to steering boxes. When a steering box is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering box and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure

The steering box must be replaced if one or more of the following points apply:

A. Visible or noticeable damage to the steering box
   - Version with electric steering box (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.

B. Unacceptable torque increase and jamming when the steering box is turned from lock to lock (without hydraulic/electrical assistance)

C. Permissible tolerances exceeded during axle/wheel alignment (include alignment record with invoice/report if necessary)

D. Fire damage

E. Damage, permanent deformation or fractures to:
   - Wheel rims in the event of a negative result from the wheel/axle alignment check
   - Spring struts, steering stubs, wheel carriers
   - Wishbones
   - Leading or trailing links or anti-roll bars with this function
   - Body-side screwing/attachment points for wheel guide/control components
   - Front axle support
   - Pitman arms
   - Track rods
   - Steering gear fixtures
   - Steering Column

This guideline is binding for all accident repairs to BMW and MINI vehicles.

NOTE: **If the steering box replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.**

IMPORTANT: **The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!**

32 00 155 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD

NOTE:

- **Read and comply with GENERAL INFORMATION AND DEFINITIONS .**
- **Read and comply with GENERAL CHASSIS DEFINITION .**
- **Update KDS DATA STATUS**
- **Vehicles with active steering: Start up active steering prior to wheel alignment.**

NOTE:

- **For vehicles with rear axle slip angle control (F01/F02/F07/F10/F11):**

  During measurement, move HSR actuator with BMW diagnosis system to center position "0" (see Service function/Chassis/HSR/Wheel alignment)

- **Check compliance with TEST CONDITIONS, repair vehicle if necessary.**
- **If the ride height is outside the tolerance range (+40/-20 mm), load or unload vehicle accordingly to adjust the vehicle in this ride-height window**

- If necessary, prepare vehicle hoist.
- Drive vehicle onto vehicle hoist.

NOTE: **The front and rear wheels must be positioned centrally on the rotary and sliding plates.**

- Remove locking pins from both rotary and sliding plates.

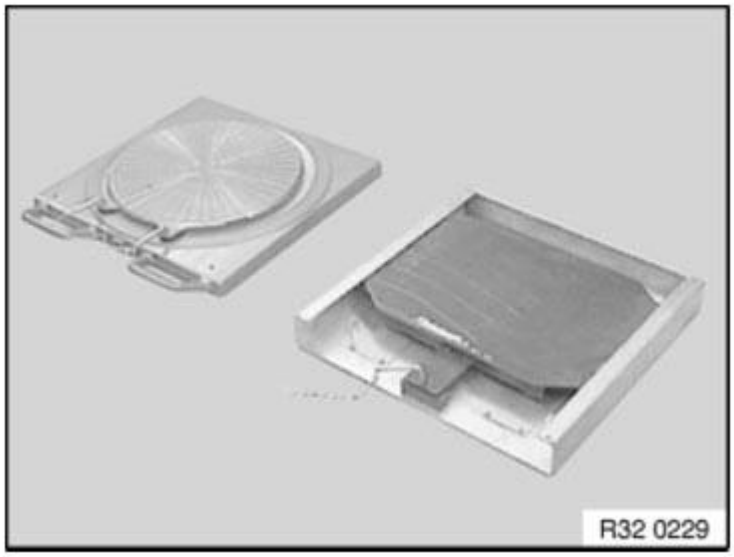


Fig. 18: Identifying Rotary And Sliding Plates Locking Pins (3200155)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Use quick-clamping holders with poly control arm bushings only. Due to excessive measuring inaccuracy, other quick-clamping units are not permitted!

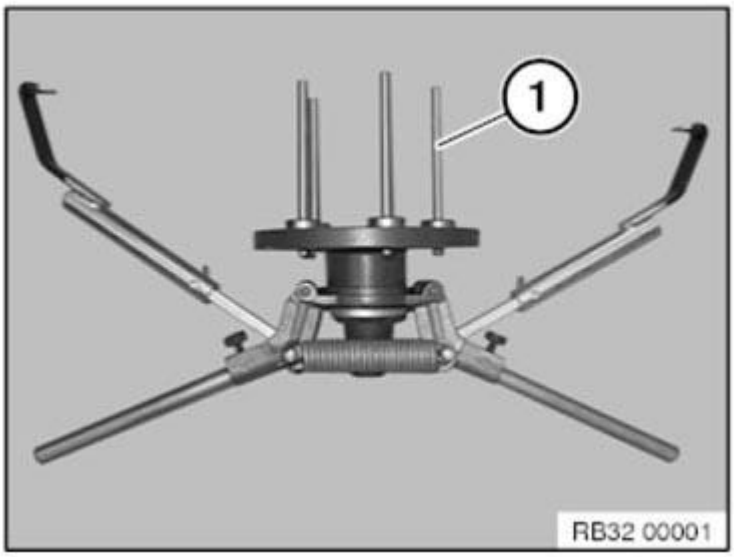


Fig. 19: Identifying Quick-Clamping Holders With Poly Control Arm Bushings (3200155)
Courtesy of BMW OF NORTH AMERICA, INC.

- Attach quick-clamping holder unit to vehicle and remove clamping levers in area of front wheels
- Attach pickup to quick-clamping holder, align using bubble level and connect to turntables



Fig. 20: Removing Front Wheel Clamping Lever Using Quick-Clamping Holder (3200155)
Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, attach spoiler adapter.



Fig. 21: Identifying Spoiler Adapter (3200155)
Courtesy of BMW OF NORTH AMERICA, INC.

- Install brake tensioner.

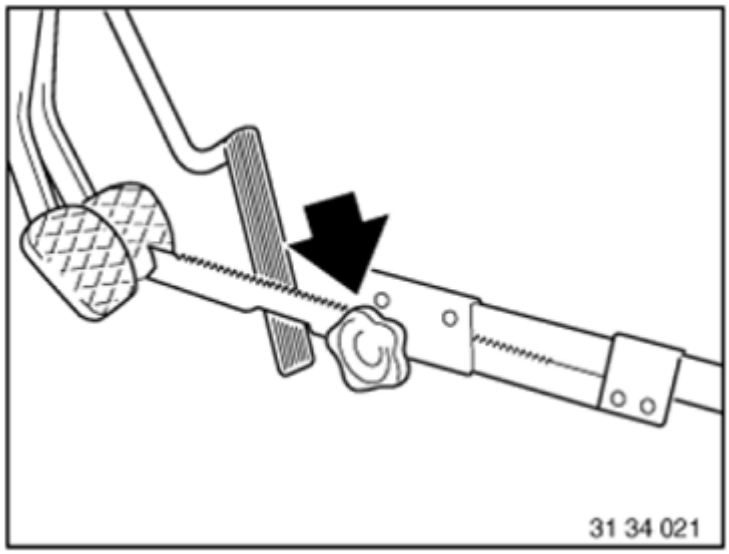


Fig. 22: Locating Brake Tensioner (3200155)
Courtesy of BMW OF NORTH AMERICA, INC.

- Enter customer and vehicle data
- Identify chassis version and select vehicle
- Enter tire inflation pressure and tread depth
- Measure and enter **VEHICLE RIDE HEIGHT**

  If the ride height is outside the tolerance range (+40/-20 mm), load or unload vehicle accordingly to adjust the vehicle in this ride-height window

- Perform input measurement in accordance with equipment manufacturer's instructions.
- If necessary, adjust front axle and rear axle. See **ADJUSTING TOE-IN ON FRONT AXLE**, **ADDITIONAL WORK FOR CAMBER CORRECTION**, and **ADJUSTING REAR AXLE**.
- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Insert locking pins into both rotary and sliding plates
- Remove wheel alignment system

32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION

NOTE:

- **Note general notes and GENERAL DATA**
- **Note GENERAL DRIVE TRAIN DEFINITION**
- **Update KDS DATA VERSIONS**

NOTE:

- **For vehicles with rear axle slip angle control (F01/F02/F07)**

During measurement, move HSR actuator with BMW diagnosis system to center position "0" (see Service function/Chassis and suspension/HSR/Wheel alignment)

- **Check compliance with TEST CONDITIONS, repair vehicle if necessary.**
- **If necessary, prepare vehicle hoist.**
- **Drive vehicle onto vehicle hoist.**

NOTE: The front and rear wheels must be positioned centrally on the rotary and sliding plates.

- **Remove locking pins from both rotary and sliding plates.**

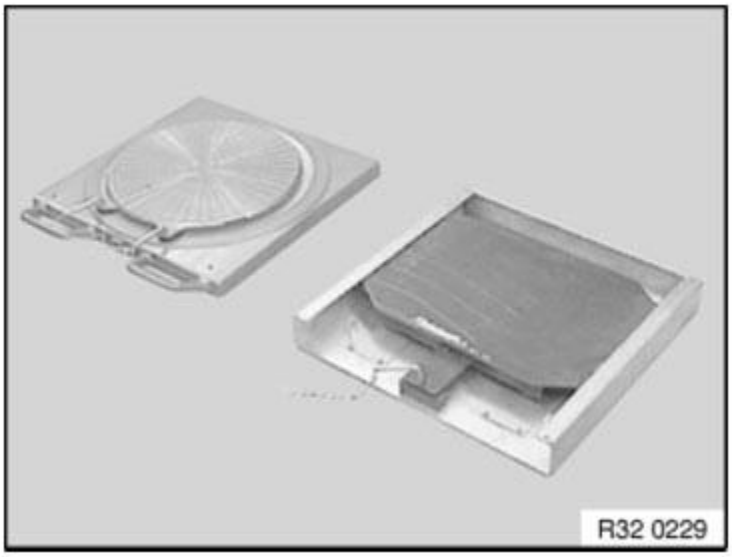


Fig. 23: Identifying Rotary And Sliding Plates Locking Pins (3200150)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Use only quick connectors with poly control pins (1).
Due to excessive measuring inaccuracy, other quick-clamping units are not permitted!

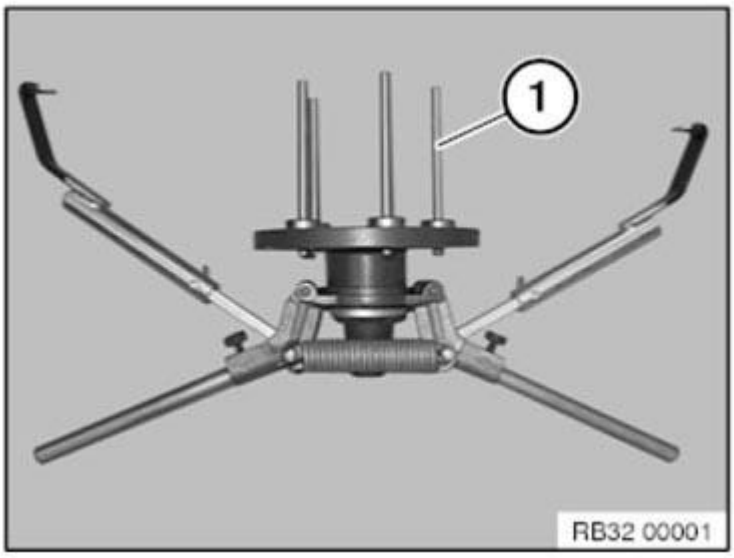


Fig. 24: Identifying Quick-Clamping Holders With Poly Control Arm Bushings (3200150)
Courtesy of BMW OF NORTH AMERICA, INC.

- Attach quick-clamping holder unit to vehicle and remove clamping levers in area of front wheels
- Attach the pickup to the quick-clamping holder.



Fig. 25: Removing Front Wheel Clamping Lever Using Quick-Clamping Holder (3200150)
Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, attach spoiler adapter.



Fig. 26: Identifying Spoiler Adapter (3200150)
Courtesy of BMW OF NORTH AMERICA, INC.

- Enter customer and vehicle data
- Identify chassis version and select vehicle
- Enter tire inflation pressure and tread depth
- Move vehicle into **DESIGN POSITION**
- Install brake tensioner.

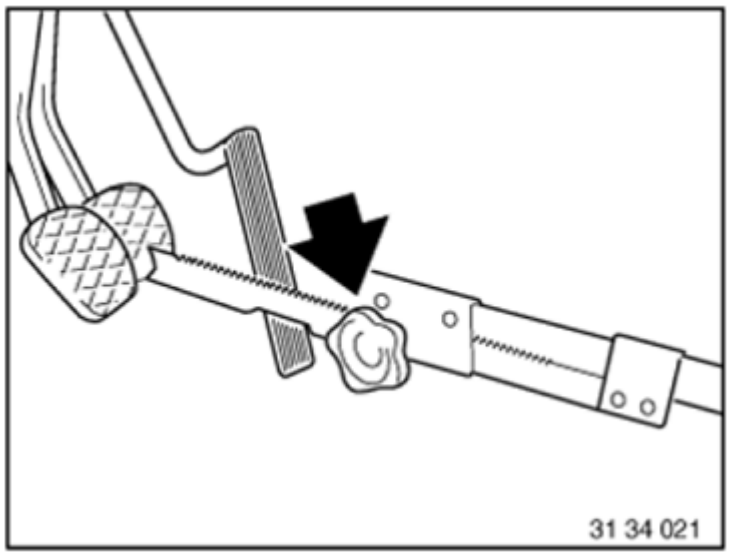


Fig. 27: Locating Brake Tensioner (3200150)
Courtesy of BMW OF NORTH AMERICA, INC.

- Perform input measurement in accordance with equipment manufacturer's instructions.

- If necessary, adjust front axle and rear axle. See **ADJUSTING TOE-IN ON FRONT AXLE**, **ADDITIONAL WORK FOR CAMBER CORRECTION**, and **ADJUSTING REAR AXLE**.
- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Insert locking pins into both rotary and sliding plates
- Remove chassis/wheel alignment system

32 00... KDS DATA STATUSES

Setpoint values for wheel alignment are not published in ISTA.

The current setpoint values are made available in the workshop equipment portal.

See:

- www.bmwbroup-wep.com
  - Workshop Equipment catalogue:
  - Select Wheel alignment
  - Select KDS nominal values
  - e.g. select "Beissbarth KDS update", copy data

Or:

- After sales Assistance Portal (ASAP)
  - Profile: Select Service/Technology
  - Select Workshop equipment
  - Select Start BMW
  - Select Workshop equipment catalogue
  - Select Wheel alignment
  - Select KDS nominal values
  - e.g. select "Beissbarth KDS update", copy data

We recommend that the data records are updated on a regular basis.

Please contact your subsidiary if you do not have access to the portals listed.

31 33... MEASURING VEHICLE RIDE HEIGHT

Determine actual ride height (A) _ to do so, attach tape measure to rim flange (2) at bottom middle and measure to wheel arch lower edge (1).

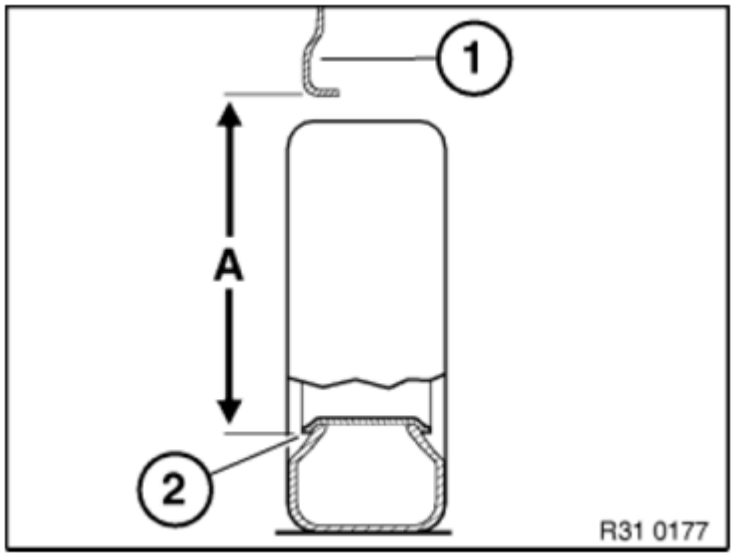


Fig. 28: Identifying Actual Ride Height From Rim Flange To Wheel Arch Lower Edge
Courtesy of BMW OF NORTH AMERICA, INC.

32 00... MOVING VEHICLE INTO DESIGN POSITION

Necessary preliminary work

- Move **VEHICLE INTO NORMAL POSITION**
- **F01/F02/F07: Version with air spring system:**
  - Remove ignition key
  - Pull fuse for air supply unit control unit
- Add/distribute weights in area of spring struts until the vehicle ride height is within the tolerance. See **REAR AXLE - RIDE HEIGHT** or **FRONT AXLE - RIDE HEIGHT** .

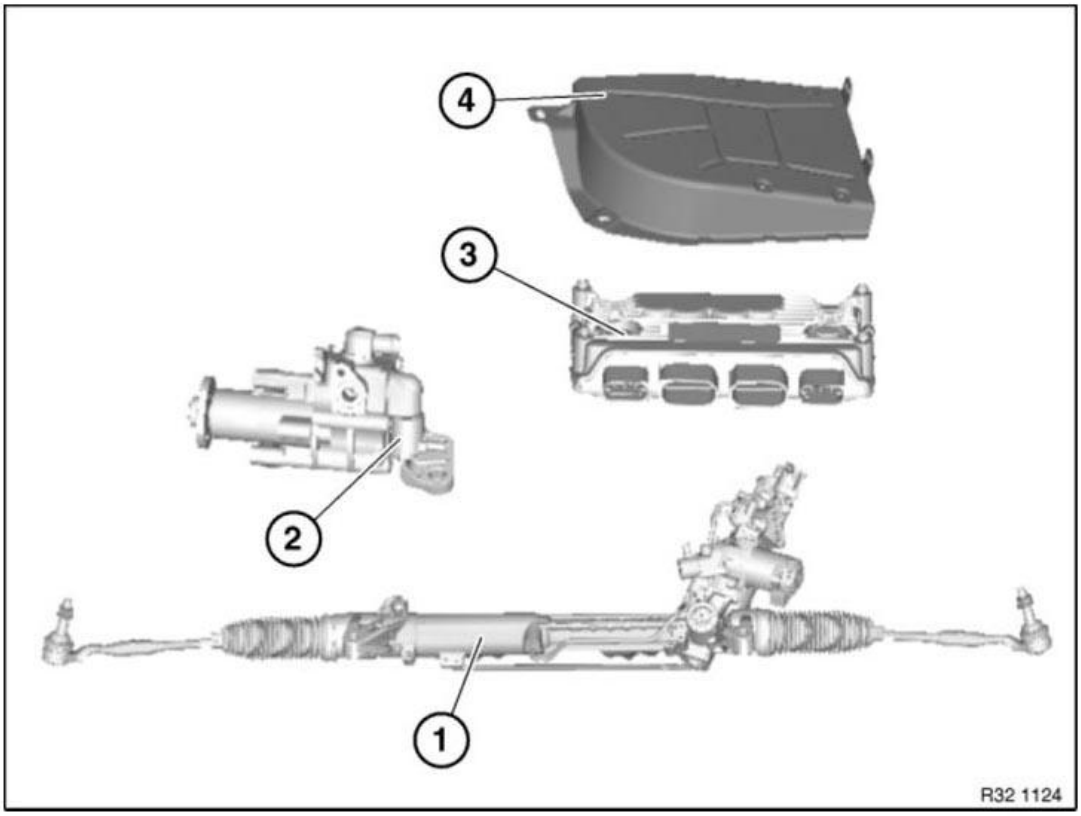
  Measure **VEHICLE RIDE HEIGHT**.

32 00... MOVING VEHICLE INTO NORMAL POSITION

Necessary preliminary work

- Check compliance with **TEST CONDITIONS**, repair vehicle if necessary.
- F01/F02/F04/F07/F11: Version with air suspension system: Carry out **RIDE HEIGHT ADJUSTMENT**
- Check vehicle interior and luggage compartment (incl. spare wheel well) for load, unload vehicle if necessary
- Introduce DIN load into vehicle. See **CHASSIS/WHEEL ALIGNMENT - NORMAL POSITION** .

32.... OVERVIEW OF ACTIVE STEERING

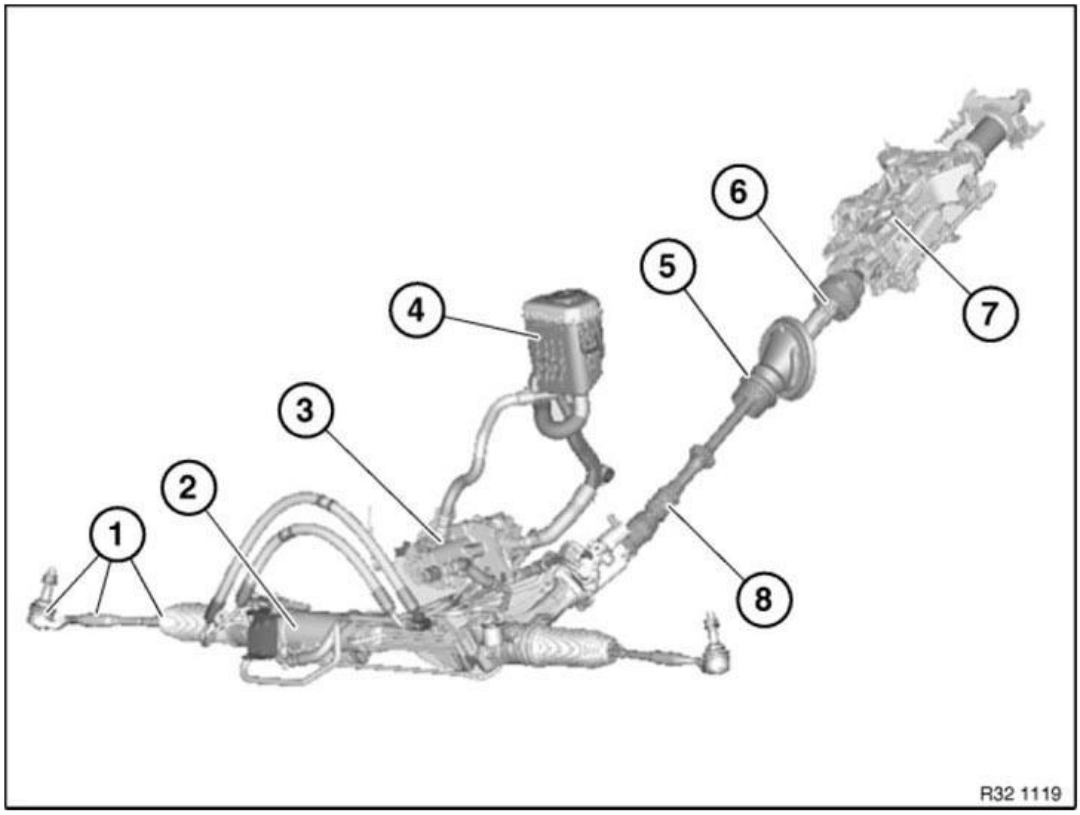


Safety precautions & general information

1 Hydraulic steering gear adjustment for active steering
2 Eco valve (on power steering pump)
3 Control unit
4 Retaining plate, control unit

Fig. 29: Overview Of Active Steering
Courtesy of BMW OF NORTH AMERICA, INC.

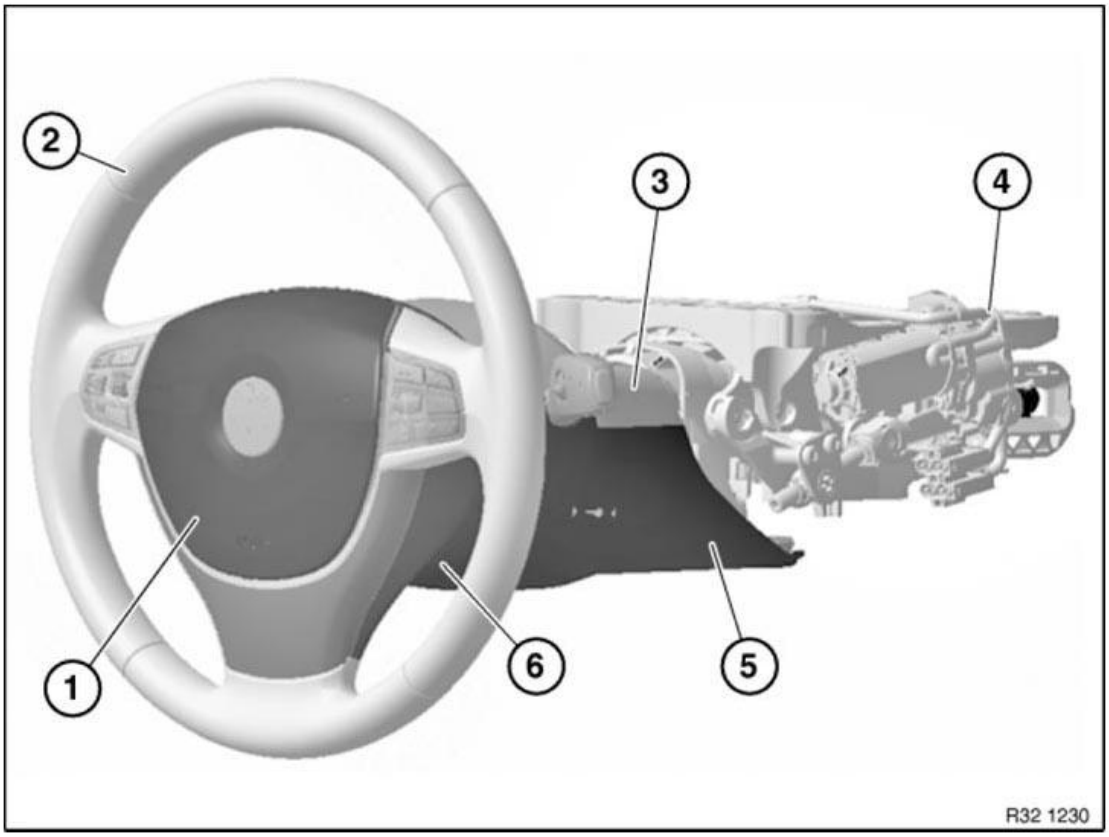
32..... OVERVIEW OF STEERING



	Safety information and general information	
1	Track rod end / track rod / gaiter	Adjusting procedure
2	Hydraulic steering gear	
3	Vane pump	
4	Oil container	
5	Sleeve	Overview, active front steering
6	Steering shaft, middle section	Overview, Dynamic Drive
7	Steering column	Bleed hydraulic steering
8	Steering shaft lower section	Carry out steering angle sensor adjustment/adjustment for active steering

Fig. 30: Overview Of Steering
Courtesy of BMW OF NORTH AMERICA, INC.

32.... OVERVIEW OF STEERING (INTERIOR)



Safety precautions & general information

1 Airbag unit	6	Steering angle sensor (see steering column switch cluster)
2 Steering wheel		
3 Upper steering column casing		
4 Steering column		Carry out steering angle sensor adjustment/adjustment for active front steering
5 Lower steering column casing		

Fig. 31: Overview Of Steering (Interior)
Courtesy of BMW OF NORTH AMERICA, INC.

32 00... PERFORMING RIM RUNOUT COMPENSATION

NOTE: Rim runout compensation involves electronically recording the lateral runout of the rim and the possible clamping error of the quick-clamping unit for one wheel rotation and compensating the toe and camber for measurement/alignment.

Raise body.

Perform rim runout compensation in accordance with equipment manufacturer's instructions.

Compress/deflect car.

33 00... REAR AXLE: WHEEL ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

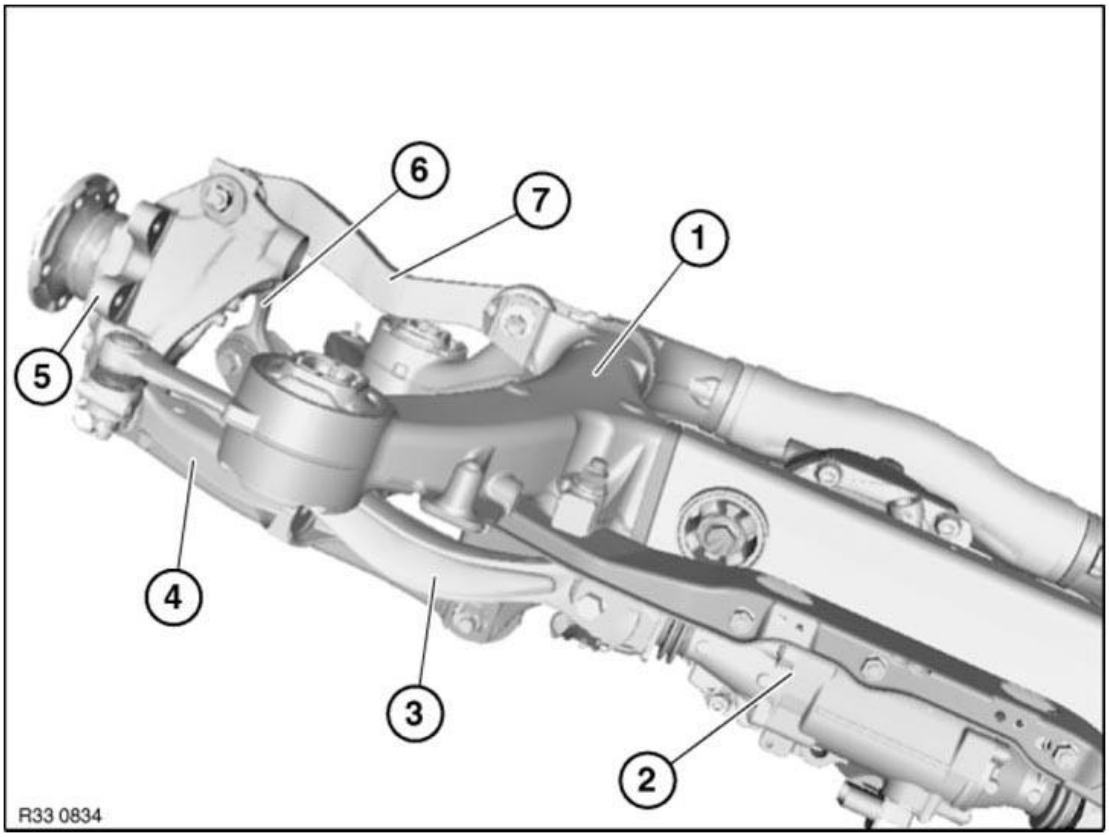


Fig. 32: Identifying Rear Axle Support, HSR Actuator, Toe Arm, Swinging Arm, Wheel Carrier And Wishbone
Courtesy of BMW OF NORTH AMERICA, INC.

Graphic F01/F02.

A **WHEEL ALIGNMENT CHECK** must be carried out after the following work:

- **Release the following screw connection:**
  - Swinging arm, front/rear, to rear axle support
  - Swinging arm to integral link/wheel carrier
  - Guide arm to rear axle support/HSR unit
  - Wishbone to rear axle support/wheel carrier

- Replacement of following parts:
  1. Rear axle support
  2. HSR actuator
  3. Toe arm
  4. Swinging arm
  5. Wheel carrier
  6. Integral link
  7. Wishbone

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

**WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start_stop function is active.
An automatic engine start is possible.**

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

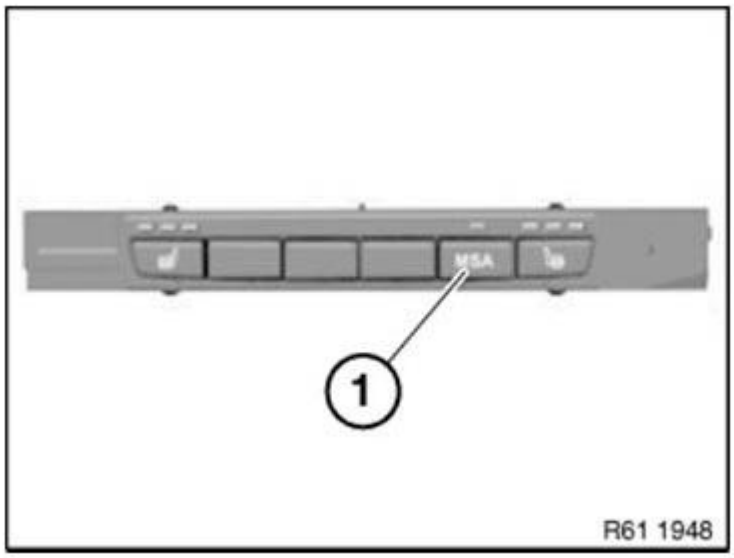


Fig. 33: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

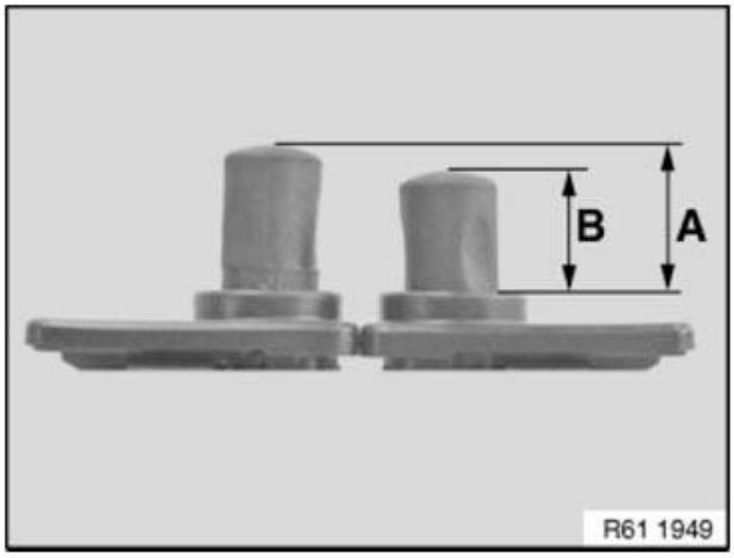


Fig. 34: Identifying Basic Setting Of Engine Hood/Bonnet Open
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

34 52.. STARTUP OF ICM CONTROL UNIT

NOTE: Startup of ICM control unit must be carried out:

- **After replacement or removal and installation of ICM control unit**

Connect vehicle to BMW diagnosis system.

Select and carry out startup of ICM control unit under Service functions.

32 00... TEST CONDITIONS FOR CHASSIS/WHEEL ALIGNMENT CHECK

Observe the following test conditions prior to the chassis/wheel alignment check:

1. Correct and identical wheel rim and tire sizes.
2. Correct tread depth. The tread depth for each axle may differ from left to right by max. 1_2 mm.
3. Correct tire pressure (see label on vehicle).
4. Wheel bearing play OK
5. Steering backlash OK
6. Condition of suspension and shock absorbers OK: Visually inspect for breakage, etc.
7. Vehicles with self-levelling suspension: Pull fuse of air supply system so that there is no controlling down or up.

32 11 MECHANICAL STEERING GEAR

32 00... INFORMATION ON REPLACING STEERING BOX AFTER ACCIDENT DAMAGE

Situation

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to steering boxes. When a steering box is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering box and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure

The steering box must be replaced if one or more of the following points apply:

A. Visible or noticeable damage to the steering box
   - Version with electric steering box (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.

B. Unacceptable torque increase and jamming when the steering box is turned from lock to lock (without

hydraulic/electrical assistance)

C. Permissible tolerances exceeded during axle/wheel alignment (include alignment record with invoice/report if necessary)
D. Fire damage
E. Damage, permanent deformation or fractures to:
   - Wheel rims in the event of a negative result from the wheel/axle alignment check
   - Spring struts, steering stubs, wheel carriers
   - Wishbones
   - Leading or trailing links or anti-roll bars with this function
   - Body-side screwing/attachment points for wheel guide/control components
   - Front axle support
   - Pitman arms
   - Track rods
   - Steering gear fixtures
   - Steering Column

This guideline is binding for all accident repairs to BMW and MINI vehicles.

NOTE: If the steering box replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

IMPORTANT: The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!

32 11... NOTES ON CHECKING STEERING BACKLASH ON VEHICLES WITH RACK-AND-PINION STEERING

NOTE: The evaluation "steering backlash" is made usually when the front axle is raised, where the track rod is angled.

The force introduced via the track rod is divided into a horizontal force and a vertical force relieving the thrust member (1) against the spring (2).

The steering box is depressurized on account of no hydraulic assistance due to engine standstill and is thus not preloaded!

The play created in this way is incorrectly referred to as steering backlash.

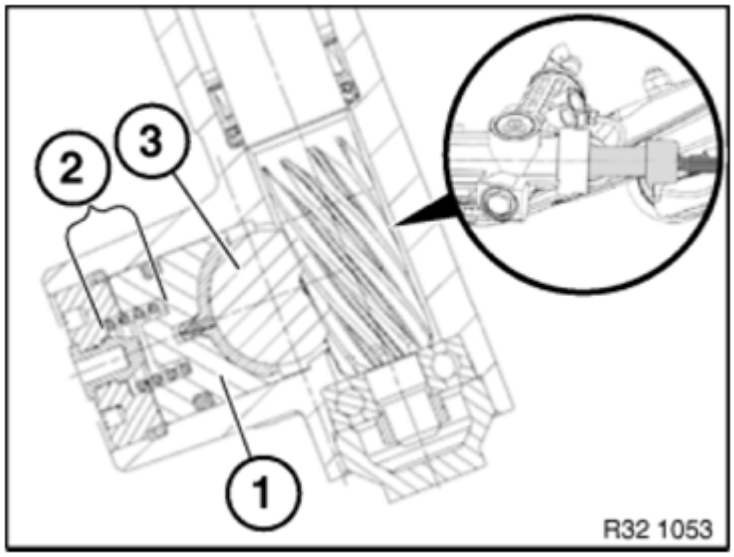


Fig. 35: Identifying Thrust Member, Spring And Rack
Courtesy of BMW OF NORTH AMERICA, INC.

3 = Rack

Solution

1. Check the tie rod backlash only in loaded condition or in the design position.
2. Checking with front axle raised:
   - To evaluate the backlash of the tie rod bearings on the steering box side, it is necessary to pressures the steering box via its servo system!
   - The combustion engine must be running during hydraulically assisted steering for this purpose
   - For electro-hydraulic steering servo systems, the ignition must be on
   - In the case of solely electric steering servo, the ignition should also be switched on so that the steering shaft is subjected to load.

Desired state

The steering must be backlash-free in all components!

32 11 100 REPLACING GAITER FOR STEERING BOX ON LEFT OR RIGHT

IMPORTANT: The hydraulic steering gear must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

Necessary preliminary work

- Remove **TRACK ROD END**
- Remove **UNDERBODY PROTECTION**

Clean track rod.

Release band clamp (1) and **EAR CLIP** (3).

Detach gaiter (2) from track rod.

Installation note:

Clean rack and check surface for damage (e.g. by corrosion).

Grease rack (refer to **STEERING AND WHEEL ALIGNMENT - OPERATING FLUIDS**).

Clean track rod and apply grease to taper.

NOTE: This ensures that the gaiter is not rotated when the track rod is rotated.

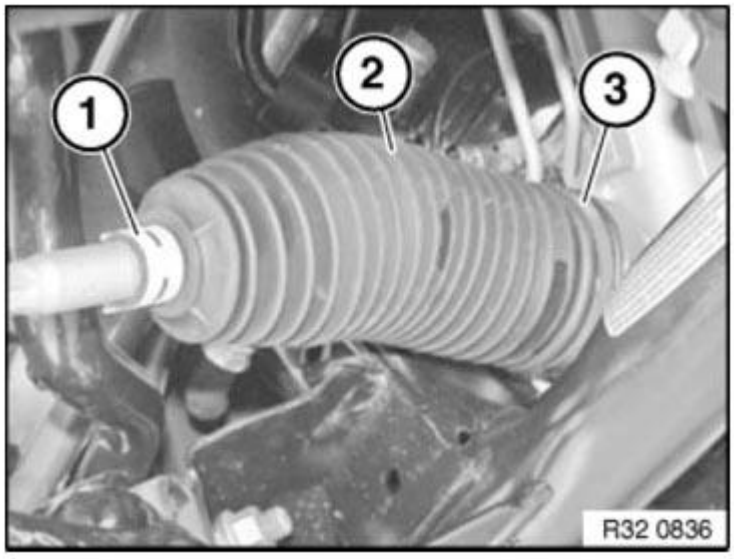


Fig. 36: Identifying Track Rod Clamp, Gaiter And Ear Clip
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform **CHASSIS/WHEEL ALIGNMENT CHECK**

32 13 STEERING GEAR WITH SERVO UNIT

32 13 006 BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Using contaminated equipment to add fluid may introduce dirt particles into the fluid reservoir and significantly reduce the service life of the power steering system. Do not use any filler funnels or similar!
Use only Pincushion CHF11S from original containers!
The fill level may only be checked or adjusted when the engine is stopped! The fluid temperature should be approx. 20°C here.
Ensure that the cap is fully screwed in prior to the fill level check.

NOTE: To avoid mix-ups when filling with hydraulic fluid, mark the fluid reservoirs or their caps with identification marks.



Fig. 37: Identifying Hydraulic Fluid Reservoir Cap Identification Mark
Courtesy of BMW OF NORTH AMERICA, INC.

1. Thoroughly clean fluid reservoir and its immediate surroundings
2. Check and correct fill level

NOTE: The fill level is dependent on the fluid temperature. Check fluid level at a fluid temperature between 20° and 80°C.

With engine at normal operating temperature do not exceed "Max. marking 80°C" (1).

Do not drop below "Min. marking 20°C" (2).

Hydraulic fluid: see **STEERING AND WHEEL ALIGNMENT - OPERATING FLUIDS**

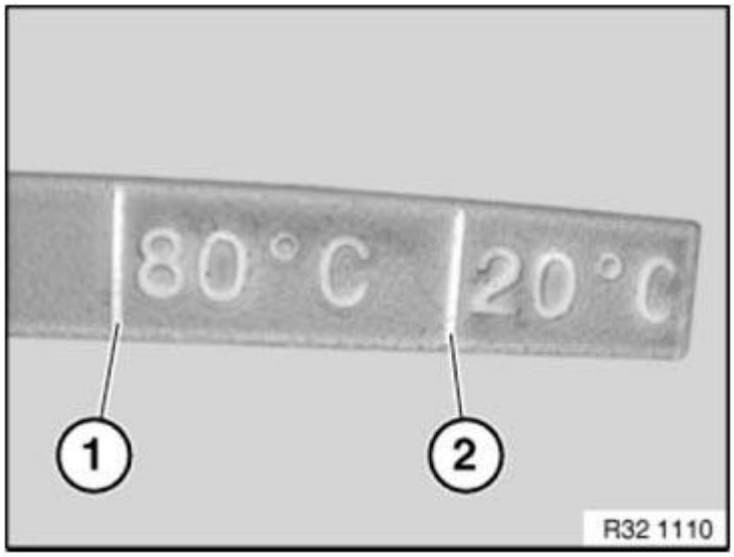


Fig. 38: Identifying Maximum And Minimum Temperature Marking Of Fluid Level
Courtesy of BMW OF NORTH AMERICA, INC.

3. Start engine
4. Turn steering wheel left and right twice in each case up to full lock; if necessary, top up hydraulic fluid (e.g. if hydraulic system is completely drained)
5. Move steering wheel to straight-ahead position and turn off 122 engine
6. Check and correct fill level with engine stopped
7. Check hydraulic system for leaks

After filling

- If necessary, carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 13 006 BLEEDING POWER STEERING UNIT

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Using contaminated equipment to add fluid may introduce dirt particles into the fluid reservoir and significantly reduce the service life of the hydraulic steering system. Do not use any filler funnels or similar!
The fill level may only be checked or adjusted when the engine is stopped! The oil temperature should be approx. 20°C here.
Ensure that the cap is fully screwed in prior to the fill level check.

NOTE: To avoid mix-ups when filling with hydraulic fluid, mark the fluid reservoir or the cap with an identification mark.



Fig. 39: Identifying Hydraulic Fluid Reservoir Cap Identification Mark
Courtesy of BMW OF NORTH AMERICA, INC.

1. Thoroughly clean fluid reservoir and its immediate surroundings
2. Check and correct fill level

NOTE: The fill level is dependent on the oil temperature. Check fill level at an oil temperature between 20° and 80°C.

With engine at operating temperature do not exceed "Max. marking 80°C" (1).

Do not drop below "Min. marking 20°C" (2).

Hydraulic fluid: see **STEERING AND WHEEL ALIGNMENT - OPERATING FLUIDS**

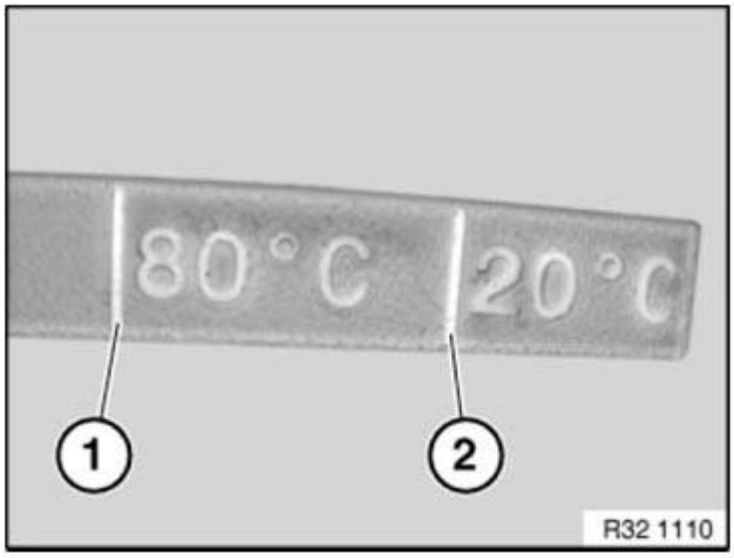


Fig. 40: Identifying Maximum And Minimum Temperature Marking Of Fluid Level
Courtesy of BMW OF NORTH AMERICA, INC.

3. Start engine
4. Turn steering wheel left and right twice in each case up to full lock; if necessary, top up hydraulic fluid (e.g. if hydraulic system is completely drained)
5. Move steering wheel to straight-ahead position and turn off engine
6. Check and correct fill level with engine stopped
7. Check hydraulic system for leaks

32 00... INFORMATION ON REPLACING STEERING BOX AFTER ACCIDENT DAMAGE

Situation

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to steering boxes. When a steering box is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering box and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure

The steering box must be replaced if one or more of the following points apply:

A. Visible or noticeable damage to the steering box
   - Version with electric steering box (EPS): Examine in particular the control unit with all plug

connections for damage and hairline cracks.

B. Unacceptable torque increase and jamming when the steering box is turned from lock to lock (without hydraulic/electrical assistance)

C. Permissible tolerances exceeded during axle/wheel alignment (include alignment record with invoice/report if necessary)

D. Fire damage

E. Damage, permanent deformation or fractures to:

- Wheel rims in the event of a negative result from the wheel/axle alignment check
- Spring struts, steering stubs, wheel carriers
- Wishbones
- Leading or trailing links or anti-roll bars with this function
- Body-side screwing/attachment points for wheel guide/control components
- Front axle support
- Pitman arms
- Track rods
- Steering gear fixtures
- Steering Column

This guideline is binding for all accident repairs to BMW and MINI vehicles.

NOTE: If the steering box replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

IMPORTANT: The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!

32 13 065 REMOVING AND INSTALLING ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

**IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Seal connections and lines immediately after removal with sealing plugs.**

Necessary preliminary tasks

- Draw off and dispose of hydraulic fluid from fluid reservoir

- Remove underbody protection at front and rear. See **REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** and **REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION** .
- Remove **COVER FOR STEERING ASSEMBLIES** on left and right
- Remove **TRACK ROD END ON BOTH SIDES FROM SWIVEL BEARING**
- Remove lower section of steering spindle from steering gear
- Replacement only: Remove **TRACK ROD END AT BOTH ENDS OF TRACK ROD**
- Version with Dynamic Drive:
  - Remove front anti-roll bar. See **REMOVING AND INSTALLING/REPLACING FRONT ACTIVE ANTI-ROLL BAR** .
  - Remove **EXPANSION HOSE**

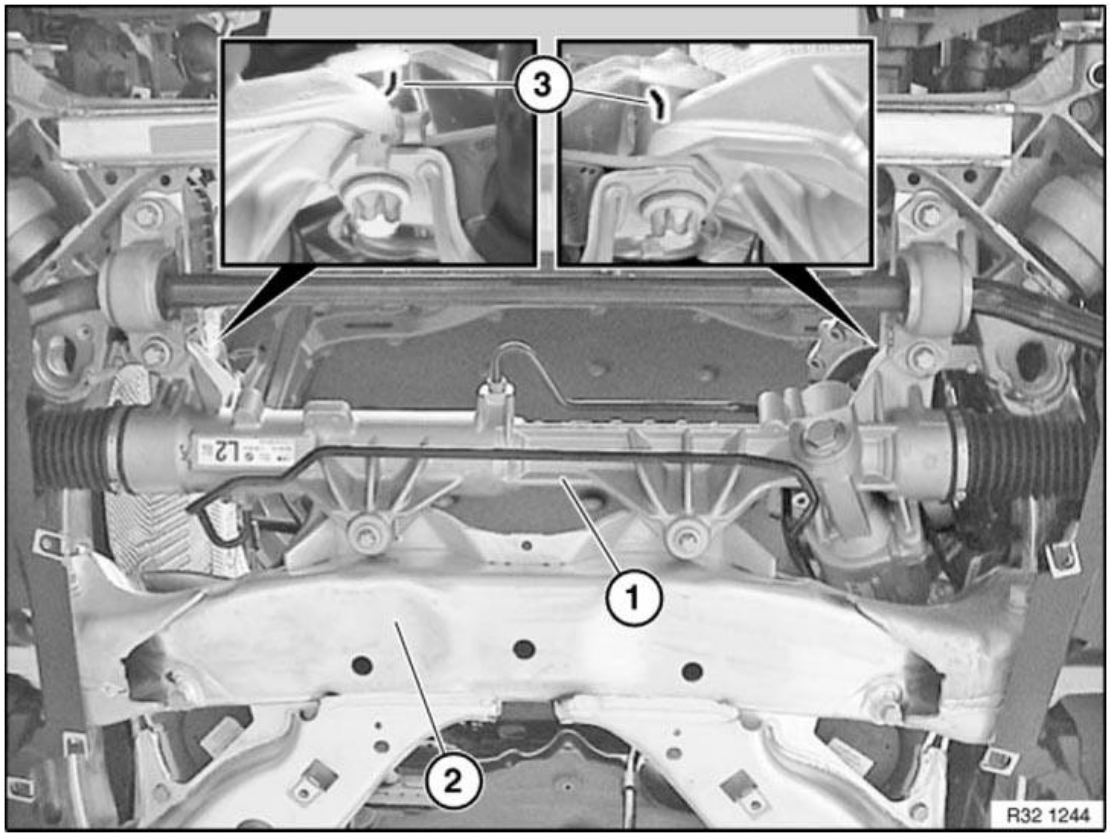


Fig. 41: Identifying Marks On Steering Gear Box And Front Bolting Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid the need for axle/wheel alignment, mark position of steering gear (1) to front axle support (2).
To do so, draw a wide white stripe on the front bolting points (left and right) and apply a thin black marking (3) to this stripe.

Slacken nut (1).

Tightening torque **32 41 7AZ** .

Release screw (2) on bracket.

Tightening torque **32 41 7AZ** .

Release screw (3).

Tightening torque **32 00 1AZ** .

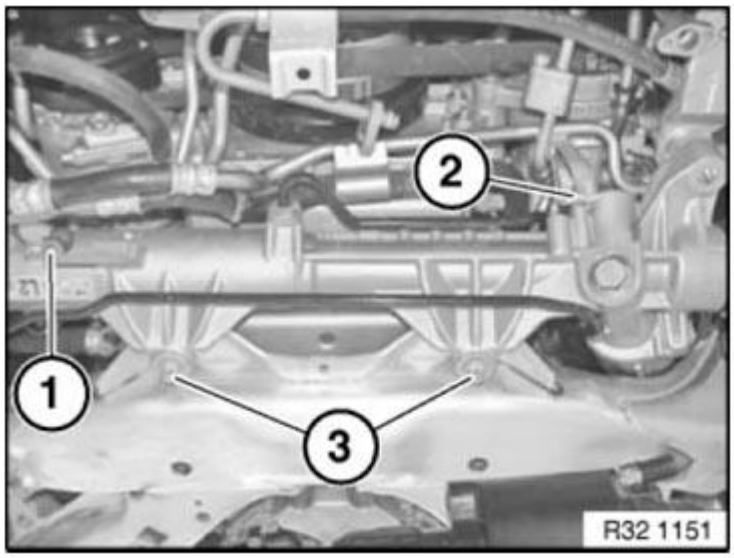


Fig. 42: Identifying Front Axle Nut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

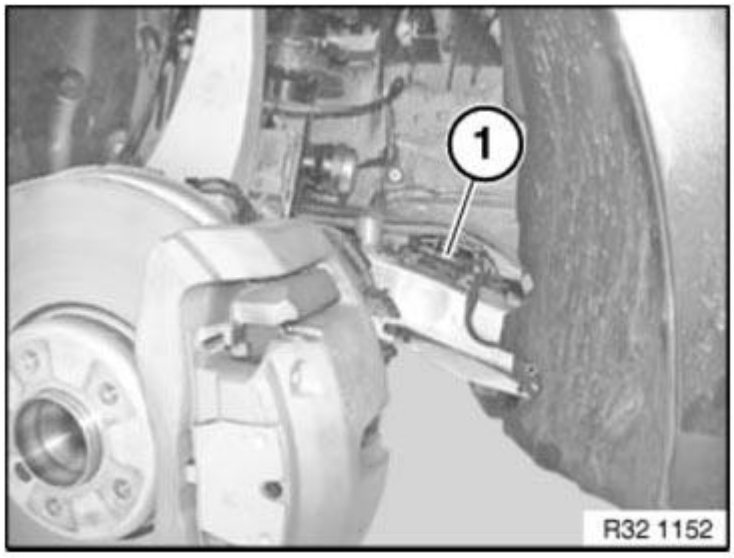


Fig. 43: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Pull hydraulic steering gear towards front a little.

Unfasten plug connection (1) and disconnect.

Release screw (2) and remove lines (3) from hydraulic steering gear.

Tightening torque **32 41 5AZ** .

Remove power steering gear in downward direction.

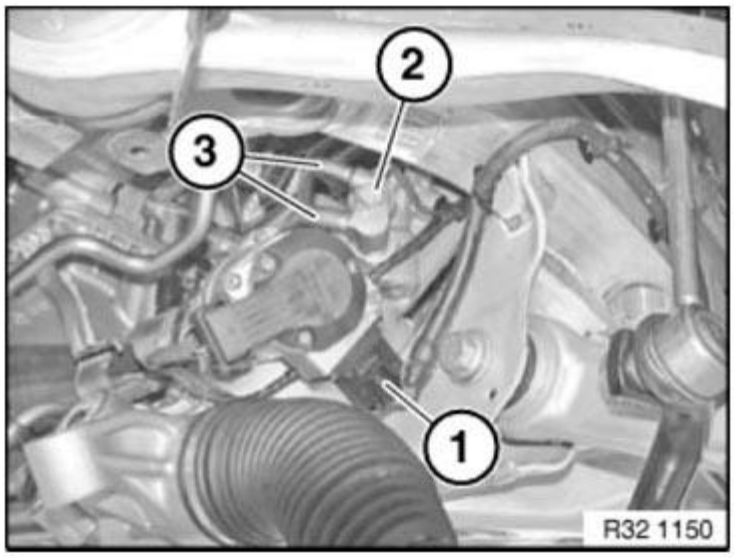


Fig. 44: Identifying Plug Connections And Hydraulic Steering Gear Screw And Fluid Lines

Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed hydraulic system. See **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** or **BLEEDING POWER STEERING UNIT**.
- Check pipe connections for leaks
- **ADJUSTMENT FOR ACTIVE STEERING**
- If necessary, carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 13 070 REMOVING AND INSTALLING ELECTRIC STEERING BOX (EPS)

IMPORTANT: Steering box:

Check connection of steering box for corrosion, clean contacts if necessary. The steering box must be replaced if the corrosion is too far advanced.

Connecting line:

In the event of moisture/corrosion inside the two plug connections, check the insulation of the connecting line. If the insulation reveals any noticeable/striking features, partial replacement will be necessary. Otherwise it will be sufficient to replace the contacts or connector housing.

NOTE: In a warranty case you must always provide a fault memory printout, even where there is no fault entry, with the defective part.

Necessary preliminary work:

- Disconnect **BATTERY EARTH LEAD**

NOTE: High-current-carrying wiring laid with permanent positive connection (80 A fuse).

- Remove underbody protection at **FRONT** and **REAR**
- Remove **COVER FOR STEERING ASSEMBLIES** on left and right
- Remove stiffening plate
- Remove **TRACK ROD END** on both sides from swivel bearing
- Remove **LOWER SECTION** of steering shaft from steering box
- Version with Dynamic Drive:
  - Remove **ANTI-ROLL BAR LINK ON RIGHT OF ANTI-ROLL BAR**

IMPORTANT: To avoid the need for axle/wheel alignment, mark position of steering box (1) to

front axle support (2).

To do so, draw a wide white stripe on the front bolting points (left and right) and apply a thin black marking (3) to this stripe.

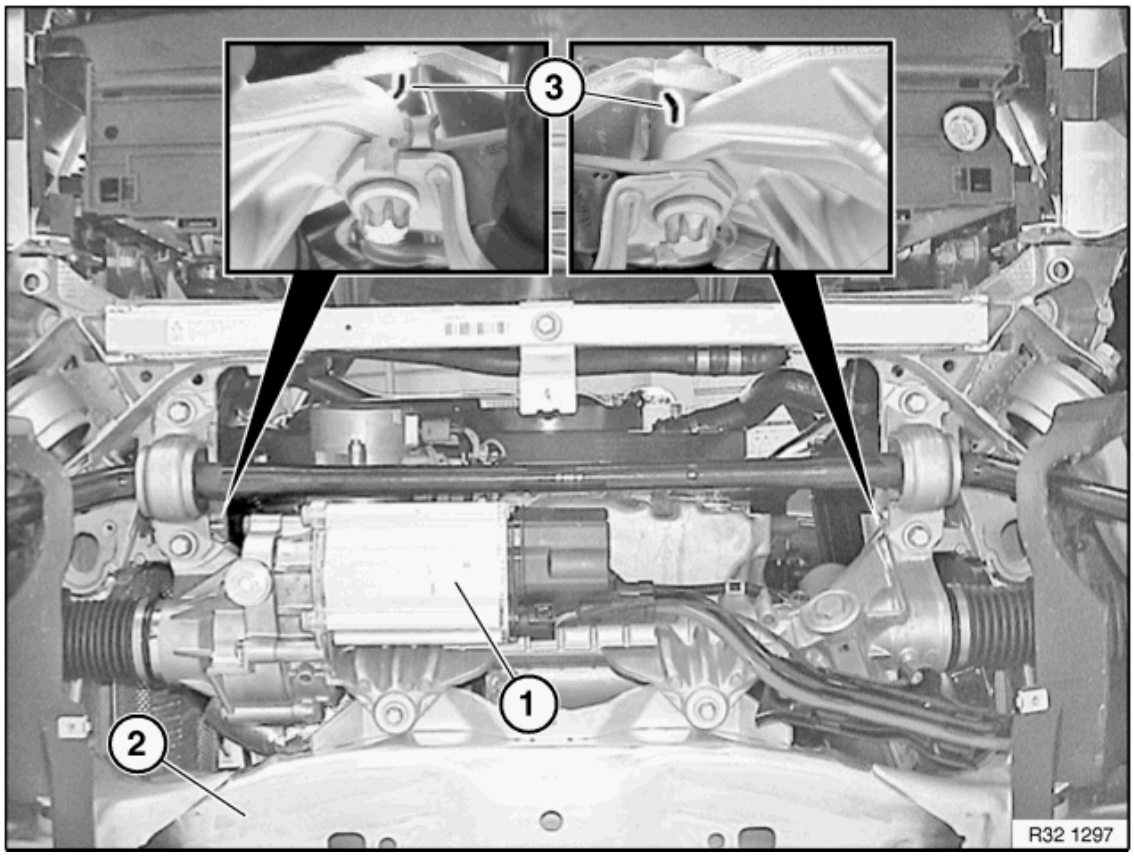


Fig. 45: Marking Position Of Steering Box To Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and tie anti-roll bar (2) to front axle support.

Tightening torque **31 35 1AZ** .

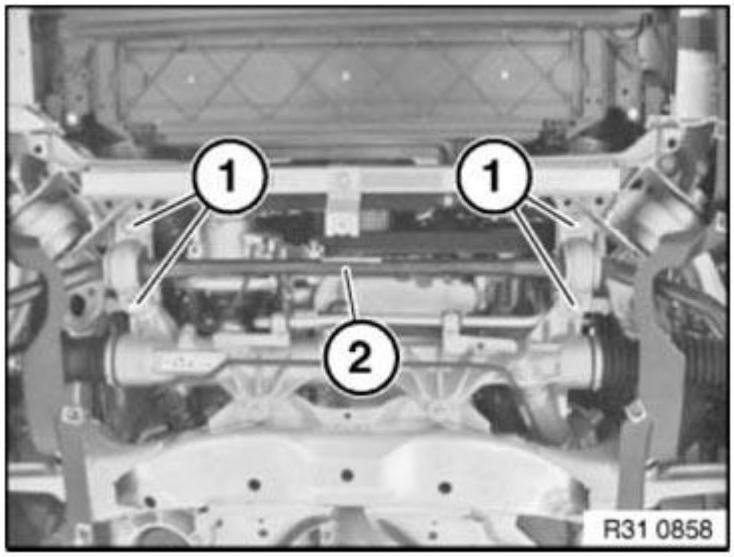


Fig. 46: Identifying Anti-Roll Bar Link With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connection (1) and disconnect.

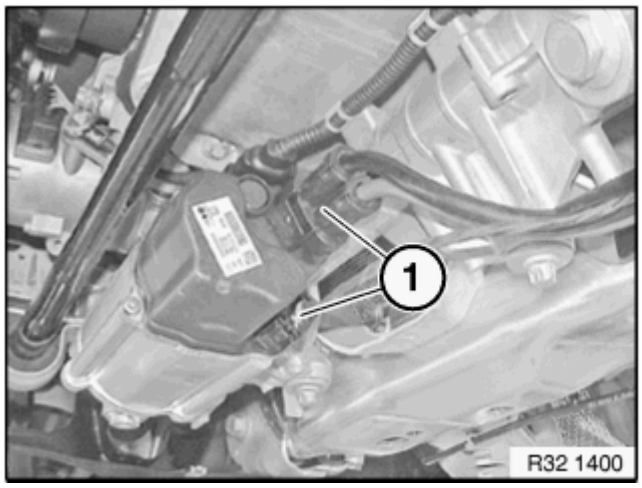


Fig. 47: Identifying Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Lay holder (2) with wiring to one side.

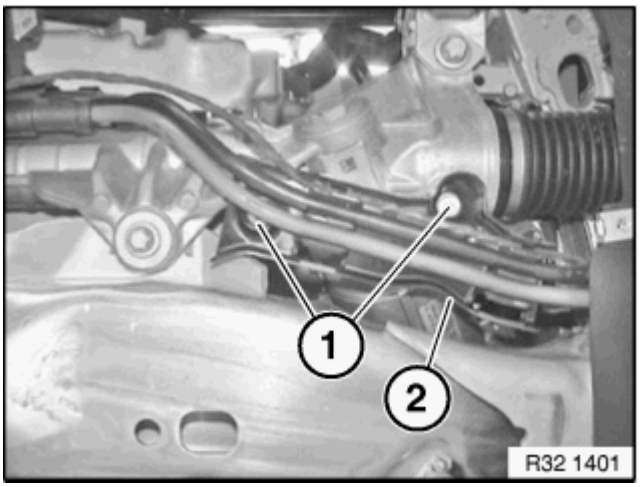


Fig. 48: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Undo screws (1) and remove steering box from below.

Tightening torque **32 00 1AZ**

Installation note:

When installing, make sure that the steering box is realigned to the marking applied to the front axle support prior to removal.

Replace screws.

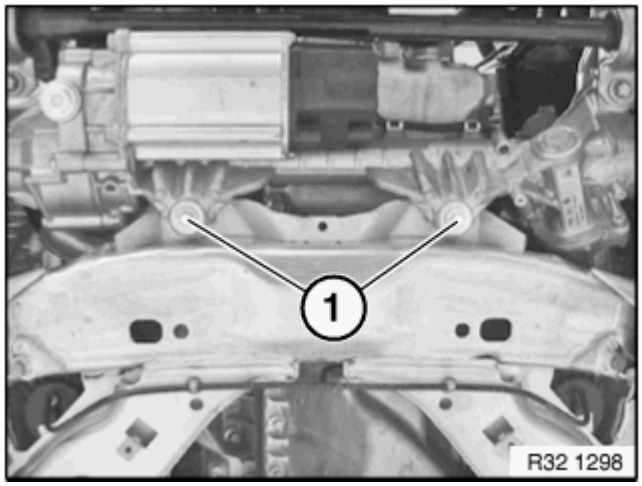


Fig. 49: Identifying Steering Box Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Plug connection (1) on electrical steering box must not be damaged when

removing.

Remove steering box with wiring harness downward.

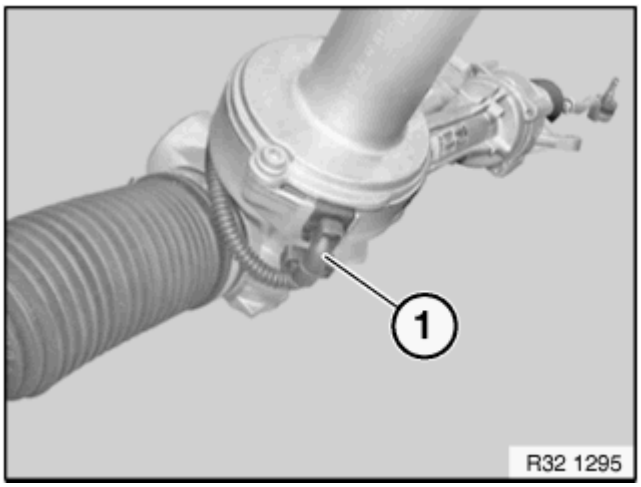


Fig. 50: Identifying Connector
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Teach in **END STOP SOFTWARE**

32 13 060 REMOVING AND INSTALLING HYDRAULIC STEERING GEAR

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Close off line connections with seal plugs.

Necessary preliminary work

- Draw off and dispose of hydraulic fluid from oil reservoir
- Remove **FRONT UNDERBODY PROTECTION**
- Remove **COVER FOR STEERING ASSEMBLIES** on left and right
- Remove front anti-roll bar. See **REMOVING AND INSTALLING/REPLACING FRONT ACTIVE ANTI-ROLL BAR** .
- Remove **TRACK ROD END ON BOTH SIDES FROM SWIVEL BEARING**
- Remove **TRACK ROD END AT BOTH ENDS OF TRACK ROD**

Release screw (1) from engine compartment.

Tightening torque **32 31 2AZ** .

Installation note:

Replace screw

Detach steering shaft lower section.

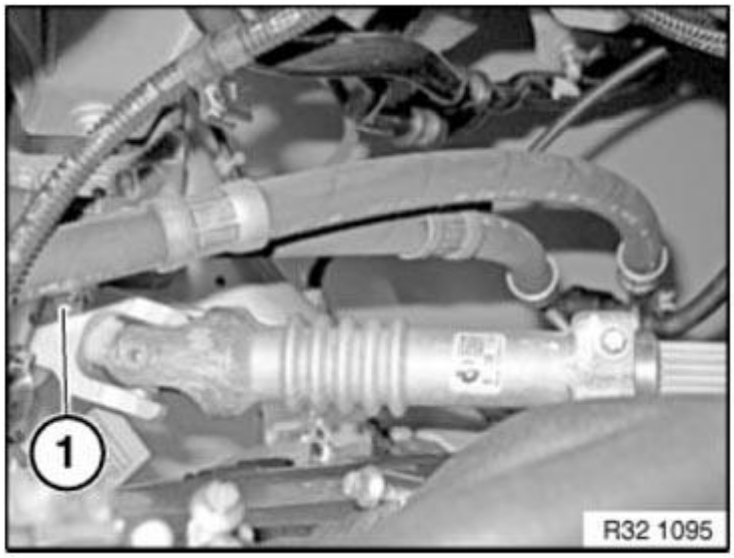


Fig. 51: Identifying Engine Compartment Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **32 41 5AZ** .

Remove lines (2) from hydraulic steering gear.

Disconnect plug connection (3) and release cable strap.

Installation note:

Replace sealing rings.

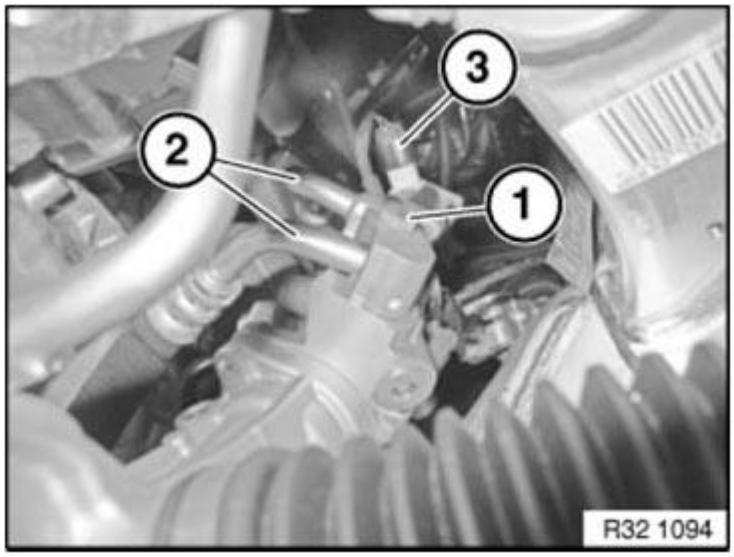


Fig. 52: Identifying Hydraulic Steering Gear Screw, Plug Connection And Fluid Lines
Courtesy of BMW OF NORTH AMERICA, INC.

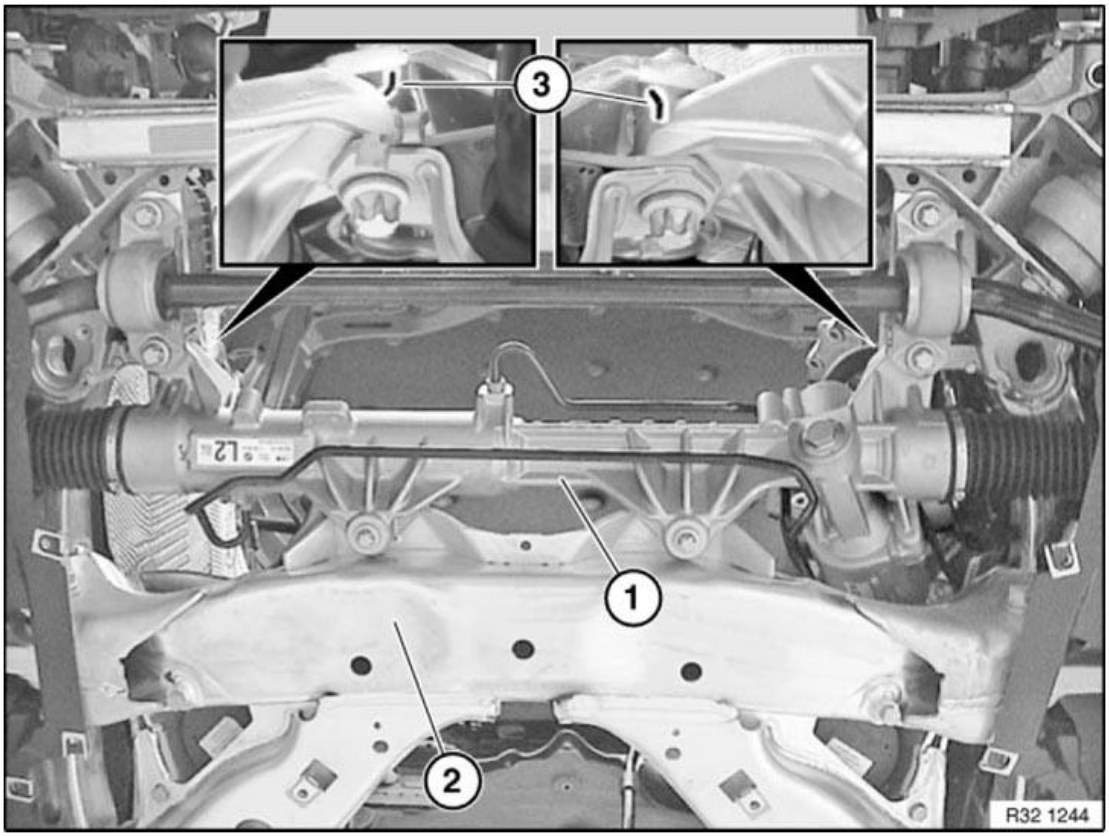


Fig. 53: Identifying Marks On Steering Gear Box And Front Bolting Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid the need for axle/wheel alignment, mark position of steering box (1) to front axle support (2).
To do so, draw a wide white stripe on the front bolting points (left and right) and apply a thin black marking (3) to this stripe.

Release screws (1) and lay lines to one side.

Tightening torque **32 41 7AZ** .

Unfasten screws (2).

Installation note:

Replace bolts.

Tightening torque **32 00 1AZ** .

Remove hydraulic steering gear in downward direction.

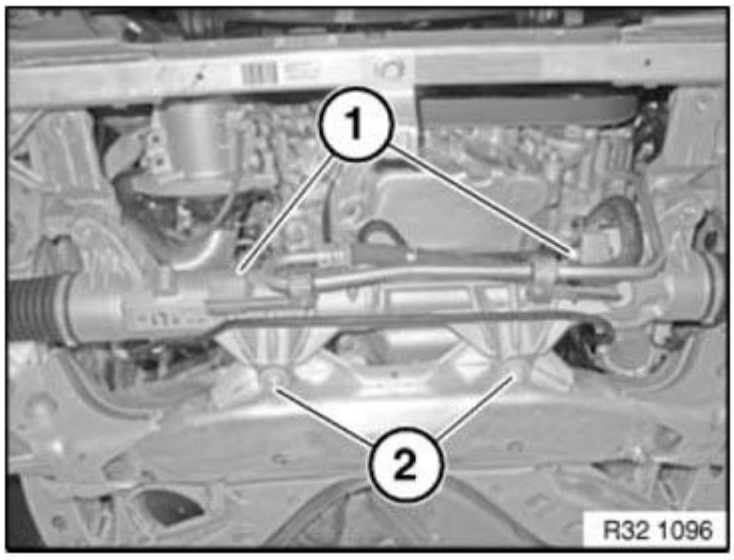


Fig. 54: Identifying Hydraulic Steering Gear Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After Installation note

- Fill and bleed hydraulic system. See **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** or **BLEEDING POWER STEERING UNIT**.
- Check line connections for leak tightness
- If necessary, carry out **INITIAL OPERATION FOR DYNAMIC DRIVE**

32 13 650 REMOVING AND INSTALLING/REPLACING EH CONVERTER FOR SERVOTRONIC

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Necessary preliminary tasks

- Remove **REAR UNDERBODY PROTECTION**

Disconnect plug connection (1).

Unfasten screws (2).

Remove EH converter.

Installation:

Clean side return orifice with compressed air.

Align EH converter to opening in power steering gear, press by hand into power steering gear up to stop, insert screws (2) and tighten down.

Tightening torque **32 00 2AZ** .

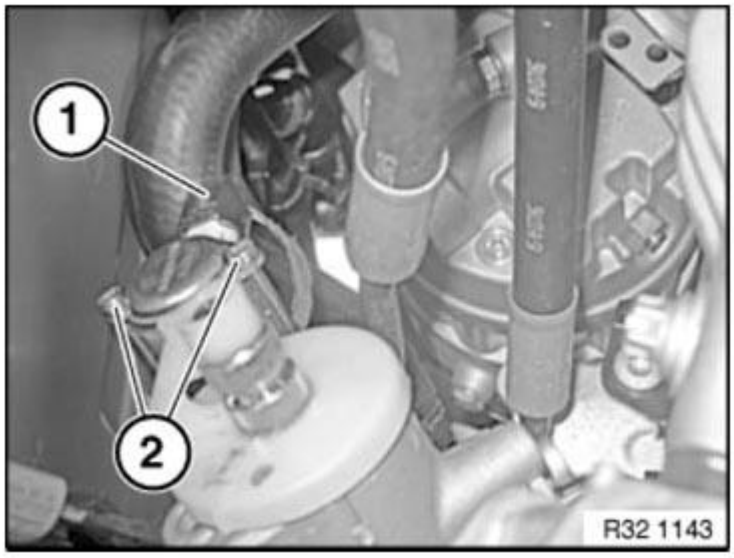


Fig. 55: Identifying EH Converter Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed hydraulic system. See **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** or **BLEEDING POWER STEERING UNIT**.

32 130 71 REPLACE ELECTRICAL STEERING BOX (EPS)

IMPORTANT: Steering box:

Check connection of steering box for corrosion, clean contacts if necessary. The steering box must be replaced if the corrosion is too far advanced.

Connecting line:

In the event of moisture/corrosion inside the two plug connections, check the insulation of the connecting line. If the insulation reveals any noticeable/striking features, partial replacement will be necessary. Otherwise it will be sufficient to replace the contacts or connector housing.

NOTE: In a warranty case you must always provide a fault memory printout, even where there is no fault entry, with the defective part.

Necessary preliminary work:

- Disconnect **BATTERY EARTH LEAD**

NOTE: High-current-carrying wiring laid with terminal 30 (80 A fuse).

- Remove underbody protection at **FRONT** and **REAR**
- Remove **COVER FOR STEERING ASSEMBLIES** on left and right
- Remove stiffening plate
- Remove **TRACK ROD END** on both sides from swivel bearing
- Remove **LOWER SECTION** of steering shaft from steering box
- Version with Dynamic Drive:
  - Remove **ANTI-ROLL BAR LINK ON RIGHT OF ANTI-ROLL BAR**

Unlock plug connection (1) and disconnect.

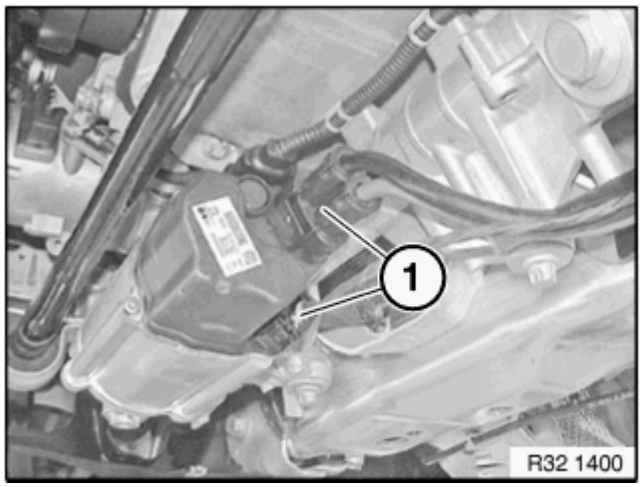


Fig. 56: Identifying Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Lay holder (2) with wiring to one side.

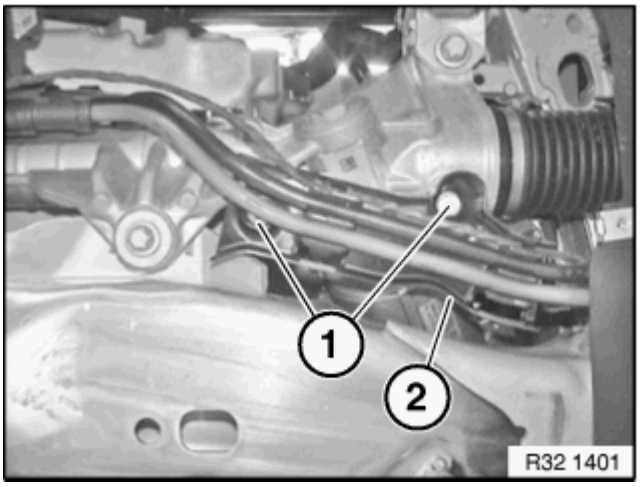


Fig. 57: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and tie anti-roll bar (2) to front axle support.

Tightening torque **31 35 1AZ** .

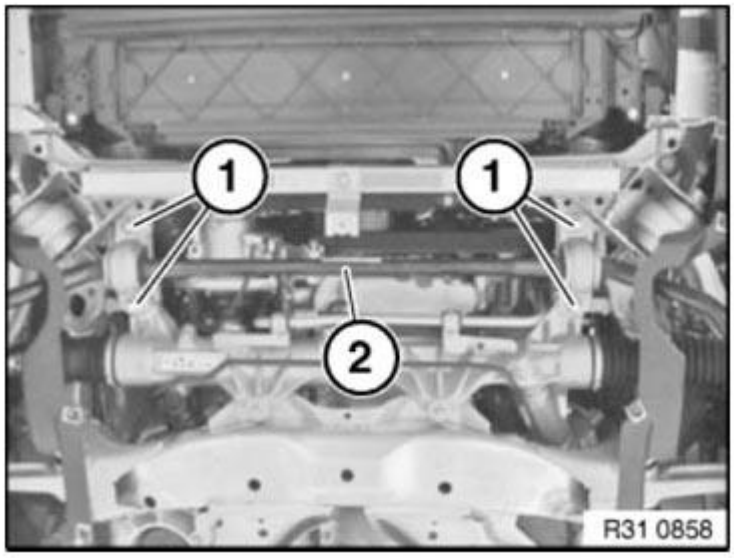


Fig. 58: Identifying Anti-Roll Bar Link With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **32 00 1AZ**

Installation note:

Replace screws.

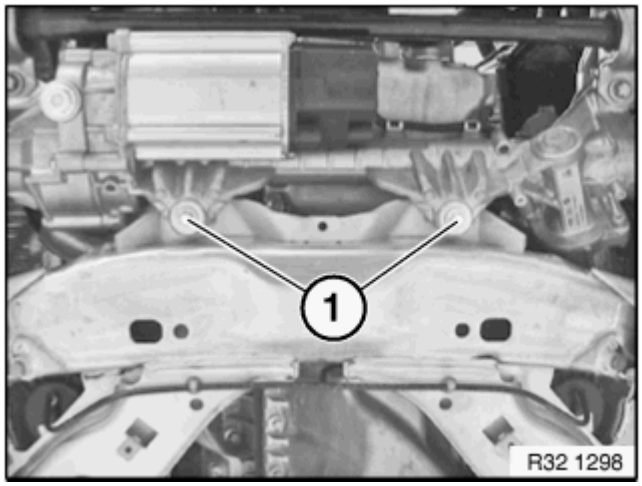


Fig. 59: Identifying Steering Box Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Plug connection (1) on electrical steering box must not be damaged when

removing.

Remove steering box with wiring harness downward.

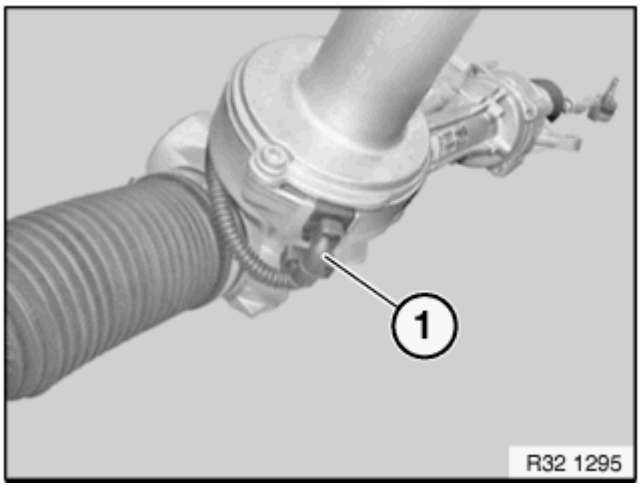


Fig. 60: Identifying Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Modify **TRACK ROD END** on left and right.

After installation:

- Carry out **PROGRAMMING/ENCODING**
- Teach in **END STOP SOFTWARE**
- Perform **CHASSIS / WHEEL ALIGNMENT CHECK**

32 13 075 REMOVING AND INSTALLING ELECTRICAL STEERING BOX ACTIVE STEERING

IMPORTANT: Steering box:

Check connection of steering box for corrosion, clean contacts if necessary. The steering box must be replaced if the corrosion is too far advanced.

Connecting line:

In the event of moisture/corrosion inside the two plug connections, check the insulation of the connecting line. If the insulation reveals any noticeable/striking features, partial replacement will be necessary. Otherwise it will be sufficient to replace the contacts or connector housing.

NOTE: In a warranty case you must always provide a fault memory printout, even

where there is no fault entry, with the defective part.

Necessary preliminary work:

- Disconnect **BATTERY EARTH LEAD**

NOTE: High-current-carrying wiring laid with permanent positive connection (80 A fuse).

- Remove underbody protection at **FRONT** and **REAR**
- Remove **COVER FOR STEERING ASSEMBLIES** on left and right
- Remove stiffening plate
- Remove **TRACK ROD END** on both sides from swivel bearing
- Remove **LOWER SECTION** of steering shaft from steering box
- Version with Dynamic Drive:
  - Remove **ANTI-ROLL BAR LINK ON RIGHT OF ANTI-ROLL BAR**

IMPORTANT: To avoid the need for axle/wheel alignment, mark position of steering box (1) to front axle support (2).

To do so, draw a wide white stripe on the front bolting points (left and right) and apply a thin black marking (3) to this stripe.

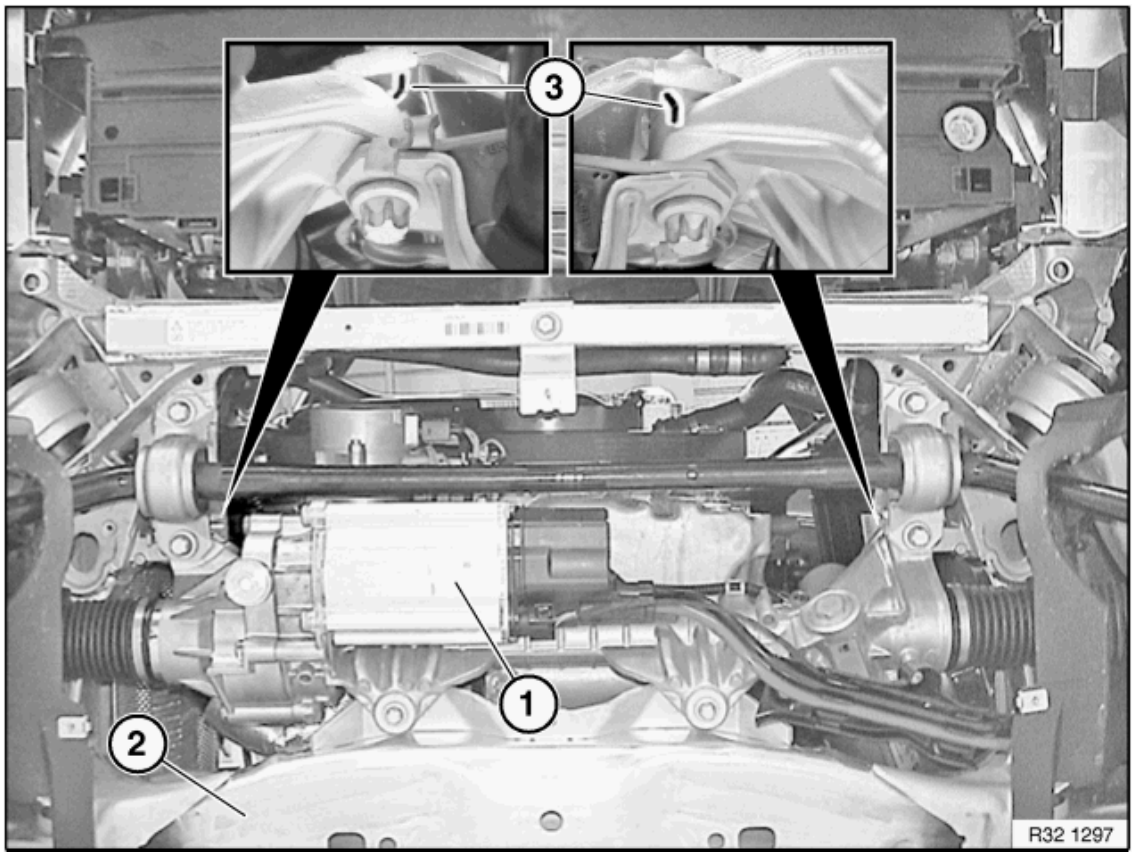


Fig. 61: Marking Position Of Steering Box To Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

For greater clarity steering box shown removed.

Unlock plug connections (1) and disconnect.

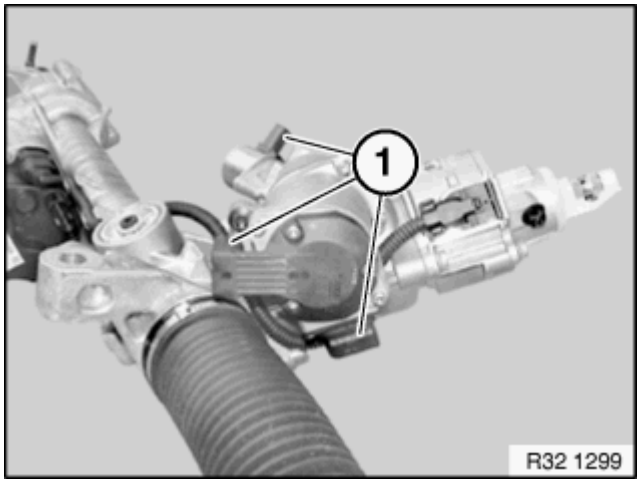


Fig. 62: Identifying Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connection (1) and disconnect.

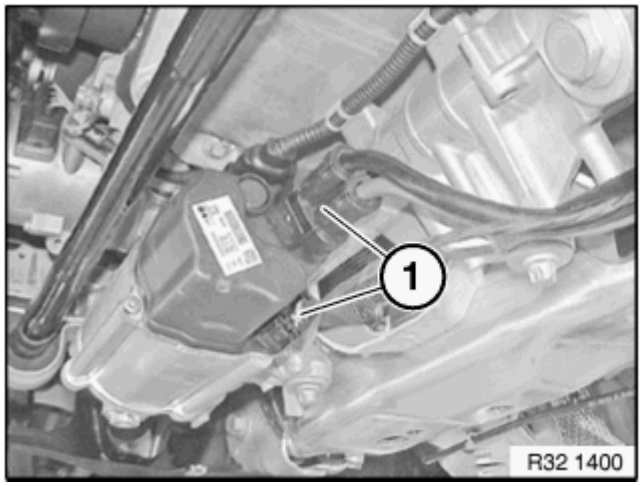


Fig. 63: Identifying Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Lay holder (2) with wiring to one side.

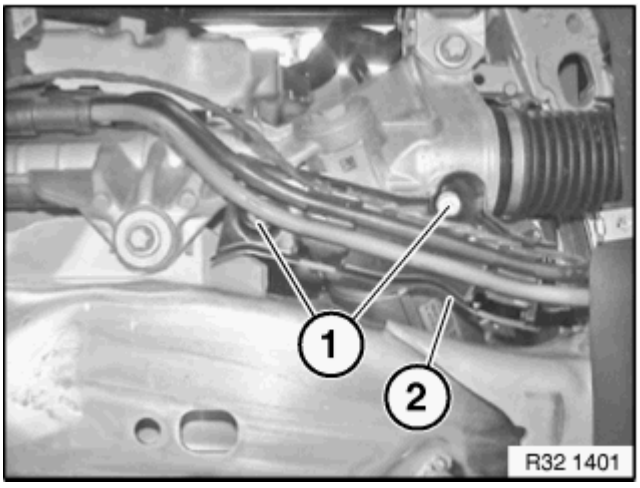


Fig. 64: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and tie anti-roll bar (2) to front axle support.

Tightening torque **31 35 1AZ** .

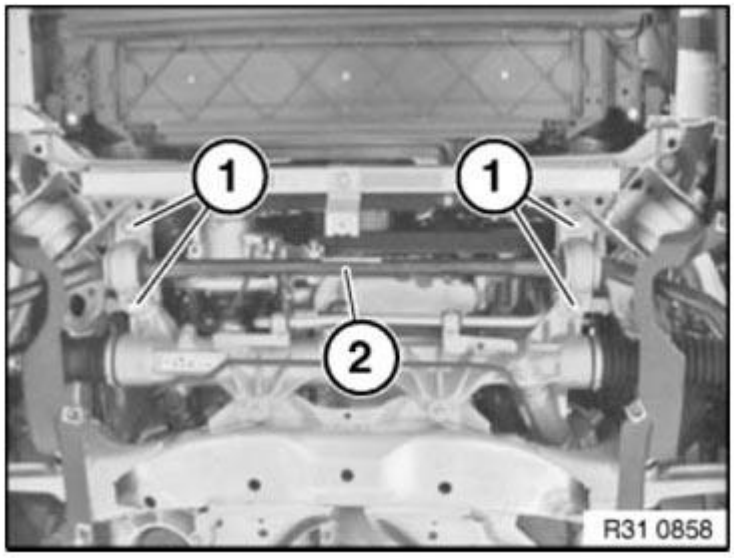


Fig. 65: Identifying Anti-Roll Bar Link With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **32 00 1AZ**

Installation note:

When installing, make sure that the steering box is realigned to the marking applied to the front axle support prior to removal.

Replace screws.

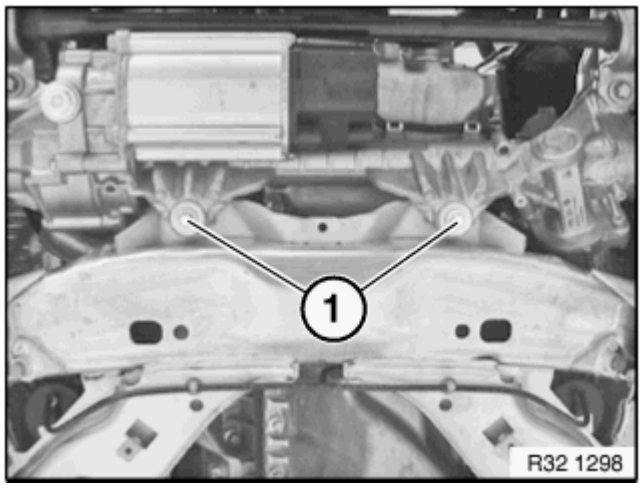


Fig. 66: Identifying Steering Box Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Plug connection (1) on electrical steering box must not be damaged when removing.

Remove steering box with wiring harness downward.

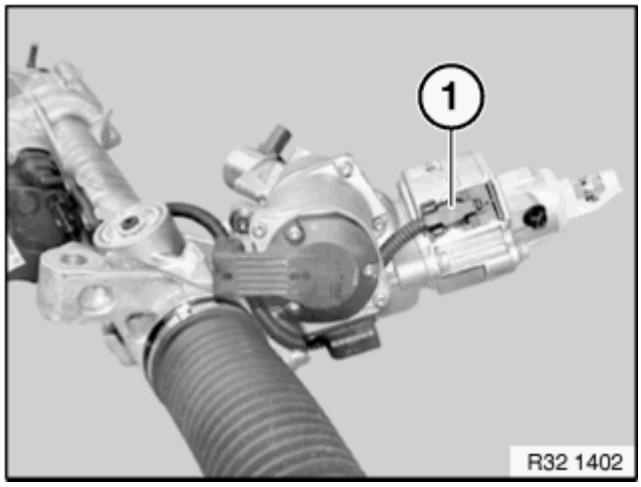


Fig. 67: Identifying Connector
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Teach in **END STOP SOFTWARE**
- Perform **ALIGNMENT/START-UP** for active steering

32 13 066 REPLACING ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin! RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Seal connections and lines immediately after removal with sealing plugs.

Necessary preliminary tasks

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Remove underbody protection at front and rear. See **REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** and **REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION** .
- Remove **COVER FOR STEERING ASSEMBLIES** on left and right

- Remove **TRACK ROD END ON BOTH SIDES FROM SWIVEL BEARING**
- Remove **LOWER SECTION OF STEERING SPINDLE FROM STEERING GEAR**
- Remove **TRACK ROD END AT BOTH ENDS OF TRACK ROD**
- Version with Dynamic Drive (F01/F02/F07):
  - Remove **FRONT ANTIROLL BAR**
  - Remove **EXPANSION HOSE**

Slacken nut (1).

Tightening torque **32 41 7AZ** .

Release screw (2) on bracket.

Tightening torque **32 41 7AZ** .

Release screw (3).

Tightening torque **32 00 1AZ** .

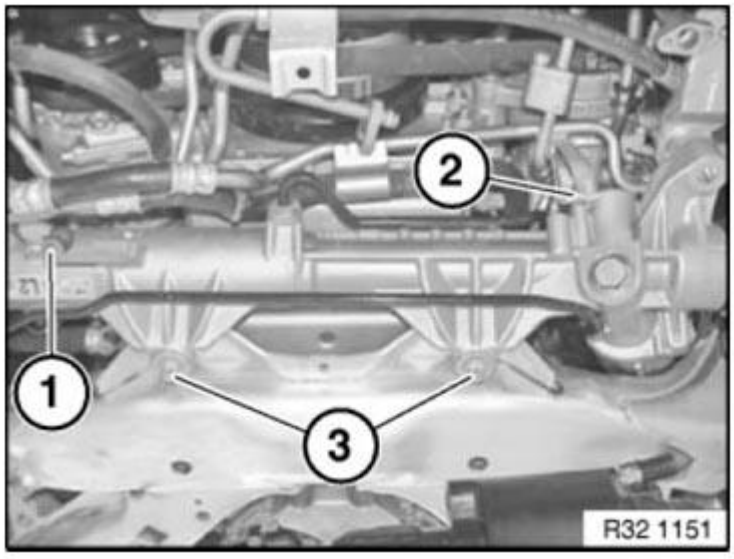


Fig. 68: Identifying Front Axle Nut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

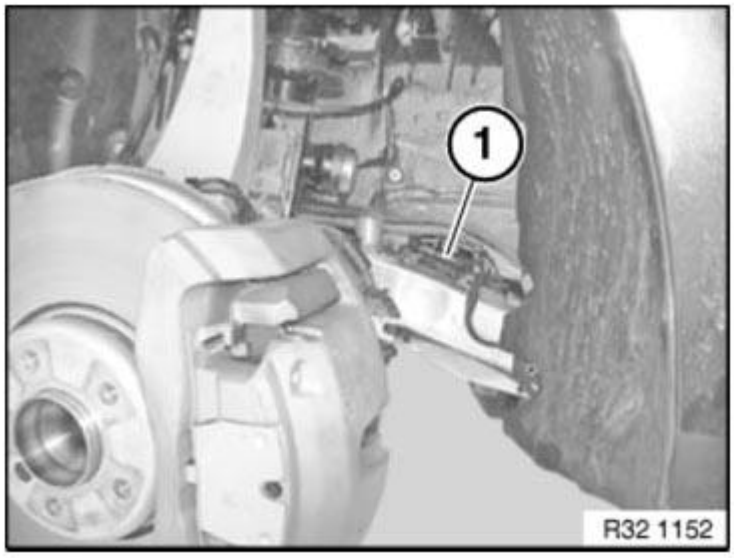


Fig. 69: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Pull hydraulic steering gear towards front a little.

Unfasten plug connection (1) and disconnect.

Release screw (2) and remove lines (3) from hydraulic steering gear.

Tightening torque **32 41 5AZ** .

Remove power steering gear in downward direction.

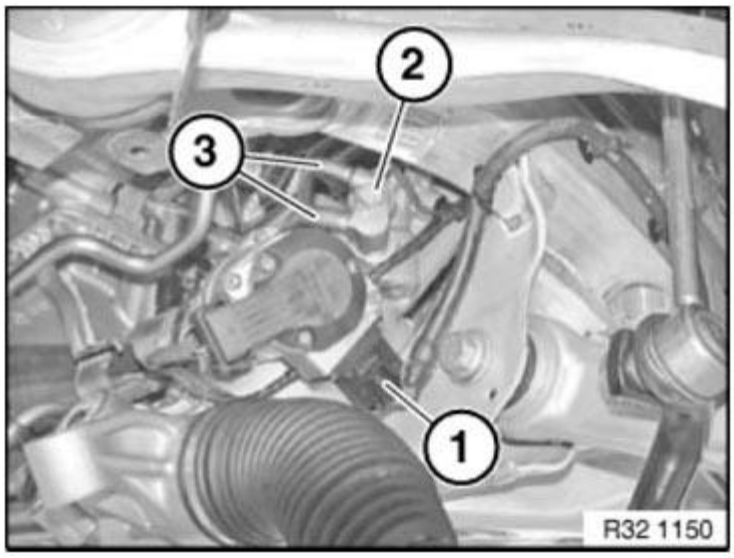


Fig. 70: Identifying Front Hydraulic Steering Gear Screw, Plug Connection And Fluid Lines

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Modify wiring harness on hydraulic steering gear.

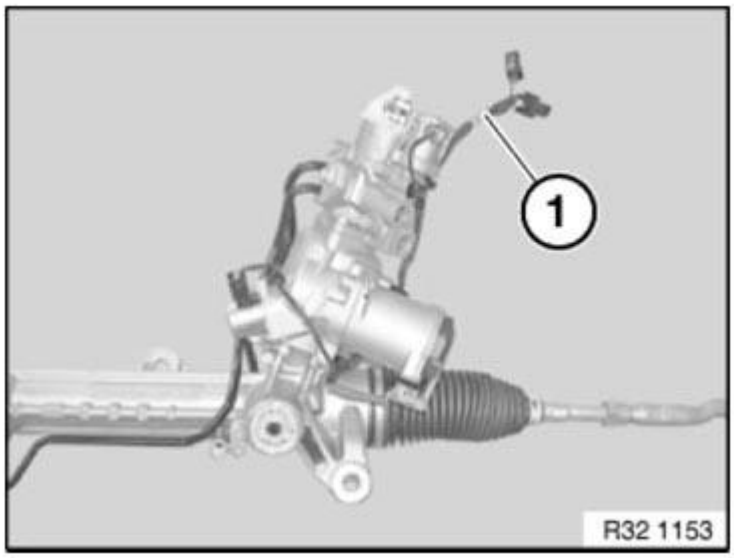


Fig. 71: Identifying Hydraulic Steering Gear Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed hydraulic system. See **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** or **BLEEDING POWER STEERING UNIT**.
- Check pipe connections for leaks
- Perform chassis alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD**.
- **ADJUSTMENT FOR ACTIVE STEERING**
- If necessary, carry out **INITIAL OPERATION FOR DYNAMIC DRIVE** (F01/F02/F07)

32 13 061 REPLACING HYDRAULIC STEERING GEAR

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
DANGER OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Close off pipe connections with seal plugs.

Necessary preliminary work

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Remove **FRONT UNDERBODY PROTECTION**
- Remove **COVER FOR STEERING ASSEMBLIES** on left and right
- Remove front stabilizer. See **REMOVING AND INSTALLING/REPLACING FRONT STABILIZER** .
- Remove **TRACK ROD END ON BOTH SIDES FROM SWIVEL BEARING**
- Remove **TRACK ROD END AT BOTH ENDS OF TRACK ROD**

Release screw (1) from engine compartment.

Tightening torque **32 31 2AZ** .

Installation note:

Replace screw

Detach steering shaft lower section.

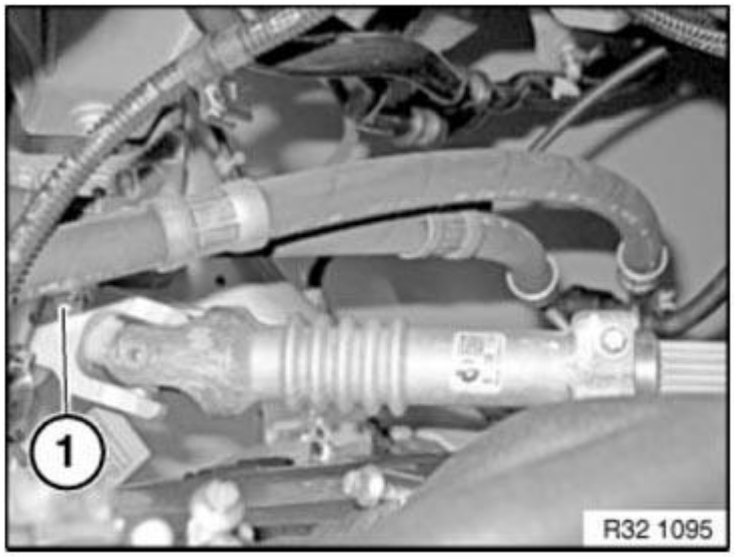


Fig. 72: Identifying Engine Compartment Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **32 41 5AZ** .

Remove lines (2) from hydraulic steering gear.

Disconnect plug connection (3) and release cable strap.

Installation note:

Replace sealing rings.

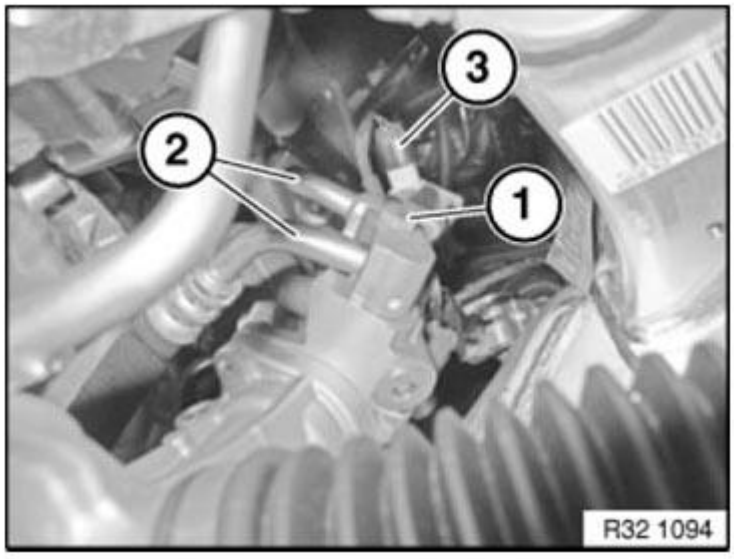


Fig. 73: Identifying Hydraulic Steering Gear Screw, Plug Connection And Fluid Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and lay lines to one side.

Tightening torque **32 41 7AZ** .

Unfasten screws (2).

Installation note:

Replace bolts.

Tightening torque **32 00 1AZ** .

Remove hydraulic steering gear in downward direction.

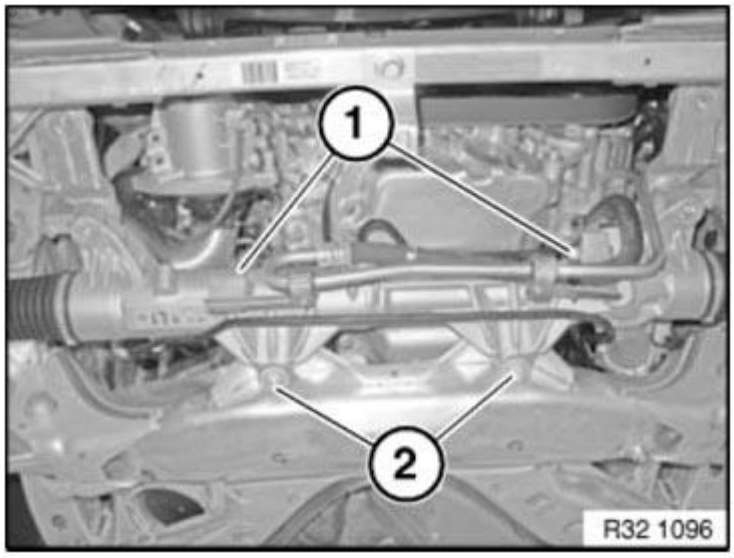


Fig. 74: Identifying Hydraulic Steering Gear Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed hydraulic system. See **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** or **BLEEDING POWER STEERING UNIT**.
- Check pipe connections for leaks
- Perform **CHASSIS/WHEEL ALIGNMENT CHECK**
- If necessary, carry out **INITIAL OPERATION FOR DYNAMIC DRIVE** (F01/F02/F07)

32 10... TEACHING IN END STOP SOFTWARE FOR ELECTRIC STEERING GEAR (EPS)

NOTE: The end stop software must be taught in:

- **after the steering gear is replaced**
- **after programming/coding**

Connect vehicle to BMW diagnosis system.

Select and perform end stop under Service functions.

32 21 STEERING ARMS, TIE RODS, STEER. DAMPER

32 41... INSTRUCTIONS FOR REMOVING AND INSTALLING EAR CLIPS

Notes

NOTE: The work steps are show on assorted components.

Ear clip must always be replaced.

To remove an ear clip, place special tool 32 1 260 at right angles to ear and cut ear open.

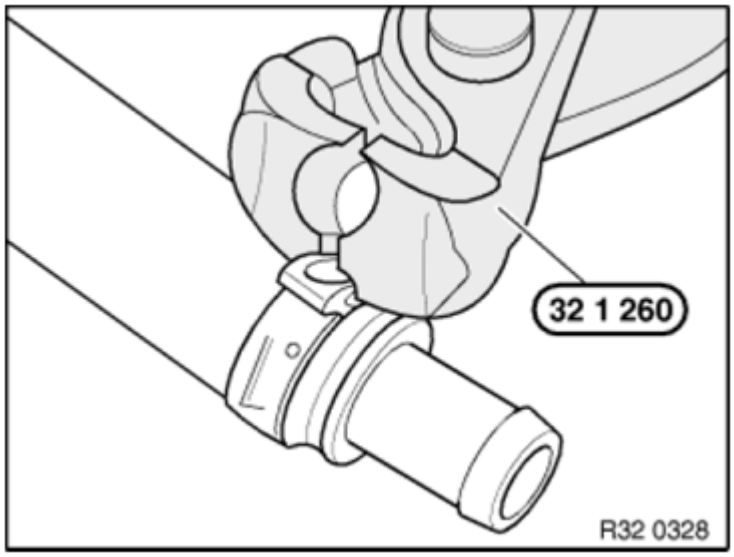


Fig. 75: Removing Ear Clip Using Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

The ear clip can be fitted not only axially but also radially after the hook fastener has been opened.

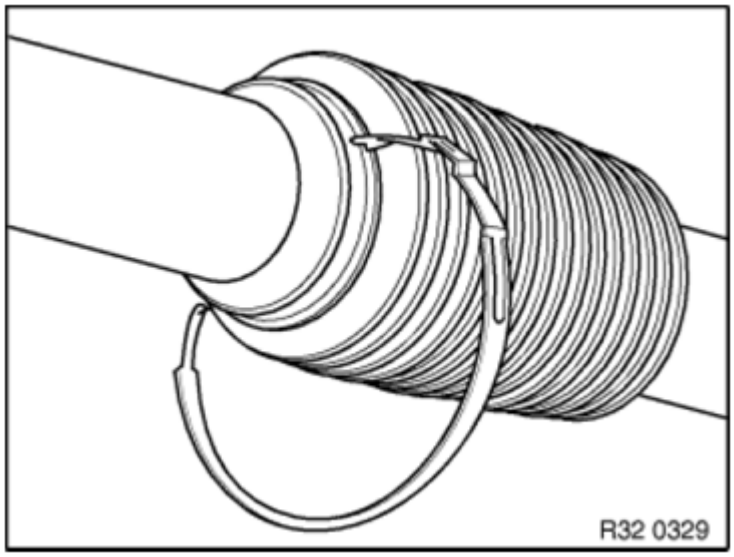


Fig. 76: Identifying Hook Fastener On Ear Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Attach hook fastener and press ear together with special tool 32 1 260.

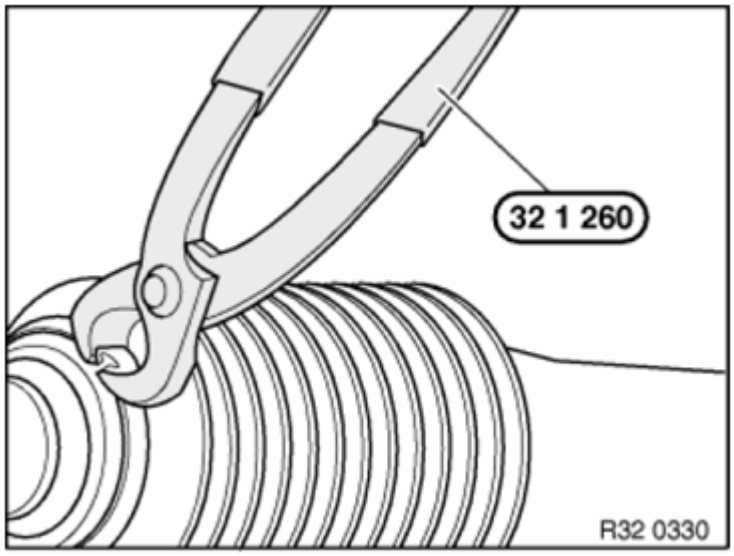


Fig. 77: Pressing Hook Fastener And Ear Clip Using Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

The diagonal cutting pliers of special tool 32 1 260 can be used in areas which are difficult to access.

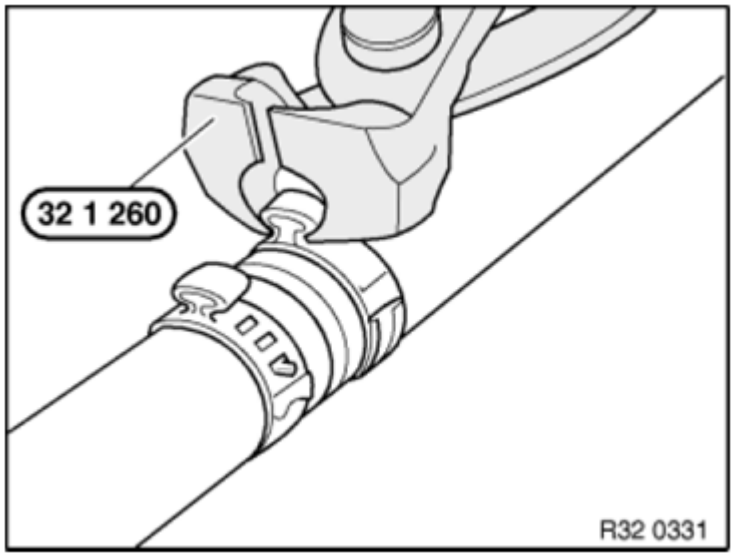


Fig. 78: Removing Ear Clip Using Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Gap (A) max. 1 mm!

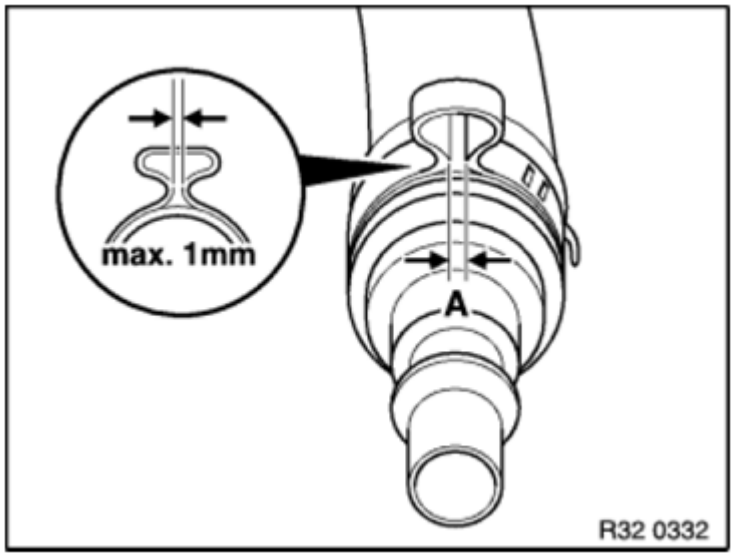


Fig. 79: Identifying Ear Clip Gap
Courtesy of BMW OF NORTH AMERICA, INC.

32 21 231 REPLACING (REMOVING AND INSTALLING) LEFT OR RIGHT TRACK ROD

Notes

IMPORTANT: The steering box must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

Necessary preliminary work

- Remove **TRACK ROD END FROM SWIVEL BEARING**
- Remove **GAITER FROM STEERING BOX** and slide back

IMPORTANT: To avoid damage to rack and to suspension mounting, move rack in as far as possible.

Unscrew track rod with special tool **32 3 220** from rack of steering box.

Installation note:

Clean rack.

Check surface of rack for damage (e.g. corrosion).

Grease rack (refer to **STEERING AND WHEEL ALIGNMENT - OPERATING FLUIDS**).



Fig. 80: Removing Track Rod Using Special Tool (32 3 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **32 21 1AZ** .

On replacement, assemble new part with gaiter

- Determine dimension (A) on used part to simplify following adjustment of front axle
- Slacken clamping nut (2)
- Screw off track rod end; if necessary, grip track rod with open-end spanner
- Remove clamping ring (1) and screw off clamping nut (2)
- Slide gaiter (4) and ear clamp and band clamp (3) onto track rod

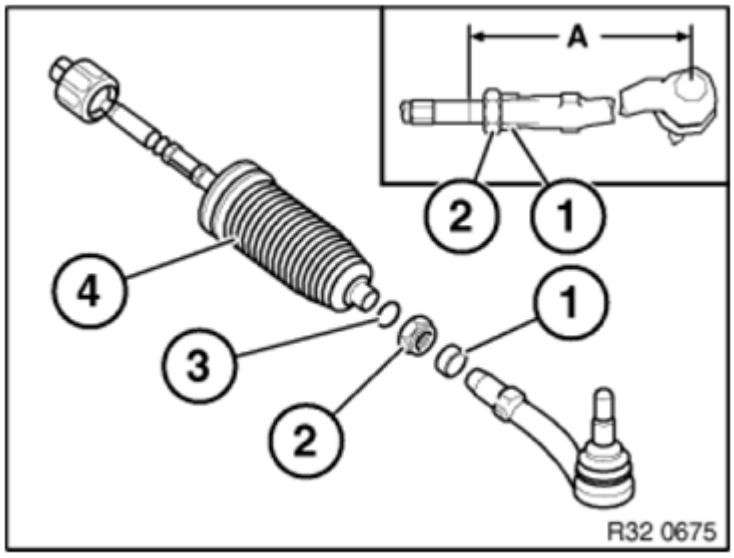


Fig. 81: Identifying Track Rod Clamping Ring, Nut, Gaiter And Band Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

- Slide clamping nut (2) and clamping ring (1) onto track rod
- Screw track rod end onto track rod to dimension (A)
- Tighten down clamping nut (2)

Tightening torque **32 21 2AZ** .

After installation

- Only if replacing/removing track rod end: Perform **CHASSIS/WHEEL ALIGNMENT CHECK**

32 21 151 REPLACING LEFT OR RIGHT TRACK ROD END

NOTE: If the track rod end to track rod screw connection is released, it is necessary after reinstallation to carry out a chassis/wheel alignment check.

Release nut (1) and remove track rod end (2) from swivel bearing.

Installation note:

Keep track rod end to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque **32 21 3AZ** .

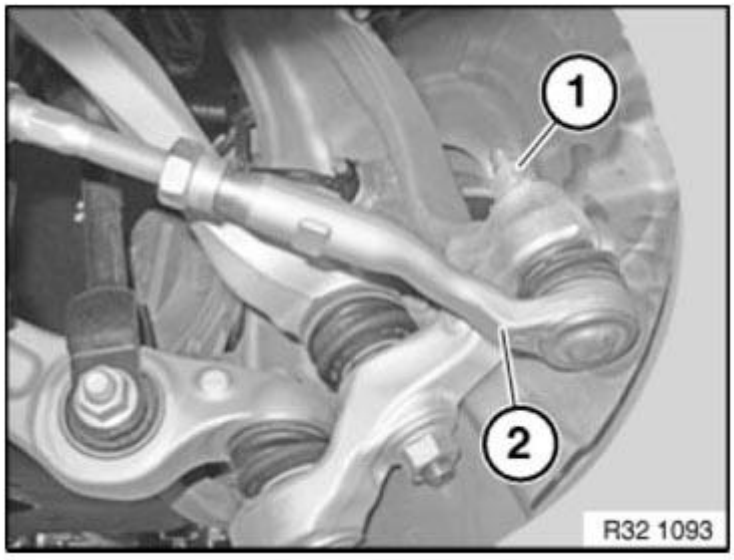


Fig. 82: Identifying Track Rod End With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Determine dimension (A) to simplify following adjustment of front axle.

Slacken nut and clamping ring.

Unscrew track rod end from track rod.

Installation note:

Check **GAITER** for damage, replace if necessary.

Refit clamping ring (1).

Screw track rod end onto track rod to dimension (A).

Tightening torque **32 21 2AZ** .

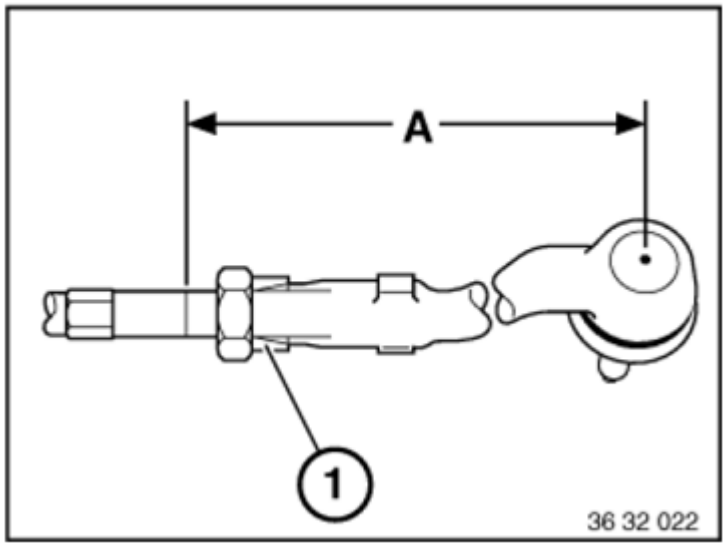


Fig. 83: Identifying Track Rod End Tightening Dimension On Track Rod
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform chassis/wheel alignment check. See **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD**.

32 31 STEERING COLUMN

32 31... ELECTRICAL STEERING COLUMN ADJUSTMENT NORMALIZATION

NOTE: Normalization must be carried out after the following work:

- **Removal or replacement of control panel in heater-A/C system or of steering column**
- **Repair work to electric steering column adjustment**
- **Coding/programming of IHKA control unit**

Normalization of electric steering column adjustment is possible via the BMW diagnosis and information system under the following path:

- Diagnosis
- Function selection
- Service functions
- Chassis
- Electric steering column adjustment

32 31 020 REMOVING AND INSTALLING/REPLACING LOWER SECTION OF STEERING COLUMN TRIM

Necessary preliminary tasks

- Remove **TOP SECTION OF STEERING COLUMN CASING** .
- Move steering column in "top" and "extended" position.

Press detent lugs outwards a little and unclip steering column trim downwards.

Installation:

Align steering column trim by means of detent lugs to steering column and press up as far as it will go.

Press steering column trim on both sides together a little and then press upwards completely until detent lugs snap into place.

Check installation position, correct if necessary.

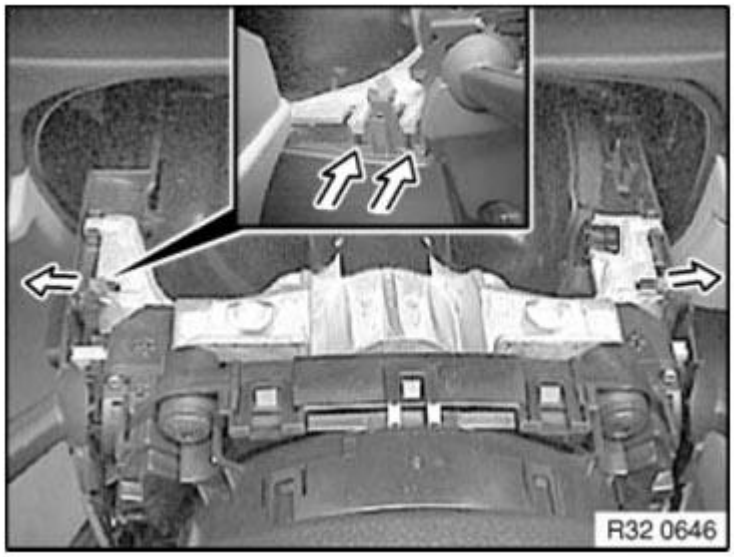


Fig. 84: Pressing Detent Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Tilt steering column trim in downward direction.

Unlock plug connection (1) on steering column adjustment switch and (2) emergency starting aerial and disconnect.

Remove lower section of steering column trim.

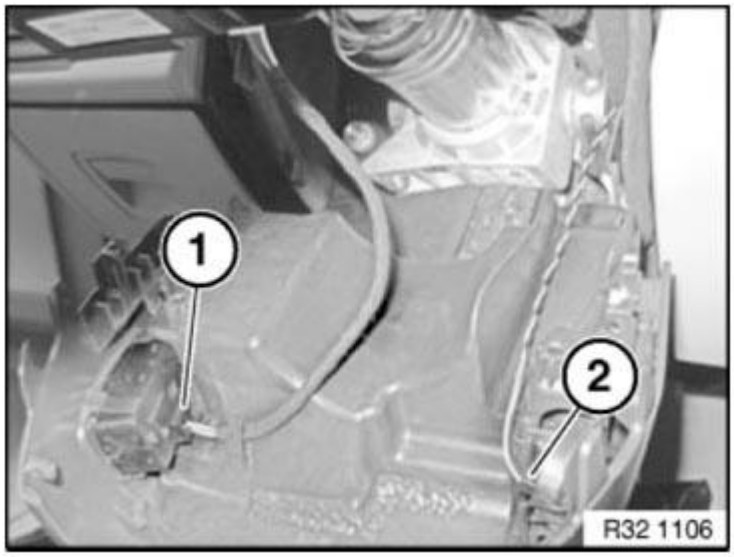


Fig. 85: Identifying Plug Connection On Steering Column Adjustment Switch
Courtesy of BMW OF NORTH AMERICA, INC.

32 31 082 REMOVING AND INSTALLING/REPLACING STEERING ANGLE SENSOR

NOTE: Steering angle sensor is integrated in steering-column switch cluster. Remove and install/renew STEERING COLUMN SWITCH CLUSTER .

32 31 090 REMOVING AND INSTALLING/REPLACING STEERING COLUMN

IMPORTANT: To avoid damaging the coil spring cassette, it is necessary to remove the steering wheel because of the absence of a steering column lock!

Necessary preliminary tasks

- Move steering column into "extended" position
- Disconnect **BATTERY EARTH LEAD**
- Remove steering wheel. See **REMOVING AND INSTALLING/REPLACING SPORT STEERING WHEEL** or **REMOVING AND INSTALLING/REPLACING STEERING WHEEL**.
- Remove steering column trims. See **REMOVING AND INSTALLING/REPLACING UPPER SECTION OF STEERING COLUMN TRIM** and **REMOVING AND INSTALLING/REPLACING LOWER SECTION OF STEERING COLUMN TRIM**.
- Replacement only: Remove **STEERING COLUMN CONTROL PANEL**
- Remove trim panel for pedal assembly. See **REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR PEDAL ASSEMBLY (US ONLY)** .

IMPORTANT: Mark installation position (1) of steering spindle in relation to steering column.

Release clamping screw (2) and pull off steering spindle in direction of arrow.

Installation note:

Do not damage toothed shaft.

Recut thread in steering spindle.

Replace clamping screw (2).

Clamping screw must rest in groove of upper steering spindle.

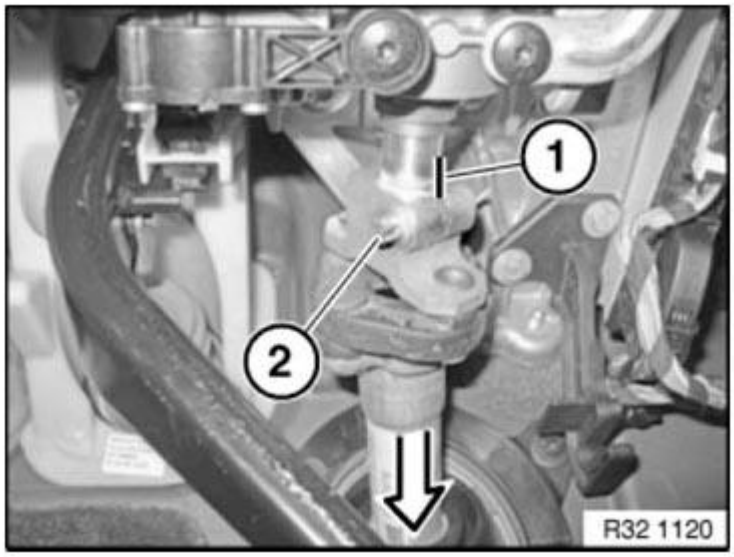


Fig. 86: Pulling Steering Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

No subsequent retorquing permitted!

Tightening torque **32 31 3AZ** .

Disconnect plug connection (1).

Unclip wiring harness (2) and lay to one side.

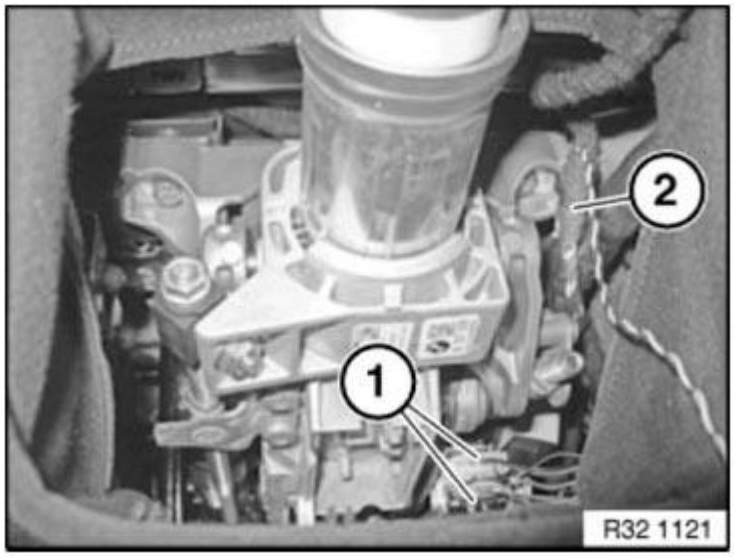


Fig. 87: Identifying Steering Column Plug Connection And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **32 31 1AZ** .

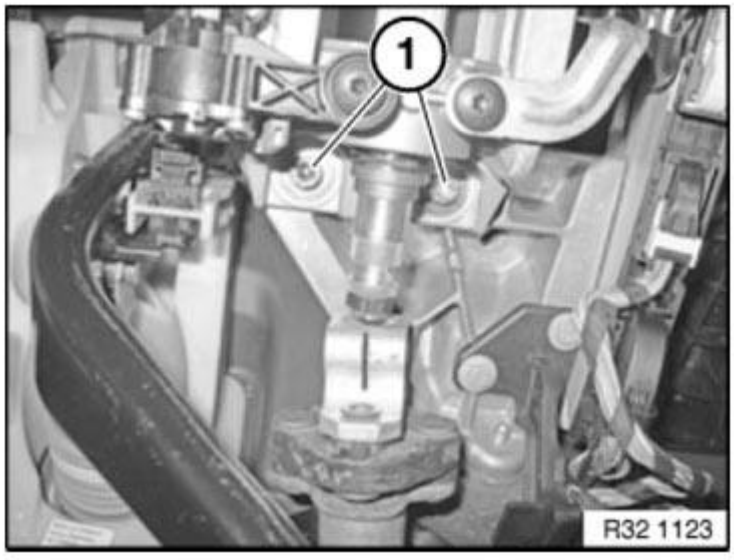


Fig. 88: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure steering column against falling out.

Release screws (1).

Tightening torque **32 31 1AZ** .

Feed steering column upwards to remove.

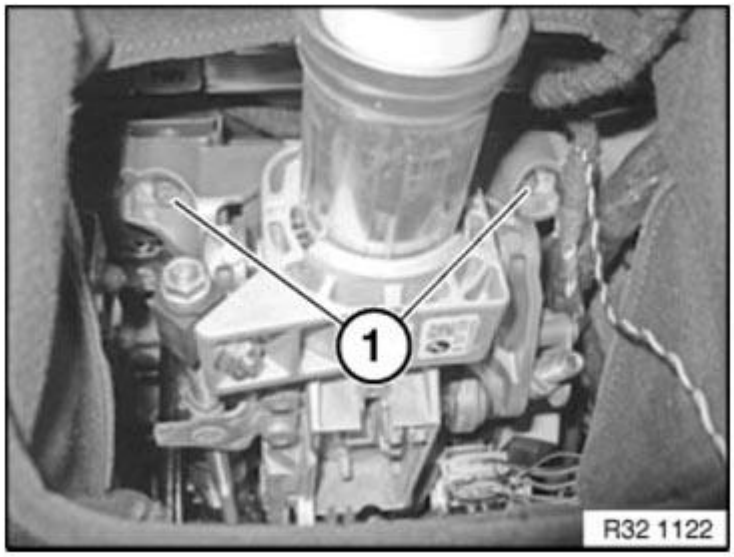


Fig. 89: Identifying Steering Column Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out **NORMALIZATION** of electric steering column adjustment
- Replacement only: Turn steering wheel in both directions to the limit position. The airbag indicator light must not light up in the process.
- Check directional stability of vehicle

32 31 211 REMOVING AND INSTALLING/REPLACING UNIVERSAL JOINT WITH CORRUGATED TUBING

IMPORTANT: If the lower section of the steering shaft is separated from the steering box/steering shaft middle section, the steering column switch cluster may be damaged when the steering wheel is turned.

Necessary preliminary tasks

- Remove rear **UNDERBODY PROTECTION**
- If necessary, remove **STIFFENING PLATE**

Release screw (1) on corrugated tubing.

Tightening torque **32 31 3AZ** .

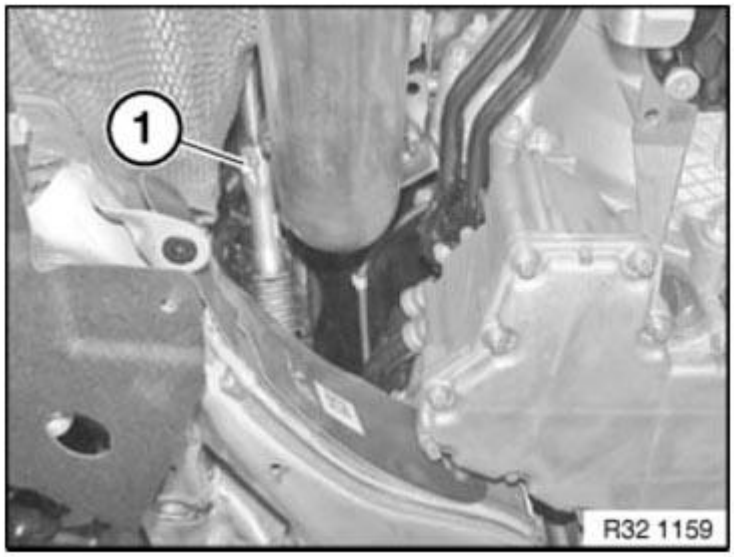


Fig. 90: Identifying Screw On Corrugated Tubing
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Graphic N63 shows rear-wheel drive!

Release screws (1) from below.

Tightening torque **32 31 2AZ** .

Slide universal joint with corrugated tubing upwards and remove.

Installation note:

Connect universal joint with corrugated tubing first to steering shaft and then to steering box.

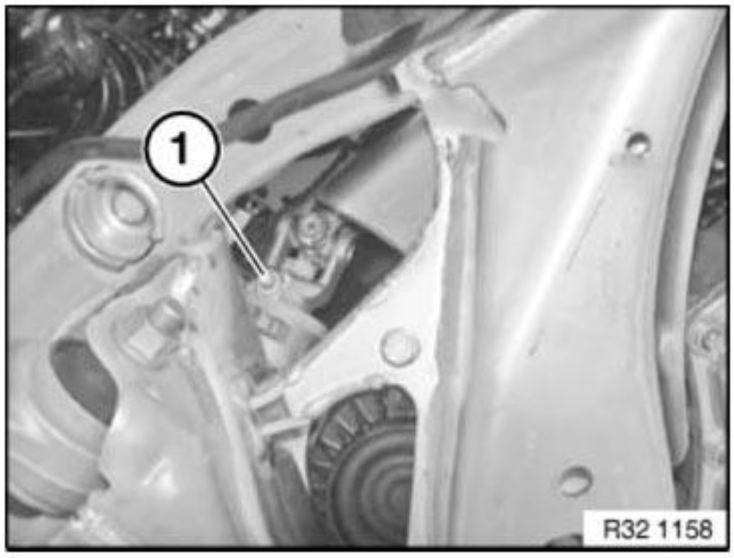


Fig. 91: Identifying Universal Joint Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Clean screw threads to remove all remnants of screw locking adhesive.

Replace screw.

Screw must rest in steering box groove or steering shaft middle section.

No subsequent retorquing permitted!

NOTE: Picture shows F04!

Release screws (1) from below.

Tightening torque **32 31 2AZ**

Slide universal joint with corrugated tubing upwards and remove.

Installation note:

Connect universal joint with corrugated tubing first to steering shaft and then to steering box.

Clean screw threads to remove all remnants of screw locking adhesive.

Replace screw.

Screw must rest in steering box groove or steering shaft middle section.

No subsequent retorquing permitted!

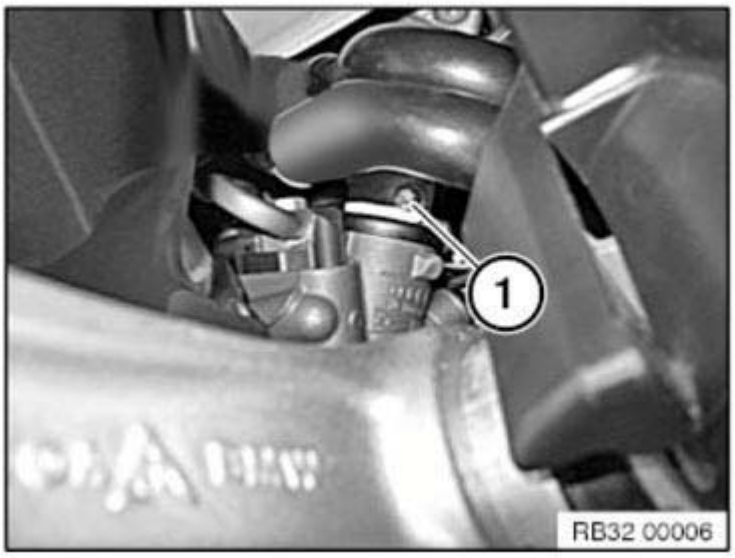


Fig. 92: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Turn steering wheel in both directions to the limit position. The airbag indicator light must not light up in the process.
- Check directional stability of vehicle

32 31 003 REMOVING AND INSTALLING/REPLACING UPPER SECTION OF STEERING COLUMN TRIM

Notes

Move steering column in "bottom" and "extended" position.

IMPORTANT: Risk of damage!
Unclip steering column shroud (1) at side with special tool 00 9 317 .



Fig. 93: Removing Steering Column Shroud Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Pull steering column trim (1) towards front.

Unclip steering column gap cover (1) from upper section of steering column trim (2).

Remove upper section of steering column trim (2).

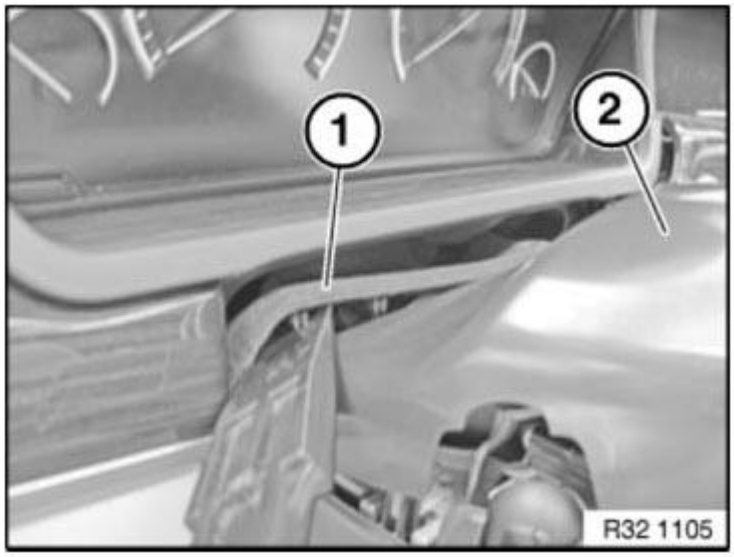


Fig. 94: Identifying Steering Column Gap Cover And Steering Column Trim
Courtesy of BMW OF NORTH AMERICA, INC.

32 31 102 REPLACING STEERING SHAFT SLEEVE

Necessary preliminary tasks:

- Remove stiffening plate (all N73/S63 and F12 N63)
- Remove **EXHAUST SYSTEM** (only N63/N73/S63)
- Remove **CATALYTIC CONVERTERS CYLINDERS 5-8** (only N63/N73/S63)
- Remove heat shield on bulkhead (only N63/N73/S63)
- Release **UNIVERSAL JOINT WITH CORRUGATED TUBING** on "bottom section of steering shaft"
- Remove **TRIM PANEL** for pedal assembly

Release bolts and remove bulkhead cover (1) with gaiter.

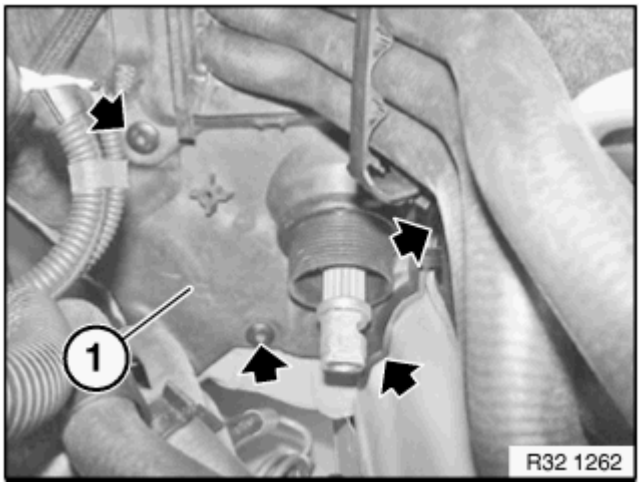


Fig. 95: Locating Bulkhead Cover Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Press in latch mechanism from the footwell and press out sleeve (1) from the bulkhead.

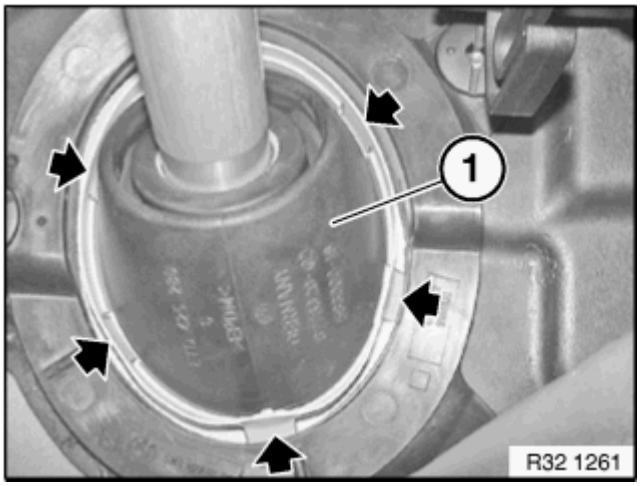


Fig. 96: Pressing Out Sleeve From Bulkhead
Courtesy of BMW OF NORTH AMERICA, INC.

Check installation position.

Press sleeve (1) from the engine compartment out into the bulkhead!

Latch mechanisms of the sleeve must noticeably engage.

-> To check: Visual inspection in footwell!

Spray sealing lip (2) of the sleeve with silicone spray.

Mount bulkhead cover.

Make sure sealing lip is correctly seated.

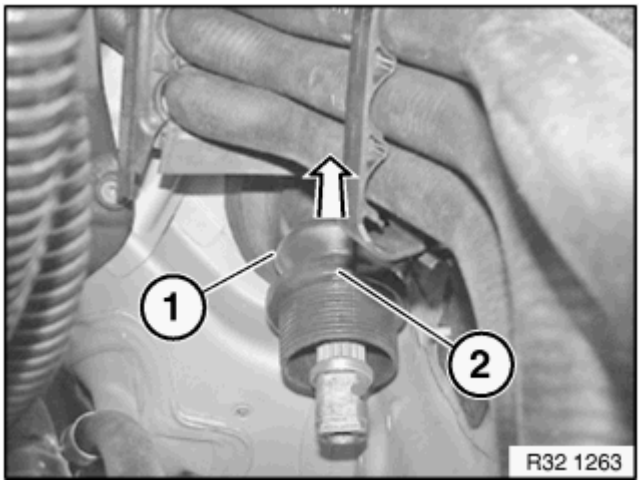


Fig. 97: Identifying Sleeve And Sealing Lip
Courtesy of BMW OF NORTH AMERICA, INC.

32 33 STEERING WHEEL

32 33 010 REMOVING AND INSTALLING/REPLACING SPORT STEERING WHEEL

NOTE: Chassis/wheel alignment is not necessary after the steering wheel has been removed and installed or replaced.

Necessary preliminary work

- Remove **AIRBAG UNIT**

Move wheels/sport steering wheel into straight-ahead position.

Disconnect plug connection (1).

Release screw (2) and remove sport steering wheel.

Installation note:

Make sure connecting line(s) is/are correctly laid.

Tightening torque **32 33 1AZ** .

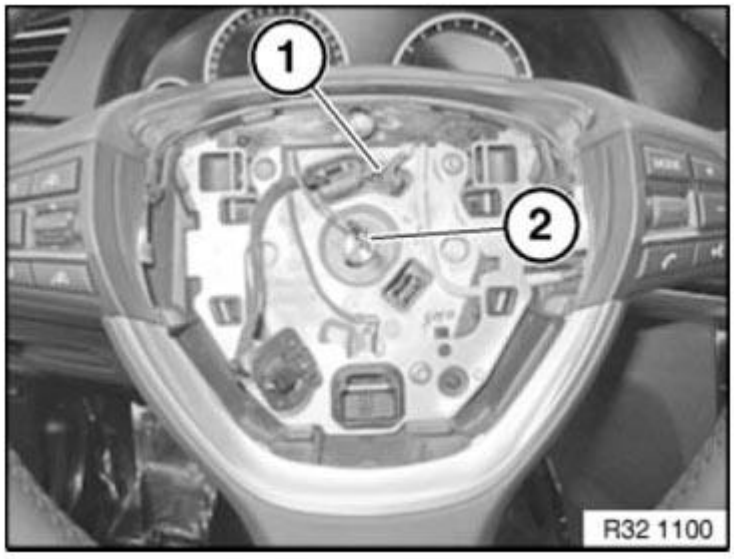


Fig. 98: Identifying Steering Wheel Plug Connection And Screw (32 33 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Version with steering wheel heating: Before fitting sport steering wheel on steering column, ensure correct cable routing.

Align sport steering wheel by way of marking (1) to steering column marking (2) and attach.

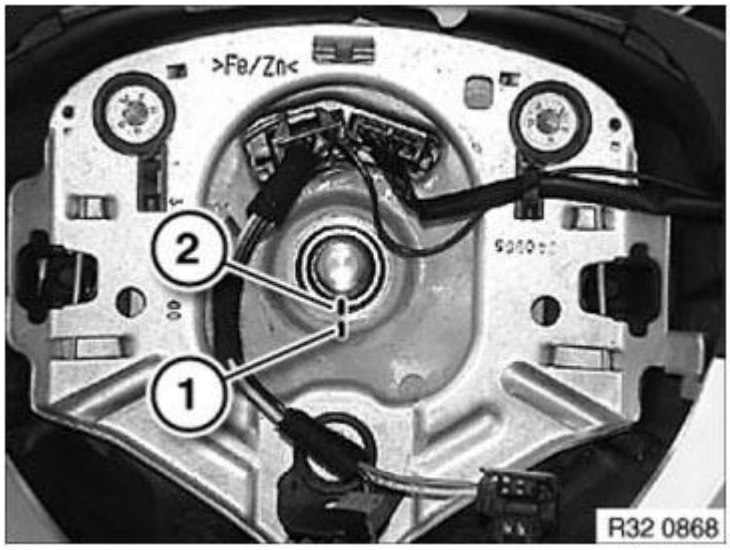


Fig. 99: Identifying Marks On Steering Column (32 33 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Modify both **SWITCHES ON SPORT STEERING WHEEL**
- Modify **DESIGN COVER**
- If necessary, modify **STEERING WHEEL MODULE CONTROL UNIT**

32 33 000 REMOVING AND INSTALLING/REPLACING STEERING WHEEL

NOTE: Chassis/wheel alignment is not necessary after the steering wheel has been removed and installed or replaced.

Necessary preliminary tasks

- Remove **AIRBAG UNIT**

Move wheels/steering wheel into straight-ahead driving position.

Disconnect plug connection (1).

Release screw (2) and remove steering wheel.

Installation note:

Make sure connecting line(s) is/are correctly laid.

Tightening torque **32 33 1AZ** .

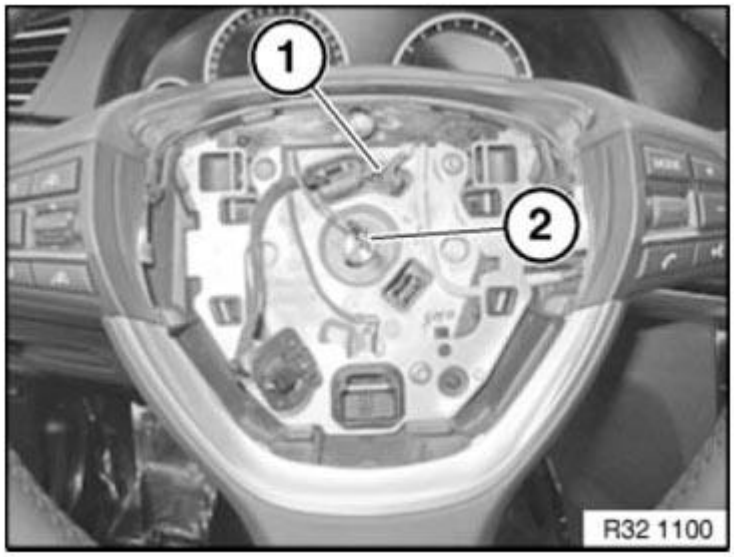


Fig. 100: Identifying Steering Wheel Plug Connection And Screw (32 33 000)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Before fitting steering wheel on steering column, ensure correct cable routing.

Align steering wheel by way of marking (1) to steering column marking (2) and attach.

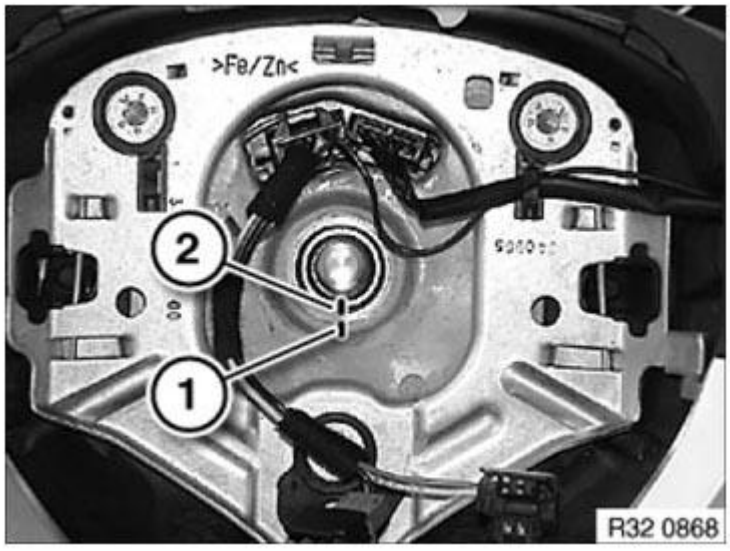


Fig. 101: Identifying Marks On Steering Column (32 33 000)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Modify **DESIGN COVER**
- Modify **MULTIFUNCTION STEERING WHEEL SWITCH**
- If necessary, modify **STEERING WHEEL MODULE CONTROL UNIT**

32 33... REPLACING DESIGN COVER FOR SPORT STEERING WHEEL

Necessary preliminary tasks

- Remove **AIRBAG UNIT**
- Remove **BOTH SWITCHES FROM SPORT STEERING WHEEL**

Unclip design cover in direction of arrow.

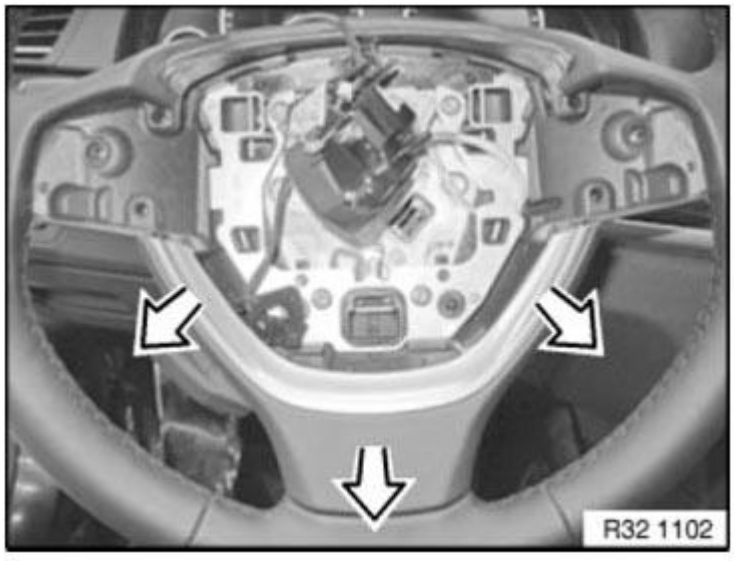


Fig. 102: Removing Design Cover Of Steering Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

32 33... REPLACING STEERING WHEEL DESIGN COVER

Necessary preliminary tasks

- **REMOVE AIRBAG UNIT**

Unclip design cover in direction of arrow.

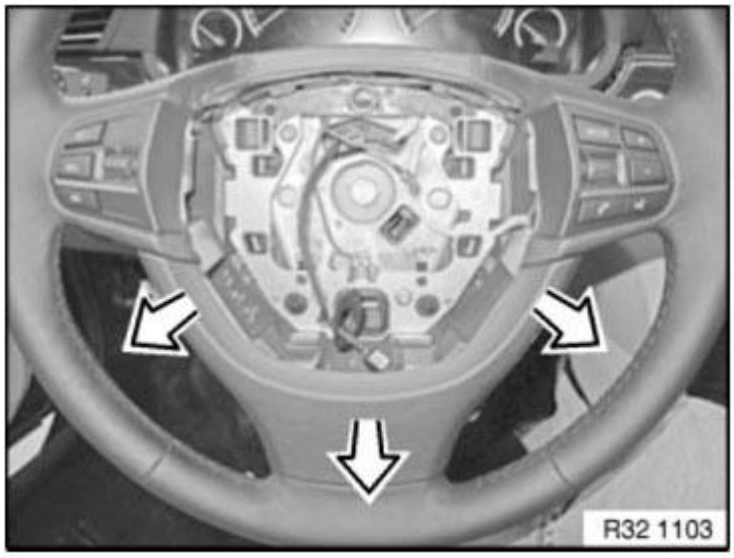


Fig. 103: Removing Design Cover Of Steering Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

32 34 STEERING WHEEL FOR AIRBAG

72 12... PROCEDURE AFTER AIRBAG TRIGGERING AS RESULT OF AN ACCIDENT

Check and/or replace following components after airbag triggering:

Satellites (control unit + sensor)

- Components
  - Satellite, A-/B-pillar, left/right
  - Satellite, front door
  - Satellite, rear seat
  - Satellite, driver's/front passenger seat
  - Satellite, vehicle center
- Procedure
  - Inspect visually for mechanical damage
  - Read fault memory
  - Disconnect battery and observe waiting period
  - Rectify faults
  - Connect battery and observe waiting period (at least 10 seconds)
  - Delete fault memory
  - Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. inside lights, radio, etc.)

    Switch on ignition (wait at least 10 seconds)

- Clear fault memory and if necessary rectify faults

Cables and plugs

- Components and procedure
  - Check cables and plugs for damage, replace if necessary.

    (e. g. corrosion, correct engagement, bent pin)

Belt system

- Components
  - Retractor mechanism
  - Belt buckle tensioner
  - Seatbelt height adjustment
  - Anchor fitting tensioner
- Procedure
  - Check components, replace if necessary

Seats

- Components
  - Seat
  - Airbag module
  - Active head restraint
- Procedure
  - Check seats (function check of seat mechanism), replace if necessary
  - Check seat screw/bolt connections
  - Replace gas generator, active head restraint

    If the severity of the impact has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

    External feature: The triggered head restraint is folded forwards and engaged.

    The repair work can be carried out in the car with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

    The gas generator can be replaced up to 5 times.

  - Replace airbag module and seat cover with padding

Driver's airbag

- Components
  - Airbag module
  - Steering Wheel
  - Steering column (if damaged)
- Procedure
  - Check components, replace if necessary
  - Replace steering wheel

Front-passenger airbag

- Components
  - Airbag module
  - Trim, instrument panel
  - Supporting tube (if damaged)
- Procedure
  - Check components, replace if necessary

Side airbag, front/rear

- Components
  - Airbag module
  - Door panel
  - Door in white
  - Seat
- Procedure
  - Check components; replace if necessary

Head airbag

- Components
  - Airbag module
  - Trim, A-pillar
  - Roofliner
  - Trim, B-pillar (if damaged)
  - Trim, C-pillar (if damaged)
  - Connection/mounting (on side frame)
- Procedure
  - Check components, replace if necessary

Knee airbag

- Components
  - Panel (driver's side)
  - Lower section of glove box
  - Active knee protector (driver's and passenger sides)
- Procedure
  - Check components, replace if necessary

Passive knee protector

- Components
  - Panel (driver's side)
  - Glove box incl. knee protector (passenger side)
- Procedure
  - Check components for damage, replace if necessary
  - Check fastening elements

32 34 020 REMOVING AND INSTALLING/REPLACING AIRBAG UNIT

WARNING: Observe the following instructions to avoid any risk of injury by the airbag unit.

- **Comply with SAFETY REGULATIONS for handling components with gas generators.**
- **Do not exert any force on the airbag unit.**
- **Use only specified tools for releasing the airbag unit.**

NOTE: Incorrect handling may result in triggering of the airbag unit and thereby cause serious injury.

IMPORTANT: Steering wheel must be replaced if airbag unit has been triggered! See REMOVING AND INSTALLING/REPLACING SPORT STEERING WHEEL or REMOVING AND INSTALLING/REPLACING STEERING WHEEL. Follow PROCEDURE AFTER AIRBAG DEPLOYMENT.

Necessary preliminary tasks

- Disconnect **BATTERY EARTH LEAD**

Insert Torx screwdriver T30 (1) straight into concealed opening on reverse side of steering wheel until a spring resistance is felt (approx. 2 cm).

Increase pressure at spring leg with Torx screwdriver T30 (1) until airbag unit is unlocked.

For purposes of clarity: airbag unit removed.

Installation note:

Make sure electrical leads are correctly positioned.

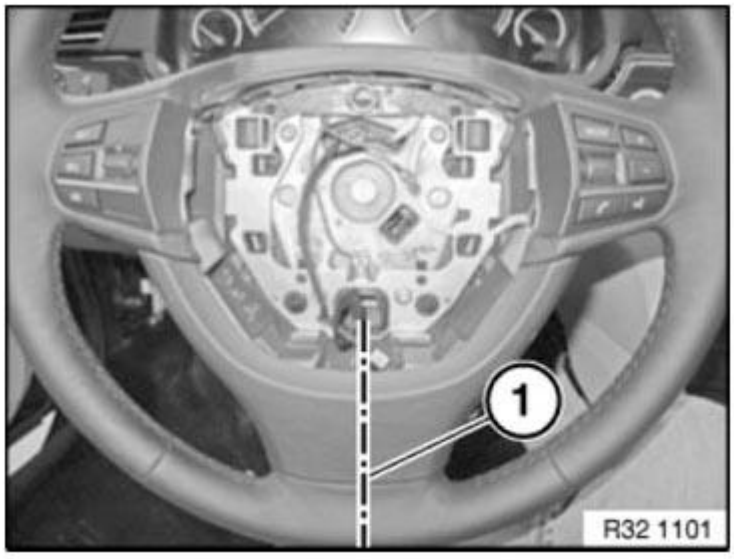


Fig. 104: Identifying Torx Screwdriver T30 (32 34 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Snap airbag unit with uniform pressing force plane-parallel in direction of steering column shaft into steering wheel.

WARNING: Danger of injury!
Airbag unit may only be set down with the airbag itself facing upwards .

Tilt airbag unit towards rear.

Disconnect plug connection (1) and earthing cable (2) and remove airbag unit.

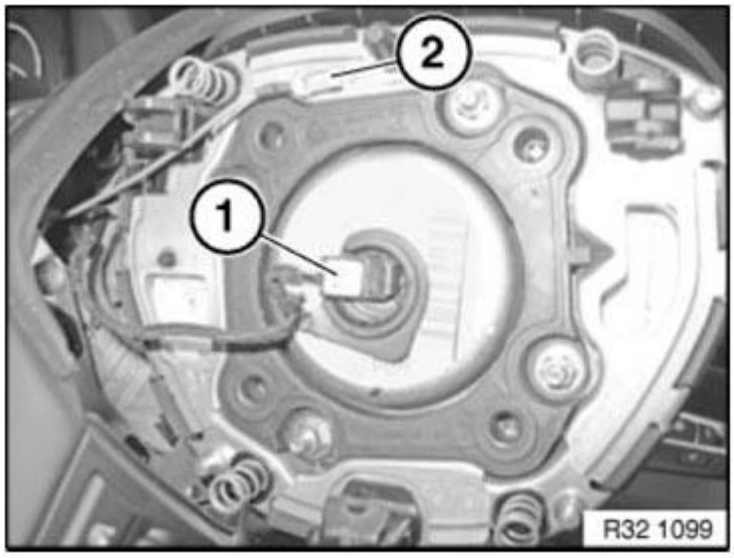


Fig. 105: Identifying Airbag Unit Plug Connection And Earthing Cable (32 34 020)
Courtesy of BMW OF NORTH AMERICA, INC.

32 34 030 REMOVING AND INSTALLING/REPLACING AIRBAG UNIT (SPORT STEERING WHEEL)

WARNING: Observe the following instructions to avoid any risk of injury by the airbag unit.

- **Comply with SAFETY REGULATIONS for handling components with gas generators.**
- **Do not exert any force on the airbag unit.**
- **Use only specified tools for releasing the airbag unit.**

NOTE: Incorrect handling may result in triggering of the airbag unit and thereby cause serious injury.

IMPORTANT: Steering wheel must be replaced if airbag unit has been triggered! See REMOVING AND INSTALLING/REPLACING SPORT STEERING WHEEL or REMOVING AND INSTALLING/REPLACING STEERING WHEEL. Follow PROCEDURE AFTER AIRBAG DEPLOYMENT.

Necessary preliminary tasks

- Disconnect **BATTERY EARTH LEAD**

Insert Torx screwdriver T30 (1) straight into concealed opening on reverse side of steering wheel until a spring resistance is felt (approx. 2 cm).

Increase pressure on spring leg using Torx screwdriver T30 (1) until airbag unit is released.

For purposes of clarity: airbag unit removed!

Installation note:

Make sure electrical leads are correctly positioned.

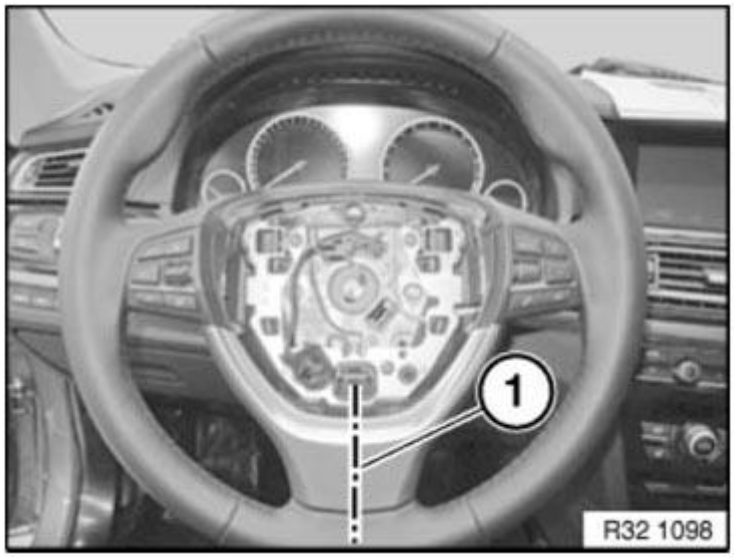


Fig. 106: Identifying Torx Screwdriver T30 (32 34 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Snap airbag unit with uniform pressing force plane-parallel in direction of steering column shaft into steering wheel.

WARNING: Danger of injury!
Airbag unit may only be set down with the airbag itself facing upwards.

Tilt airbag unit towards rear.

Disconnect plug connections (1) and grounding cable (2) and remove airbag unit.

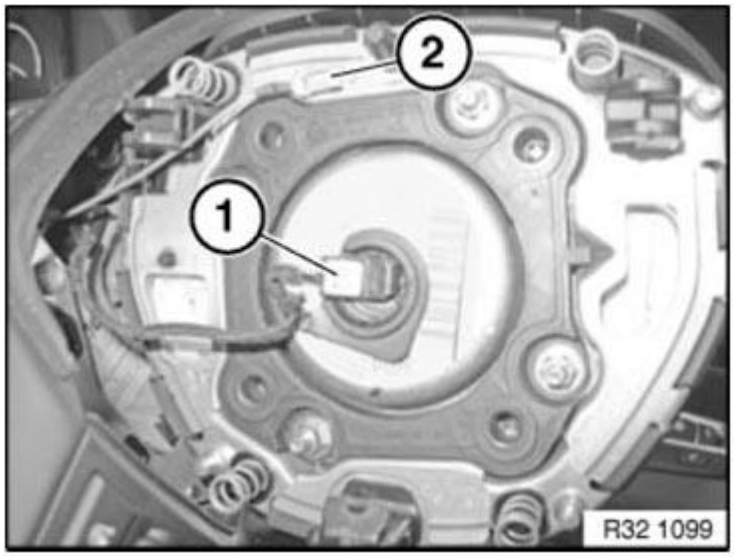


Fig. 107: Identifying Airbag Unit Plug Connection And Earthing Cable (32 34 030)
Courtesy of BMW OF NORTH AMERICA, INC.

72 00... SAFETY REGULATIONS FOR HANDLING COMPONENTS WITH GAS GENERATORS

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnically objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

IMPORTANT: Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Buckle/belt tensioner
- Head airbag
- Active knee protection
- Active head restraint
- Safety battery terminal

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnically objects belonging to danger class T1.

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnically objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Dismantling and installation

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
  - 30 minutes for vehicles up to 9/93;
  - 1 minute for vehicles from 9/93
- In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.
- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75°C.
- Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- Before installing, subject components such as housing, connector pins etc. of the airbag system (including diagnosis electronics) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the BMW ISTA.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing *upwards* . Otherwise the generator will be thrown upwards if it is fired.
- Do not point the ignition squib of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.

- When carrying out straightening and welding work with an electric welder:
  - Disconnect battery
  - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module _ wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.

32 41 PUMP AND OIL SUPPLY

32 13 006 BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Using contaminated equipment to add fluid may introduce dirt particles into the fluid reservoir and significantly reduce the service life of the power steering system. Do not use any filler funnels or similar!
Use only Pincushion CHF11S from original containers!
The fill level may only be checked or adjusted when the engine is stopped! The fluid temperature should be approx. 20°C here.
Ensure that the cap is fully screwed in prior to the fill level check.

NOTE: To avoid mix-ups when filling with hydraulic fluid, mark the fluid reservoirs or their caps with identification marks.



Fig. 108: Identifying Hydraulic Fluid Reservoir Cap Identification Mark
Courtesy of BMW OF NORTH AMERICA, INC.

1. Thoroughly clean fluid reservoir and its immediate surroundings
2. Check and correct fill level

NOTE: The fill level is dependent on the fluid temperature. Check fluid level at a fluid temperature between 20° and 80°C.

With engine at normal operating temperature do not exceed "Max. marking 80°C" (1).

Do not drop below "Min. marking 20°C" (2).

Hydraulic fluid: see **STEERING AND WHEEL ALIGNMENT - OPERATING FLUIDS**

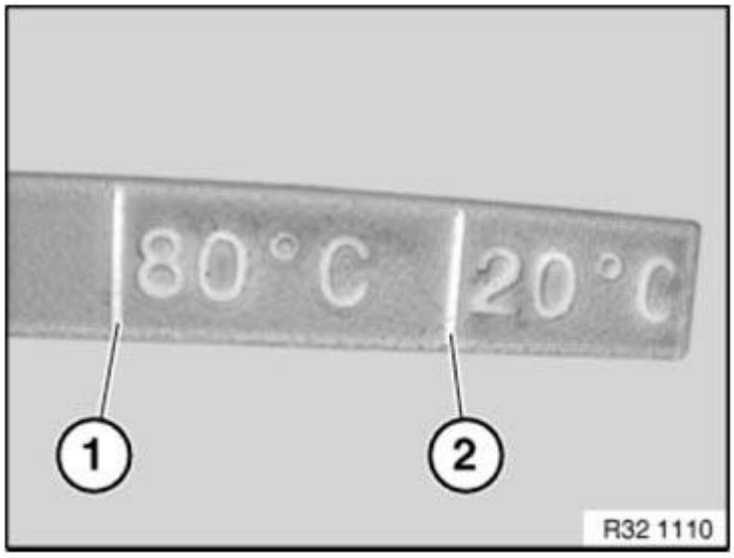


Fig. 109: Identifying Maximum And Minimum Temperature Marking Of Fluid Level
Courtesy of BMW OF NORTH AMERICA, INC.

3. Start engine
4. Turn steering wheel left and right twice in each case up to full lock; if necessary, top up hydraulic fluid (e.g. if hydraulic system is completely drained)
5. Move steering wheel to straight-ahead position and turn off engine
6. Check and correct fill level with engine stopped
7. Check hydraulic system for leaks

After filling

- If necessary, carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 13 006 BLEEDING POWER STEERING UNIT

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin! RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Using contaminated equipment to add fluid may introduce dirt particles into the fluid reservoir and significantly reduce the service life of the hydraulic steering system. Do not use any filler funnels or similar!
The fill level may only be checked or adjusted when the engine is stopped! The oil temperature should be approx. 20°C here.
Ensure that the cap is fully screwed in prior to the fill level check.

NOTE: To avoid mix-ups when filling with hydraulic fluid, mark the fluid reservoir or the cap with an identification mark.



Fig. 110: Identifying Hydraulic Fluid Reservoir Cap Identification Mark
Courtesy of BMW OF NORTH AMERICA, INC.

1. Thoroughly clean fluid reservoir and its immediate surroundings
2. Check and correct fill level

NOTE: The fill level is dependent on the oil temperature. Check fill level at an oil temperature between 20° and 80°C. With engine at operating temperature do not exceed "Max. marking 80°C" (1).

Do not drop below "Min. marking 20°C" (2).

Hydraulic fluid: see **STEERING AND WHEEL ALIGNMENT - OPERATING FLUIDS**

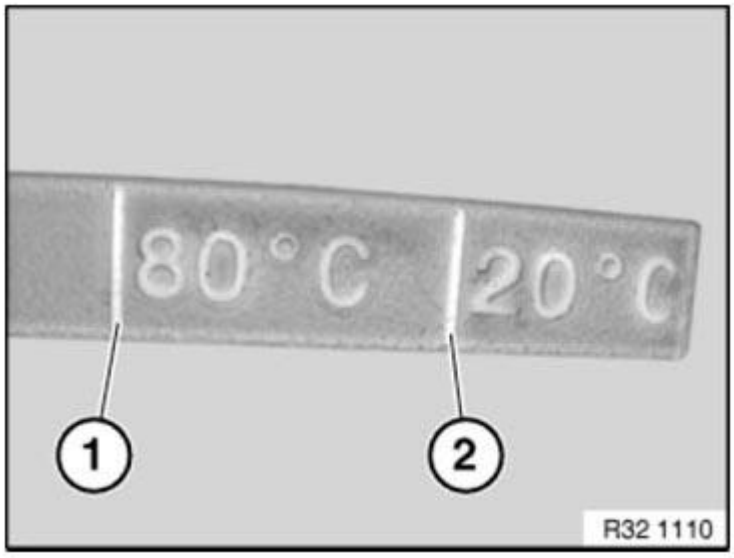


Fig. 111: Identifying Maximum And Minimum Temperature Marking Of Fluid Level
Courtesy of BMW OF NORTH AMERICA, INC.

3. Start engine
4. Turn steering wheel left and right twice in each case up to full lock; if necessary, top up hydraulic fluid (e.g. if hydraulic system is completely drained)
5. Move steering wheel to straight-ahead position and turn off engine
6. Check and correct fill level with engine stopped
7. Check hydraulic system for leaks

32 41... INSTRUCTIONS FOR REMOVING AND INSTALLING EAR CLIPS

Notes

NOTE: The work steps are show on assorted components. Ear clip must always be replaced.

To remove an ear clip, place special tool 32 1 260 at right angles to ear and cut ear open.

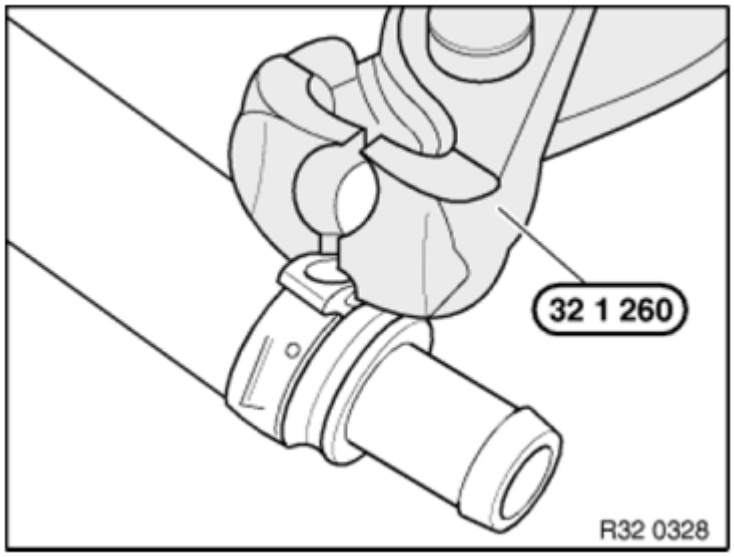


Fig. 112: Removing Ear Clip Using Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

The ear clip can be fitted not only axially but also radially after the hook fastener has been opened.

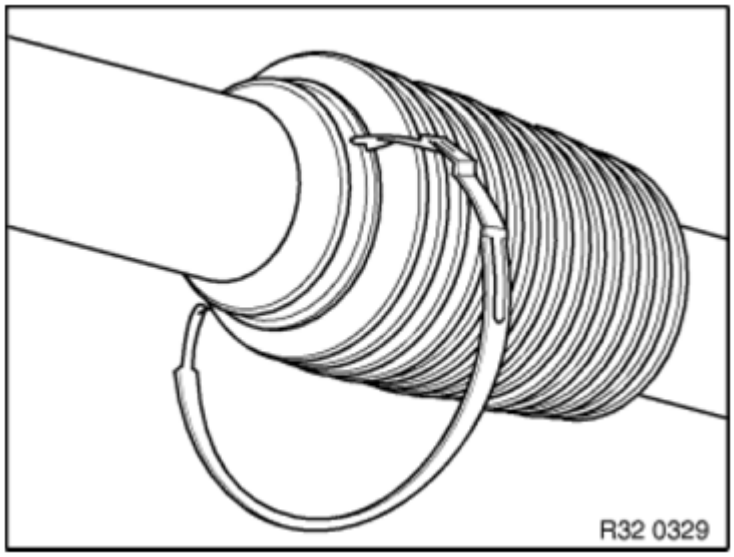


Fig. 113: Identifying Hook Fastener On Ear Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Attach hook fastener and press ear together with special tool 32 1 260.

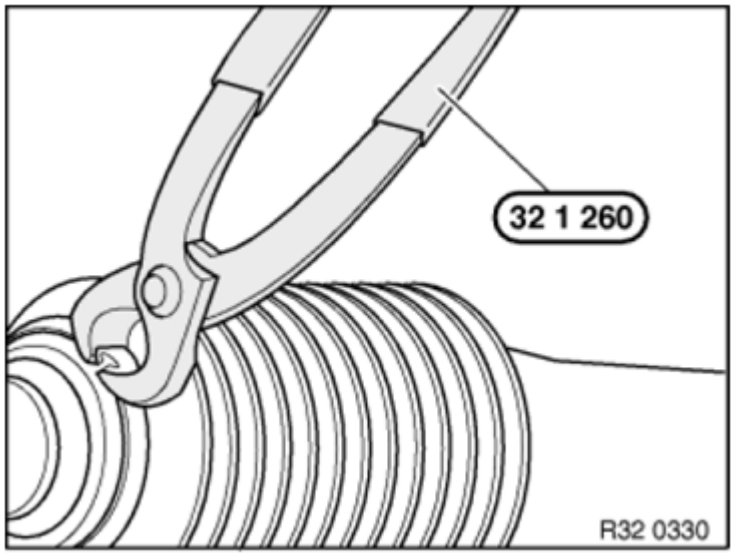


Fig. 114: Pressing Hook Fastener And Ear Clip Using Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

The diagonal cutting pliers of special tool 32 1 260 can be used in areas which are difficult to access.

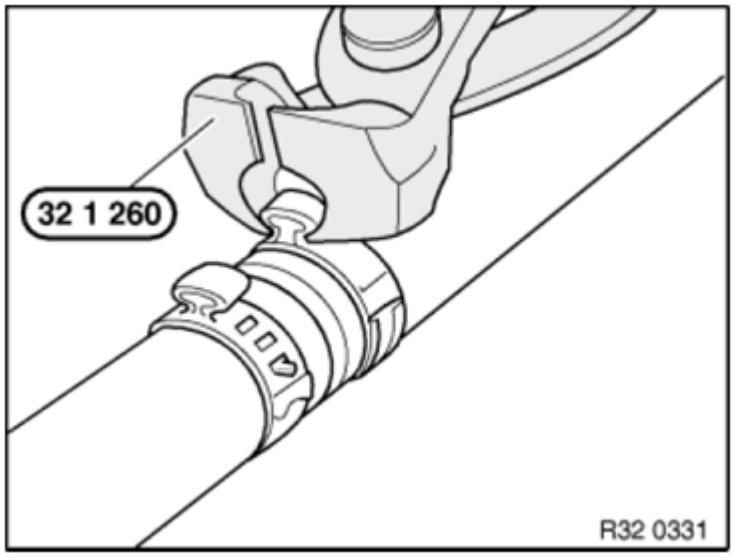


Fig. 115: Removing Ear Clip Using Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Gap (A) max. 1 mm!

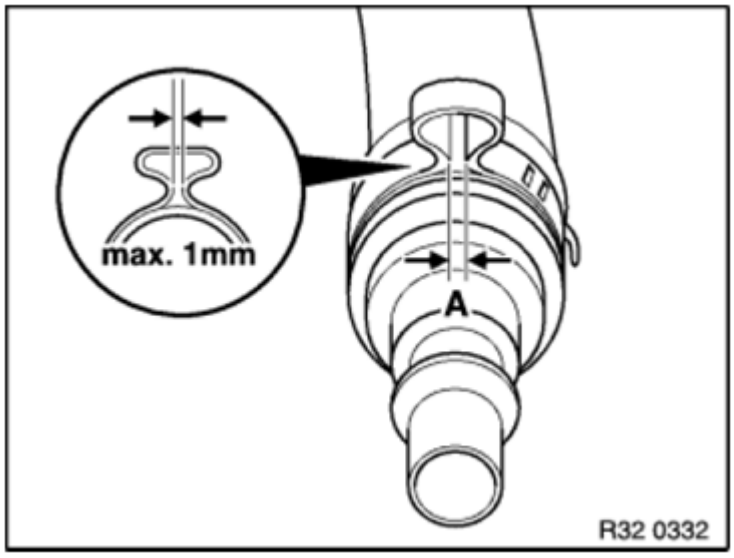


Fig. 116: Identifying Ear Clip Gap
Courtesy of BMW OF NORTH AMERICA, INC.

32 41... NOTES ON HYDRAULIC LINE WITH QUICK-CONNECT COUPLING

1) Quick-connect coupling with ID marking

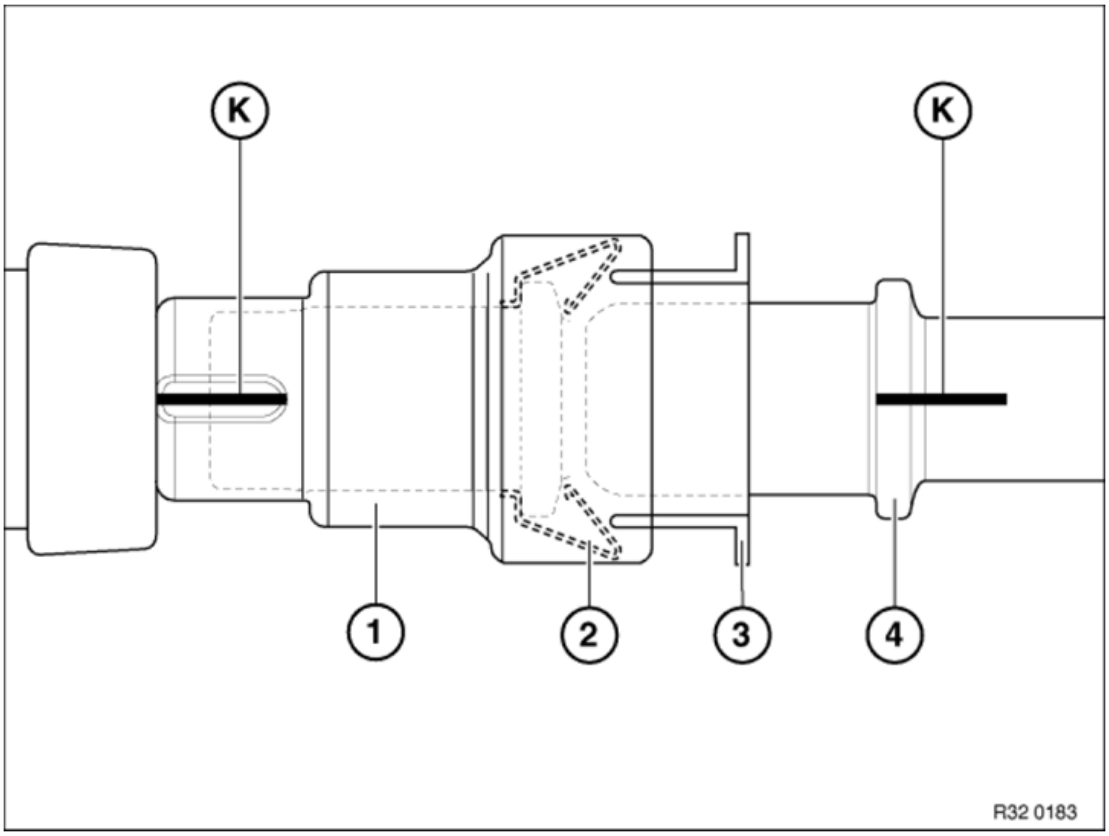


Fig. 117: Identifying Quick-Connect Coupling With ID Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Removing

Push quick-connect coupling (1) against pipe (4) (thereby relieving strain on spring (2)).

Press plastic ring (3) into quick-connect coupling (1) and remove coupling (1).

Assembly

Markings (K) on coupling (1) and pipe (4) must be flush.

Push quick-connect coupling (1) onto pipe (4) until a "click" can clearly be heard.

To check that quick-connect coupling (1) has been installed correctly, pull it back forcefully.

2) Quick-connect coupling with indication pins

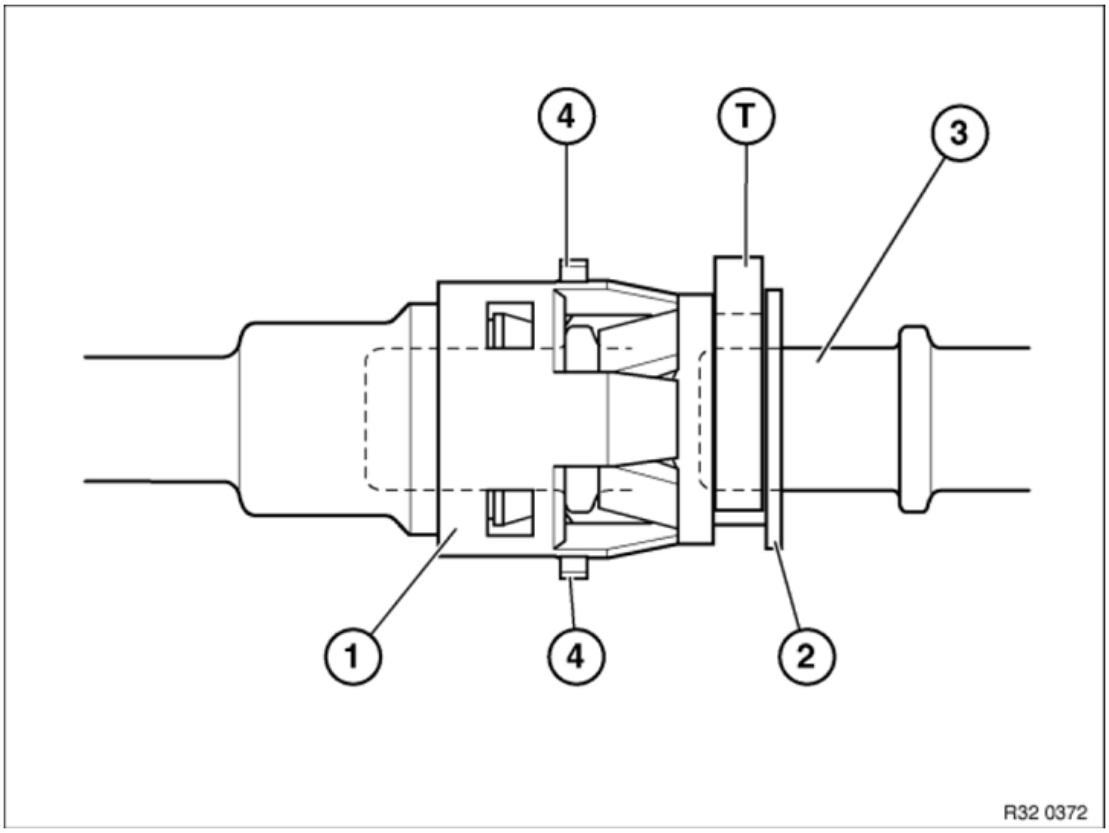


Fig. 118: Identifying Quick-Connect Coupling With Indication Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Removing

Press plastic ring (2) into quick-connect coupling (1) and remove coupling (1).

Assembly

When replacing hydraulic line: remove transportation lock (T).

Push quick-connect coupling (1) onto pipe (3) until both indication pins (4) can be seen and felt to point outwards at outside diameter of housing.

To check that quick-connect coupling (1) has been correctly fitted, feel indication pins (4) at outside diameter of housing. When correctly seated, indication pins (4) cannot be pressed into housing.

IMPORTANT: Coupling is not correctly engaged if both indication pins (4) fail to protrude from housing. Leakage is thus unavoidable.

37 13... OVERVIEW OF LINES, STEERING WITH ARS

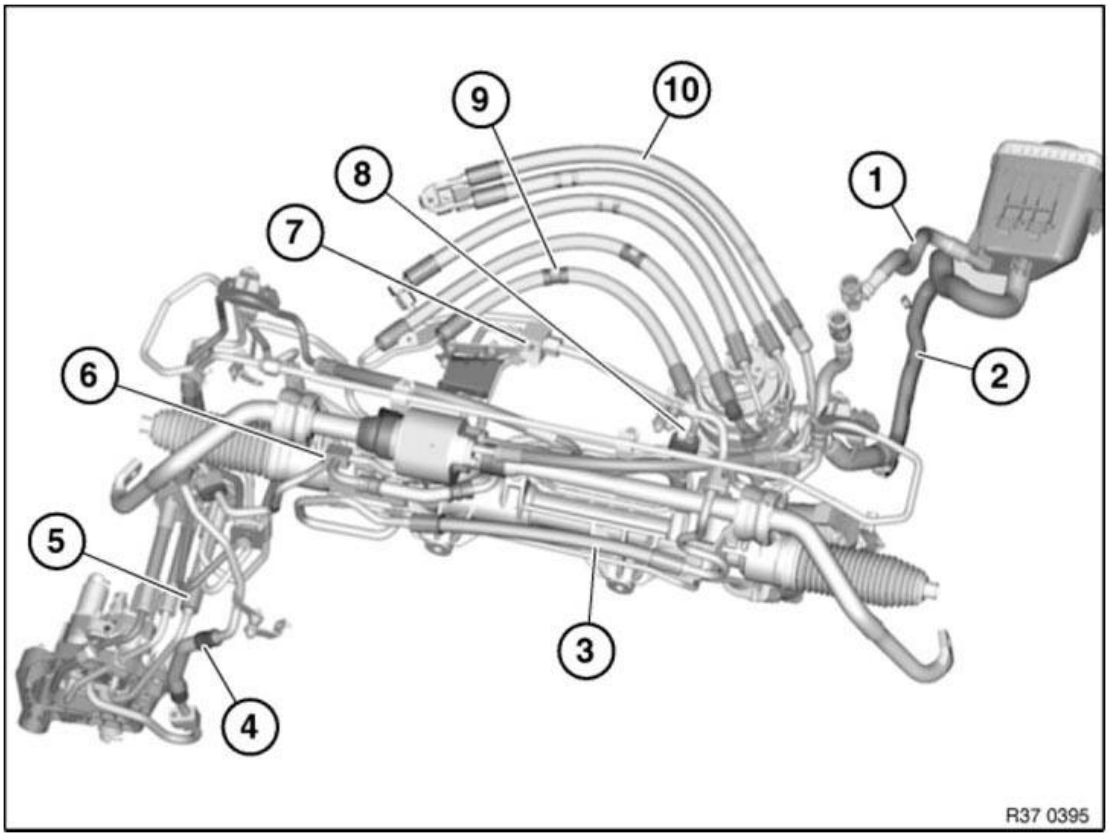


Fig. 119: Overview Of Lines, Steering With ARS
Courtesy of BMW OF NORTH AMERICA, INC.

STEERING LINES REFERENCE CHART

No.	Designation

1	**Return line**
2	**Suction line**
3	**ARS expansion hose part 3**
4	**ARS return line**
5	**ARS expansion hose part 2**
6	**ARS+AFS return**
7	**ARS expansion hose part 4**
8	**Expansion hose part 2**
9	**Expansion hose part 1**
10	**ARS expansion hose part 1**

32 41 033 REMOVING AND INSTALLING POWER STEERING PUMP FOR POWER STEERING GEAR WITH ACTIVE FRONT STEERING (N63)

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Seal off hydraulic lines with plugs.

Necessary preliminary tasks

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Remove **BELT PULLEY**
- Remove **FAN COWL**
- Remove front assembly underside protection. See **REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** .

Release hose clamp (1) and detach suction line from power steering pump.

Installation:

Replace hose clamp.

Make sure hydraulic lines are laid without tension and with sufficient spacing to adjoining components.

Align suction line by way of marking (2) to power steering pump connection marking.

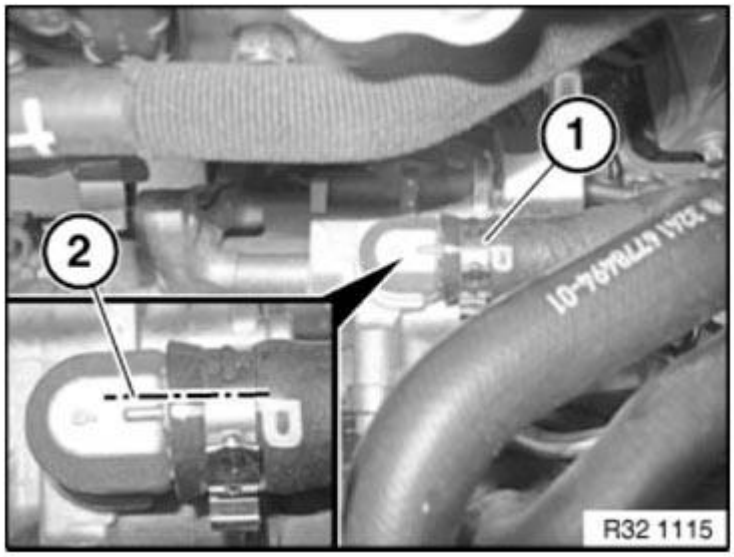


Fig. 120: Identifying Power Steering Pump Connection Marking With Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **32 41 10AZ** .

Release screw (2) and detach pressure line from power steering pump.

Tightening torque **32 41 18AZ** .

Unlock plug connection (3) on back of power steering pump and disconnect.

Installation:

Make sure hydraulic lines are laid without tension and with sufficient spacing to adjoining components.

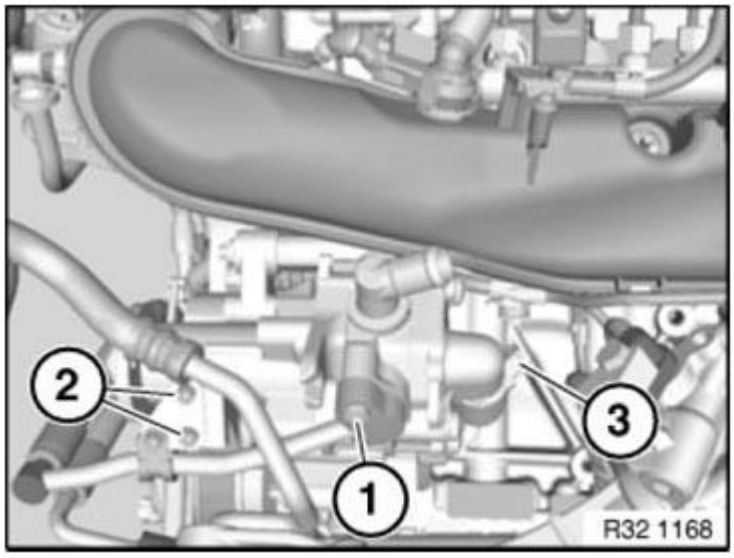


Fig. 121: Identifying Power Steering Pump Pressure Line Screws And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Align suction line by way of marking to connection on power steering pump.

Release screws (1, 2) and remove power steering pump.

Tightening torque **32 41 9AZ** .

Installation:

Replace screws.

Make sure screws are installed in correct positions.

- Screw (1) M10x110
- Screw (2) M10x130

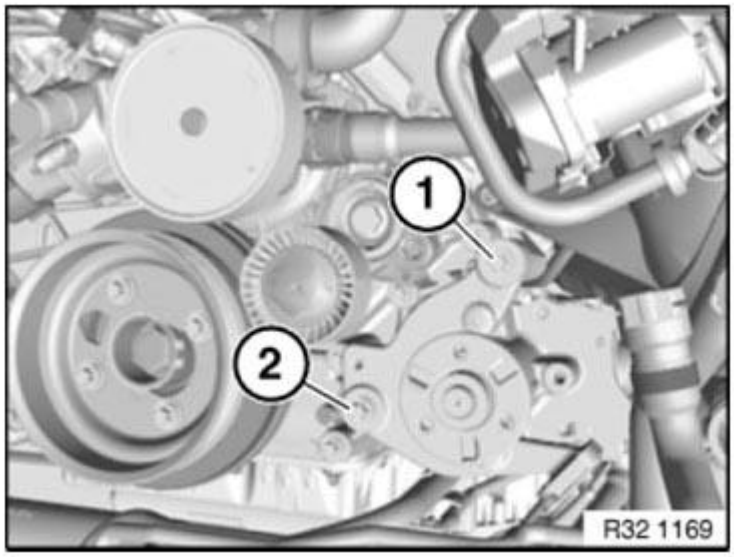


Fig. 122: Identifying Power Steering Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check pipe connections for leaks

32 41 060 REMOVING AND INSTALLING VANE PUMP FOR HYDRAULIC STEERING

NOTE: See procedure for POWER STEERING PUMP FOR POWER STEERING GEAR WITH ACTIVE FRONT STEERING (N63) or POWER STEERING PUMP FOR HYDRAULIC STEERING GEAR WITH DYNAMIC DRIVE (N63).

32 41 431 REMOVING AND INSTALLING/RENEWING DYNAMIC DRIVE EXPANSION HOSE PART 2 (IN FRONT WHEEL ARCH)

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin! RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Remove right **FRONT WHEEL**
- Remove **FRONT RIGHT WHEEL ARCH COVER REAR SECTION**
- Remove **UNDERBODY PROTECTIVE PLATE**
- Remove **STIFFENING PLATE** (N74 only)
- Remove right **STEERING ASSEMBLY COVER**
- Remove right **UNDERBODY PANELLING**

IMPORTANT: Pressure line and connection on valve block must be fitted with suitable sealing plugs immediately after removal!

Release screws (2) and tie lines to one side.

Tightening torque **37 13 3AZ** .

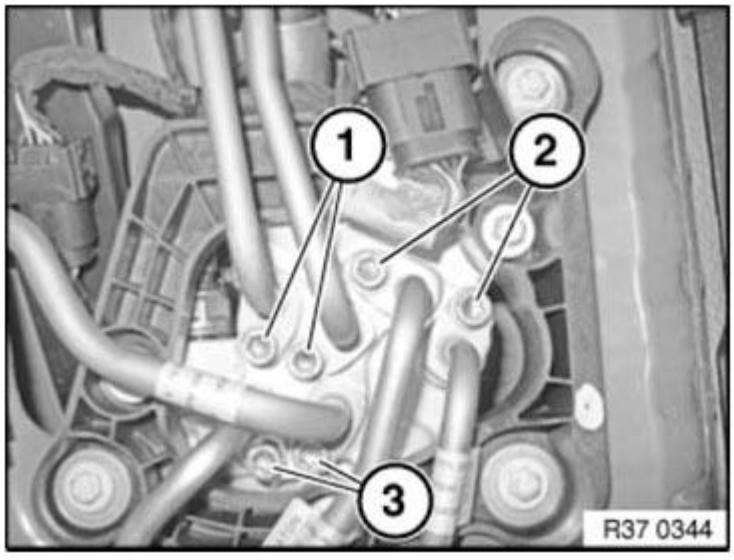


Fig. 123: Identifying Power Steering Pump Lines Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) for pressure line on valve block.

Tightening torque **37 13 3AZ** .

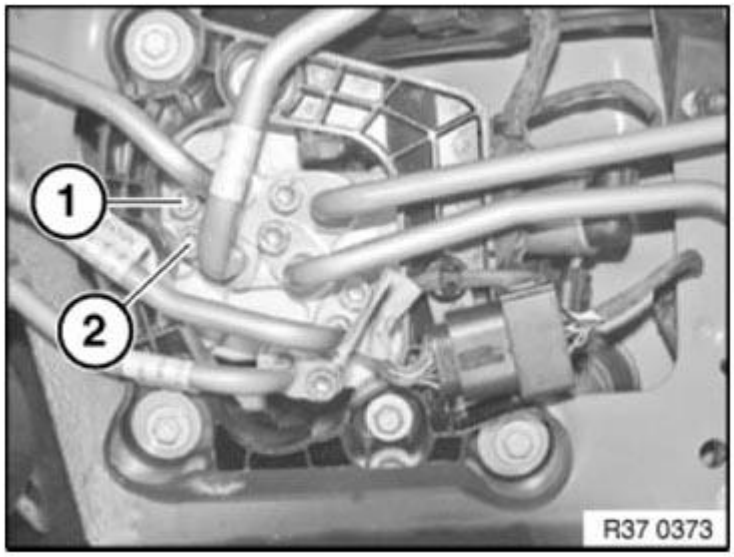


Fig. 124: Identifying Power Steering Pump Pressure Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove rubber damper (1).

Installation:

Make sure pressure lines are laid without tension and with sufficient spacing to adjoining components.

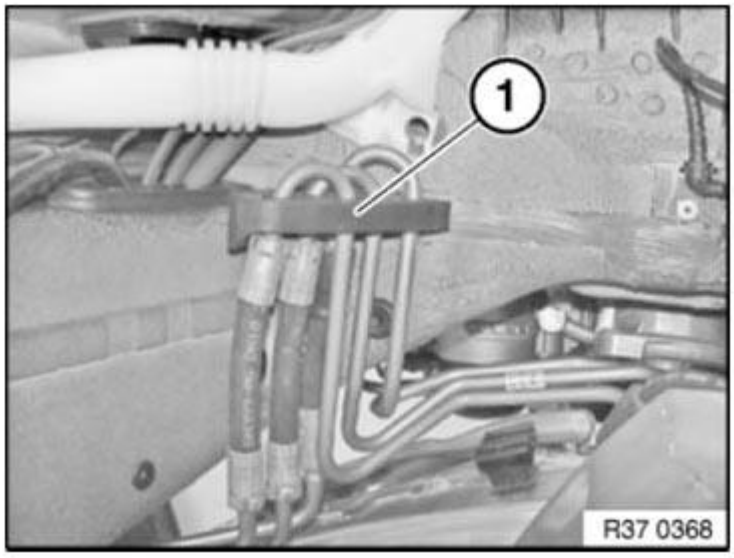


Fig. 125: Identifying Rubber Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) from line flange in engine compartment.

Remove pressure line towards rear.

Tightening torque **37 13 8AZ** .

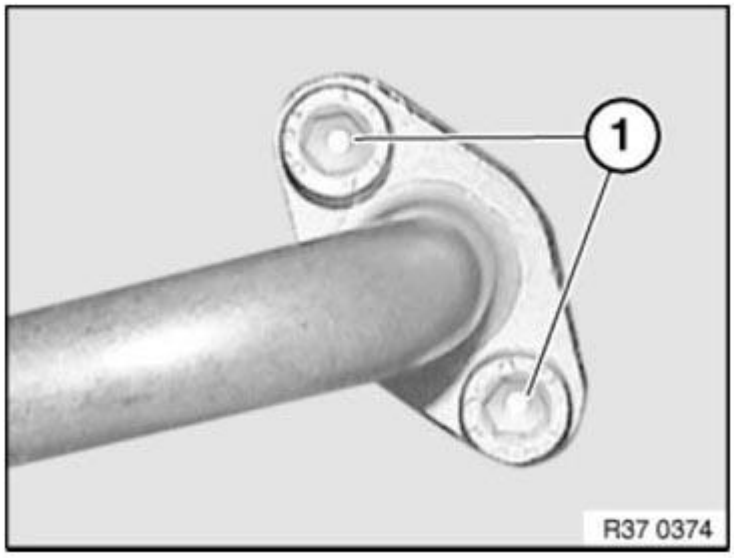


Fig. 126: Identifying Engine Compartment Flange Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 432 REMOVING AND INSTALLING/REPLACING ARS EXPANSION HOSE PART 3

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION**

IMPORTANT: Pressure line and connections must be provided with suitable plugs immediately after removal!

Release screws from line flange (1) and (2) and remove line.

Tightening torque **37 13 8AZ** .

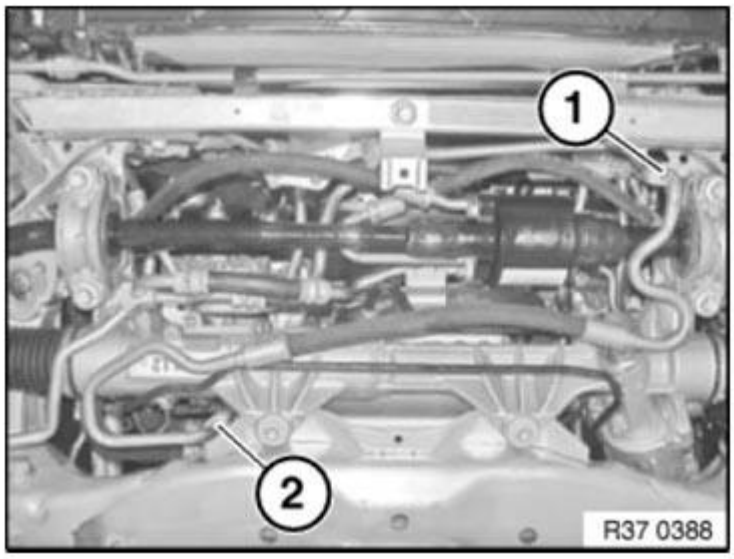


Fig. 127: Identifying Screws On Flange
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 433 REMOVING AND INSTALLING/REPLACING ARS EXPANSION HOSE PART 4

Notes

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

**IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270**

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

IMPORTANT: Pressure line and connections must be provided with suitable plugs 32 1 270 immediately after removal!

ARS expansion hose part 4 overview:

ARS EXPANSION HOSE LINES REFERENCE CHART

1	Line 1
2	Line 2
3	Line 3

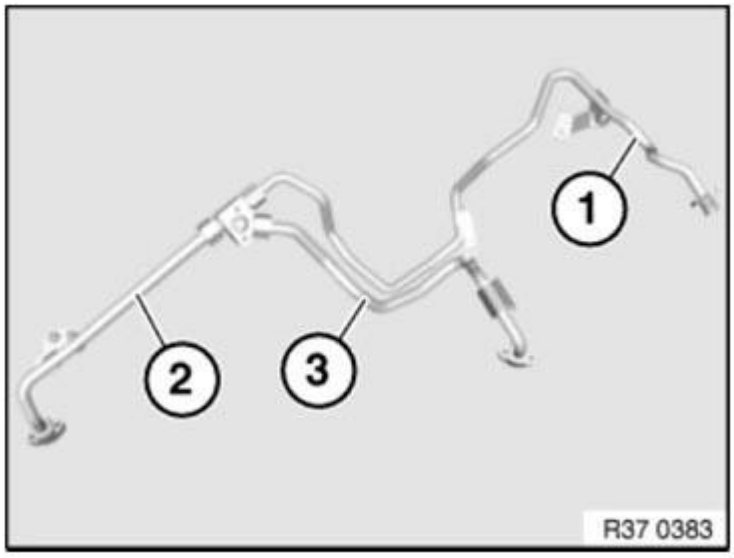


Fig. 128: Identifying ARS Expansion Hose Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Removing line 1:

Necessary preliminary tasks

- Lower **FRONT AXLE SUPPORT**

Release screws (1) from line flange in engine compartment.

Replace sealing ring.

Tightening torque **37 13 8AZ** .

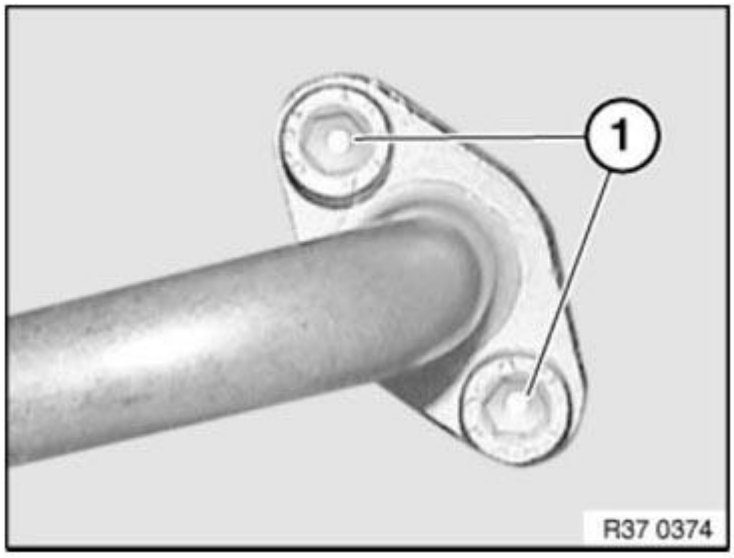


Fig. 129: Identifying Engine Compartment Flange Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) from holder of oil cooler line over front axle carrier.

Release holder in front axle carrier (see arrow) of pressure line (2).

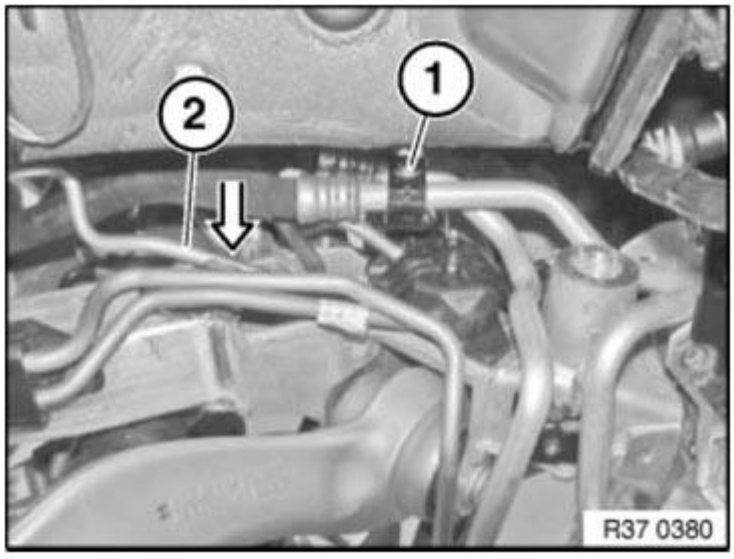


Fig. 130: Releasing Front Axle Carrier Holder Of Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw connection (1) on T-piece.

Tightening torque **37 13 5AZ** .

Feed out line through wheel arch.

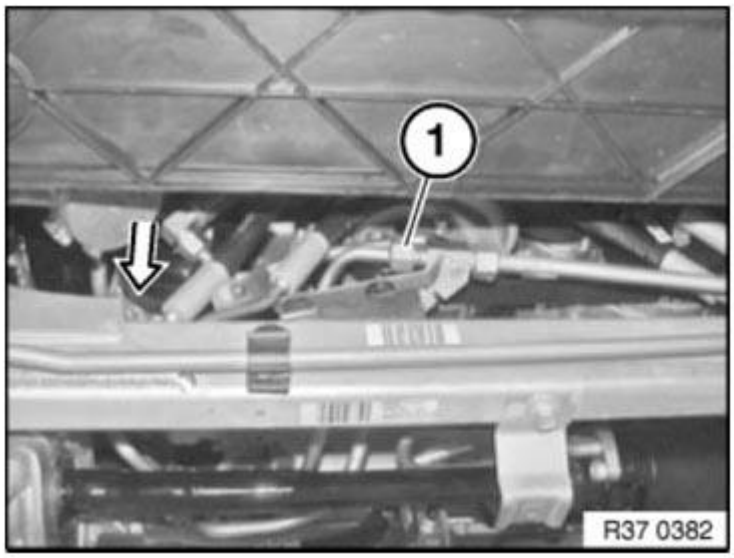


Fig. 131: Removing ARS Expansion Hose Line From Wheel Arch
Courtesy of BMW OF NORTH AMERICA, INC.

Removing line 2:

Necessary preliminary tasks

- Remove **UNDERBODY PROTECTION**
- Release **ACTIVE STABILIZER** from front axle carrier and tie up
- Remove front pressure line from active stabilizer
- Remove **ARS EXPANSION HOSE PART 3**

Release both nuts (1) from line holder.

Release screw connection (2) and remove line.

Tightening torque **37 13 5AZ** .

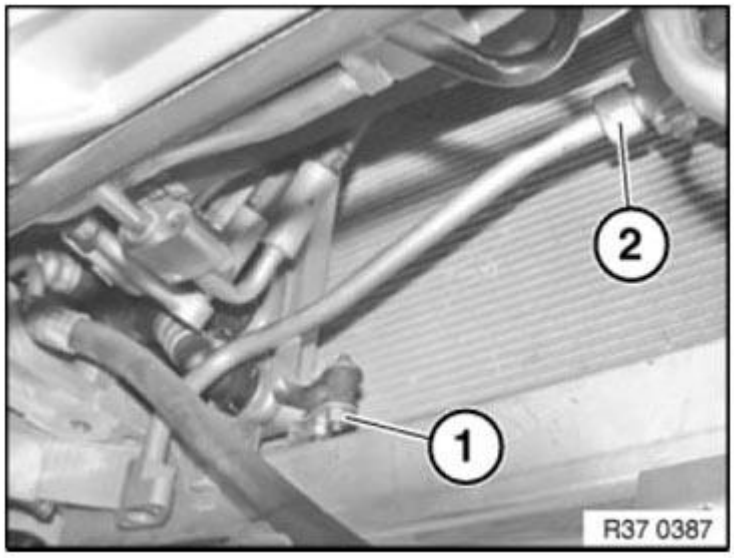


Fig. 132: Identifying ARS Expansion Hose Line Holder Nut And Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Removing line 3:

Necessary preliminary tasks

- Remove **UNDERBODY PROTECTION**
- Remove **ACTIVE STABILIZER** from front axle carrier and hang up
- Remove front pressure line from active stabilizer
- Remove **ARS EXPANSION HOSE PART 3**

Unfasten screw fitting (1).

Tightening torque **37 13 5AZ** .

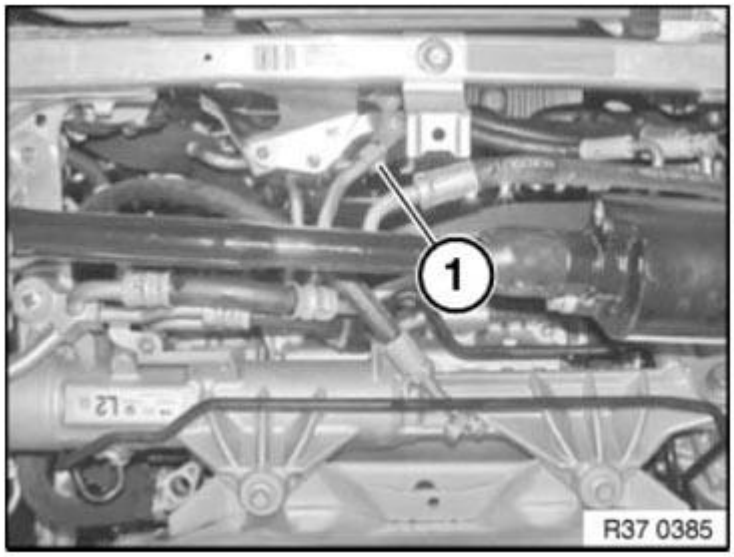


Fig. 133: Identifying ARS Expansion Hose Line Screw Fitting
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on line holder.

Feed out line upwards to remove.

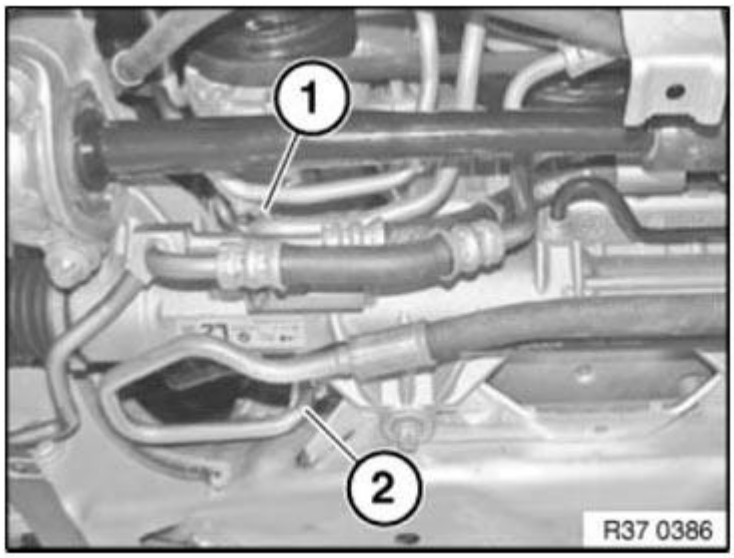


Fig. 134: Identifying ARS Expansion Hose Line Holder Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.

Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 435 REMOVING AND INSTALLING/RENEWING DYNAMIC DRIVE IN THE WHEEL ARCH

Notes

WARNING: **DANGER OF POISONING if oil is ingested/absorbed through the skin!**
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: **Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.**
Do not draw off hydraulic fluid (risk of contamination).
Close off line connections with seal plug. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable expansion tank.

Necessary preliminary work

- Remove front right wheel arch cover. See **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (FRONT SECTION)** and **REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (REAR SECTION)** .
- Remove **UNDERBODY PROTECTION**
- Remove right **STEERING ASSEMBLY COVER**
- Release front right **UNDERBODY PANELLING**

IMPORTANT: **Pressure lines must be closed off with suitable seal plugs 32 1 270 immediately after removal!**

Release screw (1) for return line.

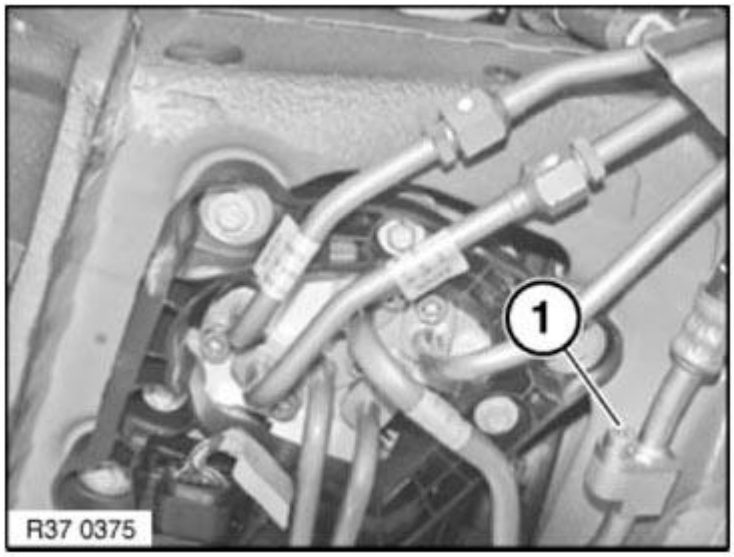


Fig. 135: Identifying Return Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

IMPORTANT: When tightening the screw connection (1), apply counter support with wrench (3) at the line (2)!
Non-compliance will result in damage to the line (2)!
Tightening torque 37 13 12AZ .

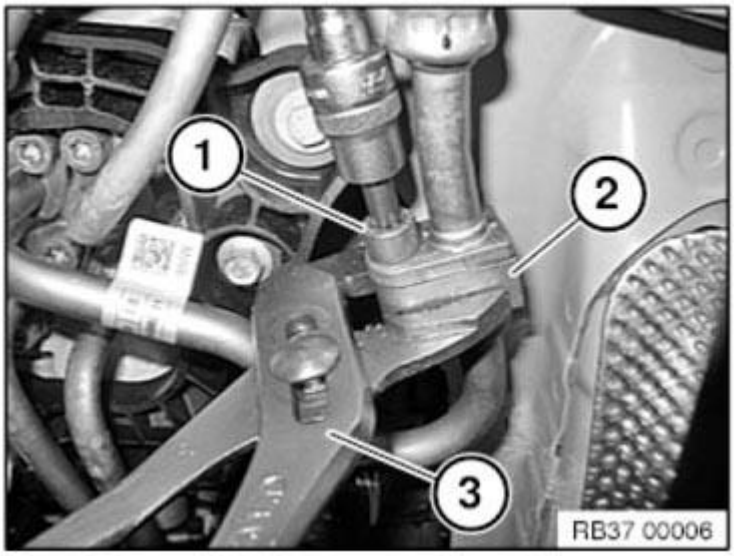


Fig. 136: Supporting Return Line Using Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Release line clips (1) and (2) from front axle support.

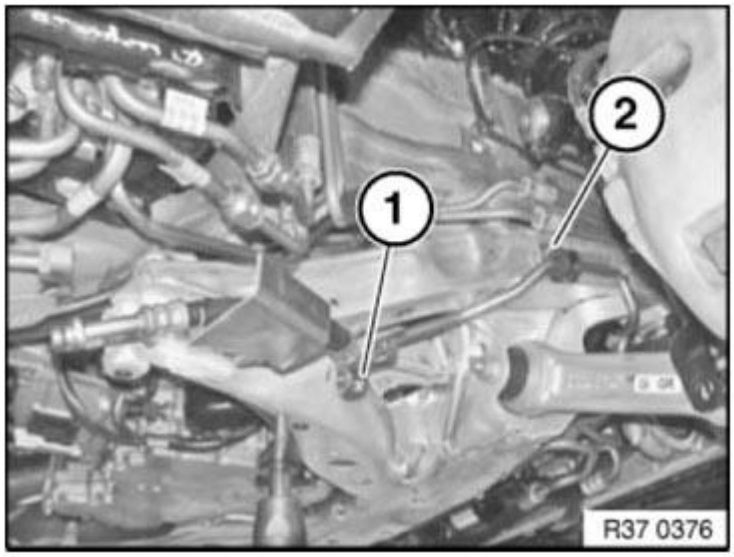


Fig. 137: Identifying Clips On Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) in area of lower wishbone.

Tightening torque **37 13 8AZ** .

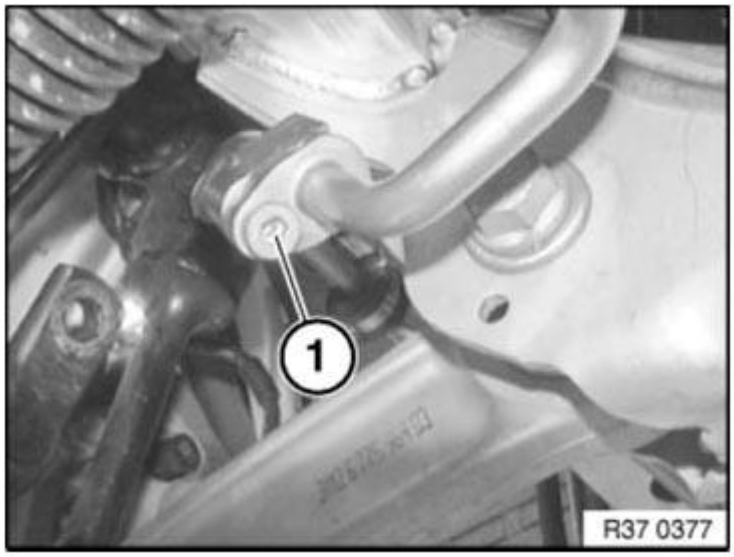


Fig. 138: Identifying Screw On Lower Wishbone
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the seal plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.

Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leak tightness
- Perform **INITIAL OPERATION OF ARS**

32 41 436 REMOVING AND INSTALLING/REPLACING RETURN LINE FOR POWER STEERING WITH ARS (N63)

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Seal off line connections with plugs 32 1 270 .

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Lower **FRONT AXLE SUPPORT**

IMPORTANT: Pressure line and connection on valve block must be fitted with suitable sealing plugs 32 1 270 immediately after removal!

Release screw (1).

Tightening torque **37 13 8AZ** .

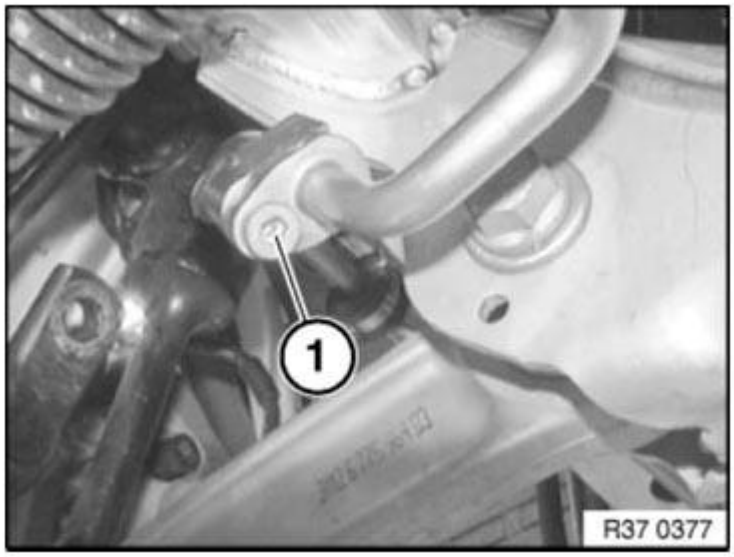


Fig. 139: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder (1).

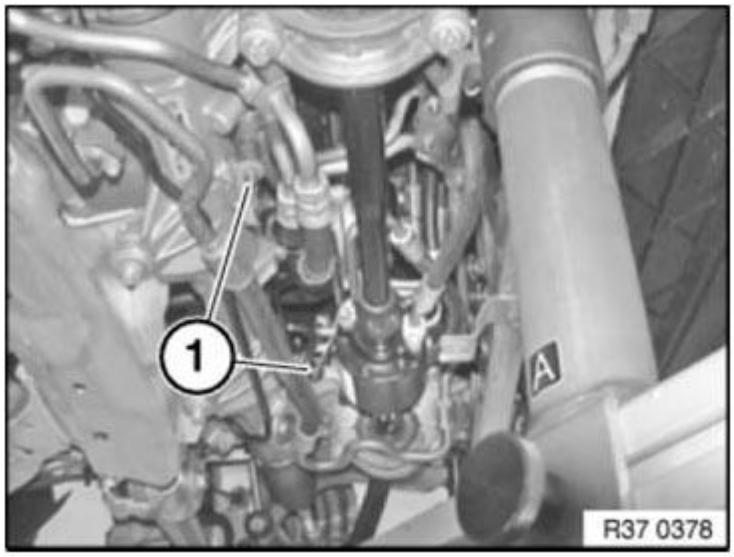


Fig. 140: Identifying Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) for hydraulic line on steering gear.

Tightening torque **32 41 5AZ** .

Remove hydraulic line.

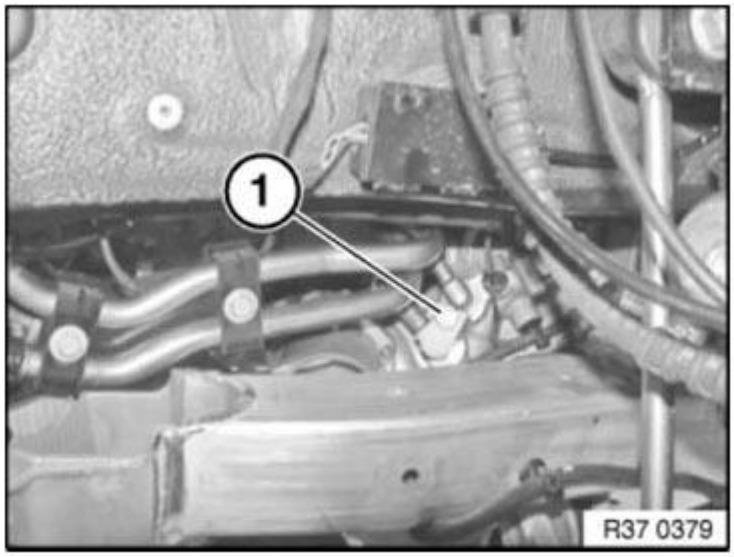


Fig. 141: Identifying Hydraulic Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock return line on cooling loop and disconnect.

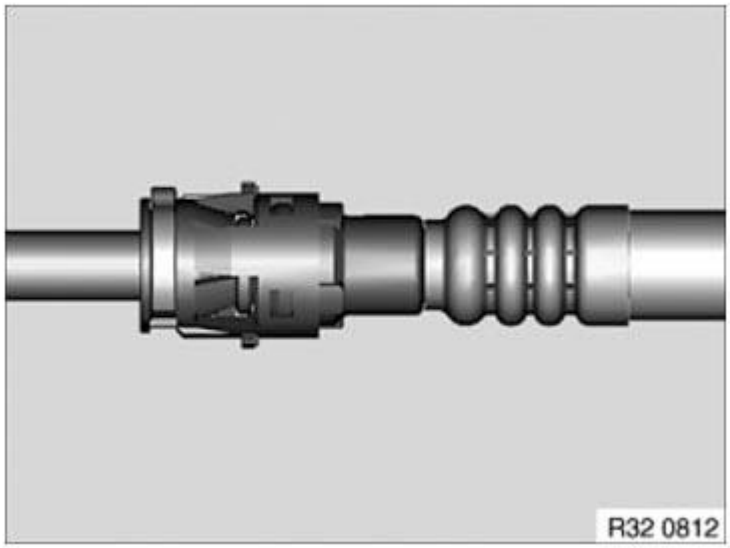


Fig. 142: Identifying Return Line On Cooling Loop
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 437 REMOVING AND INSTALLING/REPLACING DYNAMIC DRIVE RETURN FROM SEPARATION POINT TO COOLING LOOP

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.

Do not draw off hydraulic fluid (risk of contamination).

Close off line connections with seal plug 32 1 270 .

Recycling: Catch and dispose of hydraulic fluid in a suitable collecting vessel.

Necessary preliminary work:

- Remove underbody protection at **FRONT** and **REAR**
- Remove stiffening plate
- Disconnect **BATTERY EARTH LEAD**
- Remove **FAN COWL** with electric fan
- Mark **ELECTRICAL STEERING GEAR (EPS)** or **ELECTRICAL STEERING GEAR (ACTIVE STEERING)** to front axle support and release, unlock wiring harness, pull off and pull steering gear forwards

IMPORTANT: Pressure lines must be closed off with suitable seal plugs 32 1 270 immediately after removal!

Release screw (1) in area of lower wishbone.

Tightening torque **32 41 15AZ**

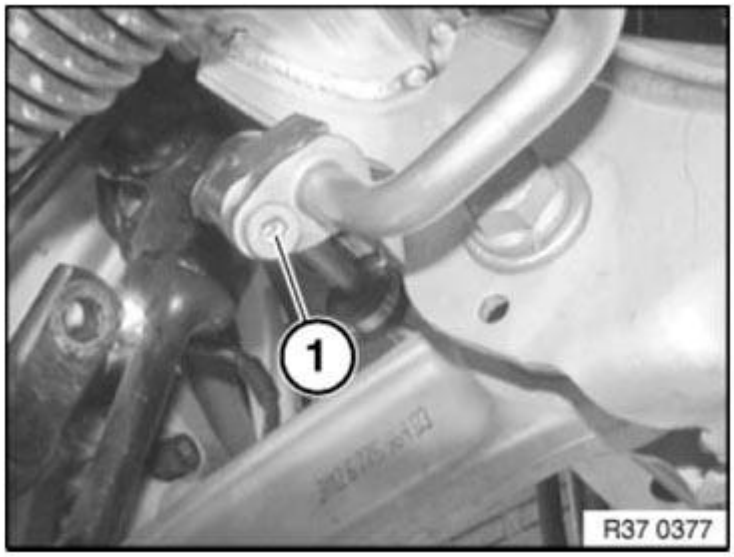


Fig. 143: Identifying Power Steering With ARS Return Line Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release line clips (1) and (2) from front axle support.

Tightening torque **37 13 7AZ**

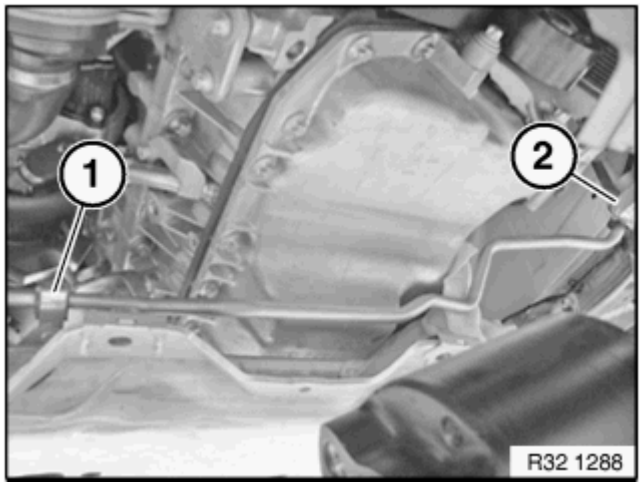


Fig. 144: Identifying Line Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock return line on cooling loop and disconnect.

Remove return line.

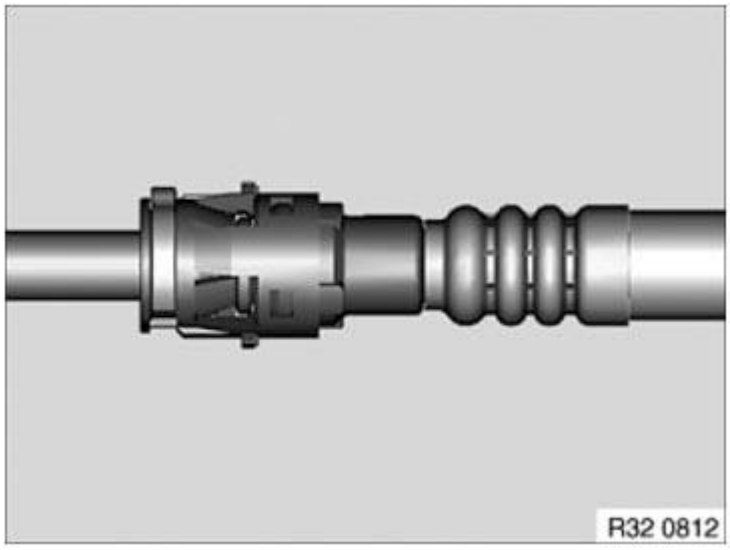


Fig. 145: Identifying Return Line On Cooling Loop
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the seal plugs of the line to be fitted are removed.

When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.

Do not replace sealing rings on hydraulic lines.

Replace affected line if sealing ring is damaged.

After installation:

- Carry out **INITIAL DYNAMIC DRIVE OPERATION**
- Check pipe connections for leaks

32 41 100 REMOVING AND INSTALLING/REPLACING BELT PULLEY ON VANE PUMP FOR POWER STEERING

NOTE: Carry out preliminary work as described in REPLACING DRIVE BELT .

Slacken screws (1)

Relieve tension on **DRIVE BELT** and remove from belt pulley (2).

Unscrew bolts (1) and remove belt pulley (2).

Installation note:

Lettering on belt pulley (2) must point forwards.

Replace microencapsulated screws.

Tightening torque **32 41 4AZ** .

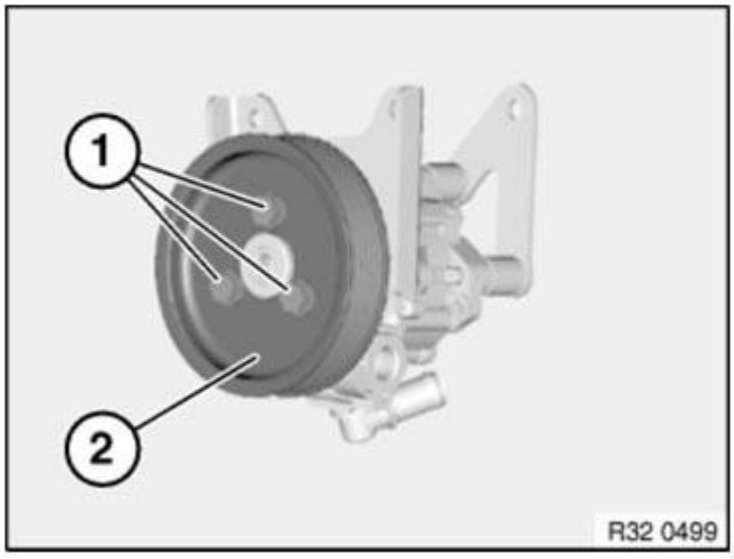


Fig. 146: Identifying Drive Belt Pulley With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

32 41 250 REMOVING AND INSTALLING/REPLACING FLUID RESERVOIR FOR POWER STEERING

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Seal off hydraulic lines with plugs.

Necessary preliminary tasks

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Remove front left **SUSPENSION CROSSBARS**

Release screws (1) on wheel arch and screw (2) on expansion tank.

Remove washers.

Tightening torque **32 41 1AZ/2AZ** .

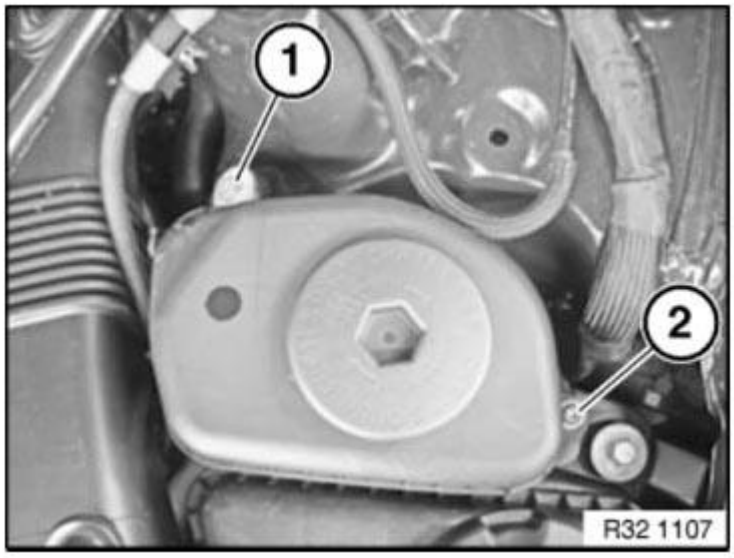


Fig. 147: Identifying Screws On Wheel Arch And Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Raise and/or turn fluid reservoir in order to gain better access to plug connection and hoses.

Release hose clamp (1) from radiator return line.

Tightening torque **32 41 3AZ** .

Unfasten hose clip (2).

Installation:

Replace hose clamp.

If necessary, disconnect plug connection (3) from oil level sensor

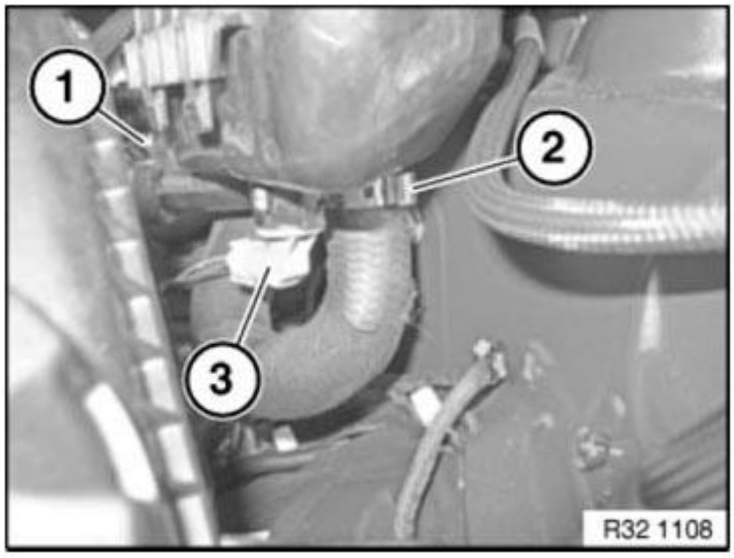


Fig. 148: Identifying Radiator Return Line Hose Clamp, Clip And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect suction line and radiator return line from fluid reservoir.

Lift out fluid reservoir.

Replacement

If necessary, modify **LEVEL SWITCH** .

After installation

- Fill and bleed hydraulic system. See **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** or **BLEEDING POWER STEERING UNIT**.
- Check pipe connections for leaks

Version with Dynamic Drive:

- If necessary, carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 037 REMOVING AND INSTALLING/REPLACING POWER STEERING PUMP FOR HYDRAULIC STEERING GEAR WITH DYNAMIC DRIVE (N63)

NOTE: **When replacing power steering pump:**
OIL RESERVOIR must be replaced in event of metal abrasion, sluggish pump shaft or increased dirt contamination!
The filter integrated in the oil reservoir can only absorb a limited amount of foreign particles. If the filter clogs, the hydraulic system can no longer be sufficiently protected.

Metal abrasion is perceived in the oil reservoir as metallically glittering hydraulic fluid.
It is only necessary to replace the oil reservoir because of leaks (e.g. at hose connections) only in the event of the unavoidably high ingress of dirt.

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
DANGER OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).

Necessary preliminary work

- Mark **HYDRAULIC STEERING GEAR** on front axle support and remove
- Draw off and dispose of hydraulic fluid from oil reservoir
- Remove **BELT PULLEY**

Release screws (1) and remove holder from power steering pump.

Tightening torque **32 41 14AZ** .

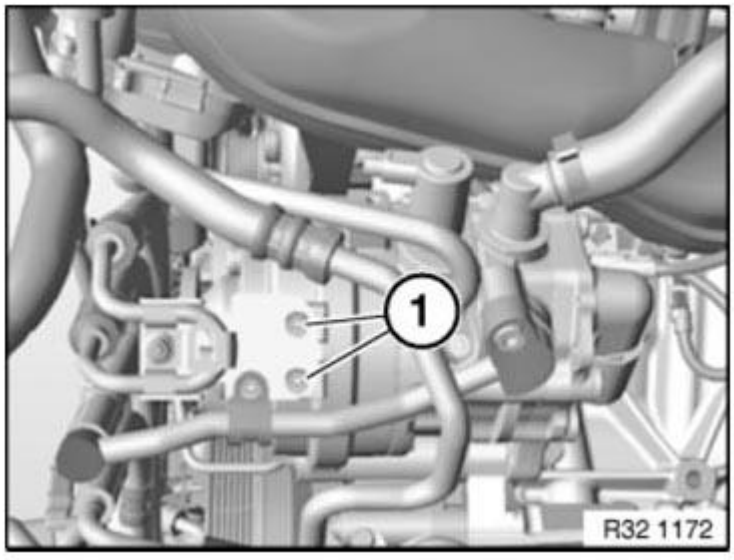


Fig. 149: Identifying Power Steering Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1, 2) and disconnect.

Release screws (3).

Tightening torque **32 41 13AZ** .

Release screw (4).

Tightening torque **32 41 10AZ** .

Release hose clamp (5) and detach intake pipe from power steering pump.

Installation note:

Replace hose clamp (5).

Align intake pipe by way of marking to power steering pump.

Make sure hydraulic lines are laid without tension and with sufficient distance to adjoining components.

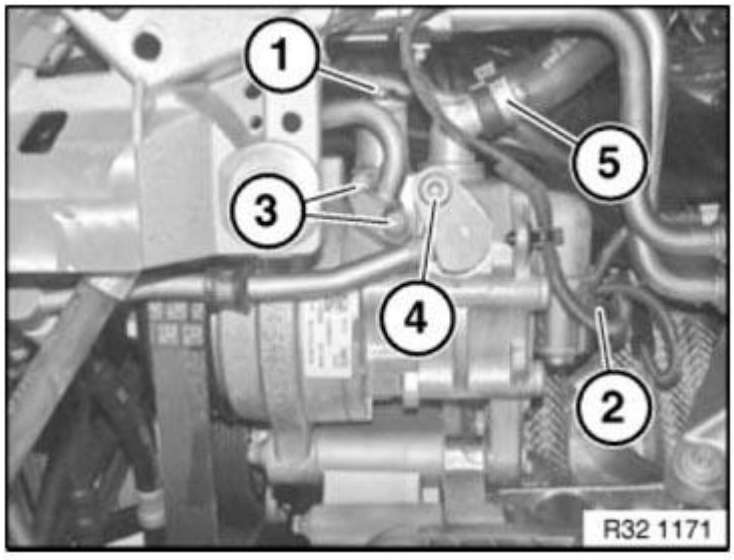


Fig. 150: Identifying Plug Connections, Hose Clamp And Screws Of Power Steering Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1, 2) and remove power steering pump.

Tightening torque **32 41 9AZ** .

Installation note:

Replace screws.

Make sure screws are installed in correct installation locations.

- Screw (1) M10x110

- Screw (2) M10x130

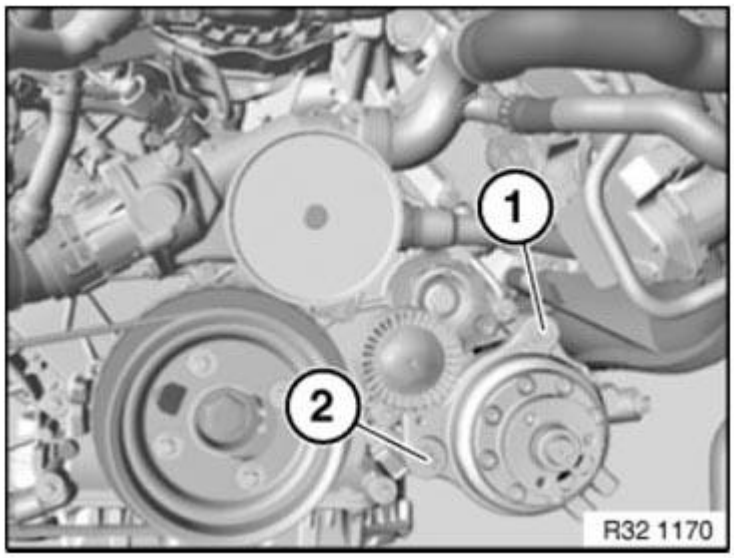


Fig. 151: Identifying Power Steering Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leak tightness
- If necessary, carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 430 REPLACING ARS EXPANSION HOSE PART 1 (FROM VANE PUMP TO EXPANSION HOSE) N63

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

IMPORTANT: Pressure line and connections must be provided with suitable plugs 32 1 270

immediately after removal!

Necessary preliminary tasks

- Remove left **FRONT WHEEL**
- Remove front **UNDERBODY PROTECTION**
- Remove left steering assembly **COVER**
- Remove **FAN COWL** with electric fan
- Release and disengage front **ACTIVE STABILIZER BAR**
- Remove pressure lines from active stabilizer bar. See **REMOVING AND INSTALLING/RENEWING PRESSURE LINE FOR VA1 SWIVEL MOTOR** and **REMOVING AND REFITTING/REPLACING PRESSURE LINE ON SWIVEL MOTOR VA2** .

Release screw connection (1) on power steering pump and detach line.

Tightening torque **37 13 10AZ** .

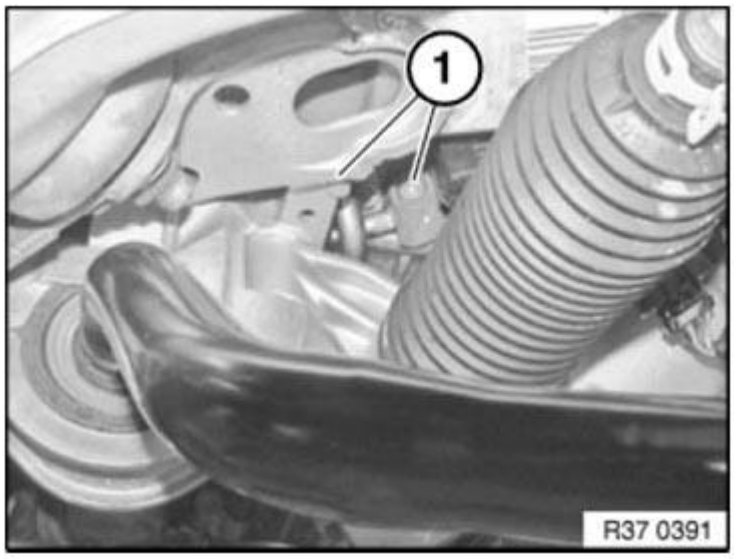


Fig. 152: Identifying Screw Connection On Power Steering Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder (1) on power steering pump.

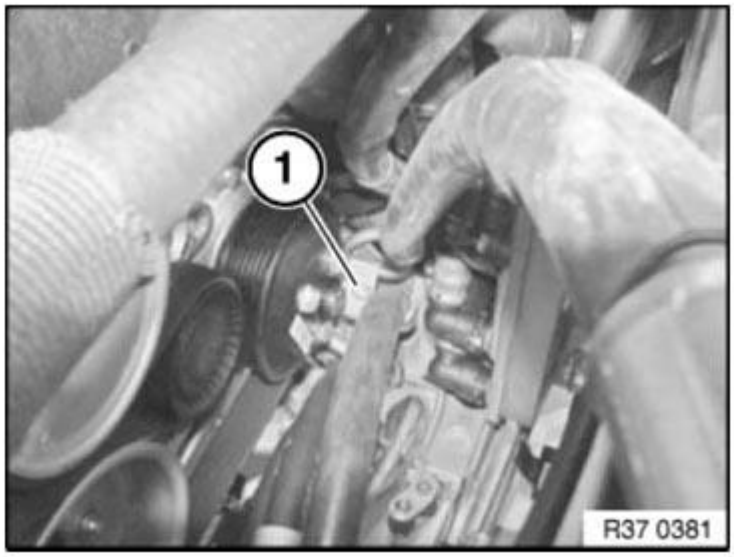


Fig. 153: Identifying Holder On Power Steering Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder (1).

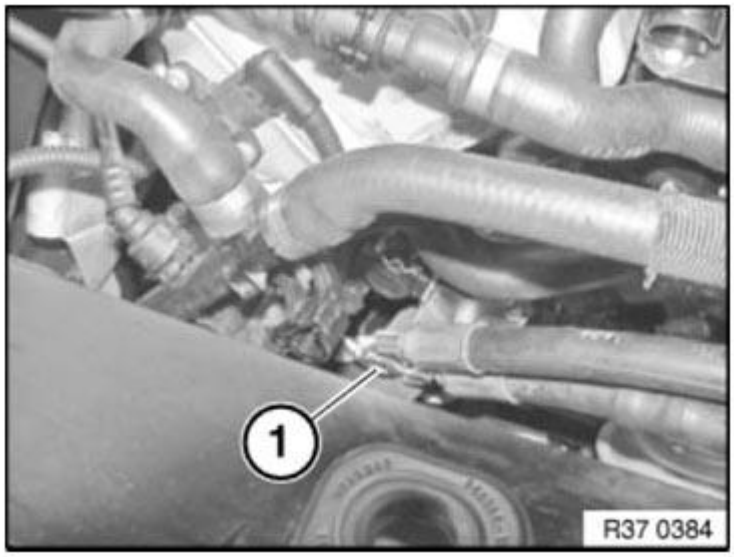


Fig. 154: Identifying Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw connection (1) on T-piece and remove expansion hose (3) towards top.

Tightening torque **37 13 11AZ** .

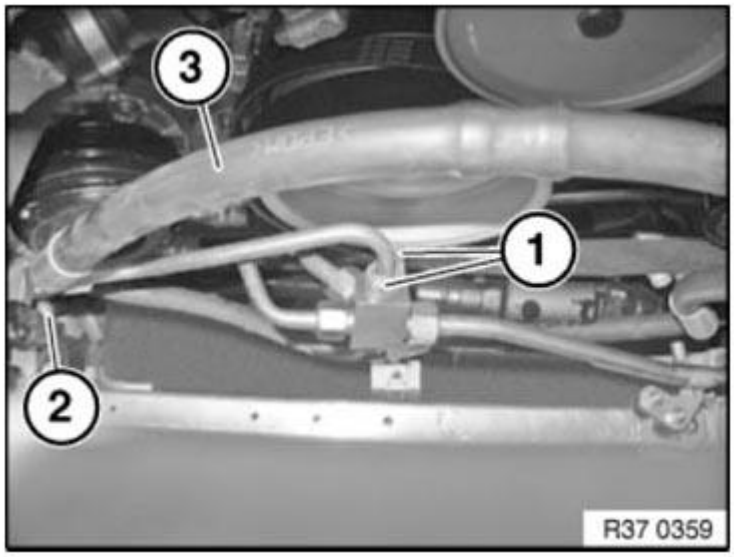


Fig. 155: Identifying Screw Connection On T-Piece And Expansion Hose
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 420 REPLACING EXPANSION HOSE PART 1 (WITH ARS) (FROM VANE PUMP) N63

Notes

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

IMPORTANT: Pressure line and connections must be provided with suitable plugs 32 1 270 immediately after removal!

Necessary preliminary tasks

- Remove left **FRONT WHEEL**
- Remove front **UNDERBODY PROTECTION**
- Remove left steering assembly **COVER**
- Release and disengage front **ACTIVE STABILIZER**
- Remove pressure lines from active stabilizer bar. See **REMOVING AND INSTALLING/RENEWING PRESSURE LINE FOR VA1 SWIVEL MOTOR** and **REMOVING AND REFITTING/REPLACING PRESSURE LINE ON SWIVEL MOTOR VA2** .

Release screw connection (1) on power steering pump and detach line.

Tightening torque **37 13 10AZ** .

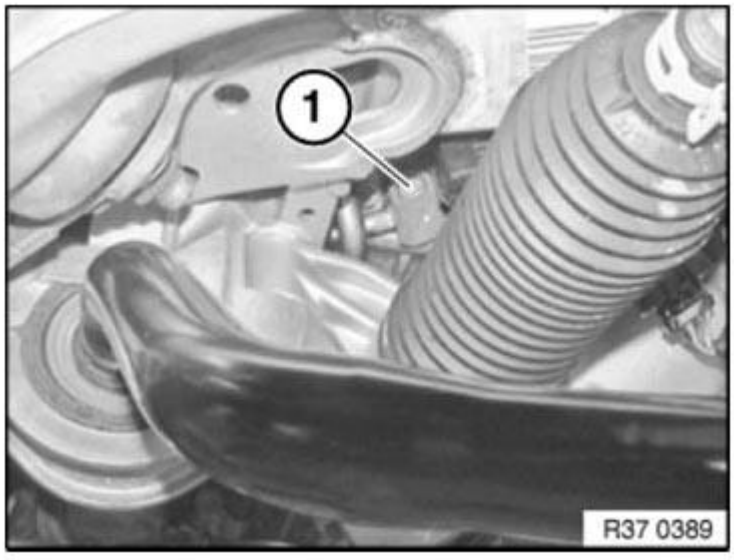


Fig. 156: Identifying Screw Connection On Power Steering Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw connection for flange (1).

Tightening torque **37 14 8AZ** .

Release pipe holder (2).

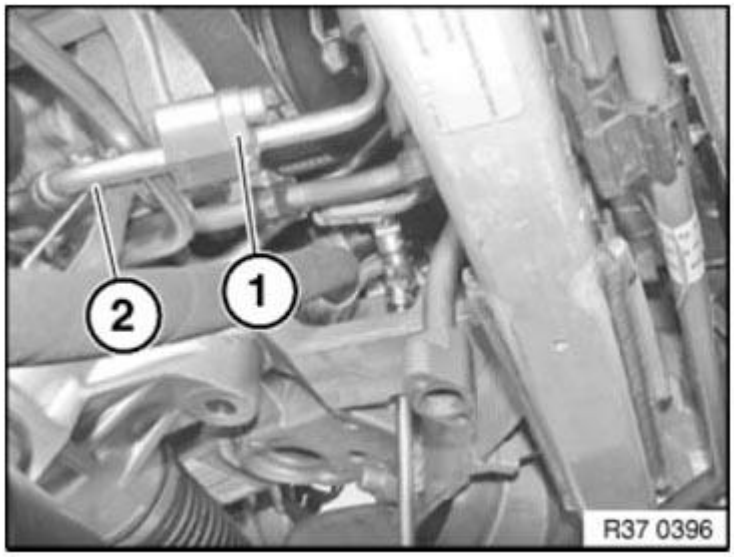


Fig. 157: Identifying Flange Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder (1) and remove line.

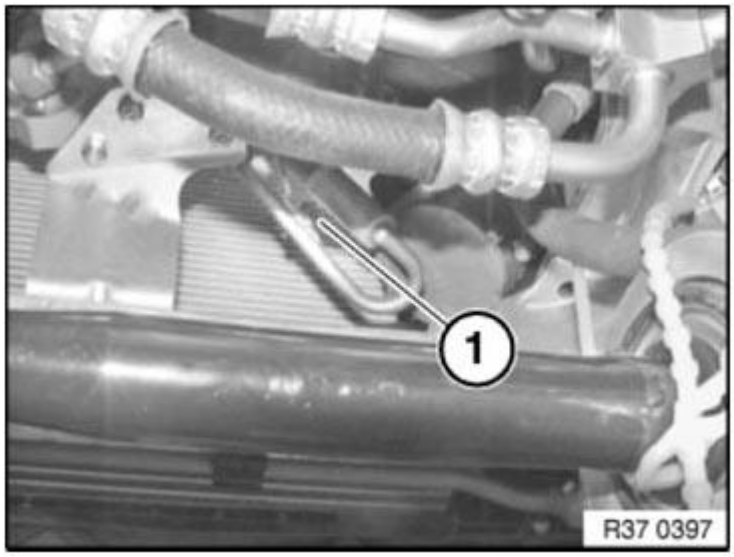


Fig. 158: Identifying Holder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.
When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 421 REPLACING EXPANSION HOSE PART 2 (WITH ARS) (FROM T-PIECE TO POWER STEERING GEAR) N63

Notes

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

**IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Do not draw off hydraulic fluid (risk of contamination).
Close off pipe connections with plugs. 32 1 270**

Recycling

Catch and dispose of hydraulic fluid in a suitable container.

Necessary preliminary tasks

- Lower **FRONT AXLE SUPPORT**

IMPORTANT: Pressure line and connections must be provided with suitable plugs 32 1 270 immediately after removal!

Release screw (1) from line flange.

Tightening torque **37 13 8AZ** .

Release holder (2).

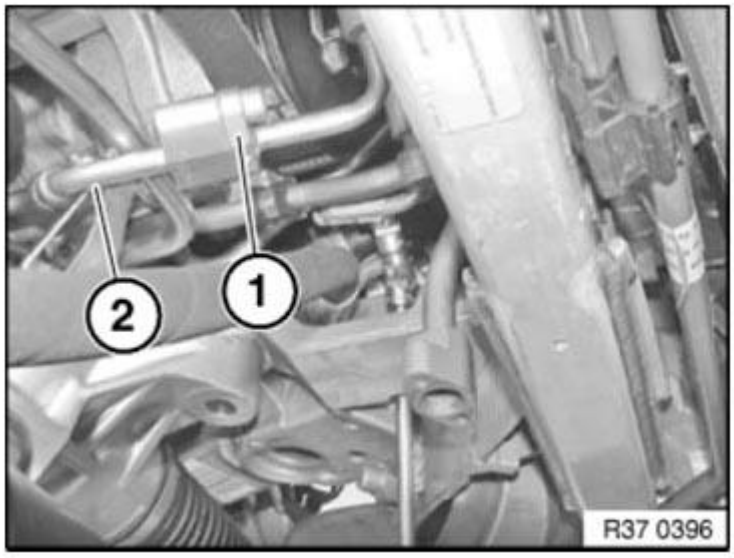


Fig. 159: Identifying Flange Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release block screw connection (1) on steering gear.

Tightening torque **32 41 5AZ** .

Remove hydraulic line.

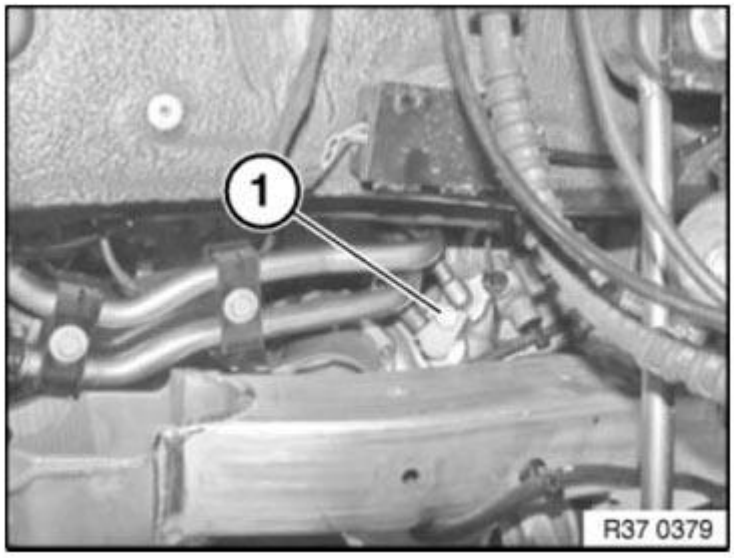


Fig. 160: Identifying Screw Connection On Steering Gear
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When assembling, make sure that in succession only the sealing plugs of the line to be fitted are removed.

When fitting lines, do not tilt connectors (sealing rings!) and connect fully before screwing.
Do not replace sealing rings on hydraulic lines.
Replace affected line if sealing ring is damaged.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leaks
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 285 REPLACING LEVEL SWITCH FOR DYNAMIC DRIVE FLUID RESERVOIR

Necessary preliminary work

- Remove intake duct for air filter housing.

Release screws (1) and (2).

Remove washers.

Tightening torque **32 41 1AZ/2AZ**

Remove fluid reservoir by pulling upwards.

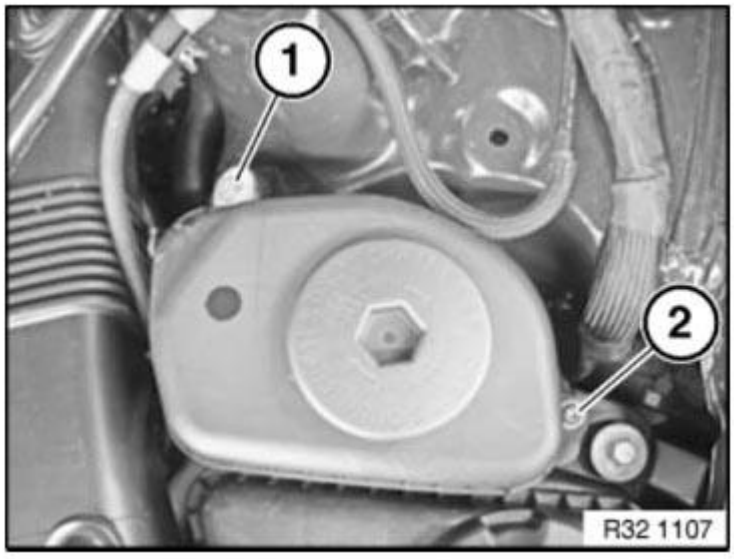


Fig. 161: Identifying Washer Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Raise and/or turn fluid reservoir in order to gain better access to plug

connection.

Disconnect plug connection (1).

Turn level switch (2) through approx. 45° and remove towards bottom.

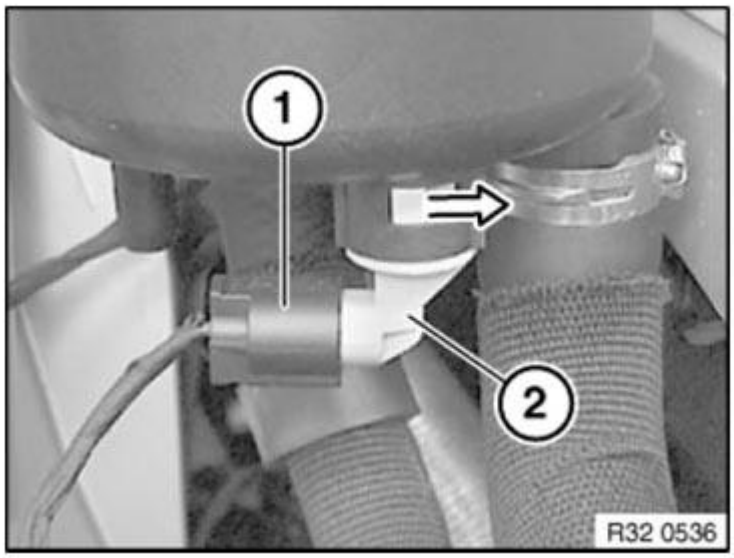


Fig. 162: Disconnect Plug Connection By Turning Level Switch
Courtesy of BMW OF NORTH AMERICA, INC.

32 41 333 REPLACING PRESSURE LINE FOR HYDRAULIC STEERING (FROM JUNCTION TO VANE PUMP)

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Close off pipe connections with seal plugs.

Recycling

Catch and dispose of hydraulic fluid in a suitable collecting vessel.

Necessary preliminary tasks

- Draw off and dispose of hydraulic fluid from fluid reservoir
- Remove underbody protection at front and rear. See **REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** and **REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION** .

- Remove stiffening plate (only all-wheel drive vehicle and F04)
- Lower front axle support (only F04)

Release screw (1).

Tightening torque **32 41 6AZ** .

Release screw (2) on bracket.

Tightening torque **32 41 14AZ** .

Disconnect pressure line (2) from power steering pump.

Installation note:

Replace all sealing rings.

Make sure hydraulic line is laid without tension and with sufficient distance to adjoining components.

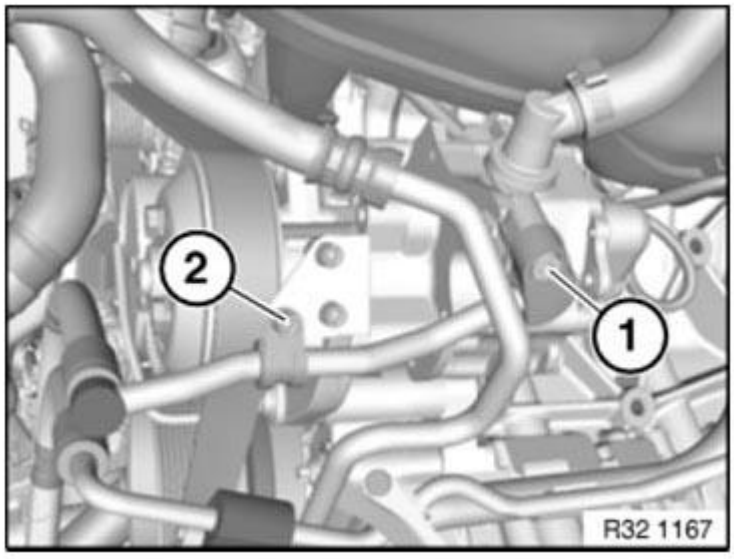


Fig. 163: Identifying Screw On Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and detach pressure line from holder.

Tightening torque **32 41 18AZ** .

Installation note:

Replace all sealing rings.

Make sure pressure line is laid without tension and with sufficient spacing to adjoining components.

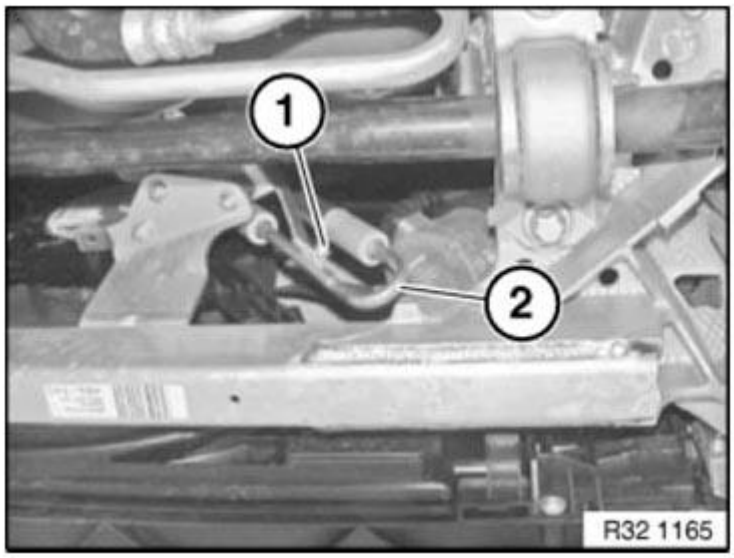


Fig. 164: Identifying Power Steering Pump Pressure Line With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **32 41 11AZ** .

Disconnect pressure line (2).

Installation note:

Replace all sealing rings.

Make sure hydraulic line is laid without tension and with sufficient distance to adjoining components.

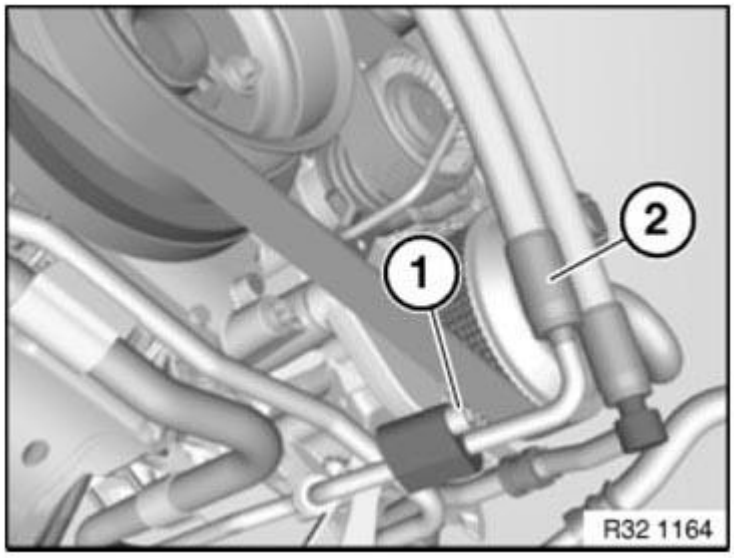


Fig. 165: Identifying Pressure Line With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check pipe connections for leaks

32 41 331 REPLACING PRESSURE LINE FOR POWER STEERING (FROM STEERING BOX TO JUNCTION)

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Close off line connections with seal plugs.

Recycling

Catch and dispose of hydraulic fluid in a suitable collecting vessel.

Necessary preliminary work

- Draw off and dispose of hydraulic fluid from oil reservoir
- Release hydraulic steering gear, see **REMOVING AND INSTALLING HYDRAULIC STEERING GEAR** or **REMOVING AND INSTALLING ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR**
- Lower front axle support (F04 and all-wheel drive vehicles)

Release screw (1) and remove pressure line (2) from steering box.

Tightening torque **32 41 5AZ** .

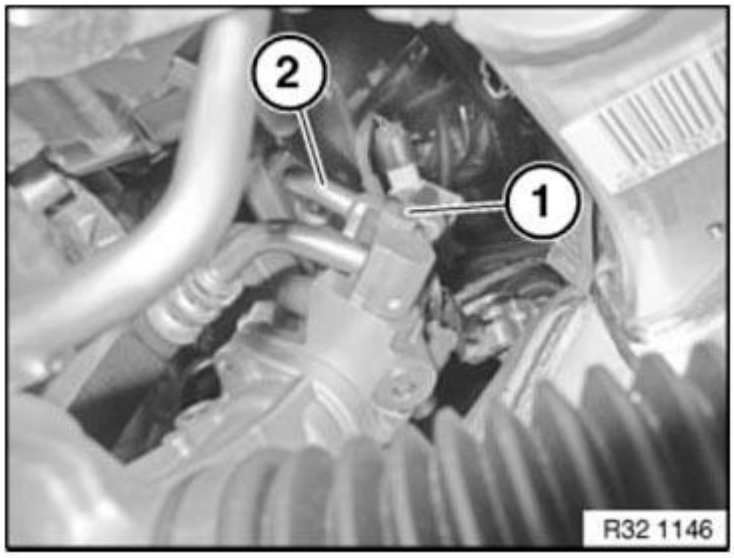


Fig. 166: Identifying Steering Box Pressure Line With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove return hose (1) from holder (2).

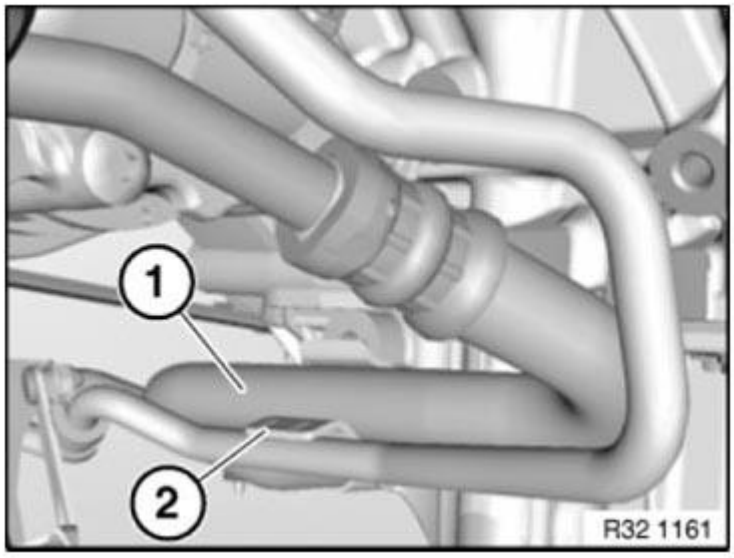


Fig. 167: Identifying Steering Box Return Hose With Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **32 41 15AZ** .

Release nut (2) on holder.

Tightening torque **32 41 7AZ** .

Disconnect pressure line (3).

Installation note:

Replace all sealing rings.

Make sure hydraulic line is laid without tension and with sufficient distance to adjoining components.

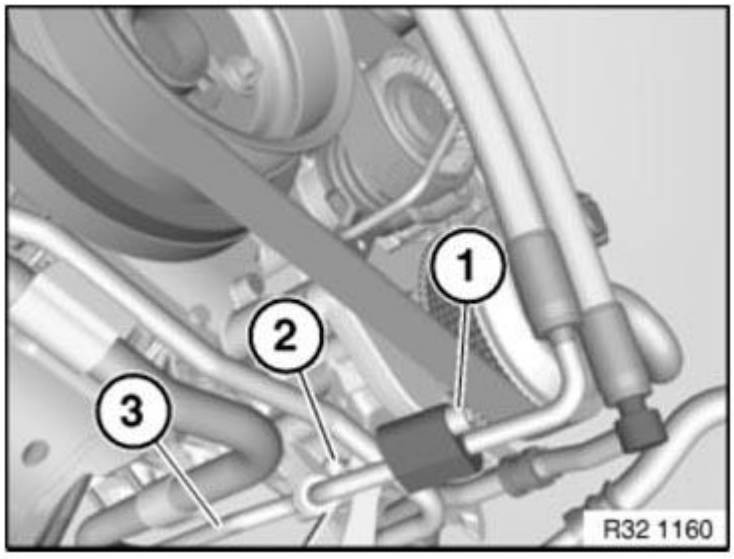


Fig. 168: Identifying Pressure Line With Screw And Nut On Holder
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leak tightness

32 41 341 REPLACING RADIATOR RETURN HOSE FOR HYDRAULIC STEERING (FROM COOLER TO OLBEHALTER_N63)

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin! RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic

system.
Close off line connections with seal plugs.

Recycling

Catch and dispose of hydraulic fluid in a suitable expansion tank.

Necessary preliminary work

- Draw off and dispose of hydraulic fluid from oil reservoir
- Remove left intake port.

Release hose clamp (1) and detach radiator return hose (2) from oil reservoir.

Installation note:

Replace hose clamp.

Make sure hydraulic line is laid without tension and with sufficient distance to adjoining components.

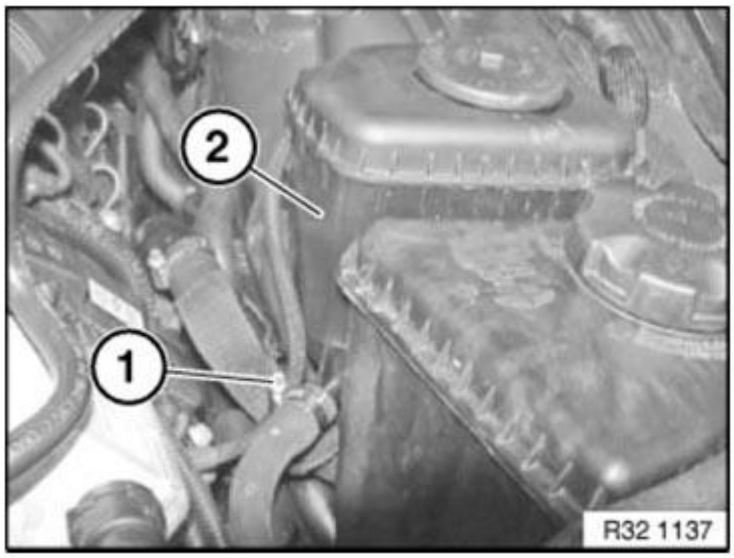


Fig. 169: Identifying Radiator Return Hose With Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release **QUICK-RELEASE COUPLING** and seal power steering cooler connection with a suitable plug.

Installation note:

Make sure hydraulic line is laid without tension and with sufficient distance to adjoining components.

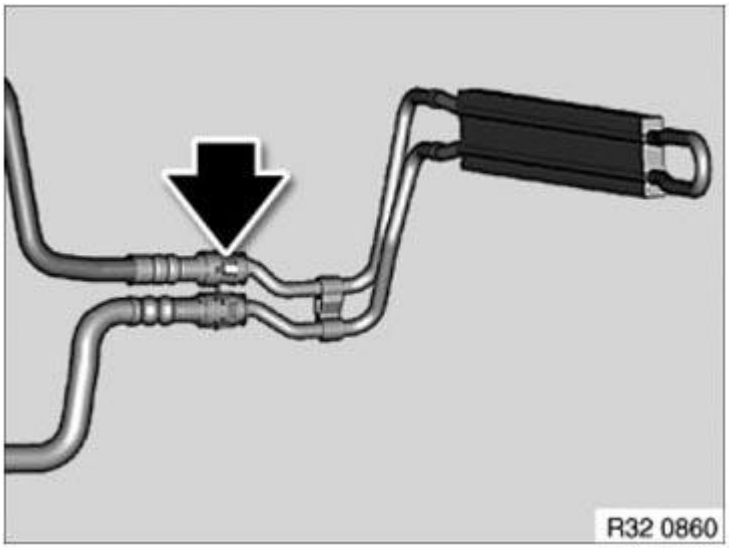


Fig. 170: Locating Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed hydraulic system. See **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** or **BLEEDING POWER STEERING UNIT**.
- Check line connections for leak tightness

32 41 351 REPLACING RETURN LINE FOR HYDRAULIC STEERING (FROM COOLER TO STEERING GEAR)

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Close off line connections with seal plugs.

Recycling

Catch and dispose of hydraulic fluid in a suitable collecting vessel.

Necessary preliminary work

- Draw off and dispose of hydraulic fluid from oil reservoir
- Remove **FAN COWL** (rear-wheel drive only)
- Remove underbody protection at front and rear. See **REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** and **REMOVING AND INSTALLING/REPLACING**

REAR UNDERBODY PROTECTION .

- Remove **HYDRAULIC STEERING GEAR** (F01/F02/F03/F07 only rear-wheel drive)
- Lower front axle support (F04 and all-wheel drive vehicles)

Release screw (1) and remove return line (2) from hydraulic steering gear.

Installation note:

Replace all sealing rings.

Make sure hydraulic line is laid without tension and with sufficient distance to adjoining components.

Tightening torque **32 41 5AZ** .

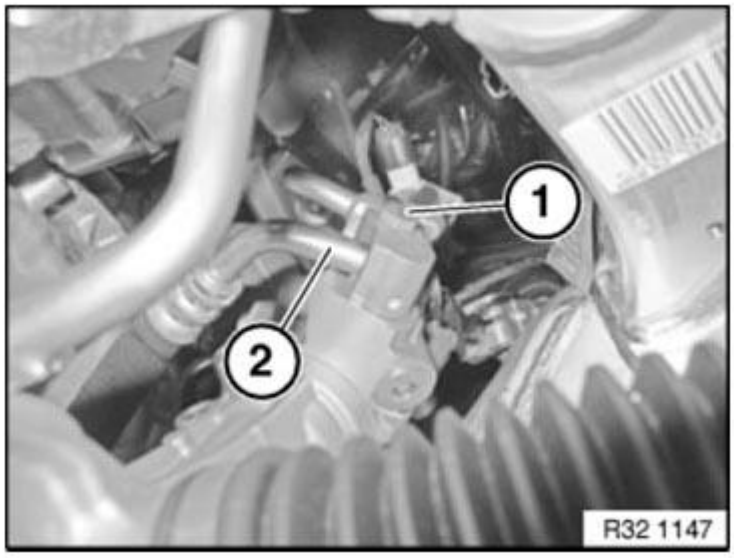


Fig. 171: Identifying Hydraulic Steering Gear Return Line With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove return line (1) from holder (2).

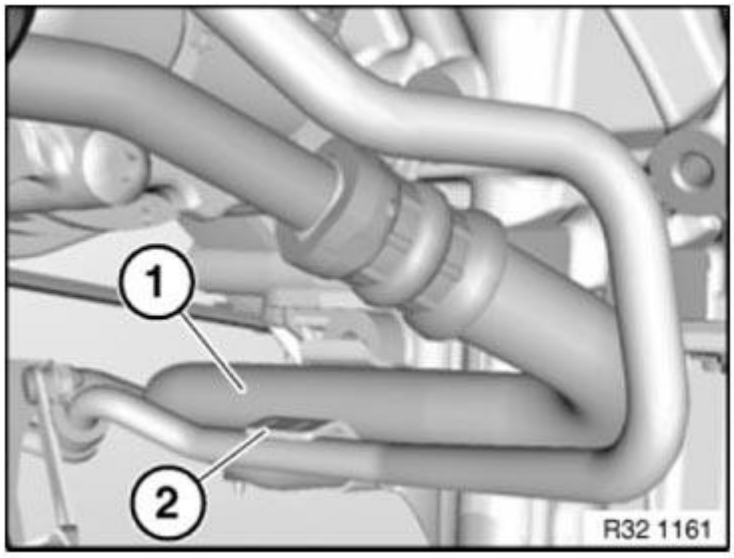


Fig. 172: Identifying Hydraulic Steering Gear Return Line With Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **32 41 7AZ** .

Slacken nut (2).

Release screw (3).

Tightening torque **32 41 16AZ** .

Remove return line (2).

Installation note:

Make sure hydraulic line is laid without tension and with sufficient distance to adjoining components.

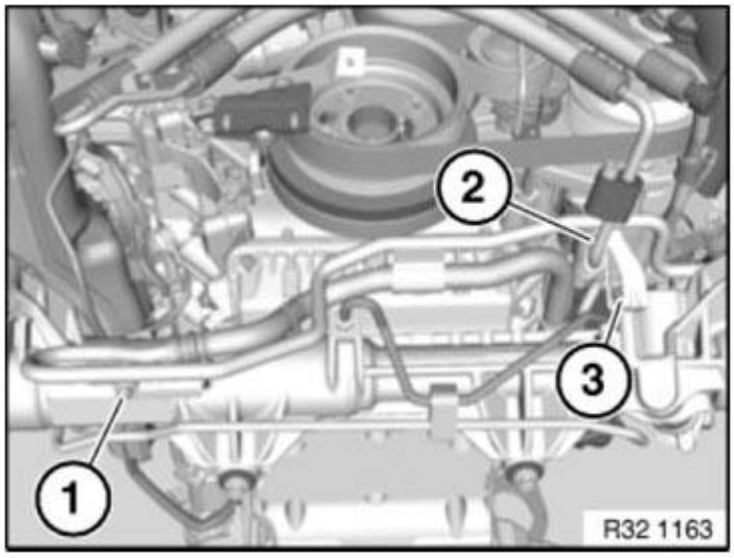


Fig. 173: Identifying Return Line With Nut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release **QUICK-RELEASE COUPLING** and seal power steering cooler connection with a suitable plug.

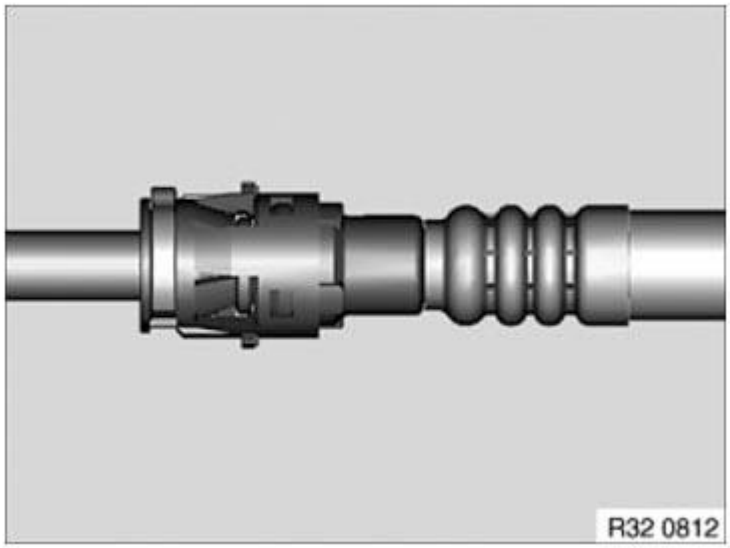


Fig. 174: Identifying Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed **HYDRAULIC SYSTEM**
- Check line connections for leak tightness

32 41 315 REPLACING SUCTION LINE FOR POWER STEERING (FROM CONNECTING PIECE

TO VANE PUMP)

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Close off line connections with seal plugs.

Recycling

Catch and dispose of hydraulic fluid in a suitable collecting vessel.

Necessary preliminary work

- Draw off and dispose of hydraulic fluid from oil reservoir
- Remove raw-air supply duct on left.
- Remove hydraulic steering gear. See **REPLACING HYDRAULIC STEERING GEAR**.
- Lower front axle support (only F04 and all-wheel drive vehicle)

Unfasten hose clamp (1).

Release screw (2).

Tightening torque **32 41 8AZ** .

Installation note:

Replace hose clamp.

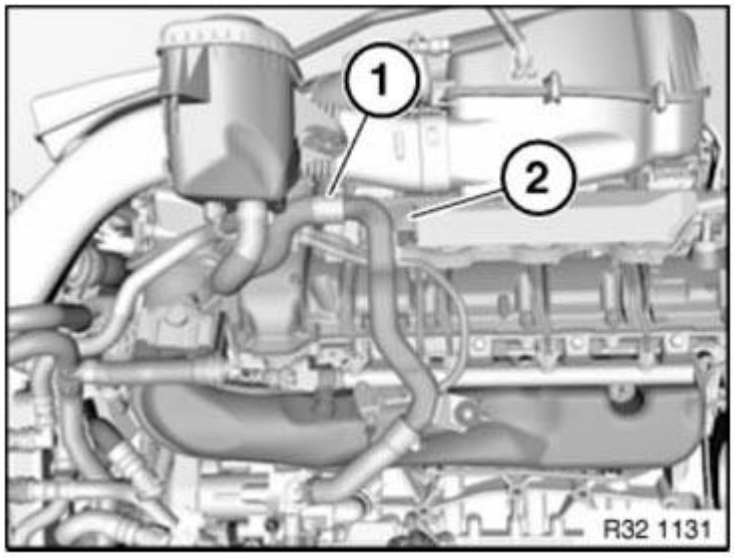


Fig. 175: Identifying Oil Reservoir Hose Clamp And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamp (1) and detach intake pipe from power steering pump.

Installation note:

Replace hose clamp.

Make sure hydraulic lines are laid without tension and with sufficient distance to adjoining components.

Align suction line by way of marking (2) to power steering pump connection marking.

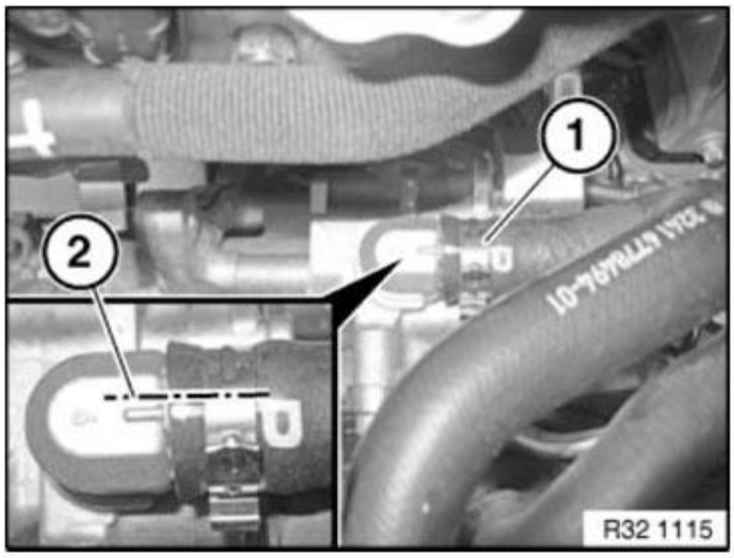


Fig. 176: Identifying Power Steering Pump Connection Marking With Hose Clamp

Courtesy of BMW OF NORTH AMERICA, INC.

Remove intake pipe (1) in direction of arrow from holder (2).

Remove intake pipe in upward direction.

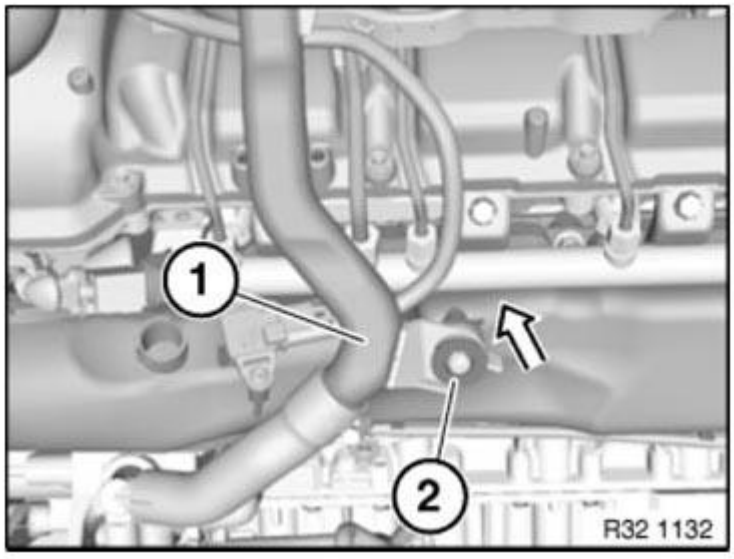


Fig. 177: Removing Intake Pipe From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed hydraulic system. See **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** or **BLEEDING POWER STEERING UNIT**.
- Check line connections for leak tightness
- Carry out **INITIAL DYNAMIC DRIVE OPERATION**

32 41 314 REPLACING SUCTION LINE FOR POWER STEERING (FROM FLUID RESERVOIR TO CONNECTING PIECE)

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Adhere to the utmost cleanliness. Do not allow any dirt to enter the hydraulic system.
Close off line connections with seal plugs.

Recycling

Catch and dispose of hydraulic fluid in a suitable expansion tank.

Necessary preliminary work

- Draw off and dispose of hydraulic fluid from oil reservoir
- Remove **OIL RESERVOIR** from body
- Remove raw-air supply duct on left.

Unfasten hose clamp (1).

Disconnect intake pipe (2) from oil reservoir.

Installation note:

Marks on oil reservoir and intake pipe must match up.

Replace hose clamp.

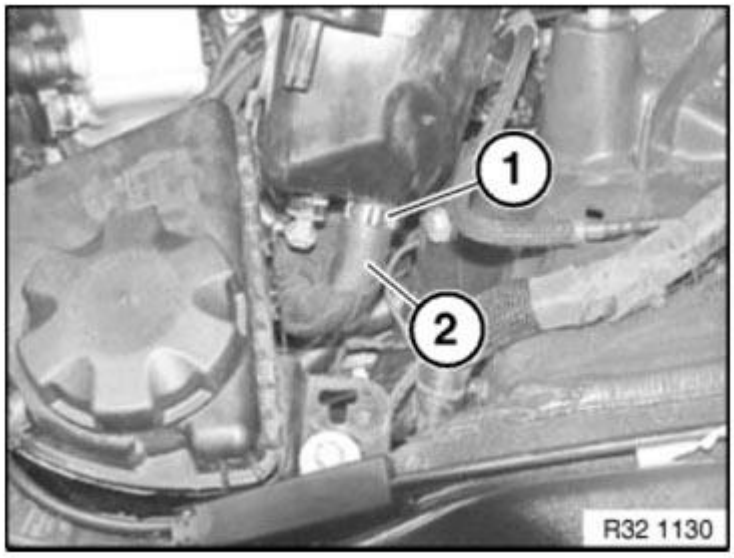


Fig. 178: Identifying Oil Reservoir Intake Pipe With Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clamp (1).

Remove intake pipe (2).

Installation note:

Replace hose clamp.

Make sure intake pipe is laid without tension and with sufficient distance to adjoining components.

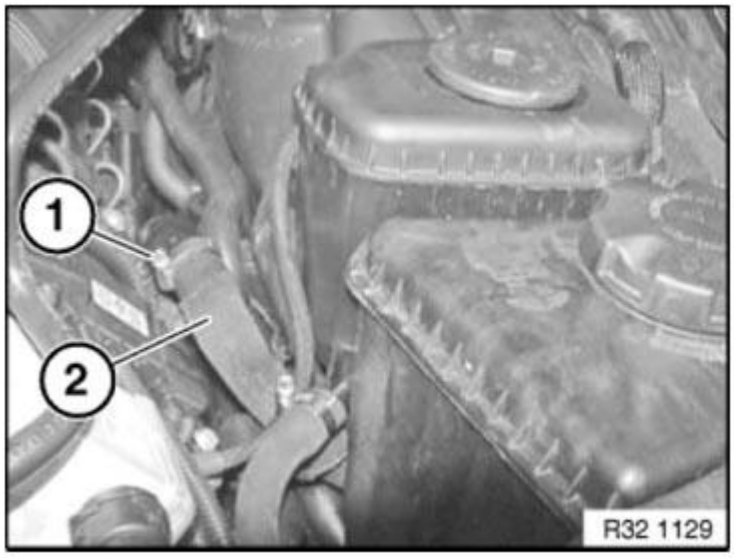


Fig. 179: Identifying Intake Pipe With Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Fill and bleed hydraulic system. See **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** or **BLEEDING POWER STEERING UNIT**.
- Check line connections for leak tightness

32 43 ELECTRONIC POWER STEERING

32 10 005 ADJUSTMENT/INITIAL OPERATION FOR ACTIVE FRONT STEERING

NOTE: Adjustment/start-up of the active steering must be carried out:

- **Before adjustment work on the front axle/steering**
- **After work on the steering column**
- **After replacement of following components:**
  - **Active front steering control unit**
  - **ICM control unit**
  - **Steering-column switch cluster (SZL)**
  - **Steering gear**

Connect vehicle to BMW diagnosis system.

Select and carry out initial operation/adjustment for active front steering under Service functions.

32 43 010 REMOVING AND INSTALLING/REPLACING CONTROL UNIT FOR ACTIVE FRONT

STEERING

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary work

- Disconnect **BATTERY EARTH LEAD**
- **RELEASE LEFT FRONT SEAT** and tilt towards rear
- Remove front left **DOOR SILL COVER STRIP**
- Remove footwell **SIDE TRIM PANEL** on A-pillar
- Remove cover of **BASS SPEAKER** at left front

Fold back front left carpet to one side.

Unscrew nuts (1).

Tightening torque **32 43 1AZ** .

Installation note:

Secure grounding strap (2) to screw fastening point.

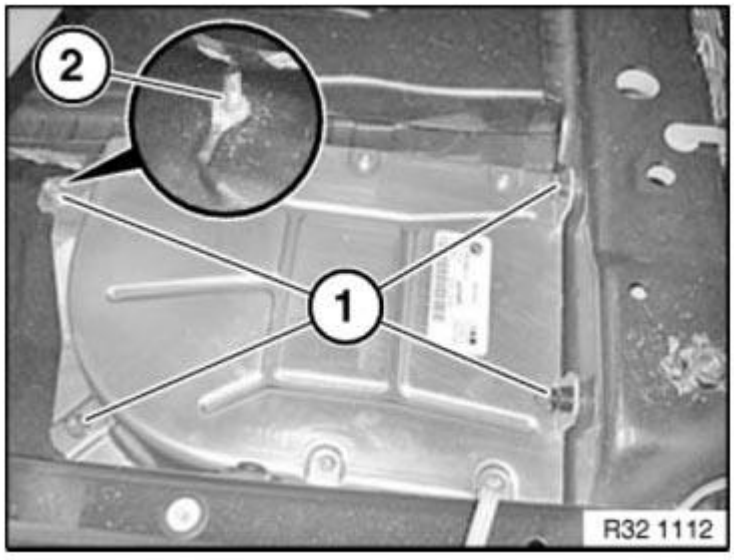


Fig. 180: Identifying Strap And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **32 43 2AZ** .

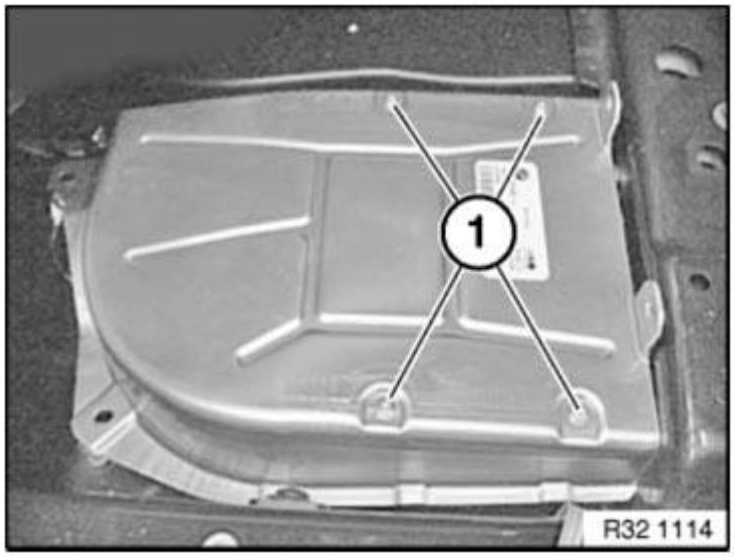


Fig. 181: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) and remove control unit.

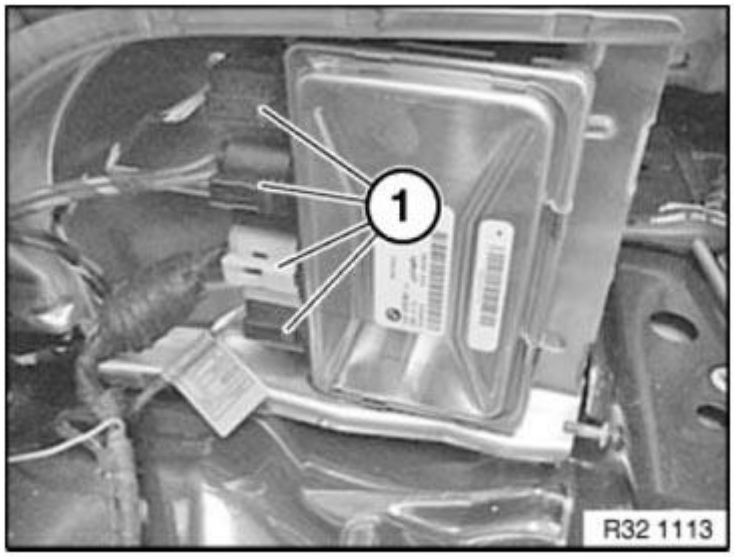


Fig. 182: Identifying Control Unit Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Replacement only: Carry out **PROGRAMMING/ENCODING**
- **ADJUSTMENT FOR ACTIVE STEERING**

34 52.. STARTUP OF ICM CONTROL UNIT

NOTE: Startup of ICM control unit must be carried out:

- **After replacement or removal and installation of ICM control unit**

Connect vehicle to BMW diagnosis system.

Select and carry out startup of ICM control unit under Service functions of BMW scan tool.

ACCESSORIES AND BODY, CAB

Trailers - Repair

8610 LOADING PLATFORM

86 10... ADJUSTING BRAKE SYSTEM

Proper adjustment of the brake system is only possible if the brake Bowden cables and all brake system moving parts move freely and are ready for operation.

The wheels must be completely fitted and able to rotate freely. Always adjust both brake sides. The left and right sides are adjusted in the same way.

Pull out overrunning equipment (1) fully in direction of arrow.

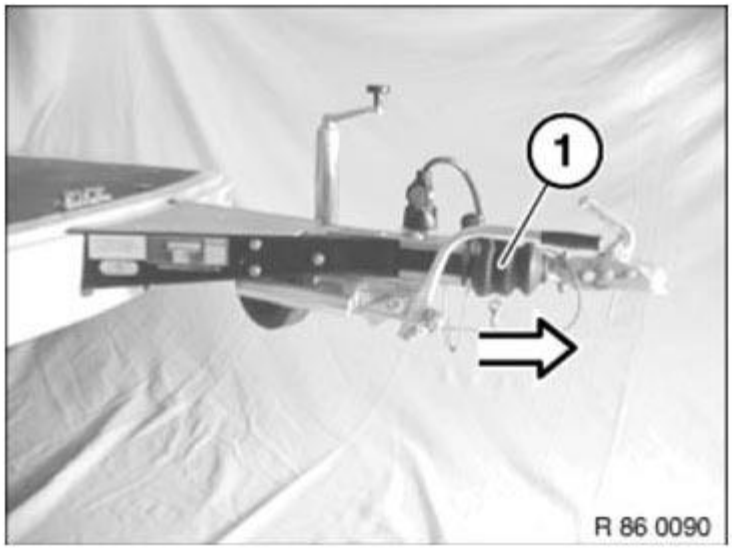


Fig. 1: Pulling Out Overrunning Equipment
Courtesy of BMW OF NORTH AMERICA, INC.

Reversing lever (1) must rest directly on inner-lying tow tube of overrunning brake.

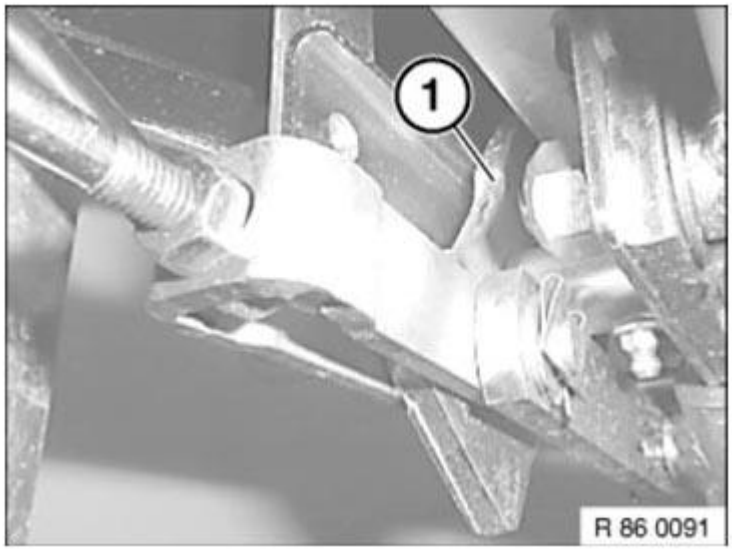


Fig. 2: Identifying Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Screw brake linkage (1) into nut (2) until distance (3) (nut (2) - end of brake linkage (1)), is 10 - 15mm. Lock brake linkage (1) in position with nut (4).

Check distance (3) and nuts (2, 4) with brake linkage installed.

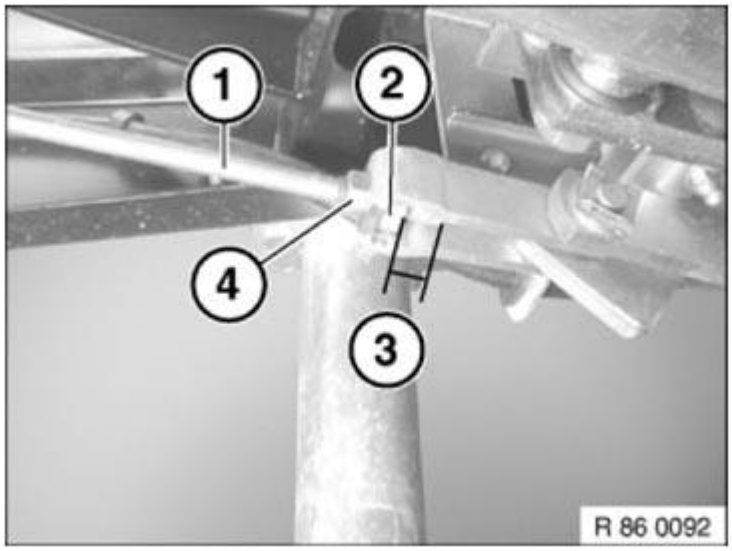


Fig. 3: Identifying Brake Linkage With Nut And Brake Linkage Distance
Courtesy of BMW OF NORTH AMERICA, INC.

Insert pull rod (1) in brake compensator (2) and screw nut (3) onto pull rod (P2).

Tighten nut (3) until pull rod (1) is free of play.

Check pull rod (1) already fitted for zero play.

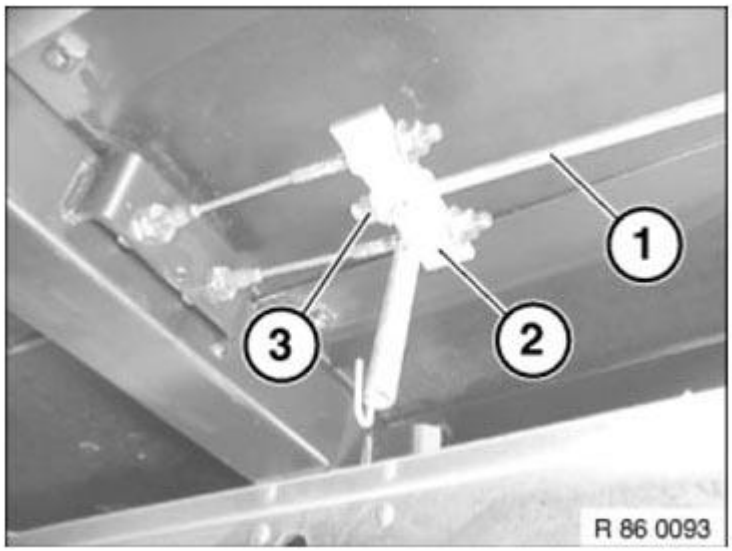


Fig. 4: Identifying Pull Rod Of Brake Compensator With Screw Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Hook tension spring (1) to tension spring mount (2).

Installation:

The brake shoes are adjusted in two work steps. In the first step, the distance between the lower half of the brake shoes and the brake drum is adjusted. In the second step, the distance between the upper half of the brake shoes and the brake drum is adjusted.

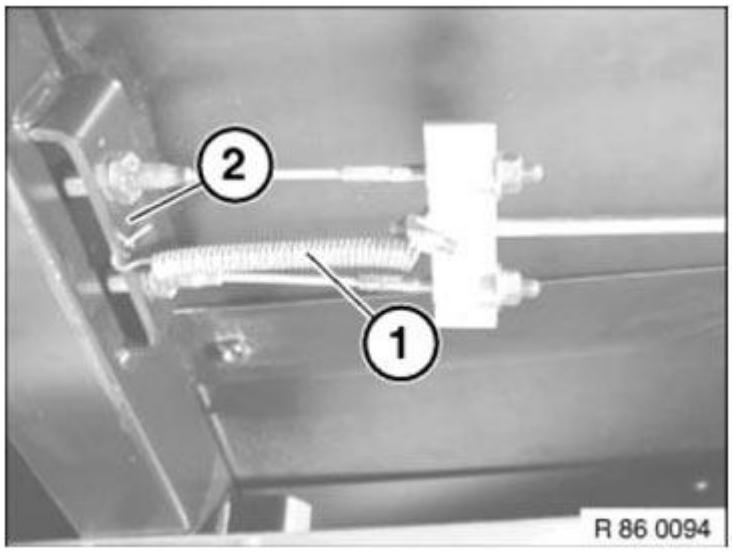


Fig. 5: Identifying Tension Spring Mount With Tension Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Rotate road wheel (1) in direction of travel and simultaneously turn adjusting screw (2) in direction of arrow.

Tighten adjusting screw (2) until road wheel (1) can no longer be turned.

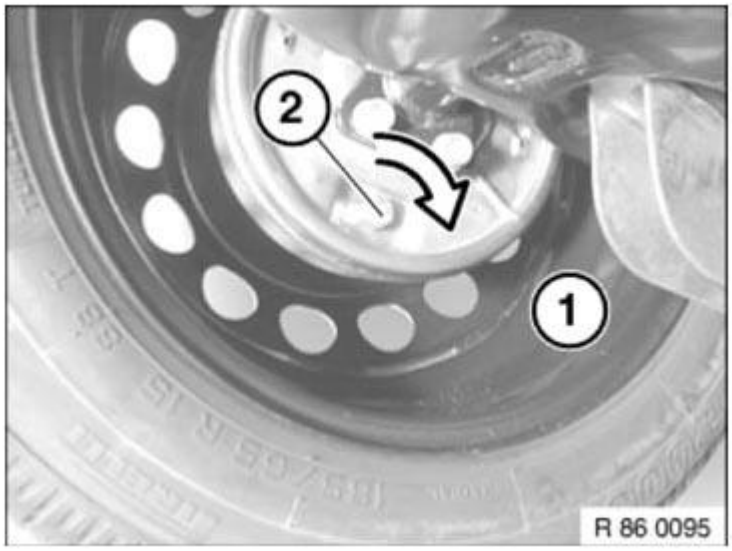


Fig. 6: Rotating Road Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Turn adjusting screw (1) in direction of arrow and release slowly until road wheel (2) can rotate.

Finish adjustment procedure when slight grinding noises can be heard in lower brake shoe halves.

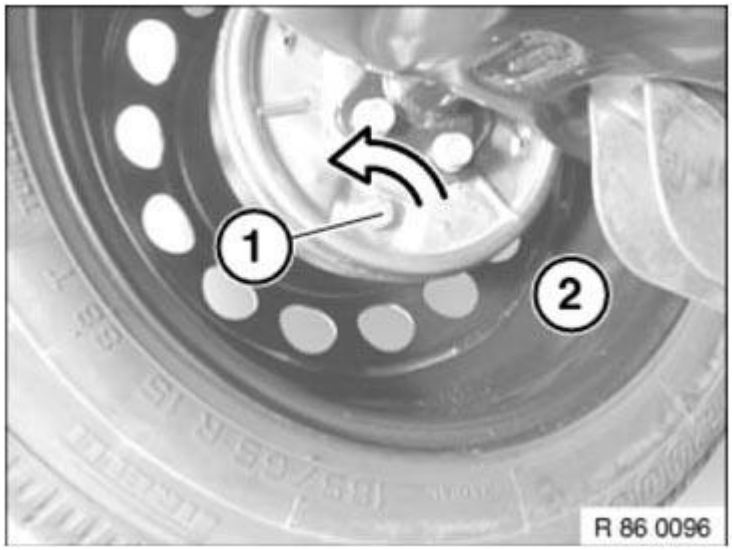


Fig. 7: Turning Adjusting Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Firmly tighten handbrake lever three to five times.

Depending on road wheel side, tighten nut (1) or (2) until slight grinding noises can be heard in upper brake shoe halves.

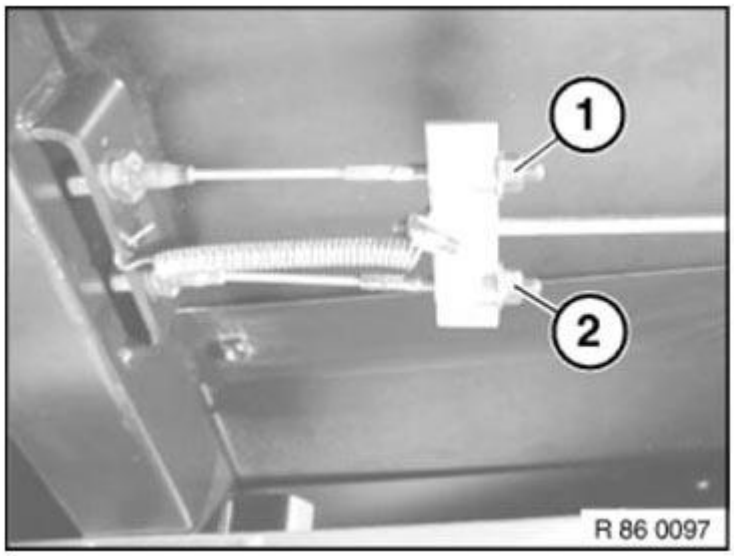


Fig. 8: Identifying Upper Brake Shoe Halves Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... ADJUSTING SPRING FORCE ACCUMULATOR

The spring force accumulator requires no maintenance and generally does not need to be readjusted.

Adjustment dimension, spring force accumulator: distance between end of support tube - internal washer (1) is 90 mm.

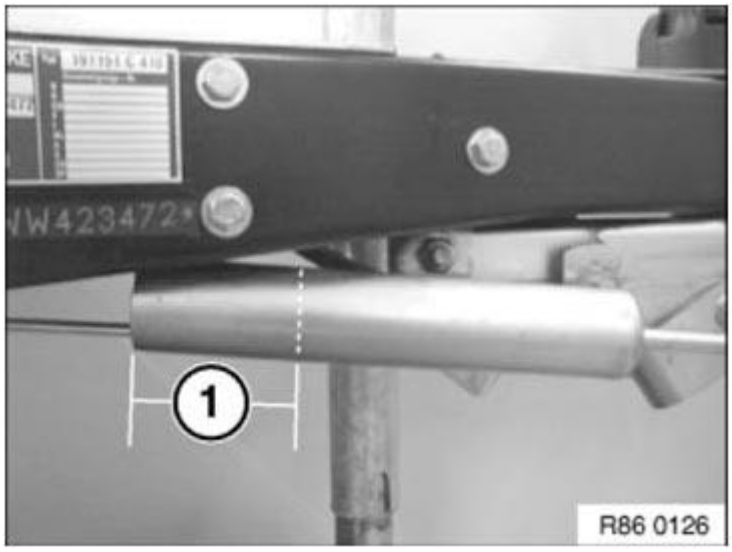


Fig. 9: Identifying Internal Washer
Courtesy of BMW OF NORTH AMERICA, INC.

To tension spring force accumulator: turn nut (2) located in support tube (1) clockwise.

To relieve tension on spring force accumulator: turn nut (2) located in support tube (1) counterclockwise.

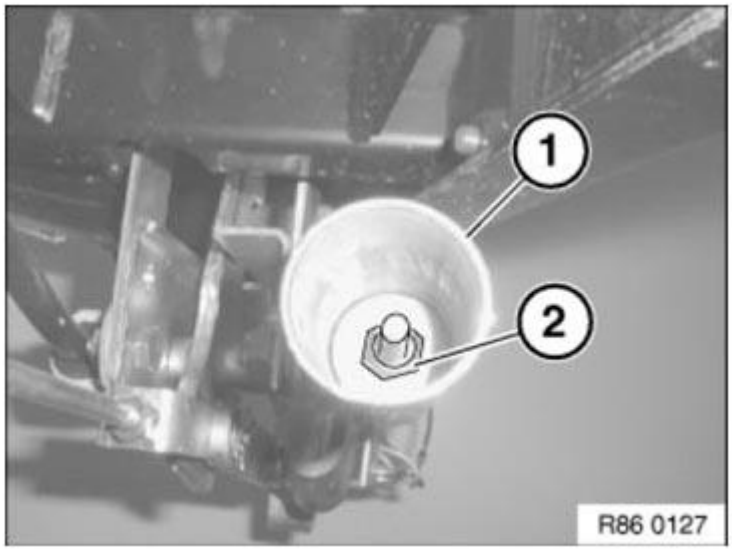


Fig. 10: Identifying Support Tube With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF CAMLOCK RETAINING CAM

Unscrew bolts (1).

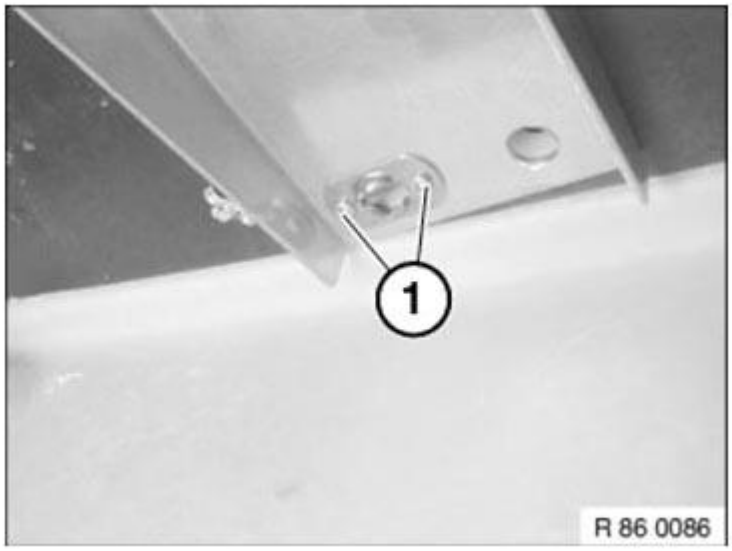


Fig. 11: Identifying Camlock Retaining Cam Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF BASE PLATE

NOTE: **Disassembly of bar,**
refer to REPLACING BAR
Disassembly of lashing plate,
refer to REPLACING LASHING PLATE AND LASHING EYE
Disassembly of 12 volt socket,
refer to REPLACING 12 VOLT SOCKET
Remove plastic bush/metal bush,
refer to REMOVING PLASTIC BUSH/METAL BUSH
Disassembly of light guard,
refer to REPLACING REAR LIGHT
Disassembly of front apron,
refer to DISASSEMBLY OF FRONT APRON
Disassembly of left and right aprons,
refer to DISASSEMBLY OF LEFT AND RIGHT APRONS
Disassembly of left and right wheel boxes,
refer to DISASSEMBLY OF LEFT AND RIGHT WHEEL BOXES
Disassembly of rear apron,
refer to DISASSEMBLY OF REAR APRON
Disassembly of left and right lamp housings,
refer to DISASSEMBLY OF LEFT AND RIGHT LAMP HOUSINGS
Disassembly of rivet connection, rear support,
refer to DISASSEMBLY PROCEDURE OF RIVET CONNECTION, REAR SUPPORT

Unscrew bolts (1).

CAUTION: Before drilling out rivet heads, drive in rivet pins with a punch. Drill out rivet connections (2).

Installation

Tightening Torque,

86 10 32AZ

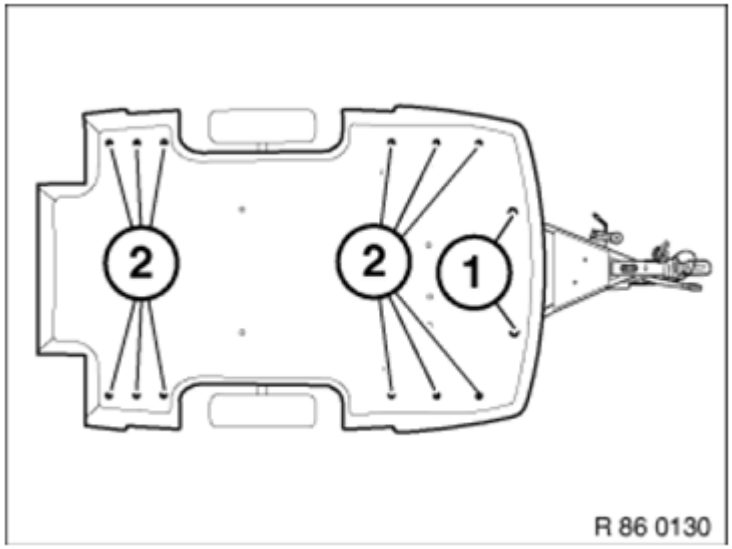


Fig. 12: Identifying Rivet Connections And Base Plate Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF BRACKET ON PLATFORM BASE

Unscrew bolts (1).

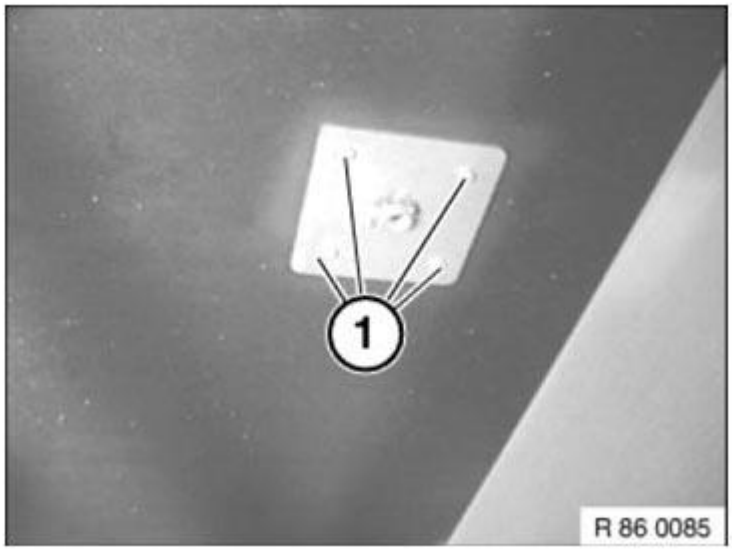


Fig. 13: Identifying Bracket Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF FRONT APRON

Drill out rivets (1) on lower apron edge.

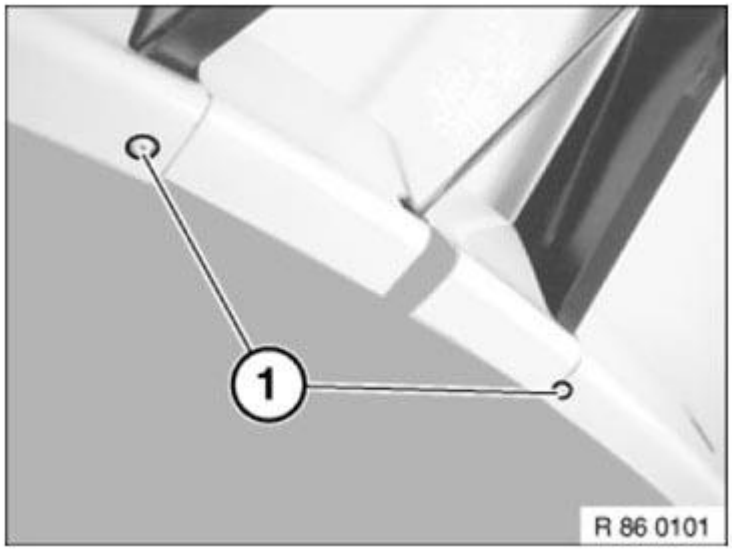


Fig. 14: Identifying Rivets On Lower Apron Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing compound (1).

Drill out rivets (2).

Use Sikaflex 221 as sealing compound.

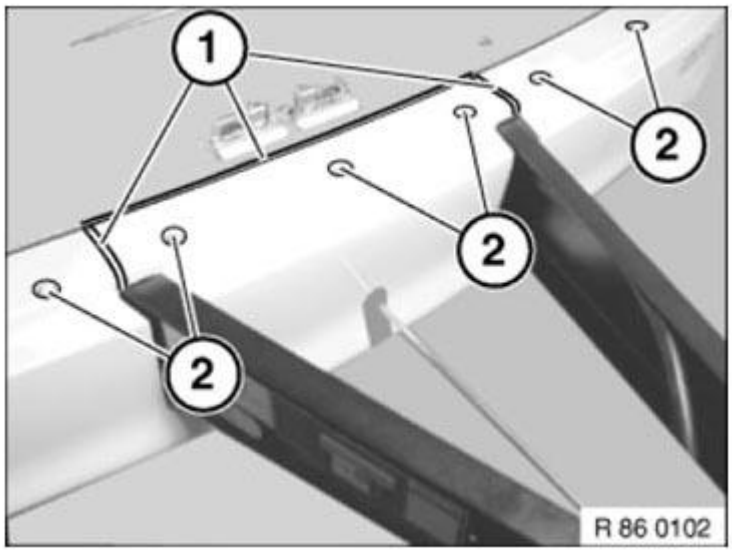


Fig. 15: Identifying Sealing Compound And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Press side sections (1) to side in direction of arrow. Tilt center section (2) downwards and remove to side.

Installation

Use Sikaflex 221 as sealing compound.

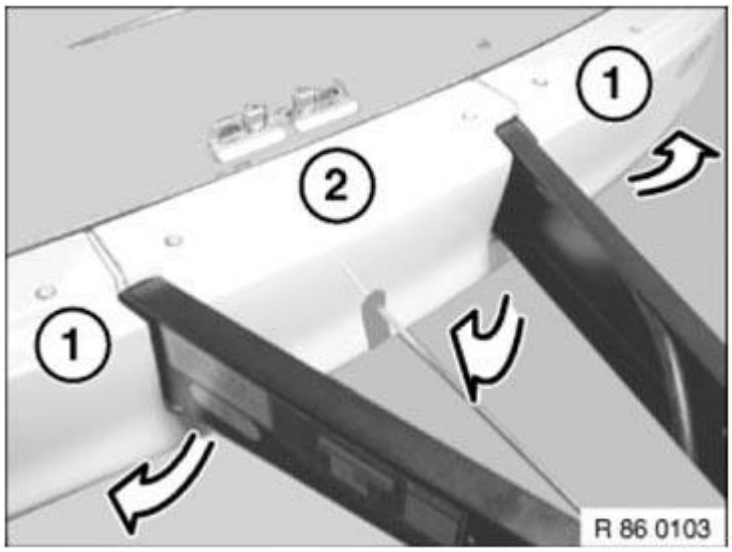


Fig. 16: Pressing Side Sections To Side
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF FRONT PROTECTION BAR

Release screws (1) on cross-member (2).

Installation

Use new self-locking nuts.

Tightening Torque,

86 10 4AZ

Installation

Tightening Torque,

86 10 5AZ

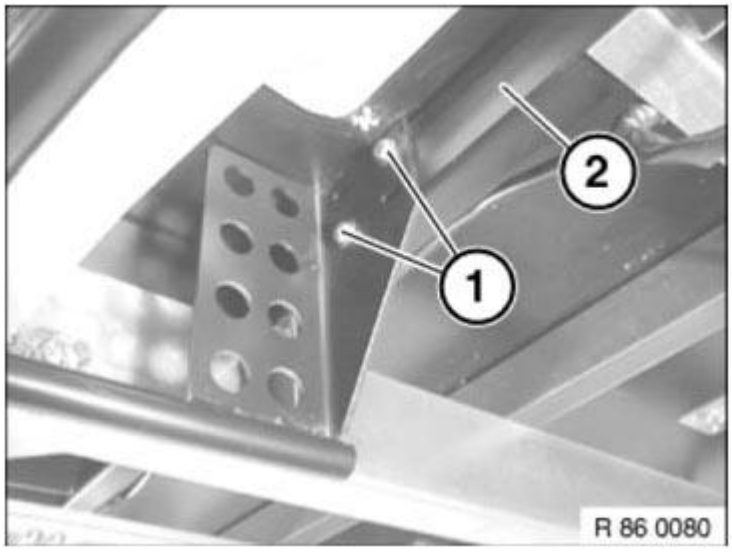


Fig. 17: Identifying Screws On Cross-Member
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on longitudinal member (2).

Installation

Tightening Torque,

86 10 5AZ

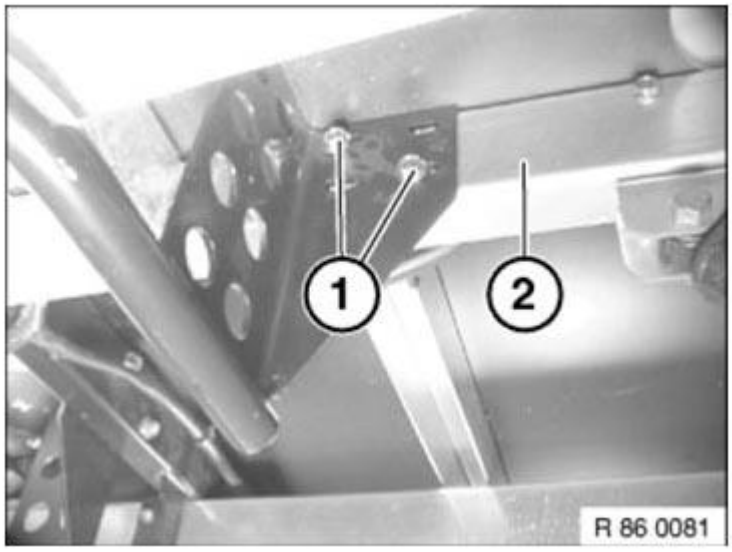


Fig. 18: Identifying Screws On Longitudinal Member
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF JOCKEY WHEEL OR JOCKEY WHEEL MOUNT

Turn clamping lever (1) in direction of arrow and release clamping connection. Open clamping bracket (2) and remove jockey wheel (3). Release screws on mount (4) and remove screws.

Installation

Tightening Torque,

86 10 11AZ

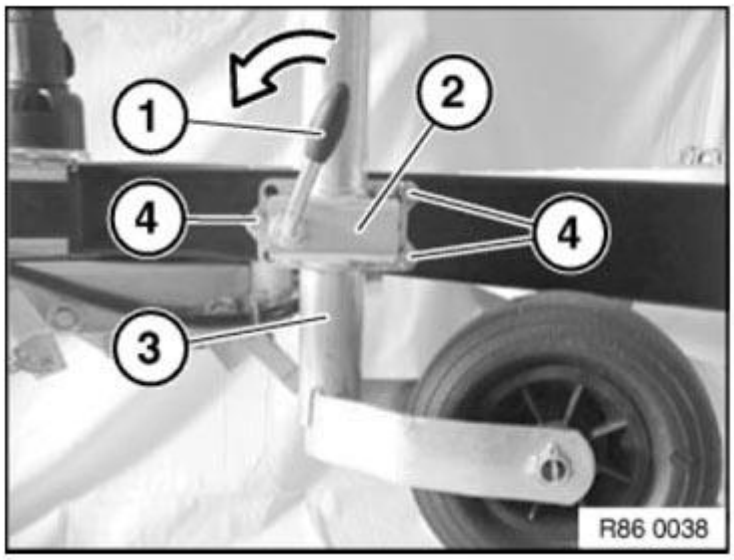


Fig. 19: Turning Clamping Lever
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF LEFT AND RIGHT APRONS

NOTE: Remove position light, refer to REPLACING POSITION LIGHT. Remove rear light, refer to REPLACING REAR LIGHT. Remove plastic bush/metal bush, refer to REMOVING PLASTIC BUSH/METAL BUSH.

Drill out rivets (1) on lower apron edge.



Fig. 20: Identifying Rivets On Lower Apron Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing compound (1).

Drill out all rivets (2) along apron edge.

Installation

Use Sikaflex 221 as sealing compound.

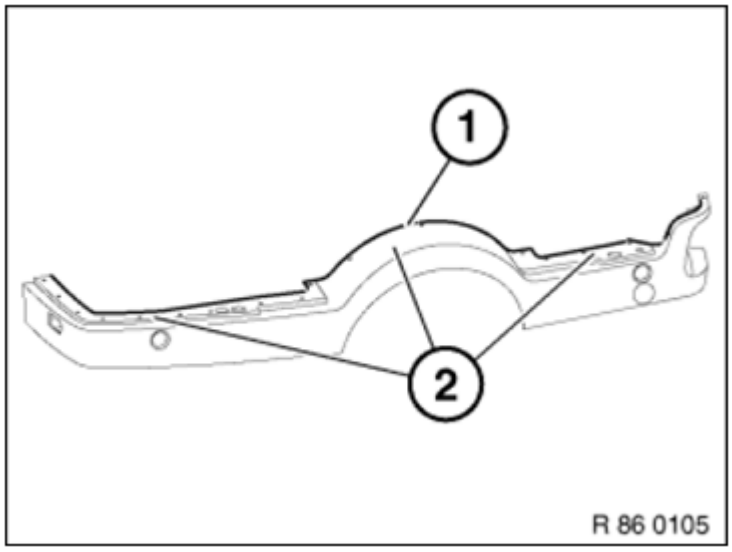


Fig. 21: Identifying Sealing Compound And Rivets On Apron Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing compound (1).

Drill out rivets (2) on lower apron edge.

Installation

Use Sikaflex 221 as sealing compound.

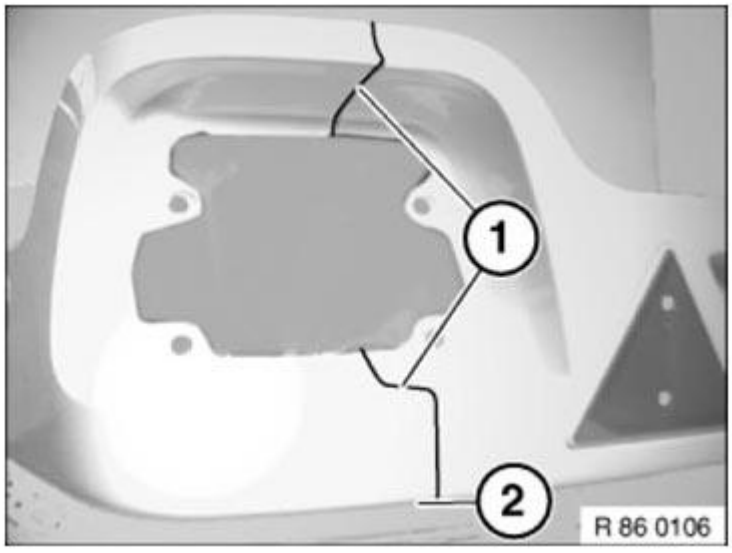


Fig. 22: Identifying Sealing Compound And Rivets On Lower Apron Edge
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 .. DISASSEMBLY OF LEFT AND RIGHT LAMP HOUSINGS

Cut through sealing compound (1) and remove.

Drill out rivet connections (2).

Installation

Use Sikaflex 221 as sealing compound.

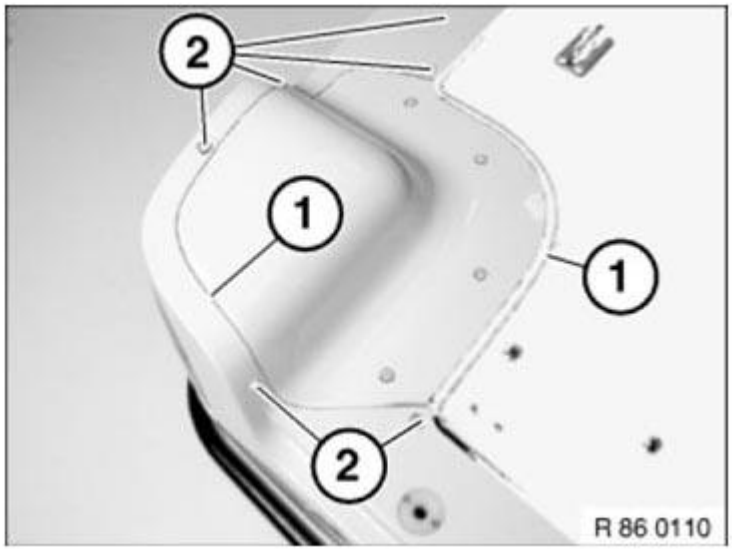


Fig. 23: Identifying Sealing Compound And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Drill out rivet connections (1).

Raise side sections (2, 3).

Pull out lamp housing (4) towards inside in direction of platform.

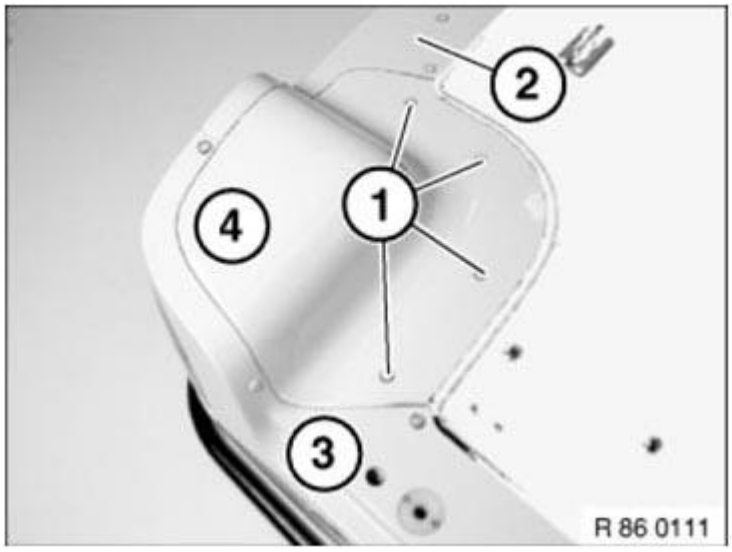


Fig. 24: Identifying Lamp Housing, Side Sections And Rivet Connections
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF LEFT AND RIGHT WHEEL BOXES

Remove sealing compound (1).

Drill out rivets (2).

Raise side apron (3). Pull out wheel box (4) towards rear.

Installation

Use Sikaflex 221 as sealing compound.

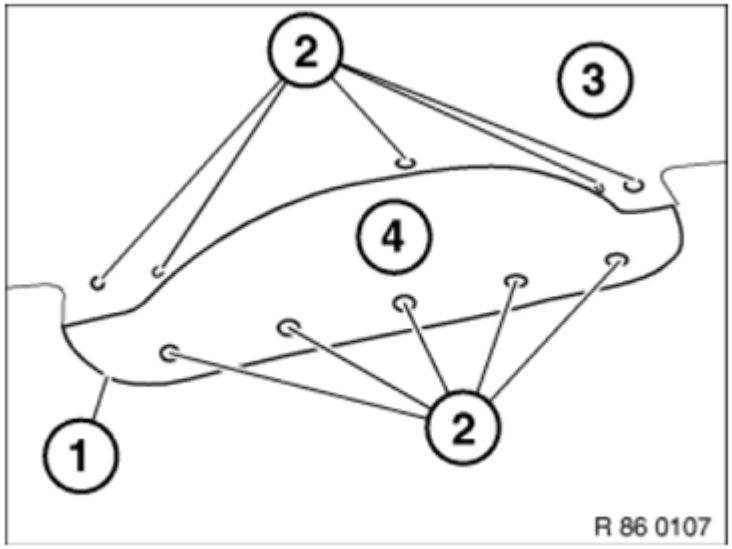


Fig. 25: Identifying Sealing Compound, Rivets, Side Apron And Wheel Box
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF LICENCE PLATE MOUNTING PLATE

CAUTION: Once the connecting screws (1) have been removed, the closing spring of the hinge retracts. Risk of trapping!

Release screws (1) in loading ramp frame (2) on left and right sides.

Installation

Use new self-locking nuts.

Tightening Torque,

86 10 7AZ

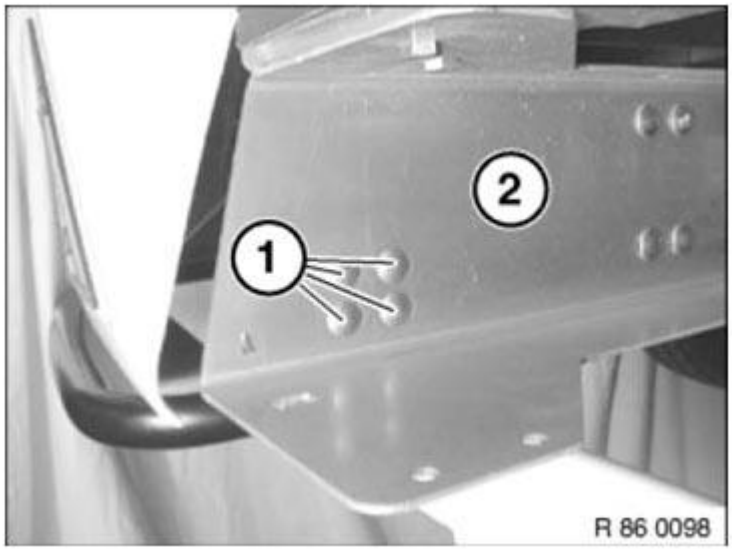


Fig. 26: Identifying Loading Ramp Frame With Screws On Left And Right Sides
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF LOADING RAMP FRAME/DISASSEMBLY OF RAIL, LEFT/RIGHT

NOTE: Two persons are required to disassemble the loading ramp frame.

Disassembly of license plate mounting plate: refer to **DISASSEMBLY OF LICENSE PLATE**.

Disassembly of pull rod: refer to **DISASSEMBLY OF OVERRUNNING EQUIPMENT**.

Installation

Tightening Torque,

86 10 7AZ

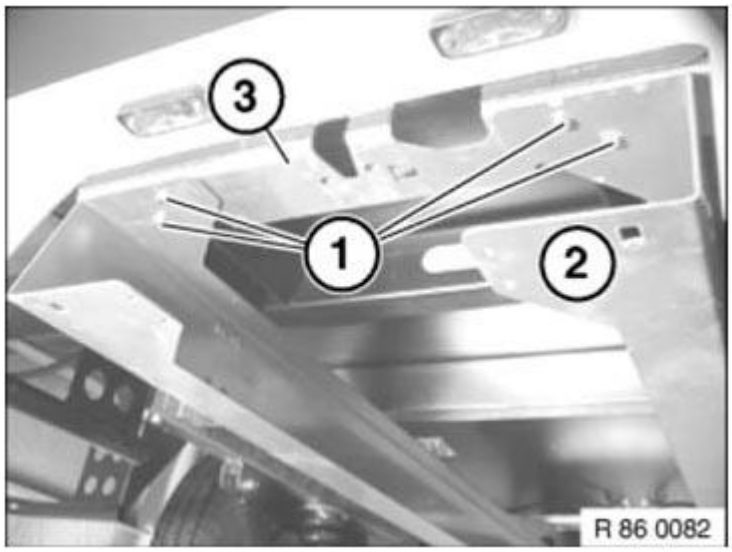


Fig. 27: Identifying Loading Ramp Frame Screws On Cross-Strut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1, 2) on left and right sides of loading ramp frame (3).

Installation

Use new self-locking nuts.

Tightening Torque, **86 10 8AZ**

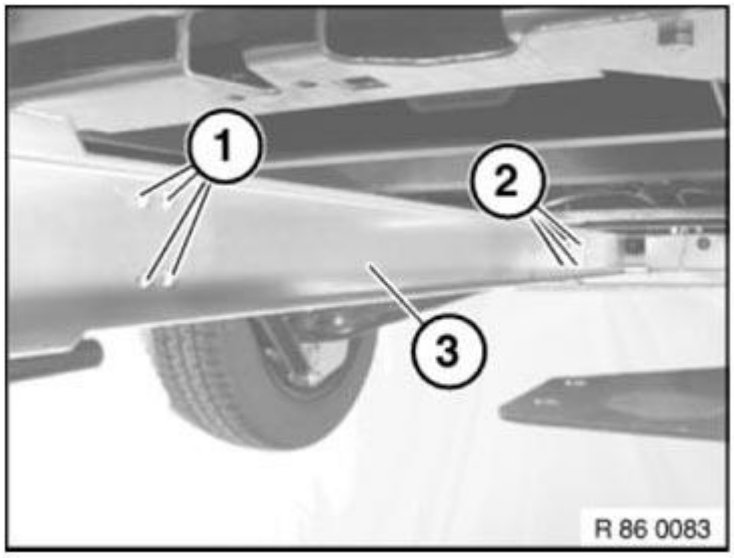


Fig. 28: Identifying Loading Ramp Frame With Screws On Left And Right Sides
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1, 2, 3).

Installation

Use new self-locking nuts.

Tightening Torque, **86 10 9AZ**

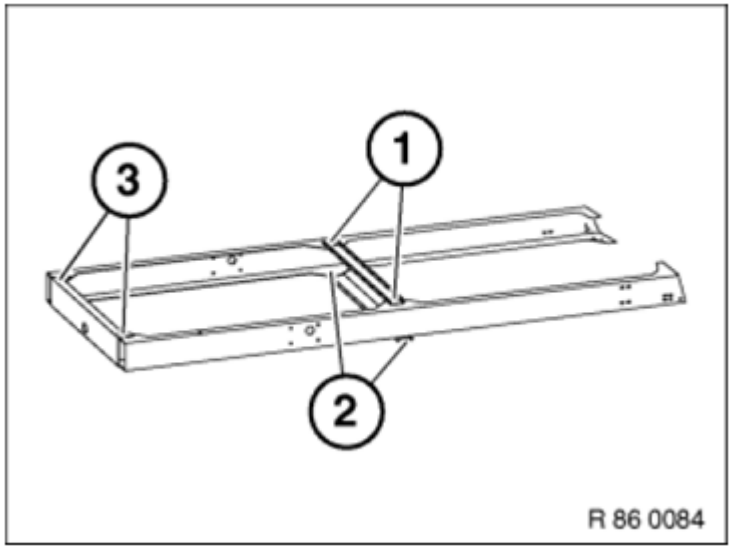


Fig. 29: Identifying Loading Ramp Frame Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISASSEMBLY OF REAR APRON

NOTE: Remove rear light, refer to REPLACING REAR LIGHT.
Remove plastic bush/metal bush, refer to REMOVING PLASTIC BUSH/METAL BUSH.

Cut through sealing compound (1) on left and right and remove.

Drill out rivets (2) on left and right sides on lower apron edge.

Installation

Use Sikaflex 221 as sealing compound.

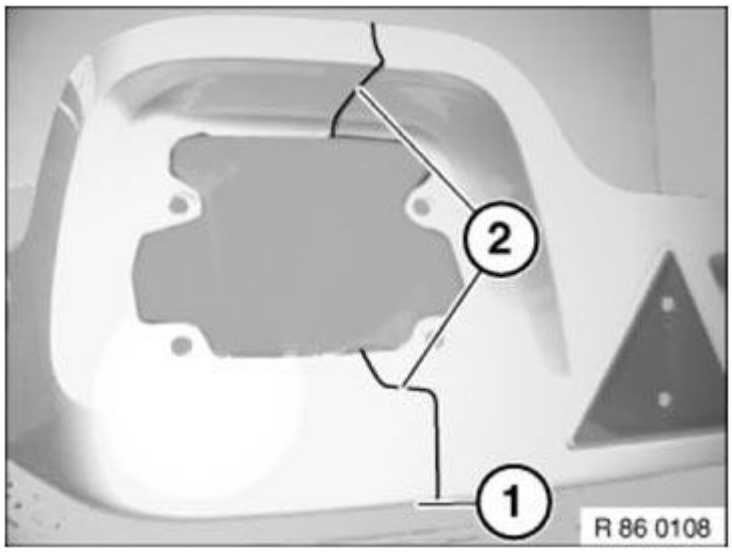


Fig. 30: Identifying Sealing Compound And Rivets On Left And Right
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through sealing compound (1) and remove.

Drill out rivets (2).

Installation

Use Sikaflex 221 as sealing compound.

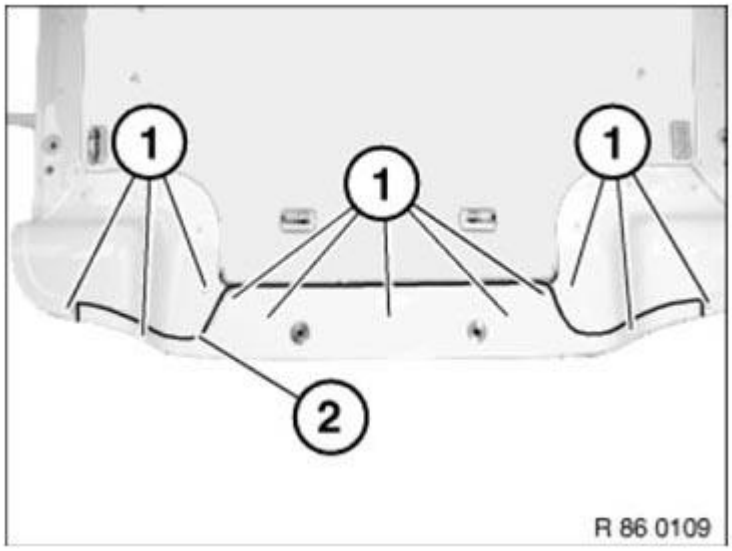


Fig. 31: Identifying Sealing Compound And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... DISCONNECTING PLUG CONNECTION, WIRING HARNESS, FRONT/REAR

Spread levers (1) on socket housing apart in direction of arrow and disconnect female connector (2) in direction of arrow towards bottom.

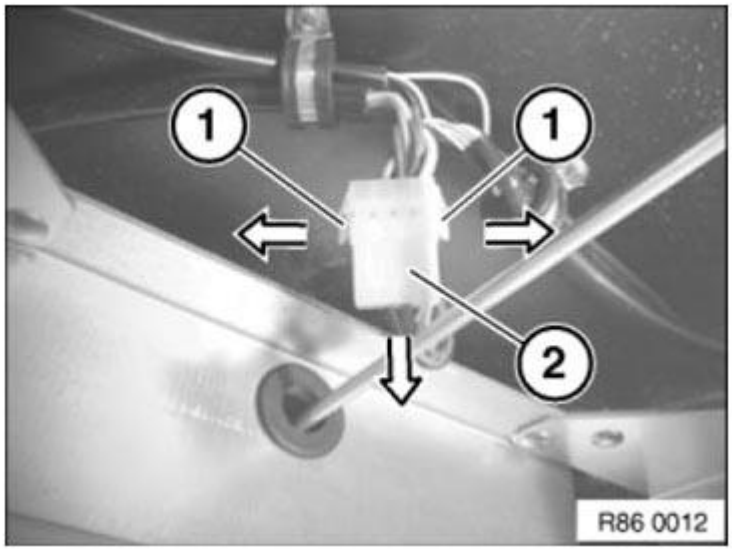


Fig. 32: Disconnecting Female Connector
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... INSTALLATION POSITION OF BMW LETTERING

Top edge of lettering at same height as recess for position light (1).

Distance between drawbar member and lettering (2) is 300 mm.

Installation

Remove grease from gluing surfaces.

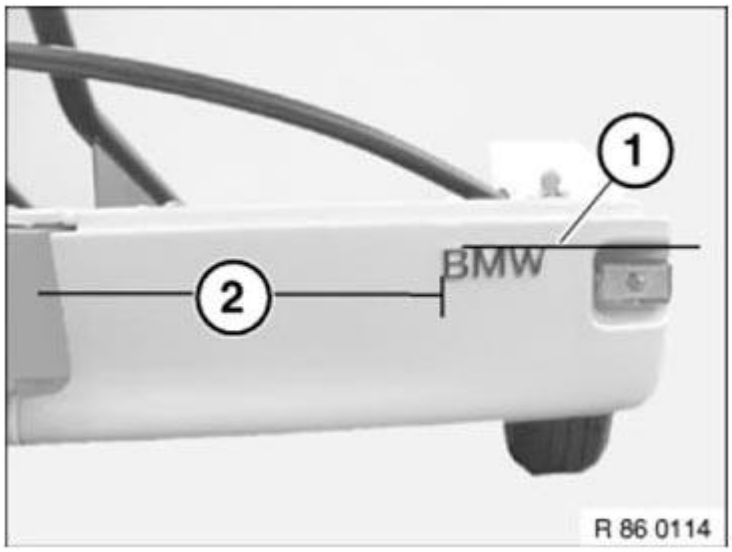


Fig. 33: Identifying Lettering And Position Light
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... POSITIONING OF MULTITRAILER HOOD FOR MAINTENANCE AND REPAIR WORK

IMPORTANT: At least two persons are needed to install and remove the hood from the platform.
Before installing and removing the hood, secure the BMW multitrailer and the entire combination against rolling. For this purpose, use the parking brake and the chocks of the BMW multitrailer.
The hood can also be set up and lowered with the aid of the universal lift available from BMW in conjunction with the roof racks and the hood adapter.
Under no circumstances should work of any kind be carried out below the suspended hood.

For maintenance and repair work, raise the hood using a lifting platform. Twin-column lifting platforms, body lifting platforms and twin-stamp underfloor platforms are suitable. The seating plates and areas of the lifting platform must be adjustable according to the dimensions of **Fig. 34**.

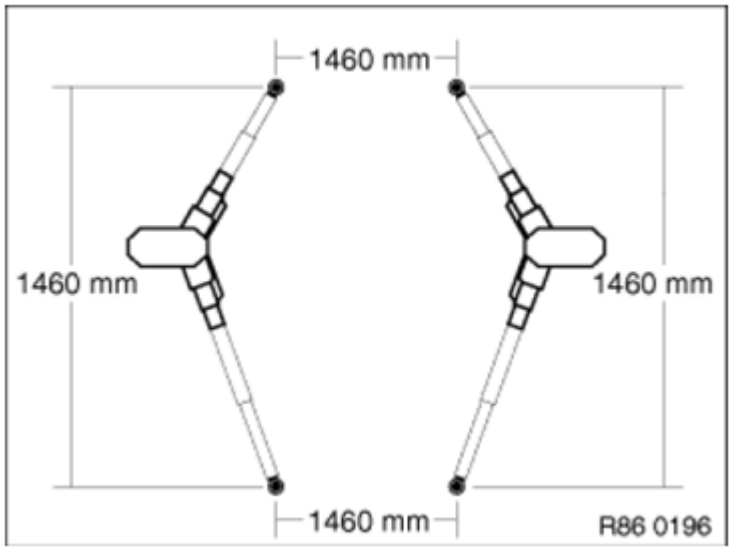


Fig. 34: Identifying Multitrailer Hood Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

The lifting platform must conform to the relevant legal provisions of the accident prevention regulations and be serviced as specified. Comply with the lifting platform operating instructions, in particular the safety instructions and the carrying capacity.

Make sure you adhere to the BMW-recommended work area of 5 x 7 m and to an escape route of 0.6 m between two lifting platforms.

Please comply with the following instructions before raising the hood:

- Raise only when it is unloaded;
- Ensure sufficient clearance between the seating plates/seating areas and the GFP edge of the hood;
- The hood must always be positioned in the middle of the lifting platform.

IMPORTANT: The hood may only be raised at the pin (1). Under no circumstances may the hood be raised at the GFP edge of the hood (2). See Fig. 35. Exclusively for removal of pin (1), raise the hood in the GFP area.

Also refer to:

REMOVING CENTERING PIN FROM MOUNTING BRACKET .

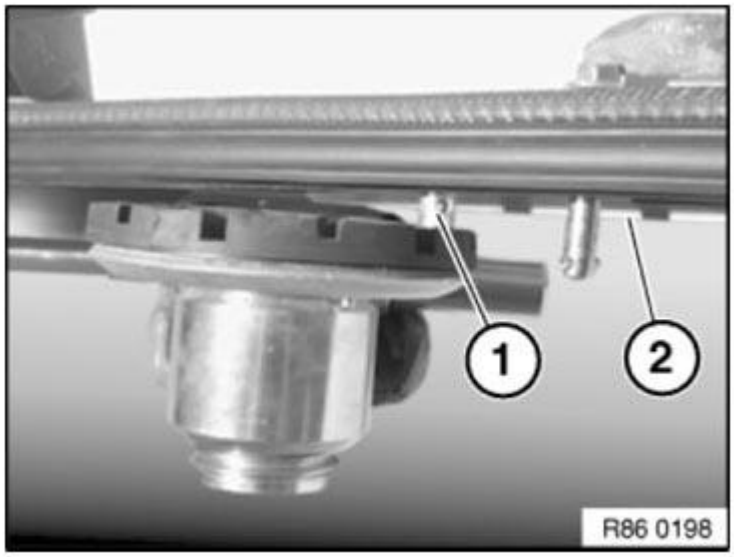


Fig. 35: Identifying Centering Pin Of Mounting Bracket And Hood
Courtesy of BMW OF NORTH AMERICA, INC.

00 00... RAISING BMW MULTI-TRAILER

CAUTION: Twin-strut underfloor platforms and twin-pillar lifting platforms are suitable for raising the BMW multi-trailer.
Lifting platforms with drive-on surfaces are not suitable for raising in order to carry out maintenance and repair work.

The lifting platform must comply with the relevant statutory accident prevention regulations and be serviced according to the manufacturer's instructions. It is essential to follow the lifting platform operating instructions, in particular the safety instructions and carrying capacity!

Make sure you adhere to the BMW-recommended work area of 5 x 7 m and to an escape route of 0.6 m between two lifting platforms.

Before raising the BMW multi-trailer, please observe the following points:

- Raise the trailer only when it is unloaded
- Remove a supplied loading ramp from the loading ramp frame so that all chassis areas of the BMW multi-trailer are freely accessible
- There must be sufficient clearance between the carrier arms/flat girder bridges and the GFK aprons or the front guard of the BMW multi-trailer
- The BMW multi-trailer must always be positioned in the middle of the lifting platform.

CAUTION: You will need special additional supports for the lifting platform in order to bridge the difference in height between longitudinal member and lower edge of GFK side apron or front guard of the BMW multi-trailer. The

minimum height of the additional supports is 145 mm. Use only the additional supports approved by the platform manufacturer or specified in these repair instructions.
You will find appropriate examples in the repair instructions for the majority of lifting platforms present in BMW workshops. For lifting platforms that are not named, the relevant manufacturers will offer you appropriate additional supports. Please contact directly the manufacturer of the lifting platform used in your dealership.

CAUTION: The BMW multi-trailer may only be raised by its longitudinal members. Do not under any circumstances raise the BMW multi-trailer by the GFK aprons. Make sure the additional supports bear the longitudinal members over their entire width and no attachments or wiring harnesses are touched or jammed. Check the securing equipment of the additional supports for correct seating. Under no circumstances should any work be carried out underneath the BMW multi-trailer if it is not adequately secured against slipping off the lifting platform.

The areas (2) on the longitudinal members (1) marked in the adjacent diagram are the best areas for attaching the additional supports.

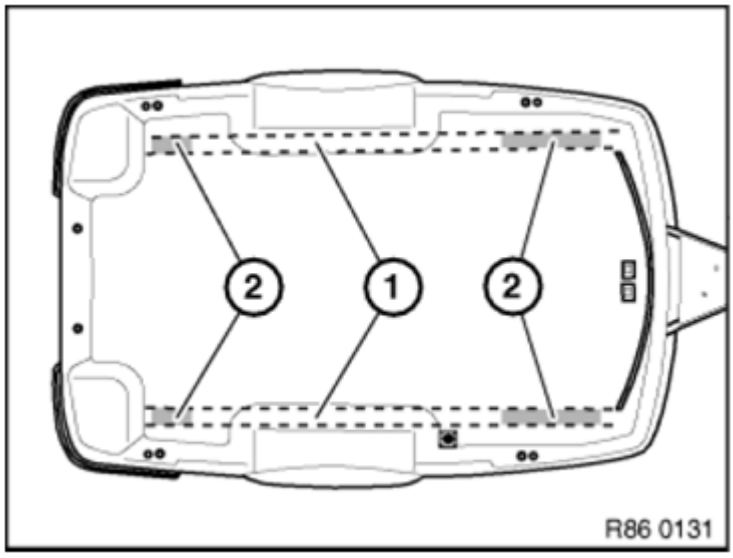


Fig. 36: Identifying Area On Longitudinal Member
Courtesy of BMW OF NORTH AMERICA, INC.

General notes on using twin-pillar lifting platforms

For the twin-pillar lifting platforms described, the BMW multi-trailer is positioned in the direction of travel on the platform. For lifting platforms which do not create sufficient clearance between disk wheel and carrier arms, move the BMW multi-trailer against the direction of travel onto the platform.

Becker&Sohne twin-strut underfloor platform

The BMW multi-trailer can only be raised if it is supported at right angles to the direction of travel. For raising, use the high additional supports (1) of Becker&Sohne.

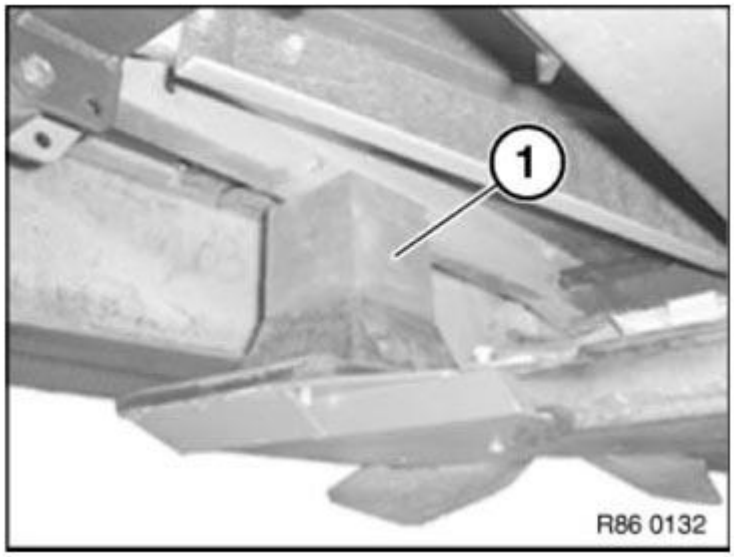


Fig. 37: Identifying Becker & $ Sohne Supports
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Also lash the BMW multi-trailer to the flat girder bridges of the lifting platform. Flag the protruding tow hitch and the drawbar member of the BMW multi-trailer conspicuously so as to prevent injury, e.g. with a red cloth.

MAHA twin-pillar lifting platform

The BMW multi-trailer can only be raised if you use the support plate attachment sleeves for transporters (1). Position the axle of the BMW multi-trailer in the direction of travel in front of the pillars of the platform in order to obtain the specified lifting ranges and to establish sufficient clearance between disk wheel and carrier arms. The long carrier arms raise the front and the short carrier arms raise the rear of the BMW multi-trailer.

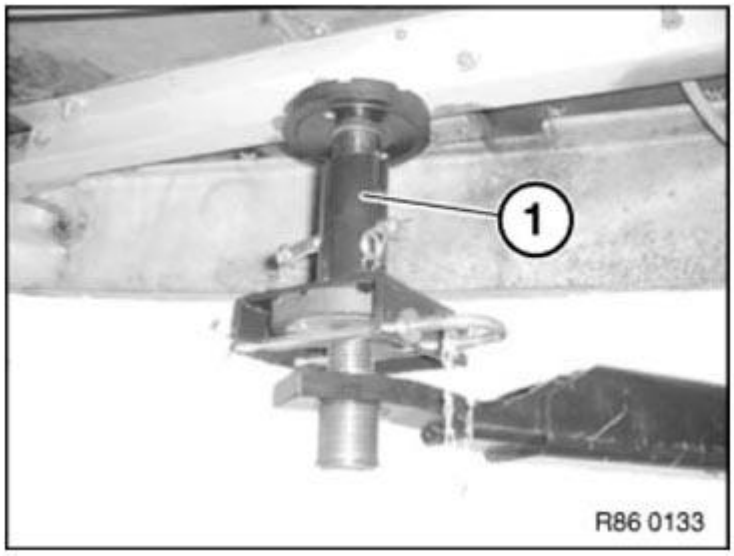


Fig. 38: Identifying Transporters Of Support Plate Attachment Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Romaico-Lift twin-pillar lifting platform

The BMW multi-trailer can only be raised if you use the 146 mm high attachments (1).

Position the axle of the BMW multi-trailer in the direction of travel in front of the pillars of the platform in order to obtain the specified lifting ranges and to establish sufficient clearance between disk wheel and carrier arms. The long carrier arms raise the front and the short carrier arms raise the rear of the BMW multi-trailer.

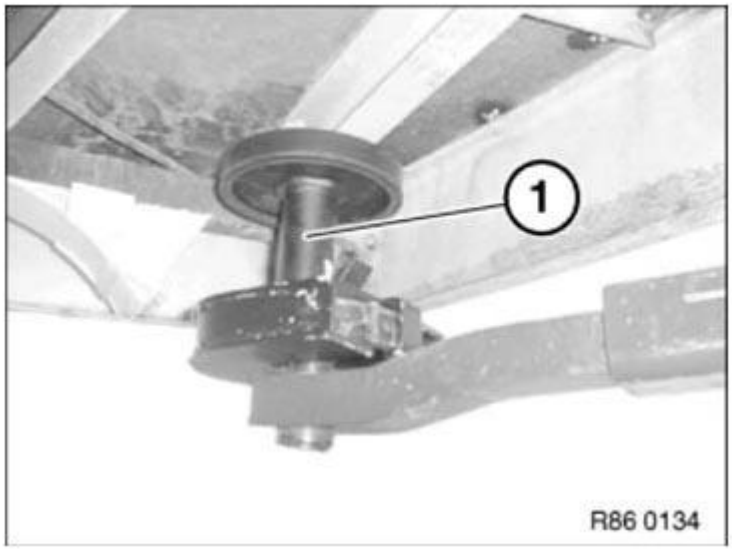


Fig. 39: Identifying Attachment Of BMW Multi-Trailer
Courtesy of BMW OF NORTH AMERICA, INC.

Working pit

The BMW multi-trailer can be serviced or repaired in conjunction with a working pit if the following measures are taken into consideration. The BMW multi-trailer must be secured against slipping/tilting sideways. The drawbar jockey wheel must be firmly secured against rolling.

86 10... REMOVING CAMLOCK RETAINING CAM ON LOADING RAMP

Drill out rivets (1).

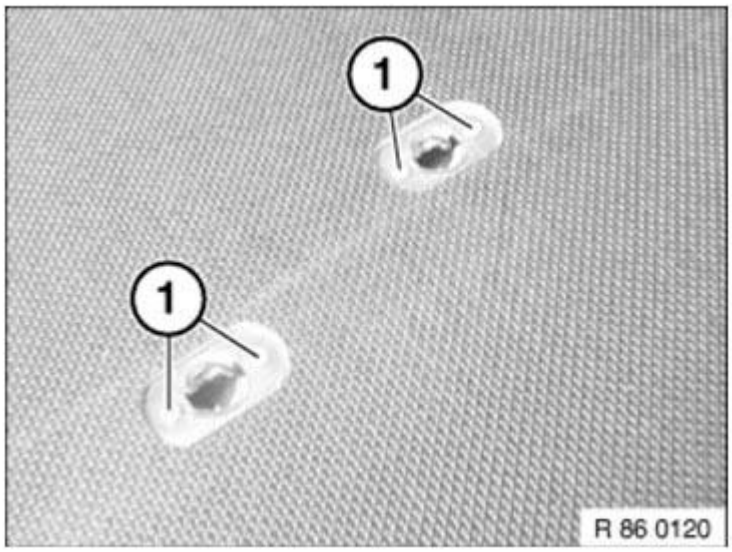


Fig. 40: Identifying Loading Ramp Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING CAMLOCK SCREW CAP

Bend back edges (1) of tab washer (2). Remove tab washer (2) over cross pin (3) towards bottom.

Installation

Replace lockplate.

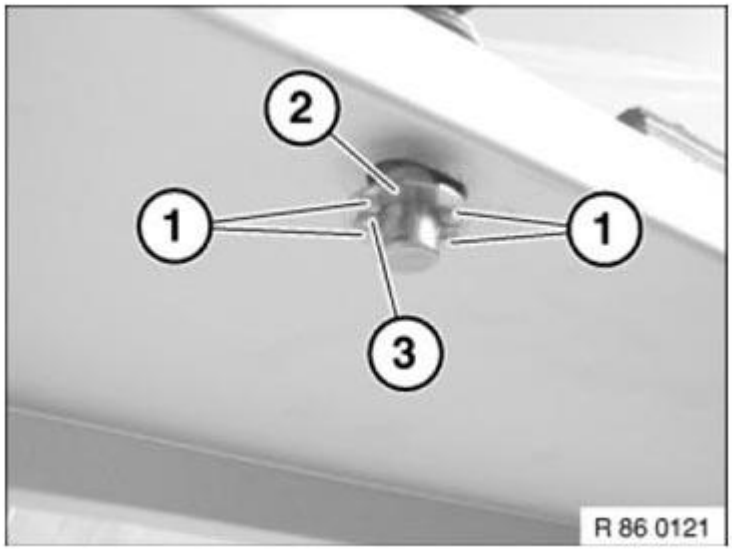


Fig. 41: Identifying Back Edges Of Tab Washer With Cross Pin
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT COIL SPRING

Release screw (1) and remove, tilt shock absorber (2) in direction of arrow towards rear.

Installation

Use new self-locking nut.

Hold shock absorber vertically and protective cap points upwards.

Completely press in shock absorber once and pull out up to required installation length. Do not tilt shock absorber further than is needed for installation.

Tightening Torque, **86 10 21AZ**

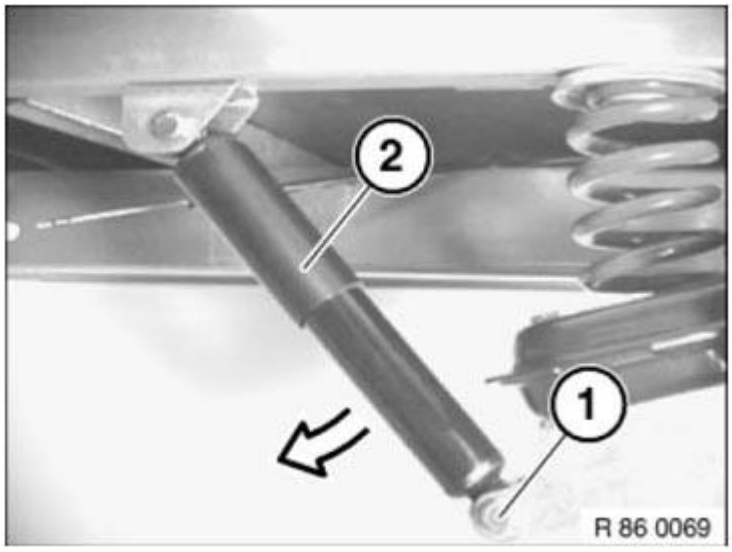


Fig. 42: Removing Shock Absorber With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

The trailing arm folds down once the coil spring on the arm has been released.

No persons should be located underneath trailing arm. Risk of injury!

Release screw (1) between trailing arm (2) and coil spring.

Installation

Tightening Torque, **86 10 22AZ**

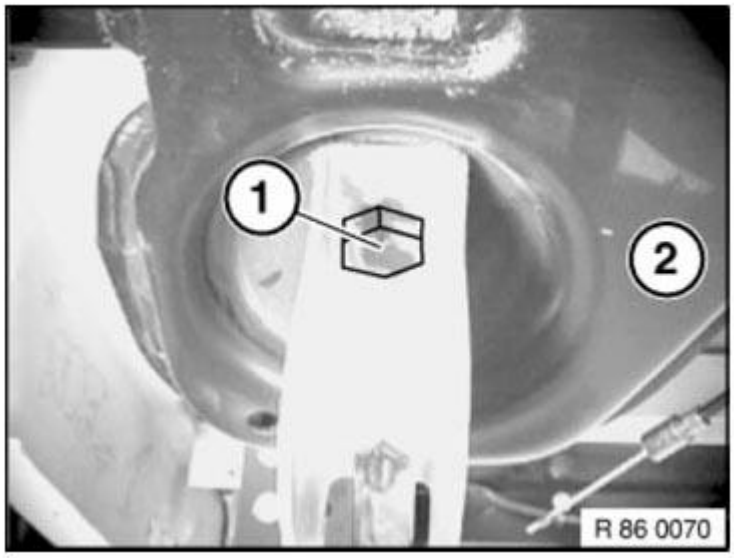


Fig. 43: Identifying Trailing Arm Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Remove pressure plate (1) from coil spring (2).

Installation

Use pressure plate with nut.

Fit pressure plate (1) according to its shape (3) into pressure spring (2).

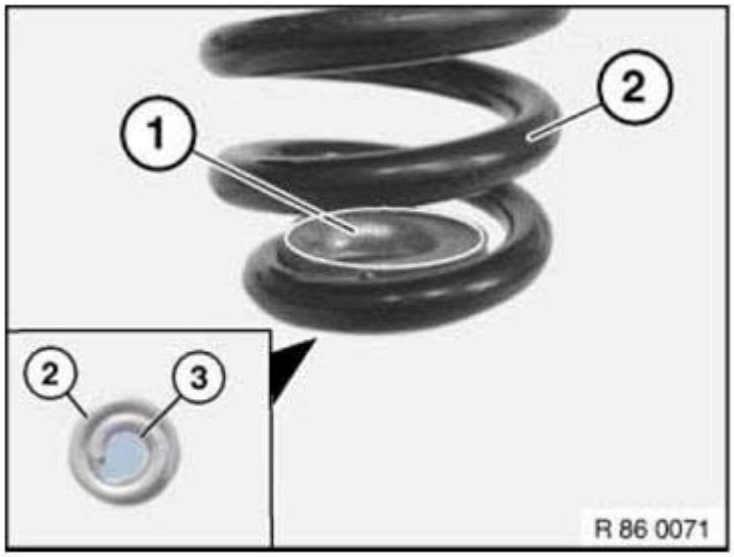


Fig. 44: Identifying Pressure Plate On Pressure Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) between coil spring (2) and longitudinal member (3). Remove small pressure plate (4) and large pressure plate (5).

Installation

Use pressure plate without nut.

Fit small pressure plate (4) according to its shape (6) into pressure spring (2).

Tightening Torque, **86 10 23AZ**

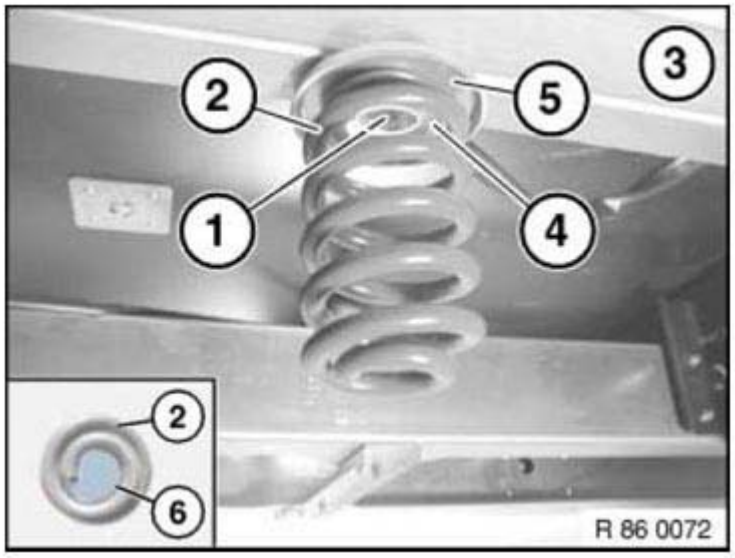


Fig. 45: Identifying Pressure Plate On Pressure Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Two persons are needed to install the coil spring correctly. One person presses down the pressure plate (2) seated inside the coil spring (1) and tightens the coil spring (1)/trailing arm (3) screw connection. At the same time, the second person levers the coil spring (1) with a screwdriver into its correct seat.

Tightening Torque for coil spring (1)/trailing arm (3), **86 10 22AZ**

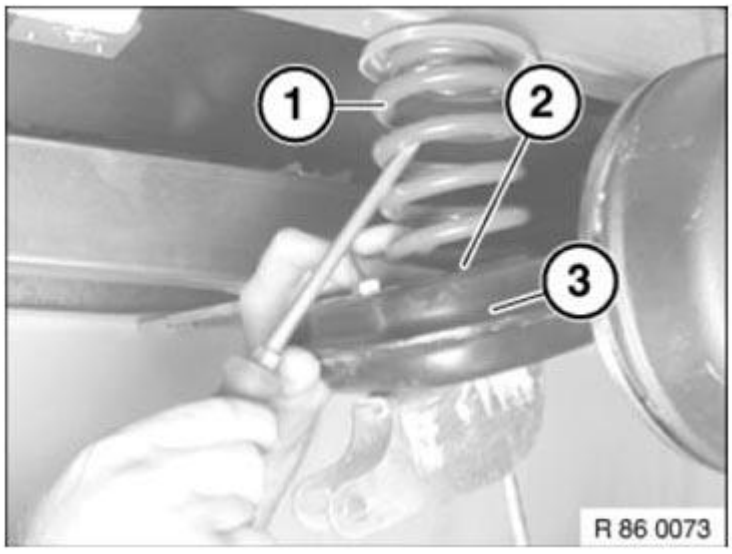


Fig. 46: Identifying Coil Spring With Pressure Plate And Trailing Arm
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING BOLT ON LOADING RAMP

Insert a drift into hole (1) of bolt (2) and turn clockwise.

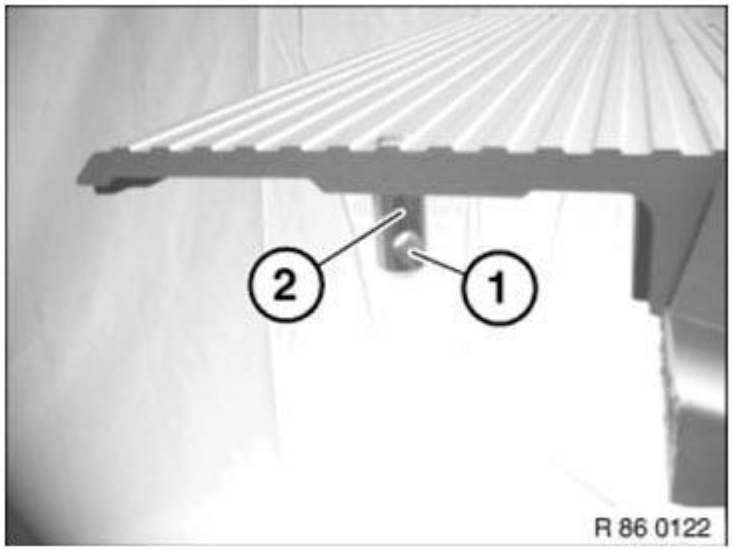


Fig. 47: Identifying Loading Ramp Hole And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING BRAKE SHOES

The wheels of the multi-trailers must be able to rotate freely. Adjust and check brake system after installing brake shoes.

Unhook tension spring (1) from tension spring mount (2).

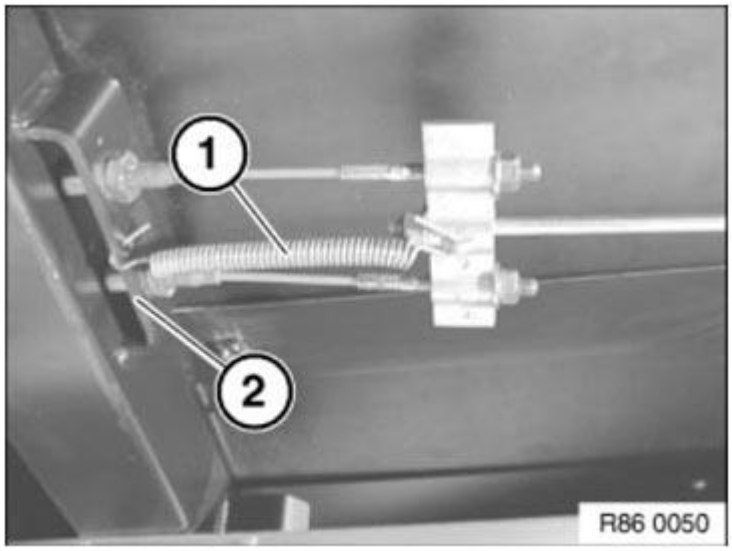


Fig. 48: Identifying Tension Spring Mount With Tension Spring
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Once nut (1) of pull rod (2) has been released, do not move handbrake lever. Handbrake lever can flick upwards.

Release nut (1) on pull rod (2) and remove hexagon nut. Slide brake compensator (3) towards rear.

Installation

Use new self-locking nut.

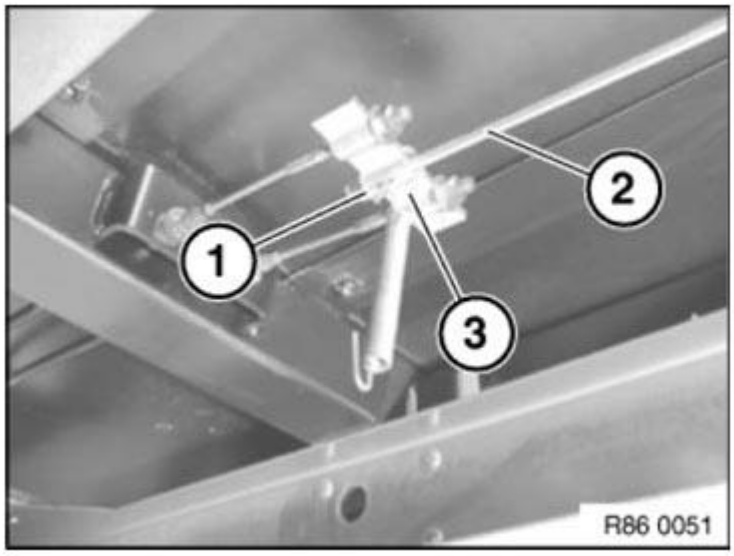


Fig. 49: Identifying Brake Compensator And Pull Rod Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Grip openings (1) in wheel trim (2) with both hands and pull off wheel trim (2).

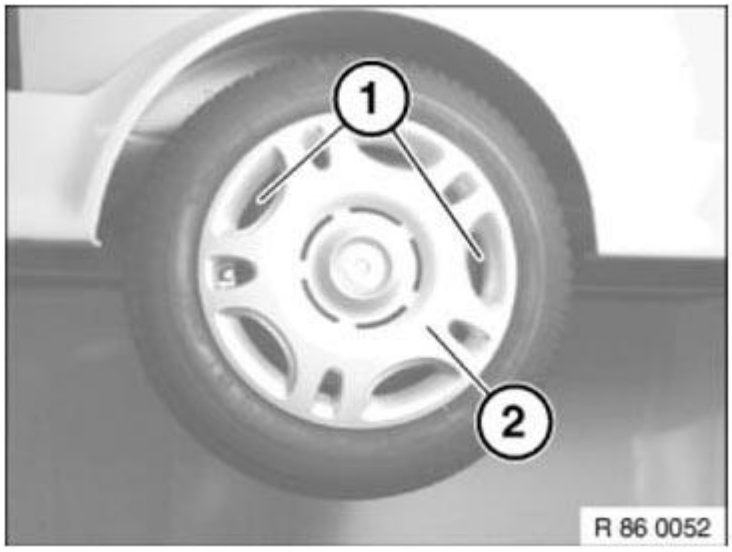


Fig. 50: Identifying Wheeltrim Opening
Courtesy of BMW OF NORTH AMERICA, INC.

Release wheel bolts (1) and remove disk wheel (2).

Installation

Tightening Torque, **86 10 19AZ**

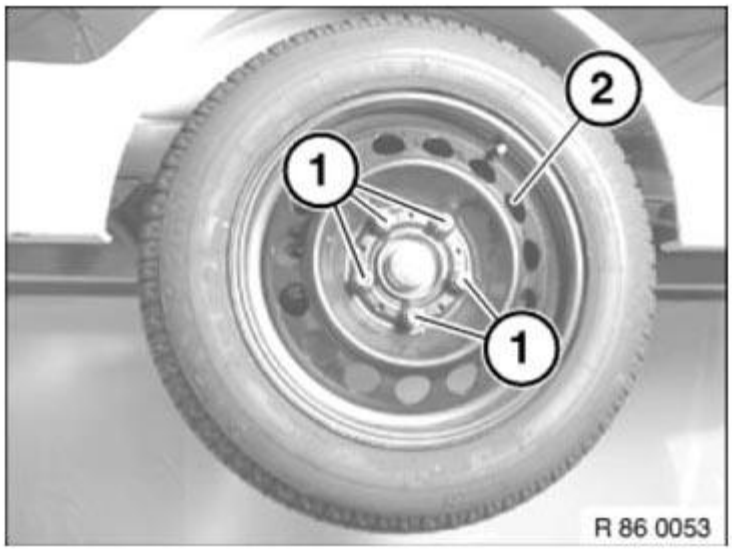


Fig. 51: Identifying Disk Wheel And Wheel Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Turn brake shoe adjusting screw (2) on brake carrier (1) in direction of arrow and release fully. The brake shoes do not rest against the drum.

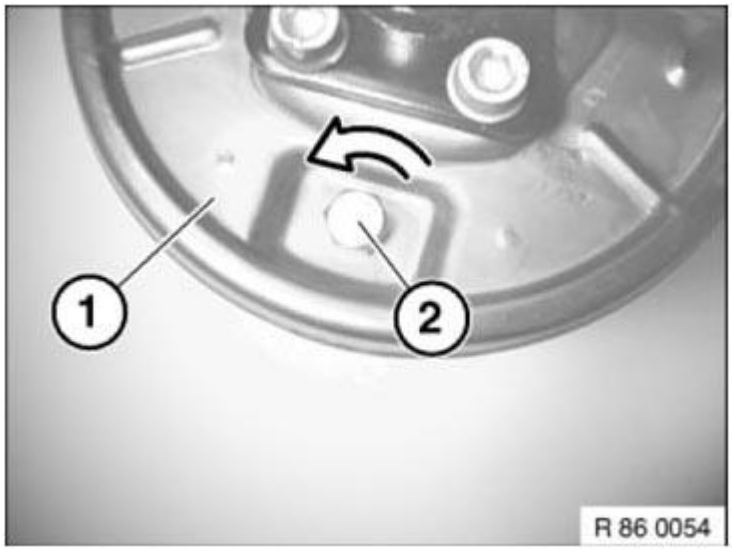


Fig. 52: Turning Brake Shoe Adjusting Screw On Brake Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Lever off cap (1).

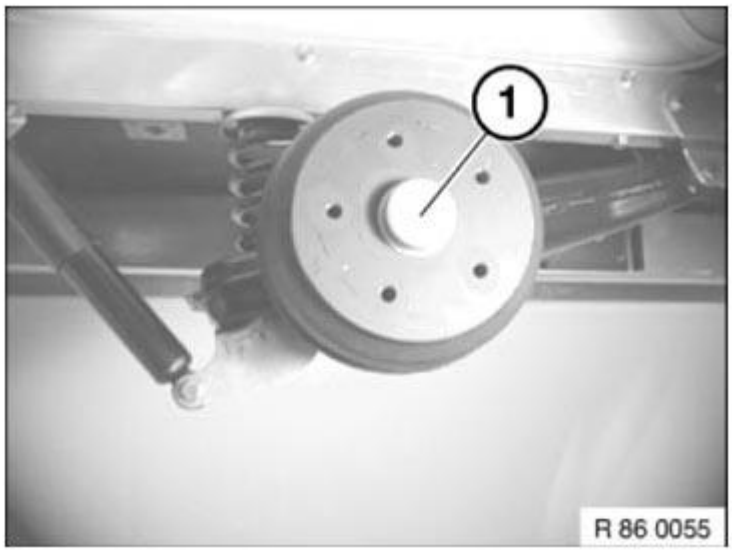


Fig. 53: Identifying Brake Hub Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove. Pull off brake hub (2) with both hands.

Installation

Only a new nut is permitted for reinstallation.

Tightening Torque **86 10 20AZ**

Do not screw off brake hub under any circumstances.

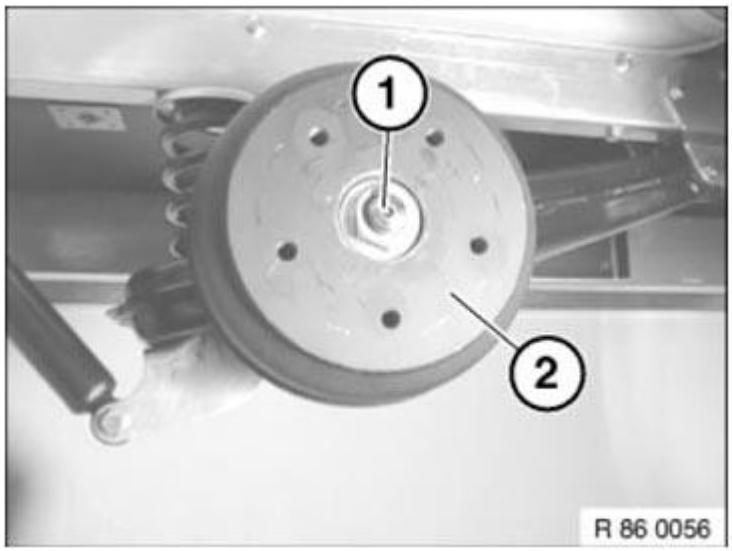


Fig. 54: Identifying Brake Hub With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

To illustrate more clearly the work steps in **Fig. 55**, **Fig. 56** and **Fig. 57**, the wheel brake has been detached from the axle.

This procedure is not necessary for removing the brake shoes.

Push back cable (1).

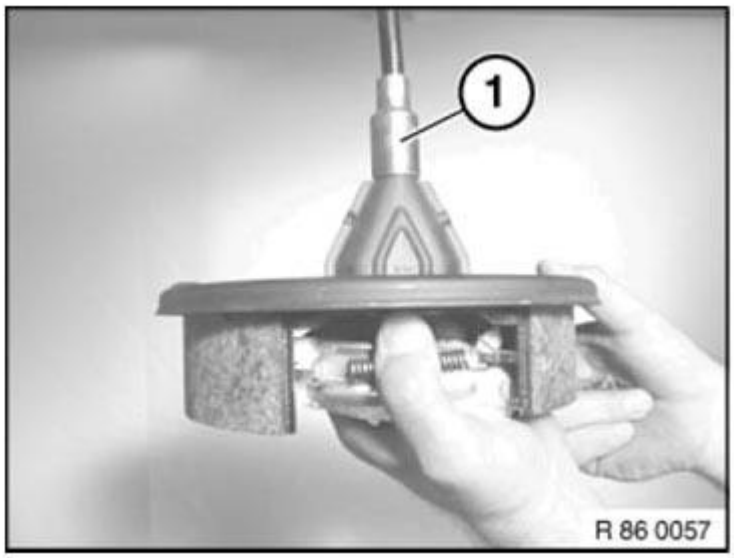


Fig. 55: Identifying Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Remove shell (1).

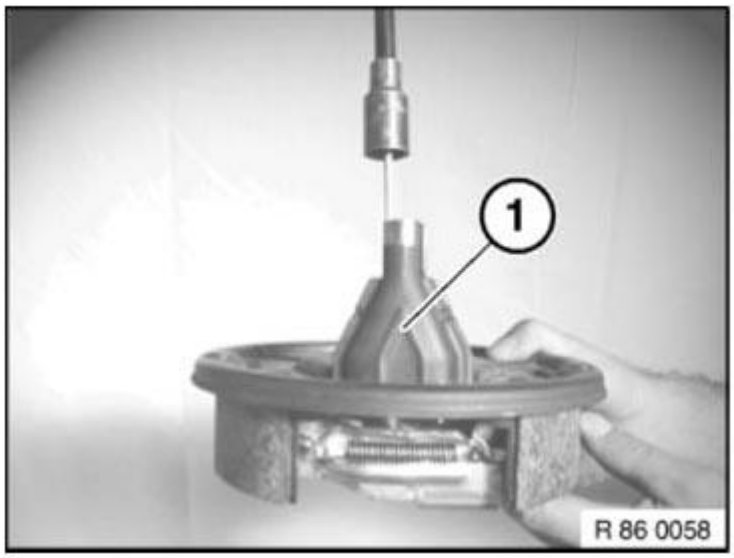


Fig. 56: Identifying Cable Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Remove brake cable (1) from mounting (2).

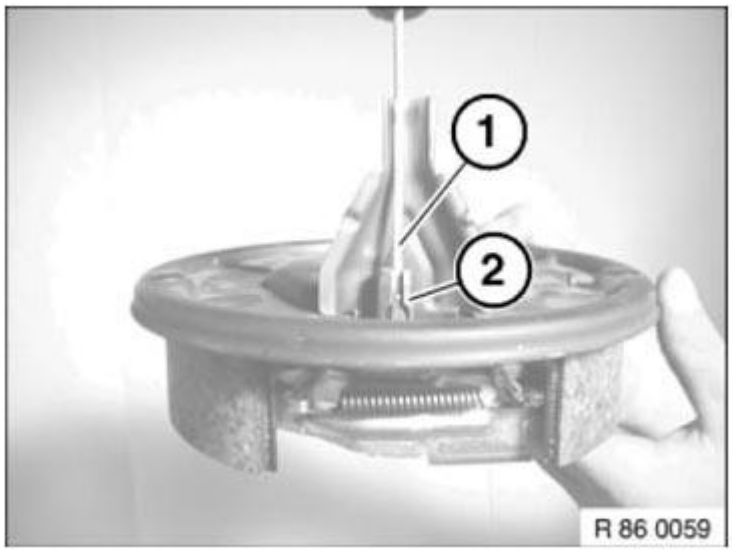


Fig. 57: Identifying Brake Cable Of Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook pressure spring (1) from fixed brake shoe (2) and brake carrier (3).

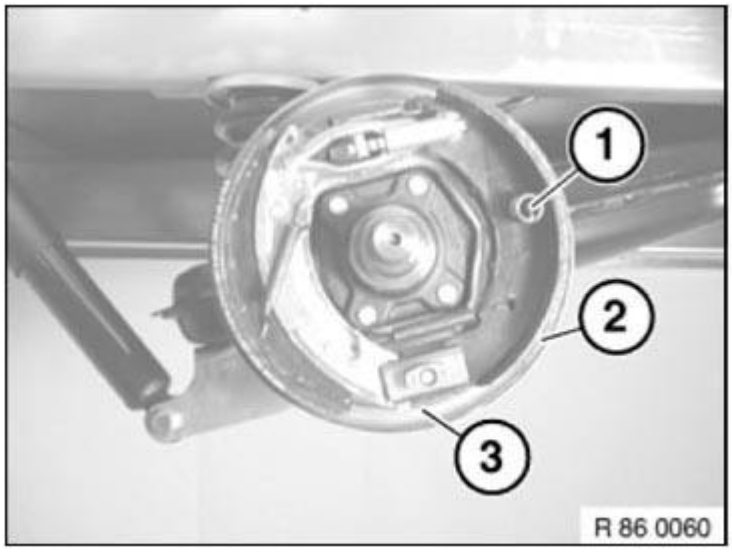


Fig. 58: Identifying Pressure Spring Of Fixed Brake Shoe And Brake Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Remove tension spring (1) from both brake shoe fixtures (2).

Remove brake lever assembly (3).

Installation

The fixed part of the brake lever assembly (3) is seated on the moving brake shoe. The moving part of the brake lever assembly is seated on the fixed brake shoe.

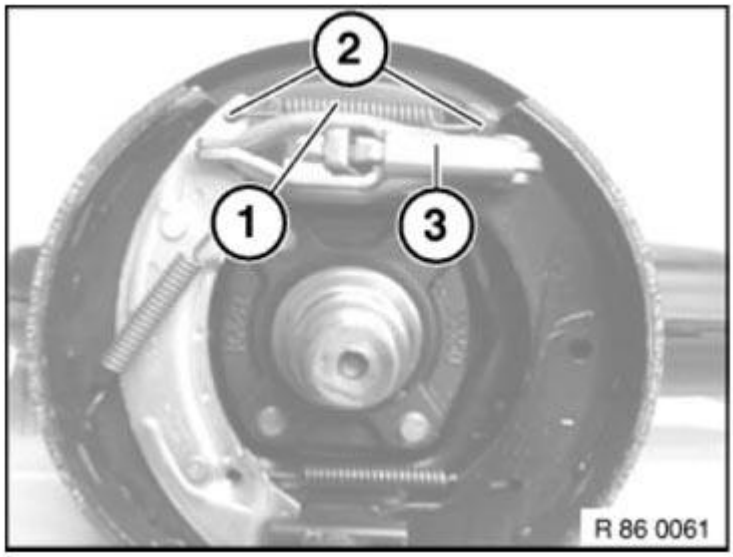


Fig. 59: Identifying Tension Spring Of Brake Shoe Fixtures
Courtesy of BMW OF NORTH AMERICA, INC.

Pull brake shoes (1) apart in direction of arrow, tilt forward and remove from adjustment device (2).

Installation

Always replace the four shoes and use the same make.

Minimum lining thickness: 1.5 mm

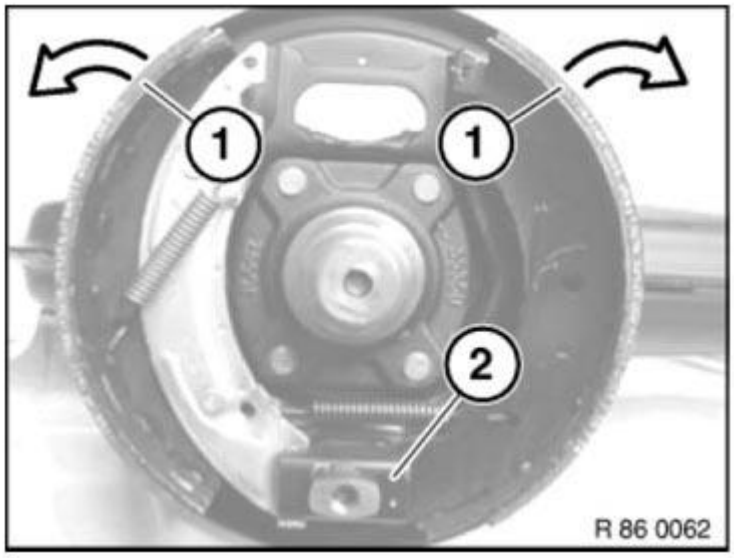


Fig. 60: Pulling Brake Shoes Apart
Courtesy of BMW OF NORTH AMERICA, INC.

Check adjustment device (1).

Check wedge (2) and setting pins (3) for ease of movement and wear.

Apply grease if necessary.

Check brake cables for ease of movement and wear.

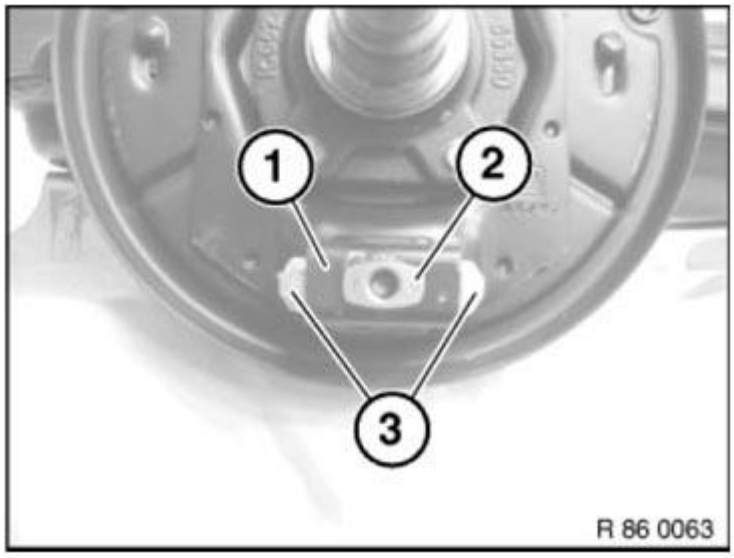


Fig. 61: Identifying Adjustment Device And Wedge With Setting Pins
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING ENTRY PROFILE SECTION ON LOADING RAMP, LEFT, RIGHT AND CENTER

CAUTION: Before drilling out rivets, drive in rivet pins with a punch.

Drill out rivets (1). Remove entry profile section (2) towards front.

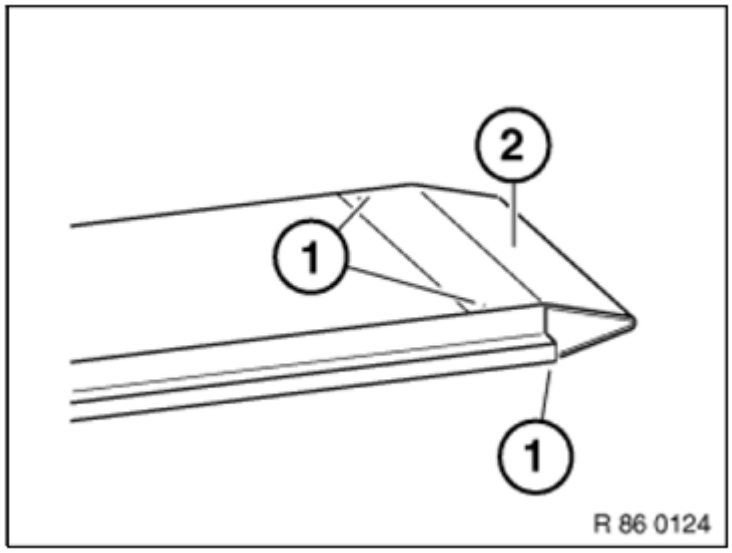


Fig. 62: Identifying Profile Section On Loading Ramp And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING LEFT OR RIGHT SHOCK ABSORBER

Inspect the shock absorber while installed to ascertain whether it needs to be replaced.

Replace shock absorber if it is leaking. Replace shock absorber if it can be easily pushed in or pulled out when removed.

Release screw (1) and remove. Tilt shock absorber in direction of arrow. Release screw (2) and remove shock absorber.

Installation

Hold shock absorber vertically: protective cap points upwards. Completely press in shock absorber once and pull out up to required installation length. Do not tilt shock absorber further than is needed for installation.

Tightening Torque, **86 10 21AZ**

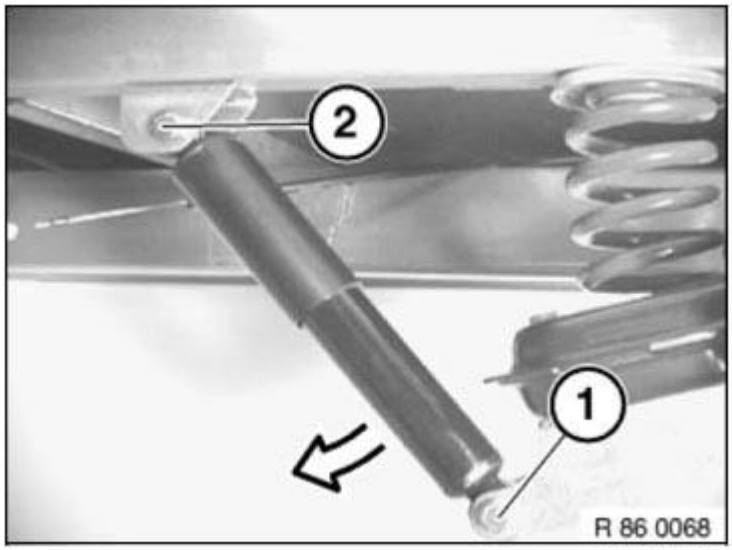


Fig. 63: Removing Shock Absorber With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING LOADING RAMP LOCK

Unscrew bolts (1).

Installation

Tightening Torque, **86 10 28AZ**

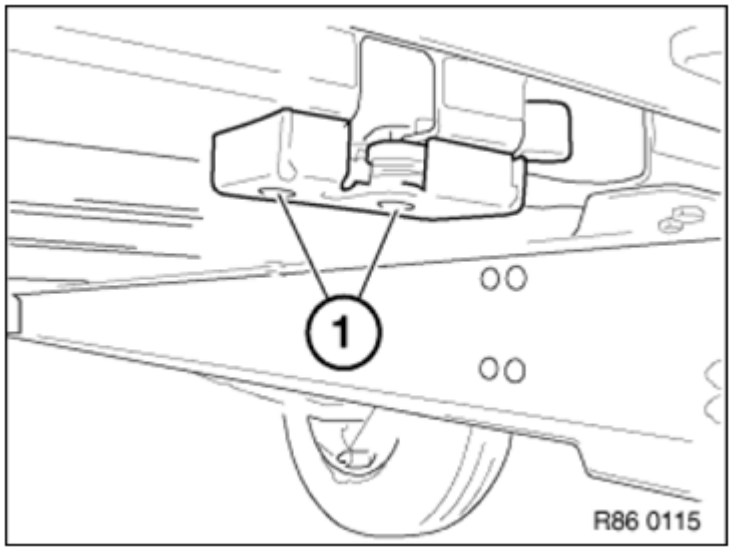


Fig. 64: Identifying Loading Ramp Lock Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Pass lever (1) of rotary striker lock (2) out of square hole (3) by twisting from side to side.

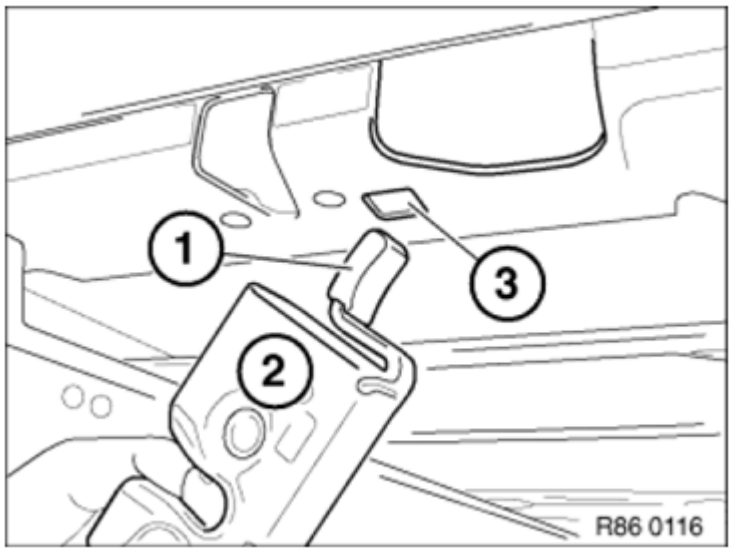


Fig. 65: Identifying Lever Of Rotary Striker Lock Out Of Square Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bolts (1).

Installation

Opening for securing clip (2) points to front or rear.

Square-head nut (3) rests with its square surface parallel to bearing pedestal (4)

Tightening Torque, **86 10 29AZ**

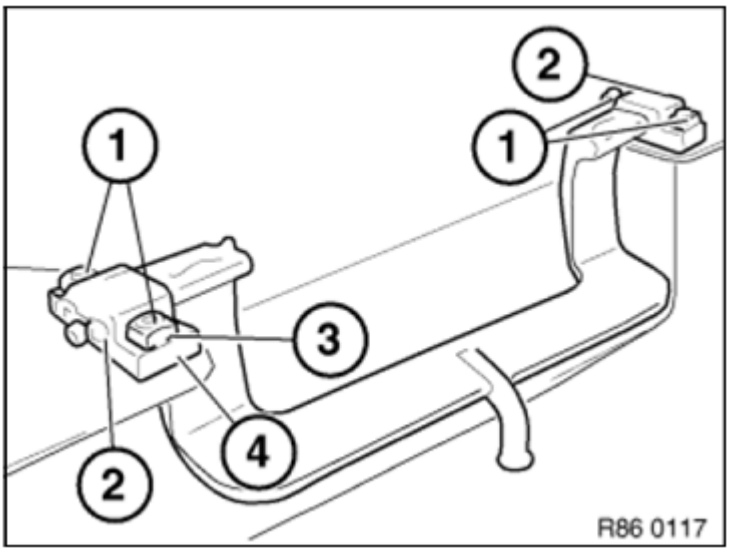


Fig. 66: Identifying Clip, Square-Head Nut With Bearing Pedestal And Loading Ramp Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Raise edge (1) of securing clip and slide in direction of arrow towards rear.

Detach bearing pedestal (2).

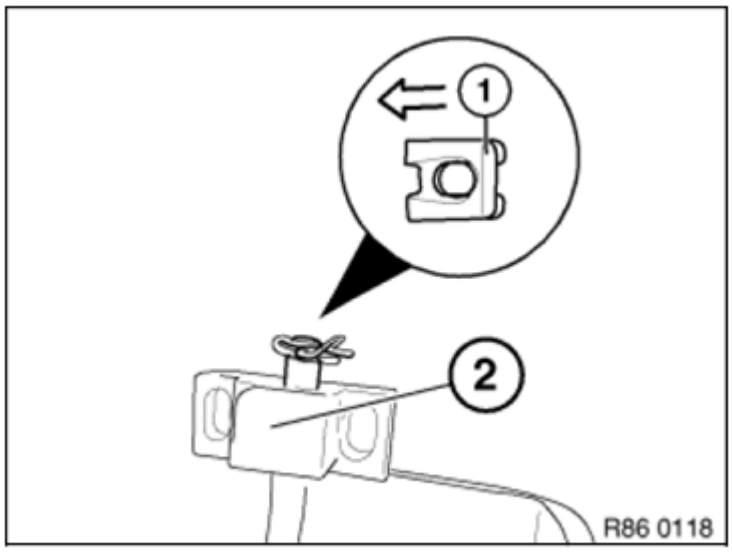


Fig. 67: Removing Bearing Pedestal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Install bearing pedestal (1) on stub (3) of locking bracket (3).

Off-center bore (4) in bearing pedestal (1) points with short distance (A) to locking bracket (3).

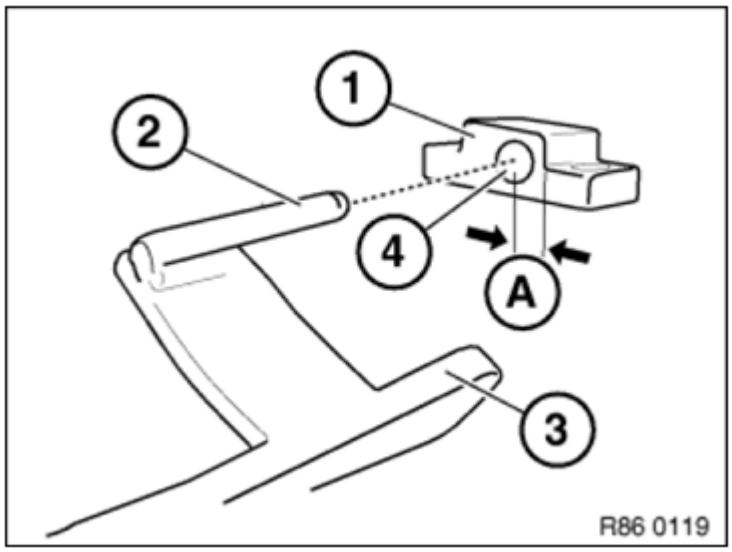


Fig. 68: Identifying Bearing Pedestal On Stub Of Locking Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING MOUNTING BRACKET SEALING CAP

Cut out mounting bracket (3) along markings (1, 2) and lever out of apron (4).

Installation

For gluing, use two-component adhesive ICEMA R 101 and hardener 7.

Mixture ratio: ICEMA R 101 7 parts; hardener 7 1 part.

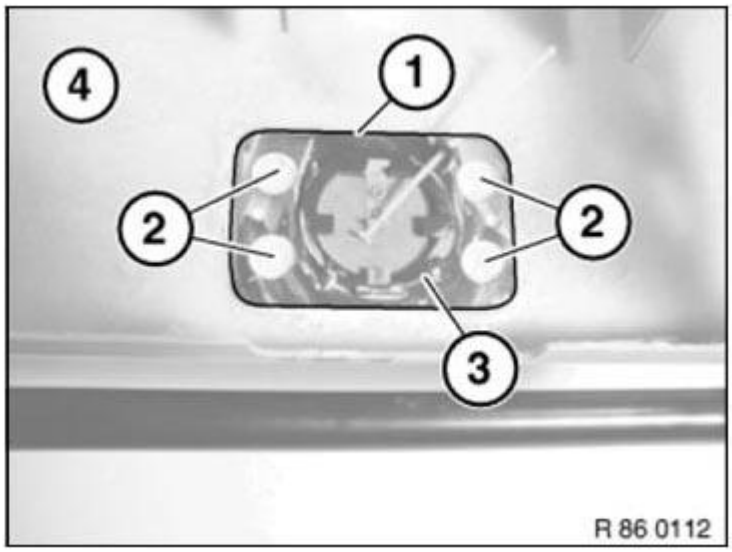


Fig. 69: Identifying Mounting Bracket Along Markings And Lever Out Of Apron
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING MOUNTING BRACKET, CENTER, LEFT AND RIGHT

NOTE: Disassembly of Camlock retaining cam, refer to DISASSEMBLY OF CAMLOCK RETAINING CAM

Unscrew bolts (1).

Installation

Tightening Torque, **86 10 31AZ**

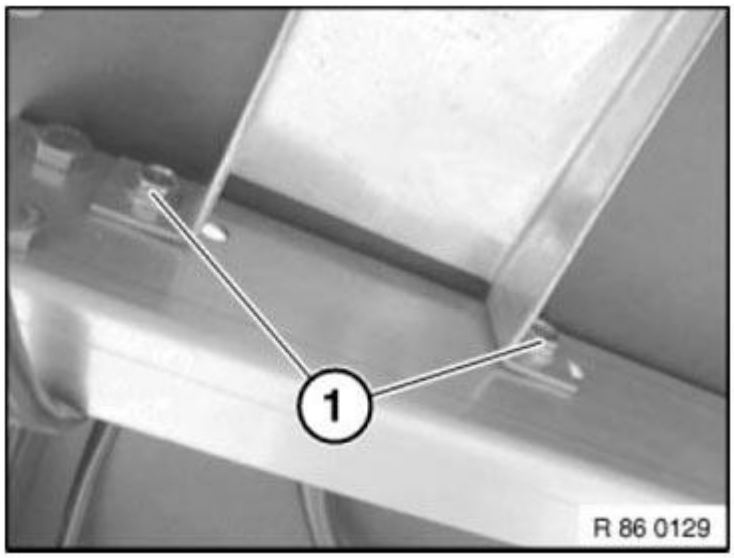


Fig. 70: Identifying Mounting Bracket Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING OUTER PULL ROD MOUNT, LEFT AND RIGHT

Release screws (1) and remove pull rod mount (2).

Installation

Tightening Torque, **86 10 30AZ**

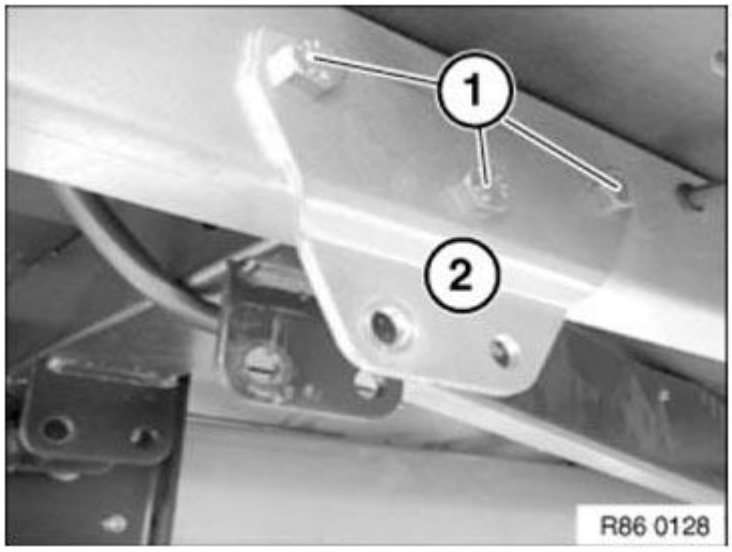


Fig. 71: Identifying Pull Rod Mounts With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING OVERRUNNING EQUIPMENT/MAINTAINING OR REPLACING GUIDE BUSH/INSTALLING OVERRUNNING EQUIPMENT

After installing overrunning equipment, readjust brake system, refer to **ADJUSTING BRAKE SYSTEM**

Check the guide bush while installed to ascertain whether it needs to be replaced. Raise ball end area and replace guide bush if play is detected in ball end area.

NOTE: After installing, readjust and check brake system.

Release round head screws (1) and remove running board (2) towards top.

Installation

Use new self-locking nuts.

Tightening Torque, **86 10 10AZ**

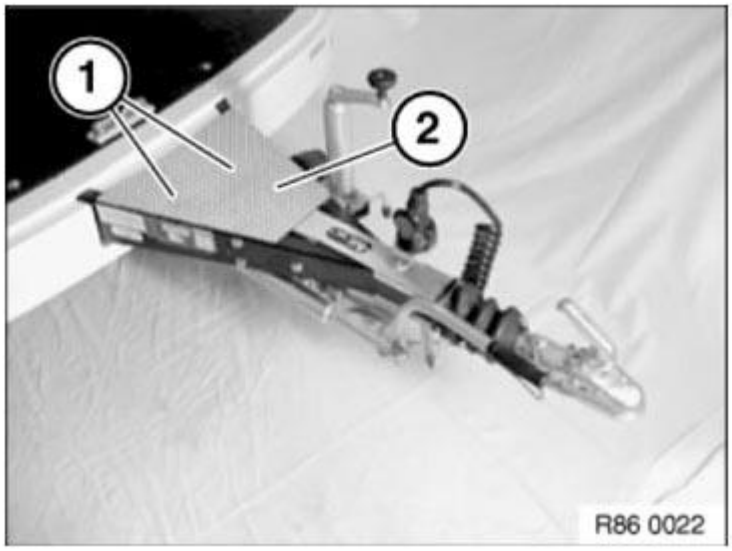


Fig. 72: Identifying Running Board With Round Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook tension spring (1) from tension spring mount (2).

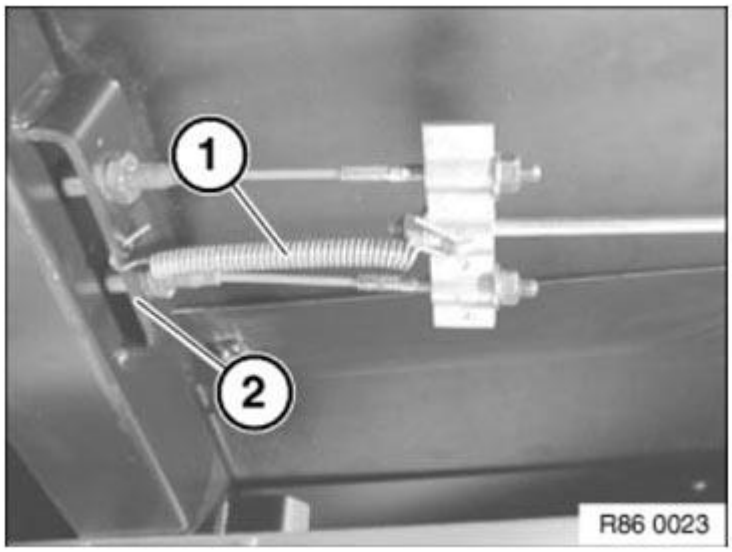


Fig. 73: Identifying Tension Spring Mount With Tension Spring
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Once nut (1) of pull rod (2) has been released, do not move handbrake lever. Handbrake lever can flick upwards.

Release screw (1) on pull rod (2) and remove hexagon nut. Slide brake compensator (3) towards rear.

Installation

Use new self-locking nut.

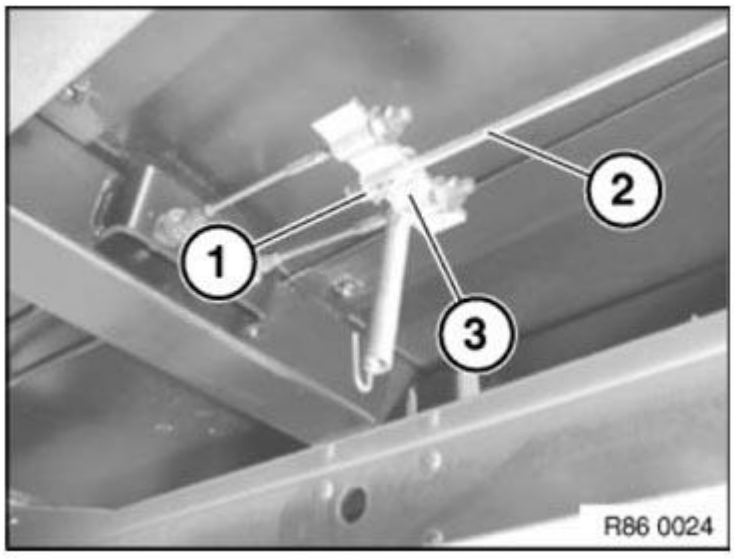


Fig. 74: Identifying Brake Compensator, Hexagon Nut And Pull Rod Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on jockey wheel mount and remove.

Release wiring harness mount (2) and remove. Reinstall screw and tighten until hand-tight.

Installation

Tightening Torque for jockey wheel mount (1), **86 10 11AZ**

Tightening Torque for wiring harness mount (2), **86 10 12AZ**

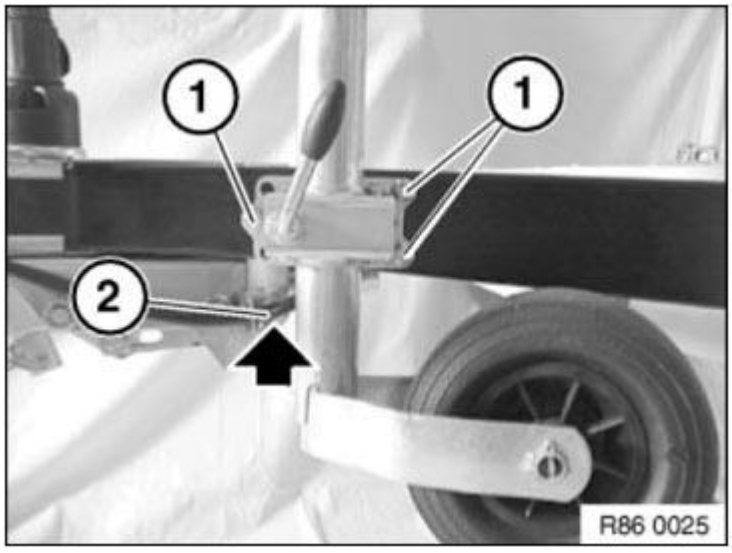


Fig. 75: Locating Wiring Harness Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw on socket holder (1) and remove. Cut through strap (2) and lay wiring harness to one side. Pull gaiter (3) in direction of arrow.

Installation

Use new self-locking nut.

Tightening Torque, **86 10 13AZ**

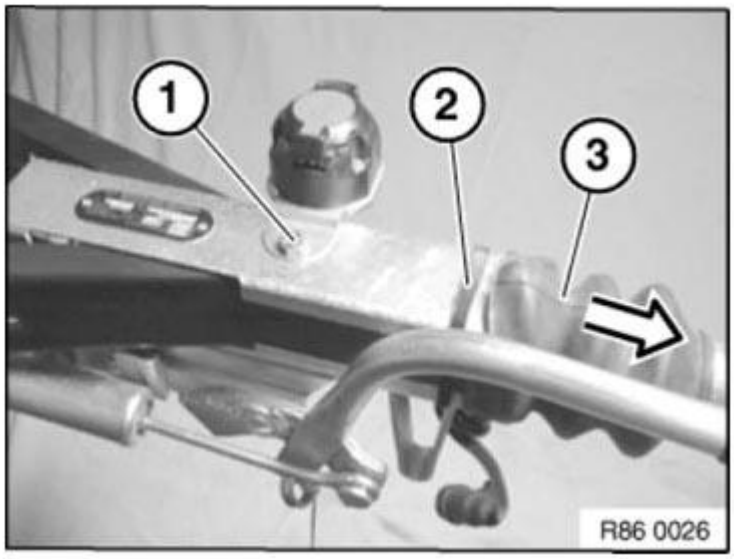


Fig. 76: Pulling Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Remove protective caps (1).

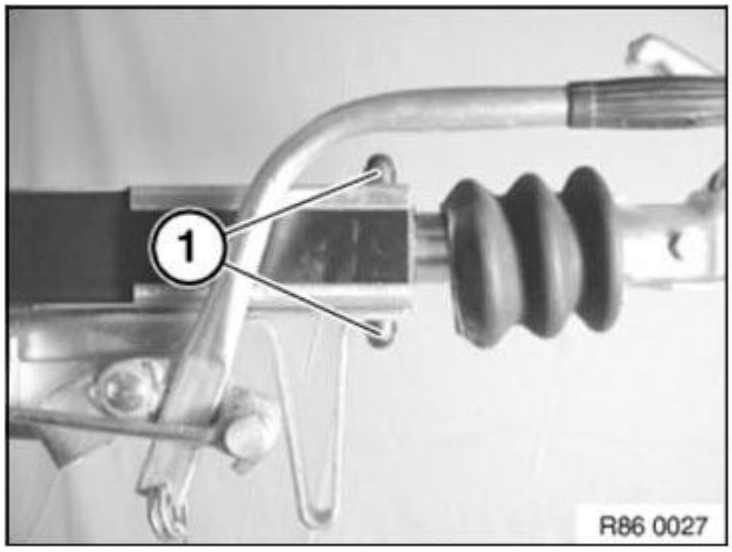


Fig. 77: Identifying Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and remove.

Installation

Use new self-locking nuts.

Tightening Torque, **86 10 14AZ**

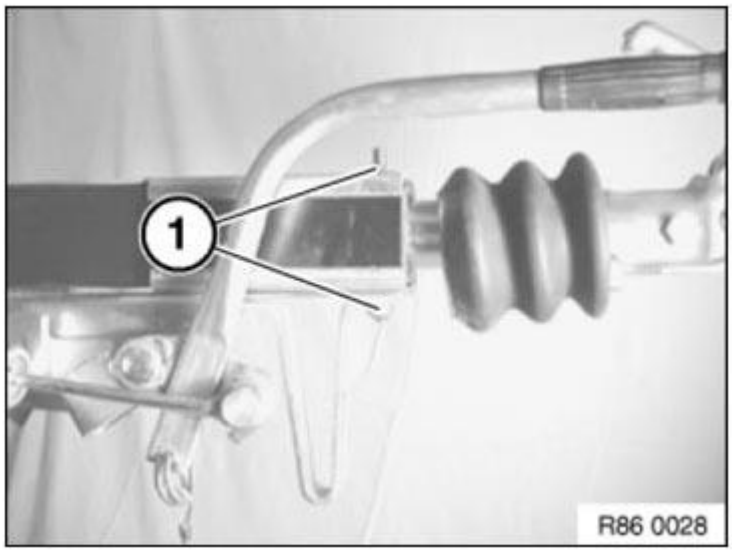


Fig. 78: Identifying Caps Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Tilt top reversing housing (1) in direction of arrow towards rear. Slide out top reversing housing (1) and bottom

reversing housing with handbrake lever unit (2) in direction of arrow towards rear.

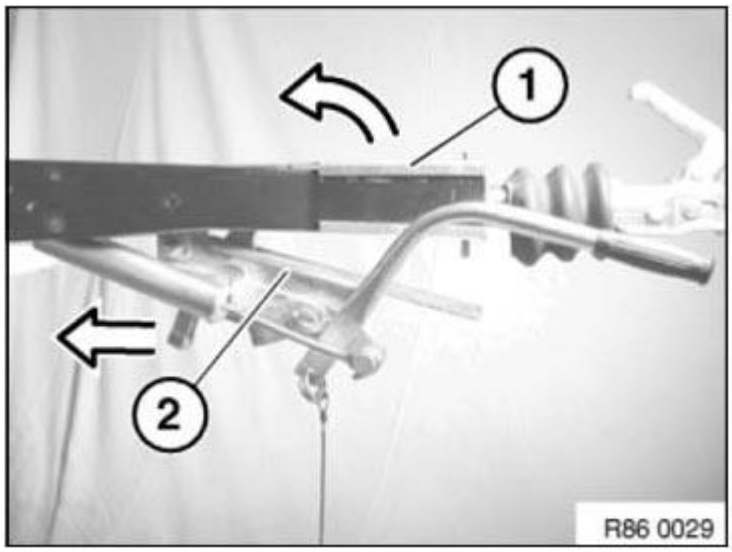


Fig. 79: Sliding Out Top Reversing Housing And Bottom Reversing Housing With Handbrake Lever Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Remove holder (1) towards bottom.

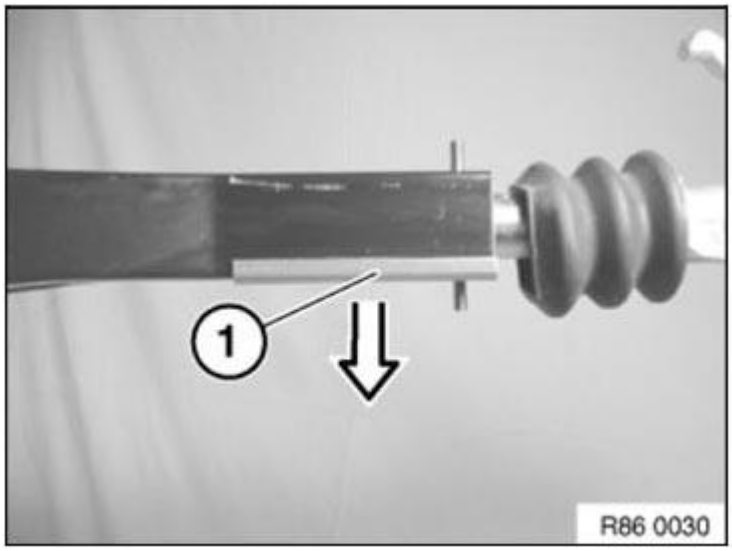


Fig. 80: Removing Socket Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Pull drawbar member (1) in direction of arrow and pull out overrunning equipment (2) in direction of arrow towards front.

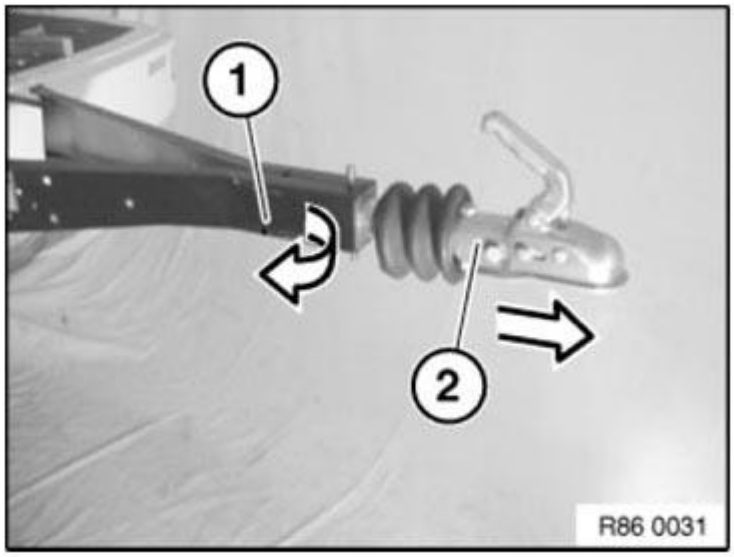


Fig. 81: Pulling Drawbar Member And Overrunning Equipment
Courtesy of BMW OF NORTH AMERICA, INC.

Remove spacer tubes (1) and threaded pins (2) from guide bush (3).

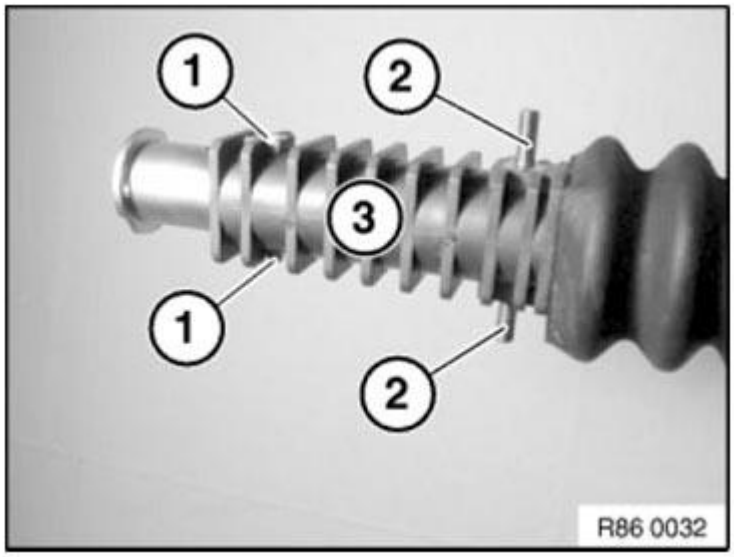


Fig. 82: Identifying Spacer Tubes And Threaded Pins Of Guide Bush
Courtesy of BMW OF NORTH AMERICA, INC.

Press pins (1) inwards. Detach counter support (2) and guide bush (3).

Maintenance

Grease tow tube (4) and attach guide bush (3).

Installation

Secure counter support (2) with new clamping sleeves to tow tube (4).

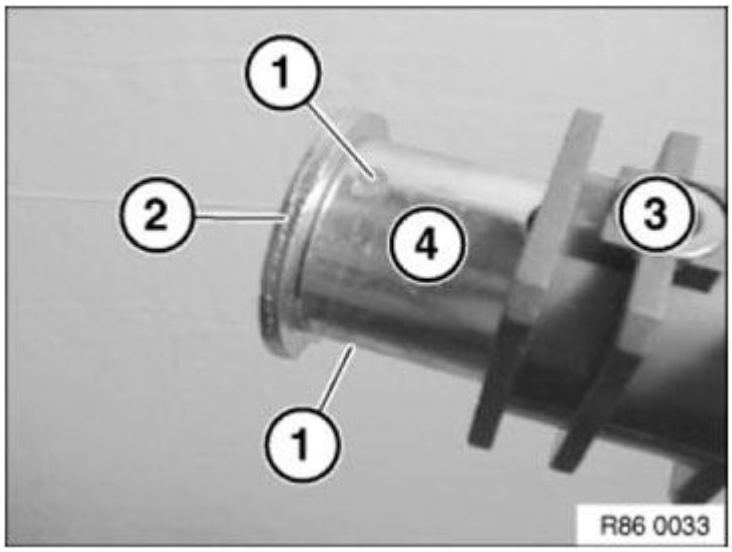


Fig. 83: Identifying Guide Bush, Tow Tube And Counter Support With Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Insert spacer tubes (1) and threaded pins (2) in guide bush (3).

Make sure spacer tubes (1) are correctly seated in guide bush (3).

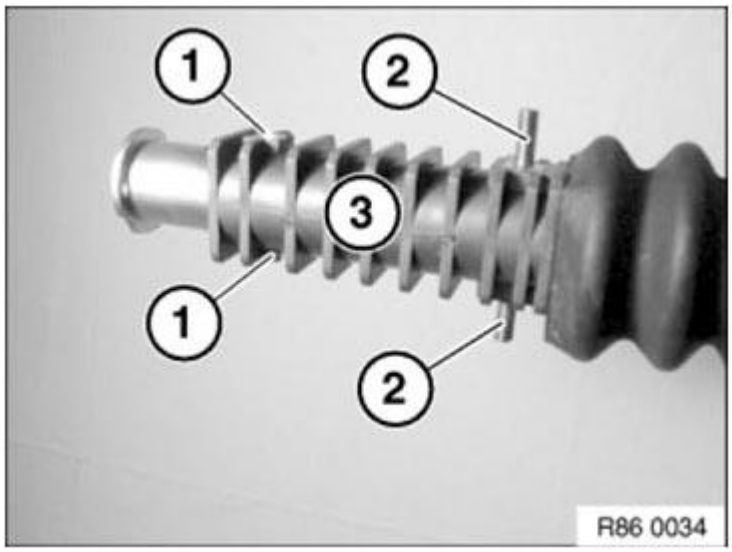


Fig. 84: Identifying Spacer Tubes And Threaded Pins With Guide Bush
Courtesy of BMW OF NORTH AMERICA, INC.

Using a screwdriver, link spacer tubes (1) and shock absorber located in tow tube. This ensures that the shock

absorber remains in the correct installation position. Pull drawbar member (2) in direction of arrow and push in overrunning equipment (3) in direction of arrow towards rear.

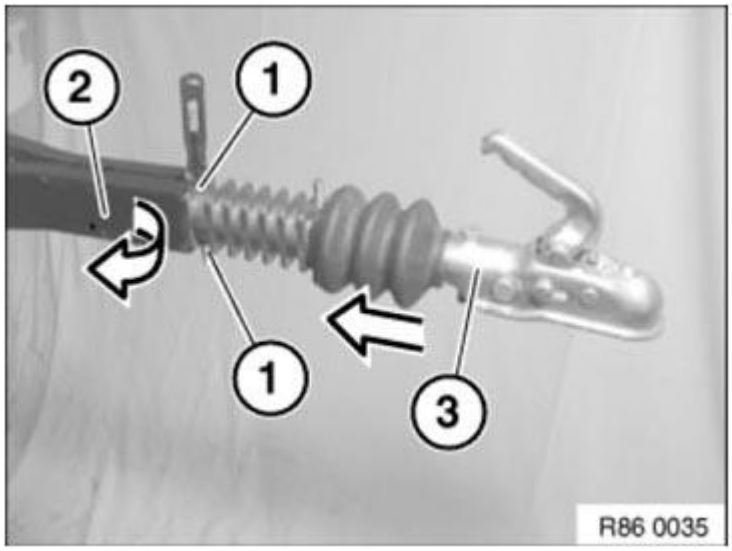


Fig. 85: Pulling Drawbar Member
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING PLASTIC BUSH/METAL BUSH

Release countersunk metal screws (1).

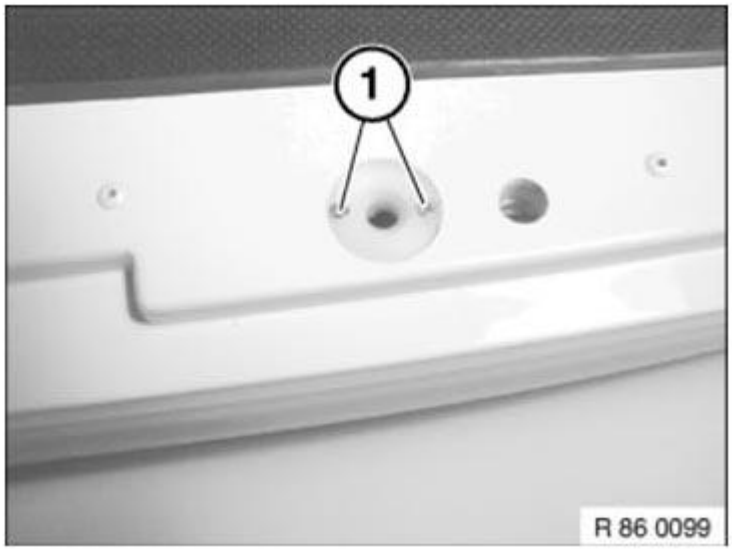


Fig. 86: Identifying Countersunk Metal Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out plastic bush/metal bush (1) with a screwdriver.

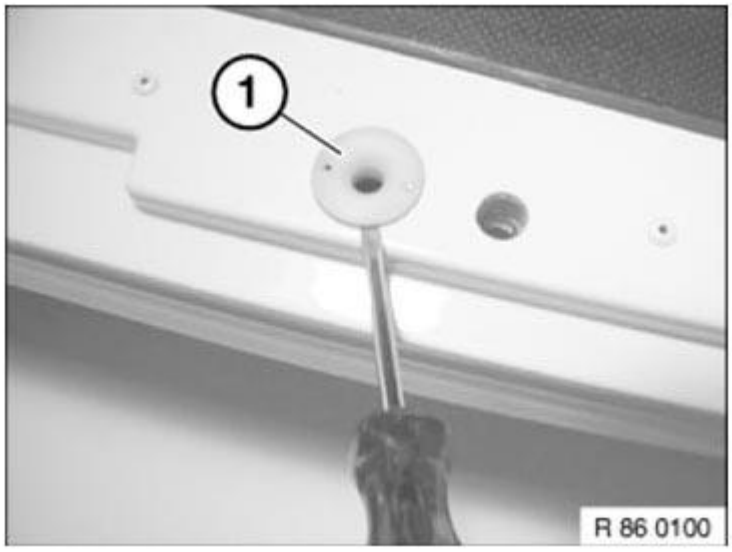


Fig. 87: Removing Plastic Bush/Metal Bush With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING REAR SUPPORTS AND BRACKET

Release screws (1) and remove rear support (2) from bracket (3).

Installation

Tightening Torque, **86 10 26AZ**

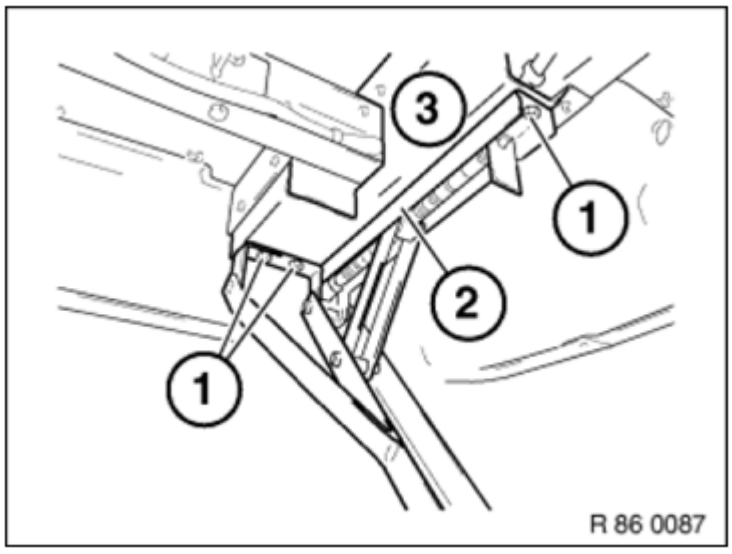


Fig. 88: Identifying Rear Support Of Bracket With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cable holders (1) from bracket (2)

Release screws (3) on left and right sides of bracket (2). Drill out rivets (4) from underside of platform. Drill out rivets (5) from upper side of platform.

Installation

Tightening Torque, **86 10 27AZ**

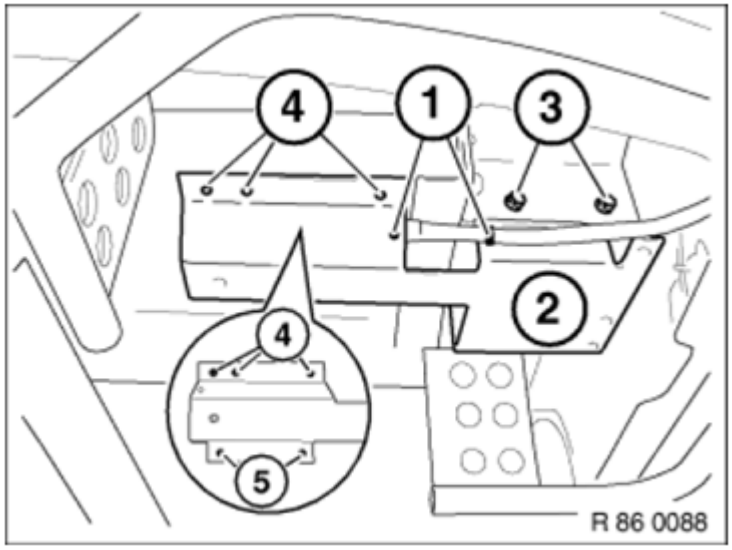


Fig. 89: Identifying Bracket With Cable Holder, Screws And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Feed cable for rear light (1) through opening (2). Fit cable holders (4) in holes (3).

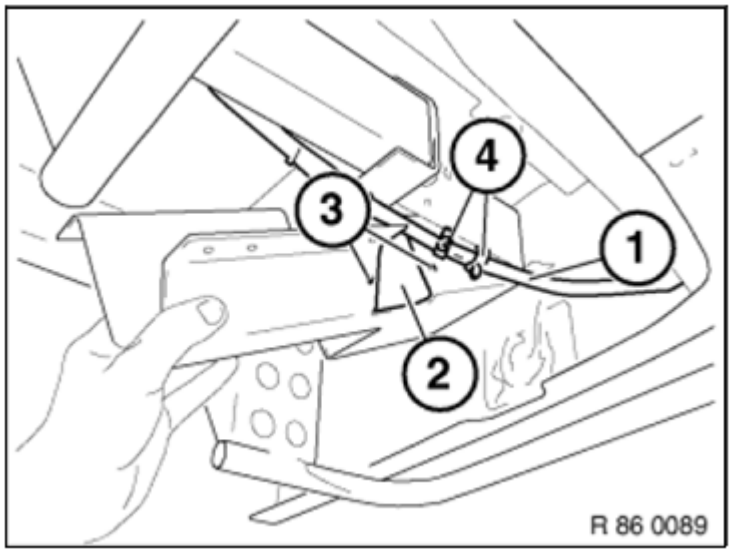


Fig. 90: Identifying Rear Light And Cable Holder

Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING REFLECTING REAR LIGHT

From rear side of GFK apron, drive out plastic pins (1) with a drift.

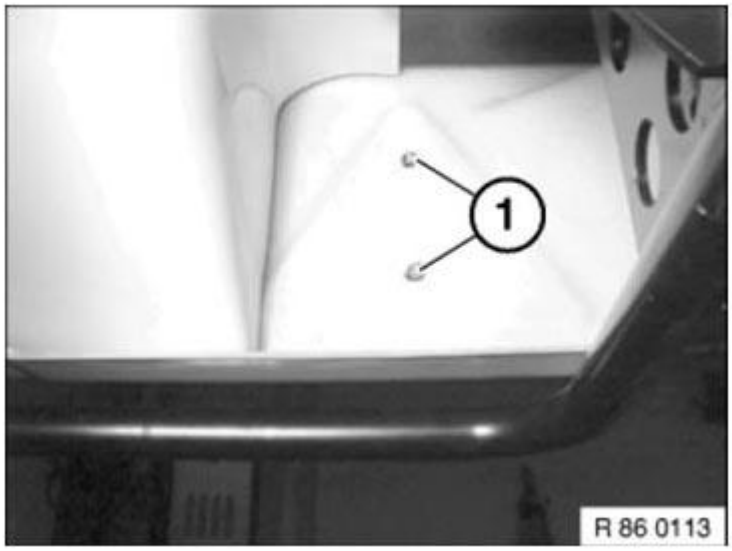


Fig. 91: Identifying Plastic Pin Of Drift
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING REST ON LOADING RAMP, LEFT, RIGHT AND CENTER

CAUTION: Before drilling out rivets, drive in rivet pins with a punch.

Drill out rivets (1). Remove rest (2) towards front.

Installation

Stick on new sealing tape.

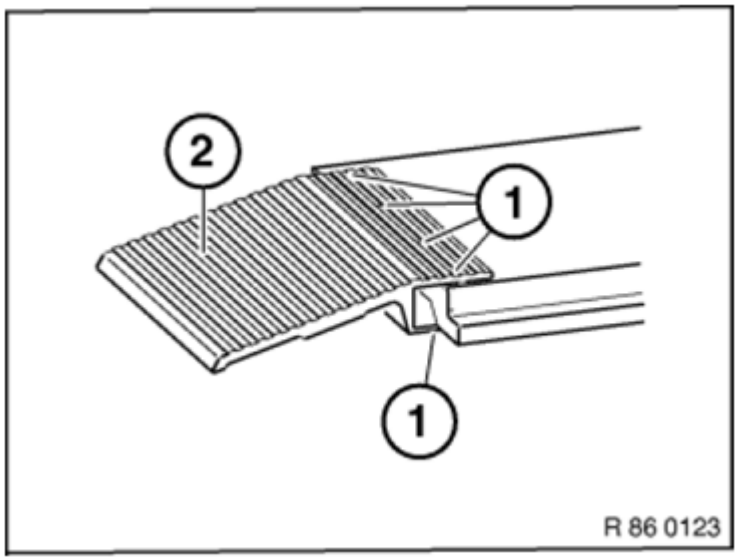


Fig. 92: Identifying Rivets And Rest
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING SHOCK ABSORBER FROM OVERRUNNING EQUIPMENT

Check the overrunning equipment shock absorber while installed to ascertain whether it needs to be replaced.

Apply handbrake. Push in and pull out tow ball end by hand. If it is very easy to pull out the tow ball end, the shock absorber must be replaced.

NOTE: Complete disassembly of overrunning equipment and guide bush, refer to DISASSEMBLY OF OVERRUNNING EQUIPMENT.

Release screw (1) and remove. Pull out internal shock absorber (2) from opening in tow tube (3) towards rear.

Installation

Tightening Torque, **86 10 15AZ**

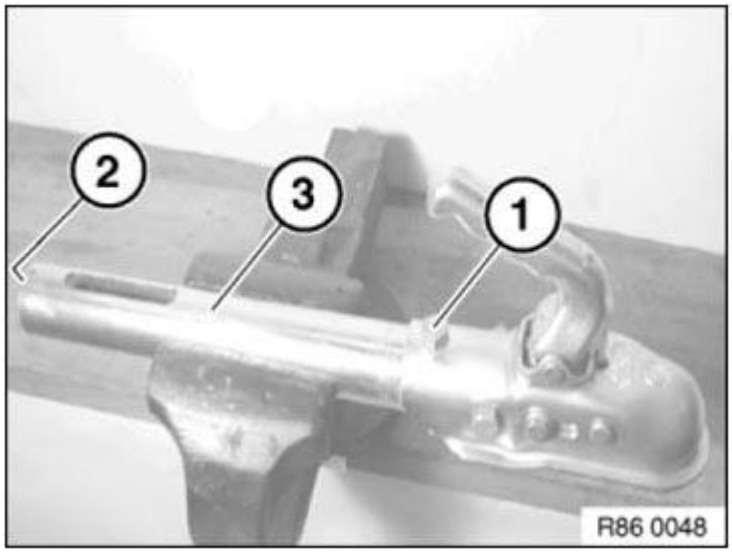


Fig. 93: Identifying Shock Absorber, Tow Tube With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Push in new shock absorber (1) as shown in illustration through opening in tow tube (2).

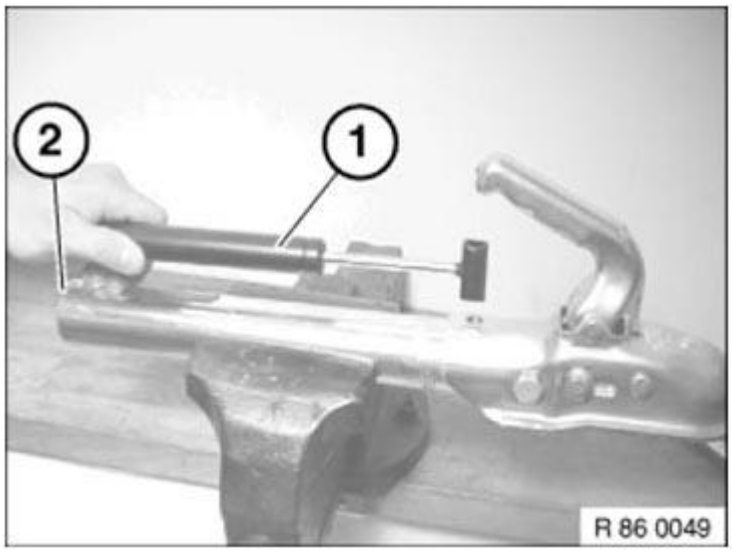


Fig. 94: Pushing Shock Absorber Through Opening In Tow Tube
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING TRAILING ARM, REMOVING AND INSTALLING OR REPLACING MOUNTING

Replace bearing in trailing arm if there is play in trailing arm.

NOTE: Remove brake cable, refer to REMOVING BRAKE SHOES.

Remove shock absorber and coil spring, refer to REMOVING AND INSTALLING COIL SPRING.

Release screws (1) between wheel brake (2) and trailing arm (3) and remove complete wheel brake (2).

Installation

Do not reuse screws (1). Use only the socket-head cap screws intended for this purpose. Stamped arrow on the reverse side of the brake carrier points in the direction of travel and stands at the 12 o'clock position.

Tightening Torque, **86 10 24AZ**

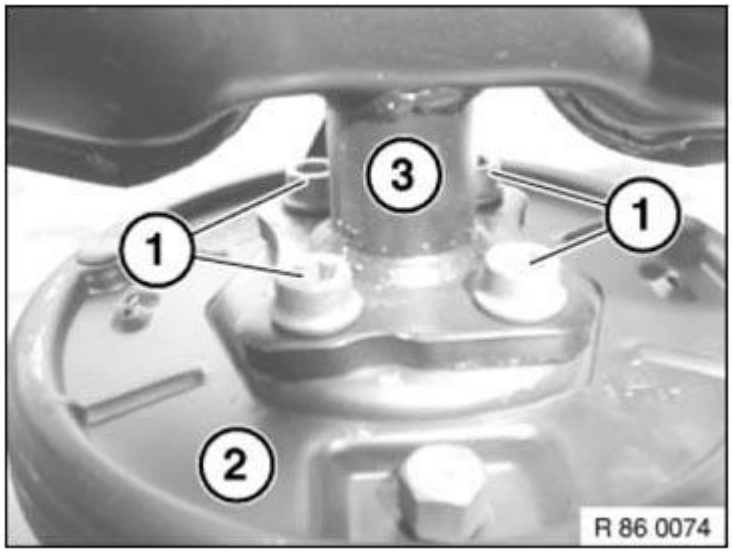


Fig. 95: Identifying Screws Between Wheel Brake And Trailing Arm
Courtesy of BMW OF NORTH AMERICA, INC.

The trailing arm folds down once the coil spring on the arm has been released.

No persons should be located underneath trailing arm. Risk of injury!

Release screws (1, 2). Use assembly hole (3) to release screw connection (2).

Press out screws (1, 2) with a mandrel.

Installation

Use new self-locking nut.

Tightening Torque, **86 10 25AZ**

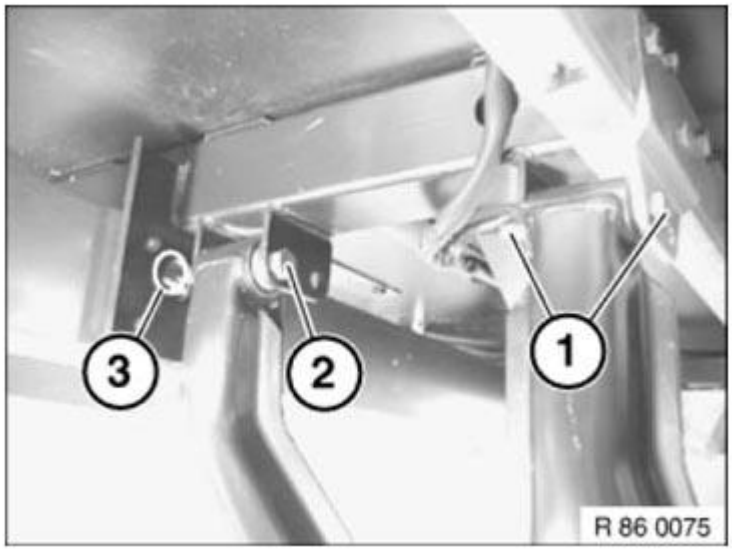


Fig. 96: Identifying Trailing Arm Hole With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Mount trailing arms (1) at rear mounts (4) only, viewed in direction of travel, with screws (2, 3).

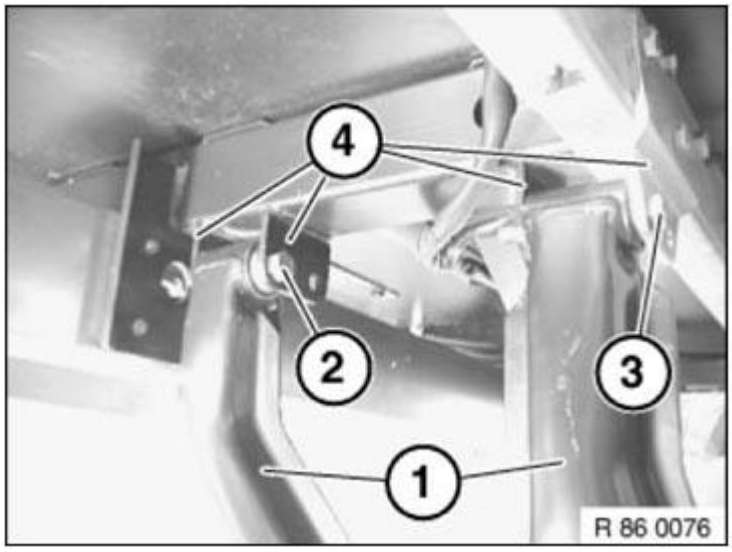


Fig. 97: Identifying Trailing Arms At Rear Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

Do not damage trailing arm with drill when drilling.

Drill spacer tube (1) with a 4 mm drill at three evenly offset points. Place drill as near as possible to compensating bush (2).

Bores relieve tension on material of spacer tube.

Press out spacer tube (1) and compensating bush (2) with a drift.

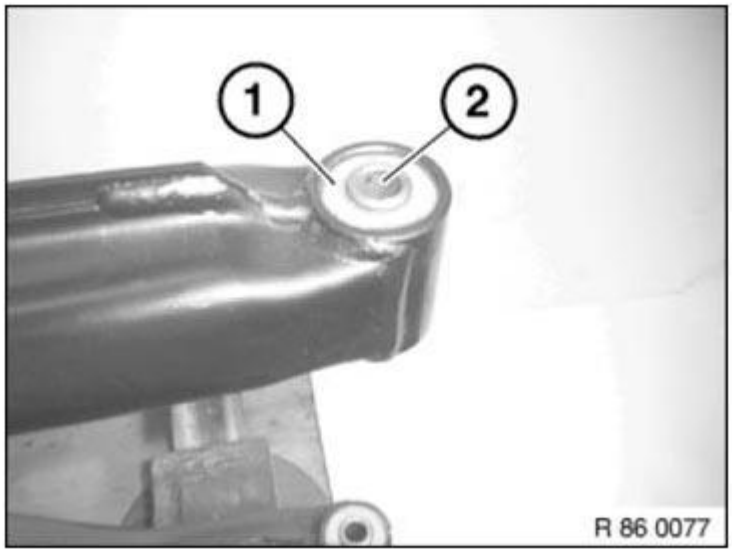


Fig. 98: Identifying Spacer Tube And Bush
Courtesy of BMW OF NORTH AMERICA, INC.

Grease new spacer tube (1) for installation with Syntheso Glep I. Drive new spacer tube (1) with a rubber mallet into trailing arm mount (2).

Installation

Make sure spacer tube (1) is not tilted when driven in.

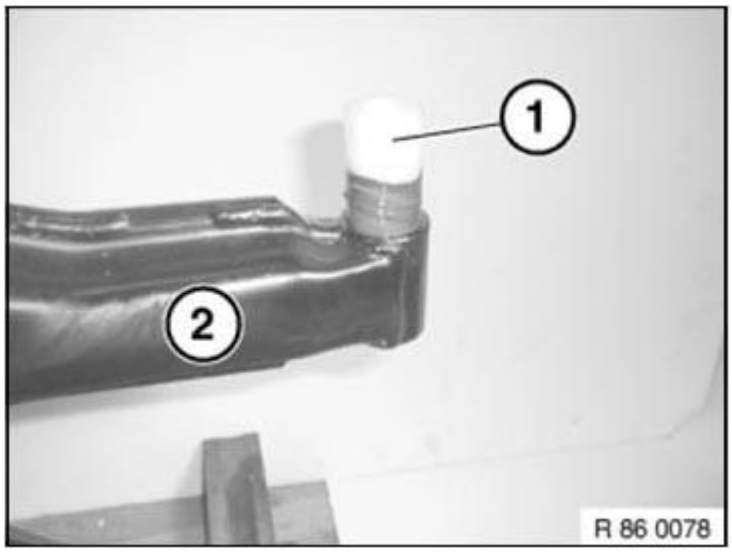


Fig. 99: Identifying Trailing Arm Mount And Spacer Tube

Courtesy of BMW OF NORTH AMERICA, INC.

Drive compensating bush (1) with a drift into spacer tube (2). Set compensating bush (1) and spacer tube (2) centrally in trailing arm mount (3).

Installation

Make sure compensating bush (1) is not tilted when driven in.

Install coil spring, refer to **REMOVING AND INSTALLING COIL SPRING.**

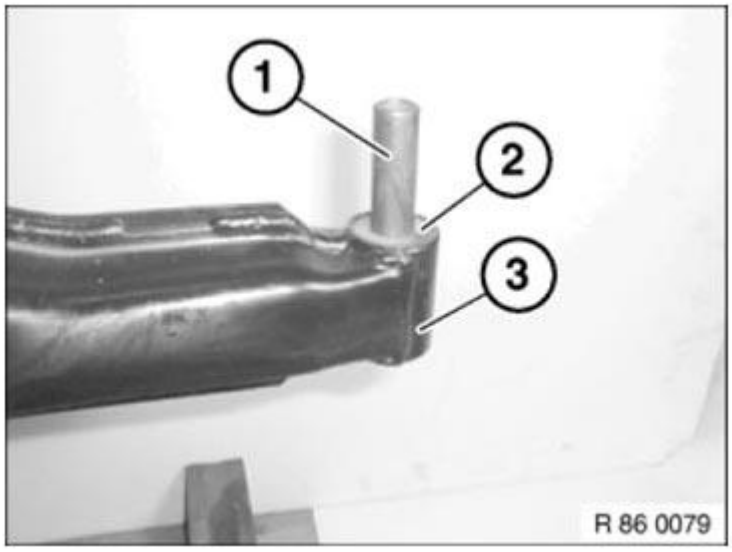


Fig. 100: Identifying Compensating Bush With Spacer Tube And Trailing Arm Mount
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING WHEEL BEARING

The angular-contact ball bearings do not require maintenance and have lifetime lubrication. The bearings cannot be readjusted.

Remove brake drum, refer to **REMOVING BRAKE SHOES.**

Lever out both snap rings (1).

Installation

Replace expanded or damaged snap rings (1). Ensure correct seating.

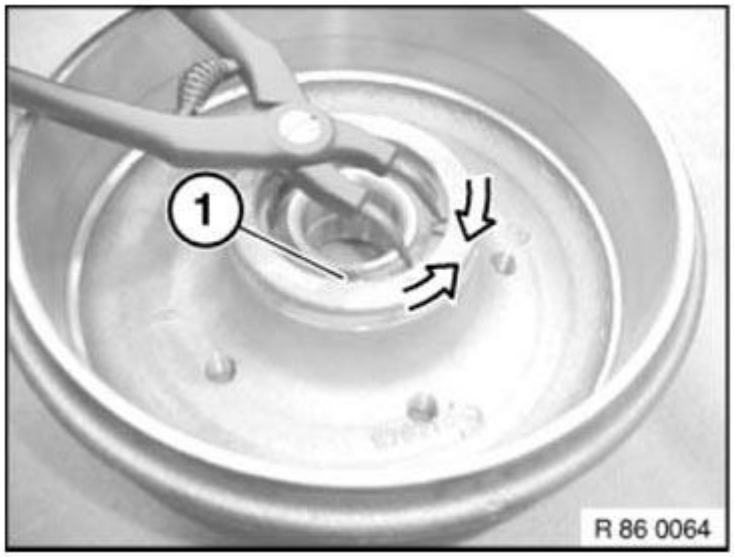


Fig. 101: Removing Snap Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Press out wheel bearing with special tool 24 1 010.

CAUTION: Do not reuse old wheel bearing.

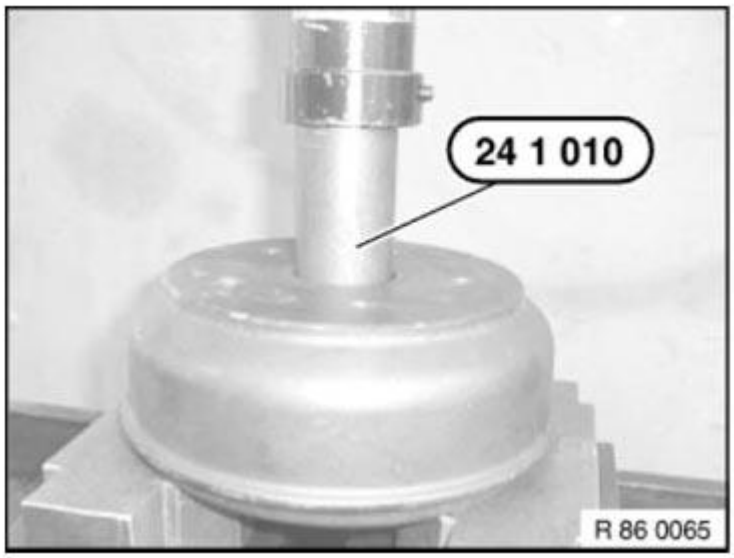


Fig. 102: Pressing Wheel Bearing Using Special Tool 24 1 010
Courtesy of BMW OF NORTH AMERICA, INC.

Place new wheel bearing (1) with lathe-turned end (2) in center of bore in brake drum (3).

Before pressing in new wheel bearing, check bearing seat for possible damage.

Make sure wheel bearing is not tilted when pressed in.



Fig. 103: Identifying Wheel Bearing With Lathe-Turned End And Brake Drum
Courtesy of BMW OF NORTH AMERICA, INC.

Press in new wheel bearing (1) with special tool 23 2 150 and 33 1 374.

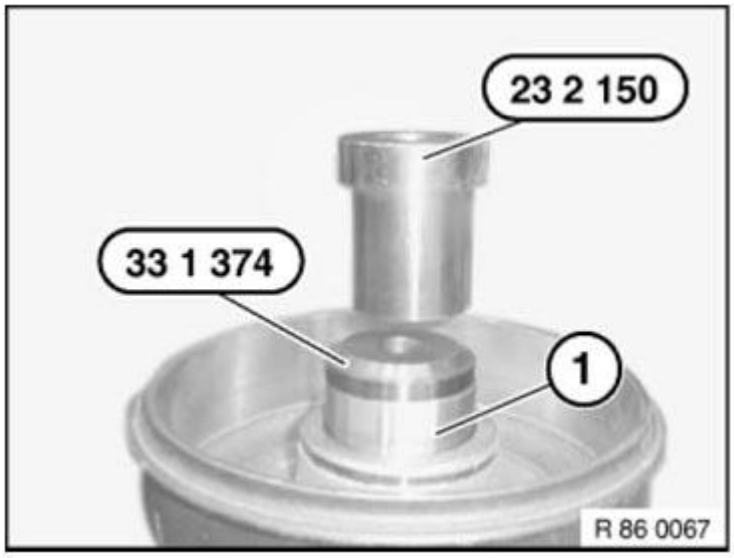


Fig. 104: Pressing Wheel Bearing Using Special Tool 23 2 150 And 33 1 374
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REMOVING WOODEN REST ON LOADING RAMP, LEFT, RIGHT AND CENTER

CAUTION: Before drilling out rivets, drive in rivet pins with a punch.

Drill out rivets (1).

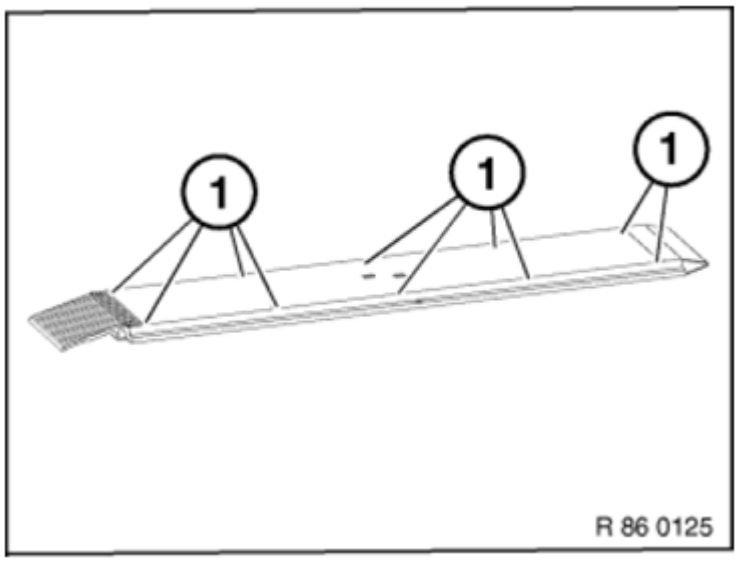


Fig. 105: Identifying Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REPAIR WORK ON GFP COMPONENTS WITH GELCOAT SURFACE

Scratches in Gelcoat surface

Scratches in the Gelcoat surface which do not allow the GFP mat structure to show through can be touched up. Sand out scratches with water and 800 wet sandpaper. Then sand with water and 2000 wet sandpaper. Prepare repair area for polishing.

Cracks in Gelcoat surface

Sand the cracked area in a V shape beyond the end of the crack and clean.

There must be no grease or oil residues, moisture or dust remaining in the crack to be repaired.

When repairing holes such as e.g. rivet holes, deburr hole edge and heavily roughen large area around hole.

Prepare required amount of Gelcoat paste with 2% hardener and fill prepared repair area with spatula.

Apply Gelcoat paste in several applications to repair areas.

Adhere to mixture ratio (2 parts hardener to 100 parts Gelcoat paste) as precisely as possible.

Too much added hardener slows down the hardening time and changes the paint color.

The hardening period is at least 12 hours at 20° C room temperature.

The hardening period can be longer depending on the temperature.

Once the Gelcoat paste has hardened, sand the touched-up area with water and 800 wet sandpaper. Sand with water and 2000 wet sandpaper and prepare for polishing.

86 10... REPLACING 12 VOLT SOCKET

From underside of platform, cut through cable tie (1) and remove. Disconnect plug with grommet (2) from socket (3) towards bottom.

Installation

Position all seals correctly. Also secure plug with grommet (2) using new cable tie to other socket.

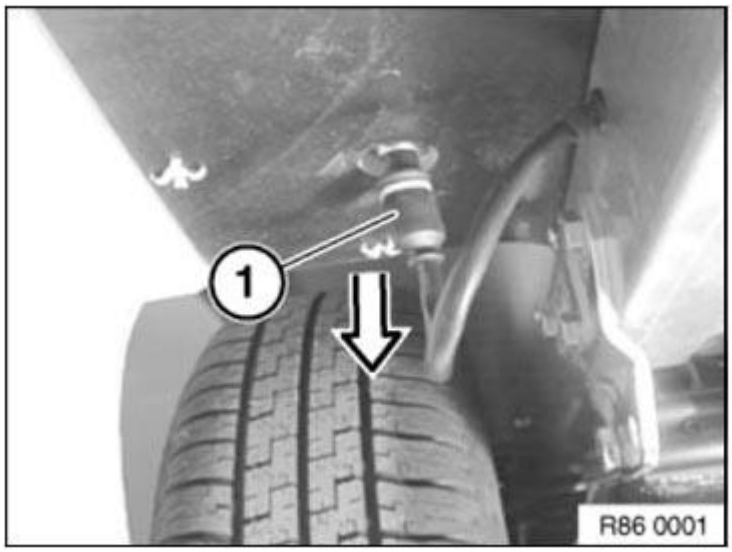


Fig. 106: Removing Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

On upper side of platform, release Phillips screws (1) on mounting bracket (2).

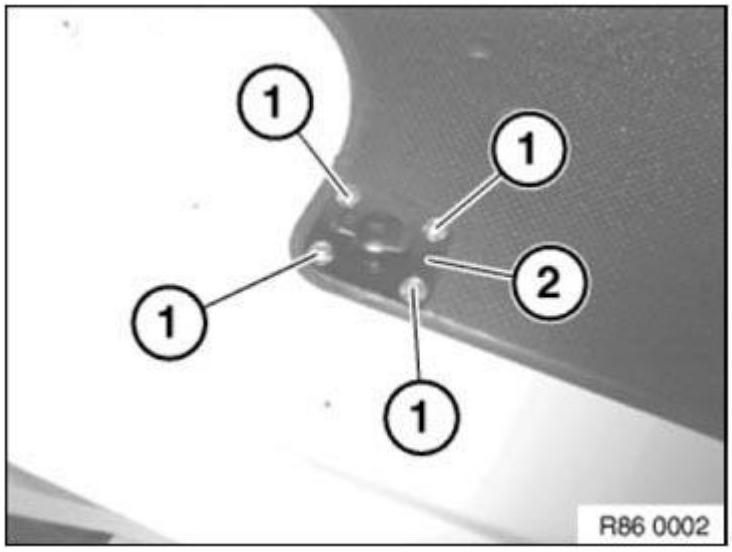


Fig. 107: Identifying Phillips Screws On Mounting Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing compound along white marking (1).

Installation

Make sure cable is correctly laid.

Use Sikaflex 221 as sealing compound.

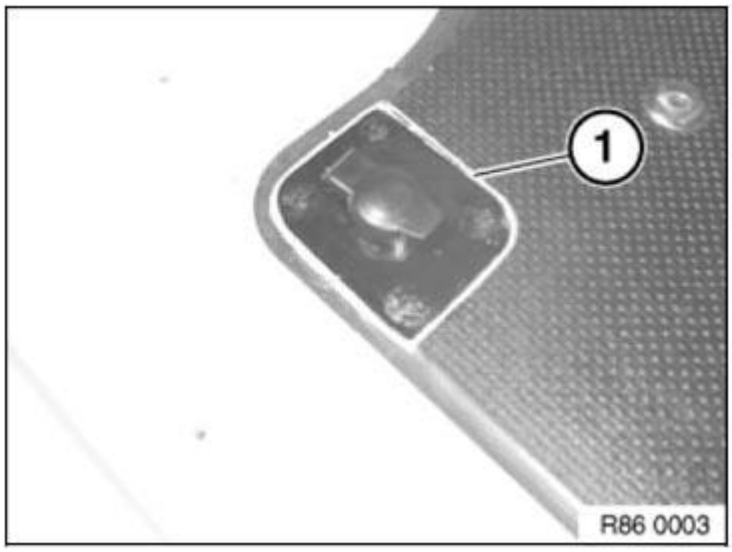


Fig. 108: Identifying White Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Grip under mounting bracket (1) with a screwdriver and lever out bracket (1) towards top. Remove bracket (1)

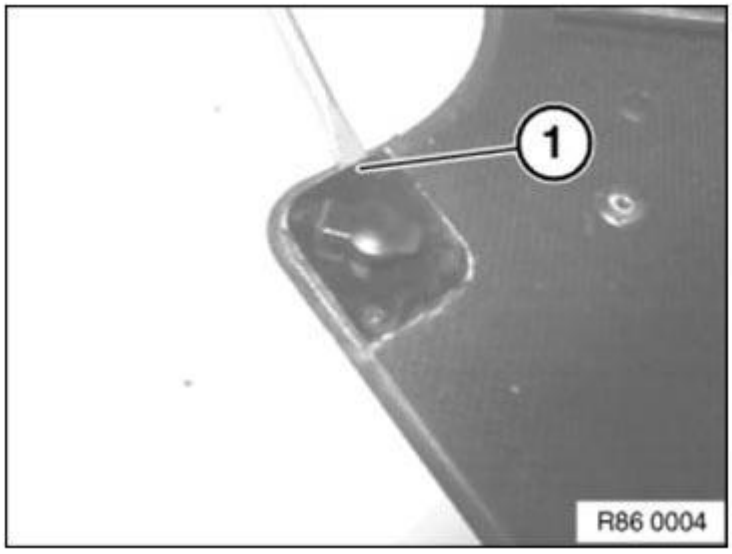


Fig. 109: Removing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1). Remove socket (2) from mounting bracket (3).

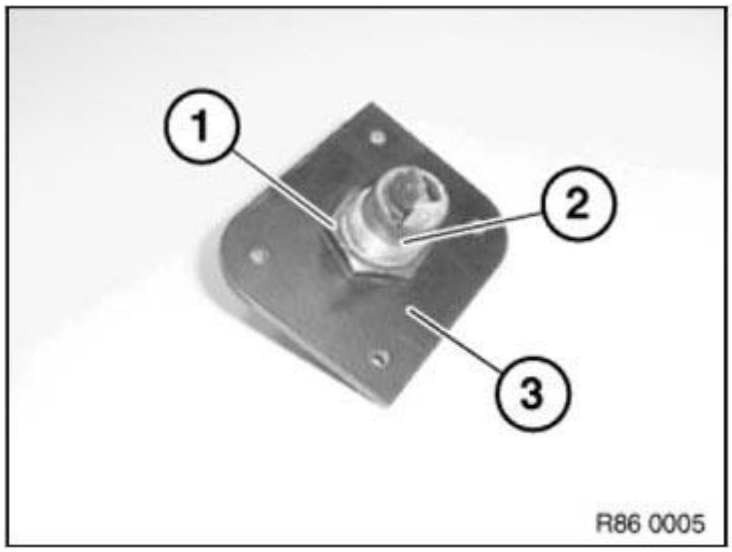


Fig. 110: Identifying Socket, Mounting Bracket With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REPLACING BAR

NOTE: Disassembly of lashing eyes, refer to REPLACING LASHING PLATE AND LASHING EYE.

Remove lashing eyes (1).

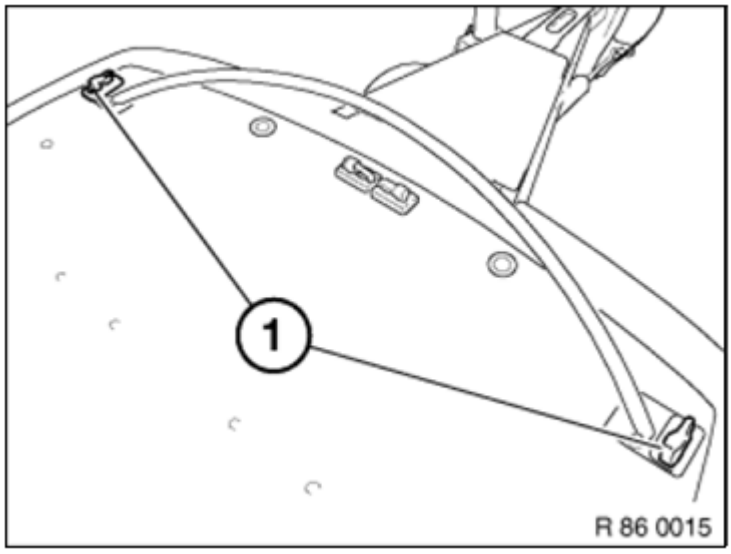


Fig. 111: Identifying Lashing Eyes
Courtesy of BMW OF NORTH AMERICA, INC.

Remove protective caps (1) on left/right.

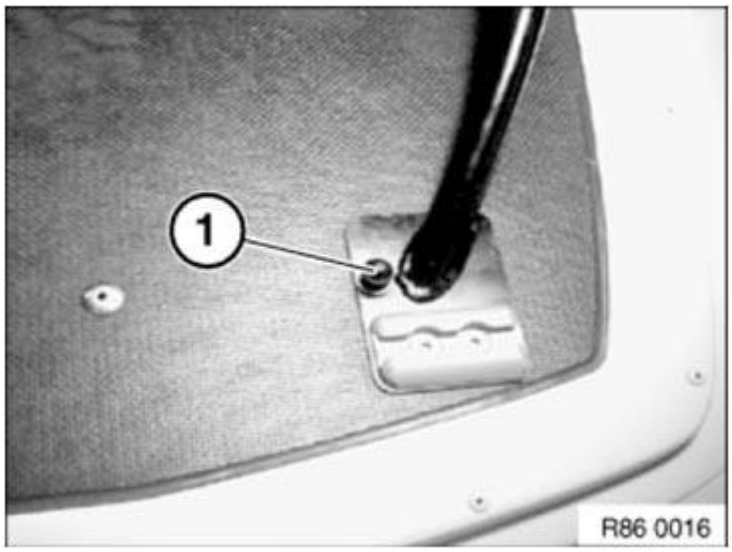


Fig. 112: Identifying Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon screws (1) and countersunk head screws (2) on left/right.

Remove bar.

Installation

Tightening Torque for hexagon screw **86 10 2AZ**

Tightening Torque for countersunk head screw, **86 10 3AZ**

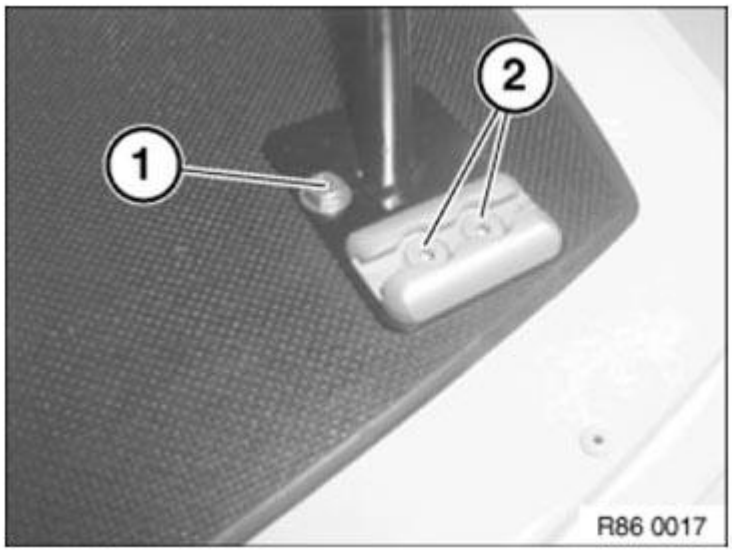


Fig. 113: Identifying Hexagon Screw And Countersunk Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REPLACING DRAWBAR MEMBERS, LEFT AND RIGHT

NOTE: Disassembly of overrunning equipment, refer to DISASSEMBLY OF OVERRUNNING EQUIPMENT.
Remove complete brake pull rod.
Removal of position light cable, refer to REPLACING LICENSE PLATE LIGHT.

Release screws (1) on cross-member (2).

Pull out cross-member (2) towards rear.

Installation

Tightening Torque, **86 10 16AZ**

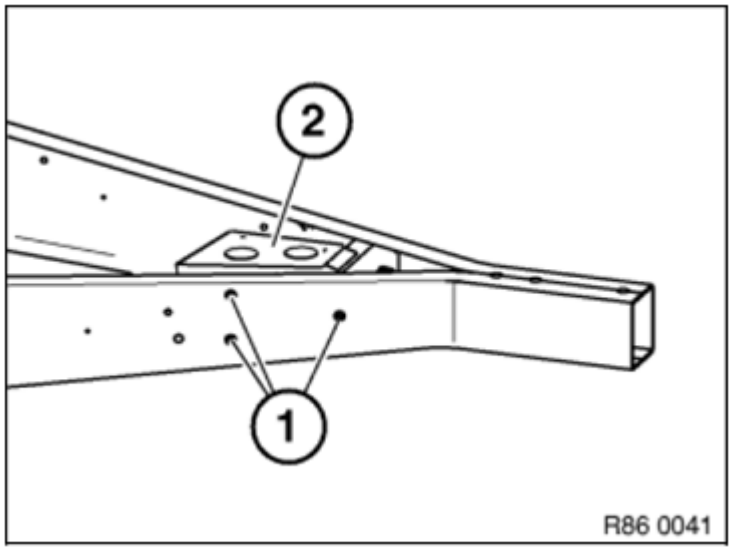


Fig. 114: Identifying Screws On Cross-Member
Courtesy of BMW OF NORTH AMERICA, INC.

Release countersunk head screws (1) and remove.

Installation

Tightening Torque, **86 10 3AZ**

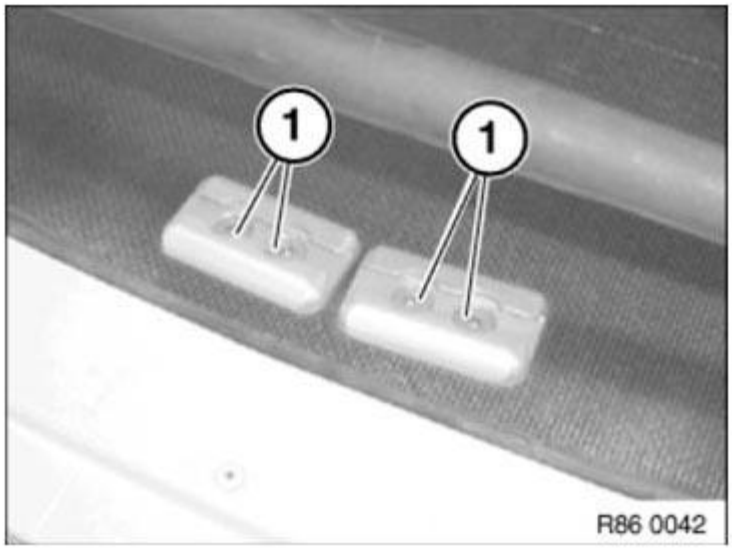


Fig. 115: Identifying Countersunk Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cable holder (1) and remove wiring harness (2) from drawbar member (3).

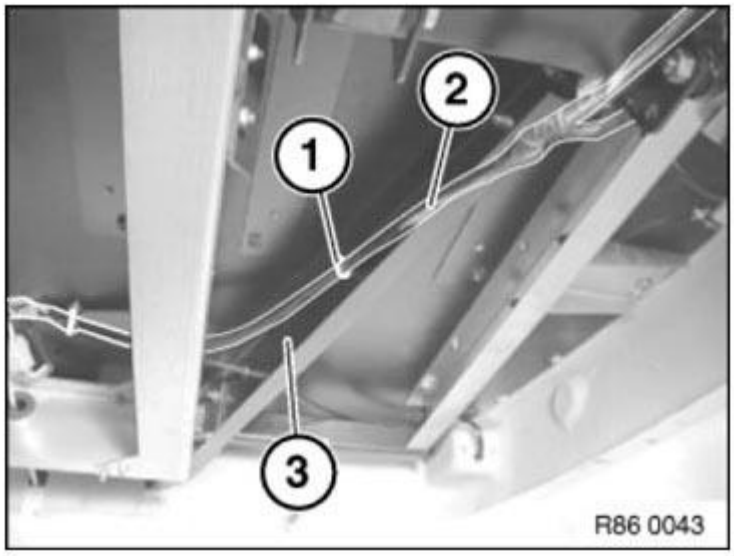


Fig. 116: Identifying Cable Holder With Wiring Harness On Drawbar Member
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cable (1) from position light housing (2). Pull out cable (1) through drawbar member aperture (3).

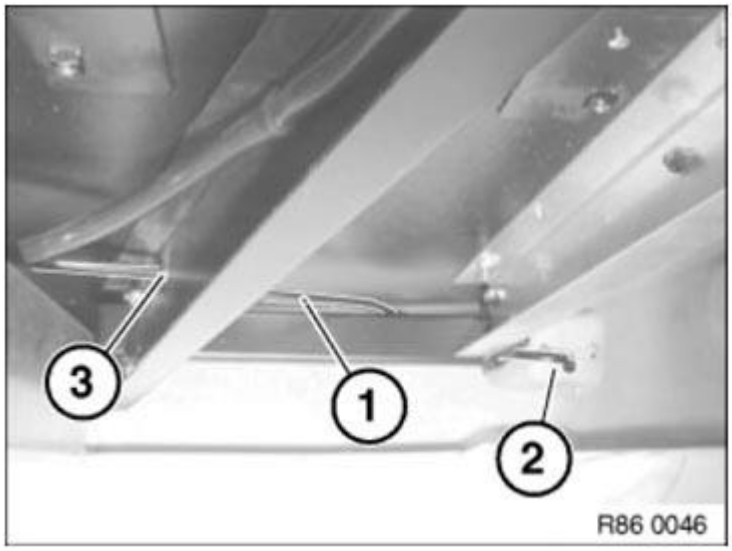


Fig. 117: Identifying Cable, Light Housing And Drawbar Member Aperture
Courtesy of BMW OF NORTH AMERICA, INC.

Release all screws on cross-member (1) and remove cross-member (1).

If necessary, release screws on mounting brackets (2) and remove cross-members (3).

Installation

Tightening Torque, **86 10 17AZ**

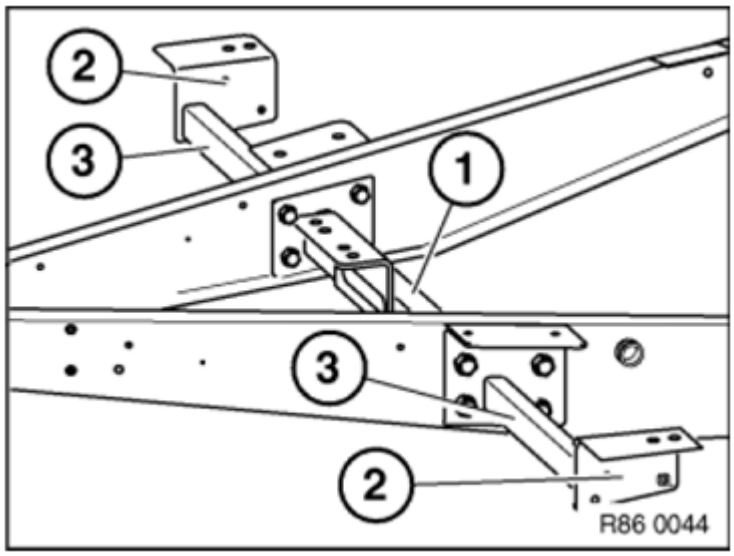


Fig. 118: Identifying Cross-Members With Screws On Mounting Brackets
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bolt (1). Grip nut from rear through assembly hole (2) in crossmember.

Installation

Use new self-locking nuts.

Tightening Torque, **86 10 18AZ**

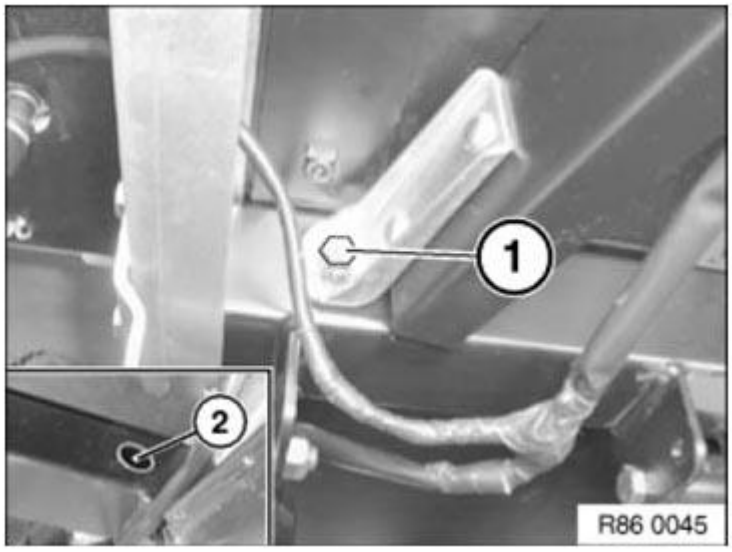


Fig. 119: Identifying Rear Through Assembly Hole In Crossmember With Bolt

Courtesy of BMW OF NORTH AMERICA, INC.

Tilt drawbar member (1) down in direction of arrow A and pull out towards rear in direction of arrow B.

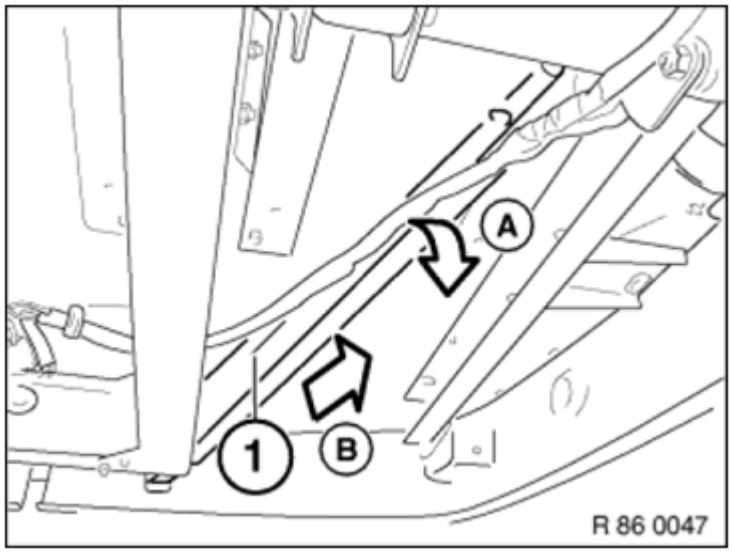


Fig. 120: Tilting Drawbar Member
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REPLACING GAITER

Position brake lever fully towards rear.

Release screws (1) and (2) and remove.

Pull off towing attachment (3) in direction of arrow.

Installation

Tightening Torque, **86 10 15AZ**

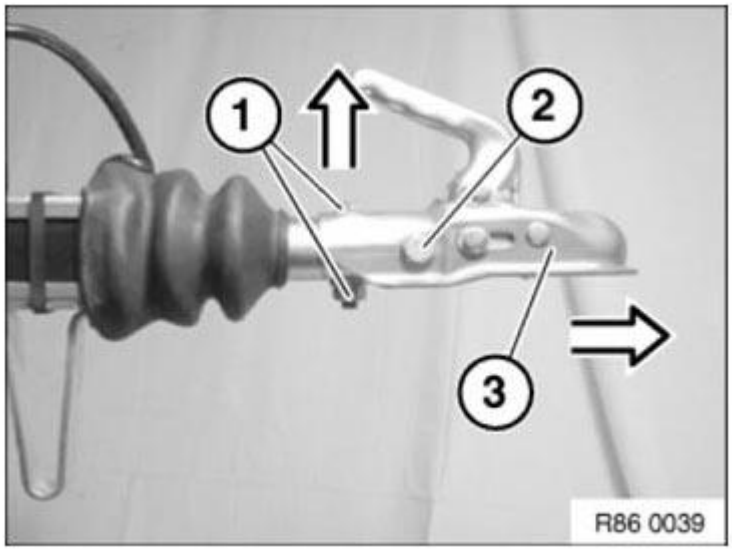


Fig. 121: Pulling Off Towing Attachment
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off gaiter (1) in direction of arrow.

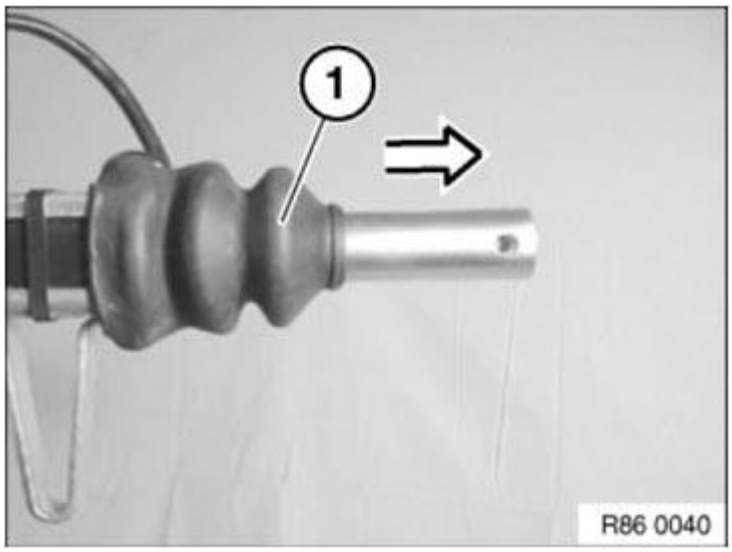


Fig. 122: Pulling Off Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REPLACING HOLDER FOR CHOCK

Pull bar (1) down in direction of arrow A. Pull out chock (2) in direction of arrow B at an angle towards bottom.

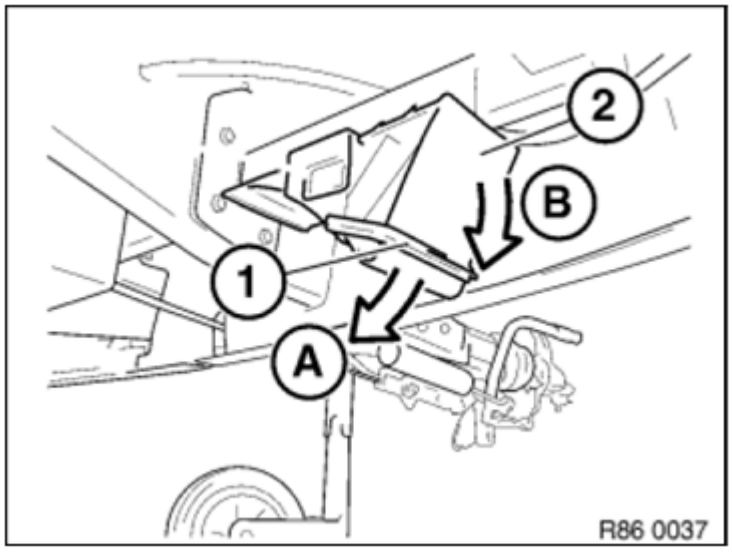


Fig. 123: Pulling Bar And Chock
Courtesy of BMW OF NORTH AMERICA, INC.

Release and unscrew cheese head tapping screws (1) on holder (2).

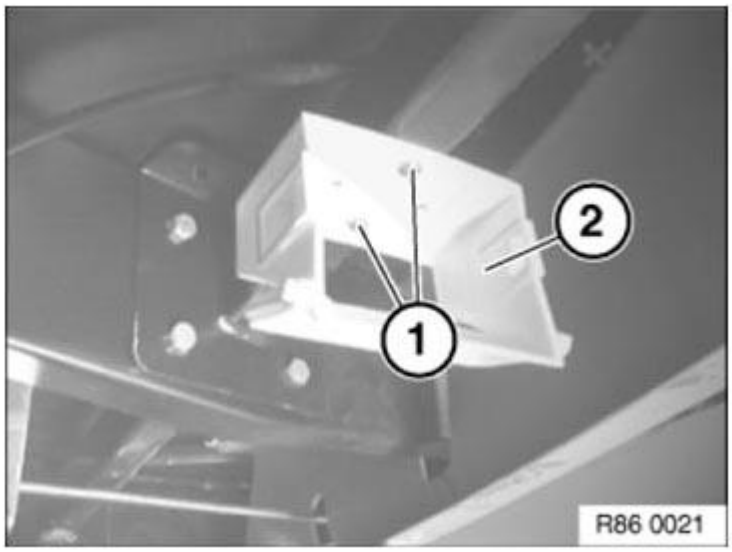


Fig. 124: Identifying Cheese Head Tapping Screws On Holder
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REPLACING LASHING PLATE AND LASHING EYE

Releasing lashing eye

Pull spring bar (1) upwards in direction of arrow A. Slide lashing eye (3) in direction of arrow B and remove from lashing plate (2).

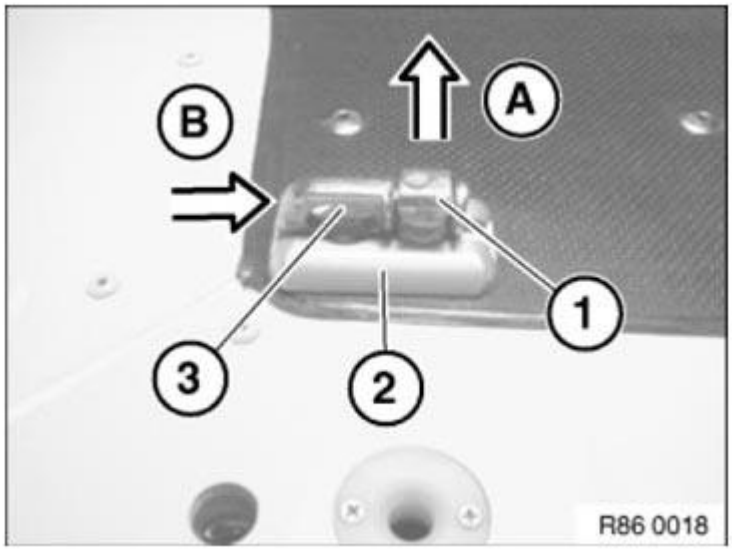


Fig. 125: Pulling Spring Bar
Courtesy of BMW OF NORTH AMERICA, INC.

Release countersunk head screws (1) and remove lashing plate.

Installation

Tightening torque, **86 10 3AZ**

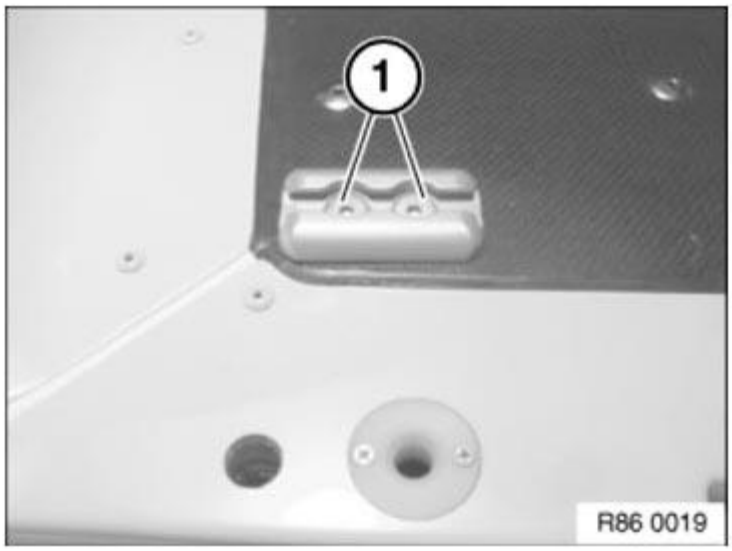


Fig. 126: Identifying Countersunk Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Locking lashing eye

Position lashing eye (1) on circular openings on lashing plate (2). Press lashing eye (1) in direction of arrow A

into lashing plate (2). In this position, slide lashing eye (1) in direction of arrow B.

Spring bar (3) snaps in, anchors and secures lashing eye (1) in lashing plate (2).

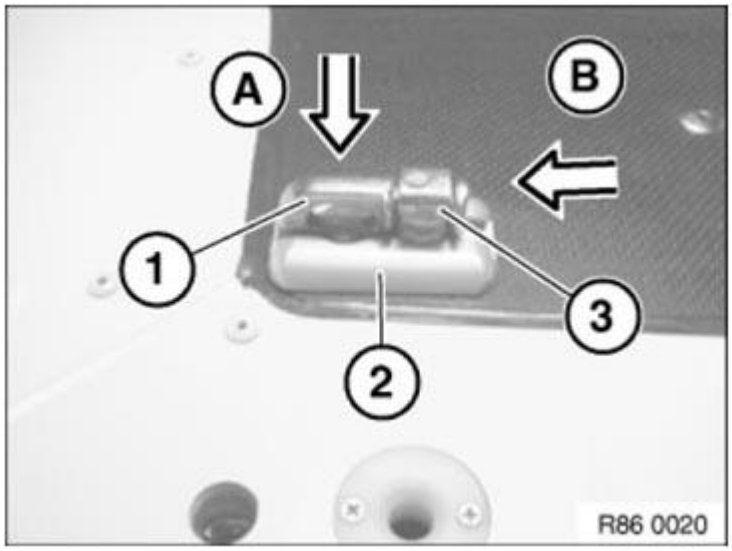


Fig. 127: Sliding Lashing Eye
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REPLACING LICENSE PLATE LIGHT

Release screws (1) and remove license plate light (2) from mounting.

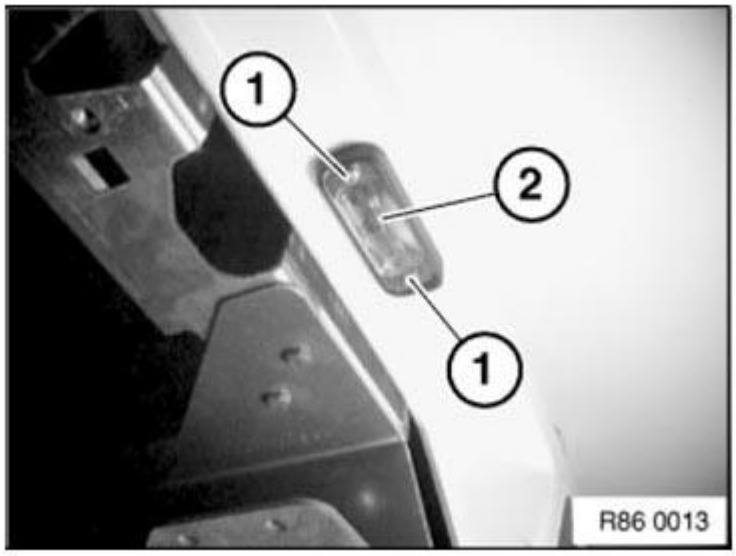


Fig. 128: Identifying License Plate Light With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect flat connector (1) in direction of arrow.

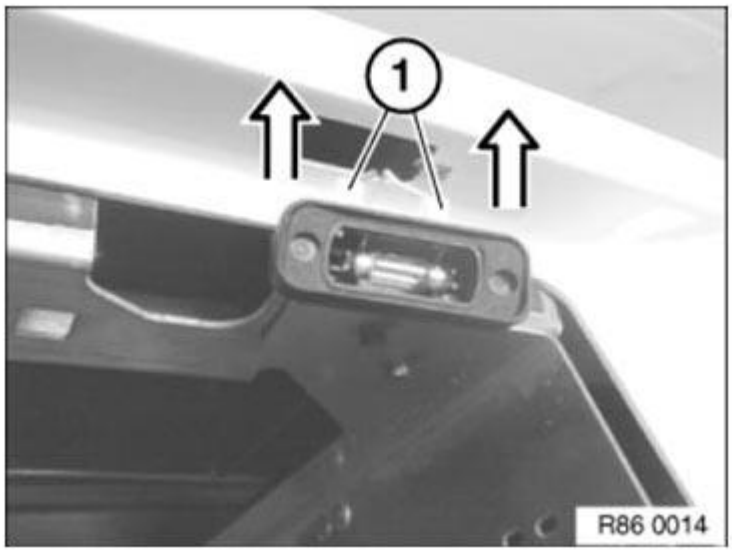


Fig. 129: Disconnecting Flat Connector
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REPLACING POSITION LIGHT

Unclip cover (1) on side recess (arrow).

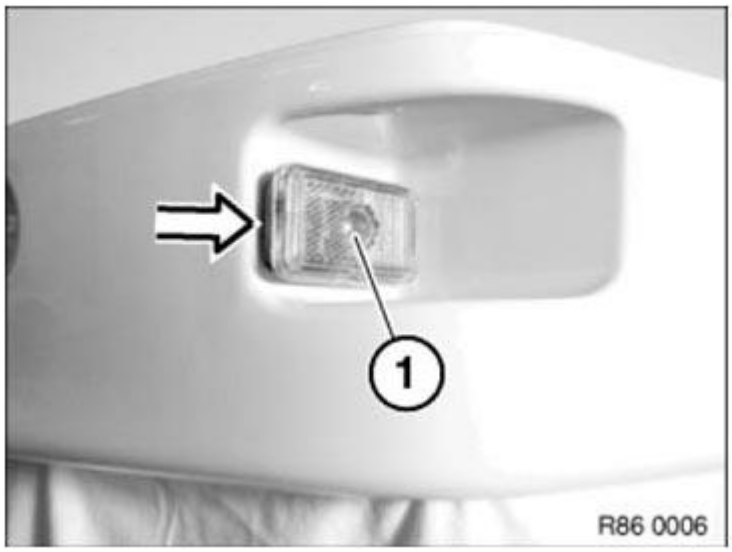


Fig. 130: Identifying Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Pull flat connector (1) from flat contact.

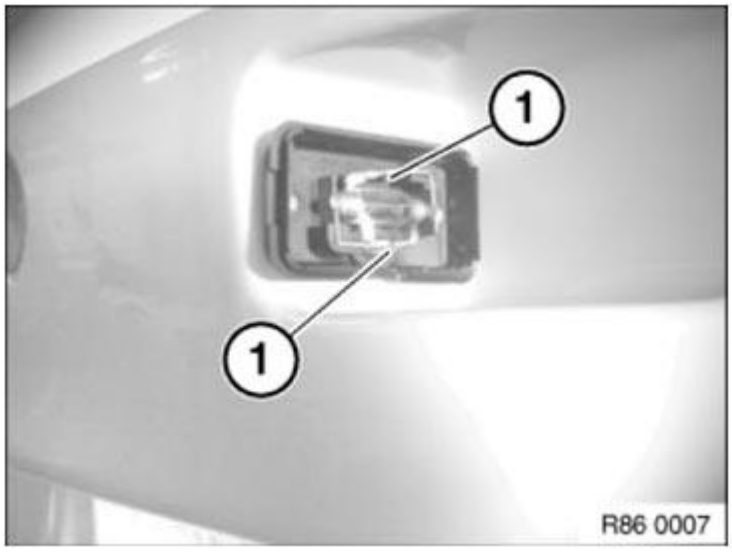


Fig. 131: Identifying Flat Connector And Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out cable (1) completely.

CAUTION: Before drilling out rivet heads, drive in rivet pins with a punch. Drill out rivet heads (2) and remove position light housing from front.

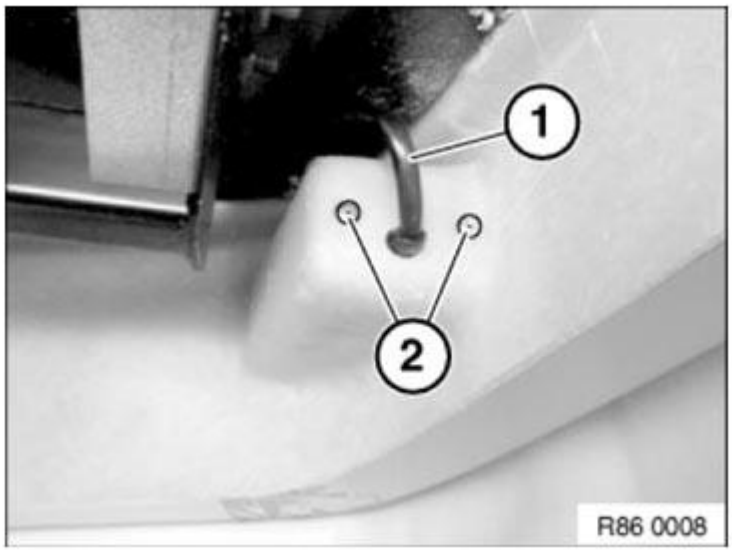


Fig. 132: Identifying Cable And Rivet Heads
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... REPLACING REAR LIGHT

Release thumb screws (1), slide light guard (2) in direction of middle of car and tilt out towards rear.

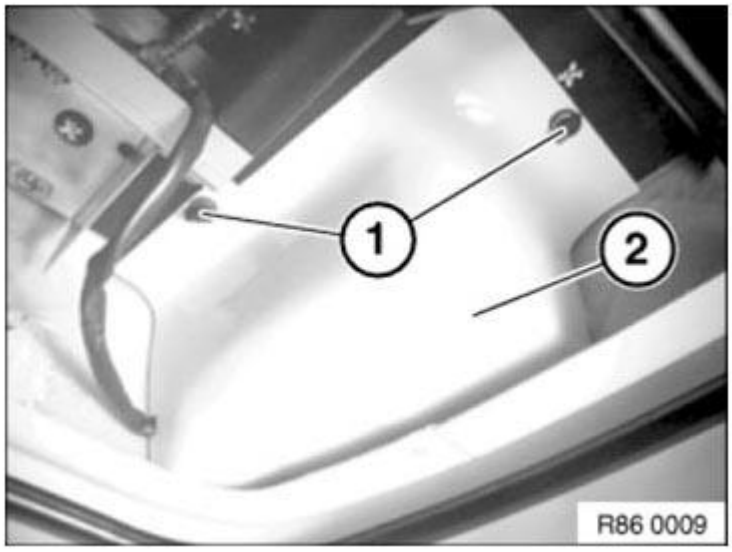


Fig. 133: Identifying Light Guard With Thumb Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Turn handwheel (1) counterclockwise in direction of arrow and remove base (2).

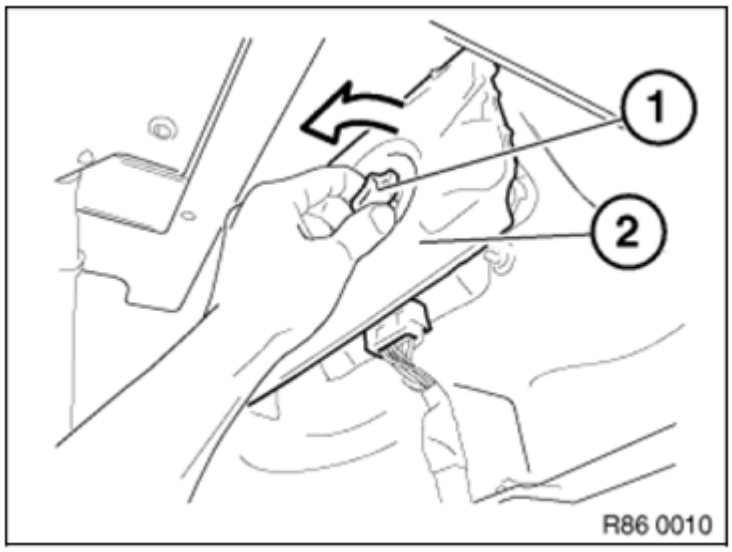


Fig. 134: Removing Base
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and press rear light (2) out towards front.

Installation

Use new self-locking nuts.

Tightening Torque **86 10 1AZ**

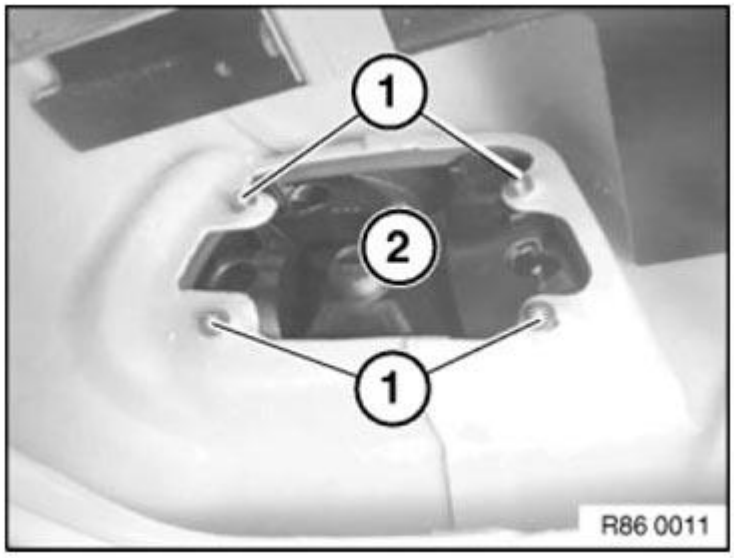


Fig. 135: Identifying Rear Light With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... TROUBLESHOOTING ON MULTI-TRAILER

MULTI-TRAILER TROUBLESHOOTING CHART

Fault	Cause	Remedy
Trailer already brakes when foot is taken off accelerator	Shock absorber of overrunning equipment faulty	Replace shock absorber of overrunning equipment
Reversing sluggish or not possible	Brake system adjusted too strongly	Adjust brake system
NOTE: **When automatic reversing is activated, there is a residual braking torque caused by the design. This results in slightly heavier overrunning.**	Brake shoes jammed	Free brake shoes, replace complete brake shoes with brake shoe carrier if necessary
	Cables overtensioned	Adjust brake system
Handbrake effect too weak	Faulty adjustment	Adjust brake system
	Faulty spring force accumulator	Adjust spring force accumulator
	Brake cables heavily contaminated, corroded or kinked	Free cables, replace if necessary
Wheel brakes overheating	Brake system incorrectly adjusted	Adjust brake system
	Overrunning equipment is sluggish	Lubricate overrunning equipment
	Brake cables heavily contaminated, corroded or kinked	Free cables, replace if necessary
	Cables overtensioned	Adjust brake system
	Wheel brakes contaminated	Clean wheel brakes

	Reversing lever of overrunning equipment jammed	Remove reversing lever, clean and grease with conventional BMW lubricants
Braking effect too weak	Excessive play in brake system	Adjust brake system
	Brake linings glazed, fouled by oil, damaged or worn	Replace complete brake shoes, clean brake drums, replace if necessary
	Overrunning equipment is sluggish	Lubricate overrunning equipment
	Brake cables heavily contaminated, corroded or kinked	Free cables, replace if necessary
Jolting braking or starting off	Excessive play in brake system	Adjust brake system
	Shock absorber of overrunning equipment faulty	Replace shock absorber of overrunning equipment
	Brake shoes jammed	Replace complete brake shoes with brake shoe carrier
Brakes squeal or rattle	Wheel brakes contaminated or worn	Clean wheel brakes, replace brake shoes and/or brake drums if necessary
	Out-of-round or banging brake drum	Replace brake drums
	Pad loose	Replace brake shoes
	Wheel-bearing play excessive	Replace wheel bearings
Brakes pull to one side	Tire pressure incorrect	Correct tire pressure
	Brake linings glazed, fouled by oil, damaged or worn	Replace complete brake shoes, clean brake drums, replace if necessary
	Suspension shock absorber has no effect	Replace suspension shock absorber
Brake pads worn at angle	Wheel-bearing play excessive	Replace wheel bearings
	Pads worn to less than minimum thickness	Replace brake shoes
Towing attachment fails to engage after connection	Internal attachment parts contaminated	Clean and lubricate attachment

8621 HOOD

86 21... ADJUSTING HOOD PRETENSION - CAMLOC FASTENER WITH SPACERS

NOTE: **At least two persons are needed to install and remove the hood. Before installing and removing the hood, secure the BMW multitrailer and the entire combination against rolling. For this purpose, use the parking brake and the chocks of the BMW multitrailer.**
To help adjust the hood pretension, you will need four blocks with a minimum

height of 60 mm.

Installation

Before attaching the hood, thoroughly clean the top side of the GFP apron of the BMW multitrailer.

It is particularly important to clean the contact surface of the GFP apron (1) (marked in gray) on which the rubber seal of the hood rests. Refer to **Fig. 136**.

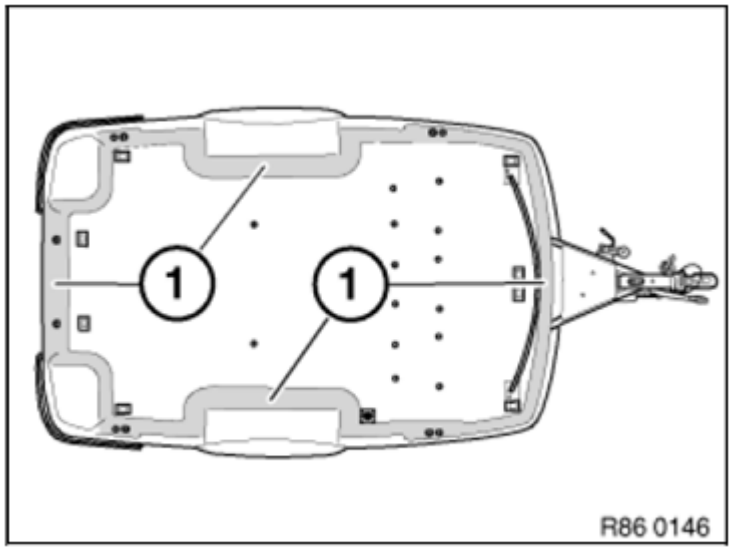


Fig. 136: Identifying Contact Surface Of GFP Apron
Courtesy of BMW OF NORTH AMERICA, INC.

The following text describes how to adjust the hood pretension as an example at one support area of the platform or at one hood fastener. The pretension is adjusted at the other support areas and fasteners in the same sequence.

The hood must be fixed on the platform in such a way that the rubber seal of the hood is placed under pretension or compressed. Only with this pretension is it possible to obtain a tight seal between hood and platform. Pretension is achieved with the Camloc fasteners and by using spacers.

Two different types of spacers (2) are available for each Camloc fastener (1): one thick and one thin. You can fit one, two or no spacer (2) on the Camloc fastener (1).

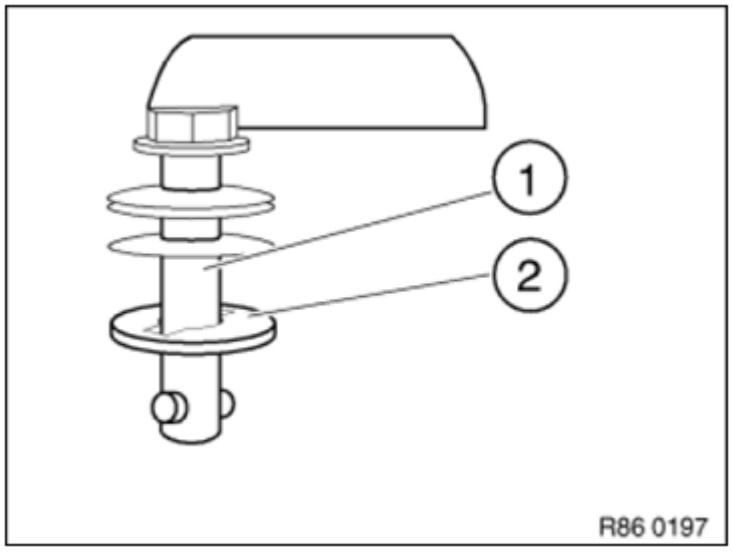


Fig. 137: Identifying Spacer On Camloc Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Access to hood lighting plug (1):

Right side lid.

Open out spring-loaded cap (2) on socket (3) and remove hood lighting plug (1). Close cap (2). Insert hood lighting plug (1) into plug receptacle (4).

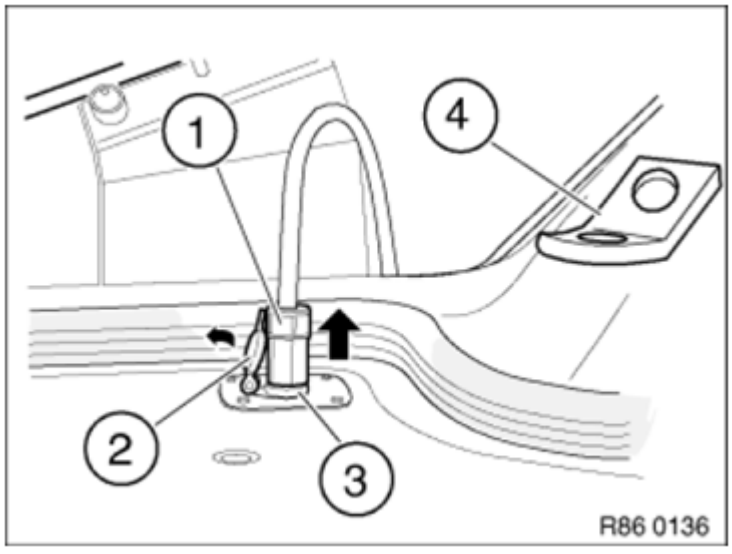


Fig. 138: Removing Hood Lighting Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Unlocking Camloc fastener:

Wing (1) of Camloc fastener (2) is parallel to outer edge of hood. Turn Camloc fastener (2) counterclockwise until it is heard and felt to unlock.

Locking

Press hood in lid frame downwards by hand. Turn Camloc fastener clockwise until it is heard and felt to lock into place. Wing (1) of Camloc fastener is parallel to outer edge of hood.

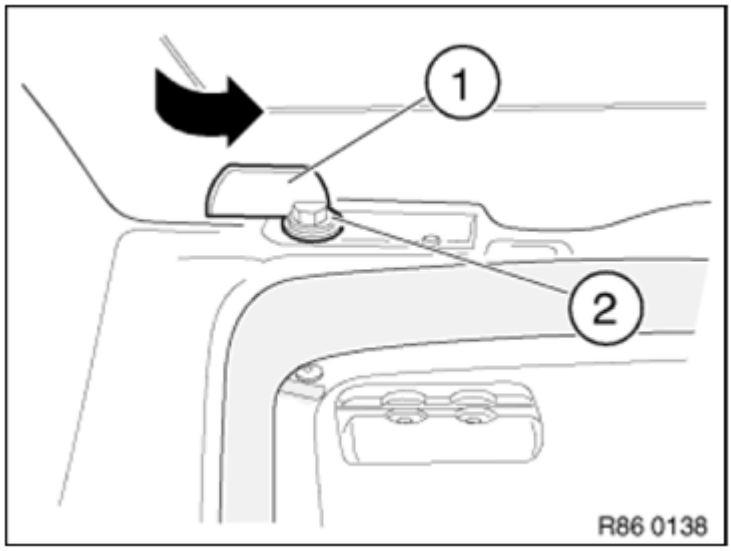


Fig. 139: Unlocking Camloc Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Raise hood and place block (1) between centering pin (2) and platform. Lower hood and position centering pin (2) on block (1).

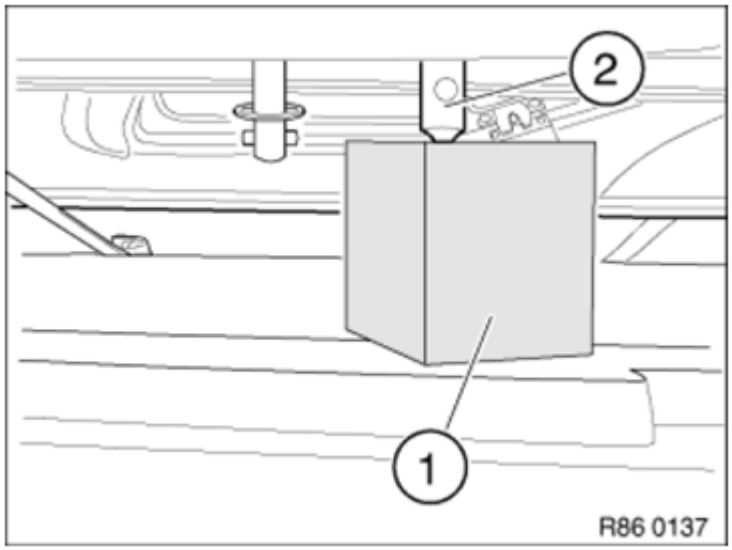


Fig. 140: Positioning Centering Pin On Block

Courtesy of BMW OF NORTH AMERICA, INC.

Remove spring nut (1) from Camloc fastener (2).

Installation

Use new spring nut.

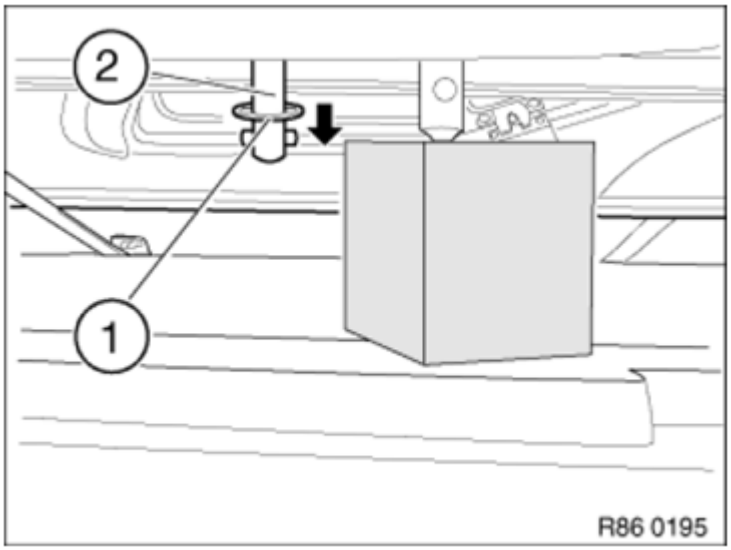


Fig. 141: Removing Spring Nut From Camloc Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Remove Camloc fastener (1) from locating hole (2).

Installation

Press Camloc fastener (1) downwards until contact is made with hood stop. Wing (3) of Camloc fastener points to middle of hood.

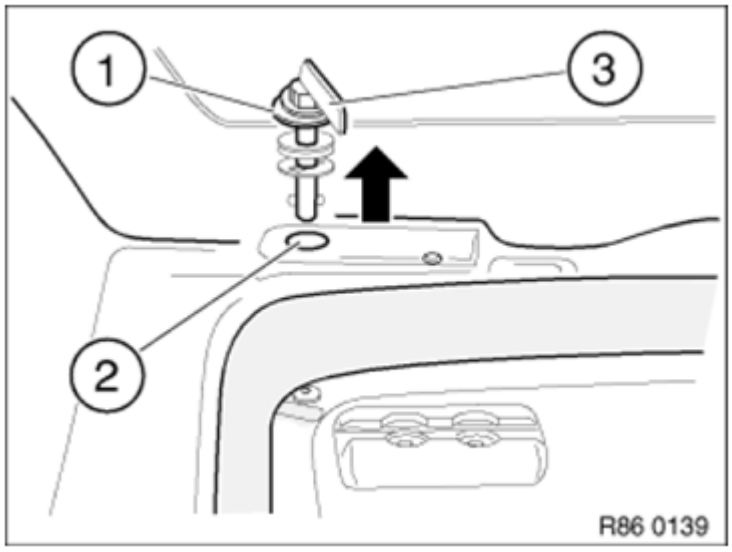


Fig. 142: Removing Camloc Fastener From Locating Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing spacer:

Remove spacer (1) from Camloc fastener (4) by aligning opening (2) over lateral pin (3).

Reducing pretension:

Reduce spacer thickness, replace spacer or install Camloc fastener without spacer.

Increasing pretension:

Fit a thicker spacer or two spacers.

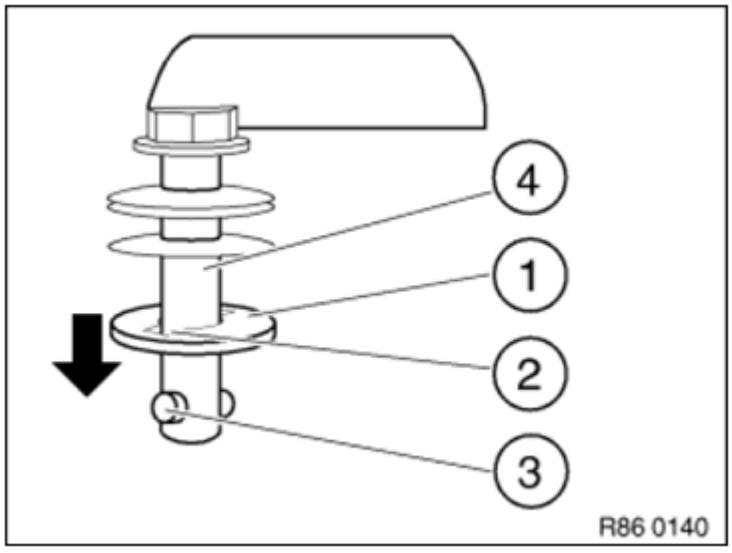


Fig. 143: Removing Spacer From Camloc Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Place spacer (1) on Camloc fastener (4) and turn until it is in a secure position.

Check that hood seal is correctly seated.

Check that Camloc fasteners are locked. Lift hood by handle recesses. Hood must not be able to move with respect to platform of BMW multitrailer.

86 21... ADJUSTING REAR LID TO FIT

NOTE: The following text describes how to adjust the rear lid to fit at one mounting point as an example. Proceed in the same way for the other mounting points.

Height adjustment of rear lid:

Release screws (1) and move rear lid in direction of arrows.

Depth adjustment of rear lid:

Release screws (2) and move rear lid in direction of arrows.

Installation

Tightening Torque, height adjustment, **86 21 7AZ**

Tightening Torque, depth adjustment, **86 21 9AZ**

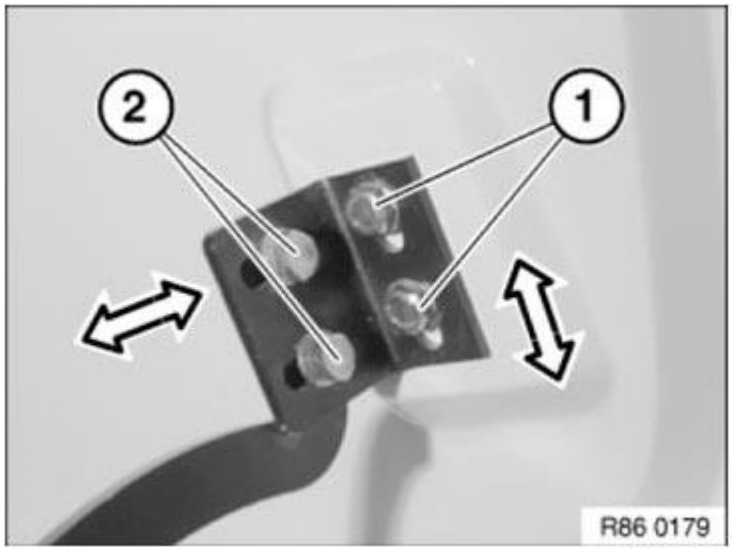


Fig. 144: Adjusting Rear Lid
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust gap (A) evenly all around without displacement and correct if necessary.

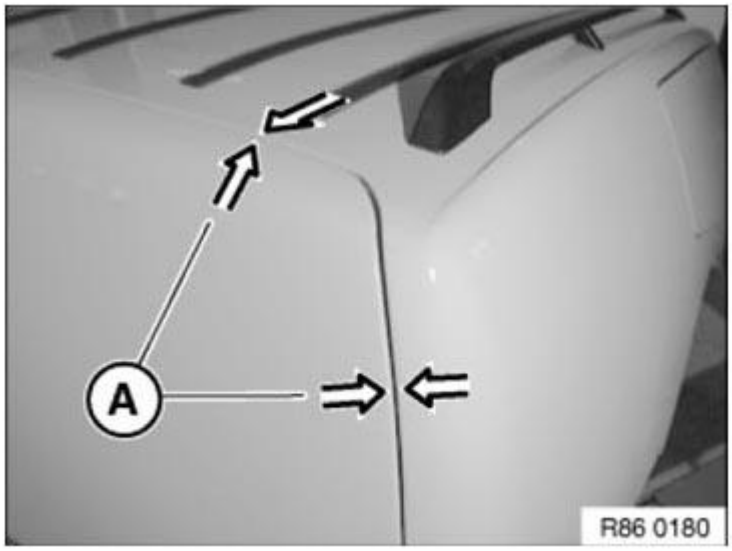


Fig. 145: Adjusting Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Check lid in transition (B) to hood for displacement and correct if necessary (flush).

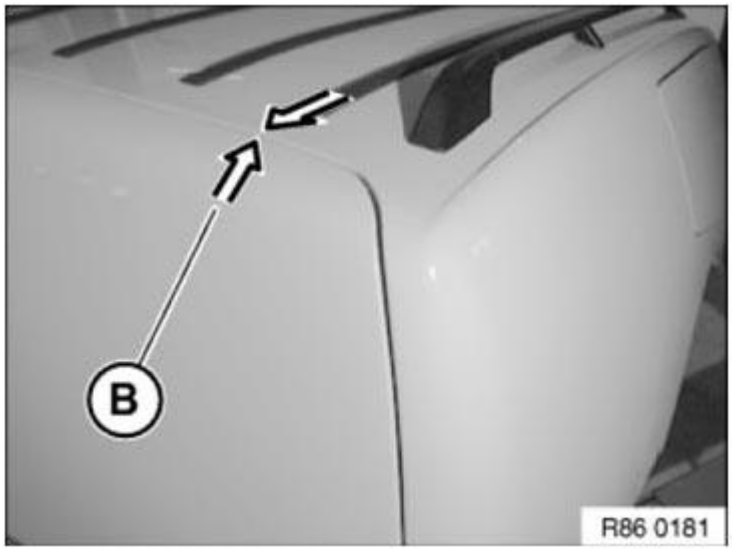


Fig. 146: Checking Lid In Transition To Hood
Courtesy of BMW OF NORTH AMERICA, INC.

To align lid in transverse direction, you can install or remove plastic washers (3) between hinge bracket (1) and

mounting bracket (2).

Installation

There must always be a plastic washer (3) fitted on left and right sides of mounting bracket (2). Plastic washers are available in thicknesses of 1 mm and 3 mm.

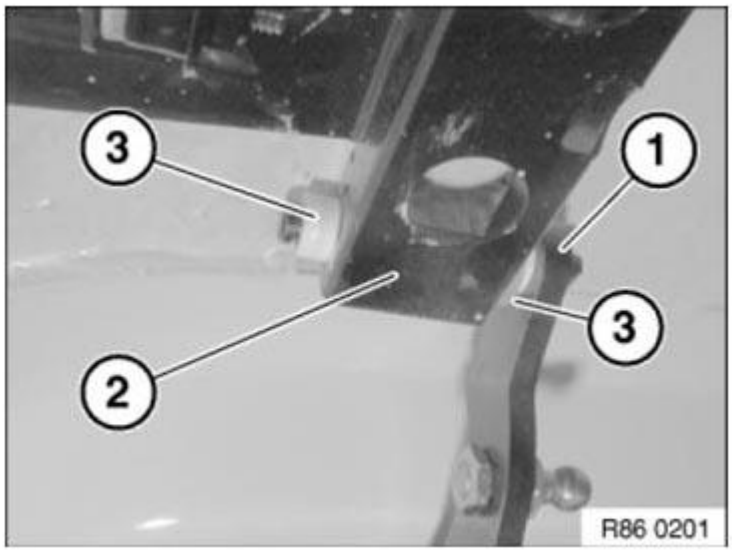


Fig. 147: Identifying Plastic Washers Between Hinge Bracket And Mounting Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Check lid in transition (C) to hood (flush) and correct if necessary. Correction is made by inserting or omitting plastic washers (refer to **Fig. 147**).

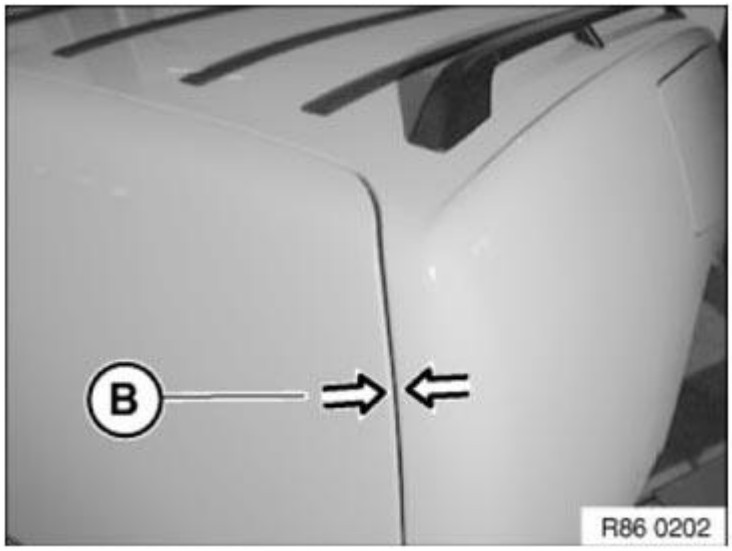


Fig. 148: Checking Lid In Transition To Hood
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... ADJUSTING ROTARY STRIKER LOCK

The following text describes how to adjust the rotary striker lock on the rear lid as an example. Proceed in the same way for the side lids. Adjust the lock while the lid is open.

Release screws (1) and adjust rotary striker lock (2) in elongated hole area in direction of arrows.

Installation

Tightening Torque, **86 21 12AZ**

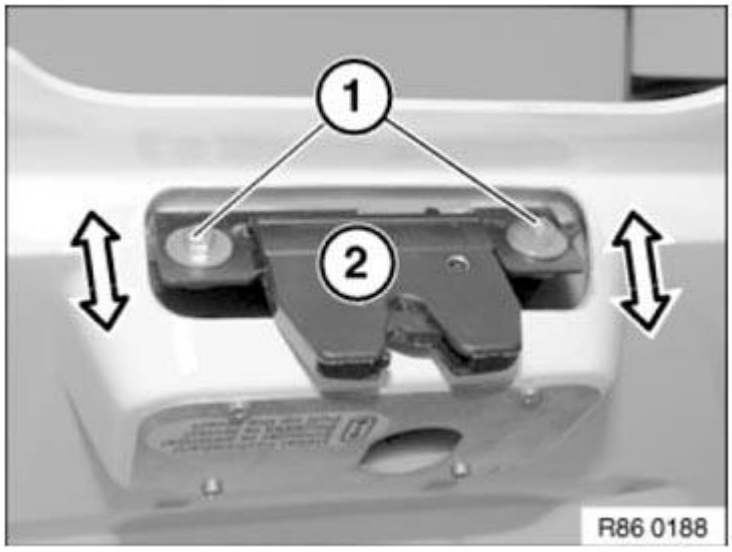


Fig. 149: Adjusting Rotary Striker Lock
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... ADJUSTING SIDE LID TO FIT

NOTE: The following text describes how to adjust the side lid to fit at one mounting point as an example. Proceed in the same way for all other mounting points.

Height adjustment of side lid:

Release screws (1) and move side lid in direction of arrows.

Installation

Tightening Torque, **86 21 7AZ**

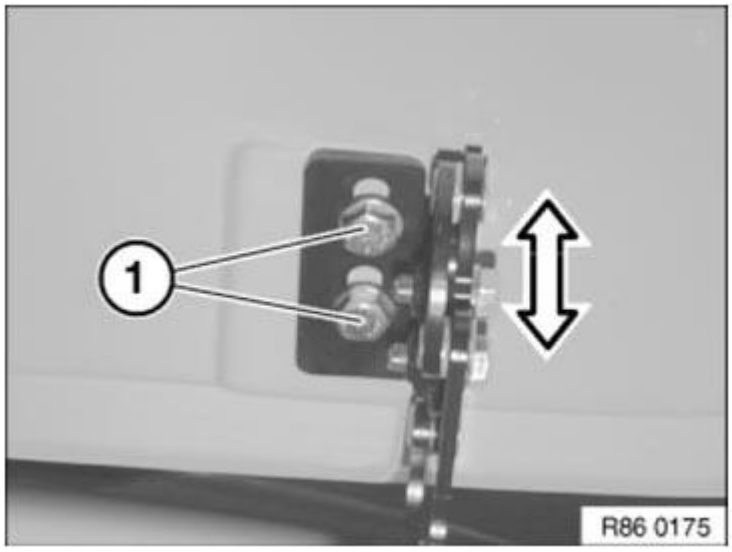


Fig. 150: Adjusting Side Lid
Courtesy of BMW OF NORTH AMERICA, INC.

Depth adjustment of side lid:

Release screws (1) and move side lid in direction of arrows.

Installation

Tightening Torque, **86 21 7AZ**

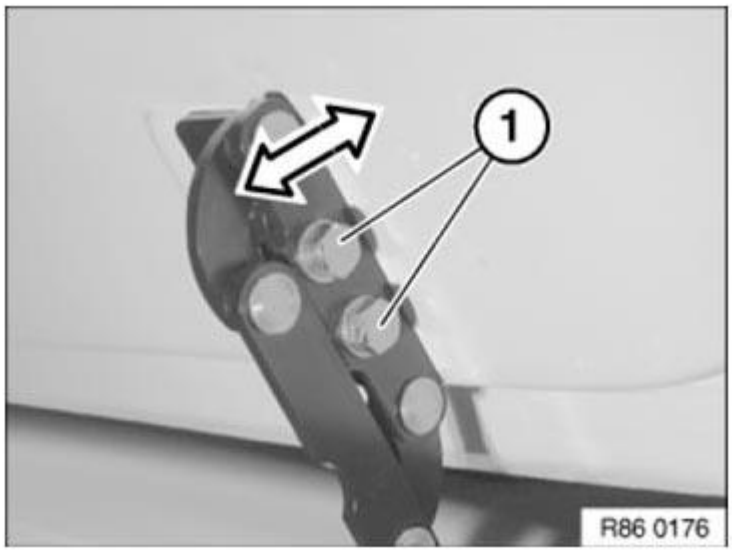


Fig. 151: Adjusting Side Lid Depth
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust gap (A) evenly all around and correct if necessary

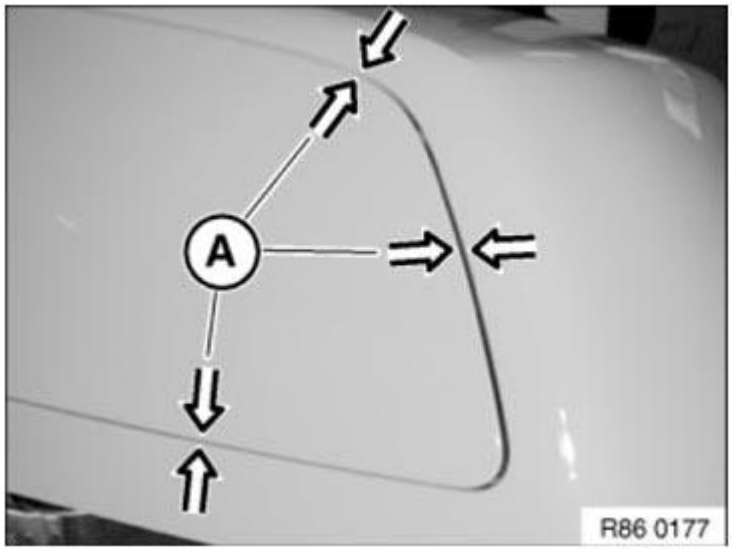


Fig. 152: Adjusting Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Check lid in transition (B) to hood for displacement and correct if necessary (flush).

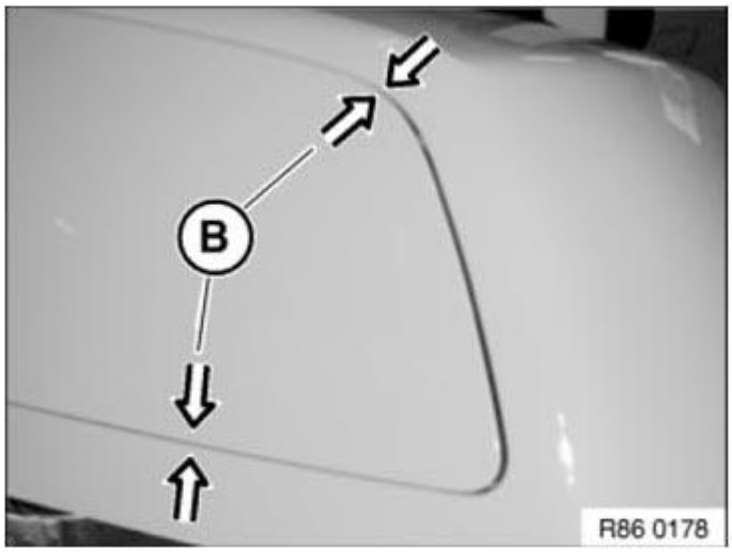


Fig. 153: Checking Lid In Transition To Hood
Courtesy of BMW OF NORTH AMERICA, INC.

To align lid in direction of travel, you can install or remove a spacer plate (3) between mounting bracket (1) and hinge (2).

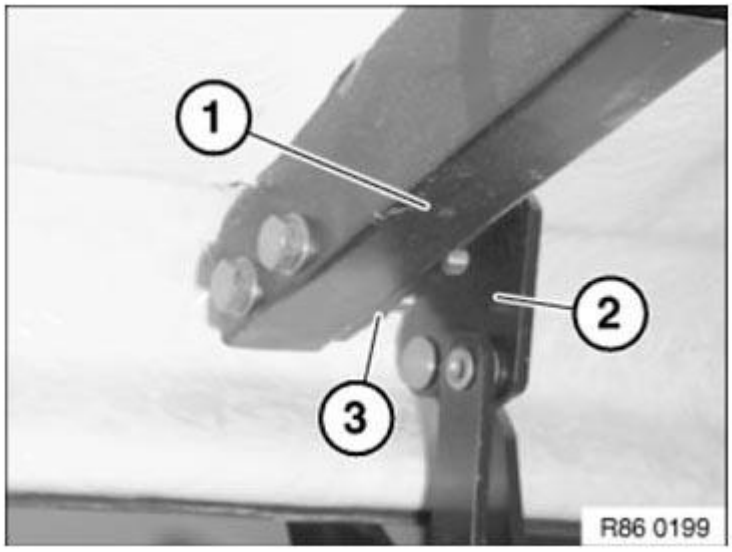


Fig. 154: Identifying Spacer Plate Between Mounting Bracket And Hinge
Courtesy of BMW OF NORTH AMERICA, INC.

Check lid in transition (C) to hood for displacement and correct if necessary (flush). Correction is made by inserting or omitting spacer plates (refer to **Fig. 154**).

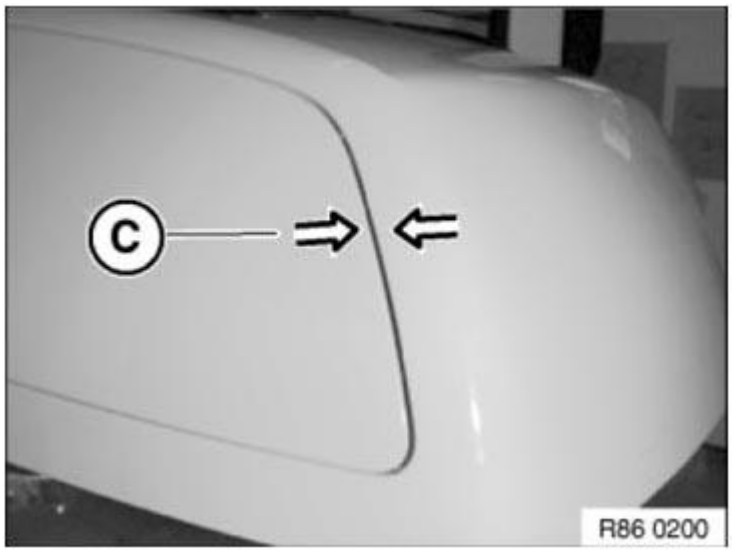


Fig. 155: Checking Lid In Transition To Hood
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... ATTACHING/REPLACING BMW BADGE

Position of attachment: inside of rear lid Remove plastic cover (1) from bore holes (2).

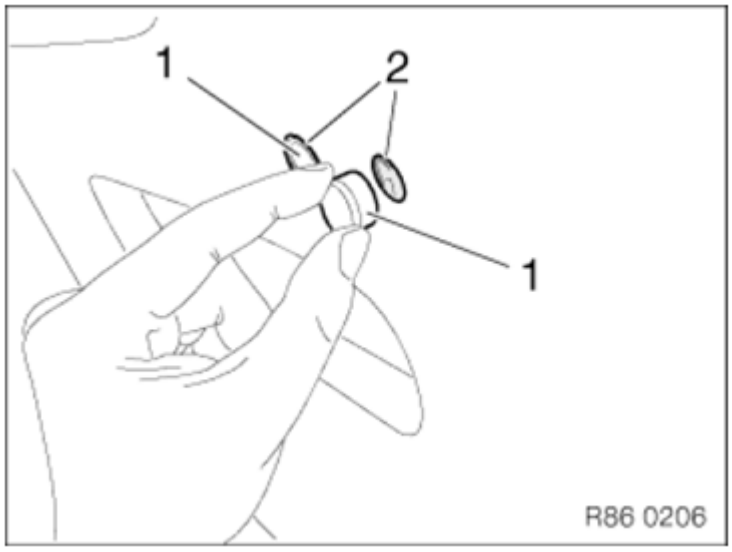


Fig. 156: Removing Plastic Cover From Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Inserting a set of pointed pliers through bore holes (1), detach retaining washers (2) from pins of BMW badge.

Installation:

Use only new retaining washers.

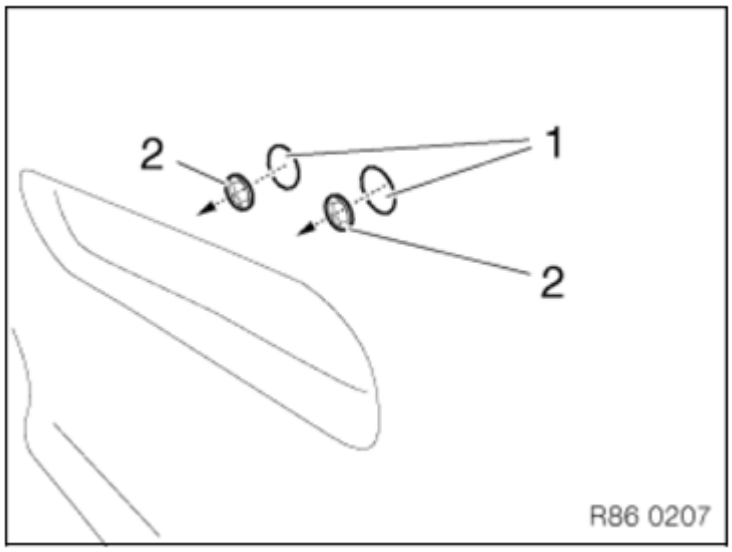


Fig. 157: Identifying Bore Holes And Retaining Washers
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Instruction for removing BMW badge:

Slide a blunt object (e.g. a wooden wedge) under the BMW badge and carefully lever off the badge.

Position of attachment: outside of rear lid The BMW badge must be attached at room temperature.

Degrease bonding area with petroleum ether.

Rub down bonding area with a dry cloth.

Peel off protective film on BMW badge (1).

Insert BMW badge (1) with pin (2) into bore hole (3). If bore holes (3) are considerably larger than pin (2), optically align BMW badge (1) exactly.

Press down BMW badge (1) firmly.

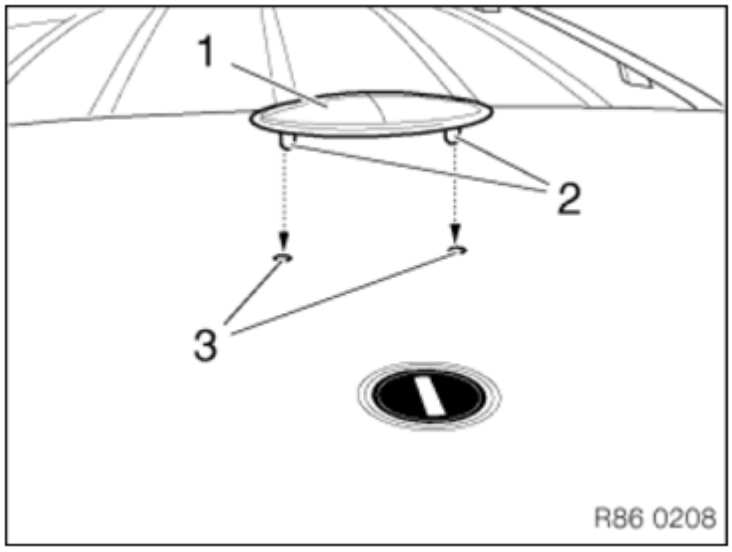


Fig. 158: Identifying BMW Badge, Pin And Bore Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Position of attachment: inside of rear lid

By inserting a 1/4" ratchet with extension and socket wrench insert (7 mm A/F) through bore holes (2), attach a retaining washer (1) in each case to pin of BMW badge. In so doing, press down on outside of rear lid with one hand on BMW badge and grip.

Push on relevant retaining washer (1) as far as it will go.

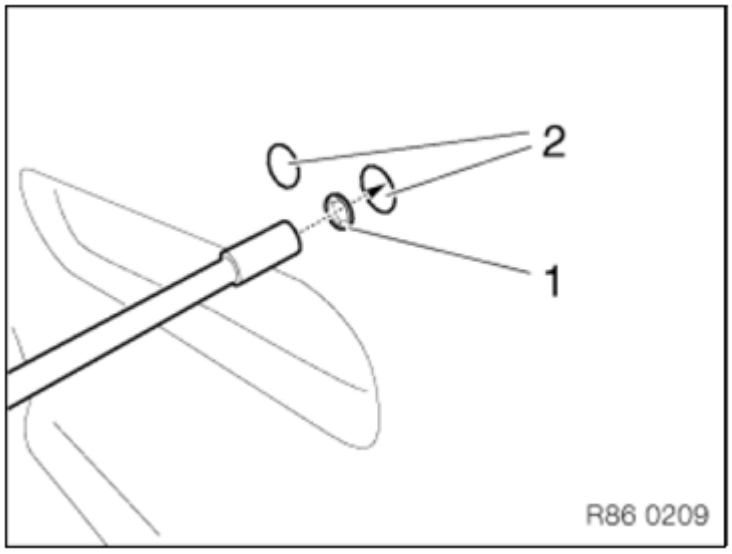


Fig. 159: Identifying Retaining Washer And Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Position of attachment: inside of rear lid Insert plastic cover (1) in bore holes (2).

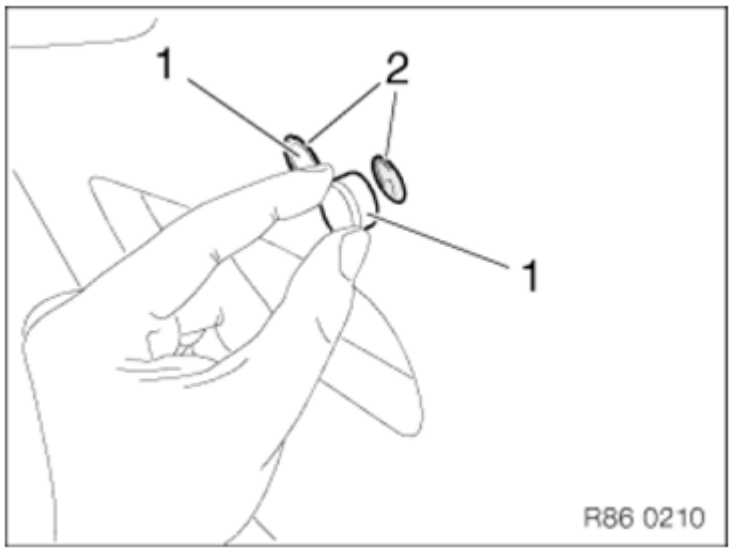


Fig. 160: Inserting Plastic Cover In Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... FITTING BMW LOGO

Distance between hood edge and lower edge of BMW logo (1) is 100 mm.

Distance between middle of lock and lettering (2) is 300 mm.

Degrease bonding areas with benzine. Rub down bonding area with a dry cloth.

Position of BMW logo (1): parallel to lower edge.

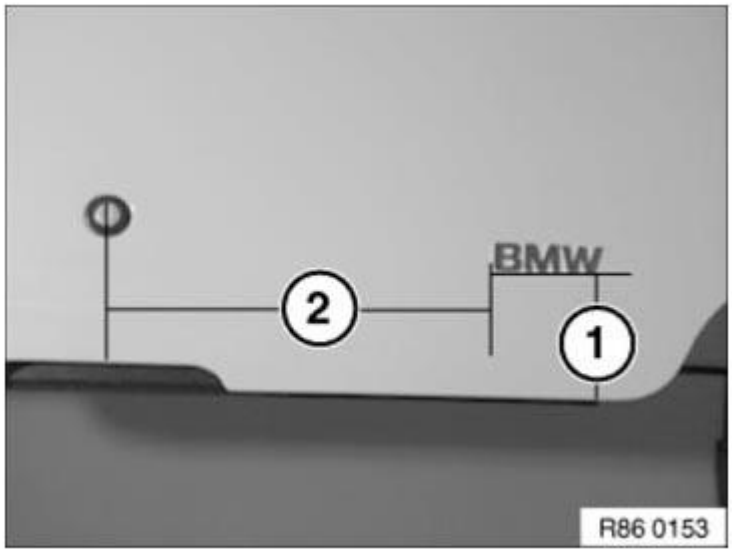


Fig. 161: Position Of BMW Logo
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... INSTALLING HOOD SEAL

NOTE: Removing old seal:
In a straight area of hood, grip old seal piping with a pair of pliers and pull off horizontally. Grip detached seal with both hands and uniformly pull away from hood ridge.

Push seal piping (1) by hand onto hood ridge (2). Using a rubber hammer, gently tap seal piping (1) as far as it will go onto hood ridge (2). Make sure piping is evenly positioned especially in radii of hood ridge.

Installation

Position end face of seal at front end of hood in a straight area. Lay seal from front to rear.

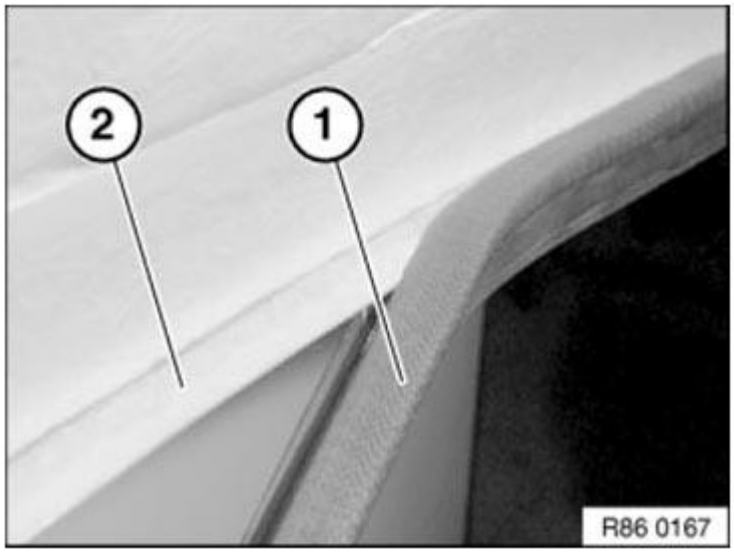


Fig. 162: Identifying Seal Piping And Hood Ridge
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... INSTALLING RUBBER ROOF STRIP

NOTE: Pull off old rubber roof strip and remove remaining traces of adhesive with universal cleaner. Rub down with a dry cloth.

Select rubber roof strip according to length of roof recess (1). Arrange chamfered ends of rubber roof strip to match shape of roof recess (1).

Installation

Pretreat bonding area and stick on rubber roof strip according to manufacturer's instructions.

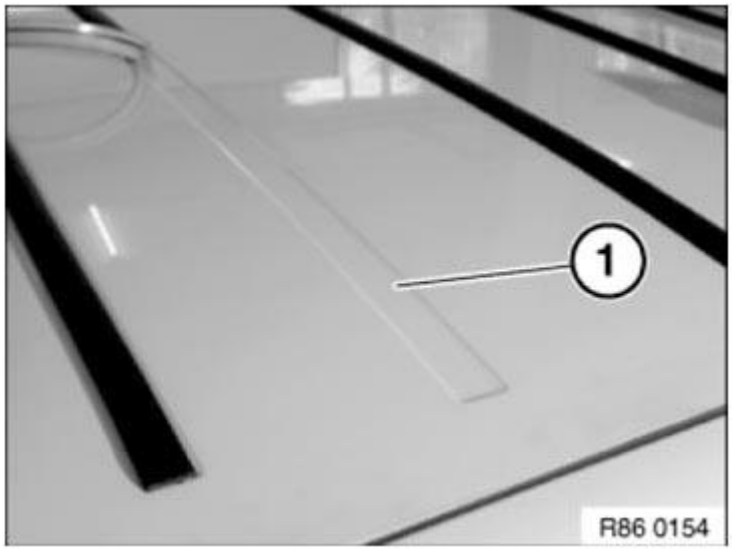


Fig. 163: Identifying Roof Recess
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... INSTALLING SEAL FOR REAR LID AND SIDE LID

NOTE: The following text describes how to install the seal for the rear lid as an example. Proceed in the same way for the side lids.

Removing old seal:

Open lid. Grip seal piping with both hands and pull seal off hood ridge. Remove old seal over lid.

Push seal piping (1) by hand onto hood ridge (2). Using a rubber hammer, gently tap seal piping (1) as far as it will go onto hood ridge (2). Make sure piping (1) is evenly positioned especially in radii of hood ridge.

Installation

Always position end face of seal in a straight area only:

e.g. on cross-member or on upper hood ridge of rear lid.

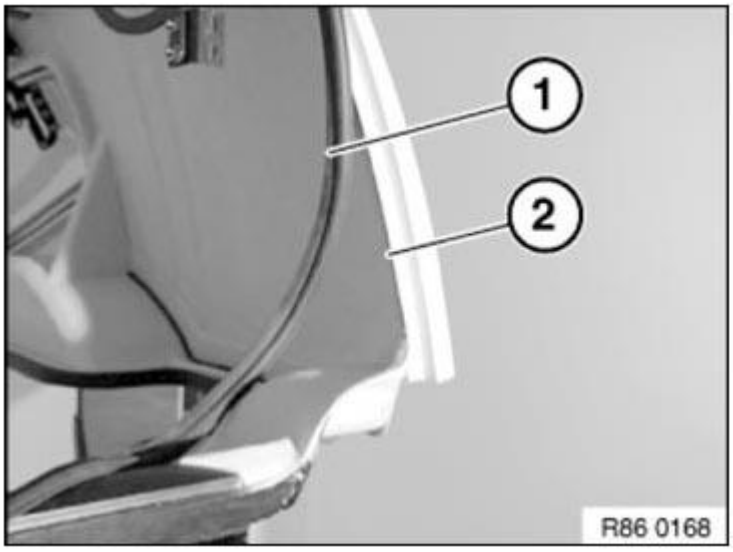


Fig. 164: Identifying Seal Piping And Hood Ridge
Courtesy of BMW OF NORTH AMERICA, INC.

Suitable areas on side lids:

Upper and lower hood ridge.

Sealing lip of seal must point outwards.

After installing from inside and outside, check correct seating between lid seal and lid. Lid must rest without air on lid seal.

86 21... INSTALLING SPONGE RUBBER SEAL

NOTE: Removing old sponge rubber seal: Pull off old sponge rubber seal. Remove remaining traces of adhesive with universal cleaner.

Sponge rubber seal runs along area marked gray (1).

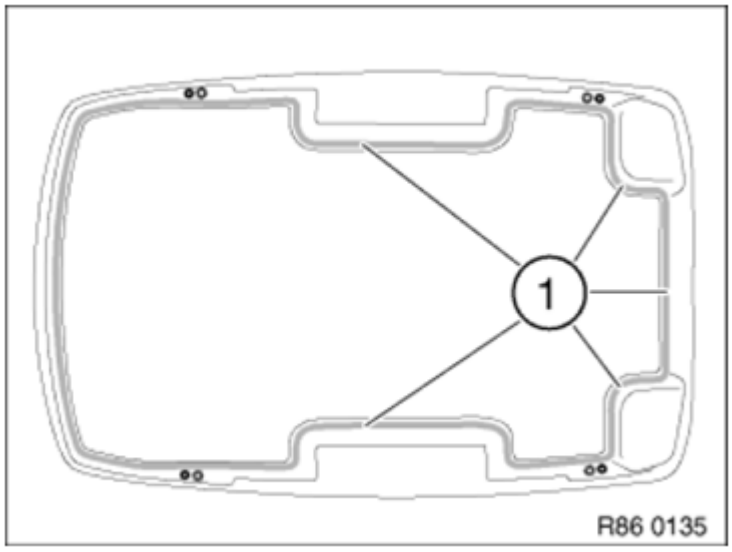


Fig. 165: Identifying Sponge Rubber Seal Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Lay sponge rubber seal (1) in middle of hood contact surface (2).

Installation

Degrease contact surface (2) with benzine and rub down with a dry cloth. Stick on sponge rubber seal (1) according to manufacturer's instructions. Position end face of seal (1) in a straight area.

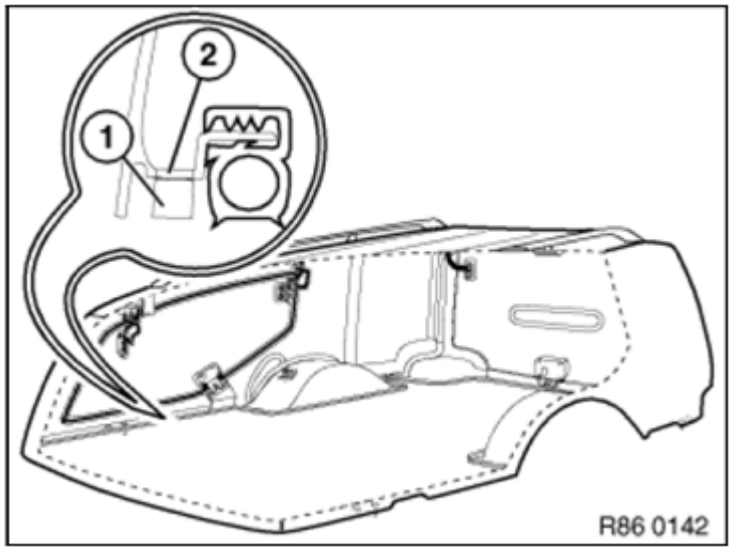


Fig. 166: Identifying Sponge Rubber Seal In Middle Of Hood Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

86 10... POSITIONING OF MULTITRAILER HOOD FOR MAINTENANCE AND REPAIR WORK

IMPORTANT: At least two persons are needed to install and remove the hood from the platform.
Before installing and removing the hood, secure the BMW multitrailer and the entire combination against rolling. For this purpose, use the parking brake and the chocks of the BMW multitrailer.
The hood can also be set up and lowered with the aid of the universal lift available from BMW in conjunction with the roof racks and the hood adapter.
Under no circumstances should work of any kind be carried out below the suspended hood.

For maintenance and repair work, raise the hood using a lifting platform. Twin-column lifting platforms, body lifting platforms and twin-stamp underfloor platforms are suitable. The seating plates and areas of the lifting platform must be adjustable according to the dimensions of **Fig. 167**.

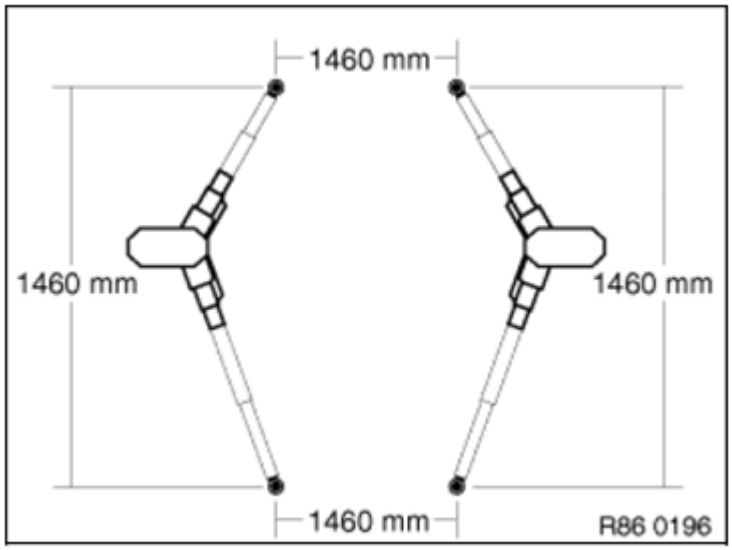


Fig. 167: Identifying Lifting Platform Adjustable Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

The lifting platform must conform to the relevant legal provisions of the accident prevention regulations and be serviced as specified. Comply with the lifting platform operating instructions, in particular the safety instructions and the carrying capacity.

Make sure you adhere to the BMW-recommended work area of 5 x 7 m and to an escape route of 0.6 m between two lifting platforms.

Please comply with the following instructions before raising the hood:

- Raise only when it is unloaded;
- Ensure sufficient clearance between the seating plates/seating areas and the GFP edge of the hood;
- The hood must always be positioned in the middle of the lifting platform.

IMPORTANT: The hood may only be raised at the pin (1). Under no circumstances may the hood be raised at the GFP edge of the hood (2). See Fig. 168. Exclusively for removal of pin (1), raise the hood in the GFP area.

Also refer to:

REMOVING CENTERING PIN FROM MOUNTING BRACKET .

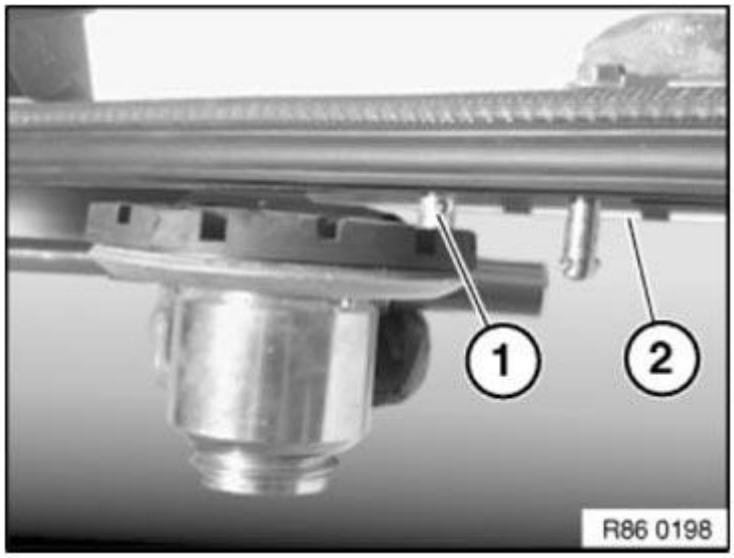


Fig. 168: Identifying GFP Edge Of Hood And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING BALL PIVOT

NOTE: Remove gas spring, refer to REMOVING GAS SPRING.

NOTE: The following text describes how to remove the ball pivot from the hinge retaining bracket on the rear lid as an example. Proceed in the same way for the other ball pivots.
Make sure the attachments are reinstalled in the correct sequence. Only in this way will the gas springs open and close properly.

Grip ball pivot (1) at hexagon mount (2) and release nut (3).

Installation

Use new self-locking nut.

Tightening Torque, **86 21 10AZ**

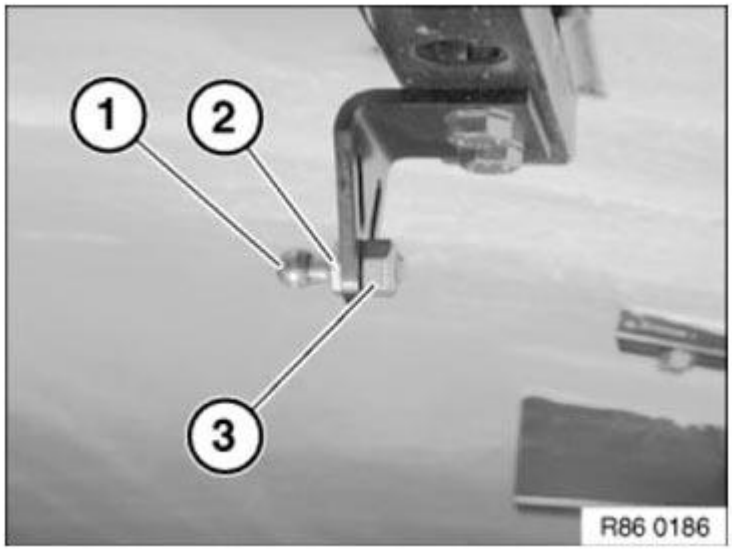


Fig. 169: Identifying Ball Pivot, Hexagon Mount And Release Nut
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING CENTERING PIN FROM MOUNTING BRACKET

NOTE: Exclusively for removal of pin, raise the hood in the GFP area. For raising, use a wooden block with a maximum width of 35 mm and a height of 45 mm. The length must be selected depending on the lifting platform securing point. Ensure the hood is secure on the blocks.

Position block (1) so that it is only located in area of sponge rubber seal (2).

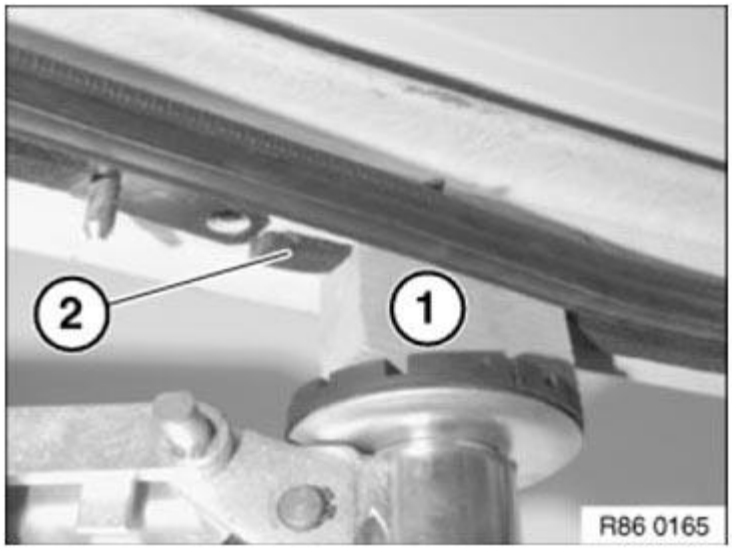


Fig. 170: Identifying Rubber Seal And Block
Courtesy of BMW OF NORTH AMERICA, INC.

Insert a mandrel into hole (1) of pin (2) and turn counterclockwise.

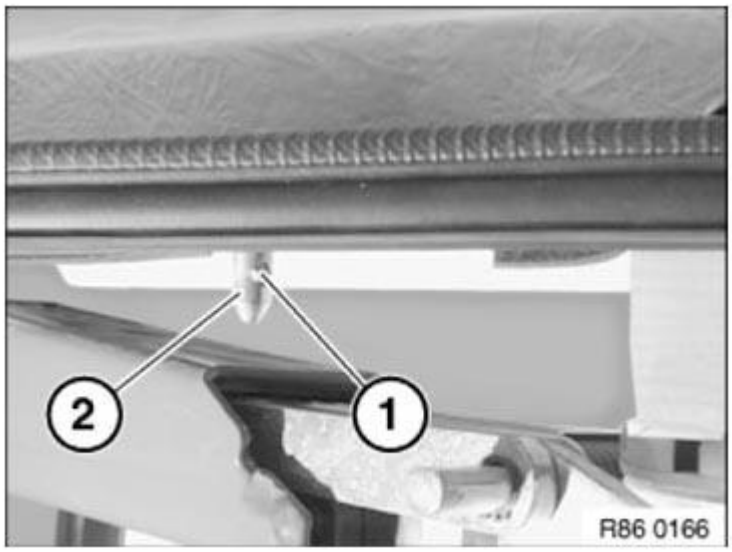


Fig. 171: Identifying Hole And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING GAS SPRING

Only remove the gas spring while the lid is open. The gas spring will then not be subjected to load and the spring piston will not jump out of the spring housing. Prop the lid open with one hand to prevent it dropping closed. Remove the gas spring with your other hand.

NOTE: Side lids are each fitted with a gas spring. Rear lid is fitted with two gas springs. The following text describes how to remove the gas spring at one mounting point as an example. Proceed in the same way for all other mounting points. Rear lid: Replace gas springs in pairs only.

Lever out retaining clip (1) in recess (2) and push on gas spring head (3) in direction of arrow. Detach spring head (3) from ball pivot.

Installation

Push retaining clip (1) back into its original position. Press spring head (3) onto ball pivot until spring head (3) snaps audibly into place.

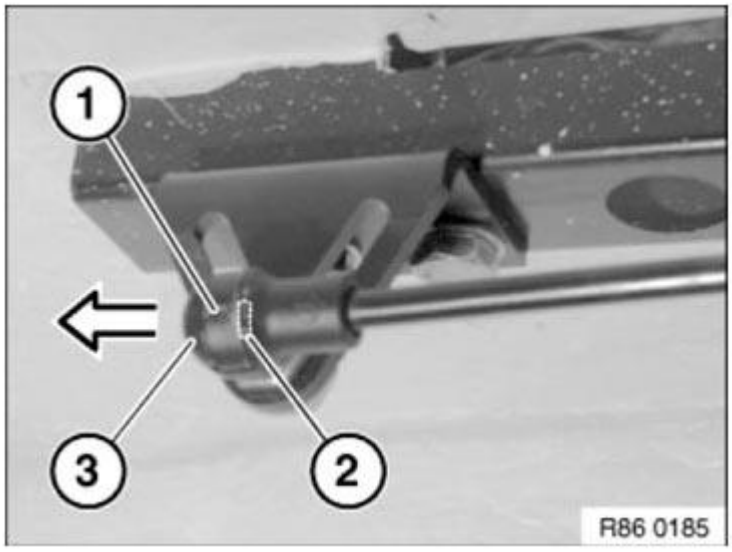


Fig. 172: Removing Gas Spring
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING GAS SPRING RETAINING BRACKET

NOTE: Remove gas spring, refer to REMOVING GAS SPRING.

Remove ball pivot, refer to REMOVING BALL PIVOT.

Release screws (1) and remove gas spring retaining bracket (2) from mounting bracket (3).

Installation

Install retaining bracket so that it is centered in elongated holes.

Tightening Torque, **86 21 11AZ**

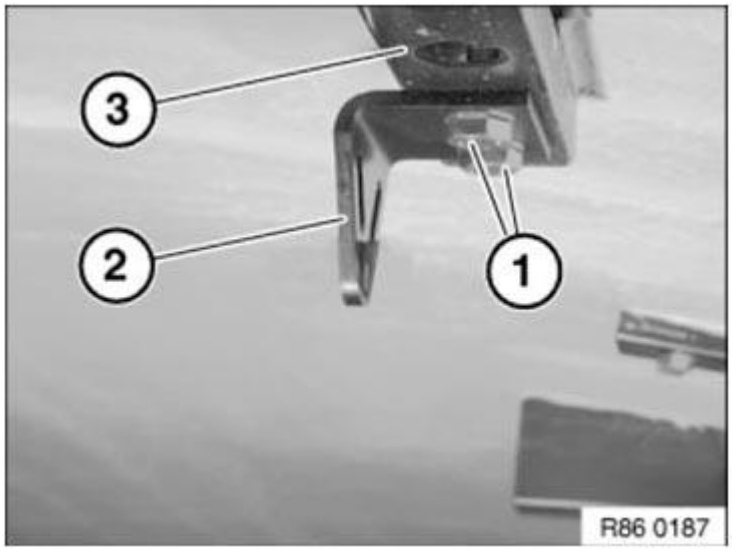


Fig. 173: Identifying Gas Spring Retaining Bracket And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING HINGE BRACKET ON REAR LID

NOTE: Remove rear lid, refer to REMOVING LID.
Remove gas spring, remove gas spring on hinge side only, refer to REMOVING GAS SPRING.

Raise edge (1) of retaining clip (2) and slide in direction of arrow towards rear.

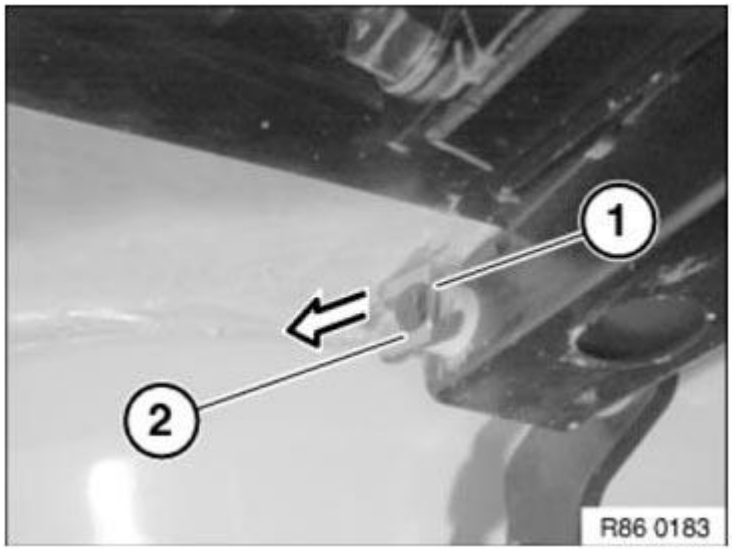


Fig. 174: Sliding Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plastic washer (1). Pull hinge bracket (2) in direction of arrow out of mounting bracket (3).

Installation

There must always be a plastic washer (1) fitted on left and right sides of mounting bracket (3).

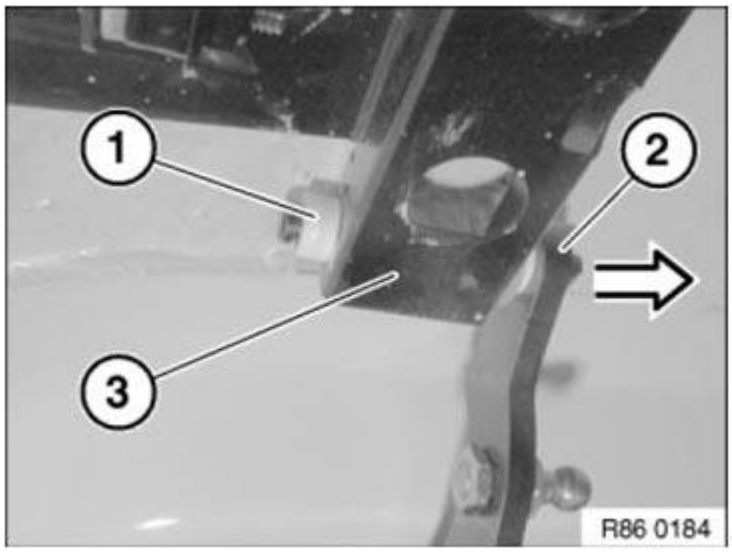


Fig. 175: Removing Hinge Bracket On Rear Lid
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING LID

NOTE: Adjusting side lid to fit, refer to ADJUSTING SIDE LID TO FIT.
Adjusting rear lid to fit, refer to ADJUSTING REAR LID TO FIT.

NOTE: The text describes how to remove the lid at one rear lid mounting point as an example. Proceed in the same way for the side lids. Spare part lids are always supplied without complete locking systems.

Two persons are required for this task.

NOTE: Open lid.

Loosen screws (1). Remove lid (2).

Installation

Rear lid: shoulder (3) points to middle of hood.

Side lid: shoulder (3) points to outside of hood.

Tightening Torque:

86 21 7AZ

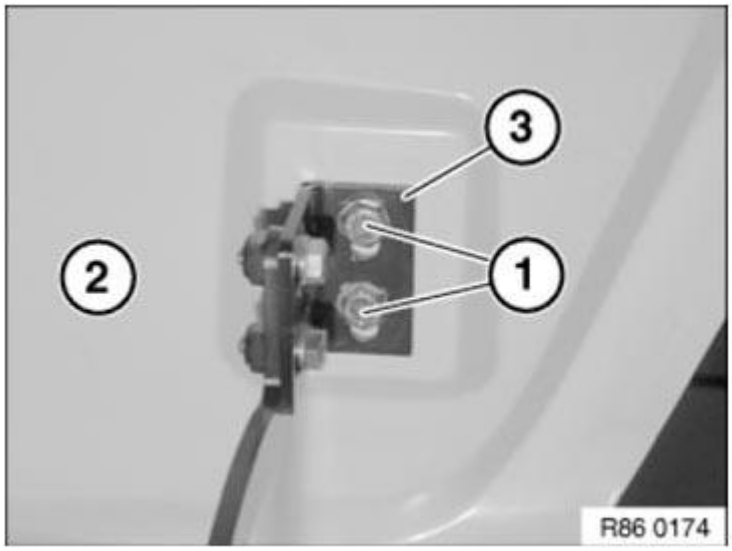


Fig. 176: Identifying Shoulder With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING LOCK BARREL

NOTE: The following text describes how to remove the lock barrel on the rear lid as an example.
Proceed in the same way for the side lids. Remove the lock barrel while the lid is open.
Remove cover, spring nut and pull rod, refer to REMOVING ROTARY STRIKER LOCK.

Slide retainer (1) in direction of arrow away from lock barrel (2). Remove lock barrel (2).

Installation

Examine rubber backing for damage and replace if necessary. When replacing lock barrel, make sure coding of new lock barrel matches coding of fitted lock barrel (simultaneous closing).

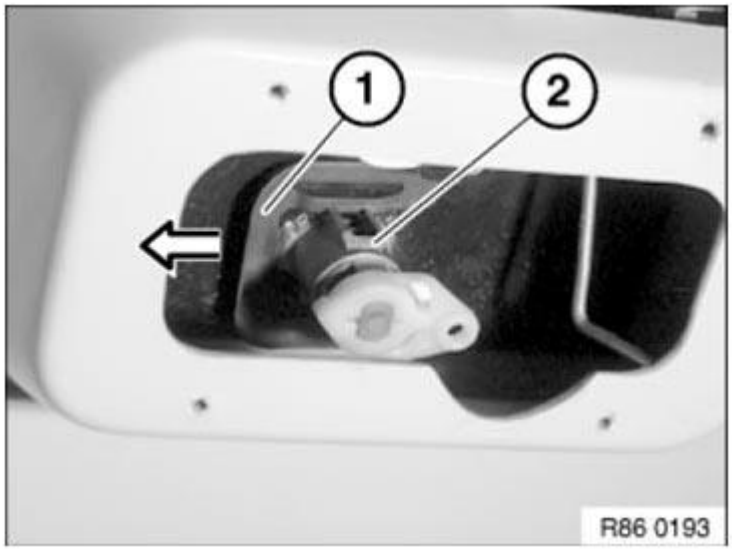


Fig. 177: Removing Lock Barrel
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING LOCK STRIKER FIXTURE ON REAR LID

Grip rubber seal on seal piping (1) and pull off in area of lock striker fixture (2). Grip lid seal (3) on seal piping (4) and pull off in area of lock striker fixture (2).

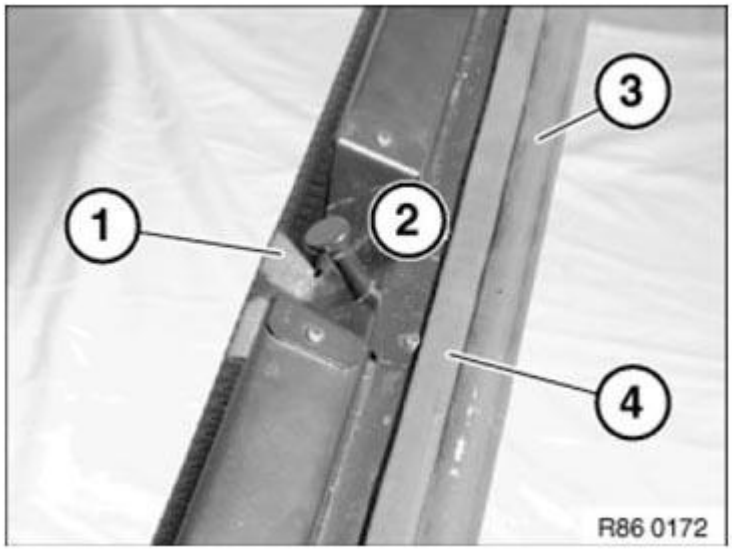


Fig. 178: Identifying Seal Piping, Lock Striker Fixture And Lid Seal
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Before drilling out rivets, drive in rivet pins with a punch. Drill out rivets (1+2) and remove lock striker fixture (3).

Installation

Rivets (1) have black heads and long shanks. Rivets (2) have silver heads and short shanks.

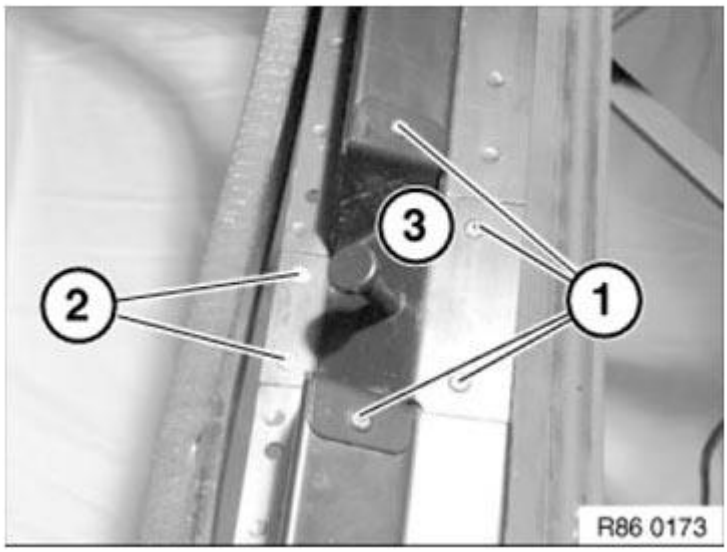


Fig. 179: Identifying Lock Striker Fixture With Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING PLUG FOR INSIDE LIGHT

NOTE: Two different types of plugs are used for the inside light. Both types function in the same way, only their designs are different.

Type 1:

Release screw (1) and separate housing plug (2).

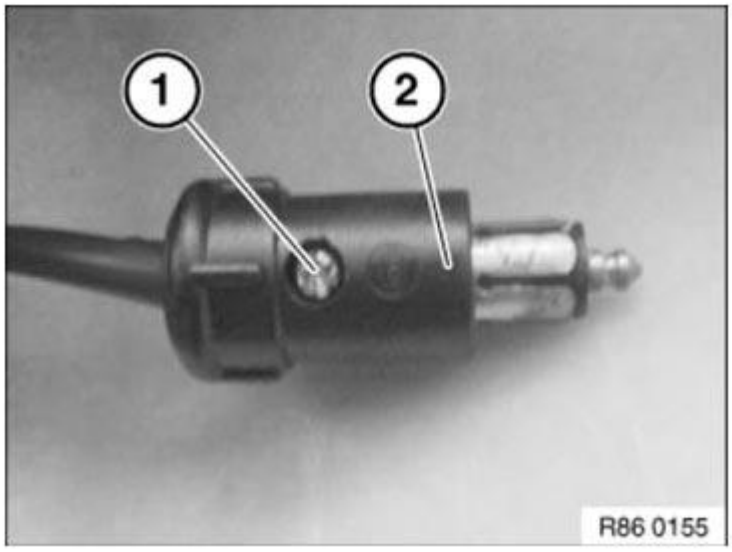


Fig. 180: Identifying Housing Plug With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and disconnect cables (2) from screw clamp.

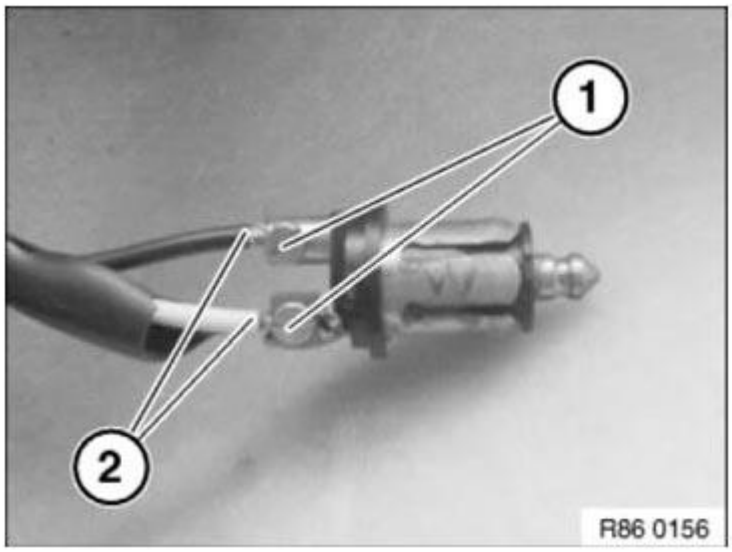


Fig. 181: Identifying Cables And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Type 2:

Release screw (1) and separate housing plug (2).

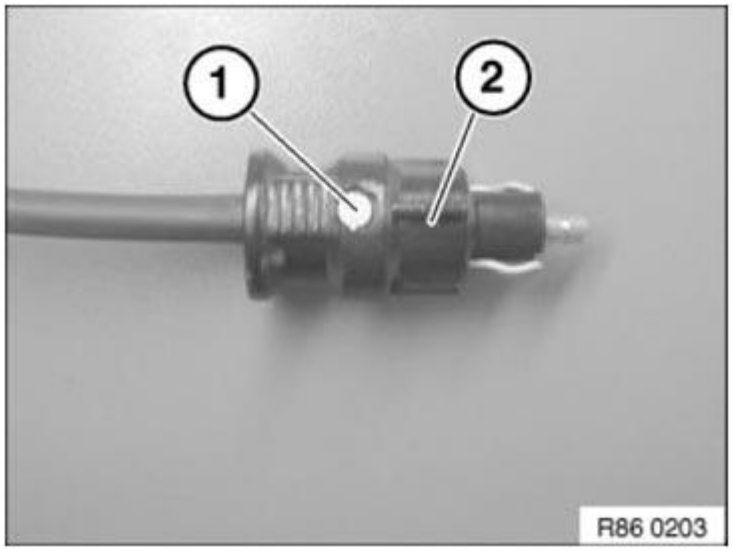


Fig. 182: Identifying Housing Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove contact parts (1+2).

Installation

When installing, make sure contact parts (1+2) are in correct installation position.

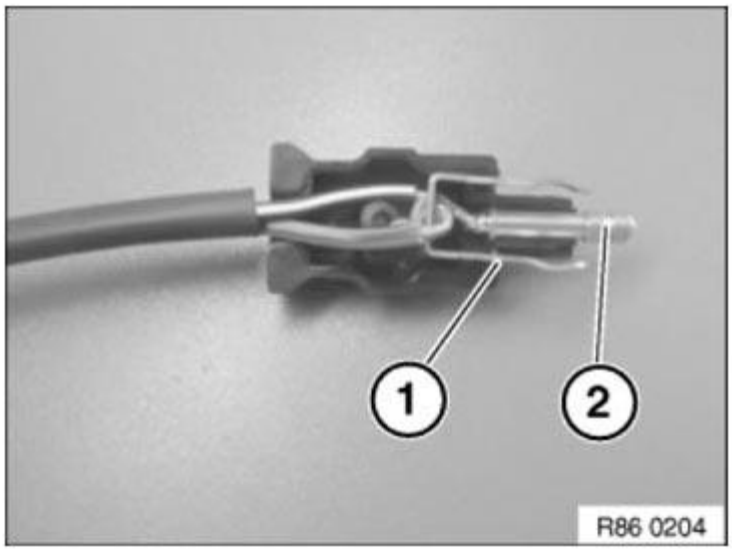


Fig. 183: Identifying Contact Parts
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING ROOF RAILING

NOTE: The text describes how to remove the roof railing at one mounting point as an example. Proceed in the same way for the other mounting points.

Open cover (1) and fold down.

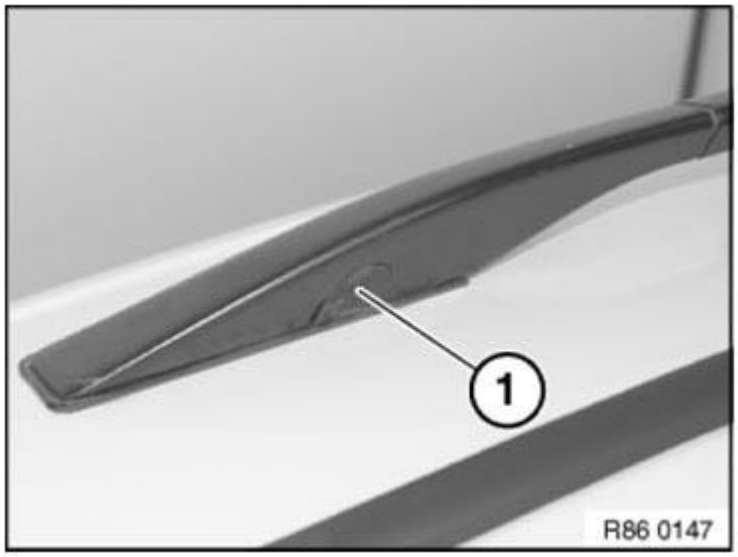


Fig. 184: Identifying Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bolt (1).

After releasing three retaining screws, lift off roof railing (2).

Installation

Check molded sealing parts for faults and replace if necessary. Pay attention to identification of molded sealing parts and position accordingly.

Check butylene tape seal.

Use new screws. Coat all screws with OKS 90 thread locking adhesive.

First screw down railing adapter in middle. Then press roof railing downwards with a force of approx. 50 N. Then screw down railing adapter at front and rear.

Tightening Torque for roof railing at front and rear, **86 21 1AZ**

Tightening Torque for roof railing in middle, **86 21 2AZ**

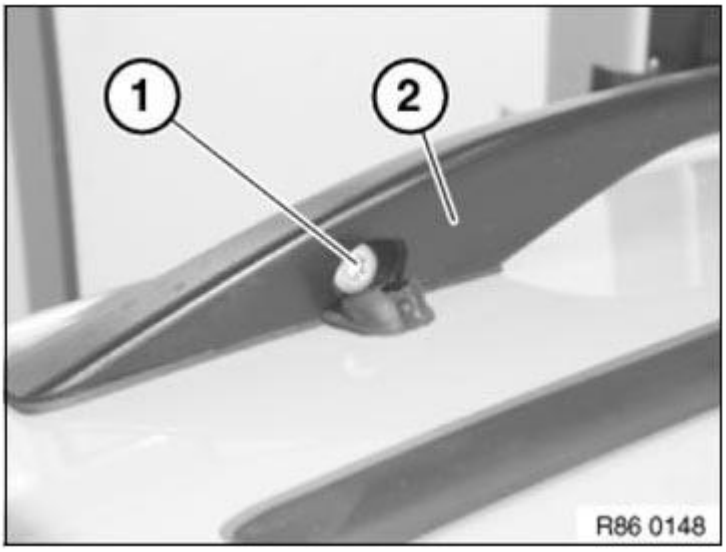


Fig. 185: Identifying Roof Railing With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING ROOF RAILING ADAPTER

NOTE: Removing roof railing, refer to REMOVING ROOF RAILING

Remove molded sealing part (1).

Installation

All molded sealing parts must rest flat on hood. Molded sealing parts are marked according to their position.

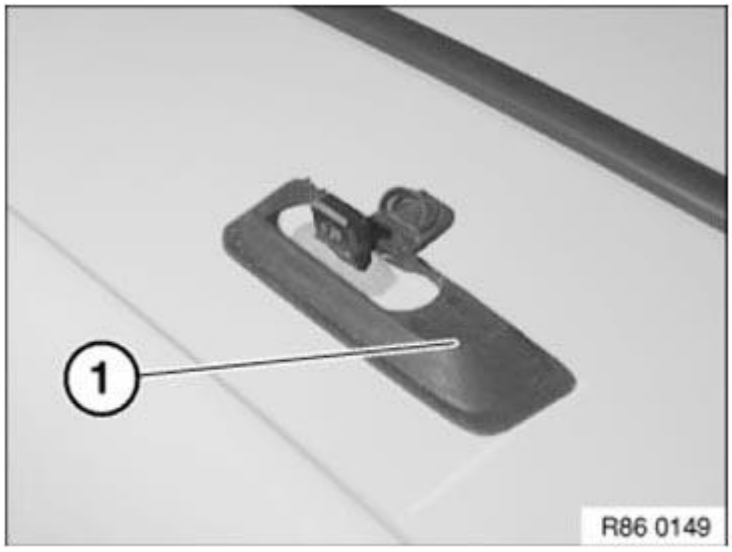


Fig. 186: Identifying Molded Sealing Part

Courtesy of BMW OF NORTH AMERICA, INC.

Cut butylene tape (1) out of railing adapter (2) along dotted line (3) with a knife.

Installation

Use butylene tape, 5 mm round, for sealing railing adapter on hood roof.

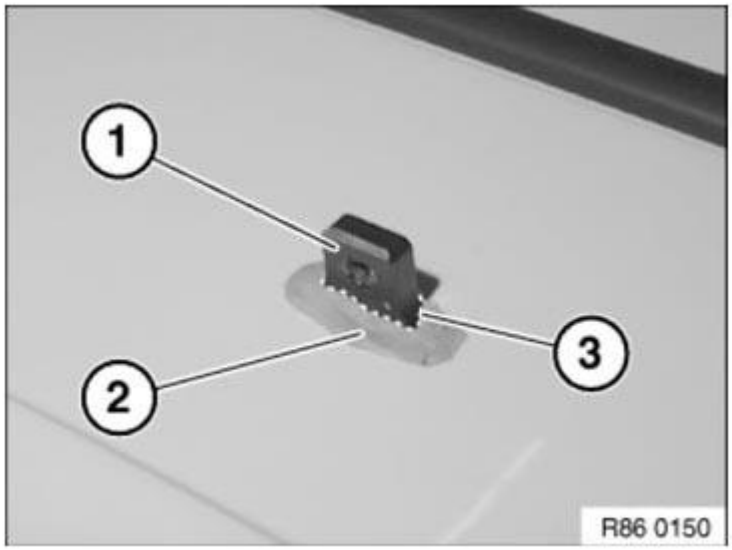


Fig. 187: Identifying Butylene Tape, Railing Adapter With Dotted Line
Courtesy of BMW OF NORTH AMERICA, INC.

Railing adapters at front and rear: Release screws (1) from inside of hood. Pull out railing adapter (2) and spacer plate (3) towards bottom.

Installation

Use new screws. Coat all screws with OKS 90 thread locking adhesive. Install spacer plate (3) in its original position.

Tightening Torque for railing adapters at front and rear, **86 21 3AZ**

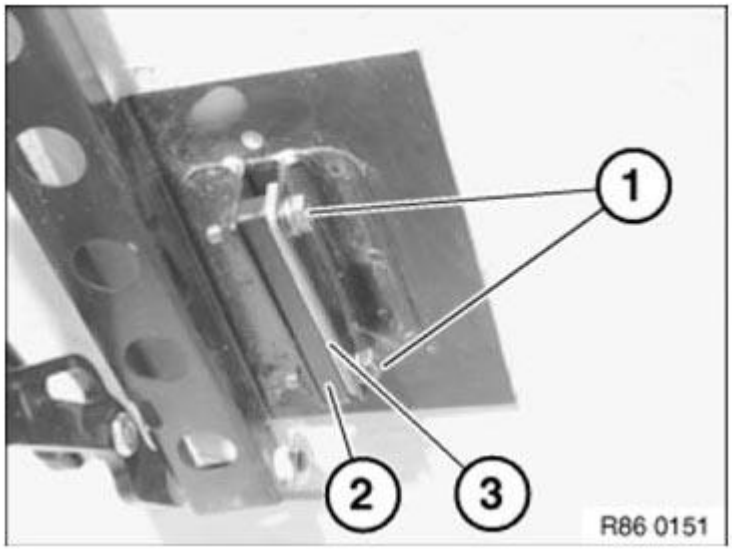


Fig. 188: Identifying Railing Adapter, Spacer Plate With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Railing adapter in middle: Release screws (1) from inside of hood. Twist out railing adapter from outside.

Installation:

Use new screws. Tightening Torque for railing adapter in middle, **86 21 4AZ**

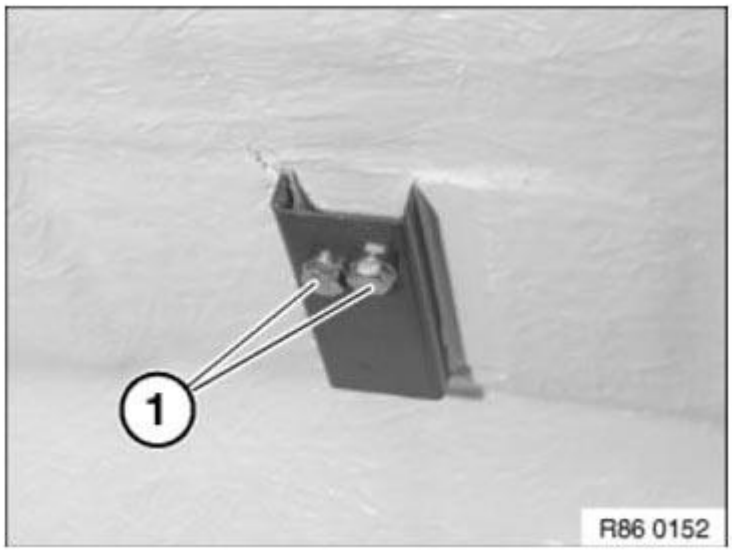


Fig. 189: Identifying Hood Inside Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING ROTARY STRIKER LOCK

The following text describes how to remove the rotary striker lock on the rear lid as an example. Proceed in the same way for the side lids. Remove the lock while the lid is open.

Release screws (1) and remove cover (2). On rear lid, remove red cap (3).

Installation, rear lid only:

Place red cap back on pull rod. Red cap serves to indicate rear lid emergency unlocking facility.

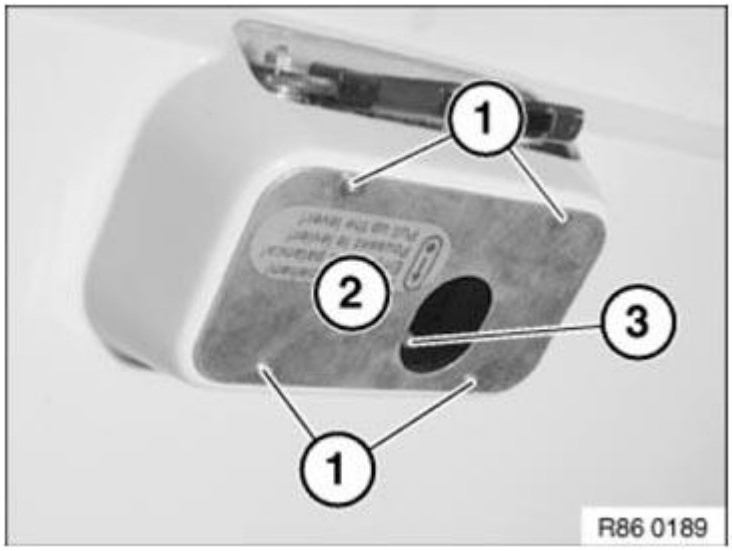


Fig. 190: Identifying Red Cap, With Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove spring nut (1) from pull rod (2).

Installation

Use new spring nut.

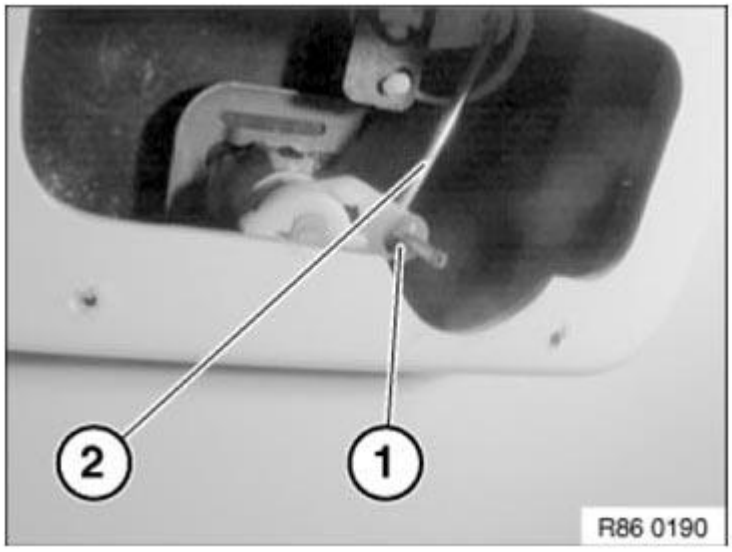


Fig. 191: Identifying Spring Nut And Pull Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook pull rod (1) from rocker (2).

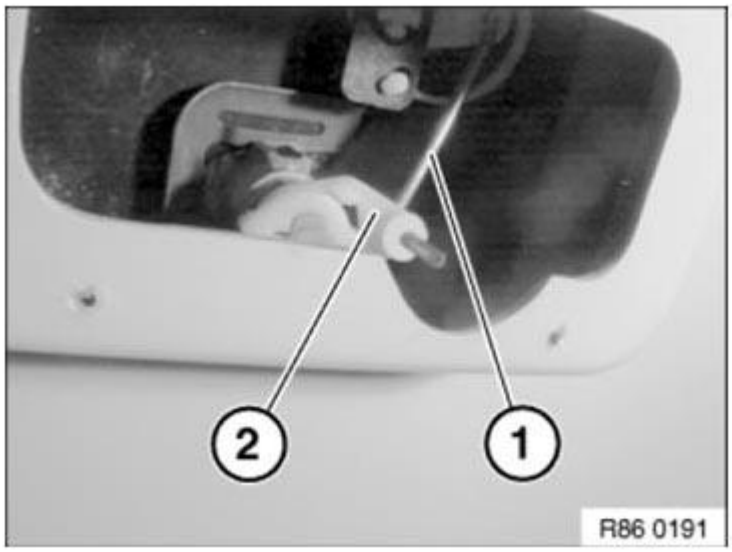


Fig. 192: Identifying Pull Rod And Rocker
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove rotary striker lock (2) from opening (3).

Installation

Tightening Torque, **86 21 12AZ**

Use new Stover nuts

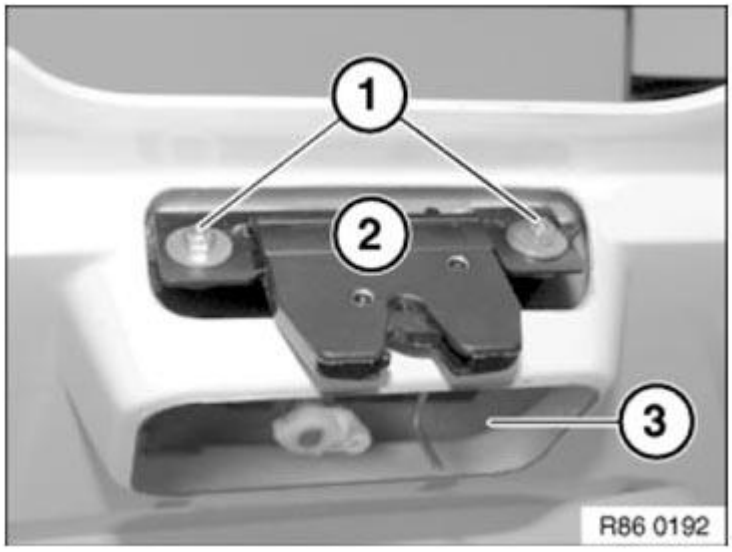


Fig. 193: Identifying Rotary Striker Lock With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach spring nut (1) from pull rod (2). Remove pull rod (2) from rotary striker lock (3).

Installation

Use new spring nut.

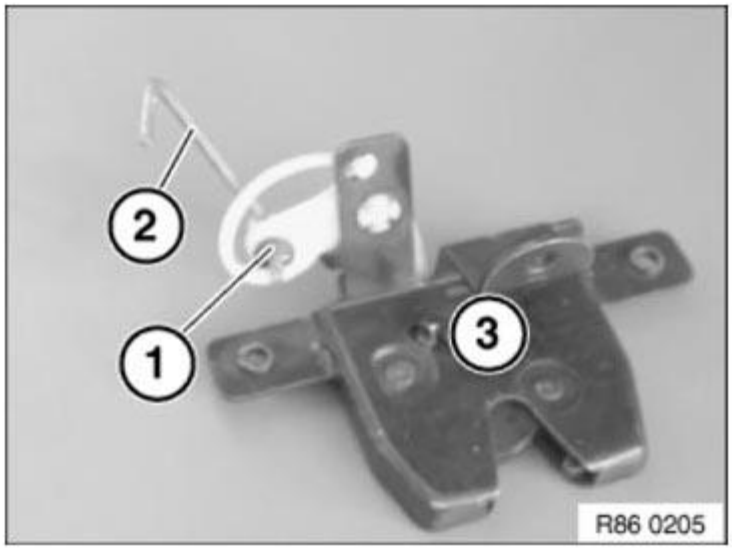


Fig. 194: Identifying Rotary Striker Lock, Pull Rod And Spring Nut
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REMOVING SIDE LID HINGE

NOTE: **Remove side lid, refer to REMOVING LID.**
Remove gas spring, remove gas spring on hinge side only, refer to REMOVING GAS SPRING.

Unscrew bolt (1). Remove hinge (2). If fitted, remove spacer plate(s) (3).

Installation

Pass screws (1) again through spacer tubes. Reinstall existing spacer plate (s) in its/their original position(s). Use new self-locking nuts.

Tightening Torque, **86 21 6AZ**

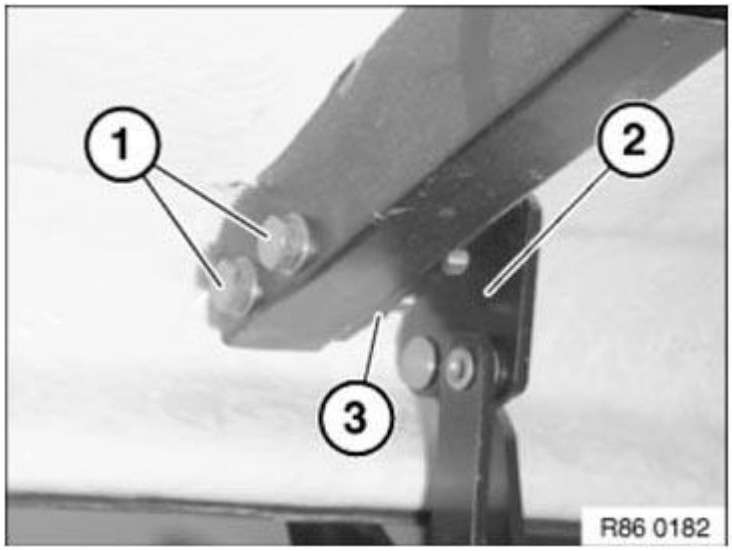


Fig. 195: Identifying Spacer Plate With Hinge And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REPLACING INSIDE LIGHT

Unclip cover (1) at side recess (arrowed) and remove towards bottom.

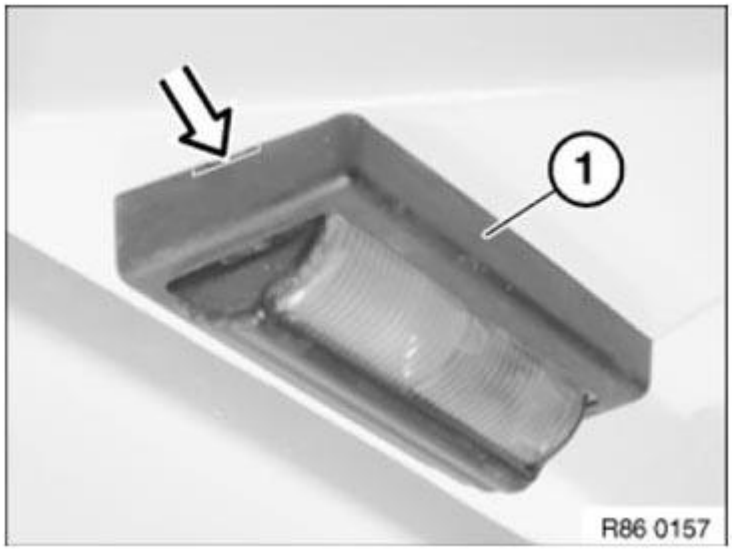


Fig. 196: Locating Cover Side Recess
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip lamp housing (1) at side recess (arrowed).

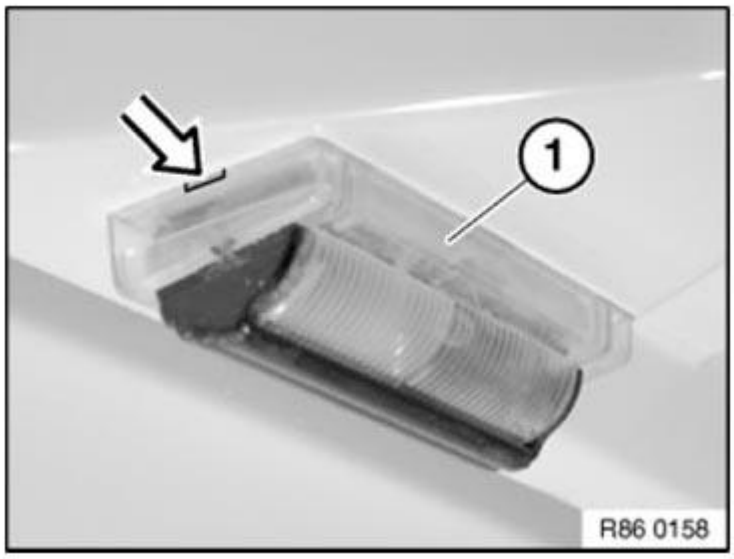


Fig. 197: Locating Lamp Housing Recess
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect flat connector (1) from flat connector contact.

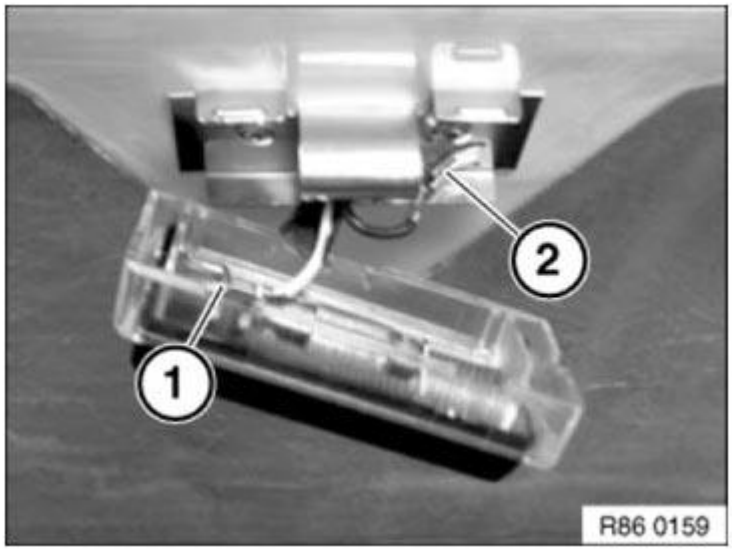


Fig. 198: Identifying Flat Connector
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Before drilling out rivets, drive in rivet pins with a punch. Drill out rivets (1). Pull off inside light mounting bracket (2) over flat connector (3).

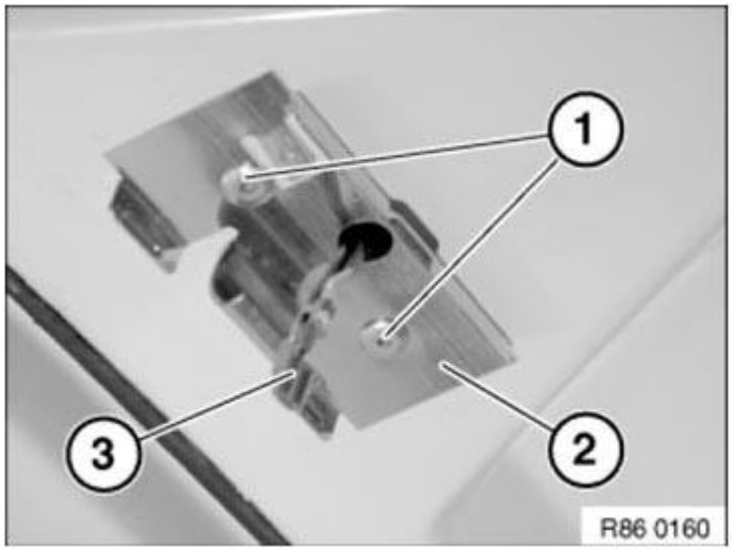


Fig. 199: Identifying Rivets, Inside Light Mounting Bracket And Flat Connector
Courtesy of BMW OF NORTH AMERICA, INC.

86 21... REPLACING INSIDE LIGHT POWER CABLE

NOTE: Remove inside light cover and lamp housing, refer to REPLACING INSIDE LIGHT.

Remove inside light plug, refer to REMOVING INSIDE LIGHT PLUG.

Carefully remove adhesive bonds of power cable (1) from hood surface.

Installation

Carefully remove traces of old adhesive with a scraper. Use standard heat gun adhesive as adhesive.

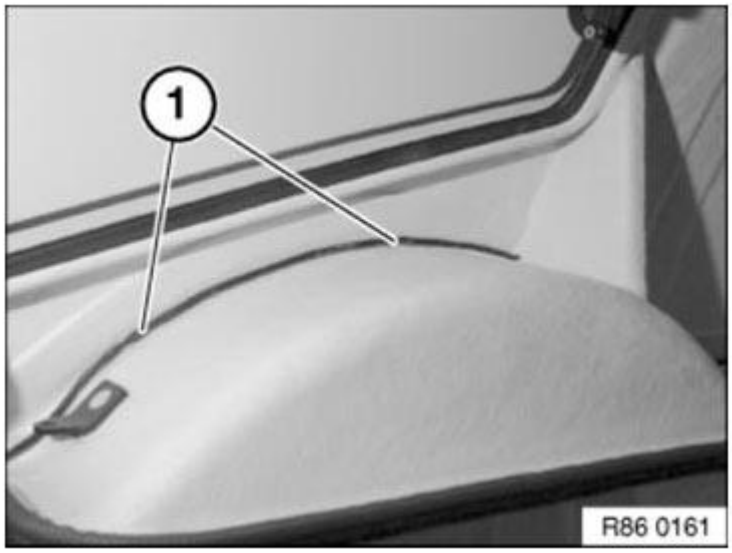


Fig. 200: Identifying Adhesive Bonds Of Power Cable On Hood Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove adhesive bonds of power cable (1) from hood surface.

Installation

Carefully remove traces of old adhesive with a scraper. Use standard heat gun adhesive as adhesive.

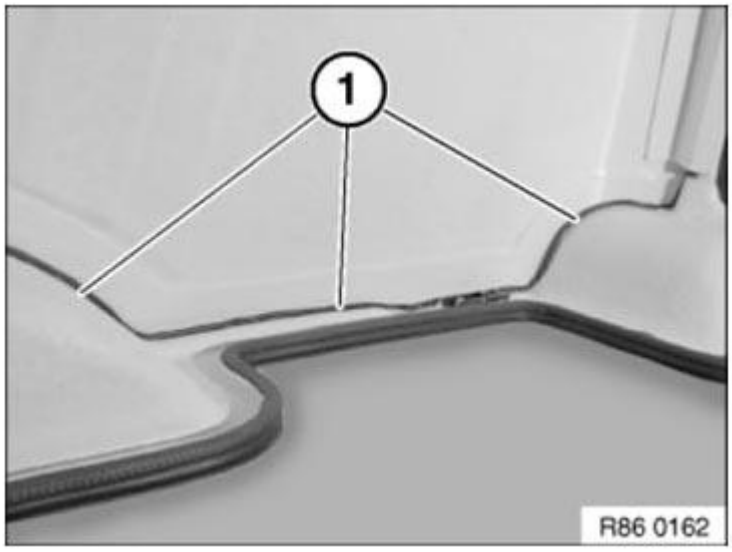


Fig. 201: Identifying Adhesive Bonds Of Power Cable On Hood Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Remove flat connectors (1). Strip cable ends (2) and connect to a new cable. Feed cable connection through opening (3).

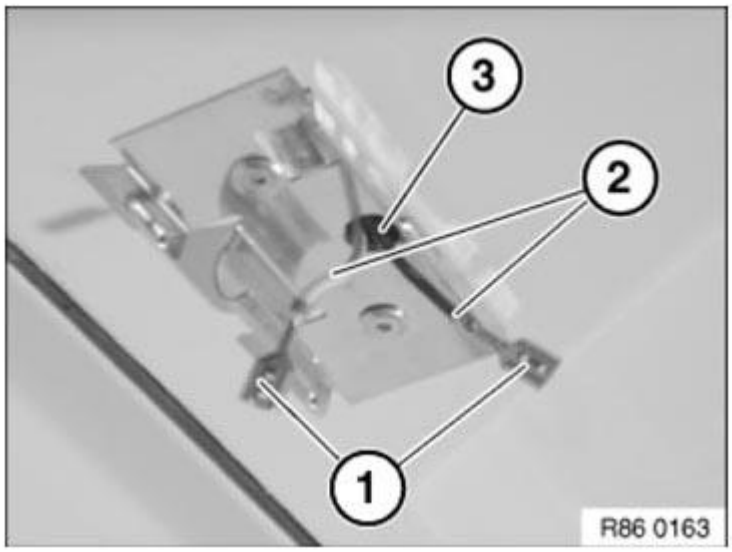


Fig. 202: Identifying Flat Connectors And Cable Ends
Courtesy of BMW OF NORTH AMERICA, INC.

Lay new power cable with old power cable through duct (1).

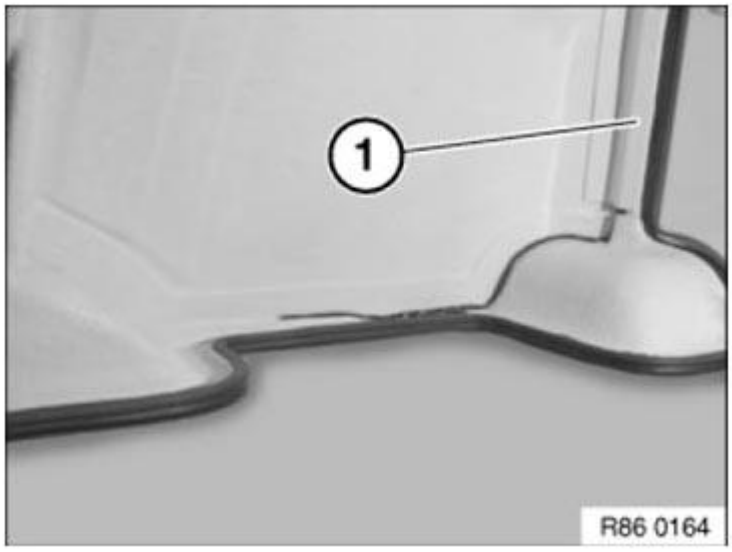


Fig. 203: Identifying Power Cable Duct
Courtesy of BMW OF NORTH AMERICA, INC.

ACCESSORIES AND BODY, CAB

Trailers - Tightening Torques

PLATFORM

86 10 PLATFORM

TIGHTENING TORQUE SPECIFICATION - PLATFORM

		Type	thread	tightening specification	Measure
1AZ	Nut to retaining thread, rear light		M5		7 Nm
2AZ	Bar to platform		M8x35		23 Nm
3AZ	Lashing plate to platform		M8x35		15 Nm
4AZ	Front guard to cross-member		M8x55		28 Nm
5AZ	Front guard to longitudinal member		M8x25		34 Nm
6AZ	Saucer head screw to rail		M5x15		7 Nm
7AZ	Rail, loading ramp frame to cross strut		M6x16		11.5 Nm
8AZ	Rail, loading ramp frame to longitudinal member mount		M6x16		11.5 Nm
9AZ	Cross strut to rail		M6x16		5.5 Nm
10AZ	Footplate to drawbar member		M6x25		11.5 Nm
11AZ	Bracket to drawbar member		M8x25		34 Nm
12AZ	Wiring harness mount to reversing housing		M10x1x20		58 Nm
13AZ	Socket holder to drawbar		M10x95		55 Nm
14AZ	Top reversing housing and bracket to drawbar member		M10		55 Nm

15AZ	Towing attachment to tow tube		M12x70		96 Nm
16AZ	Drawbar member to cross-member		M8x20		28 Nm
17AZ	Cross-member to drawbar member		M8x25		40 Nm
18AZ	Drawbar member to cross-member		M8x25		28 Nm
19AZ	Disk wheel to brake hub				100 Nm
20AZ	Brake hub to axle				280 Nm
21AZ	Shock absorber to bracket		M12x55		96 Nm
22AZ	Trailing arm to coil spring		M10x35		46 Nm
23AZ	Coil spring to longitudinal member		M10x25		46 Nm
24AZ	Wheel brake to trailing arm		M10x1.5x30		145 Nm
25AZ	Trailing arm to mount		M12x85		96 Nm
26AZ	Rear apron to bracket		M8x25		26 Nm
27AZ	Bracket to mounting bracket		M6x16		11 Nm
28AZ	Rotary striker lock to cross strut		M8x35		18 Nm
29AZ	Bearing pedestal to loading ramp frame		M6x16		10 Nm
30AZ	Outer towbar mount to longitudinal member		M10x25		55 Nm
31AZ	Mounting bracket to longitudinal member		M10x25		78 Nm
32AZ	Base plate to cross-member		M10x35		78 Nm

HOOD

86 21 HOOD

TIGHTENING TORQUE SPECIFICATION - HOOD

		Type	thread	tightening specification	Measure
1AZ	Roof railing, front and rear, to roof railing adapter		M8		22.5 Nm
2AZ	Roof railing, middle, to roof railing adapter		M8		22.5 Nm
3AZ	Roof railing, front and rear, to support		M6		15 Nm
4AZ	Roof railing, middle, to support		M6		10 Nm
5AZ	Upper lock striker fixture to lower lock striker fixture		M8		27 Nm
6AZ	Hinge, side lid, to support		M8		27 Nm
7AZ	Support, lid to lid		M8		23 Nm
8AZ	Screw, depth adjustment, side lid		M8		27 Nm
9AZ	Screw, depth adjustment, rear lid		M8		27 Nm
10AZ	Ball pivot to retaining bracket		M8		23 Nm
11AZ	Retaining bracket to support		M8		27 Nm
12AZ	Rotary striker lock to support		M5		7 Nm

TRANSMISSION

Transfer Box - Repair

2700 TRANSFER CASE, GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

**WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!**

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

SUSPENSION

Wheel and Tires - Repair

3610 WHEELS

36 10 209 CHECKING FRONT AND REAR WHEEL FOR LATERAL AND RADIAL RUNOUT

Necessary preliminary tasks

- Check wheel bearings

Lift vehicle.

Check wheel with special tool **36 1 030** (measuring fixture) for lateral runout. See **WHEELS TWO-PART ALLOY WHEELS** , **WHEELS ONE-PART ALLOY WHEELS** , or **WHEELS STEEL AND ALUMINIUM STRIP WHEELS** .

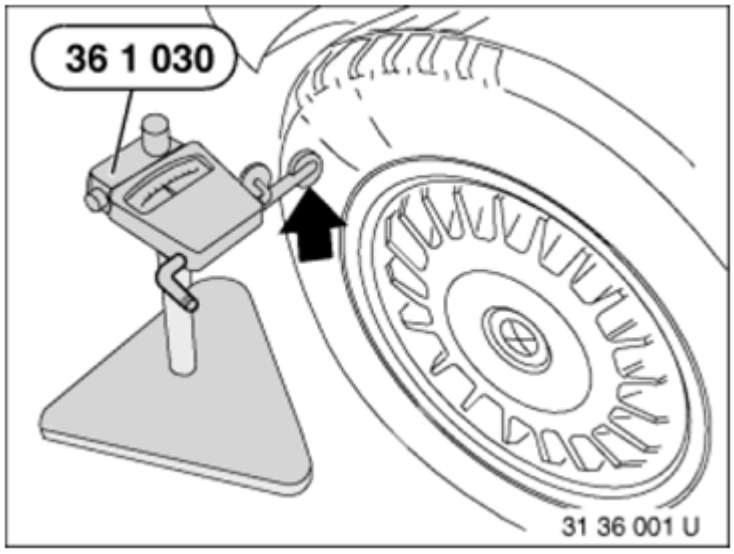


Fig. 1: Checking Wheel Lateral Runout Using Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Check wheel with special tool **36 1 030** (measuring fixture) for radial runout. See **WHEELS TWO-PART ALLOY WHEELS** , **TED-TED-TD36-1B1S2 WHEELS ONE-PART ALLOY WHEELS** , or **TED-TED-TD36-1B1S1 WHEELS STEEL AND ALUMINIUM STRIP WHEELS** .

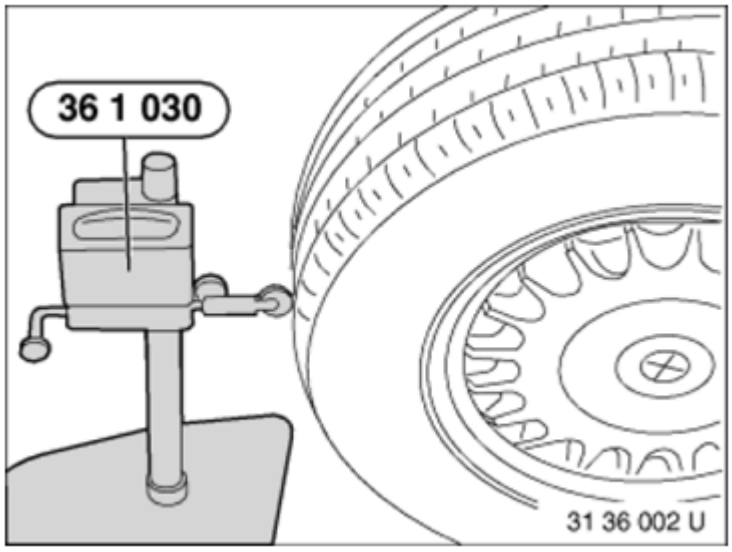


Fig. 2: Checking Wheel Radial Runout Using Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

If applicable, remove balance weights.

Check lateral runout of rim with special tool **36 1 030** (measuring fixture). See **WHEELS TWO-PART ALLOY WHEELS** , **WHEELS ONE-PART ALLOY WHEELS** , or **WHEELS STEEL AND ALUMINIUM STRIP WHEELS** .

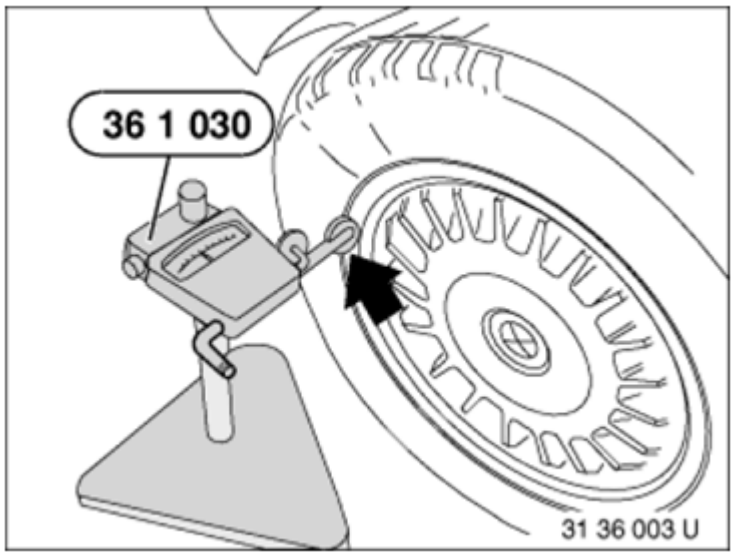


Fig. 3: Checking Rim For Lateral Runout Using Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Check radial runout of rim with special tool **36 1 030** (measuring fixture). See **WHEELS TWO-PART ALLOY WHEELS** , **WHEELS ONE-PART ALLOY WHEELS** , or **WHEELS STEEL AND**

ALUMINIUM STRIP WHEELS .

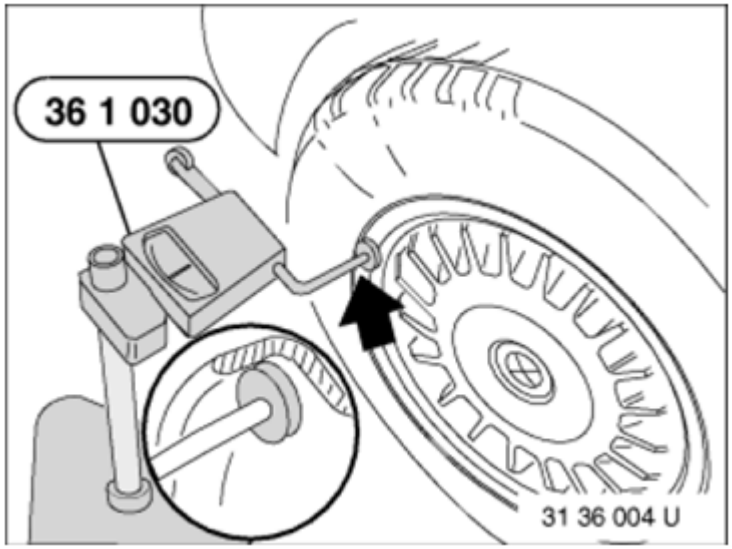


Fig. 4: Checking Rim Radial Runout Using Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

36 10 713 CHECKING ONE ROAD WHEEL ON BALANCING MACHINE FOR LATERAL AND RADIAL RUNOUT (WHEEL REMOVED)

Necessary preliminary work

- Remove **WHEEL**

Mount wheel in balancing machine.

To avoid retooling errors, fit the wheel on the balancing machine in the same way as it is also fitted on the car (valve position facing down).

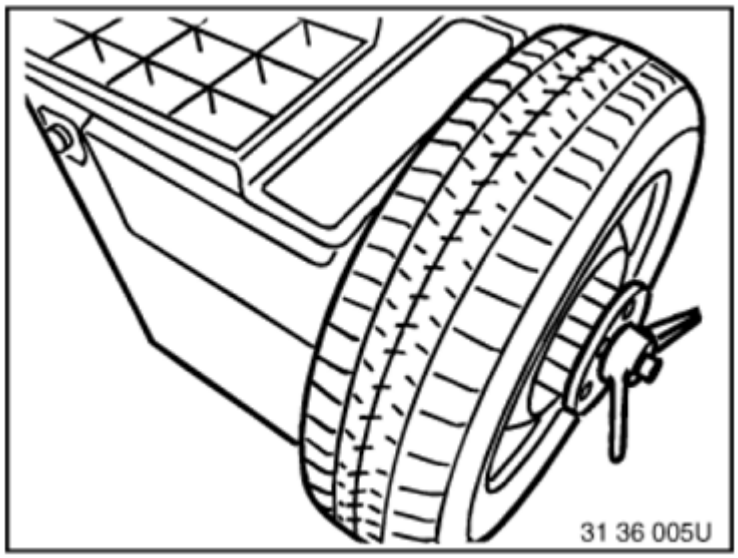
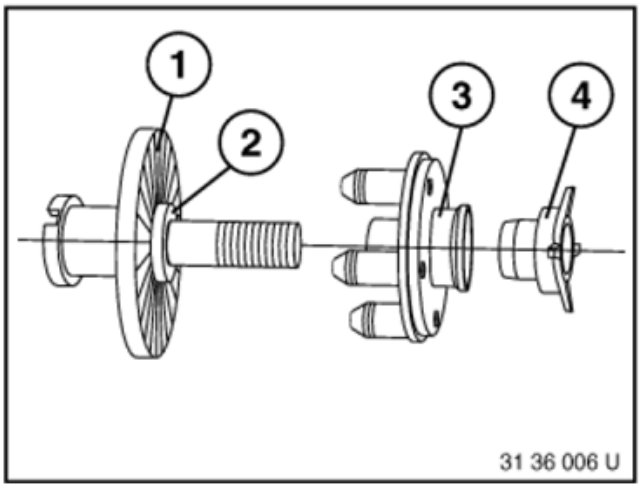


Fig. 5: Identifying Wheel On Balancing Machine
Courtesy of BMW OF NORTH AMERICA, INC.

Use suitable wheel centering element supplied with corresponding balancing machine.

1. Basic flange
2. Wheel centering element
3. Type flange
4. Clamping nut



1. Basic flange
2. Wheel centring element
3. Type flange
4. Clamping nut

Fig. 6: Identifying Basic Flange, Wheel Centering Element, Type Flange And Clamping Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Use special tool **36 1 030** for testing.

Special tool **36 1 030** consists of:

1. Base 36 1 031
2. Post with clamp 36 1 032
3. Holder with clamp 36 1 033
4. Clamp 36 1 034
5. Measuring roll 36 1 035
6. Dial gauge 36 1 036

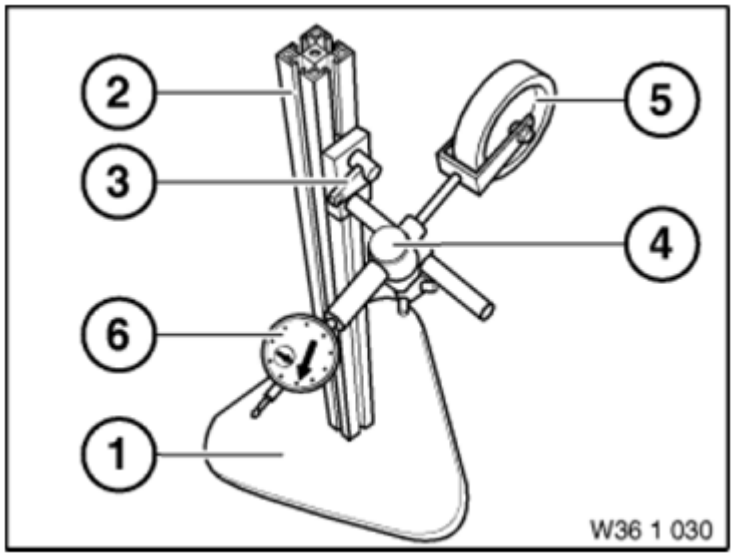


Fig. 7: Identifying Special Tool (36 1 030) Components
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **36 1 030** on tire tread surface.

Turn wheel by hand and measure max. radial tire runout. See **WHEELS TWO-PART ALLOY WHEELS** , **WHEELS ONE-PART ALLOY WHEELS** , or **WHEELS STEEL AND ALUMINIUM STRIP WHEELS** .

NOTE: Measuring device must be vertical to tire tread.

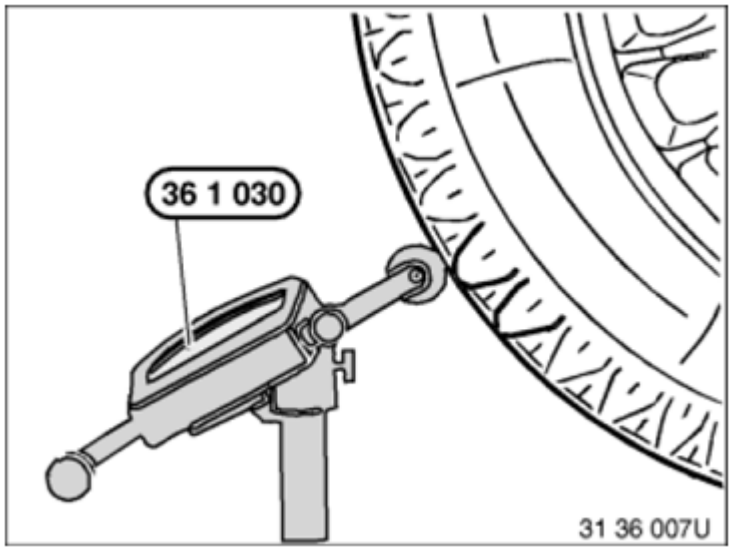


Fig. 8: Measuring Max. Radial Tyre Runout Using Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **36 1 030** on tire side wall.

Turn wheel by hand and measure max. lateral runout of rim with special tool **36 1 030** (measuring fixture). See **WHEELS TWO-PART ALLOY WHEELS** , **WHEELS ONE-PART ALLOY WHEELS** , or **WHEELS STEEL AND ALUMINIUM STRIP WHEELS** .

NOTE: Measuring device must be vertical to tire side wall.

Never measure on printed text on tire!

If necessary, check **DISC WHEEL** (rim) for radial and face runout.

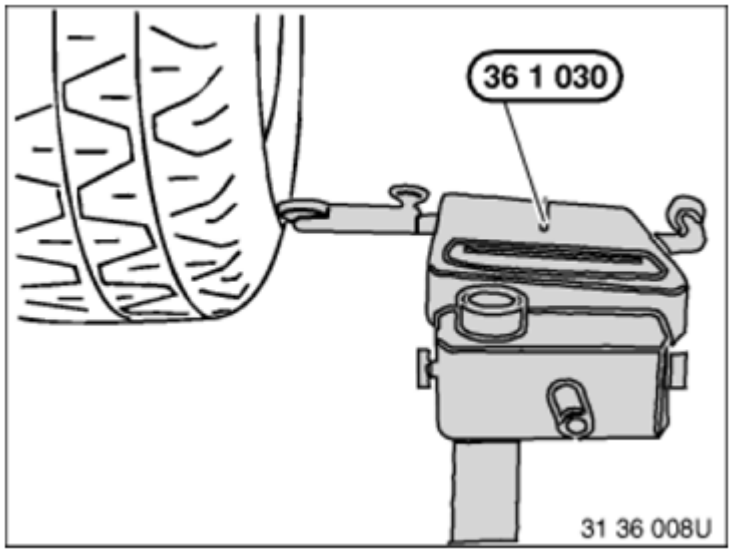


Fig. 9: Measuring Max. Lateral Tyre Runout Using Special Tool (36 1 030)
Courtesy of BMW OF NORTH AMERICA, INC.

36 10 715 CHECKING RIM FOR LATERAL AND RADIAL RUNOUT

Necessary preliminary tasks

- Remove **WHEEL**
- Check **WHEEL** for lateral and radial runout
- Remove **TYRE** from disc wheel
- Remove dirt from rim well and rim flange

IMPORTANT: Disc wheels are not allowed to be repaired!

Mount disc wheel in balancing machine.

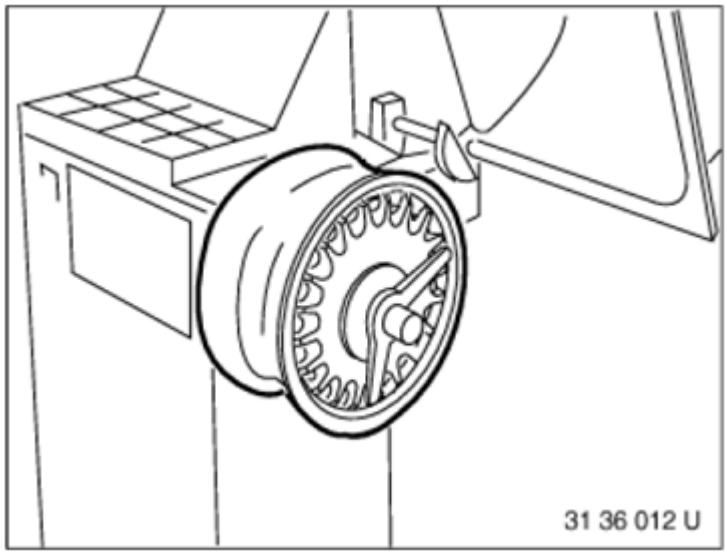
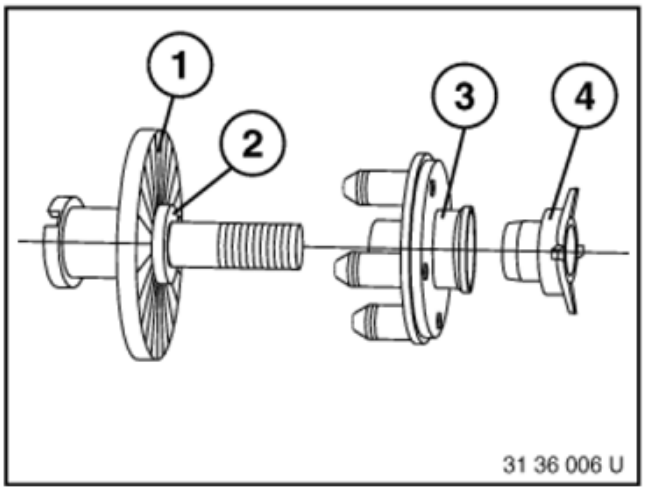


Fig. 10: Identifying Disc Wheel In Balancing Machine
Courtesy of BMW OF NORTH AMERICA, INC.

Use suitable wheel centering element supplied with corresponding balancing machine.

1. Basic flange
2. Wheel centering element
3. Type flange
4. Clamping nut



1. Basic flange
2. Wheel centring element
3. Type flange
4. Clamping nut

Fig. 11: Identifying Basic Flange, Type Flange, Wheel Centering Element And Clamping Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Place dial gauge sensor on rim shoulder.

Turn wheel by hand and measure max. radial runout. See **WHEELS TWO-PART ALLOY WHEELS** , **WHEELS ONE-PART ALLOY WHEELS** , or **WHEELS STEEL AND ALUMINIUM STRIP WHEELS** .

Carry out measurement on both rim shoulder sides.

NOTE: Dial gauge must be vertical to rim shoulder.

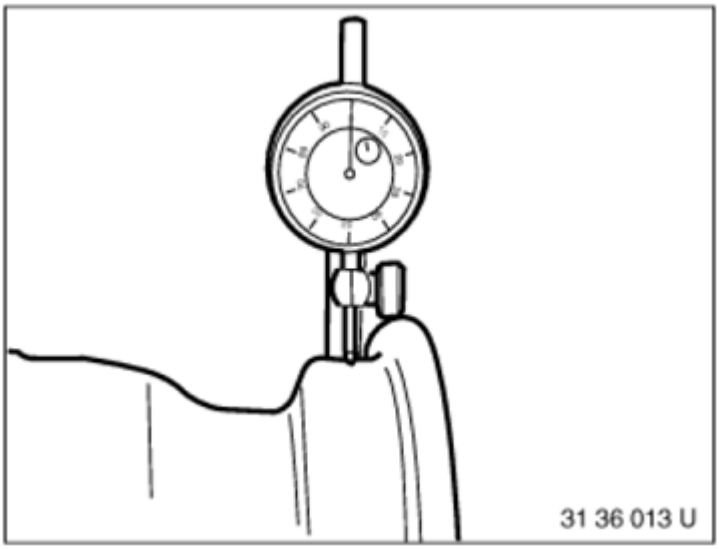


Fig. 12: Identifying Dial Gauge Sensor On Rim Shoulder
Courtesy of BMW OF NORTH AMERICA, INC.

Position sensor on rim flange.

Turn wheel by hand and measure max. lateral runout of rim with special tool **36 1 030** (measuring fixture). See **WHEELS TWO-PART ALLOY WHEELS** , **WHEELS ONE-PART ALLOY WHEELS** , or **WHEELS STEEL AND ALUMINIUM STRIP WHEELS** .

Carry out measurement on both rim flanges.

NOTE: Dial gauge must be vertical to rim flange.

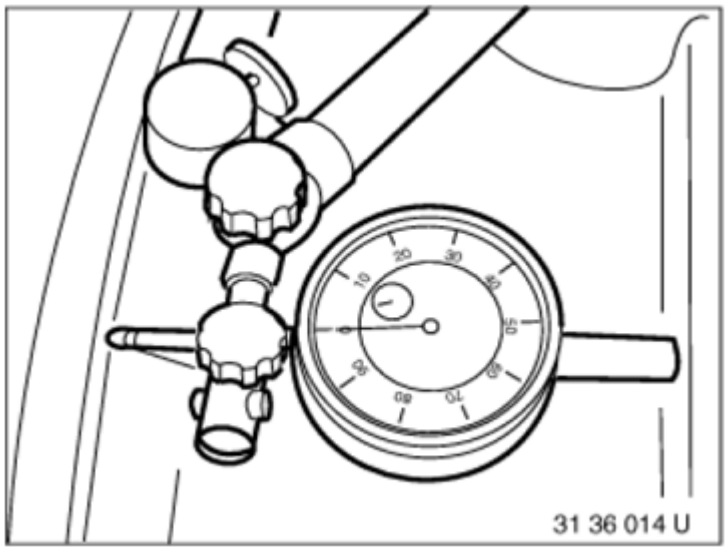


Fig. 13: Measuring Max. Lateral Runout Using Dial Gauge Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid transformation errors during subsequent installation tasks.

36 10... GENERAL NOTES ON WHEEL AND TIRES (BMW ALPINA B7)

NOTE:

- **Pay attention to released wheel and tire combinations for BMW ALPINA.**
- **The valve for checking the tire inflation pressure is located under the hub cap.**

Removing the hub cap

Press on emblem in area (1) and turn in direction of arrow.

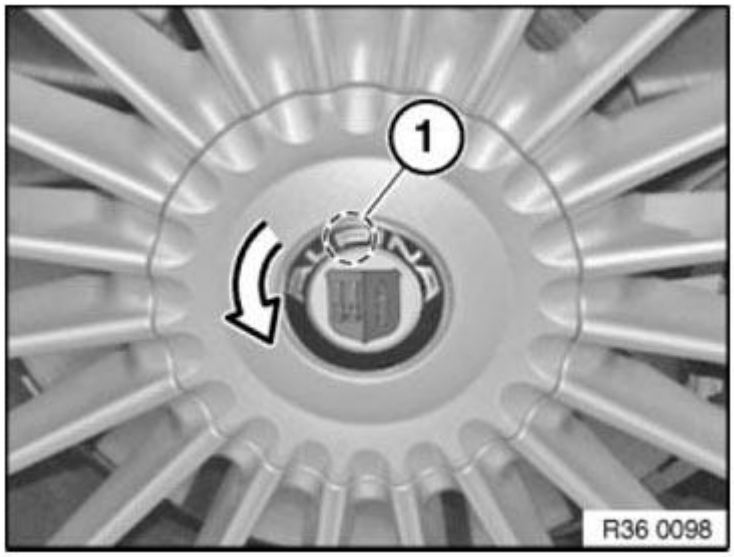


Fig. 14: Turning Hub Cap By Pressing On Emblem
Courtesy of BMW OF NORTH AMERICA, INC.

Open lock with key (1) and remove hub cap (2).

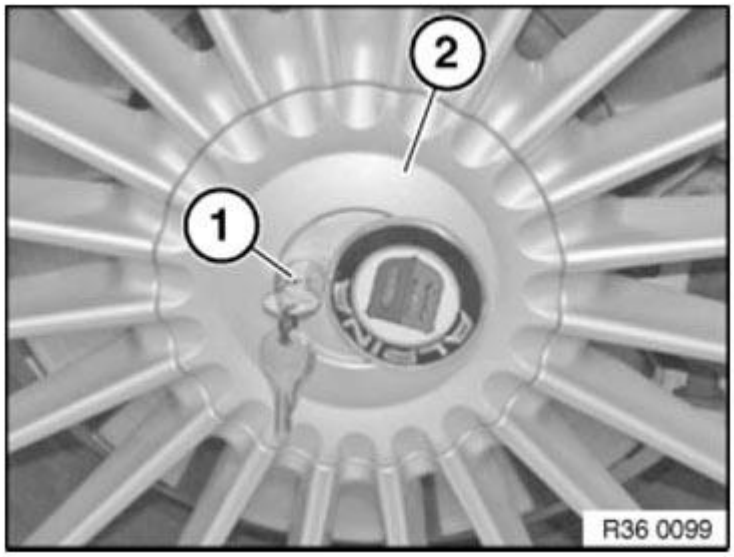


Fig. 15: Identifying Lock Key And Hub Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure that there are 10 friction film pieces (see arrows) on the hub cap.

When replacing the hub caps, the supplied friction film pieces must also be attached.



Fig. 16: Locating Friction Film Faces On Hub Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Note on valve insert:

IMPORTANT: In the event of repair, only valve insert (1) may be replaced!
The screw valve (2) must not be removed from the wheel rim!

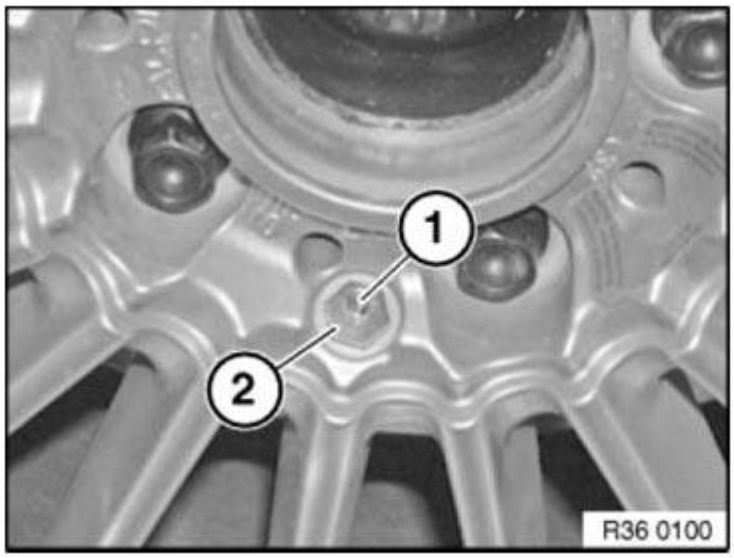


Fig. 17: Identifying Valve Insert And Screw Valve
Courtesy of BMW OF NORTH AMERICA, INC.

36 10 300 REMOVE OR INSTALL FRONT OR REAR WHEEL

Notes

IMPORTANT: Wheel was balanced electronically.
Observe safety instructions on raising the vehicle.
Follow instructions on initializing Run Flat Indicator (RPA).
When fitting all four wheels (e.g. when changing from summer to winter wheels), check the tire inflation pressure.
To avoid tire damage, advise the customer to check the tire inflation pressures on a regular basis (see Owner's Handbook).

Observe the following procedure to prevent shift errors and imbalance:

- Loosen wheel bolts.
- Wheel positioned with valve facing down.
- If several wheels are simultaneously removed, mark installation location of wheels on tires (e.g. with a piece of chalk).
- Mark out wheel to wheel hub.
- Mark out lockable wheel bolt in relation to wheel.
- Unscrew wheel bolts. Remove wheel.

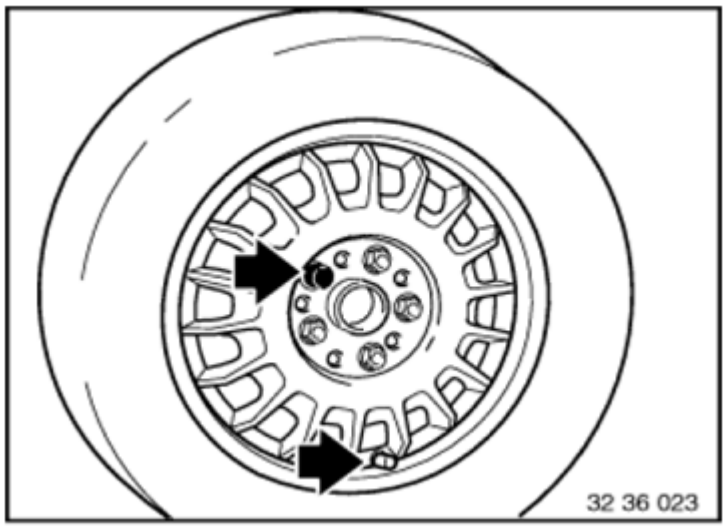


Fig. 18: Locating Wheel Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Contact surfaces between:

- **brake disc and disc wheel,**
- **brake disc and wheel hub,**

must be clean and free from grease.

Remove dirt, grease residues and corrosion from contact surface (1) with a drill and special tool **36 1 250** .

IMPORTANT: Do not operate special tool 36 1 250 with an impact screwdriver!

NOTE: Degrease contact face with universal cleaner.

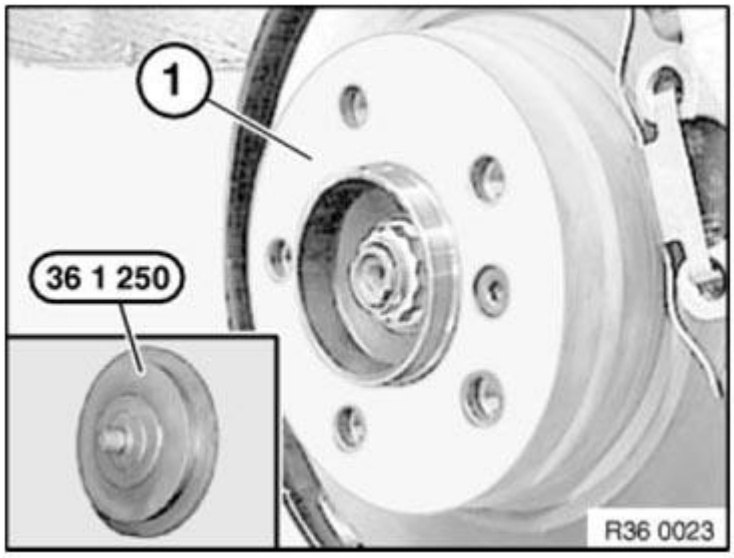


Fig. 19: Identifying Brake Disc And Disc Wheel Contact Surface With Special Tool (36 1 250)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If there are grease residues in the area of the wheel bolt bore, the brake disc must be removed and cleaned.

Remove dirt, grease residues and corrosion from contact surface (1) with a drill and special tool **36 1 250** .

IMPORTANT: Do not operate special tool 36 1 250 with an impact screwdriver!

NOTE: Degrease contact face with universal cleaner.

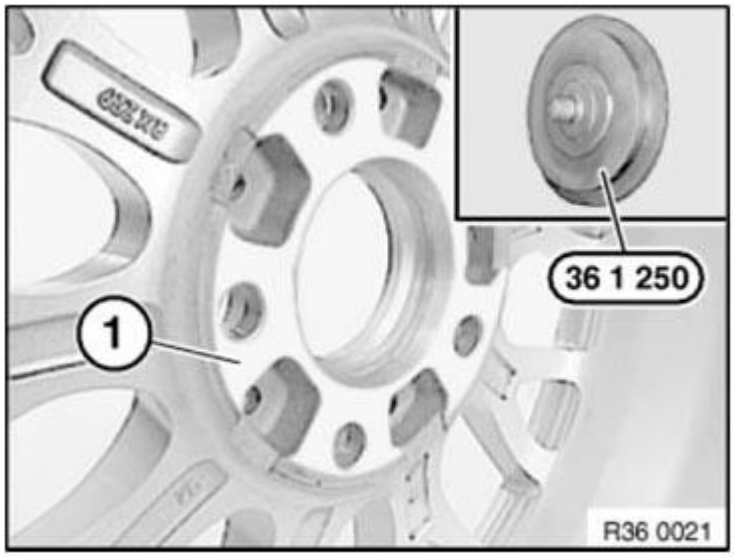


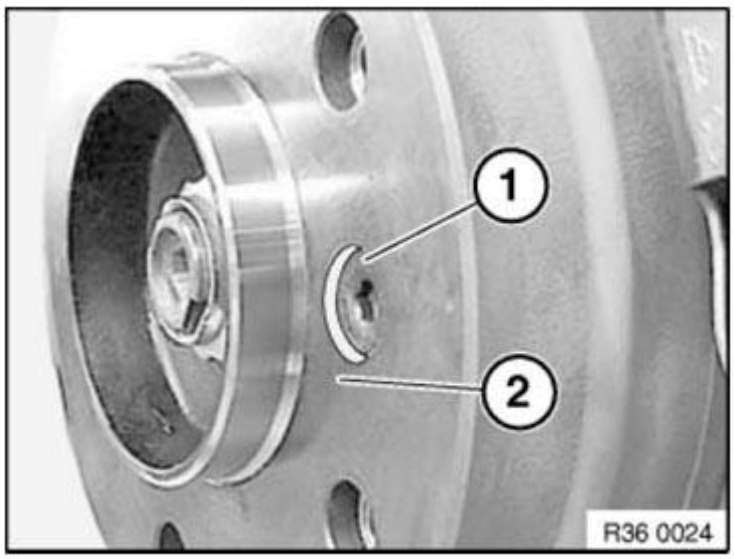
Fig. 20: Identifying Mounting Bolt Position
Courtesy of BMW OF NORTH AMERICA, INC.

Check brake disc retaining bolt (1) for secure seating.

IMPORTANT: Mounting bolt (1) must not under any circumstances protrude over contact surface (2) between brake disc and disc wheel.

Tightening torque brake disc retaining bolt:

- Front axle **34 11 1AZ**
- Rear axle **34 21 1AZ**



Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a thin coat of **GREASE** to wheel centering (1) in disc wheel.

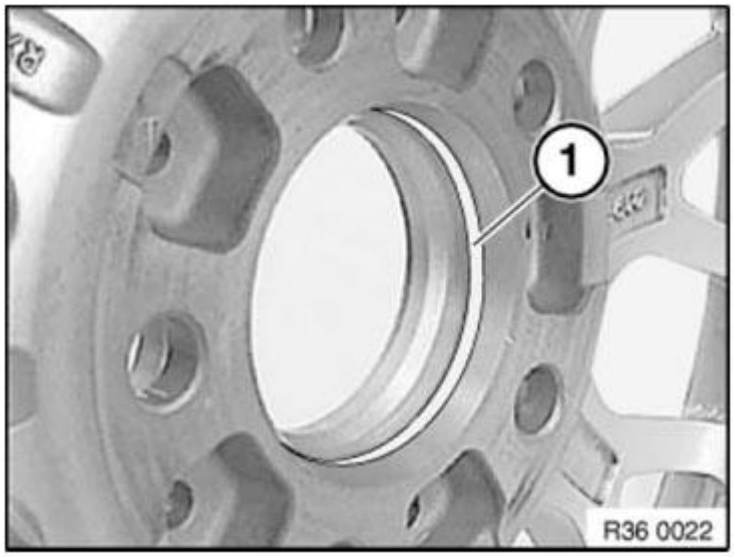


Fig. 22: Identifying Wheel Centering
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel bolts with taper:

a. Wheel bolt - galvanized
b. Wheel bolt - black chrome plated
c. Wheel bolt - black chrome plated and lockable
d. Lockable wheel bolt with adapter, black chrome-plated

NOTE: To release and tighten down lockable wheel bolts, use a matching adapter from special tool 36 1 300 .

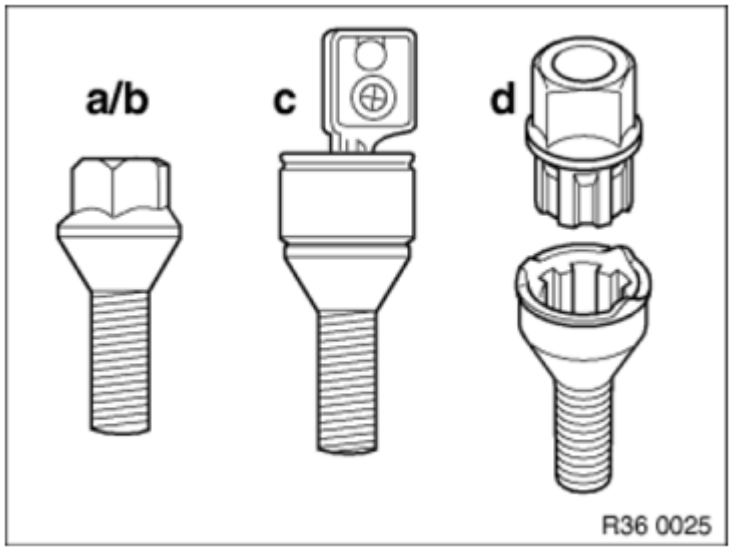


Fig. 23: Identifying Wheel Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Clean wheel bolts and check threads for damage, replace, if necessary.

Replace rusty wheel bolts.

IMPORTANT: Do not apply oil to wheel bolts.

IMPORTANT: Under no circumstances use pneumatic or power screwdrivers to install and tighten the wheel bolts.

IMPORTANT: Disc wheel must rest uniformly against brake disc.
In the case of non-original BMW wheel bolts/rims it may be necessary to retighten the wheel bolts on account of settling properties (refer to manufacturer's instructions).

Fit wheel bolts and evenly tighten crosswise by hand in order to center the disc wheel.

Tighten down wheel bolts in crosswise sequence with a calibrated torque wrench to prescribed tightening torque **36 10 1AZ** .

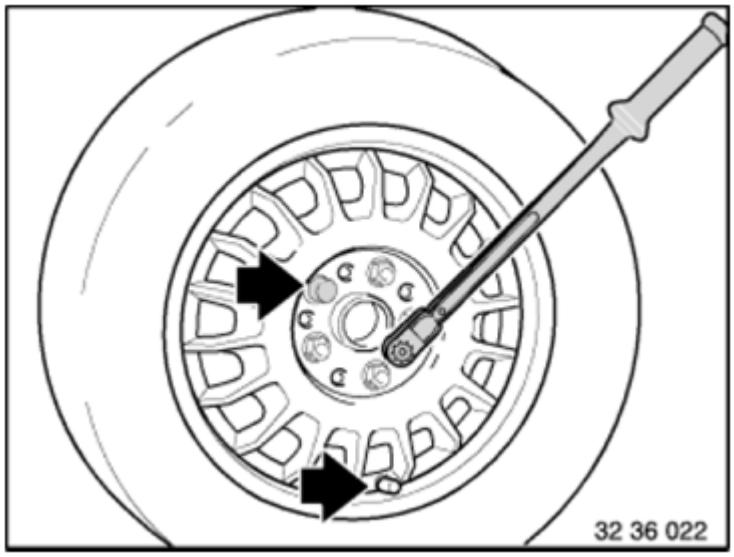


Fig. 24: Tightening Down Wheel Bolts Using Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

36 10 508 STATIONARY WHEEL BALANCING

Necessary preliminary work

- Remove **WHEEL**

IMPORTANT: Use only BMW-approved balance weights.

Remove any fitted balancing weights, stones in tread pattern and larger contaminants.

Check tire inflation pressure and tire for condition, damage, flat spots (out-of-round caused by e.g. parking of vehicle with tires which have run hot). If necessary, check **WHEEL AND TYRE** for radial and lateral runout.

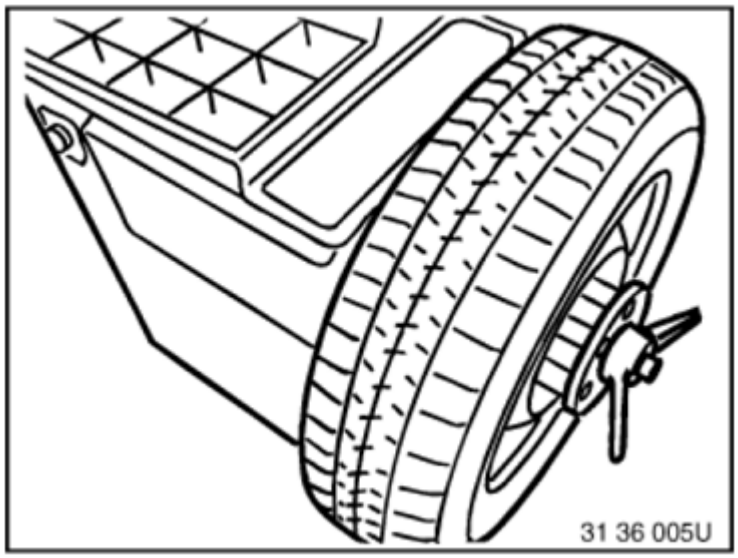
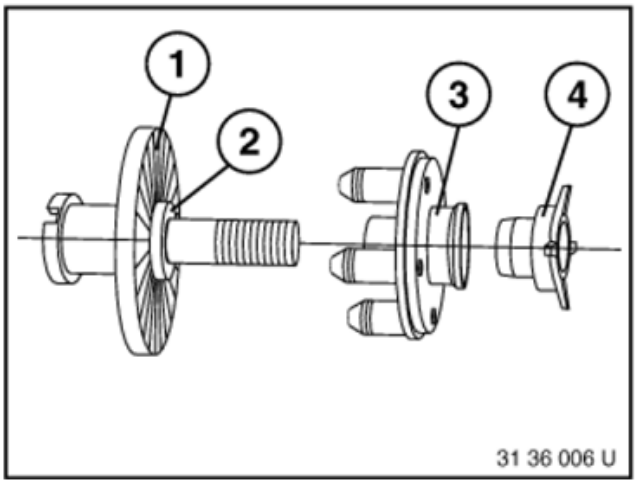


Fig. 25: Identifying Wheel On Wheel Balancing Machine
Courtesy of BMW OF NORTH AMERICA, INC.

Use BMW-approved centering elements of relevant balancing machine manufacturers.

1. Basic flange
2. Wheel centering element
3. Type flange
4. Clamping nut



1. Basic flange
2. Wheel centring element
3. Type flange
4. Clamping nut

Fig. 26: Identifying Basic Flange, Type Flange, Wheel Centering Element, Clamping Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid retooling errors, it will be necessary to fit the wheel on the balancing machine in the same way (e.g. valve facing down) as it is then fitted on the car.

Balance wheel in accordance with operating instructions of relevant balancing machine.

On light-alloy rims with distinctive J-shape rim flange, proceed as follows:

1. Gently force off tire sidewall with special tool **36 1 020** at appropriate point from rim flange.
2. Install retaining clip (1).
3. Remove special tool **36 1 020** .

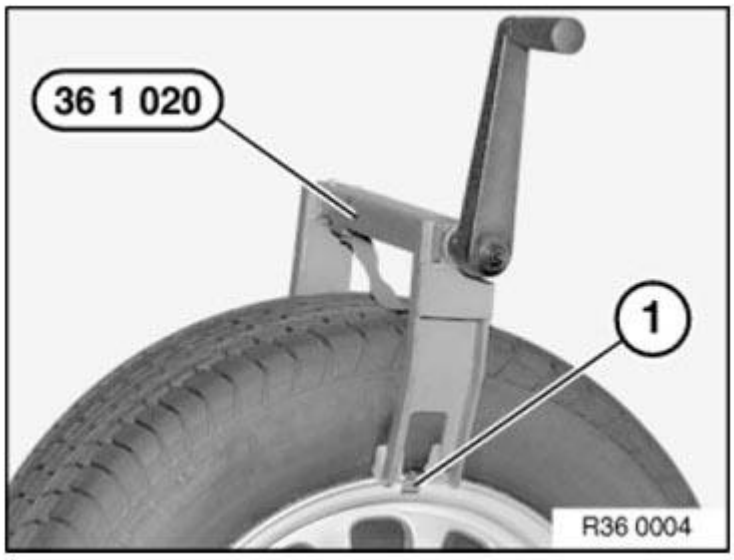


Fig. 27: Installing Retaining Clip By Pressing Side Wall Of Tyre Using Special Tool (36 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Raise retaining clip with special tool. **36 1 010** Slide balance weight underneath and allow it to snap into place.

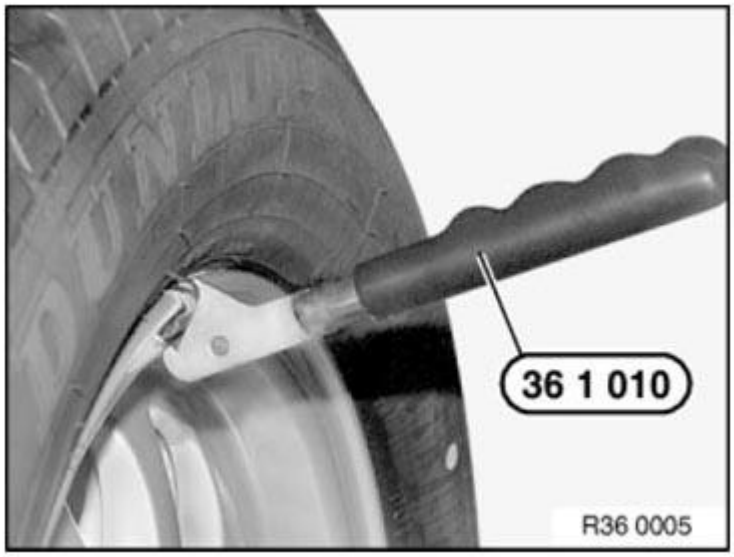


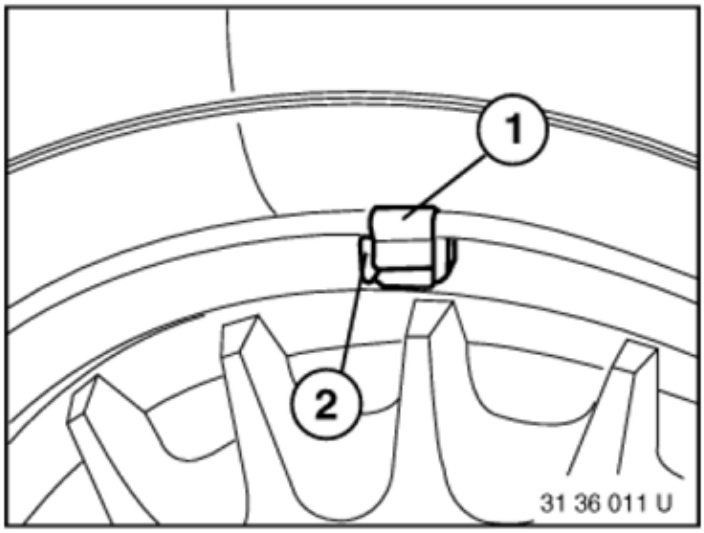
Fig. 28: Raising Retaining Clip Using Special Tool (36 1 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of balance weights for light-alloy rims with distinctive J-shape rim flanges.

1. Spring retainer
2. Balance weight

Adhesive weights must be used on all other light-alloy rims.

Max. imbalance per wheel: see **WHEELS TWO-PART ALLOY WHEELS** , **WHEELS ONE-PART ALLOY WHEELS** , or **WHEELS STEEL AND ALUMINIUM STRIP WHEELS** .



1. Spring retainer
2. Balance weight

Fig. 29: Identifying Spring Retainer And Balance Weight

NOTE: When using adhesive weights, proceed as follows:

1. **Carefully remove any adhesive weights. Do not damage rim when doing so.**
2. **Select suitable location for fitting.**
3. **Clean adhesive area thoroughly.**

3611 DISC WHEELS (RIMS)

36 10 715 CHECKING RIM FOR LATERAL AND RADIAL RUNOUT

Necessary preliminary tasks

- Remove **WHEEL**
- Check **WHEEL** for lateral and radial runout
- Remove **TYRE** from disc wheel
- Remove dirt from rim well and rim flange

IMPORTANT: Disc wheels are not allowed to be repaired!

Mount disc wheel in balancing machine.

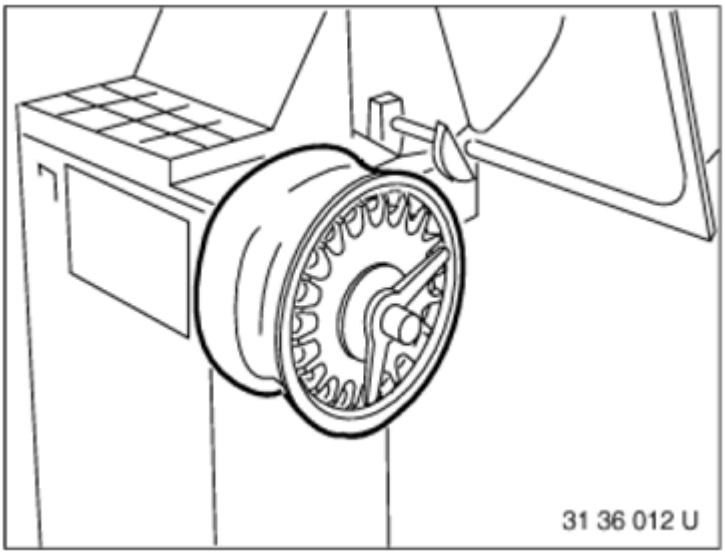
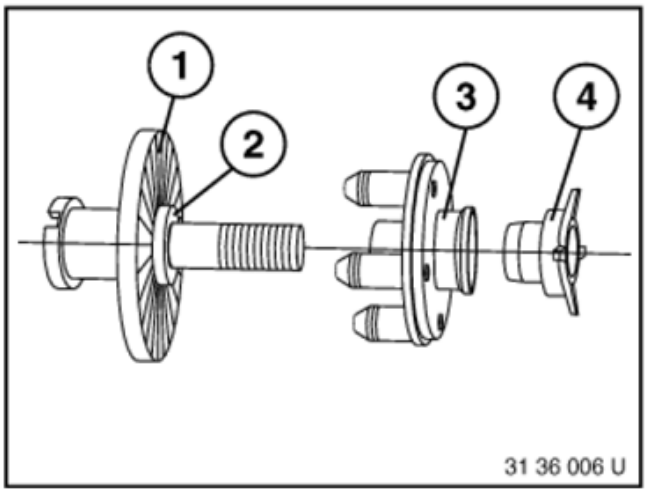


Fig. 30: Identifying Disc Wheel On Wheel Balancing Machine
Courtesy of BMW OF NORTH AMERICA, INC.

Use suitable wheel centering element supplied with corresponding balancing machine.

1. Basic flange

2. Wheel centering element
3. Type flange
4. Clamping nut



1. Basic flange
2. Wheel centring element
3. Type flange
4. Clamping nut

Fig. 31: Identifying Basic Flange, Wheel Centering Element, Type Flange, Clamping Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Place dial gauge sensor on rim shoulder.

Turn wheel by hand and measure max. radial runout. See **WHEELS TWO-PART ALLOY WHEELS** , **WHEELS ONE-PART ALLOY WHEELS** , or **WHEELS STEEL AND ALUMINIUM STRIP WHEELS** .

Carry out measurement on both rim shoulder sides.

NOTE: Dial gauge must be vertical to rim shoulder.

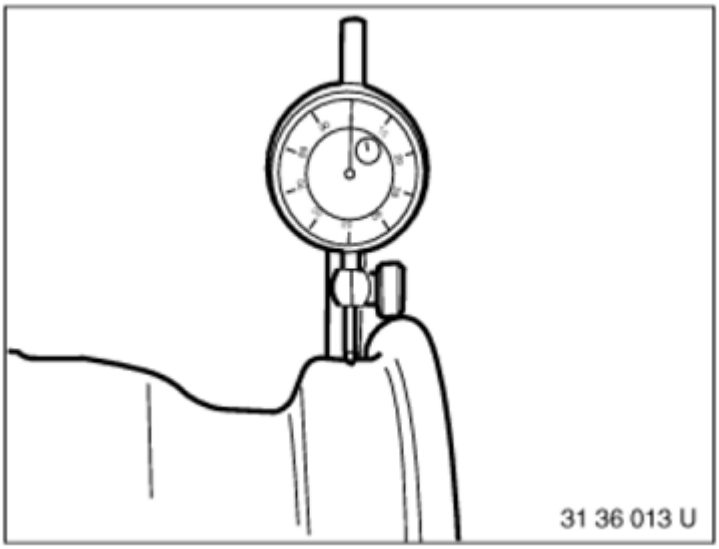


Fig. 32: Measuring Max. Radial Runout Using Dial Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Position sensor on rim flange.

Turn wheel by hand and measure max. lateral runout of rim with special tool **36 1 030** (measuring fixture). See **WHEELS TWO-PART ALLOY WHEELS** , **WHEELS ONE-PART ALLOY WHEELS** , or **WHEELS STEEL AND ALUMINIUM STRIP WHEELS** .

Carry out measurement on both rim flanges.

NOTE: Dial gauge must be vertical to rim flange.

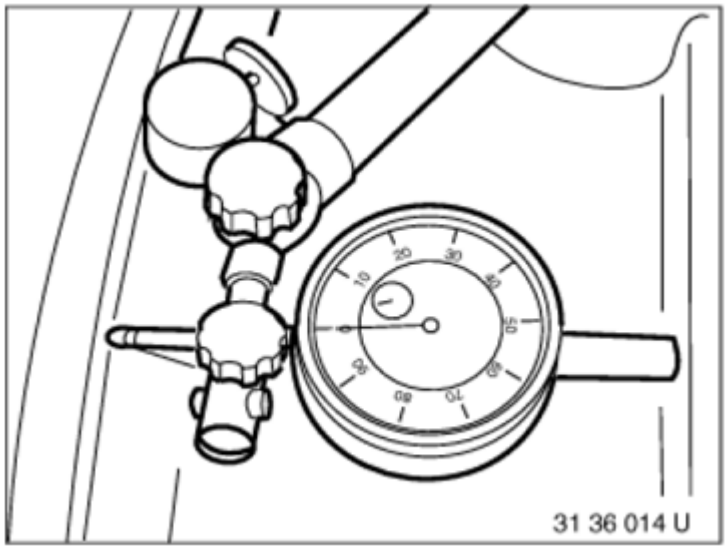


Fig. 33: Measuring Max. Lateral Runout Using Dial Gauge

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid transformation errors during subsequent installation tasks.

36 00... GENERAL INFORMATION ON LIGHT ALLOY DISC WHEELS

NOTE: It is sometimes difficult to distinguish light alloy disc wheels visually from steel disc wheels.

Identifying features:

- Sticker on light alloy disc wheel. (1) = Indication "Aluminium"
- Wall thickness of rim dish: approx. 8 mm.
- Light alloy disc wheels are not magnetic.
- Light alloy disc wheels can be identified from their BMW parts numbers.

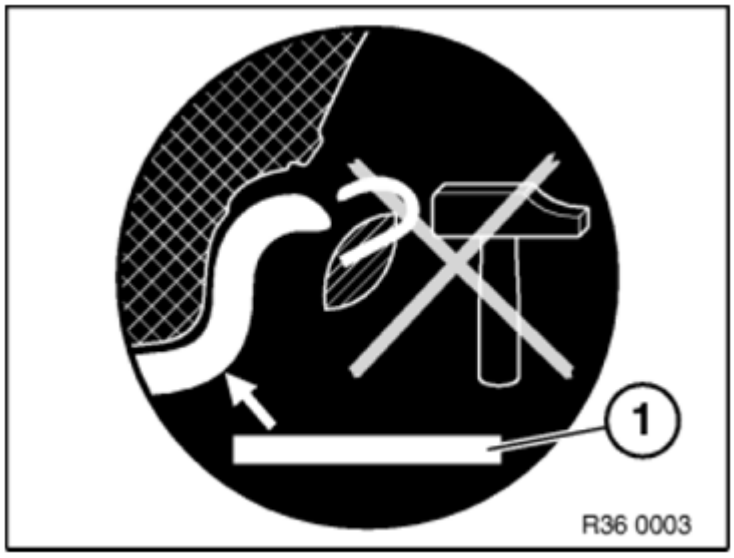


Fig. 34: Identifying Light Alloy Disc Wheel Sticker
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Use only BMW-approved two-part balancing weights.**
- **When fitting two-part balancing weights, always use specified tools.**
- **Do not straighten light alloy disc wheels: always replace damaged light alloy disc wheels.**
- **Notches in light alloy disc wheels can lead to cracking.**
- **Do not lubricate wheel nuts.**
- **When fitting tires, avoid damaging light alloy disc wheels, e.g. on sharpedged retaining claws on fitting machine.**

36 11 000 INITIALIZING RUN FLAT INDICATOR (RPA)

NOTE: Checking the tire pressure is based on monitoring the speeds of the wheels in relation to each other. A tire puncture is detected and signalled by way of a deviation in specific speed ratios.
The four tires mounted on the vehicle are monitored while the vehicle is moving.
Initialization must be carried out in each case immediately after tire pressures have been corrected, after tires/wheels have been replaced and after repairs to the air spring system.

IMPORTANT: The Run Flat Indicator does not function when the vehicle is driven with the compact spare wheel.

Please refer to the relevant Owner's Handbook for details of the initialization procedure.

36 11 503 RDC RESETTING

NOTE: RDC monitors the tire inflation pressure in the four wheels.
Each tire incorporates an electronic wheel circuit, which constantly monitors the tire inflation pressure.
The system signals when the inflation pressure drops in one or more tires.
Resetting must be carried out in each case immediately after tire pressures have been corrected, after tires/wheels have been replaced and after repairs to the air spring system.

Please refer to the relevant Owner's Handbook for details of the resetting procedure.

36 11 105 REMOVING AND INSTALLING RDC (TYRE PRESSURE CONTROL) CONTROL UNIT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection).

Necessary preliminary tasks

- Remove right **LUGGAGE COMPARTMENT WHEEL ARCH PANEL** .

Disconnect plug connection (1).

Pull out RDC control unit (2) upwards in direction of arrow.

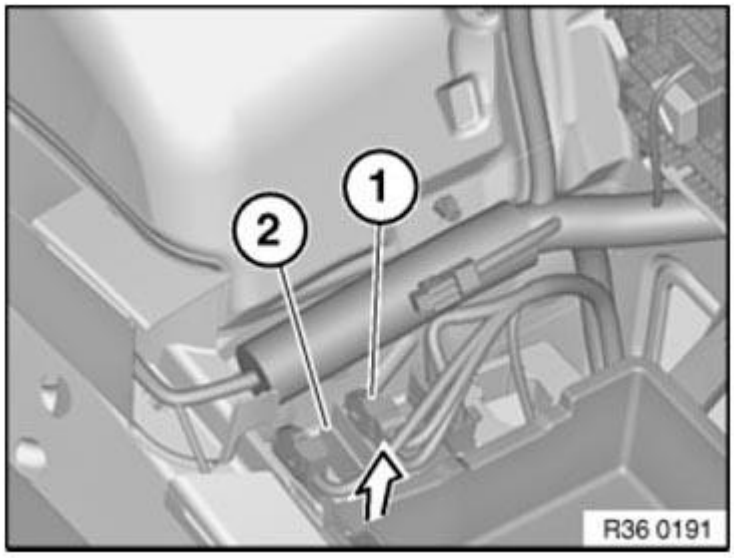


Fig. 35: Pulling Out RDC Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out programming/encoding

36 11 105 REMOVING AND INSTALLING RDC (TYRE PRESSURE CONTROL) CONTROL UNIT (LOW COST)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection).

Disconnect plug connection (1).

Press retaining tabs (2) apart as indicated by arrow.

Pull out TPC control unit.

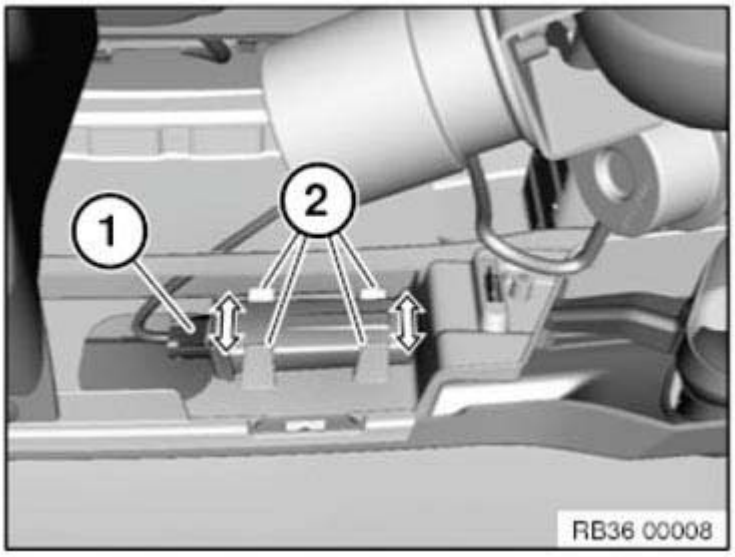


Fig. 36: Press Tpc Control Unit Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out programming/encoding

36 11 533 REMOVING AND INSTALLING/RENEWING TIRE PRESSURE CONTROL WHEEL ELECTRONICS (2ND GENERATION/3RD GENERATION)

IMPORTANT: Before removing and installing, check which generation of RDC wheel electronics module is installed! (see BMW Spare Parts Catalogue). If the wheel electronics have been removed, the complete valve must be replaced.

NOTE: There are two different wheel electronics. The SP303 wheel electronics module must be used with RDC-01 and RDC-02 from model year 03/06. The Gen3 wheel electronics must be used with the RDC-LC from model year 09/2010 (all F0x/F1x vehicles).

If a tire sealant has been used, replace the wheel electronics.

When a tire has been removed, do not clean the rim with installed wheel electronics with high-pressure cleaning equipment.

Before the installation of new wheel electronics with valve, thoroughly clean the valve bore of the wheel rim.

Do not treat wheel electronics with solvents, cleaning agents etc. If dirty, wipe with a clean cloth only.

Do not clean wheel electronics with compressed air.

Necessary preliminary tasks:

- **REMOVE TIRE**

Labelling of generation 2.3 wheel electronics

1. Transmission frequency of electronic wheel module
2. Large Torx socket screw
3. BMW part number
4. Tightening torque of Torx screw and union nut
5. Width across flats of union nut
6. Serial number of wheel electronics
7. Production date of wheel electronics

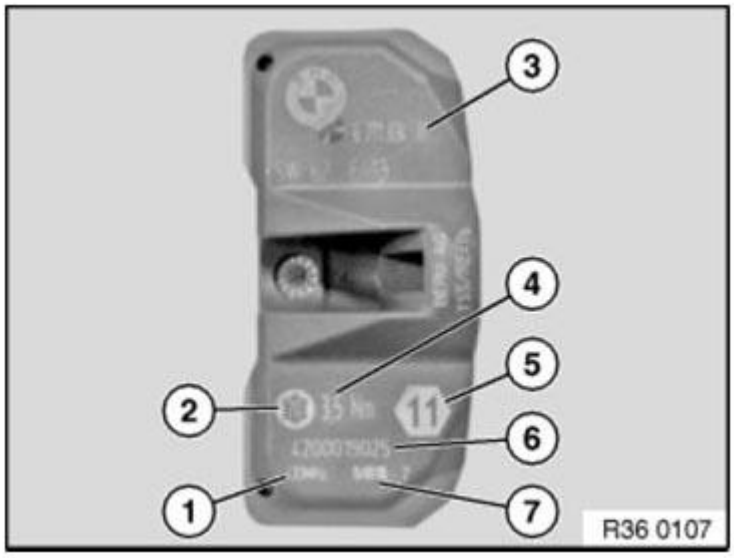


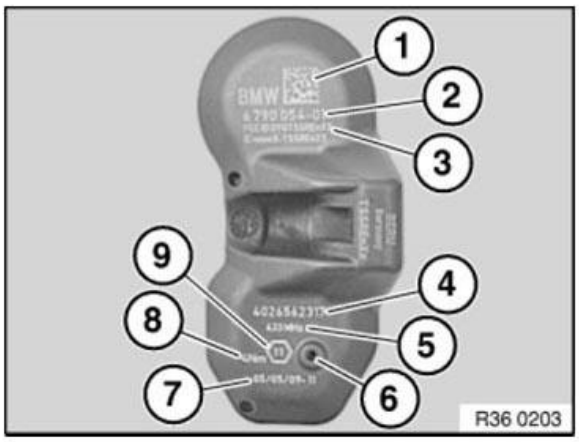
Fig. 37: Identifying Labels On Gen2.3 Wheel Electronics
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The following illustrations only show removal and refitting of the 3rd generation wheel module. The instructions also apply without alteration to the wheel module SP303.

Labelling of generation 2.4 and 3.3 wheel electronics

1. Data Matrixcode
2. BMW part number
3. FCC ID = radio authorization
4. Wheel electronics ID
5. Transmission frequency

6. Pressure sensor
7. Production date of wheel electronics
8. Tightening torque
9. Width across flats of union nut



1. Data Matrixcode
2. BMW part number
3. FCC ID = radio authorisation
4. Electronic wheel module ID
5. Transmission frequency
6. Pressure sensor
7. Production date of electronic wheel module
8. Tightening torque
9. Width across flats of union nut

Fig. 38: Identifying Labels On Gen2.4 And Gen3.3 Wheel Electronics
Courtesy of BMW OF NORTH AMERICA, INC.

Labelling of generation 3.4/3.41 wheel electronics

1. FCC ID = radio authorization
2. Tightening torque
3. Pressure sensor
4. Data Matrixcode
5. Production date of wheel electronics
6. Transmission frequency
7. Wheel electronics ID
8. Width across flats of union nut
9. BMW part number

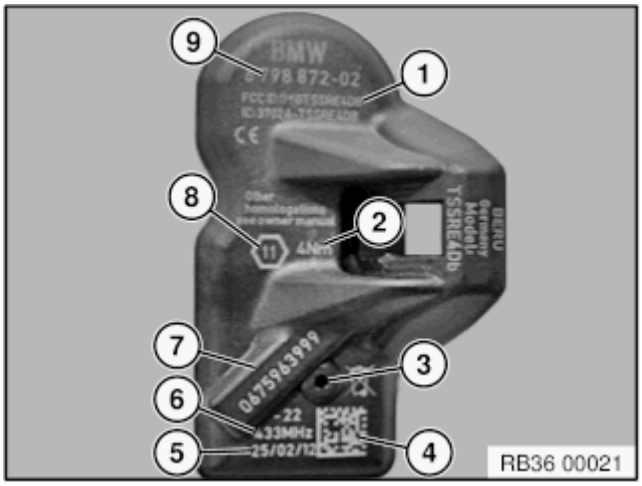


Fig. 39: Identifying Labels On Gen3.4/3.41 Wheel Electronics
Courtesy of BMW OF NORTH AMERICA, INC.

Removing electronic wheel module

NOTE: The following illustrations only show removal and refitting of the 3rd generation wheel electronics module. The instructions also apply without alteration to the 2nd generation wheel electronics.

Release union nut (1).



Fig. 40: Identifying Union Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove wheel module and valve (1) from valve hole.

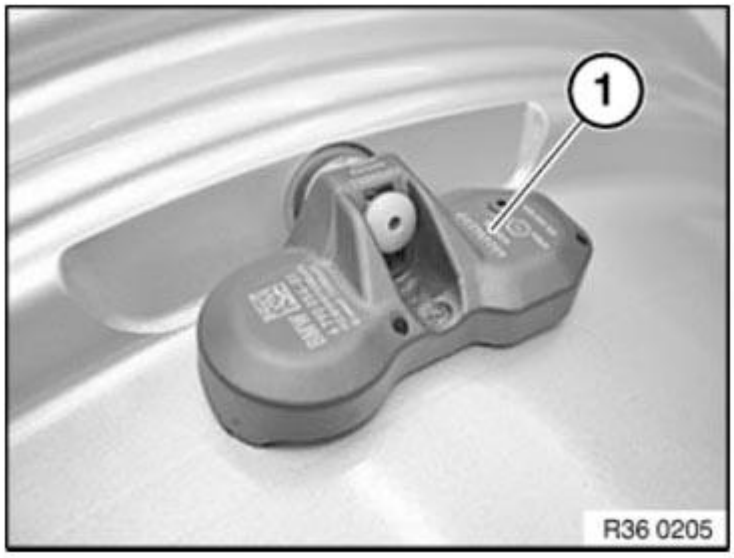


Fig. 41: Identifying Wheel Module Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Using suitable pliers (2), unscrew valve (1) from the thread of the square-head bolt (3), while holding the wheel module (4) firm. Completely unscrew valve (1).

Remove square head screw from holder for electronic wheel module.

Installation note:

Replace valve.

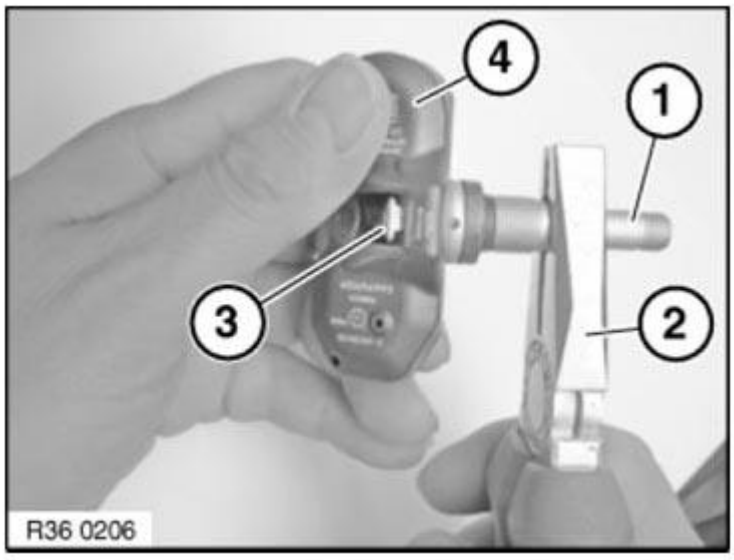


Fig. 42: Unscrewing Valve From Thread Of Square-Head Bolt Using Plier
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before the installation of new wheel electronics with valve, thoroughly clean the valve bore of the wheel rim!
Also make sure that the valve bore is free of burrs

Installing electronic wheel module

NOTE: The following illustrations only show removal and refitting of the 3rd generation wheel electronics module. The instructions also apply without alteration to the 2nd generation wheel electronics.

Insert new square-head bolt (1) in wheel module (2).

Screw single-use valve insert (3) three turns onto square-head bolt (1).

NOTE: Make sure the square head screw (1) fits exactly in the holder for the electronic wheel module!

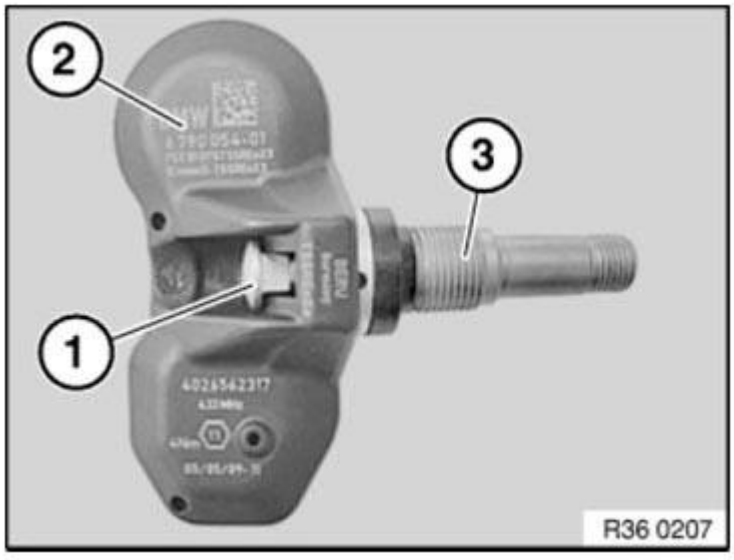


Fig. 43: Identifying Wheel Module With Square Head Bolt And Valve Insert
Courtesy of BMW OF NORTH AMERICA, INC.

Insert valve insert with wheel electronics into cleaned valve bore.

Both outer feet on the underside of the wheel module must be resting against the rim wall.



Fig. 44: Identifying Wheel Module
Courtesy of BMW OF NORTH AMERICA, INC.

Screw on sleeve nut (1) by hand as far as it will go.

Tighten sleeve nut until the inner strip-off ring breaks. Breakage is perceptible audibly and tangibly (momentary drop in torque resistance).

Then fully tighten sleeve nut (1).

Tightening torque **36 11 1AZ** .



Fig. 45: Identifying Sleeve Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fixing must not under any circumstances be retightened!
The square-head bolt should be located precisely in the wheel module holder.
After tightening, the electronic wheel module must fit snugly on the rim!

36 11 115 REMOVING AND INSTALLING/REPLACING RDC RECEPTION AERIAL

Necessary preliminary tasks

- Remove front left **UNDERBODY PANELLING**

Disconnect plug connection (1).

Gently press retaining tabs apart in direction of arrow and remove RDC aerial (2).

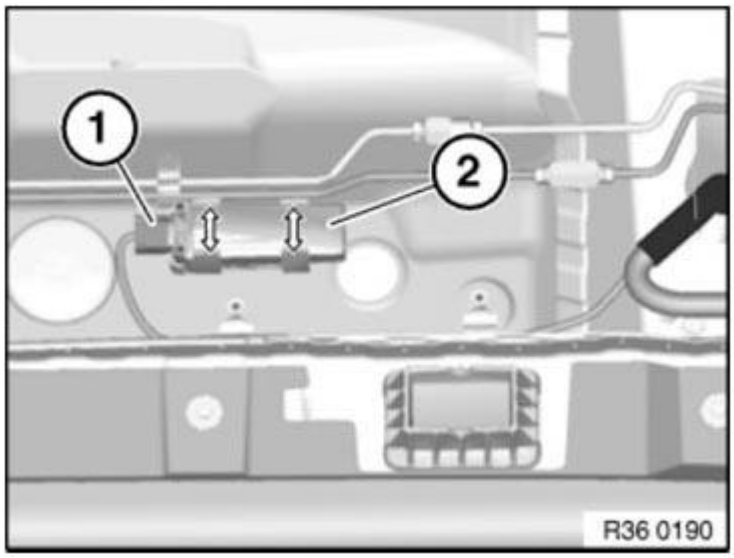


Fig. 46: Press RDC Aerial Retaining Tabs Apart
Courtesy of BMW OF NORTH AMERICA, INC.

36 11 533 REMOVING AND INSTALLING/REPLACING A TIRE PRESSURE CONTROL ELECTRONIC WHEEL MODULE (GENERATION I)

Notes

IMPORTANT: Before removing and installing, check which generation of tire pressure control electronic wheel modules are fitted (see BMW Spare Parts Catalogue).
If the electronic wheel module has been removed, the complete valve must be replaced.
These instructions describe how to install the (old) 2-time operating valves.
These can be used if still in stock.
1-TIME OPERATING VALVES , see repair instruction.

NOTE: If a tire sealant has been used, replace the electronic wheel module.

When a tire has been removed, do not clean the rim with installed electronic wheel module with high-pressure cleaner.

Before the installation of new wheel electronics with valve, thoroughly clean the valve bore of the wheel rim.

Do not treat electronic wheel module with solvents, cleaning agents etc. If dirty, wipe with a clean cloth only.

Do not clean electronic wheel module with compressed air.

Necessary preliminary tasks

- **REMOVE TYRE**

Labelling of electronic wheel modules SP303 RDC-01 and RDC-02

1. Transmission frequency of electronic wheel module
2. Large Torx socket screw
3. BMW part number
4. Tightening torque of Torx screw and union nut
5. Width across flats of union nut
6. Serial number of electronic wheel module
7. Production date of electronic wheel module

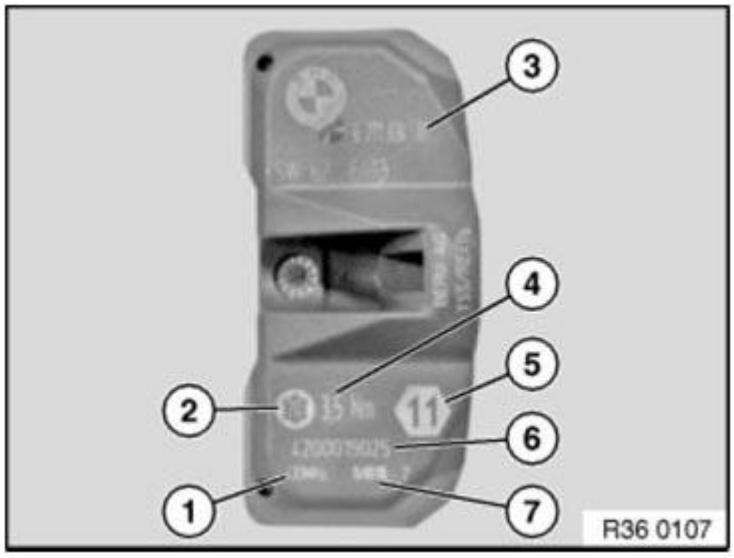
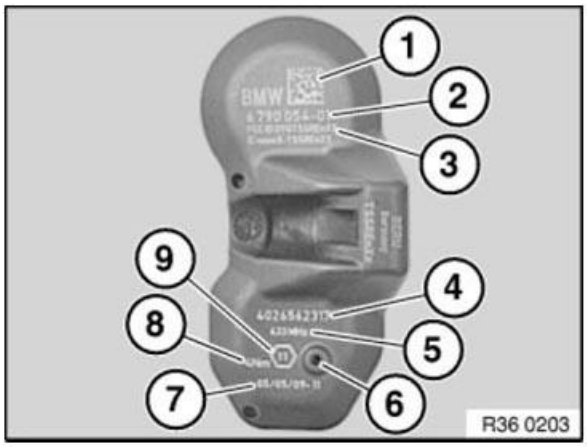


Fig. 47: Labelling Electronic Wheel Modules (SP303 RDC-01 And RDC-02)
Courtesy of BMW OF NORTH AMERICA, INC.

Labelling of Gen3 electronic wheel module for RDC-LC

1. Data Matrixcode
2. BMW part number
3. FCC ID radio authorization
4. Electronic wheel module
5. Transmission frequency
6. Pressure sensor
7. Width across flats of union nut
8. Tightening torque
9. Production date of electronic wheel module



1. Data Matrixcode
2. BMW part number
3. FCC ID radio authorisation
4. Electronic wheel module
5. Transmission frequency
6. Pressure sensor
7. Width across flats of union nut
8. Tightening torque
9. Production date of electronic wheel module

Fig. 48: Labelling Gen3 Electronic Wheel Module (RDC-LC)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The following graphics show exclusively how to install and remove the SP-303 electronic wheel module. The handling instructions also apply without any differences to the Gen3 electronic wheel module!

Removing electronic wheel module

Release Torx socket screw (1) and remove electronic wheel module (2).

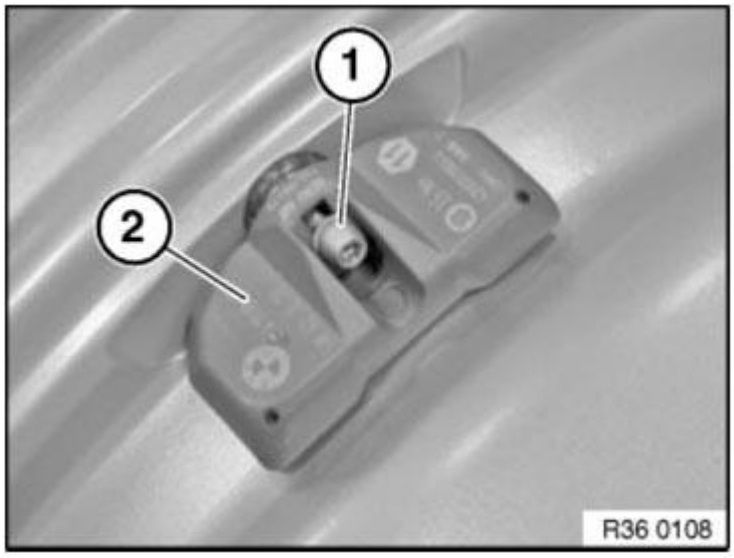


Fig. 49: Identifying Torx Socket Screw And Electronic Wheel Module
Courtesy of BMW OF NORTH AMERICA, INC.

Release union nut with special tool 00 2 190; if necessary, grip valve insert (1) at cylindrical section of ball head.

Remove valve insert from rim.

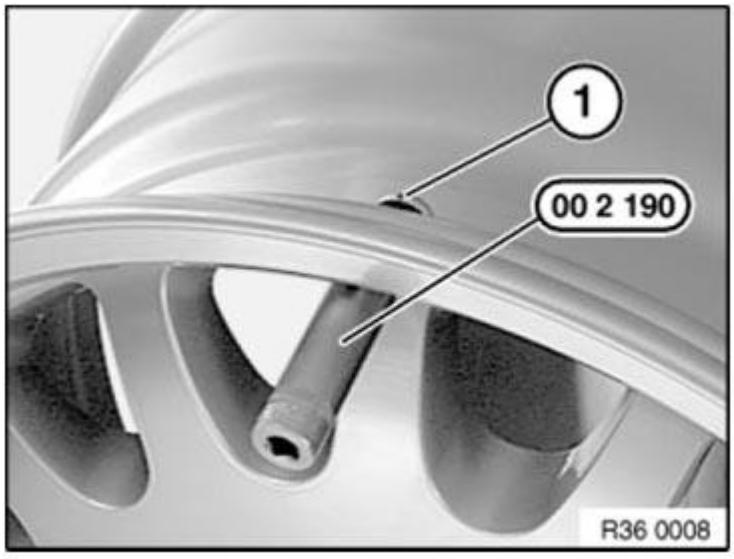


Fig. 50: Release Union Nut Using Special Tool (00 2 190)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove washer (1).

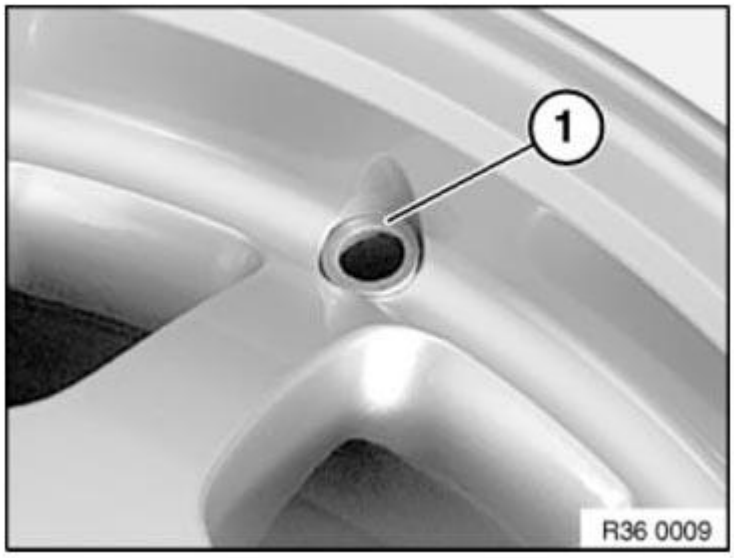


Fig. 51: Identifying Washer
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before the installation of new wheel electronics with valve, thoroughly clean the valve bore of the wheel rim!
Also make sure that the valve bore is free of burrs

Installing electronic wheel module

Insert new Torx socket screw (1) in electronic wheel module (2) and secure firmly.

Twist new valve insert (3) by hand approx. 3 turns onto screw (1).

NOTE: Do not tighten screw; electronic wheel module and valve insert must be loosely joined together.

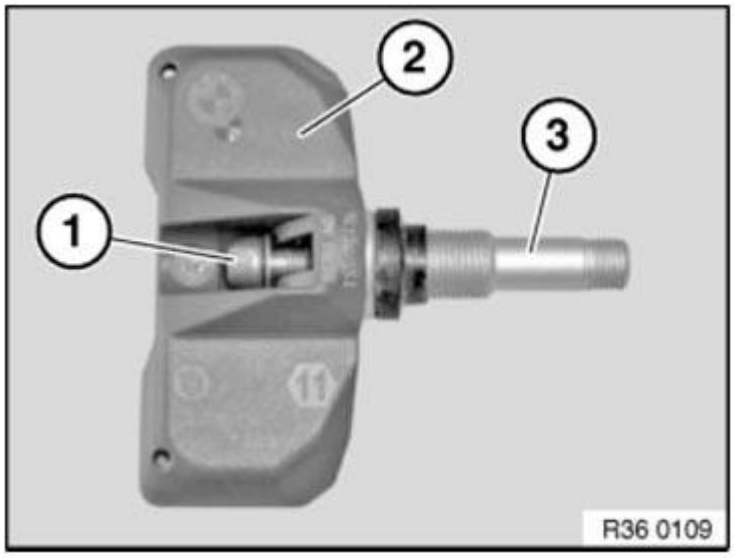


Fig. 52: Identifying Wheel Module With Torx Socket Screw And Valve Insert
Courtesy of BMW OF NORTH AMERICA, INC.

Insert valve insert with electronic wheel module into cleaned valve bore.

Here the radial bore hole (1) for gripping on the circumference of the valve insert ball head must point outwards.

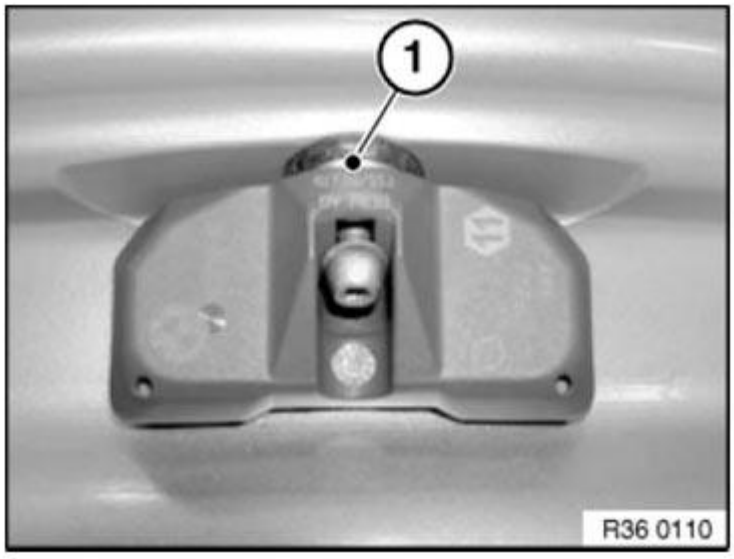


Fig. 53: Identifying Radial Bore Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Insert the brace (1) supplied with the valve into the valve insert bore hole.

Fit new washer and screw on new union nut (2) by hand as far as it will go.

IMPORTANT: The screw connection must be tightened to the specified torque in one go! Do not under any circumstances retighten the screw connection! Remove brace, otherwise it may damage the tire.

Tighten down union nut (2) while using brace (1) to prevent valve insert from turning.

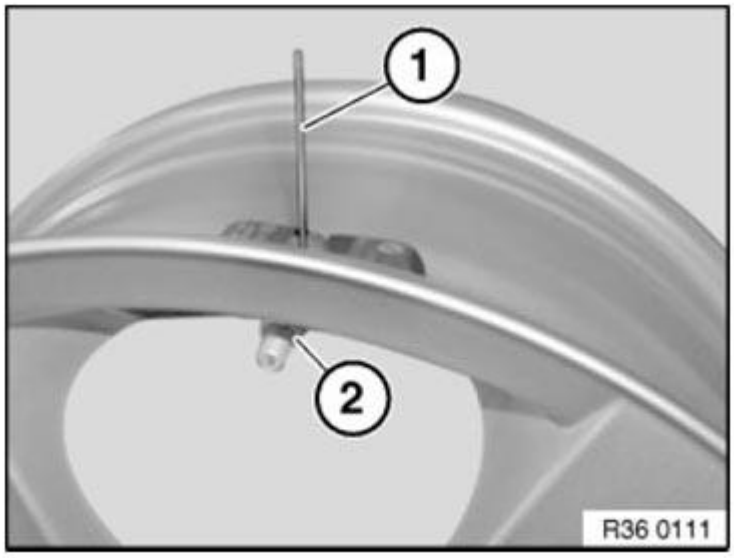


Fig. 54: Identifying Brace And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tightening torque **36 11 1AZ** .

IMPORTANT: The screw connection must be tightened to the specified torque in one go! Do not under any circumstances retighten the screw connection!

Press electronic wheel module gently into wheel base and tighten Torx socket screw (1).

Installation:

Tightening torque **36 11 2AZ** .

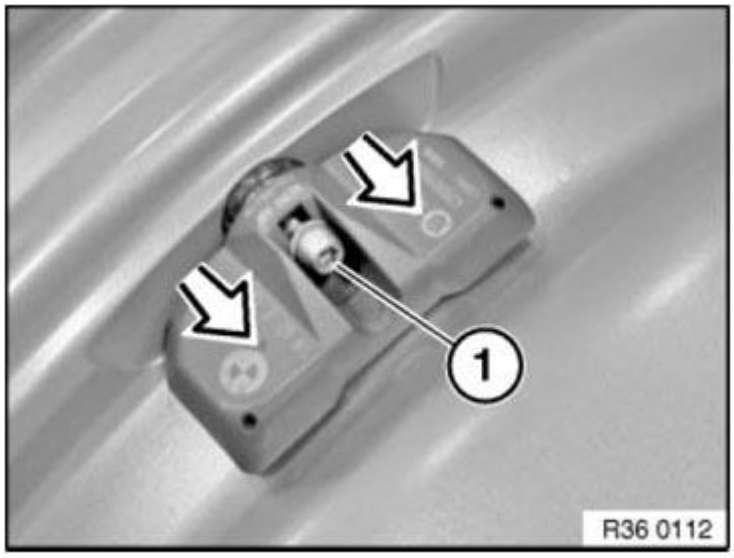


Fig. 55: Pressing Electronic Wheel Module Gently Into Wheel Base
Courtesy of BMW OF NORTH AMERICA, INC.

36 11 121 REMOVING AND INSTALLING/REPLACING AN RDC TRIGGER TRANSMITTER (FRONT)

Necessary preliminary tasks

- Detach **WHEEL ARCH COVER** front section at front

Disconnect plug connection (1).

Gently press lugs (2) apart.

Remove RDC sensor (3) in direction of arrow.

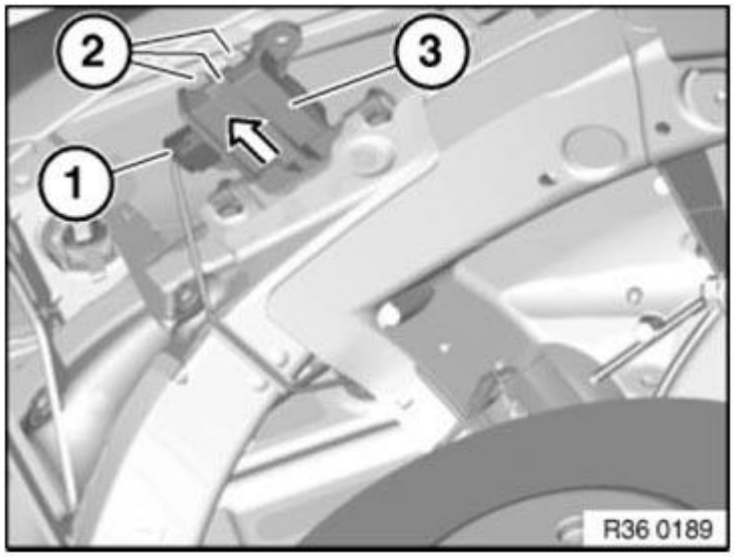


Fig. 56: Removing RDC Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

36 11 123 REMOVING AND INSTALLING/REPLACING AN RDC TRIGGER TRANSMITTER (REAR)

Necessary preliminary tasks

- Remove right **WHEEL ARCH TRIM**

Left side

Disconnect plug connection (1).

Release plastic nuts (2).

Remove RDC transmitter (3).

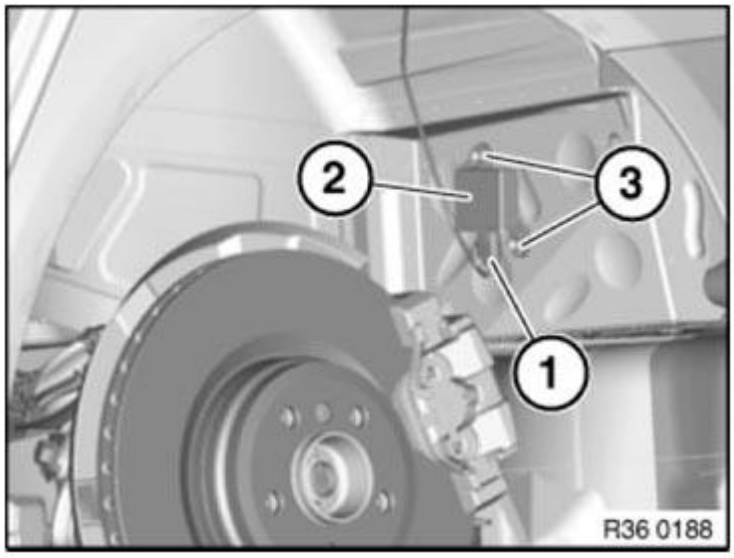


Fig. 57: Identifying RDC Transmitter With Plug Connection And Nuts (Left Side)
Courtesy of BMW OF NORTH AMERICA, INC.

Right side

Disconnect plug connection (1).

Release expander rivets (2).

Remove RDC transmitter (3).

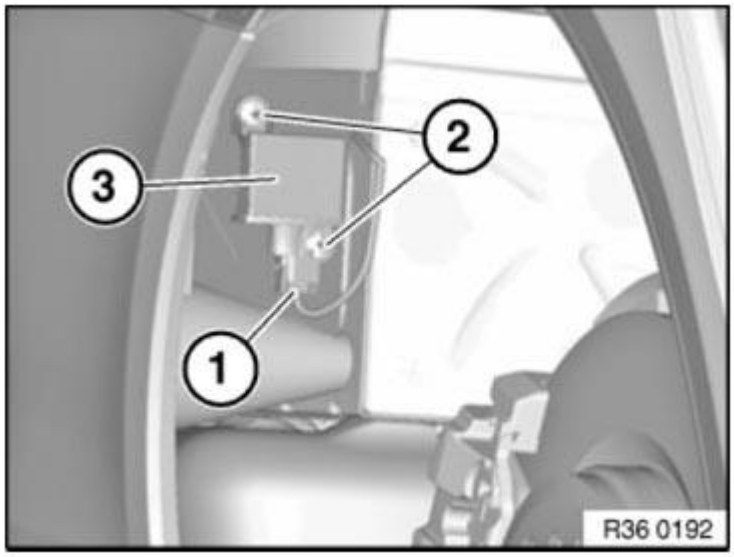


Fig. 58: Identifying RDC Transmitter With Plug Connection And Nuts (Right Side)
Courtesy of BMW OF NORTH AMERICA, INC.

3612 TIRES

36 12 005 REPLACING A RUNFLAT TIRE OR A UHP TIRE

NOTE: **UHP tire = Ultra High Performance tire**
UHP tires are tires with an aspect ratio (H:B) < or = 45 % or tires with a speed index > or = "V"

NOTE: **Follow the fitting machine manufacturer's operating instructions.**
It is absolutely essential to ensure that the equipment is in proper working condition and that there is no damage to the disc wheel and tire.
Balance WHEELS after completing work.

IMPORTANT: **Only fitting machines which are approved for fitting runflat and UHP tires may be used!**
Please refer to the operating instructions of the respective fitting machine for details of the exact fitting procedure.
Use only BMW-approved plastic-covered tire irons.
Use only BMW-approved tire mounting paste.
For approved wheel/tire combinations, tire makes and optional extras, refer to KSD CD.

NOTE: **Pay attention to different tire markings:**

- **Item (1) Marking denoting BMW-approved tires. Ensure that only BMW-approved tires are fitted.**
- **Item (2) RSC is the abbreviation for R unflat S ystem C omponent (runflat tires).**
- **Item (3) Outside. The tire must be fitted so that the wording Outside is always situated on the outside of the rim.**

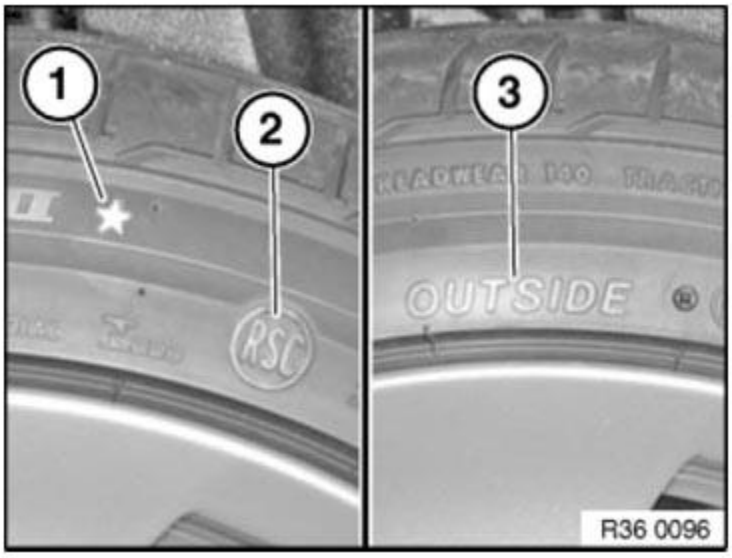


Fig. 59: Identifying Markings On Tyre
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Many tires are directional!
The arrow on the tire must point in the "Forward" direction of rotation!

IMPORTANT: Before removal:

- **Observe tire temperature of min. +15°C.**
- **Clean wheel/tire unit**
- **Remove valve insert (deflate tire)**
- **Remove fitted balancing weights**

Removal - upper bead

Unseat bead if possible with unseating roller (1) from rim flange.

Note position of sensor - do not unseat in this area!

If using a pressing-off tool (2), unseat 3 to 4 times around circumference max. 1 cm from rim flange.

Observe pressing-off/unseating limitation.

Start at 90° or 270°.

Do not position at 0° or 180° refer to **Fig. 62**.

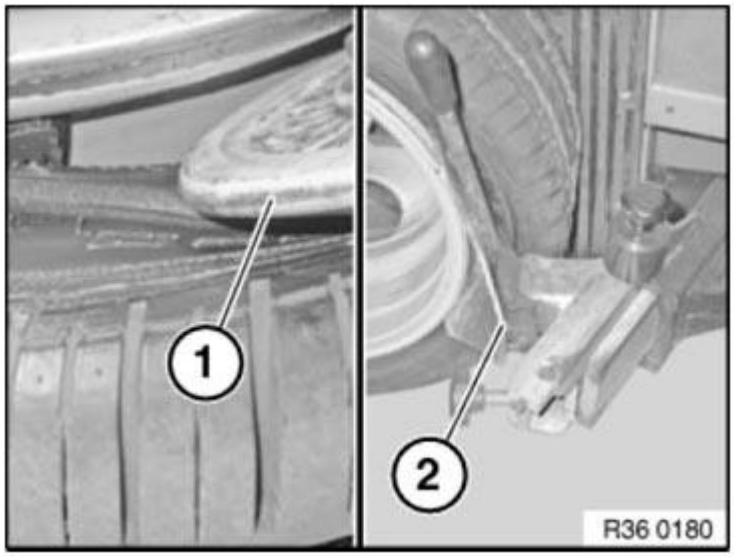


Fig. 60: Removing Tyre Upper Bead Using Pressing-Off Tool Or Unseating Roller
Courtesy of BMW OF NORTH AMERICA, INC.

Apply sufficient **ANTISEIZE COMPOUND** as deeply as possible between rim and tire.

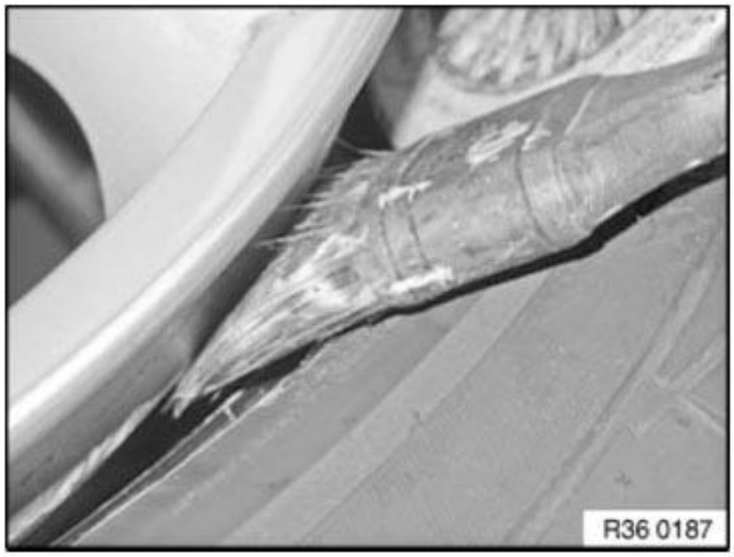


Fig. 61: Applying Antiseize Compound Between Rim And Tyre
Courtesy of BMW OF NORTH AMERICA, INC.

Position fitting head (1) in direction of rotation before valve (2).

Position holding-down element at 0° to hold tire in well.

Position tire iron (3) on fitting head.

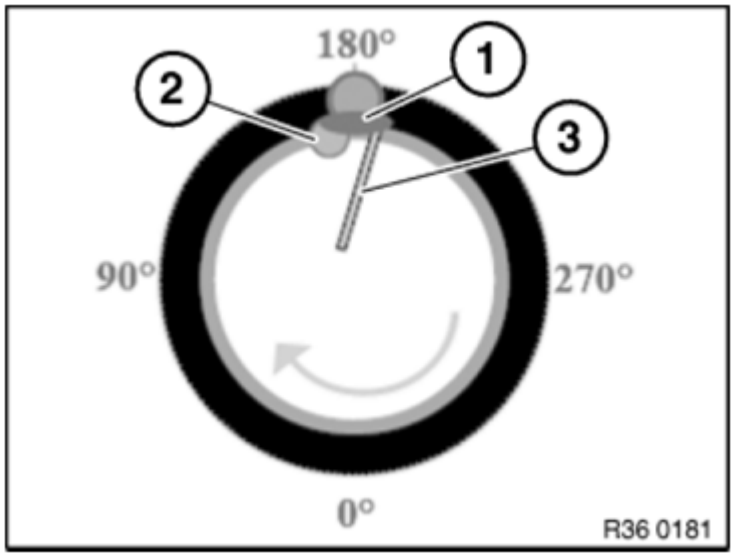


Fig. 62: Positioning Fitting Head
Courtesy of BMW OF NORTH AMERICA, INC.

Lever bead with tire iron (1) over rim flange.

IMPORTANT: Avoid damaging the rim by using a suitable tire iron with protective coating. Make sure there is sufficient lubrication between bead and rim flange; apply ANTISEIZE COMPOUND if necessary.

Allow fitting machine to rotate slowly and relieve tension on holding-down element and rollers during rotation.

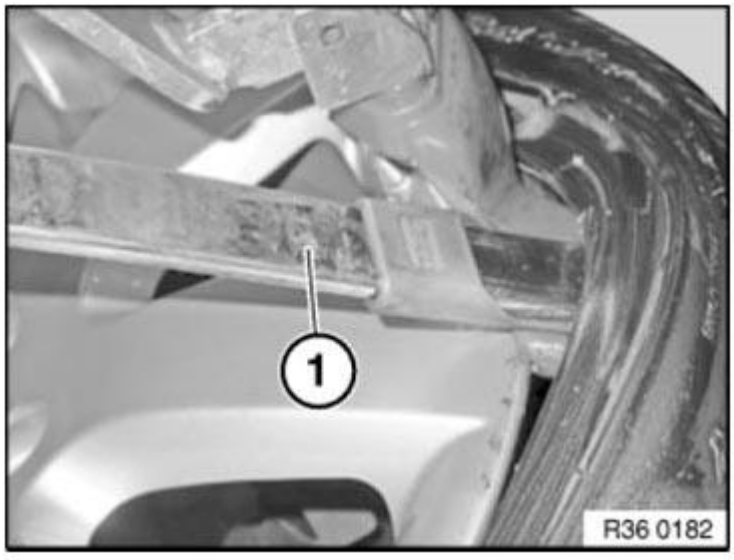


Fig. 63: Levering Tyre Bead Using Tyre Iron
Courtesy of BMW OF NORTH AMERICA, INC.

Removal - lower tire bead

IMPORTANT: Apply sufficient ANTISEIZE COMPOUND between rim and tire.

Position fitting head (1) in direction of rotation before sensor (2).

Position tire iron (3) on fitting head (1).

Tyre bead must be positioned entirely in well opposite fitting head (1).

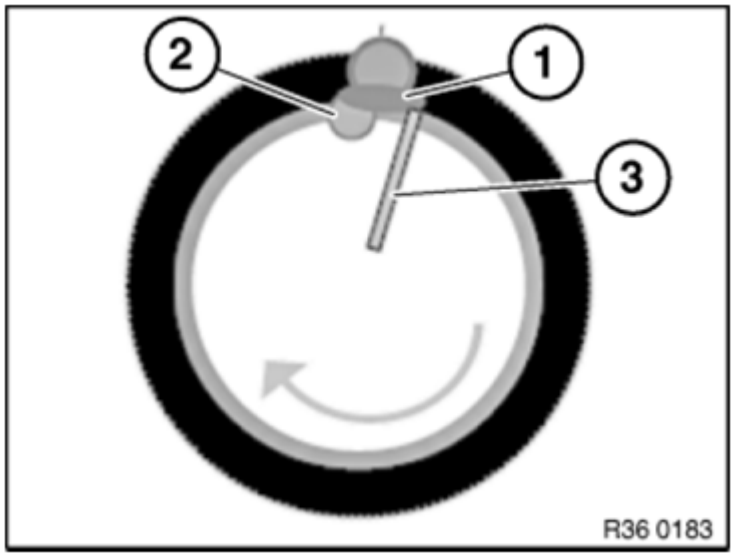


Fig. 64: Positioning Fitting Head
Courtesy of BMW OF NORTH AMERICA, INC.

Lever bead with tire iron (1) over rim flange.

IMPORTANT: Avoid damaging the rim by using a suitable tire iron with protective coating.

Allow fitting machine to rotate slowly.

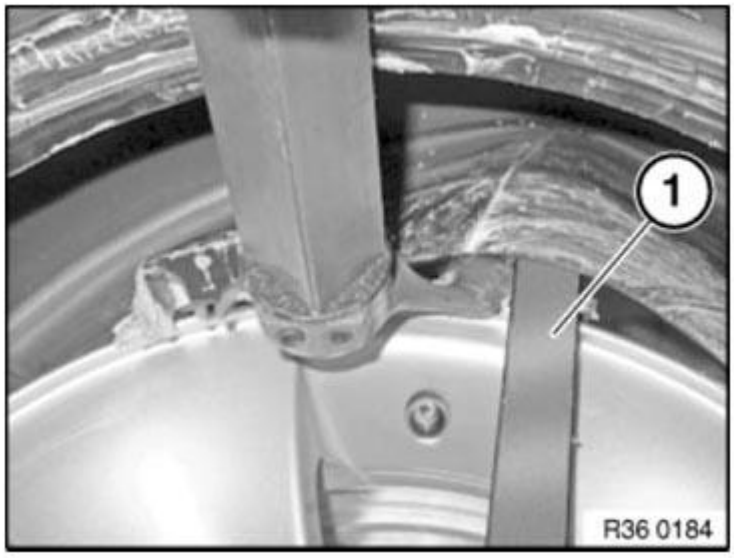


Fig. 65: Levering Tyre Bead Using Tyre Iron
Courtesy of BMW OF NORTH AMERICA, INC.

Observe before mounting

- Observe tire temperature of min. +15°C.
- Clean wheel/tire
- Check rim for burrs, wear and other damage
- Clean tire beads and check for evidence of damage
- Check RDC sensor for damage
- Replace rubber valve

Before Mounting:

IMPORTANT: Apply ANTISEIZE COMPOUND to inside of upper bead (1) and to outside of upper and lower sidewall (2) up to upper decorative line.

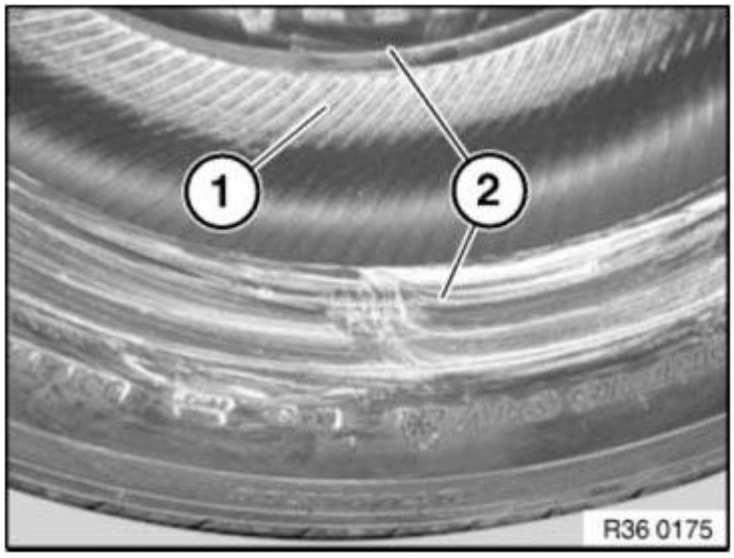


Fig. 66: Identifying Tyre Upper Bead And Lower Sidewall
Courtesy of BMW OF NORTH AMERICA, INC.

Apply **ANTISEIZE COMPOUND** over entire well area.

Lever sensor spare.

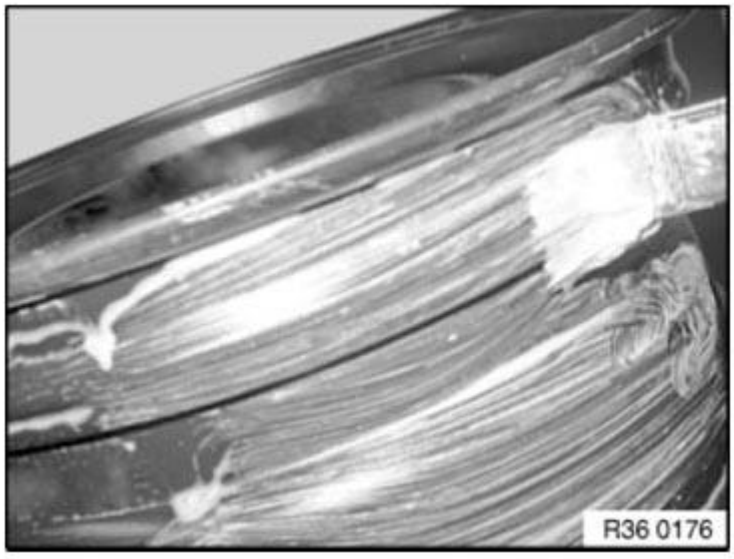


Fig. 67: Applying Antiseize Compound Over Entire Well Area
Courtesy of BMW OF NORTH AMERICA, INC.

Mounting lower tire bead:

Grip wheel and lay on tire.

IMPORTANT: Apply a light coating of ANTISEIZE COMPOUND to fitting head.

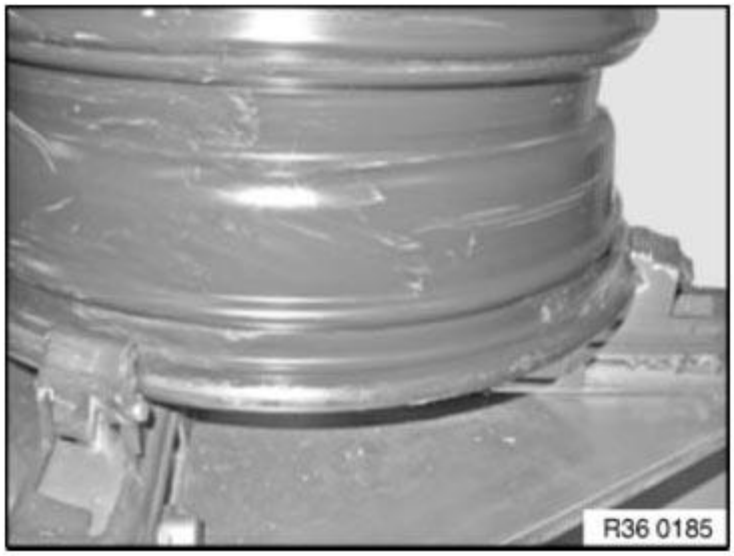


Fig. 68: Gripping Wheel Rim
Courtesy of BMW OF NORTH AMERICA, INC.

Position fitting head (1) as pictured.

IMPORTANT: Make sure tire is correctly positioned on fitting head. Position bead in relation to fitting head (1) in accordance with equipment manufacturer's instructions. Position sensor (RDC) (3) and valve min. 10 - 15 cm before traction point/catching point (2).
Sensor must not be subjected to load.

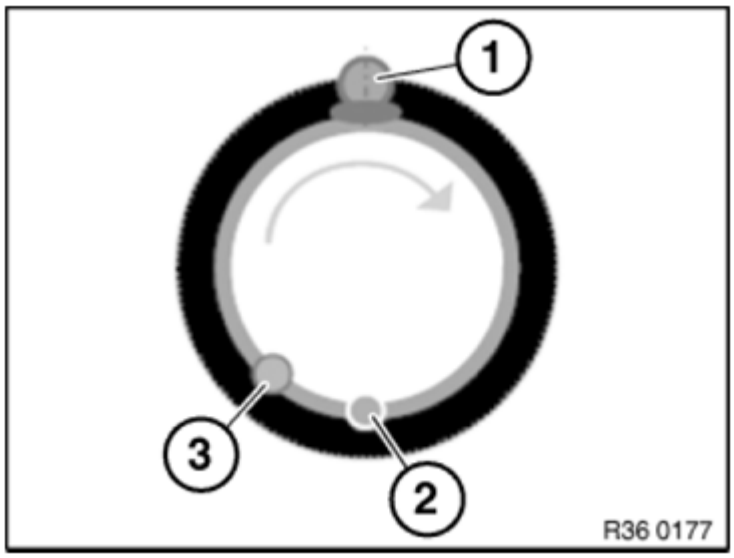


Fig. 69: Positioning Fitting Head
Courtesy of BMW OF NORTH AMERICA, INC.

Allow fitting machine to rotate slowly.

Guide tire in direction of rotation and press towards well.

Mounting upper bead:

Position sensor (1) in relation to fitting head (2) as pictured.

IMPORTANT: Make sure tire is correctly positioned on fitting head. Position bead in relation to fitting head (2) in accordance with equipment manufacturer's instructions. Position sensor (RDC) (1) and valve min. 10 - 15 cm before traction point/catching point.
Sensor must not be subjected to load.

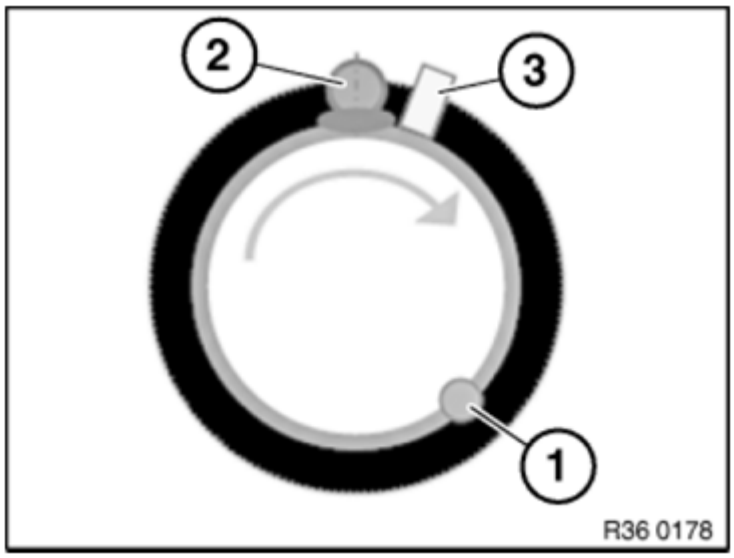


Fig. 70: Position Sensor In Relation To Fitting Head
Courtesy of BMW OF NORTH AMERICA, INC.

Coat bead holding-down element (3) with **ANTISEIZE COMPOUND** and insert.

Allow fitting machine to rotate slowly.

Insert additional bead holding-down elements (1) to hold the bead in the well.

The last part of the bead should jump over the rim flange in the sensor area.

IMPORTANT: Perform fitting in stages, take short breaks and relieve tension. Avoid heavy deformations at the traction point.

Do not squash belt edge and sidewalls through holding-down elements.
Never use a tire iron as a holding-down element.

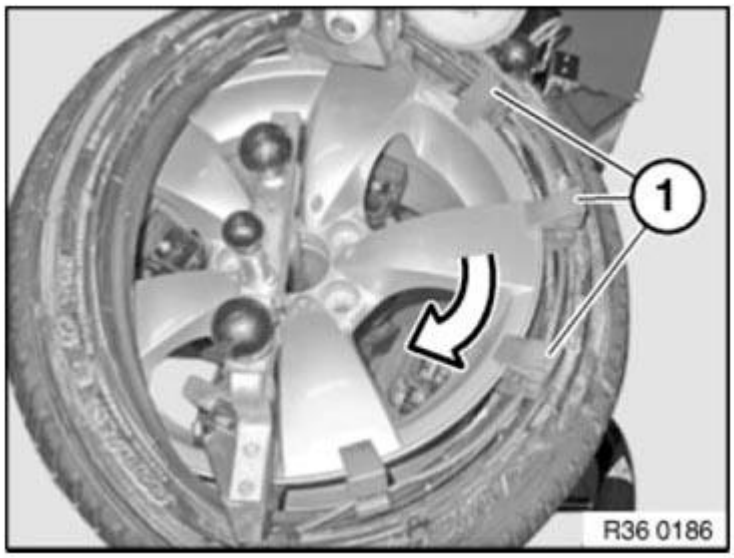


Fig. 71: Rotating Fitting Machine Over Tyre Bead
Courtesy of BMW OF NORTH AMERICA, INC.

Filling/inflating tire

Remove all fitting aids.

IMPORTANT: Possibilities for safely securing the wheel or incorporation in inflation apparatus should be utilized!
Observe instructions/conditions of trade association.
Observe national/country-specific regulations.

Inflate with air (without valve insert).

- Increase pressure up to 3.3 bar in stages (jumping pressure).
- If the tire bead does not slip fully past the rim edge all round, do not under any circumstance increase the pressure.
- If necessary, release air and force off tire bead again.
- Coat rim flange and tire again with **TIRE MOUNTING PASTE** .
- Inflate tire again up to 3.3 bar.
- When tire beads are resting perfectly on rim shoulders, increase inflation pressure to max. 4.0 bar (settling pressure) to "settle" the tire.

Screw in valve insert and correct tire pressure.

Observe notes/instruction on initializing the **RUN FLAT INDICATOR** (RPA) or RDC (USA=TPM).

IMPORTANT: Advise the customer to avoid heavy acceleration and heavy braking in the initial period.
The mounting paste can cause the tire to turn on the rim and give rise to imbalance.

3613 MOUNTING

36 13 SUBSEQUENT INSTALLATION OF WHEEL-BOLT LOCK

Loosen wheel bolts.

Raise car so that wheel can be turned freely.

Release wheel studs to such an extent that the wheel can move freely on the wheel hub.

Turn wheel so that valve is face down.

Remove top wheel stud and insert wheel stud lock.

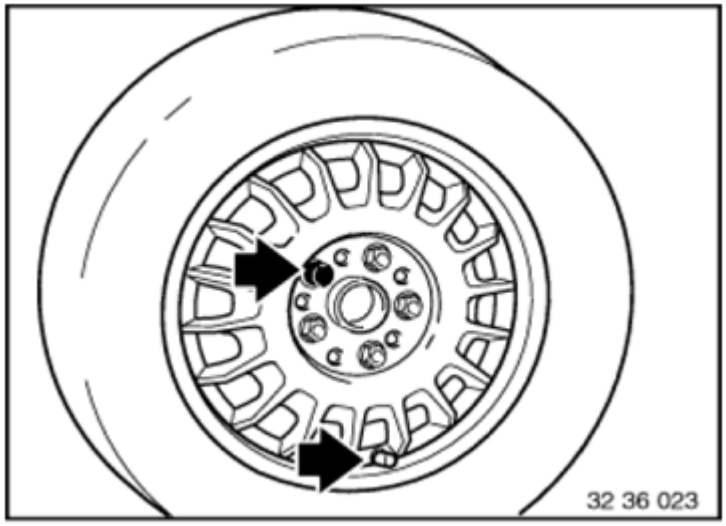


Fig. 72: Identifying Wheel Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Possible play in wheel center and wheel weight could cause imbalance.

This imbalance is reduced to a minimum by installing the somewhat heavier wheel-bolt lock in the top wheel-bolt position.

In this position - wheel stud lock at top, valve at bottom - tighten wheel studs hand-tight in diagonal sequence.

Lower car and tighten wheel bolts crosswise.

Tightening torque **36 10 1AZ** .

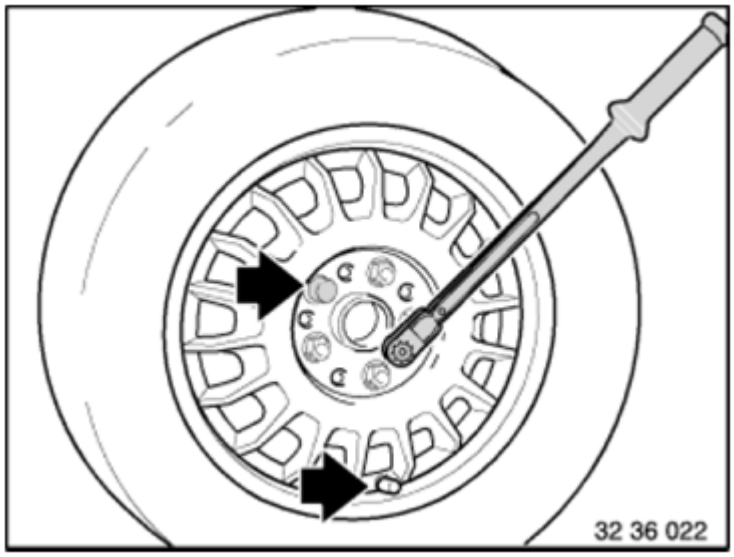


Fig. 73: Tightening Wheel Bolts Using Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION

Automatic Transmission

TRANSMISSION IN GENERAL

24 00 018 ADJUSTING GEAR LEVER (PARKING LOCK EMERGENCY RELEASE)

The emergency release of the parking lock from the passenger compartment is discontinued for GA8HP transmissions:

- F01/F02/F03/F04 GA8HP from production date 09/2010
- F07 GA8HP from production date 03/2010
- F10/F11/F18 GA8HP from production date 06/2010

NOTE: Check cable for ease of movement.
Move gear selector switch to "P" position.
Control for emergency release must not be actuated.

Release screw (2).

Disconnect cable (1).

Installation note:

- Release screw (2).

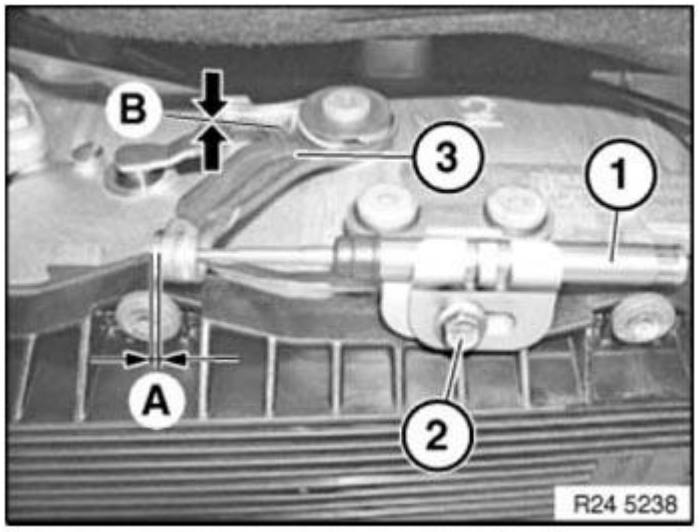


Fig. 1: Pressing Release Lever
Courtesy of BMW OF NORTH AMERICA, INC.

- Bring release lever (3) into contact with selector shaft by pressing slightly. Distance B=0 mm.
- Adjust cable by means of holder until spacing A > or = 1 mm is obtained
- Tighten screw (2).

00 11 500 CHECKING/TOPPING UP OIL LEVEL IN AUTOMATIC TRANSMISSION

IMPORTANT:

- **Do not let skin come in contact with transmission oil and do not inhale fuel vapors.**
- **Wear protective gloves.**
- **Ensure adequate ventilation**

IMPORTANT: Use only the approved transmission oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters

To set the correct level, it is **mandatory** that the service function "Transmission control unit: oil adjustment" is performed using the diagnosis system.

Failure to comply with this requirement will result in serious damage to the automatic transmission .

Conditions for the oil adjustment:

- Initial condition: Transmission oil temperature 30 °C to 40 °C
- Final condition: Transmission oil temperature 40 °C to 50 °C

IMPORTANT: Transmission GA8HP70Z with N57 engine from 03/2011!!

Precondition for oil adjustment

- Transmission oil temperature 30°C to maximum 40°C.

(The transmission oil temperature must be maintained. This will increase the oil quantity in the transmission.)

Performing oil-level adjustment:

An oil-level adjustment is necessary for certain fault code entries in the automatic transmission and after repair (e. g. mechatronic replacement, converter replacement, transmission replacement).

- Connect diagnosis and information system.
- Service function (transmission control unit: Oil adjustment) call up
- Carry out oil level check in accordance with instructions

Adding transmission oil

Stand vehicle on a level surface and secure against rolling off.

Undo oil filler plug (1).

Add automatic transmission fluid according to instructions in the BMW diagnosis system.

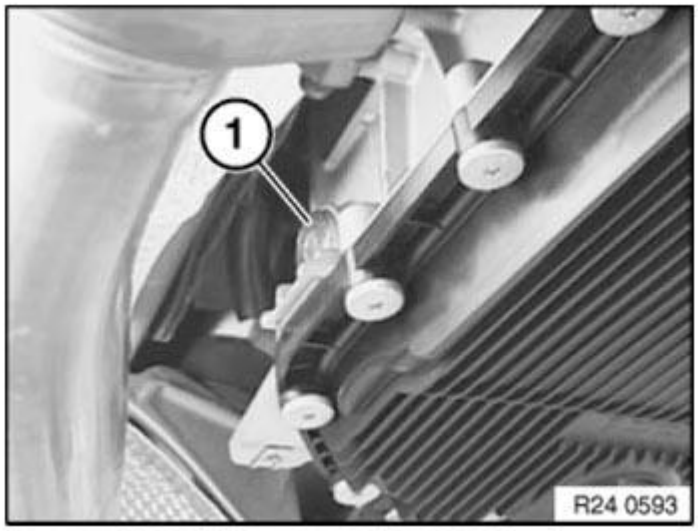


Fig. 2: Identifying Oil Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing ring/oil filler plug

Tightening torque: **24 11 3AZ**

Tighten down oil filler plug using

1. Hexagon socket wrench AF 8
2. Torque wrench

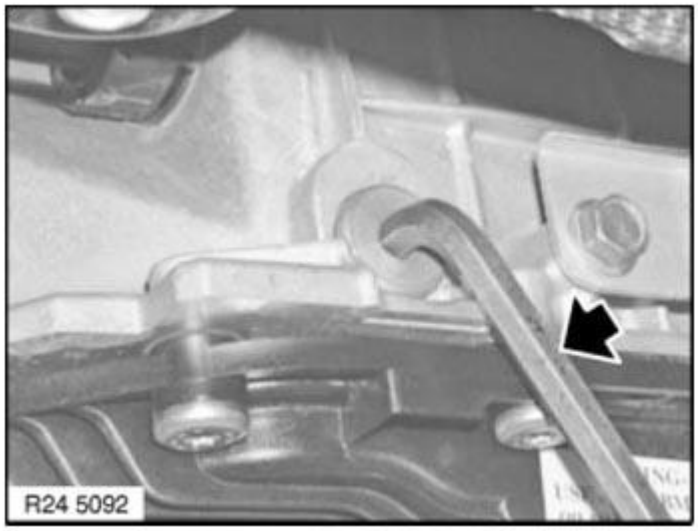


Fig. 3: Tightening Oil Filler Plug Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

3. Socket AF 8

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

24 00 056 INSTALLING EXCHANGE TRANSMISSION

IMPORTANT:

- **Do not let skin come in contact with transmission oil and do not inhale transmission oil vapors.**
- **Wear protective gloves.**
- **Ensure adequate ventilation**

Drain automatic transmission fluid at oil drain plug.

Tightening torque **24 11 5AZ** .

IMPORTANT: After completion of work, program control transmission control unit.

Recycling:

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.

IMPORTANT:

- **Before installing exchange transmission, always flush TRANSMISSION OIL COOLER TOGETHER WITH LINES .**
- **After completion of work, CHECK TRANSMISSION OIL LEVEL .**
- **Use only approved transmission oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters**

  Failure to comply with this requirement will result in serious damage to the automatic transmission

  Exchange transmissions come filled with oil

Necessary preliminary tasks:

- Remove **AUTOMATIC TRANSMISSION**

Vehicles up to production date 08/2010 only:

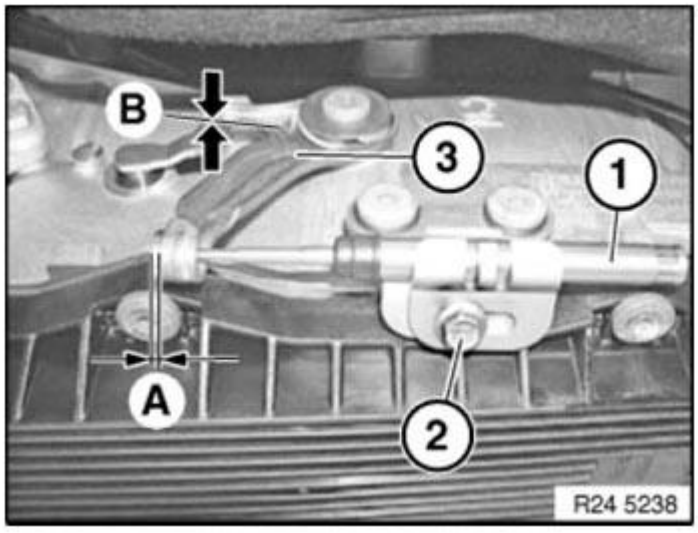


Fig. 4: Pressing Release Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Swap over release lever (3).

Tightening torque **24 51 3AZ** .

Convert holder for cable.

Tightening torque **24 51 4AZ** .

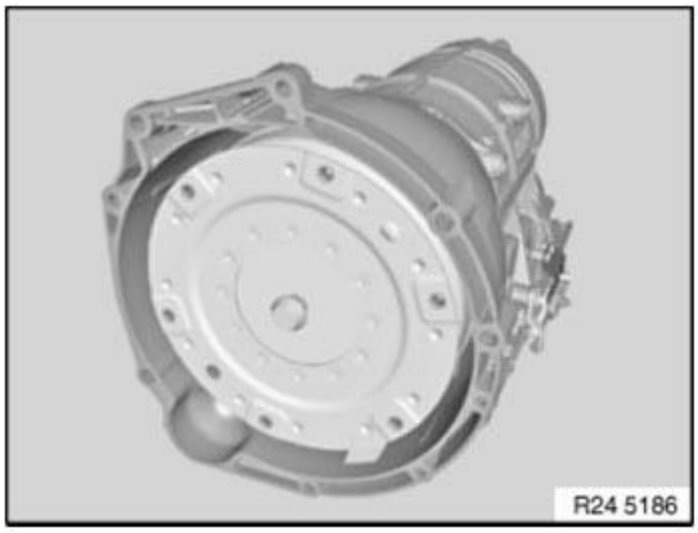


Fig. 5: Identifying Torque Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Modify transportation retainers.

Convert all cable clips.

Convert all seal plugs.

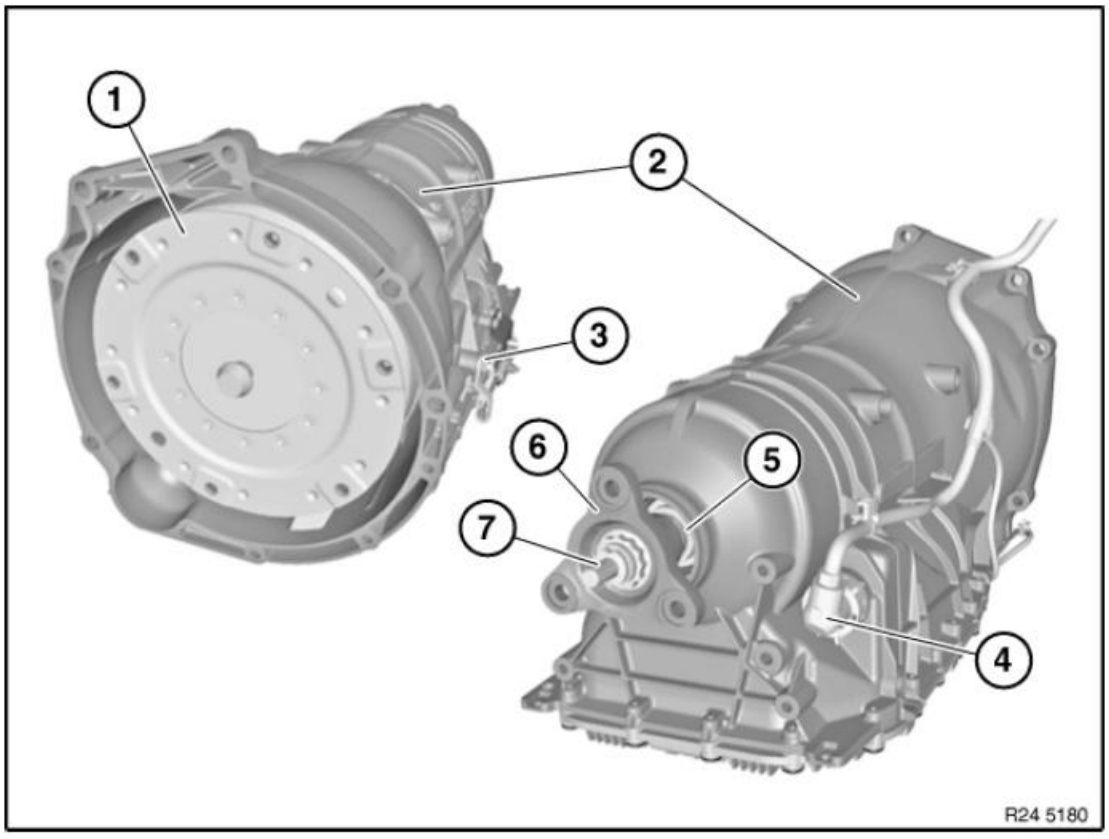
Convert protective cap on output shaft.

IMPORTANT: After removing transportation retainer, secure torque converter against slipping out.

Transmission identification:

- refer to BMW Parts Department.
- On type plate

24 00... OVERVIEW OF GEARBOX CASING



1 Torque converter

2 Transmission housing, front section

3 Radial shaft seal

4 Sealing sleeve for transmission housing

5 Radial seal

6 Output flange

7 Output shaft

Fig. 6: Identifying Gearbox Casing (GA8HP45Z, GA8HP70Z, GA8HP90Z)
Courtesy of BMW OF NORTH AMERICA, INC.

Complete transmission, transmission oil change, transmission designations

24 00 035 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION

IMPORTANT:

- **Do not let skin come in contact with transmission oil and do not inhale**

transmission oil vapors.

- **Wear protective gloves.**
- **Ensure adequate ventilation**

IMPORTANT: After completion of repair work, check TRANSMISSION OIL LEVEL .
Use only the approved transmission oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters
Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

- Disconnect the **BATTERY 61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD** or **61 20... (SAFETY) INFORMATION ON AGM BATTERY**
- Remove **FAN COWL**
- Remove **BOTH INTAKE SILENCER HOUSINGS**
- Remove **CATALYTIC CONVERTER** , cylinders 7-12

Unfasten ground strap (1).

Remove holder (2).

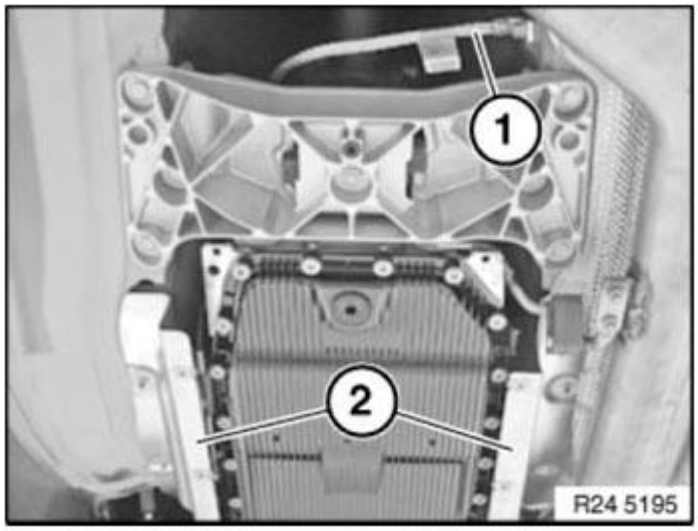


Fig. 7: Identifying Ground Strap And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Vehicles up to production date 08/2010 only:

Release screw (2).

Disconnect cable (1).

Installation note:

- Release screw (2).
- Bring release lever (3) into contact with selector shaft by pressing slightly. Distance B=0 mm.
- Adjust cable by means of holder until distance A > or = 1 mm is obtained.
- Tighten screw (2).

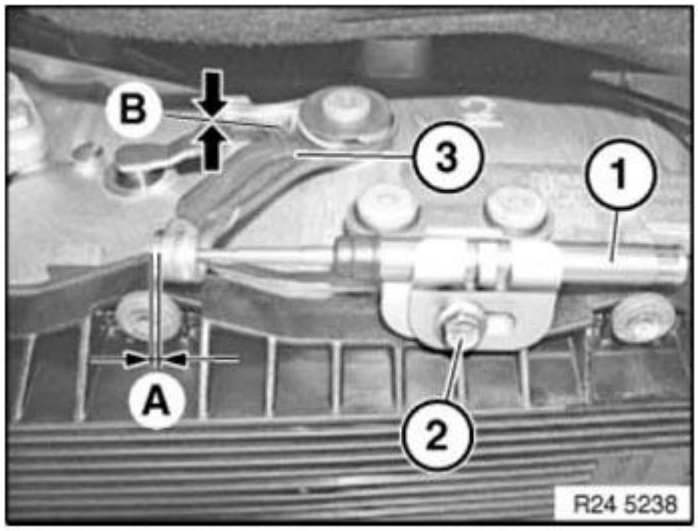


Fig. 8: Pressing Release Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **18 31 3AZ** .

Remove holder (2).

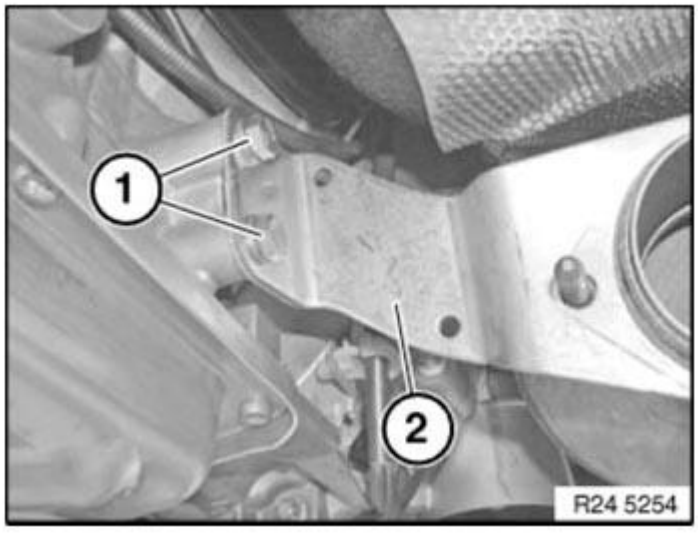


Fig. 9: Identifying Holder And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release monitoring sensor (1) for catalytic converter, cylinders 1-6 with special tools 11 7 030 and 11 9 150.

Tightening torque **11 78 1AZ** .

Remove monitoring sensor (1).

IMPORTANT: When using special tool 11 7 030 in conjunction with 11 9 150, it is essential to reduce the prescribed tightening torque by 3 Nm.

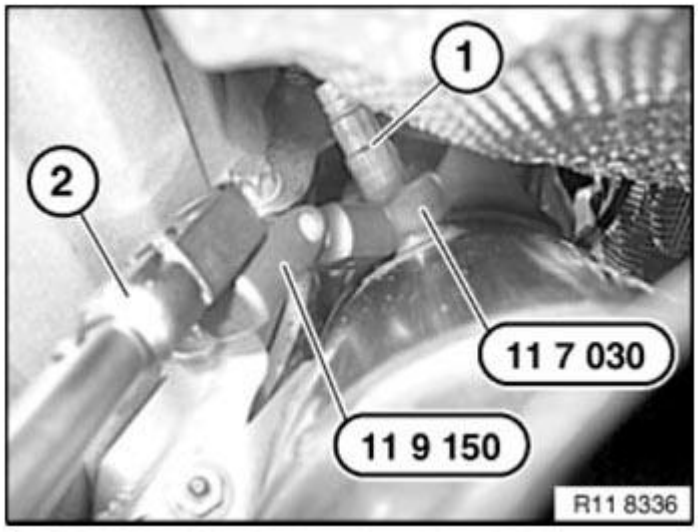


Fig. 10: Removing Monitoring Sensor Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect connector (1) from oil level sensor.

Release cable from retaining clips (2).

When disconnecting the transmission, pay attention to installation position of rubber plugs (3).

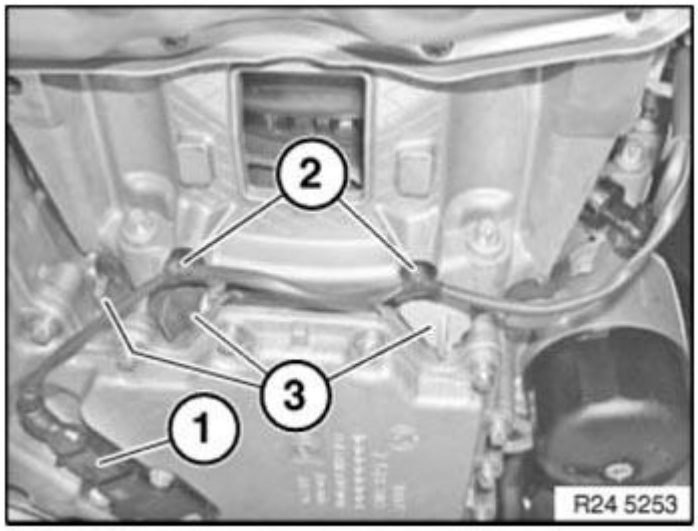


Fig. 11: Identifying Oil Level Sensor Connector, Retaining Clips And Rubber Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove crankshaft sensor.

Disengage cable from holder (2).

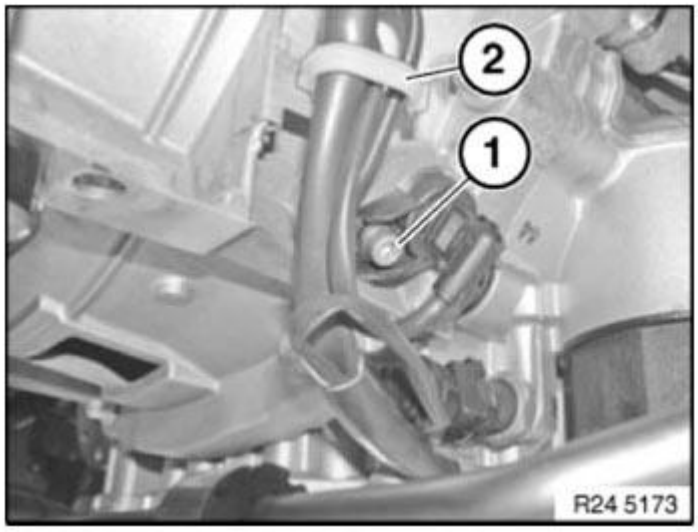


Fig. 12: Identifying Crankshaft Sensor Holder And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **24 00 1AZ** .

Remove cover (2).

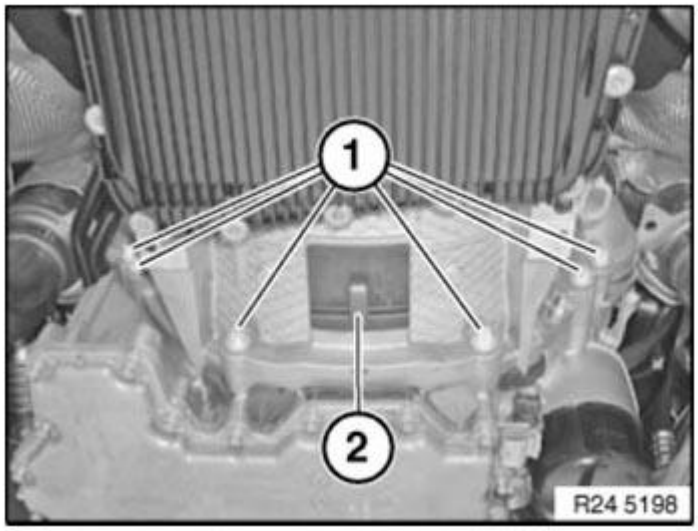


Fig. 13: Identifying Crankshaft Sensor Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

- Unlock connector (1) by turning and disconnect
- Release cable from brackets
- Insert special tool **24 2 390** in sealing sleeve.

These tasks are described in **NOTES ON MECHATRONICS**

(Important: Observe important note)

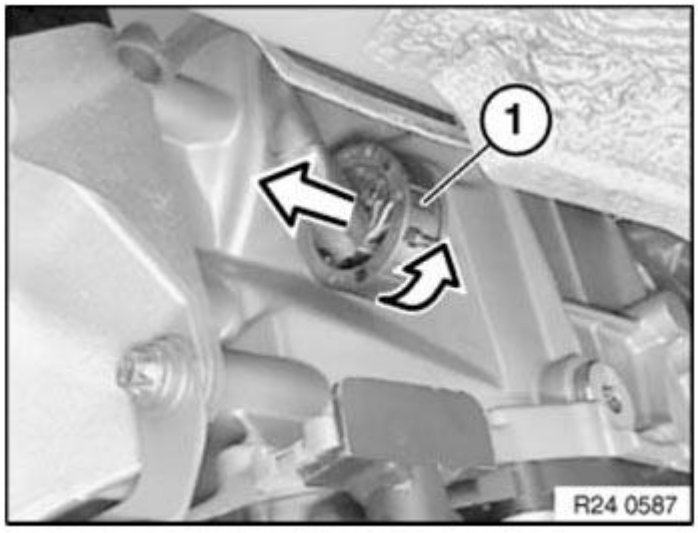


Fig. 14: Disconnecting Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 22 1AZ** .

Release oil cooler line (2).

Installation note:

Replace sealing rings.

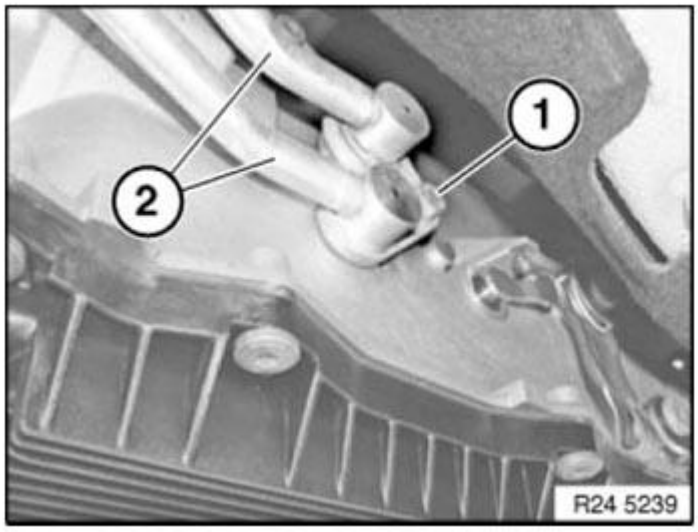


Fig. 15: Identifying Oil Cooler Line And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at vibration damper in direction of rotation until screw (1) is visible in recess.

Release all 6 screws (1) on torque converter.

Tightening torque **24 40 1AZ** .

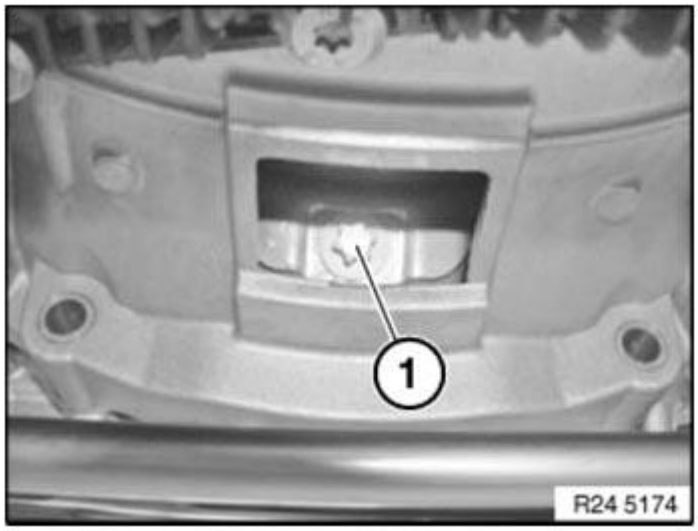


Fig. 16: Identifying Torque Converter Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **24 4 131** and **24 4 138** into recess in transmission housing.

Twist special tool and secure torque converter.

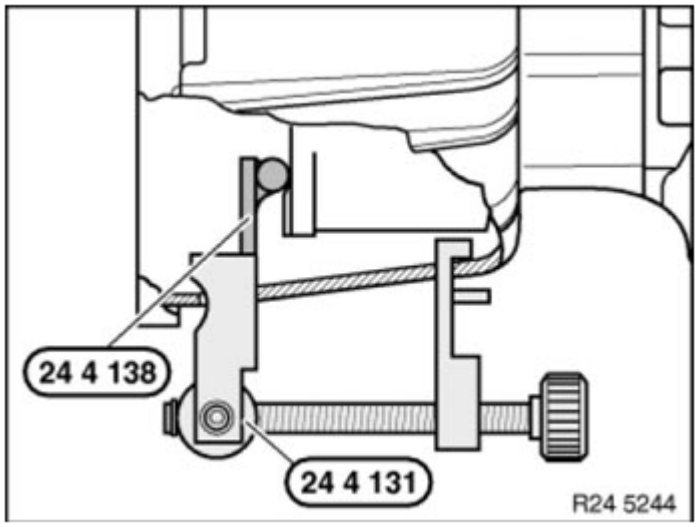


Fig. 17: Securing Torque Converter Using Special Tool (24 4 131 And 24 4 138)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on left and right of axle.

Remove cover plate (2) on left and right of axle.

Remove bolt (3) on left and right of axle.

Tightening torque **31 10 1AZ** .

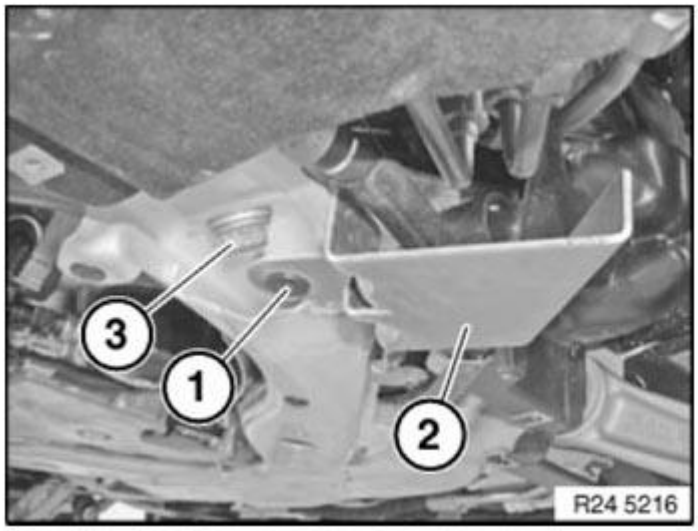


Fig. 18: Identifying Axle Cover Plate, Bolt And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Screw on special tool 11 8 910.

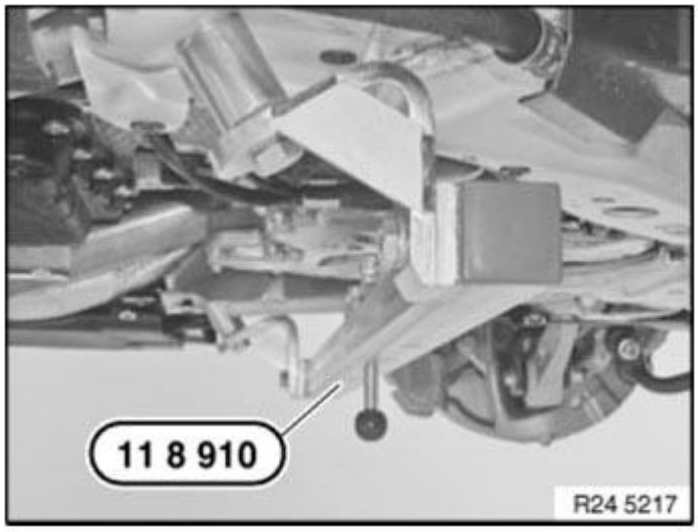


Fig. 19: Connecting Special Tool (11 8 910)
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust distance (1) between cross bar and facing using nuts (2).

Nuts (2) must be screwed down in opposite direction after distance has been adjusted.

IMPORTANT: Distance:

N74 37 mm

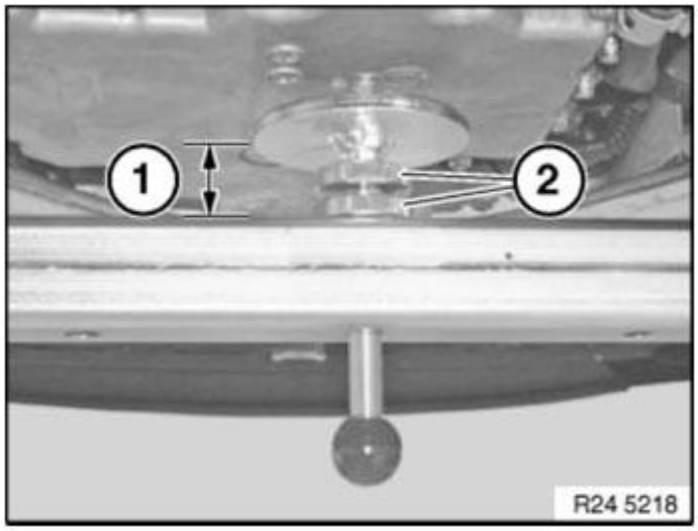


Fig. 20: Adjusting Distance Between Cross Bar And Facing Using Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **22 32 3AZ** .

Unfasten screws (2).

Tightening torque **22 32 4AZ** .

Remove transmission cross member.

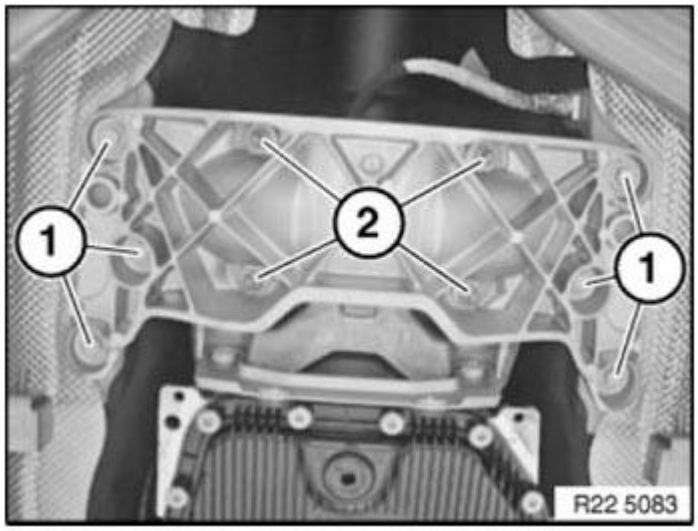


Fig. 21: Identifying Transmission Cross Member Screws
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove **PROPELLER SHAFT**

NOTE: Bending the propeller shaft by an excessive angle can cause premature damage to the joint/propeller shaft!

- Support engine with lifter when removing transmission.

Lower engine with transmission.

Secure engine and transmission in lowered position with engine support beam.

Then support transmission.

Supporting transmission

Support transmission with special tools 23 4 050, **00 2 030** .

Secure transmission to mounting with tensioning strap (1).

Tasks are described in **TRANSMISSION BRACKET**.

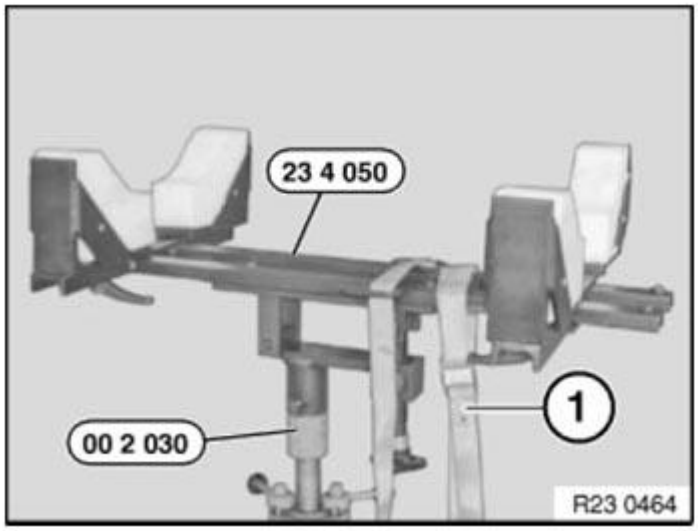


Fig. 22: Supporting Transmission Using Special Tools (23 4 050 And 00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque **24 00 1AZ** .

Unflange transmission.

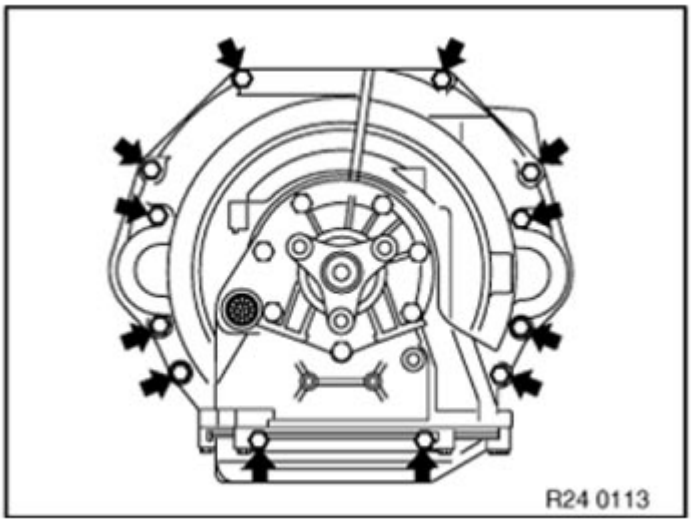


Fig. 23: Locating Transmission Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check that fitting sleeves (2) are correctly fitted.

Replace damaged fitting sleeves.

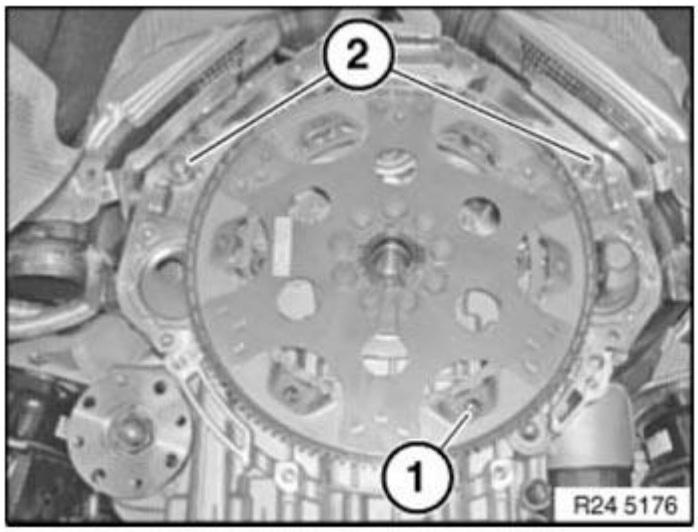


Fig. 24: Identifying Sleeves And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Rotate torque converter until bore hole in torque converter is flush with bore hole in drive plate.

Flange-mount transmission to engine.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin! RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

23 TRANSMISSION DESIGNATIONS

Breakdown of BMW designation

A5S 300J (former designation)		
A	Transmission type	○ S = Manual gearbox ○ A = Automatic transmission
5	Number of forward gears	
S	Type of top gear	○ D = Direct gear ○ S = Overdrive gear
300	Max. input torque (Nm)	
J	Code letter of transmission manufacturer	○ G = Getrag ○ J = Jatco ○ R = GMPT (General Motors Powertrain)

		○ Z = ZF (Zahnradfabrik Friedrichshafen)
SMG	Notes	SMG = Sequential M gearbox/transmission

GS6-37BZ (new designation according to BMW Group Standard GS 90007)		
G	Transmission	
S	Transmission type	○ S = Manual gearbox ○ A = Automatic transmission
6	Number of forward gears	
-		○ - = Standard with manual gearshift ○ HP = Hydraulic planetary gear ○ DKG= twin-clutch gearbox
37	Transmission type	○ 26 = D-transmission ○ 31 = C-transmission ○ 39 = F-transmission ○ 37 = H-transmission ○ 53 = G-transmission ○ 17 = I-transmission ○ 47 = J transmission SMG -7-speed ○ 45 = K transmission ○ 36 = Transmission DKG
B	Gear set	○ B = Gasoline gear ratio ○ D = Diesel gear ratio ○ S= Sport gear ratio
Z	Code letter of transmission manufacturer	○ G = Getrag ○ Z = ZF (Zahnradfabrik Friedrichshafen)

Manual gearbox

BMW designation	**Manufacturer**	**Manufacturer designation**	**Remarks**
S5D 200G	Getrag	B transmission (220/5)	
S5D 200G	Getrag	B transmission (221/5)	for M41 engine only
S5D 250G	Getrag	B transmission (220/5)	Reinforced version
S5D 260Z	ZF	C-transmission (S5-31 D)	for M51 engine only
S5D 280Z	ZF	C-transmission (S5-31)	
S5D 310Z	ZF	C-transmission (S5-31)	up to 9.95
S5D 320Z	ZF	C-transmission (S5-31)	from 9.95 (reinforced version)
GS5S31BZ (SMG)	ZF	C transmission	SMG
GS5-39DZ	ZF	F transmission	

S6S 420G	Getrag	D-transmission (226/6)	
S6S 420G (SMG)	Getrag	D transmission	SMG
S6S 560G	Getrag	E-transmission (286/6)	
GS6-37BZ	ZF	H-transmission	
GS6S37BZ (SMG)	ZF	H-transmission	
GS6-37DZ	ZF	H-transmission	
GS6-37BG	Getrag	H-transmission	
GS6-53BZ	ZF	G-transmission	
GS6-53DZ	ZF	G-transmission	
GS6-17BG	Getrag	I-transmission	
GS6-17DG	Getrag	I-transmission	
GS7S47BG (SMG)	Getrag	J-transmission (247)	SMG -7-gear
GS7D36SG	Getrag	DKG (436)	DKG -7-gear
GS6-45BZ	ZF	K transmission	
GS6-45DZ	ZF	K transmission	

Automatic transmission

BMW designation	Manufacturer	Manufacturer designation	Remarks
A4S 200R	General Motors Powertrain	GM4	
A4S 270R	General Motors Powertrain	THM-R1w	Transmission wide-stepped
A4S 310R	General Motors Powertrain	THM-R1	
A5S 300J	Jatco	Jatco	
A5S 310Z	ZF	5HP-18	
A5S 325Z	ZF	5HP-19	
A5S 440Z	ZF	5HP-24	
A5S 560Z	ZF	5HP-30	
A5S 360R / 390R	GM	GM5	
GA6HP19Z	ZF	6HP19	
GA6HP26Z	ZF	6HP26	
GA6HP32Z	ZF	6HP32	
GA6L45R	GM	GM6	
GA8HP45Z	ZF	8HP45	
GA8HP70Z	ZF	8HP70	
GA8P70H	ZF	8P70	Hybrid
GA8HP90Z	ZF	8HP90	
GA7AHSCD	Daimler	AHS-C	Hybrid

23... UNIVERSAL BMW TRANSMISSION TAKE-UP

NOTE:

- **The universal transmission bracket is introduced for the E60 AWD**

- **Suitable for manual and automatic transmissions**

IMPORTANT: Front and rear supports (1) can be laterally adjusted by means of screws (2). Carrier (3) of rear supports (1) can be longitudinally adjusted by means of screw.
Supports must be adapted in length and width to the transmission.

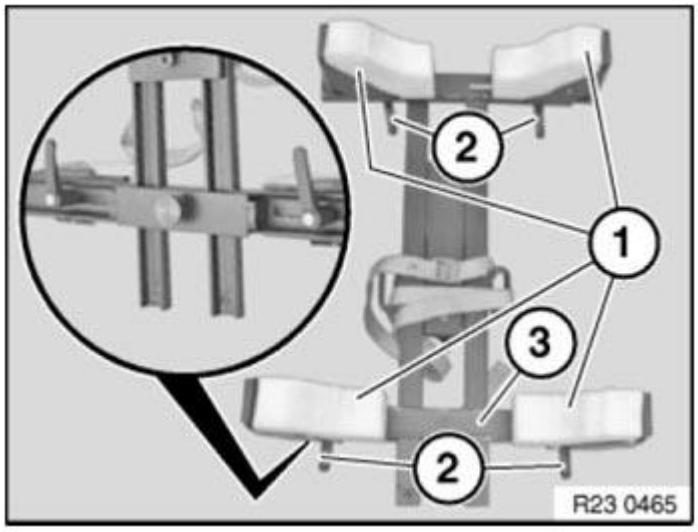


Fig. 25: Identifying Rear Supports, Carrier And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission

Support transmission with special tools 23 4 050, **00 2 030** .

IMPORTANT: Transmission must be secured with tensioning strap (1).

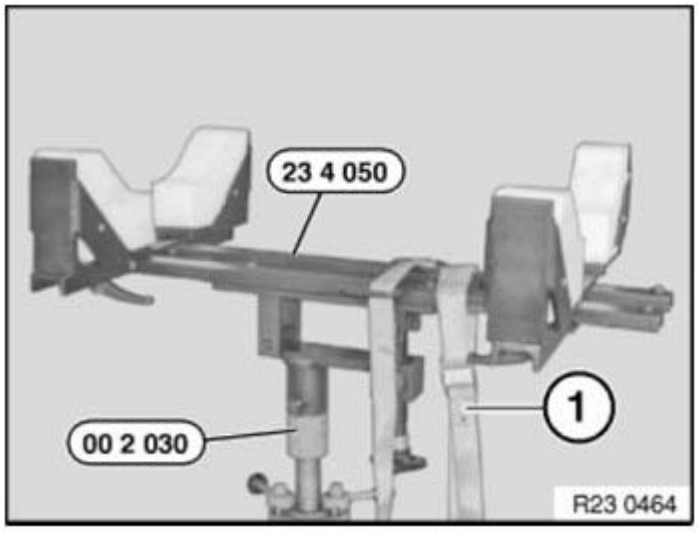


Fig. 26: Supporting Transmission Using Special Tools (23 4 050 And 00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

23..... UNIVERSAL TRANSMISSION RETAINING BRIDGE

NOTE:
- **The transmission retaining bridge 24 0 200 is suitable for both manual and automatic transmissions**

IMPORTANT: Adapters and spindles must be adapted for positive locking to the transmission.

(Risk of injury)

Adapt adapters (1) and spindle with thrust piece (3) to transmission.

Adapt length with slide (2).

Screw in spindle (4).

IMPORTANT: Before mounting on assembly stand 00 1 450, check retaining bridge for secure seating.

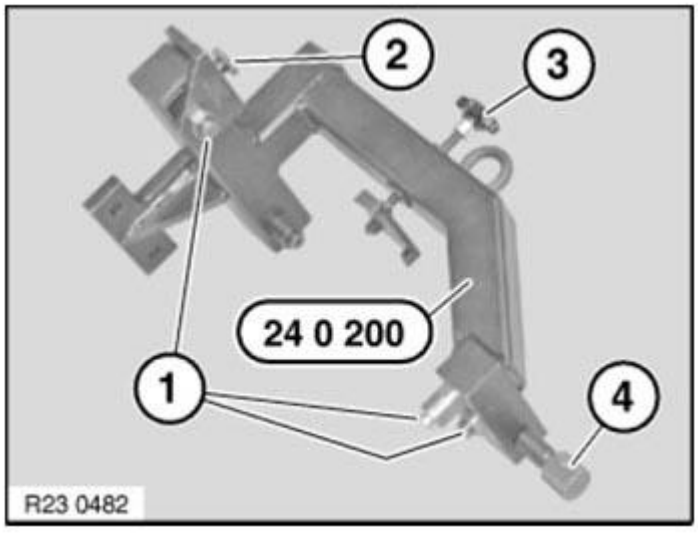


Fig. 27: Identifying Special Tool Components
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION CASE, OIL SUMP

24 11 665 REMOVING AND INSTALLING/REPLACING GEARBOX OIL FILTER

IMPORTANT:
- **Avoid skin contact with gearbox oil and inhaling gearbox oil fumes.**
- **Wear protective gloves.**
- **Ensure adequate ventilation.**

IMPORTANT: After completion of work, check GEARBOX OIL LEVEL .
Use only approved gearbox oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove **GEARBOX OIL SUMP**

Remove gear oil filter (1).

Installation note:

Wet oil filter seal with automatic transmission oil.

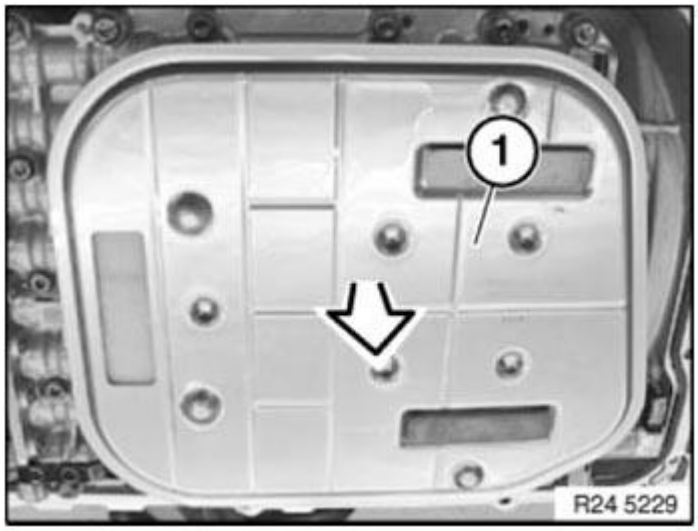


Fig. 28: Removing Gear Oil Filter
Courtesy of BMW OF NORTH AMERICA, INC.

24 11 016 REMOVING AND INSTALLING/SEALING OR REPLACING TRANSMISSION SUMP

IMPORTANT:
- **Do not let skin come in contact with gearbox oil and do not inhale fuel vapors.**
- **Wear protective gloves.**
- **Ensure adequate ventilation**

IMPORTANT: Remove transmission sump only after it has cooled down.
After completion of work, CHECK GEARBOX OIL LEVEL .
Use only the approved transmission oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters
Failure to comply with this requirement will result in serious damage to the automatic transmission!

IMPORTANT: Aluminium screws/bolts must be replaced each time they are released .
Aluminium screws/bolts are permitted with and without color coding.

For reliable identification:

Aluminium screws/bolts are **not magnetic** .

Jointing torque and angle of rotation must be observed without fail **(risk of damage)** .

Necessary preliminary tasks:

- Remove rear **UNDERBODY PROTECTION** with side guides

Remove oil drain plug (1).

Tightening torque **24 11 5AZ** .

Drain automatic transmission oil.

Installation note:

Replace oil drain plug.



Fig. 29: Identifying Oil Drain Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Recycling:

Catch and dispose of escaping transmission fluid.

Observe country-specific waste disposal regulations.

Release all screws (1-13).

Remove transmission oil sump.

Installation note:

Aluminium screws **must** be replaced.

Insert screws in sequence 1...13 until screw heads make contact.

Tighten screws in sequence 1...13 to specified torque.

Tightening torque **24 11 4AZ** .

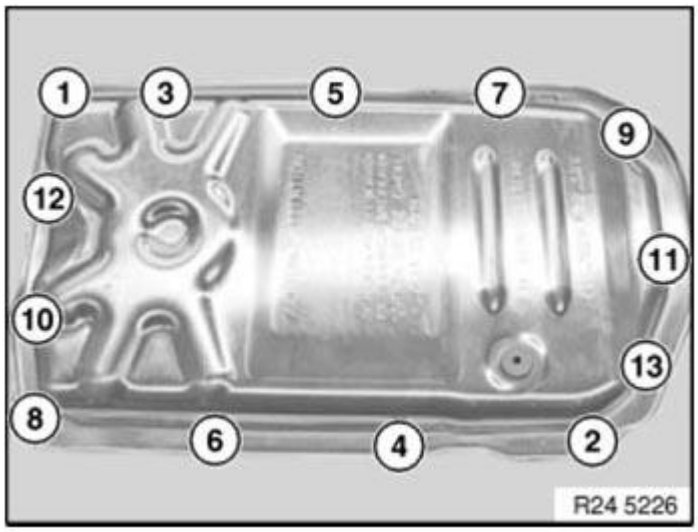


Fig. 30: Identifying Tightening Sequence Of Transmission Oil Sump Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove gasket (1) from transmission sump.

Clean gearbox oil sump to remove residual oil.

Clean sealing surfaces with a cloth.

Place new gasket on sealing surface of transmission oil sump.

IMPORTANT: Do not degrease gearbox sump with cleaning agent.

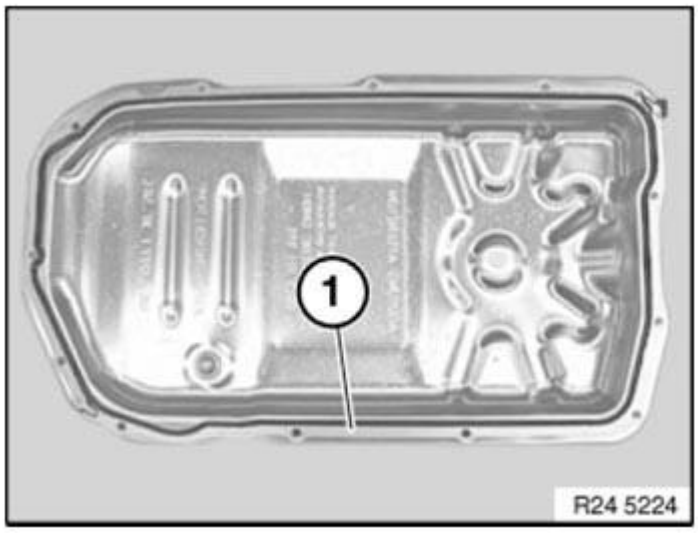


Fig. 31: Identifying Transmission Sump Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

TORQUE CONVERTER BEARING, SEAL

24 31 565 REPLACING TORQUE CONVERTER SHAFT SEAL

IMPORTANT:
- **Avoid skin contact with gearbox oil and inhaling gearbox oil fumes.**
- **Wear protective gloves.**
- **Ensure adequate ventilation.**

IMPORTANT: After completion of work, check GEARBOX OIL LEVEL .
Use only approved gearbox oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove **TORQUE CONVERTER**.

Secure gearbox with special tool **24 0 200** on assembly stand 00 1 450.

NOTE: Read and comply with note on installation of GEARBOX RETAINING BRIDGE.

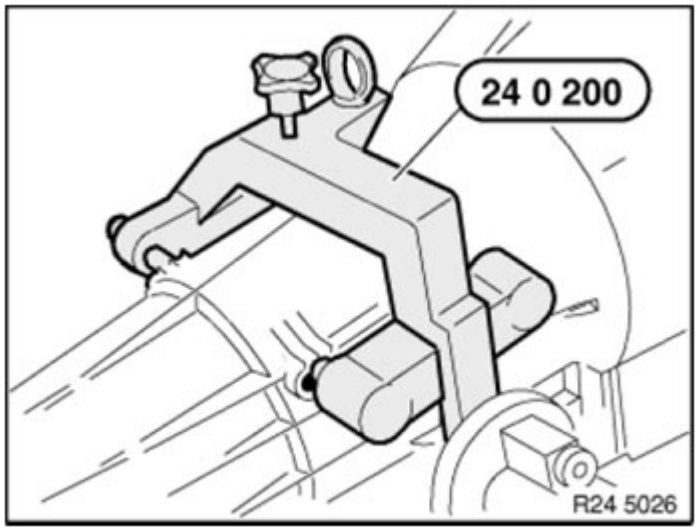


Fig. 32: Securing Gearbox Using Special Tool (24 0 200 And 00 1 450)
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out radial shaft seal (1) with special tools **24 1 420** and **13 5 250** .

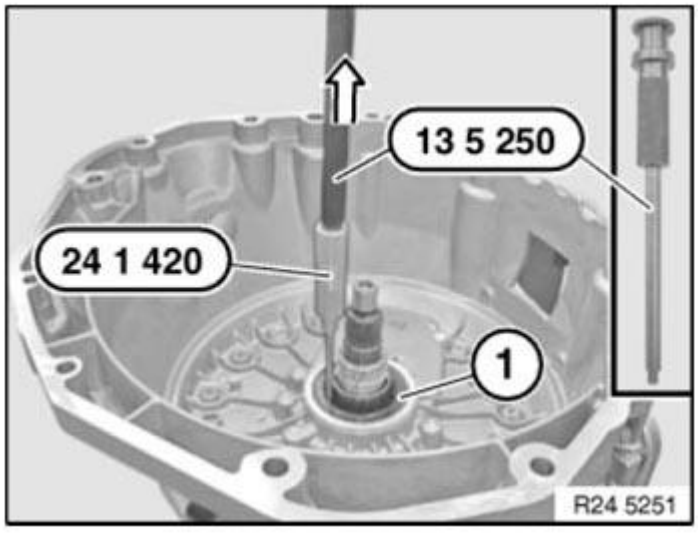


Fig. 33: Pulling Radial Shaft Seal Using Special Tools (24 1 420 And 13 5 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip on shaft seal.

Drive in radial shaft seal (1) with special tool **24 2 410** as far as it will go.

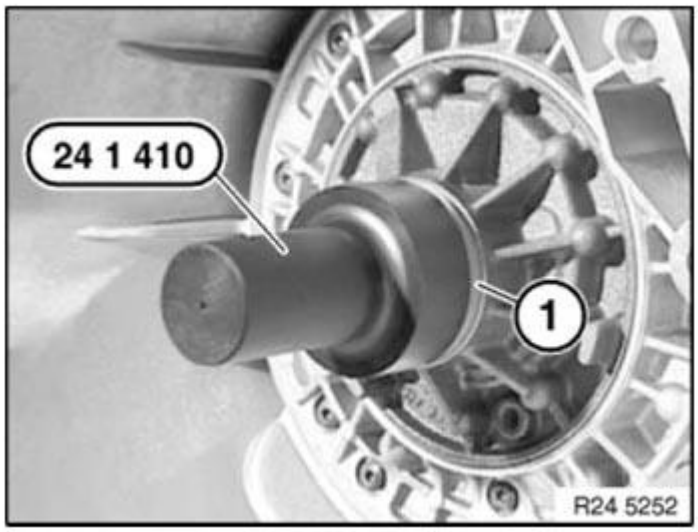


Fig. 34: Driving Radial Shaft Seal Using Special Tool (24 2 410)
Courtesy of BMW OF NORTH AMERICA, INC.

EXTENSION HOUSING, BEARINGS, SEAL

24 20 012 REPLACE OUTPUT FLANGE

Operations are identical to replacing the **SHAFT SEAL FOR THE OUTPUT FLANGE**.

24 13 016 REPLACE RADIAL SHAFT SEAL FOR OUTPUT FLANGE

IMPORTANT:

- **Avoid skin contact with gearbox oil and inhaling gearbox oil fumes.**
- **Wear protective gloves.**
- **Ensure adequate ventilation.**

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved gearbox oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters
Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

- Remove **REAR UNDERBODY PROTECTION**
- Remove complete **EXHAUST SYSTEM**
- Remove **TRANSMISSION CROSS-MEMBER** .
- Remove **PROPELLER SHAFT**
- Support transmission with lifter.

Release transmission support block from transmission.

Tightening torque **22 32 1AZ** .

Grip output flange (1) with special tool 23 0 020.

Release nut with special tool **24 2 380** .

Tightening torque **24 13 1AZ** .

Installation note:

Replace nut and secure with a mandrel (8 mm) by caulking.

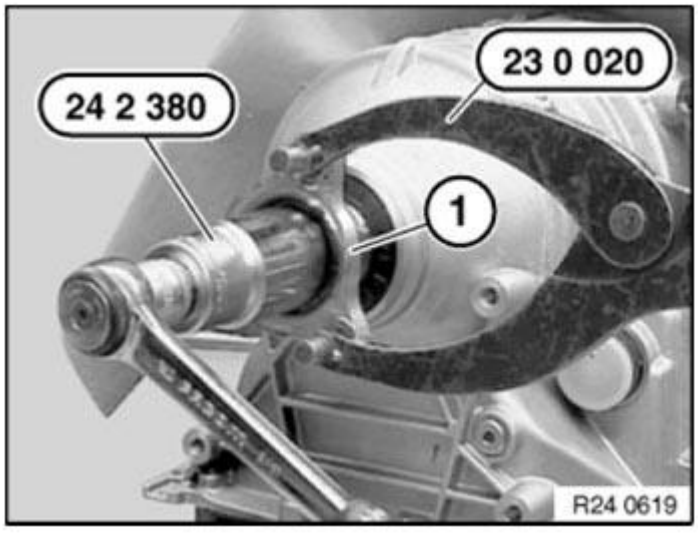


Fig. 35: Removing Output Flange Nut Using Special Tool (24 2 380)
Courtesy of BMW OF NORTH AMERICA, INC.

Detach output flange from output shaft.

Remove spacer.

Attach special tool **24 2 353** to output shaft (1).

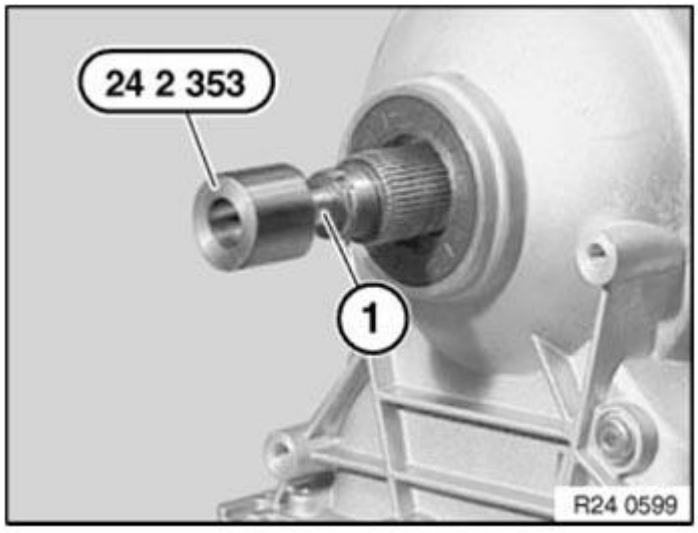


Fig. 36: Connecting Special Tool (24 2 353) To Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **24 2 351** until it is firmly connected with radial shaft seal.

Pull out radial shaft seal by screwing in special tool **24 2 352** .

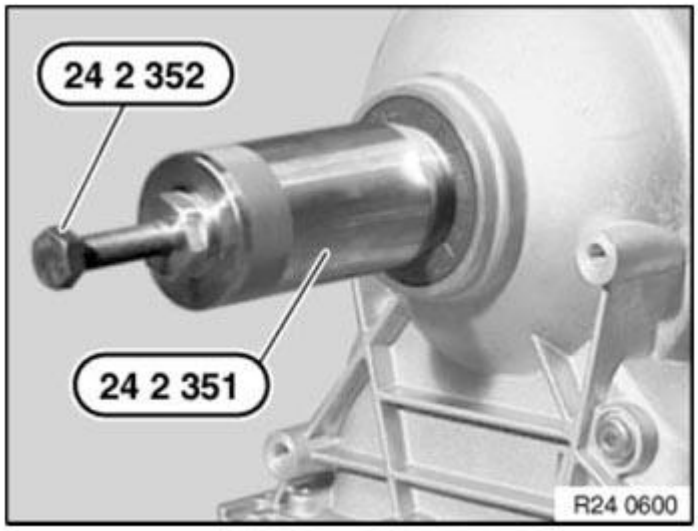


Fig. 37: Pulling Radial Shaft Seal Using Special Tool (24 2 352)
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip of radial shaft seal (1). Drive in radial seal (1) with special tool **24 2 370** and adapter ring **24 2 410** as far as it will go.

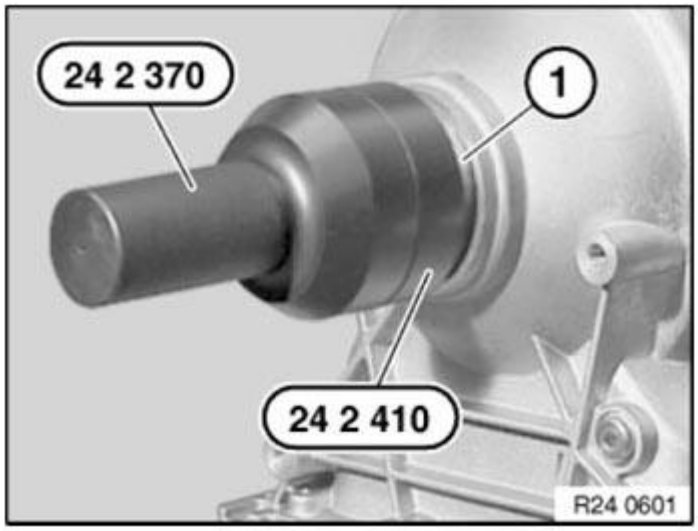


Fig. 38: Installing Radial Seal Using Special Tool (24 2 370)
Courtesy of BMW OF NORTH AMERICA, INC.

MECHANICAL ATTACHMENTS

24 14 007 REPLACING SHAFT SEAL FOR SELECTOR SHAFT

IMPORTANT:

- **Avoid skin contact with gearbox oil and inhaling gearbox oil fumes.**

- **Wear protective gloves.**
- **Ensure adequate ventilation.**

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved gearbox oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters
Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

- Remove **MECHATRONICS**.
- Remove **EXHAUST SYSTEM** .
- Remove heat shields.
- Detach **PROPELLER SHAFT** center mount.
- Detach **CROSS MEMBER**
- Lower transmission using working jack.

Using a suitable tool, drive roll pin (1) out of selector shaft.

Withdraw selector shaft (2) outwards.

NOTE: Return spring is under tension.

Installation note:

Replace roll pin (1).

Insert narrower end of roll pin (1) into hole first.

Using a suitable tool, drive in roll pin until it is flush with the hole.

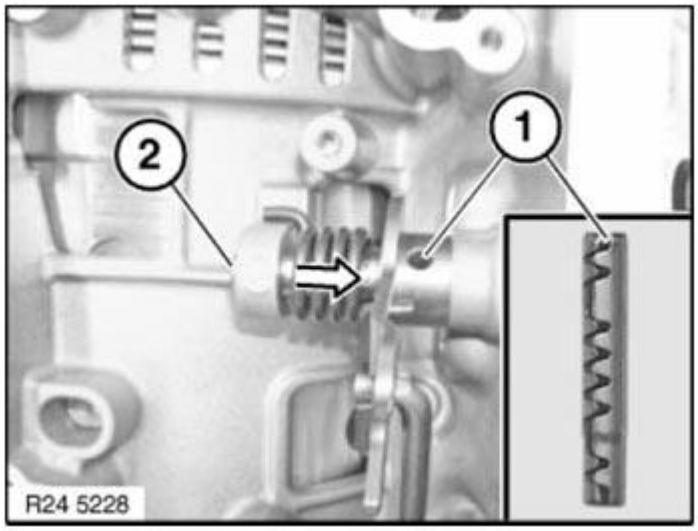


Fig. 39: Removing Selector Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **24 5 367** until it is firmly connected with radial shaft seal.

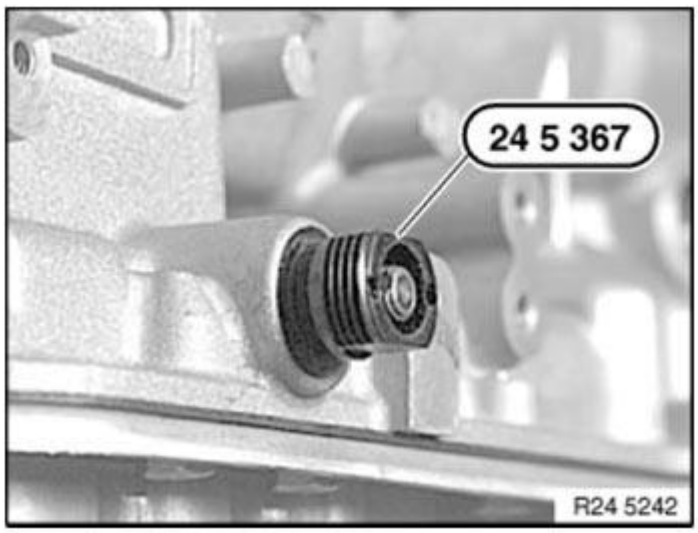


Fig. 40: Connecting Special Tool (24 5 367) To Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool **24 5 362** onto special tool **24 5 367** and tighten down.

This pulls the shaft seal out of the transmission housing.

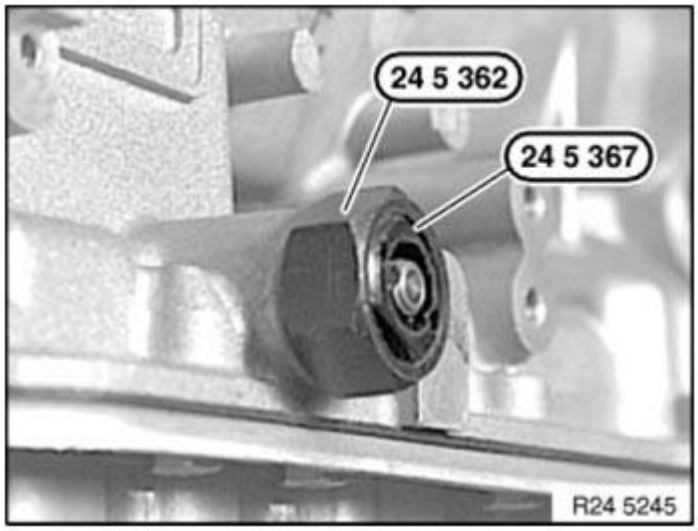


Fig. 41: Connecting Special Tool (24 5 362) Onto Special Tool (24 5 367)
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip on shaft seal (1).

Drive radial shaft seal (1) fully home using special tool **24 5 366** and plastic hammer.

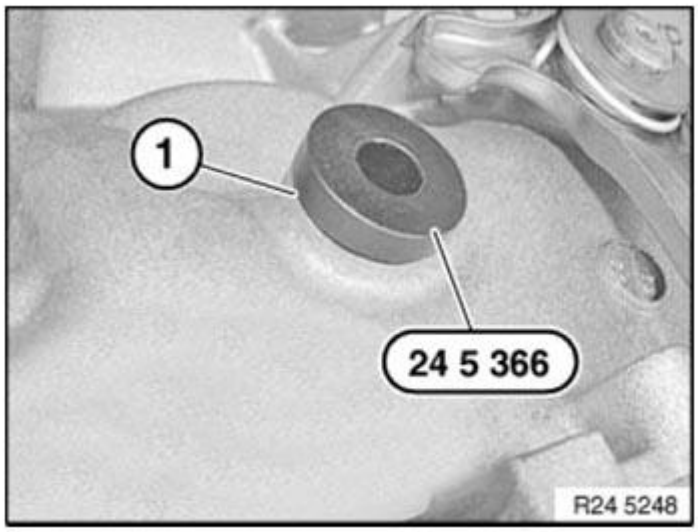


Fig. 42: Installing Radial Shaft Seal Using Special Tool (24 5 366)
Courtesy of BMW OF NORTH AMERICA, INC.

OIL PUMP

24 31 565 REPLACING TORQUE CONVERTER SHAFT SEAL

IMPORTANT:

- **Avoid skin contact with gearbox oil and inhaling gearbox oil fumes.**

- **Wear protective gloves.**
- **Ensure adequate ventilation.**

IMPORTANT: After completion of work, check GEARBOX OIL LEVEL .
Use only approved gearbox oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove **TORQUE CONVERTER**.

Secure gearbox with special tool **24 0 200** on assembly stand 00 1 450.

NOTE: Read and comply with note on installation of GEARBOX RETAINING BRIDGE.

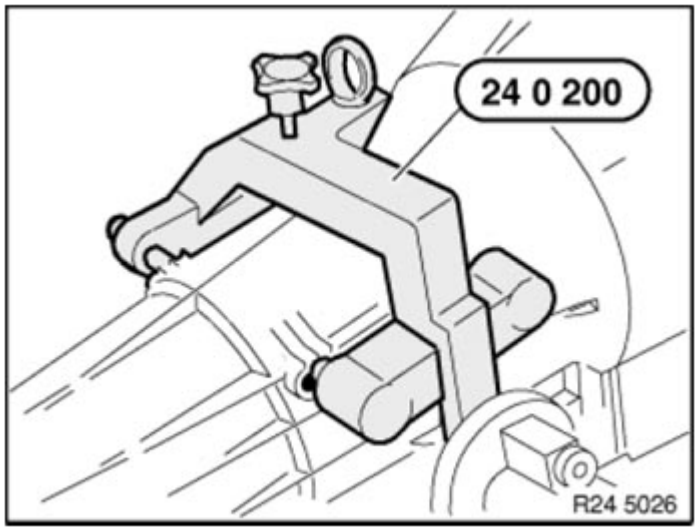


Fig. 43: Securing Gearbox Using Special Tool (24 0 200 And 00 1 450)
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out radial shaft seal (1) with special tools **24 1 420** and **13 5 250** .

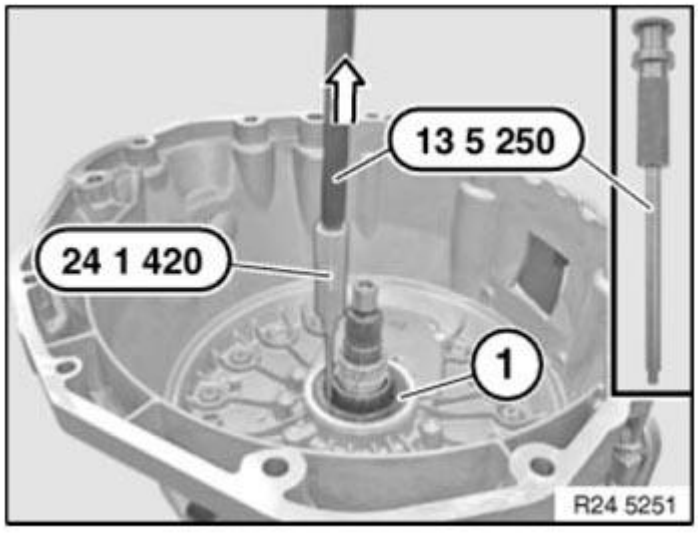


Fig. 44: Pulling Radial Shaft Seal Using Special Tools (24 1 420 And 13 5 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip on shaft seal.

Drive in radial shaft seal (1) with special tool **24 2 410** as far as it will go.

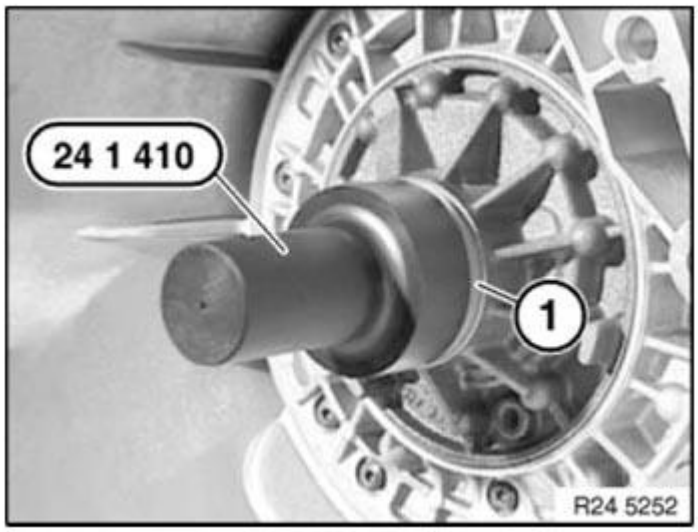


Fig. 45: Driving Radial Shaft Seal Using Special Tool (24 2 410)
Courtesy of BMW OF NORTH AMERICA, INC.

CONTROLLER

24 34... MANUAL EMERGENCY RELEASE OF TRANSMISSION LOCK

Manual emergency release of parking lock from passenger compartment is not possible with GA6HP/GA8HP gearboxes

- F01/F02/F03 GA6HP from production date 03/2010
- F01/F02/F03/F04 GA8HP from production date 09/2010
- F07 GA8HP from production date 03/2010
- F10 / F11 GA8HP as from production date 06/2010

NOTE: Releasing the transmission lock under the vehicle floor remains possible for towing purposes.

See **MANUALLY RELEASING TRANSMISSION LOCK**.

In the event of a power supply interruption, e.g. flat battery or electrical fault, the parking lock must be manually released, otherwise the wheels will be locked and the vehicle cannot be moved.

IMPORTANT: Secure vehicle against rolling, e.g. with chocks.

Press the brake pedal when manually releasing the transmission lock, otherwise there is a risk that the vehicle will roll when the transmission lock is manually released.

If the parking brake has to be released as well, observe the following procedure:

1. First, manually release the **PARKING BRAKE** .
2. Then manually release the automatic transmission lock.

NOTE: Release tool is located in on-board tool kit.

Open lid of drinks holder (1).

Lift out drinks holder (1) and rubber mat (2) from drinks holder base.

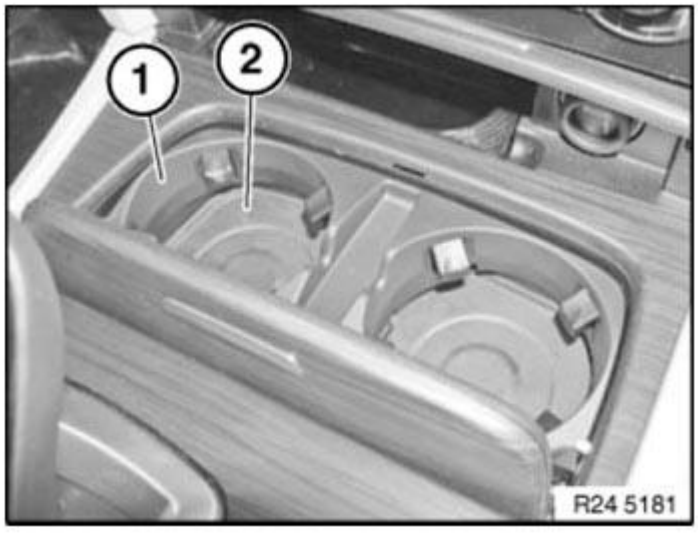


Fig. 46: Identifying Drinks Holder And Rubber Mat
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover (1).

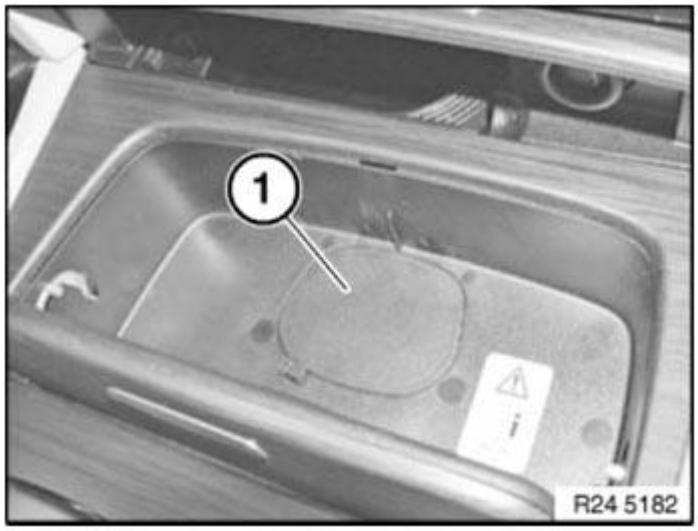


Fig. 47: Identifying Transmission Lock Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Releasing transmission lock:

Insert release tool (1) into opening.

Turn release tool clockwise up to stop and press down.

Transmission lock is released!

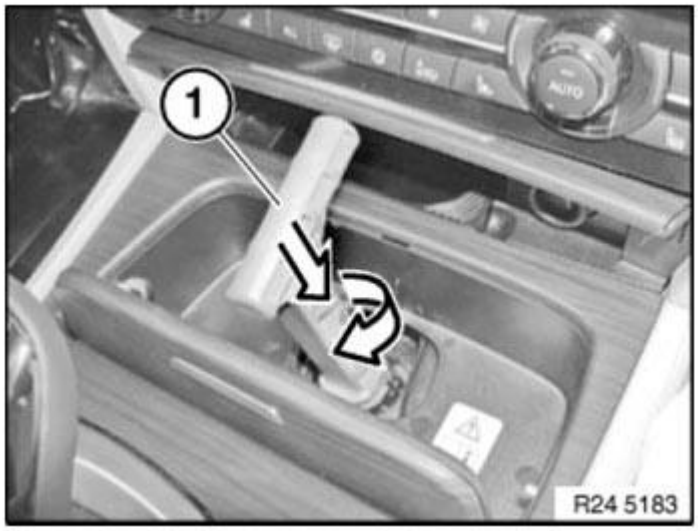


Fig. 48: Turning Release Tool To Clockwise
Courtesy of BMW OF NORTH AMERICA, INC.

Locking transmission lock:

Pull out release tool in direction of arrow.

Transmission lock is locked.

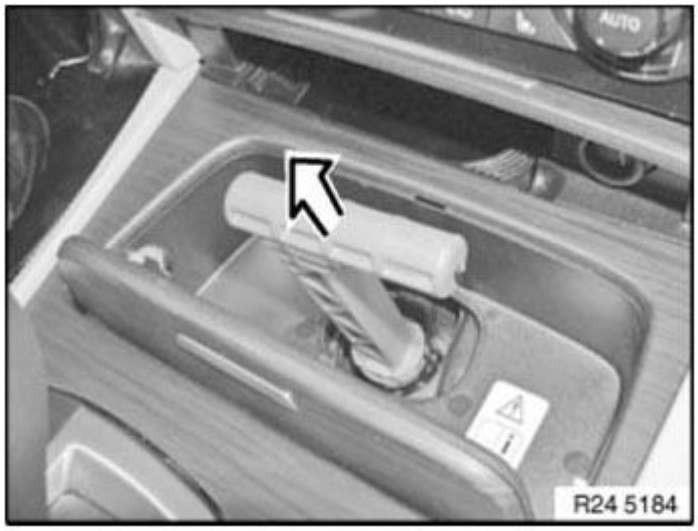


Fig. 49: Pulling Out Release Tool
Courtesy of BMW OF NORTH AMERICA, INC.

SHIFT VALVES, PARKING LOCK

24 34... MANUAL EMERGENCY RELEASE OF TRANSMISSION LOCK

Manual emergency release of parking lock from passenger compartment is not possible with GA6HP/GA8HP gearboxes for:

- F01/F02/F03 GA6HP from production date 03/2010
- F01/F02/F03/F04 GA8HP from production date 09/2010
- F07 GA8HP from production date 03/2010
- F10 / F11 GA8HP as from production date 06/2010

NOTE: Releasing the transmission lock under the vehicle floor remains possible for towing purposes.

MANUALLY RELEASING TRANSMISSION LOCK

In the event of a power supply interruption, e.g. flat battery or electrical fault, the parking lock must be

manually released, otherwise the wheels will be locked and the vehicle cannot be moved.

IMPORTANT: Secure vehicle against rolling, e.g. with chocks.
Press the brake pedal when manually releasing the transmission lock, otherwise there is a risk that the vehicle will roll when the transmission lock is manually released.
If the parking brake has to be released as well, observe the following procedure:

1. First, manually release the **PARKING BRAKE** .
2. Then manually release the automatic transmission lock

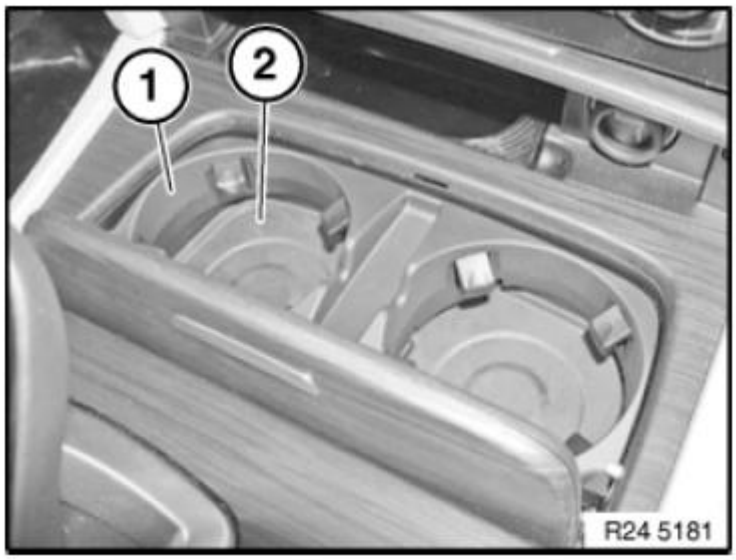


Fig. 50: Identifying Drinks Holder And Rubber Mat
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Release tool is located in on-board tool kit.

Open lid of drinks holder (1).

Lift out drinks holder (1) and rubber mat (2) from drinks holder base.

Remove cover (1).

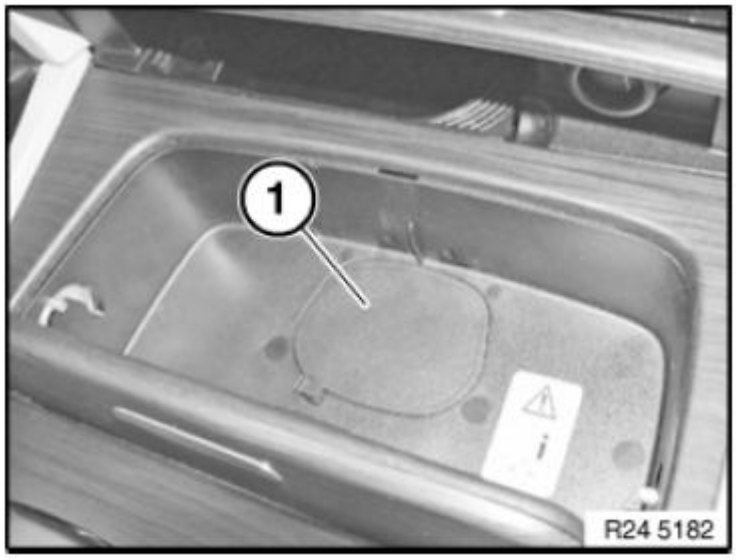


Fig. 51: Identifying Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Releasing transmission lock:

Insert release tool (1) into opening.

Turn release tool clockwise up to stop and press down.

Transmission lock is released!

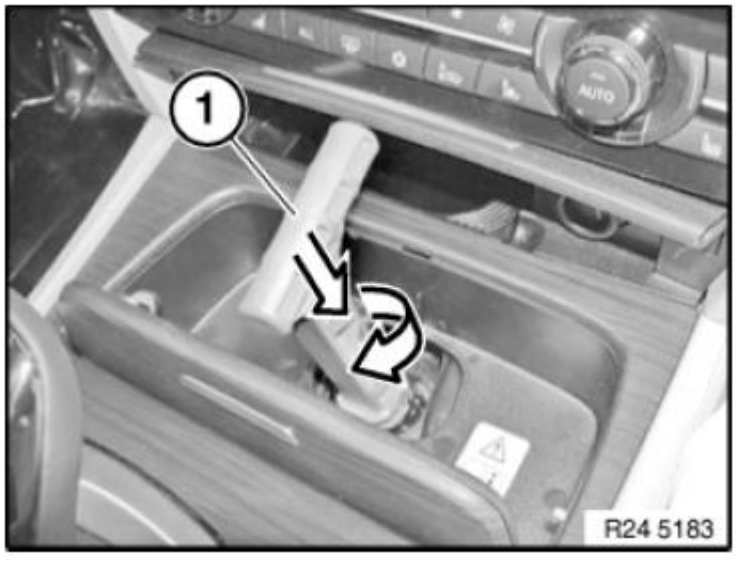


Fig. 52: Inserting Release Tool Into Opening
Courtesy of BMW OF NORTH AMERICA, INC.

Locking transmission lock:

Pull out release tool in direction of arrow.

Transmission lock is locked.

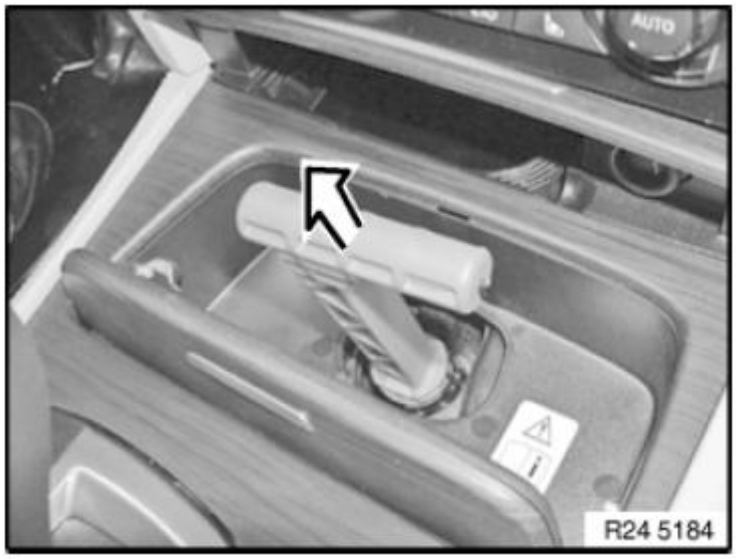


Fig. 53: Identifying Release Tool Pulling Direction
Courtesy of BMW OF NORTH AMERICA, INC.

24 34... MANUALLY RELEASING PARKING LOCK (FROM VEHICLE UNDERBODY)

For various tasks, it is necessary to unlock and lock the parking lock.

This can be done from inside the passenger compartment or underneath the vehicle.

Before releasing the parking lock, secure the vehicle against rolling away.

In the event of a power supply interruption, e.g. flat battery or electrical fault, the parking lock must be manually released, otherwise the wheels will be locked and the vehicle cannot be moved.

Manual emergency release of parking lock from passenger compartment is not possible with GA8HP transmissions for

- F01/F02/F03/F04 GA8HP from production date 09/2010
- F07 GA8HP from production date 03/2010
- F10 / F11 GA8HP as from production date 06/2010

Before removing the underbody panel, always check inside the vehicle to be certain the parking lock emergency release is not fitted.

From the vehicle underbody:

Raise vehicle.

Manual emergency release of parking lock

- Remove **UNDERBODY PROTECTION**
- Screw in screw (1) with hexagon socket (SW5) until parking lock is released by lever (2).
- It is **imperative** that bolt is always replaced.
- Clean thread with screw tap size M6X1, 0.

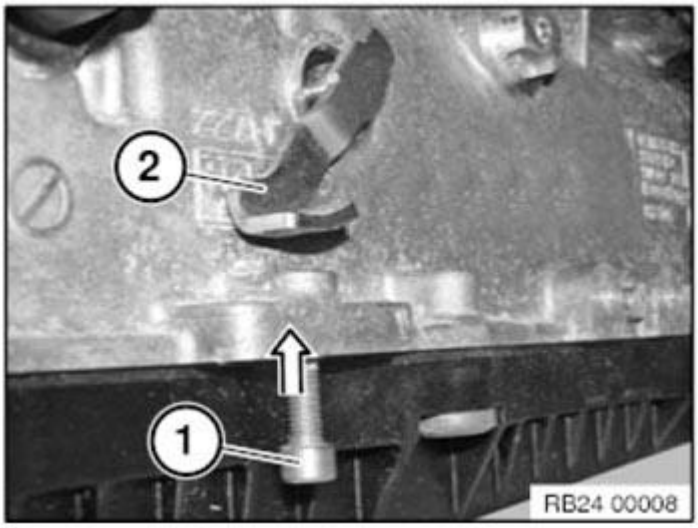


Fig. 54: Identifying Parking Lock Lever And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Screw new micro-encapsulated screw (1) into thread.

IMPORTANT: Screwing in and adjusting of screw to 1.5 to 2.5 mm above thread lip (A) must occur within 3 minutes.
The screw may no longer be turned after 3 minutes (hardening of adhesive), otherwise it must be replaced.

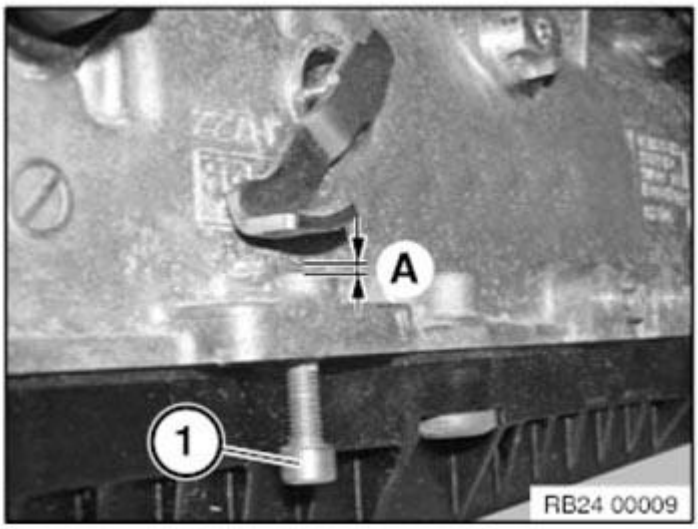


Fig. 55: Identifying Thread Lip
Courtesy of BMW OF NORTH AMERICA, INC.

From passenger compartment:

- Refer to **MANUAL EMERGENCY UNLOCKING OF PARKING LOCK**.

From underneath vehicle with Bowden cable:

- Remove rear **UNDERBODY PROTECTION** .
- Press release lever (3) backwards.

If permanent release is desired, fix lever in position (e.g. with cable strap).

Locking:

- Let go of release lever (3) or undo means by which it is secured.

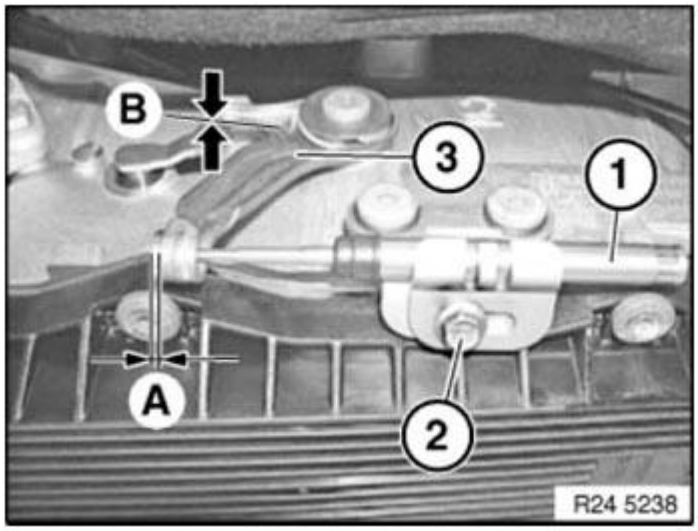


Fig. 56: Pressing Release Lever
Courtesy of BMW OF NORTH AMERICA, INC.

24 34... NOTES ON MECHATRONICS

IMPORTANT:
- **Do not let skin come in contact with transmission oil and do not inhale fuel vapors.**
- **Wear protective gloves.**
- **Ensure adequate ventilation.**

IMPORTANT: After completing work:

- **Load specific data status with the BMW diagnosis system**
- **Check TRANSMISSION OIL LEVEL**
- **Use only approved transmission oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters**

Failure to comply with this requirement will result in serious damage to the automatic transmission!

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Unscrew connector (1) and disconnect.

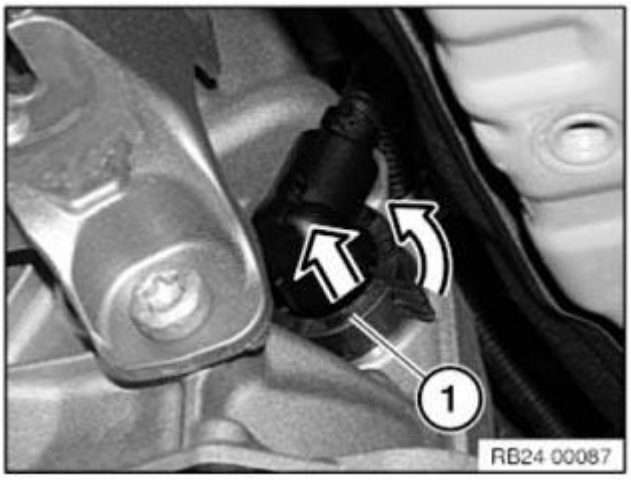


Fig. 57: Disconnecting Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **24 2 390** in sealing sleeve (1).

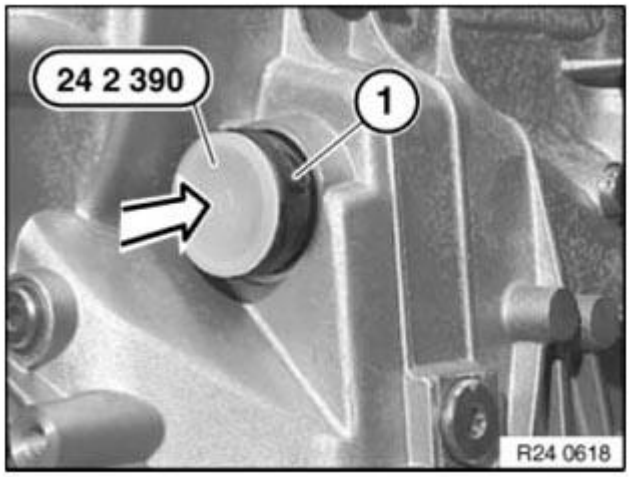


Fig. 58: Inserting Special Tool (24 2 390) In Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

24 34 566 REPLACING MECHATRONICS

IMPORTANT:

- **It is mandatory to avoid skin contact with transmission oil and breathing in transmission oil vapors.**
- **Wear protective gloves.**
- **Ensure adequate ventilation**

NOTE: **After completing work:**

- **Load specific data status with the BMW diagnosis system**

IMPORTANT: After completion of work, CHECK GEARBOX OIL LEVEL .
Use only approved transmission oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters
Failure to comply with this requirement will result in serious damage to the automatic transmission!

IMPORTANT: Read and comply with notes on PROTECTION AGAINST DAMAGE FROM ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove rear **UNDERBODY PROTECTION** .

Remove panels (2).

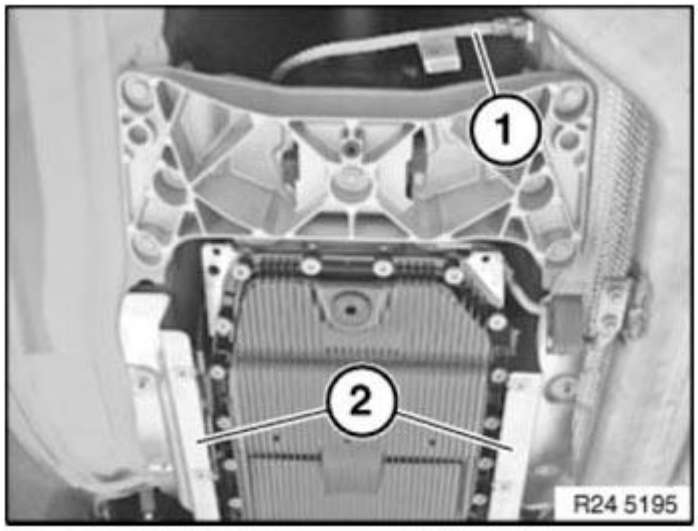


Fig. 59: Identifying Ground Strap And Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Disconnect cable (1).

Installation note:

Adjusting cable:

- Release screw (2).
  Adjust cable by means of holder (2) until distance A > or = 1 mm is obtained

- Tighten down nut

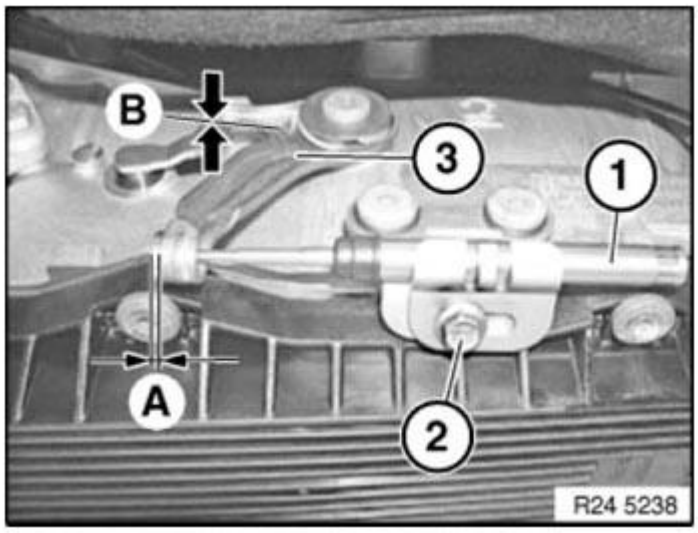


Fig. 60: Pressing Release Lever
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mechatronics can be destroyed by static discharges. Therefore the contacts inside the connector must not be touched. Insert special tool immediately after operation.

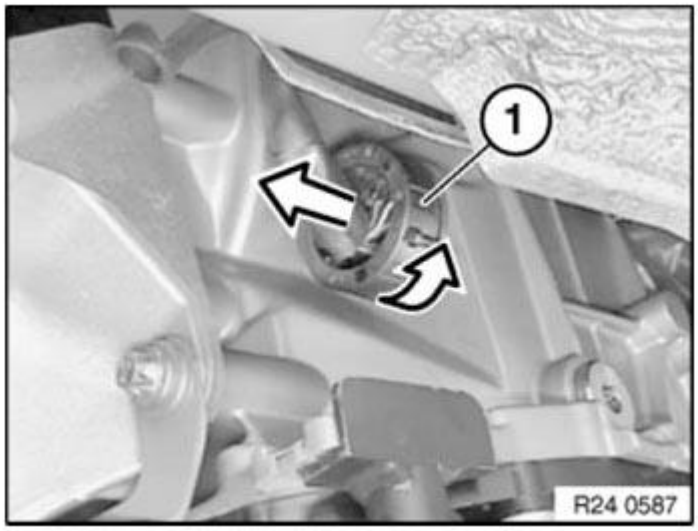


Fig. 61: Disconnecting Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew connector (1) and disconnect.

Insert special tool **24 2 390** in sealing cup (1).

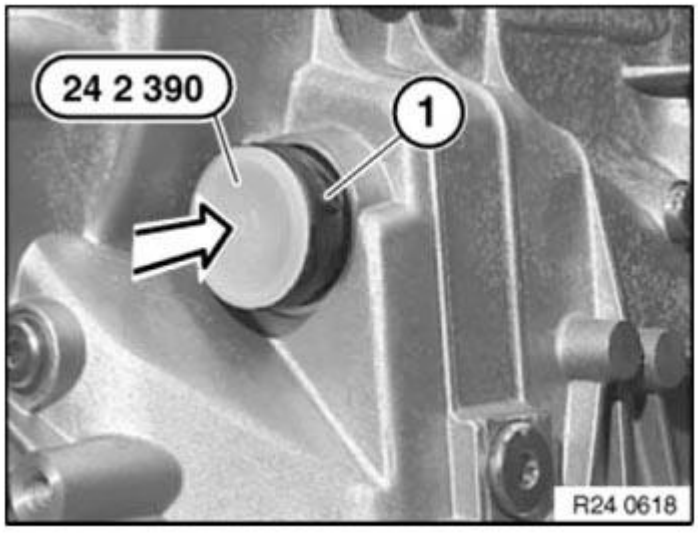


Fig. 62: Inserting Special Tool (24 2 390) In Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TRANSMISSION OIL SUMP**.

Remove oil filter (1).

Replace gasket.

Installation note:

Wet seals with transmission oil.

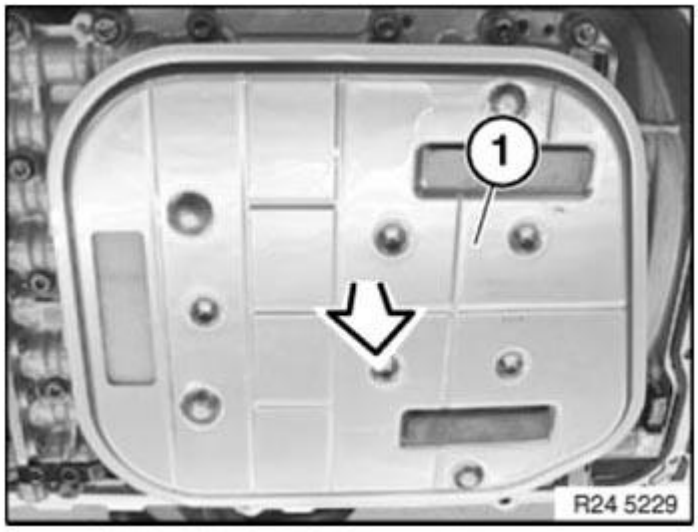


Fig. 63: Removing Gear Oil Filter
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and unlock sealing cup with slide (2).

Tightening torque **24 30 4AZ** .

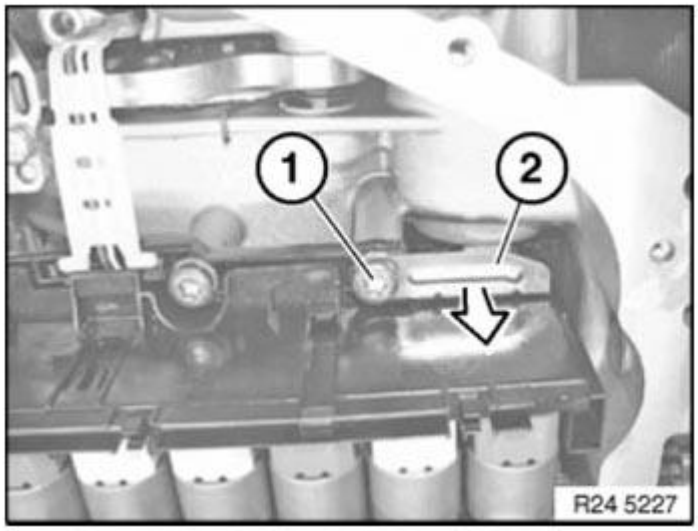


Fig. 64: Removing Sealing Cup
Courtesy of BMW OF NORTH AMERICA, INC.

Note position of sealing cup.

Pull out sealing cup (1).

Installation note:

Fit sealing cup in position (lug on inside). Turn until lug engages in groove of transmission. Slide in sealing cup.

Lug on sealing cup must not be damaged!

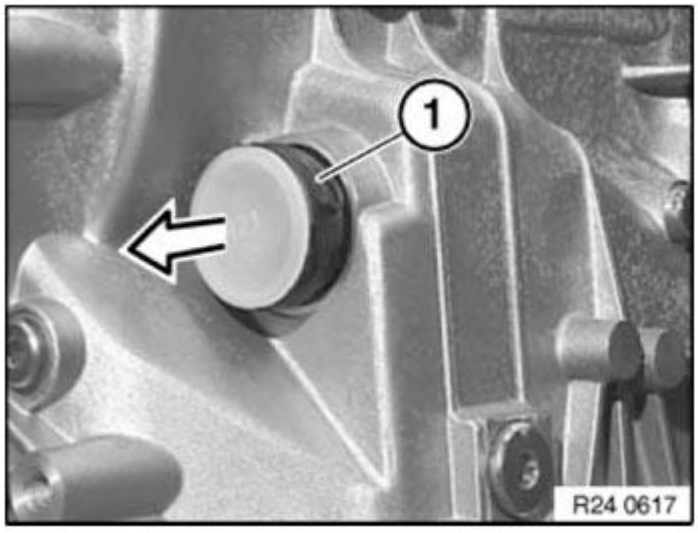


Fig. 65: Pulling Out Sealing Cup
Courtesy of BMW OF NORTH AMERICA, INC.

Release all screws (1 and 2).

- 1 = M6 x 59 mm
- 2 = M6 x 20 mm

Remove mechatronics.

Installation note:

Replace O-rings for oil channels and wet with automatic transmission fluid.

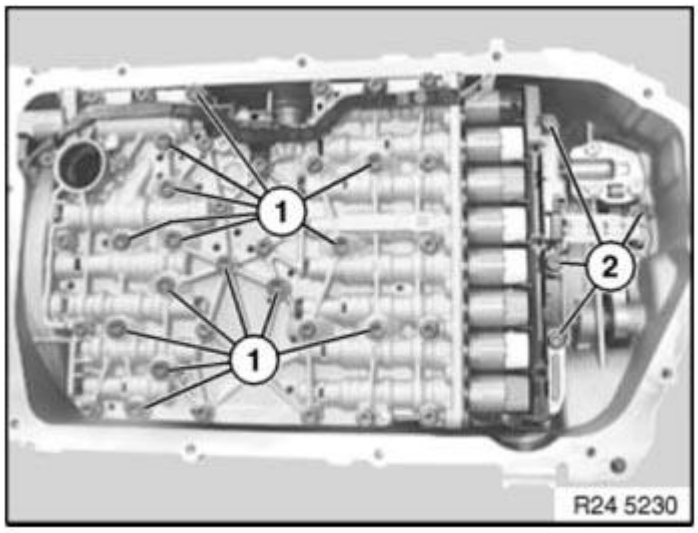


Fig. 66: Identifying Mechatronics Mounting Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check gasket (1) for damage.

Replace the gasket (1) if necessary.

Coat new seal with automatic transmission fluid and install.

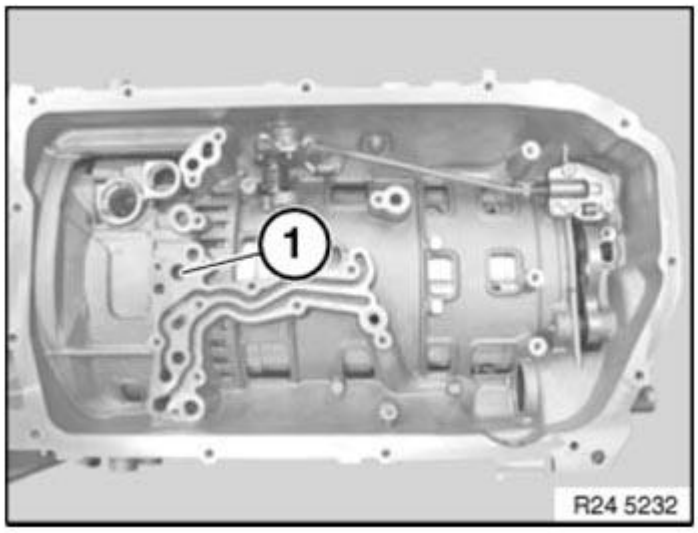
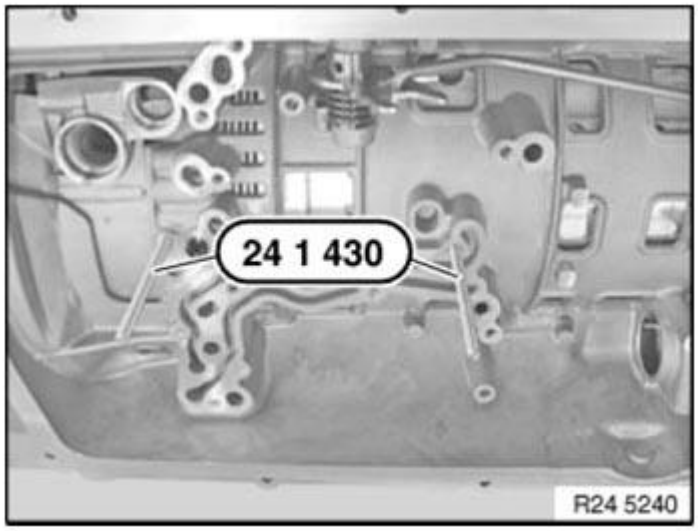


Fig. 67: Identifying Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in retaining pins **24 1 430** at screw position 4 and 9.



Courtesy of BMW OF NORTH AMERICA, INC.

Fit mechatronics unit.

Fit shift claw (2) in gearshift shaft (3) by pressing release lever (1).

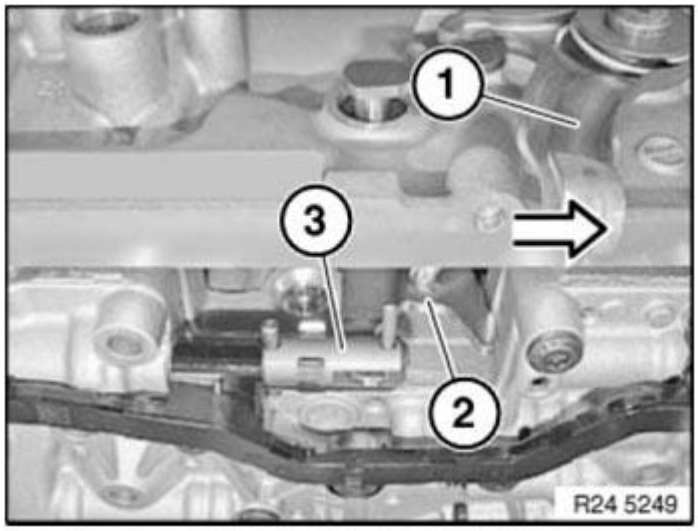


Fig. 69: Pressing Release Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Screw down wing nuts as far as they will go on to the mechatronics unit.

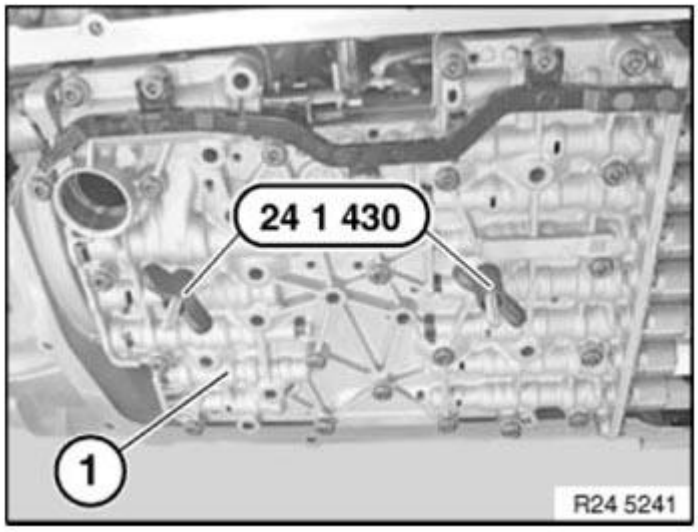


Fig. 70: Installing Mechatronics Unit Wing Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Insert screws until screw heads make contact.

Remove retaining pins and fit remaining screws.

IMPORTANT: Tighten down screws in order 1...18.
Failure to comply with this requirement will result in serious damage to the automatic transmission!
Tightening torque 24 30 4AZ .

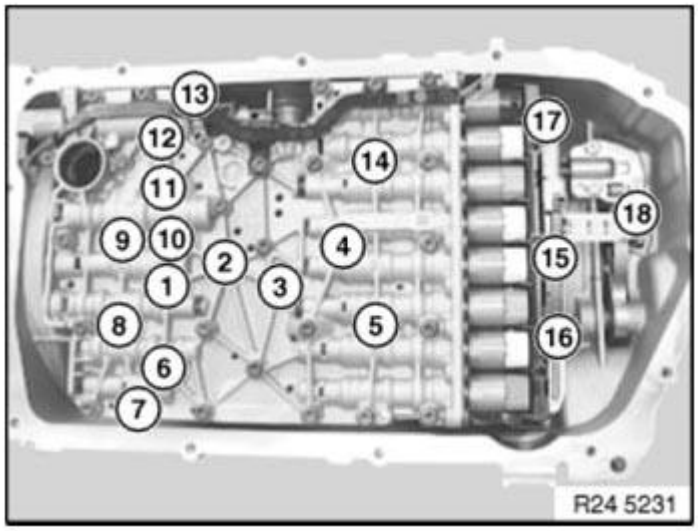


Fig. 71: Identifying Tightening Sequence Of Mechatronics Screws
Courtesy of BMW OF NORTH AMERICA, INC.

24 34 024 REPLACING SEALING SLEEVE FOR TRANSMISSION HOUSING

IMPORTANT:
- **It is imperative to avoid skin contact with transmission oil and inhalation of transmission oil vapors.**
- **Wear protective gloves.**
- **Ensure adequate ventilation.**

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved transmission oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters
Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks:

- Remove rear **UNDERBODY PROTECTION** .
- Remove **TRANSMISSION OIL SUMP**.

- Remove **TRANSMISSION CROSS MEMBER** .

IMPORTANT: Support transmission with workshop jack.

Unlock and disconnect connector (1) by turning.

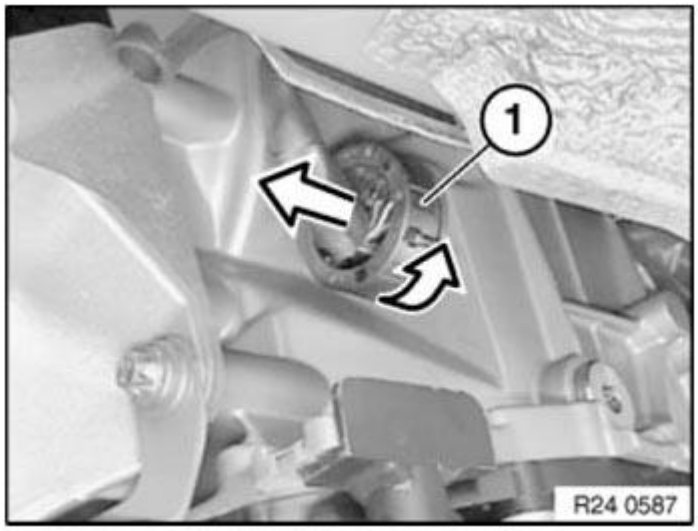


Fig. 72: Disconnecting Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **24 2 390** in sealing sleeve (1).

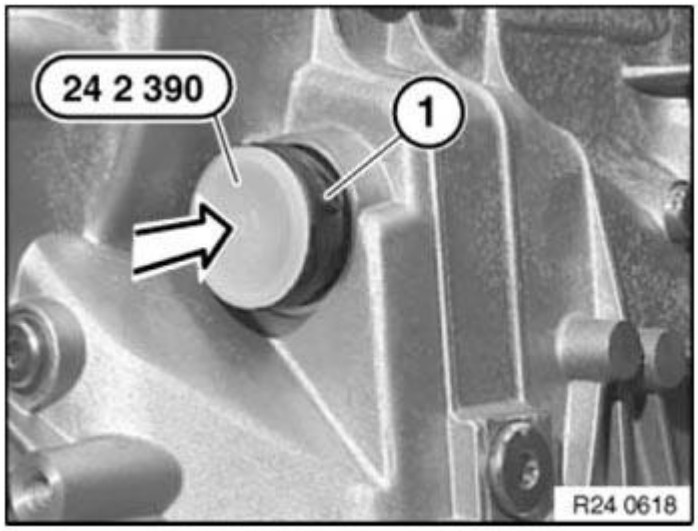


Fig. 73: Inserting Special Tool (24 2 390) In Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and unlock sealing sleeve with slide (2).

Tightening torque **24 30 4AZ** .

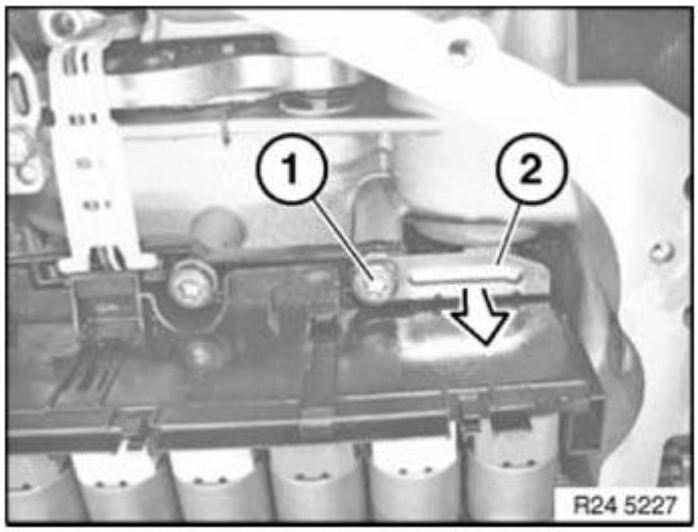


Fig. 74: Disconnecting Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Make a note of installation position of sealing sleeve.

Pull out sealing sleeve (1).

Installation note:

Fit sealing sleeve in position (lug on inner surface). Turn until lug engages in groove of transmission. Slide in sealing sleeve.

Lug on sealing sleeve must not be damaged!

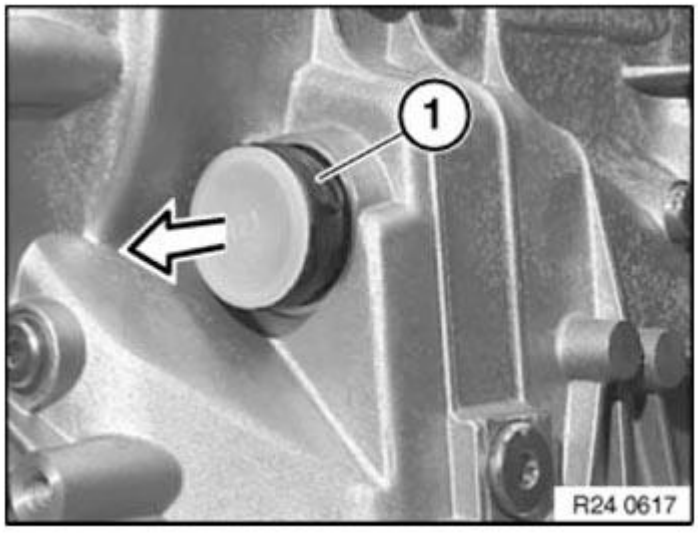


Fig. 75: Pulling Out Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

24 34... UNLOCK TRANSMISSION LOCK ELECTRONICALLY

For various tasks, it is necessary to unlock and lock the parking lock.

Before releasing the parking lock, secure the vehicle against rolling away.

- The emergency release is only possible if the engine does **not** start and the starter is turning.
- If the emergency release must be activated although the engine starts, the fuse for the electrical fuel pump may be pulled.
- The emergency release is active for 15 minutes.
- As soon as a wheel speed signal is recorded, this period will be extended by another 15 minutes.
- After this period of time, the parking lock will be engaged without message.
- The chronological information depends on the battery capacity.
- Only specially trained service personnel are permitted to operate both the mechanical as well as the electrical emergency transmission release system. See **MANUALLY RELEASING PARKING LOCK (FROM VEHICLE UNDERBODY)** or **MANUAL EMERGENCY RELEASE OF TRANSMISSION LOCK**.
- The vehicle must be raised and the underbody panelling removed in order to operate the mechanical emergency transmission release.

IMPORTANT: To operate the electronic emergency transmission release the vehicle must not be towed but rather only pushed.
In the case of misuse, a corresponding fault is entered in the fault memory.

Unlock transmission lock electronically

- Switch the ignition on.
- Apply the brake pedal and hold it down during the entire procedure.
- Press START-STOP button.
- As soon as the starter can be heard to operate (this may take several seconds on diesel engines or at low temperatures).
- Press and hold down the release button (1)



Fig. 76: Identifying Release Button
Courtesy of BMW OF NORTH AMERICA, INC.

1. The specified time must necessarily be complied with!
2. Push selector lever (2) forward up to point of resistance and hold for 2 seconds.
3. Release the selector lever and quickly move it forward by another level again.



Fig. 77: Caution For Shifting Selector Lever
Courtesy of BMW OF NORTH AMERICA, INC.

- Gear position N is shown in the instrument panel.
- The parking lock is now electronically unlocked.
- Release the brake pedal after the parking lock has been successfully unlocked.
- Leave the ignition switched on in order to subsequently move the vehicle.
- The transmission automatically shifts into P when the ignition is turned off.



Fig. 78: Display - Instrument Panel Neutral Positions
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the Start-Stop button is pressed again, the parking lock will be reactivated without message.
If the gearbox cannot be released, turn the ignition off and on again and repeat the previous steps.
Allow the starter to cool down for approx. 10 minutes after unsuccessful attempts.

TORQUE CONVERTER

24 40 011 REMOVING AND INSTALLING/REPLACING TORQUE CONVERTER

IMPORTANT:

- **It is imperative to avoid skin contact with transmission oil and inhalation of transmission oil vapors.**
- **Wear protective gloves.**
- **Ensure adequate ventilation.**

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved transmission oil: ATF oil Shell L12108 ; BMW part number 83 22 2 152 426 ; 20 liters
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove **AUTOMATIC TRANSMISSION**.

Fit special tool **24 1 440** in torque converter.

Remove torque converter.

NOTE: When torque converter is removed, transmission oil flows out.
Place torque converter vertically.

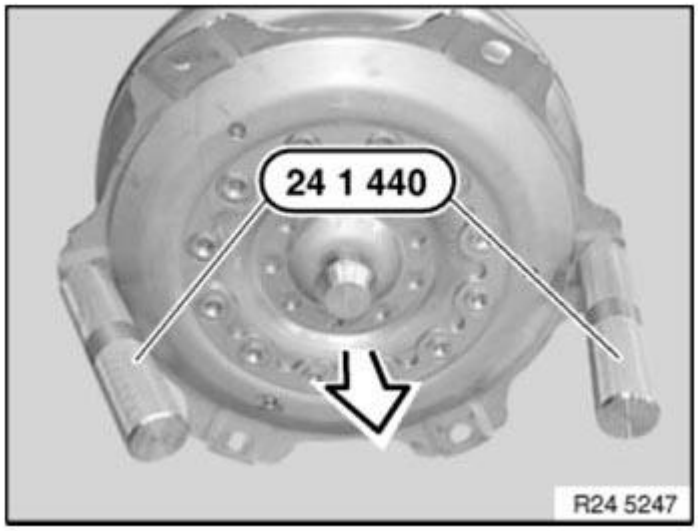


Fig. 79: Removing Torque Converter Using Special Tool (24 1 440)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

When installing, do not damage shaft seal and bearing.

If the torque converter is not correctly installed, the driver of the pump impeller may be damaged when the transmission is flanged to the engine.

Installation note:

Push torque converter through shaft seal onto transmission shaft as far as it will go.

Press torque converter by hand into converter housing and turn in the process. Converter hub recess must snap into place in driver of pump impeller. Torque converter must be felt to slip inwards.

Determine dimension between contact surface (1) and outer edge (2) of bore hole in torque converter with special tool **00 2 550** .

NOTE: The measured value must be > or = 25 mm.

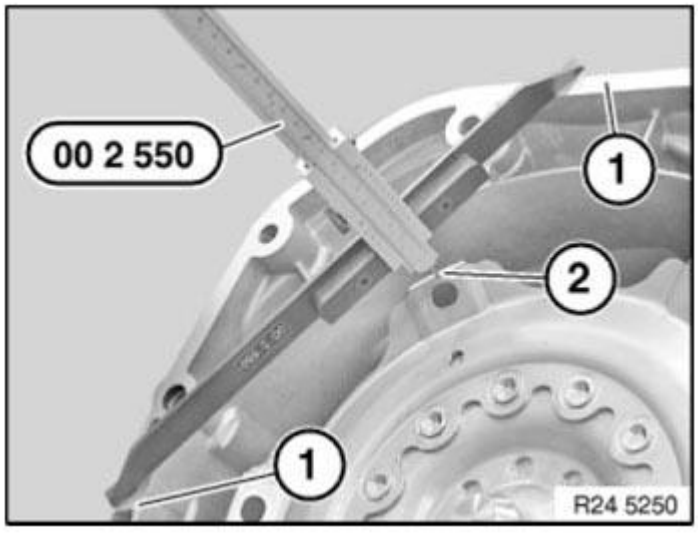


Fig. 80: Measuring Dimension Between Contact Surface And Outer Edge Of Bore Hole In Torque Converter Using Special Tool (00 2 550)
Courtesy of BMW OF NORTH AMERICA, INC.

GEARSHIFT

24 50 021 REPLACING EMERGENCY RELEASE

The emergency release is discontinued for GA8HP transmissions:

- F01/F02/F03/F04 GA8HP from production date 09/2010
- F07 GA8HP from production date 03/2010

Necessary preliminary tasks:

- Remove **CENTRE CONSOLE** .
- Remove rear **UNDERBODY PROTECTION** .
- Remove left retaining plate from underbody protection
- Support transmission with lifter.
- Remove **TRANSMISSION CROSS MEMBER** .
- Remove transmission support block.

Release screw (2).

Remove cable (1).

Installation note:

Adjust **GEARSHIFT LEVER**.

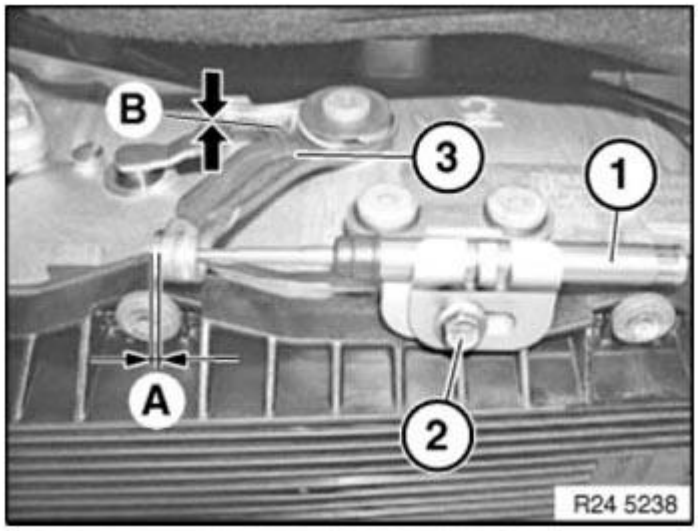


Fig. 81: Pressing Release Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **24 51 2AZ** .

Release cable from pipe clamp (2).

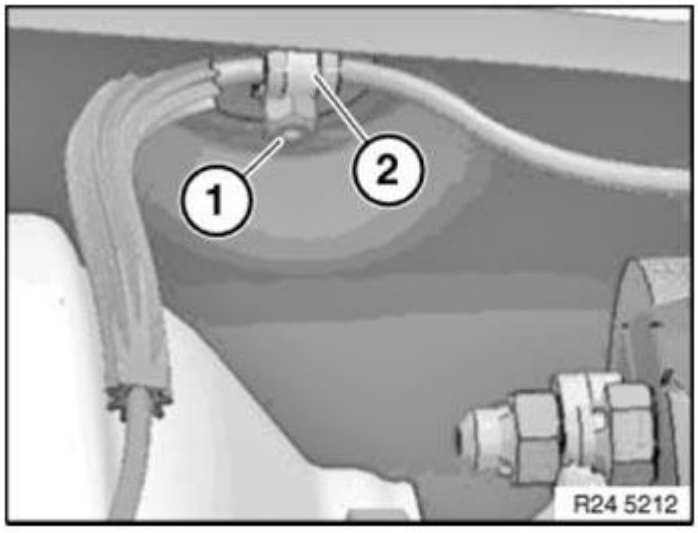


Fig. 82: Identifying Pipe Clamp And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE:

- **Reinstall transmission support bracket and transmission cross member**
- **Lower vehicle**

Unscrew nuts (1).

Remove the emergency release (2) upwards.

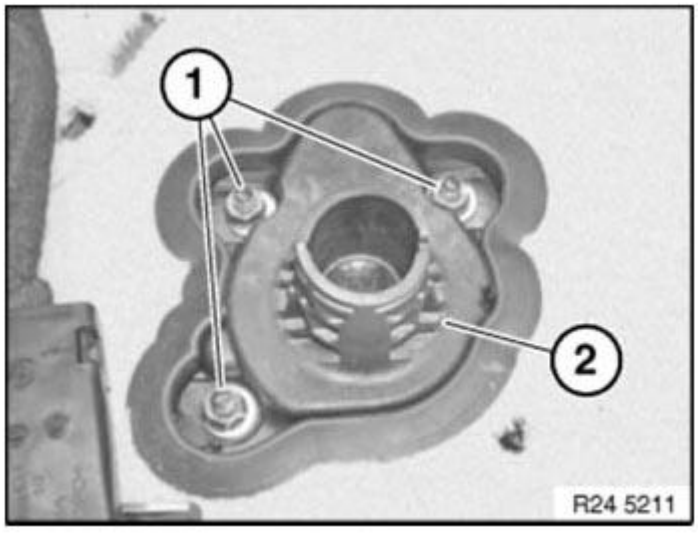


Fig. 83: Identifying Emergency Release And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE

Cooling System

COOLANT, CHECKING COOLING SYSTEM

17 00 009 CHECKING WATERTIGHTNESS OF COOLING SYSTEM (N63 B40/B44 O 1, N74)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

Protective measures/rules of conduct

- Wear safety goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of skidding due to coolant on the floor.

Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

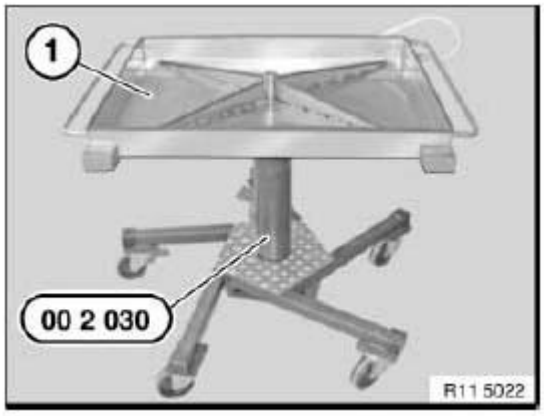


Fig. 1: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open the sealing cap on the coolant expansion tank. Fit special tools (1) **17 0 101** and (2) **17 0 113** .

Build up **GAUGE PRESSURE** and wait approx. 2 minutes.

Cooling system is impervious to watertightness if pressure drop is max. 0.1 bar.

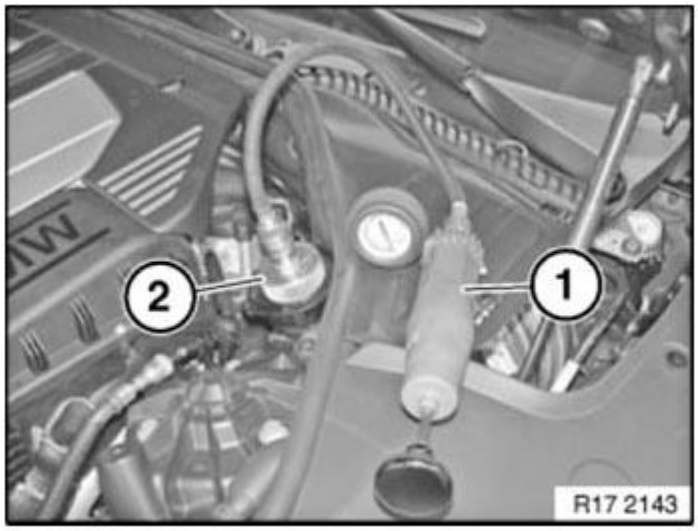


Fig. 2: Checking Cooling System Pressure Drop Using Special Tools (17 0 101 And 17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in sealing cap

NOTE: While driving the vehicle at high outside temperatures, depending on the design, the pressure relief valve in the sealing cap can open slightly and air, together with dissolved coolant, can escape. This coolant vapor condenses on the surface of the expansion tank and leaves traces of coolant when the vehicle has cooled down. These coolant traces do not indicate whether the cap is defective or not. When the vehicle has been parked up for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the sealing cap to stick; therefore check the sealing cap again 2 to 3 times.

Replace the sealing cap only after you have checked three times and there is an incorrect opening pressure .

Checking pressure relief valve in sealing cap

Screw sealing cap (1) onto special tool **17 0 114** .

Build up pressure with special tool (hand pump) **17 0 101** ; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

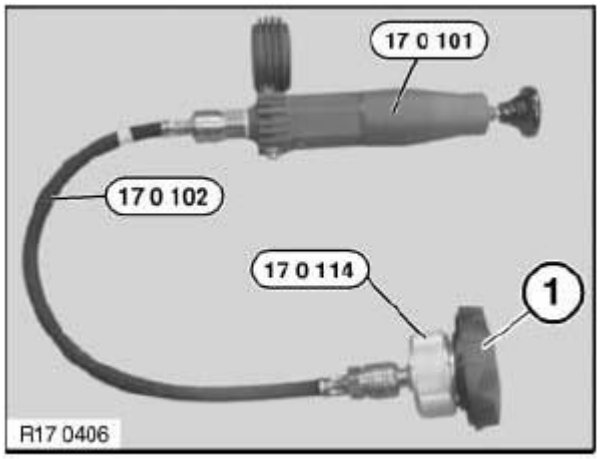


Fig. 3: Checking Sealing Cap Pressure Relief Valve Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

17 00 005 DRAINING AND ADDING COOLANT (N74)

WARNING: Risk of scalding!
The repair work on the cooling system should only be carried out on an engine that has cooled down!

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

Installation note:

Use only recommended **COOLANT** .

Observe mixture ratio: 50% antifreeze and 50% water. In severely cold areas, the antifreeze can be increased to 60% which provides freezing protection down to-62°F (-52°C). Do not exceed a 60% ratio of antifreeze.

Protective measures/rules of conduct

- Wear safety goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: For dirt contamination of the cooling system (e.g. by engine oil), the cooling system must be rinsed with water until all dirt contamination is removed!

IMPORTANT: Risk of skidding due to coolant on the floor.

Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

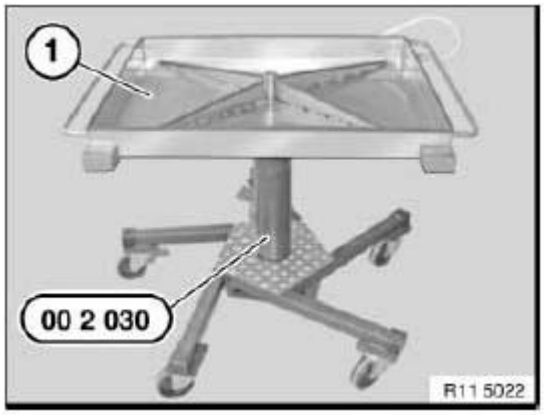


Fig. 4: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks

- Remove **STIFFENING PLATE**

Draining coolant

Loosen the sealing cap at the coolant filler neck.

Installation note:

Close the sealing cap (1) until the arrows line up.

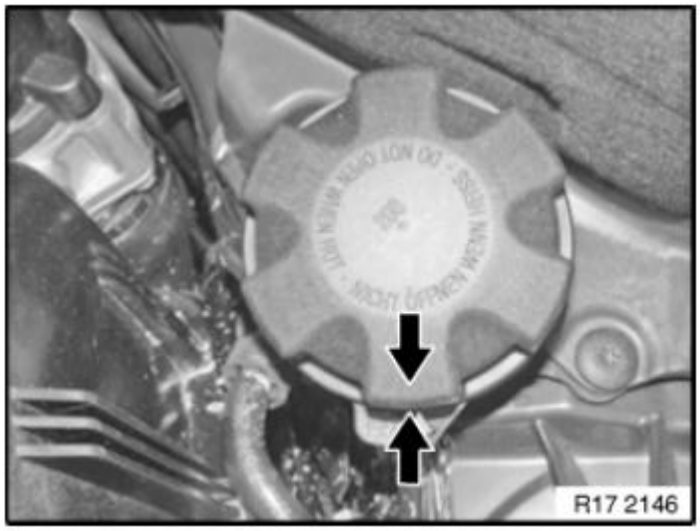


Fig. 5: Identifying Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach coolant hose (1) from radiator.

Drain, catch and dispose of coolant.

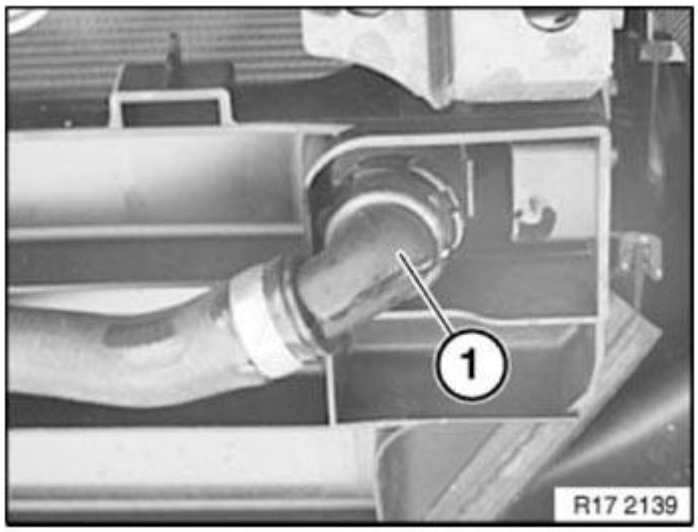


Fig. 6: Identifying Radiator Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant

Use only recommended **COOLANT** .

Observe mixture ratio: 50% antifreeze and 50% water. In severely cold areas, the antifreeze can be increased to 60% which provides freezing protection down to-62°F (-52°C). Do not exceed a 60% ratio of antifreeze.

Observe **FILLING CAPACITIES** .

Fill and vent **COOLING SYSTEM**.

Observe bleeding instructions without fail .

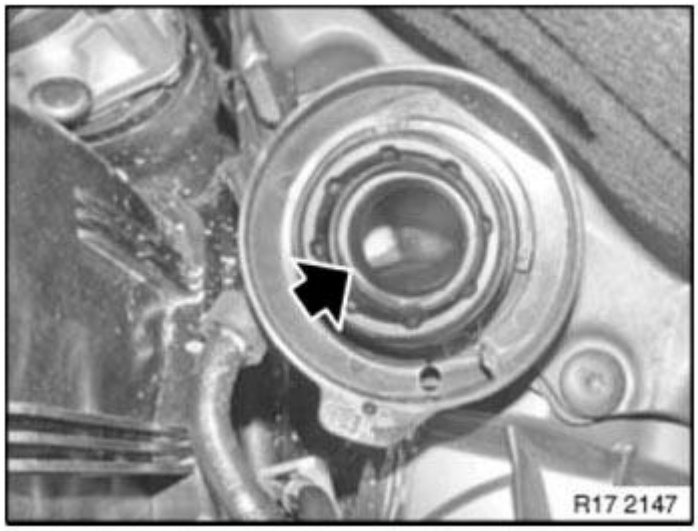


Fig. 7: Identifying Cooling System Vent
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Visual inspection of cooling system for tightness.

17 00... INSTRUCTIONS FOR REPAIR WORK ON COOLING SYSTEM

WARNING: Risk of scalding. Only carry out repair work on the cooling system after the engine has cooled down.

IMPORTANT: Wear protective gloves and safety goggles.

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant.
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: Open cooling system only when it has cooled down.
Opening the cooling system while hot can result in air entering the system.
This can cause overheating with permanent damage to the engine.

IMPORTANT: You must protect the alternator against dirt contamination before carrying out any repair work on the cooling circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Do not fill coolant expansion tank over MAX level as overfilling will cause the coolant to overflow. This may give rise to traces of coolant on the expansion tank or in the engine compartment and wrongly suggest possible leaks.

Recycling

Catch and dispose of drained coolant.

Observe country-specific waste disposal regulations.

NOTE: To disconnect coolant hoses, use commercially available disconnect tools such as HAZET brand tools (see table below).

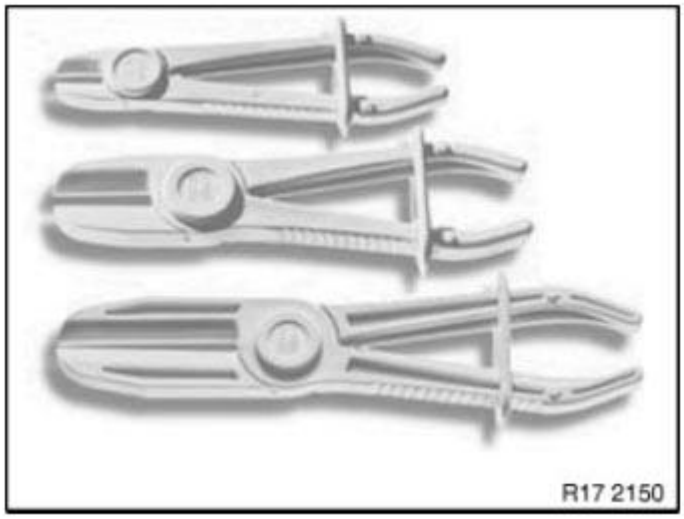


Fig. 8: Identifying Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

HAZET no.:	Designation
4590-1	Disconnect-pliers, length (mm): 150
4590-2	Disconnect-pliers, length (mm): 180
4590-3	Disconnect-pliers, length (mm): 253

4590 / 2	Disconnect-plier set
4590 / 3	Disconnect-plier set

NOTE: Tightening torque for hose clamps

WAF 5	1.0 - 1.5 Nm
WAF 6	2.5 - 3.5 Nm

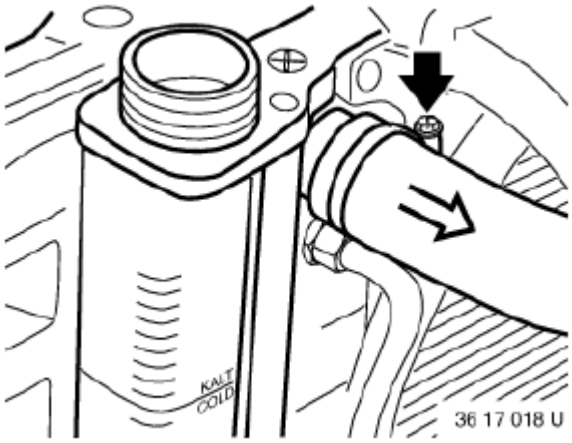


Fig. 9: Locating Hose Clamp Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Instructions for dismantling/assembly of coolant hose quick-release couplings

Dismantling of quick-release coupling

Pull out lock (1) and (2). Pull off hose.

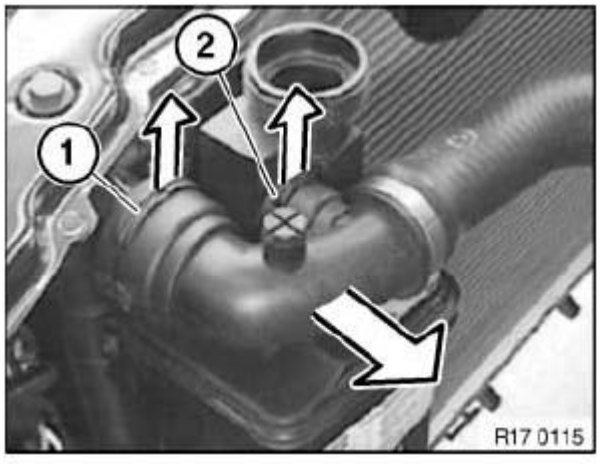


Fig. 10: Releasing Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note

Check O-rings (1).

Do not coat O-rings (1) with lubricant.

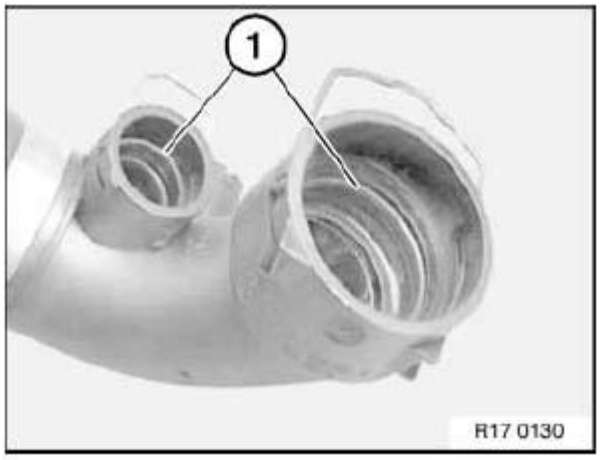


Fig. 11: Identifying O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly of quick-release coupling

Press in lock (1) before installing quick-release coupling.

Push on hose.

Quick-release couplings must clearly snap audibly into place.

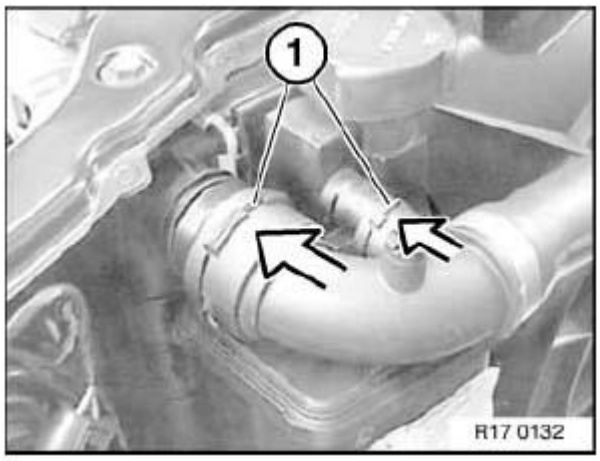


Fig. 12: Installing Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles .

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

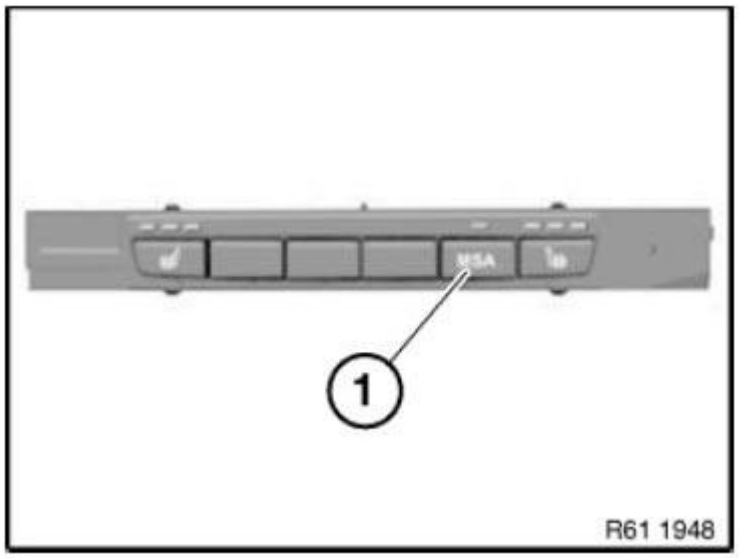


Fig. 13: Identifying MSA Function Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

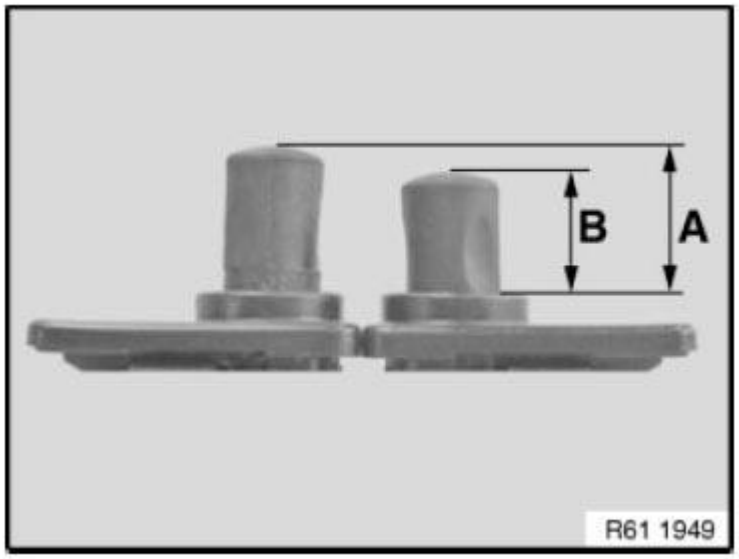


Fig. 14: Identifying Engine Hood/Bonnet Workshop Mode And Basic Setting Length
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

17 00 039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT (N74)

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant when carrying out repair work on the cooling circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue

- No.- 81 39 2 152 473

IMPORTANT: Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

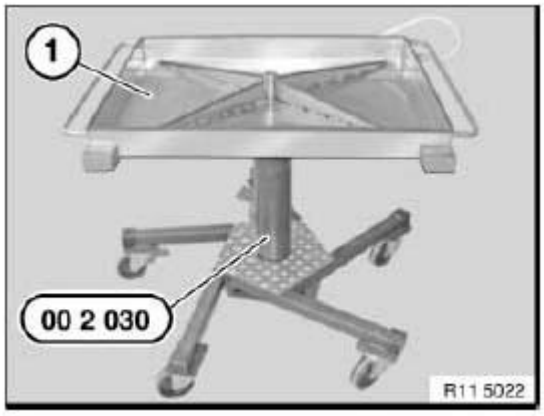


Fig. 15: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Illustration shows N63, procedure for N74 engine is identical.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.
If necessary, replace damaged and porous coolant hoses.

Vacuum filling unit consists of

- 1) Filling unit with vacuum meter and shutoff valves
- 2) Filler hose
- 3) Coolant tank
- 4) Venturi air vent
- 5) Compressed air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting vessel)

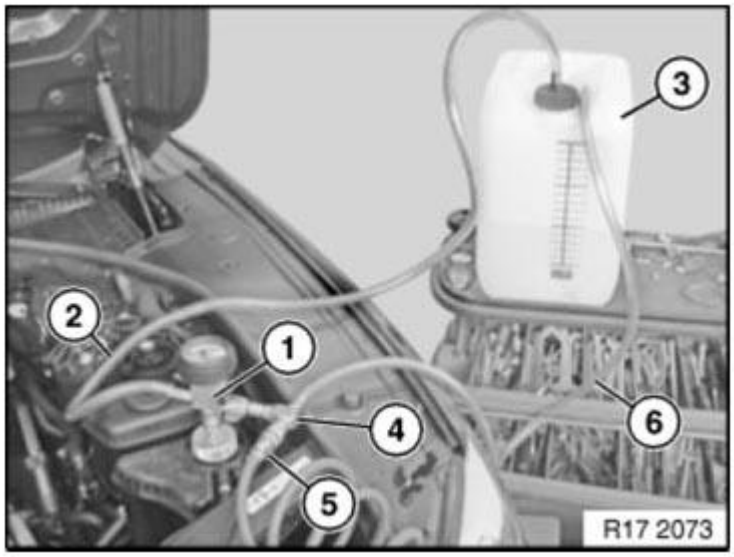


Fig. 16: Identifying Vacuum Filling Unit Components
Courtesy of BMW OF NORTH AMERICA, INC.

Prerequisites

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
  - Use only recommended **COOLANT** .
  - Observe mixture ratio: 50% antifreeze and 50% water. In severely cold areas, the antifreeze can be increased to 60% which provides freezing protection down to-62°F (-52°C). Do not exceed a 60% ratio of antifreeze.
  - Observe **FILLING CAPACITIES** .
- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed air connection with 6 bar pressure present.
- Set heating to maximum temperature.

Use

Connect filling unit (1) with adapter (2) **17 0 113** to coolant expansion tank.

Shutoff valves (A) and (B) must be closed.

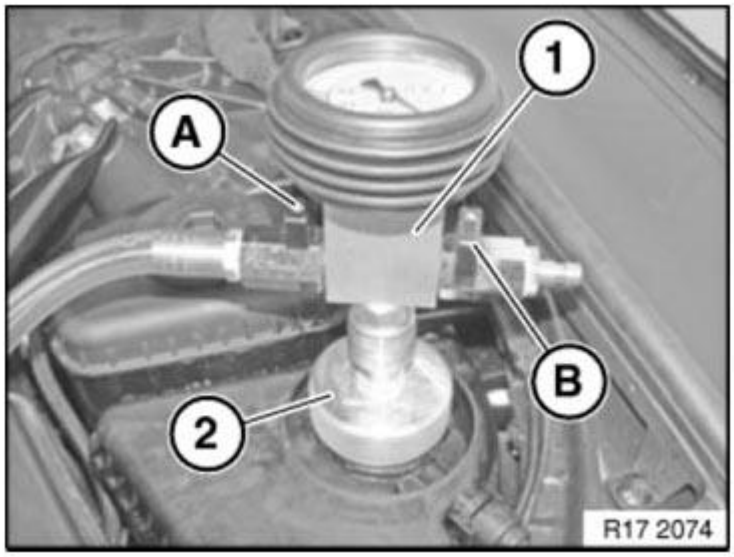


Fig. 17: Connecting Filling Unit To Coolant Expansion Tank Using Adapter (17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

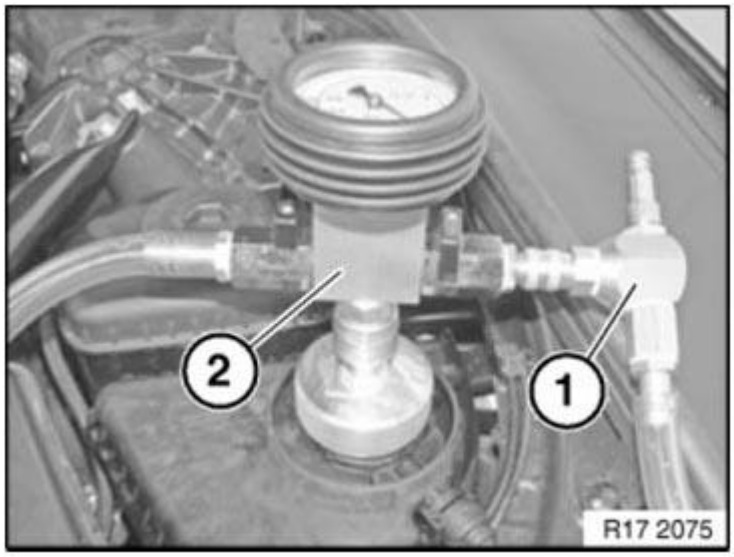


Fig. 18: Identifying Venturi Nozzle And Filling Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1) and open shutoff valve (B).

The venturi nozzle produces a flow noise.

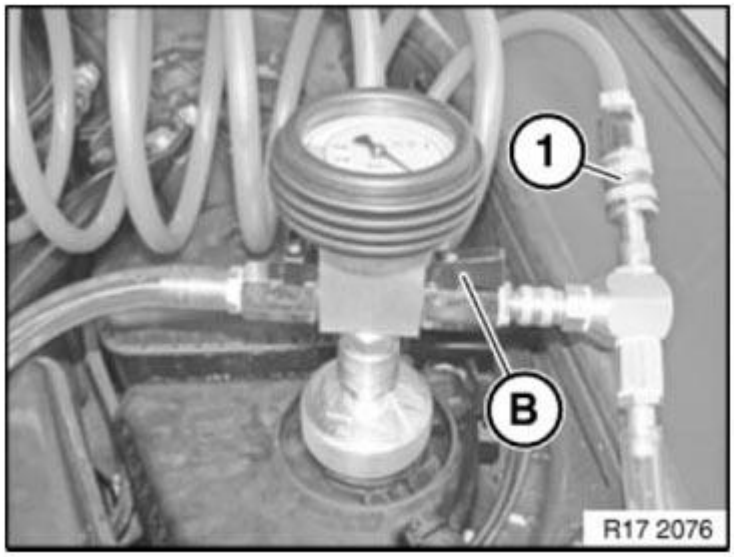


Fig. 19: Identifying Compressed Air Hose And Shutoff Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shutoff valve (A) until the filling hose (1) is free of bubbles. Close shutoff valve (A) again. The filling hose (1) is vented in this way.

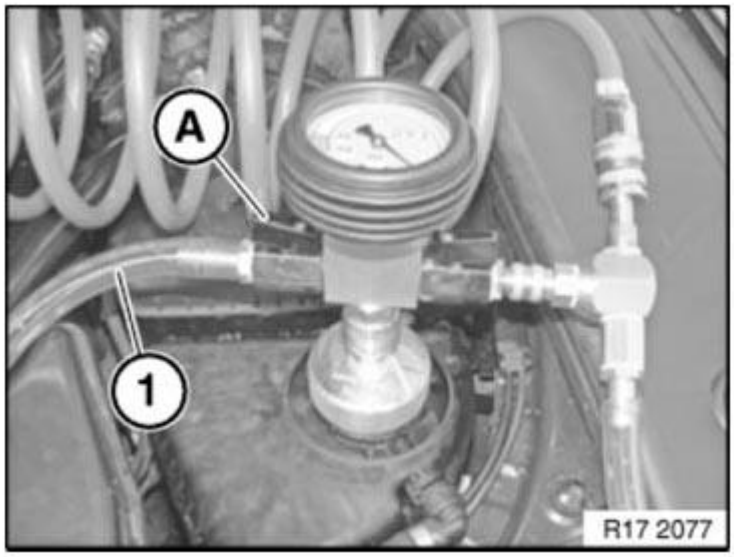


Fig. 20: Identifying Shutoff Valve And Filling Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Shutoff valve (B) remains open (approx. 1 min). Generate vacuum in cooling circuit. The end vacuum is reached at a vacuum of -0.7 to - 0.95 bar. Green scale on the vacuum meter.

NOTE: The coolant hoses contract during vacuum buildup.

Then close shutoff valve (B) again.

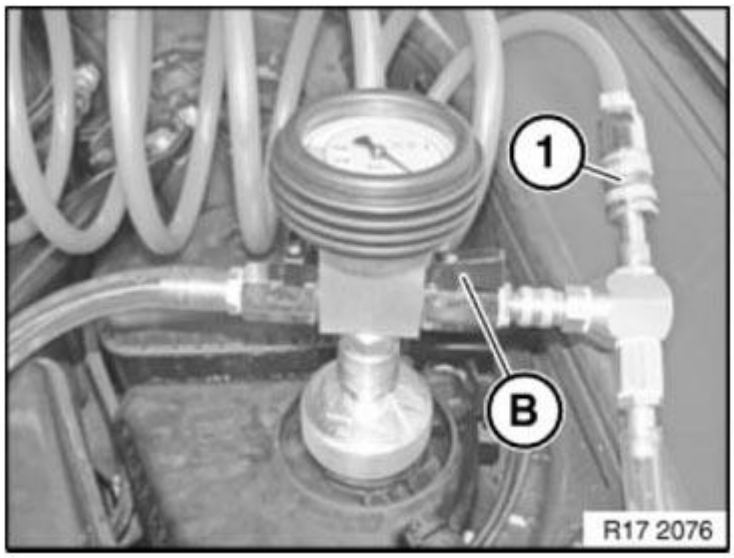


Fig. 21: Identifying Compressed Air Hose And Shutoff Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Both shutoff valves (A) and (B) must be closed. Then seal Venturi nozzle (1).

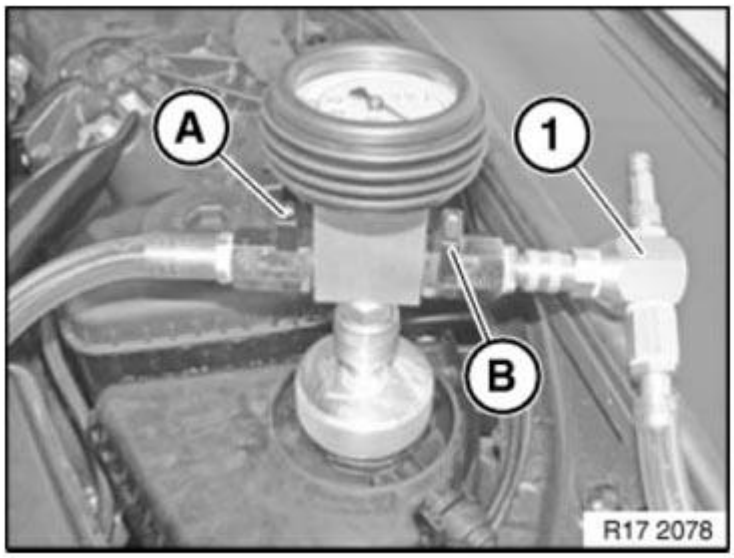


Fig. 22: Identifying Shutoff Valves And Venturi Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must hold the vacuum for 30 s. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In the event of leaks, check **COOLING SYSTEM FOR LEAKS**.

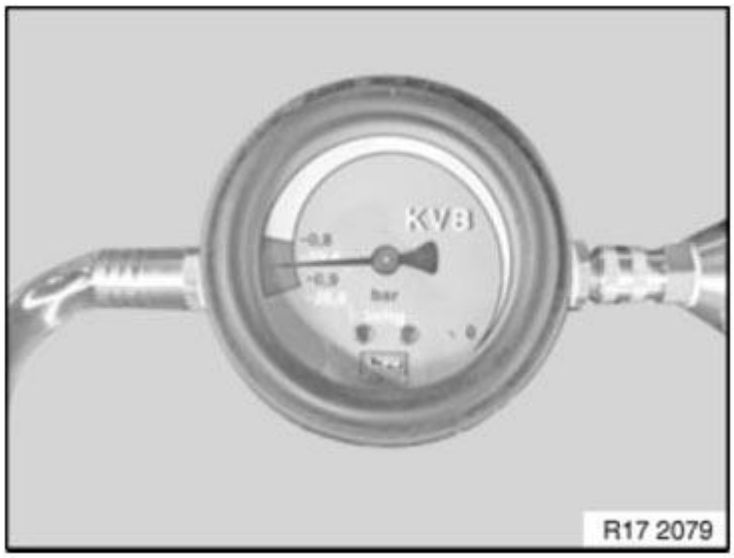


Fig. 23: Checking Cooling System Leaks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently PREMIXED COOLANT in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
Position the filling unit container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shutoff valve (A) to filling unit container.

Coolant is now added.

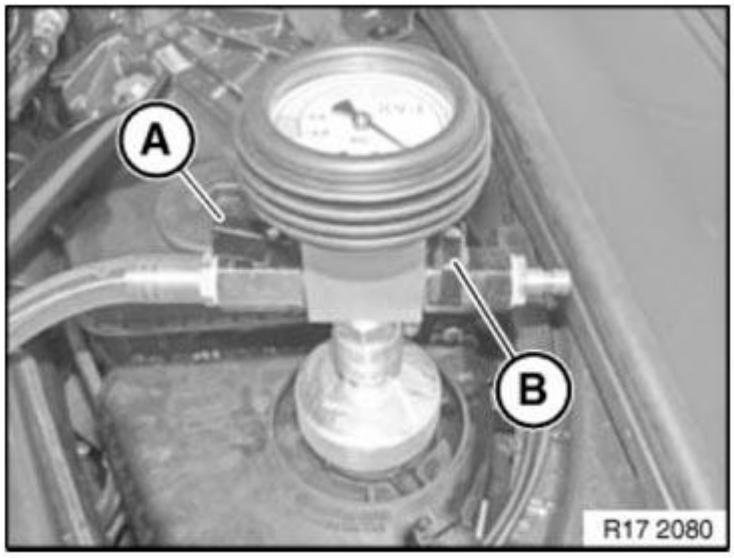


Fig. 24: Identifying Shut-Off Valve (A And B)
Courtesy of BMW OF NORTH AMERICA, INC.

The filling procedure is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

If necessary, reduce remaining vacuum. Open shutoff valve (B) to do so.

Remove filling unit with adapter from expansion tank.

After the cooling system has been filled with the vacuum filling unit, another bleeding procedure must be performed!

Bleeding procedure for vehicles up to 03/2010 (heating pump in heater feed hose) .

1. Add coolant up to top edge of the coolant filler neck. Coolant level must not drop any further (no drop in coolant for approx. 1 minute).
2. Connect the battery charger and switch on the ignition.
3. Set heater to maximum temperature. Press Automatic button (if present) and turn blower down to lowest stage (for a minimum period of 5 minutes).
4. Check coolant level and add coolant, if necessary.
5. After switching off the heating pump, set the heating to min. temperature and switch off the blower.
6. Check cooling system for leaks.
7. Close coolant filler neck.
8. Start engine and run for approx. 1 min in high idle; to do so, switch on the air conditioning.
9. Afterwards, press on accelerator three times for 5 seconds each to approximately 4, 000 RPM. Then leave the vehicle in idle for another approx. 5 minutes.
10. Warm up the engine and activate the map thermostat through the diagnosis system.
11. When the engine has cooled off, check the coolant level and adjust it to approx. 110 mm to 160 mm

below the upper edge of the coolant filler neck (described further below in these instructions).

Bleeding procedure for vehicles from 03/2010 (heating pump in heater return hose) .

1. Add coolant up to upper edge of coolant filler neck. Coolant must not drop any further (no drop in coolant for approx. 1 minute.)
2. Connect the battery charger and switch on the ignition.
3. Check coolant level and add coolant, if necessary.
4. Check cooling system for leaks.
5. Close coolant filler neck.
6. Set heater to maximum temperature. Press Automatic button (if present) and turn blower down to lowest stage (for a minimum period of 5 minutes).
7. Start engine and run at increased idle for approximately 1 minute.
8. During this period of time, press on accelerator three times for 5 seconds each to approximately 4000 RPM. Then leave the vehicle in idle for another approx. 5 minutes.
9. Warm up the engine and activate the map thermostat through the diagnosis system.
10. When the engine has cooled off, check the coolant level and adjust it to approx. 110 mm to 160 mm below the upper edge of the coolant filler neck (described further below in these instructions).

When the engine has cooled off, check the coolant level and adjust it to approx. 110 mm to 160 mm below the upper edge of the coolant filler neck (described further below in these instructions). Use a tape measure where appropriate.

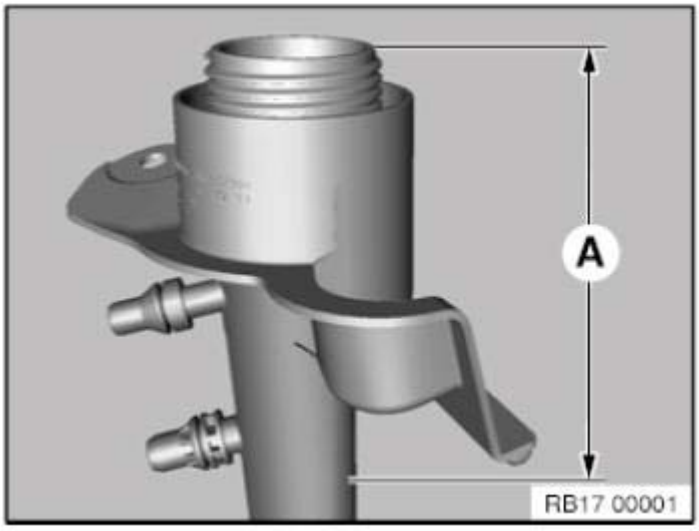


Fig. 25: Identifying Coolant Level Adjustment Length
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation note:

Close the sealing cap (1) until the arrows line up.

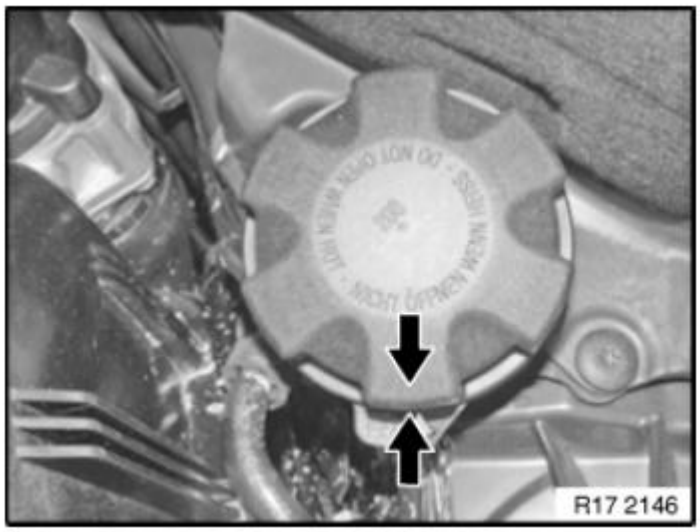


Fig. 26: Identifying Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of cooling system.

Check **COOLING SYSTEM FOR LEAKS**.

17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR WATERTIGHTNESS (N74)

WARNING: Risk of scalding!
Open sealing cap only after engine has cooled down.

IMPORTANT: You must protect the alternator against contamination before carrying out any repair work on the cooling circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Electric coolant pump!
FOLLOW NOTES FOR CARRYING OUT REPAIR WORK ON THE COOLING SYSTEM.

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of part quantities of

coolant, replace these quantities which have been drained with new coolant.

Only when refilling!

Use only recommended **COOLANT** .

Observe mixture ratio: 50% antifreeze and 50% water. In severely cold areas, the antifreeze can be increased to 60% which provides freezing protection down to-62°F (-52°C). Do not exceed a 60% ratio of antifreeze.

Perform filling operation slowly.

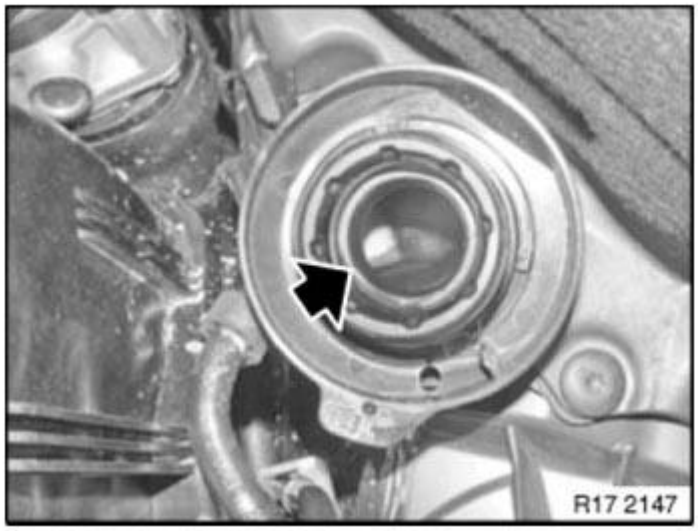


Fig. 27: Identifying Cooling System Vent
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following bleeding procedure is necessary when a part is replaced in the cooling system or when the cooling system is refilled.

Adding coolant

Cooling system must be filled with a **VACUUM FILLING UNIT** only!

Use only recommended **COOLANT** .

Observe mixture ratio: 50% antifreeze and 50% water. In severely cold areas, the antifreeze can be increased to 60% which provides freezing protection down to-62°F (-52°C). Do not exceed a 60% ratio of antifreeze.

Observe **FILLING CAPACITIES** .

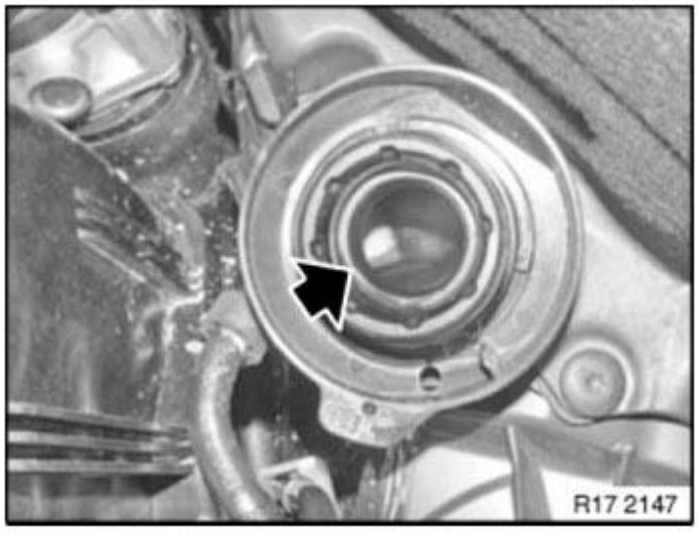


Fig. 28: Identifying Cooling System Vent
Courtesy of BMW OF NORTH AMERICA, INC.

Venting cooling system

Bleeding procedure for vehicles up to 03/2010 (heating pump in heater feed hose) .

1. Add coolant up to top edge of the coolant filler neck. Coolant level must not drop any further (no drop in coolant for approx. 1 minute).
2. Connect the battery charger and switch on the ignition.
3. Driving experience switch must not be set to ECO PRO!
4. Set heater to maximum temperature. Press Automatic button (if present) and turn blower down to lowest stage (for a minimum period of 5 minutes).
5. Check coolant level and add coolant if necessary.
6. After switching off the heating pump, set the heating to min. temperature and switch off the blower.
7. Check cooling system for tightness.
8. Close off the coolant filler neck.
9. Switch on air conditioning.
10. Start engine and run at increased idle for approximately 1 minute.
11. Then press on the accelerator three times for 5 seconds each to approximately 4000 RPM. Then let the vehicle idle for about 5 minutes.
12. Warm up engine and activate map thermostat via diagnosis system.
13. When the engine has cooled off, check the coolant level and adjust it to approx. 110 mm to 160 mm below the upper edge of the coolant filler neck (described further below in these instructions).

Bleeding procedure for vehicles from 03/2010 (heating pump in heater return hose) .

1. Add coolant up to top edge of the coolant filler neck. Coolant level must not drop any further (no drop in

coolant for approx. 1 minute).

2. Connect the battery charger and switch on the ignition.
3. Driving experience switch must not be set to ECO PRO!
4. Check coolant level and add coolant if necessary.
5. Check cooling system for tightness.
6. Close off the coolant filler neck.
7. Set heater to maximum temperature. Press Automatic button (if present) and turn blower down to lowest stage (for a minimum period of 5 minutes).
8. Start engine and run at increased idle for approximately 1 minute.
9. Meanwhile, press on the accelerator three times for 5 seconds each to approximately 4000 RPM. Then let the vehicle idle for about 5 minutes.
10. Warm up engine and activate map thermostat via diagnosis system.
11. When the engine has cooled off, check the coolant level and adjust it to approx. 110 mm to 160 mm below the upper edge of the coolant filler neck (described further below in these instructions).

When the engine has cooled off, check the coolant level and adjust it to approx. 110 mm to 160 mm below the upper edge of the coolant filler neck (described further below in these instructions). Use a tape measure where appropriate.

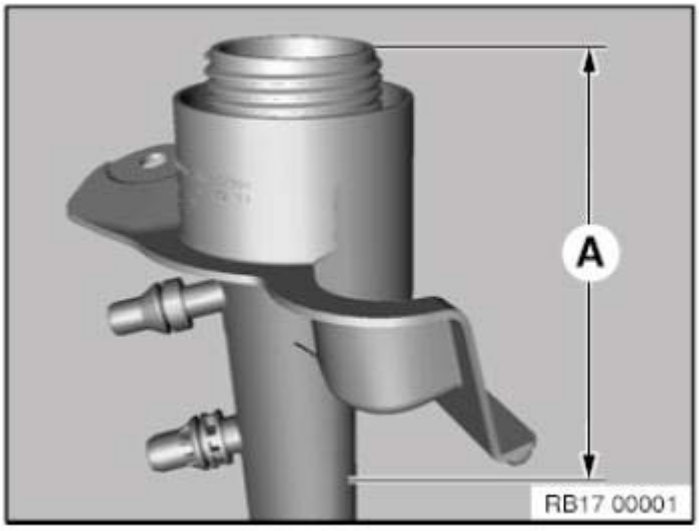


Fig. 29: Identifying Coolant Level Adjustment Length
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation note:

Close the sealing cap (1) until the arrows line up.

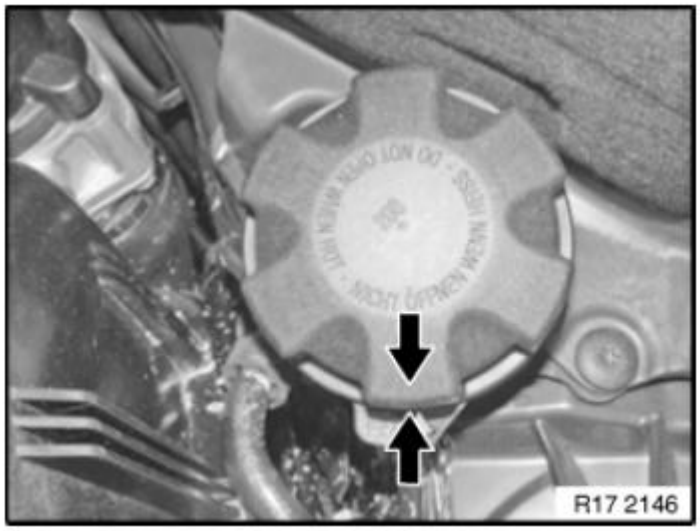


Fig. 30: Identifying Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

CHECK cooling system for leaks.

17..... VENTING COOLING SYSTEM FOR CHARGE AIR COOLER (N74)

WARNING: Risk of scalding!
Open sealing cap only after engine has cooled down.

IMPORTANT: Cooling system for charge air cooler has a separate cooling circuit
Coolant is added at charge air cooler expansion tank.
Electric coolant pump!
FOLLOW NOTES FOR CARRYING OUT REPAIR WORK ON THE COOLING SYSTEM!

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: Risk of skidding due to coolant on the floor.

Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

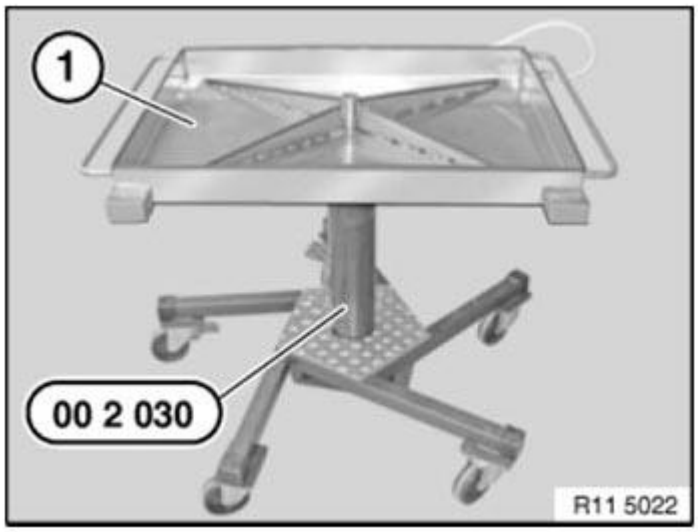


Fig. 31: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following bleeding procedure is necessary when a part is replaced in the cooling system or when the cooling system is refilled.

Top up coolant .

Coolant is added at charge air cooler expansion tank.

Use only approved **COOLANT** .

Observe mixture ratio: 50% antifreeze and 50% water. In severely cold areas, the antifreeze can be increased to 60% which provides freezing protection down to-62°F (-52°C). Do not exceed a 60% ratio of antifreeze.

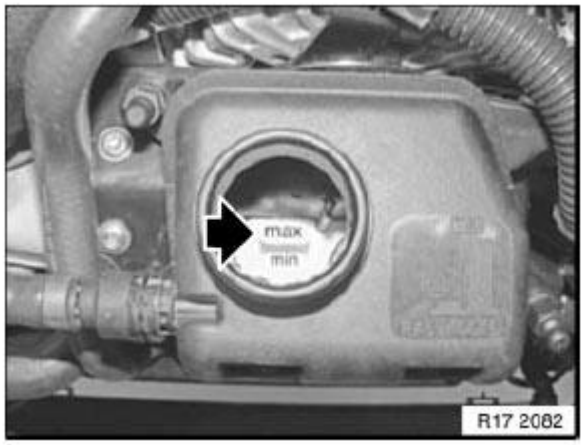


Fig. 32: Locating Max Level Mark On Charge Air Cooler Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Venting cooling system

NOTE: Do not leave the coolant expansion tank sealing cap open during the bleeding procedure.

Switch on the low-beam headlights to perform the bleeding procedure. If the low-beam headlights are not switched on, the ignition (Terminal 15) will switch off automatically after a certain period of time and interrupt the bleeding procedure.

1. Top coolant up to the upper edge of the expansion tank. Coolant level may not drop further! No drop in coolant for approx. 1 minute.
2. Connect battery charger.
3. Switch on ignition and low-beam headlight.
4. Set heating to maximum temperature. Press Automatic button. Then set the blower to the lowest speed.
5. Press accelerator pedal for 15 seconds to floor. **Engine** must **not** be started.
6. The bleeding procedure is started when the accelerator pedal is pressed and takes approx. 5 minutes.
7. Refill expansion tank up to top edge immediately after drawing off until empty.
8. Adjust expansion tank to maximum level at end of bleeding procedure.
9. Check cooling system for leaks.
10. Close expansion tank.
11. If the bleeding procedure has to be carried out again, allow DME to drop completely (ignition key removed for approx. 3 minutes), then repeat from Item 5.

RADIATOR, EXPANSION TANK, PIPES

64 53... INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

IMPORTANT: Even when they are correctly installed or due to normal driving, coolers (oil cooler, radiator, charge air cooler) or air conditioning capacitors may show slight impressions or deformations on their discs (picture).

This is not damage.

Radiators, cooler or capacitors are not to be replaced in this case.

NOTE: The deformations shown in Fig. 33 can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require replacement of the radiator/or air conditioning condenser (picture 2-6).

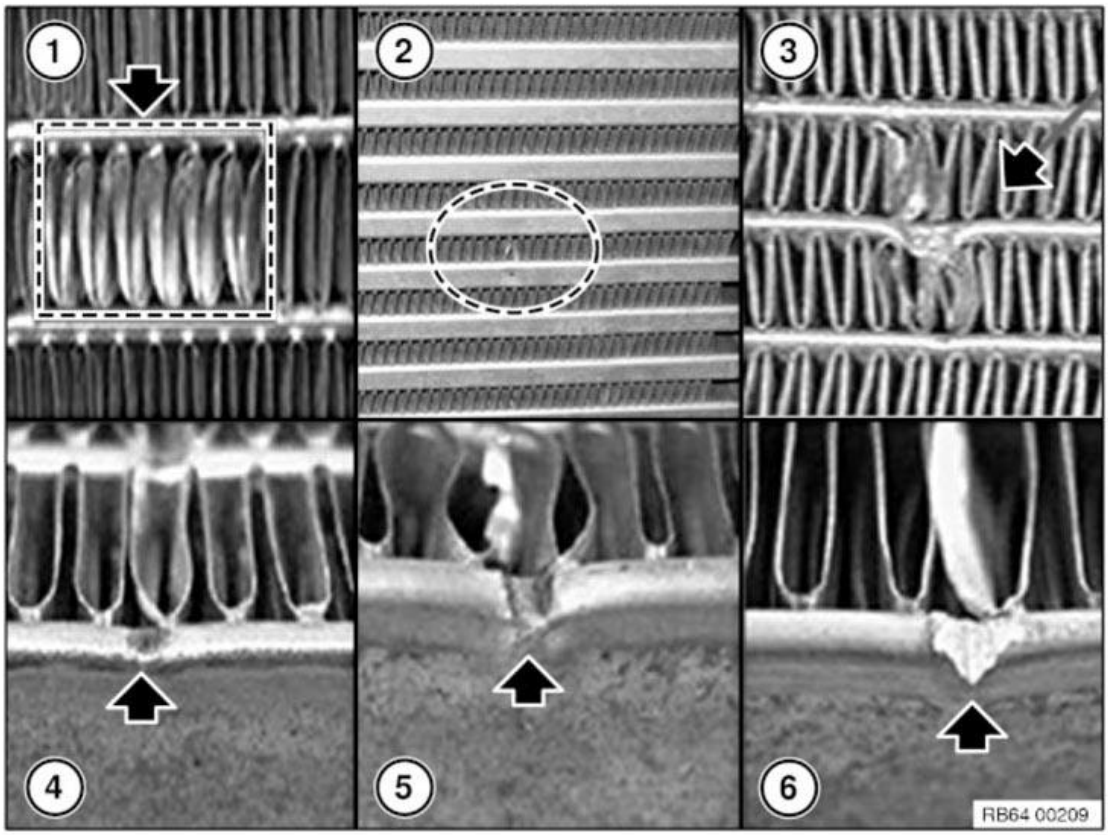


Fig. 33: Locating Damage On Radiator/Air Conditioning Condenser
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE RADIATOR WITH ATTACHMENT

17 11... BLEED AND FILL THE COOLING SYSTEM FOR THE CHARGE AIR COOLER WITH THE VACUUM FILLING UNIT

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant when carrying out repair work on the cooling circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- No.- 81 93 2 152 473

IMPORTANT: Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

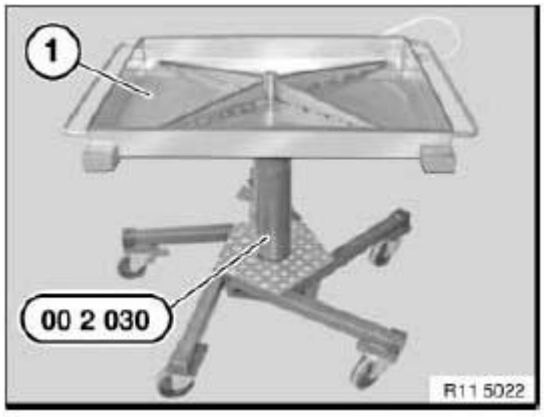


Fig. 34: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Graphic shows the N63, procedure for other engines identical.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.
If necessary, replace damaged and porous coolant hoses.

Vacuum filling unit consists of

- 1) Filling unit with vacuum meter and shutoff valves
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)

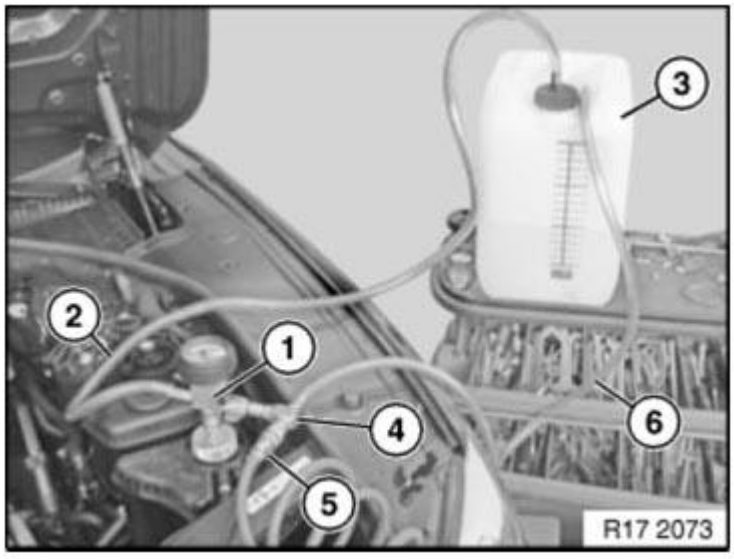


Fig. 35: Identifying Vacuum Filling Unit Components
Courtesy of BMW OF NORTH AMERICA, INC.

Preconditions

- The expansion tank of the cooling system for the charge air cooler must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
  - Use only recommended **COOLANT** .
  - Observe mixture ratio: 50% antifreeze and 50% water. In severely cold areas, the antifreeze can be increased to 60% which provides freezing protection down to-62°F (-52°C). Do not exceed a 60% ratio of antifreeze.
  - Observe capacities.
- Position the filling unit container at the same height as the coolant expansion tank.

Compressed-air connection with 6 bar pressure present

- Set heating to maximum temperature.

Application

Connect filling unit (1) with a suitable adapter (2) from special tool set **17 0 100** to the charge air cooler expansion tank.

Shutoff valves (A) and (B) must be closed.

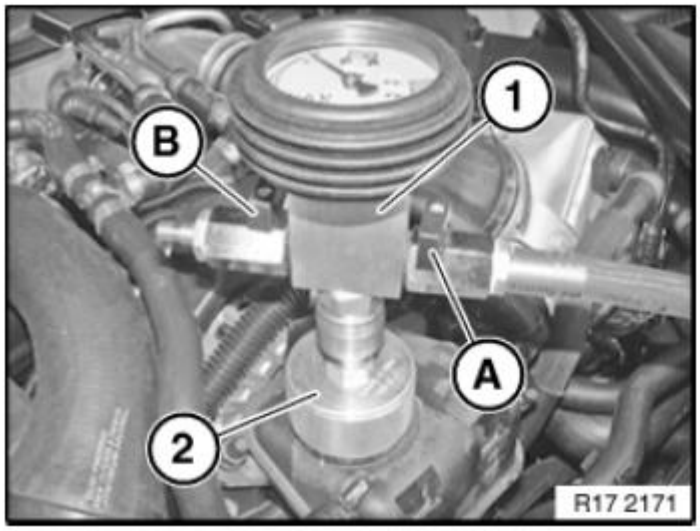


Fig. 36: Connecting Filling Unit Using Adapter And Special Tool Set (17 0 100)
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

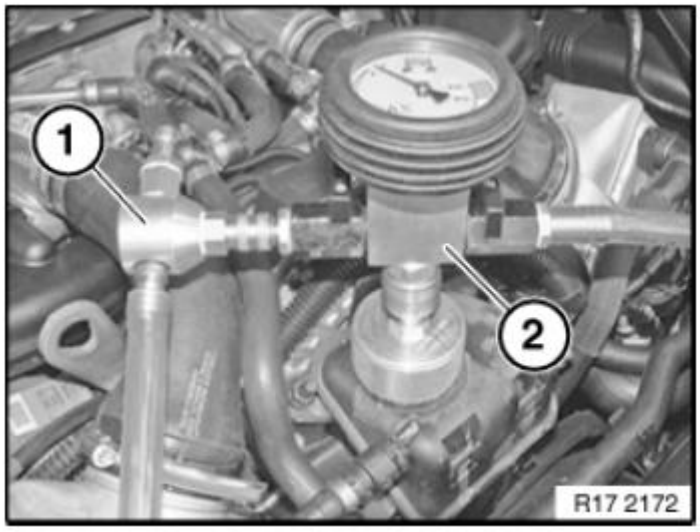


Fig. 37: Identifying Venturi Nozzle And Filling Unit

Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1) and open shutoff valve (B).

The venturi nozzle produces a flow noise.

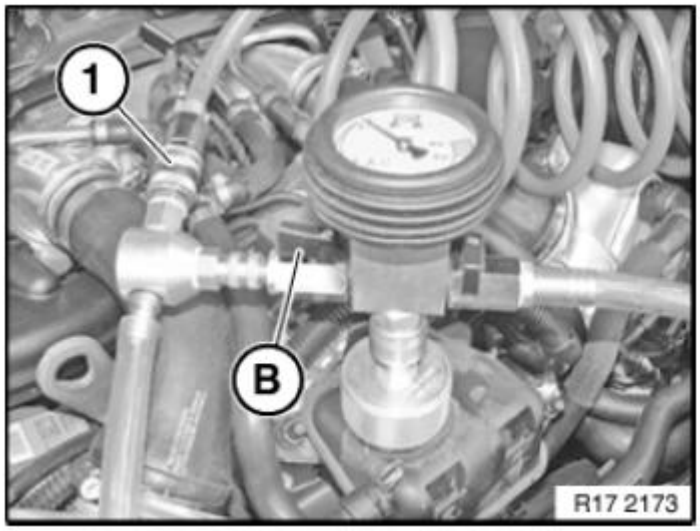


Fig. 38: Identifying Compressed Air Hose And Shutoff Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shutoff valve (A) until the filling hose (1) is free of bubbles. Close shutoff valve (A) again. The filling hose (1) is vented in this way.

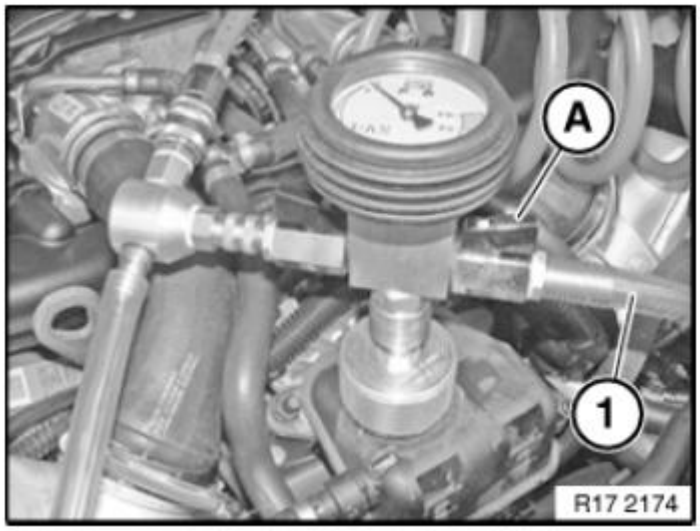


Fig. 39: Identifying Filling Hose And Shutoff Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shutoff valve (B) remains open. Generate vacuum in cooling cycle for approx. 1 minute. The end vacuum is

reached at a vacuum of -0.7 to -0.95 bar. Green scale on the vacuum meter.

NOTE: The coolant hoses contract during vacuum buildup.

Then close shutoff valve (B) again.

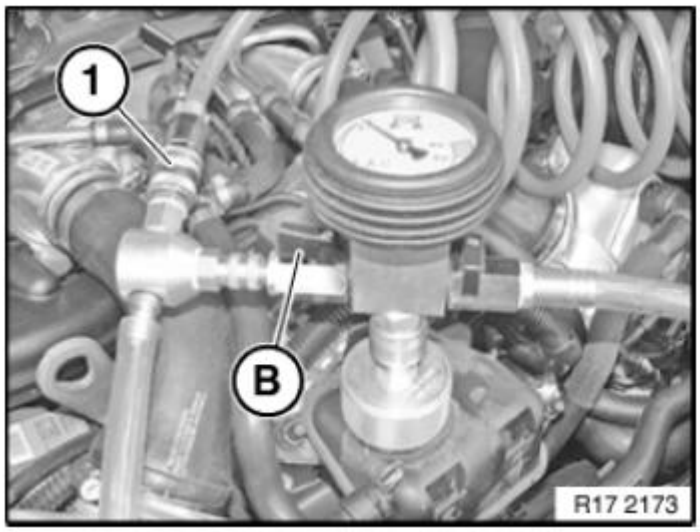


Fig. 40: Identifying Compressed Air Hose And Shutoff Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Both shutoff valves (A) and (B) must be closed. Then seal Venturi nozzle (1).

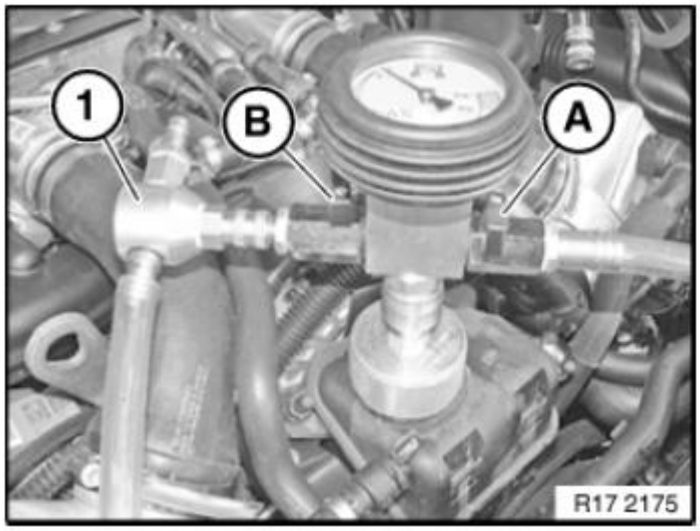


Fig. 41: Identifying Shutoff Valves And Venturi Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must hold the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates

a leak in the cooling system. If the vacuum remains constant, proceed with filling.

In the event of a leak, check the cooling system for the charge air cooler for leaks.

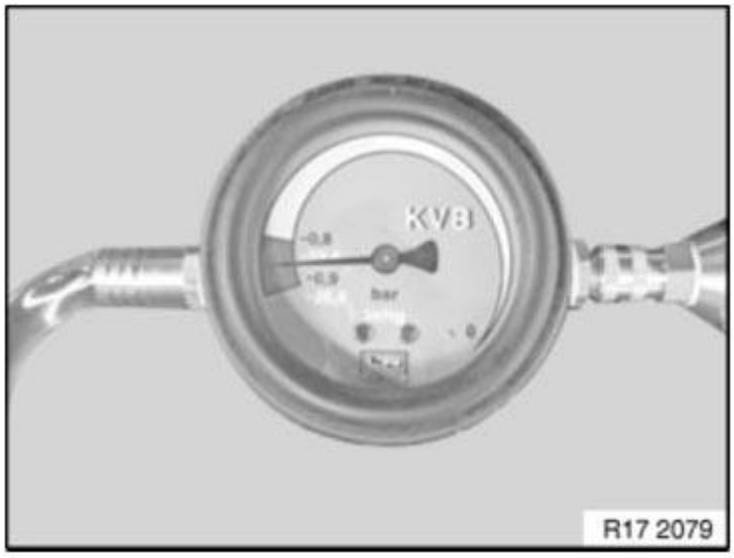


Fig. 42: Checking Cooling System Leaks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
Position the filling unit container at the same height as the coolant expansion tank.

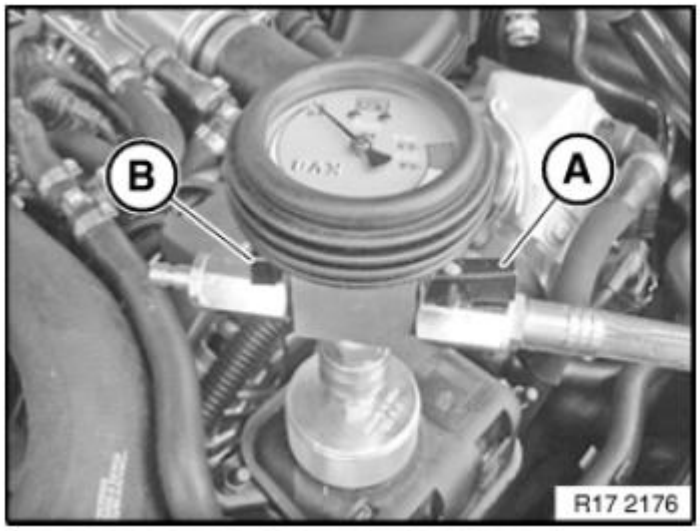


Fig. 43: Identifying Shut-Off Valve (A And B)
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shutoff valve (A) to filling unit container.

Coolant is now added.

The filling procedure is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

If necessary, reduce remaining vacuum. Open shutoff valve (B) to do so.

Remove filling unit with adapter from expansion tank.

After the cooling system has been filled with the vacuum filling unit, another bleeding procedure must be performed for the following vehicles

- F01, F02, F03, F04, F07, F06, F10, F11, F12, F13 N63 B40/B44 O 0/1
- **F01, F02, F03, F04 N74**
- F06, F10, F12, F13 S63 B44 T 0

Close charge air cooler expansion tank.

Adjust coolant level to maximum.

Check cooling system for charge air cooler for leaks.

64 53... INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

IMPORTANT: Even when they are correctly installed or due to normal driving, coolers (oil cooler, radiator, charge air cooler) or air conditioning capacitors may show slight impressions or deformations on their discs (picture).

This is not damage.

Radiators, cooler or capacitors are not to be replaced in this case.

NOTE: The deformations shown in Fig. 44 can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require replacement of the radiator/or air conditioning condenser (picture 2-6).

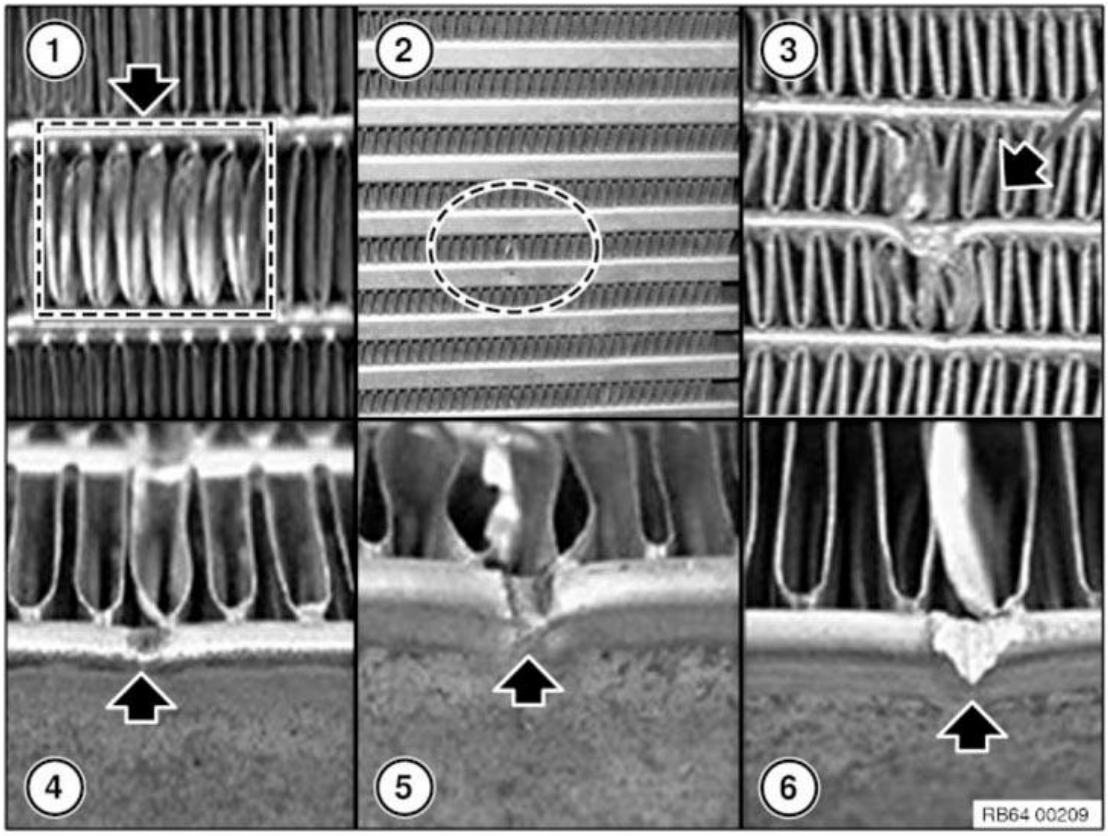


Fig. 44: Locating Damage On Radiator/Air Conditioning Condenser
Courtesy of BMW OF NORTH AMERICA, INC.

17 11 000 REMOVING AND INSTALLING RADIATOR (N63 B40/B44 O 0/1, N74)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: Wear safety goggles and protective gloves.

Necessary preliminary tasks:

- Remove **FAN COWL**.
- Drain **COOLANT**.
- Draw off **A/C SYSTEM** .
- Unlock and detach coolant hoses on radiator.

Release screws (1).

Tightening torque: see 6AZ in **17 10 RADIATOR, EXPANSION TANK**

Detach A/C lines (2) and place to one side.

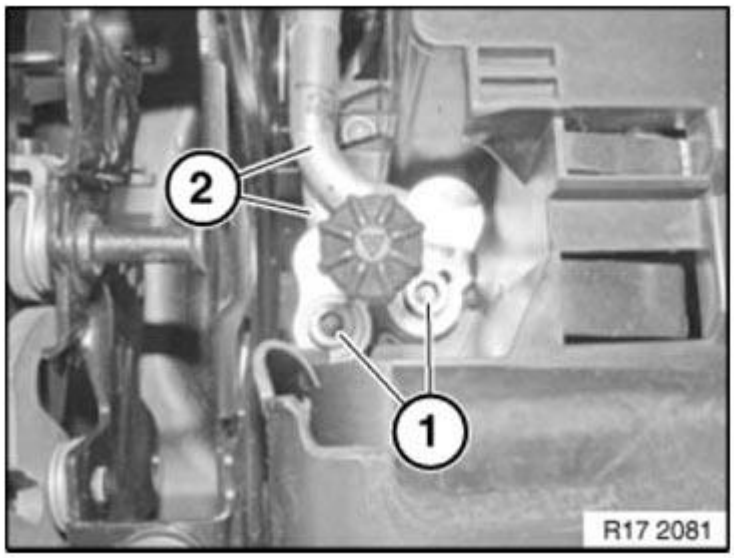


Fig. 45: Identifying A/C Lines And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing rings.

Release screws (1) on left and right from cover (3).

Tightening torque: see 1AZ in **17 10 RADIATOR, EXPANSION TANK**

Release screws (2) behind sealing lip.

Tightening torque: see 1AZ in **17 10 RADIATOR, EXPANSION TANK**

Lift out cover (3).

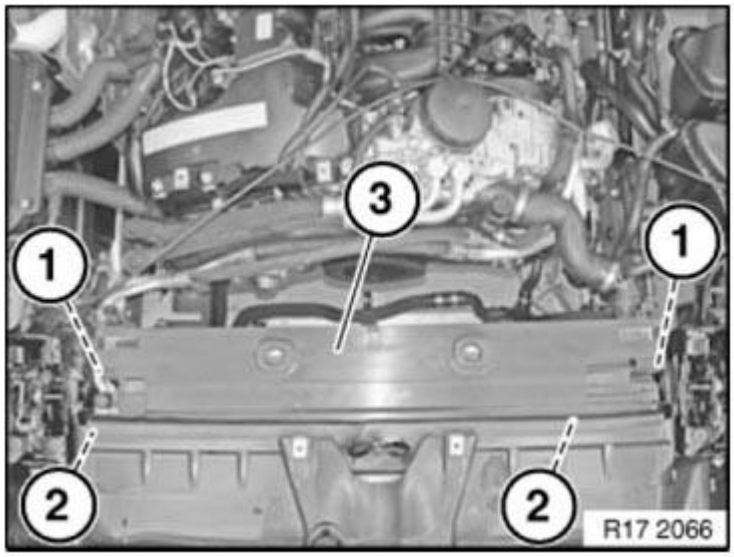


Fig. 46: Identifying Cover And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove radiator (1) towards top.

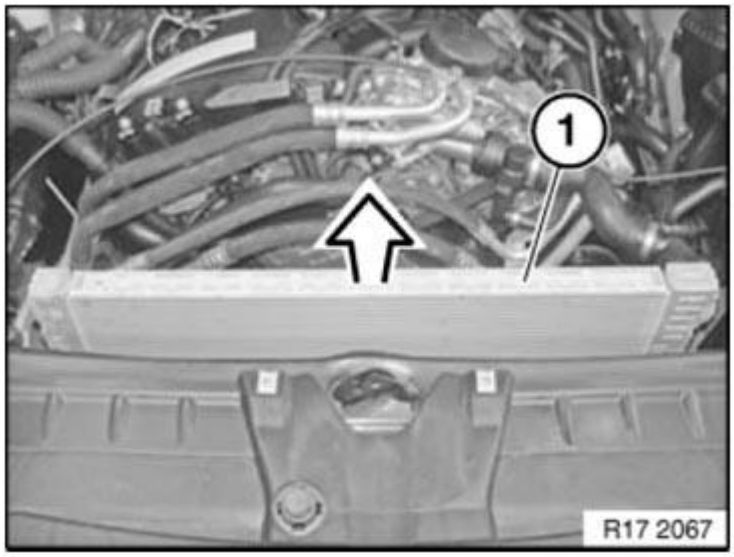


Fig. 47: Removing Radiator
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

Fill **A/C SYSTEM** .

Visual inspection of cooling system for tightness.

17 11 100 REMOVING AND INSTALLING/RENEWING COOLANT EXPANSION TANK (N74)

Necessary preliminary tasks:

- Drain **COOLANT**
- Remove **WHEEL ARCH COVER (REAR SECTION)** front left

Release screws (1).

Tightening torque: see 2AZ in **17 10 RADIATOR, EXPANSION TANK**

Unlock plug (1) on coolant level switch and disconnect.

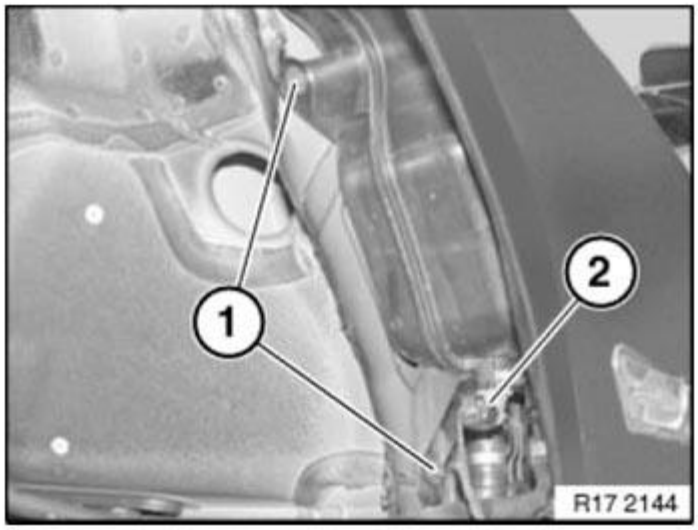


Fig. 48: Identifying Coolant Level Switch Plug And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull expansion tank (1) forward.

Release and disconnect coolant hoses (2).

Release and disconnect coolant hoses (3).

Feed expansion tank (1) forward and remove.

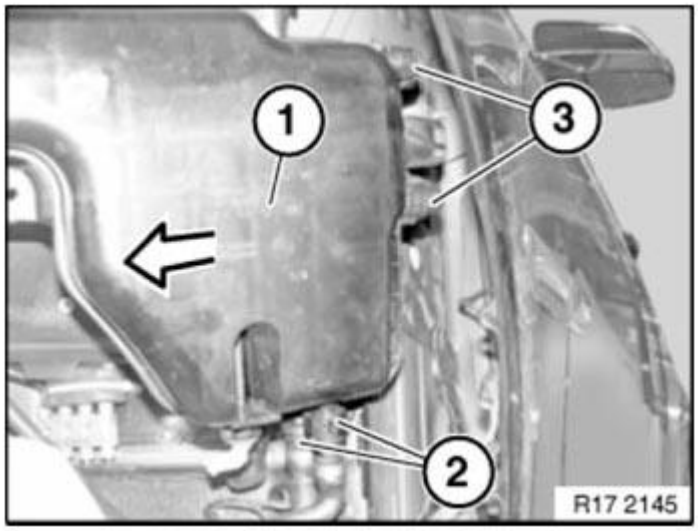


Fig. 49: Removing Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT**.

Check cooling system for **LEAKS**.

17 11 035 REMOVING AND INSTALLING/RENEWING FAN COWL WITH ELECTRIC FAN (N74)

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Turn off ignition
- Remove **CROSS-MEMBER**
- Remove **INTAKE MANIFOLDS** on left and right
- Remove front **UNDERBODY PROTECTION**
- Remove **REINFORCEMENT PLATE**

Release lines from fan cowl on clamps (1).

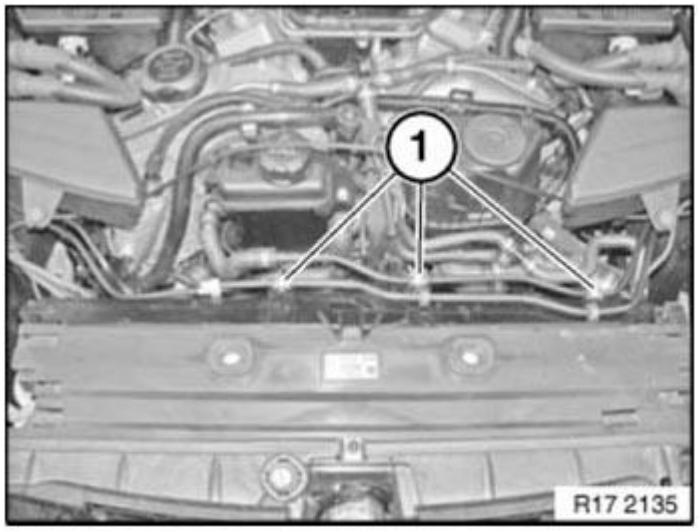


Fig. 50: Identifying Fan Cowl Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug (1) on fan cowl.

Release screw (2) on holder for coolant hoses.

Tightening torque: see 5AZ in **17 10 RADIATOR, EXPANSION TANK**

Detach coolant hoses with holder from fan cowl.

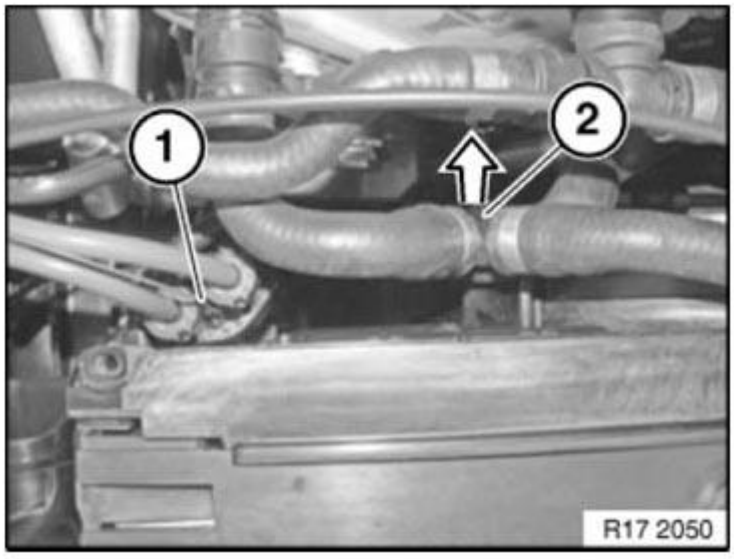


Fig. 51: Removing Coolant Hose Holder Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: see 3AZ in **17 10 RADIATOR, EXPANSION TANK**

Pull off transmission oil cooler upwards from module carrier.

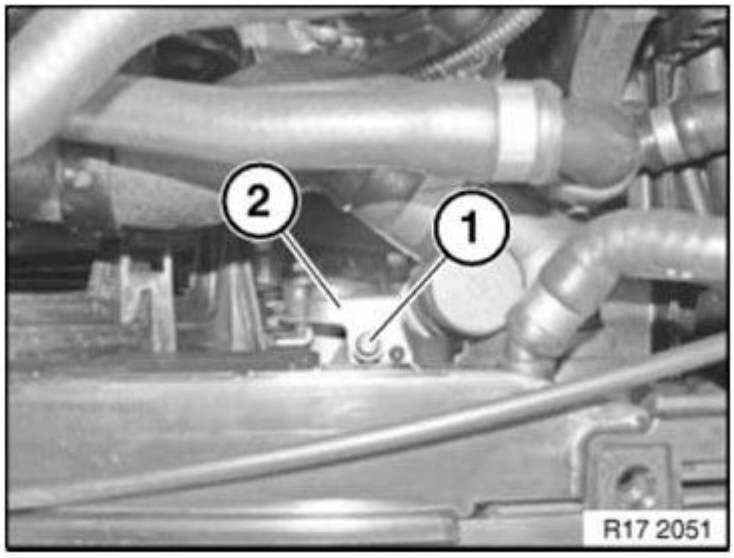


Fig. 52: Identifying Fan Cowl Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip fan cowl (1) at retainers (2) on left and right, feed out in upward direction and remove.

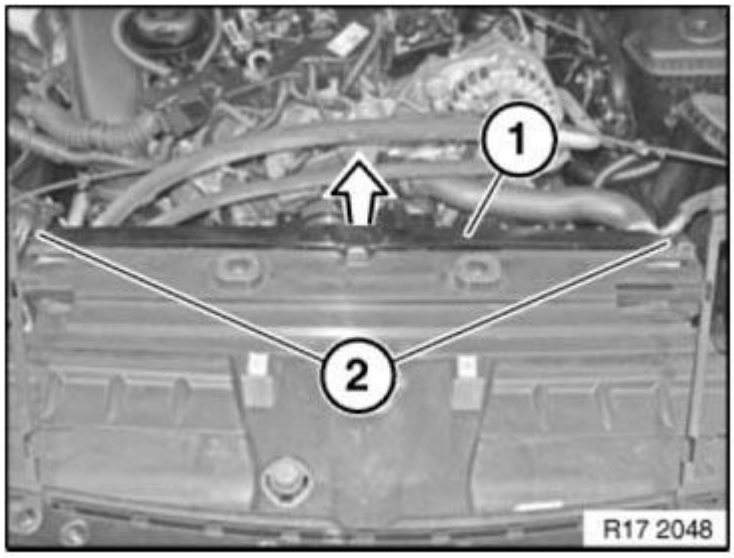


Fig. 53: Removing Fan Cowl
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert retaining tab (1) at bottom on module carrier.

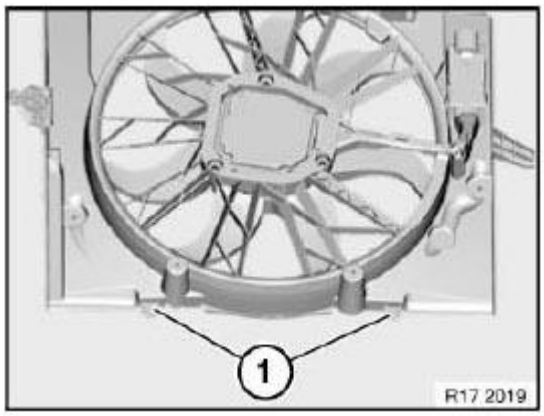


Fig. 54: Identifying Module Carrier Retaining Tab
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Reassemble the vehicle.
Delete fault memory.

17 13 030 REMOVING AND INSTALLING/REPLACING COOLANT FILLER NECK (N53, N63 B40/B44 O 0/1, N74)

Necessary preliminary tasks:

- Drain **COOLANT**.
- Remove **ACOUSTIC INSULATION** for bulkhead on left
- Remove front left **WHEEL ARCH COVER**

Release screws (1).

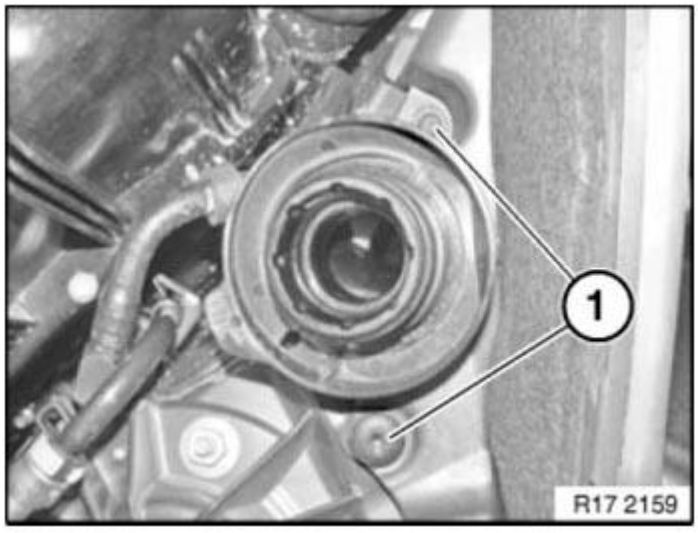


Fig. 55: Identifying Coolant Filler Neck Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach coolant hoses (1) on coolant filler neck.

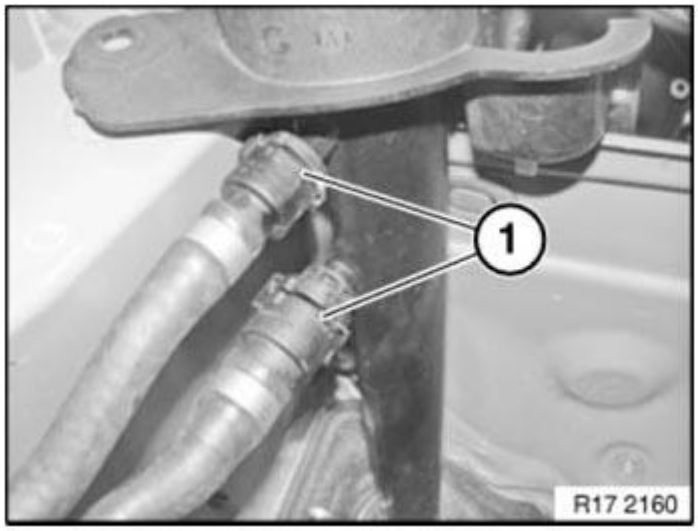


Fig. 56: Identifying Coolant Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach coolant hoses (1) on coolant filler neck.

Weave out and remove coolant filler neck.

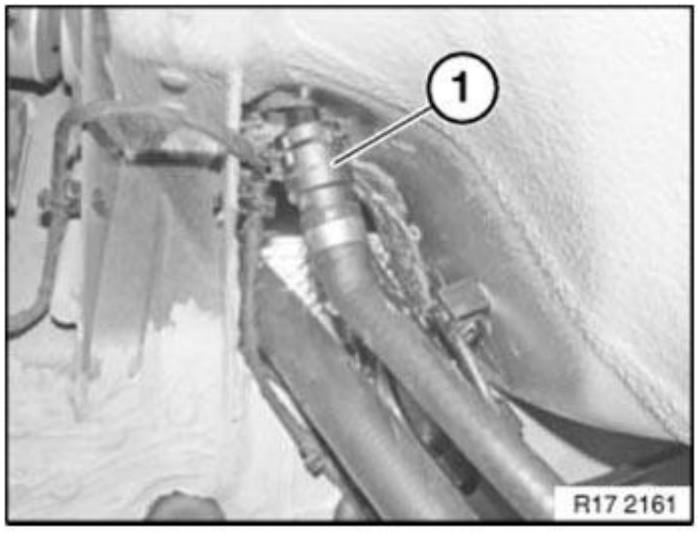


Fig. 57: Identifying Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT**.

Visual inspection of cooling system for tightness.

17 11 120 REMOVING AND INSTALLING/REPLACING COOLER FOR CHARGE AIR COOLER (N63 B40/B44 O 0/1, N74)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: When carrying out repair work on the coolant circuit, protect the alternator from dirt contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Necessary preliminary tasks:

- Remove **COOLING LOOP** for hydraulic steering (not ALPINA B7).
- Drain coolant for charge air cooler.

Release and disconnect coolant hoses (1).

Release lock (2).

Pull lines (3) with holder upwards.

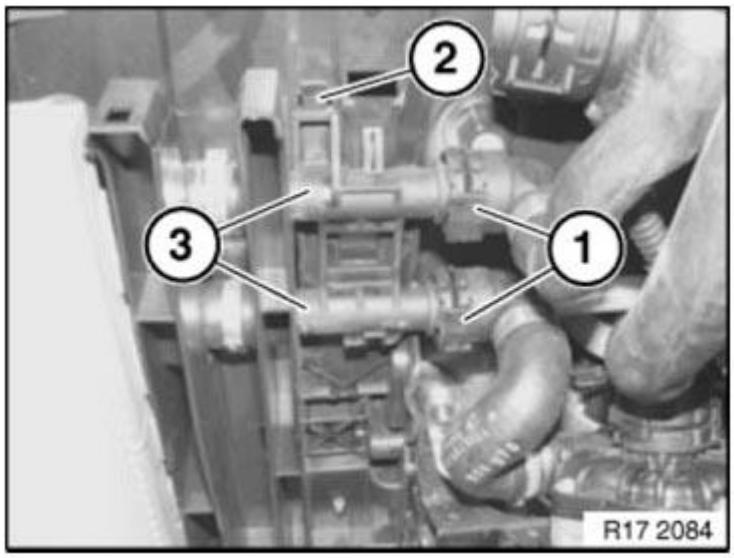


Fig. 58: Identifying Coolant Hoses, Lines And Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out radiator for charge air cooler (1).

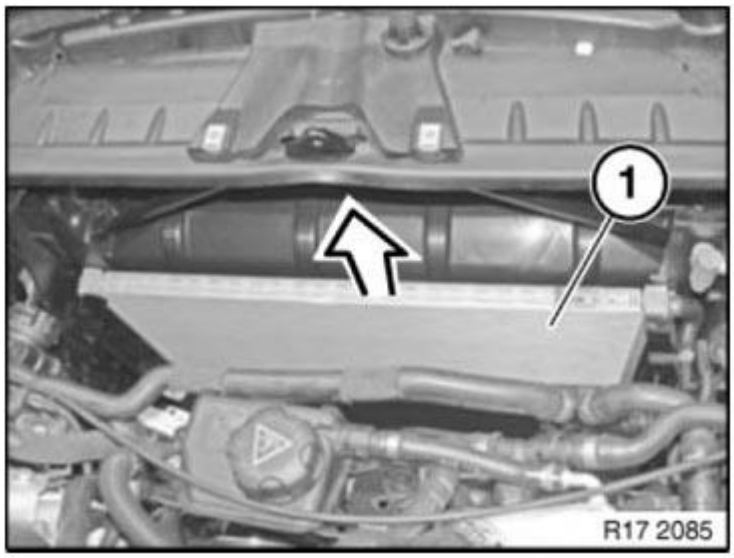


Fig. 59: Lifting Out Radiator For Charge Air Cooler
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

After completing repair work, top charge air cooler up with coolant.

Vent **COOLING SYSTEM FOR CHARGE AIR COOLER**.

Check cooling system for tightness.

Assemble engine.

17 11 370 REMOVING AND INSTALLING/REPLACING COOLING LOOP FOR HYDRAULIC STEERING (N63 B40/B44 O 0/1, N74)

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: When carrying out repair work on the oil and cooling circuit, protect the alternator against dirt contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Necessary preliminary tasks:

- Remove **A/C CONDENSER**
- After completing this repair work, check oil level in oil reservoir of hydraulic steering. See **BLEEDING POWER STEERING UNIT** or **BLEEDING POWER STEERING (VERSION WITH DYNAMIC DRIVE)** .

Remove circlips (1).

Unlock lines (2) and detach from cooling loop.

Press in latch mechanisms (3) and pull cooling loop together with module carrier upwards.

IMPORTANT: Catch and dispose of emerging oil.

Installation note:

Reinstall circlips.

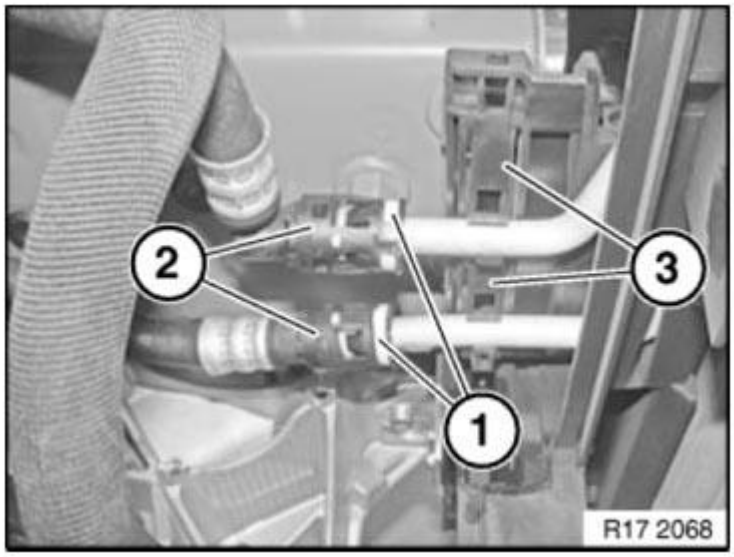


Fig. 60: Identifying Circlips, Lines And Latch Mechanisms
Courtesy of BMW OF NORTH AMERICA, INC.

Release module carrier (2) in direction of arrow.

Lift out cooling loop (1) together with module carrier (2).

Installation note:

When replacing cooling loop, remount module carrier on left and right.

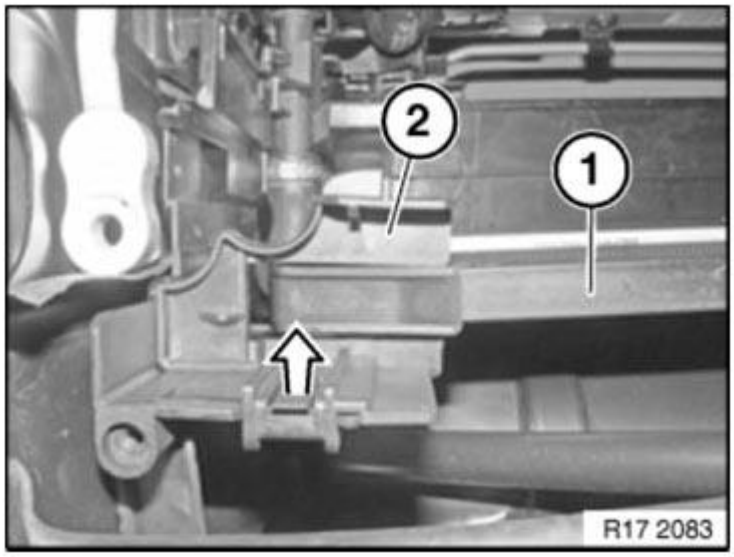


Fig. 61: Releasing Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

Check hydraulic steering for leak tightness.

17 11 150 REMOVING AND INSTALLING/REPLACING ENGINE OIL COOLER (N74)

Necessary preliminary tasks:

- **REMOVE** front right wheel arch cover.

WARNING: Risk of scalding!
Only perform this repair work after engine has cooled down.

IMPORTANT: Wear safety goggles and protective gloves.

IMPORTANT: Adhere to conditions of absolute cleanliness when repairing the engine oil circuit.
When removing engine oil pipes and engine oil cooler, seal off all openings with suitable plugs.
To avoid engine damage, do not allow any dirt particles to get into the engine oil circuit.

Recycling

Engine oil escapes when the engine oil pipes are released. Catch and dispose of emerging engine oil.

Observe country-specific waste disposal regulations.

Release screw (1).

Tightening torque: see 6AZ in **17 22 ENGINE OIL COOLER LINES AND TRANSMISSION OIL COOLER LINES**

Release screw (2).

Tightening torque: see 8AZ in **17 22 ENGINE OIL COOLER LINES AND TRANSMISSION OIL COOLER LINES**

Unlock engine oil pipes (3) and detach from engine oil cooler flange.

Seal off engine oil cooler flange and engine oil lines.

Catch and dispose of emerging oil.

Remove engine oil cooler (4).

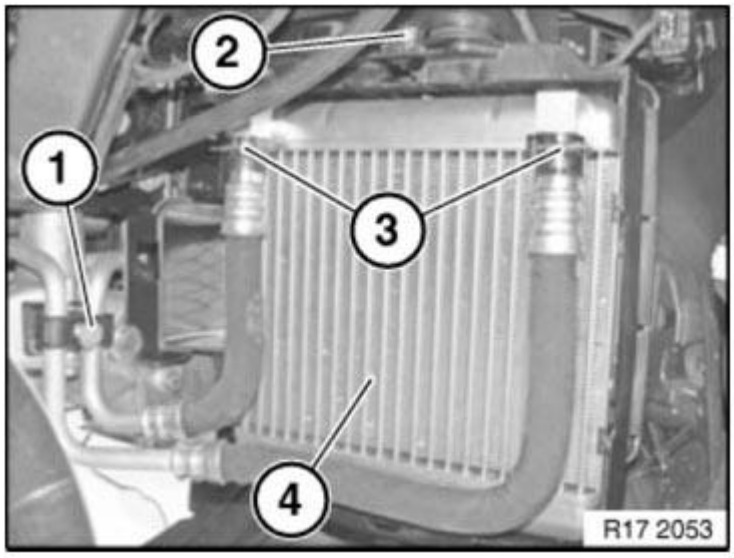


Fig. 62: Identifying Engine Oil Cooler, Pipes And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check the engine oil level after repair work is completed. Top up engine oil if necessary.

17 13 020 REMOVING AND INSTALLING/REPLACING INTERCOOLER EXPANSION TANK (N74)

IMPORTANT: Danger of scalding!
Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**
- Drain coolant for intercooler

Release screws (1).

Tightening torque: see 8AZ in **17 10 RADIATOR, EXPANSION TANK**

Detach coolant hoses (3) from expansion tank (2) and remove.

Installation:

Replace faulty clamps.

Remove expansion tank (2).

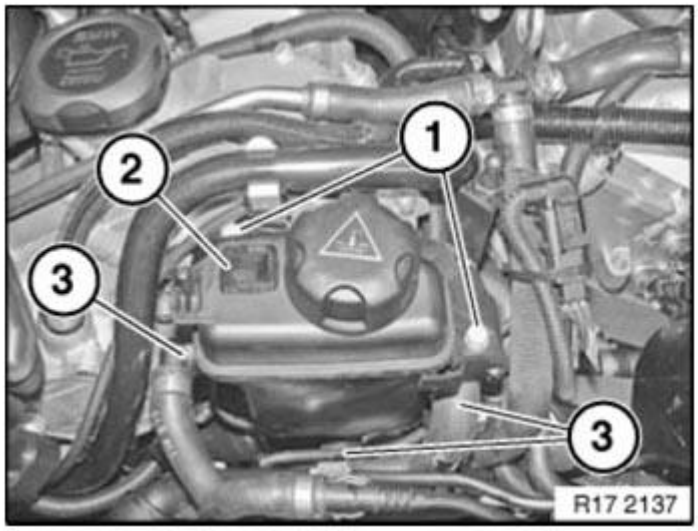


Fig. 63: Identifying Coolant Hoses, Expansion Tank And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

After completing work, fill intercooler with coolant.

Vent **COOLING SYSTEM** for intercooler.

Check cooling system for intercooler for leaks.

17 11 046 REMOVING AND INSTALLING/REPLACING MODULE CARRIER (N63, N74)

Necessary preliminary tasks:

- Remove **RADIATOR**.
- **REMOVE** cooling loop for hydraulic steering

Release screws (1) on left and right on holder for module carrier.

Tightening torque: see 10AZ in **17 10 RADIATOR, EXPANSION TANK**

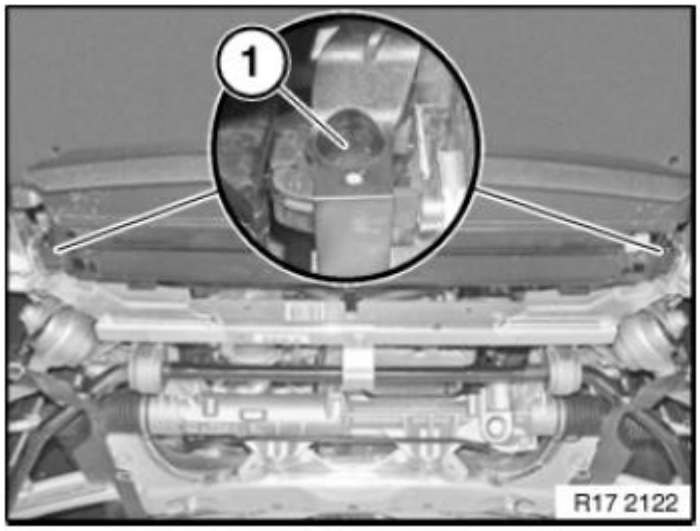


Fig. 64: Identifying Module Carrier Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Release holder (2) together with auxiliary water pump from module carrier.

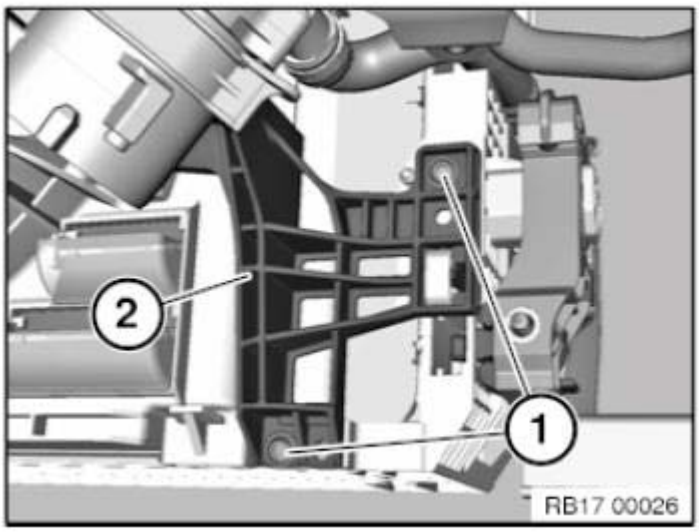


Fig. 65: Identifying Auxiliary Water Pump Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Only with installed auxiliary radiator:

Unlock holders (1) from coolant pipe and pull off the module carrier toward the top.

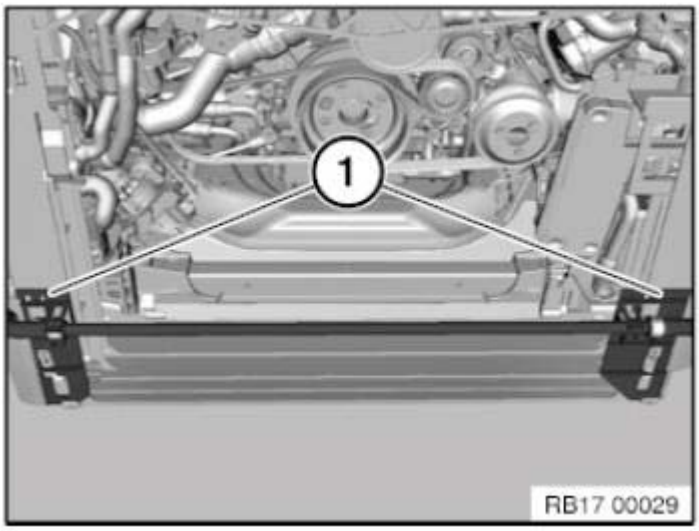


Fig. 66: Identifying Coolant Pipe Holders
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows left side. Procedure on right side identical.

Lift module carrier (1) upwards slightly.

Disengage holder for module carrier (2) from bumper support (3).

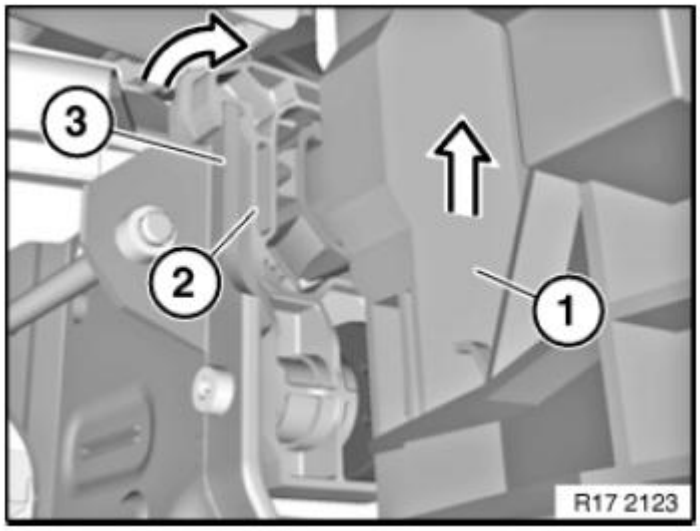


Fig. 67: Lifting Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows left side. Procedure on right side identical.

For purposes of clarity, the front bumper panel is shown removed.

Pull holder for module carrier (1) off module carrier (2), feed out and remove.

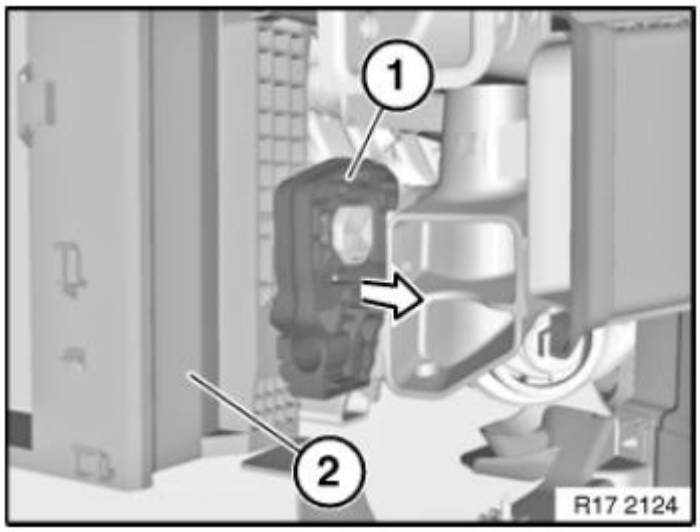


Fig. 68: Removing Module Carrier Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Press module carrier (1) slightly towards rear.

Then feed out module carrier (1) towards bottom and remove.

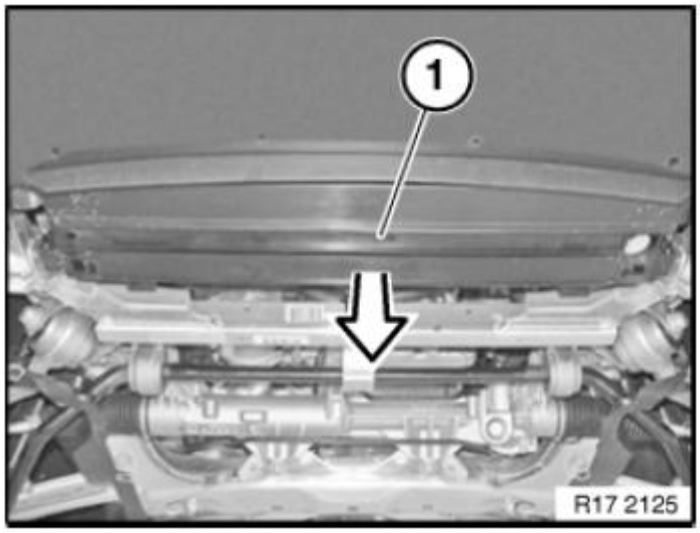


Fig. 69: Pressing Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

17 11 040 REMOVING AND INSTALLING/REPLACING THERMOSTAT INSERTS (N63 B40/B44 O

IMPORTANT: Risk of scalding!
Only perform this repair work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable container.

Transmission oil emerges when engine oil lines are detached from transmission oil cooler.

Catch and dispose of escaping transmission oil in a suitable container.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Drain **COOLANT**.
- Remove **FAN COWL**.

Release and disconnect coolant hoses (1).

Unscrew nuts (2).

Tightening torque: see 4AZ in **17 10 RADIATOR, EXPANSION TANK**

Remove thermostat insert (3).

Installation note:

- Clean contact surfaces.

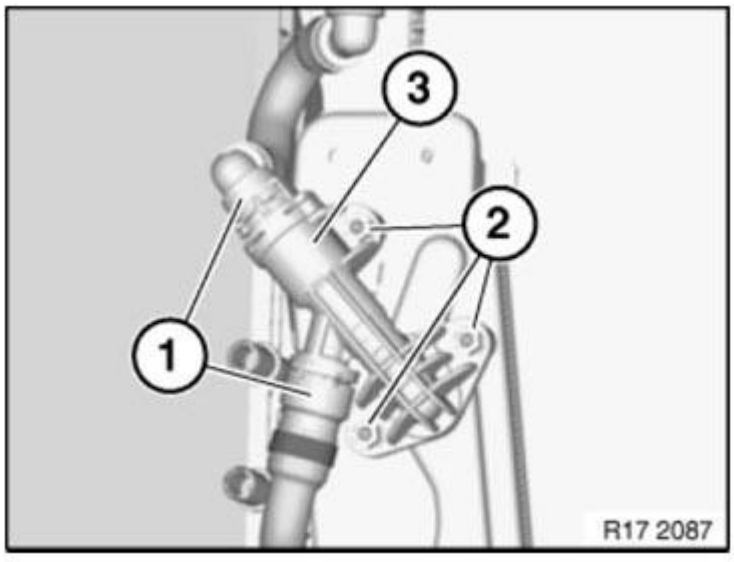


Fig. 70: Identifying Coolant Hoses, Nut And Thermostat Insertion Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check the **OIL LEVEL** in the automatic transmission.

If necessary, top up automatic transmission fluid.

Use only approved transmission fluid:

Trade name	BMW part number	Container size
ATF oil Shell L12108	83 22 2 152 426	20 liters

17..... REPLACE THE MOUNTS FOR THE MODULE CARRIER ON TOP AND BOTTOM (N63, N74)

Necessary preliminary tasks:

- **Only if the rubber mount for the top module carrier has to be removed:**

  Remove **CROSS CONNECTION** .

- **Only if the rubber mount for the bottom module carrier has to be removed:**

Remove front **UNDERBODY PROTECTION** .

Removing the rubber mount for the top module carrier

Remove the rubber mount (1) from the upper section of the module carrier from the top.

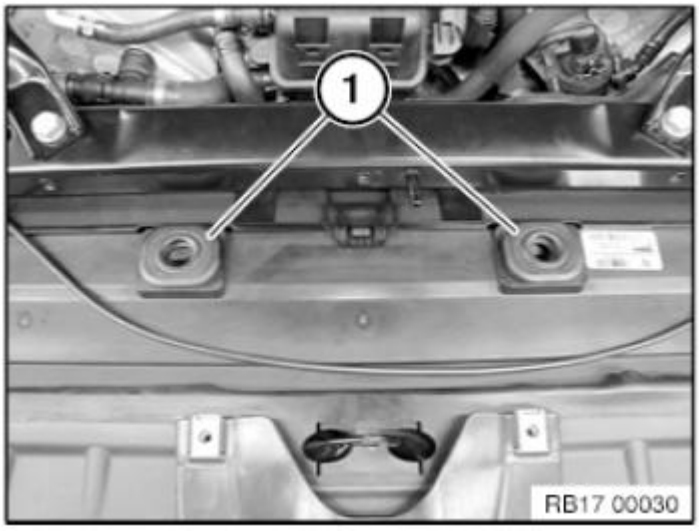


Fig. 71: Identifying Module Carrier Rubber Mount

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Apply mounting lubricant to the new rubber mounts (1) prior to installation.



Fig. 72: Identifying Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Removing the rubber mount for the bottom module carrier

Release screws (1) on left and right on holder for module carrier.

Tightening torque: see 10AZ in **17 10 RADIATOR, EXPANSION TANK**

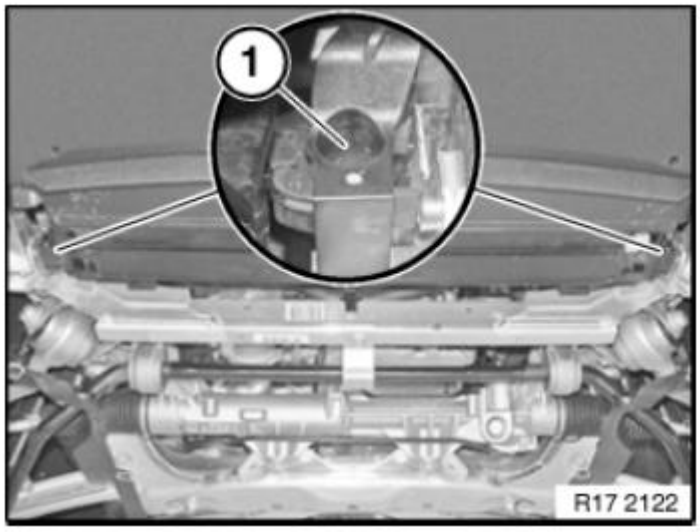


Fig. 73: Identifying Module Carrier Holder Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows left side. Procedure on right side identical.

Lift module carrier (1) upwards slightly.

Disengage holder with rubber mount for module carrier (2) from bumper support (3).

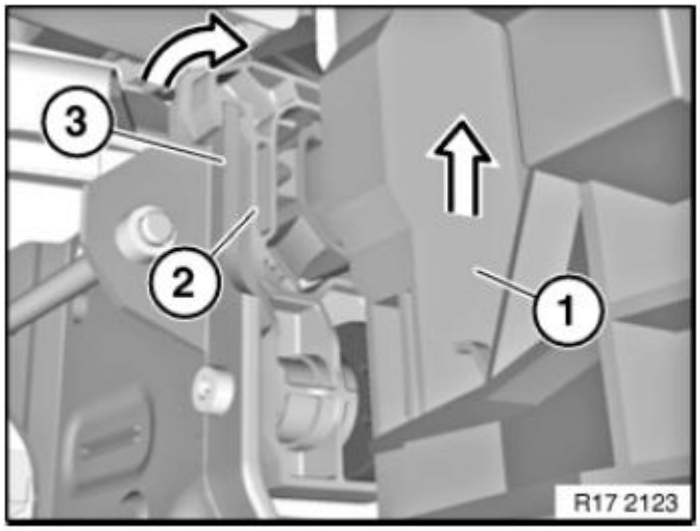


Fig. 74: Lifting Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows left side. Procedure on right side identical.

For purposes of clarity, the graphic shows the front bumper removed.

Pull holder with rubber mount for module carrier (1) off module carrier (2), feed out and remove.

Installation note:

Apply mounting lubricant to the new rubber mounts prior to installation.

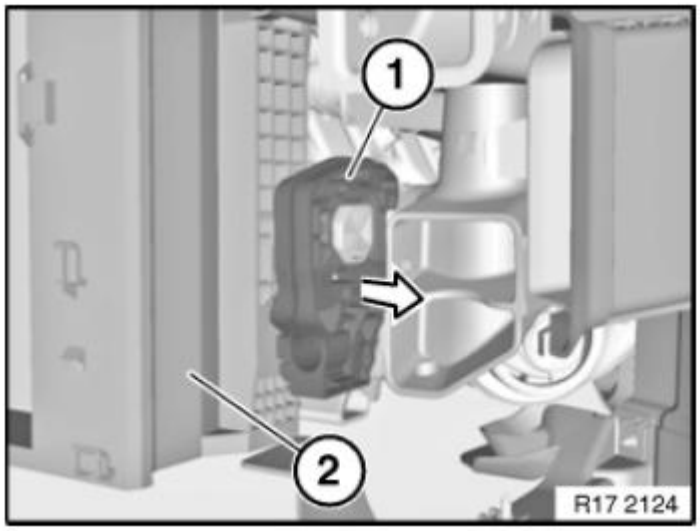


Fig. 75: Removing Module Carrier Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

OIL COOLER

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.
Flushing can only be carried out with the automatic transmission removed.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line **17 2 019** from the oil collection unit with the quick-release coupling.

Connect drain line **17 2 018** using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid through oil lines and transmission oil cooler.

Use only approved transmission fluid:

Trade name	BMW part number	Container size
ATF oil Shell L12108	83 22 2 152 426	20 liters

Reposition quick-release couplings.

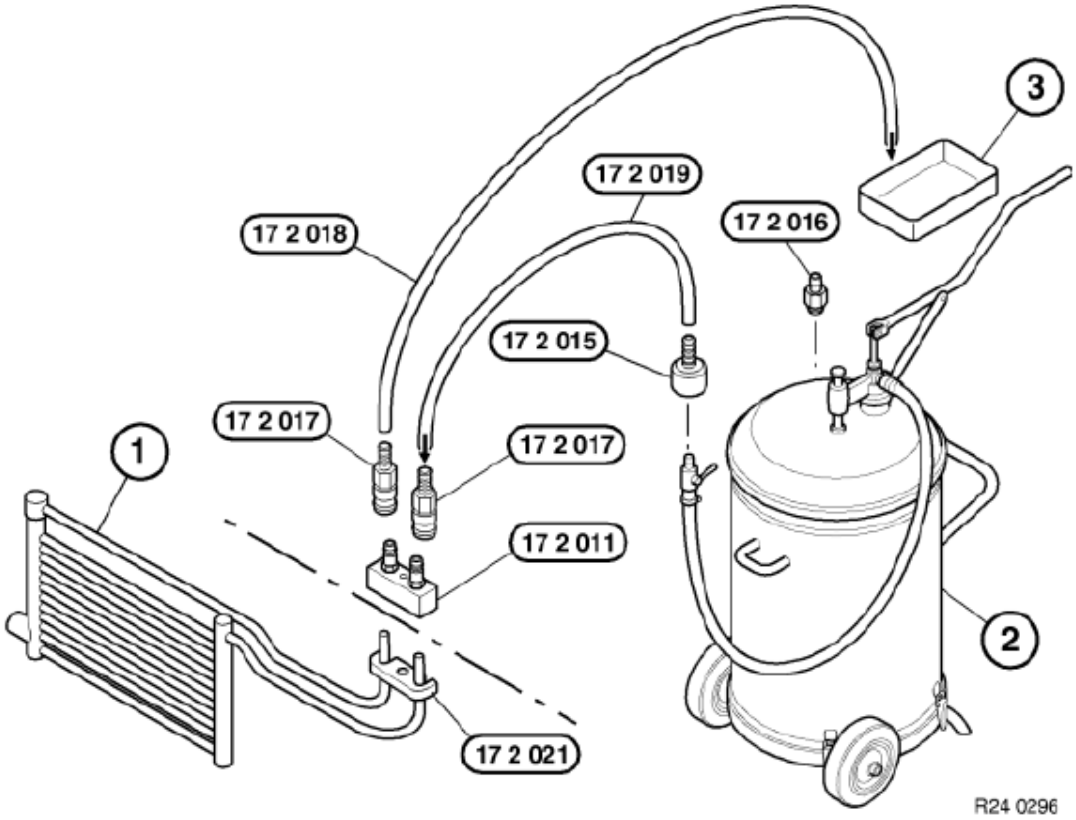
Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Arrangement, flushing apparatus for transmissions A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 76: Arrangement Of Flushing Apparatus For Transmissions (A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z)

Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 011 Adapter for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

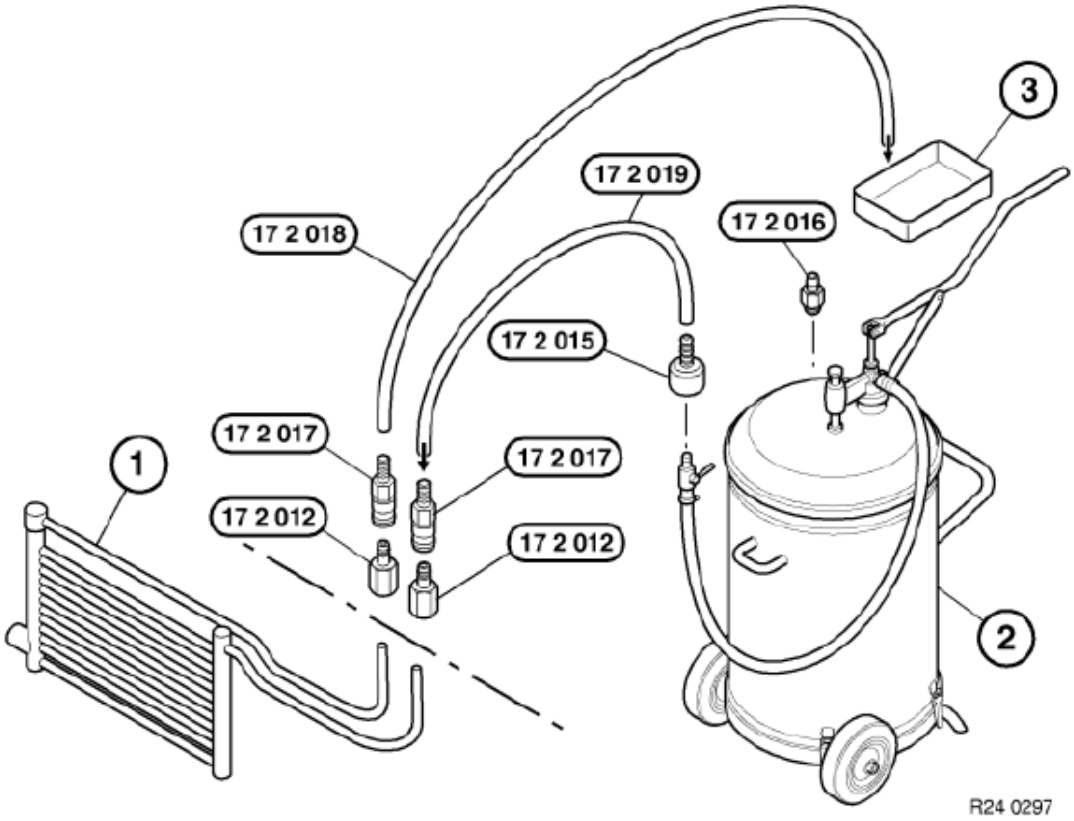
17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 2 021 Mounting plate for adapter 17 2 011 for transmissions A5S 325Z, GA6HP26Z

Arrangement of flushing apparatus for transmission A4S 310R



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 77: Arrangement Of Flushing Apparatus For Transmission A4S 310R
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A4S 300J

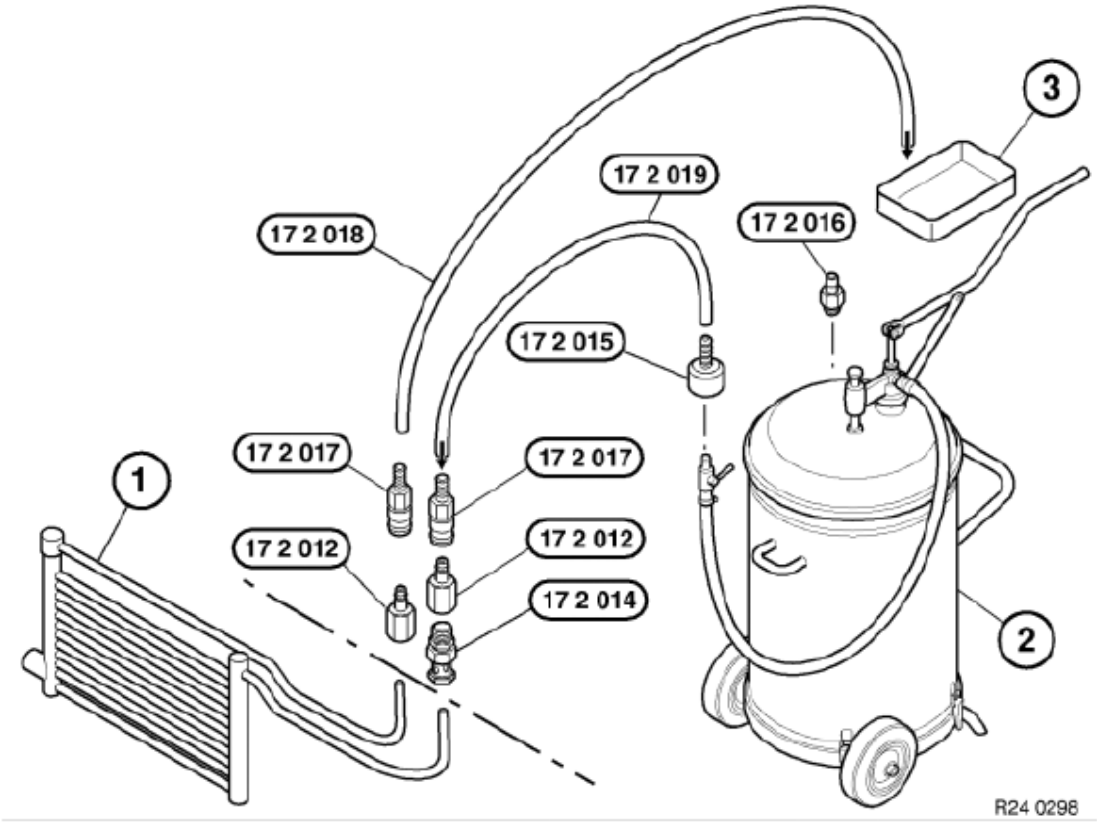


Fig. 78: Arrangement Of Flushing Apparatus For Transmission A4S 300J
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 014 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

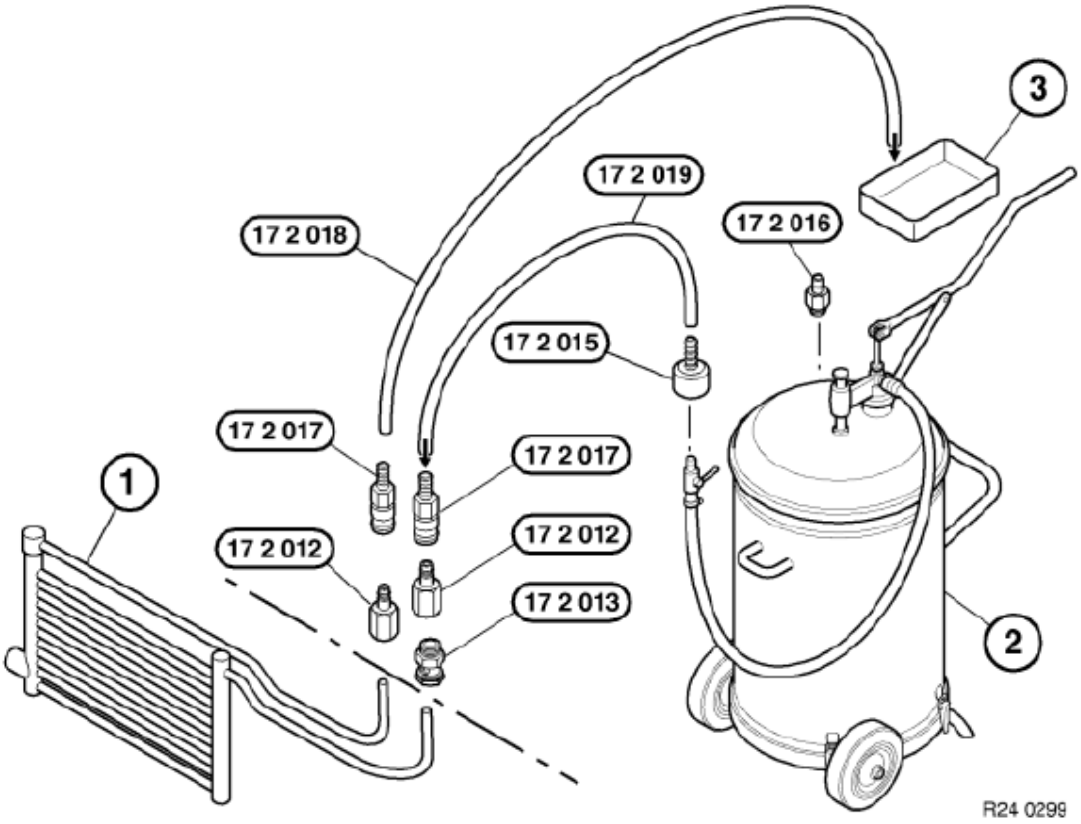
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A5S 440Z



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 79: Arrangement Of Flushing Apparatus For Transmission A5S 440Z
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 013 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION) (GA6HP19Z, GAHP26Z, GA6HP32Z)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line **17 2 019** from the oil collection unit with the quick-release coupling.

Connect drain line **17 2 018** using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid through oil lines and transmission oil cooler.

Use only approved transmission fluid:

Trade name	BMW part number	Container size
ATF oil Shell L12108	83 22 2 152 426	20 liters

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

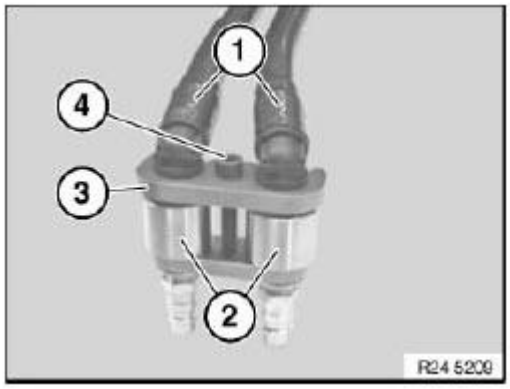


Fig. 80: Identifying Hydraulic Lines, Adapters, Clamping Bar And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for transmissions GA6HP19Z, GA6HP26Z, GA6HP32Z

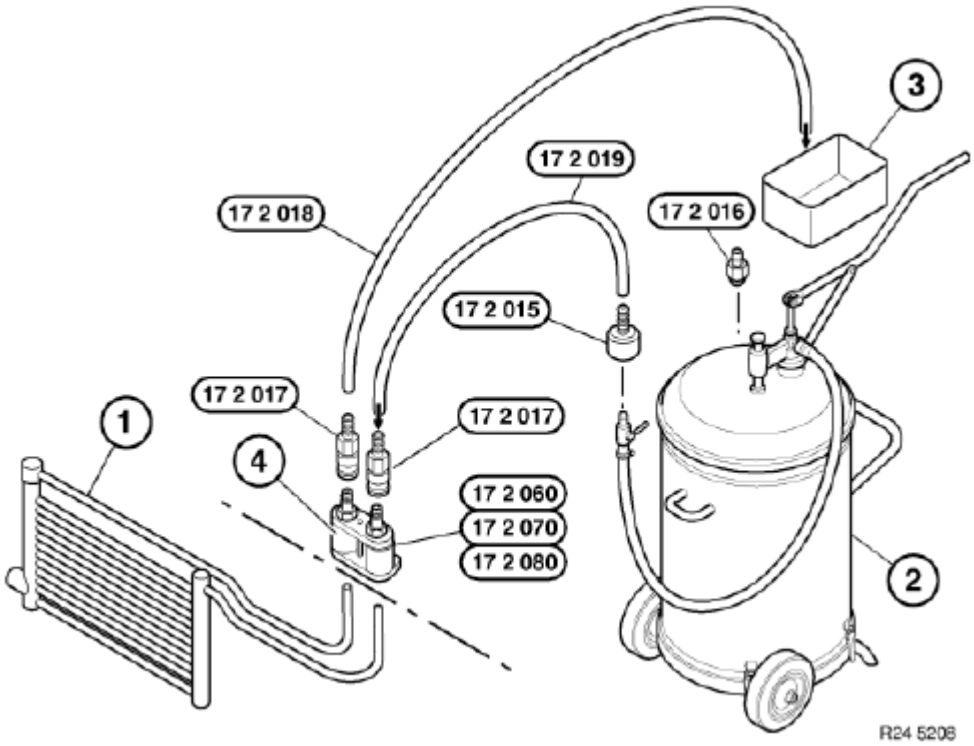


Fig. 81: Arrangement Of Flushing Apparatus For Transmissions (GA6HP19Z, GA6HP26Z, GA6HP32Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission-oil cooler with lines
2. Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 019 Hose to oil collection unit (2)

3. Oil drip tray

   17 2 018 Hose to oil drip tray (3)

4. Adapter with clamping bar

17 2 060 Adapter with clamping bar for aluminium lines and steel lines with aluminium connection (line diameter 12 mm) GA6HP19Z

17 2 070 Adapter with clamping bar (line diameter 15 mm) GA6HP26Z, GA6HP32Z, TCT for N54 engine

17 2 080 Adapter with clamping bar for fuel lines GA6HP26Z

64 53... INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

IMPORTANT: Even when they are correctly installed or due to normal driving, coolers (oil cooler, radiator, charge air cooler) or air conditioning capacitors may show slight impressions or deformations on their discs (picture).

This is not damage.

Radiators, cooler or capacitors are not to be replaced in this case.

NOTE: The deformations shown in Fig. 82 can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require replacement of the radiator/or air conditioning condenser (picture 2-6).

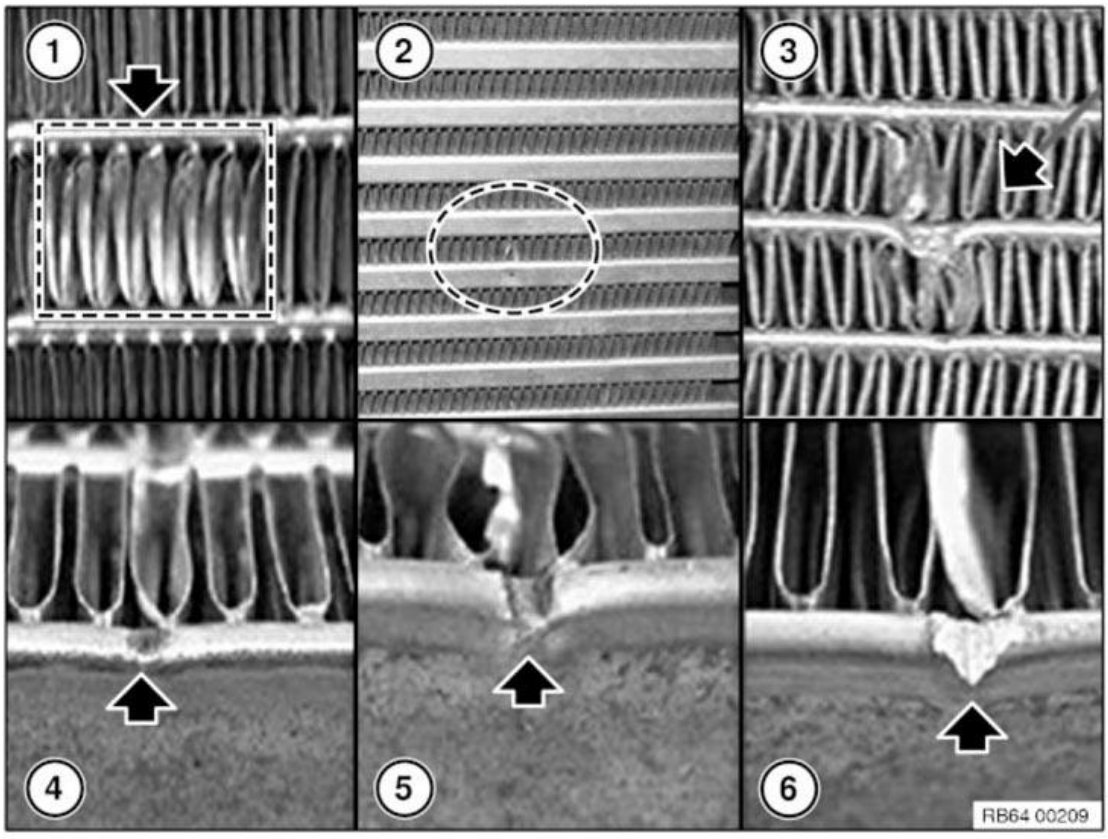


Fig. 82: Locating Damage On Radiator/Air Conditioning Condenser
Courtesy of BMW OF NORTH AMERICA, INC.

17 21 500 RINSING THE TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION) (GA8HP45Z, GA8HP70Z, GA8HP90Z)

NOTE: Carry out the operations listed when:
Installing a new or replacement transmission.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Use quick-release coupling to connecting line **17 2 019** from oil dispenser unit.

Use quick-release coupling to drain line **17 2 018** .

Hold and direct open end of drain line into a suitable collecting vessel.

Using oil dispenser unit, flush approx. 1 liter of transmission fluid through oil lines and transmission oil cooler.

Use only approved transmission fluid:

Trade name	BMW part number	Container size
ATF oil Shell L12108	83 22 2 152 426	20 liters

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

Recycling

Never use flushing oil.

Dispose of flushing oil according to country-specific waste disposal regulations.

Press hydraulic lines (1) into adapters (2).

Slide clamping bracket (3) into guides and secure with screw (4).

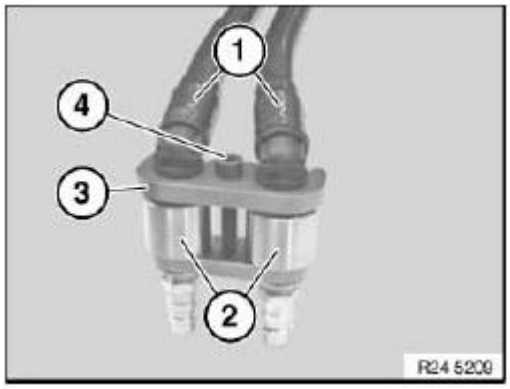


Fig. 83: Identifying Hydraulic Lines, Adapters, Clamping Bar And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing device for transmissions GA8HP45Z, GA8HP70Z, GA8HP90Z

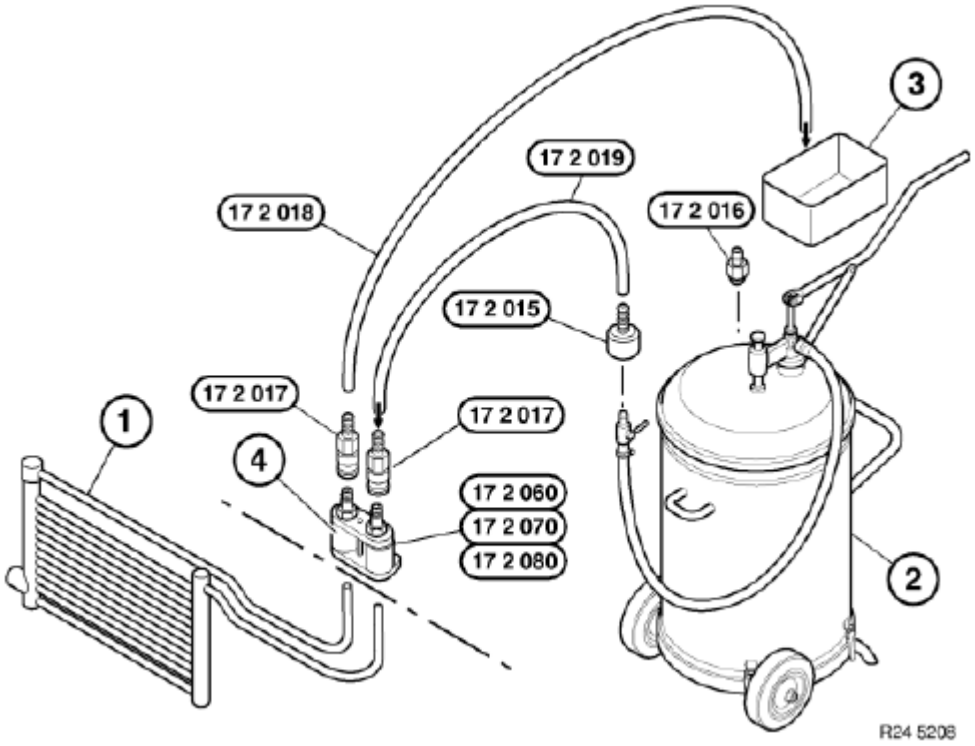


Fig. 84: Arrangement Of Flushing Device For Transmissions (GA8HP45Z, GA8HP70Z, GA8HP90Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil dispenser unit

   17 2 015 Connection for oil dispenser unit (2), manufacturer: Deutsche Tecalemit or

   17 2 016 Connection for oil dispenser unit (2), manufacturer: Horn

   17 2 017 quick-release coupling (2 pieces)

   17 2 019 Hose to oil dispenser unit (2)

3. Oil drip tray

   17 2 018 Hose to oil drip tray (3)

4. Adapter with clamping bracket

17 2 080 Adapter with clamping bracket GA8HP45Z/GA8HP70Z/GA8HP90Z

OIL COOLER LINES

17 22 010 REMOVING AND INSTALLING/REPLACING TRANSMISSION OIL COOLER FOR

AUTOMATIC TRANSMISSION (N63 B40/B44 O 0/1, N74)

IMPORTANT: Risk of scalding!
Only perform this repair work after engine has cooled down.

Necessary preliminary tasks:

- Drain **COOLANT**.
- Remove **FAN COWL**.

Recycling

Catch and dispose of drained coolant in a suitable container.

Transmission oil emerges when engine oil lines are detached from transmission oil cooler.

Catch and dispose of escaping transmission oil in a suitable container.

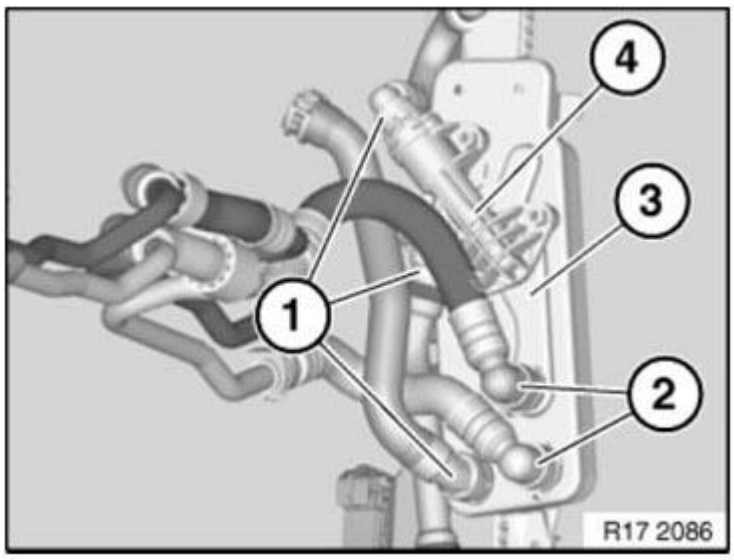
Observe country-specific waste disposal regulations.

Release and disconnect coolant hoses (1).

Unlock transmission oil lines (2) and detach.

Remove transmission oil cooler (3).

NOTE: Only when replacing transmission oil cooler (3), remount THERMOSTAT INSERTS (4).



Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.

Check **OIL LEVEL** in automatic transmission. If necessary, top up automatic transmission oil.

17 22 080 REMOVING AND INSTALLING/REPLACING FEED AND RETURN LINES FOR ENGINE OIL COOLER (N74)

WARNING: Risk of scalding!
Only perform this work after engine has cooled down.

IMPORTANT: Wear protective gloves and safety goggles.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the engine oil circuit.

When removing engine oil lines and engine oil cooler, seal off all openings with suitable plugs.

To avoid engine damage, do not allow any dirt particles to get into the engine oil circuit.

Recycling

Engine oil escapes when oil line is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Remove left and right **WHEEL ARCH PANEL, FRONT SECTION**
- Remove front **UNDERBODY PROTECTION**
- Remove right **INTAKE SILENCER HOUSING**
- Remove right-hand **INTAKE PORT**
- Remove **FAN COWL**

Release screw (1).

Tightening torque: see 4AZ in **17 22 ENGINE OIL COOLER LINES AND TRANSMISSION OIL COOLER LINES**

Release screw (2).

Tightening torque: see 5AZ in **17 22 ENGINE OIL COOLER LINES AND TRANSMISSION OIL COOLER LINES**

Remove oil lines from oil filter control housing and oil sump.

Catch and dispose of emerging oil.

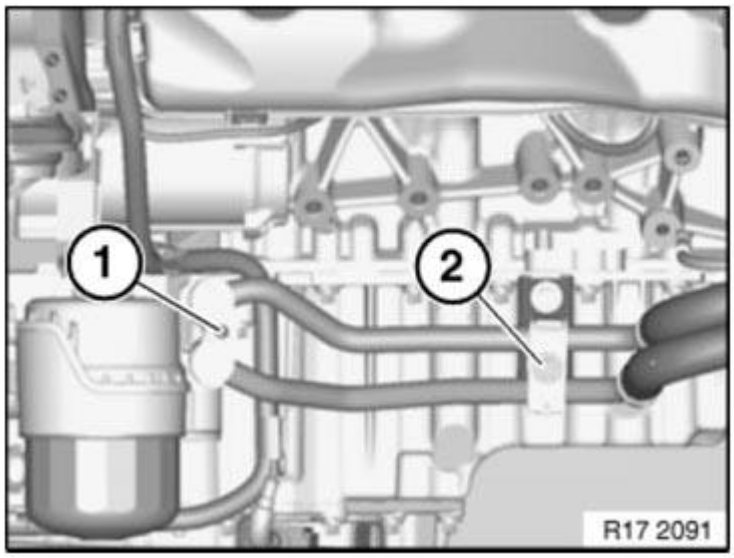


Fig. 86: Identifying Oil Filter Control Housing And Oil Sump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note

Replace all sealing rings on oil lines.

Release screw (1).

Release engine oil lines from holder.

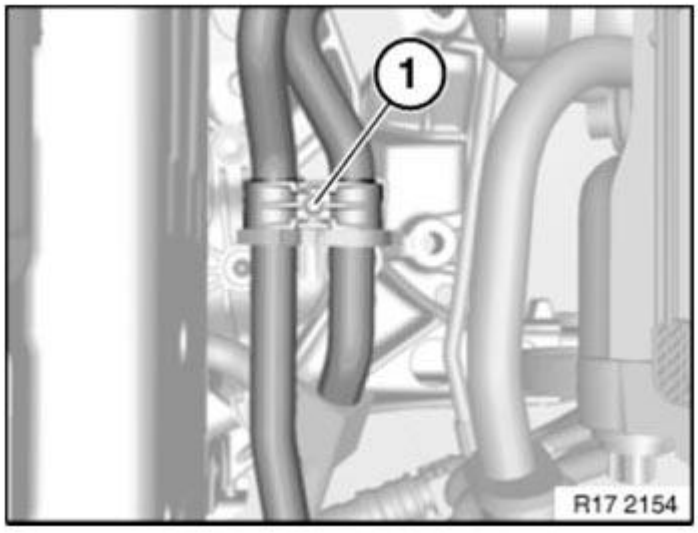


Fig. 87: Identifying Engine Oil Line Holder Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock engine oil lines (1) and pull off.

Catch and dispose of emerging oil.

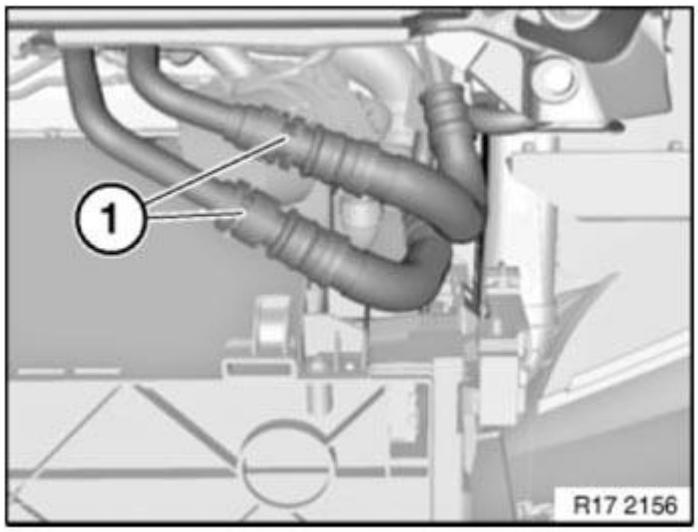


Fig. 88: Identifying Engine Oil Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock oil lines (1) and pull off them off the engine oil cooler, right.

Release screw (2).

Release engine oil lines from holder.

Feed out oil lines and remove.

Catch and dispose of emerging oil.

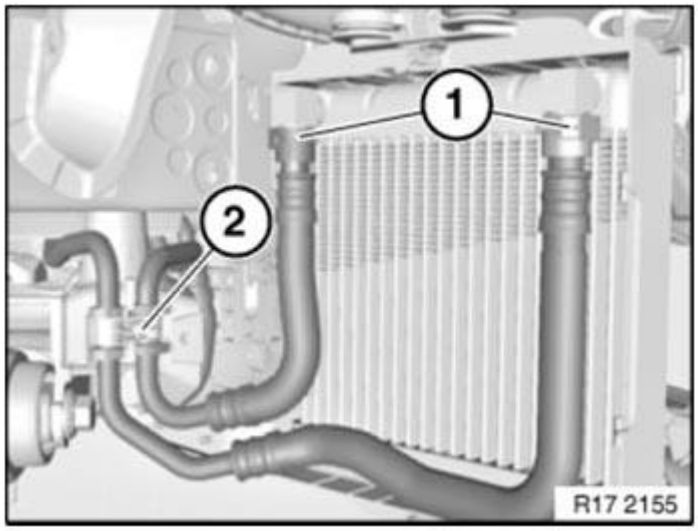


Fig. 89: Identifying Engine Oil Lines And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Release engine oil lines on the front axle.

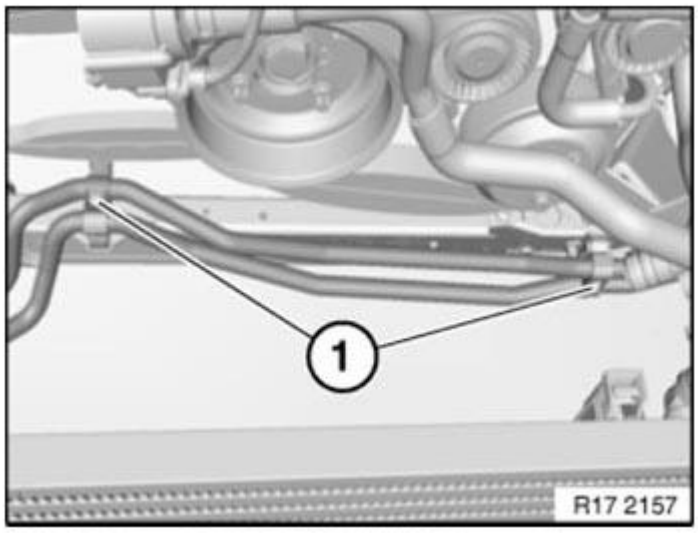


Fig. 90: Identifying Engine Oil Line Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock oil lines (1) and pull off them off the engine oil cooler, left.

Release screw (2).

Release engine oil lines from holder.

Feed out oil lines and remove.

Catch and dispose of emerging oil.

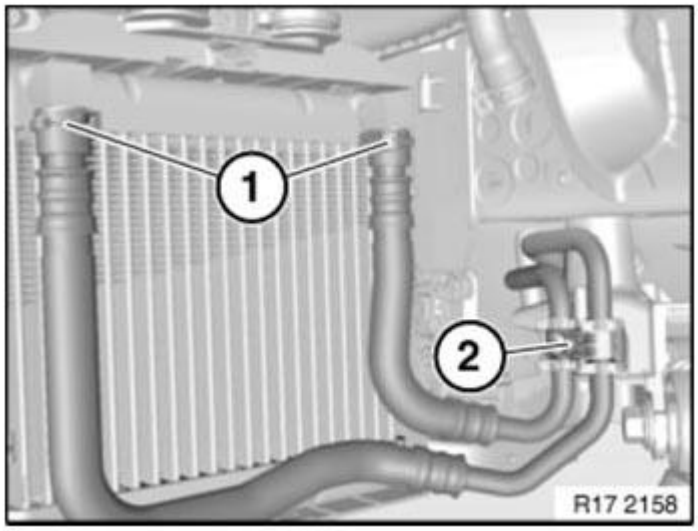


Fig. 91: Identifying Oil Lines And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary. Check oil lines for leaks.

CHARGE AIR COOLER WITH MOUNT

64 53... INSTRUCTIONS FOR REPLACEMENT OF AIR CONDITIONING CAPACITORS AND RADIATOR/COOLERS

IMPORTANT: Even when they are correctly installed or due to normal driving, coolers (oil cooler, radiator, charge air cooler) or air conditioning capacitors may show slight impressions or deformations on their discs (picture).

This is not damage.

Radiators, cooler or capacitors are not to be replaced in this case.

NOTE: The deformations shown in Fig. 92 can be bent back with a standard fin comb..

Damage to lines carrying media or on the flat pipe require replacement of the radiator/or air conditioning

condenser (picture 2-6).

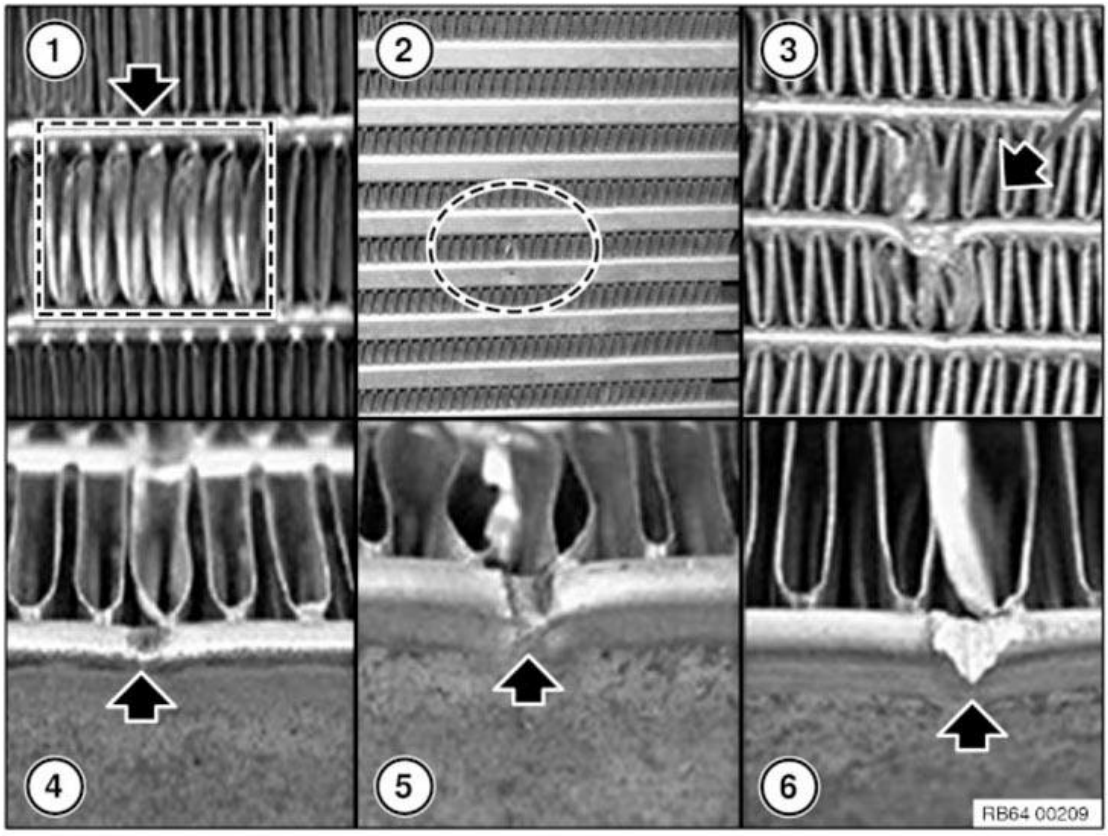


Fig. 92: Locating Damage On Radiator/Air Conditioning Condenser
Courtesy of BMW OF NORTH AMERICA, INC.

17 51 001 REMOVING AND INSTALLING/REPLACING LEFT INTERCOOLER (N74)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**
- Remove **THROTTLE BODY** left
- Drain coolant for intercooler

Release screws (1).

Tightening torque: see 1AZ in **17 51 INTERCOOLER WITH MOUNTING**

Release screw (2) below the charge air cooler.

Lift charge air cooler (3) slightly upward.

Installation:

Check gasket on intake plenum. Renew if necessary.

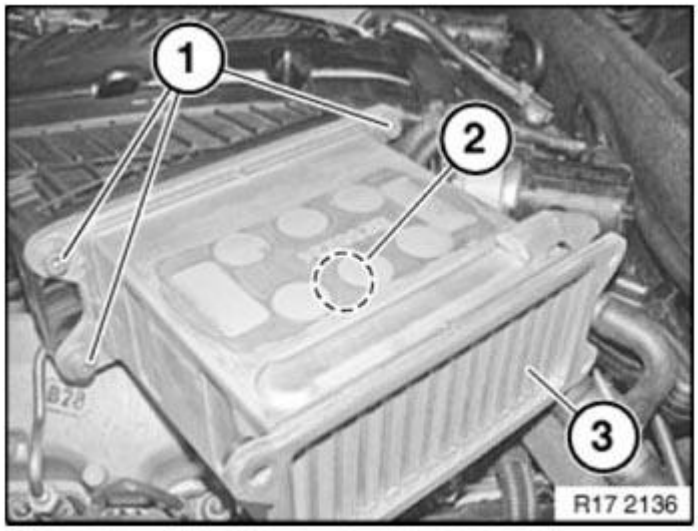


Fig. 93: Identifying Charge Air Cooler And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release and disconnect coolant hoses (1).

Remove intercooler.

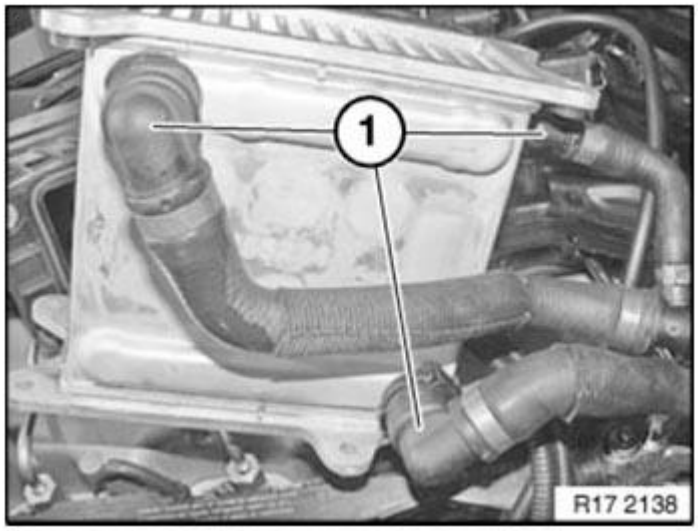


Fig. 94: Identifying Coolant Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Vent **COOLING SYSTEM** for intercooler.

Check cooling system for intercooler for leaks.

17 51 001 REMOVING AND INSTALLING/REPLACING RIGHT INTERCOOLER (N74)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**
- Remove right **THROTTLE VALVE ASSEMBLY**
- Drain coolant for intercooler

NOTE: Pictures show the left side, the procedure for the right side is identical.

Release screws (1).

Tightening torque: see 1AZ in **17 51 INTERCOOLER WITH MOUNTING**

Release screw (2) below the charge air cooler.

Raise charge air cooler (3) slightly.

Installation:

Check seal on the intake manifold; replace if necessary.

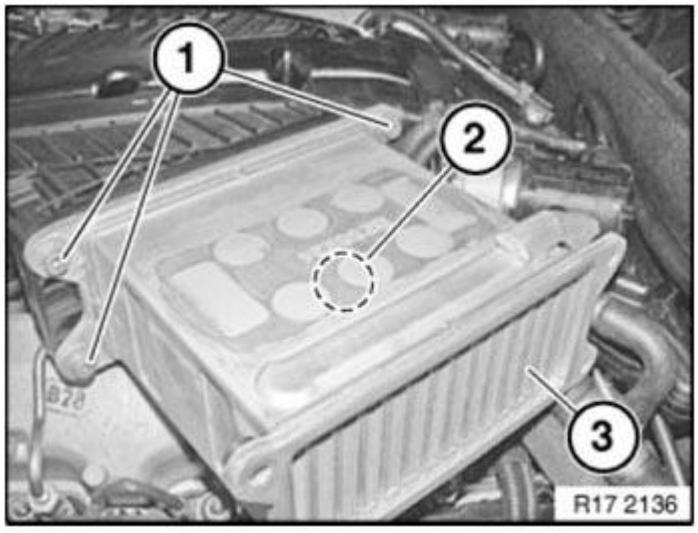


Fig. 95: Identifying Charge Air Cooler And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Pictures show the left side, the procedure for the right side is identical.

Release and disconnect coolant hoses (1).

Remove intercooler.

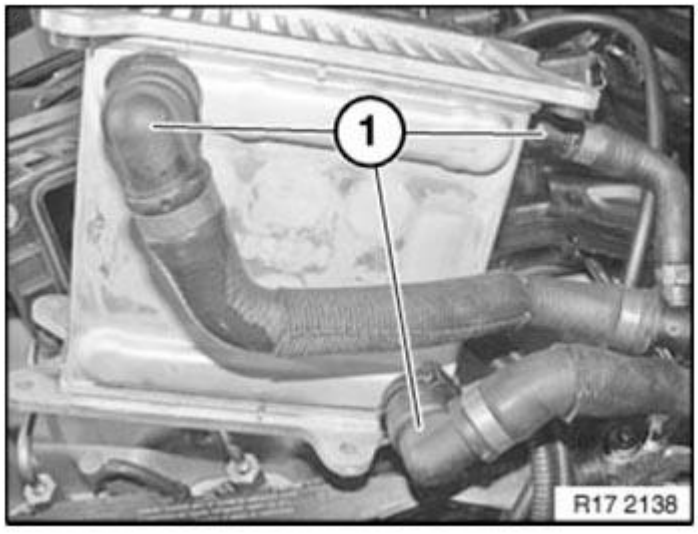


Fig. 96: Identifying Coolant Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Vent **COOLING SYSTEM** for intercooler.

Check cooling system for intercooler for leaks.

ENGINE

Engine And Gearbox Suspension

ENGINE MOUNTING

22 11 011 REPLACING LEFT ENGINE MOUNT (N74)

Necessary preliminary tasks:

- Secure engine in **INSTALLATION POSITION**
- Lower **FRONT AXLE SUPPORT**

Release bolt (1) and remove engine mount.

IMPORTANT: Installation:
To ensure play between engine mount and engine support arm, lower the engine completely before tightening the bolt connection (engine mount/engine support arm).

Tightening torque **22 11 2AZ** .

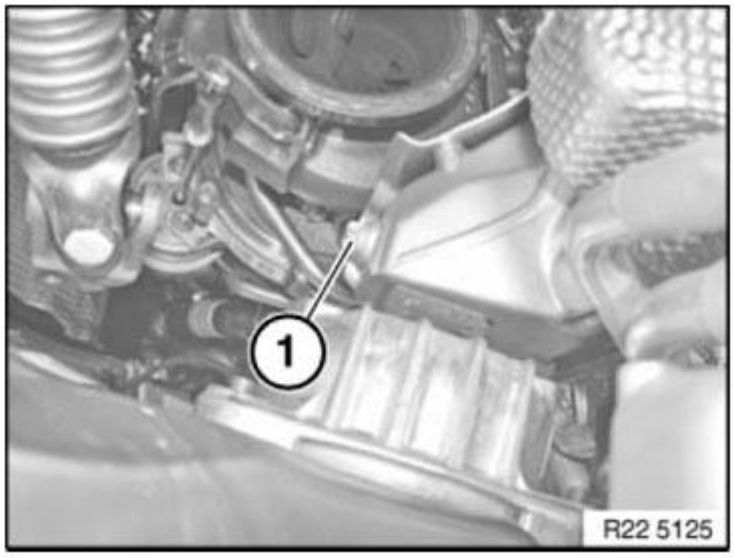


Fig. 1: Identifying Engine Mount Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rubber section (1) of engine mount must point to middle of vehicle.

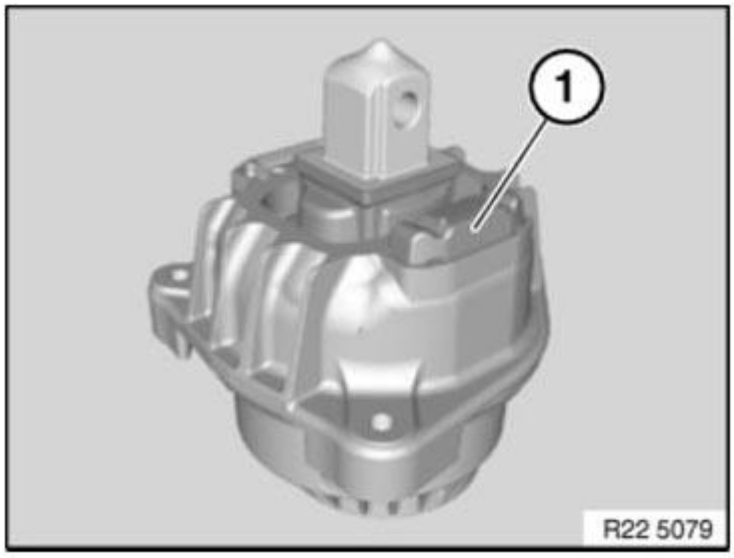


Fig. 2: Identifying Engine Mount Rubber Section
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 110 REPLACING LEFT ENGINE SUPPORT ARM (N74)

Necessary preliminary tasks:

- Secure engine in **INSTALLATION POSITION**
- Lower **FRONT AXLE SUPPORT**
- Remove left **CATALYTIC CONVERTER**

Release screw (1).

IMPORTANT: Installation:
To ensure play between engine mount and engine support arm, lower the engine completely before tightening the bolt connection (engine mount/engine support arm).

Tightening torque **22 11 2AZ** .

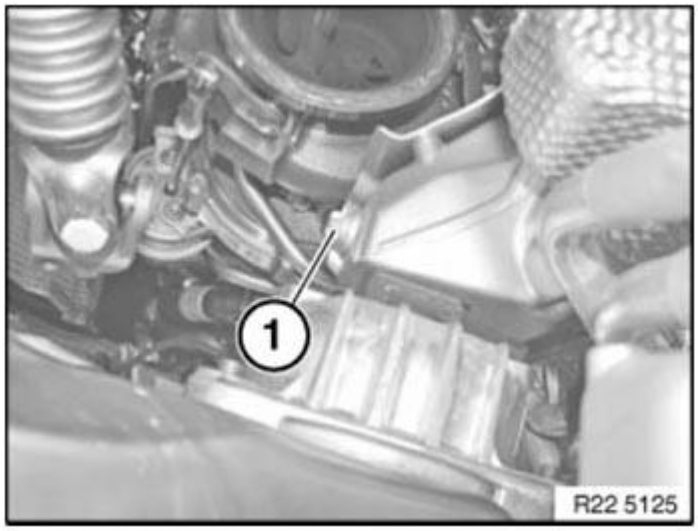


Fig. 3: Identifying Left Engine Support Arm Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove heat shield (2).

Tightening torque, **12 41 2AZ** .

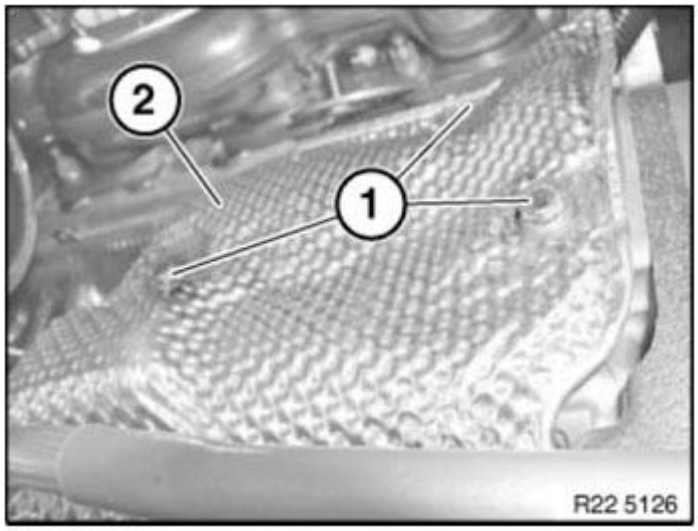


Fig. 4: Identifying Heat Shield And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove engine support arm.

Tightening torque **22 11 3AZ** .

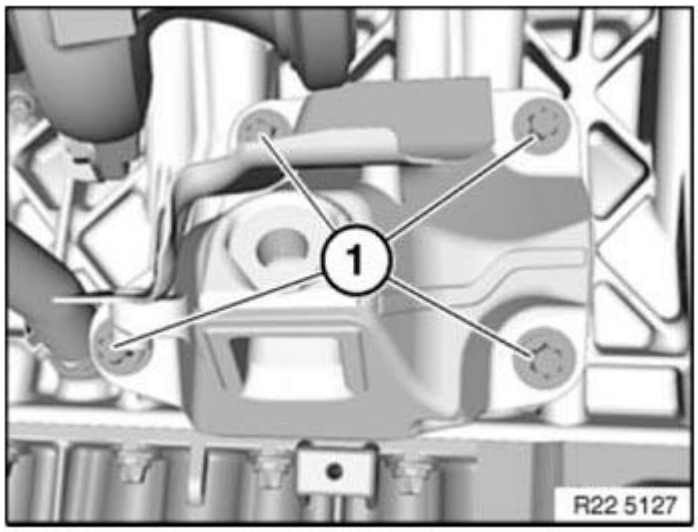


Fig. 5: Identifying Engine Support Arm Screws
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 001 REPLACING RIGHT ENGINE MOUNT (N74)

Necessary preliminary tasks:

- Secure engine in **INSTALLATION POSITION**
- Lower **FRONT AXLE SUPPORT**

Release bolt (1) and remove engine mount.

IMPORTANT: Installation:
To ensure play between engine mount and engine support arm, lower the engine completely before tightening the bolt connection (engine mount/engine support arm).

Tightening torque **22 11 2AZ** .

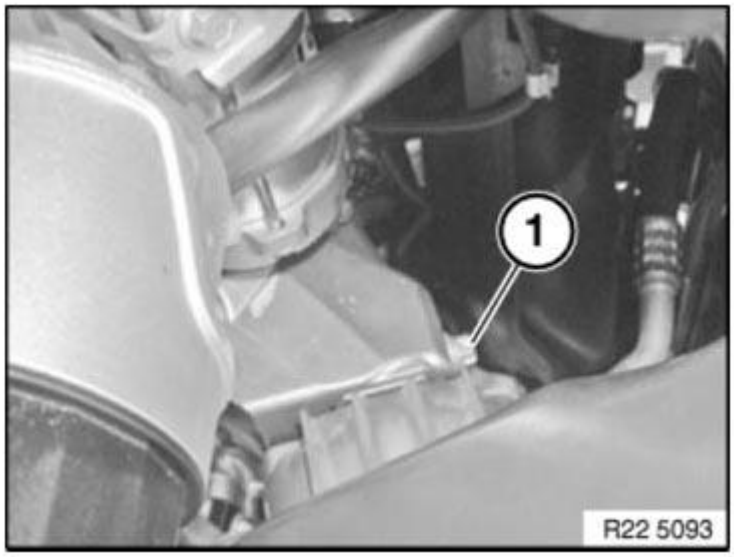


Fig. 6: Identifying Engine Mount Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rubber section (1) of engine mount must point to middle of vehicle.

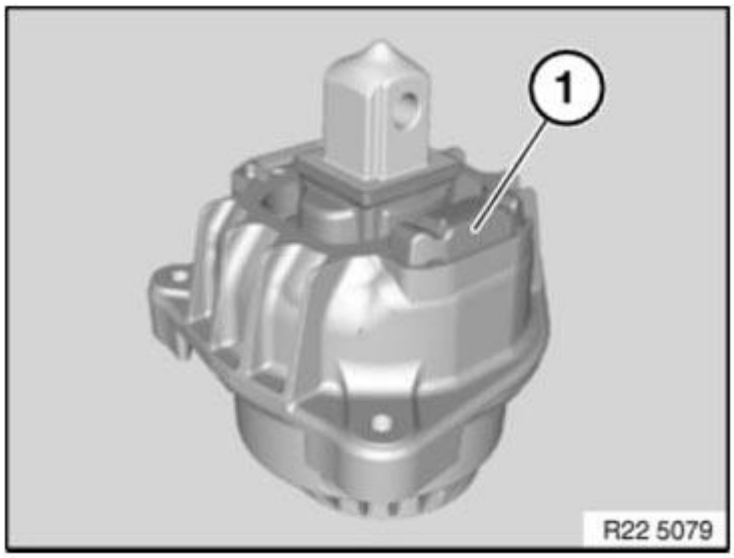


Fig. 7: Identifying Engine Mount Rubber Section
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 100 REPLACING RIGHT ENGINE SUPPORT ARM (N74)

Necessary preliminary tasks:

- Secure engine in **INSTALLATION POSITION**
- Lower **FRONT AXLE SUPPORT**

Release screw (1).

IMPORTANT: Installation:
To ensure play between engine mount and engine support arm, lower the engine completely before tightening the bolt connection (engine mount/engine support arm).

Tightening torque **22 11 2AZ** .

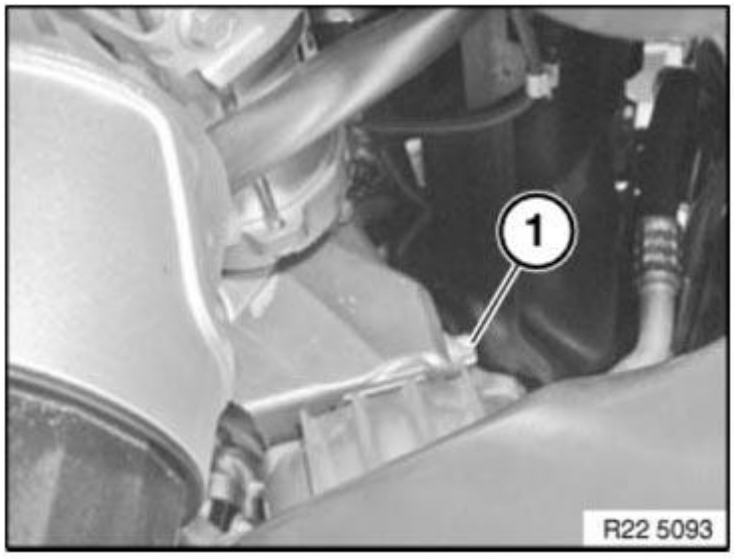


Fig. 8: Identifying Engine Mount Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove engine support arm.

Tightening torque **22 11 3AZ** .

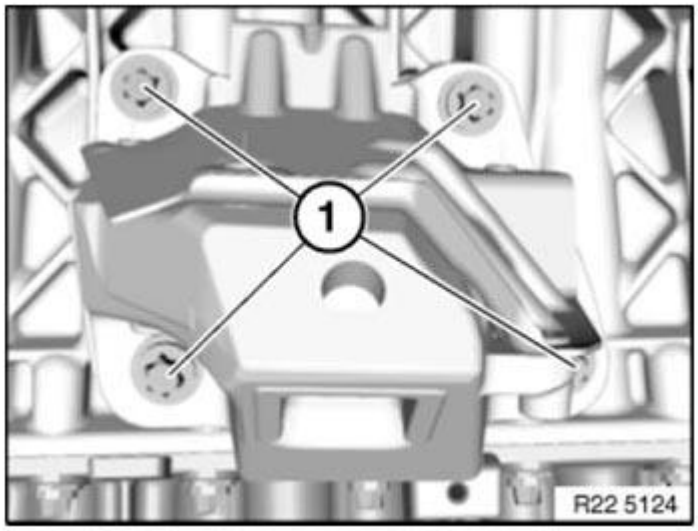


Fig. 9: Identifying Engine Support Arm Screws
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION SUSPENSION

22 32 055 REMOVING AND INSTALLING/REPLACING TRANSMISSION BEARING BLOCK (N74)

Necessary preliminary tasks:

- Remove **RUBBER MOUNTS FOR GEARBOX MOUNTING**.

Release ground cable.

Release screws (1).

Tightening torque **22 32 1AZ** .

Remove transmission mounting bracket from transmission.

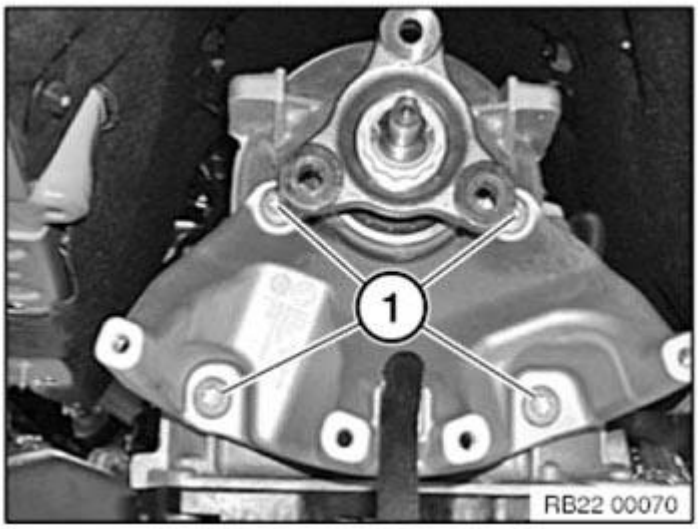


Fig. 10: Identifying Transmission Mounting Bracket Screws
Courtesy of BMW OF NORTH AMERICA, INC.

22 32 050 REPLACING CROSSMEMBER FOR TRANSMISSION MOUNTING (N74)

Necessary preliminary tasks:

- Remove rear **UNDERBODY PROTECTION**
- Support transmission with lifter.

Release screws (1) and (2).

Remove transmission cross-member.

Tightening torque **22 32 3/4AZ** .

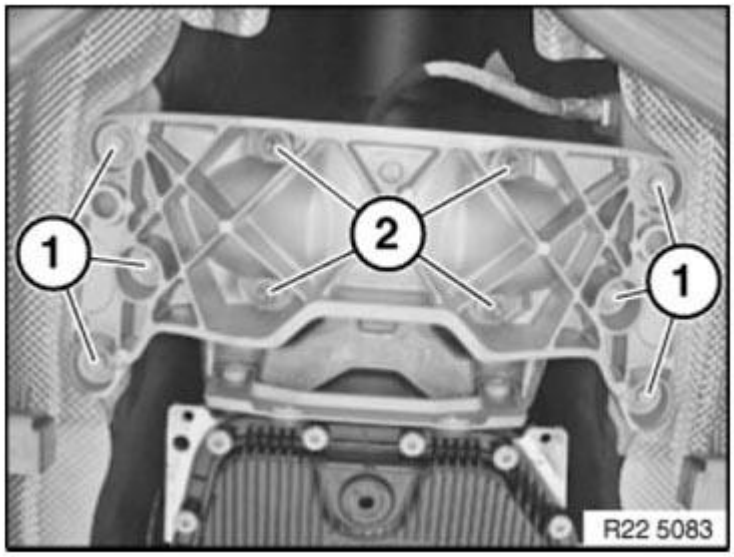


Fig. 11: Identifying Transmission Cross-Member Screws
Courtesy of BMW OF NORTH AMERICA, INC.

22 32 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (N74)

Necessary preliminary tasks:

- Remove **TRANSMISSION CROSS-MEMBER**.

Release screws (1).

Remove rubber mount.

Tightening torque **22 32 2AZ** .

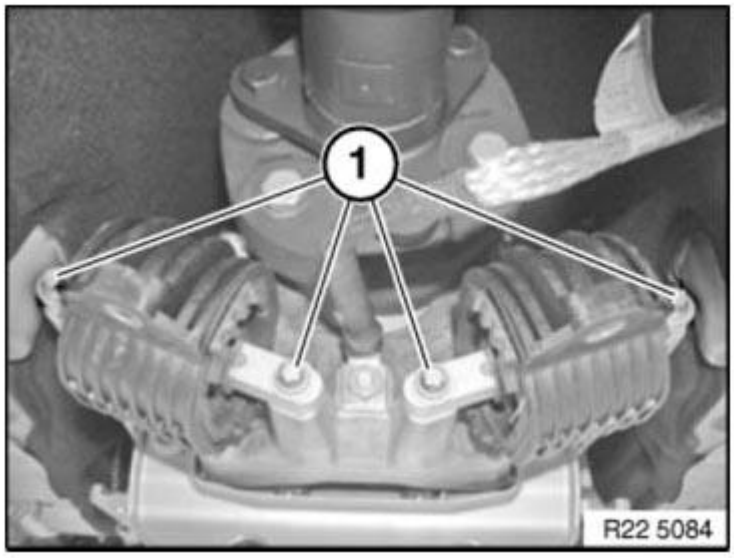


Fig. 12: Identifying Rubber Mount Screws
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE

Engine Electrical System

TROUBLESHOOTING

61 20... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular engine types and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents possible short-circuiting.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery replacement

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, there will always be only one work scope provided that is permitted by the current status of information.

If the performance readiness drops below a defined minimum, a Check Control message will be generated to advise the driver that the battery must be replaced.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

NOTE: Only this registration/logon will ensure that the corresponding Check Control message will go out again.

Diagnosis system

Register battery replacement

- Service functions
- Body

- Voltage supply
- Register battery replacement

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system

- Battery retrofitting

61 13... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

IMPORTANT:

1. **Identify cause of damage (e.g. sharp-edged body components, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).**
2. **Read out fault memory**
3. **Eliminate cause of damage.**
4. **Disconnect battery negative terminal**
5. **Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Department)**
6. **Carry out function test and read out fault memories again**
7. **Eliminate new faults if applicable and clear fault memories**

NOTE: **The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.**

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Department.

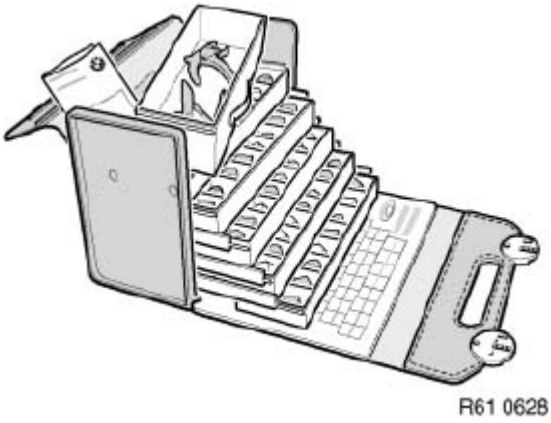


Fig. 1: Identifying Tool Box
Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular connector system D 2.5.

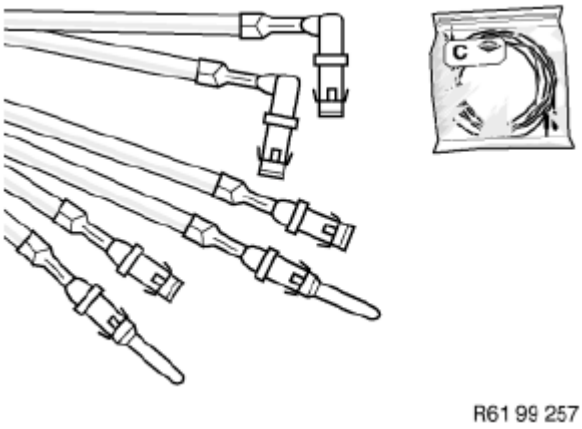


Fig. 2: Identifying Repair Kits
Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts:

1. Pre-packaged end of cable with requisite wire cross-section
2. Crimp connector for selected wire cross-section
3. Shrink-fit hose

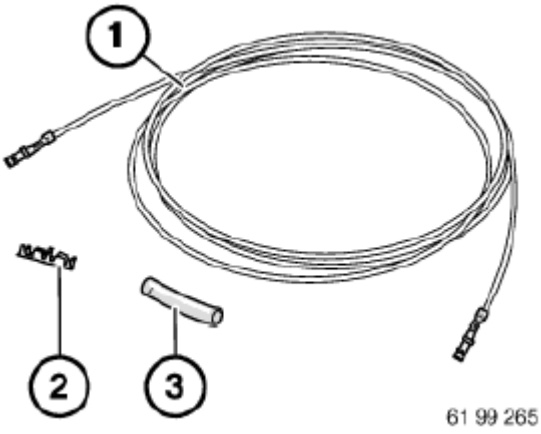


Fig. 3: Identifying Shrink-Fit Hose, Crimp Connector And Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool set **61 0 300**).

See repair instructions:

NOTES FOR OPENING CONTACTS AND LOCKS of different plug contact systems.

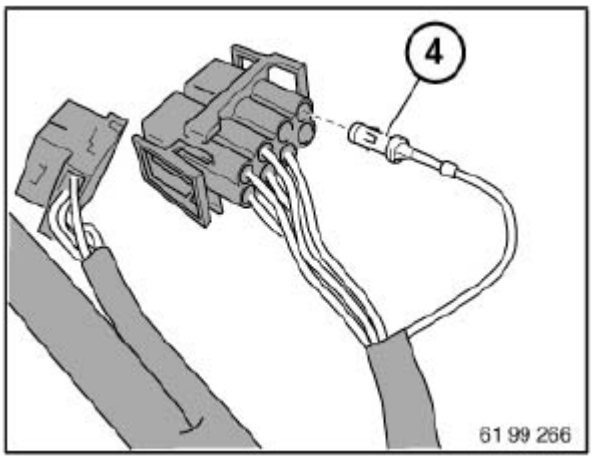


Fig. 4: Identifying Housing Damaged Contact
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Check maximum length of repair cable**
- **If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.**

Adhere to following procedure:

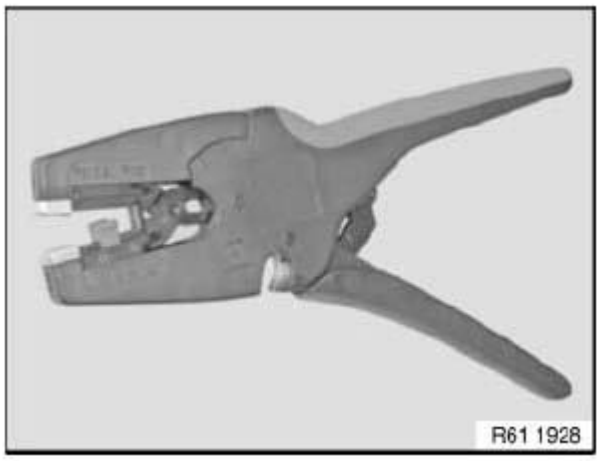


Fig. 5: Identifying Wire Cutter
Courtesy of BMW OF NORTH AMERICA, INC.

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Refer also to repair instruction:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

Crimp butt connector on preassembled wire end.

Special tools:

- **61 4 340** (0.35 - 2.5 sq mm)
- **61 0 240** (4.0 - 6.0 sq mm)

See repair instructions:

CRIMPING ON STOP PARTS

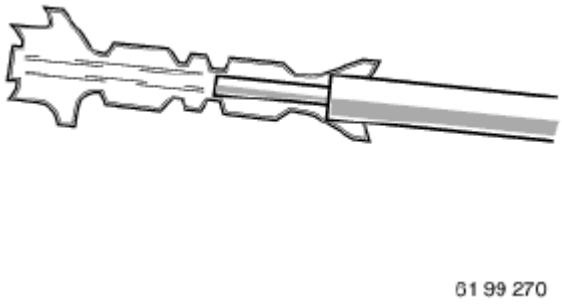


Fig. 6: Identifying Crimp Butt Connector On Preassembled Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (8) onto free wire end.

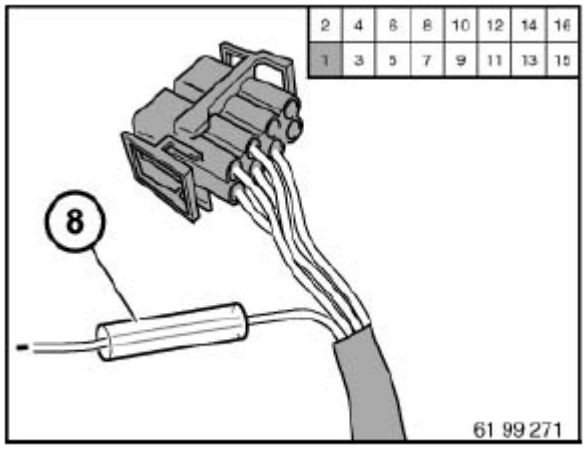
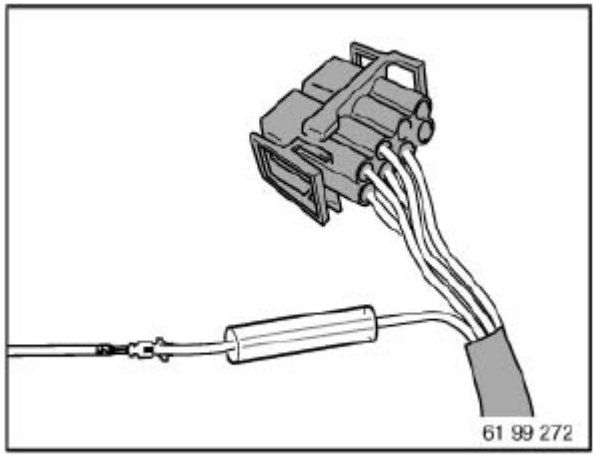


Fig. 7: Identifying Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.



Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

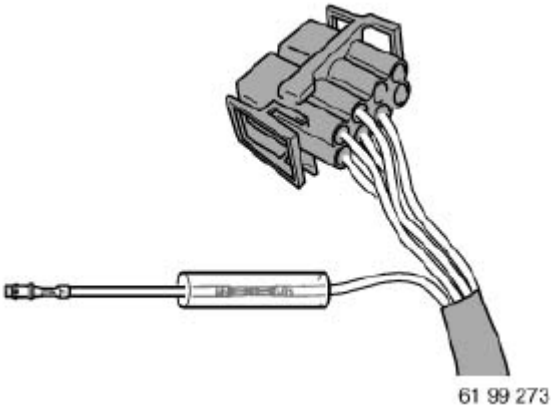


Fig. 9: Identifying Shrink-On Sleeve Over Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

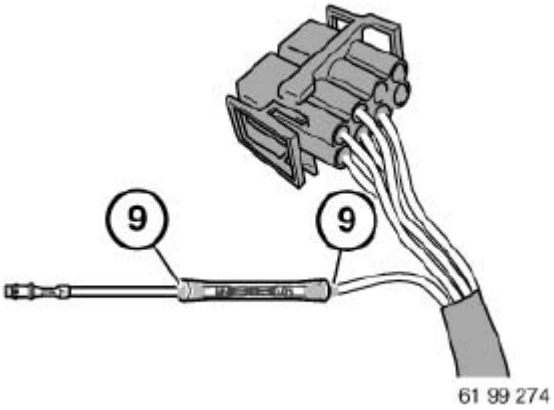


Fig. 10: Identifying Shrink-Fit Hose Sleeve Both Sides
Courtesy of BMW OF NORTH AMERICA, INC.

12 00... INSTRUCTIONS FOR REMOVAL AND REPLACEMENT OF CONTROL UNITS

IMPORTANT:

- **Disconnecting the vehicle battery will cancel the fault memories of control units. Consequently, before disconnecting the car's battery, always interrogate the fault memories. Investigate stored faults and, once any faults have been remedied, cancel the fault memory.**
- **Control unit plugs should only ever be connected and disconnected while the ignition is turned off.**
- **The removal and installation of components, relays, fuses etc. can cause faults to be stored in fault memories capable of self diagnosis. Always interrogate the fault memories after completing work on the electrical system.**
- **Investigate stored faults and, once any faults have been remedied, cancel the fault memory.**
- **If necessary, initialize power window regulator Initialize power window regulator**

On replacement of the DME/DDE control unit note the following:

- In every case use the diagnosis system to read out the hardware/software version of the corresponding control unit.

  Comply with the diagnosis system instructions for the encoding and programming work operations.

  On vehicles with an electronic immobilizer, comply with the diagnosis system instructions.

- In every control unit certain mean values are stored that are the basic values. The control unit receives different input values according to the engine condition. The teachable system compares the input values against the stored basic values and then forms the associated control commands. The control commands are forwarded to the corresponding actuators.
- When the DME control unit is de-energized for a long period (over one hour), the teachable system then loses the stored values. When a deleted control unit is returned to service or a new control unit is installed, the teachable system itself must read in and store the input value of the associated engine as new basic values.
- This process may cause uneven idle and faults in coasting mode after starting. Depending on the engine characteristics, it may take some time until all values have been compared with the engine condition.
- Therefore, comply with the following procedure before replacement or reinstallation of a DME/DDE control unit is carried out:
  1. If possible, bring the engine up to its operating temperature prior to replacement of the control unit.
  2. Change control units and drive the vehicle with changing engine speeds.

12 00... INSTRUCTIONS FOR WORKING ON THE IGNITION SYSTEM

CAUTION: Always switch off ignition before working on ignition system.
Use only test leads which have been approved and belong to these testing instruments (e.g. DIS Tester).

Comply with operating instructions of the respective testing instrument used.
Comply with the country-specific safety regulations.
Never touch components under current with engine running!
Comply with instructions of DIS tester.
Do not connect any suppression capacitors or inspection lamps to terminal 1 on the ignition coil.
Terminal 1 of ignition coil must not be connected to ground or battery positive lead.
If an alarm system is subsequently installed, lead of terminal 1 must not be used for start prevention.
When working on ignition system, always disconnect supply leads to ignition coils.
High tension! - High tension!

IMPORTANT: Hazardous voltages occur at:

- Ignition lead
- spark-plug connectors
- spark plugs
- Ignition coil (high voltage at terminal 4 is approx. 40 kV)
- Lead of terminal 1 from ignition coil to DME control unit (high voltage approx. 350 V)

61 00... NOTES FOR DISCONNECTING AND CONNECTING BATTERY

Observe **SAFETY INFORMATIONS FOR HANDLING VEHICLE BATTERY** .

Before disconnecting battery

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

IMPORTANT:

- **There is a danger of mixing up battery cables: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.**
- **The on-board computer and clock may lose your data.**

General notes on disconnecting battery

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Vehicles with IBS on battery negative terminal:

Do not under any circumstances pull/lever off pole shoes by force.

Do not under any circumstances release socket-head cap screw of IBS.

- Disconnect terminal of **BATTERY NEGATIVE LEAD** from vehicle battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal:

Tightening torque: see 1AZ in **61 21 BATTERY WITH TERMINAL**

After connecting battery

IMPORTANT: The scope of application of some systems may be restricted after a power supply interruption.

Likewise, individual settings may be lost.

Settings or activations must be carried out, depending on the equipment specification.

For example:

- If necessary, activate **SLIDE/TILT SUNROOF**
- If necessary, activate **POWER WINDOWS** .

61 13... NOTES FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

Abbreviations of contacts and what they mean:	
ELA	Strand seal
D 1.5/2.5/3.5	Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter
MDK	Miniature double flat spring contact
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact

Mcon	Multi contact

IMPORTANT: The contacts can be changed on ultrasonically welded connectors (1).

Ultrasonically welded connectors (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

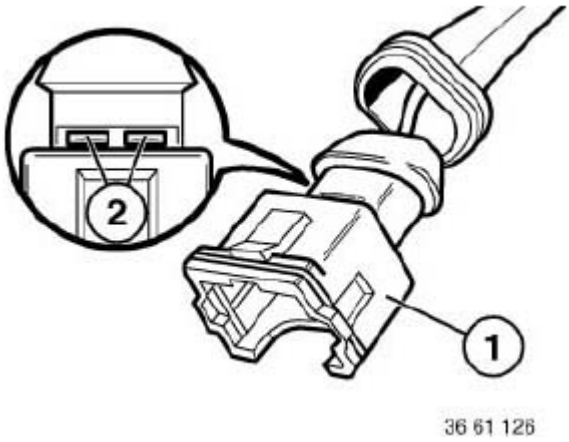


Fig. 11: Identifying Ultrasonic-Welded Connectors And Welds
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool sets:

- Unlocking and pressing-off tool 61 1 150 is replaced as of 09/2005 by **61 0 300**
- Release and pressing-off tool 61 1 100 (engine)

Repair instructions for opening connector housings and removing contacts of different connector systems

Connector system D 1.5/D 2.5

- **CIRCULAR CONNECTORS, 7- OR 8-PIN, SYSTEM D 2.5**
- **CIRCULAR CONNECTORS, 13-PIN, SYSTEM D 2.5**
- **CIRCULAR CONNECTORS, 20-PIN, SYSTEM D 2.5**
- **CIRCULAR CONNECTORS, 4-, 7-, 10-, 12- OR 25-PIN, SYSTEM D 1.5/D 2.5**
- **IN-LINE CONNECTORS, 15-PIN, SYSTEM D 2.5**
- **IN-LINE CONNECTORS, 8-, 12-PIN, SYSTEM D 2.5**
- **IN-LINE CONNECTORS, 30-PIN, SYSTEM D 2.5**
- **IN-LINE CONNECTORS, 20-PIN, SYSTEM D 2.5**

Connector system JPT/MDK/DFK

- **IN-LINE CONNECTORS, 2-PIN, SYSTEM JPT ELA**
- **IN-LINE PLUGS, 2-PIN, SYSTEM MDK 3 PLUS 2.8**
- **IN-LINE PLUGS, 4-PIN, SYSTEM DFK ELA**

Connector system Elo/Elo Power

- **INLINE PLUGS, 4-, 10-PIN, SYSTEM ELO**
- **IN-LINE CONNECTORS, 6- TO 50-PIN, SYSTEM ELO**
- **INLINE PLUGS, 3-, 6-PIN, SYSTEM ELO-POWER 2.8**

Connector system LSK

- **CONNECTOR HOUSING LSK CONTACT**

Connector system MQS/MPQ

- **INLINE CONNECTORS, 6-, 8-PIN, SYSTEM MQS**
- **INLINE PLUGS, 2-PIN, SYSTEM MPQ 2.8**
- **CONTROL UNIT CONNECTORS, 25-, 35-, 55-, 83-, 88-PIN**
- **IN-LINE PLUGS, 24-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSING 42-, 43-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSINGS 2X21-, 2X27-PIN, HYBRID SYSTEM MQS/MPQ, ELO/ELO POWER**
- **IN-LINE CONNECTORS, 30-PIN, HYBRID SYSTEM MQS/MPQ**
- **SOCKET HOUSINGS, 5-, 8-PIN, SYSTEM MQS/MPQ**
- **SOCKET HOUSING (RADIO CONNECTOR), HYBRID SYSTEM MQS/MPQ**

61 00... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general:

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded cables

Joins in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial cable

- Shielded RTK031 coaxial lines may only be repaired using special crimping tools.

CVBS cables

- CVBS cables may not be repaired.
- CVBS cables must be replaced in their entirety.

HSD cables

- HSD cables may not be repaired.
- HSD cables must be replaced in their entirety.

Fibre-optic cables:

NOTE: Fibre-optic cables are colored differently as follows:

- Green = **MOST** (**M** edia
- **O** riented **S** ystems **T** ransport) optical fibre
- Yellow = **ISIS** (Intelligent **S** afety Integration **S** ystem) optical fibres
- Orange=repair fibre-optic cables

IMPORTANT:

- **Optical fibres are permitted to show only one junction point (bridge). Replace optical fibres if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables. See **CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** and **CRIMPING OPTICAL FIBRES** .

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK TUBING**.

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary.**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair.**

Airbag lines:

REPAIRING AIRBAG CABLES

12 00... NOTES/INFORMATION ON START ASSISTANCE (JUMP STARTING)

Do not start the engine with help of starting sprays.

Preparation

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.
- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

IMPORTANT: Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

IMPORTANT: Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the

negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles .

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

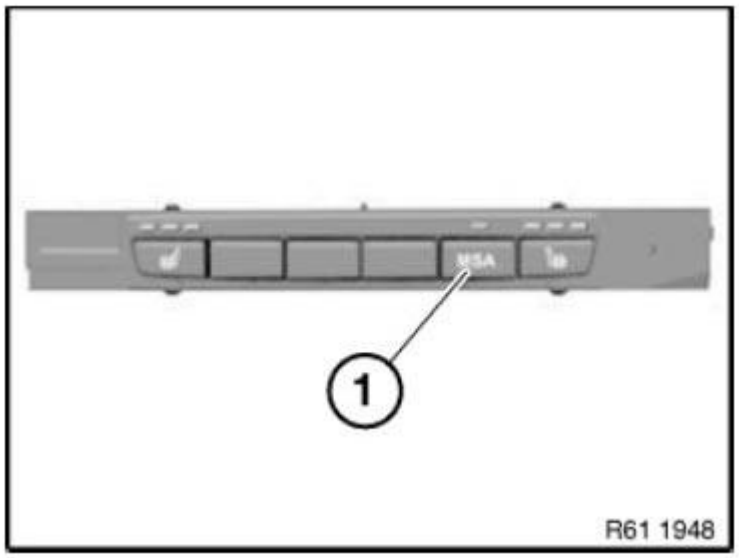


Fig. 12: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

B = 7 mm

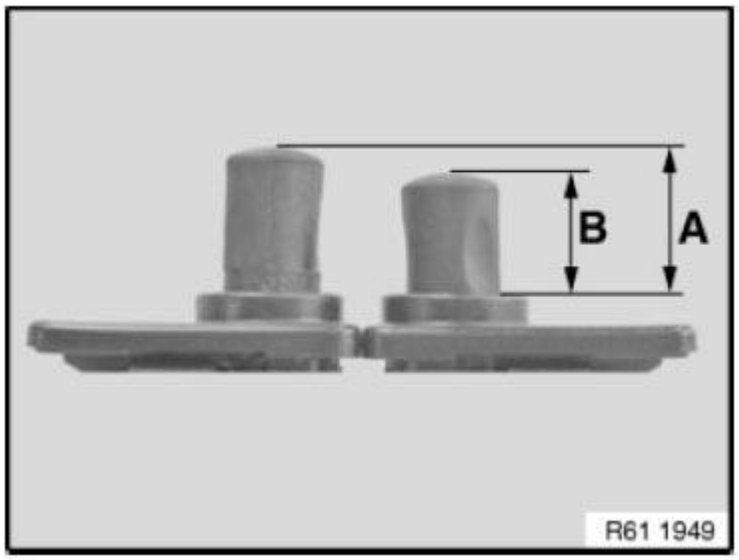


Fig. 13: Identifying Engine Bonnet/Hood Position (Workshop Mode And Basic Setting)
Courtesy of BMW OF NORTH AMERICA, INC.

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

When working with diagnosis tools

- Observe instructions in diagnosis tool

IGNITION WIRES, SPARK PLUGS

12 12 011 REMOVING AND INSTALLING/REPLACING ALL SPARK PLUGS (N54, N63 B44 0/1, N74)

Necessary preliminary tasks:

- Switch off ignition.
- Remove **IGNITION COILS**.

IMPORTANT: Wear safety goggles.

Oil and dirt particles may get into your eyes!

Clean spark plug slot with compressed air .

1. Remove dirt contamination from the spark plug shaft. The plug shaft must be cleaned with compressed air after the ignition coils have been removed but before the spark plugs have been dismounted. After

removing the spark plugs, check the sealing surface again for dirt contamination and if necessary, clean with a damp cloth or again with compressed air.

NOTE: Deposits that are not removed according to instructions may enter the combustion chamber and lead to uncontrolled combustion. Remaining deposits in the area of the spark plug seal can lead to leaks and to the spark plugs coming loose during engine operation.

2. Do not grease/oil thread or use any graphite or copper grease. Adhere to the torque values of the packaging information or regulation.

NOTE: If these instructions are not followed, especially with regard to greasing, this may result in mechanical damage to the spark plug housing/thread. Spark plugs that are not tightened sufficiently lead to leaks and to the spark plugs coming loose during engine operation.

Unscrew spark plugs with special tool **12 1 220** and extension with min. 8° bend.

Flexible ratchet extensions must always be used. If rigid mounting tools are used, there is a risk of insulator breakages.

NOTE: Also do not use a variable plug connection with locking capability as this also poses a risk of insulator breakages.

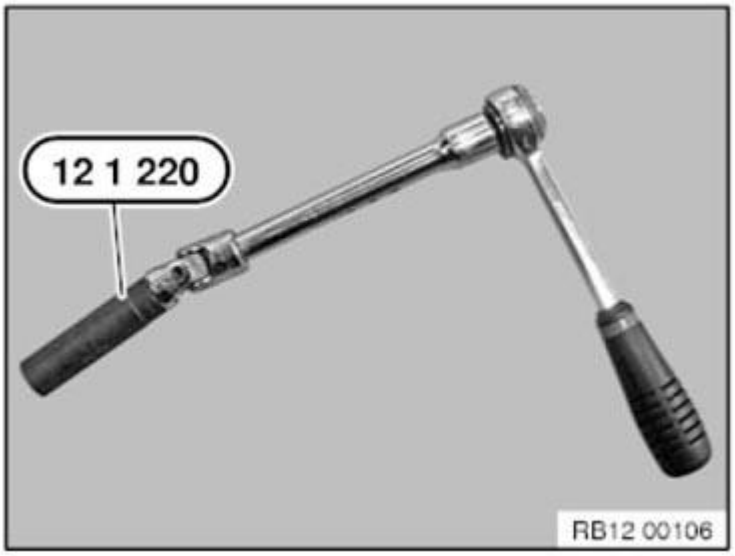


Fig. 14: Unscrewing Spark Plugs Using Special Tool 12 1 220
Courtesy of BMW OF NORTH AMERICA, INC.

Attach new spark plug (1) to special tool **12 1 230** .

IMPORTANT: Do not let spark plugs fall into the spark plug shaft. This can lead to a reduction of the electrode gap and so impair the smooth running of the engine, especially in idle mode.

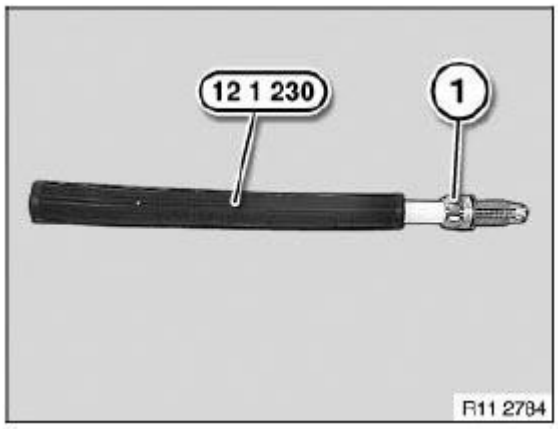


Fig. 15: Attaching Spark Plug To Special Tool 12 1 230
Courtesy of BMW OF NORTH AMERICA, INC.

Screw spark plug with special tool **12 1 230** hand-tight into cylinder head plug thread as far as it will go.

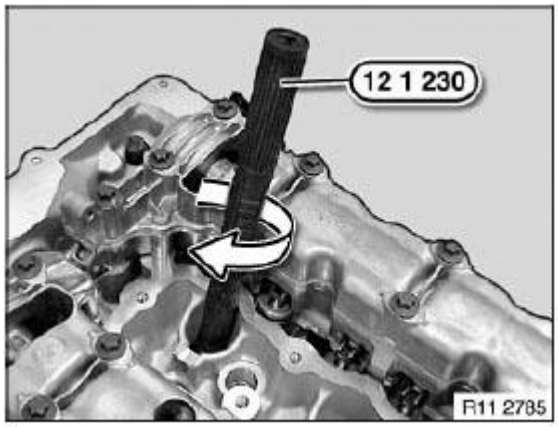


Fig. 16: Screwing Spark Plug Using Special Tool 12 1 230
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten spark plugs with torque wrench, special tool **12 1 220** and extension with min. 8° bend.

Flexible ratchet extensions must always be used. If rigid mounting tools are used, there is a risk of insulator breakages.

NOTE: Also do not use a variable plug connection with locking capability as this also poses a risk of insulator breakages.

Observe tightening torque.

Tightening torque: see 2AZ in **12 12 SPARK PLUGS** .

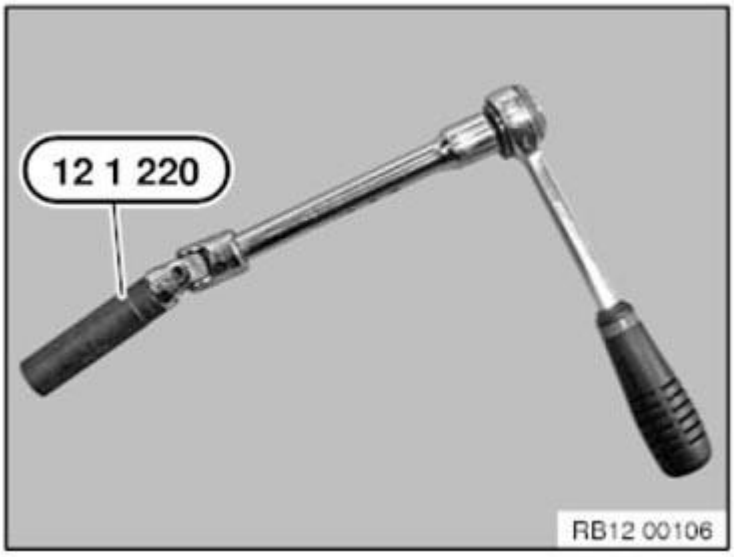


Fig. 17: Tightening Spark Plugs Using Torque Wrench, Special Tool 12 1 220
Courtesy of BMW OF NORTH AMERICA, INC.

IGNITION COIL

12 13 511 REPLACING IGNITION COILS (N74)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Check stored fault messages and process procedure.
- Switch off ignition.
- Remove left and right **INTAKE FILTER HOUSINGS** .
- Remove **LEFT** and **RIGHT** throttle body.

IMPORTANT: Ignition coils must not be contaminated by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

The silicone tube of the spark plug connector is coated with talc to reduce the pulling forces. The silicone tube must NOT be oiled or greased. This would greatly reduce the durability of the silicone material, which can lead to a malfunction of the ignition coil.

Unlock plug catch (2) on ignition coil (2) and unplug connector (1).

Pull out the ignition coil (2) slowly in a smooth upwards movement.

NOTE: There is a possibility that the silicone tube will tear and therefore be destroyed.

This procedure is applicable to all ignition coils.

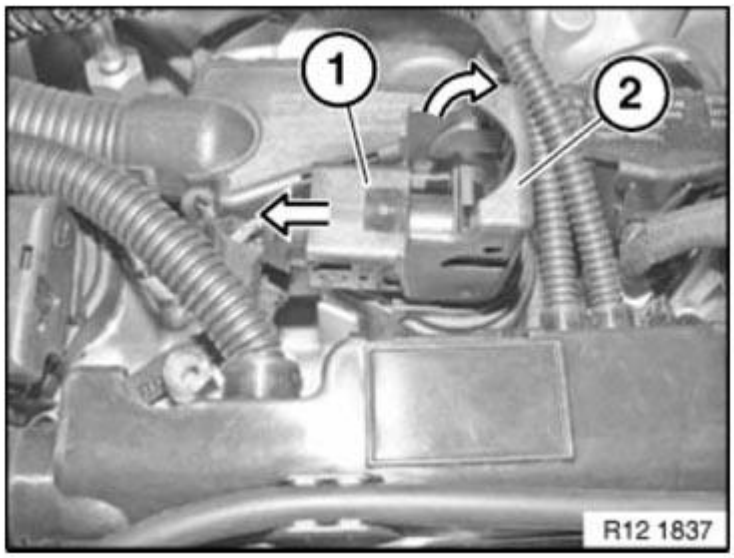


Fig. 18: Pulling Out Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Position the ignition coil and gently push it to the limit position, if necessary by twisting it back and forth slightly. Then check anti-twist lock.

The rubber cap must completely surround the sealing collar of the cylinder head cover.

NOTE: If rubber parts are squashed, the ignition coil can slip out again during engine operation.

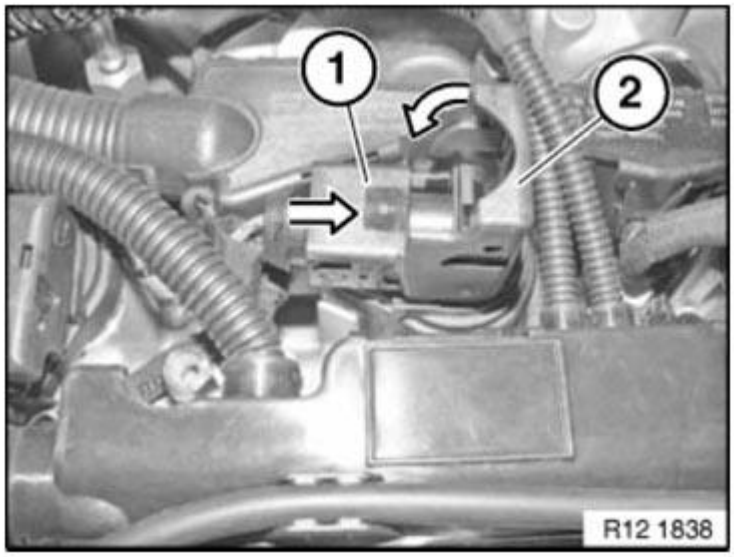


Fig. 19: Pushing Connector With Connector Catch Open Onto Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Push connector (1) with connector catch (2) open onto ignition coil.

Carefully close connector catch (2) in direction of arrow.

The connector catch must snap into place without great effort.

The connector must be positioned on the counter piece with hardly any gaps when the locking lever is being closed. In the process, the cheeks of the lever are positioned inside the counter piece.

NOTE: The locking lever can become deformed if it is not installed correctly. This means that there is no longer a safety lock on the plug connection. As a result, the connector can slip out during engine operation (loose contact, misfiring).

NOTE: Delete fault memory.

ELECTRONIC SWITCHING OR CONTROL UNITS

12 14 700 CODING CONTROL MODULE (DME/DDE)

Switch on ignition .

Connect MoDiC or DIS/GT1 Tester.

Switch on ignition.

Select "Coding" program.

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

12 14 705 PROGRAMMING CONTROL UNIT (DME/DDE)

Switch on ignition .

Connect MoDiC or DIS/GT1 Tester.

Switch on ignition.

Select "Programming".

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

12 14 611 REMOVING/REPLACING LEFT KNOCK SENSORS (N74)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **INTAKE PIPE, LEFT** .

Feed out vacuum hose (1) and set aside.

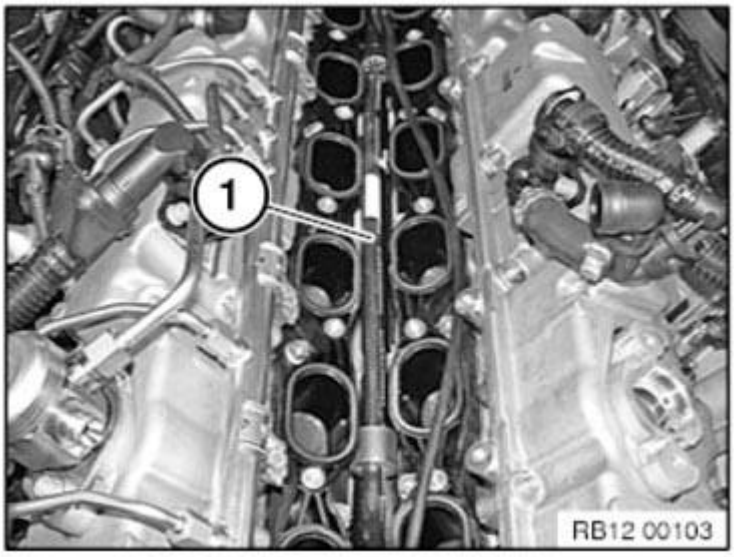


Fig. 20: Identifying Feed Out Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Release positive battery cable from clamps

(1) and set aside.

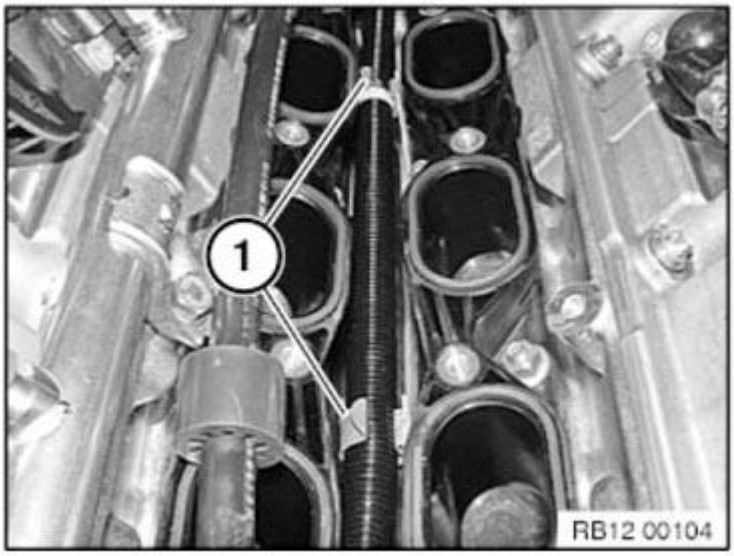


Fig. 21: Identifying Positive Battery Cable Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on both knock sensors.

Tightening torque: see 4AZ in **13 62 SENDERS FOR CONTROL UNIT**

Remove knock sensors.

Installation note:

Clean contact surface of knock sensors on engine block.

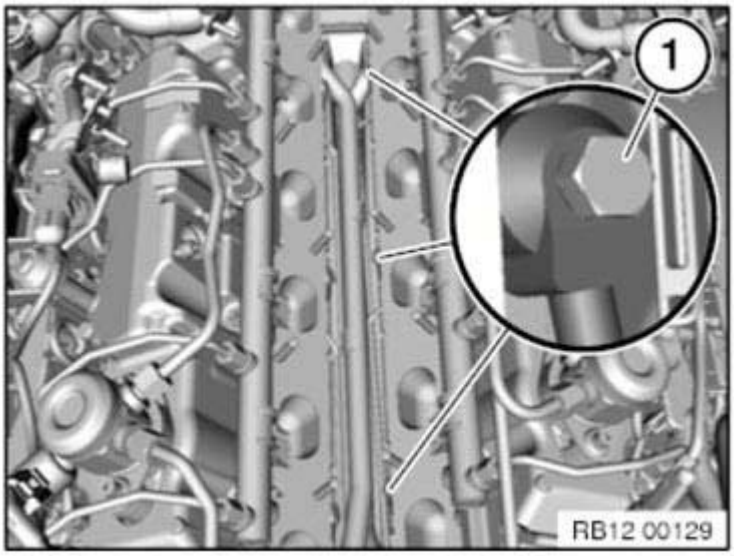


Fig. 22: Identifying Knock Sensors Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach connector (1) from knock sensors on the front of the expansion tank for the charge air cooler.

Feed out and remove knock sensors, right.

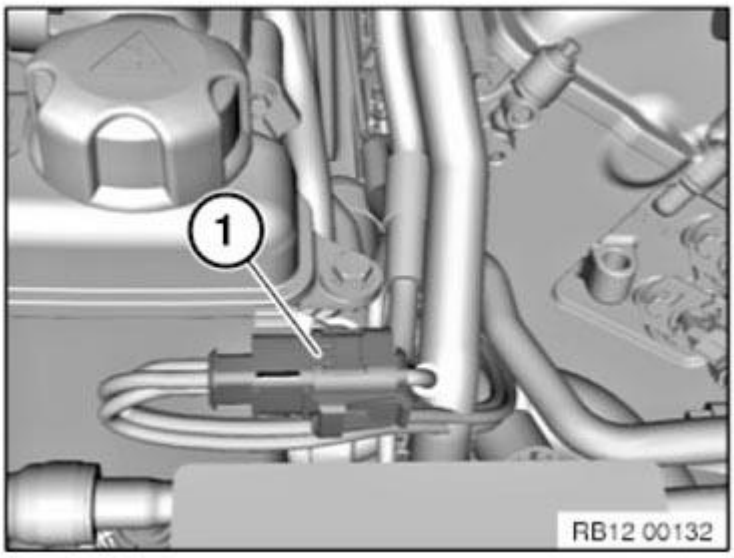


Fig. 23: Identifying Knock Sensor Connector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.

Delete fault memory.

12 14 610 REMOVING/REPLACING RIGHT KNOCK SENSORS (N74)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Remove **INTAKE PIPE, RIGHT** .

Feed out vacuum hose (1) and set aside.

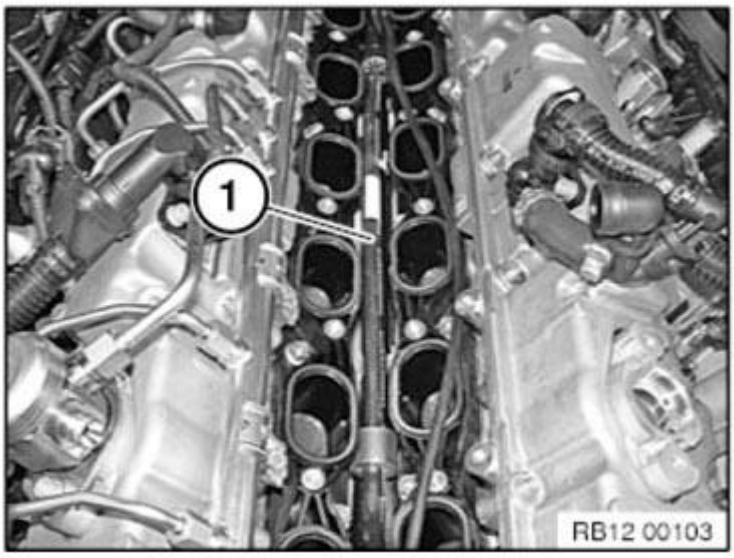


Fig. 24: Identifying Feed Out Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Release positive battery cable from clamps

(1) and set aside.

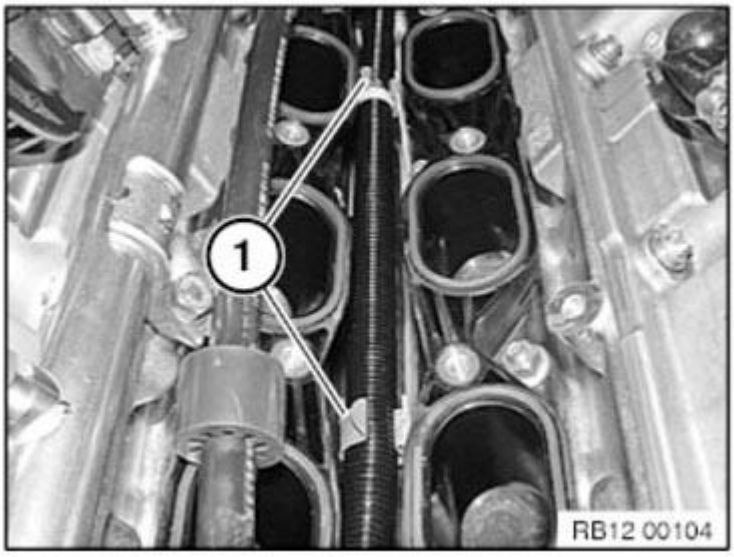


Fig. 25: Identifying Positive Battery Cable Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on knock sensors, right.

Tightening torque: see 4AZ in **13 62 SENDERS FOR CONTROL UNIT**

Remove knock sensors.

Installation note:

Clean contact surface of knock sensors on engine block.

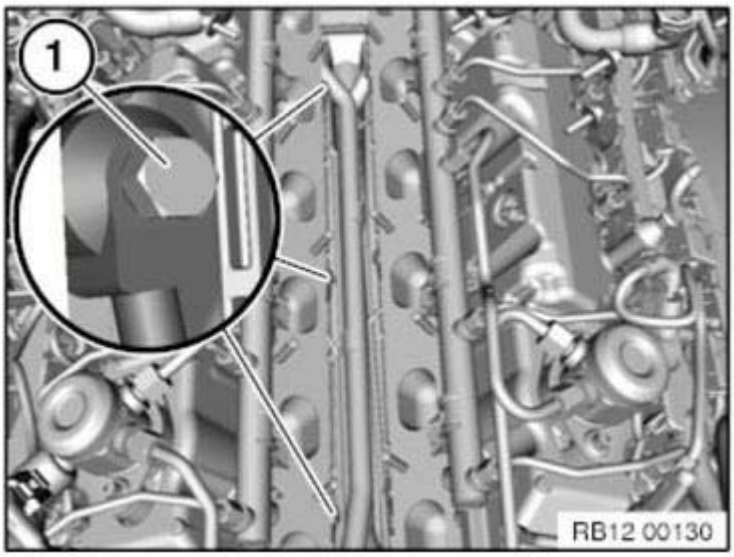


Fig. 26: Identifying Knock Sensor Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach connector (1) from knock sensors on the right behind the expansion tank for the charge air cooler. Release **EXPANSION TANK** for charge air cooler and set aside.

Feed out and remove knock sensors, right.

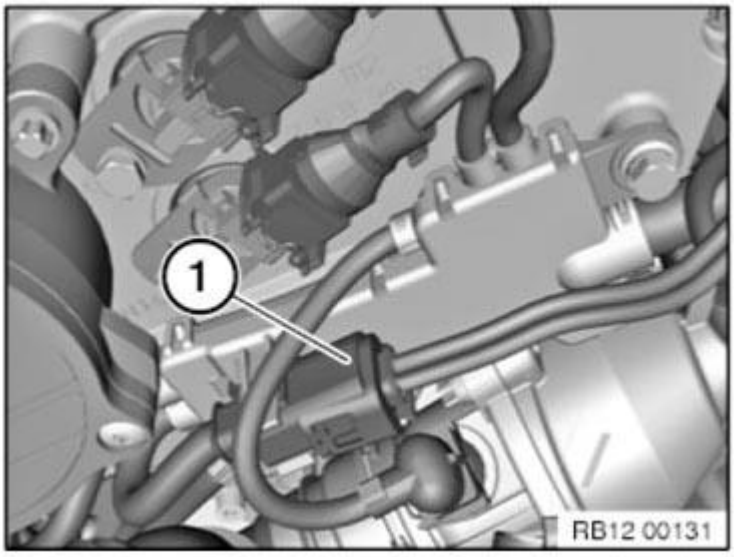


Fig. 27: Identifying Knock Sensor Connector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.

Delete fault memory.

12 14 552 REPLACING CONTROL UNIT (DME) CYLINDERS 1-6 (N74)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection)

Necessary preliminary tasks:

- Switch off ignition
- Disconnect **BATTERY EARTH LEAD**
- Remove right **INTAKE PIPE**

IMPORTANT: Follow INSTRUCTIONS for removing and installing control units

Replacement:

- Carry out programming/encoding
- If no data can be read out from the previous control unit, carry out injection quantity compensation (description at end of instructions).

IMPORTANT: It is absolutely essential to read out the fault memory with the BMW diagnosis system and to create a fault memory printout.

Switch off ignition.

Release screw (1).

Lay filler neck (2) for windscreen washer fluid to one side.

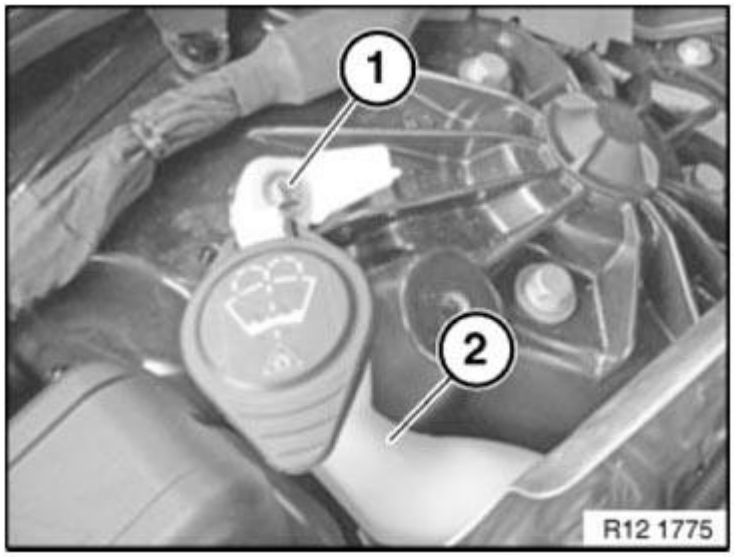


Fig. 28: Identifying Filler Neck And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 2AZ in **12 90 ELECTRONICS BOX, WIRING HARNESS** .

Remove electronics box cover (2).

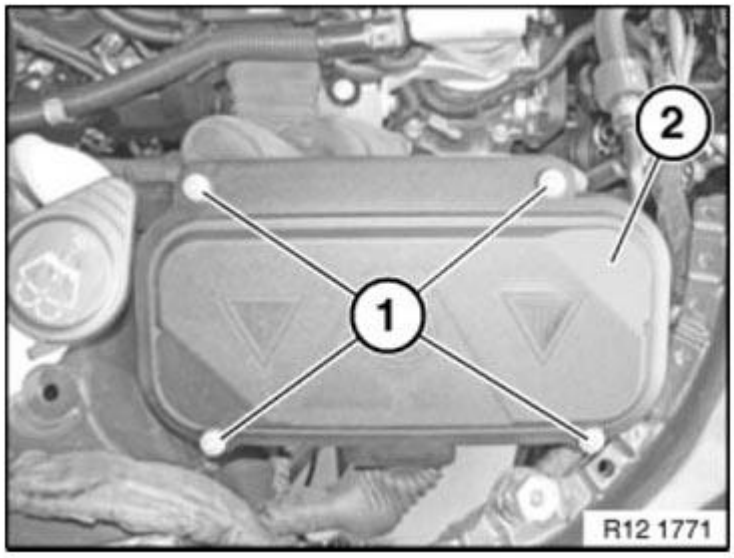


Fig. 29: Identifying Electronics Box Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all connectors (1) from control unit and disconnect.

Unclip grommet hold-down device (2) and remove.

Detach rubber grommets (3) from electronics box. Place wiring harnesses to the side.

Installation note:

Make sure grommets are correctly seated (watertightness).

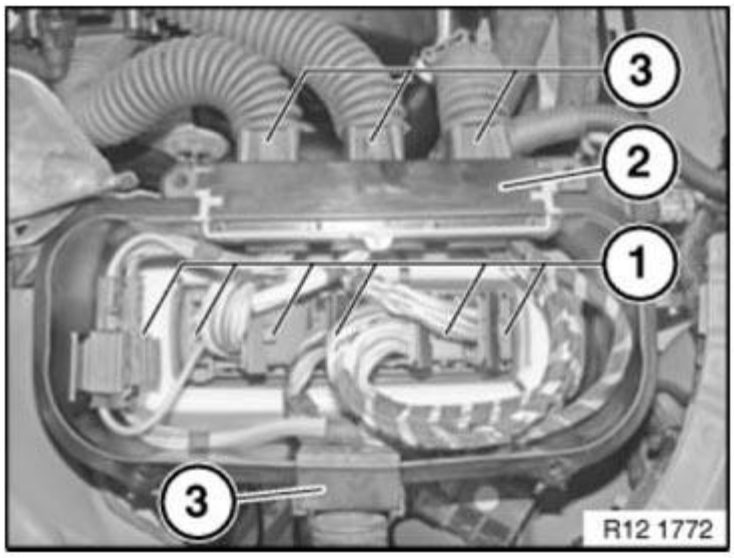


Fig. 30: Identifying Control Unit Connectors, Rubber Grommets And Grommet Hold-Down Device

Courtesy of BMW OF NORTH AMERICA, INC.

Release outer locks on electronics box at front and rear.

Remove cover (1) from control unit.

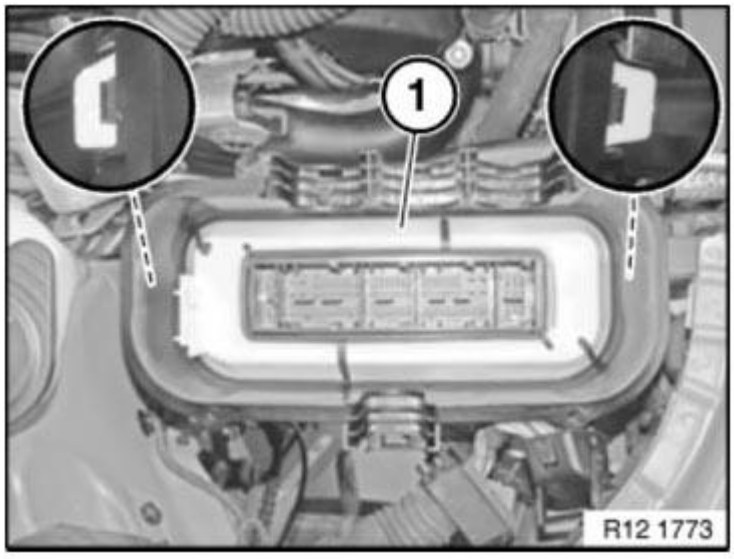


Fig. 31: Identifying Control Unit Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 1AZ in **12 90 ELECTRONICS BOX, WIRING HARNESS** .

Unclip coolant lines at clamp (2) from electronics box.

Release the electronics box (3) from the spring strut but do not remove.

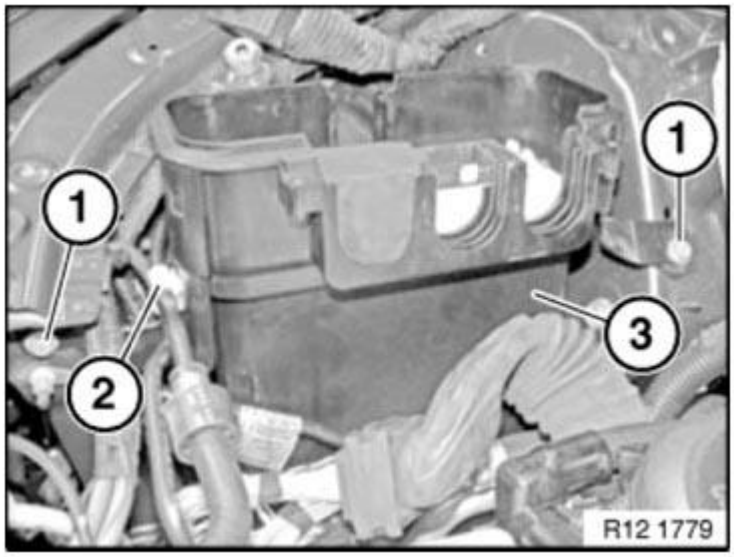


Fig. 32: Identifying Feed Electronics Box, Clamp And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows rear coolant line on control unit, procedure for front is identical.

Press in lock (2) and detach coolant line (1) from control unit. Seal coolant line with suitable plugs or disconnect.

Catch and dispose of escaping coolant.

Lift out control unit.

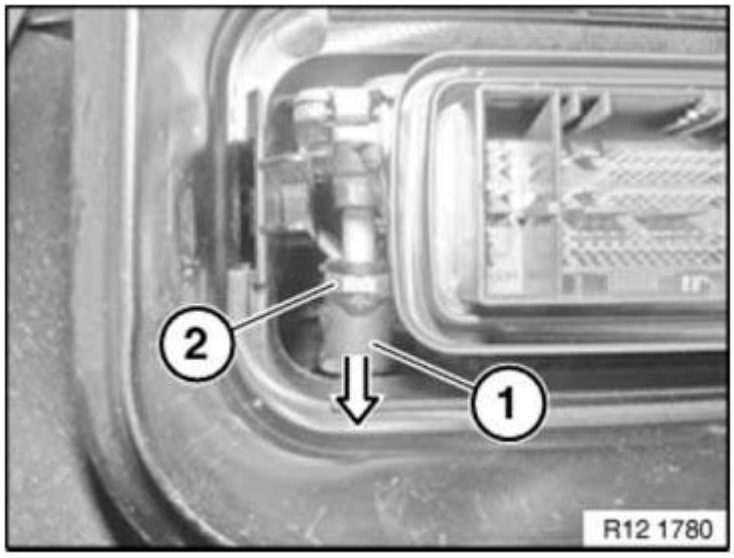


Fig. 33: Detaching Coolant Line By Pressing Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Injection quantity compensation

If the DME control unit has been replaced, it will also be necessary to carry out adjustment of the injectors!

Injection quantity compensation is carried out with the aid of so-called adjustment values.

The adjustment values are printed in two blocks of three digits on each injector.

The adjustment values must be stored in the new control unit!

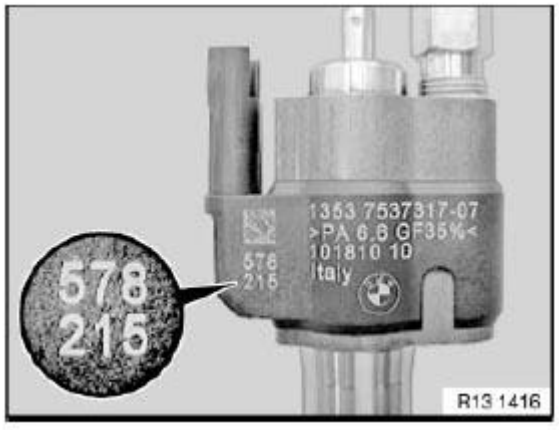


Fig. 34: Identifying Injectors Injection Quantity Adjustment Values
Courtesy of BMW OF NORTH AMERICA, INC.

If injector quantity compensation is not carried out, the engine may run roughly or fail to start.

Read off the adjustment values and enter according to the installation location (cylinder) of the injectors:

- Connect BMW diagnosis system
- Identify vehicle
- Select "Function selection"
- Select "Service functions"



Fig. 35: Identifying Injectors Injection Quantity Adjustment Values
Courtesy of BMW OF NORTH AMERICA, INC.

- Select "Engine electronics"
- Select "Adjustment function"
- Select "Adjust injectors"
- Select "Test plan"
- The adjustment value must be entered for each cylinder.

NOTE: Check stored fault message.

Clear diagnostic fault entries from fault memory.

Check coolant level for charge air cooler and top up coolant as required.

12 14 552 REPLACING CONTROL UNIT (DME) CYLINDERS 7-12 (N74)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection)

Necessary preliminary tasks:

- Switch off ignition
- Disconnect **BATTERY EARTH LEAD**
- Remove **LEFT INTAKE PIPE**

IMPORTANT: Follow INSTRUCTIONS for removing and installing control units

Replacement:

- Carry out programming/encoding

- If no data can be read out from the previous control unit, carry out injection quantity compensation (description at end of instructions).

IMPORTANT: It is absolutely essential to read out the fault memory with the BMW diagnosis system and to create a fault memory printout.

Switch off ignition.

Release screws (1).

Tightening torque: see 2AZ in **12 90 ELECTRONICS BOX, WIRING HARNESS** .

Remove electronics box cover (2).

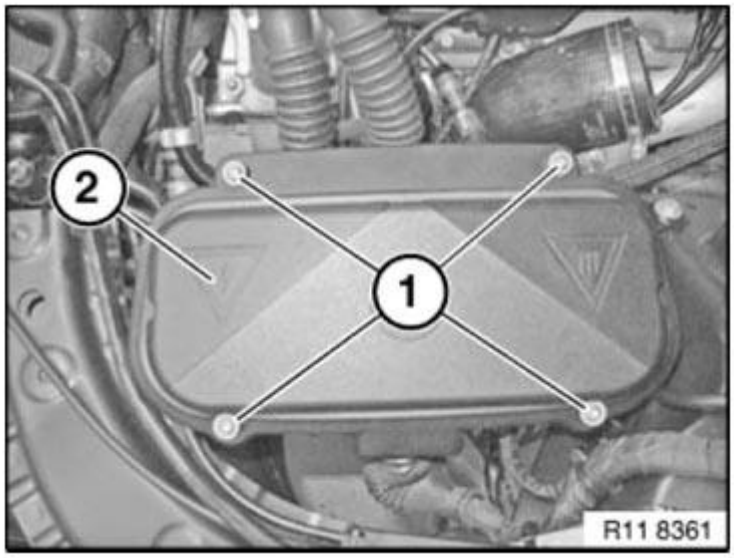


Fig. 36: Identifying Electronics Box Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock all connectors (1) from control unit and disconnect.

Unclip grommet hold-down device (2) and remove.

Detach rubber grommets (3) from electronics box. Place wiring harnesses to the side.

Installation note:

Make sure grommets are correctly seated (watertightness).

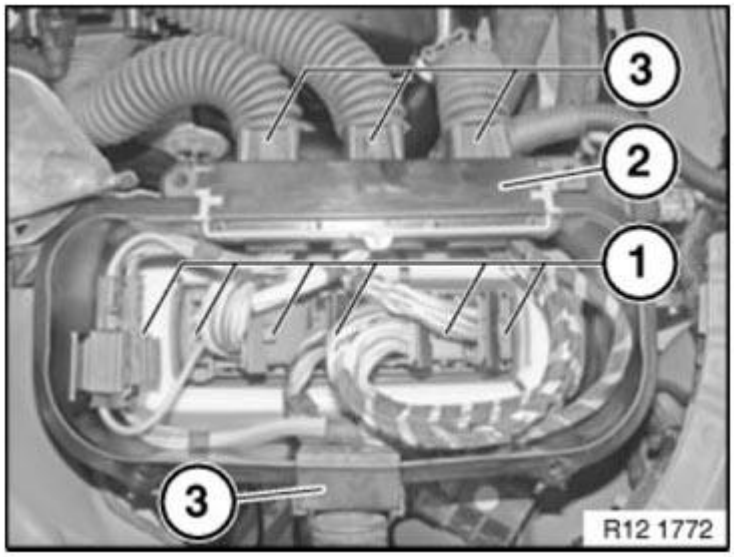


Fig. 37: Identifying Control Unit Connectors, Rubber Grommets And Grommet Hold-Down Device
Courtesy of BMW OF NORTH AMERICA, INC.

Release outer locks on electronics box at front and rear.

Remove cover (1) from control unit.

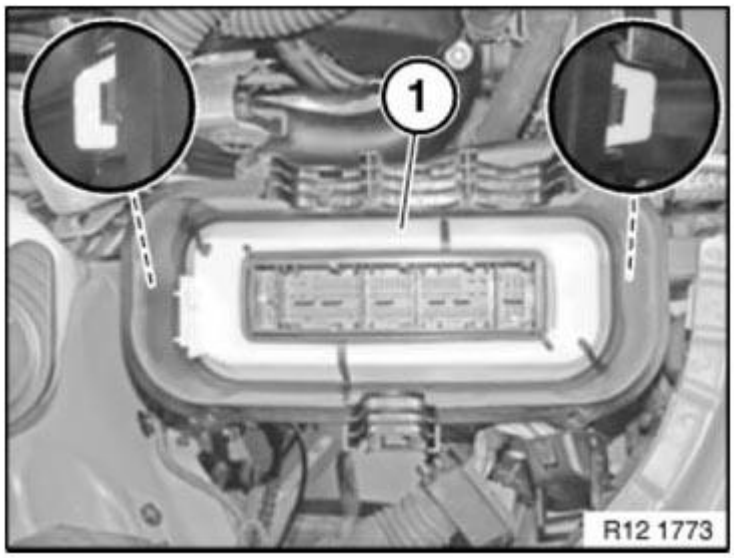


Fig. 38: Identifying Control Unit Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the right side, the procedure for the left side is identical.

Release screws (1).

Tightening torque: see 1AZ in **12 90 ELECTRONICS BOX, WIRING HARNESS** .

Unclip coolant lines at clamp (2) from electronics box.

Release the electronics box (3) from the spring strut but do not remove.

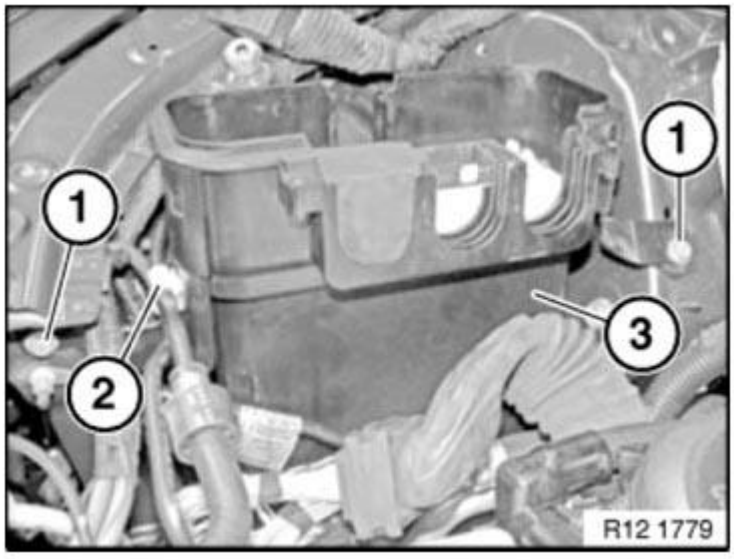


Fig. 39: Identifying Feed Electronics Box, Clamp And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows front coolant line on control unit. Procedure for rear is identical.

Press in lock (2) and detach coolant line (1) from control unit. Seal coolant line with suitable plugs or disconnect.

Catch and dispose of escaping coolant.

Lift out control unit.

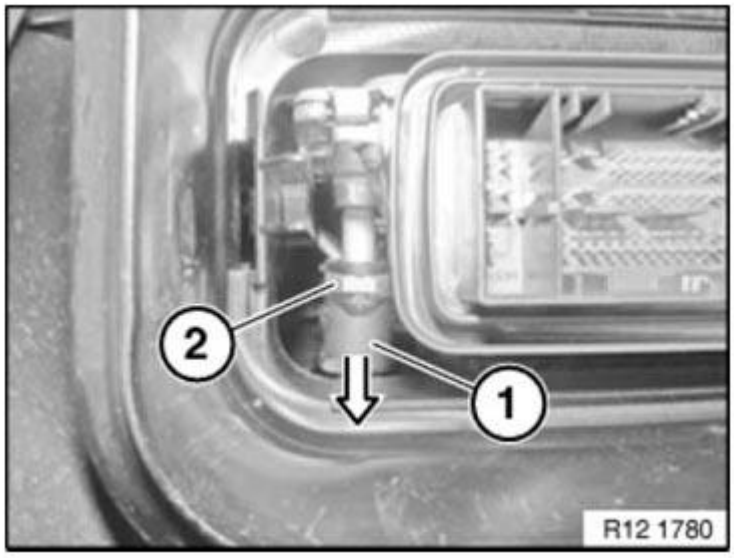


Fig. 40: Detaching Coolant Line By Pressing Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Injection quantity compensation

If the DME control unit has been replaced, it will also be necessary to carry out adjustment of the injectors!

Injection quantity compensation is carried out with the aid of so-called adjustment values.

The adjustment values are printed in two blocks of three digits on each injector.

The adjustment values must be stored in the new control unit!

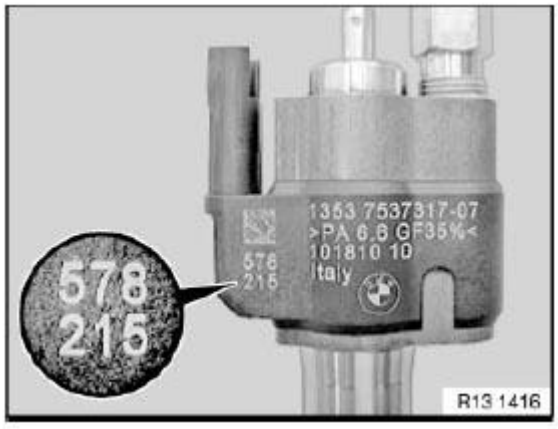


Fig. 41: Identifying Injectors Injection Quantity Adjustment Values
Courtesy of BMW OF NORTH AMERICA, INC.

If injector quantity compensation is not carried out, the engine may run roughly or fail to start.

Read off the adjustment values and enter according to the installation location (cylinder) of the injectors:



Fig. 42: Identifying Injectors Injection Quantity Adjustment Values
Courtesy of BMW OF NORTH AMERICA, INC.

- Connect BMW diagnosis system
- Identify vehicle
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment function"
- Select "Adjust injectors"
- Select "Test plan"
- The adjustment value must be entered for each cylinder.

NOTE: Check stored fault message.

Clear diagnostic fault entries from fault memory.

Vent **COOLING SYSTEM** for intercooler.

12 14 521 REPLACING CRANKSHAFT PULSE SENSOR (N74)

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Turn off ignition
- Remove rear **UNDERBODY PROTECTION**

Installation location

On transmission housing at bottom right.

Unlock plug (1) and remove.

Release screw (2).

Tightening torque: see 3AZ in **13 62 SENDERS FOR CONTROL UNIT**

Withdraw pulse generator (3) from transmission housing.

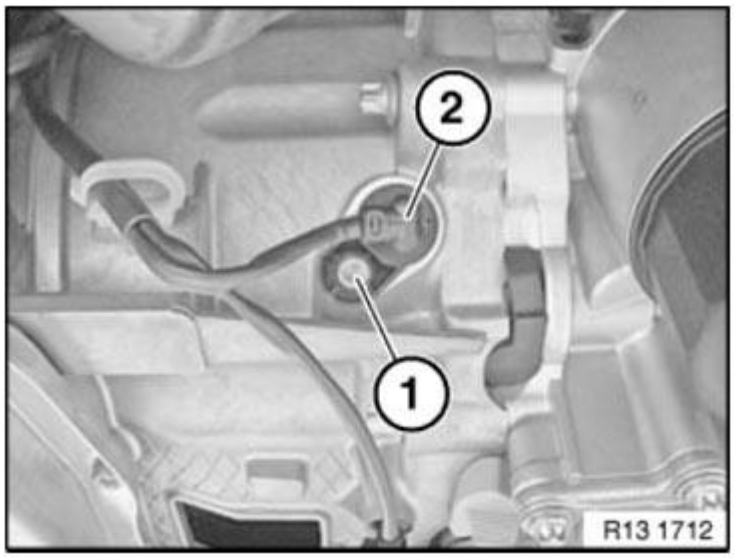


Fig. 43: Identifying Transmission Housing Pulse Generator With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Delete fault memory.

12 14 512 REPLACING PULSE GENERATOR ON LEFT EXHAUST CAMSHAFT (N74)

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Turn off ignition
- Remove left **INTAKE SILENCER HOUSING**
- Remove left bulkhead **SOUND INSULATION**
- Remove left **THROTTLE BODY**

Unlock plug (1) and remove.

Release screw (2).

Tightening torque: see 2AZ in **13 62 SENDERS FOR CONTROL UNIT**

Remove pulse generator (3).

Installation

Replace sealing ring and coat with antiseize agent.

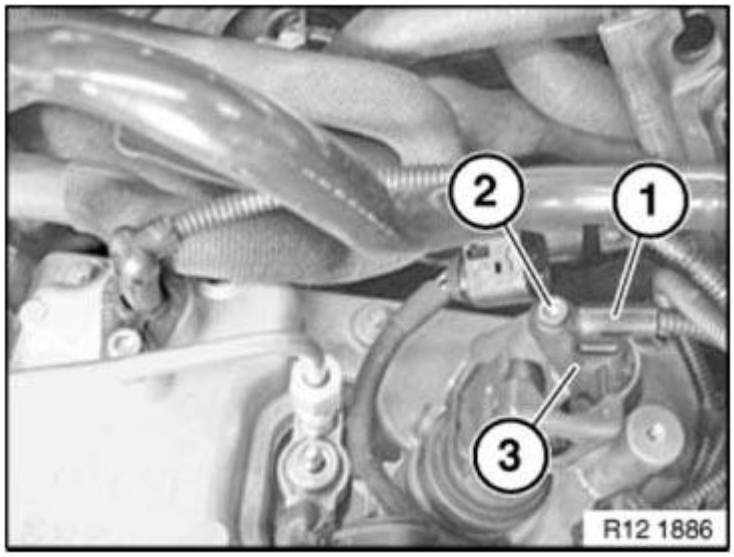


Fig. 44: Identifying Transmission Housing Pulse Generator With Screw And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.

Delete fault memory.

12 14 522 REPLACING PULSE GENERATOR ON LEFT INLET CAMSHAFT (N74)

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Turn off ignition
- Remove left **THROTTLE VALVE ASSEMBLY**
- **LOOSE LEFT CHARGE AIR COOLER** , do not remove or disconnect coolant lines

Unlock plug (1) and remove.

Release screw (2).

Tightening torque: see 2AZ in **13 62 SENDERS FOR CONTROL UNIT**

Remove pulse generator (3).

Installation

Replace sealing ring and coat with antiseize agent.

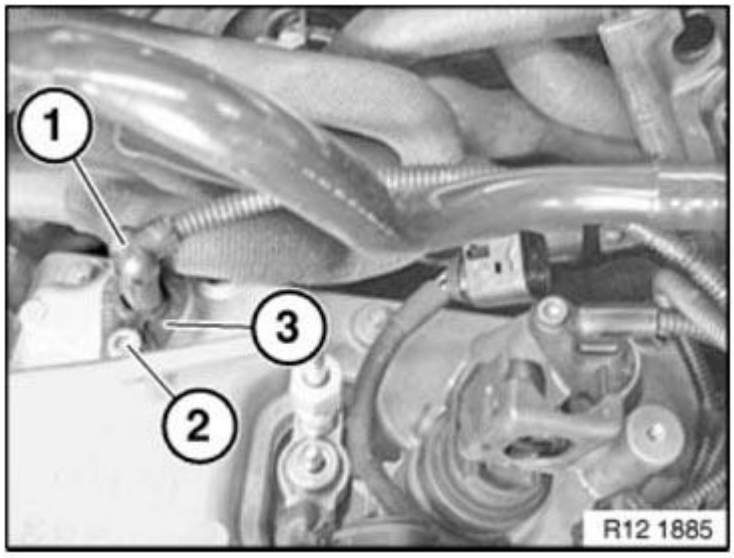


Fig. 45: Identifying Transmission Housing Pulse Generator With Screw And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.

Delete fault memory.

12 14 513 REPLACING PULSE GENERATOR ON RIGHT EXHAUST CAMSHAFT (N74)

cylinder bank 1 to 6)

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Turn off ignition
- Remove right **INTAKE FILTER HOUSING**
- Remove right **SUSPENSION CROSS-BRACE**
- Remove **SOUND INSULATION** from bulkhead on right
- Remove **RIGHT THROTTLE BODY**

Unlock plug (1) and remove.

Release screw (2).

Tightening torque: see 2AZ in **13 62 SENDERS FOR CONTROL UNIT**

Remove pulse generator (3).

Installation

Replace sealing ring and coat with antiseize agent.

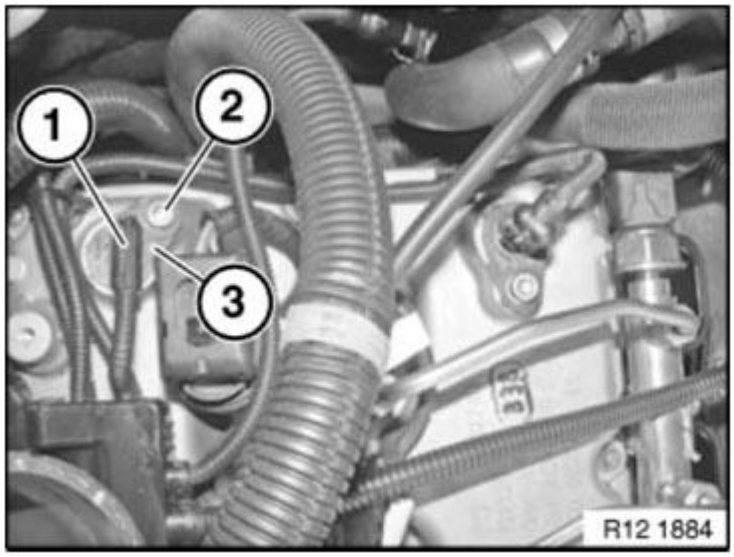


Fig. 46: Identifying Transmission Housing Pulse Generator With Screw And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Delete fault memory.

12 14 526 REPLACING PULSE GENERATOR ON RIGHT INLET CAMSHAFT (N74)

(cylinder bank 1 to 6)

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Turn off ignition
- Remove **THROTTLE VALVE ASSEMBLY** .
- **LOOSE RIGHT CHARGE AIR COOLER** , do not remove or disconnect coolant lines

Unlock plug (1) and remove.

Release screw (2).

Tightening torque: see 2AZ in **13 62 SENDERS FOR CONTROL UNIT**

Remove pulse generator (3).

Installation

Replace sealing ring and coat with antiseize agent.

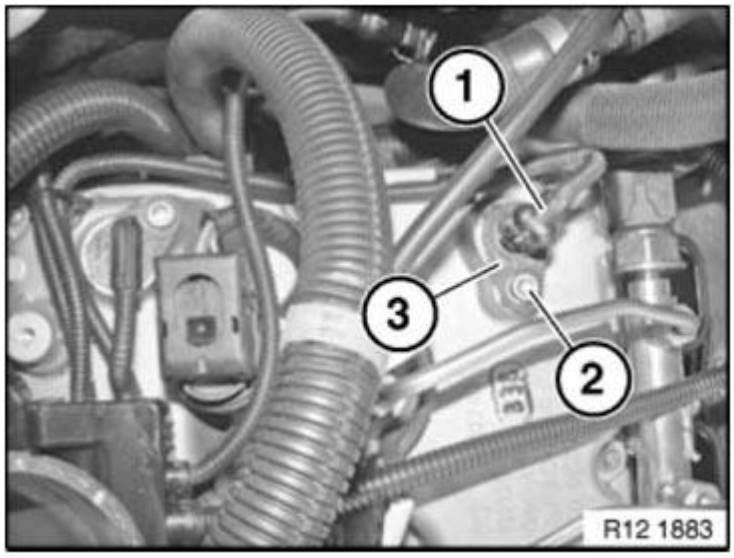


Fig. 47: Identifying Transmission Housing Pulse Generator With Screw And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Delete fault memory.

ALTERNATOR WITH DRIVE AND MOUNTING

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N74)

Necessary preliminary tasks:

- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove alternator **DRIVE BELT**
- Remove **COOLANT RADIATOR**
- Remove **A/C CONDENSER**
- **LOOSEN HYDRAULIC STEERING EXPANSION TANK. DO NOT REMOVE** .
- Remove **HYDRAULIC STEERING PUMP**
- **REMOVE LEFT CLEAN AIR PIPE** .

Slacken nut (1).

Release hydraulic fluid lines from holder on alternator.

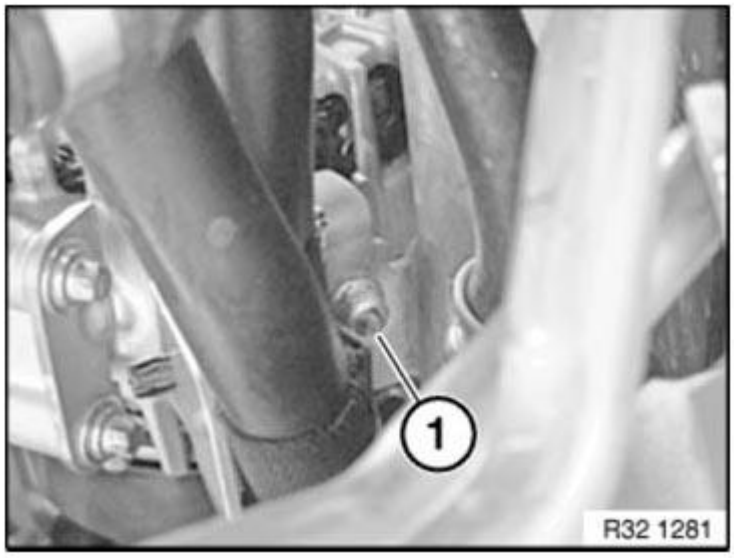


Fig. 48: Identifying Alternator Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2) below alternator.

Tightening torque: see 1AZ in **12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS** .

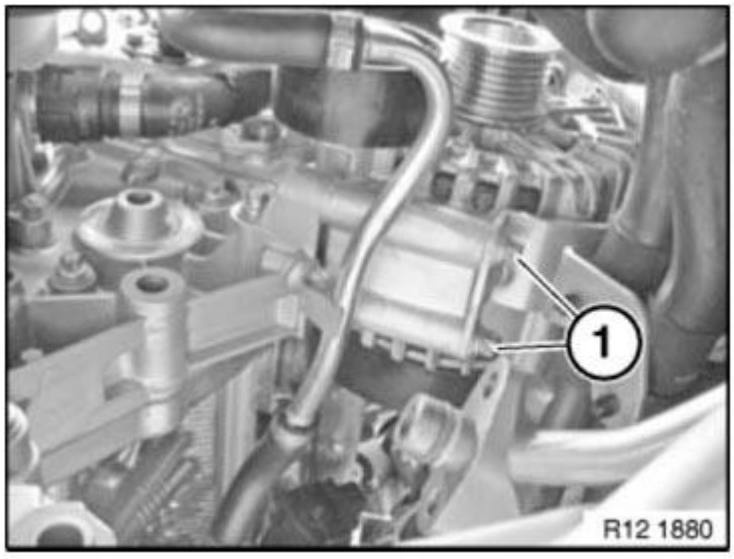


Fig. 49: Identifying Alternator Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten screws (2) above alternator.

Tightening torque: see 1AZ in **12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS** .

Pull alternator towards front a little.

Unlock plug (2) and detach from alternator.

Detach cover (3) and release nut underneath.

Tightening torque: see 1AZ in **12 42 ALTERNATOR LEAD** .

Disconnect battery positive lead from alternator

Feed out alternator towards front and remove.

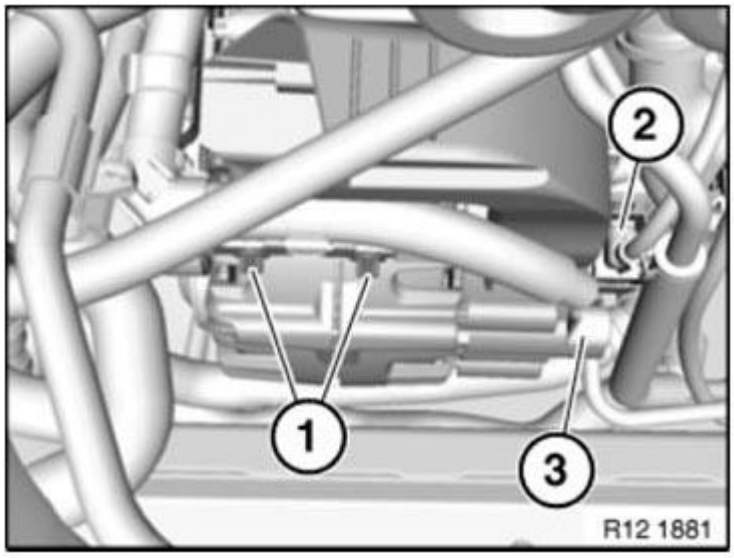


Fig. 50: Identifying Alternator Cover, Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.

Check stored fault message.

Delete fault memory.

12 31... REPLACING ALTERNATOR BELT PULLEY (WITH OVERRUNNING CLUTCH)

Remove and install alternator drive belt.

Grip alternator shaft with:

- internal serration

Release nut with special tools 12 7 120.

Installation:

Tightening torque: see 3AZ in **12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS** .

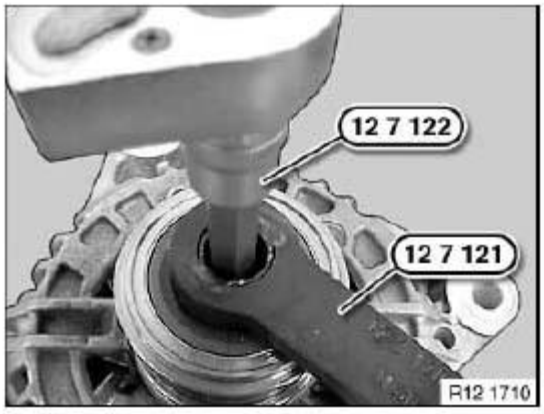


Fig. 51: Replacing Alternator Belt Pulley Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

CONTROLLER

12 32 501 REPLACING VOLTAGE REGULATOR

Necessary preliminary tasks:

- Switch off ignition
- Disconnect battery negative lead
- **NOTES** on removing and installing electronic control units
- Remove alternator

Bosch

Release protective caps (1).

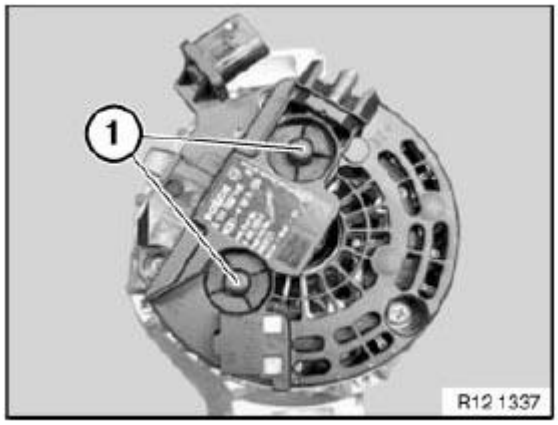


Fig. 52: Identifying Voltage Regulator Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

Release screw (1) and nuts (2), remove cover.

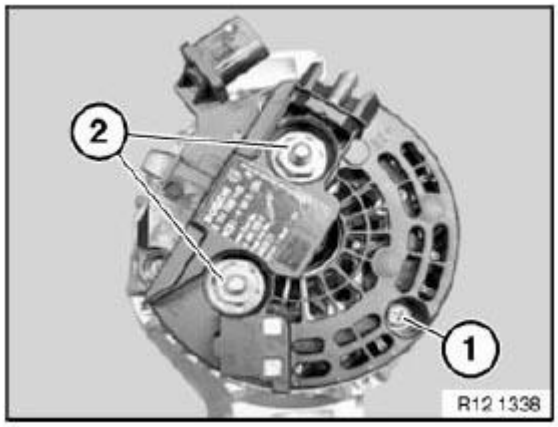


Fig. 53: Identifying Voltage Regulator Screw And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch:

Release screws and remove regulator switch (1) in direction of arrow.

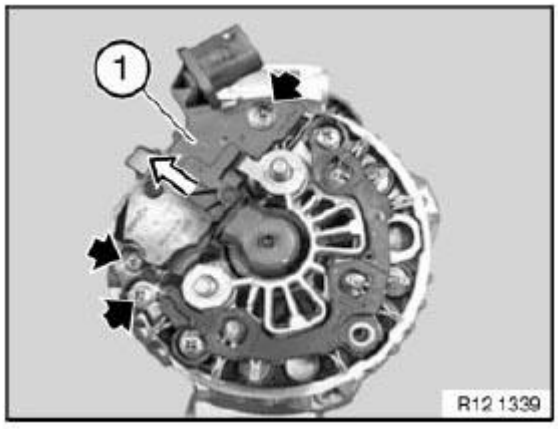


Fig. 54: Identifying Voltage Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Installation

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

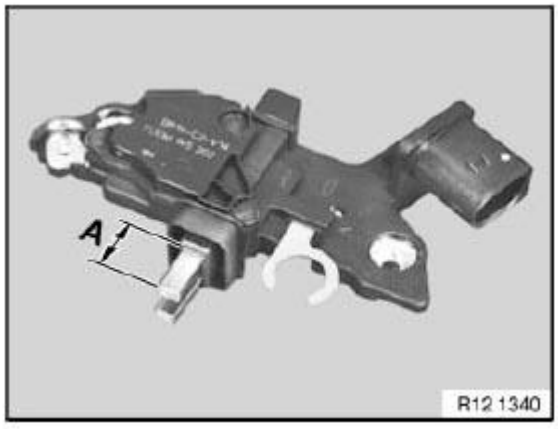


Fig. 55: Identifying Contact Spring Pretension Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Slacken nut (1).

Slacken nut (2).

Release screws (3).

Release cover (4).

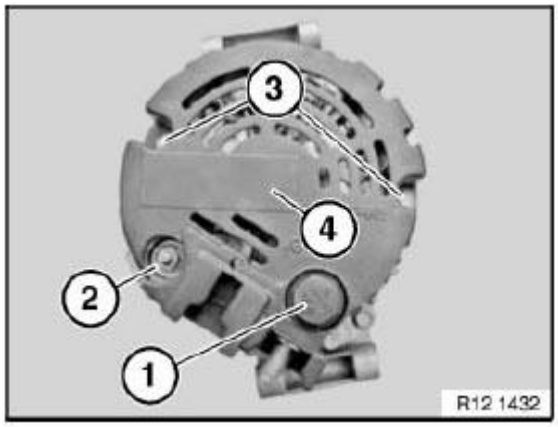


Fig. 56: Identifying Voltage Regulator Cover, Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo:

Release screws.

Remove regulator switch (1) towards top.

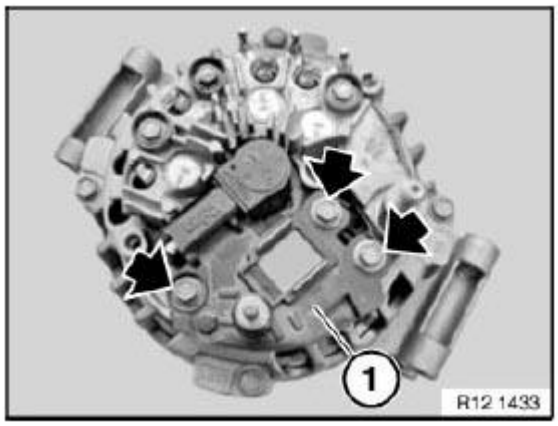


Fig. 57: Identifying Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo:

Installation

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

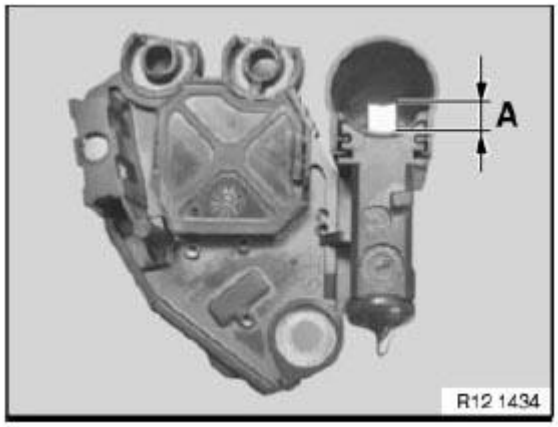


Fig. 58: Identifying Contact Spring Pretension Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit new regulator (1) with attached mounting sleeve (2) or locked carbon brush.

Pull off mounting sleeve (2) and replace with cover (3).

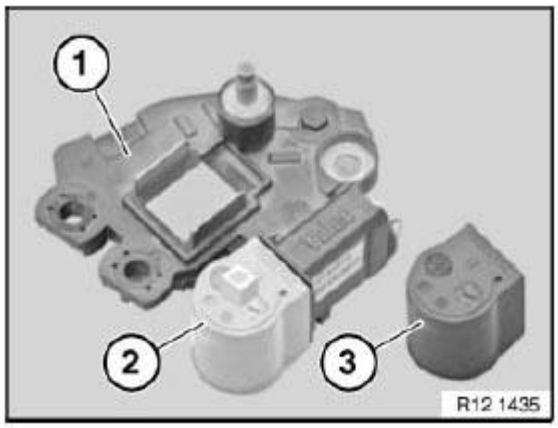


Fig. 59: Identifying Regulator, Cover And Mounting Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

STARTER WITH MOUNTING

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER (N74)

Necessary preliminary tasks:

- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove left **CATALYTIC CONVERTER**

Release screws (1).

Tightening torque: see 2AZ in **12 41 STARTER MOTOR WITH MOUNTING** .

Remove heat shield (2).

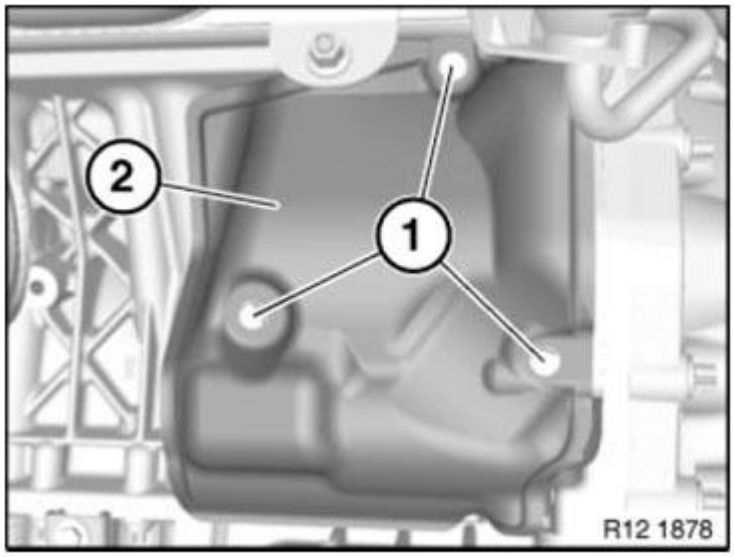


Fig. 60: Identifying Heat Shield With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Tightening torque: see 2AZ in **12 42 ALTERNATOR LEAD** .

Detach battery positive lead from starter motor.

Unlock connector (2) and remove.

Release screws (3).

Tightening torque: see 1AZ in **12 41 STARTER MOTOR WITH MOUNTING** .

Pull out starter (4) in direction of travel, feed out and remove.

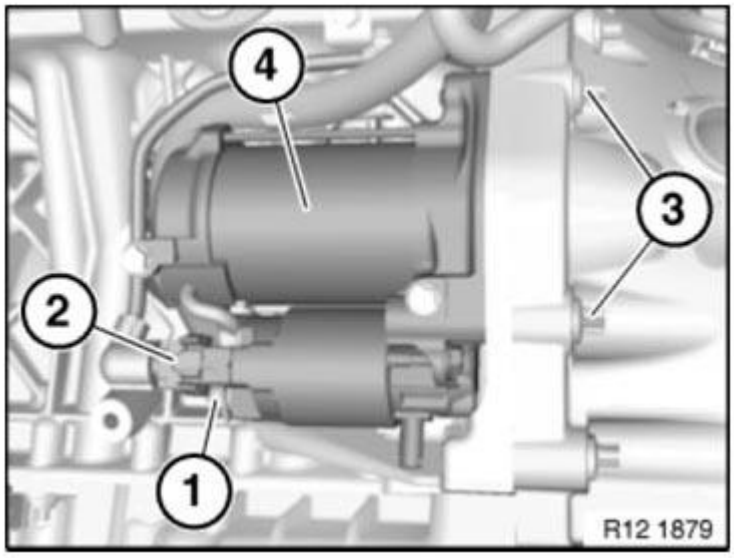


Fig. 61: Identifying Starter, Connector, Screw And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check starter pinion and ring gear for damage. Replace damaged parts if necessary.

Reassemble the vehicle.

12 41 041 REPLACING SOLENOID SWITCH

Turn off ignition .

Remove starter motor .

Release nut (1).

Remove cable lug (2).

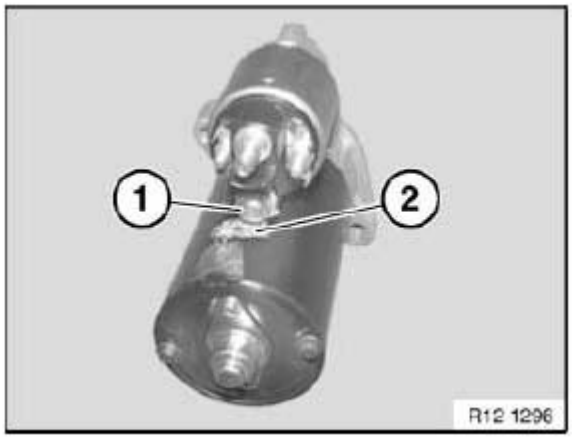


Fig. 62: Identifying Cable Lug And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not turn cable lug (2) while tightening down - risk of short circuit to starter motor housing.
Tightening torque: see 4AZ in 12 41 STARTER MOTOR WITH MOUNTING .

Release screws (1).

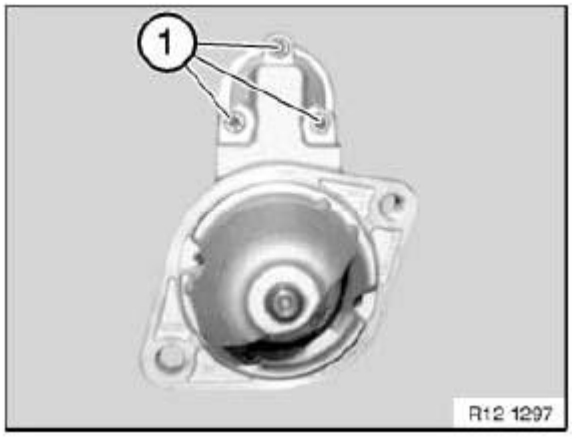


Fig. 63: Identifying Starter Motor Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove solenoid switch (1) and spring (2).

Unhook pin (3).

Installation:

Check pin (3) for wear and apply grease.

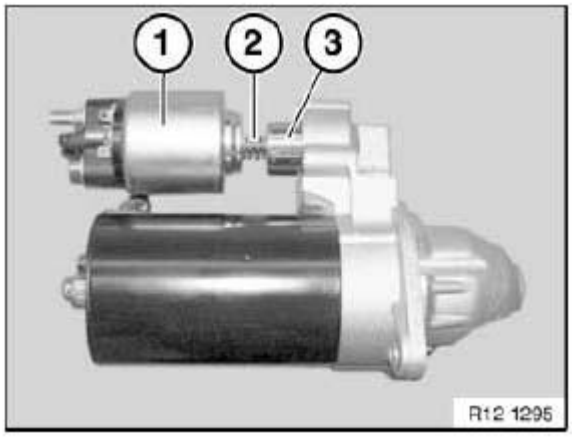


Fig. 64: Identifying Solenoid Switch, Pin And Spring
Courtesy of BMW OF NORTH AMERICA, INC.

STARTER LEAD

12 42 550 REPLACING POSITIVE BATTERY CABLE LEAD BETWEEN STARTER MOTOR, ALTERNATOR AND POSITIVE BATTERY CONNECTION POINT (N74)

Necessary preliminary tasks:

- Read out the fault memory of the DME control unit.
- Switch off ignition.
- Disconnect **BATTERY EARTH LEAD**
- Remove catalytic converters. See **CYLINDER 7-12 CATALYTIC CONVERTER** and **CYLINDER 1-6 CATALYTIC CONVERTER** .
- Remove **INTAKE PLENUM** .
- Remove **FRONT BULKHEAD SOUND INSULATION** .
- Remove **INTAKE PORT** on left and right

Fold back cover (1).

Release nut underneath. Remove positive battery cable lead (2) from positive battery connection point.

Tightening torque: see 3AZ in **12 42 ALTERNATOR LEAD** .

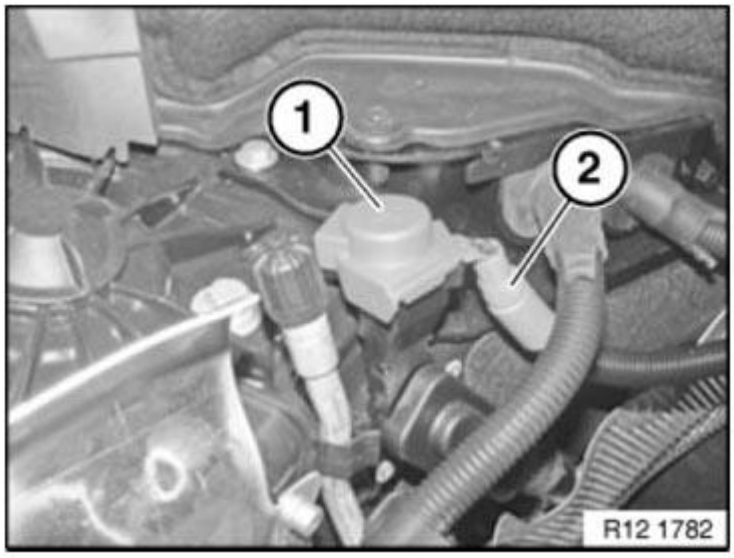


Fig. 65: Identifying Positive Battery Cable Lead And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip the positive battery cable (1) above the gearbox from the clamps (2).

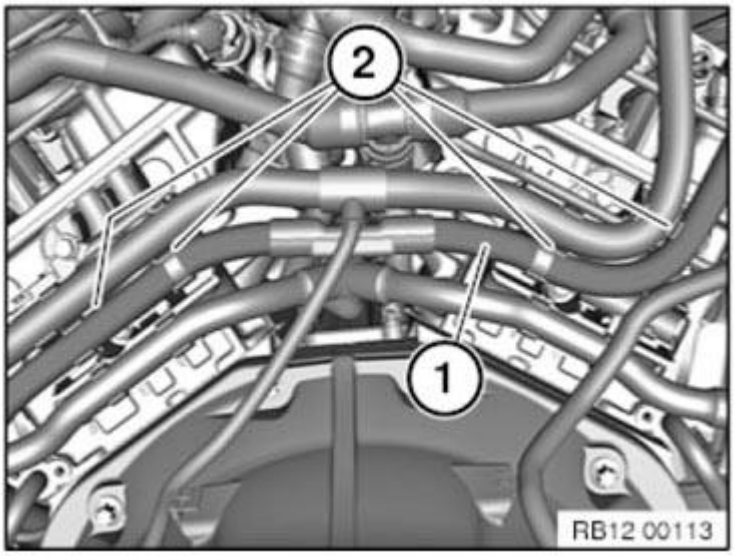


Fig. 66: Identifying Positive Battery Cable And Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out the vacuum hose (1) and remove.

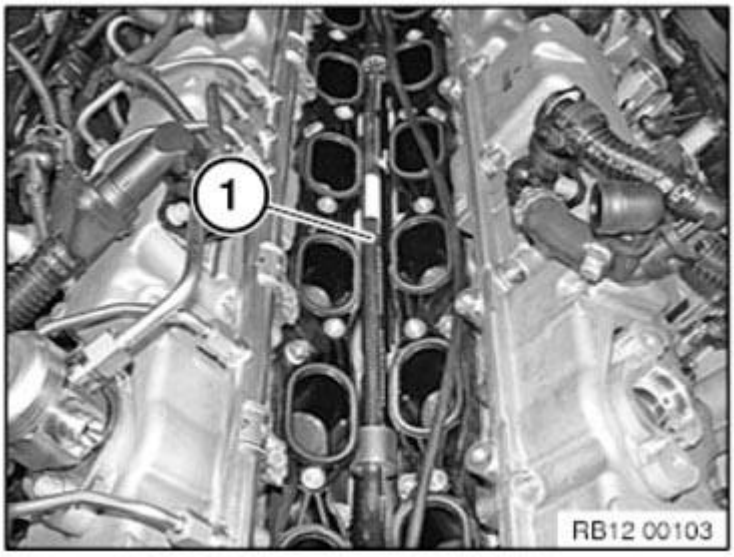


Fig. 67: Identifying Feed Out Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Release positive battery cable from clamps (1) and expose.

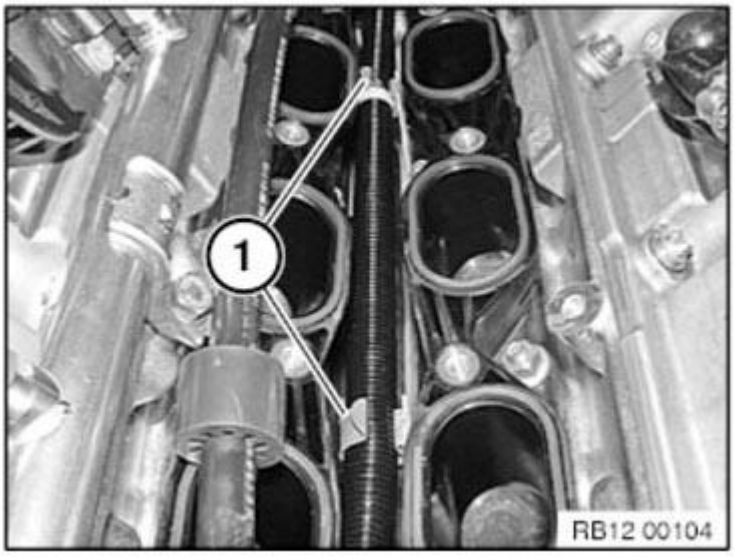


Fig. 68: Identifying Positive Battery Cable Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Release positive battery cable from clamps (1) and expose.

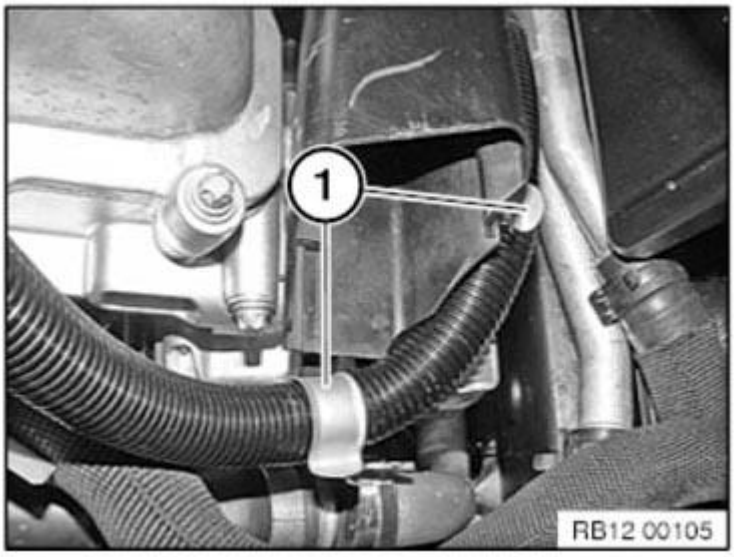


Fig. 69: Identifying Positive Battery Cable Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Remove the cover (3) and undo the nuts underneath.

Tightening torque: see 1AZ in **12 42 ALTERNATOR LEAD** .

Disconnect positive battery cable from alternator and feed out.

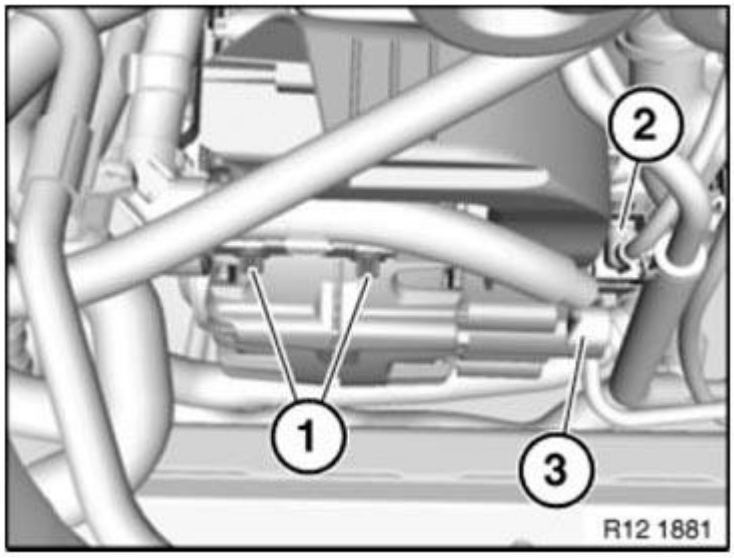


Fig. 70: Identifying Alternator Cover, Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 2AZ in **12 41 STARTER MOTOR WITH MOUNTING** .

Remove heat shield (2).

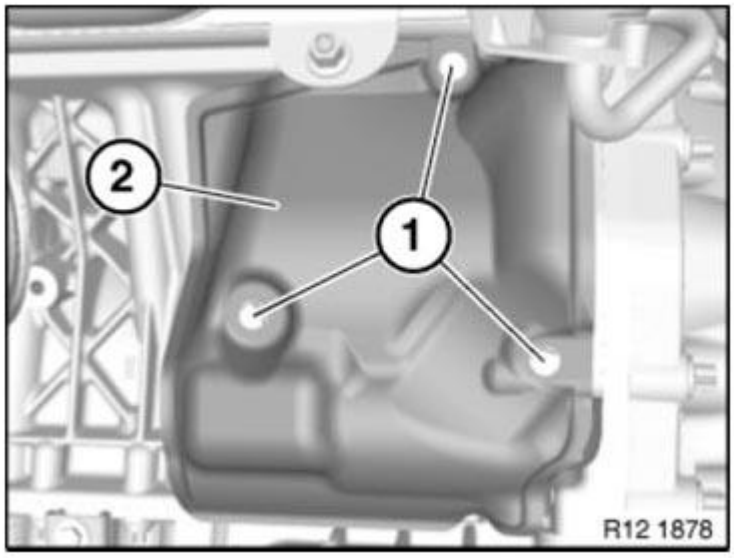


Fig. 71: Identifying Heat Shield With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque: see 2AZ in **12 42 ALTERNATOR LEAD** .

Undo positive battery cable from starter motor and remove.

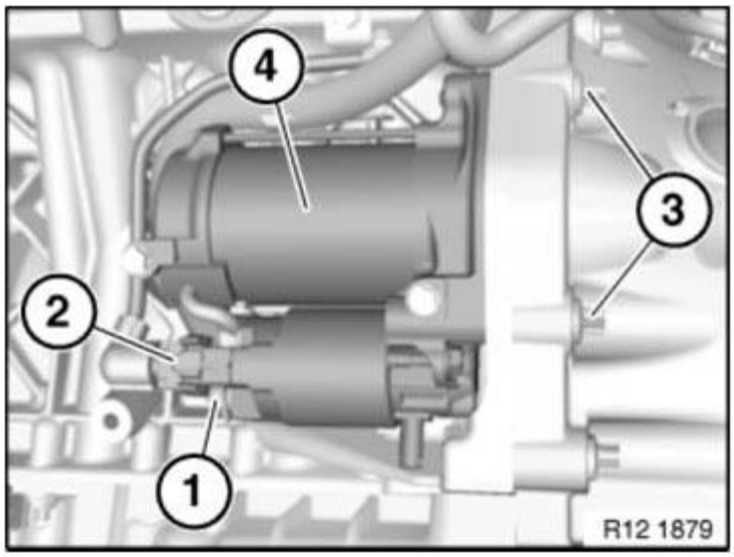


Fig. 72: Identifying Starter, Connector, Screw And Nut

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Reassemble the vehicle.

Check stored fault message.

Delete fault memory.

12 42 540 REPLACING SAFETY BATTERY TERMINAL (SBK)

CAUTION: Observe safety regulations.

Investigate cause of triggering of safety battery terminal.

To do so, read out fault memory of airbag control unit. Note fault messages stored in memory. Rectify faults. Then clear fault memory.

Use of safety battery terminal:

- From model year 1998 in Series E38, E39, E46
- From 4/99 in E36/Z3
- in each of following new Series

The different models have different installation locations:

Battery in engine compartment

Safety battery terminal is replaced with cable up to battery positive support point.

Safety battery terminal is omitted as from 03/2002 from all E46 LHD models with 4-cylinder engines .

Battery in luggage compartment behind side trim panel

Remove side trim panel.

Follow instructions for disconnecting and connecting battery.

Disconnect and cover battery negative lead.

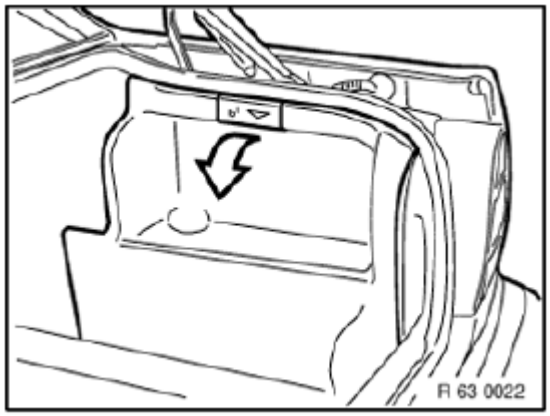


Fig. 73: Removing Side Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Release front side trim panel partly and fold forward.



Fig. 74: Releasing Front Side Trim Panel Partly
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under floor trim panel

Follow instructions for disconnecting and connecting battery.

Fold back floor trim panel (1).

Lift cover (2) on battery negative lead.

Disconnect and cover battery negative lead (3).

Release nuts (4).

Remove battery cover.

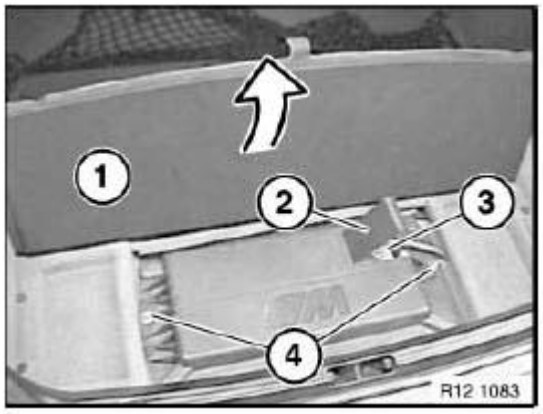


Fig. 75: Folding Back Floor Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under spare wheel

Remove spare wheel.

Release screws.

CAUTION: Do not kink air pipes.

Set air supply system (1) to one side.

Follow instructions for disconnecting and connecting battery.

Disconnect battery negative lead.

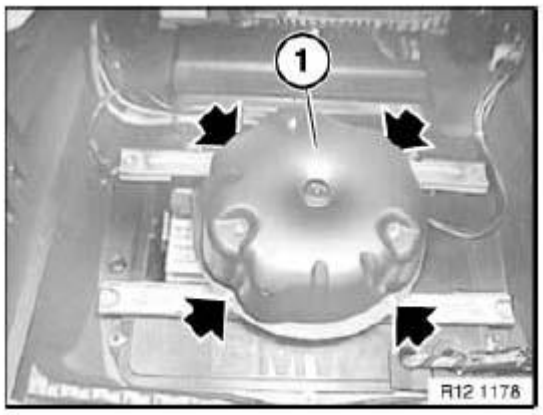


Fig. 76: Identifying Air Supply System
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect supply cable (1) for vehicle electrical system.

Installation:

Remove faulty fuses and carry out troubleshooting.

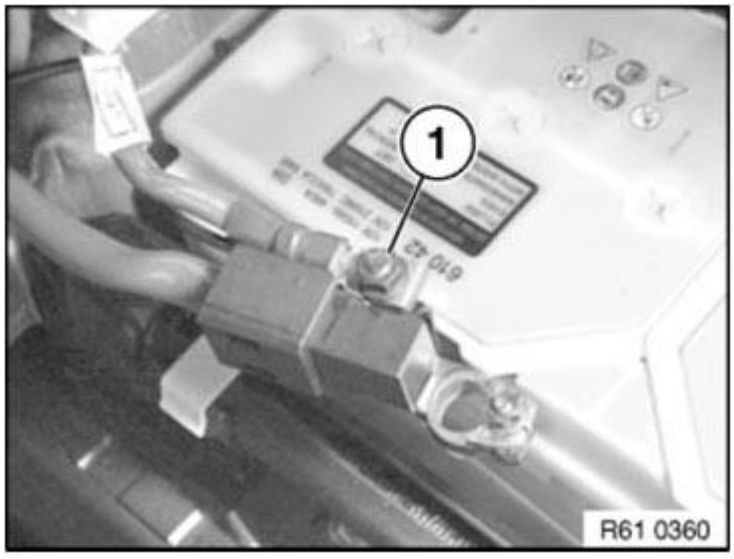


Fig. 77: Identifying Vehicle Electrical System Supply Cable
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Pay attention to interface.

The repair cable is always a standard length.

The heavy-current connector of the repair cable has a larger diameter than the battery positive lead.

In some Series (e.g. E46 touring), the heavy-current connector of the repair cable can lead to installation problems.

This is the case when the interface is in the area of the close-fitting trim panels.

Find matching interface (e.g. approx. 10 cm behind rear seat backrest in E46 touring).

Lay repair cable parallel to battery positive lead.

Mark interface of battery positive lead at end of repair cable.

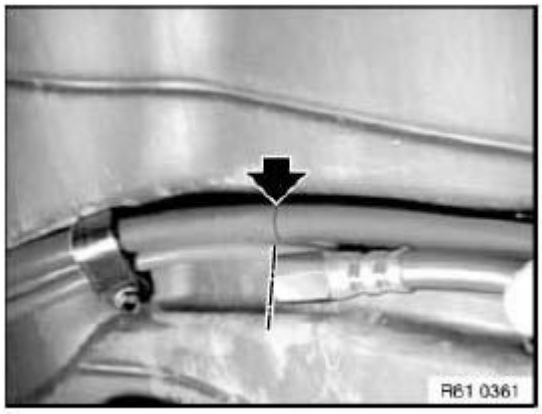


Fig. 78: Locating Mark Interface Of Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable ties (1).

Disconnect plug connection (2).

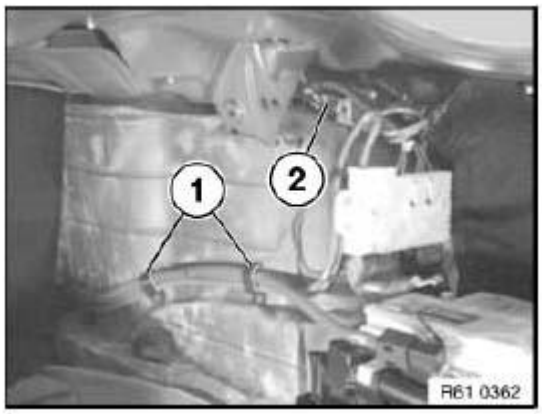


Fig. 79: Identifying Cable Ties And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not use bolt cutters or similar tools to cut through the cable.

A cable end that has been squashed flat will no longer fit into the clamping sleeve.

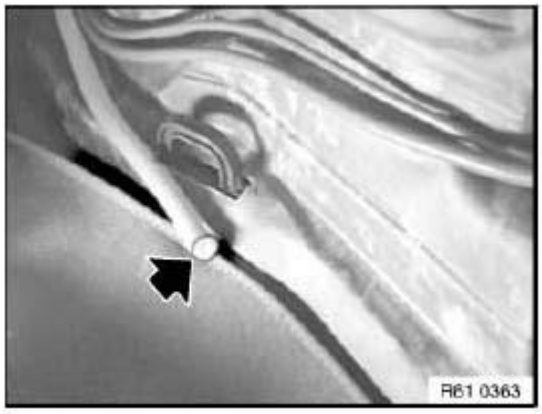


Fig. 80: Locating Battery Positive Cable End
Courtesy of BMW OF NORTH AMERICA, INC.

Saw through battery positive cable at marked point with an iron saw.

Strip insulation - length (A) - from cable end.

Distance (A) = 15 mm.

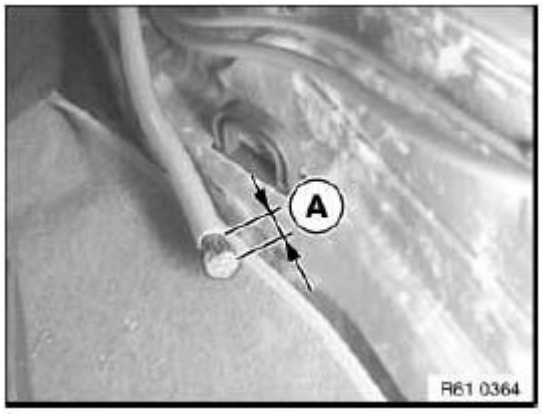


Fig. 81: Identifying Strip Insulation Dimension From Cable End
Courtesy of BMW OF NORTH AMERICA, INC.

Push heavy-current connector (1) over stripped cable end and screw into position.

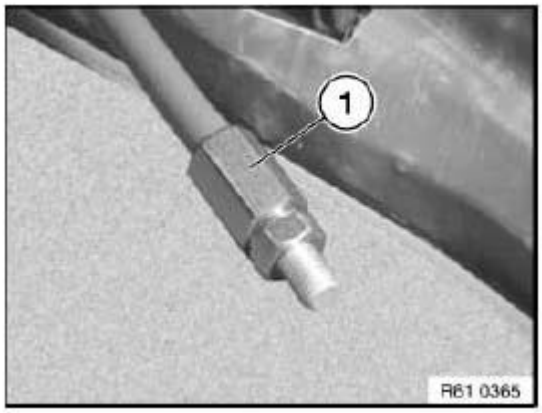


Fig. 82: Identifying Heavy-Current Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (3) over repair cable. Screw threaded sleeve (1) of repair cable (2) to heavy-current connector.

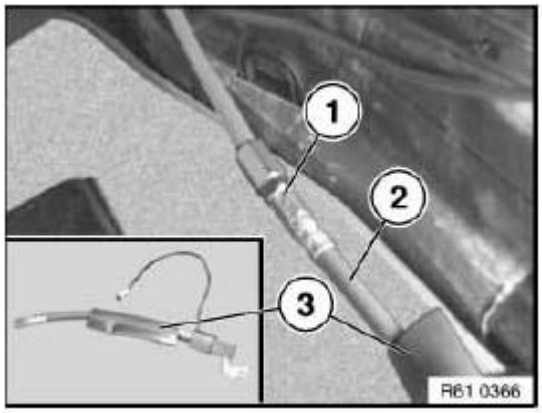


Fig. 83: Identifying Shrink-Fit Hose And Threaded Sleeve Of Repair Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (1) over connecting point and shrink on with a hot-air blower (2).

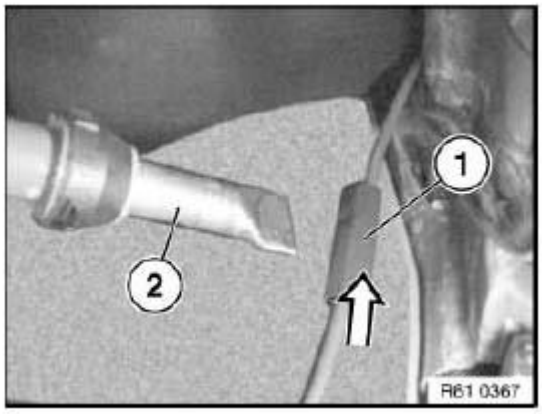


Fig. 84: Identifying Shrink-Fit Hose And Hot-Air Blower
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Heat up shrink-fit hose until it has settled completely around the connection point.

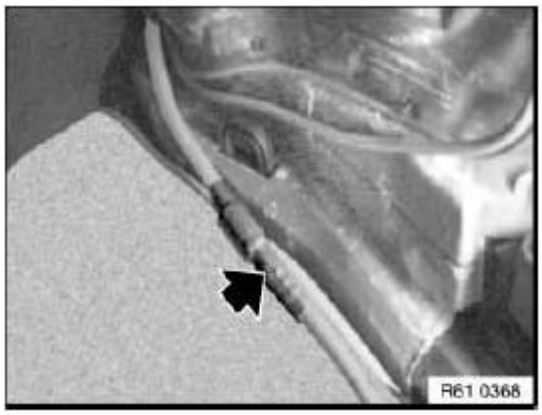


Fig. 85: Locating Shrink-Fit Hose Connection Point
Courtesy of BMW OF NORTH AMERICA, INC.

When laying the repaired battery positive cable, observe the following:

- The shrink-fit hose must not be scuffed during any movement.
- The repair cable must not cause any disturbing noises during driving operation.

NOTE: Offsetting cutting line by approx. 10 cm produces excess length of battery positive lead (1).

Lay battery positive lead (1) without kinks or abrasions.

(Shown on E46 touring.)

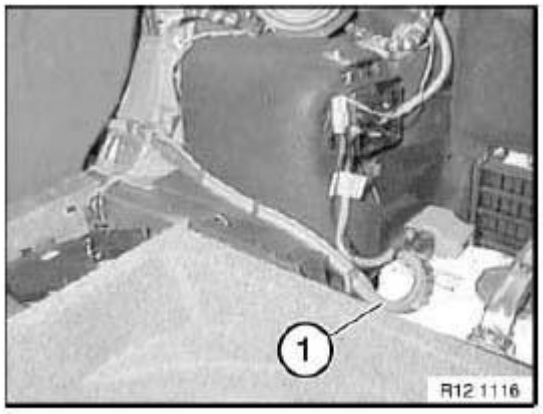


Fig. 86: Identifying Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE WIRING LOOM

12 51 001 REPLACING WIRING HARNESS SECTION FOR IGNITION COILS ON RIGHT OR LEFT (N74)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

IMPORTANT: Screw back on all screw points of cable channels without fail ! Some screw points are also ground points . If the wiring harnesses are not correctly screwed tight and secured, this may cause DME malfunction and failure!

Necessary preliminary tasks:

- Read out fault code memory of the DME control unit.
- Switch off ignition
- Disconnect **BATTERY NEGATIVE CABLE**
- Remove charge air cooler on left or right. See **RIGHT INTERCOOLER** or **LEFT INTERCOOLER**

Picture shows the left side, the procedure for the right side is identical.

Release screws (1).

Tightening torque: see 2AZ in **12 90 ELECTRONICS BOX, WIRING HARNESS** .

Remove electronics box cover (2).

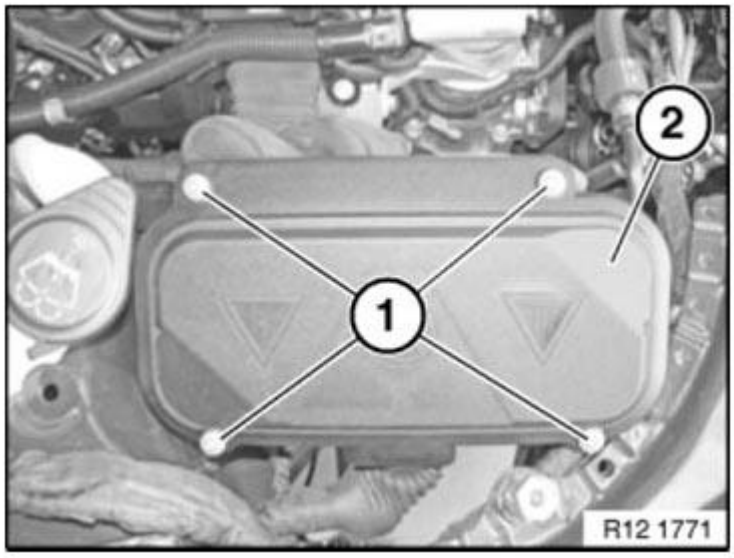


Fig. 87: Identifying Electronics Box Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Unlock all connectors (1) from control unit and disconnect. Unclip grommet hold-down device (2) and remove.

Detach rubber grommets (3) from electronics box. Place wiring harnesses to the side.

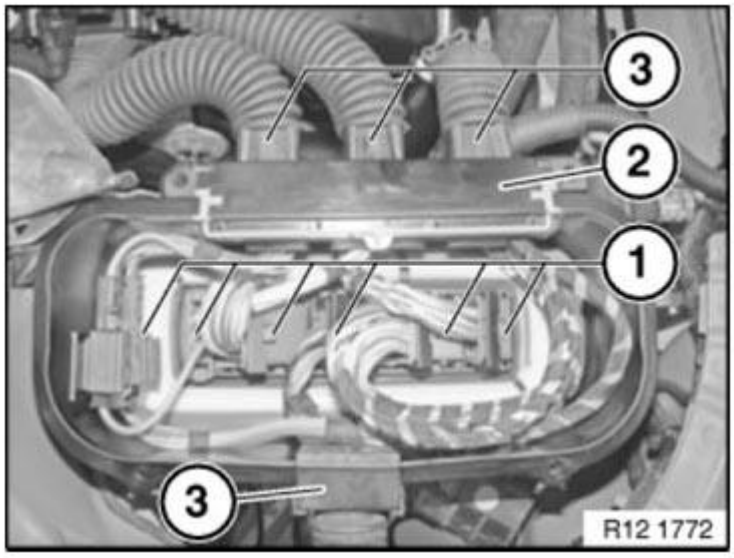


Fig. 88: Identifying Control Unit Connectors, Rubber Grommets And Grommet Hold-Down Device
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure grommets are correctly seated (watertightness).

Picture shows the left side, the procedure for the right side is identical.

Release screw (1).

Tightening torque: see 5AZ in **12 52 ENGINE WIRING HARNESS** .

Unfasten screws (2).

Tightening torque: see 5AZ in **12 52 ENGINE WIRING HARNESS** .

Unlock all connectors from injectors and ignition coils and detach.

Feed out air wiring harness (3) and remove.

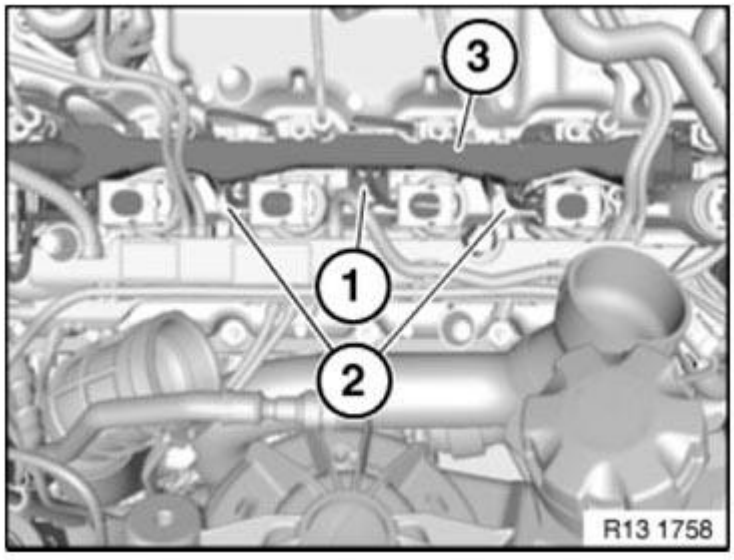


Fig. 89: Identifying Feed Out Air Wiring Harness And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screw back on all screw points of cable channels without fail. Some screw points are also ground points .

Release wiring harness if necessary from existing clips and clamps.

Installation note:

Check wiring harness installation arrangement.

Check plug connections for correct fit.

Check stored fault message.

Delete fault memory.

OIL PRESSURE/OIL TEMPERATURE/OIL GAUGE

12 61 285 REMOVING AND INSTALLING/REPLACING OIL LEVEL SENSOR FOR ENGINE OIL (N74)

IMPORTANT: Read and comply with notes on protection against damage from electrostatic discharge (ESD protection).

Necessary preliminary tasks:

- Switch off ignition
- Remove rear **UNDERBODY PROTECTION**
- Drain off **ENGINE OIL**

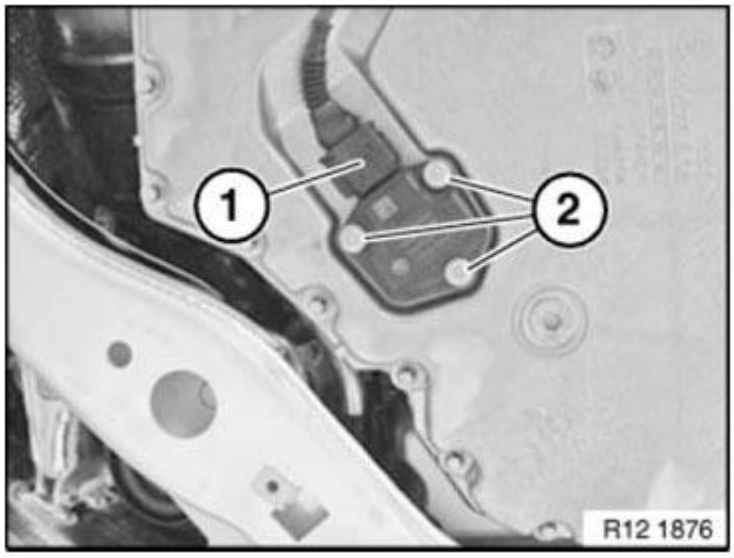


Fig. 90: Identifying Oil Level Sensor Connector With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector (1) and remove.

Unscrew nuts (2).

Tightening torque: see 2AZ in **12 61 ENGINE OIL PRESSURE, OIL CONDITION DISPLAY** .

Remove oil level sensor.

Installation note:

Clean sealing surface on oil sump.

Replace seal on oil level sensor.

An excessively low torque value will result in oil leaks.

An excessively high torque value will result in damage to the oil level sensor.

Top up engine oil.

NOTE: Check stored fault message.

Delete fault memory.

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N74)

WARNING: Scalding hazard!

Only perform this task on an engine that has cooled down.

Necessary preliminary tasks:

- Turn off ignition
- Remove rear **UNDERBODY PROTECTION**

Installation location: Oil pressure sensor is located above the oil filter housing.

Engine oil may emerge when oil pressure sensor is replaced; have a cleaning cloth ready.

Unlock plug (1) and remove.

Release and remove oil pressure sensor (2).

Tightening torque: see 1AZ in **12 61 ENGINE OIL PRESSURE, OIL CONDITION DISPLAY** .

Installation:

Check engine oil level. Top up engine oil if level is too low.

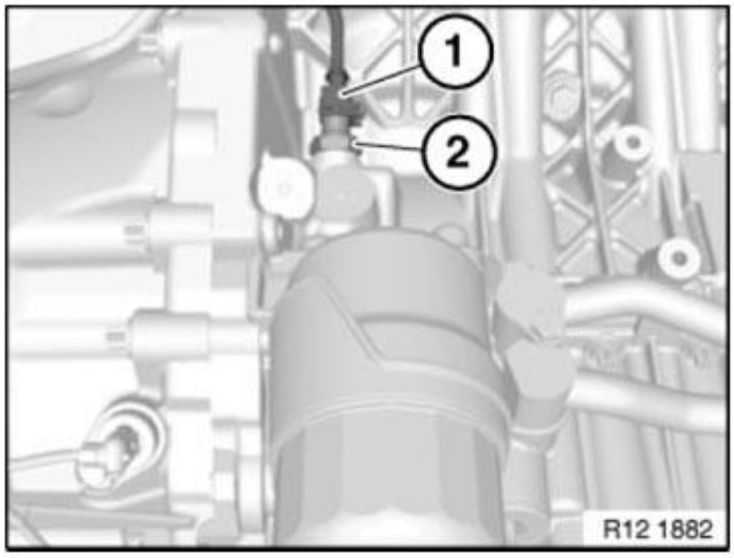


Fig. 91: Identifying Oil Pressure Sensor With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

CONTROL UNIT BOX

12 90... REMOVING AND INSTALLING/REPLACING ELECTRONICS BOX ADD-ON

IMPORTANT: Comply with NOTES ON PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection)!

NOTE: Follow notes for removing and installing control units.

Necessary preliminary tasks:

- Read fault memory.
- Disconnect **BATTERY EARTH LEAD** .

Release expanding rivet (1) and remove cover (2).

Installation note:

Replace damaged expanding rivet.

Holder of cover (2) must snap into place in suspension cross-brace during installation.

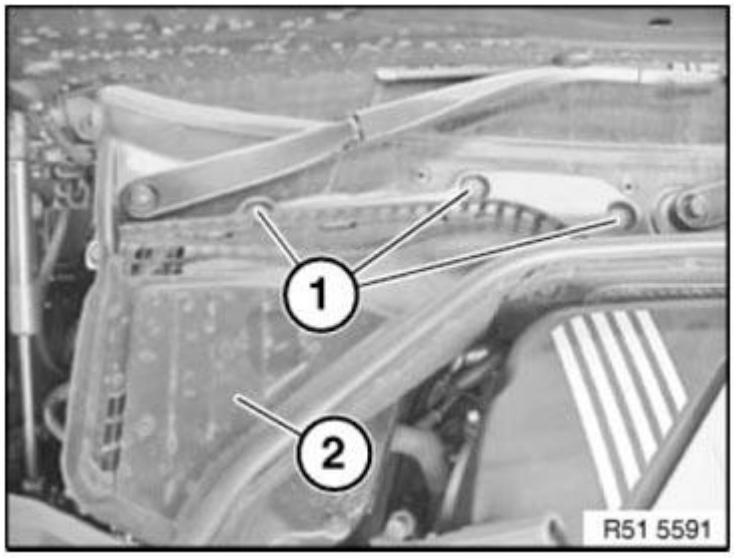


Fig. 92: Identifying Expanding Rivet And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 4AZ in **12 90 ELECTRONICS BOX, WIRING HARNESS** .

Release clamp (2).

Remove cover (3) from supplementary electronics box.

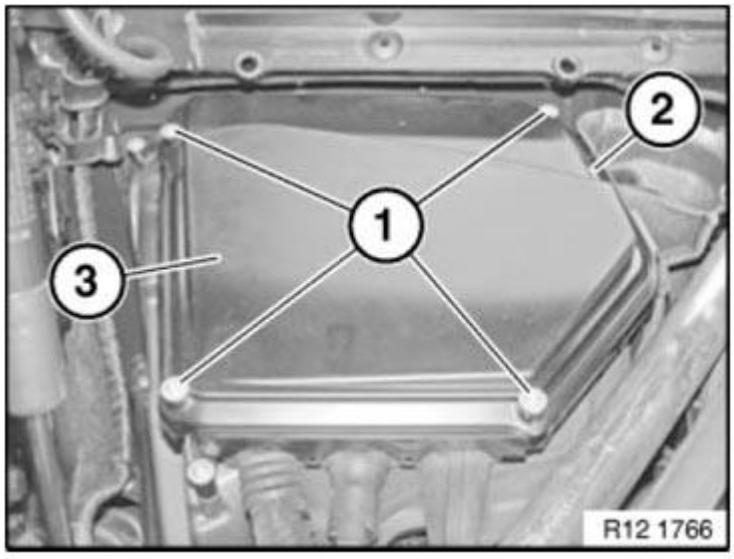


Fig. 93: Identifying Supplementary Electronics Box Cover, Clamp And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip grommet hold-down device (1).

Detach rubber grommets (2) from electronics box add-on.

Installation note:

Make sure grommets are correctly seated (watertightness).

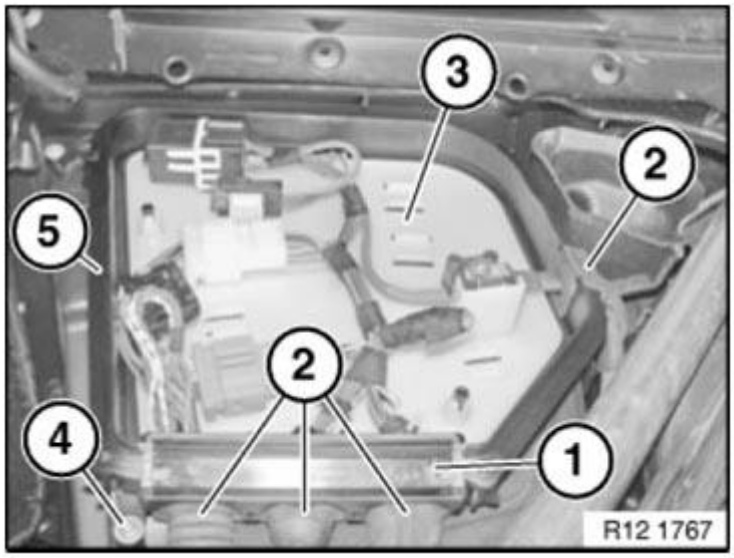


Fig. 94: Identifying Supplementary Electronics Box, Carrier Plate, Screws, Rubber Grommets And Grommet Hold-Down Device
Courtesy of BMW OF NORTH AMERICA, INC.

Release carrier plate (3) from lower section of supplementary electronics box (5) and set aside.

Release screw (4).

Tightening torque: see 2AZ in **12 90 ELECTRONICS BOX, WIRING HARNESS** .

Remove the lower section of the supplementary electronics box (5).

12 90... REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ELECTRONICS BOX

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

NOTE: Follow instructions for removing and installing CONTROL UNITS!

Necessary preliminary tasks:

- Read fault memory.

- Disconnect **BATTERY EARTH LEAD** .
- Remove DME control unit left or right. See **CONTROL UNIT (DME) CYLINDERS 7-12** or **CONTROL UNIT (DME) CYLINDERS 1-6**.

NOTE: Picture shows the right side, the procedure for the left side is identical.

Release screws (1).

Tightening torque: see 1AZ in **12 90 ELECTRONICS BOX, WIRING HARNESS** .

Unclip coolant lines at clamp (2) from electronics box.

Feed electronics box (3) out upward and remove.

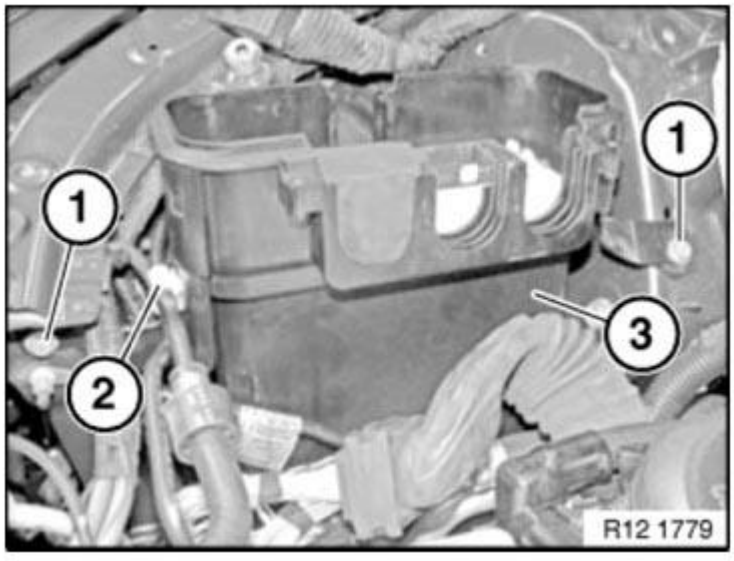


Fig. 95: Identifying Feed Electronics Box, Clamp And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

When installing the electronics box, insert guide (1) on engine support.

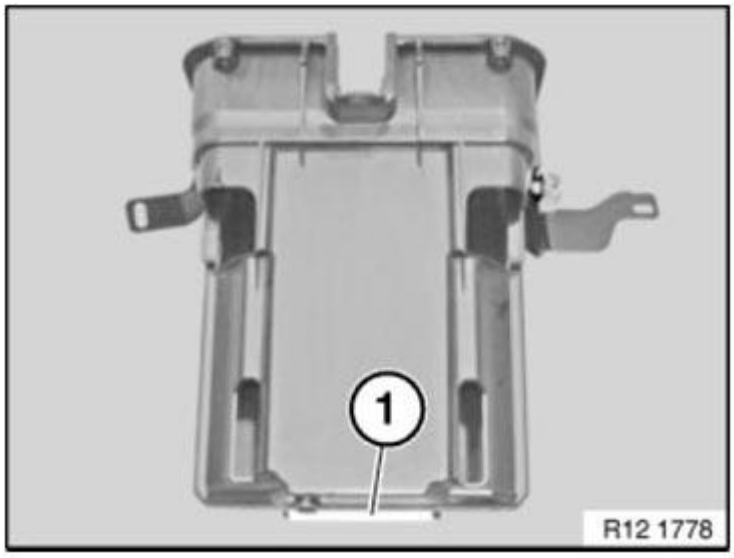


Fig. 96: Identifying Electronics Box Guide
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE

Exhaust System

EXHAUST SYSTEM, COMPLETE

18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (N74)

WARNING: **Scalding hazard!**
Only perform this work after engine has cooled down.
Risk of injury!
Removal of the exhaust system must be carried out with the assistance of a second person.

Necessary preliminary tasks:

- Remove **COVER** for exhaust pipe on left and right
- **F03 Only:**

Remove underbody protection on left and right

Support exhaust system with special tool 31 2 220.

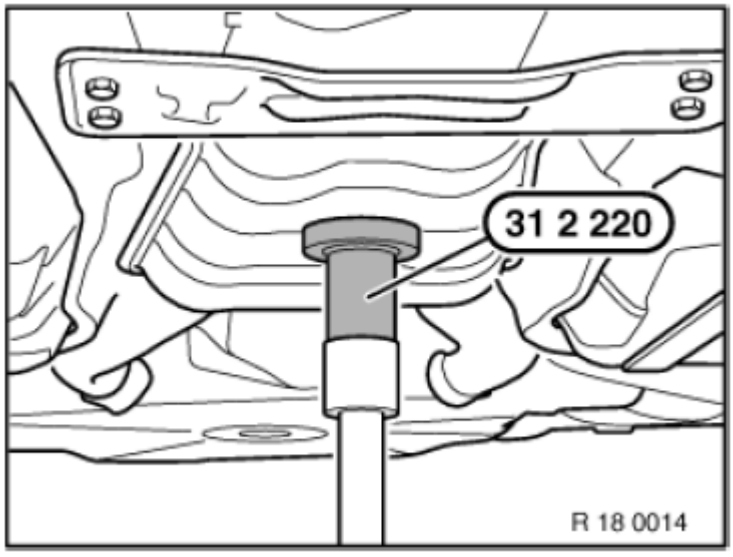


Fig. 1: Supporting Exhaust System Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Unscrew nuts (1).

Tightening torque: see 1AZ in **18 31 EXHAUST SYSTEM**

Replace self-locking nuts and seals.

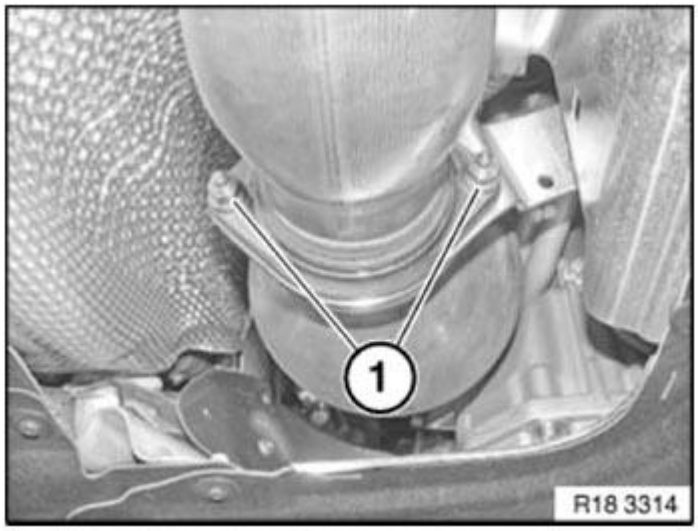


Fig. 2: Identifying Exhaust System Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 2AZ in **18 20 EXHAUST SYSTEM SUSPENSION**

Only when independent heating is fitted: release screw (2) on metering pump.

Tightening torque: see 3AZ in **18 20 EXHAUST SYSTEM SUSPENSION**

Release screws (3) on underbody panels.

Remove reinforcement plate (4).

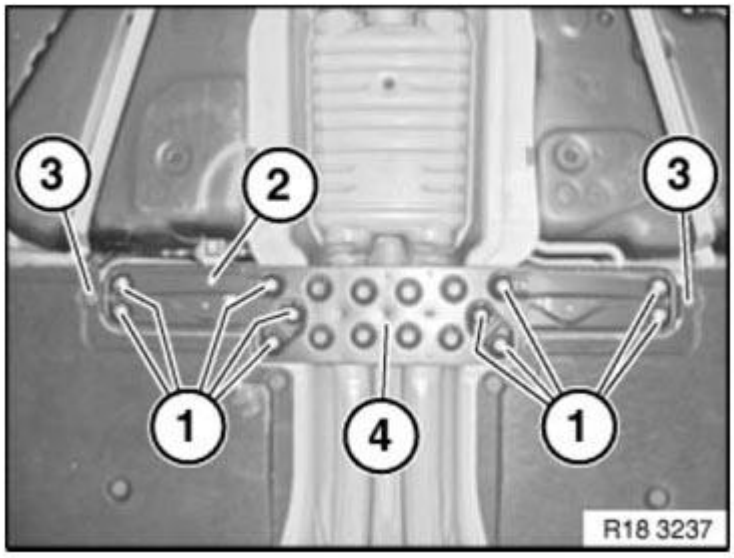


Fig. 3: Identifying Reinforcement Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Release exhaust system from rubber mount (1).

Check rubber mount for damage. Replaced damaged rubber mounts.

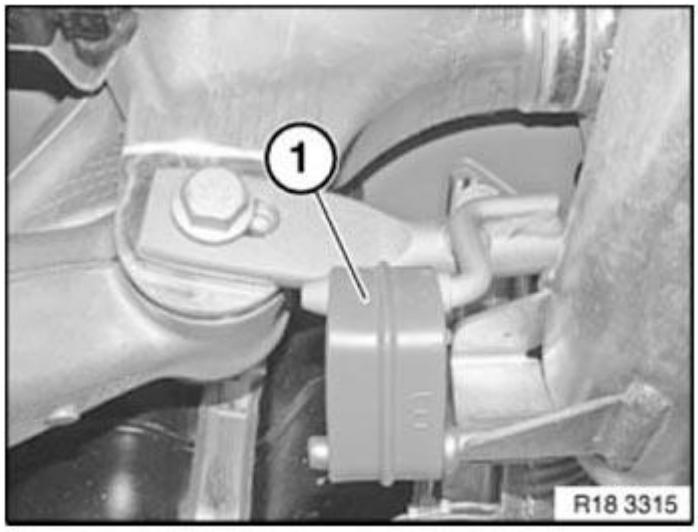


Fig. 4: Identifying Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Unscrew nuts (1).

Tightening torque: see 1AZ in **18 20 EXHAUST SYSTEM SUSPENSION**

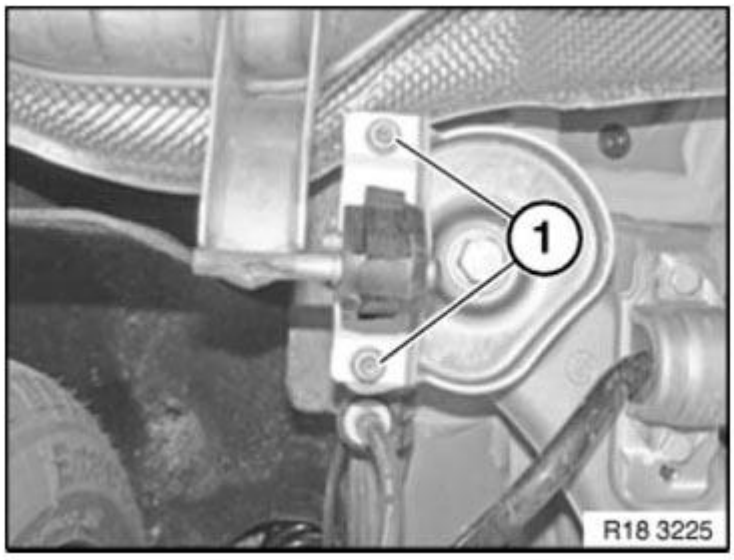


Fig. 5: Identifying Left Side Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Detach hose (1) on vacuum unit.

Slacken nut (2).

Tightening torque: see 1AZ in **18 20 EXHAUST SYSTEM SUSPENSION**

Lower and remove exhaust system with assistance of a second person.

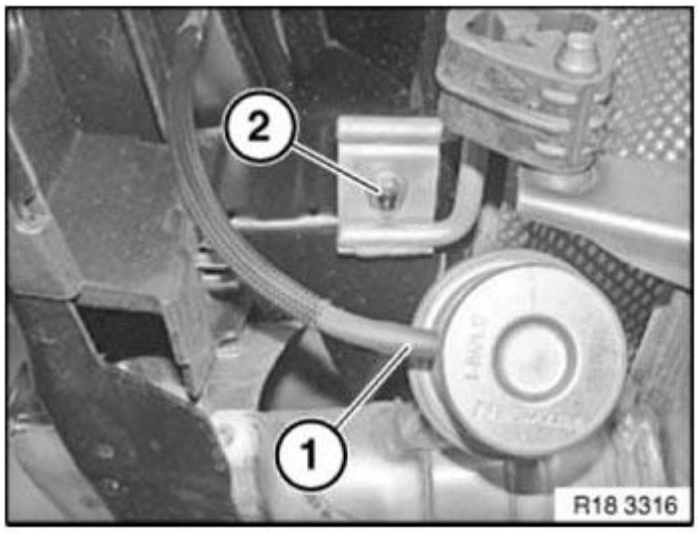


Fig. 6: Identifying Vacuum Unit Hose And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

Check exhaust system for leaks.

51 47 390 REMOVING AND INSTALLING/REPLACING EXHAUST PIPE TRIM IN BUMPER COVER ON LEFT OR RIGHT

Necessary preliminary tasks:

- Remove **COVER ON REAR BUMPER TRIM**

The following graphic may differ, depending on the engine specification.

Release screws (1).

Remove exhaust pipe cover (2).

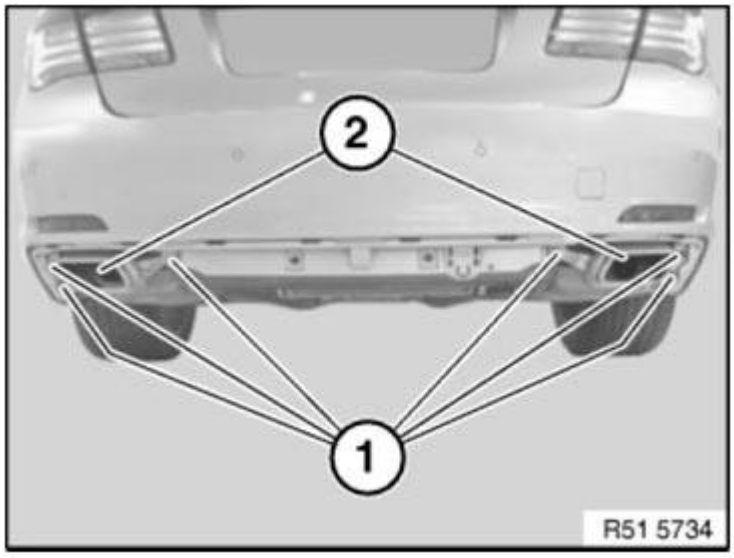


Fig. 7: Identifying Exhaust Pipe Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

MUFFLERS

18 12 050 REPLACING CENTER SILENCER (N74)

WARNING: Risk of burns!

Only perform these tasks after exhaust system has cooled down.

Support center silencer with special tool 31 2 220 and a suitable universal lifter.

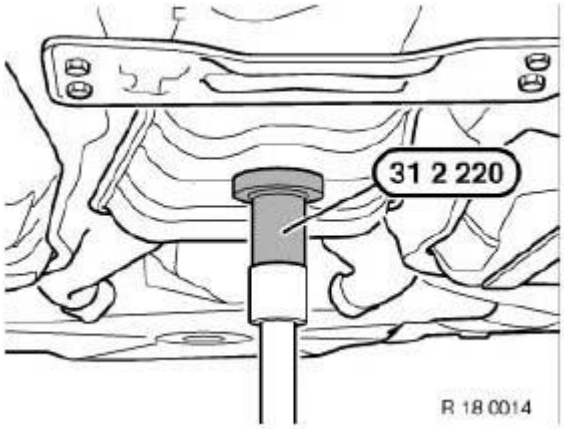


Fig. 8: Supporting Centre Silencer Using Special Tool (31 2 220) And Suitable Universal Lifter
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 2AZ in **18 20 EXHAUST SYSTEM SUSPENSION**

Only when auxiliary heater is fitted: release screw (2) on metering pump.

Tightening torque: see 3AZ in **18 20 EXHAUST SYSTEM SUSPENSION**

Release screws (3) on underbody panelling.

Remove reinforcement plate (4).

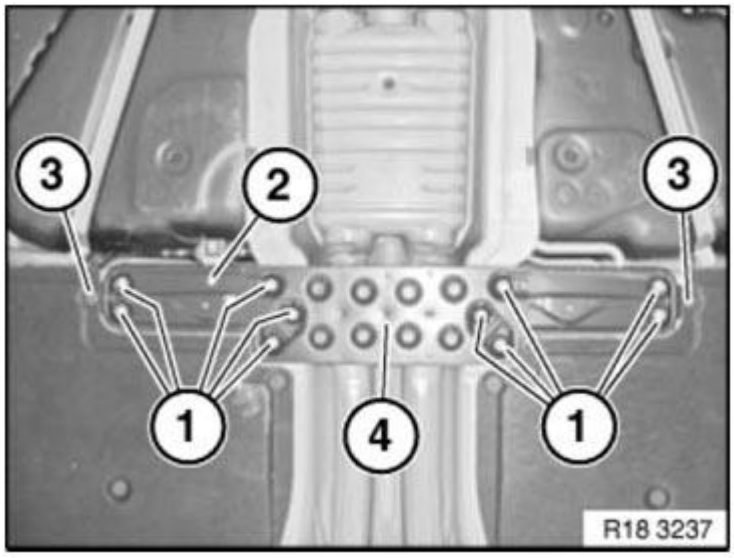


Fig. 9: Identifying Reinforcement Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **If the separation point is not marked by a punch mark in the pipe, determine the separation point by means of the pipe length on the new center silencer (2).**

Carry over separation point to faulty center silencer (2) and mark out.

Secure center silencer against falling off.

Cut through exhaust pipes at marked point with a suitable tool.

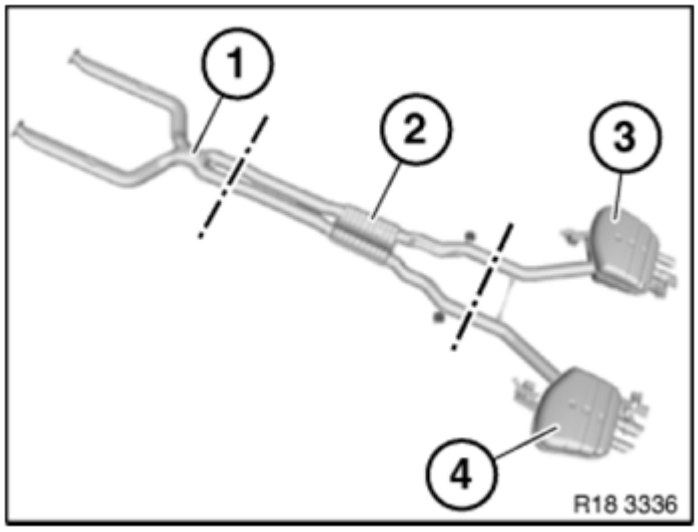


Fig. 10: Identifying Centre Silencer Components

Picture shows the left side, the procedure for the right side is identical.

Detach the center silencer from the rubber mount (1).

Lower and remove center silencer with assistance of a second person.

Check rubber mount for damage. Replaced damaged rubber mounts.

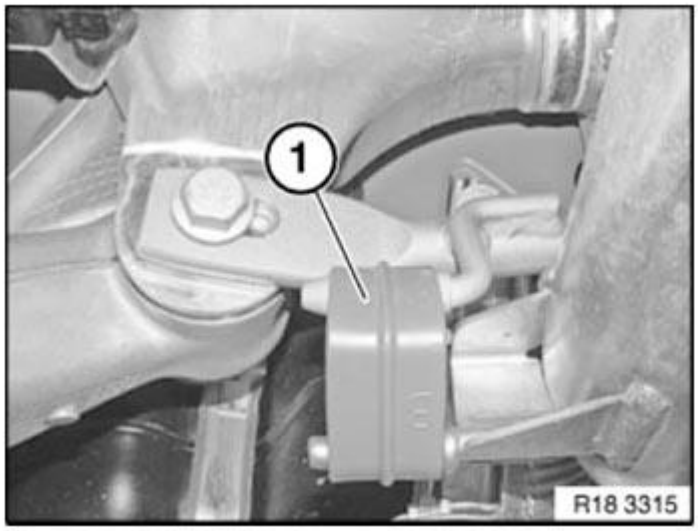


Fig. 11: Identifying Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Adjust center silencer to fit and connect with clamps.

Centre clamps and tighten down.

Tightening torque: see 2AZ in **18 31 EXHAUST SYSTEM**

The procedure is identical on both sides.

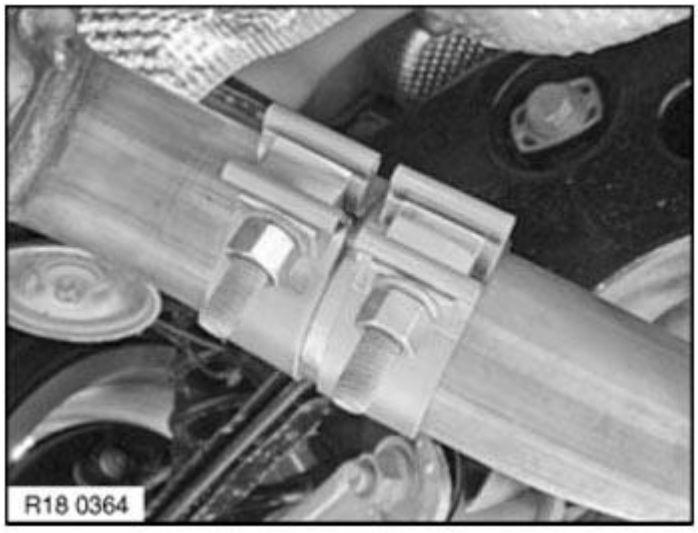


Fig. 12: Identifying Fitting Of Centre Silencer And Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 12 046 REPLACING FRONT PIPE (N74)

WARNING: Risk of burns!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks:

- Remove rear **UNDERBODY PROTECTION**
- **F03 Only:**

Remove underbody protection on left and right

Support front pipe with special tool 31 2 220 and a suitable universal lifter.

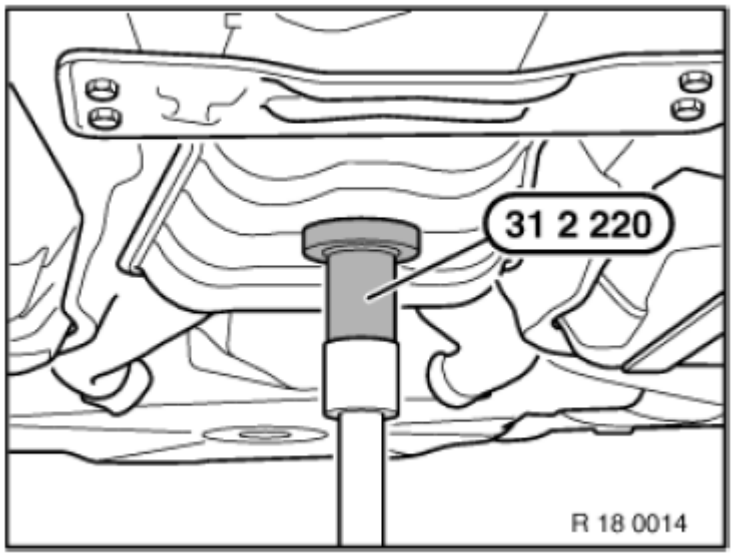


Fig. 13: Supporting Front Pipe Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **If the separation point is not marked by a punch mark in the pipe, determine the separation point by means of the pipe length on the new front pipe (1).**

Carry over separation point to defective front pipe and mark.

Secure front pipe against falling off.

Cut through exhaust pipes at marked point with a suitable tool.

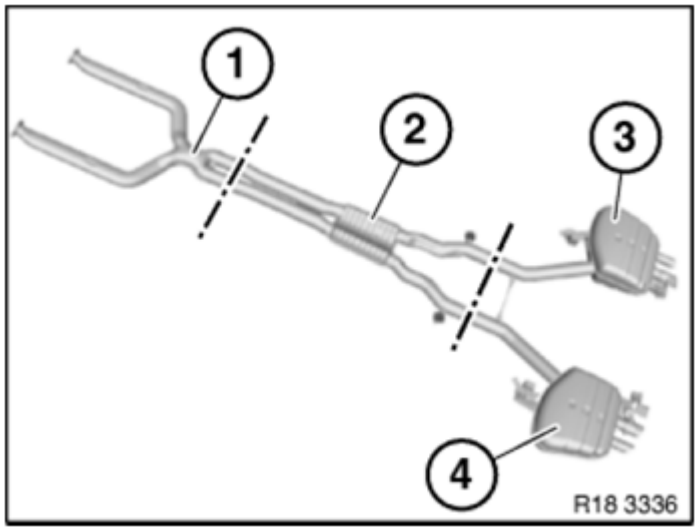


Fig. 14: Identifying Front Pipe Components

Picture shows the left side, the procedure for the right side is identical.

Slacken nut (1).

Tightening torque: see 1AZ in **18 31 EXHAUST SYSTEM**

Replace self-locking nuts.

Replace seals.

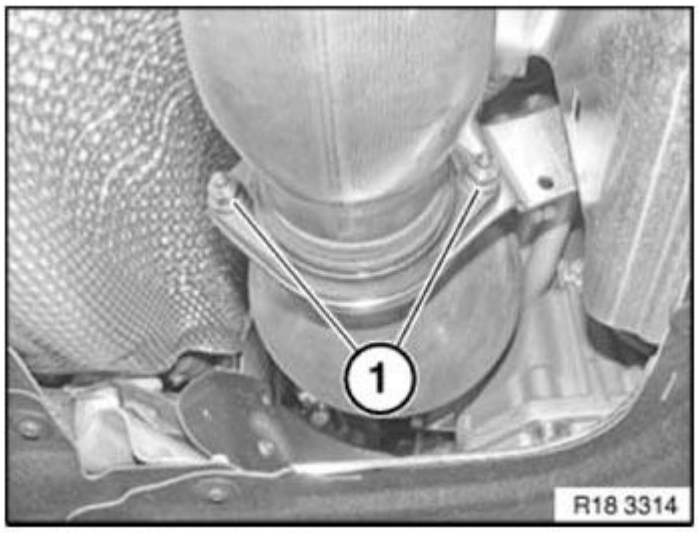


Fig. 15: Identifying Exhaust System Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Install front pipe to fit and connect with clamps.

Centre clamps and tighten down.

Tightening torque: see 2AZ in **18 31 EXHAUST SYSTEM**

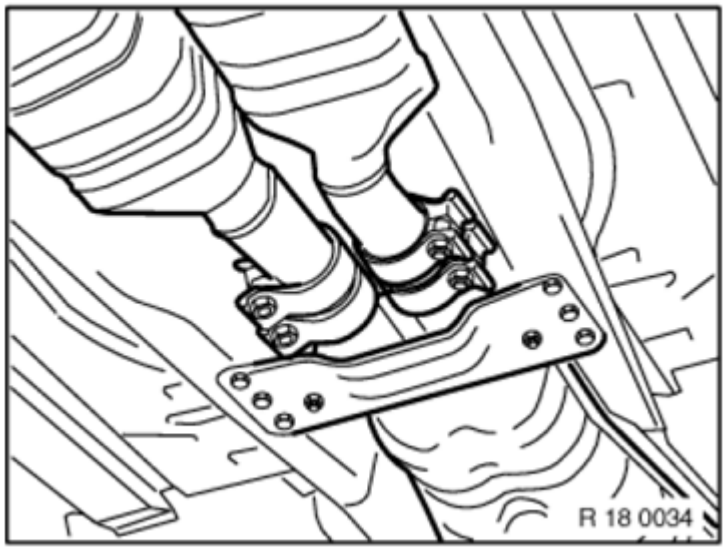


Fig. 16: Identifying Front Pipe Centre Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 12 031 REPLACING LEFT OR RIGHT REAR SILENCER (N74)

WARNING: Risk of burns!

Only perform these tasks after exhaust system has cooled down.

Support rear silencer with special tool 31 2 220 and a suitable universal lifter.

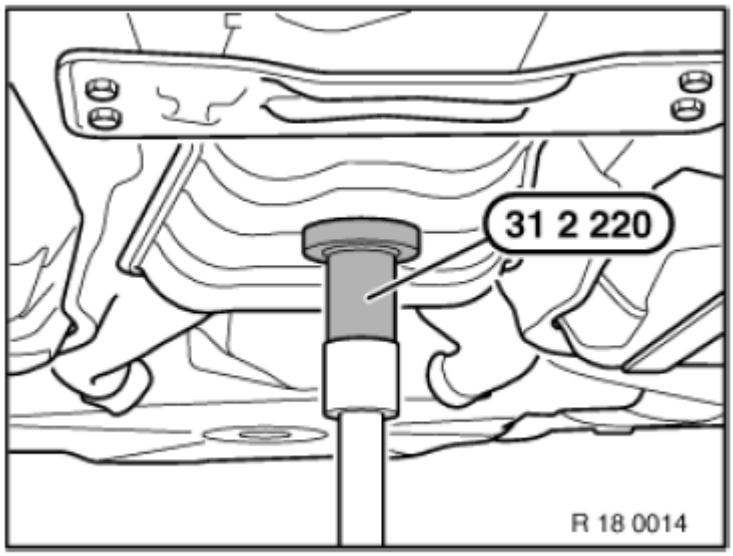


Fig. 17: Supporting Rear Silencer Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the separation point is not marked by a punch mark on the pipe, determine the separation point by means of the pipe length on the new rear silencer. Carry over separation point to faulty rear silencer (3) or (4) and mark out.

Secure rear silencer against falling off.

Cut through exhaust pipes at marked point with a suitable tool.

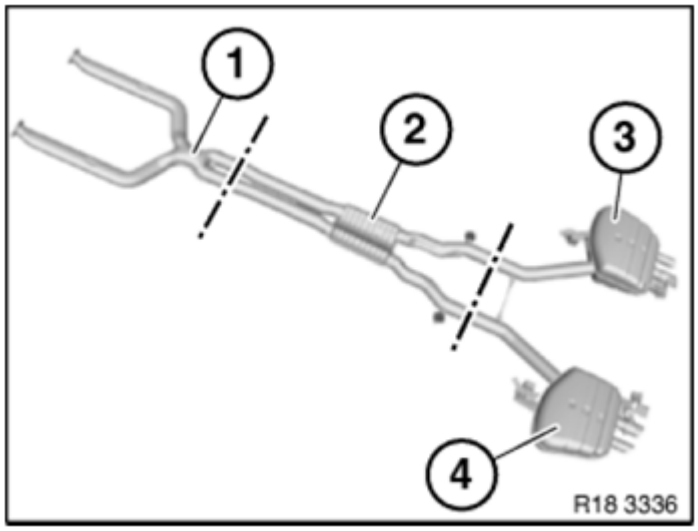


Fig. 18: Identifying Rear Silencer Components
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque: see 1AZ in **18 20 EXHAUST SYSTEM SUSPENSION**

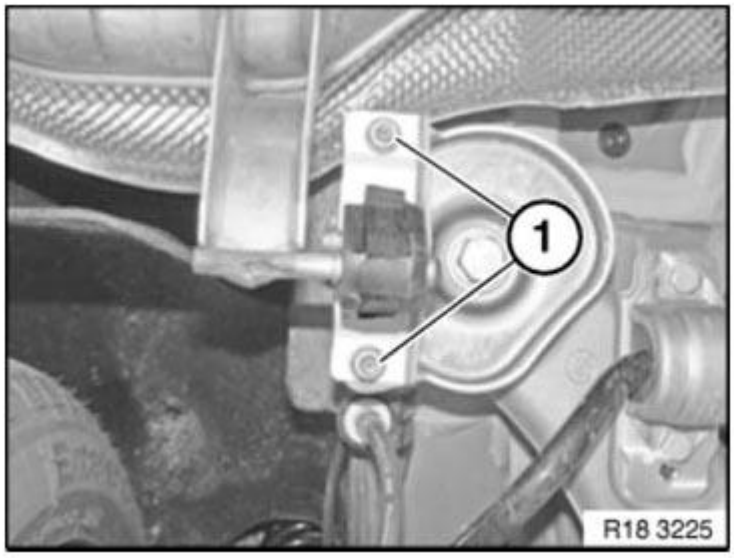


Fig. 19: Identifying Left Side Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Detach hose (1) on vacuum unit.

Slacken nut (2).

Tightening torque: see 1AZ in **18 20 EXHAUST SYSTEM SUSPENSION**

Lower and remove rear silencer with assistance of a second person.

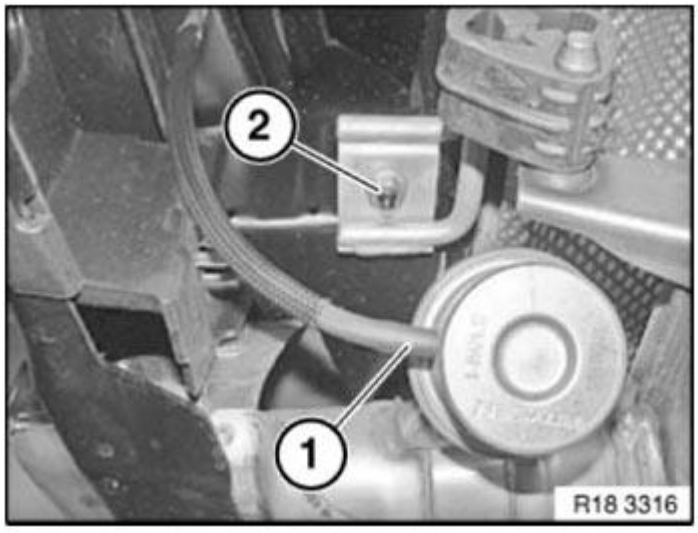


Fig. 20: Identifying Vacuum Unit Hose And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Install, adjust new rear silencer and connect with hose clamp.

Centre clamp and tighten down.

Tightening torque: see 2AZ in **18 31 EXHAUST SYSTEM**

The procedure is identical on both sides.

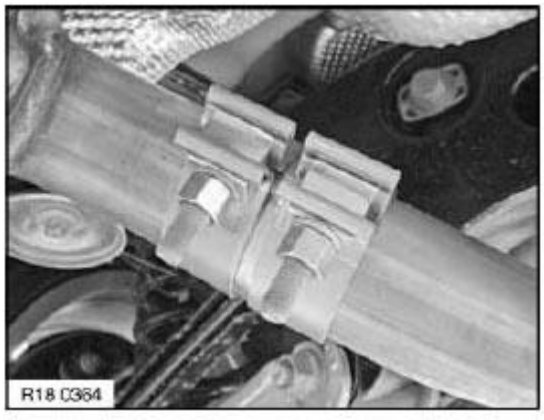


Fig. 21: Identifying Rear Silencer Centre Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check rubber mount for damage.

Replace damaged rubber mount.

Check exhaust system for leaks.

EXHAUST CATALYTIC CONVERTER

18 32 050 REMOVING AND INSTALLING/REPLACING CYLINDER 1-6 CATALYTIC CONVERTER (N74)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks:

- Remove right **INTAKE FILTER HOUSING**
- Remove **CHARGE AIR PIPE** cylinder 1-6
- Remove **EXHAUST SYSTEM**
- Remove **CONTROL SENSOR** cylinder 1-6
- Remove **MONITORING SENSOR** cylinder 1-6

Graphic shows the left side, the procedure for the right side is identical.

Unscrew nuts (1).

Remove heat shield (2).

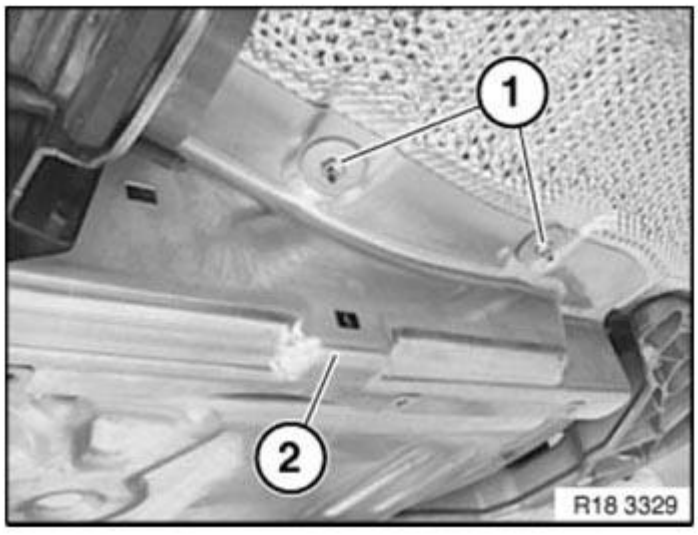


Fig. 22: Identifying Heat Shield And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 3AZ in **18 31 EXHAUST SYSTEM**

Remove holder (2).

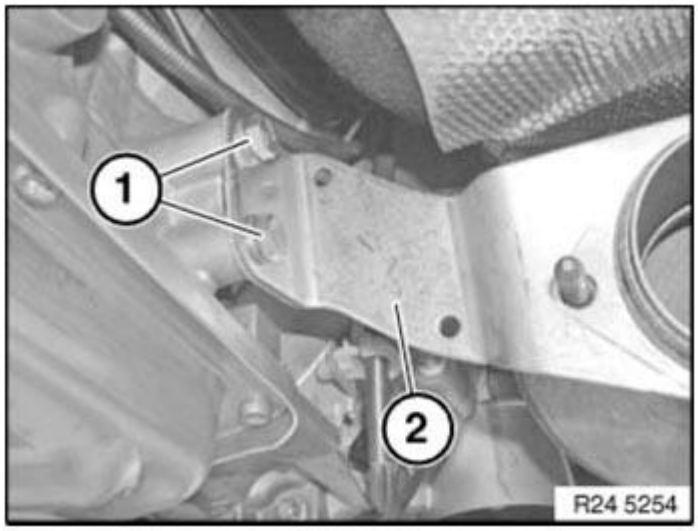


Fig. 23: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp (1).

Tightening torque: see 4AZ in **18 31 EXHAUST SYSTEM**

Renew clamp and gasket.

Slacken nut (2).

Tightening torque: see 5AZ in **18 31 EXHAUST SYSTEM**

Feed out catalytic converter (3) and remove.

Installation:

For easier installation the V-band clamp can be turned by 180°. Make sure that a clearance of 20 mm to other components is maintained.

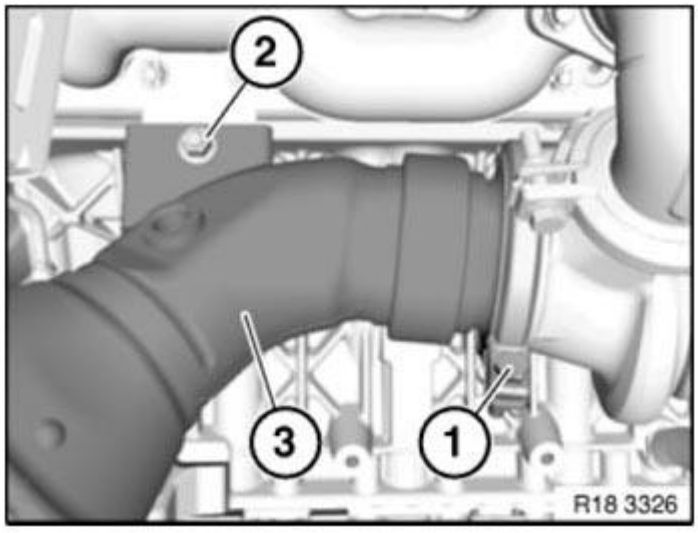


Fig. 24: Identifying Catalytic Converter, Clamp And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The ends of the V-band clamps must rest parallel to each other.

Tightening torque: see 4AZ in **18 31 EXHAUST SYSTEM**

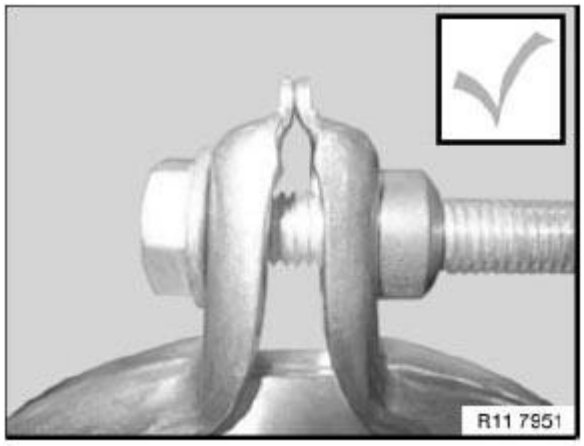


Fig. 25: Identifying V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If you can see a gap between the ends of the V-band clamps, release and then repeat the screw connection.

Tightening torque: see 4AZ in **18 31 EXHAUST SYSTEM**

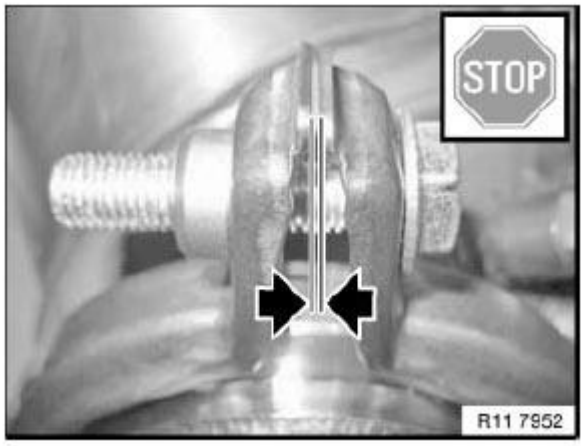


Fig. 26: Identifying Gap Between Ends Of V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If the ends of the V-band clamps are positioned under each other, release and then repeat the screw connection.

Tightening torque: see 4AZ in **18 31 EXHAUST SYSTEM**

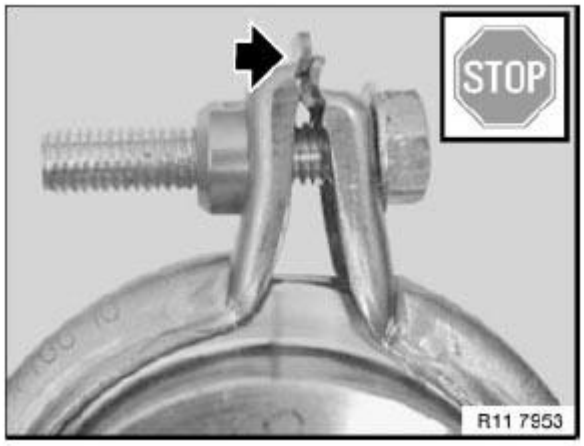


Fig. 27: Positioning Of V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leaks.

18 32 050 REMOVING AND INSTALLING/REPLACING CYLINDER 7-12 CATALYTIC CONVERTER (N74)

Removing and installing/replacing cylinder 7-12 catalytic converter (N74)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks:

- Remove left **INTAKE SILENCER HOUSING**
- Remove **CHARGE AIR PIPE,** cylinders 7-12
- Remove **EXHAUST SYSTEM**
- Remove **CONTROL SENSOR** , cylinders 7 to -12
- Remove **MONITORING SENSOR,** cylinders 7-12

Unscrew nuts (1).

Remove heat shield (2).

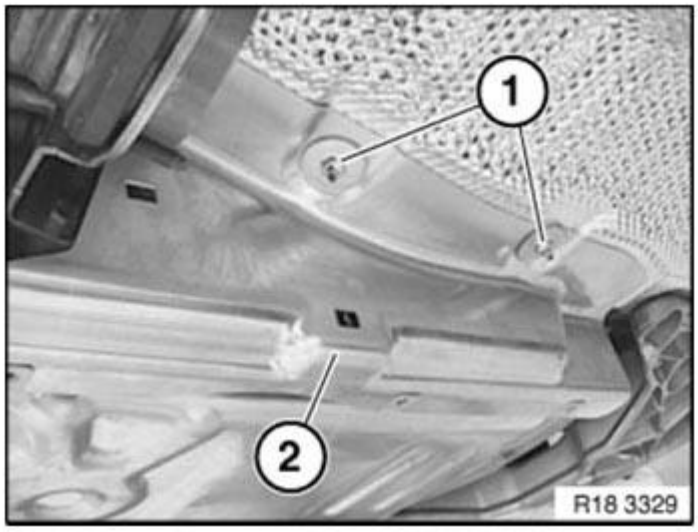


Fig. 28: Identifying Heat Shield And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 3AZ in **18 31 EXHAUST SYSTEM**

Remove holder (2).

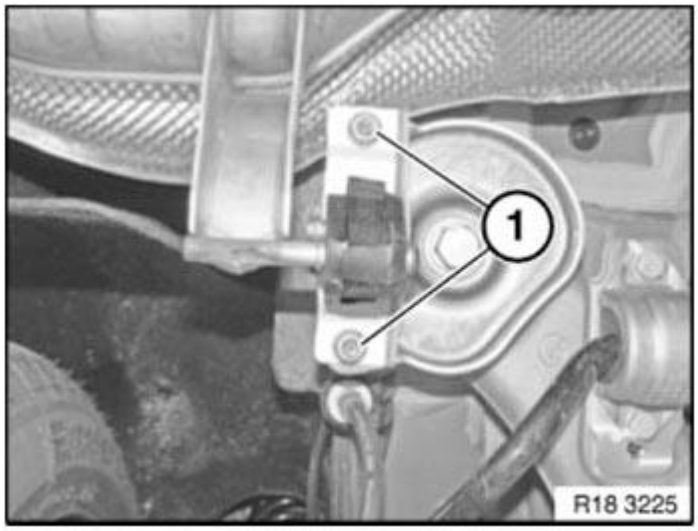


Fig. 29: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp (1).

Tightening torque: see 4AZ in **18 31 EXHAUST SYSTEM**

Replace clamp and seal.

Slacken nut (2).

Tightening torque: see 5AZ in **18 31 EXHAUST SYSTEM**

Feed out catalytic converter (3) and remove.

Installation:

To facility assembly, the V-belt clamp can be turned 180°. Make sure that a distance of 20 mm from other components is maintained.

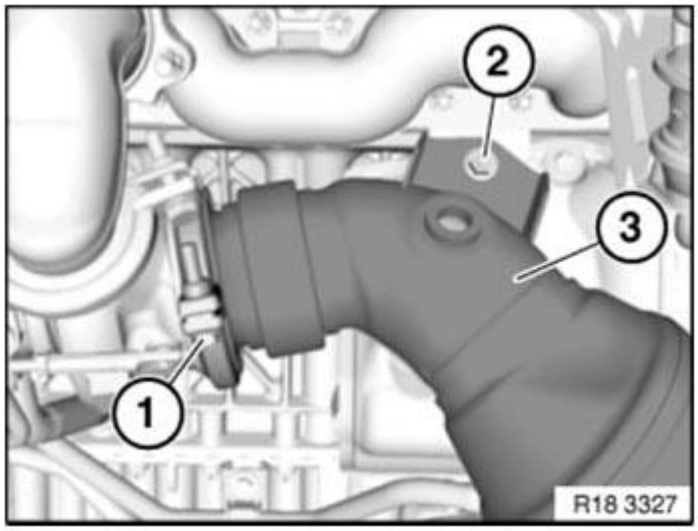


Fig. 30: Identifying Catalytic Converter, Clamp And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The ends of the V-band clamps must rest parallel to each other.

Tightening torque: see 4AZ in **18 31 EXHAUST SYSTEM**

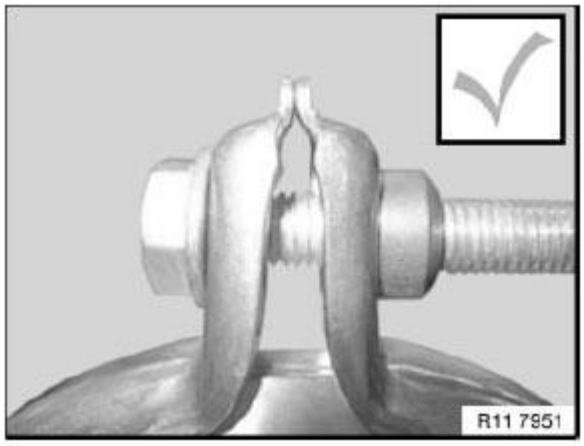


Fig. 31: Identifying V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If you can see a gap between the ends of the V-band clamps, release and then repeat the screw connection.

Tightening torque: see 4AZ in **18 31 EXHAUST SYSTEM**

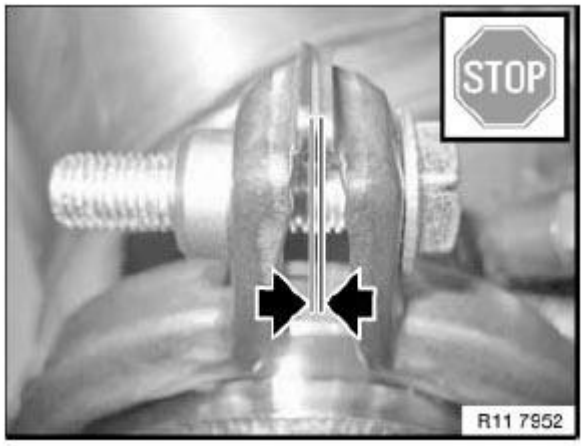


Fig. 32: Identifying Gap Between Ends Of V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If the ends of the V-band clamps are positioned under each other, release and then repeat the screw connection.

Tightening torque: see 4AZ in **18 31 EXHAUST SYSTEM**

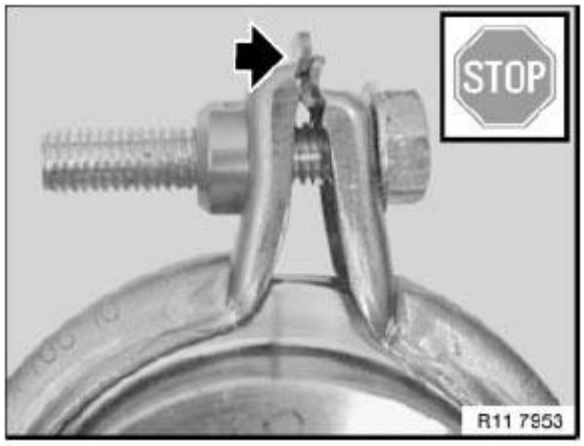


Fig. 33: Positioning Of V-Band Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leaks.

EXHAUST MANIFOLD WITH INTEGRATED CATALYTIC CONVERTER

18 40 070 REMOVING AND INSTALLING LEFT INTERMEDIATE PIPE (N74)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Remove **CATALYTIC CONVERTER,** cylinders 7 - 12

Unscrew nuts (1).

Replace self-locking nuts.

Tightening torque: see 6AZ in **18 31 EXHAUST SYSTEM**

Release clamp (2).

If necessary, replace clamp.

Tightening torque: see 7AZ in **18 31 EXHAUST SYSTEM**

Feed out intermediate pipe (3) and remove.

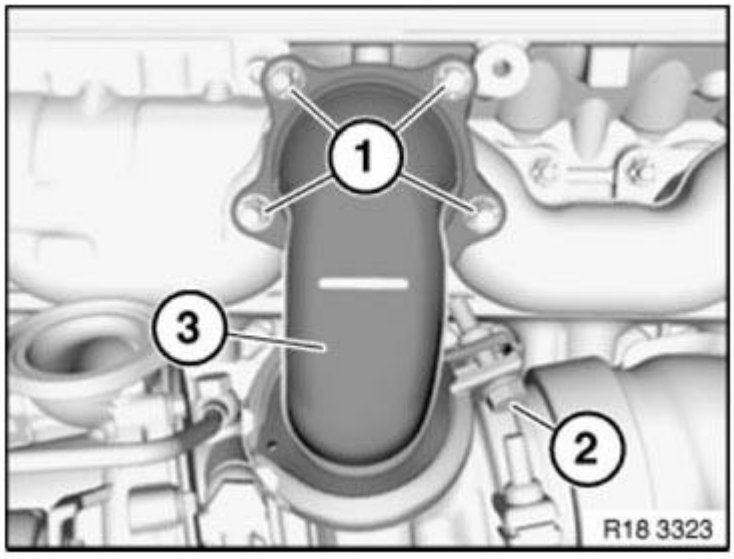


Fig. 34: Identifying Intermediate Pipe, Clamp And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Renew gaskets (1) and (2).

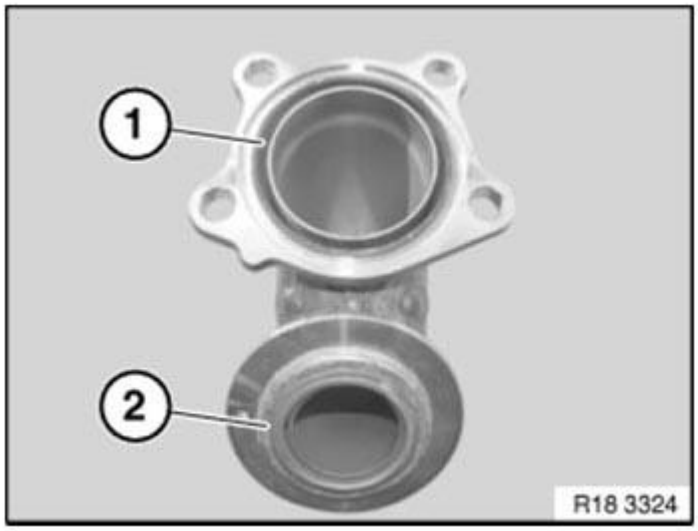


Fig. 35: Identifying Gaskets
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

Check exhaust system for leaks.

18 40 080 REMOVING AND INSTALLING RIGHT INTERMEDIATE PIPE (N74)

Removing and installing right intermediate pipe (N74)

WARNING: Scalding hazard!
Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Remove **CATALYTIC CONVERTER**, cylinders 1-6

NOTE: Graphic shows the left side, the procedure for the right side is identical.

Unscrew nuts (1).

Replace self-locking nut.

Tightening torque: see 6AZ in **18 31 EXHAUST SYSTEM**

Release clamp (2).

If necessary, replace clamp.

Tightening torque: see 7AZ in **18 31 EXHAUST SYSTEM**

Feed out and remove intermediate pipe (3).

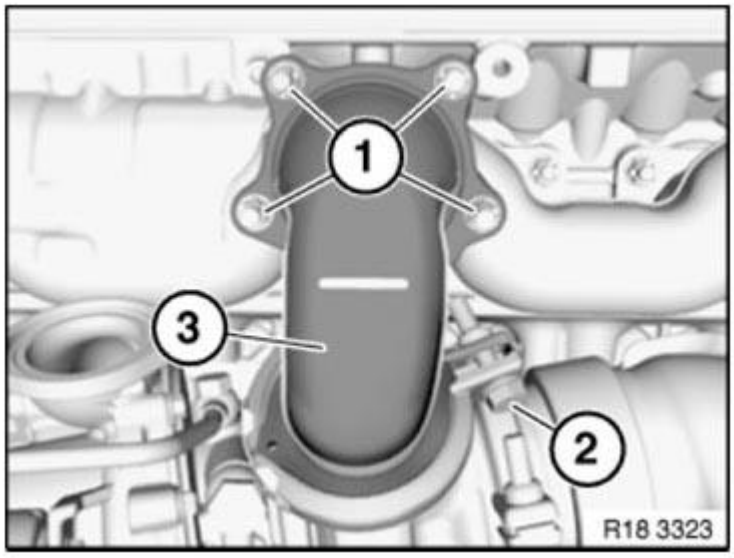


Fig. 36: Identifying Intermediate Pipe, Clamp And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Replace seals (1) and (2).

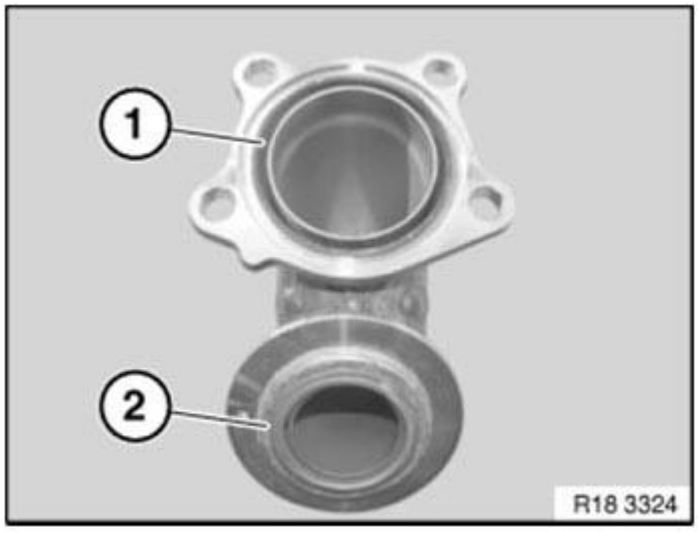


Fig. 37: Identifying Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

Check exhaust system for leaks.

18 40 010 REMOVING AND INSTALLING/RENEWING LEFT EXHAUST MANIFOLD (N74)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks:

- Remove **CLEAN-AIR PIPE,** cylinders 7-12
- Remove **INTERMEDIATE PIPE,** cylinders 7-12

Release screws (1).

Tightening torque: see 9AZ in **18 31 EXHAUST SYSTEM**

Remove heat shield (2).

Release screw (3).

Tightening torque: see 10AZ in **18 31 EXHAUST SYSTEM**

Release holder (4) with check valve and lay to one side.

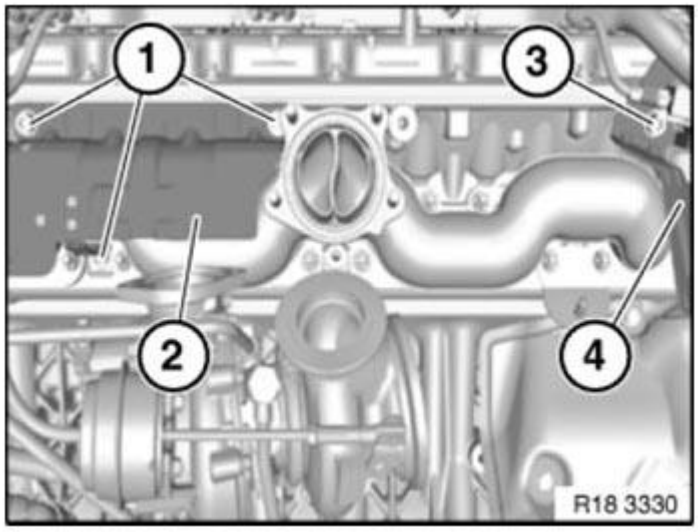


Fig. 38: Identifying Heat Shield, Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts along line (1).

Replace self-locking nuts

Tightening torque: see 8AZ in **18 31 EXHAUST SYSTEM**

Feed out exhaust manifold (2) and remove.

Replace seal.

Installation:

Seal beads faces the exhaust manifold.

Reinstall holder (3) for the catalytic converter.

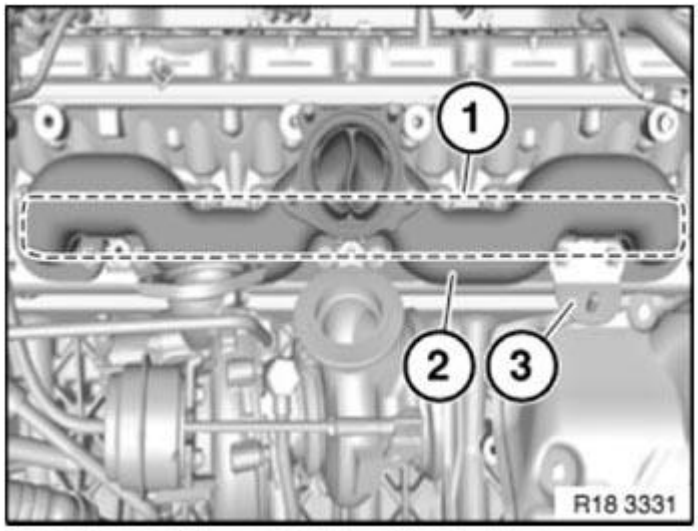


Fig. 39: Identifying Exhaust Manifold, Catalytic Converter Holder And Line
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leaks.

18 40 010 REMOVING AND INSTALLING/REPLACING RIGHT EXHAUST MANIFOLD (N74)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks:

- Remove **CLEAN AIR PIPE** cylinder 1-6
- Remove **INTERMEDIATE PIPE** cylinder 1-6

Release screws (1).

Tightening torque: see 9AZ in **18 31 EXHAUST SYSTEM**

Remove heat shield (2).

Release screw (3).

Tightening torque: see 10AZ in **18 31 EXHAUST SYSTEM**

Release holder (4) with shut-off valve and place to one side.

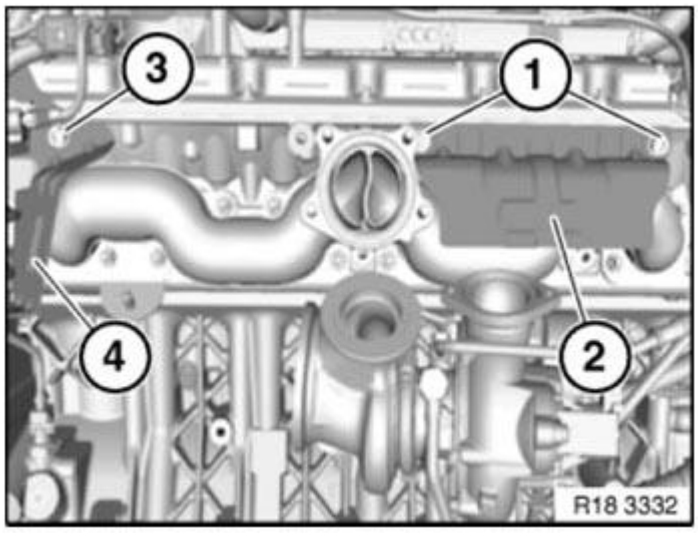


Fig. 40: Identifying Heat Shield, Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts along line (1).

Replace self-locking nuts

Tightening torque: see 8AZ in **18 31 EXHAUST SYSTEM**

Feed out air exhaust manifold (2) and remove.

Replace seal.

Installation:

Seal beads faces the exhaust manifold.

Reinstall holder (3) for the catalytic convertor.

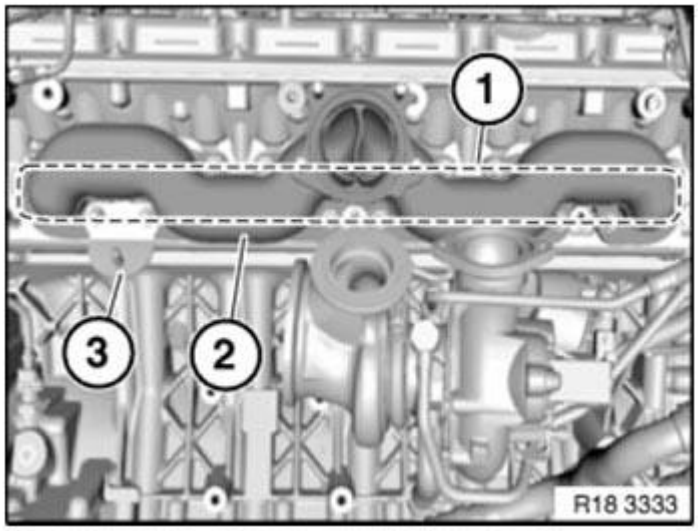


Fig. 41: Identifying Air Exhaust Manifold, Catalytic Convertor Holder And Line
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leaks.

ENGINE PERFORMANCE

Fuel System

CHECKING/SETTING ENGINE/EMISSION

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles .

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

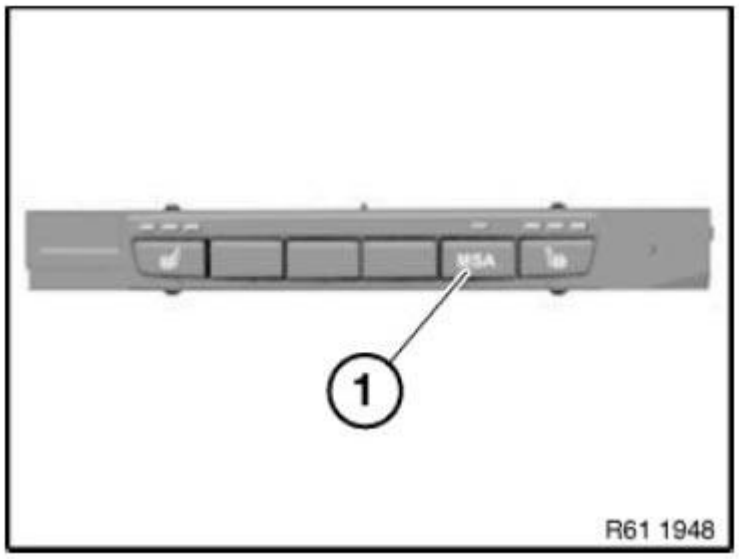


Fig. 1: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode

- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

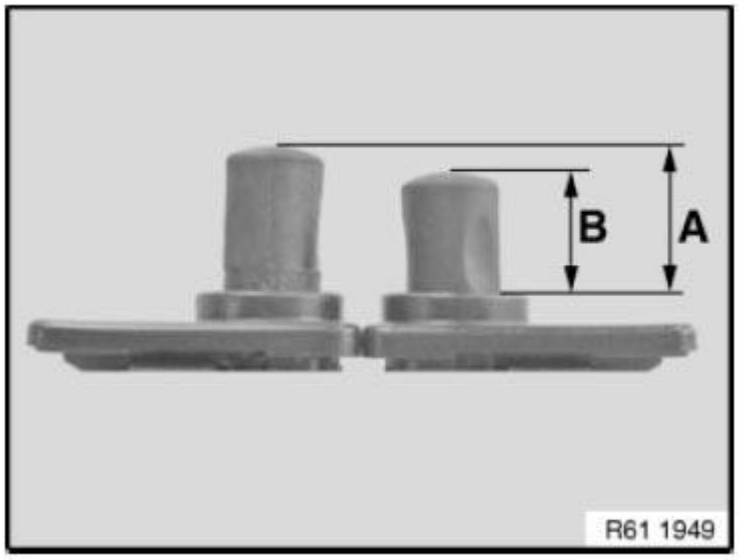


Fig. 2: Identifying Engine Hood/Bonnet Setting Position (Workshop Mode And Basic Setting)
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

FUEL PUMP WITH DRIVE AND LINE

13 31 032 CHECK FUEL PRESSURE

Necessary preliminary tasks:

- Connect BMW diagnosis system.

IMPORTANT: Lines are under pressure!

Wear protective goggles and gloves.

Fuel can emerge spontaneously at high velocity when the fuel line is released!

Recycling:

Catch and dispose of escaping fuel with auxiliary materials.

Observe country-specific waste disposal regulations.

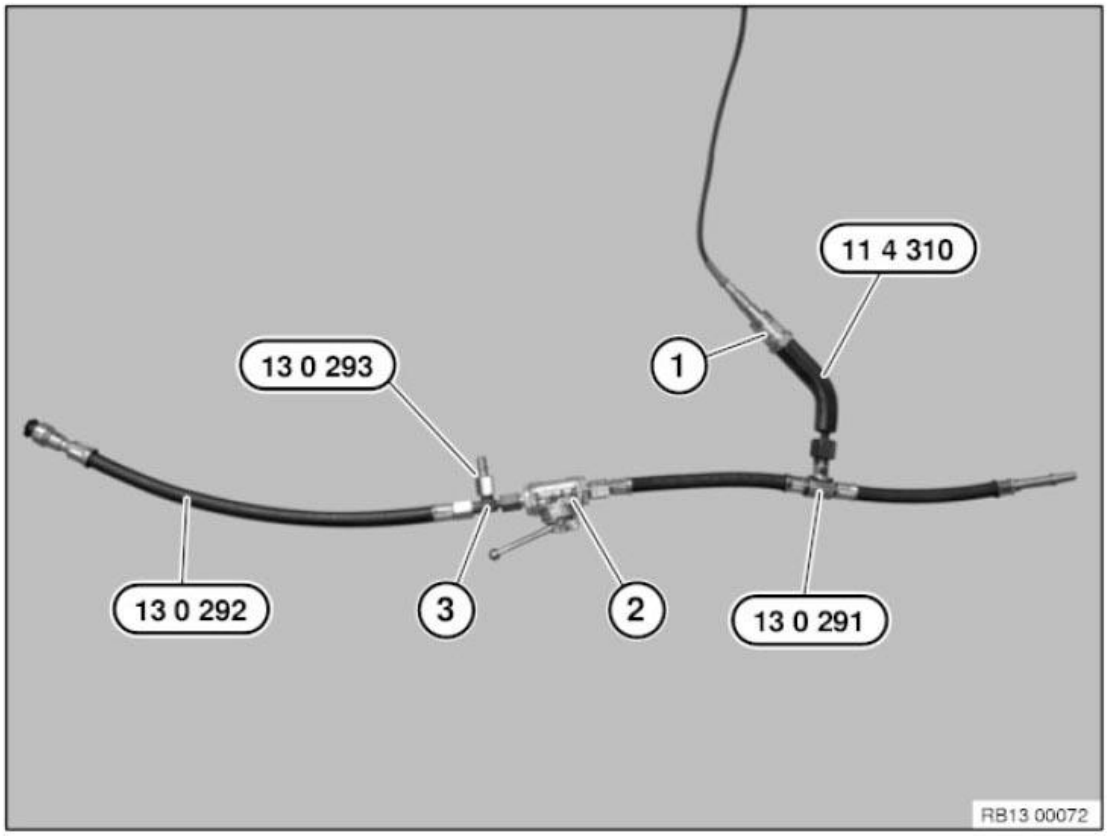


Fig. 3: Checking Fuel Delivery Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Check fuel delivery pressure

To check the fuel delivery pressure, special tool **13 0 290** must be assembled as follows.

Screw adapter 11 4 310 onto line **13 0 291** . Screw the IMIB 100 bar pressure sensor (1) onto adapter 11 4 310.

Alternatively, the pressure gauge from the set of special tools **13 3 060** can be screwed onto line **13 0 291** .

Between lines **13 0 291** and **13 0 292** , mount a shutoff tap (2) and a T-piece (3) from the set of special tools **13 3 060** .

Close up T-piece (3) from the set of special tools with the cap **13 0 293** .

NOTE: The graphic shows F07 The procedure is identical for other vehicles.

Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.

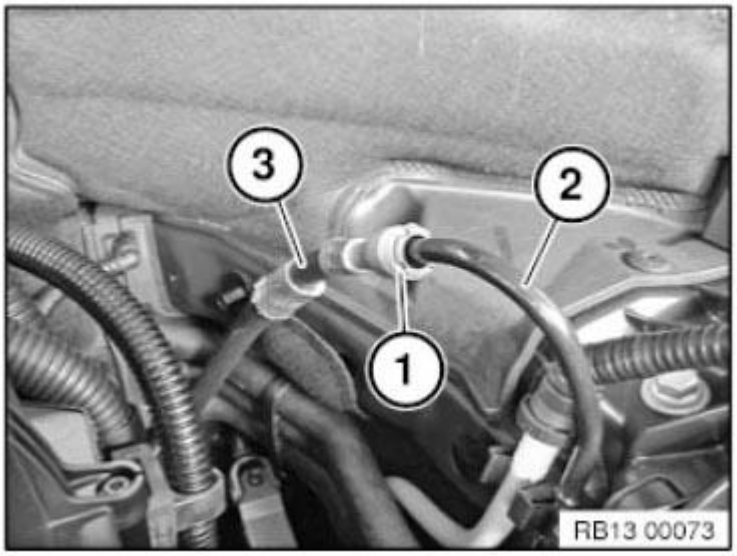


Fig. 4: Identifying Fuel Line And Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool (1) **13 0 290** into detached fuel line with IMIB fuel pressure sensor (100 bar).

Connect IMIB with fuel pressure sensor.

Establish fuel delivery pressure. Read off fuel delivery pressure on IMIB and compare with values in diagnosis system.

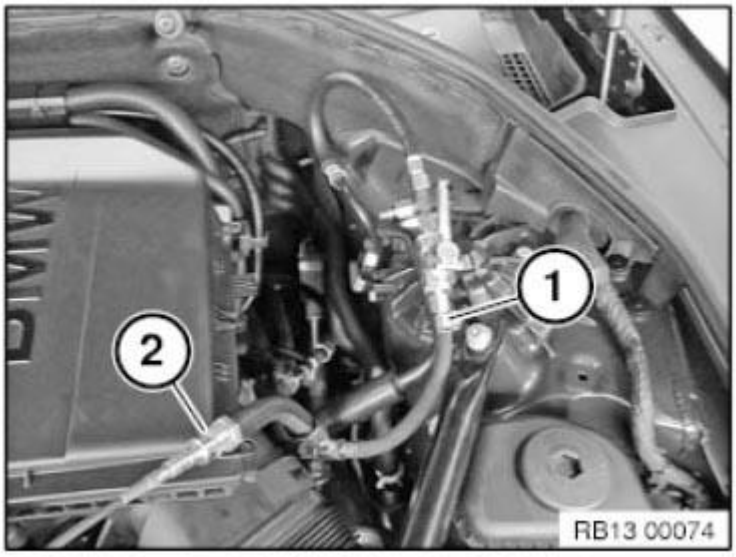


Fig. 5: Checking Fuel Delivery Pressure On IMIB Using Special Tool (13 0 290)
Courtesy of BMW OF NORTH AMERICA, INC.

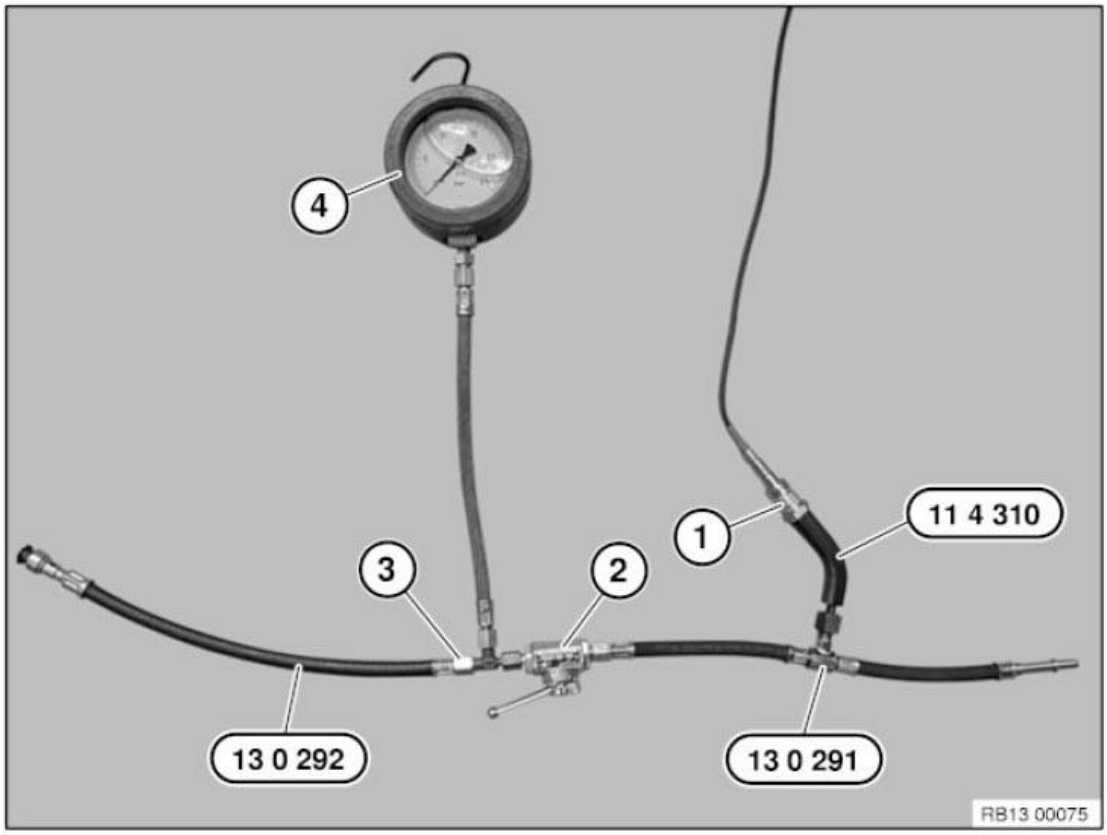


Fig. 6: Checking Fuel Pressure Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Check fuel holding pressure

To check the fuel holding pressure, special tool **13 0 290** must be assembled as follows.

Screw adapter 11 4 310 onto line **13 0 291** . Screw the IMIB 100 bar pressure sensor (1) onto adapter 11 4 310.

Alternatively, the pressure gauge from the set of special tools **13 3 060** can be screwed onto line **13 0 291** .

Between lines **13 0 291** and **13 0 292** , mount a shutoff tap (2) and a T-piece (3) from the set of special tools **13 3 060** .

Mount pressure gauge (4) from special tool set **13 3 060** onto T-piece (3) from special tool set **13 3 060** .

NOTE: The graphic shows F07 The procedure is identical for other vehicles.

Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.

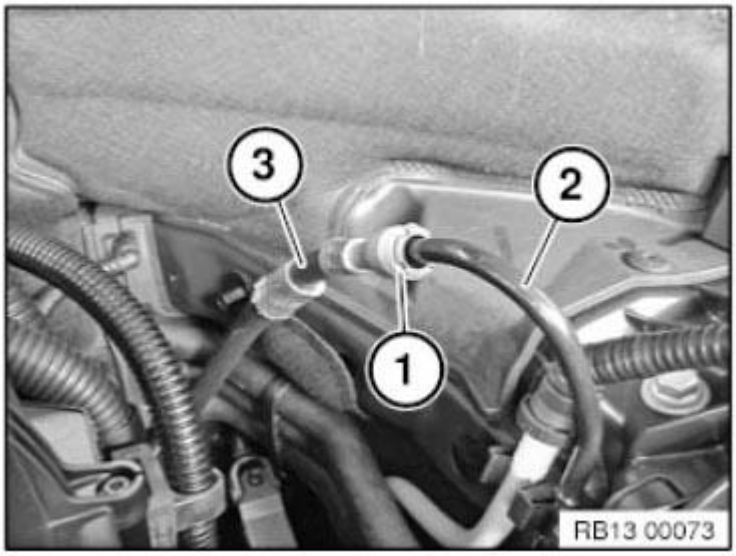


Fig. 7: Identifying Fuel Line And Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool (1) **13 0 290** with pressure gauge (2) and IMIB 100 bar fuel pressure sensor (3) into the detached fuel line.

Establish fuel delivery pressure.

Close shutoff tap (4) and switch off the engine.

Read off fuel holding pressure of high pressure pump from IMIB tester and compare with values in diagnosis system.

Read off fuel holding pressure to fuel tank on pressure gauge (2) and compare with values in diagnosis system.

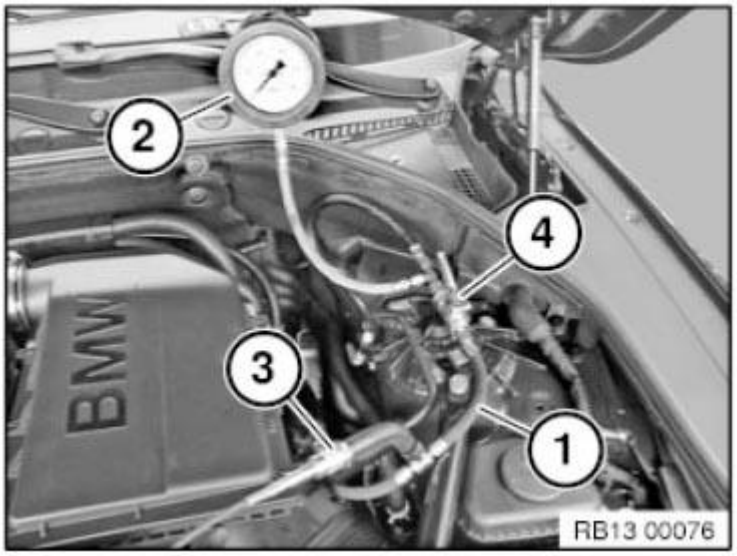


Fig. 8: Checking Fuel Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leak tightness.

13 31 029 CHECKING FUEL DELIVERY PRESSURE (N20, N53, N54, N55, N63, N74)

Necessary preliminary tasks:

- Connect BMW diagnosis system

IMPORTANT: Lines are under pressure!

Wear safety goggles and gloves.

Fuel can emerge spontaneously at high velocity when the fuel line is released!

Recycling:

Catch and dispose of escaping fuel with auxiliary materials.

Observe country-specific waste disposal regulations.

NOTE: Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump

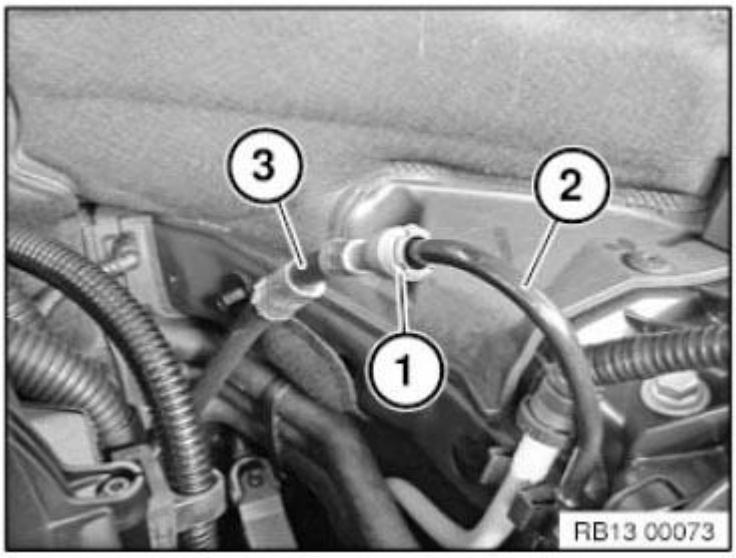


Fig. 9: Identifying Fuel Line And Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew adapter (1) from special tool 13 5 270.

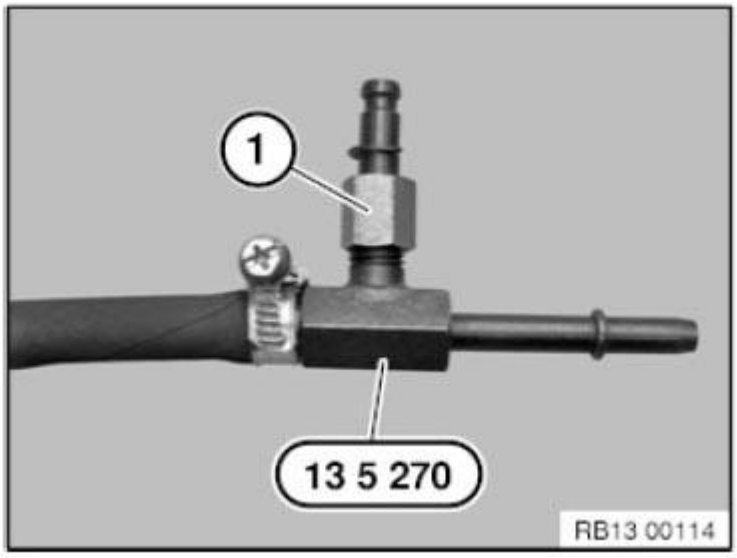


Fig. 10: Removing Adapter From Special Tool 13 5 270
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 13 5 270 into disconnected fuel line.

Screw onto special tool 13 5 270, the special tool 11 4 310.

Screw IMIB 100 bar pressure sensor (1) on the special tool 11 4 310.

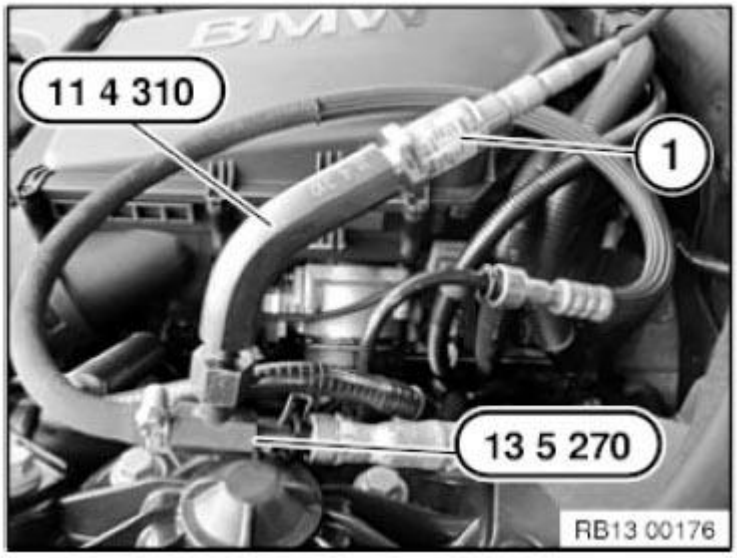


Fig. 11: Checking Fuel Delivery Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: As an alternative to the 100 bar IMIB pressure sensor (1), the 25 bar pressure sensor can also be used. For this, screw on special tool 11 5 364 instead of special tool 11 4 310 into special tool 13 5 270. Or directly screw the pressure manometer from the set of special tools 13 3 060 onto the special tool 13 5 270.

Establish fuel delivery pressure. Read off fuel delivery pressure on IMIB and compare with values in diagnosis system.

Assemble engine.

Check fuel system for tightness.

13 31... NOTES REGARDING THE FUEL PRESSURE TEST (REFERENCE PRESSURE: SURROUNDING AREA)

The characteristic of this version with ambient pressure

The connection for the vacuum hose of the fuel pressure regulator is located between the throttle valve and the air cleaner and/or on the air cleaner.

Test prerequisite

The correct fuel pressure regulator has been installed.

- Use the BMW Electronic Parts Catalogue to check whether the correct fuel pressure regulator has been installed for the vehicle:

Connect test adapter: see **CHECK FUEL PRESSURE** or **CHECKING FUEL DELIVERY PRESSURE (N20, N53, N54, N55, N63, N74)**.

The regulating function of the fuel pressure regulator must be ensured under all operating conditions. The fuel pump must always be able to generate a fuel pressure that is higher than the pressure that is adjusted by the pressure regulator.

The DME controls the injection period for which the injection rate is adjusted.

The fuel return line is depressurized at engine standstill and ignition key position 0.

The pressure regulator will close at engine standstill and ignition key position 0. The fuel pressure in the feed will be maintained for an extended period of time. A non-return valve will close in the fuel pump. This measure will maintain the fuel pressure in the fuel system. Extended start times are thereby prevented.

- Let the engine run at idle and measure the fuel pressure.

When the measured value is less than the nominal value - 0.2 bar

- The line cross-sections in the fuel feed are constricted or the fuel filter is plugged, or
- The voltage supply to the fuel pump function is not OK: For example, as a result of high con resistance (corrosion) in the plug connection between the wiring harness and the fuel pump

When the measured value exceeds the nominal value + 0.2 bar

- Stop the engine and then monitor the measured value.
- When the measured value drops to the nominal value, the line cross-sections in the fuel return line are constricted or plugged.
- Check the fuel lines for kinks.

If no kinks are visible:

- Replace the return lines.

When the measured value remains too high, the pressure regulator is most likely faulty.

Attention

There is a low probability that the return line is completely closed due to obstruction. Fuel would then leak out under pressure when the pressure regulator is removed!

- Have a cleaning rag ready and catch and dispose of escaping fuel.
- Do not replace the pressure regulator. Replace the return line instead.
- Let the engine run briefly at idle and then stop the engine.
- Write down the measured value at engine standstill.

- Read the measured value again after about 20 to 30 minutes at engine standstill.

The following check requires special tool 13 3 010 (hose clip).

If the measured value dropped by more than 0.5 bar

- Start the engine and wait briefly for stable pressure build-up
- Stop the engine and immediately disconnect the feed line just before the pressure gauge wi special tool 13 3 010
- Write down the measured value
- Read the measured value again after about 20 to 30 minutes at engine standstill

The following faults may be present if the measured value now dropped less than 0.5 bar

- Fault in the feed lines
- Fault in the internal tank feed hose
- Faulty pressure-maintaining stop valve in the fuel pump

Check components. Replace faulty components.

If the measured value dropped again by more than 0.5 bar

- Replace the pressure regulator
- All fuel hoses and their hose clamps that were loosened during the checks must be replaced.
- Read out fault memory of DME control unit. Check stored fault messages. Rectify fault. Clear diagnostic fault entries from fault memory.

INJECTION PUMP, REGULATOR, MIXTURE REGULATOR

13 51 065 REMOVING AND INSTALLING/REPLACING LEFT HIGH PRESSURE PUMP (N74)

WARNING: Observe warning on cylinder head cover.
Disconnect NEGATIVE BATTERY TERMINAL (risk of fire due to short circuit on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40 °C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high speed when the high pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing lines or separate components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be contaminated by fuel.
The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!
Cover ignition coil with suitable means.

Necessary preliminary tasks:

- Remove **FUEL FEED LINE**
- Remove the **HIGH PRESSURE LINE** from the high pressure pump on the left toward the rail

Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

IMPORTANT: High-pressure pump can be pretensioned by camshaft cams!

Slightly slacken screws (1) of high pressure pump (3). If the high pressure pump is forced out, the engine will have to be turned to bring the camshafts to a different position.

Otherwise it will not be possible to install the high-pressure pump!

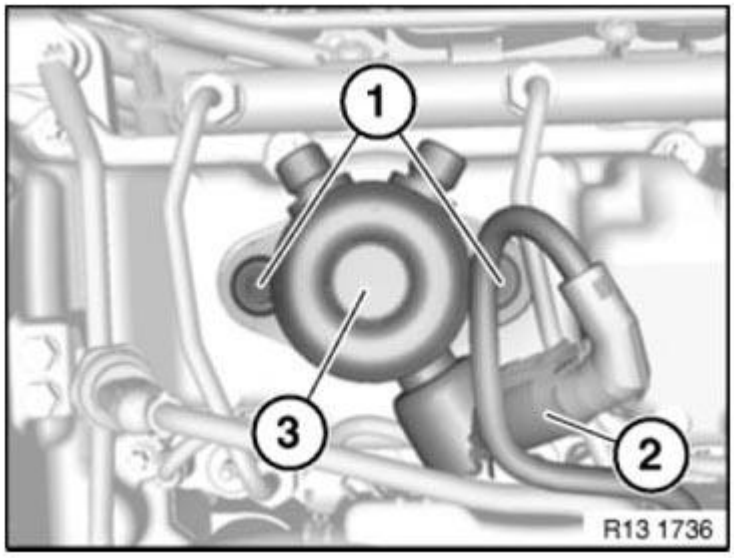


Fig. 12: Identifying High Pressure Pump, Connector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Place depth gauge (1) flat on fuel pump flange (see arrow in illustration) (shown on N43 engine).

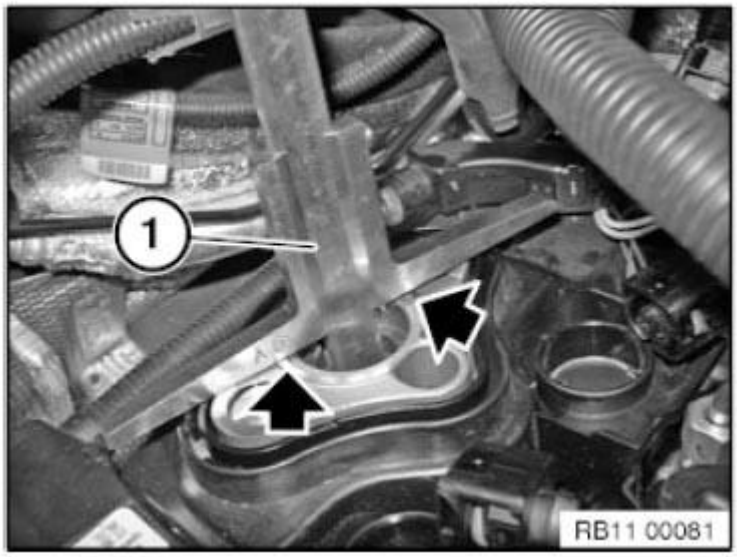


Fig. 13: Measuring Fuel Pump Flange Using Depth Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Turn engine at central bolt in direction of engine rotation until the depth gauge shows that the camshaft has reached the BDC position.

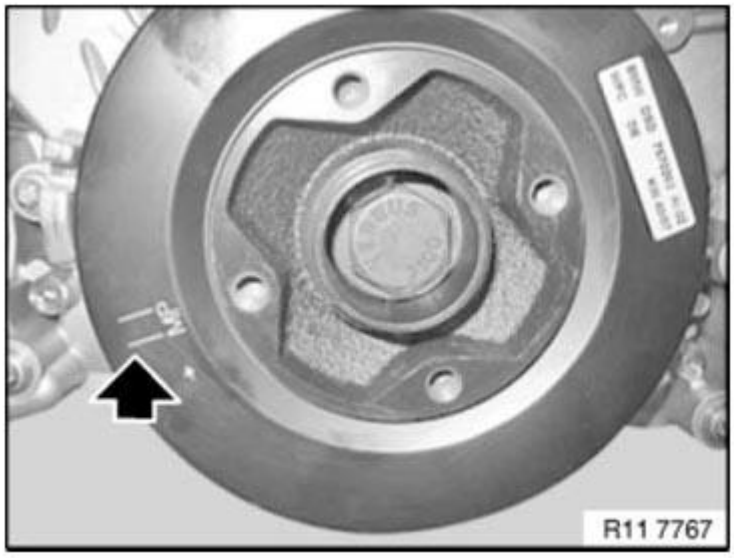


Fig. 14: Locating Camshaft At BDC Position
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Replace screws (1). Screws (1) are coated with sealant.

Unlock connector (3) and remove.

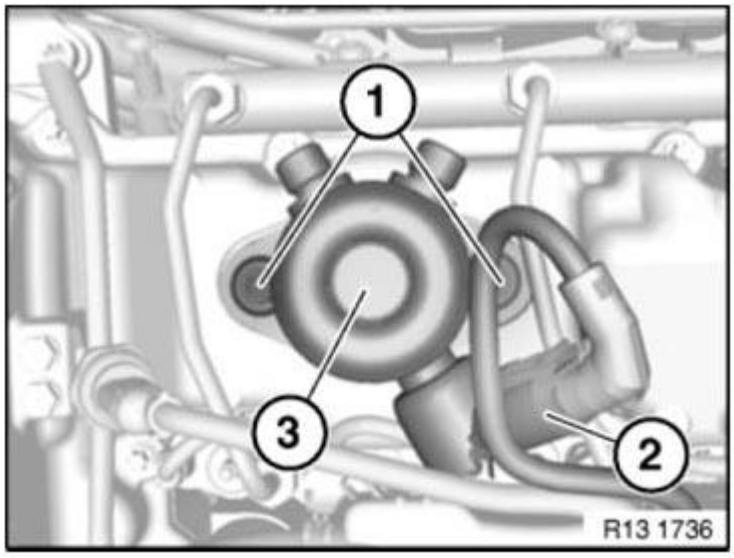


Fig. 15: Identifying High Pressure Pump, Connector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pump plunger can fall out when high-pressure pump (3) is pulled out! Detach high-pressure pump (2) and remove.

Engine oil can escape when pump is detached; have a cleaning cloth ready.

Installation note:

Provisionally fasten screws (1) and tighten uniformly in 90° increments until final tightening.

Tightening torque: see 1AZ in **13 51 INJECTION PUMP, CONTROL**

Installation note:

Replace sealing ring (1).

Clean contact surfaces.

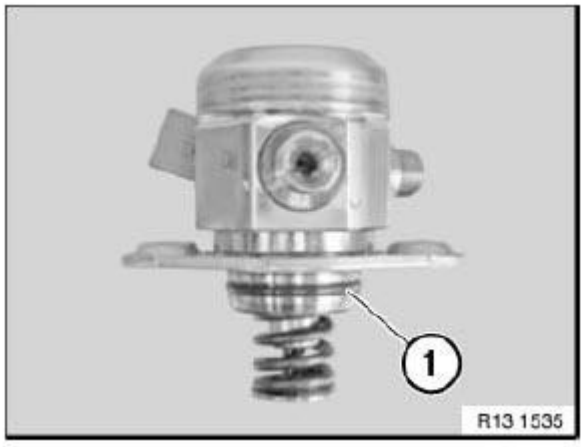


Fig. 16: Identifying High Pressure Pump Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for tightness.

Check function of DME.

13 51 070 REMOVING AND INSTALLING/REPLACING RIGHT HIGH PRESSURE PUMP (N74)

WARNING: Observe warning on cylinder head cover.
Disconnect NEGATIVE BATTERY TERMINAL (risk of fire due to short circuit on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40 °C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing lines or separate components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be contaminated by fuel.
The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!
Cover ignition coil with suitable means.

Necessary preliminary tasks:

- Remove **FUEL FEED LINE**
- Remove the **HIGH PRESSURE LINE** from the high pressure pump on the right toward the rail

Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

IMPORTANT: High-pressure pump can be pretensioned by camshaft cams!

Slightly slacken screws (1) of high pressure pump (2). If the high pressure pump is forced out, the engine will have to be turned to bring the camshafts to a different position.

Otherwise it will not be possible to install the high-pressure pump!

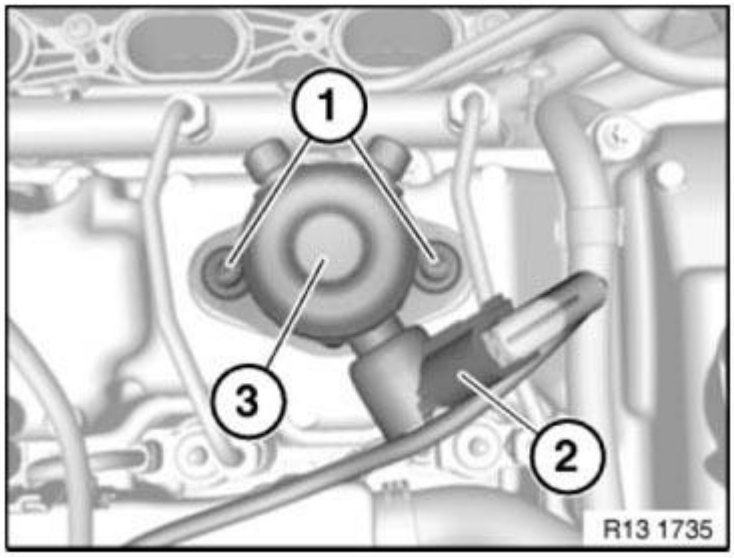


Fig. 17: Identifying High Pressure Pump, Connector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Place depth gauge (1) flat on fuel pump flange (see arrow in illustration) (shown on N43 engine).

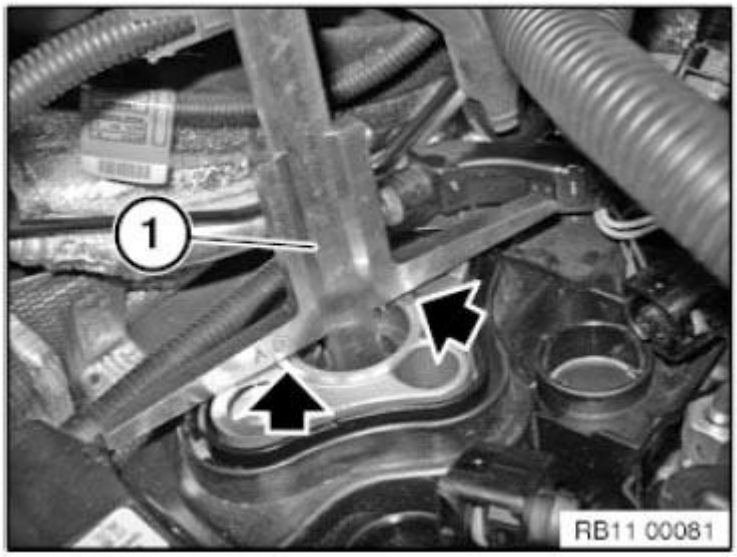


Fig. 18: Measuring Fuel Pump Flange Using Depth Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Turn engine at central bolt in direction of engine rotation until the depth gauge shows that the camshaft has reached the BDC position.

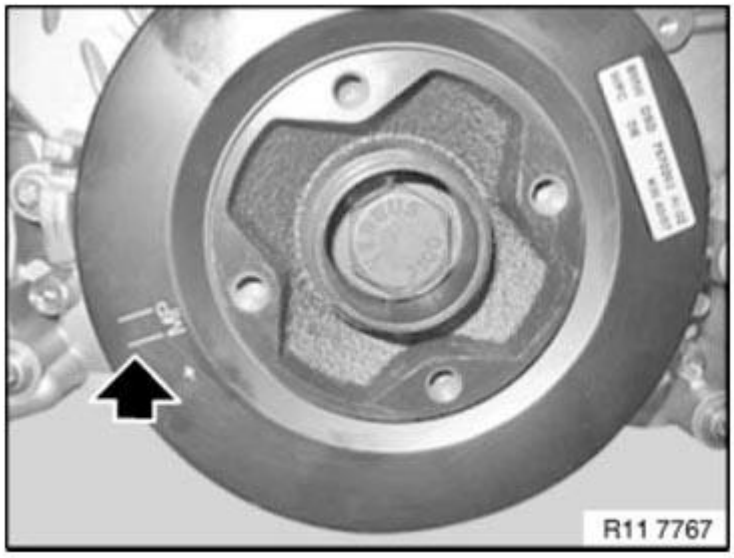


Fig. 19: Locating Camshaft At BDC Position
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Replace screws (1). Screws (1) are coated with sealant.

Unlock connector (2) and remove.

IMPORTANT: Pump plunger can fall out when high-pressure pump (3) is pulled out!

Detach high-pressure pump (3) and remove.

Engine oil can escape when pump is detached; have a cleaning cloth ready.

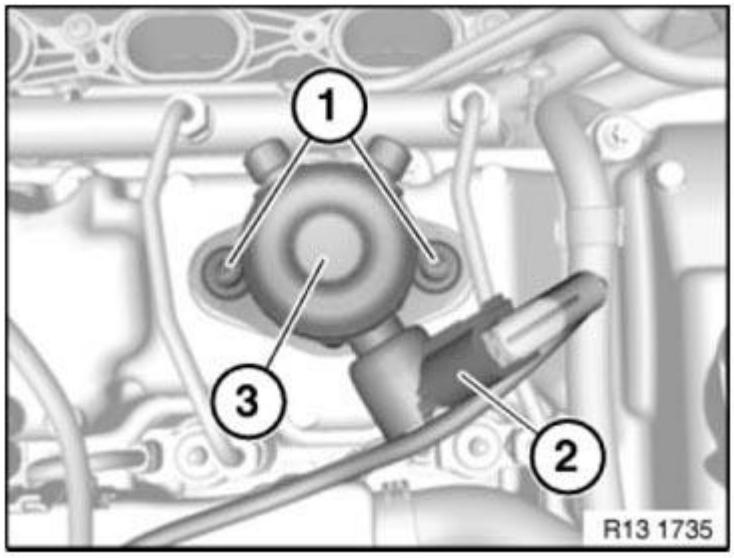


Fig. 20: Identifying High Pressure Pump, Connector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Provisionally fasten screws (1) and tighten uniformly in 90° increments until final tightening.

Tightening torque: see 1AZ in **13 51 INJECTION PUMP, CONTROL**

Installation note:

Replace sealing ring (1).

Clean contact surfaces.

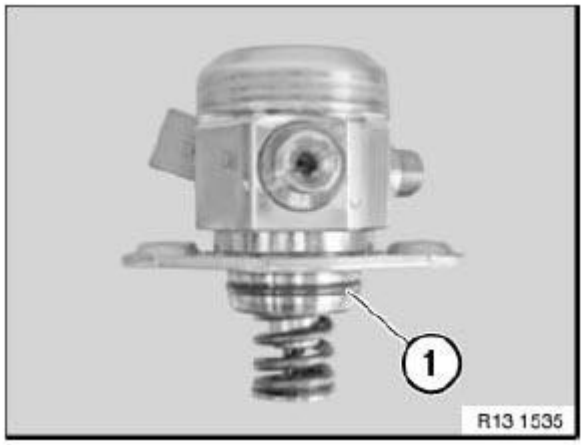


Fig. 21: Identifying High Pressure Pump Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for tightness.

Check function of DME.

INJECTION NOZZLE AND LINES

13 53 180 REMOVING AND INSTALLING OR REPLACING PRESSURE LINE (BETWEEN HIGH-PRESSURE PUMP AND LEFT OR RIGHT RAIL, (N74)

**WARNING: Electric fuel pump starts up automatically when door is opened!
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Observe warning on cylinder head cover.**

WARNING: Carry out installation work on fuel system only with coolant temperature below 40 °C.

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

**IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!**

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs 32 1 270 .**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

NOTE:

- **Ignition coils must not be fouled by fuel!**

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.

Necessary preliminary tasks:

- Remove **INTAKE PLENUM**

Remove high-pressure line from high-pressure pump to rail .

Picture describes the right side, the procedure for the left side is identical.

Release union nuts (1).

Disconnect pressure line (2).

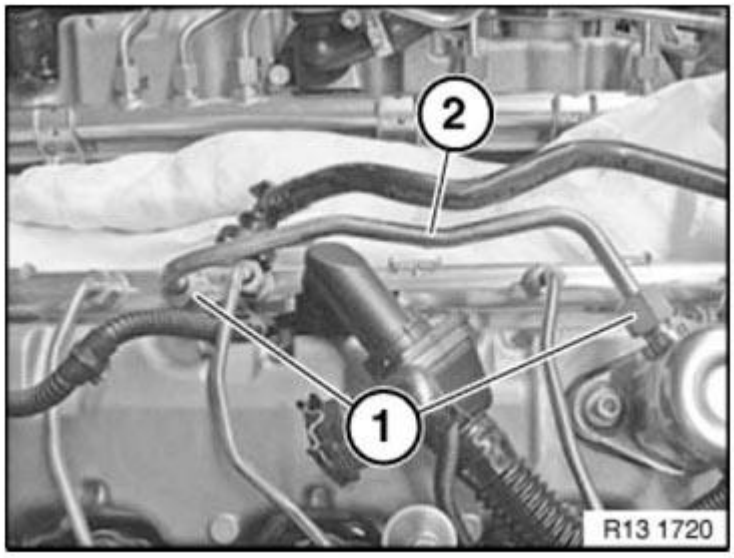


Fig. 22: Identifying Pressure Line And Union Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Refit high-pressure line from high-pressure pump to rail .

Tighten down pressure line (1) hand-tight at rail and high-pressure pump.

First tighten down pressure line (1) on high-pressure pump to torque (2) and with crowfoot wrench (3).

Then tighten down pressure line on rail.

Tightening torque: see 3AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

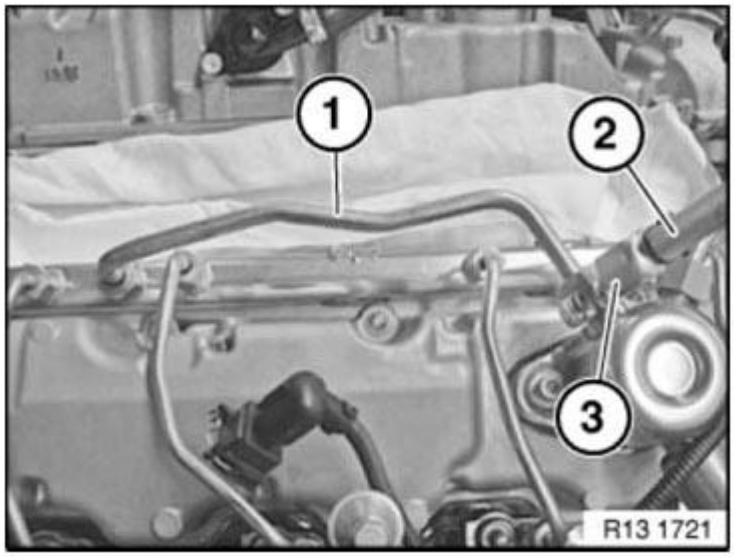


Fig. 23: Tightening Pressure Line Using Crowfoot Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Vent fuel system with BMW diagnosis system.

Check fuel system for leaks.

Check function of DME.

13 53 170 REMOVING AND INSTALLING/REPLACING ALL PRESSURE LINES (N74)

**WARNING: Electric fuel pump starts up automatically when door is opened!
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Observe warning on cylinder head cover.**

WARNING: Carry out installation work on fuel system only with coolant temperature below 40 °C.

Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

**IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!**

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs 32 1 270 .**

Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

NOTE:

- **Ignition coils must not be wetted with fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**

Necessary preliminary tasks:

- Remove **IGNITION COILS**
- Remove **INTAKE PLENUM**

Clamp off fuel delivery line. Seal off fuel lines with special tools (1) **13 5 160** and (2) **13 5 162** .

Catch and dispose of escaping fuel.

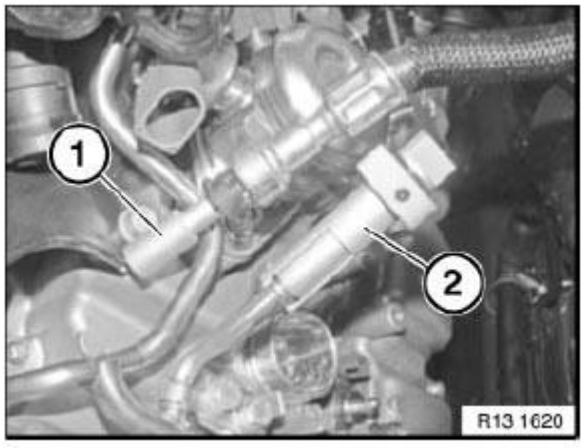


Fig. 24: Sealing Off Fuel Lines Using Special Tools (13 5 160 And 13 5 162)
Courtesy of BMW OF NORTH AMERICA, INC.

Removing high-pressure fuel line from injector to rail

NOTE: The following description applies to all pressure lines.

First release pressure line on rail to reduce existing fuel pressure if necessary. Fuel must not get into the spark plug slot. Then release pressure line on injector.

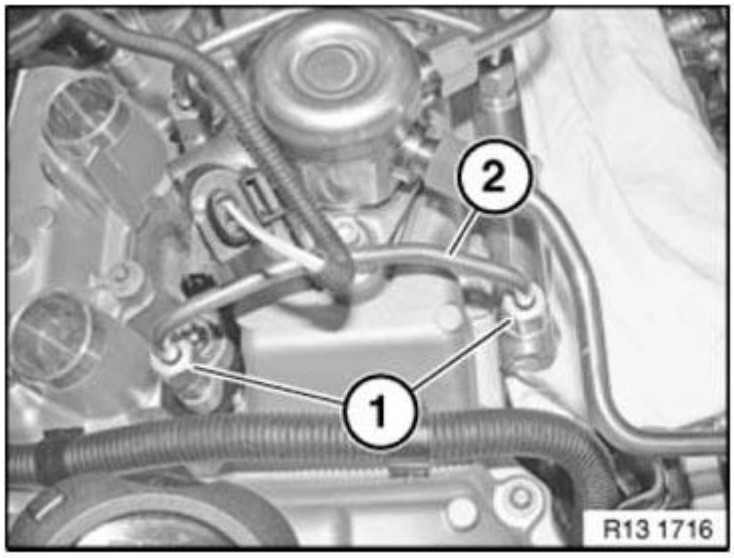


Fig. 25: Identifying Pressure Line And Union Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release union nuts (1).

Disconnect pressure line (2).

Set down pressure lines in order.

Secure injector against twisting with wrench (2).

Release union nut (1).

IMPORTANT: If several pressure lines are removed, ensure that each pressure line is reinstalled in its original location (cylinder).

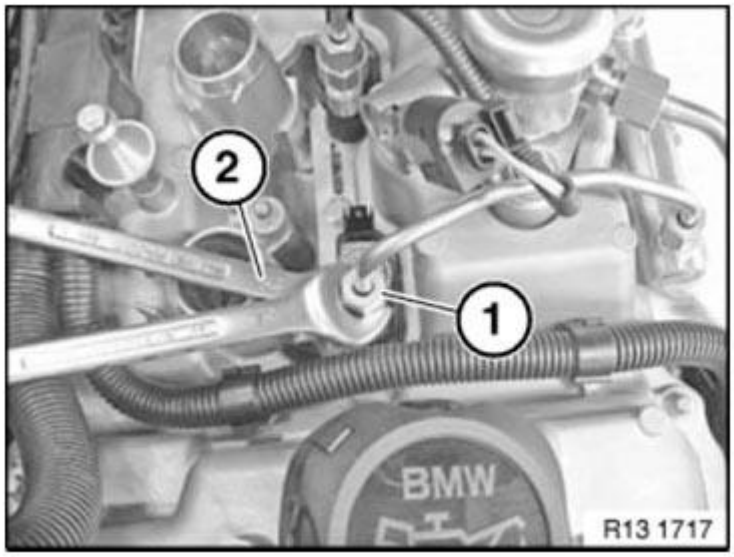


Fig. 26: Securing Injector Against Twisting Using Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Mark pressure lines.

Installation:

Only if injector has to be rotated in fitted position

- Release bolt (3) a few turns until holding-down element is slackened.
- Turn injector (1) in direction of arrow until union nuts (2) on pressure line can be easily screwed on by hand.
- To do so, engage wrench on hexagon head of injector if necessary.
- Tighten down union nut (2) of pressure line hand-tight.
- Tighten down screw on holding-down element (3).

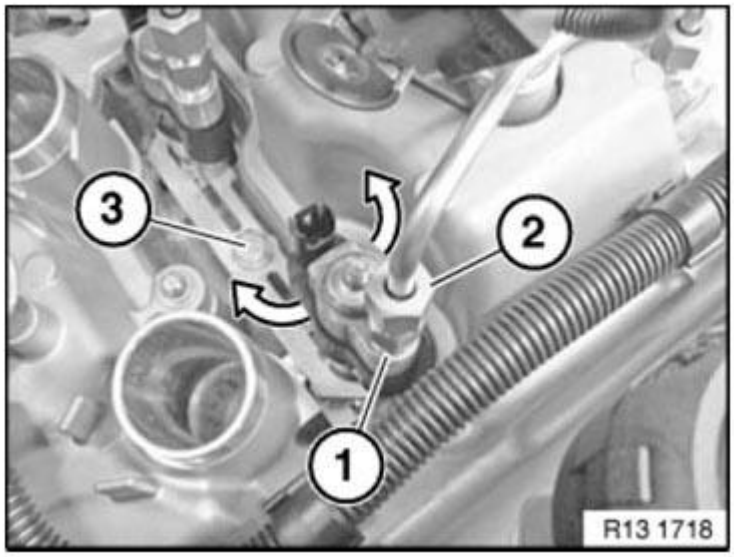


Fig. 27: Turning Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque: see 5AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

IMPORTANT: Do not under any circumstances pull injector out of bore!
If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced! Replacing PTFE sealing ring, refer to RENEWING THE PTFE SEALING RING

Adhere to tightening sequence:

- First tighten down union nut on injector.
- Then tighten down union nut on rail.

Tighten high-pressure fuel lines with special tool **13 0 160** .

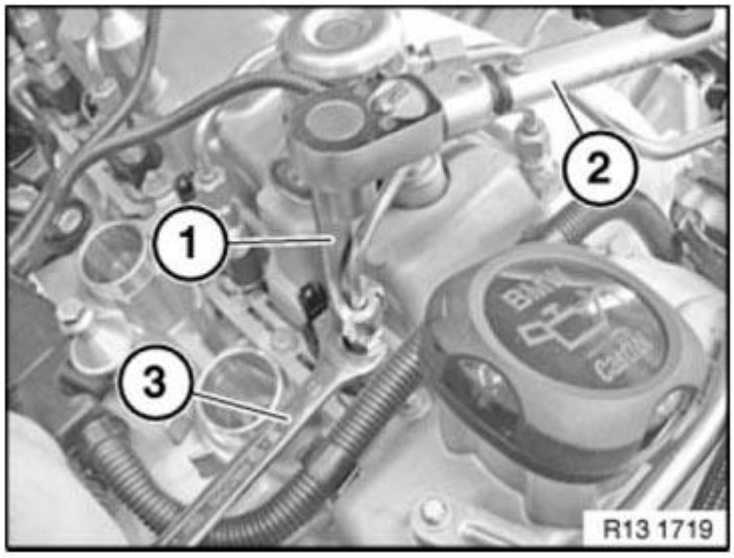


Fig. 28: Tightening High-Pressure Fuel Line On Injector Using Torque Wrench And Special Tool 13 0 161
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten high-pressure fuel line on injector with torque wrench (2) and special tool (1) **13 0 161** . In so doing, grip hexagon head of injector with wrench (3).

Tighten union nuts with special tool (1) **13 0 161** .

Tightening torque: see 2AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

Installation:

When tightening high-pressure line on rail, note that angle of rotation of special tool **13 0 161** is limited. Re-position special tool if necessary.

Distortion of torque possible!

Assemble engine.

Vent fuel system with BMW diagnosis system.

Check fuel system for leaks.

Check function of DME.

13 53 310 REMOVING AND INSTALLING/REPLACING AN INJECTOR (N74)

WARNING: Observe warning on cylinder head cover.
Disconnect NEGATIVE BATTERY TERMINAL (risk of fire due to short

circuit on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40 °C.

WARNING: **Wear full face guard and protective gloves.**
Fuel can emerge spontaneously at high velocity from the fuel injectors!
To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.
There is a risk of injury if the fuel pressure is not reduced!

IMPORTANT: **Wear safety goggles.**
Oil and dirt particles may get into your eyes!

Before removing the injectors, clean or vacuum off injector slots.

IMPORTANT: **Observe without fail the tightening sequences and tightening torques when reassembling.**
Disregard of these guidelines may result in leaks!

IMPORTANT: **Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.**
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt contamination before removing lines or separate components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High pressure lines may be re-screwed a maximum of 10 times.**

IMPORTANT: **Injectors are not waterproof!**
Carry out engine cleaning/washing only with ignition coil cover fitted.

Necessary preliminary tasks:

- Remove **IGNITION COIL** of corresponding cylinder.

NOTE:

- **Ignition coils must not become coated with fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! It is therefore essential to protect the spark plug slot against ingress of fuel with a cloth!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**
- **Remove PRESSURE LINES on corresponding injectors**

Picture shows the right side, the procedure for the left side is identical.

Release screws (1).

Tightening torque: see 5AZ in **12 51 ENGINE WIRING HARNESS**

Release screw (2).

Tightening torque: see 5AZ in **12 51 ENGINE WIRING HARNESS**

Release cable ducts (3) and (4) and place to one side.

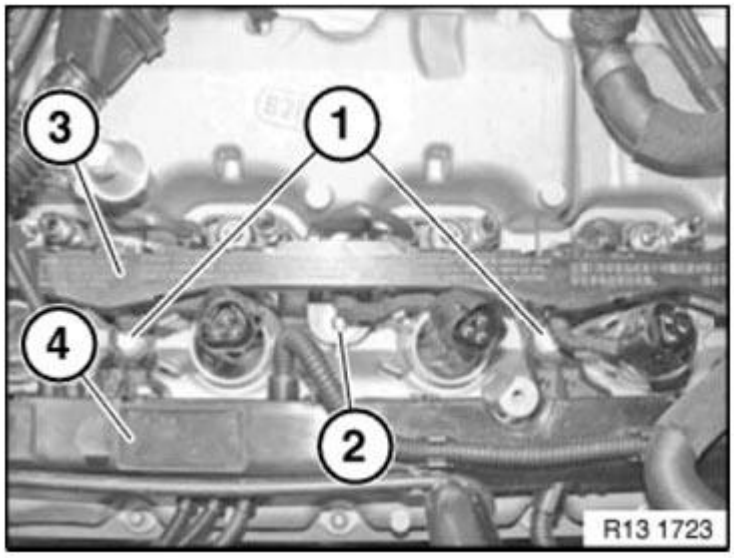


Fig. 29: Identifying Cable Ducts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The following description applies to all injectors.

Release bolt (1) and remove holding-down element (2).

Remove injector (3).

NOTE: If several injectors are removed, ensure that each injector is reinstalled in its original location (cylinder).

Mark injectors.

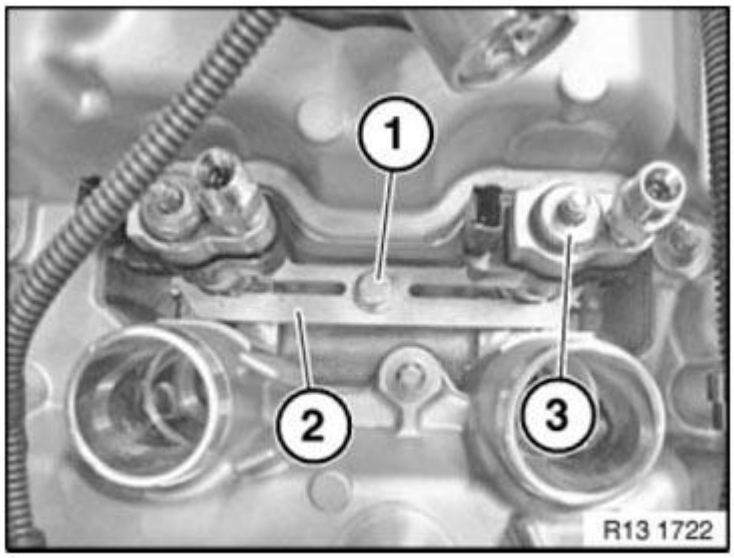


Fig. 30: Identifying Injector, Holding-Down Element And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

After removing, fit protective caps (1 and 3) to injector tip and fuel line connection.

Protective caps are available from BMW Parts Service.

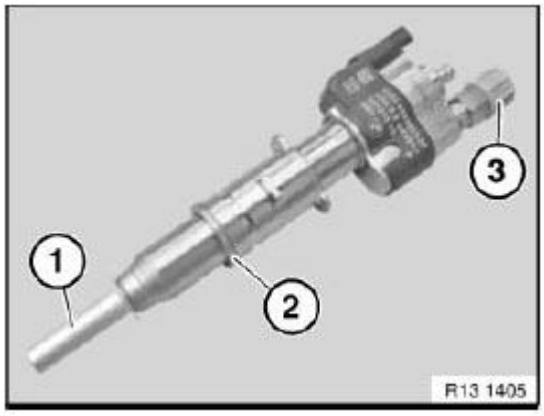


Fig. 31: Identifying Fit Protective Caps And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

When installing a new injector:

- Use a new uncoupling element (2).
- Remove protective cap (1) from injector tip max. 10 min. before installation (PTFE sealing ring swells

up).

Installation note:

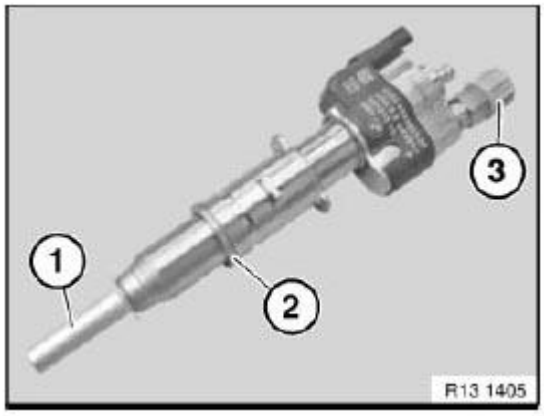


Fig. 32: Identifying Fit Protective Caps And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

When reusing fuel injector:

- Replace decoupling element (2).
- Replace PTFE sealing ring (1).

  A PTFE seal which has been heated once by engine operation must be replaced before the fuel injector is reinstalled.

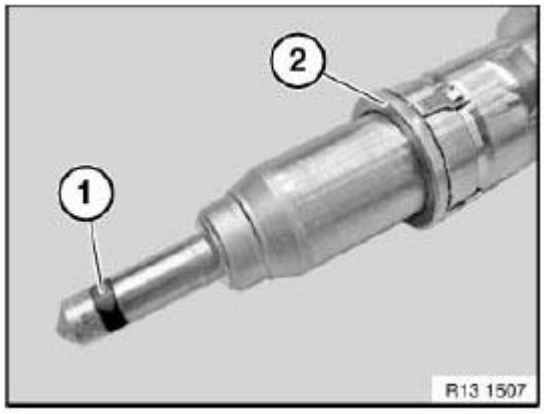


Fig. 33: Identifying PTFE Sealing Ring And Decoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

Renewing the PTFE sealing ring

Before replacing PTFE sealing ring (1), make sure hands and work surface are clean and free of oil.

Avoid mechanical contact with injector tip (2).

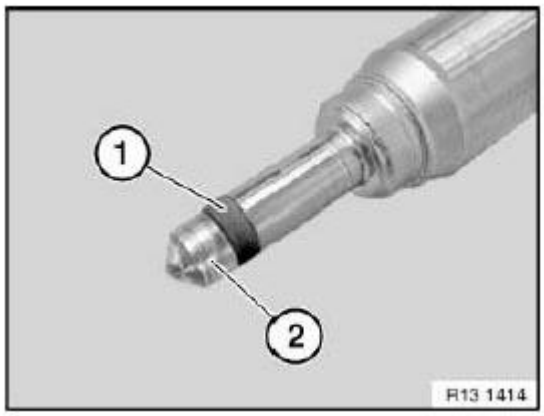


Fig. 34: Identifying PTFE Sealing Ring And Injector Tip
Courtesy of BMW OF NORTH AMERICA, INC.

Remove PTFE sealing ring (1) with special tool 13 0 191 from injector (2).

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other tools/agents).

Do not clean injector tip.

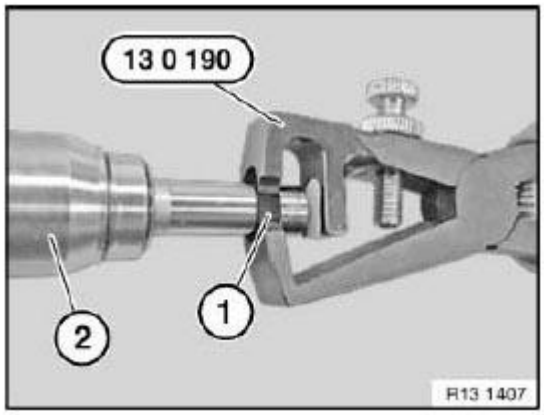


Fig. 35: Removing PTFE Sealing Ring From Injector Using Special Tool (13 0 191)
Courtesy of BMW OF NORTH AMERICA, INC.

Slide new PTFE sealing ring (1) onto mounting taper 13 0 195.

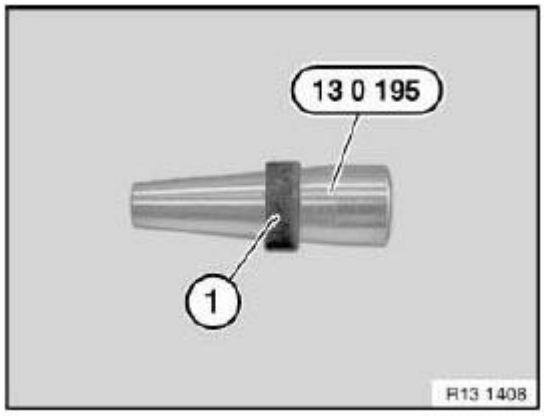


Fig. 36: Identifying PTFE Sealing Ring Onto Mounting Taper 13 0 195
Courtesy of BMW OF NORTH AMERICA, INC.

User fingers and mounting taper 13 0 195 to slide PTFE sealing ring (1) onto injector (2).

NOTE:

- **Do not use fingernails to slide PTFE sealing ring on.**
- **Do not use any lubricating agents.**
- **The sealing ring is expanded when slid on.**

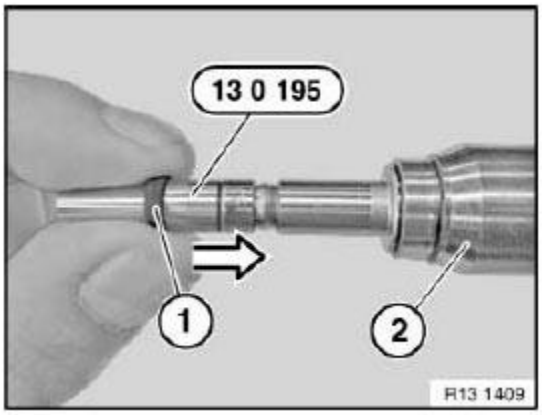


Fig. 37: Sliding PTFE Sealing Ring Onto Injector Using Fingers And Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

To bring the expanded PTFE sealing ring to its installation dimension, slide three assembly sleeves with decreasing diameters onto the injector.

Slide assembly sleeve (1) with large opening first onto injector (1).

Do not use any lubricating agents.

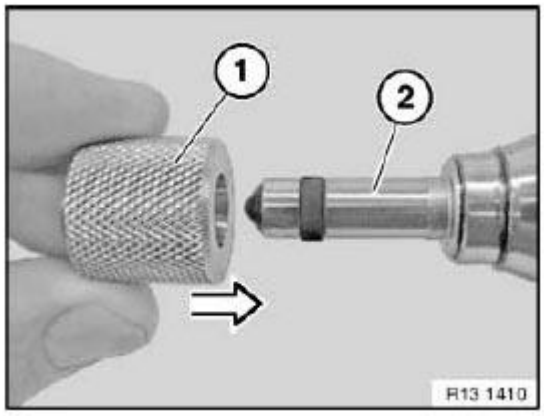


Fig. 38: Sliding Mounting Sleeve Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

First slide assembly sleeve 13 0 192 (large diameter) onto injector (1).

Then slide assembly sleeve 13 0 193 (medium diameter) onto injector (1).

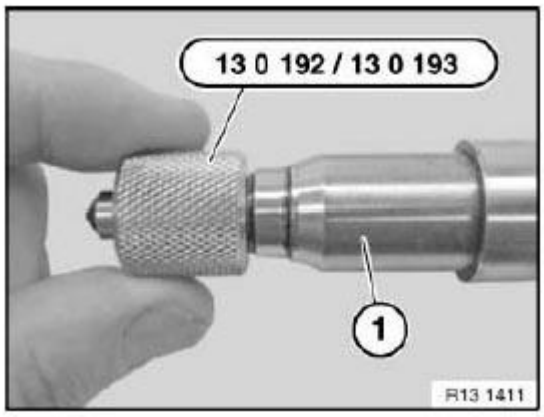


Fig. 39: Sliding Assembly Sleeve 13 0 192 (Medium Diameter) Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Finally, press injector (1) into assembly sleeve 13 0 194 (small diameter).

Installation note:

Install injector within 10 minutes or slide on protective cap (graphic 13 14 05) (PTFE sealing ring swells up).

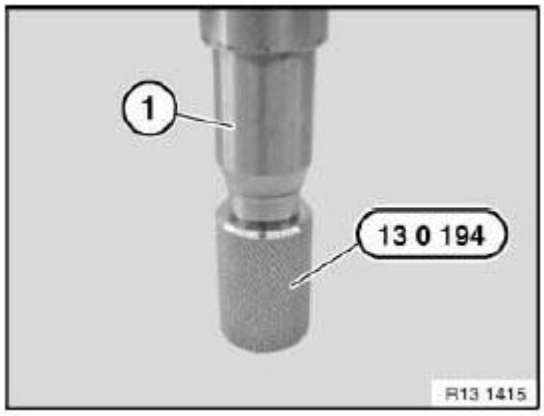


Fig. 40: Identifying Injector Into Assembly Sleeve 13 0 194 (Small Diameter)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation of injector is described separately from removal.

Before installing injector in engines that have been run

- Check injector bore for dirt.

  Clean **only dirty** injector bores.

  IMPORTANT: - do not damage injector!

- Clean injector bore: To do so, preferably slide injector without uncoupling element (2) but with new PTFE sealing ring (1) in and out of injector bores several times.

  The PTFE sealing ring must then be replaced.

- Clean contact surfaces of uncoupling elements (2) in cylinder head.
- Replace decoupling element (2).

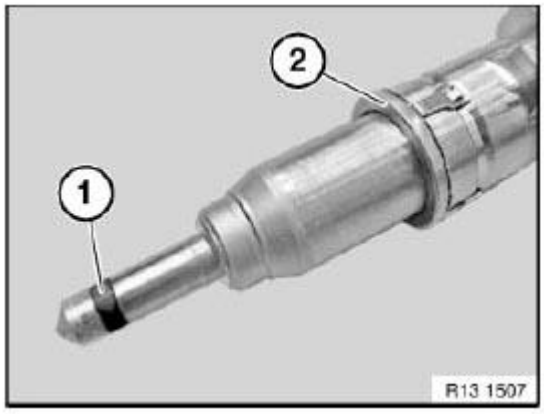


Fig. 41: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Injection quantity compensation!

An injector quantity compensation must be carried out if an injector is replaced or changed on the cylinder side.

Injector quantity compensation is carried out with the aid of a so-called adjustment value.

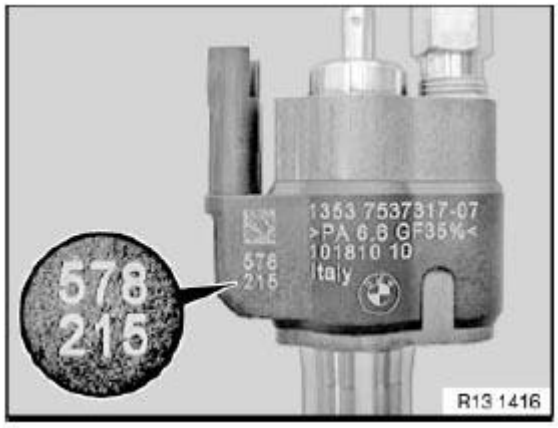


Fig. 42: Identifying Injector Adjustment Value
Courtesy of BMW OF NORTH AMERICA, INC.

The adjustment value is printed in two blocks of three digits on the injector.

The adjustment value must be read off **before** installation!

Enter the adjustment value according to the installation location (cylinder) of the injector.

If injector quantity compensation is not carried out, the engine may run roughly or fail to start.

Description of injector quantity compensation at end of instructions.



Fig. 43: Identifying Injector Adjustment Value
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Install injector (3).

Install hold-down device (2).

NOTE: Make sure hold-down device (2) is correctly seated.

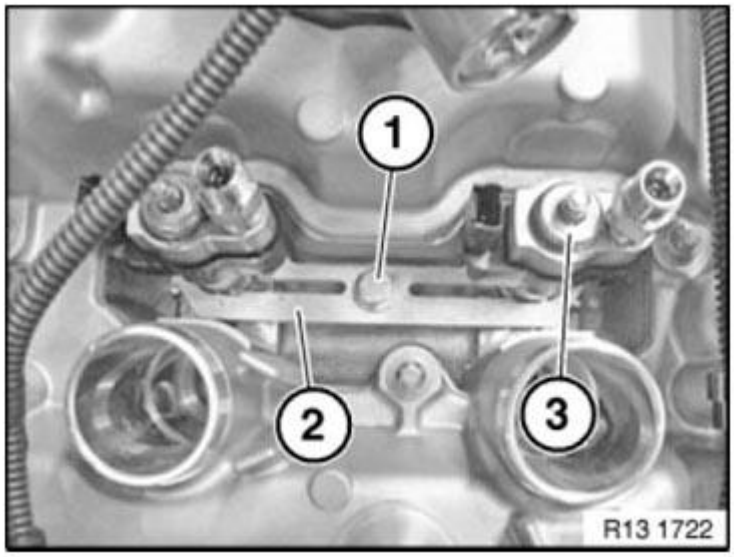


Fig. 44: Identifying Injector, Holding-Down Element And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Tighten screw (1) hand-tight only so that holding-down element (2) is slack and if necessary injector (3) can still be turned.

Install pressure line (2). Tighten nuts (1) manually only.

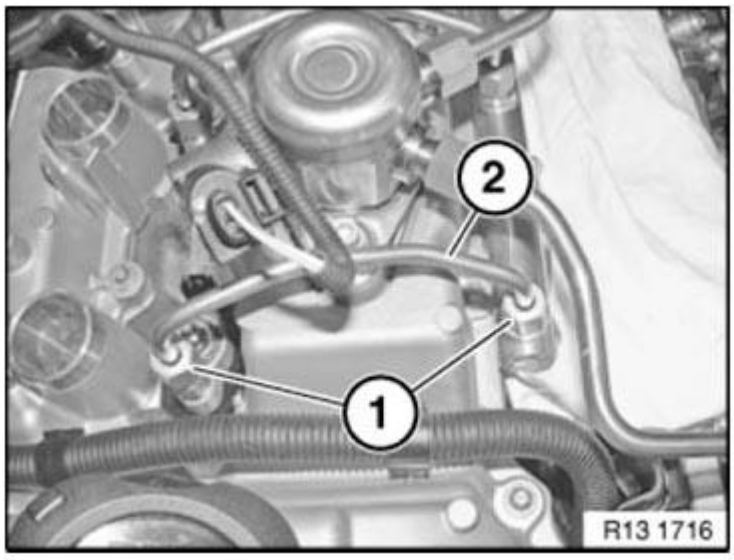


Fig. 45: Identifying Pressure Line And Union Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connect pressure line (2) without tension only.
To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the nuts cannot be screwed on easily by hand, the injector must if necessary be turned a little.

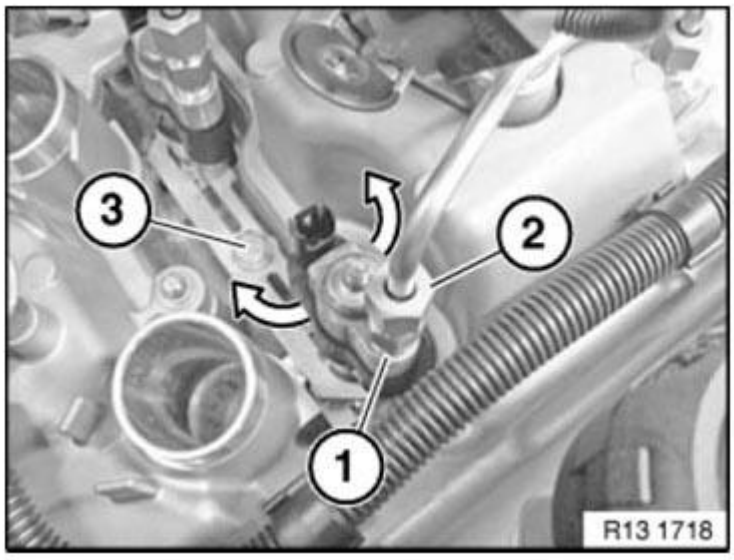


Fig. 46: Turning Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Turn injector (1) if necessary in direction of arrow until nuts on pressure line can be easily screwed on by hand.

Tighten nut (2) of pressure line hand-tight. Then tighten down bolt for hold-down device (3).

Tightening torque: see 5AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

Adhere to tightening sequence:

- First tighten down pressure line on injector.
- After this, tighten pressure line on rail.

Tighten down nut on injector with special tool (1) **13 0 161** and to torque (2). In so doing, grip hexagon head of injector with wrench (3).

Tightening torque: see 2AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

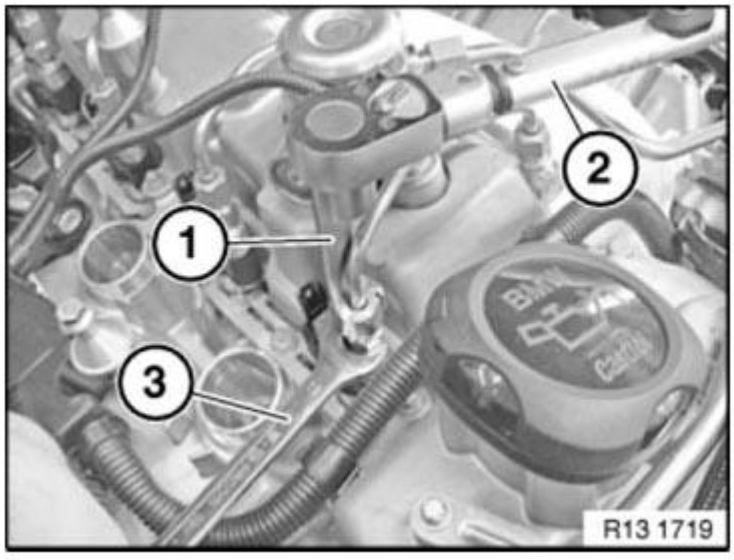


Fig. 47: Tightening High-Pressure Fuel Line On Injector Using Torque Wrench And Special Tool 13 0 161
Courtesy of BMW OF NORTH AMERICA, INC.

Perform an injection quantity compensation

- Connect BMW diagnosis system
- Identify vehicle
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment function"
- Select "Adjust injectors"

- Change "Test schedule"
- For each replaced injector, the adjustment value must be entered according to the installation location (cylinder).

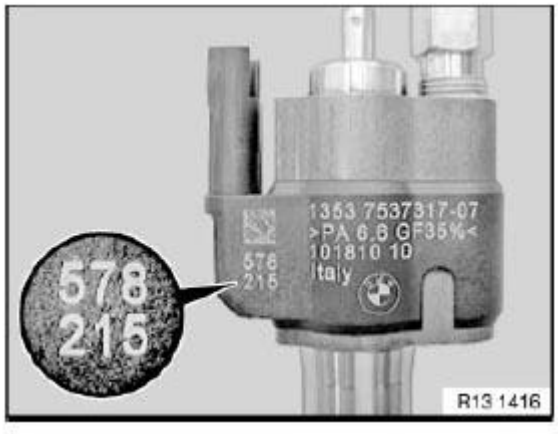


Fig. 48: Identifying Injector Adjustment Value
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Bleed fuel system with BMW diagnosis system.

Check fuel system for tightness.

Check function of DME.

13 53 332 REMOVING AND INSTALLING/REPLACING FEED LINE (N74)

WARNING: Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40 °C.

Wear safety goggles.

Wear protective gloves.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**

- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks:

- Remove left **INTAKE SILENCER HOUSING**
- Remove left **INTAKE DUCT**

Recycling:

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Seal fuel lines with special tools (1) **13 5 160** and (2) **13 5 162** .

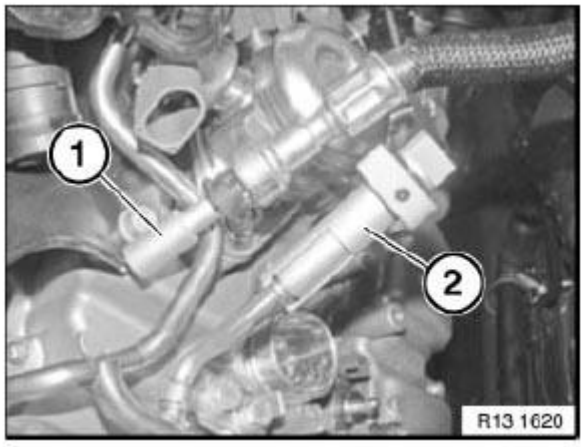


Fig. 49: Sealing Off Fuel Lines Using Special Tools (13 5 160 And 13 5 162)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on feed line retaining tab.

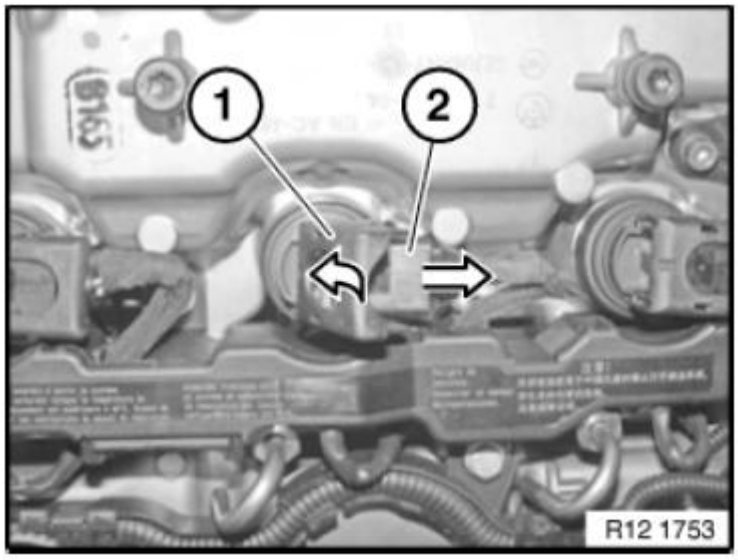


Fig. 50: Identifying Feed Line Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release fuel feed line (4) on high-pressure pumps (1).

Release screw (2).

Release screws (3) on low-pressure fuel sensor.

Feed out and remove fuel feed line (2).

Catch and dispose of escaping fuel.

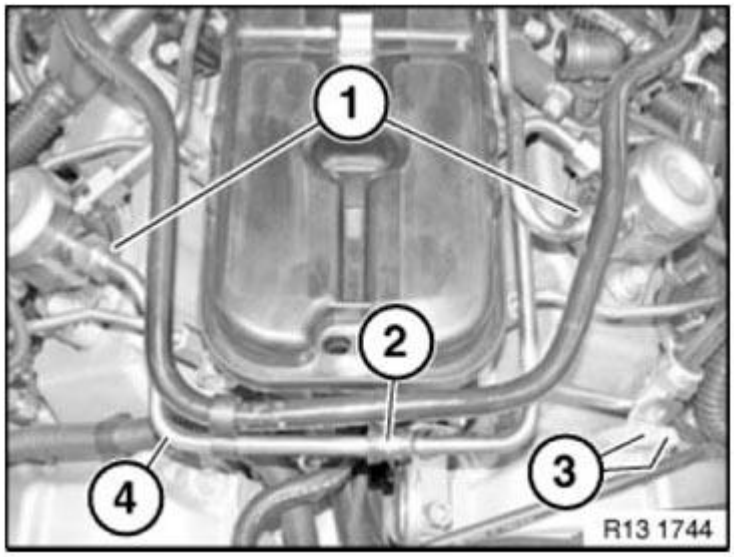


Fig. 51: Identifying Fuel Feed Line, High-Pressure Pump And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe tightening sequence .

- 1. Fit fuel feed line (4).

  In so doing, tighten screw connections **hand-tight only** .

- 2. Tighten down fuel feed line (4) on high-pressure pumps with torque wrench and with crowfoot wrench.

  Tightening torque: see 4AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

- 3. Tighten down lugs (3) on fuel low-pressure sensor.

  Tightening torque: see 6AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

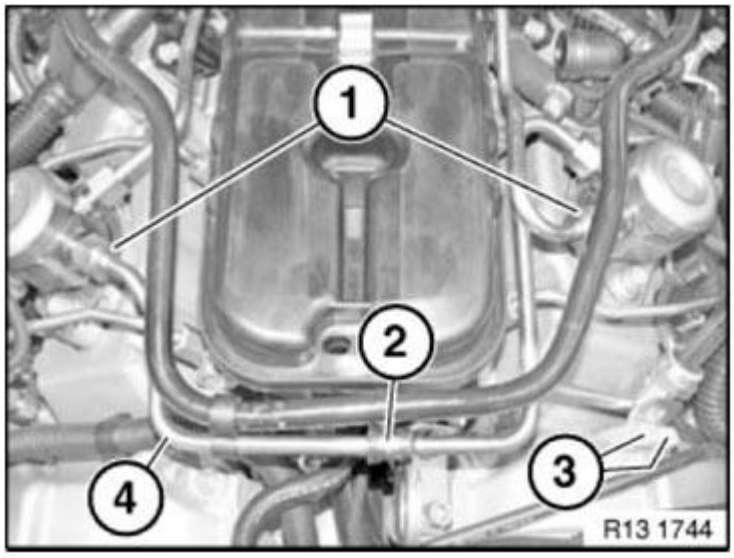


Fig. 52: Identifying Fuel Feed Line, High-Pressure Pump And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

- 4. Tighten down retaining clips.

Tightening torque: see 7AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 205 REMOVING AND INSTALLING/REPLACING LEFT RAIL (N74)

**WARNING: Electric fuel pump starts up automatically when door is opened!
Observe warning on cylinder head cover.
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Carry out installation work on fuel system only with coolant temperature below 40 °C.**

**IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity when the high-pressure line is released!**

**IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!**

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Recycling:

Fuel escapes when fuel line is detached. Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Remove **PRESSURE LINES** to injectors on left.
- Remove **PRESSURE LINE** from high-pressure pump to rail on left.

Release screws (1).

Tightening torque: see 1AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

Unlock plug (2) on high-pressure sensor and disconnect.

Remove rail (3).

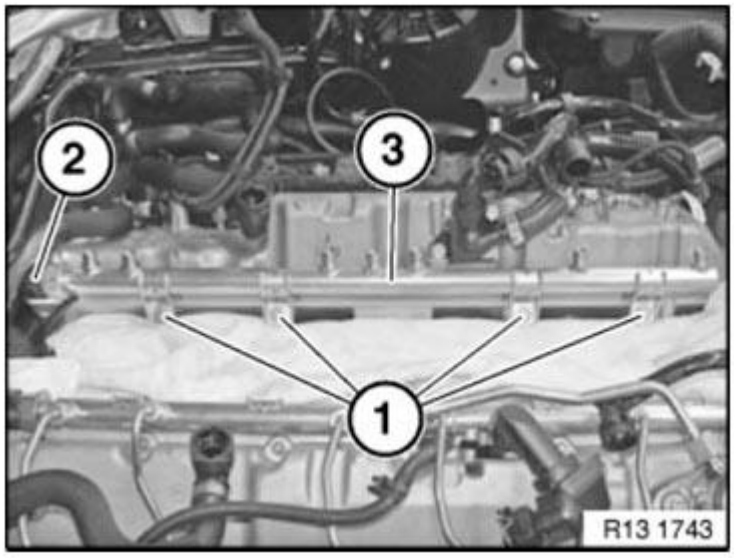


Fig. 53: Identifying Rail, Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine

Check fuel system for leaks.

Delete fault memory.

13 53 208 REMOVING AND INSTALLING/REPLACING RIGHT RAIL (N74)

WARNING: Electric fuel pump starts up automatically when door is opened!
Observe warning on cylinder head cover.
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Carry out installation work on fuel system only with coolant temperature below 40 °C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**

- **Seal all fuel system openings with protective caps or plugs.**

Recycling:

Fuel escapes when fuel line is detached. Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Remove **PRESSURE LINES** to right side injectors
- Remove **PRESSURE LINES** from right high-pressure pump to rail.

Release screws (1).

Tightening torque: see 1AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

Disconnect plug (2) from high-pressure sensor.

Remove rail (3).

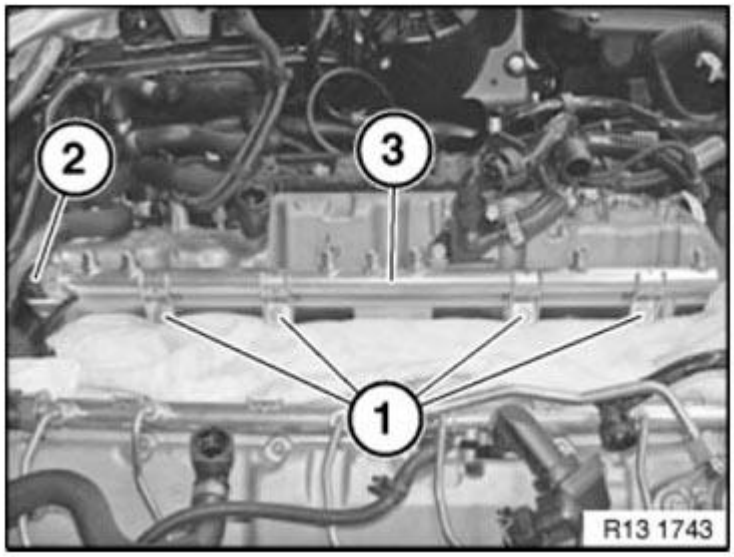


Fig. 54: Identifying Rail, Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Assemble engine**
Check fuel system for leaks.
Delete fault memory.

13 53 602 REPLACING LEFT HIGH-PRESSURE FUEL SENSOR (N74)

WARNING: Observe warning on cylinder head cover.
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40 °C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks:

- Remove **INTAKE PLENUM**

Recycling:

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Release high-pressure sensor (2) and remove.

Tightening torque: see 8AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

Assemble engine.

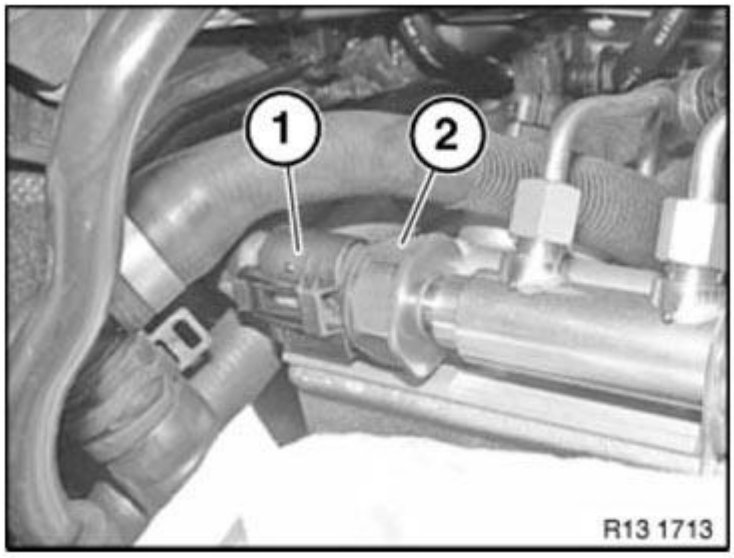


Fig. 55: Identifying High-Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Check fuel system for leaks.

Check function of DME.

13 53 594 REPLACING LOW-PRESSURE FUEL SENSOR (N74)

WARNING: Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40 °C.

Wear safety goggles.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be fouled by fuel.
The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**

Recycling:

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Release low-pressure fuel sensor (2).

Tightening torque: see 9AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

Installation:

Replace sealing ring on low-pressure fuel sensor.

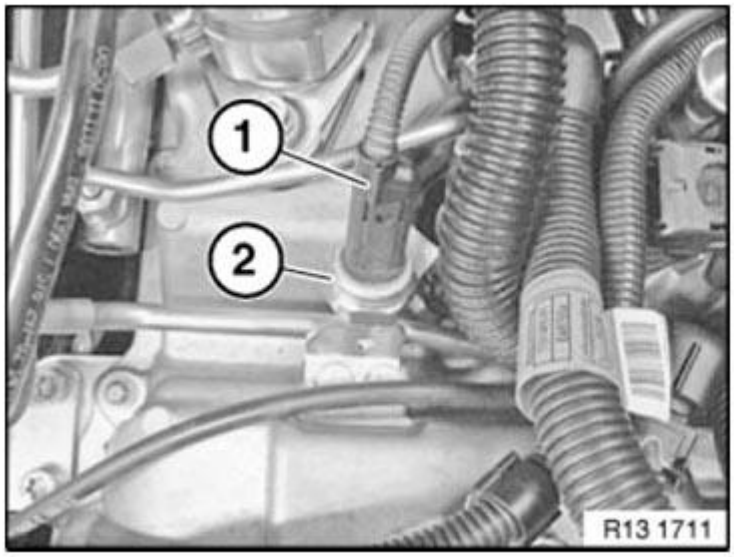


Fig. 56: Identifying Low-Pressure Fuel Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 602 REPLACING RIGHT HIGH-PRESSURE FUEL SENSOR (N74)

WARNING: Observe warning on cylinder head cover.
Disconnect BATTERY NEGATIVE TERMINAL (risk of fire due to short-circuiting on removal).
Electric fuel pump starts up automatically when door is opened!
Carry out installation work on fuel system only with coolant temperature below 40 °C.

IMPORTANT: Wear full face guard and protective gloves.
Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.
Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks:

- Remove **INTAKE PLENUM**

Recycling:

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Picture shows the left side, the procedure for the right side is identical.

Unlock plug (1) and remove.

Release high-pressure sensor (1) and remove.

Tightening torque: see 8AZ in **13 53 FUEL INJECTION NOZZLES AND PIPES**

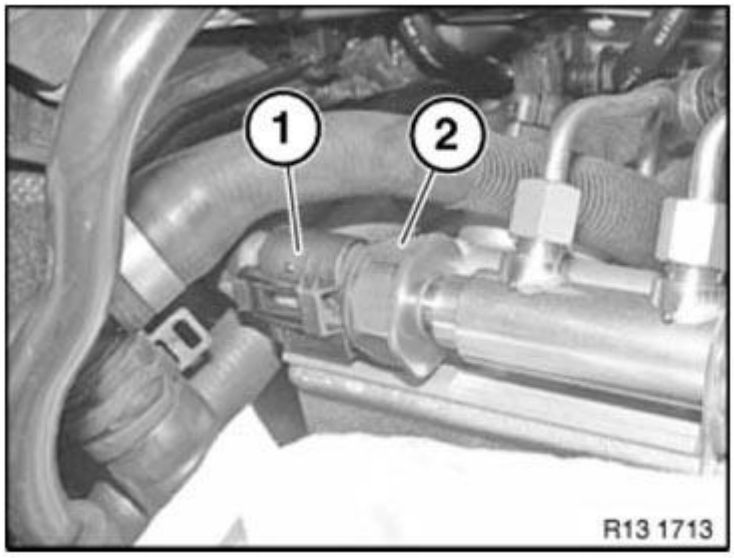


Fig. 57: Identifying High-Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

THROTTLE AND OPERATION

13 54 015 REMOVING AND INSTALLING/SEALING LEFT THROTTLE VALVE ASSEMBLY (N74)

Necessary preliminary tasks:

- Turn off ignition
- Remove **INTAKE SILENCER**, left
- Remove **ACOUSTIC INSULATION** for bulkhead on left

Release clamp (1)

Tightening torque: see 5AZ in **13 71 AIR INTAKE SYSTEM**

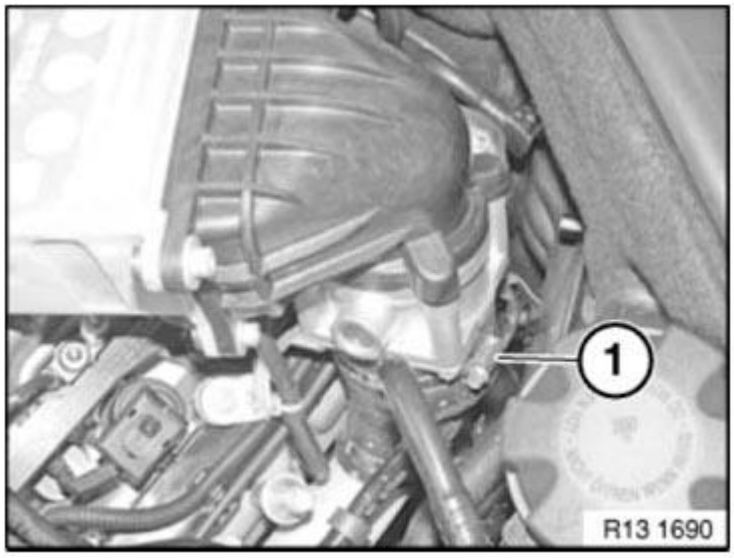


Fig. 58: Identifying Throttle Valve Assembly Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 3AZ in **13 54 THROTTLE AND ACTUATOR**

Unfasten screws (2).

Tightening torque: see 2AZ in **13 54 THROTTLE AND ACTUATOR**

Unlock plug on throttle body and disconnect.

Detach air duct (3) together with throttle body toward stop and remove.

Installation:

Check seals. Replace damaged seals.

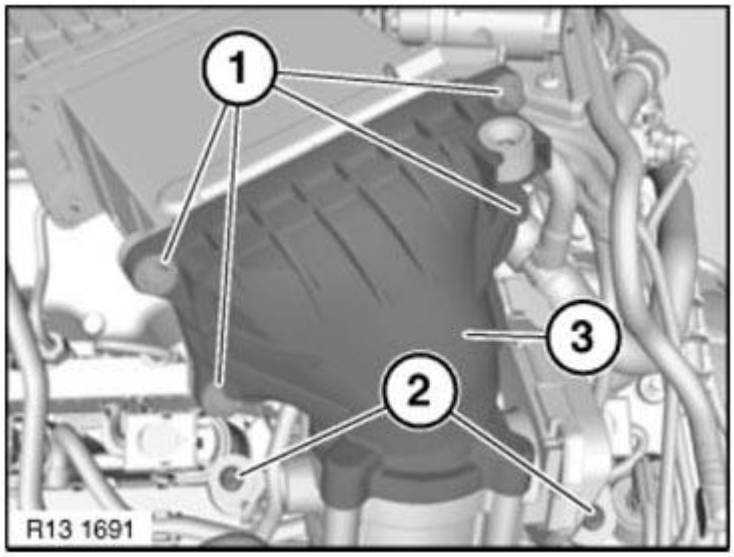


Fig. 59: Identifying Air Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Close off charge air pipe with special tool (1) 11 5 220.

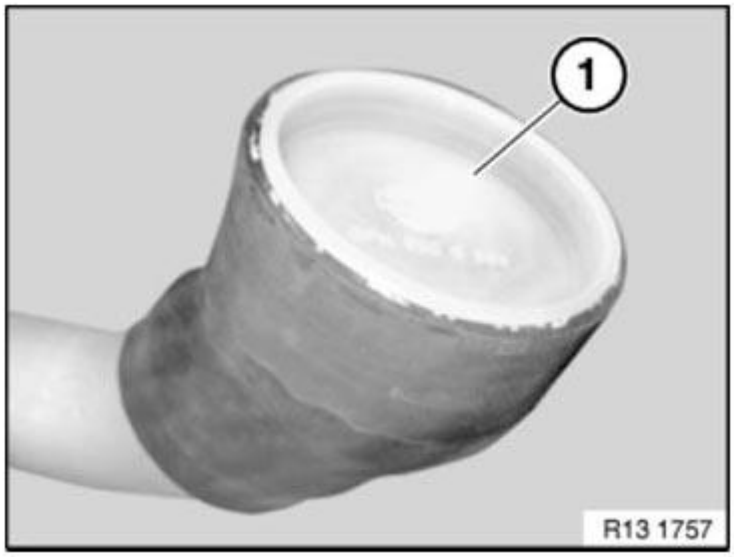


Fig. 60: Closing Off Charge Air Pipe Using Special Tool 11 5 220
Courtesy of BMW OF NORTH AMERICA, INC.

Only if replacing throttle body:

Release screws (1).

Tightening torque: see 1AZ in **13 54 THROTTLE AND ACTUATOR**

Remove throttle body from air duct.

Fit air duct on new throttle valve assembly.

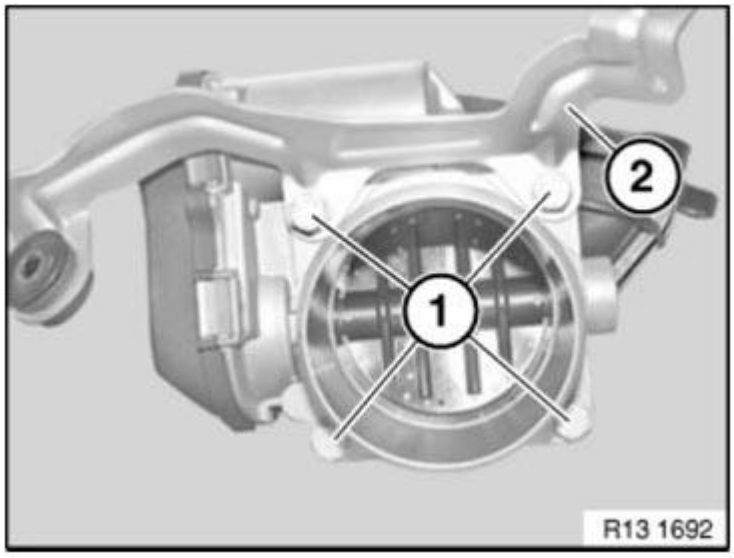


Fig. 61: Identifying Throttle Valve Assembly And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Replace sealing ring (1) of throttle assembly (2).

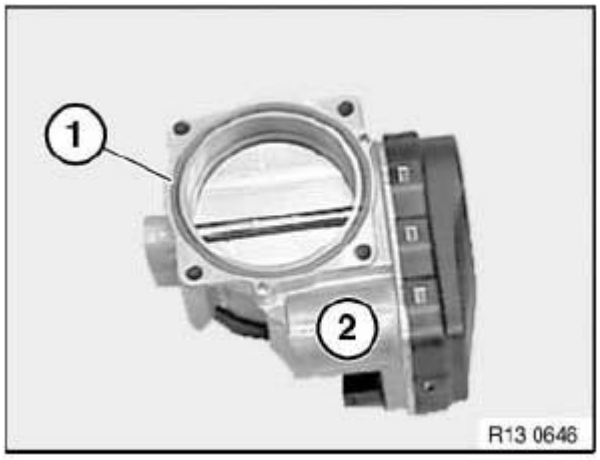


Fig. 62: Identifying Sealing Ring And Throttle Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Assemble engine.

Check stored fault message.

Delete fault memory.

13 54 020 REMOVING AND INSTALLING/SEALING RIGHT THROTTLE BODY (N74)

Necessary preliminary tasks:

- Turn off ignition
- Remove right **INTAKE FILTER HOUSING**
- Remove **ACOUSTIC INSULATION** for bulkhead on right

NOTE: Graphic shows the left side, the procedure for the right side is identical.

Release clamp (1)

Tightening torque: see 5AZ in **13 71 AIR INTAKE SYSTEM**

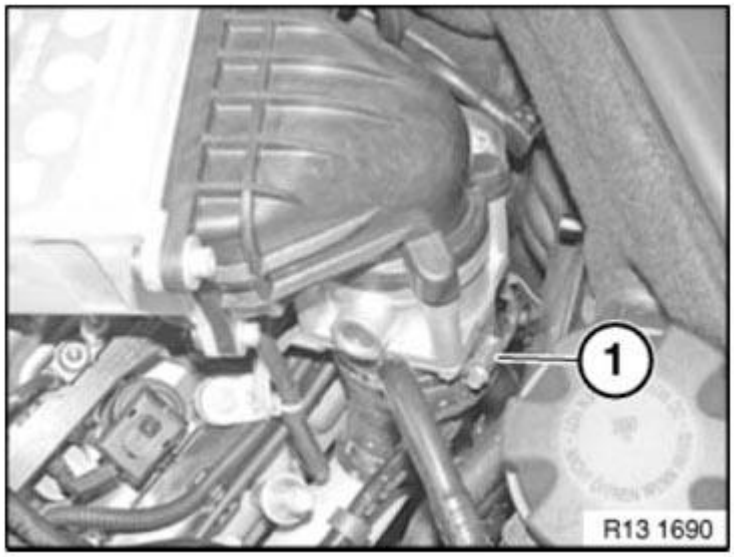


Fig. 63: Identifying Throttle Valve Assembly Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Graphic shows the left side, the procedure for the right side is identical.

Release screws (1).

Tightening torque: see 3AZ in **13 54 THROTTLE AND ACTUATOR**

Unfasten screws (2).

Tightening torque: see 2AZ in **13 54 THROTTLE AND ACTUATOR**

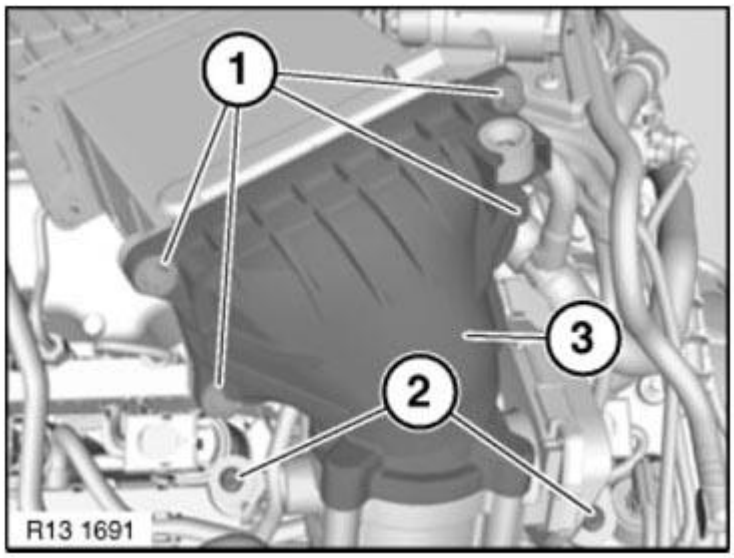


Fig. 64: Identifying Air Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug on throttle body and disconnect.

Unlock and disconnect tank vent line from throttle body.

Detach air duct (3) together with throttle body toward stop and remove.

Installation:

Check seals. Replace damaged seals.

Close off charge air pipe with special tool (1) 11 5 220.

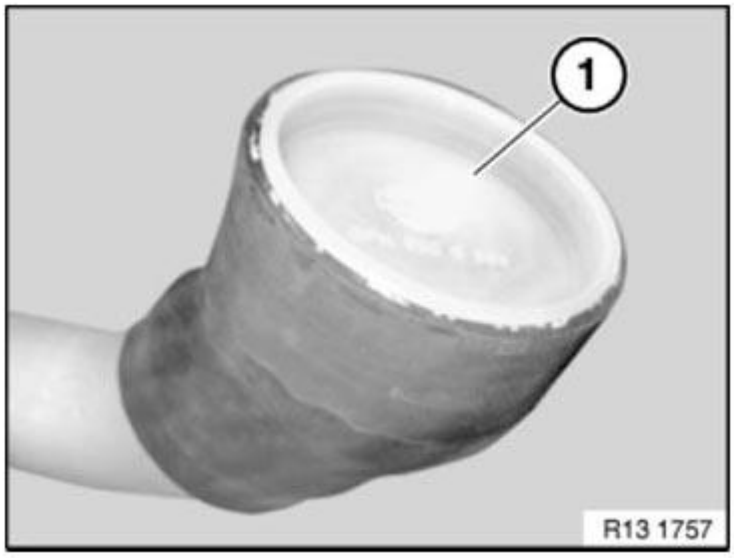


Fig. 65: Closing Off Charge Air Pipe Using Special Tool 11 5 220
Courtesy of BMW OF NORTH AMERICA, INC.

Only if replacing throttle body:

Release screws (1).

Tightening torque: see 1AZ in **13 54 THROTTLE AND ACTUATOR**

Remove throttle body from air duct.

Modify air duct and holder (2) to new throttle body.

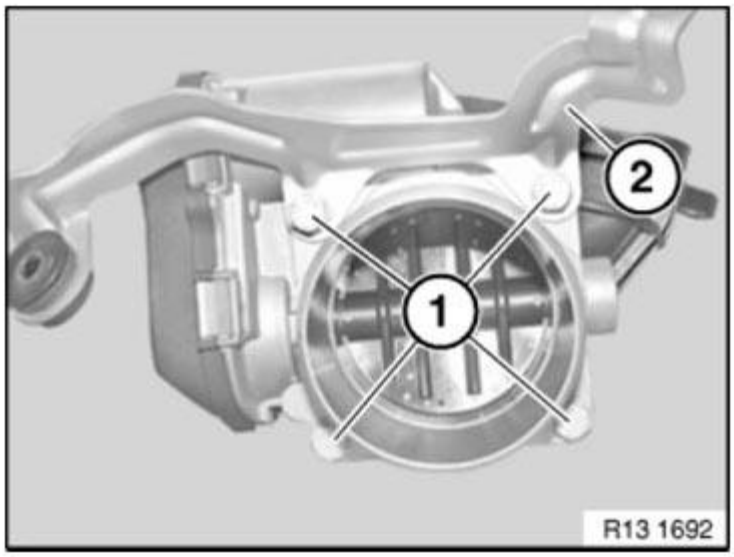


Fig. 66: Identifying Air Duct Holder And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Replace sealing ring (1) of throttle assembly (2).

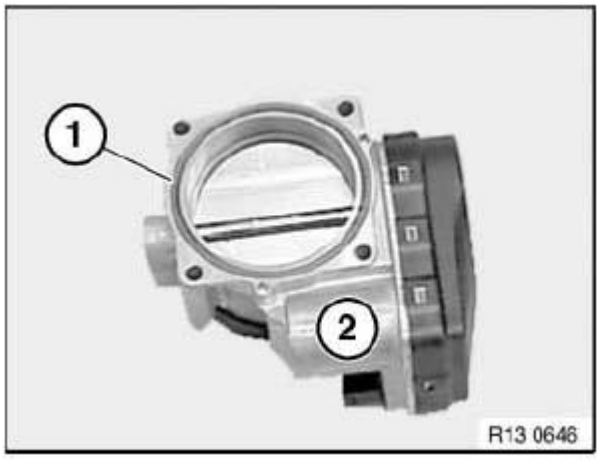


Fig. 67: Identifying Sealing Ring And Throttle Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check stored fault message.

Delete fault memory.

SENSOR FOR CONTROL UNIT

13 62 591 REMOVING AND INSTALLING / REPLACING PRESSURE SENSOR FOR CHARGE AIR ON LEFT (N74)

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Turn off ignition
- Remove left **INTAKE SILENCER HOUSING**

Release clamp (1).

Tightening torque: see 5AZ in **13 71 AIR INTAKE SYSTEM**

Remove hose supports (2).

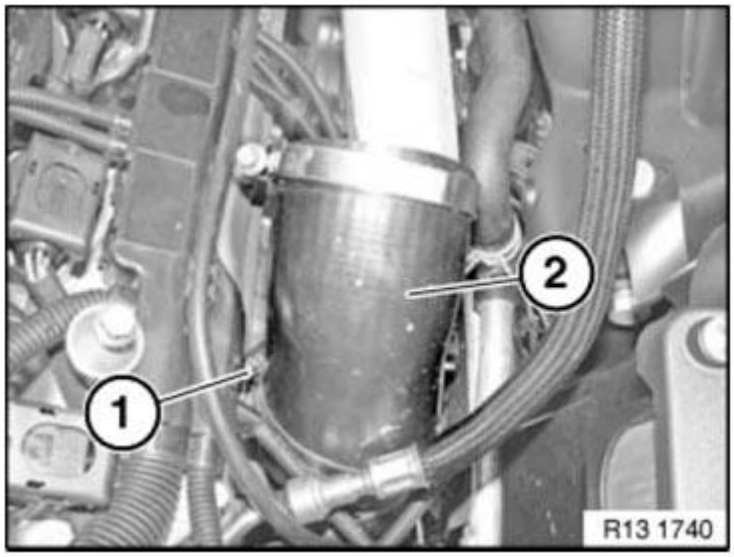


Fig. 68: Identifying Hose Supports And Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 7AZ in **13 62 SENDERS FOR CONTROL UNIT**

Pull pressure sensor (2) out of charge air duct, left.

Unlock plug (3) and remove.

Remove pressure sensor (2).

Installation:

Replace sealing ring on pressure sensor.

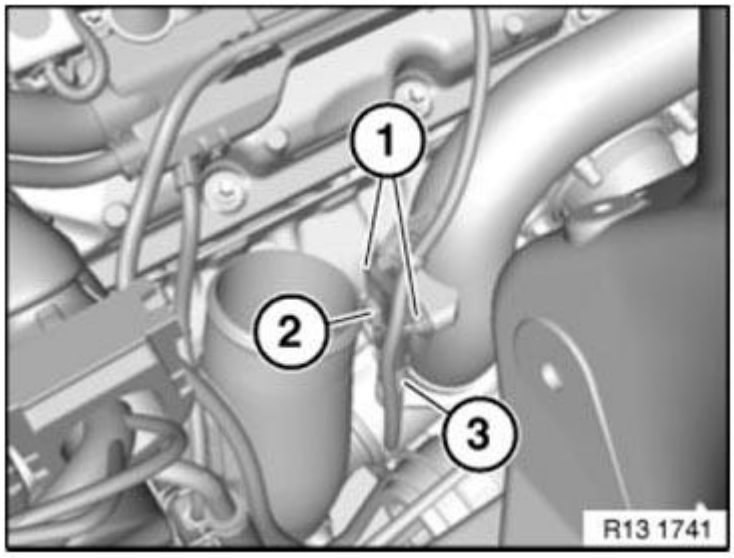


Fig. 69: Identifying Pressure Sensor, Plug And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Delete fault memory.

13 62 592 REMOVING AND INSTALLING / REPLACING PRESSURE SENSOR FOR CHARGE AIR ON RIGHT (N74)

Necessary preliminary tasks:

- Read out fault memory of DME control unit.
- Turn off ignition
- Remove right **INTAKE FILTER HOUSING**

NOTE: Graphic shows the left side, the procedure for the right side is identical.

Release clamp (1).

Tightening torque: see 5AZ in **13 71 AIR INTAKE SYSTEM**

Remove hose supports (2).

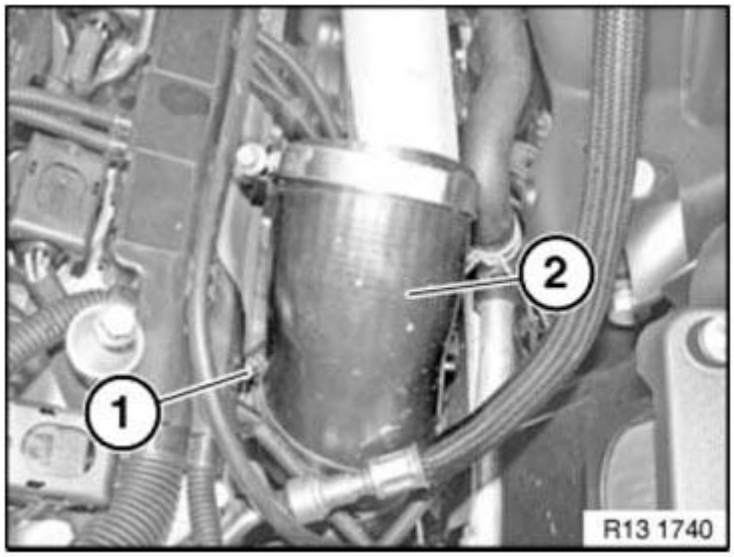


Fig. 70: Identifying Hose Supports And Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Graphic shows the left side, the procedure for the right side is identical.

Release screws (1).

Tightening torque: see 7AZ in **13 62 SENDERS FOR CONTROL UNIT**

Unlock plug (3) and remove.

Pull pressure sensor (2) out of right charge air duct.

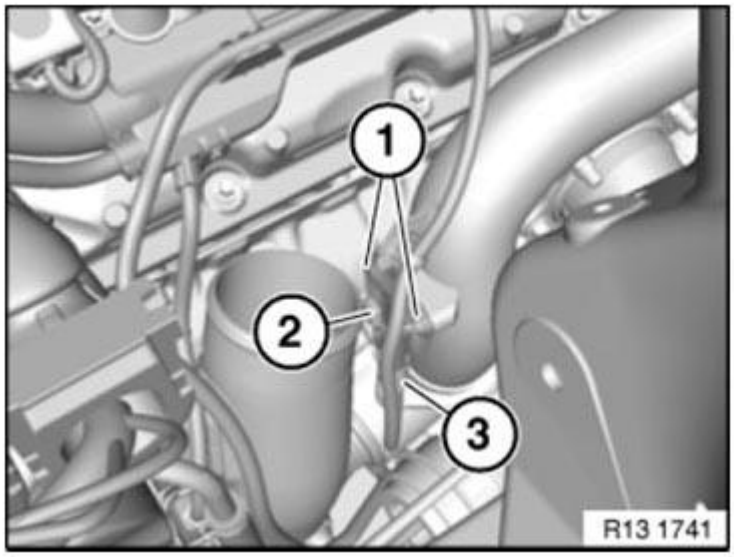


Fig. 71: Identifying Pressure Sensor, Plug And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Remove pressure sensor (2).

Installation:

Replace sealing ring on pressure sensor.

Installation:

Assemble engine.

Delete fault memory.

13 62 593 REMOVING AND INSTALLING/REPLACING PRESSURE SENSOR ON LEFT INTAKE MANIFOLD (N74)

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**

Unlock plug (1) and remove.

Unfasten screws (2).

Tightening torque: see 7AZ in **13 62 SENDERS FOR CONTROL UNIT**

Pull pressure sensor (3) out of intake air manifold.

Installation:

Coat sealing ring with anti-friction agent.

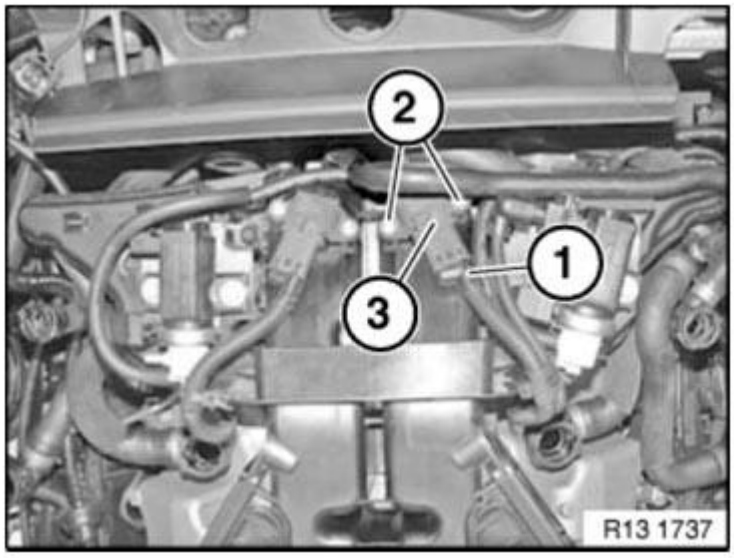


Fig. 72: Identifying Pressure Sensor, Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Delete fault memory.

13 62 594 REMOVING AND INSTALLING/REPLACING PRESSURE SENSOR ON RIGHT INTAKE MANIFOLD (N74)

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Turn off ignition
- Remove **ACOUSTIC COVER**

Release screws (1).

Tightening torque: see 2AZ in **13 62 SENDERS FOR CONTROL UNIT**

Unlock plug (3) and remove.

Pull pressure sensor (2) out of intake air manifold.

Installation:

Coat sealing ring with anti-friction agent.

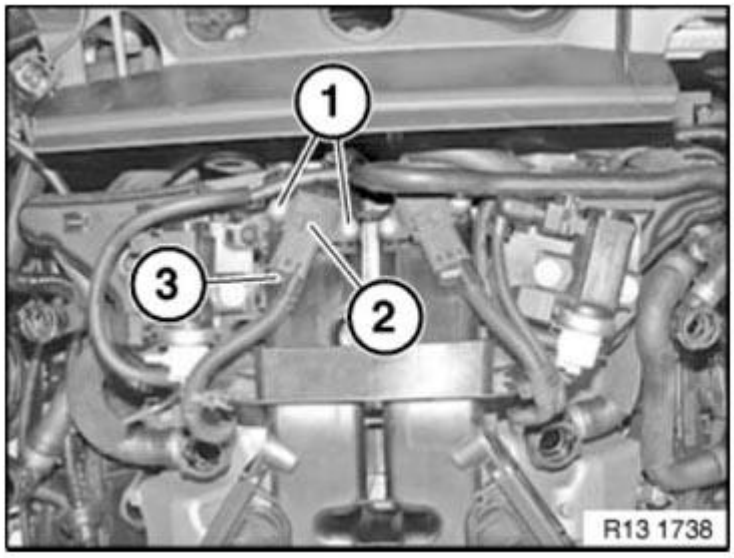


Fig. 73: Identifying Pressure Sensor, Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Assemble engine.

Delete fault memory.

13 62 531 REPLACING COOLANT TEMPERATURE SENSOR (N74)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Read out fault memory of DME control unit; if necessary, work through test schedules
- Turn off ignition
- Remove intercooler **EXPANSION TANK** .

Unlock plug (1) and remove.

Unfasten coolant temperature sensor (2).

Installation:

Tightening torque: see 1AZ in **13 62 SENDERS FOR CONTROL UNIT**

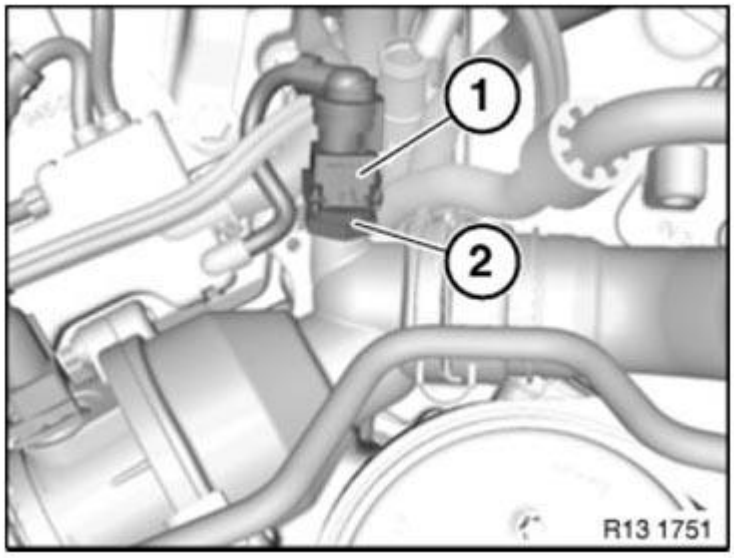


Fig. 74: Identifying Coolant Temperature Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Delete fault memory.

Check coolant level.

Check cooling system for leaks.

INTAKE SILENCER

13..... REMOVING INTAKE PORT ON RIGHT AND LEFT (N74)

Necessary preliminary tasks:

- Remove left and right **INTAKE FILTER HOUSINGS**
- Remove **TRANSVERSE REINFORCEMENT**

Picture describes the left side, the procedure for the right side is identical.

Press in catches (2) left and right on intake port.

Feed out intake duct (1) towards top.

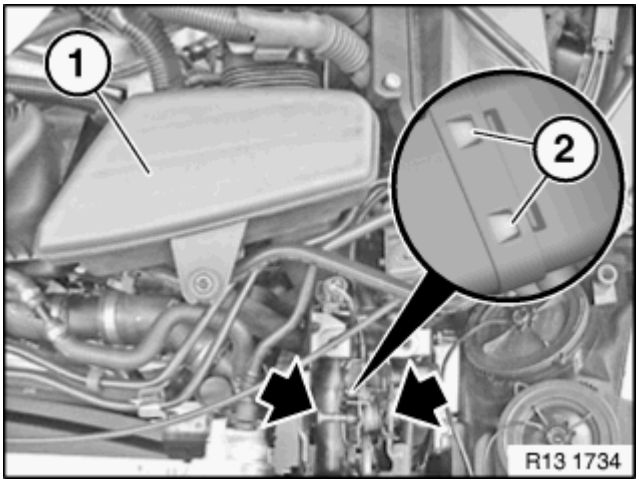


Fig. 75: Identifying Intake Port Catches And Intake Duct
Courtesy of BMW OF NORTH AMERICA, INC.

13 71 195 (N74) REMOVE CLEAN AIR PIPE

Necessary preliminary tasks:

- Remove **CHARGE AIR PIPE**, cylinders 1-6
- Remove power steering gear. See **HYDRAULIC STEERING GEAR** or **ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR** .

NOTE: Graphic shows the left side, the procedure for the right side is identical.

Release screw (1).

Tightening torque: see 1AZ in **13 71 AIR INTAKE SYSTEM**

Pull clean air pipe (2) from exhaust turbocharger, feed out and remove.

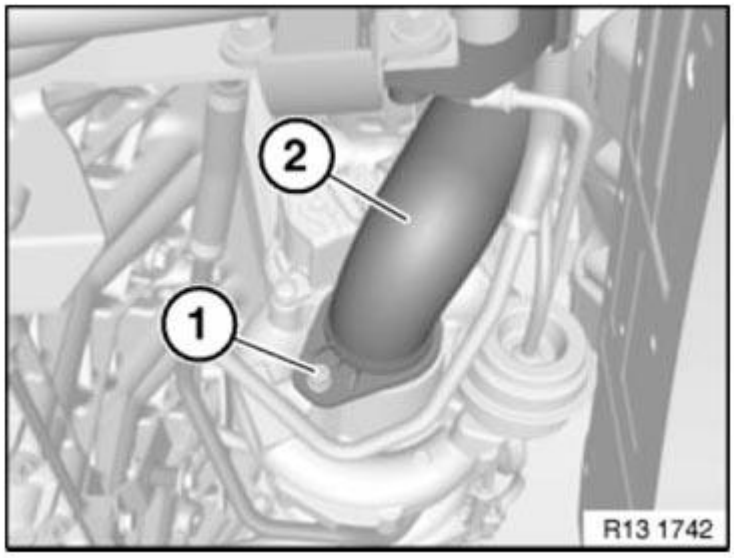


Fig. 76: Identifying Air Pipe And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check gasket on clean-air pipe for damage. Replace damaged gasket.

Assemble engine.

13 71 030 REMOVING AND INSTALLING/REPLACING BOTH INTAKE FILTER HOUSINGS (N74)

Necessary preliminary tasks:

- Turn off ignition
- Remove **ACOUSTIC COVER**

NOTE: Description relates to the left intake filter housing. Procedure for the right side is identical.

Release lower clamp (1) on intake filter housing.

Tightening torque: see 4AZ in **13 71 AIR INTAKE SYSTEM**

Release screw (2).

Tightening torque: see 9AZ in **13 71 AIR INTAKE SYSTEM**

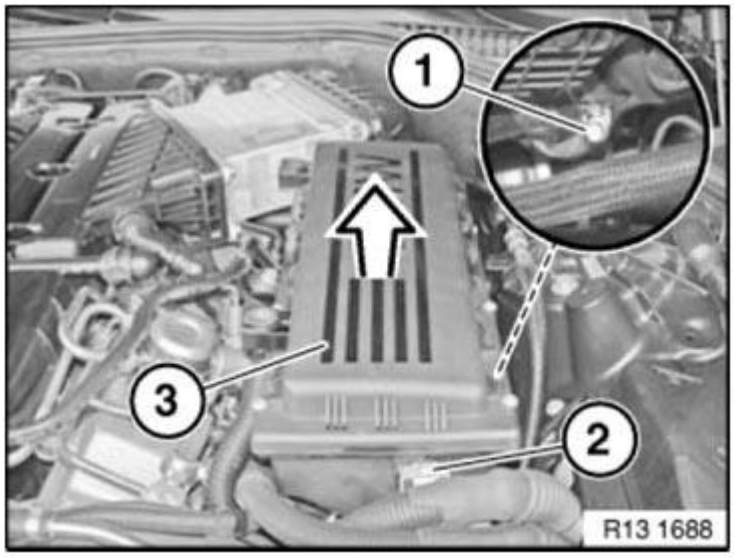


Fig. 77: Releasing Intake Filter Housing Lower Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Pull intake filter housing upward out of rubber mounts and remove.

Reassemble the vehicle.

13 71 180 REMOVING CHARGE AIR PIPE, CYLINDERS 1-6 (N74)

Necessary preliminary tasks:

- Remove right **INTAKE FILTER HOUSING**

Slacken nut (1).

Unfasten screws (2).

Remove heat shield (3).

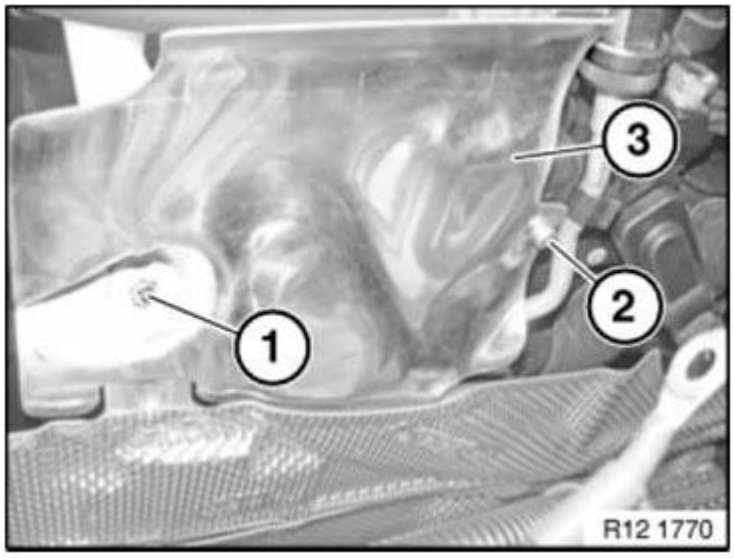


Fig. 78: Identifying Heat Shield, Screws And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Graphic shows the left side, the procedure for the right side is identical.

Release clamp (1)

Tightening torque: see 10AZ in **13 71 AIR INTAKE SYSTEM**

Remove hose fitting (2).

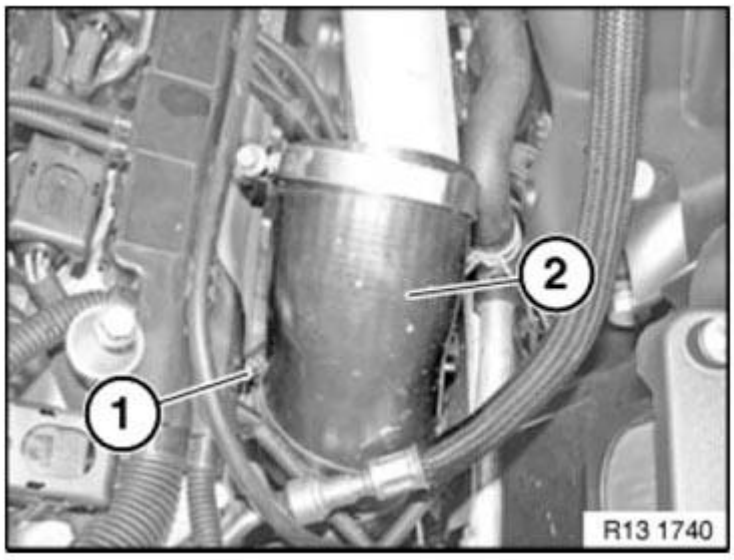


Fig. 79: Identifying Hose Fitting And Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare tool as illustrated.

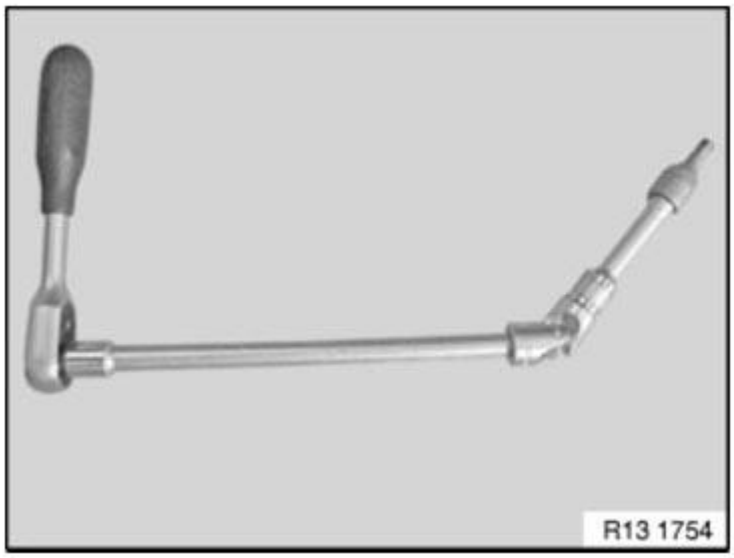


Fig. 80: Identifying Tool
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Graphic shows the left side, the procedure for the right side is identical.

Release clamp (1) on throttle body.

Tightening torque: see 5AZ in **13 71 AIR INTAKE SYSTEM**

Release screws (2) on turbocharger.

Tightening torque: see 2AZ in **13 71 AIR INTAKE SYSTEM**

Unlock plug on pressure sensor and disconnect.

Pull off air duct (3) from exhaust turbocharger, feed out and remove.

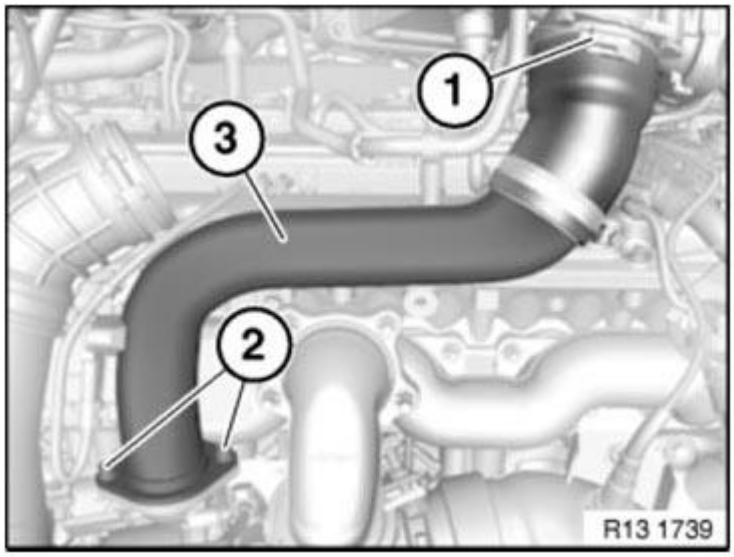


Fig. 81: Identifying Air Duct, Clamp And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Close off exhaust turbocharger with special tool (1) 11 5 220.

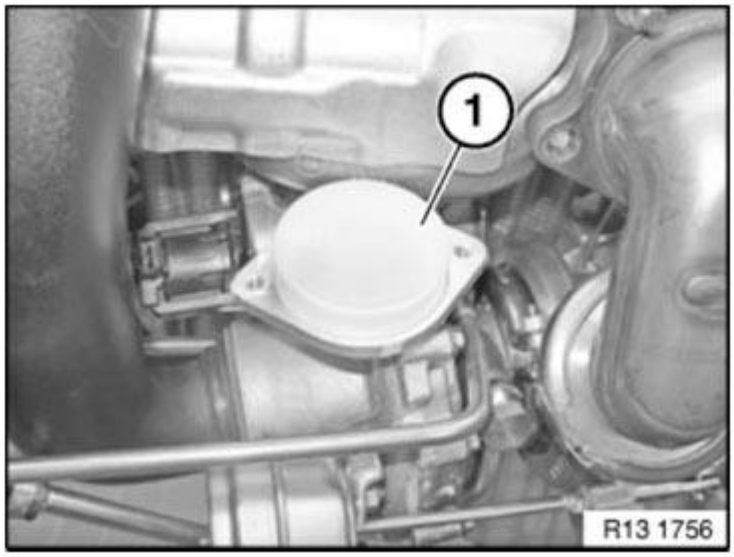


Fig. 82: Closing Off Exhaust Turbocharger Using Special Tool 11 5 220
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

13 71 181 REMOVING CHARGE AIR PIPE, CYLINDERS 7-12 (N74)

Necessary preliminary tasks:

- Remove left **INTAKE SILENCER HOUSING**

Release clamp (1)

Tightening torque: see 10AZ in **13 71 AIR INTAKE SYSTEM**

Remove hose fitting (2).

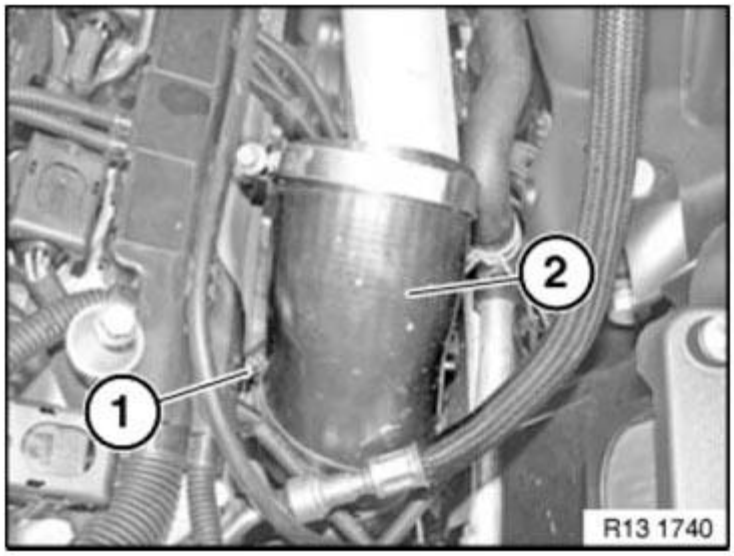


Fig. 83: Identifying Hose Fitting And Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare tool as illustrated.

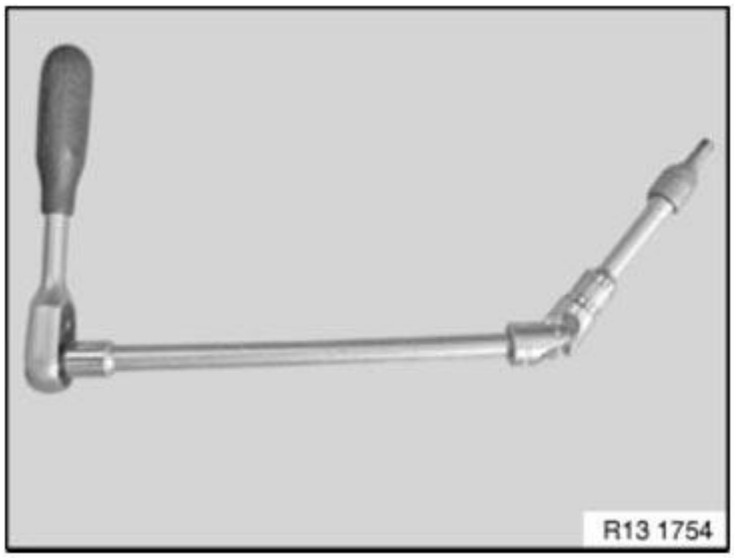


Fig. 84: Identifying Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp (1) on throttle body.

Tightening torque: see 5AZ in **13 71 AIR INTAKE SYSTEM**

Release screws (2) on turbocharger.

Tightening torque: see 2AZ in **13 71 AIR INTAKE SYSTEM**

Unlock plug on pressure sensor and disconnect.

Pull off air duct (3) from exhaust turbocharger, feed out and remove.

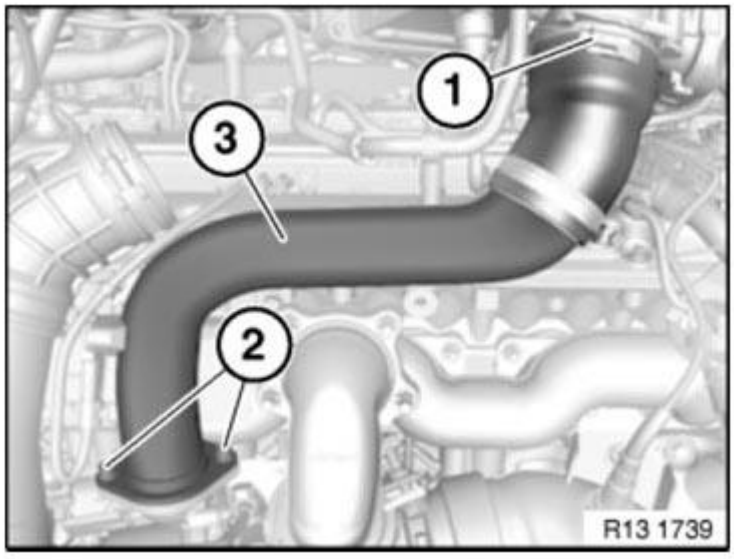


Fig. 85: Identifying Air Duct, Clamp And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Close off exhaust turbocharger with special tool (1) 11 5 220.

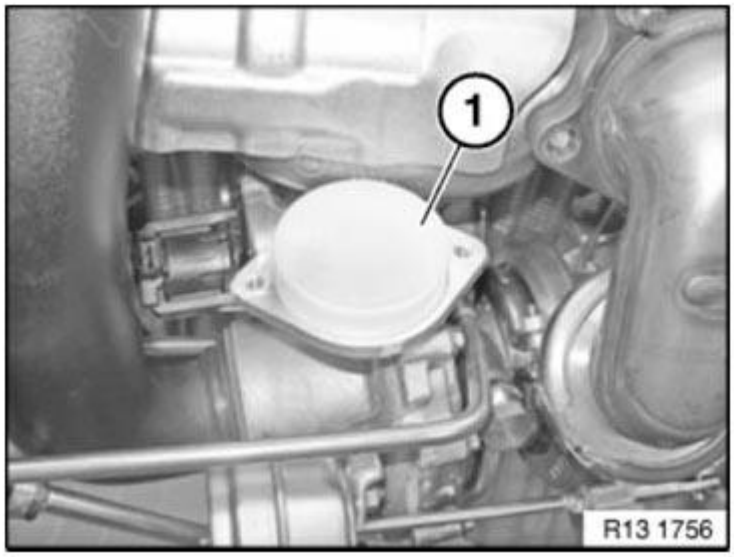


Fig. 86: Closing Off Exhaust Turbocharger Using Special Tool 11 5 220
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

13 71 190 REMOVING LEFT CLEAN AIR PIPE (N74)

Necessary preliminary tasks:

- Remove **CHARGE AIR PIPE**, cylinders 7-12
- Remove power steering gear. See **HYDRAULIC STEERING GEAR** or **ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR** .

Release screw (1).

Tightening torque: see 1AZ in **13 71 AIR INTAKE SYSTEM**

Disconnect clean air pipe (2) from exhaust turbocharger, feed out and remove.

Installation:

Check gasket on clean-air pipe for damage. Replace damaged gasket.

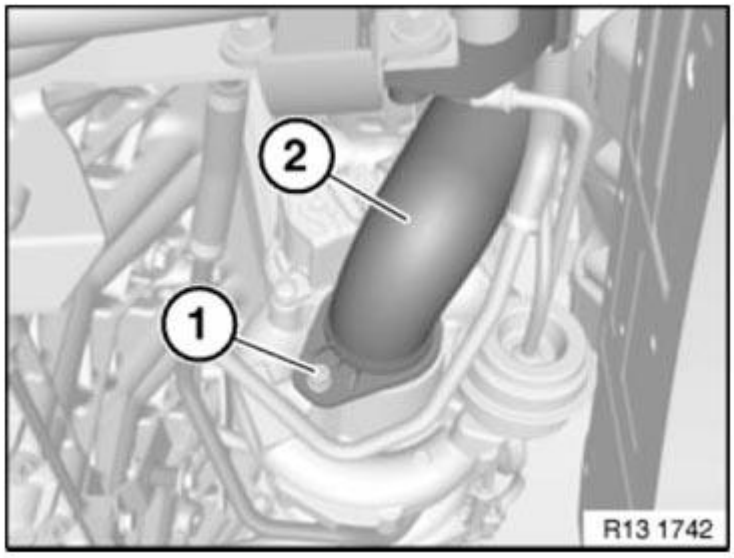


Fig. 87: Identifying Air Pipe And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

13 72 002 REPLACING BOTH AIR FILTER ELEMENTS (N74)

Necessary preliminary tasks:

- Turn off ignition
- Remove **ACOUSTIC COVER**

NOTE: Description relates to the left intake filter housing. Procedure for the right side is identical.

Release screws along the dotted line (1).

Tightening torque: see 8AZ in **13 71 AIR INTAKE SYSTEM**

Remove upper part of intake silencer housing.

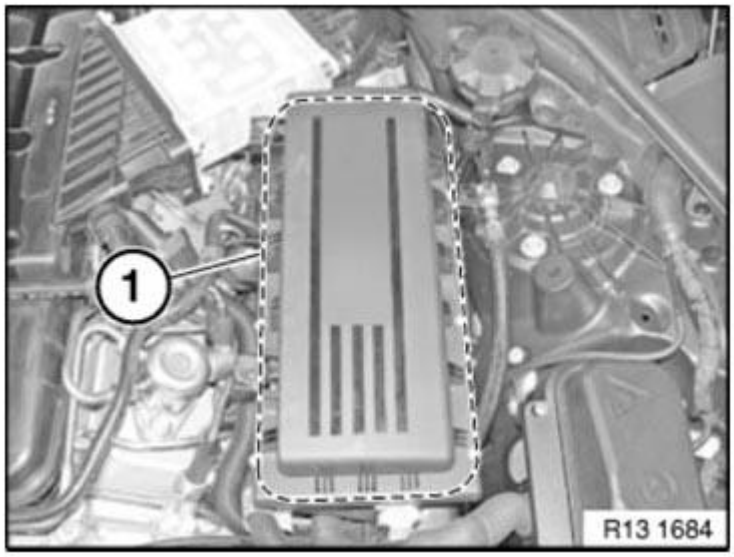


Fig. 88: Identifying Screw Releasing Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Ensure seal is seated properly!

NOTE: Description relates to the left intake filter housing. Procedure for the right side is identical.

Remove air cleaner element (1).

Installation:

Clean upper and lower sections of intake filter housing from inside.

Replace air filter element (1).

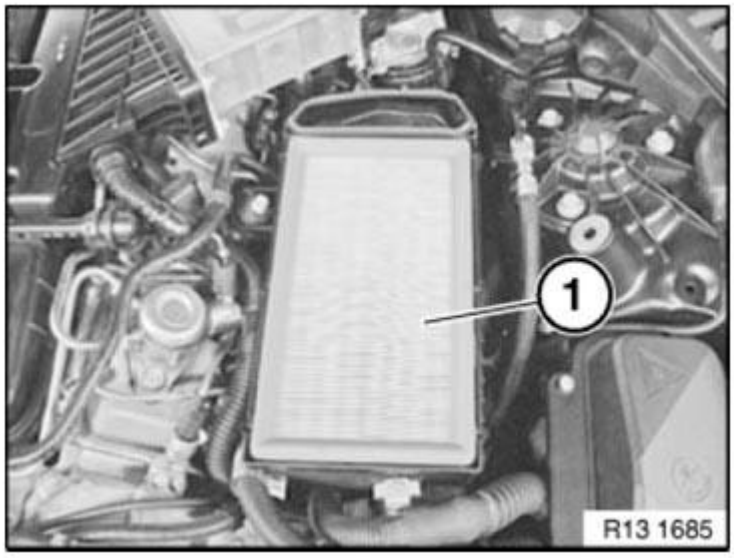


Fig. 89: Identifying Air Cleaner Element
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

AIR CLEANER

13 72 002 REPLACING BOTH AIR FILTER ELEMENTS (N74)

Necessary preliminary tasks:

- Turn off ignition
- Remove **ACOUSTIC COVER**

NOTE: Description relates to the left intake filter housing. Procedure for the right side is identical.

Release screws along the dotted line (1).

Tightening torque: see 8AZ in **13 71 AIR INTAKE SYSTEM**

Remove upper part of intake silencer housing.

Installation:

Ensure seal is seated properly!

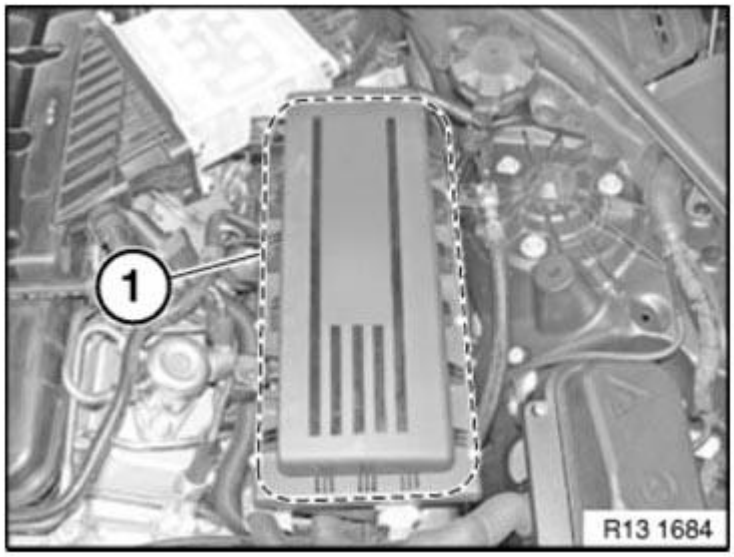


Fig. 90: Identifying Screw Releasing Area
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Description relates to the left intake filter housing. Procedure for the right side is identical.

Remove air cleaner element (1).

Installation:

Clean upper and lower sections of intake filter housing from inside.

Replace air filter element (1).

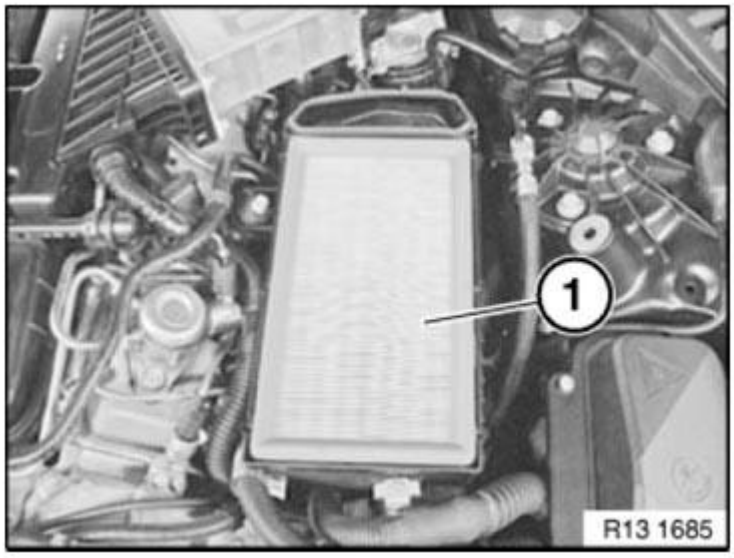


Fig. 91: Identifying Air Cleaner Element
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble the vehicle.

CARBON CANISTER VENTILATION

13 90 500 REPLACING TANK VENT VALVE (N74)

Necessary preliminary tasks:

- Check stored fault message
- Turn off ignition
- Remove **ACOUSTIC COVER**
- Remove right **INTAKE FILTER HOUSING**
- Remove right **TENSION STRUT**
- Remove **SOUND INSULATION** from bulkhead on right

Unlock hose (1) from air duct and pull off.

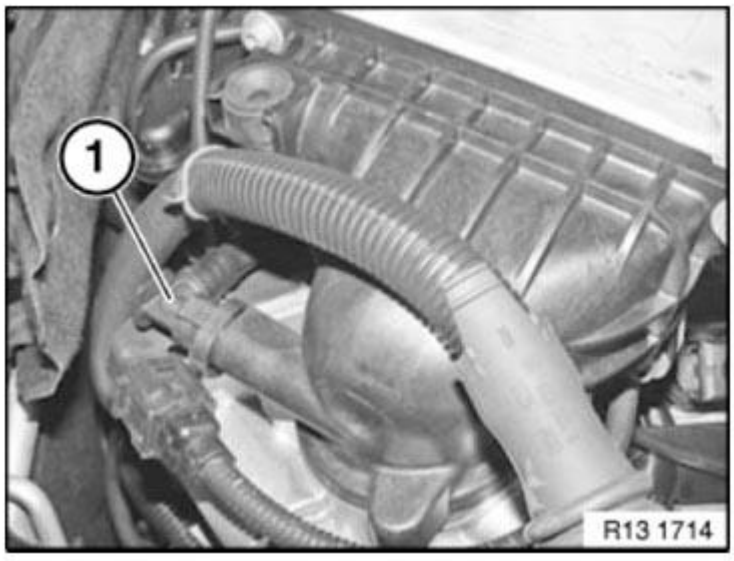


Fig. 92: Identifying Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

Unlock hose (2) and detach.

Pull off tank vent valve (3) from holder and feed out together with hose (4) and remove.

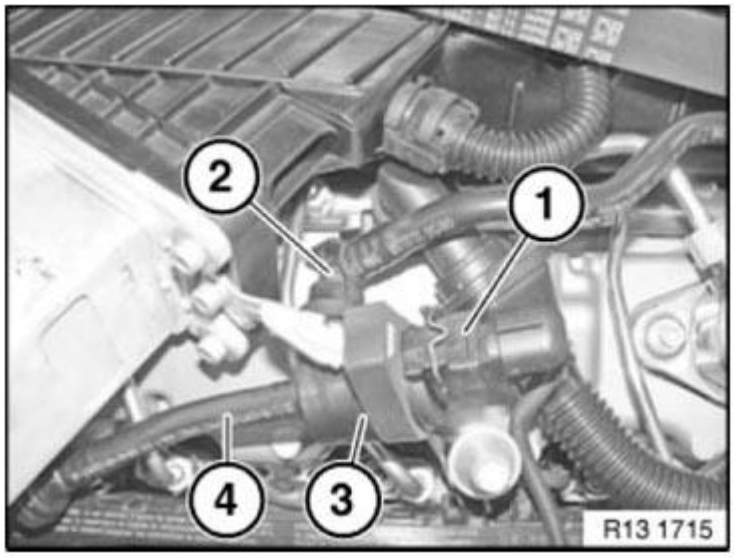


Fig. 93: Identifying Tank Vent Valve, Hose And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Read out fault memory of DME control unit.

Delete fault memory.

Assemble engine.

ENGINE

Fuel Supply System

DRAWING OFF OF FUEL, SYSTEM CLEANING

16 00 100 CHECKING FUEL TANK AND TANK VENTILATION SYSTEM FOR LEAKS

NOTE: The following procedure is only applicable to vehicles without the tank leak diagnosis module.

Necessary preliminary tasks:

- Remove rear right wheel arch trim.

Comply with the following conditions in order to obtain plausible test results:

- Content of fuel tank:
  1. Maximum 90 %
  2. Minimum 13 % (reserve telltale must not light up)
- Park the car in the workshop at least 2 hours before the test so that the fuel temperature is approximately that of the workshop temperature (ideal fuel temperature approx. 10... 20 °C).
- Never refuel the vehicle directly prior to the leak test due to the strong emission of gas by the fresh fuel

Using special tool **16 1 070** , seal opening (1) on carbon canister.

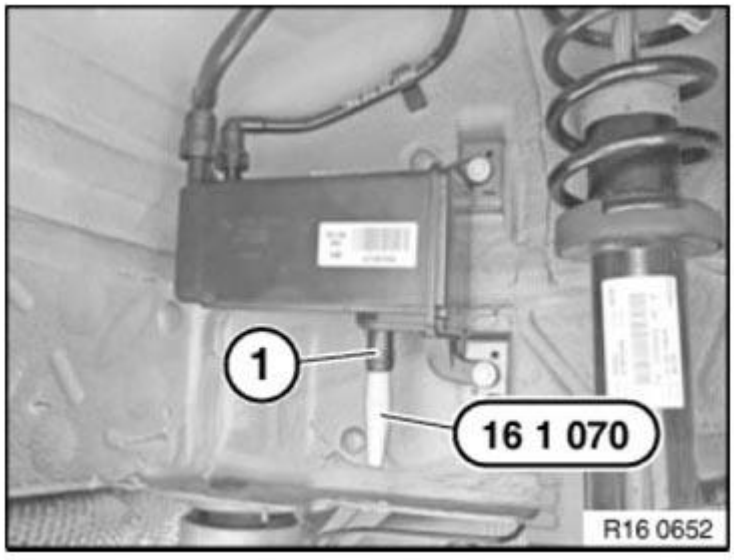


Fig. 1: Sealing Carbon Canister Opening Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fuel filler cap and connect special tool **16 1 174** to fuel filler neck.

Using thumbwheel (1), clamp special tool **16 1 174** to fuel filler neck.

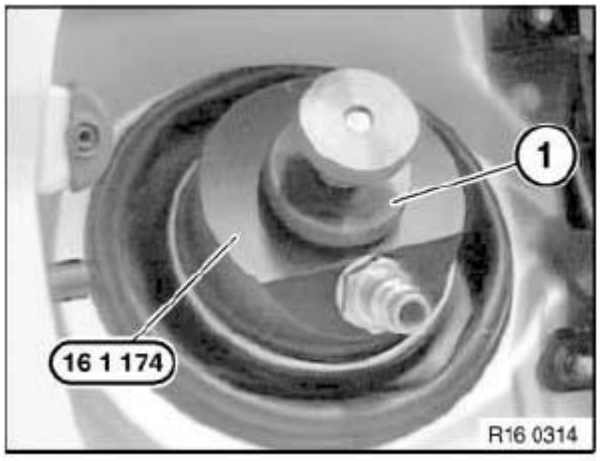


Fig. 2: Clamping Special Tool 16 1 174 To Fuel Filler Neck Using Thumbwheel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Turn pressure regulator on special tool 16 1 171 counter-clockwise as far as the stop.

Using compressed air line (1), connect special tool **16 1 171** to workshop compressed air system (8... 10 bar).

Connect pressure sensor (2) from Diagnosis and Information System with a measuring range of 0...3.5 bar.

IMPORTANT: Do not connect quick-release coupling (3) of special tool 16 1 171 as yet.

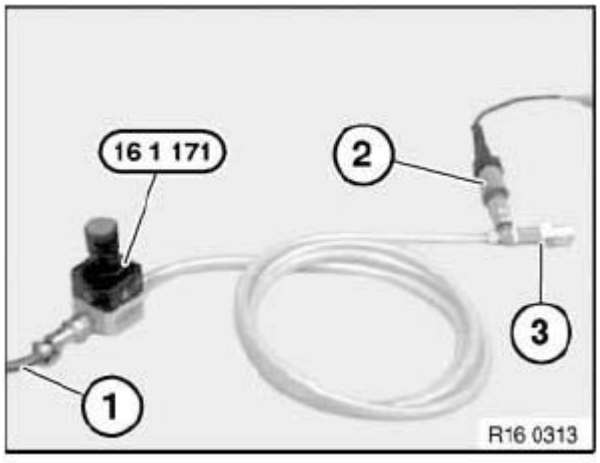


Fig. 3: Connecting Special Tool 16 1 171 To Workshop Compressed Air System Using Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Select "Measurement" function on Diagnosis and Information System (DIS).

Set measuring range according to pressure sensor to 0...3.5 bar.

Using pressure regulator on special tool **16 1 171** , increase pressure by 0.050 bar.

Connect special tool **16 1 174** to quick-release coupling of special tool **16 1 171** .

Using pressure regulator on special tool **16 1 171** , reset pressure in fuel tank to 0.050 bar above atmospheric.

IMPORTANT: Do not under any circumstances increase pressure by more than 0.100 bar as this would result in damage to the fuel tank and the fuel tank venting system.

Using special tool **13 3 010** , disconnect delivery line (1) from special tool **16 1 171** to fuel filler neck.

Allow a rest period of approx. 20 sec.

Read off and note down starting pressure value.

Approx. Wait 60 seconds.

Read off final pressure value and compare with starting pressure value.

Measurement evaluation:

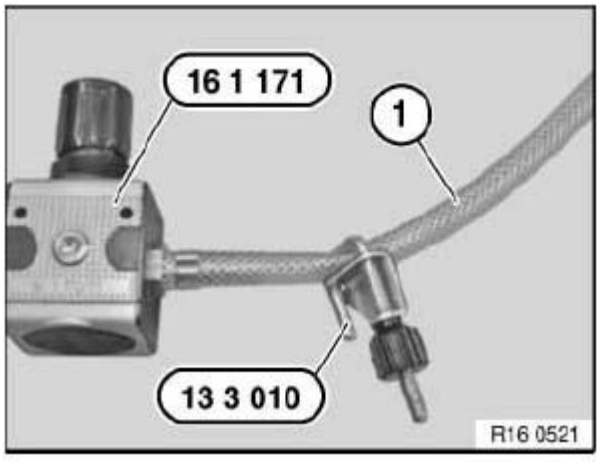


Fig. 4: Disconnecting Delivery Line From Special Tool 16 1 171 To Fuel Filler Neck Using Special Tool 13 3 010
Courtesy of BMW OF NORTH AMERICA, INC.

Pressure drop between 0.008 and 0.010 bar.	Repeat measurement.
Pressure drop in 60 secs. greater than 0.010 bar.	System leaking beyond permitted levels. **CARRY OUT LEAK TEST**.

16 00 510 CONDUCTING LEAK TEST ON FUEL TANK AND TANK VENTING SYSTEM

IMPORTANT: On vehicles with tank leak diagnosis modules (DMTL), do not work with external pressurization as the tank ventilation system will leak under this condition.

On account of emerging fuel vapors, carry out all work in well ventilated rooms. Or use a suitable extractor system.

Observe country-specific accident prevention and occupational safety regulations.

NOTE: The following procedure is only applicable to vehicles with the tank leak diagnosis module (DMTL).
For vehicles without tank leak diagnosis module:
Pressurize FUEL TANK AND TANK VENTING SYSTEM.
During the leak test with a leak detector, be sure to follow the operating instructions of the equipment manufacturer.

NOTE: Select "Tank leak diagnosis module (DMTL)" on Diagnosis and Information System (DIS).

- **The leak diagnosis pump pressurizes the fuel tank and tank ventilation system for 30 sec.**
- **If pressure is needed for longer than 30 sec., press "Activate" button again after 30 sec.**

The leak test can be carried out with a leak detector.

Possible causes may be:

- Tank cap leaking (check **TANK CAP PRESSURE RELIEF VALVE**)
- Tank ventilation lines leaky (fuel tank-activated carbon canister-tank ventilation valve)
- Tank ventilation valve leaky (engine compartment)
- Fuel level sensor flange on tank leaking



Fig. 5: Identifying Leak Detector
Courtesy of BMW OF NORTH AMERICA, INC.

16 00 005 DRAINING AND FILLING FUEL TANK

IMPORTANT: Observe country-specific safety regulations.

Ensure adequate ventilation in the place of work!

Connect the exhaust and extraction systems to the exhaust tailpipe.

The electric fuel pump must not operate without fuel! After completing repairs but before starting the engine for the first time, fill the fuel tank with min. 5 l fuel through the fuel filler pipe.

Do not damage non-return flap when pulling out extraction hose.

Diesel vehicles

Before starting the engine for the first time, if the tank has been run dry or drawn off, fill with diesel fuel and turn on ignition for approx. 1 minute. The fuel circuit is thus filled and vented, which results in the engine firing more quickly.

Drawing off fuel

Start engine and allow to run.

The electric fuel pump runs.

In this way, the fuel is repumped through the suction jet pump from the left to the right side of the fuel tank.

NOTE: Fuel can be drawn out of left and right sides of tank through filler neck, leaving

only a small residue. The residual amount is drawn off via the service opening.

Insert special tool **16 1 080** into fuel filler neck.

Special tool **16 1 080** has two different diameters for gasoline and diesel vehicles!

Slide extraction hose of extractor unit, refer to BMW Service Workshop Equipment and Planning Documentation, through special tool **16 1 080** into the fuel filler pipe, turning in the process if necessary.

Insertion length approx. 170 cm.

Draw off fuel with suction unit (refer to BMW Service Workshop Equipment) as far as possible.

Follow drawing off of fuel on fuel gauge in instrument cluster.

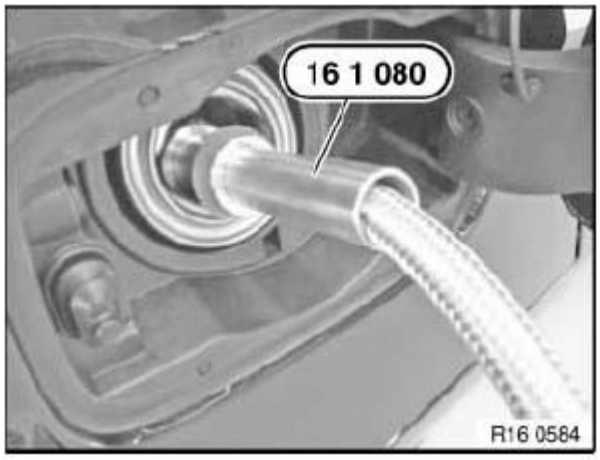


Fig. 6: Inserting Special Tool 16 1 080 Into Fuel Filler Neck
Courtesy of BMW OF NORTH AMERICA, INC.

Drawing off residual fuel quantity

Drawing off residual fuel amount is not included in the time value of this operation.

IMPORTANT: Ensure car interior is adequately ventilated.
Catch dripping fuel in a suitable container.

Remove flange cover. See **FLANGE COVER (OUTER FUEL FILTER)** and **FLANGE COVER**.

Draw off residual fuel quantity through service openings.

Fuel filling

Insert special tool **16 1 080** into fuel filler neck.

Special tool **16 1 080** has two different diameters for gasoline and diesel vehicles!

Slide extraction hose of extractor unit, refer to BMW Service Workshop Equipment and Planning Documentation, approx. 40 cm into fuel filler pipe.

Fill fuel from suction extractor unit.

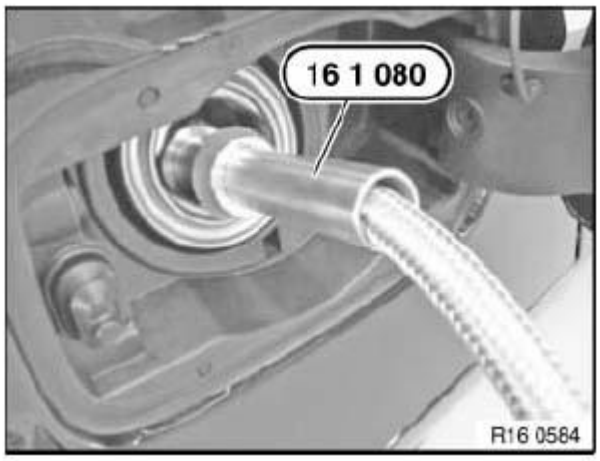


Fig. 7: Inserting Special Tool 16 1 080 Into Fuel Filler Neck
Courtesy of BMW OF NORTH AMERICA, INC.

Extracting fuel after a defect in the suction jet pump or fuel pump

Draw off right half of tank completely through fuel filler pipe.

Remove flange cover. See **FLANGE COVER (OUTER FUEL FILTER)** and **FLANGE COVER**.

Insert extraction hose through service opening in tank, fuel (also residual quantity) can be drawn off.

16 00 FUNCTIONAL DESCRIPTION FOR GENERAL FUEL SUPPLY SYSTEMS

Fuel supply systems in gasoline engines

Fuel system

The fuel is delivered from the fuel tank by the fuel pump via the feed line with a defined primary pressure to the high pressure pump. The primary pressure is monitored by the fuel pressure sensor. The fuel is delivered by the fuel pump as required. A return line is not required.

Tank-venting system

The tank safety valve is a closed system that is bled via a carbon canister. The carbon in the canister is stored as granules. The large surface of the granules traps the fuel vapor, that occurs in the fuel tank. The carbon canister needs to be refreshed regularly in order to be able to continue to store fuel vapor. This is done by flushing it with fresh air from the intake pipe. This process is controlled by the engine control unit.

Diesel engine fuel supply systems

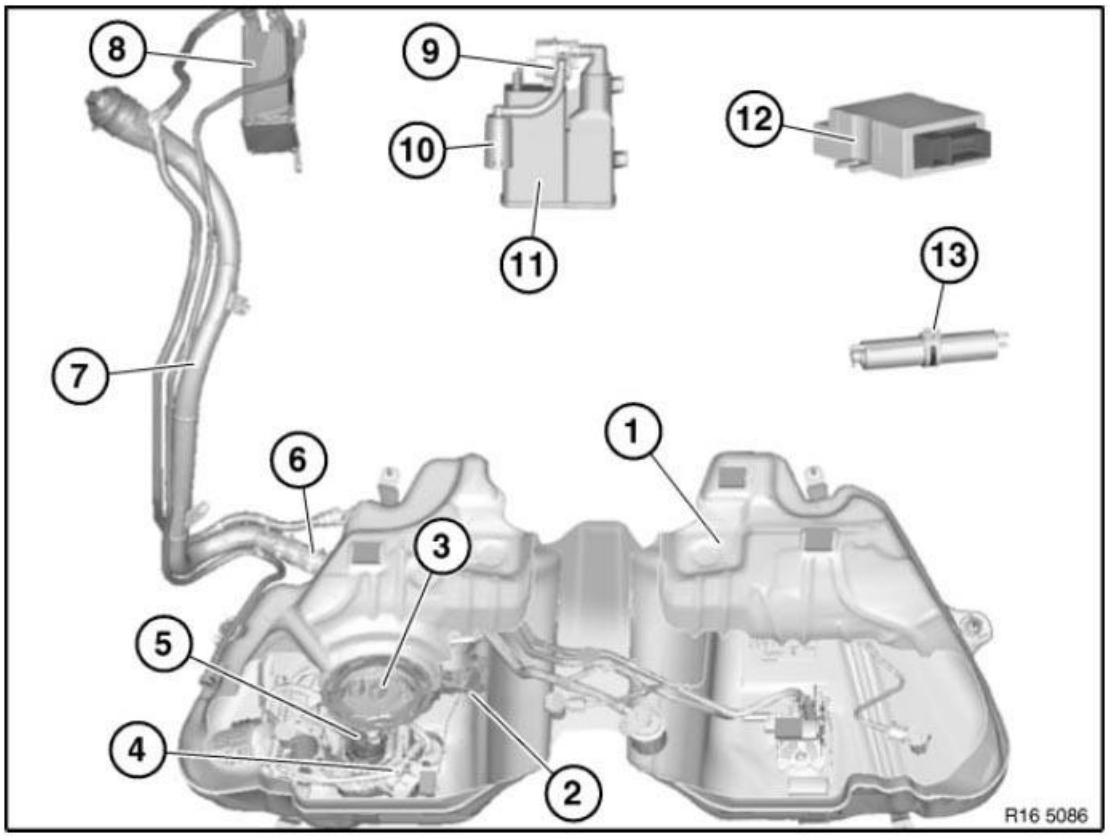
Fuel system

The fuel is delivered from the fuel tank by the fuel pump via the feed line to the high pressure pump. The fuel pump delivers more fuel than the engine requires. A return line is required.

Tank-venting system

Diesel fuel is slow-evaporating, therefore no carbon canister is required. The fuel tank is bled directly into the atmosphere.

16 00.. OVERVIEW OF FUEL SUPPLY SYSTEM



1	Fuel tank	8	Carbon canister
2	Fuel level sensor	9	Tank leak diagnosis module (US version)
3	Flange cover	10	Dust filter (US version)
4	Fuel filter with pressure regulator	11	Carbon canister (US version)
5	Fuel pump	12	Control unit for electric fuel pump
6	Filling hose	13	Fuel filter (outer)
7	Fuel filler pipe		

Fig. 8: Overview Of Fuel Supply System
Courtesy of BMW OF NORTH AMERICA, INC.

FUEL TANK WITH MOUNTING

16 11 130 CHECKING FILLER CAP PRESSURE RELIEF VALVE

Set pressure regulator on special tool **16 1 171** fully in "-" direction.

Connect special tool **16 1 171** using compressed air line (1) to workshop compressed air system (8... 10 bar).

Connect pressure sensor (2) from Diagnosis and Information System.

Connect special tool **16 1 172** to quick-release coupling (3).

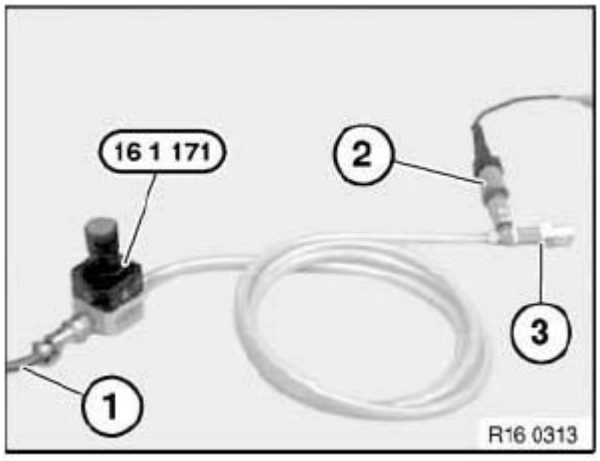


Fig. 9: Connecting Special Tool 16 1 171 To Workshop Compressed Air System Using Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Install fuel filler cap on special tool **16 1 172** .



Fig. 10: Identifying Special Tool 16 1 172
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Only the absolute pressure is indicated in the display of the Diagnosis and Information System (DIS). The current ambient air pressure is already displayed without additional pressurization.

Check testing equipment for leaks .

Select "Measurement/Pressure" function on Diagnosis and Information System (DIS).

Using pressure regulator on special tool **16 1 171** , increase pressure by 0.2 bar.

Using special tool **13 3 010** clamp off feed line from special tool **16 1 171** .

Read off and note down pressure.

Wait 60 seconds.

Read off pressure again and compare with starting pressure value.

Measurement evaluation:

Pressure drop > 0.012 bar	Test equipment leaking. Check connection points for leaks.

Check fuel filler cap pressure relief valve!

Select "Measurement/Pressure" function on Diagnosis and Information System (DIS).

Using pressure regulator on special tool **16 1 171** , increase pressure by 0.3 bar.

Using special tool **13 3 010** clamp off feed line from special tool **16 1 171** .

Read off and note down pressure.

Wait 60 seconds.

Read off pressure value again and compare with starting pressure value.

Measurement evaluation:

Pressure drop > 0.012 bar	Filler cap pressure relief valve faulty. Replace filler cap.

16 11 060 REMOVING AND INSTALLING OR REPLACING FUEL FILLER PIPE

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

Before starting the engine for the first time:

- **Fill fuel tank with at least 5 liters of fuel.**
- **Check ground connection at fuel filler neck to body for continuity. If necessary, clean contact surface between body and fuel filler pipe screw connection.**

Necessary preliminary tasks:

- Draw off **FUEL** from fuel tank
- Remove **REAR RIGHT WHEEL ARCH TRIM**

Unhook retaining strap (1) from tank flap.

Open cap and set to one side.

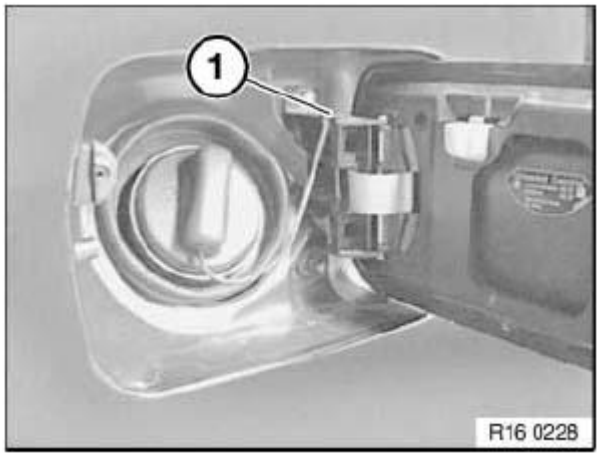


Fig. 11: Identifying Tank Flap Retaining Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Release plastic nut (1).

Installation:

Check plastic nut (1), replace if necessary.

Tightening torque: see 2AZ in **16 12 FUEL DELIVERY**

Unclip line holder (2).

Release hexagon nut (3).

Installation:

Tightening torque: see 2AZ in **16 12 FUEL DELIVERY**

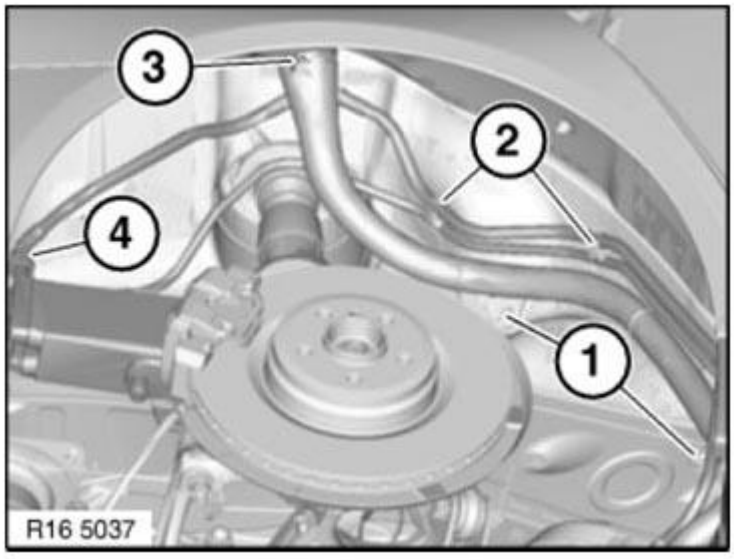


Fig. 12: Identifying Quick-Release Coupling, Line, Line Holder And Hexagon Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release quick-release coupling (4).

Unclip line (1).

Installation:

Make sure lines (1) and (2) are correctly seated in holder.

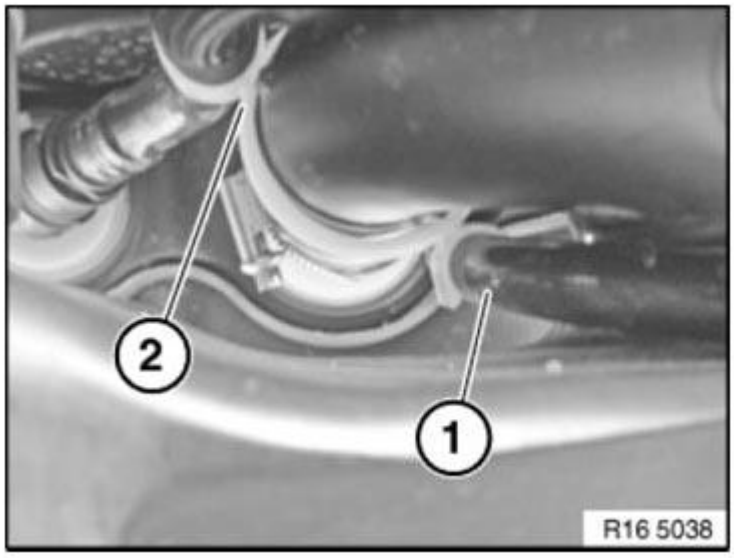


Fig. 13: Identifying Fuel Filler Pipe Lines
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There may be residual amounts of fuel in the tank! Catch escaping fuel in a suitable container.

Unfasten hose clip (1).

Installation:

Check hose clamp, replace if necessary.

Tightening torque: see 1AZ in **16 12 FUEL DELIVERY**

Release quick-release coupling (2).

Remove fuel filler pipe.

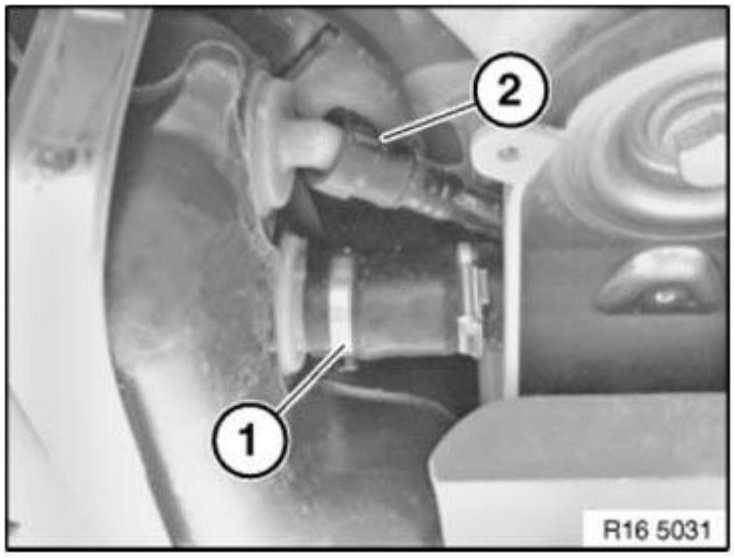


Fig. 14: Identifying Quick-Release Coupling And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Unfasten hose clip (1).

Installation:

Check hose clamp, replace if necessary.

Tightening torque: see 1AZ in **16 12 FUEL DELIVERY**

Detach filler hose (2) from fuel filler pipe (3).

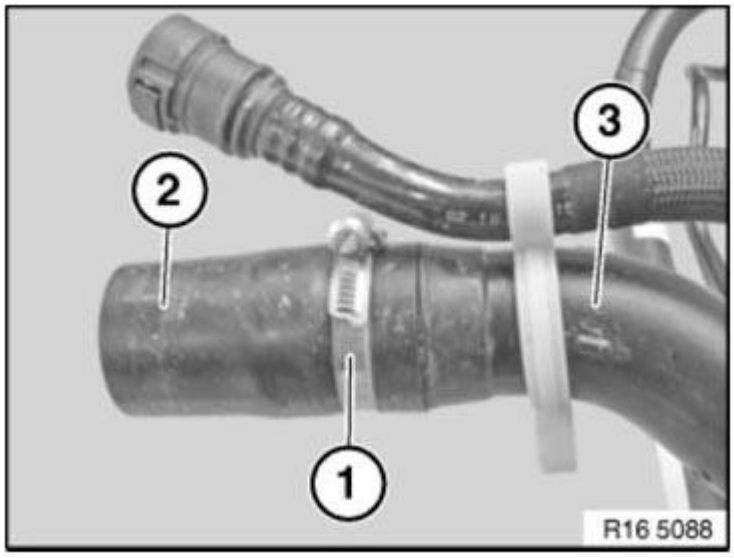


Fig. 15: Identifying Filler Hose, Fuel Filler Pipe And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

16 11 048 REMOVING AND INSTALLING/REPLACING FUEL FILTER WITH PRESSURE REGULATOR

Recycling

Fuel escapes when fuel lines are detached.

Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

Ensure absolute cleanliness when working on the open fuel system. Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks:

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:** Remove right **REAR SEAT**
- **REMOVE FLANGE COVER**

- Remove **FUEL PUMP**

NOTE: Picture does not show the fuel tank outer skin.

Unclip grounding cable (1) and feed out of holders.

Disconnect fuel line (2).

Press pressure regulator together at tabs (4) and detach in upward direction.

Unlock fuel filter (3) and pull out.

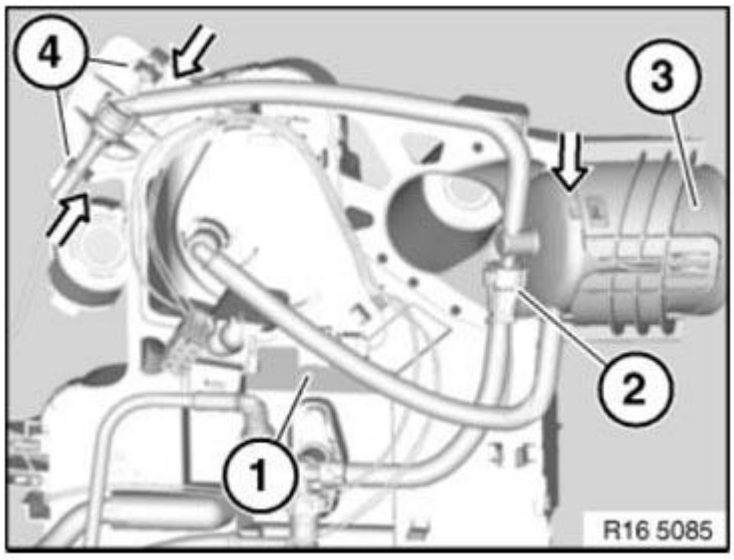


Fig. 16: Identifying Fuel Line, Filter, Tabs And Grounding Cable
Courtesy of BMW OF NORTH AMERICA, INC.

16 11 030 REMOVING AND INSTALLING/REPLACING FUEL TANK

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

IMPORTANT: Ensure adequate ventilation in the workbay!

Avoid skin contact (wear gloves)!

After installation of fuel tank/prior to first engine start-up:

- **Check earth connection at fuel filler neck to body for continuity. If necessary, clean contact surface between body and fuel filler pipe screw connection.**
- **Fill fuel tank with at least 5 liters of fuel.**

Necessary preliminary tasks:

- Draw off **FUEL** from fuel tank
- Remove **REAR SEAT**
- **Vehicles with comfort seat:** Remove right **REAR SEAT**
- Remove rear right **WHEEL ARCH PANEL**
- Remove **PROPELLER SHAFT**
- Remove **COMPRESSION STRUT** on left and right

For F02 rear air conditioners:

- Remove refrigerant lines

Remove sound insulation (1).

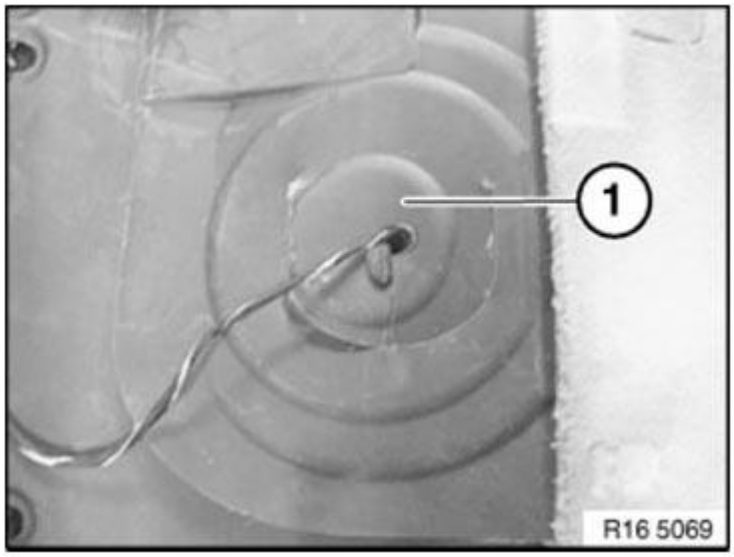


Fig. 17: Identifying Sound Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Remove cover for sensor opening (2).

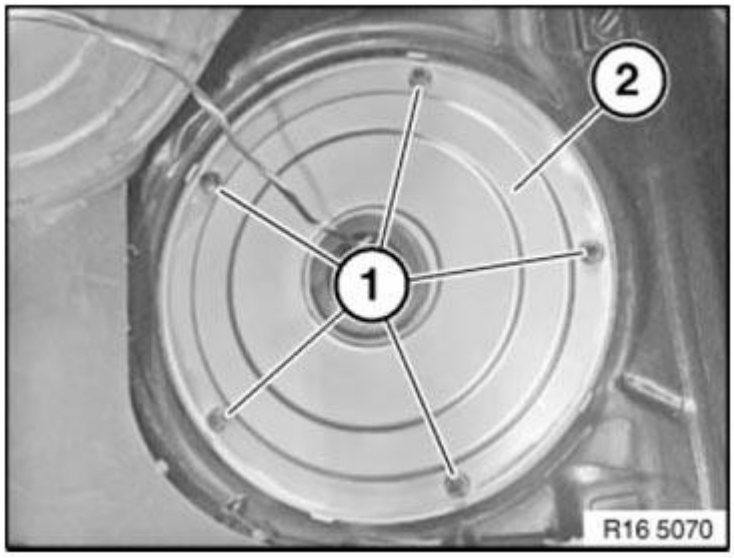


Fig. 18: Identifying Sensor Opening And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect fuel line (2).

If necessary, disconnect fuel line for auxiliary heating.

Installation note:

Check gasket (3), replace if necessary.

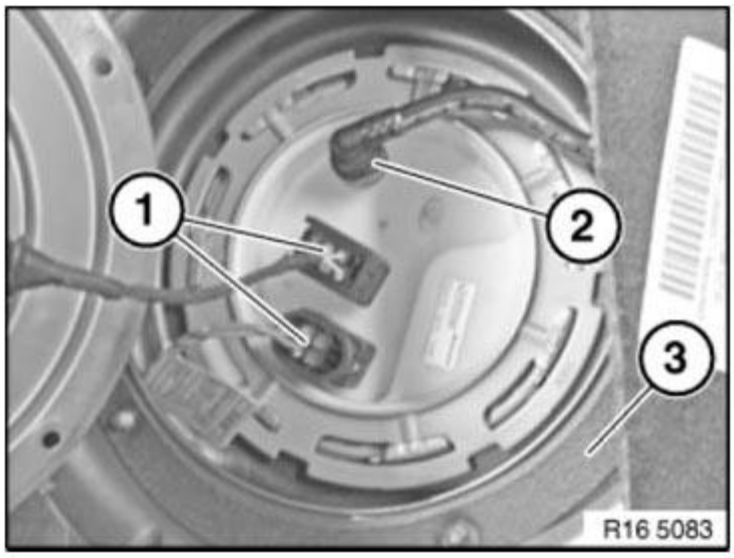


Fig. 19: Identifying Gasket, Fuel Line And Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Vehicles with outer fuel filter (S1AKA):

Disconnect plug connection (1).

Disconnect fuel lines (2).

Installation note:

Check gasket (3), replace if necessary.

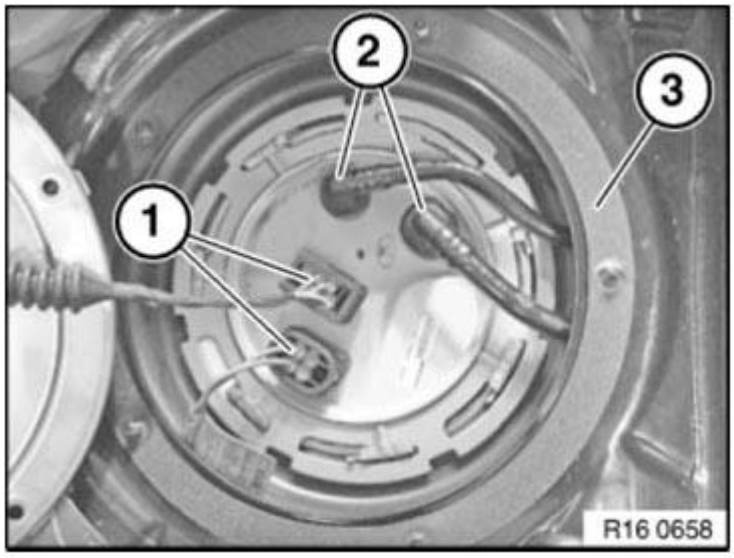


Fig. 20: Identifying Gasket, Fuel Line And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release plastic nuts (1).

Installation note:

Check plastic nuts (1), replace if necessary.

Tightening torque: see 2AZ in **16 12 FUEL DELIVERY**

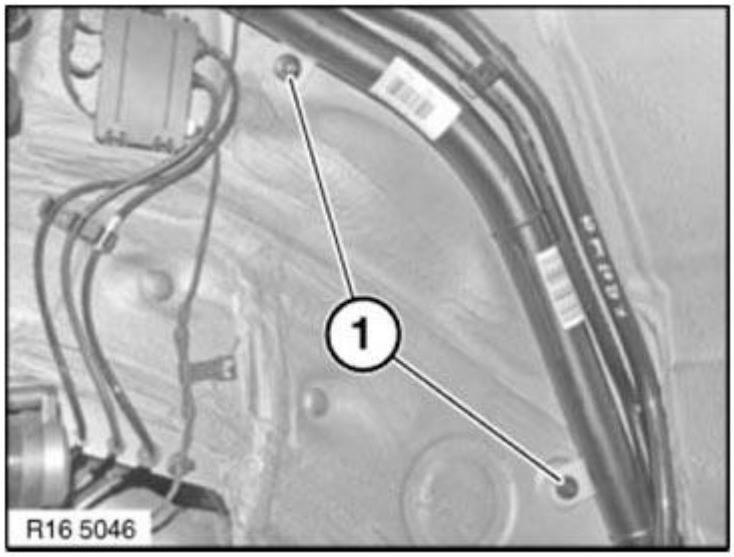


Fig. 21: Identifying Fuel Tank Plastic Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There may be residual amounts of fuel in the fuel tank. Catch escaping fuel in a suitable collecting vessel.

Unfasten hose clamp (1).

Installation note:

Check hose clamp (1), replace if necessary.

Tightening torque: see 1AZ in **16 12 FUEL DELIVERY**

Release quick-release coupling (2). Detach line.

Detach fuel filler pipe.

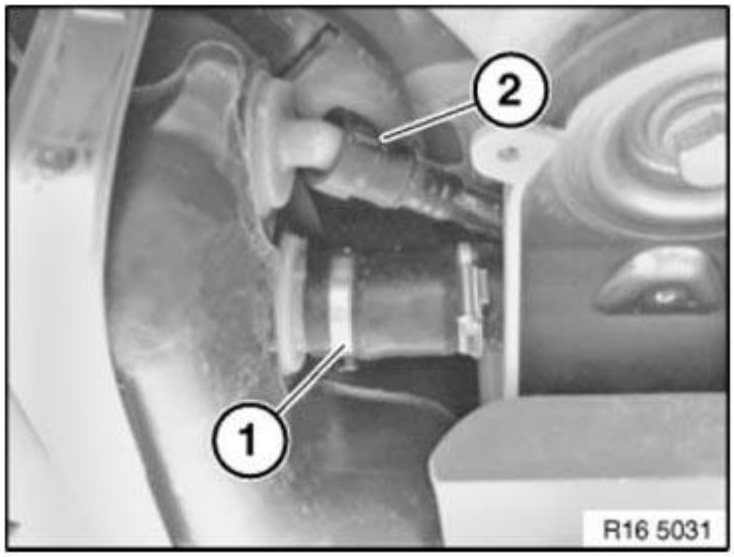


Fig. 22: Identifying Quick-Release Coupling And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure lines (1) and (2) are correctly seated in bracket.

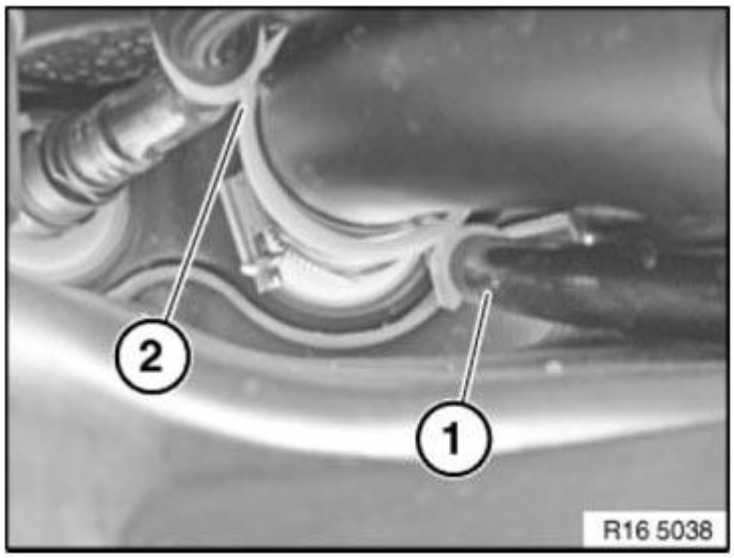


Fig. 23: Identifying Fuel Filler Pipe Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation note:

Tightening torque: see 1AZ in **16 11 FUEL TANK AND MOUNTING PARTS**

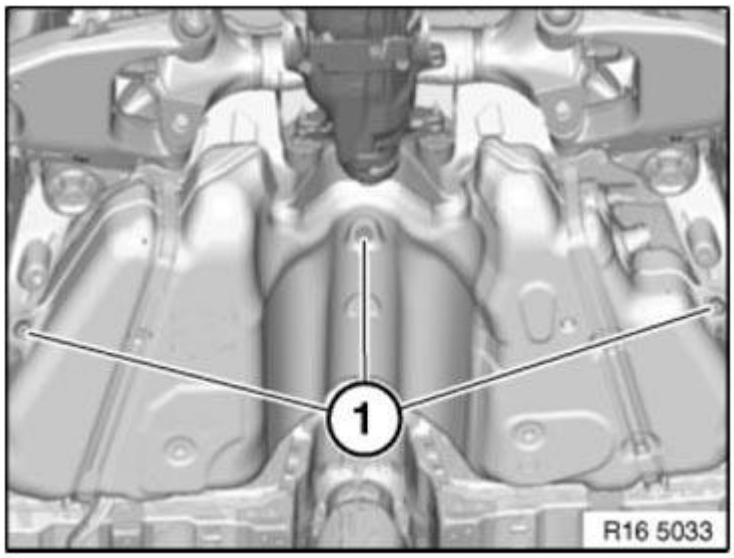


Fig. 24: Identifying Fuel Tank Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Secure fuel tank against slipping and falling out.

Heavily support the fuel tank.

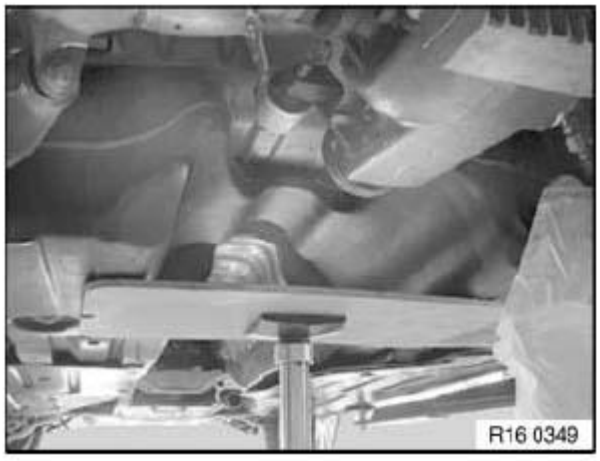


Fig. 25: Identifying Fuel Tank In Supported Position
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation note:

Tightening torque: see 2AZ in **16 11 FUEL TANK AND MOUNTING PARTS**

Lower fuel tank.

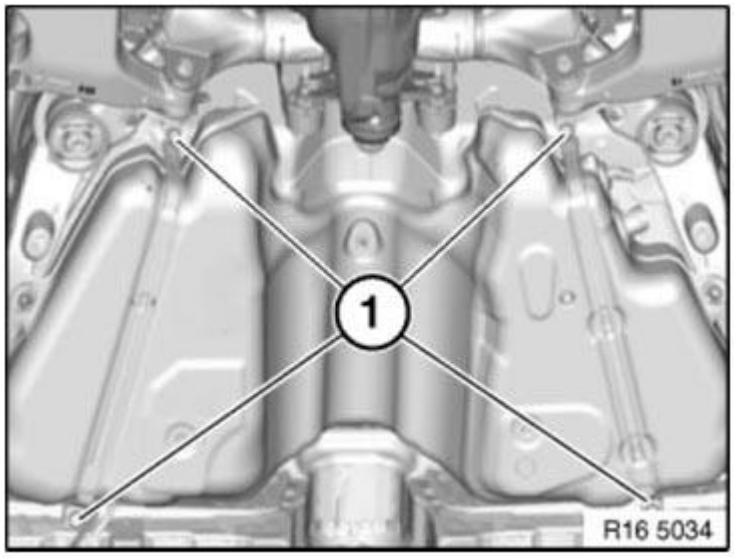


Fig. 26: Identifying Fuel Tank Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, disconnect fuel line for independent heating.

Remove fuel tank.

Replacement

- Remove flange cover. See **FLANGE COVER (OUTER FUEL FILTER)** and **FLANGE COVER**.
- Convert fuel pump. See **FUEL PUMP (OUTER FUEL FILTER)** and **FUEL PUMP**.
- Convert pressure regulator. See **PRESSURE REGULATOR (OUTER FUEL FILTER)** and **FUEL FILTER WITH PRESSURE REGULATOR**.
- Convert **FUEL LEVEL SENSOR**

16 11 030 REMOVING AND INSTALLING/REPLACING FUEL TANK FILLER HOSE

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

After installation of fuel tank/prior to first engine start-up:

- **Check ground connection at fuel filler neck to body for continuity. If necessary, clean contact surface between body and fuel filler pipe screw connection.**
- **Fill fuel tank with at least 5 liters of fuel.**

Necessary preliminary tasks:

- Draw off **FUEL** from fuel tank
- Remove rear right **WHEEL ARCH TRIM**

Release plastic nuts (1).

Installation:

Check plastic nuts (1), replace if necessary.

Tightening torque: see 2AZ in **16 12 FUEL DELIVERY**

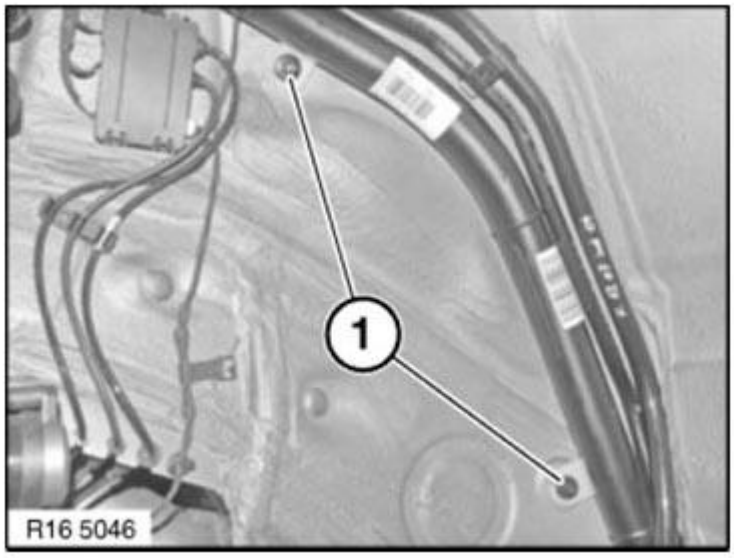


Fig. 27: Identifying Fuel Tank Plastic Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There may be residual amounts of fuel in the tank.
Catch escaping fuel in a suitable container.

Unfasten hose clip (2).

Installation:

Check hose clamp (2), replace if necessary.

Tightening torque: see 1AZ in **16 12 FUEL DELIVERY**

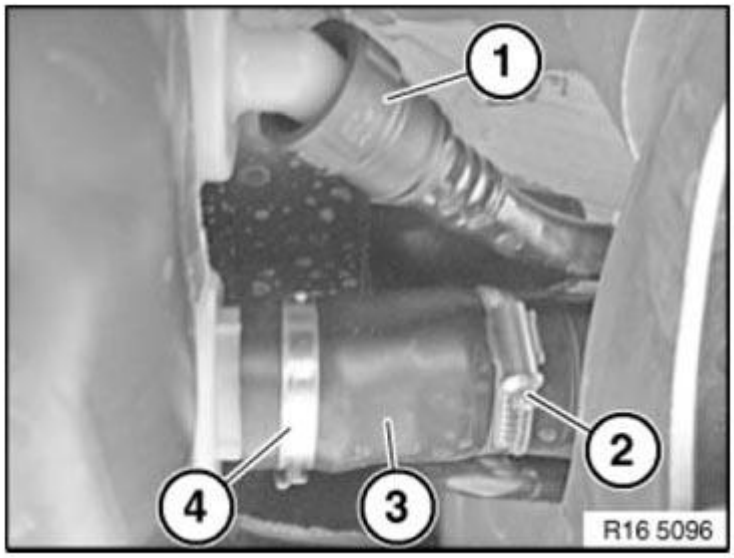


Fig. 28: Identifying Quick-Release Coupling, Filler Hose, Hose Clamp And Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Release quick-release coupling (1).

Detach fuel filler pipe from filler hose (3).

Release hose clamp (4) and remove filler hose (3).

Installation:

Check hose clamp (4), replace if necessary.

Tightening torque: see 1AZ in **16 12 FUEL DELIVERY**

Installation:

Make sure lines (1) and (2) are correctly seated in holder.

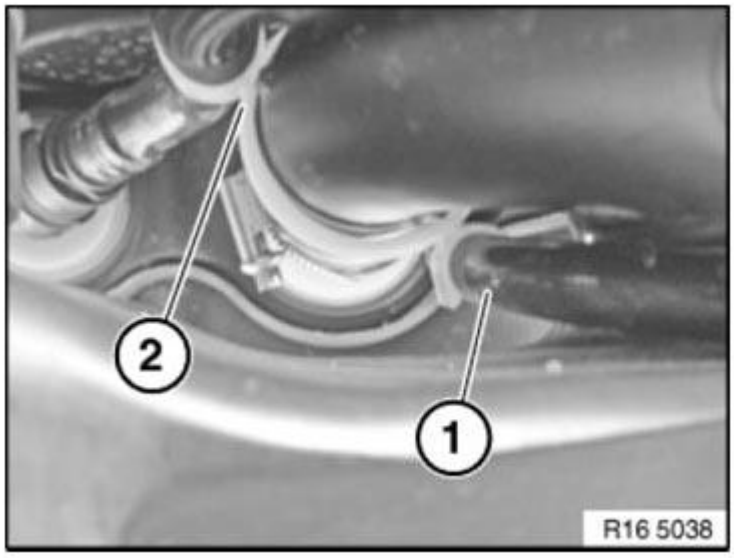


Fig. 29: Identifying Fuel Filler Pipe Lines
Courtesy of BMW OF NORTH AMERICA, INC.

16 11 350 REPLACING CLAMPING BANDS FOR FUEL TANK

Necessary preliminary tasks:

- F03: Remove underbody panelling

IMPORTANT: Secure fuel tank against slipping and falling out.

Generously support the fuel tank.

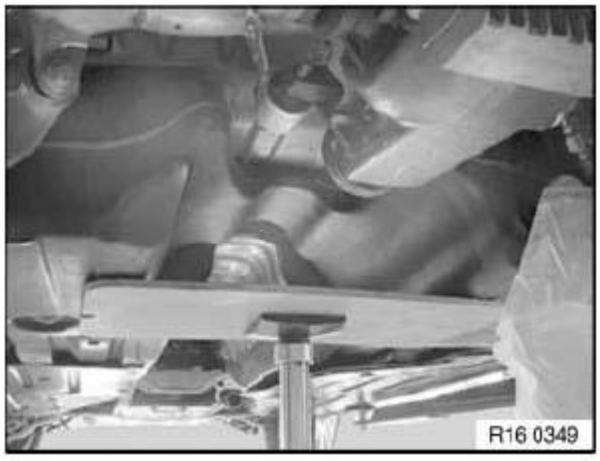


Fig. 30: Identifying Fuel Tank In Supported Position
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Tightening torque: see 2AZ in **16 11 FUEL TANK AND MOUNTING PARTS**

Remove tightening strap (2).

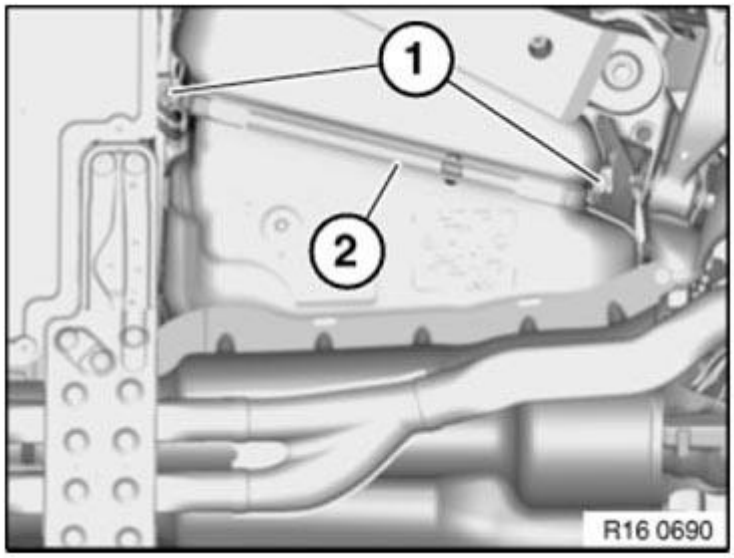


Fig. 31: Identifying Fuel Tank Tightening Strap And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

FUEL DELIVERY, SENSOR FOR DISPLAY

16 12 010 REMOVING AND INSTALLING OR REPLACING CARBON CANISTER

Necessary preliminary tasks:

- Remove rear right **WHEEL ARCH COVER**

Unlock quick-release fasteners (1) and disconnect vent lines.

Release screws (2) and swing out carbon canister (3).

Installation:

Tightening torque: see 1AZ in **16 13 TANK VENTILATION**

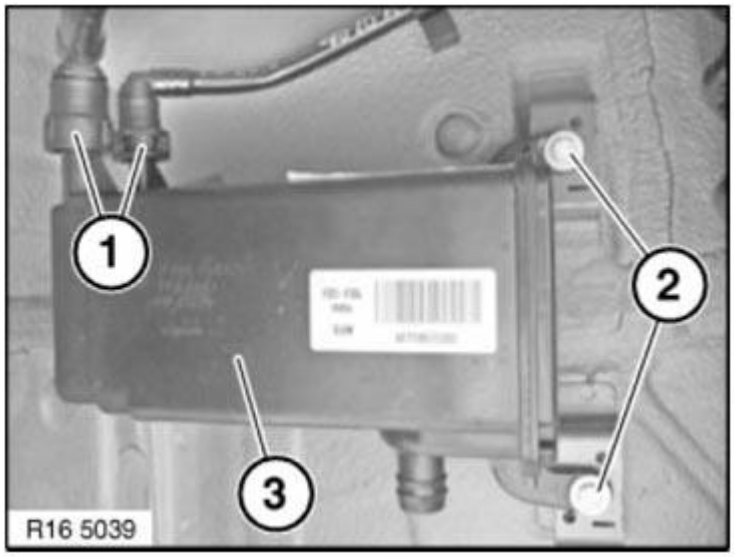


Fig. 32: Identifying Carbon Canister, Quick-Release Fasteners And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

16 12 060 REMOVING AND INSTALLING/REPLACING CARBON CANISTER (US VERSION NVLD)

Necessary preliminary tasks:

- Remove rear right **WHEEL ARCH PANEL**

Unlock snap fasteners (1) and remove tank ventilation lines.

Disconnect plug connection (2).

Release screws (3) and swing out carbon canister.

Installation note:

Tightening torque: see 1AZ in **16 13 TANK VENTILATION**

The following components must be modified when the carbon canister is replaced:

- **DUST FILTER NVLD**
- **PRESSURE SWITCH NVLD**

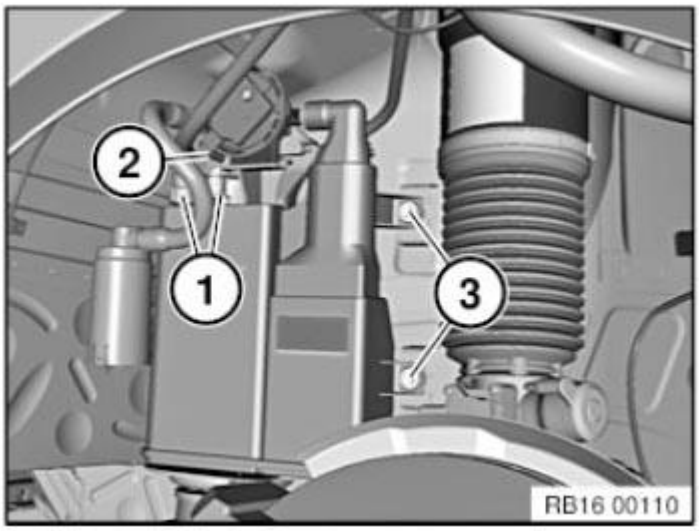


Fig. 33: Identifying Snap Fasteners, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

16 12 010 REMOVING AND INSTALLING/REPLACING CARBON CANISTER (US VERSION)

Necessary preliminary tasks:

- Remove rear right **WHEEL ARCH COVER**

Disconnect plug connection (1).

Unlock quick-release fasteners (2) and disconnect vent lines.

Release screws (3) and swing out carbon canister (4).

Installation:

Tightening torque: see 1AZ in **16 13 TANK VENTILATION**

The following components must be modified when the carbon canister is replaced:

- **DUST FILTER**
- **DIAGNOSIS MODULE**

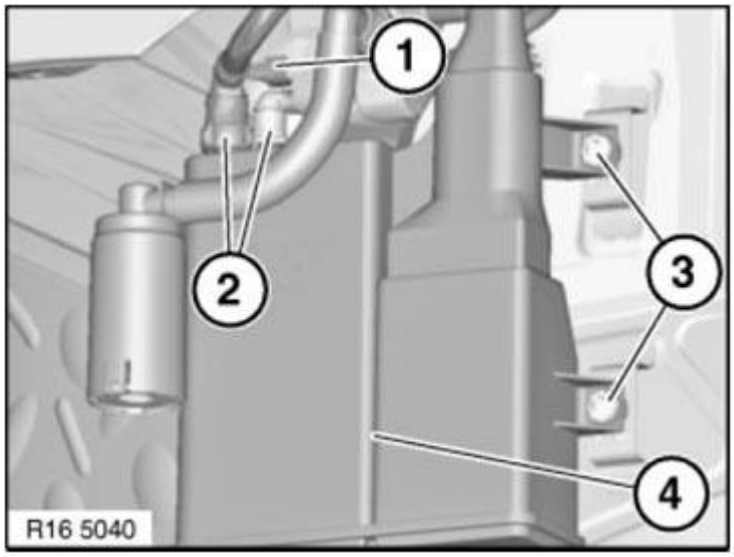


Fig. 34: Identifying Carbon Canister, Quick-Release Fasteners, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

16 12 000 REMOVING AND INSTALLING/REPLACING SENSOR FOR FUEL GAUGE

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

IMPORTANT: Ensure adequate ventilation in the workbay!
Avoid skin contact (wear gloves)!
Ensure absolute cleanliness when performing repair work on the open fuel system. Dirt contamination in the fuel tank may impair driving or may even result in vehicle breakdown.

Necessary preliminary tasks:

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat: REMOVE RIGHT REAR SEAT**
- Remove flange cover. See **FLANGE COVER (OUTER FUEL FILTER)** and **FLANGE COVER**.

NOTE: Picture does not show the fuel tank outer skin.

Unclamp connecting line for level sensor (2) through sensor opening (1).

Disconnect plug connector for level sensor (3) from plug connector installation unit on left (4).

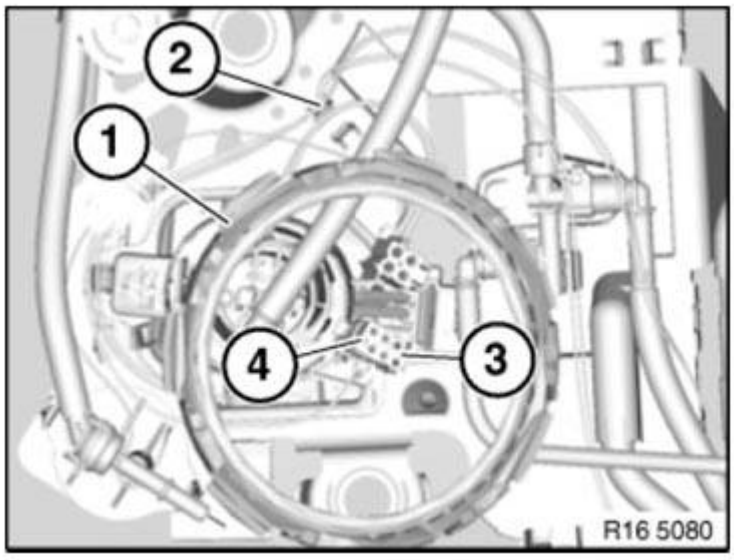


Fig. 35: Identifying Level Sensor And Sensor Opening
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture does not show the fuel tank outer skin.

Unlock tab (3) in upward direction through sensor opening (1) and lift out level sensor (2) in direction of arrow.

Installation note:

Level sensor (2) must audibly snap into place.

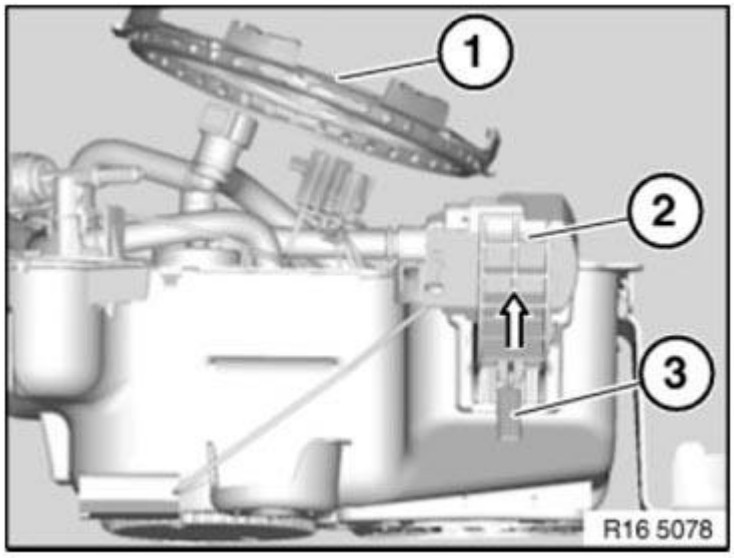


Fig. 36: Identifying Level Sensor, Sensor Opening And Tab

Courtesy of BMW OF NORTH AMERICA, INC.

16 12.. REPLACING OUTER FUEL FILTER

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid contact with skin!

Avoid contact with eyes!

Fuel escapes when fuel lines are detached.

Have a collecting container ready.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Remove left **UNDERBODY PANELLING**

IMPORTANT: Fuel in fuel lines is under pressure

Fuel escapes when fuel lines (1) are disconnected!

Catch and dispose of escaping fuel.

Disconnect fuel lines (1).

Release screw (2).

Remove fuel filter (3).

Installation:

After completing tasks, check fuel system for leaks.

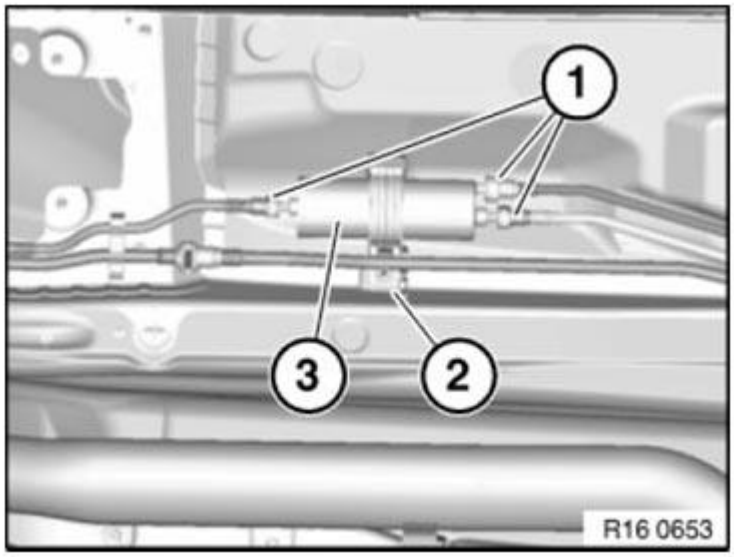


Fig. 37: Identifying Fuel Filter, Lines And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

FUEL DEAERATION

16 13 521 REMOVING AND INSTALLING/REPLACING PRESSURE SWITCH FOR NATURAL VACUUM LEAK DETECTION (NVLD)

Necessary preliminary tasks:

- Remove **CARBON CANISTER**.
- Remove **DUST FILTER**.

Unlock and disconnect snap fastener (1).

Unfasten screws (2).

Pull off pressure switch (3) in direction of arrow.

Installation note:

Check gaskets and replace if necessary.

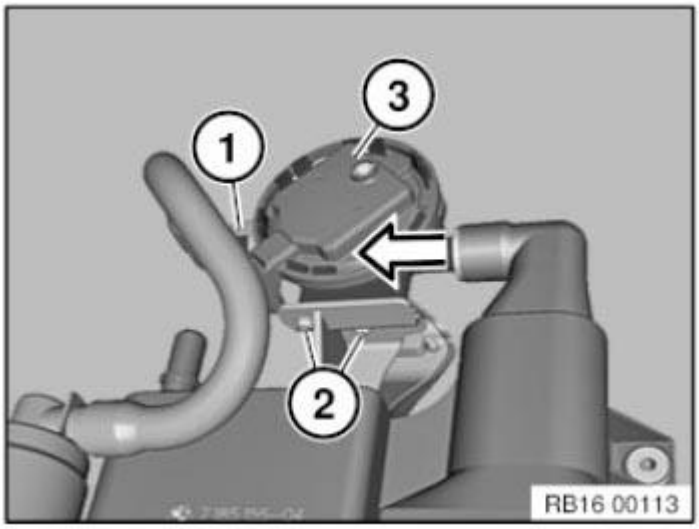


Fig. 38: Identifying Pressure Switch, Snap Fastener And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

16 13 015 REMOVING AND INSTALLING/REPLACING TANK LEAK DIAGNOSIS MODULE (VEHICLES WITH US DMTL VERSION)

Necessary preliminary tasks:

- Remove **CARBON CANISTER**

Unlock and disconnect snap fastener (1).

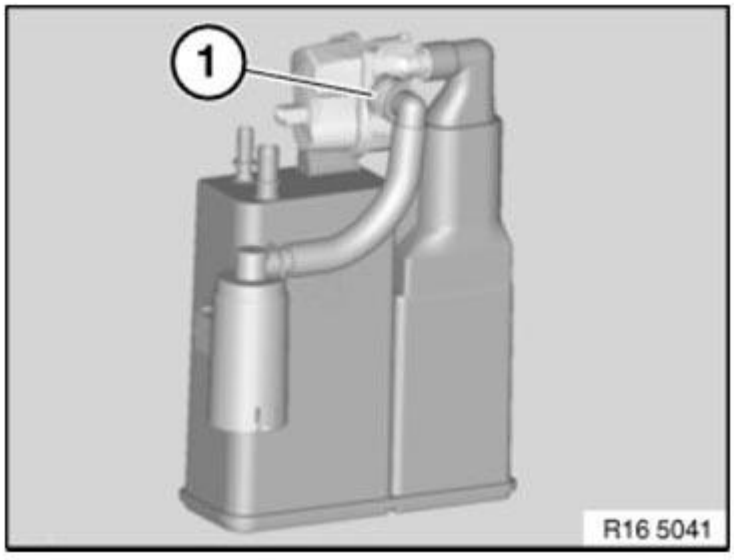


Fig. 39: Identifying Snap Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove diagnosis module (2).

Installation note:

Replace gasket (3).

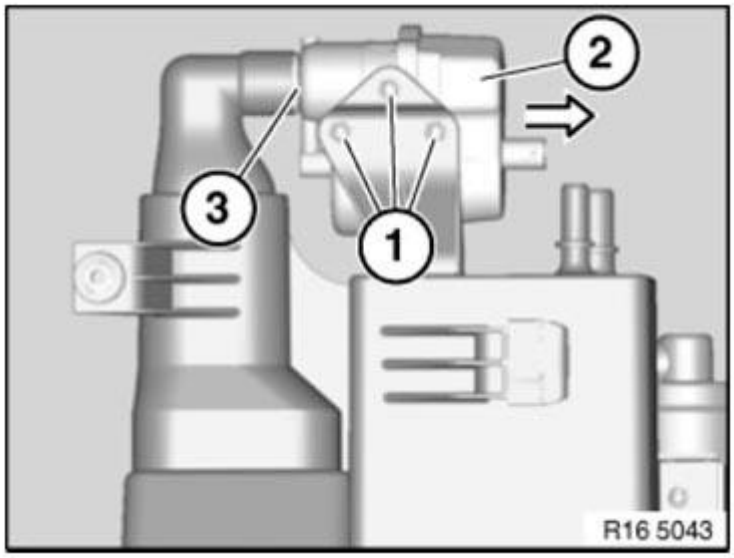


Fig. 40: Identifying Diagnosis Module, Gasket And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

16 13 522 REMOVING AND INSTALLING/REPLACING TEMPERATURE SENSOR FOR NATURAL VACUUM LEAK DETECTION (NVLD)

Only unclip seat bench (1) as shown on the left and right and fold up in direction of arrow.

Secure seat bench on front seat (2).

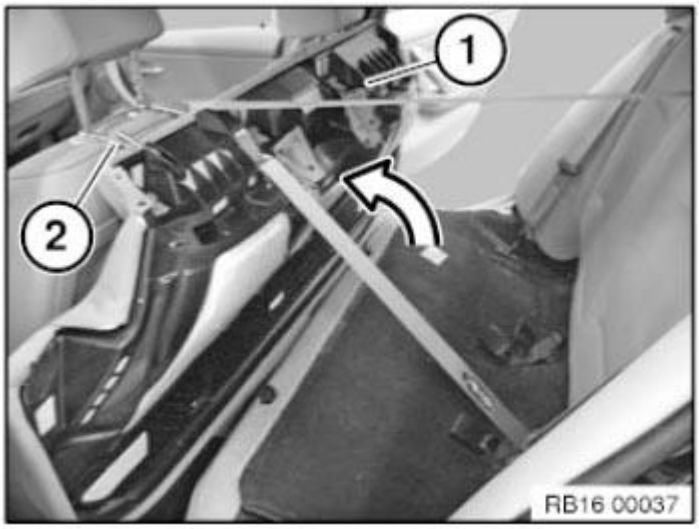


Fig. 41: Folding Seat Bench On Front Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Fold both floor trim panels (1) to the side.

Unscrew nuts (2).

Remove cover for service opening (3).

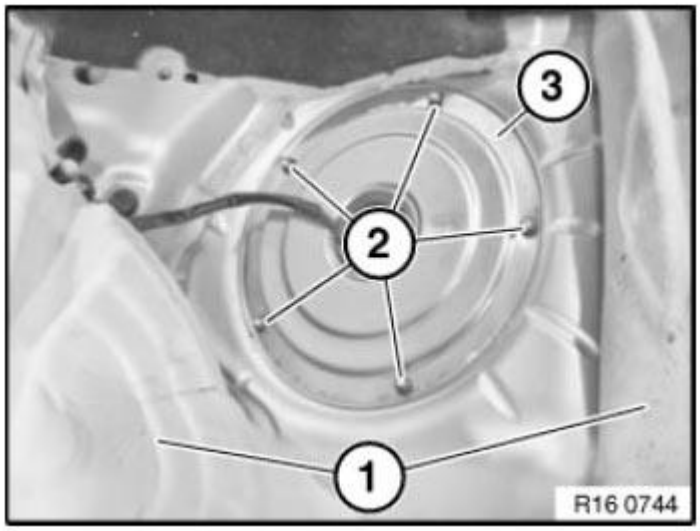


Fig. 42: Identifying Floor Trim Panels, Service Opening And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Carefully press tab (2) in direction of arrow.

Feed out temperature sensor (3) towards top.

Installation note:

Make sure latch mechanism of temperature sensor on flange cover is correct.

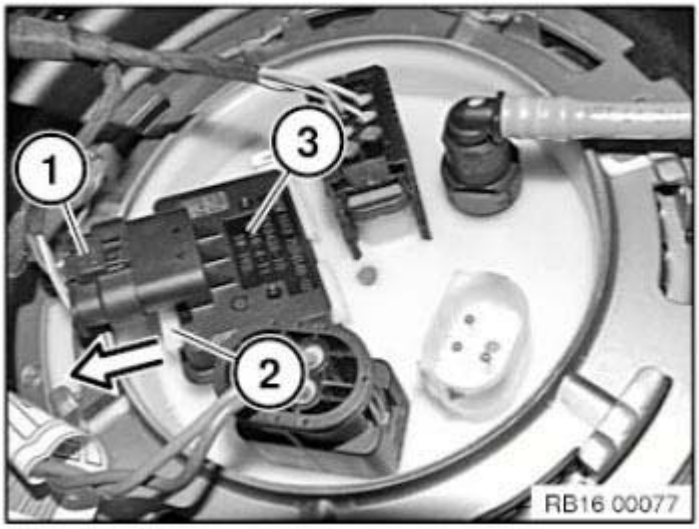


Fig. 43: Identifying Temperature Sensor, Plug Connection And Tab
Courtesy of BMW OF NORTH AMERICA, INC.

FUEL PUMP

16 14 500 REMOVING AND INSTALLING OR REPLACING CONTROL UNIT FOR ELECTRIC FUEL PUMP

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection).

Necessary preliminary tasks:

- Remove **STORAGE COMPARTMENT** in luggage compartment

Disconnect plug connection (1).

Unfasten screws (2).

Remove control unit (3).

Installation:

Tightening torque: see 1AZ in **16 14 FUEL PUMP**

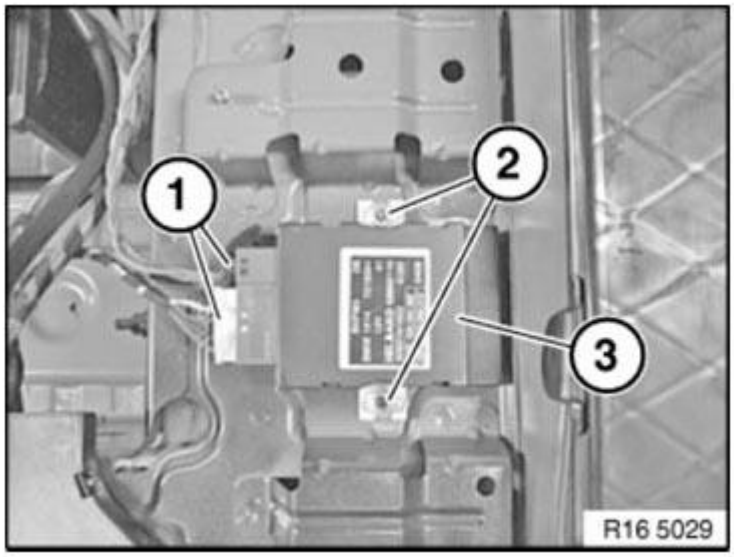


Fig. 44: Identifying Control Unit, Plug Connection and Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out programming/encoding

16 14 200 REMOVING AND INSTALLING OR REPLACING FUEL PUMP

Recycling

Fuel escapes when fuel lines are detached. Have a suitable collecting vessel ready.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

IMPORTANT: Ensure adequate ventilation in the workbay!

Avoid skin contact (wear gloves)!

Ensure absolute cleanliness when performing repair work on the open fuel system. Dirt contamination in the fuel tank may impair driving or may even result in vehicle breakdown.

Necessary preliminary tasks:

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**

- **Vehicles with comfort seat: REMOVE RIGHT REAR SEAT**
- **REMOVE FLANGE COVER**

NOTE: Picture does not show the fuel tank outer skin.

Disconnect earth cable (1).

Disconnect fuel lines (2).

Release lock (4) and remove pump body cover (3).

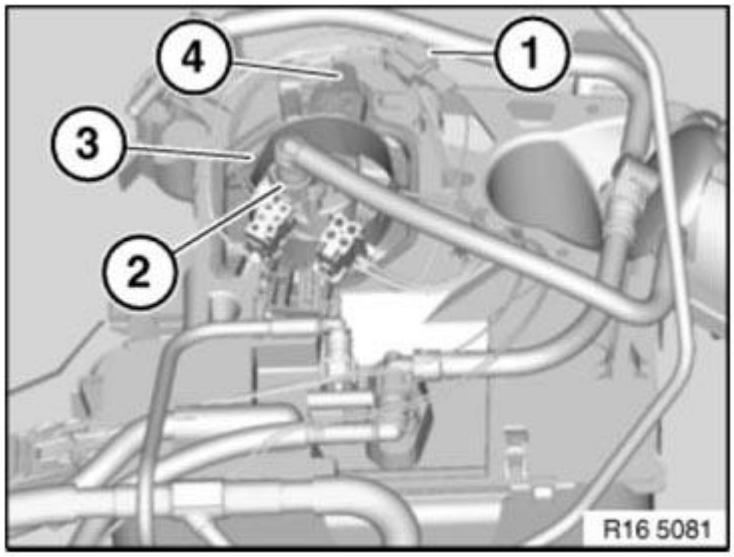


Fig. 45: Identifying Pump Body Cover, Fuel Lines, Earth Cable And Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Release lock (1) and remove fuel pump (2) towards top.

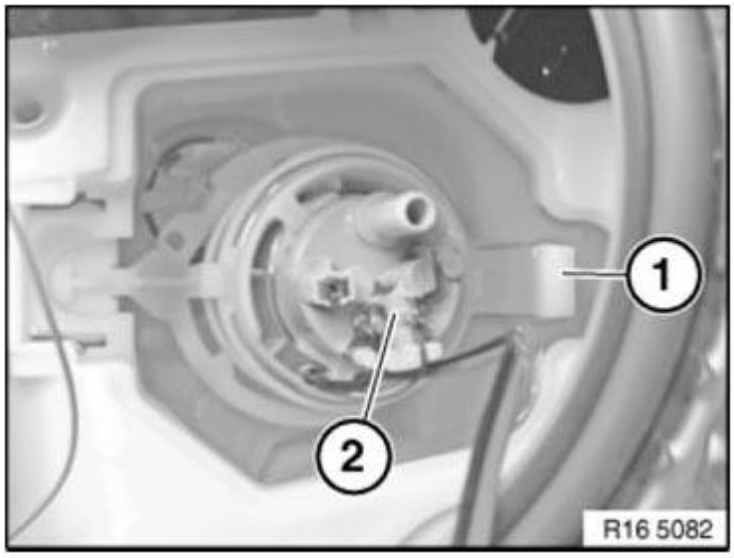


Fig. 46: Identifying Lock And Fuel Pump
Courtesy of BMW OF NORTH AMERICA, INC.

16 14 065 REMOVING AND INSTALLING/REPLACING DUST FILTER FOR NATURAL VACUUM LEAK DETECTION (NVLD)

Necessary preliminary tasks:

- Remove **CARBON CANISTER**.

Unlock and disconnect snap fastener (1).

Release screw (2) and remove dust filter (3).

Installation note:

Check gasket and replace if necessary.

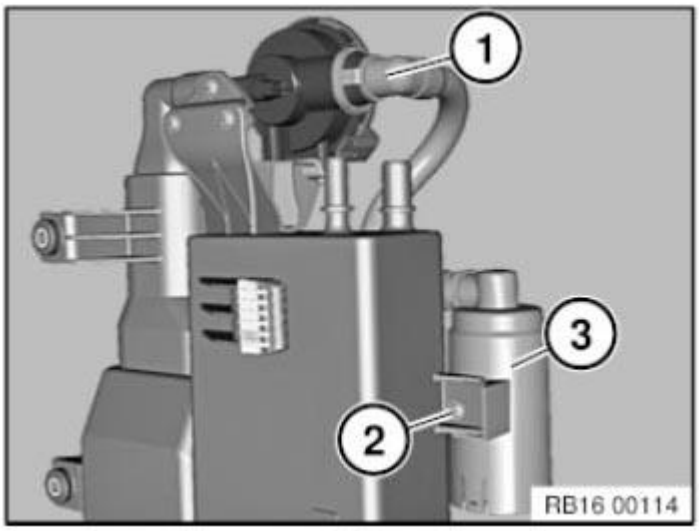


Fig. 47: Identifying Dust Filter, Snap Fastener And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

16 14 060 REMOVING AND INSTALLING/REPLACING DUST FILTER FOR TANK LEAK DIAGNOSIS MODULE (DMTL)

Necessary preliminary tasks:

- Remove **CARBON CANISTER**

Unlock and disconnect snap fastener (1).

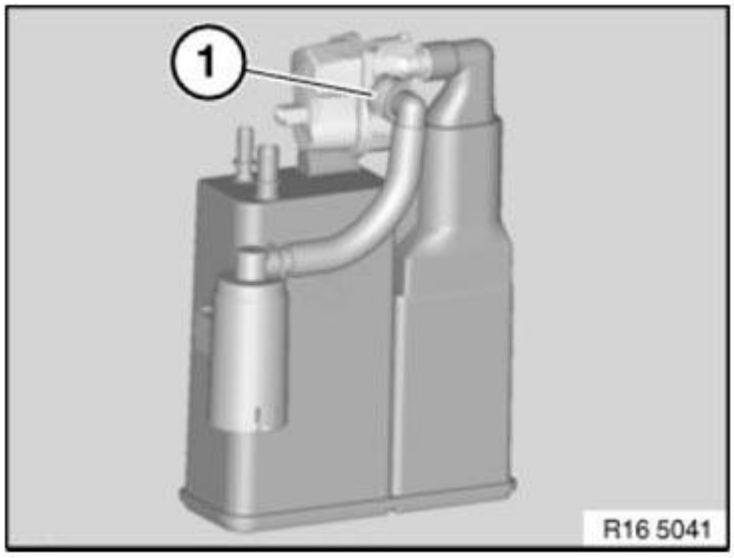


Fig. 48: Identifying Snap Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove dust filter (2).

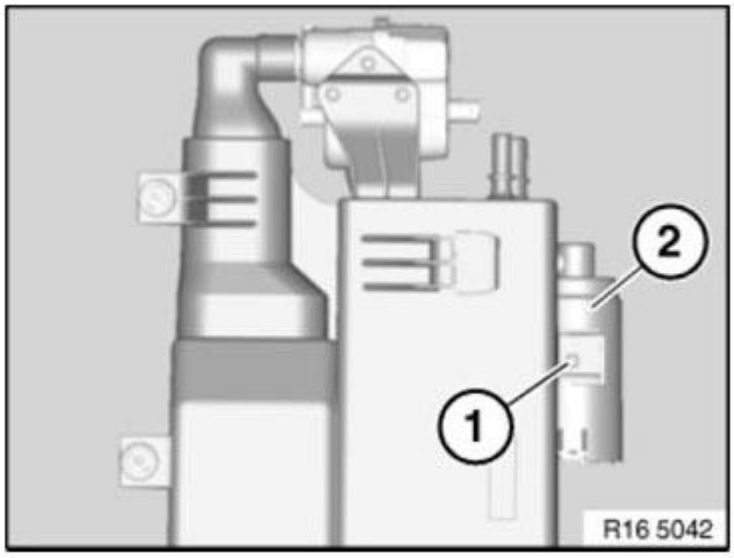


Fig. 49: Identifying Dust Filter And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

16 14... REMOVING AND INSTALLING/REPLACING FILTER CARTRIDGE FOR TANK LEAK DIAGNOSIS MODULE (DMTL)

Necessary preliminary tasks:

- Remove rear right **WHEEL ARCH TRIM**

Press lugs (1) apart slightly in direction.

Pull out filter cartridge (2) downwards.

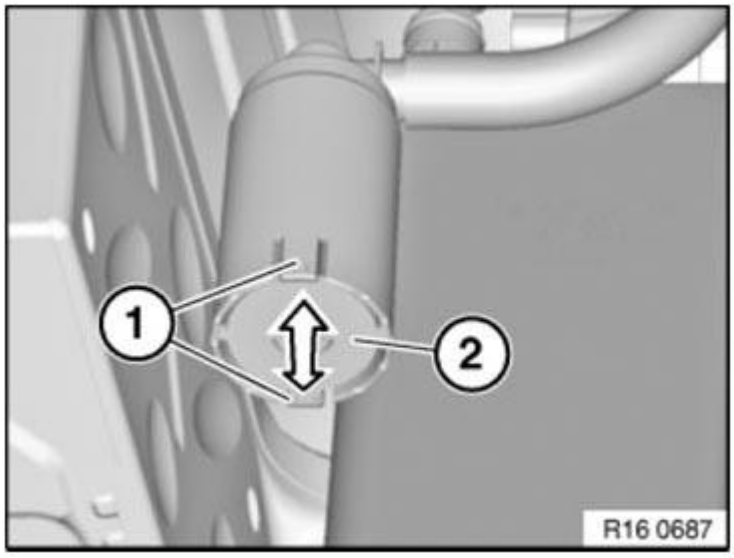


Fig. 50: Pulling Out Filter Cartridge
Courtesy of BMW OF NORTH AMERICA, INC.

16 14 200 REMOVING AND INSTALLING/REPLACING FLANGE COVER

Recycling:

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

Ensure absolute cleanliness when working on the open fuel system. Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks:

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:** Remove right **REAR SEAT**

Remove sound insulation (1).

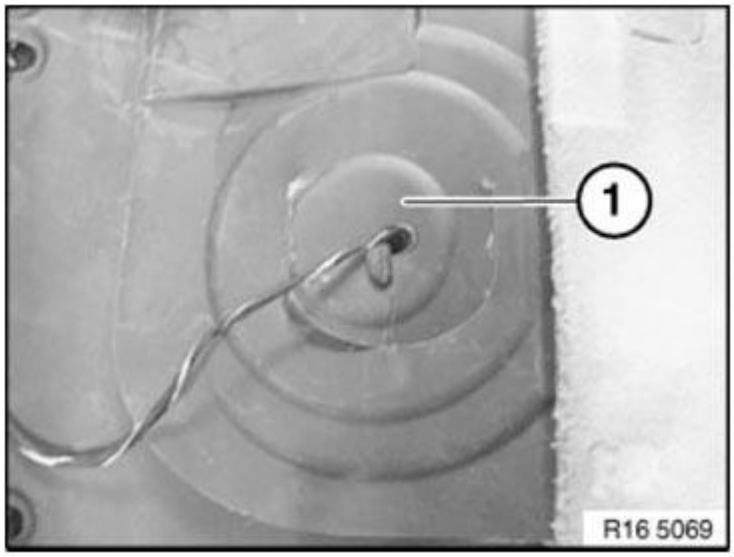


Fig. 51: Identifying Sound Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove cover for service opening (2).

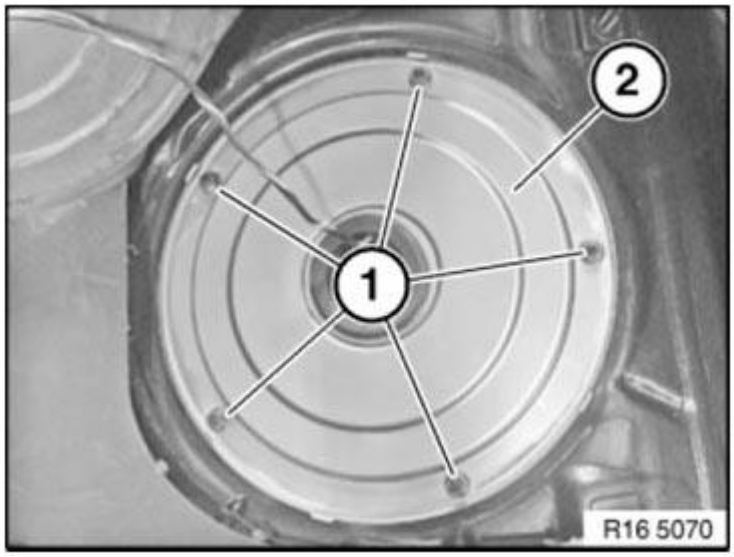


Fig. 52: Identifying Sensor Opening And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect fuel line (2).

If necessary, disconnect fuel line for independent heating.

Installation:

Check seal (3), replace if necessary.

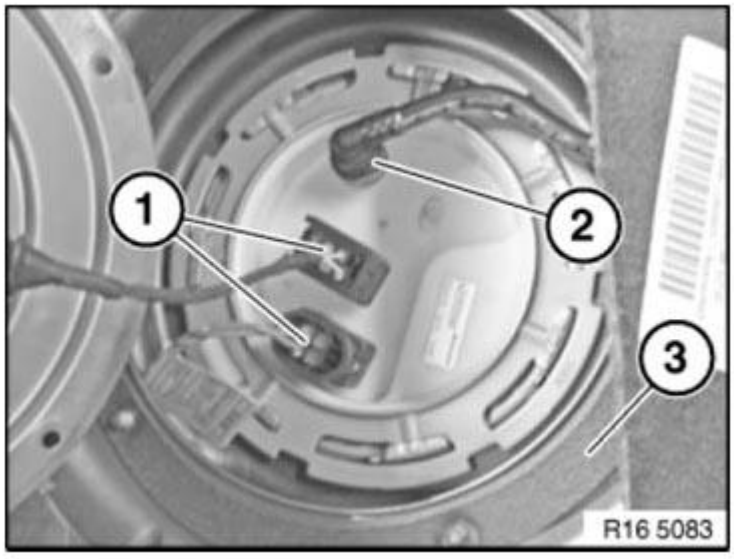


Fig. 53: Identifying Gasket, Fuel Line And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **16 1 190** with wide web (1) towards rear onto locking ring (2).

Connect special tool **33 5 070** to 1/2" reversible ratchet head (3) and position on special tool **16 1 190** .

Release locking ring (2) in counterclockwise direction.

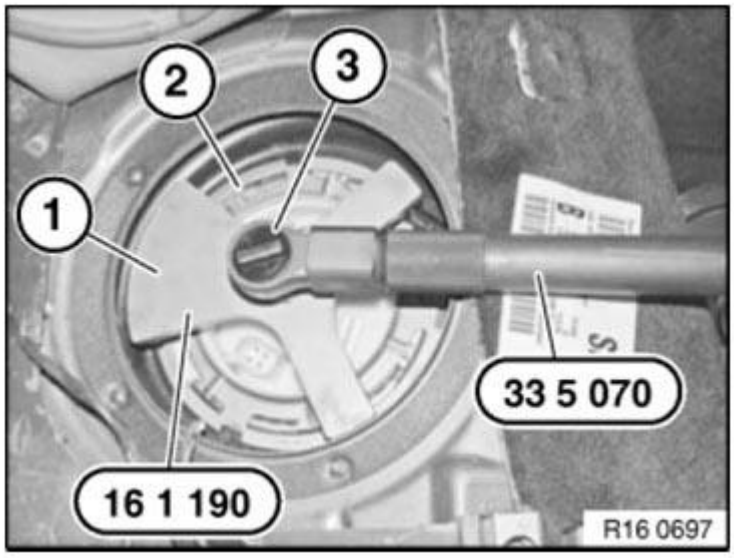


Fig. 54: Connecting Special Tool 33 5 070 To Reversible Ratchet Head And Positioning On Special Tool 16 1 190
Courtesy of BMW OF NORTH AMERICA, INC.

Lift off flange cover (1).

Disconnect plug connections (2).

Disconnect fuel line (3).

Installation:

Replace sealing ring (4).

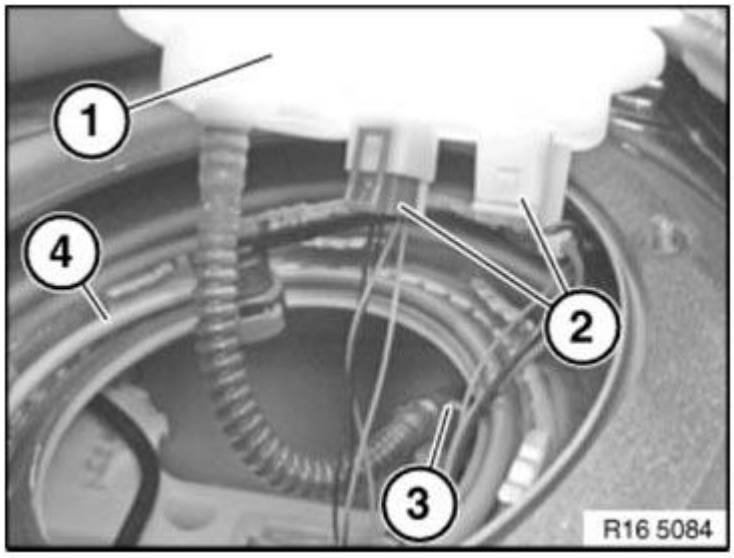


Fig. 55: Identifying Flange Cover, Fuel Line, Plug Connections And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

16 14 200 REMOVING AND INSTALLING/REPLACING FLANGE COVER (OUTER FUEL FILTER)

Recycling:

Fuel escapes when fuel lines are detached.

Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

Ensure absolute cleanliness when working on the open fuel system. Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks:

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:** Remove right **REAR SEAT**

Remove sound insulation (1).

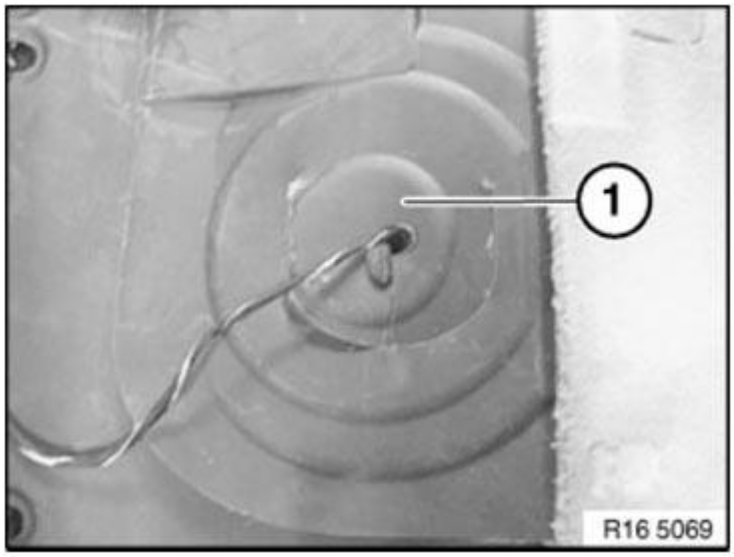


Fig. 56: Identifying Sound Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove cover for service opening (2).

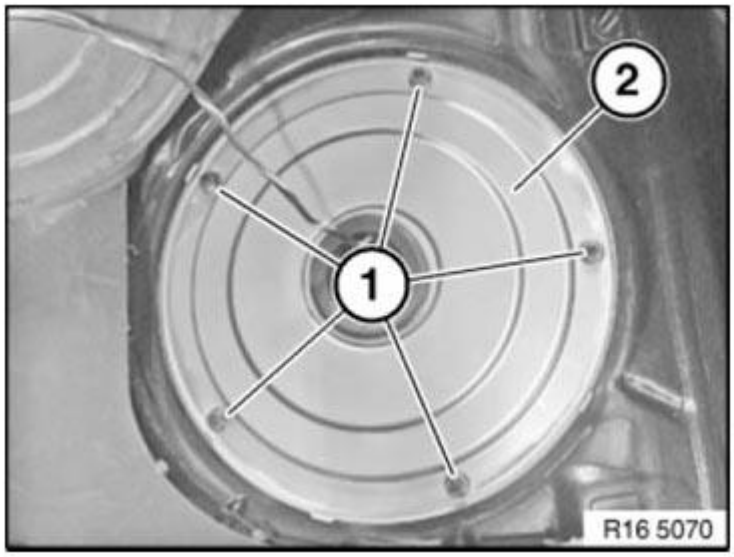


Fig. 57: Identifying Sensor Opening And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect fuel lines (2).

Installation:

Check seal (3), replace if necessary.

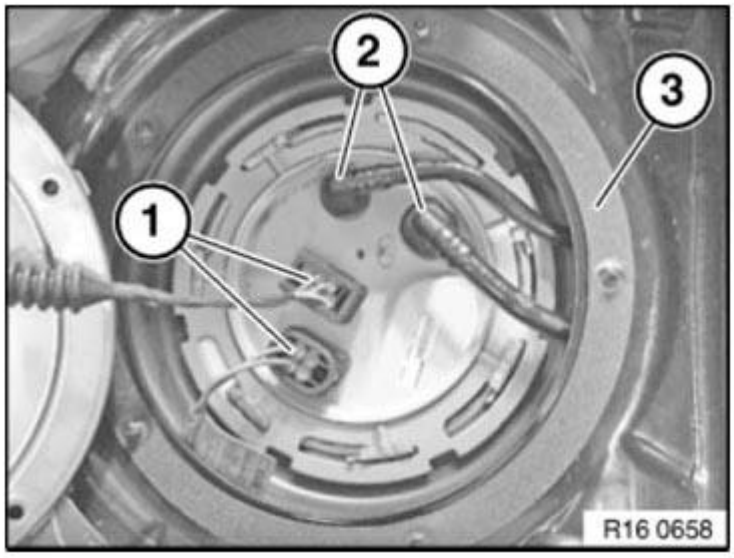


Fig. 58: Identifying Gasket, Fuel Line And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **16 1 190** with wide web (1) towards rear onto locking ring (2).

Connect special tool **33 5 070** to 1/2" reversible ratchet head (3) and position on special tool **16 1 190** .

Release locking ring (2) in counterclockwise direction.

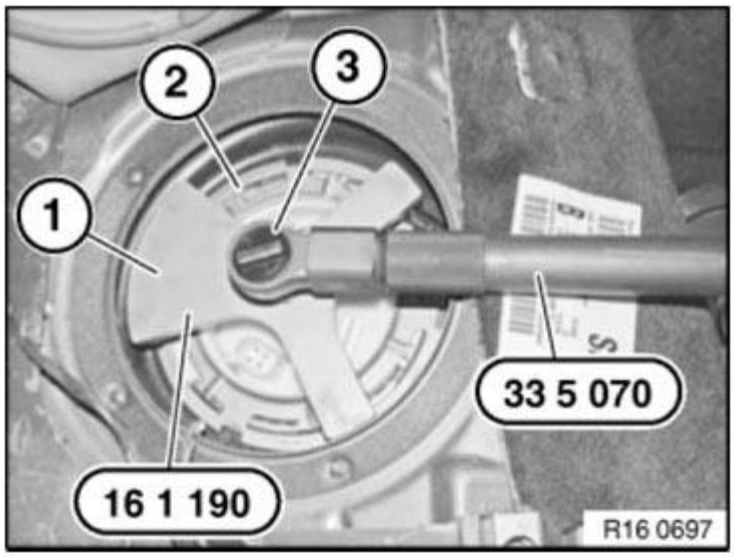


Fig. 59: Connecting Special Tool 33 5 070 To Reversible Ratchet Head And Positioning On Special Tool

16 1 190
Courtesy of BMW OF NORTH AMERICA, INC.

Lift off flange cover (3).

Release plug connection (1) and disconnect fuel lines (2) from flange cover (3).

Remove flange cover (3).

Installation:

Replace sealing ring (4).

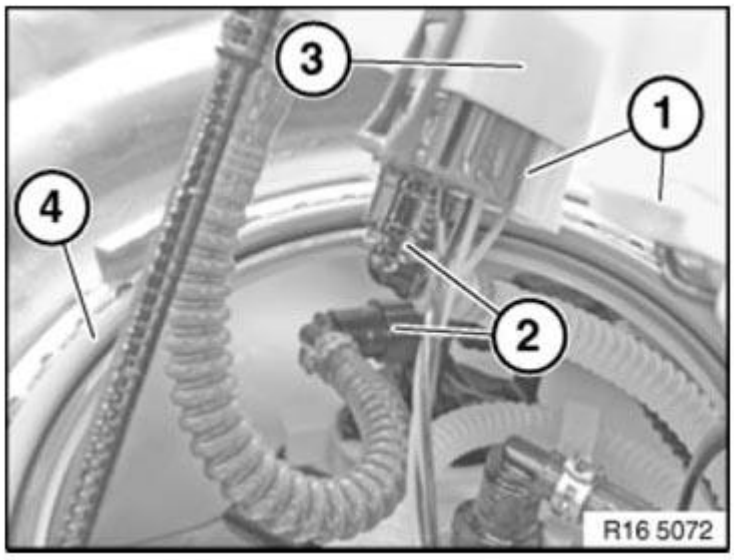


Fig. 60: Identifying Flange Cover, Fuel Line, Plug Connections And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

16 14 200 REMOVING AND INSTALLING/REPLACING FUEL PUMP (OUTER FUEL FILTER)

Recycling:

Fuel escapes when fuel lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

Ensure absolute cleanliness when working on the open fuel system. Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks:

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**
- **Vehicles with comfort seat:** Remove right **REAR SEAT**
- **REMOVE FLANGE COVER**

NOTE: Picture does not show the fuel tank outer skin.

Disconnect earth cable (1).

Disconnect fuel lines (2).

Release lock (4) and remove pump housing cover (3).

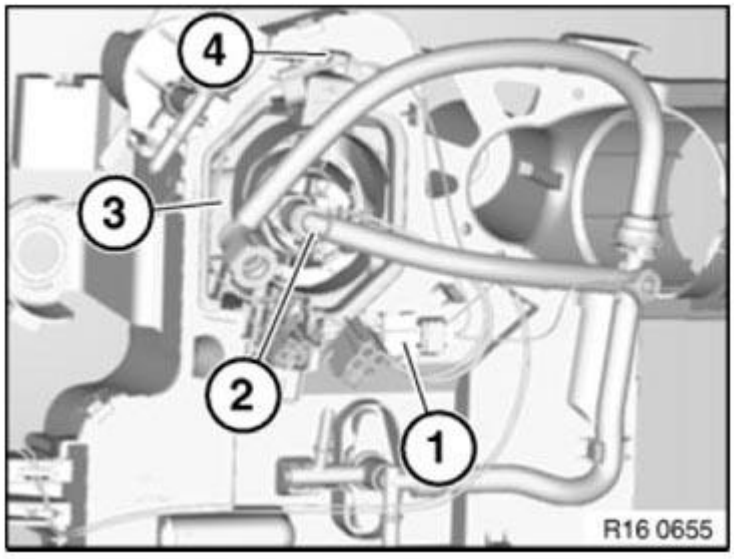


Fig. 61: Identifying Pump Housing Cover, Fuel Lines, Lock And Earth Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Release lock (1) and remove fuel pump (2) towards top.

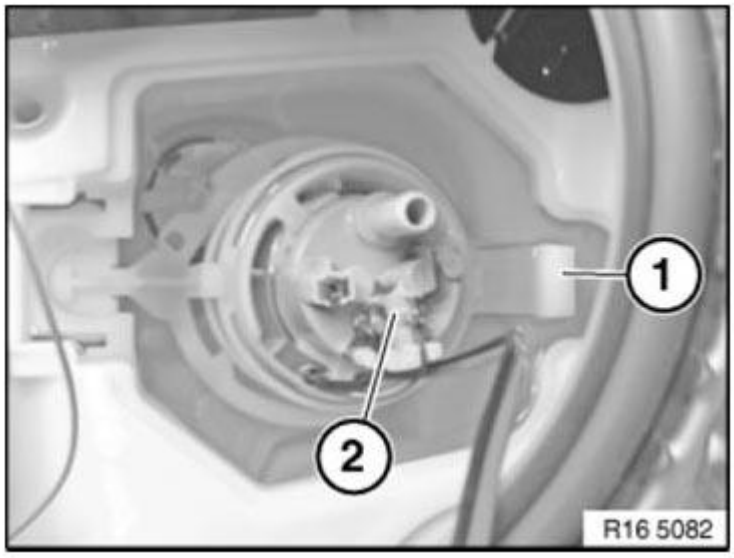


Fig. 62: Identifying Lock And Fuel Pump
Courtesy of BMW OF NORTH AMERICA, INC.

16 14 220 REMOVING AND INSTALLING/REPLACING PRESSURE REGULATOR (OUTER FUEL FILTER)

Recycling:

Fuel escapes when fuel lines are detached.

Have a suitable collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!

Avoid skin contact (wear gloves)!

Ensure absolute cleanliness when working on the open fuel system. Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks:

- **DRAW OFF FUEL**
- **REMOVE REAR SEAT**

- Remove **FLANGE COVER**

NOTE: Picture does not show the fuel tank outer skin.
Press pressure regulator (2) together at tabs (3) and detach in upward direction.

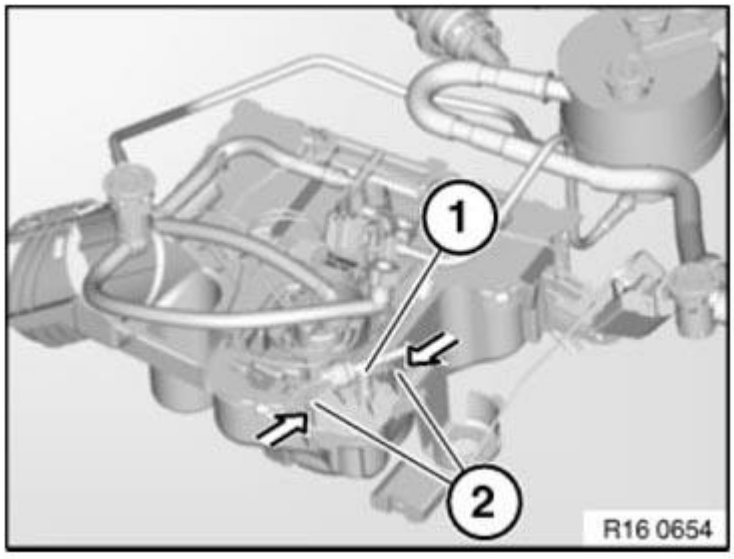


Fig. 63: Pressing Pressure Regulator Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug on lock (1) and detach grounding cable (3) from pressure regulator (2).

Installation:

IMPORTANT: Check by pulling locking of grounding cable plug.
Observe cable routing (3) at pressure regulator.

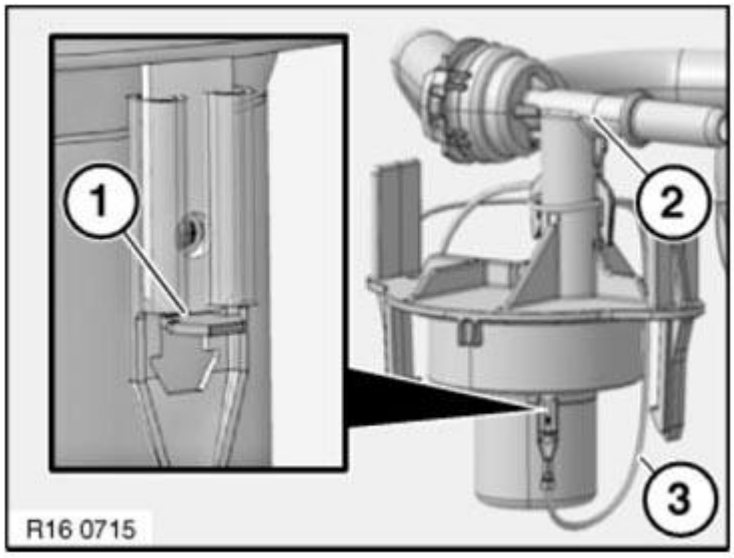


Fig. 64: Identifying Lock, Grounding Cable And Pressure Regulator
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE

Engine

ENGINE, GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

ENGINE IDENTIFICATION

Engine number at the marked surface.

Replacement drives are already assigned a number containing the identification and engine number at the factory.

The old drive number must be imprinted for replacement crankcases.

Magnesium crank cases feature a label, the engine number does not need to be embossed.

M47/M47TU/M47T2

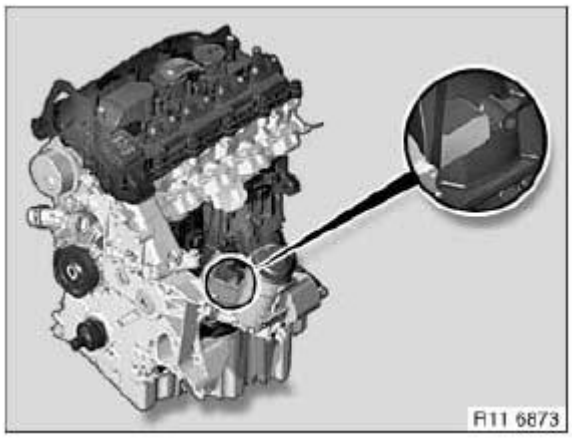


Fig. 1: Identifying Engine Identification Label (M47/M47TU/M47T2)
Courtesy of BMW OF NORTH AMERICA, INC.

M57/M57TU/M57T2

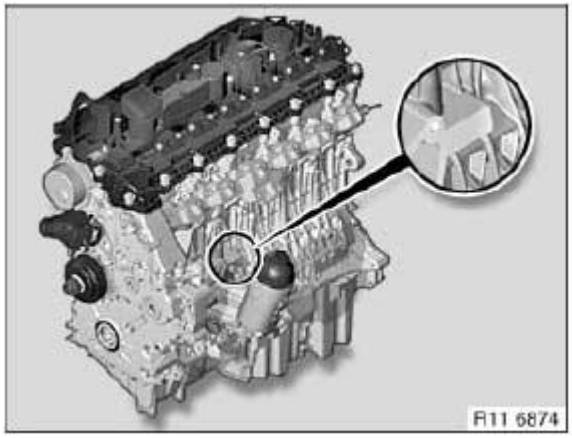


Fig. 2: Identifying Engine Identification Label (M57/M57TU/M57T2)
Courtesy of BMW OF NORTH AMERICA, INC.

M67/M67TU

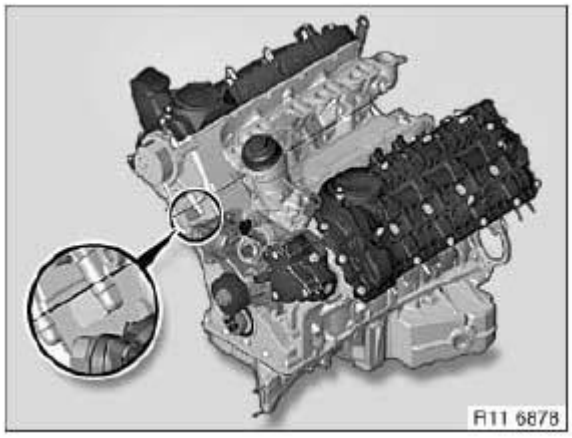


Fig. 3: Identifying Engine Identification Label (M67/M67TU)
Courtesy of BMW OF NORTH AMERICA, INC.

N47/N47S/N47C/N47T/N57/N57S/N57T

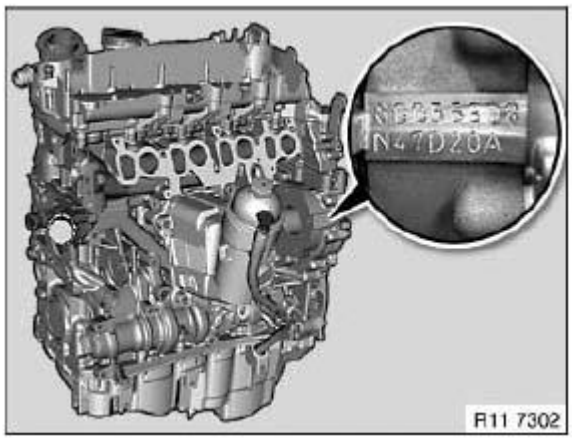


Fig. 4: Identifying Engine Identification Label (N47/N47S/N47C/N47T/N57/N57S/N57T)
Courtesy of BMW OF NORTH AMERICA, INC.

M52/M52TU

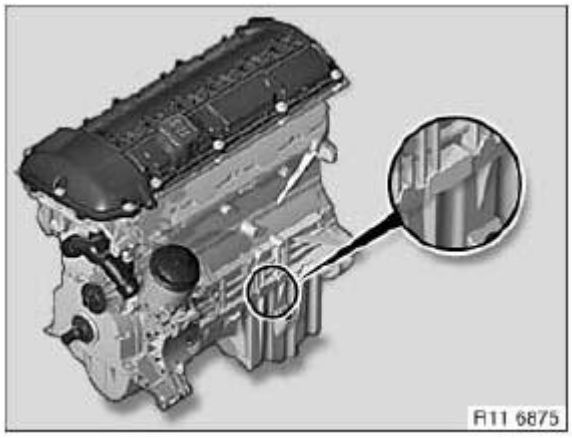


Fig. 5: Identifying Engine Identification Label (M52/M52TU)
Courtesy of BMW OF NORTH AMERICA, INC.

M54

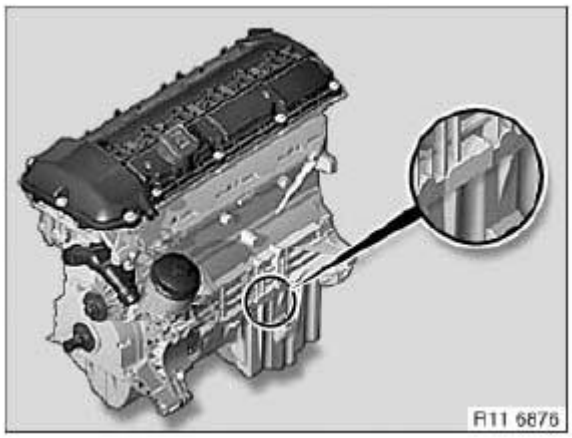


Fig. 6: Identifying Engine Identification Label (M54)
Courtesy of BMW OF NORTH AMERICA, INC.

M56

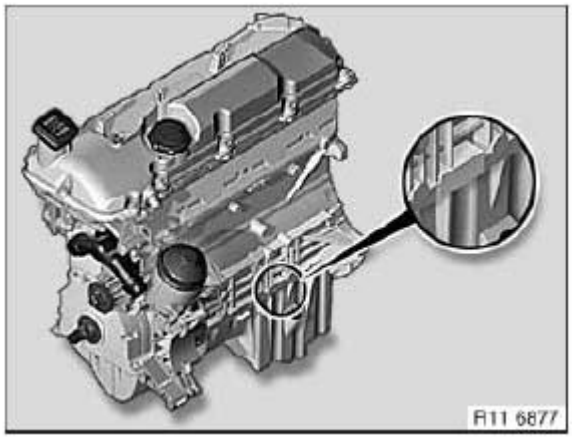


Fig. 7: Identifying Engine Identification Label (M56)
Courtesy of BMW OF NORTH AMERICA, INC.

N20/N26

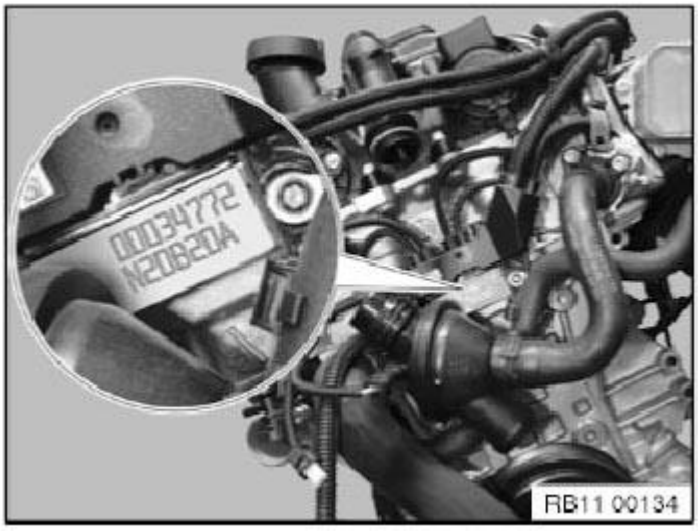


Fig. 8: Identifying Engine Identification Label (N20/N26)
Courtesy of BMW OF NORTH AMERICA, INC.

N40/N45/N45T/N43

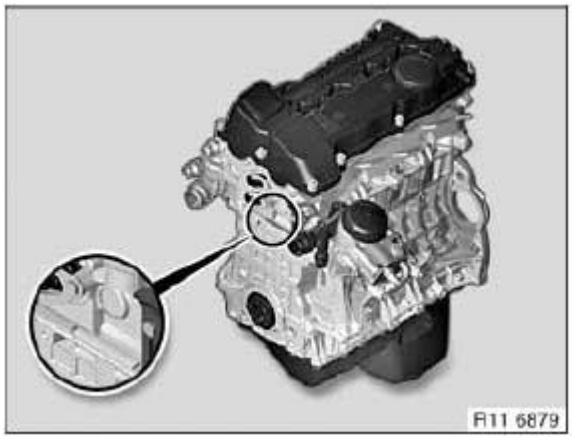


Fig. 9: Identifying Engine Identification Label (N40/N45/N45T/N43)
Courtesy of BMW OF NORTH AMERICA, INC.

N42/N46/N46T

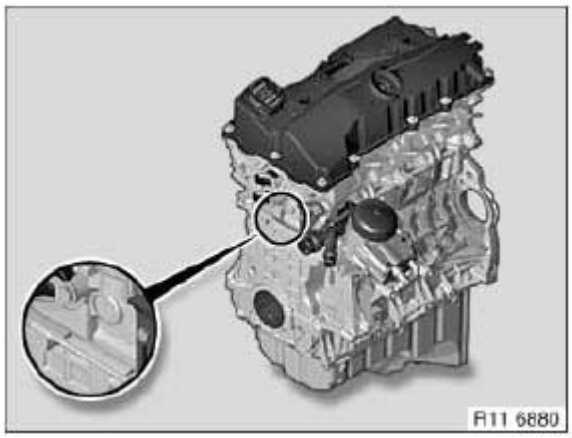


Fig. 10: Identifying Engine Identification Label (N42/N46/N46T)
Courtesy of BMW OF NORTH AMERICA, INC.

N51/N52/N52K/N52T/N53/N54/N55

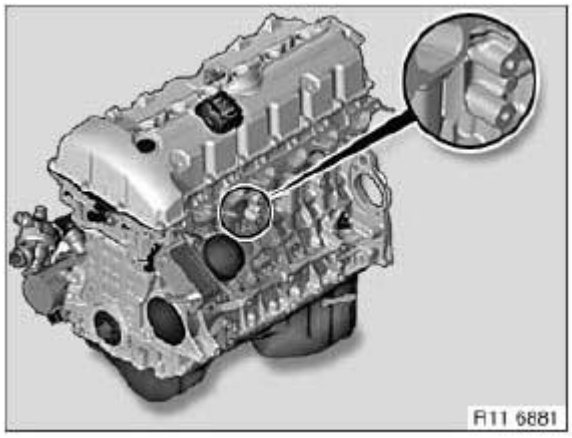


Fig. 11: Identifying Engine Identification Label (N51/N52/N52K/N52T/N53/N54/N55)
Courtesy of BMW OF NORTH AMERICA, INC.

N62/N62TU

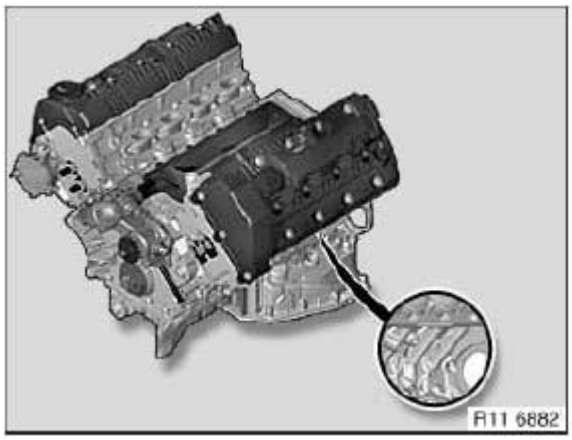


Fig. 12: Identifying Engine Identification Label (N62/N62TU)
Courtesy of BMW OF NORTH AMERICA, INC.

Position (1) engine number.

Position (2) engine code letters.

N63, N63TU.

S63

N74

S63T0 to engine number 2001 0052 on right side cyl. 1-4.

S63T0 from engine number 2001 0053 on left side cyl. 5-8.

E72 Vehicles must be imprinted on the left side cyl. 5-8.

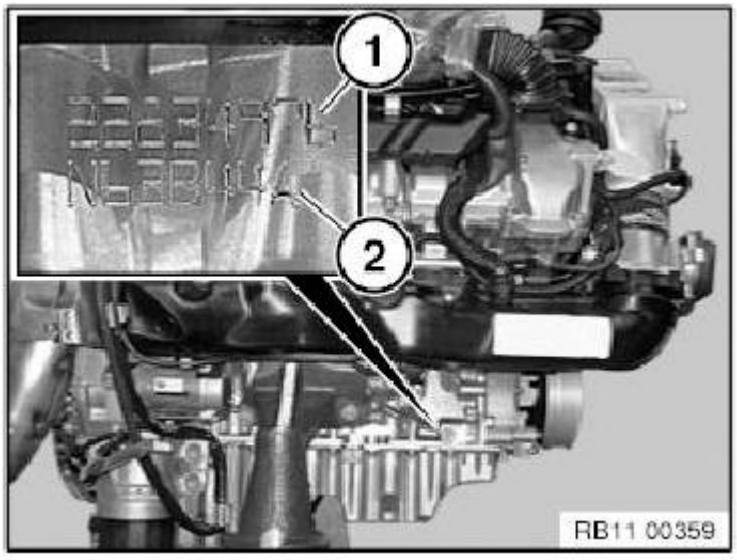


Fig. 13: Identifying Engine Number And Code Letters
Courtesy of BMW OF NORTH AMERICA, INC.

N73

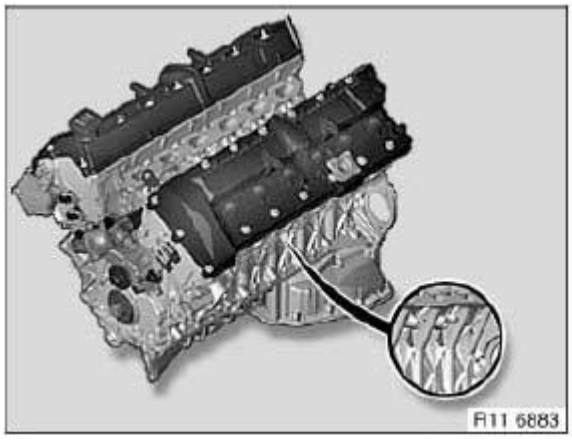


Fig. 14: Identifying Engine Identification Label (N73)
Courtesy of BMW OF NORTH AMERICA, INC.

S54

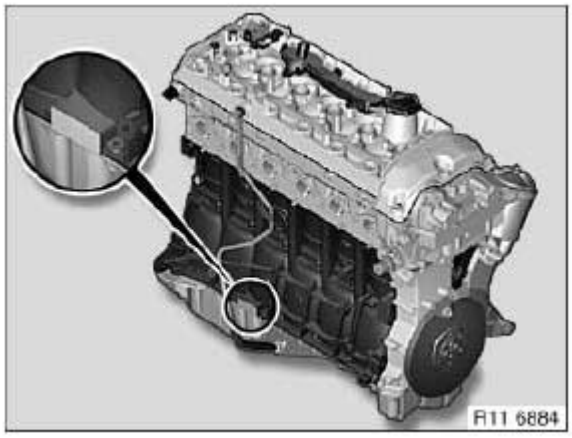


Fig. 15: Identifying Engine Identification Label (S54)
Courtesy of BMW OF NORTH AMERICA, INC.

S85/S65

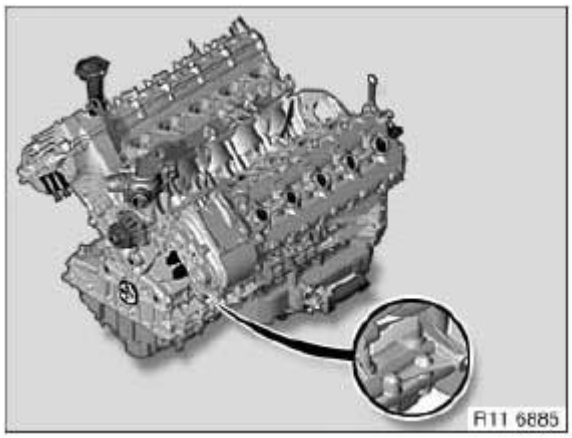


Fig. 16: Identifying Engine Identification Label (S85/S65)
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

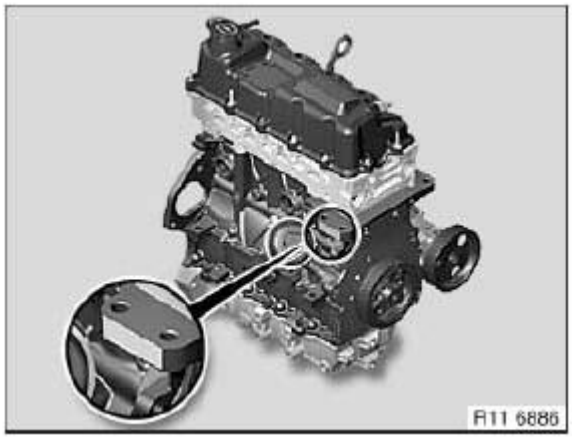


Fig. 17: Identifying Engine Identification Label (W10/W11)
Courtesy of BMW OF NORTH AMERICA, INC.

N12/N13/N14/N16/N18/W16



Fig. 18: Identifying Engine Identification Label (N12/N13/N14/N16/N18/W16)
Courtesy of BMW OF NORTH AMERICA, INC.

W17

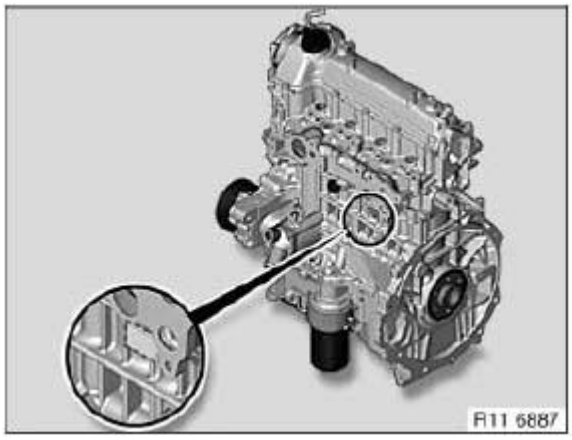


Fig. 19: Identifying Engine Identification Label (W17)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 00... OVERVIEW OF CONSUMABLES (ELECTRONIC PARTS CATALOGUE)

1.0 Sealing compound for **injection** .

	Repair instructions (engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	N40, N42, N45, N46, N43, N45N, N46N	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 128357 sealing compound
1.2	N40, N42, N45, N46, N43, N45N, N46N	Loctite 128357 liquid gasket	83 19 7 536 051	Sealing between crankcase upper and lower halves
1.3	N51, N52, N53, N54, N52N, N55	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.4	N51, N52, N53, N54, N52N, N55	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.5	S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.6	S65, S85	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves

2.0 Sealing compound for **application** .

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application example
2.1	M41, M47, M47TU, M47T2,	Drei Bond 1209 liquid gasket	07 58 9 062 376	For sealing junction points on crankcase

	M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62 N12, N14, N16, N18 N20, N26 N40, N42, N45, N45N, N46, N46N, N43, N47, N47 top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57T, N62, N62TU, N63, N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85			
2.2	N12, N13, N14, N16, N18, N20, N26 W16,	Loctite 5970 liquid gasket	83 19 0 404 517	Sealing between crankcase upper and lower sections.
2.2	N47top, N47D1, N47C1 N57D1 N57S1, B37, B38	Loctite 5970 liquid gasket	83 19 0 404 517	Sealing of gear case cover, oil sump, coolant pump, component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid gasket	07 58 9 067 732	Sealing between cover sleeve and crankcase
2.4	N12, N13, N14, N16, N18 W16	Loctite 121078 liquid gasket	83 19 2 223 765	Sealing between cover sleeve and crankcase

3.0 **Cleaning agent** .

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
3.1	N12, N13, N14, N18, N20, N26, N45, N46, N45T, N46T, N43, N51, N52, N52Kp, N52TU, N53, N55, N63, N63S, N63Hyprid, N73, N74 B37, B38	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine

4.0 Lubricant for **application** .

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
4.1	N12, N13, N18, N20, N26, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N63O1, N73 S63T0	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.
4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High temperature paste	83 19 2 152 323	For greasing the thread on the exhaust turbocharger.
4.3	N12, N13, N14, N16, N18 N20, N26, N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63O0, N63O1, N73, N73H, N74. S63T1, S65, S85.	High temperature paste (NEVER-SEEZ compound)	83 19 2 158 851	For greasing the threads on the oxygen sensors.
4.4	N47, N47O1 N47C1, N47T N47D1 N57 N57D1 N63O0, N63O1, S63, S63T0	Copper paste	81 22 9 400 794	For greasing the double hex head bolt on the exhaust turbocharger. For greasing the central bolt on the VANOS transmission.
4.5	M47, M47TU, M47T2 M57, M57TU, M57T2 N47, N47O1 N47C1, N47T N47D1 N57 N57D1	High-temperature grease (UrethynE2).	83 23 0 441 070	For greasing the injectors or injector shafts. Magnet and piezo injectors.
4.6	N47T0, N47T1 N57T0, N57T1, N57S1	Assembly paste, ATE grease	83 19 9 407 854	For lubricating the O-rings of the pressure pipes Multistage turbocharging assembly.

5.0 Lubricants to loosen locked **screw connections** .

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
5.1	M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, N57S1	Brunox lubricating grease	83 23 0 445 529	For releasing the glow elements

	W16, W17,			
5.2	E89 F10, F11.	Brunox lubricating grease	83 23 0 445 529	For releasing and fixing the screw connection of the rubber mounts

6.0 **Leak search** Spray

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
6.1	Gasoline: N13, N20, N26, N54, N55 Diesel fuel: M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1,	Leak Spray	83 19 9 407 861	Check turbocharging path for leak tightness. Example: leakage on charge air hose or charge air cooler.

11 00 598 REMOVING AND INSTALLING ENGINE ON FRONT AXLE (N74)

Necessary preliminary tasks:

- Remove front axle with engine and transmission.

Disconnect plug connection (2) of exhaust gas oxygen sensor (1).

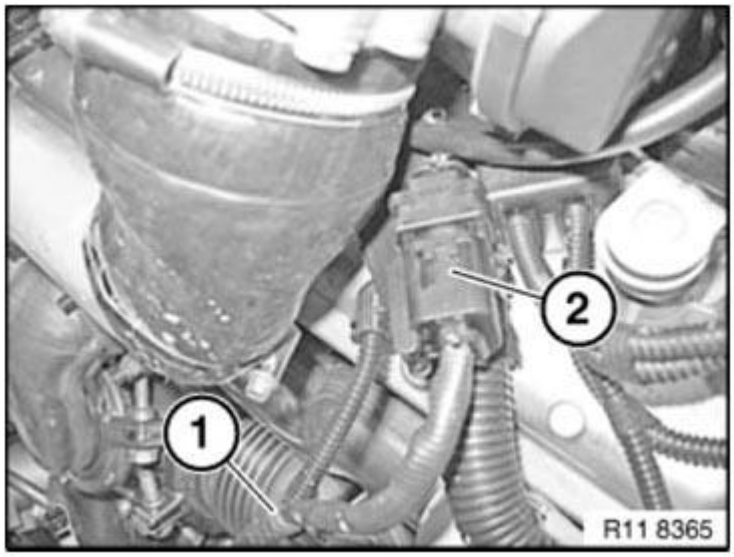


Fig. 20: Identifying Plug Connection And Exhaust Gas Oxygen Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Release V-band clamp (1).

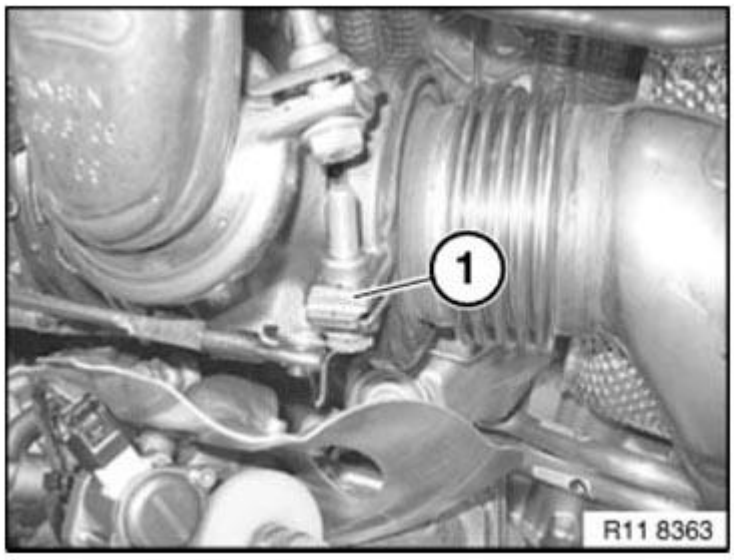


Fig. 21: Identifying V-Band Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove seal (2).

Installation note:

Replace seals.

Take off holder (3).

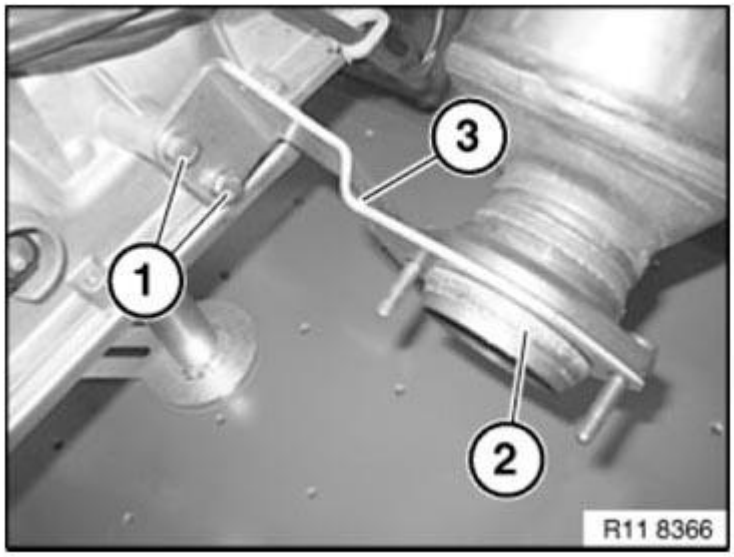


Fig. 22: Identifying Take Off Holder, Seal And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Remove catalytic converter 1-6 and 7-12.

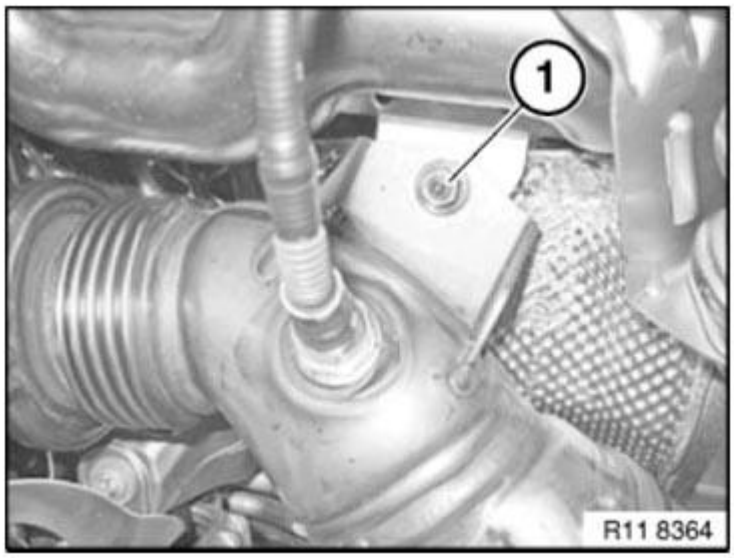


Fig. 23: Identifying Catalytic Converter Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover on transmission.

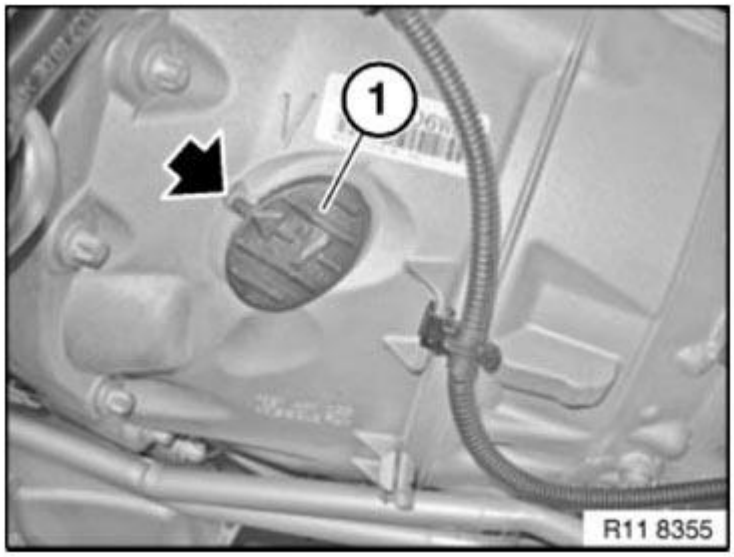


Fig. 24: Locating Transmission Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release all screws (1) on the converter.

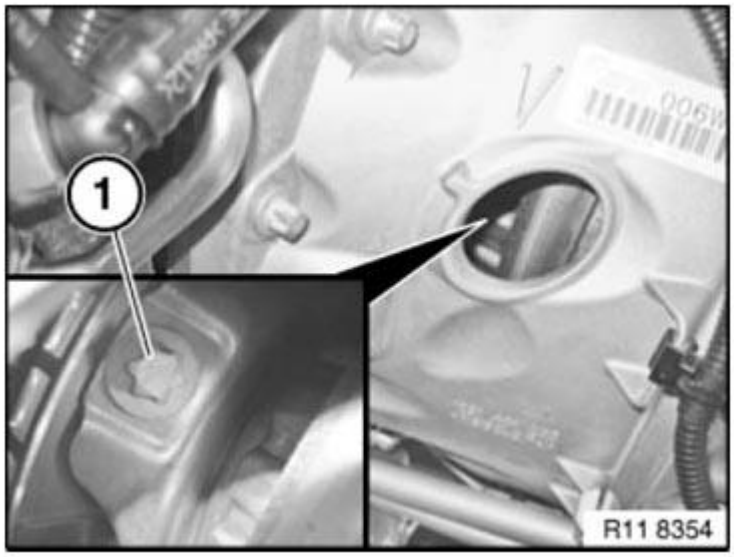


Fig. 25: Identifying Converter Screw
Courtesy of BMW OF NORTH AMERICA, INC.

The converter must be secured for removal.

Insert special tools **24 4 131** and **24 4 138** into the recess on the transmission housing.

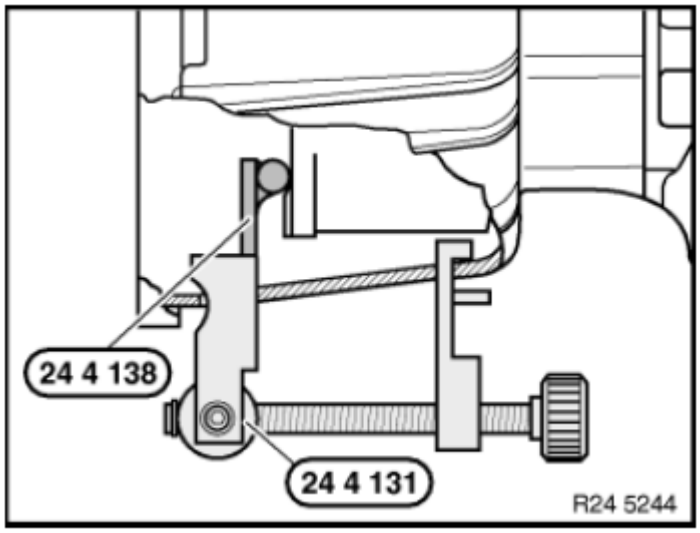


Fig. 26: Inserting Special Tools 24 4 131 And 24 4 138 Into Recess On Transmission Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off the engine wiring harness (4).

Unclip the oxygen sensor cable from the mounting (3).

Unclip and disconnect the oxygen sensor connector (5).

Undo the bolt (1) of the transmission oil line.

Take off the transmission oil line (2).

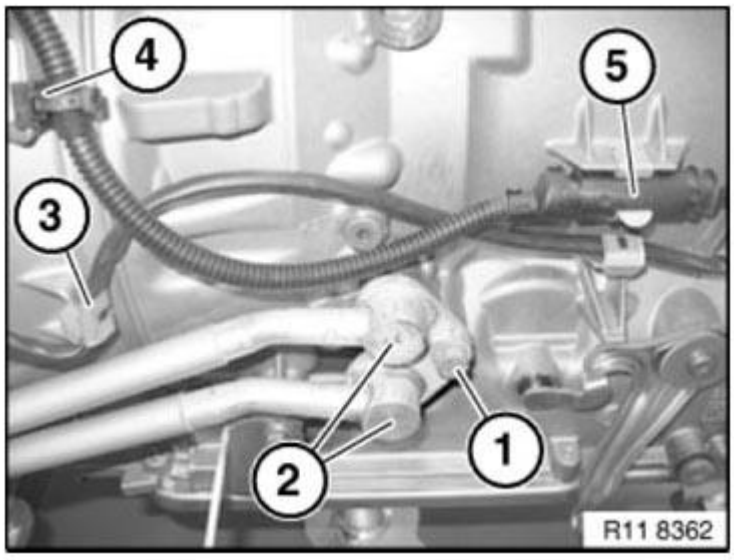


Fig. 27: Identifying Oxygen Sensor Connector, Transmission Oil Line, Engine Wiring Harness And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Undo the transmission bolts (1).

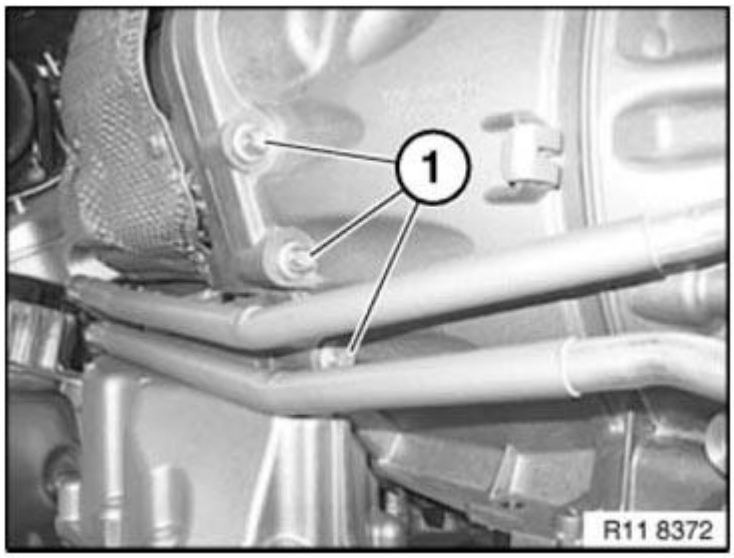


Fig. 28: Identifying Transmission Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Take off the transmission connector (1).

Unclip the transmission wiring harness from holders (2).

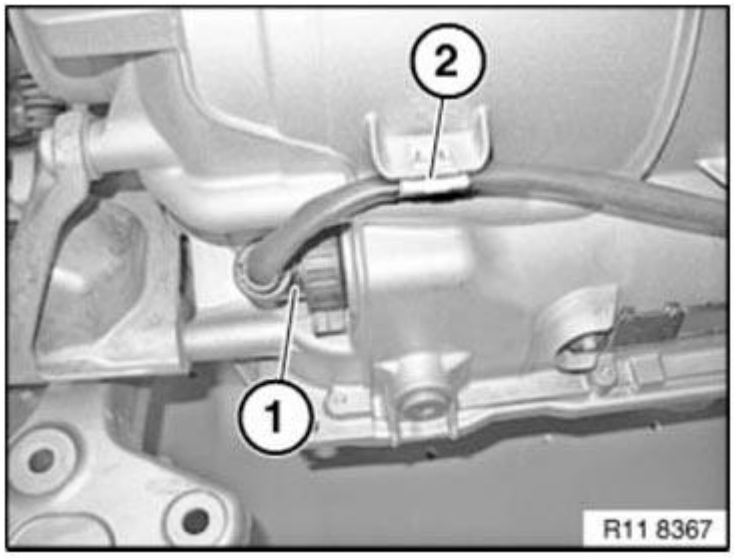


Fig. 29: Identifying Transmission Connector And Wiring Harness Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip the transmission wiring harness from its holders (2 3 4 and 5).

Pull off the transmission wiring harness from the transmission at the holder (1).

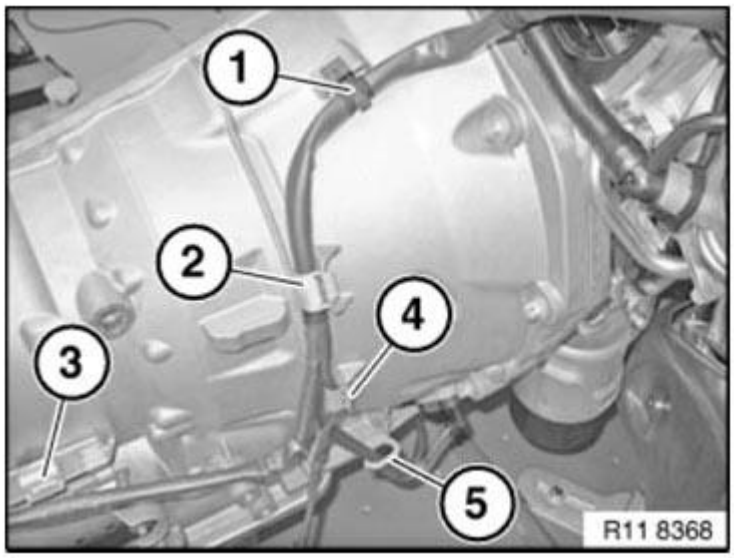


Fig. 30: Identifying Transmission Wiring Harness Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on oil level sensor.

Unclip the transmission wiring harness from holders (2).

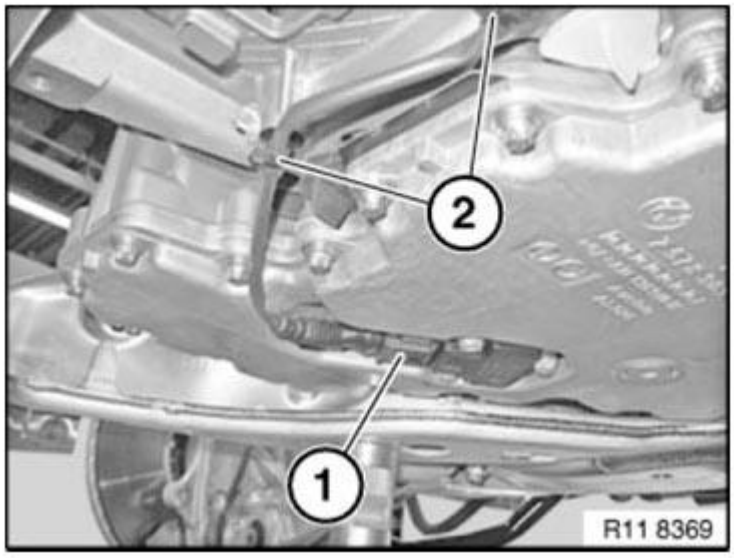


Fig. 31: Identifying Transmission Wiring Harness Holder And Oil Level Sensor Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Undo the transmission bolts (1).

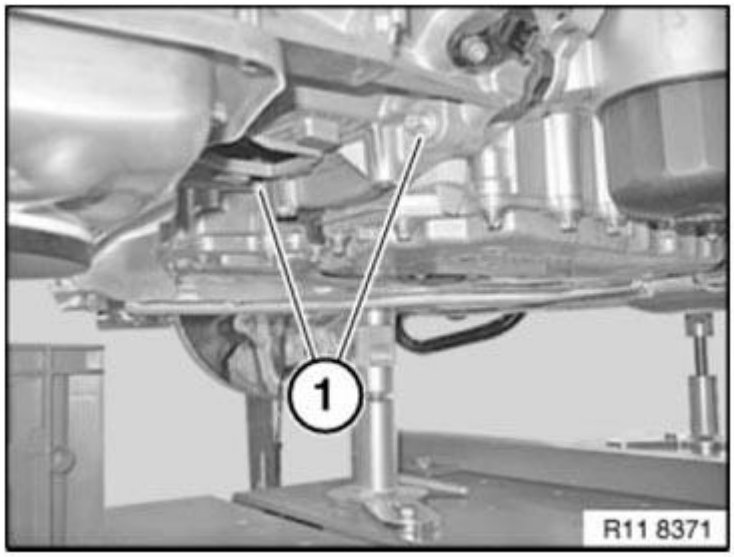


Fig. 32: Identifying Transmission Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Undo the transmission bolts (1 and 2).

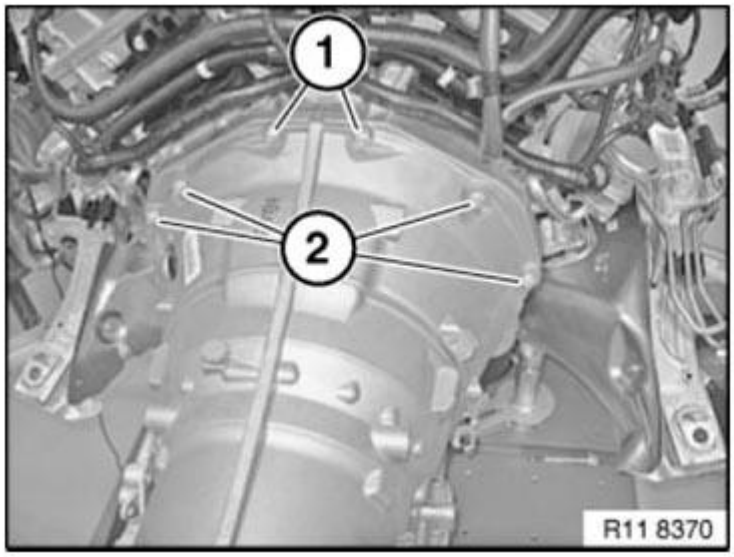


Fig. 33: Identifying Transmission Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Attach the engine using the engine crane and special tool 11 0 020.

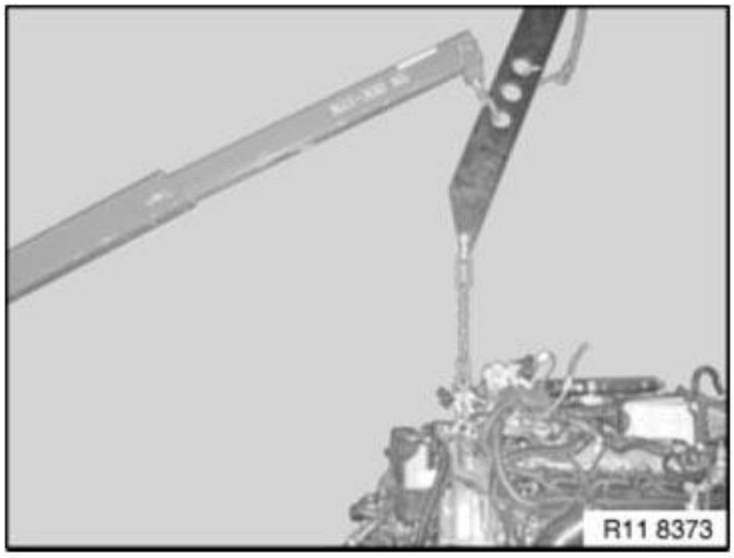


Fig. 34: Attaching Engine Using Engine Crane And Special Tool 11 0 020
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect transmission (2) from engine in the direction of the arrow.

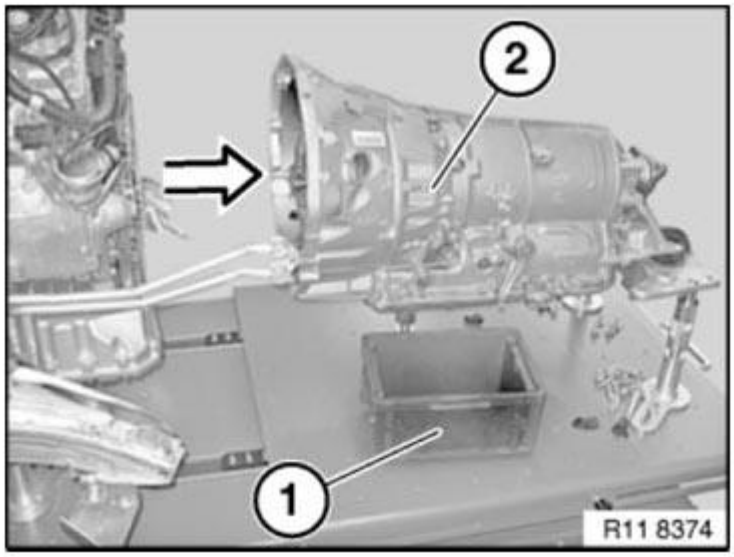


Fig. 35: Identifying Air Intake Manifold Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove the heat shield.

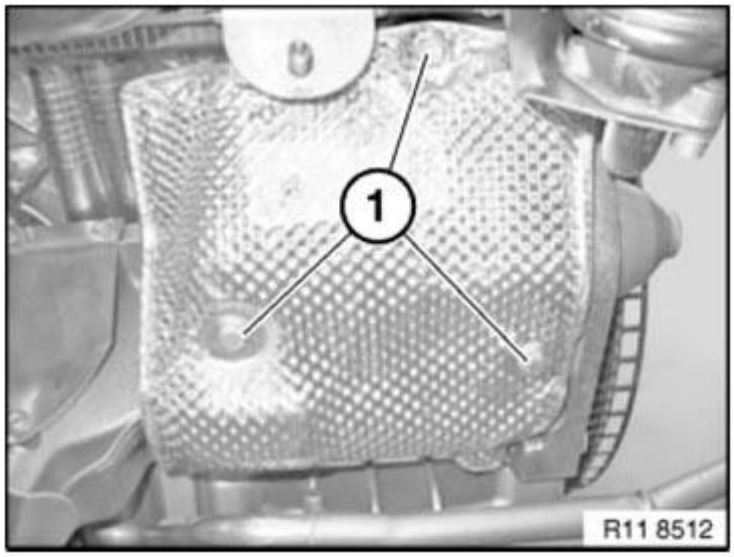


Fig. 36: Vacuum Activation - Connection Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder for hydraulic lines (1).

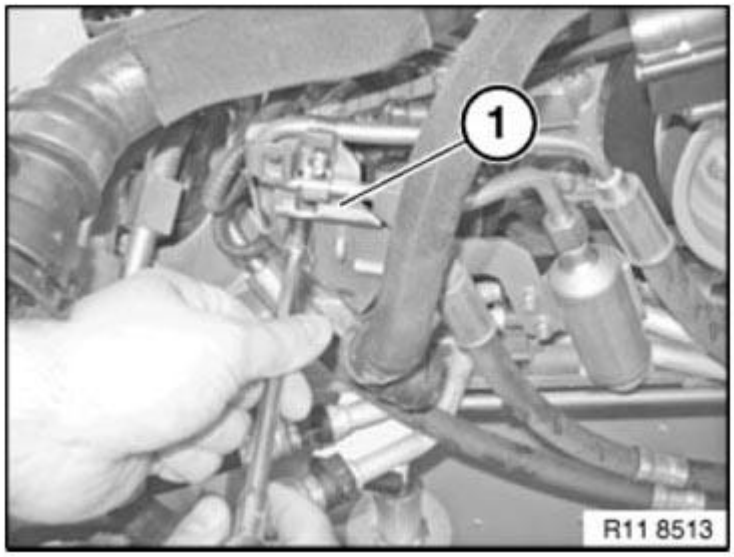


Fig. 37: Identifying Intake Plenum Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Release pressure hose of power steering pump with holder.

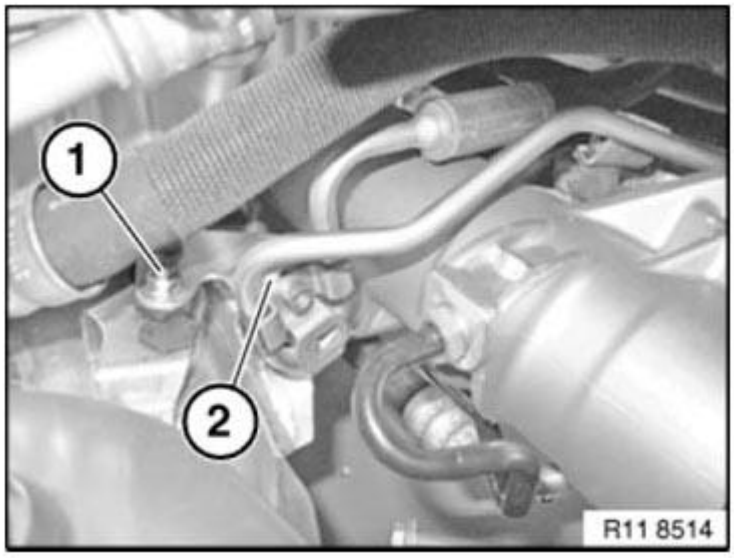


Fig. 38: Identifying Electric Changeover Valve Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Release screw (2).

Release pressure hose with holder (3).

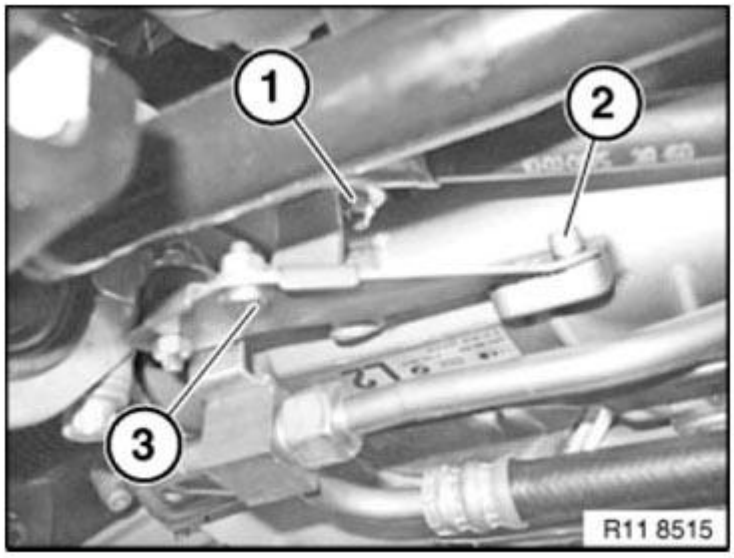


Fig. 39: Identifying Exhaust Turbocharger Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt (1).

Pull off pressure lines (2 and 3).

Installation note:

Replace all O-rings.

Open cable clips (4).

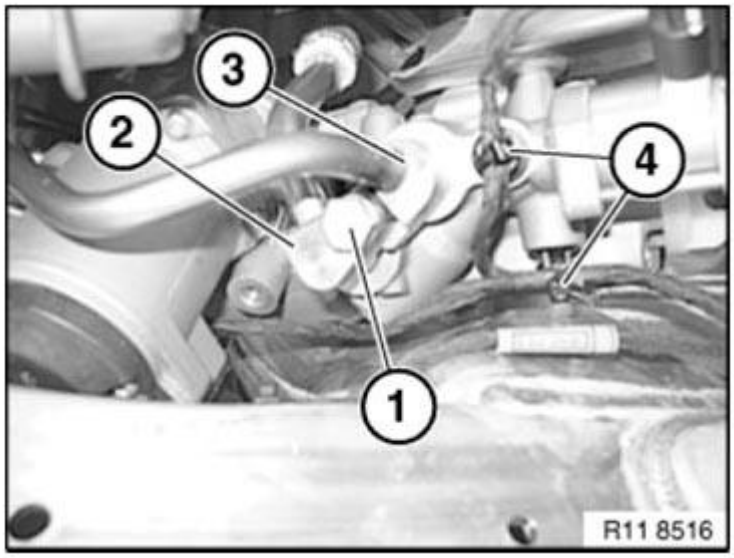


Fig. 40: Identifying Pressure Sensors And Cable Strap Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect the plug connections (1 and 2) on the steering box and front axle support.

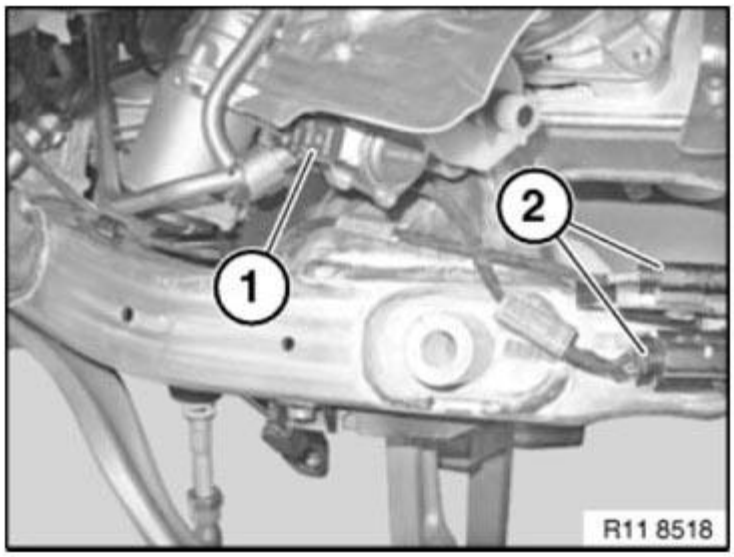


Fig. 41: Identifying Vacuum Pump Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Pull off the expansion hose (4).

Installation note:

Replace O-rings.

Release screws (3).

Pull off the expansion hose (2).

Installation note:

Replace O-rings.

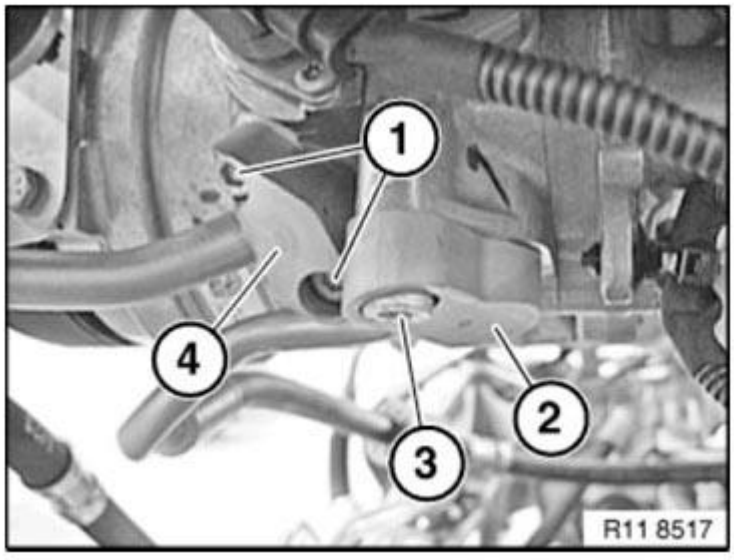


Fig. 42: Identifying Expansion Hose And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Undo the **BOLT** (1) on the left-hand engine mount.

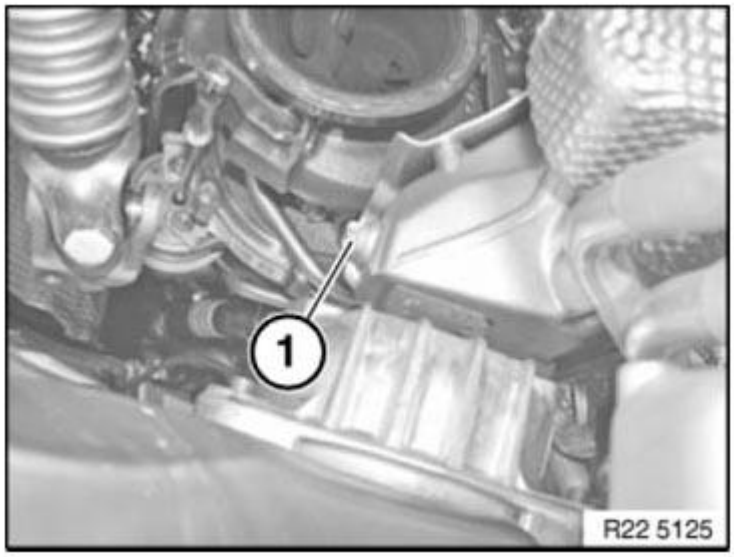


Fig. 43: Identifying Left-Hand Engine Mount Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Undo the **BOLT** (1) on the right-hand engine mount.

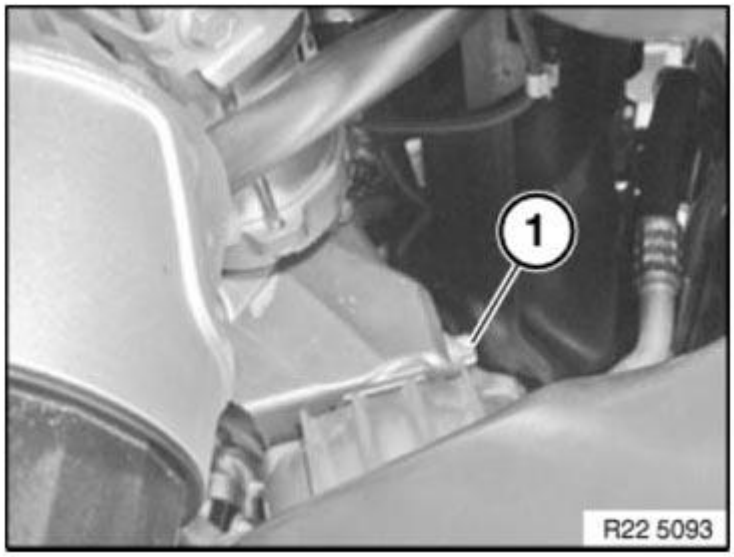


Fig. 44: Identifying Right-Hand Engine Mount Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Lift the engine (1) with the engine crane (2) and special tool 11 0 020 from the front axle.

Mount engine on assembly stand.

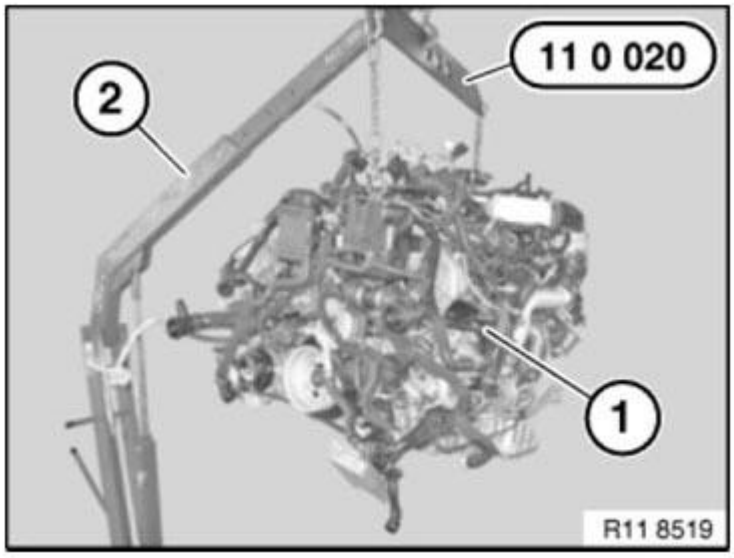


Fig. 45: Lifting Engine Using Engine Crane And Special Tool 11 0 020
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N74)

Pull acoustic cover (1) up and out of the rubber mount and remove.

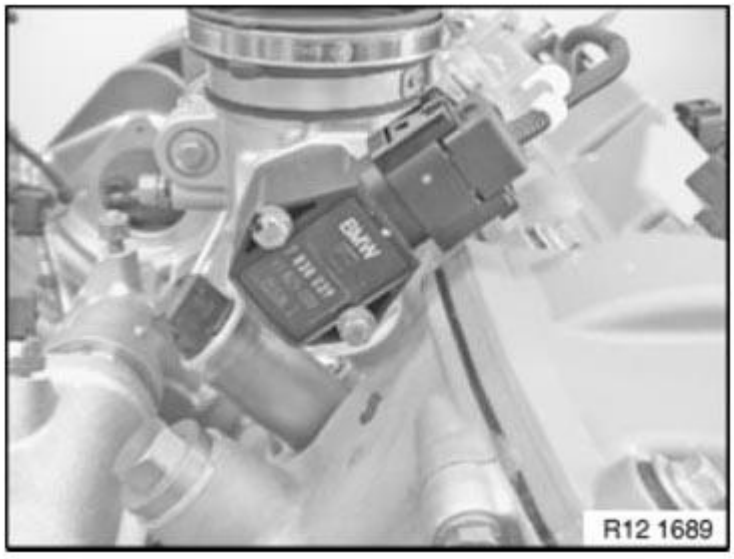


Fig. 46: Pulling Acoustic Cover Up
Courtesy of BMW OF NORTH AMERICA, INC.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear safety goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

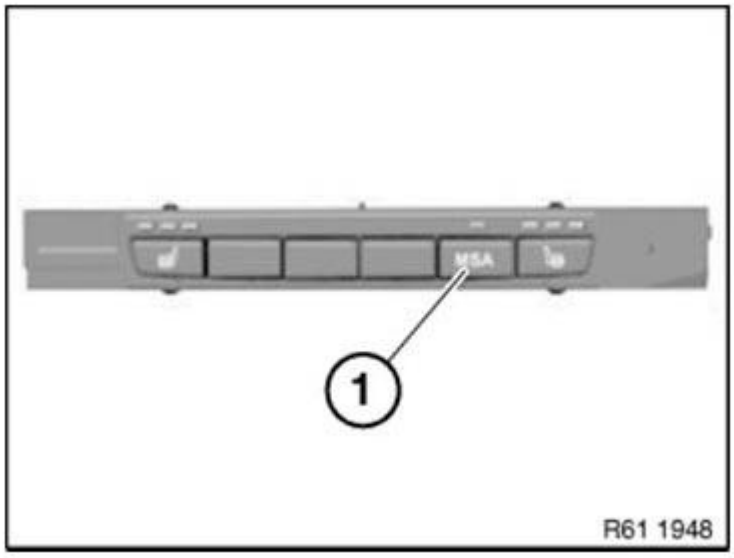


Fig. 47: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

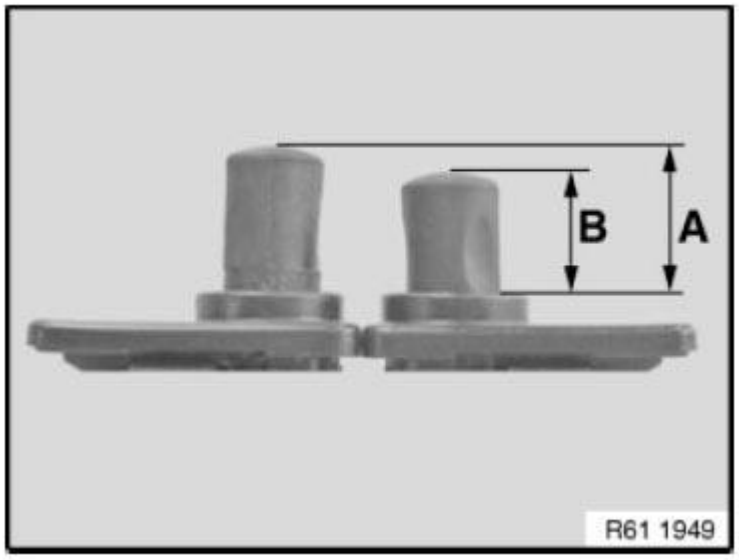


Fig. 48: Identifying Engine Bonnet/Hood Positions (Workshop Mode And Basic Setting)
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:**

  Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.

- **Environmental protection measures:**

  Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.

- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: **Do not flush oil away with water or aqueous cleaning agents.**

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N74)

WARNING: **Risk of injury!**

Observe following instructions relating to special tool:

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. Keep special tools dry, clean and free of grease.

NOTE:

- **Numbering system for special tools has been re-encoded.**

IMPORTANT: **Special tool 00 6 000 must not be fitted when transverse member (1) is installed!**

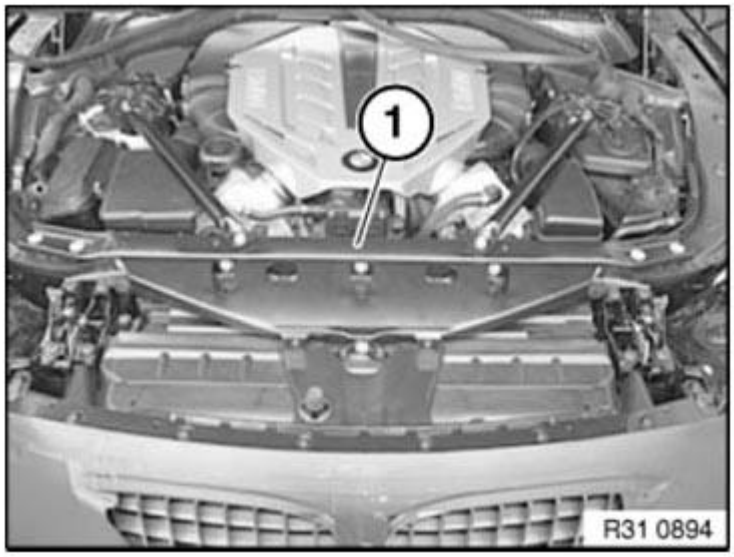


Fig. 49: Identifying Transverse Member
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Secure engine compartment lid in service position. See **SERVICE POSITION (ACTIVE UP TO 09/2011)** or **SERVICE POSITION (ACTIVE FROM 09/2011)** .
- Remove **PANEL** for engine compartment lid at side

- Remove acoustic cover
- Remove front **UNDERBODY PROTECTION**

Assemble transverse member **00 6 000** with special tools **00 6 002** **00 6 004** , 00 6 010, **00 6 050** .

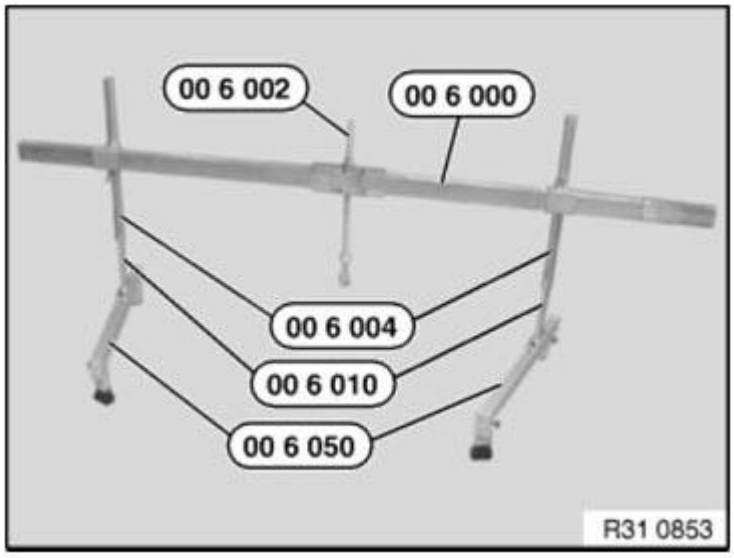


Fig. 50: Assembling Transverse Member 00 6 000 Using Special Tools 00 6 002 00 6 004, 00 6 010, 00 6 050
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Contact points (1) for special tool 00 6 050 are pictured.

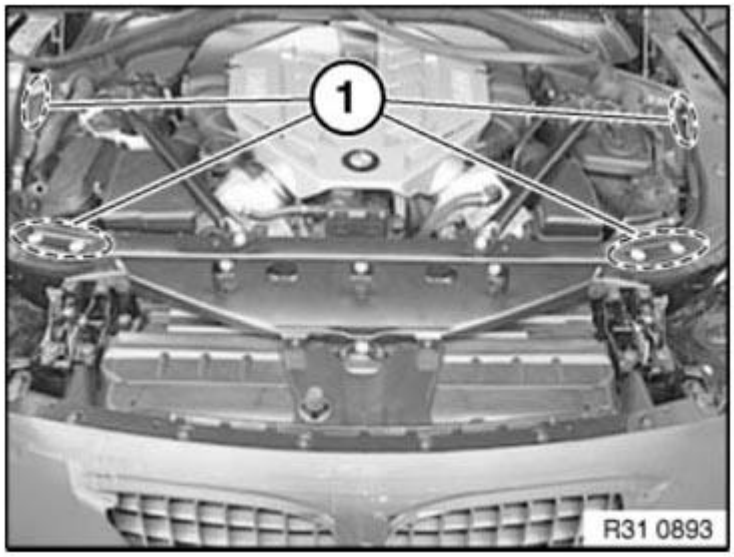


Fig. 51: Identifying Contact Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Position transverse member **00 6 000** with a 2nd person helping on contact points ().

Secure suitable chain (1) on the spindle **00 6 002** .

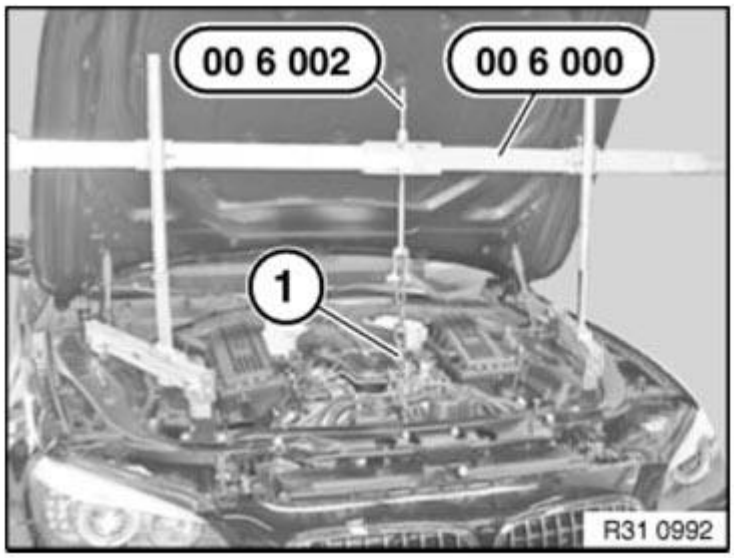


Fig. 52: Securing Suitable Chain On Spindle 00 6 002
Courtesy of BMW OF NORTH AMERICA, INC.

Suspend chain on the front suspension lug (1) of the engine.

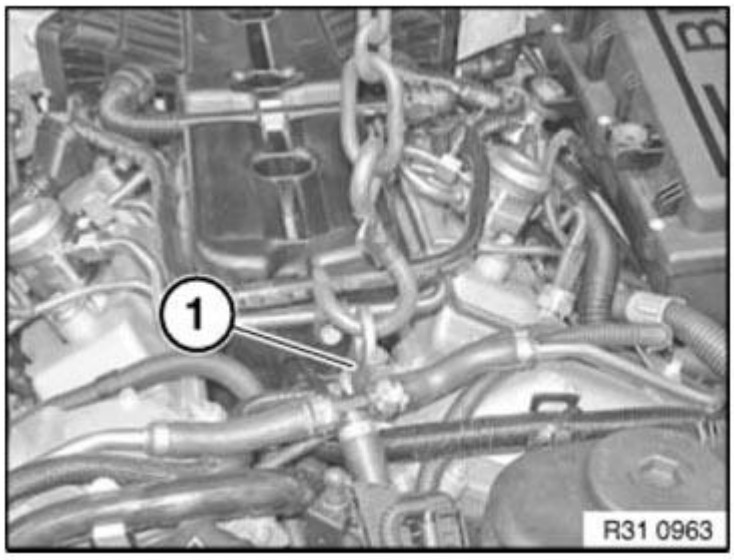


Fig. 53: Identifying Front Suspension Lug
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction.

Always make sure there is sufficient clearance between the engine (or its attachment parts) and the body.

WARNING: Risk of injury!

Tighten down all screws and nuts on transverse member **00 6 000** .

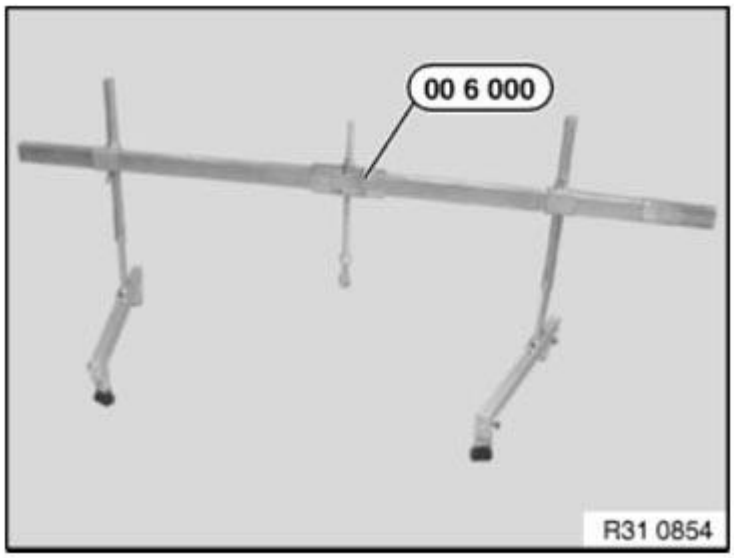


Fig. 54: Identifying Transverse Member 00 6 000
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 1AZ in **22 11 ENGINE MOUNTING**

Raise engine approx. 10 mm with transverse member.

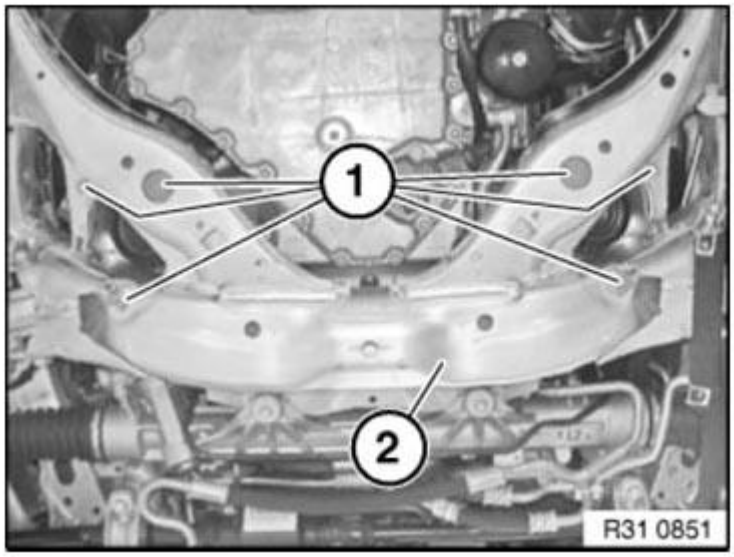


Fig. 55: Identifying Transverse Member Screws
Courtesy of BMW OF NORTH AMERICA, INC.

11 00... SERVICE - ENGINE OIL (N74)

WARNING: Risk of scalding!

Carry out work on the vehicle only when wearing oil- and heat-resistant protective gloves incl. forearm protection, face guard and protective apron.

IMPORTANT: Carry out the engine oil service only when the engine is at operating temperature.

Observe the exact engine oil filling capacity.

Overfilling the engine with engine oil will result in **engine damage** .

Checking and drip-off times (at least 15 minutes) must be observed.

Recycling:

Catch and dispose of drained engine oil in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Open the cover on the under trim panel.

Remove screw plug (1) from oil sump and drain engine oil.

Release screw plug (2) on oil filter cover.

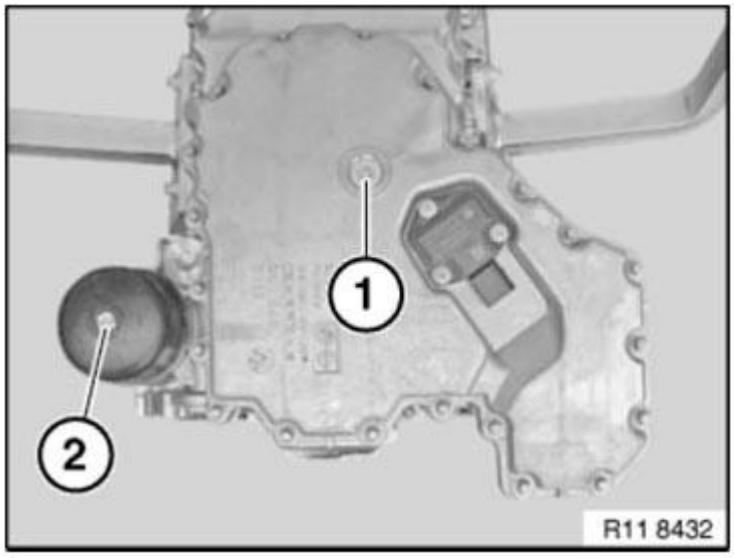


Fig. 56: Identifying Oil Filter Cover And Sump Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release oil filter cover (1) with special tool **11 9 240** .

Tightening torque: see 1AZ in **11 42 OIL FILTER AND LINES**

NOTE: Graphic shows N63.

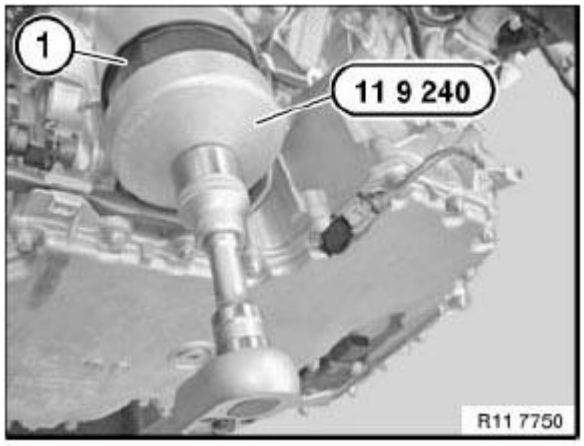


Fig. 57: Releasing Oil Filter Cover Using Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Renew sealing ring (2) and wet with oil.

Check sealing ring (1) and renew, if installed.

Renew oil filter element (3) and slide into the oil filter cover.

Oil filter element (3) must snap audibly into place.

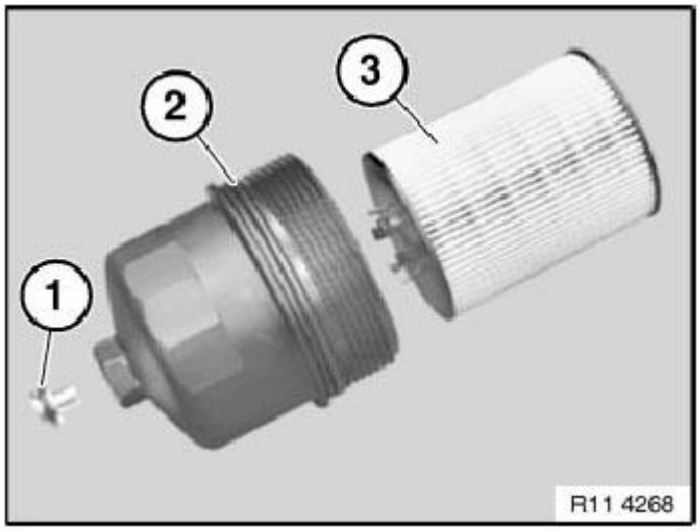


Fig. 58: Identifying Oil Filter Element And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Insert oil filter element (3) into oil filter cover.

Installation note

Oil filter element (3) must snap audibly into place.

Installation note:

Replace sealing rings .

Insert screw plug (1) for oil sump and tighten down.

Tightening torque: see 1AZ in **11 13 OIL SUMP**

Insert screw plug (2) for oil filter cover and tighten down.

Tightening torque: see 2AZ in **11 42 OIL FILTER AND LINES**

NOTE: Illustration with engine removed.

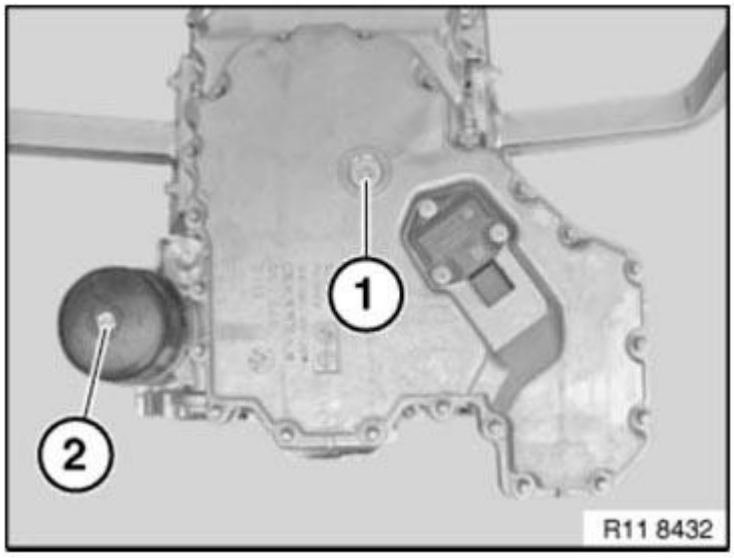


Fig. 59: Identifying Oil Filter Cover And Sump Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Engine overfill can only be detected with diagnosis tester.

NOTE: Pour in ENGINE OIL .

Start engine and run at idle speed.

Check oil filter cover and screw plugs for leak-tightness.

Assemble engine.

Checking engine oil level

- Park vehicle on a horizontal surface
- Test engine oil level via diagnosis test.

1. Vehicle check.
2. Control unit harness.
3. Call up control unit function.
4. Diagnosis request.
5. Engine performance data.
6. Query engine oil level.
    - Top up engine oil if necessary.
    - Difference between minimum and maximum is 1.5 liters.

11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N74)

Necessary preliminary tasks:

- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Remove **ALL VALVES**.

NOTE: Set of special tools 11 6 221 can be used for cylinder bank 1 to 6 and cylinder bank 7 to 12.

Position special tool **11 6 221** on cylinder head.

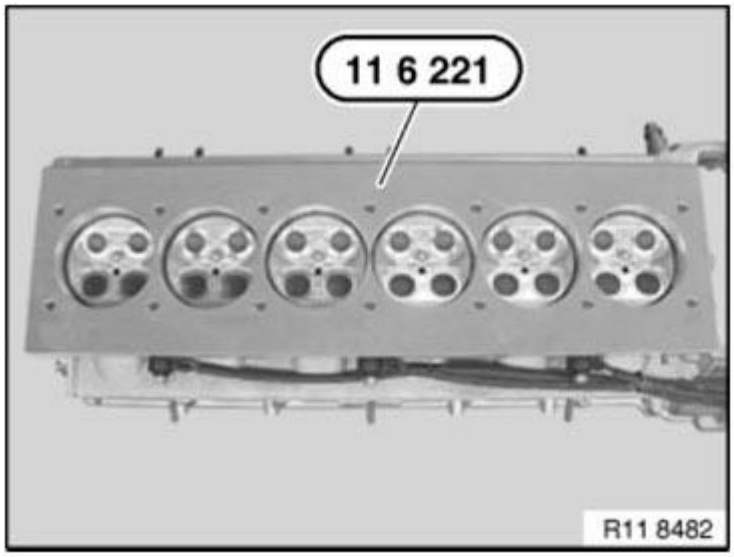


Fig. 60: Positioning Special Tool 11 6 221 On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool **11 6 222** allows the original cylinder head bolts (1) to be used to secure the pressure plate **11 6 221** .

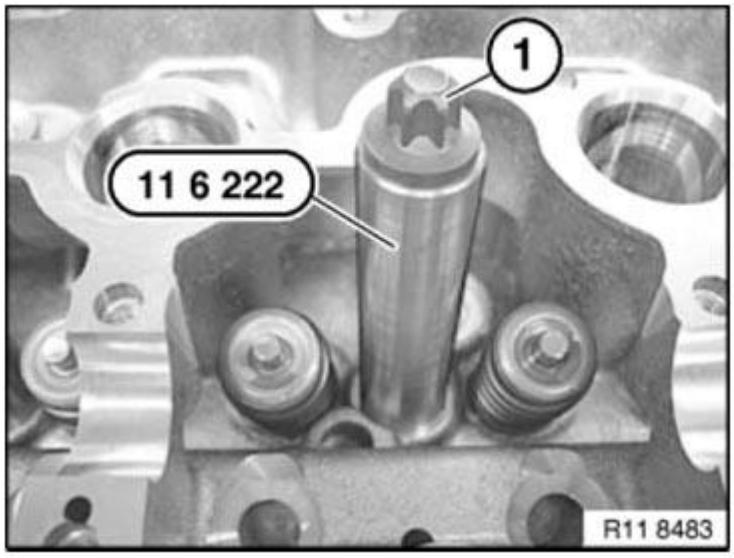


Fig. 61: Securing Cylinder Head Bolts To Pressure Plate Using Special Tool 11 6 222
Courtesy of BMW OF NORTH AMERICA, INC.

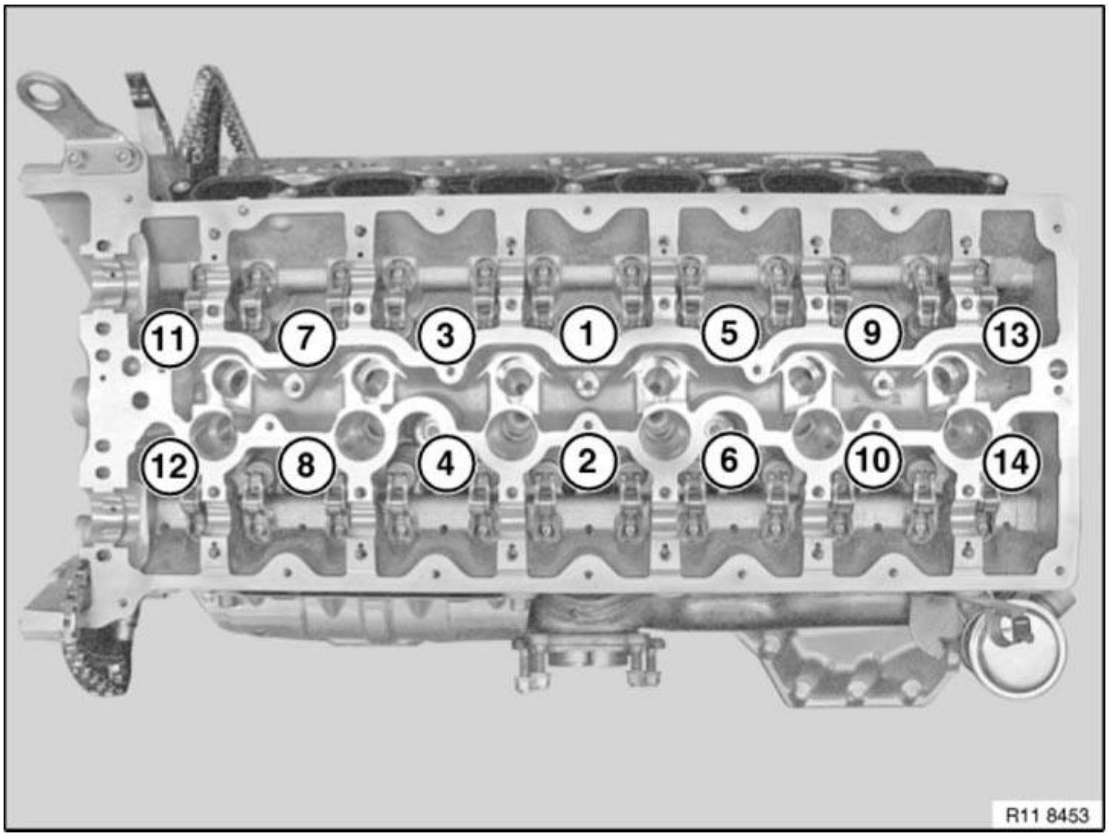


Fig. 62: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 8 083 and tighten in sequence (1 to 14) in several steps.

Tightening torque: **15 Nm**

Remove bleeder screw (1).

Tightening torque: see 8AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

Installation:

Replace sealing ring.

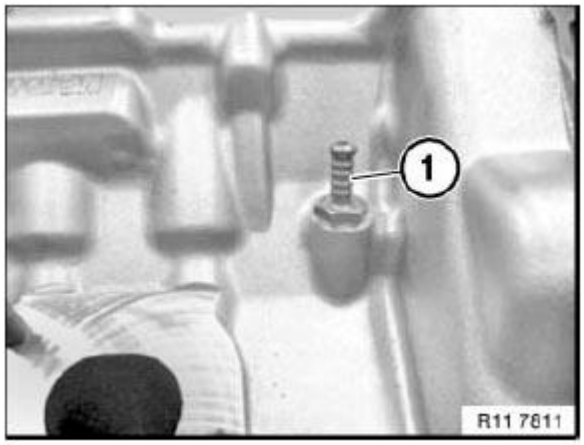


Fig. 63: Identifying Bleeder Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Max: 0.8 Nm.

Screw in special tool 11 8 082 with suitable tool and special tool to 0.8 Nm.

Connect compressed air hose with pressure gauge.

Immerse cylinder head in a water bath. Test pressure: 3.0 bar.

Check cylinder head for escaping air (cracks).

NOTE: Illustration shows N63.

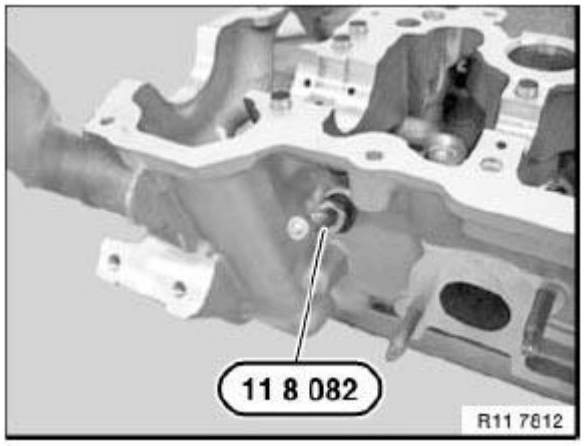


Fig. 64: Screwing Special Tool 11 8 082
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If necessary, add cleaning agent to water bath.

Assemble engine.

11 12 105 REMOVING AND INSTALLING LEFT CYLINDER HEAD (N74)

Necessary preliminary tasks:

- Check **TIMING**
- Remove left **INTAKE AND EXHAUST CAMSHAFT ADJUSTER**

Release bolt (1) on top guide rail.

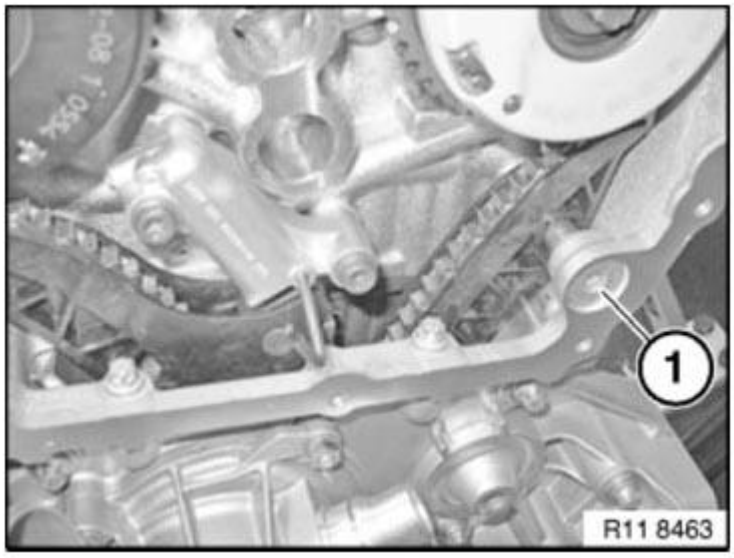


Fig. 65: Identifying Top Guide Rail Bolt

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Chain tensioner is pre-tensioned and may only be removed with secured special tool 11 4 120 .

Release screws (1) and remove chain tensioner (2).

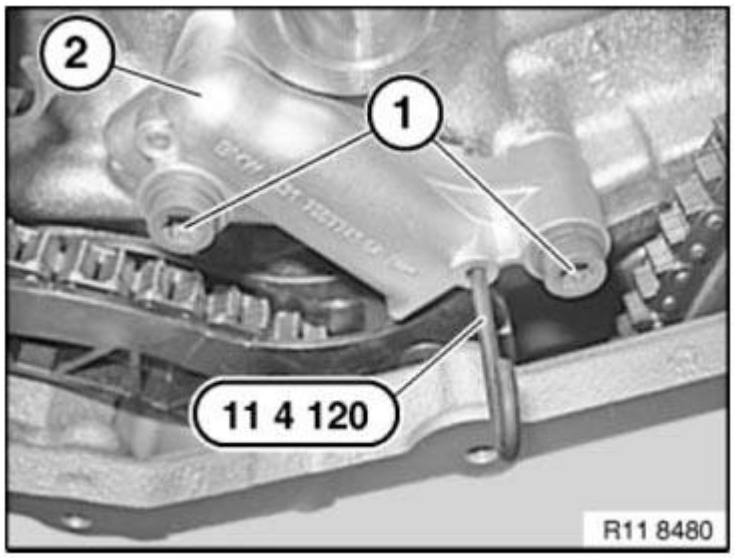


Fig. 66: Removing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head screws at front of cylinder head.

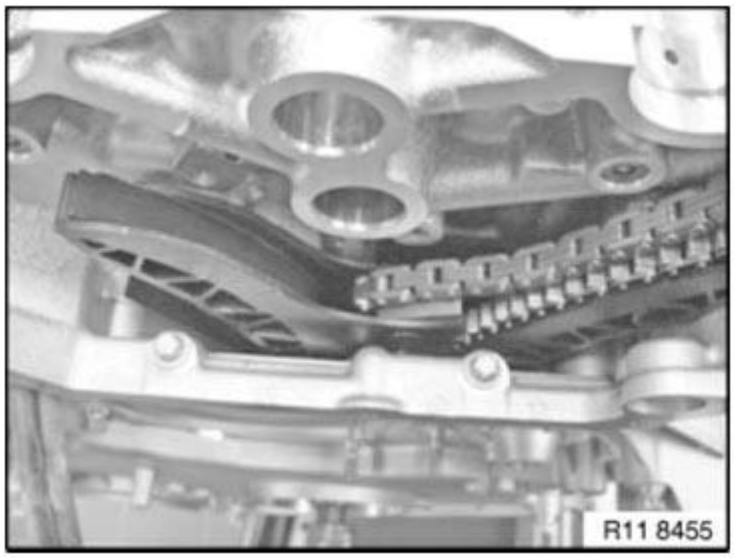


Fig. 67: Identifying Chain Tensioner Arm
Courtesy of BMW OF NORTH AMERICA, INC.

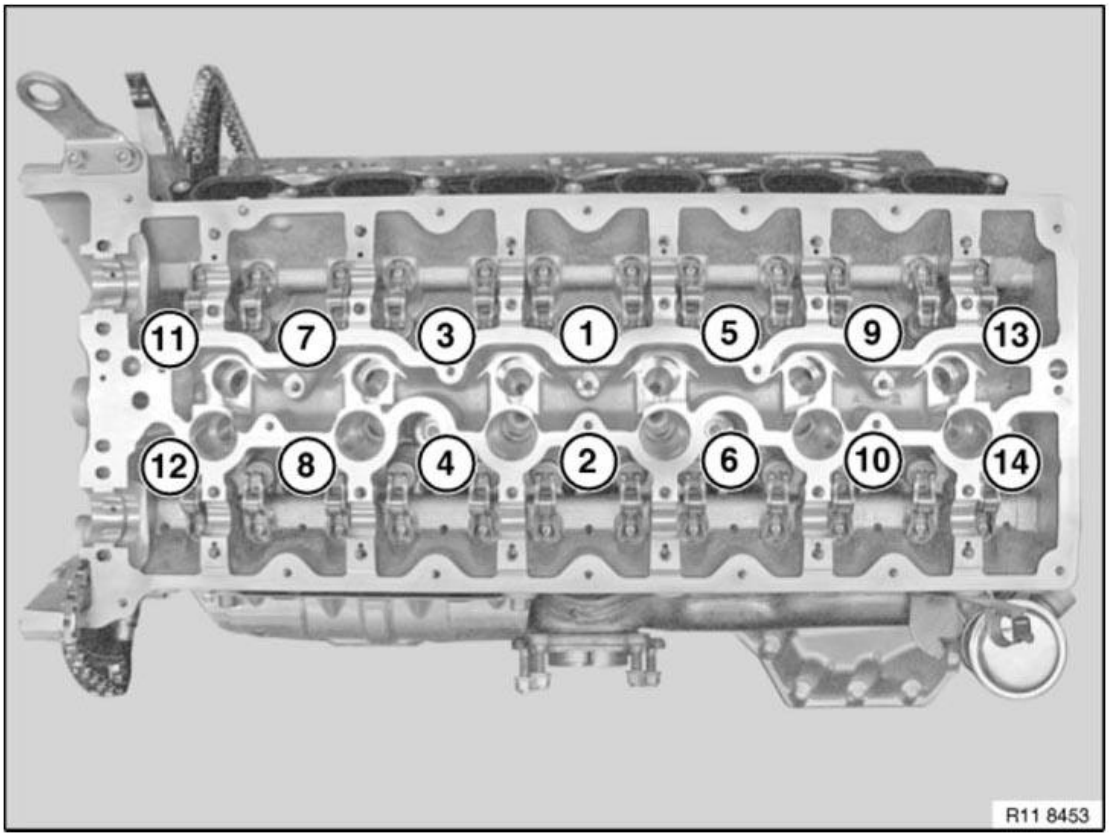


Fig. 68: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts in sequence (14 to 1).

Remove all cylinder head bolts with washers.

Remove cylinder head with assistance of a second person (weight approx. 30 kg).

NOTE: Detach ventilation line at separation point.

Remove ventilation line with cylinder head.

NOTE: For purposes of clarity, the graphic shows the camshafts removed.

Clean sealing faces of cylinder head and engine block; if necessary, remove gasket debris compound with special tool **11 4 470** . Make sure no gasket remnants drop into oil and cooling channels.

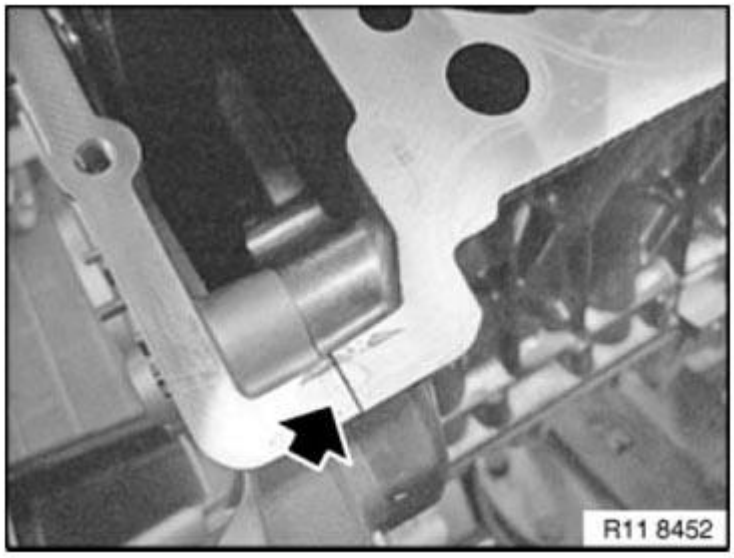


Fig. 69: Locating Sealing Face Of Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of cracking!

Threaded bores in engine block must be free of dirt and oil

Check **CYLINDER HEAD** for leaks.

Check **CYLINDER HEAD SEALING FACE** for surface evenness.

Coat joint between engine block and timing case cover with Drei Bond **1209** (refer to BMW Parts Service).

NOTE: Graphic shows an N62 engine by way of example.

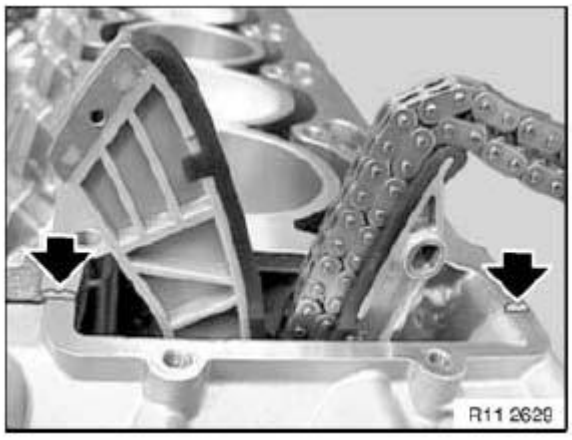


Fig. 70: Locating Drei Bond Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Check dowel sleeves (1) for damage and correct installation position.

Installation:

Replace cylinder head gasket .

Fit new cylinder-head seal.

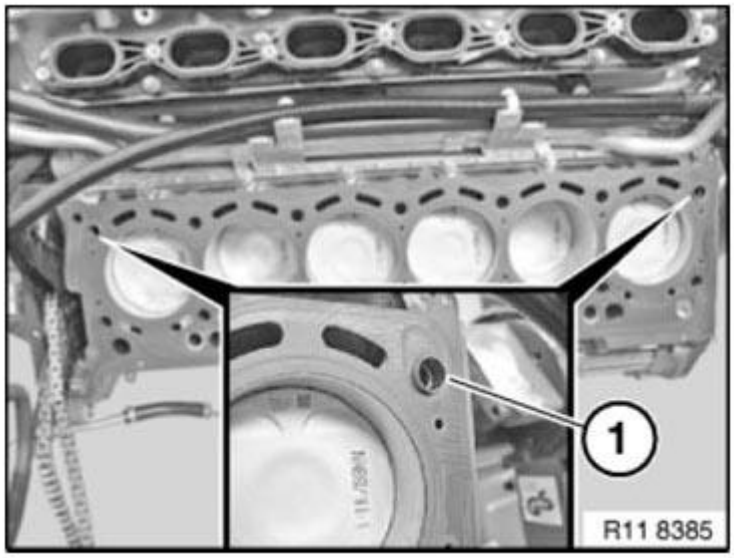


Fig. 71: Identifying Dowel Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

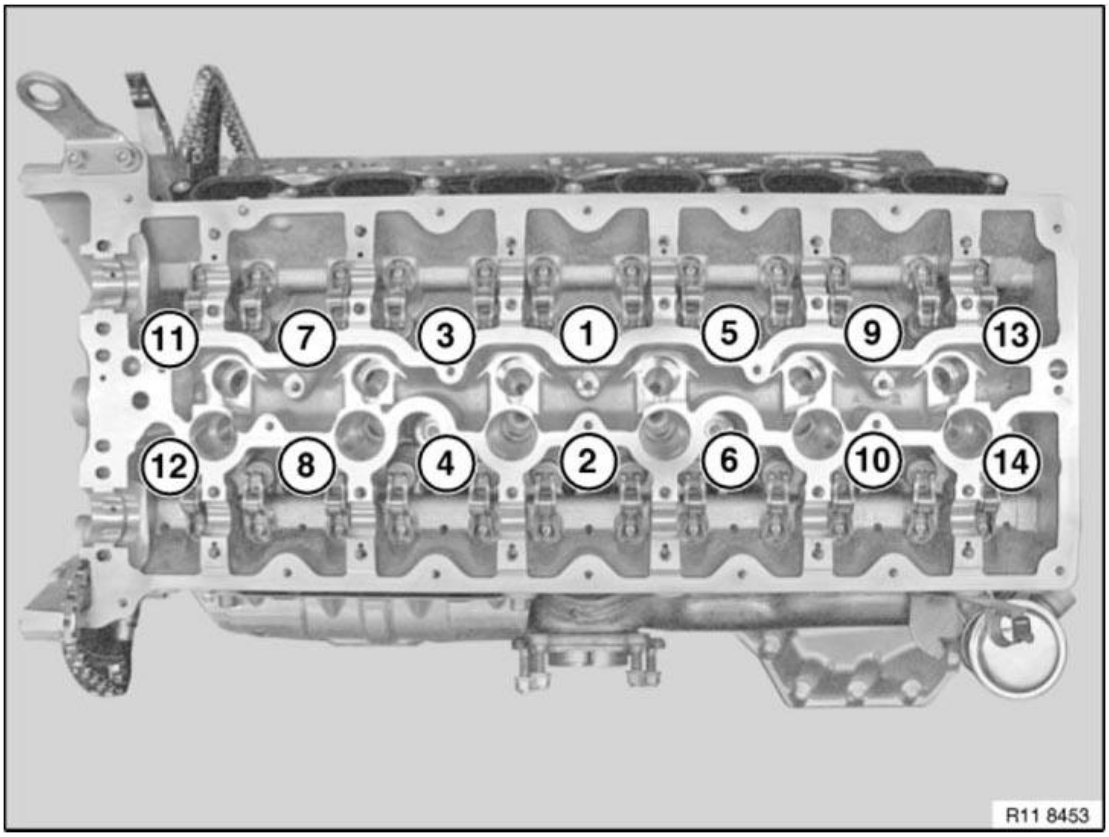


Fig. 72: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Join tensioner rails together using appropriate tool and insert timing chain.

Fit cylinder head with ventilation line.

Do not wash off bolt coating.

Fit new cylinder head screws .

Insert new cylinder head bolts and initially tighten so that they are free of play.

Tighten down cylinder head bolts in sequence 1 - 14.

Tightening torque: see 1AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

NOTE: For purposes of clarity, the graphic shows the camshafts removed.

To make it easier to check angle tightening, mark all collar bolts M11 using an oil-proof marker pen (see

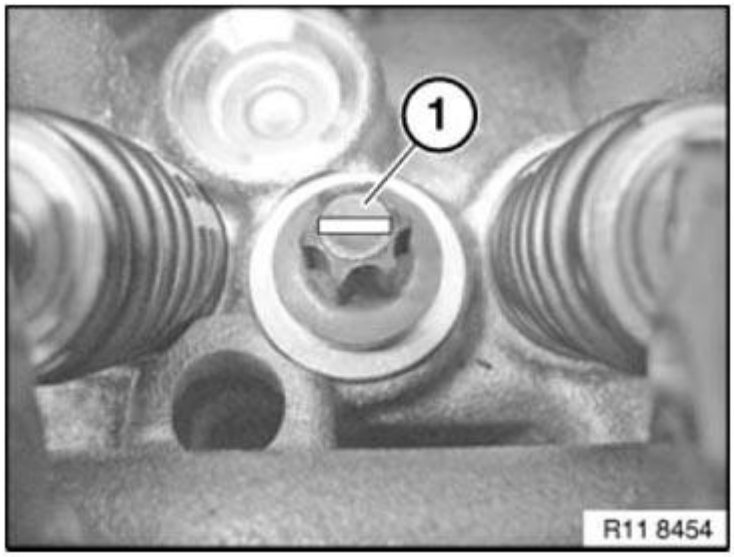


Fig. 73: Identifying Mark On Collar Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Insert and tighten down screws between cylinder head and timing case cover.

Tightening torque: see 2AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

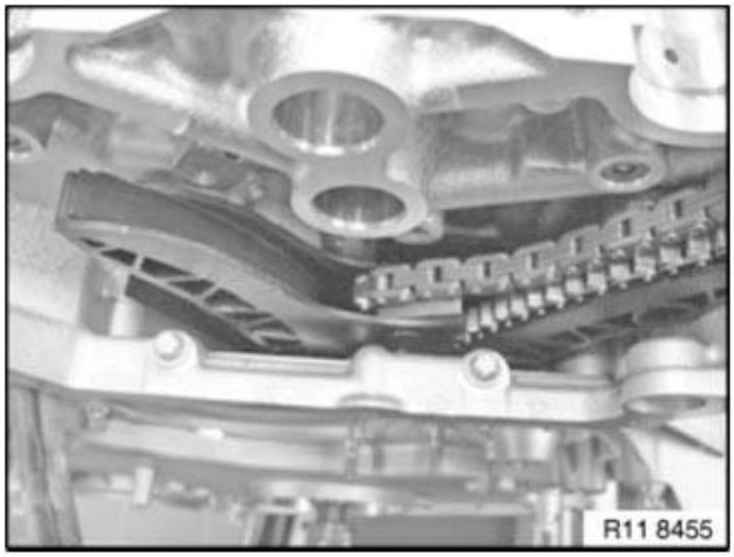


Fig. 74: Identifying Chain Tensioner Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (1) of guide rail and tighten down.

Tightening torque: see 5AZ in **11 31 CAMSHAFT**

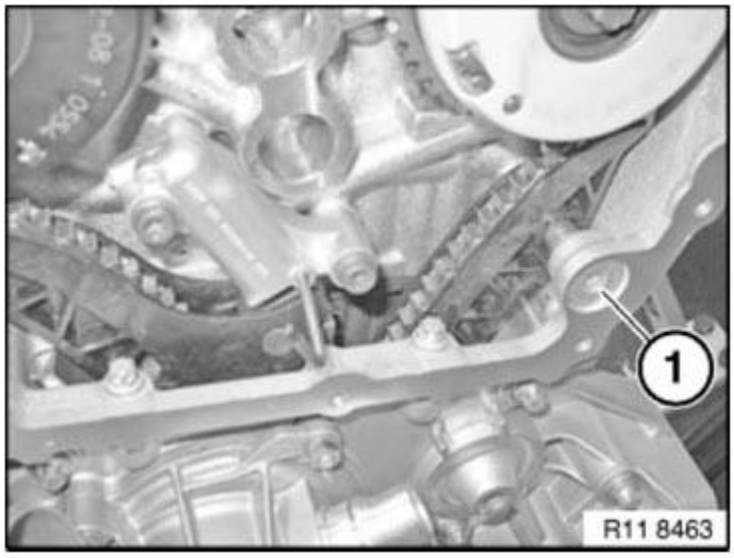


Fig. 75: Identifying Top Guide Rail Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, install camshafts. See **LEFT INTAKE CAMSHAFT** and **LEFT EXHAUST CAMSHAFT**.

Install left **INTAKE AND EXHAUST ADJUSTMENT UNITS**.

Assemble engine.

11 12 106 REMOVING AND INSTALLING RIGHT CYLINDER HEAD (N74)

Necessary preliminary tasks:

- Check **TIMING**.
- Remove **INTAKE AND EXHAUST ADJUSTMENT UNIT ON RIGHT SIDE**.
- Remove **COOLANT THERMOSTAT**

Release bolt (1) on top guide rail.

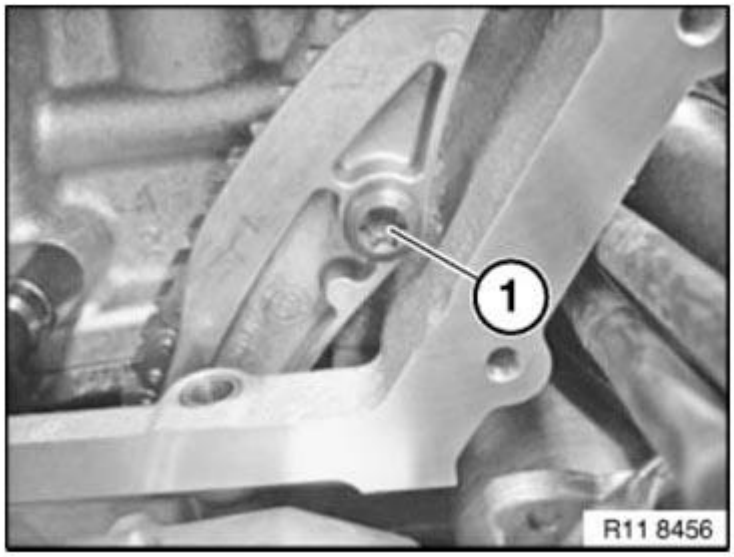


Fig. 76: Identifying Top Guide Rail Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on bottom guide rail.

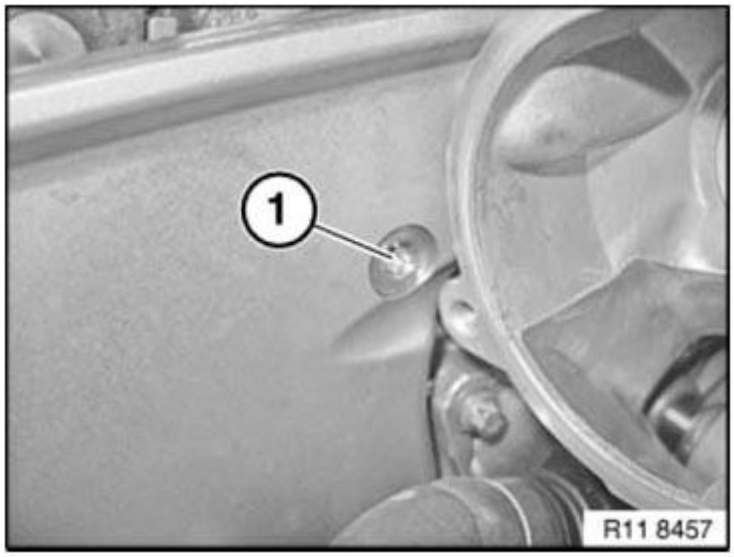


Fig. 77: Identifying Bottom Guide Rail Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Chain tensioner is pre-tensioned and may only be removed with secured special tool 11 4 120 .

Release screws (1) and remove chain tensioner (2).

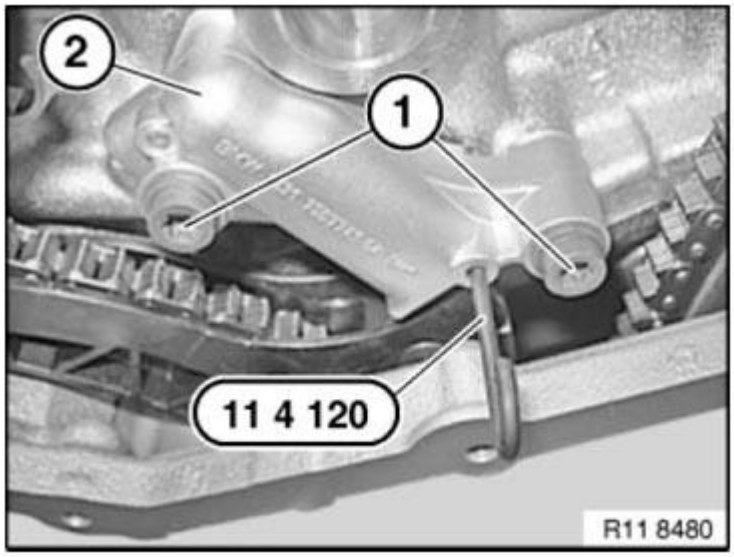


Fig. 78: Removing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head screws at front of cylinder head.

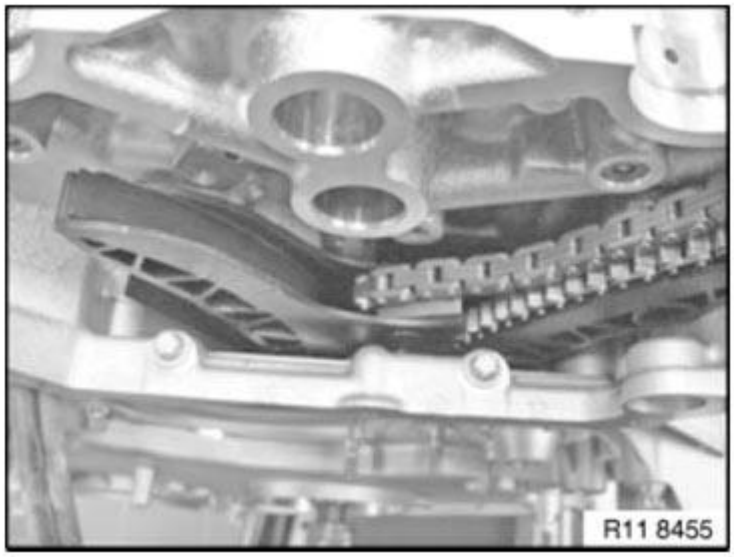


Fig. 79: Identifying Chain Tensioner Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts in sequence (14 to 1).

Remove all cylinder head bolts with washers.

Remove cylinder head with assistance of a second person (weight approx. 30 kg).

NOTE: Detach ventilation line at separation point.

Remove ventilation line with cylinder head.

NOTE: For purposes of clarity, the graphic shows the camshafts removed.

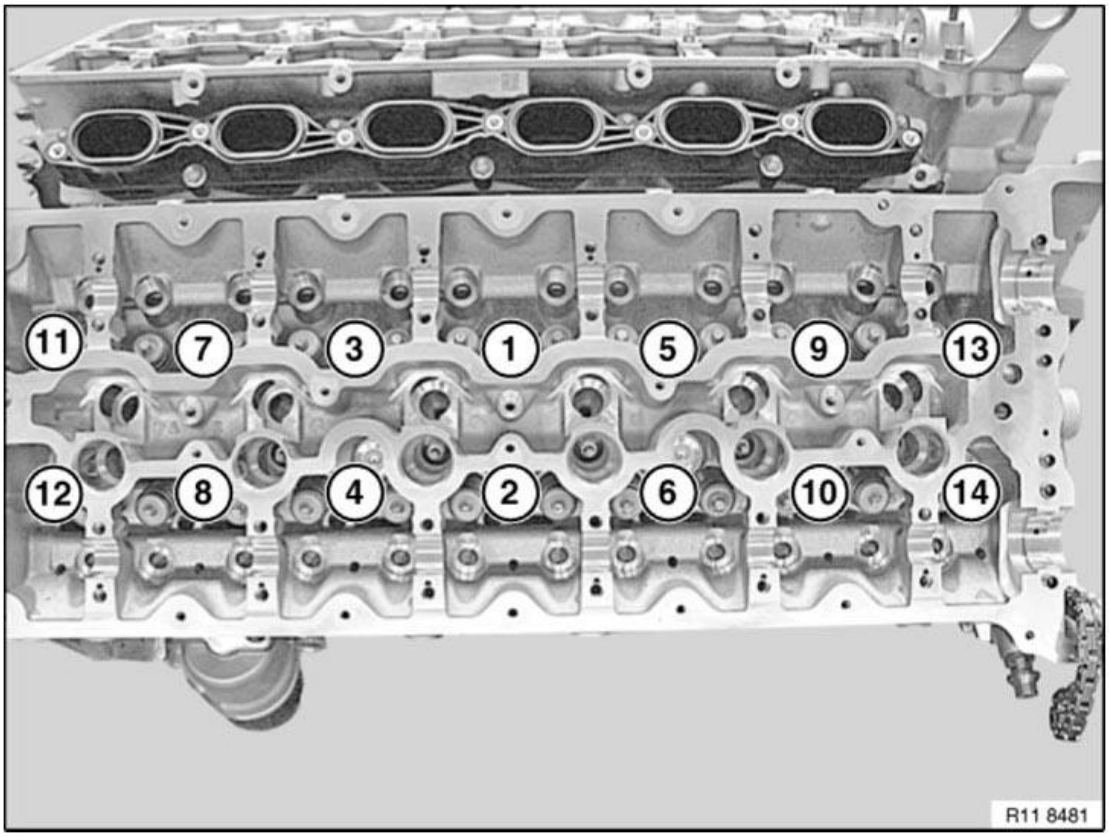


Fig. 80: Identifying Cylinder Head Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing faces of cylinder head and engine block; if necessary, remove gasket debris compound with special tool **11 4 470** . Make sure no gasket remnants drop into oil and cooling channels.

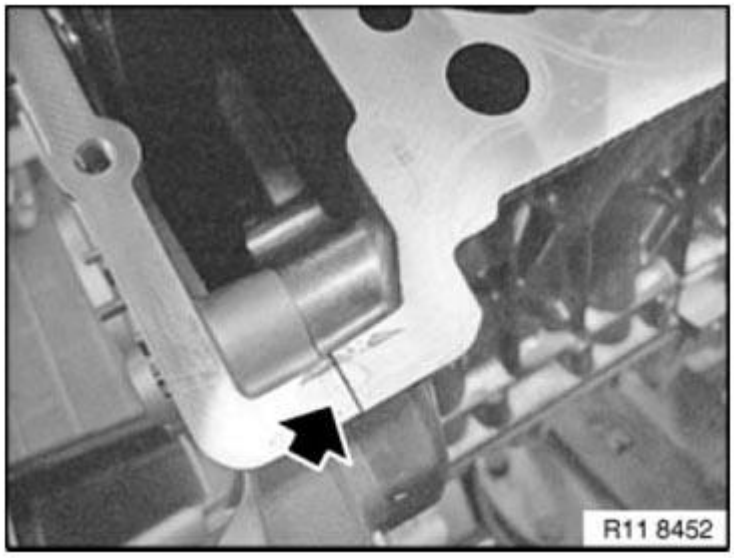


Fig. 81: Locating Sealing Face Of Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of cracking!

Threaded bores in engine block must be free of dirt and oil

Check **CYLINDER HEAD FOR LEAKS**.

Check **CYLINDER HEAD SEALING FACE** for surface evenness.

Coat joint between engine block and timing case cover with Drei Bond **1209** (refer to BMW Parts Service).

NOTE: Graphic shows an N62 engine by way of example.

Coat joint between engine block and timing case cover with Drei Bond 1209 (refer to BMW Parts Service).

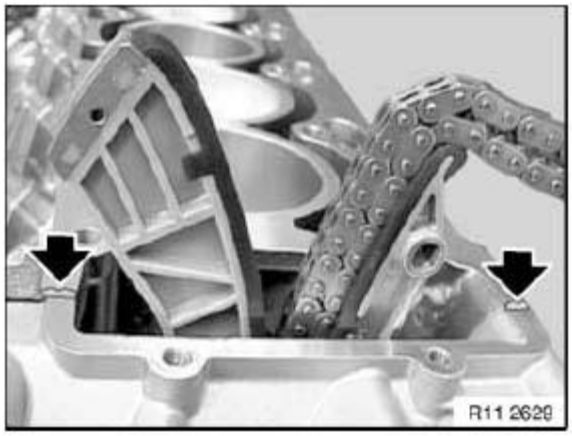


Fig. 82: Locating Drei Bond Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustrations show N62.

Check dowel sleeves (1) for damage and correct installation position.

Installation:

Replace cylinder head gasket .

Fit new cylinder head gasket (2).

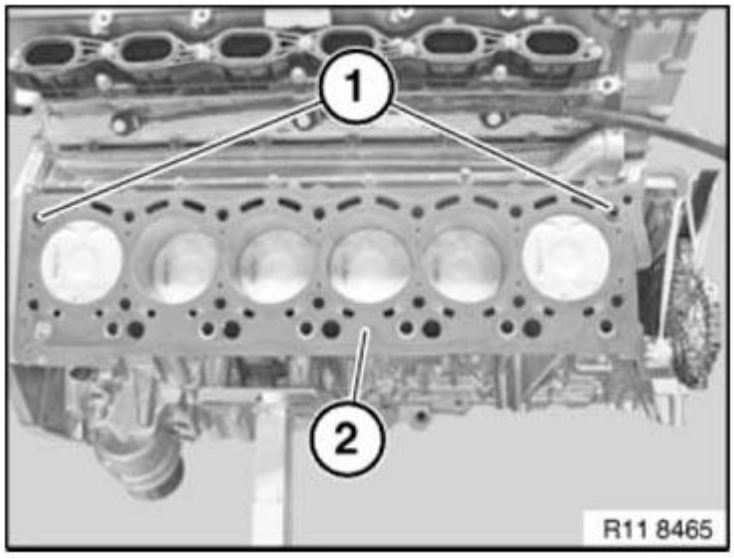


Fig. 83: Identifying Cylinder Head Gasket And Dowel Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Join tensioner rails together using appropriate tool and insert timing chain.

Fit cylinder head with ventilation line.

Do not wash off bolt coating.

Fit new cylinder head screws .

Insert new cylinder head bolts and initially tighten so that they are free of play.

Tighten down cylinder head bolts in sequence 1 - 14.

Tightening torque: see 1AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

NOTE: For purposes of clarity, the graphic shows the camshafts removed.

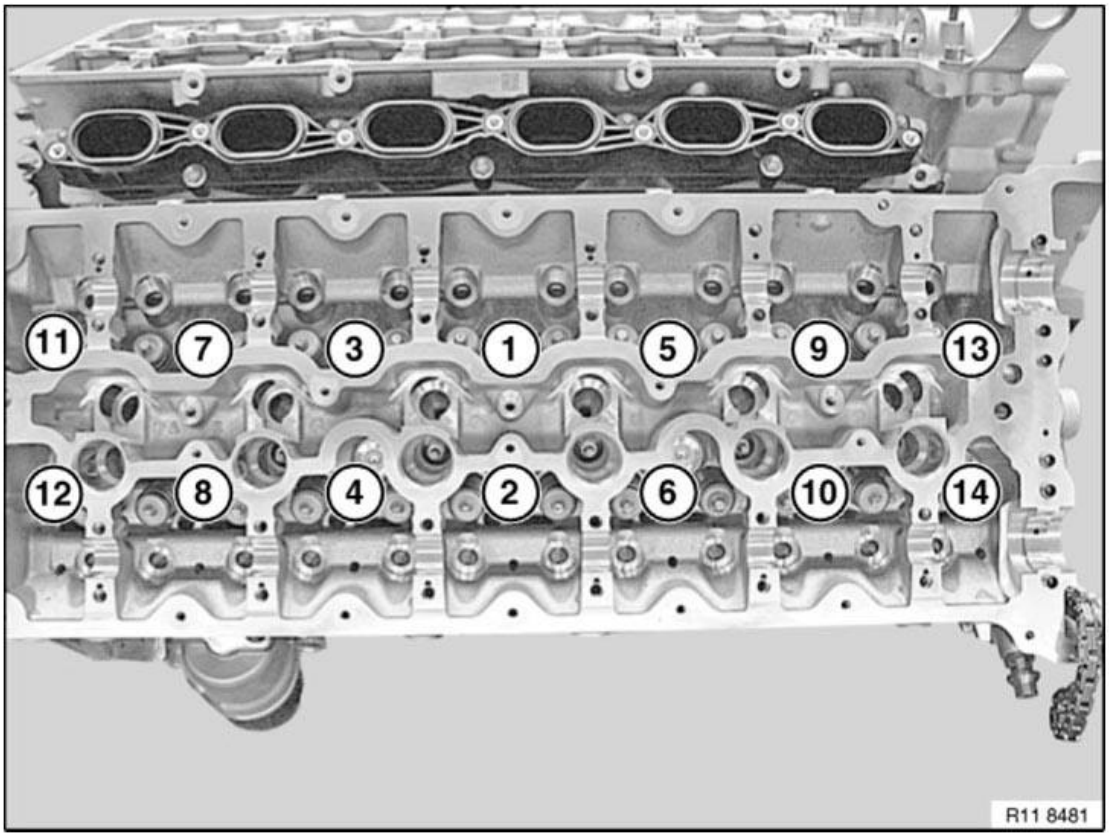


Fig. 84: Identifying Cylinder Head Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

To make it easier to check angle tightening, mark all collar bolts M11 using an oil-proof marker pen (see illustration).

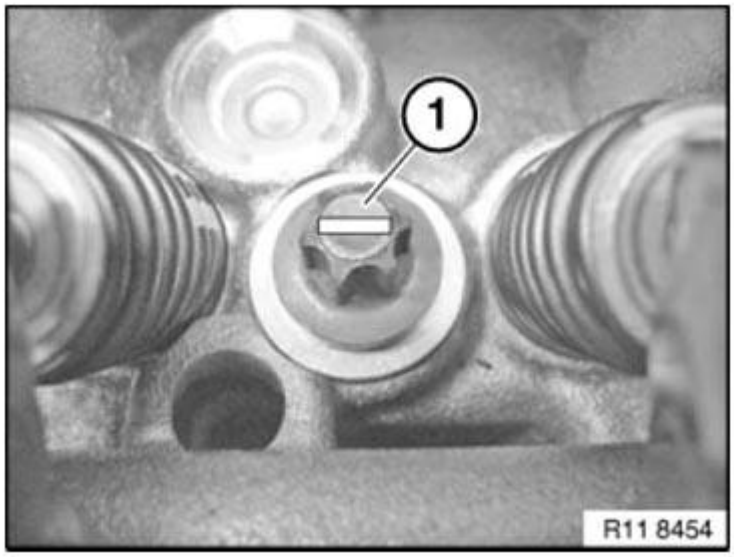


Fig. 85: Identifying Mark On Collar Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Insert and tighten down screws between cylinder head and timing case cover.

Tightening torque: see 2AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

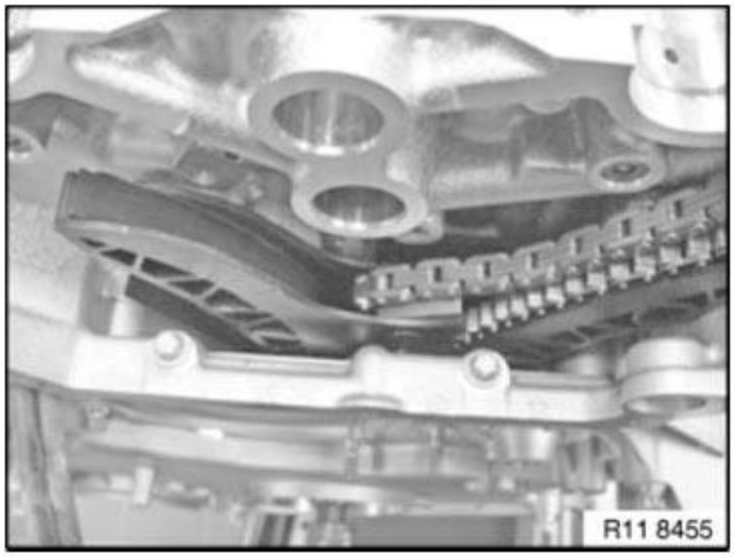


Fig. 86: Identifying Chain Tensioner Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on top guide rail.

Tightening torque: see 4AZ in **11 31 CAMSHAFT**

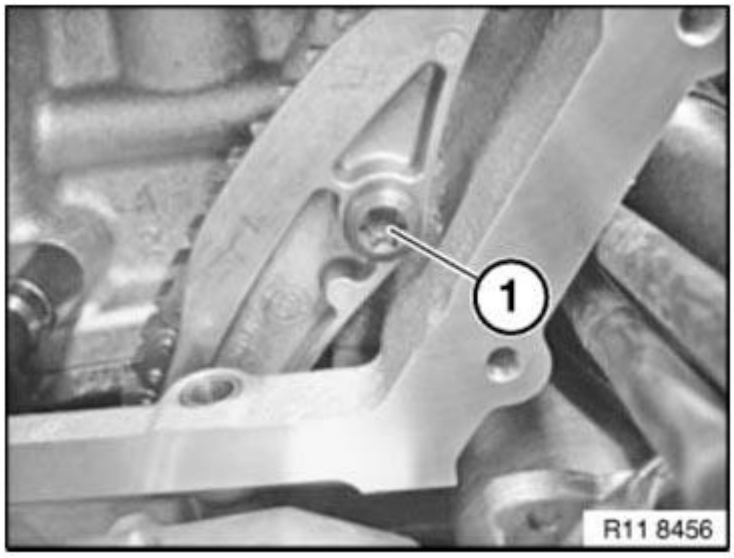


Fig. 87: Identifying Top Guide Rail Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on bottom guide rail.

Installation:

Replace O-ring.

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

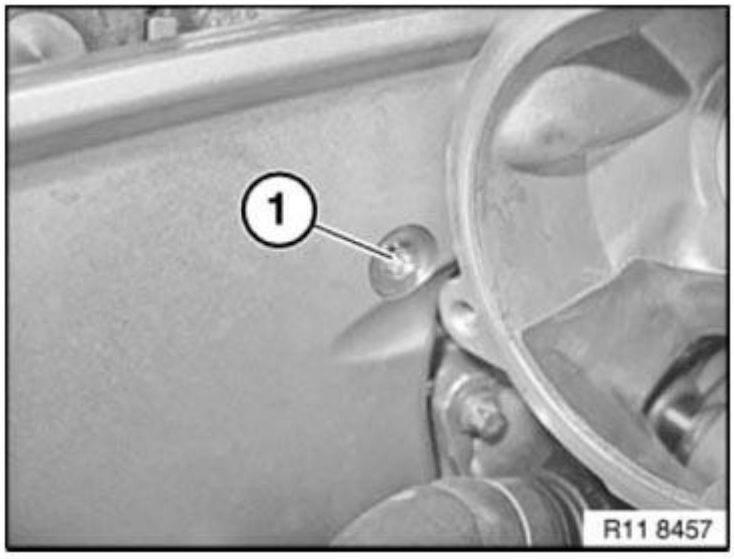


Fig. 88: Identifying Bottom Guide Rail Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, install camshafts. See **RIGHT INTAKE CAMSHAFT** and **RIGHT EXHAUST CAMSHAFT**.

Install **INTAKE AND EXHAUST ADJUSTMENT UNIT ON LEFT SIDE**.

Assemble engine.

11 12 005 REMOVING AND INSTALLING/SEALING LEFT CYLINDER HEAD COVER (N74)

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**
- Clamp off battery **NEGATIVE TERMINAL**
- Remove left **INTERCOOLER**
- Remove **INTAKE AIR MANIFOLD**
- **REMOVE IGNITION COILS** on right
- Remove **FUEL RAIL**
- Detach wiring harness for injectors and lay to one side
- Remove **H.P. PUMP** .

Release bolts in sequence (24 to 1).

Remove cylinder head cover.

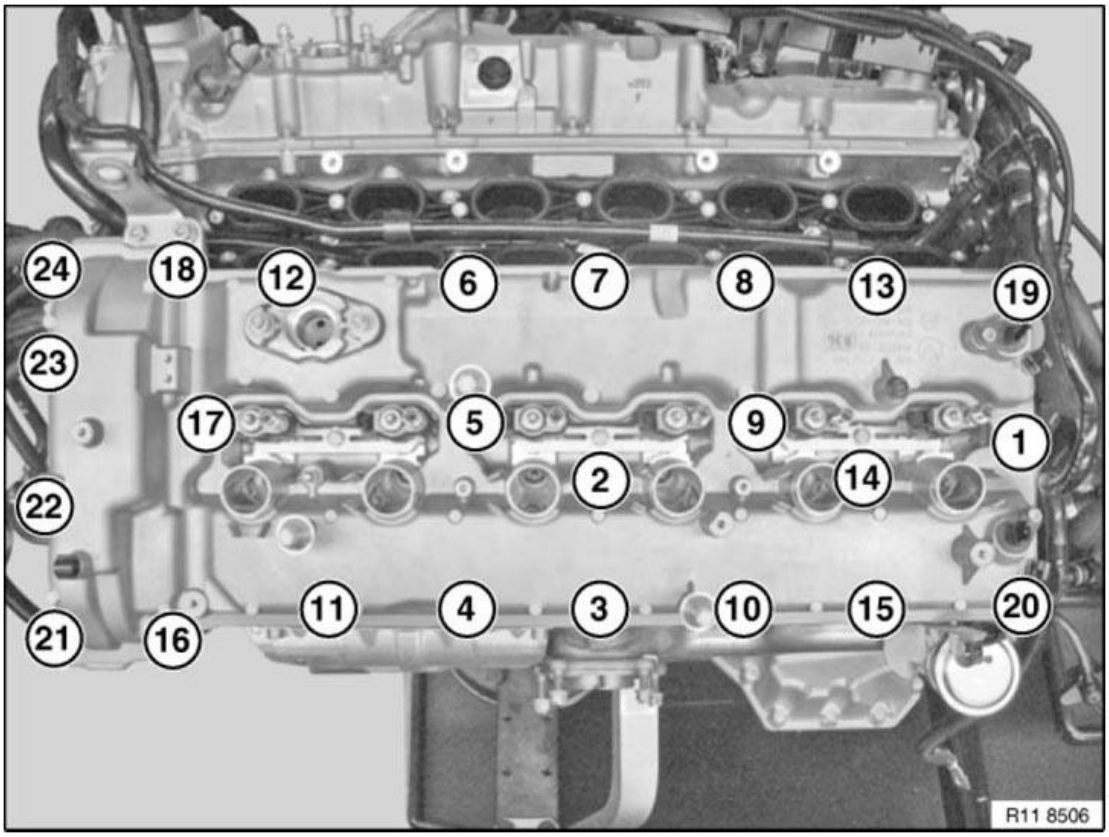


Fig. 89: Identifying Cylinder Head Cover Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing surface (1) with special tool **11 4 470** .

Installation:

Replace seal (2) .

NOTE: Graphics show N63.

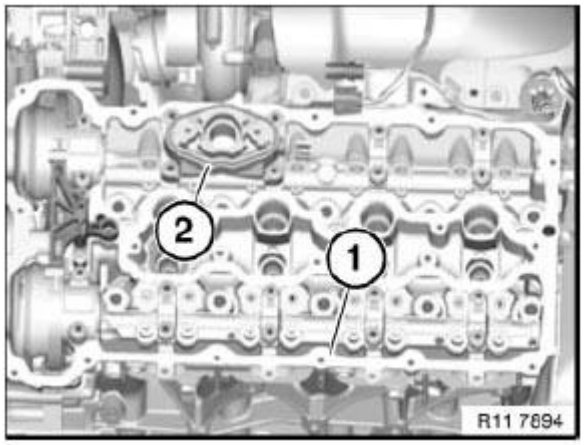


Fig. 90: Identifying Cylinder Head Cover Sealing Surface And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Apply thin coating of **DREI BOND 1209** sealing on left and right contact points on gear case cover.

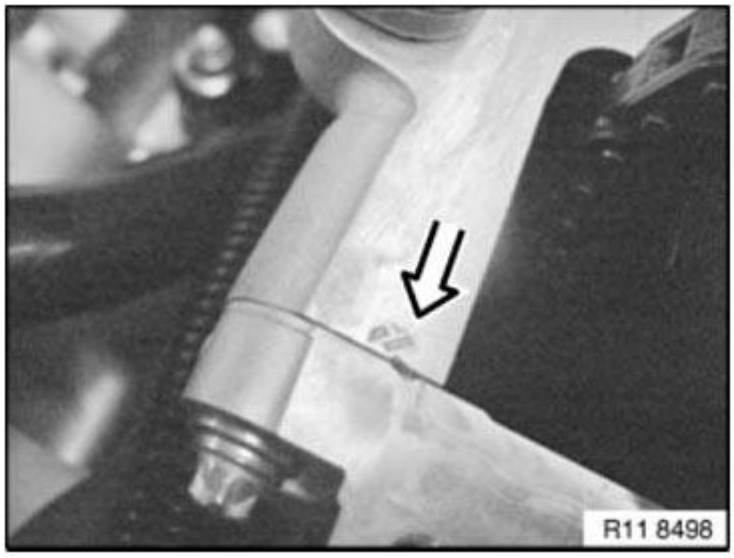


Fig. 91: Locating Drei Bond Applying Location
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace profile seal (1) on cylinder head cover .

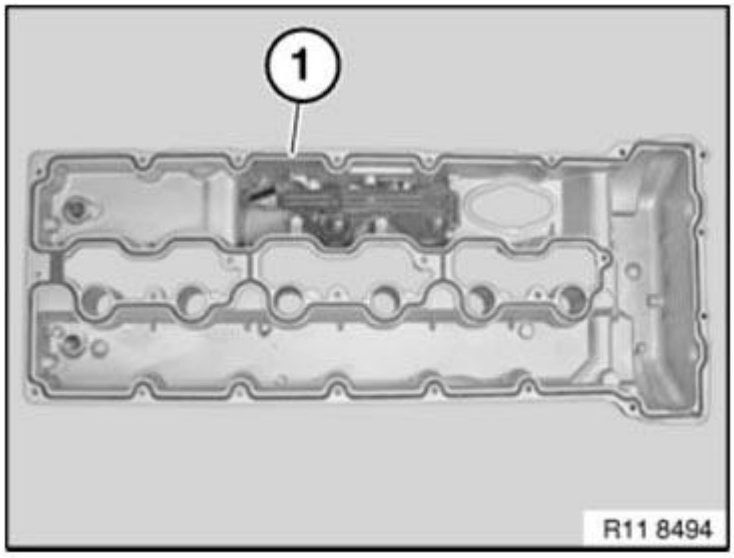


Fig. 92: Identifying Cylinder Head Cover Profile Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

It is important to join screw (1) for exact positioning of the camshaft sensors.

Fit cylinder head cover.

Position screw (1).

Release screw (1) by 90°.

NOTE: Graphics show N63.

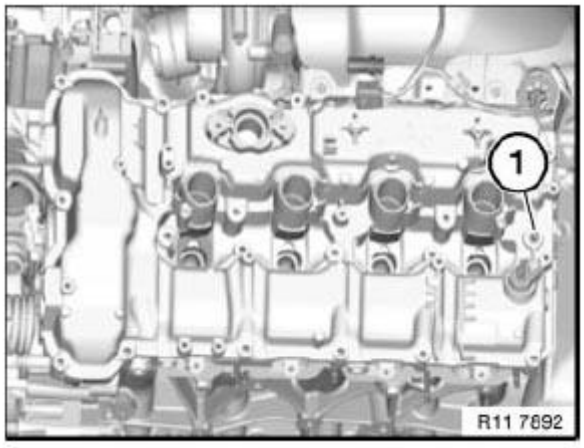


Fig. 93: Identifying Cylinder Head Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Secure cylinder head cover in sequence (1 to 24) in two work steps.

Tightening torque: see 3AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

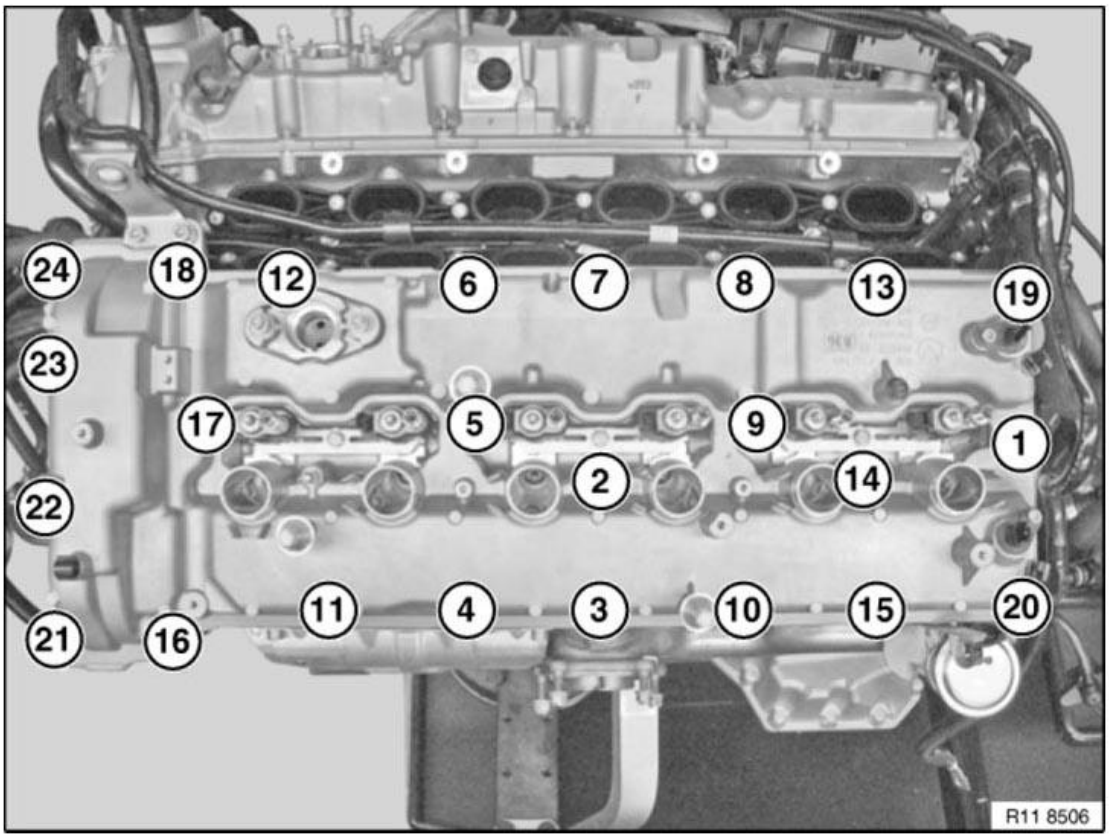


Fig. 94: Identifying Cylinder Head Cover Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Change over all sensors when replacing cylinder head cover.

11 12 006 REMOVING AND INSTALLING/SEALING RIGHT CYLINDER HEAD COVER (N74)

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**
- Clamp off battery **NEGATIVE TERMINAL**
- Remove **INTERCOOLER** .
- Remove **INTAKE AIR MANIFOLD**
- Remove **IGNITION COILS** on right

- Remove **FUEL RAIL**
- Detach wiring harness for injectors and lay to one side
- Remove **H.P. PUMP.**

Release bolts in sequence (25 to 1).

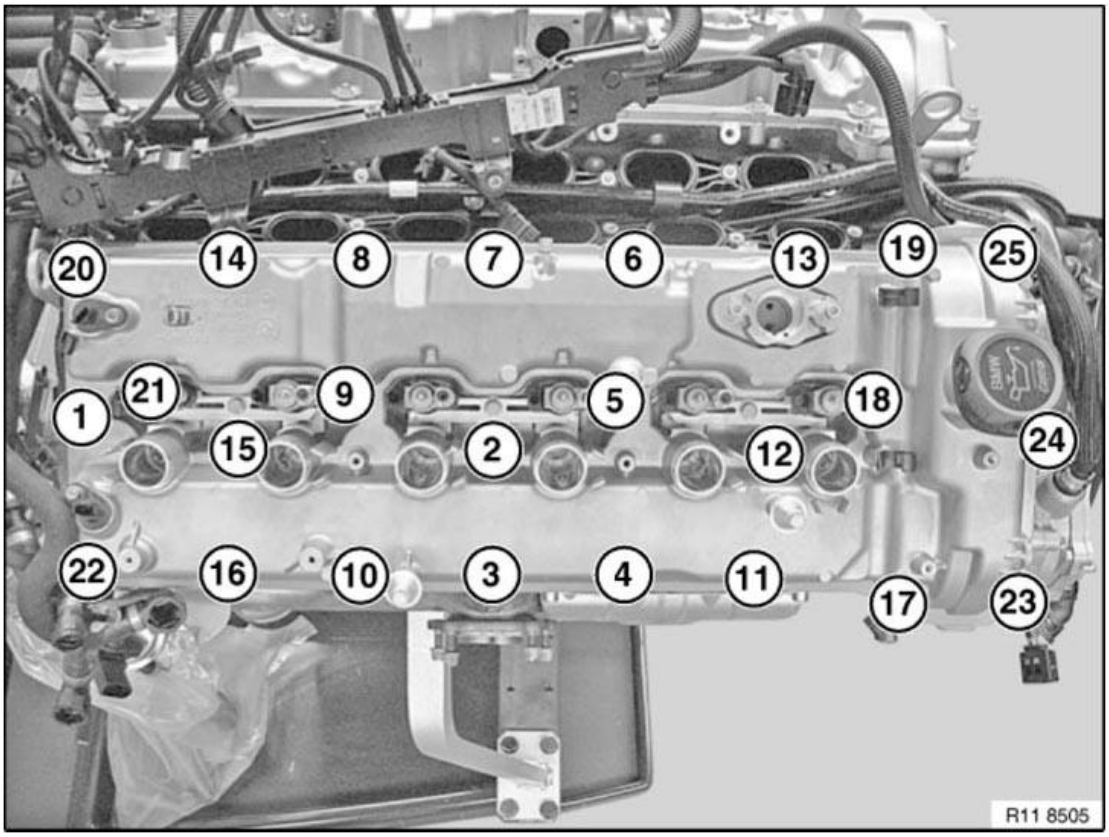


Fig. 95: Identifying Cylinder Head Cover Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cylinder head cover.

Clean sealing surface (1) with special tool **11 4 470** .

Installation:

Replace seal (2) .

NOTE: Graphics show N63.

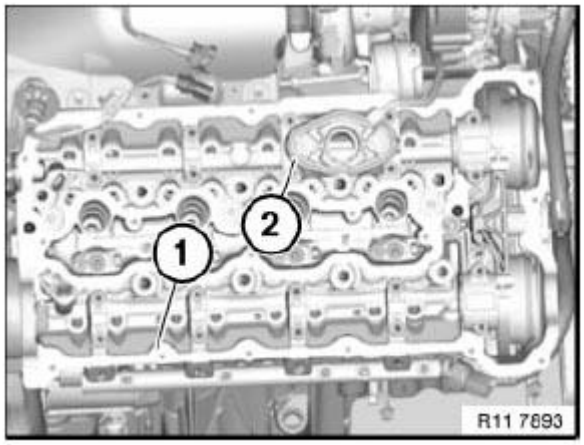


Fig. 96: Identifying Cylinder Head Cover Sealing Surface And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Apply thin coating of **DREI BOND 1209** sealing compound on left and right contact points on gear case cover.

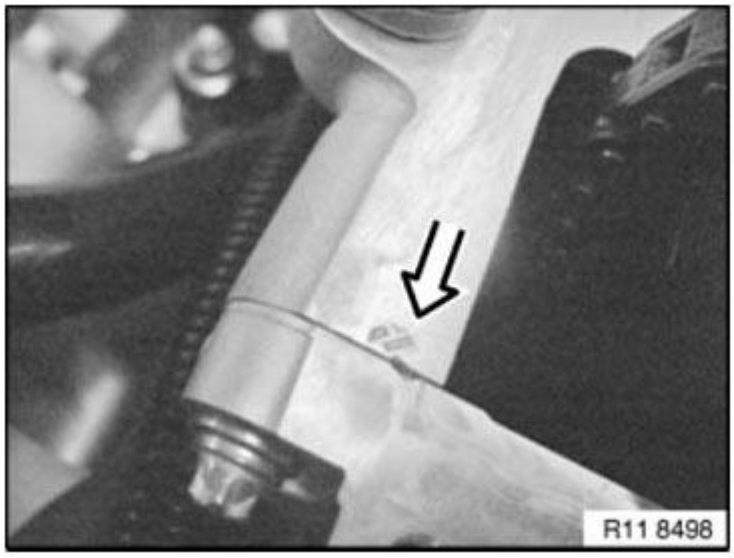


Fig. 97: Identifying Drei Bond Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace **profile seal (1) on cylinder head cover** .

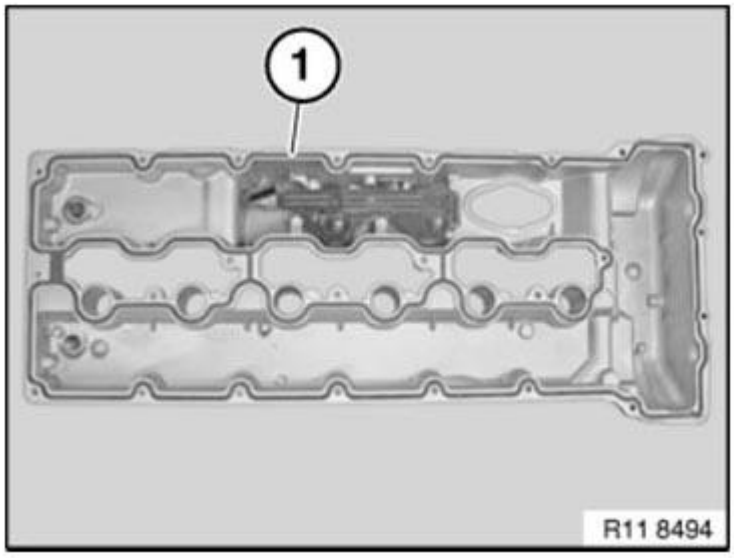


Fig. 98: Identifying Cylinder Head Cover Profile Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

It is important to join screw (1) for exact positioning of the camshaft sensors.

Fit cylinder head cover.

Position screw (1).

Release screw (1) by 90°.

NOTE: Graphics show N63.

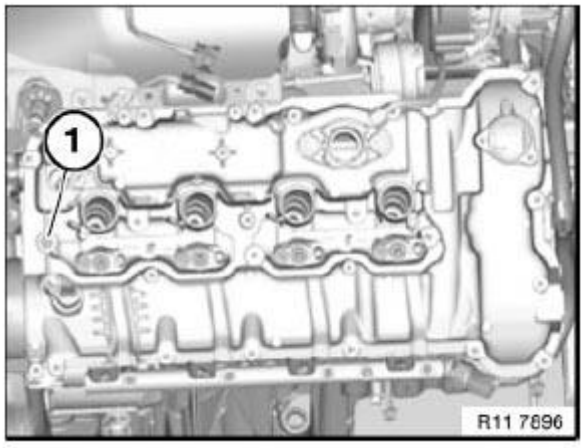


Fig. 99: Identifying Cylinder Head Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Secure cylinder head cover in sequence (1 to 25) in two work steps.

Tightening torque: see 3AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

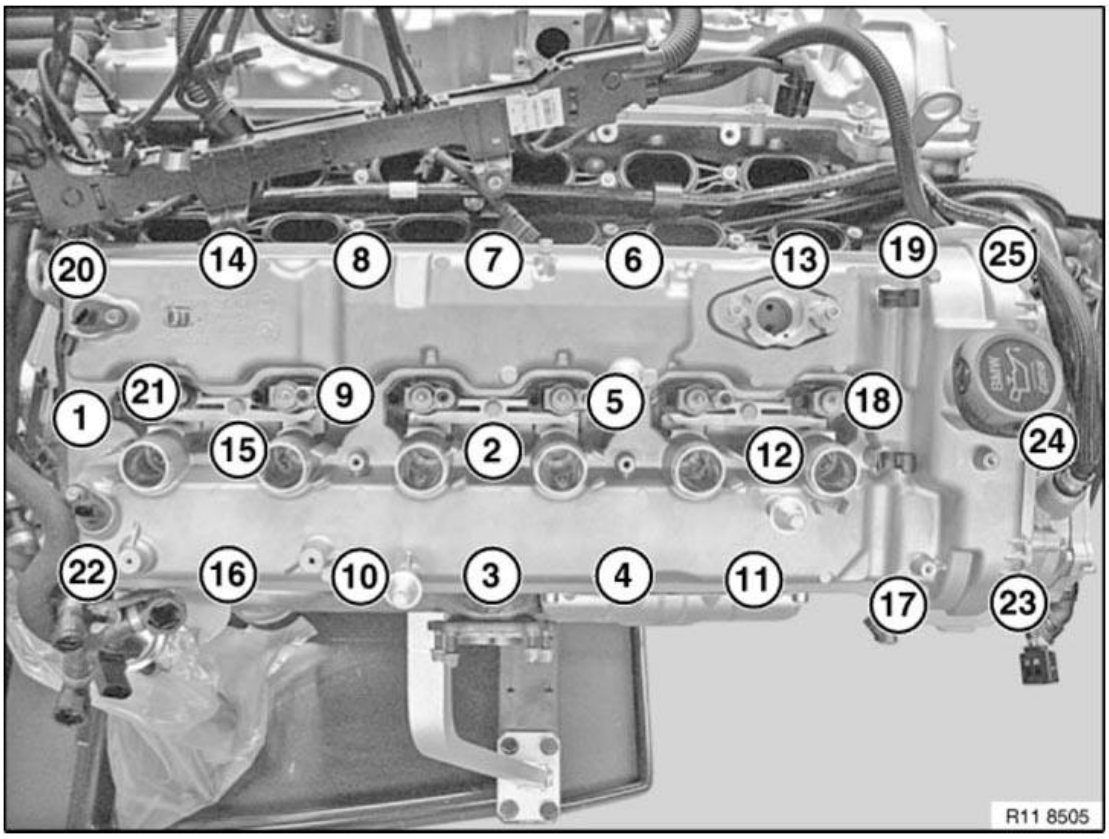


Fig. 100: Identifying Cylinder Head Cover Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Change over all sensors when replacing cylinder head cover.

11 12 112 REPLACING BOTH CYLINDER HEAD GASKETS (N74)

Necessary preliminary tasks:

- Remove left **CYLINDER HEAD**
- Remove right **CYLINDER HEAD**

Installation:

The cylinder head gaskets for cylinders 1 - 6 and 7 - 12 are identical

There is no marking (TOP).

Cylinder head gasket must be correctly positioned on the timing chain case depending on its styling.

Pay attention to fitting sleeves (1).

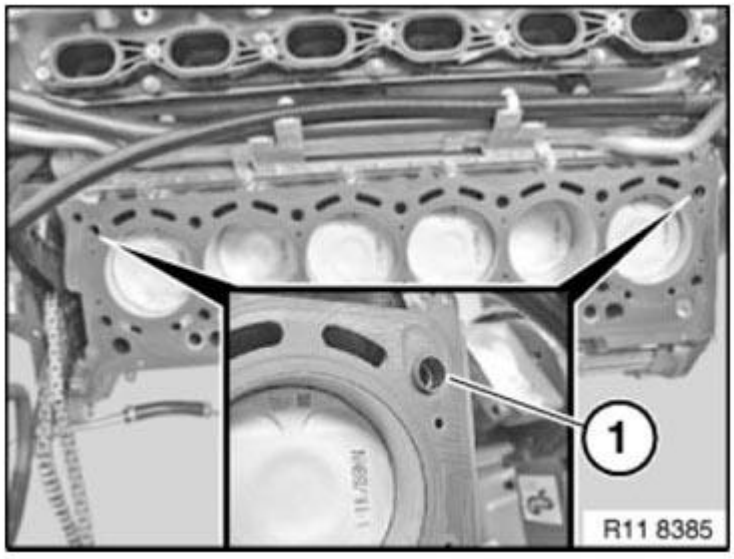


Fig. 101: Identifying Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Repair gasket (+REP) is 0.3 mm thicker.

Check cylinder head for surface evenness. See **VALVE SEAT TECHNICAL DATA** , **HEAD/VALVES/GUIDES/BEARINGS TECHNICAL DATA** , and **RESURFACING CYLINDER HEAD SEALING FACE**.

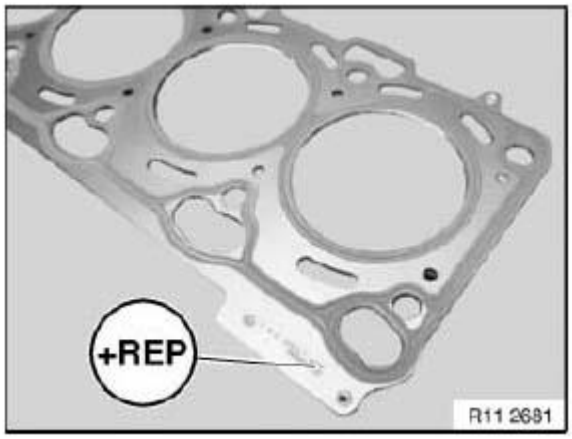


Fig. 102: Identifying Gasket (+REP)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N74)

Necessary preliminary tasks:

- Remove cylinder head. See **LEFT CYLINDER HEAD** or **RIGHT CYLINDER HEAD**.

Cylinder head disassembled

Check evenness of cylinder head sealing face with a standard straightedge (1).

NOTE: Maximum plane deviation: longitudinal 0.10 mm.

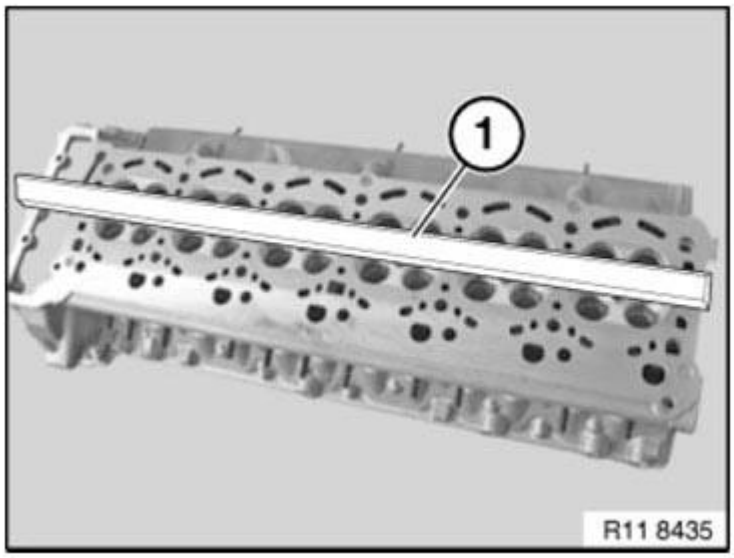


Fig. 103: Checking Cylinder Head Sealing Face Evenness Using Standard Straightedge
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Maximum plane deviation: transversal 0.05 mm.

- **Machining limit: see HEAD/VALVES/GUIDES/BEARINGS TECHNICAL DATA and VALVE SEAT TECHNICAL DATA .**

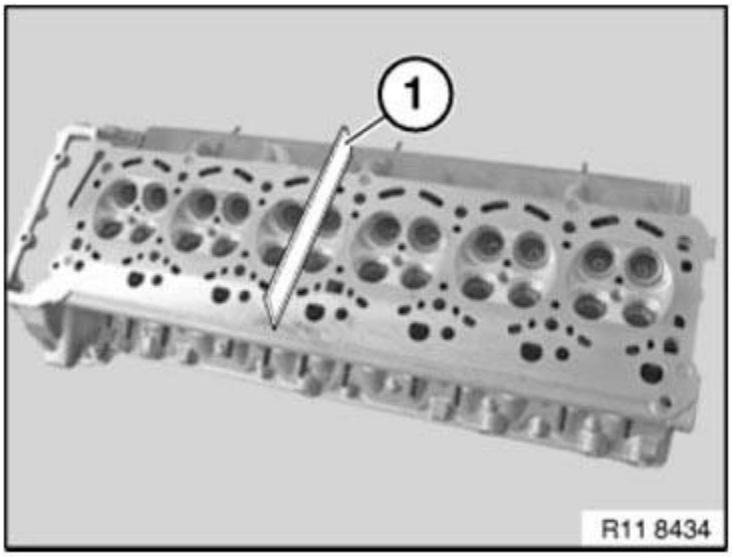


Fig. 104: Checking Cylinder Head Maximum Plane Deviation Using Standard Straightedge
Courtesy of BMW OF NORTH AMERICA, INC.

A cylinder head gasket (+REP) 0.3 mm thicker than usual can be obtained for machined (resurfaced) cylinder heads.

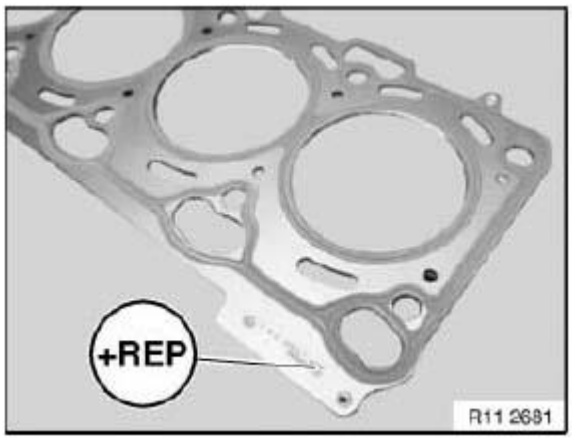


Fig. 105: Identifying Gasket (+REP)
Courtesy of BMW OF NORTH AMERICA, INC.

OIL SUMP

11 13 020 REMOVING AND INSTALLING/REPLACING LOWER OIL SUMP SECTION

Necessary preliminary tasks:

- Remove **STIFFENING PLATE**
- Drain **ENGINE OIL**

Disconnect plug connection on level sensor.

Release all screws along line (1).

Installation:

Replace seal.

Tightening torque: see 3AZ in **11 13 OIL SUMP**

Assemble engine.

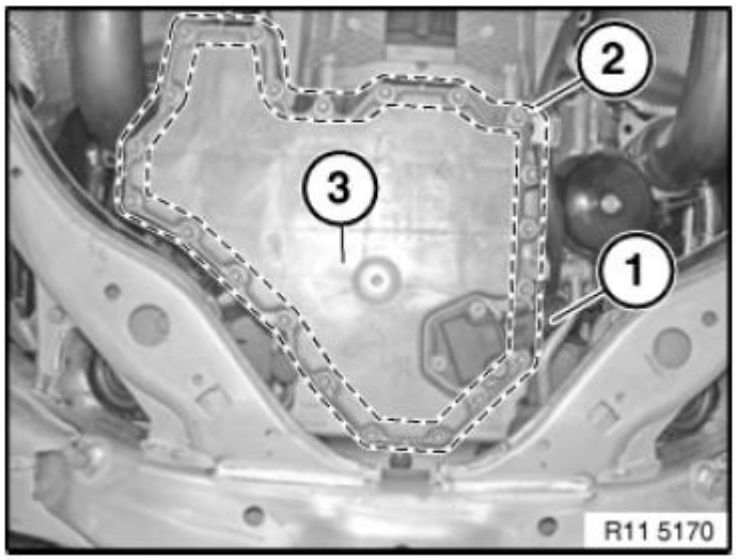


Fig. 106: Locating Screws
Courtesy of BMW OF NORTH AMERICA, INC.

11 13 010 REMOVING AND INSTALLING/REPLACING UPPER OIL SUMP SECTION (N74)

Necessary preliminary tasks:

- Drain off **ENGINE OIL**
- Secure engine in **INSTALLATION POSITION**
- **LOWER FRONT AXLE**
- Remove **LOWER** oil sump section
- Release **SUPPLY AND RETURN LINES** on oil filter
- Unclip wiring harness on oil sump

Unfasten screws (2).

Tightening torque: see 1AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

NOTE: Illustrations show N63.

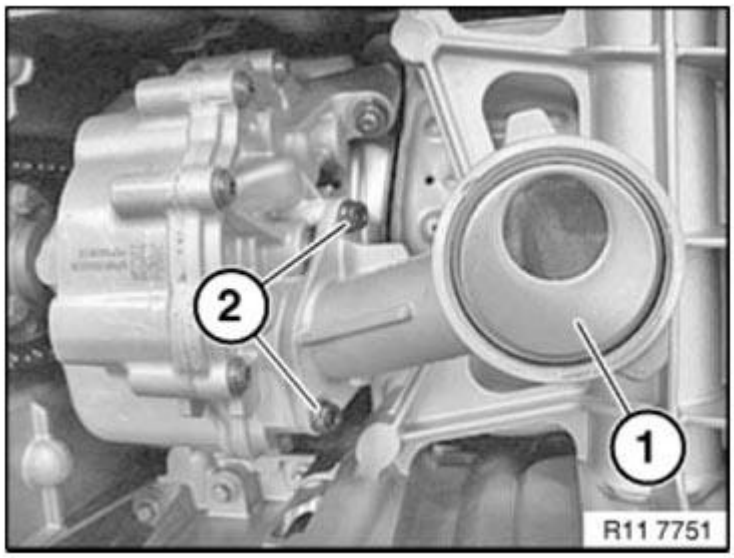


Fig. 107: Identifying Thermostat And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release thermostat (2).

Tightening torque: see 8AZ in **11 42 OIL FILTER AND LINES**

Open oil drain plug on oil filter cap.

Release oil filter cap with special tool **11 9 240** .

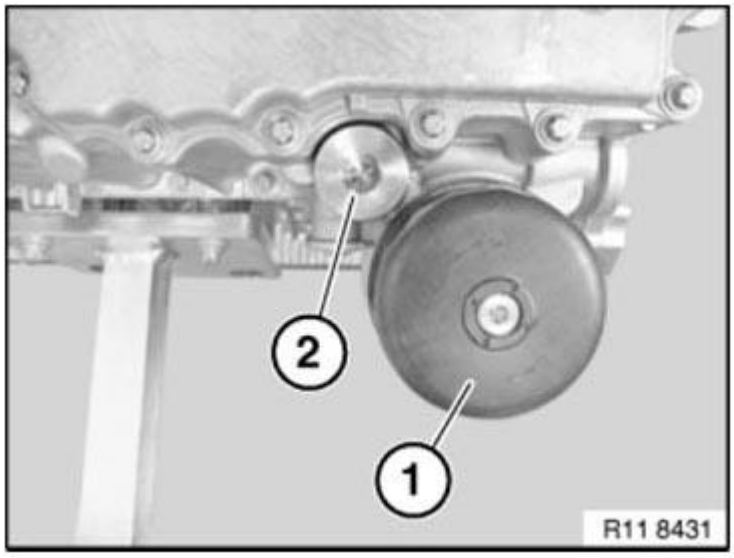


Fig. 108: Identifying Oil Filter And Thermostat
Courtesy of BMW OF NORTH AMERICA, INC.

Remove oil filter cover with oil filter (1) with special tool **11 9 240** .

Tightening torque: see 1AZ in **11 42 OIL FILTER AND LINES**

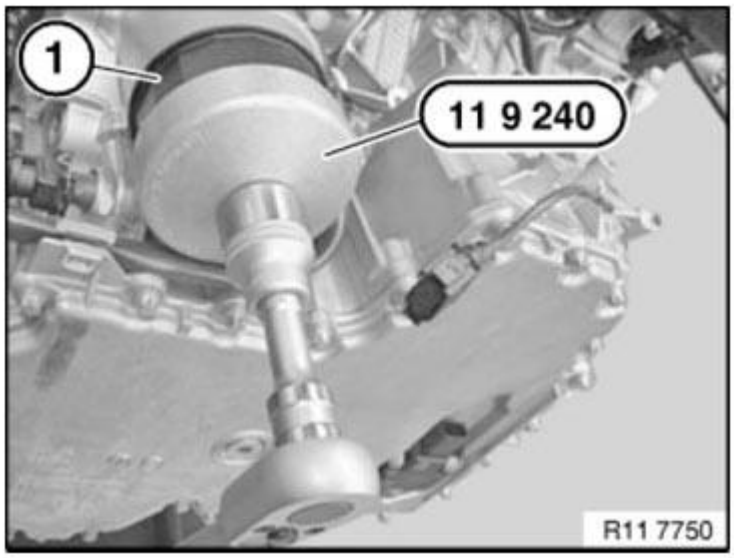


Fig. 109: Removing Oil Filter Cover Using Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Unfasten screws (2).

Tightening torque: see 2AZ in **11 13 OIL SUMP**

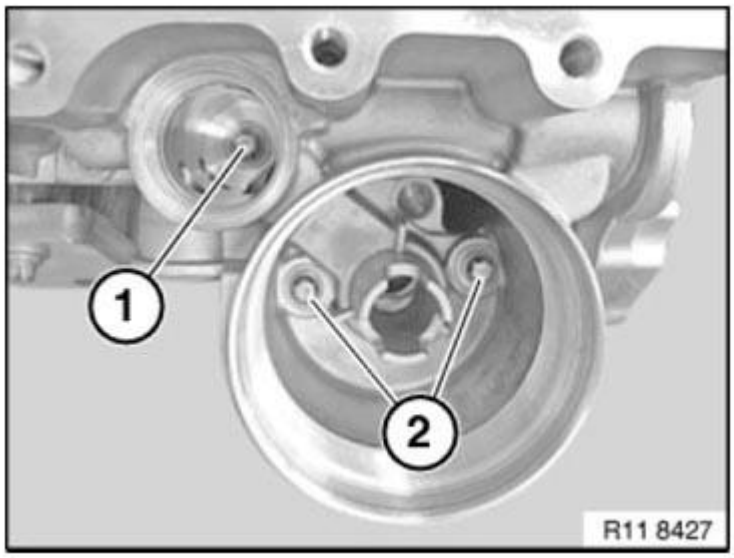


Fig. 110: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts in area of line (1).

Tightening torque: see 2AZ in **11 13 OIL SUMP**

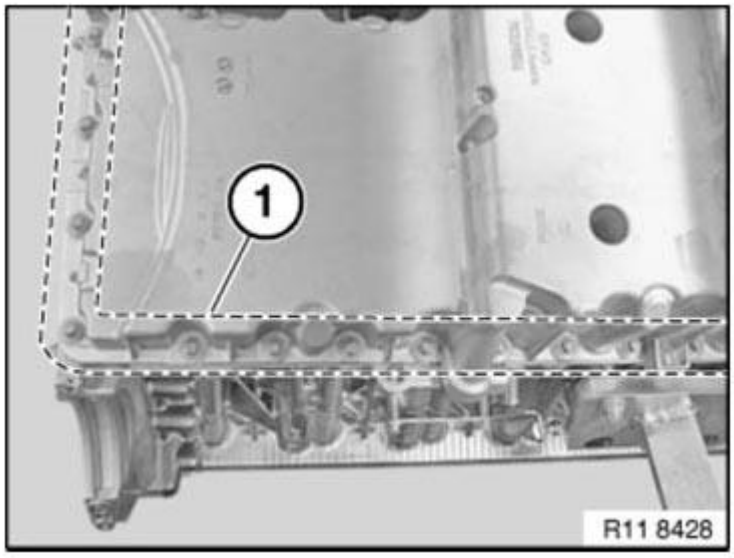


Fig. 111: Releasing Bolts In Area Of Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts in area of line (1).

Tightening torque: see 2AZ in **11 13 OIL SUMP**

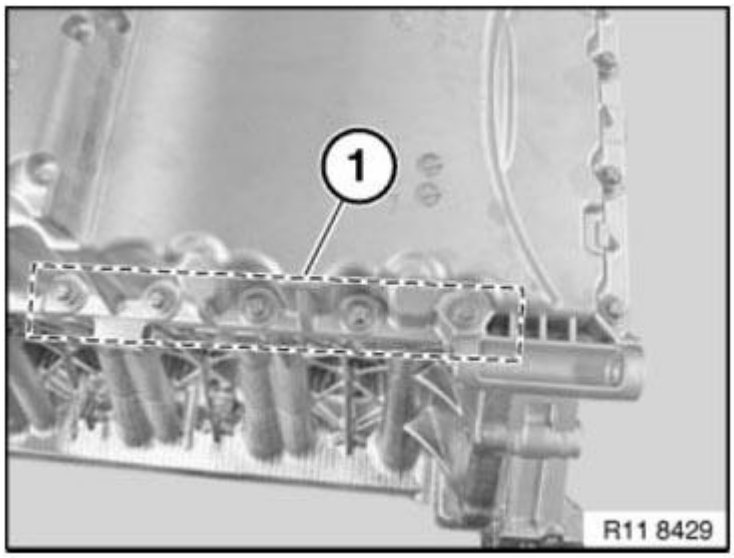


Fig. 112: Releasing Bolts In Area Of Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 2AZ in **11 13 OIL SUMP**

Release 4 bolts on transmission side.

Tightening torque: see 1AZ in **24 00 TRANSMISSION IN GENERAL**

Remove upper oil sump section (1).

Installation:

Free sealing faces of seal debris and clean.

Replace gasket.

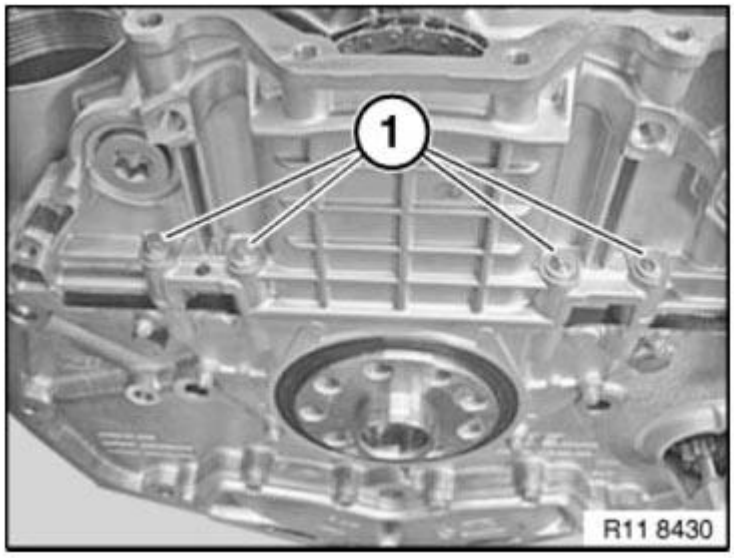


Fig. 113: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Special tool 11 8 780 is only necessary if transmission is removed.

Position special tool 11 8 780 with transmission bolts (1) so that engine oil sump is flush with engine block. Fasten upper oil sump section.

NOTE: Illustrations show N57.

Assemble engine.

HOUSING COVER

11 14 080 REMOVING AND INSTALLING GEAR CASE COVER, TOP LEFT (N74)

Gear case cover, cylinders 7-12

Necessary preliminary tasks:

- Remove **ALTERNATOR** .
- Remove **LEFT CYLINDER HEAD COVER**.
- Remove both **SOLENOID VALVES** on left side

Release screw (3).

Release screw (2).

Release screws (1).

Tightening torque: see 4AZ in **11 14 CASE COVERS**

Remove gear case cover.

Installation:

Screw (3) is an ISA-screw (internal Torx drive).

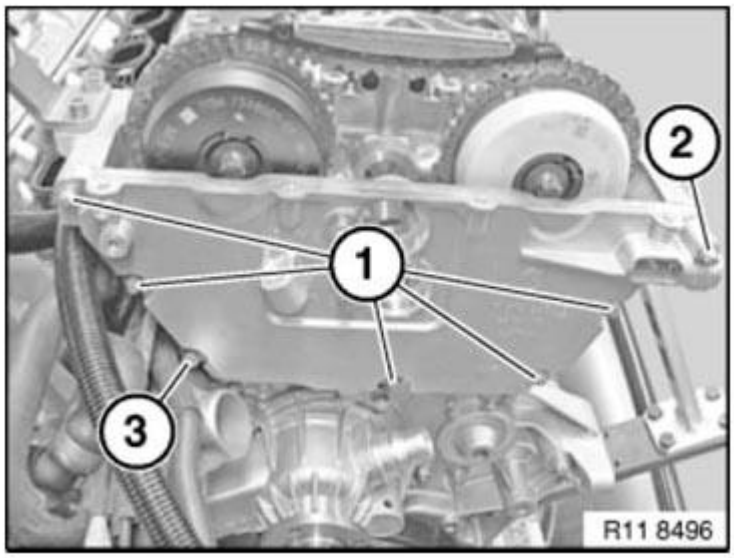


Fig. 114: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Check fitting bushes (1) for tight fit and damage.

Installation:

Replace seal (2) .

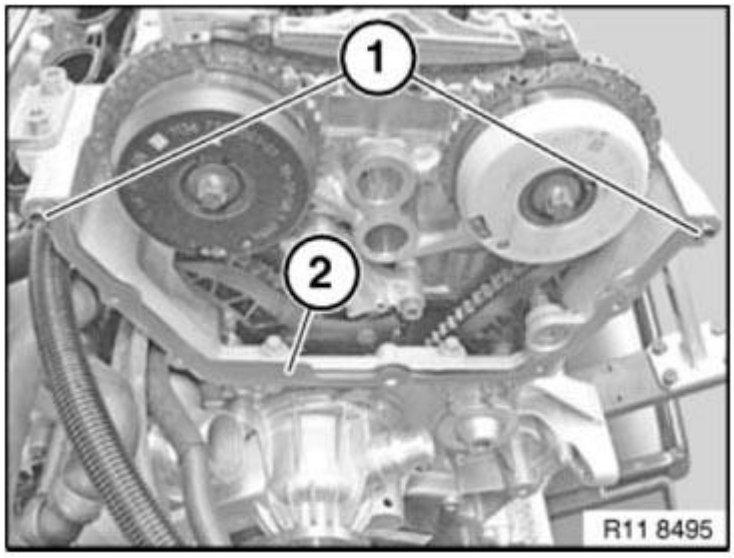


Fig. 115: Identifying Fitting Bushes And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 110 REMOVING AND INSTALLING LOWER TIMING CASE COVER (N74)

Necessary preliminary tasks:

- Remove **ENGINE**
- Remove both cylinder heads. See **LEFT CYLINDER HEAD** and **RIGHT CYLINDER HEAD**.
- Remove **LOWER** oil sump section
- Remove **UPPER OIL SUMP SECTION**
- Remove alternator **BELT TENSIONER**
- Remove **VIBRATION DAMPER**
- Remove **COOLANT PUMP**
- Remove **ALTERNATOR**
- Remove **A/C COMPRESSOR**
- Remove hub for **VIBRATION DAMPER**

Undo bolts in sequence (14 to 1).

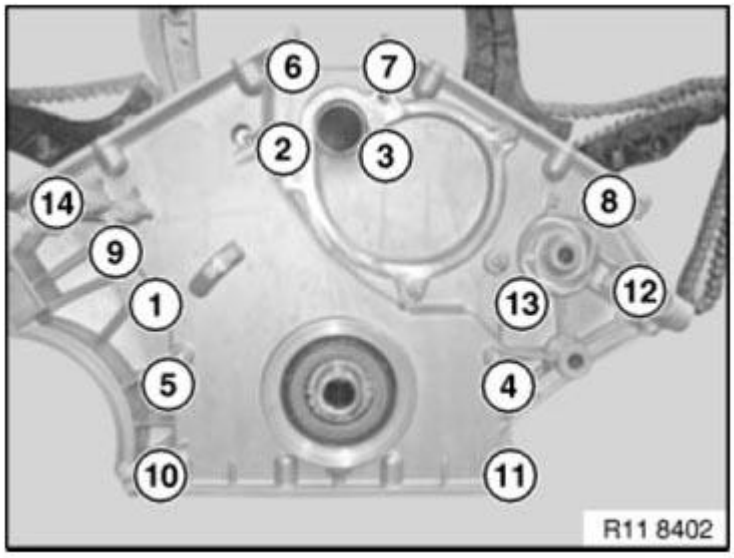


Fig. 116: Identifying Bolt Removal And Installation Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Remove gear case cover (1) in forward direction if necessary using a plastic hammer (2).

Clean sealing surfaces with special tool **11 4 470** .

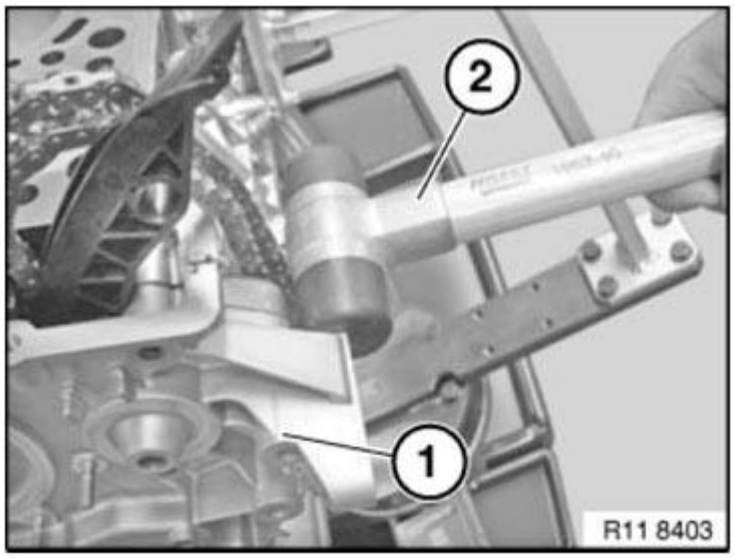


Fig. 117: Removing Gear Case Cover Using Plastic Hammer
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check jump guard for damage.

Release screw (1).

Tightening torque: see 1AZ in **11 14 CASE COVERS**

Remove jump guard (2).

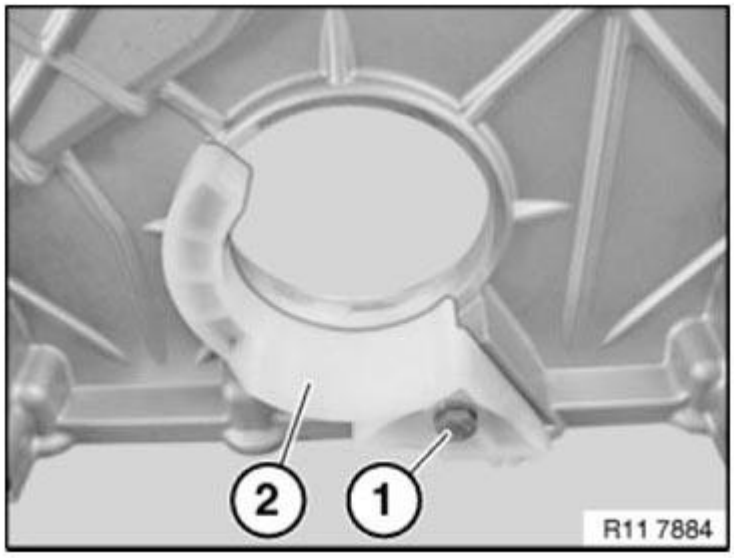


Fig. 118: Identifying Jump Guard And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove beaded metal gaskets (1, 2 and 3).

Clean all sealing surfaces with special tool **11 4 470** .

Installation:

Replace beaded metal gaskets (1, 2 and 3) .

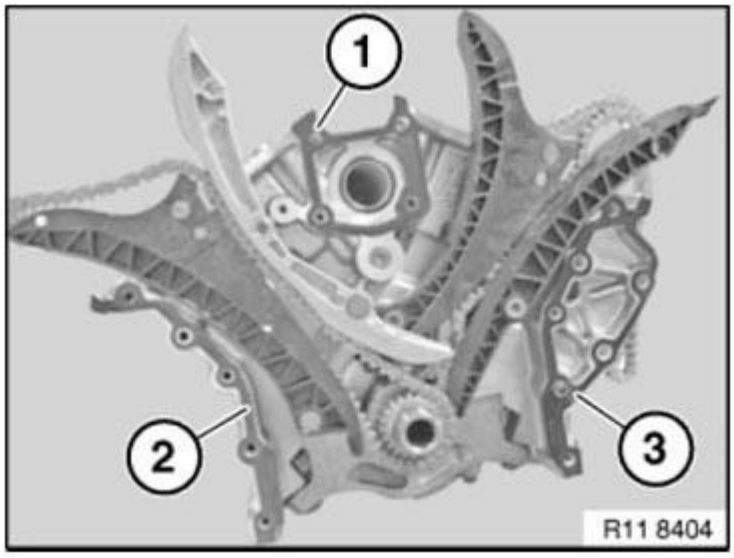


Fig. 119: Identifying Beaded Metal Gaskets
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws along lines (1).

Remove coolant cap (2).

NOTE: Graphics show N63.

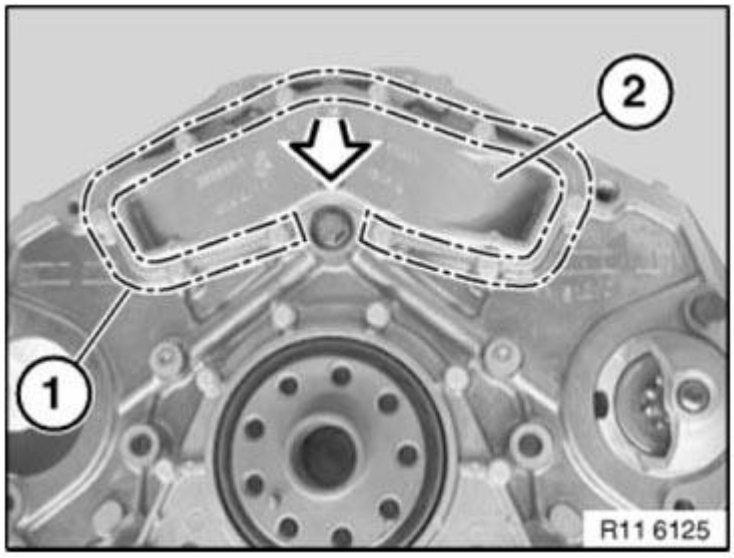


Fig. 120: Identifying Coolant Cap And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace seal (1).

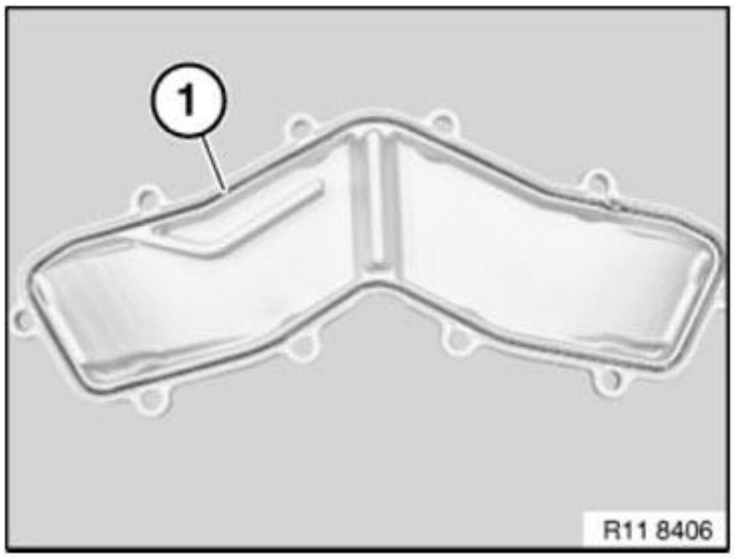


Fig. 121: Identifying Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

For safety reasons, the coolant supply pipe (1) must be replaced during the scope of gear case cover work (internal leakage).

Drive out coolant pipe (1) in direction of arrow with special tool 23 1 040.

NOTE: Picture shown without end cover for V-chamber.

The end cover does not have to be removed.

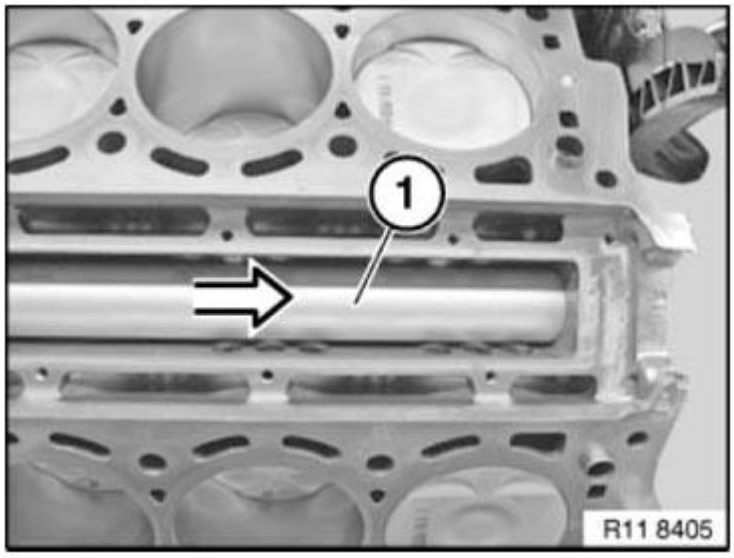


Fig. 122: Driving Out Coolant Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Fit beaded metal gaskets (1, 2 and 3).

Coat coolant pipe with lubricant (Circo Light) and move up to limit position.

Installation:

Replace beaded metal gaskets (1, 2 and 3) .

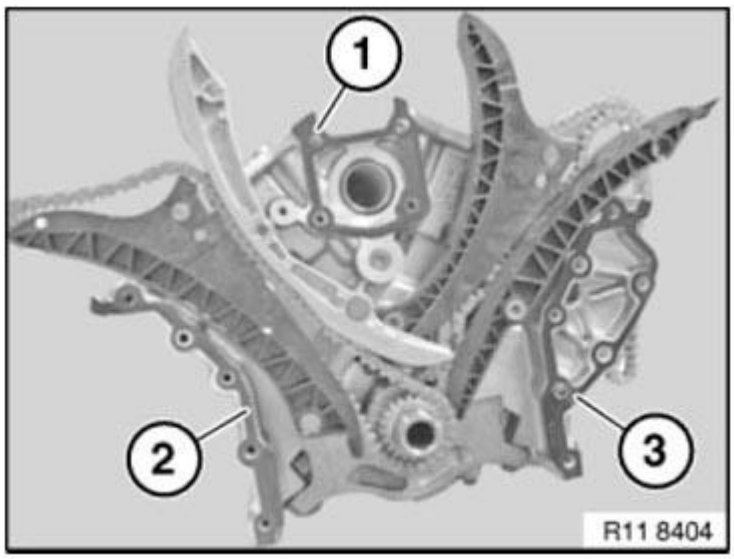


Fig. 123: Identifying Beaded Metal Gaskets
Courtesy of BMW OF NORTH AMERICA, INC.

Fit timing-chain cover.

Insert all screws in sequence (1 to 14) and initially tighten to approx. 5 Nm.

Tighten all bolts in sequence (1 to 14).

Tightening torque: see 2AZ in **11 14 CASE COVERS**

Installation:

Wait for PU material to emerge at sealing joints.

Carefully wipe off protruding PU material.

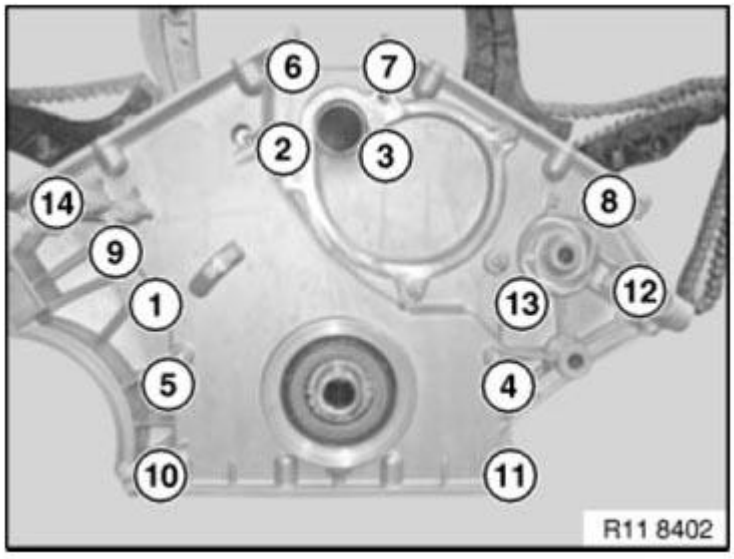


Fig. 124: Identifying Bolt Removal And Installation Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **RADIAL SHAFT SEAL** **in gear case cover at bottom** .

Assemble engine.

11 14 085 REMOVING AND INSTALLING TIMING CASE COVER, TOP RIGHT (N74)

Gear case cover, cylinders 1-6

Necessary preliminary tasks:

- Remove **SECONDARY-AIR PUMP.**
- Remove right **CYLINDER HEAD COVER.**
- Remove **FAN COWL WITH ELECTRIC FAN.**

- Remove **VACUUM PUMP.**

Disconnect plug connection (2 and 4) at solenoid valve.

Unfasten screws (1 and 3).

Release cable duct and lay to one side.

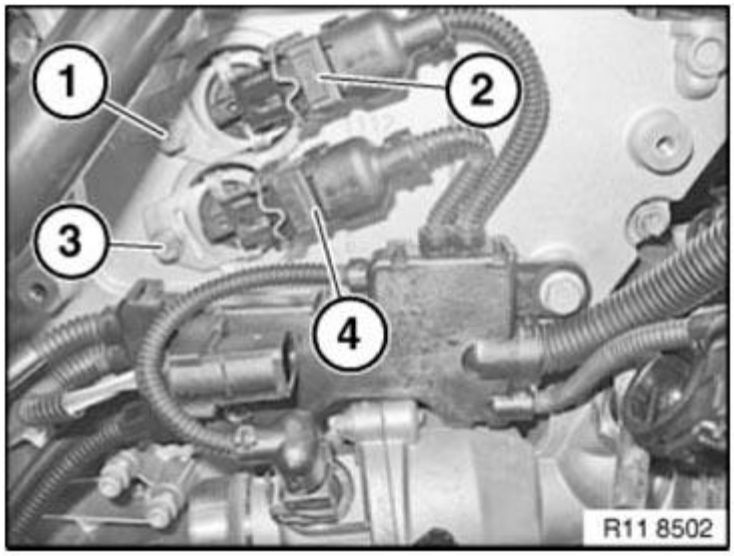


Fig. 125: Identifying Connectors And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove both solenoid valves (1 and 2).

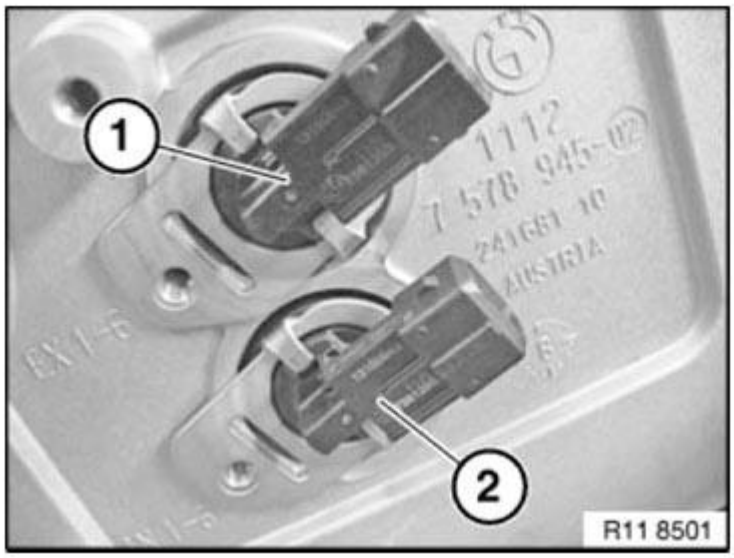


Fig. 126: Identifying Solenoid Valves

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Release screw (2).

Tightening torque: see 4AZ in **11 14 CASE COVERS**

Remove timing case cover (2).

Installation:

Screw (2) required to secure cable duct.

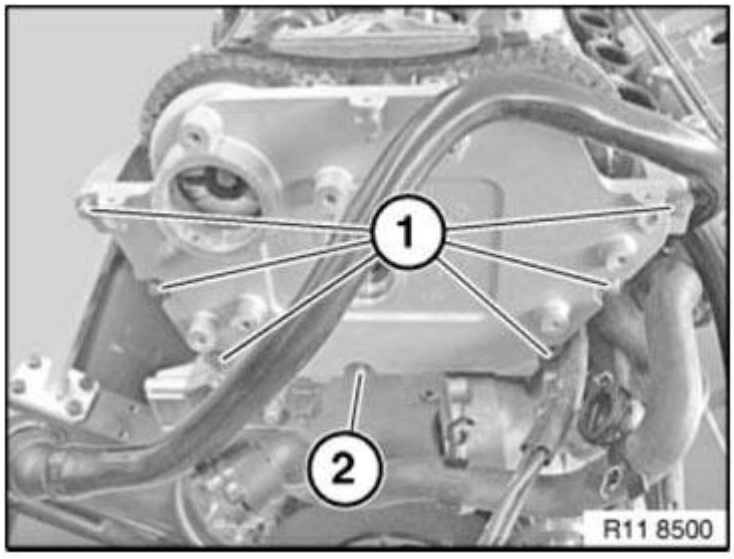


Fig. 127: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Check guide sleeves (1) for secure seating and damage.

Installation:

Replace seal (2) .

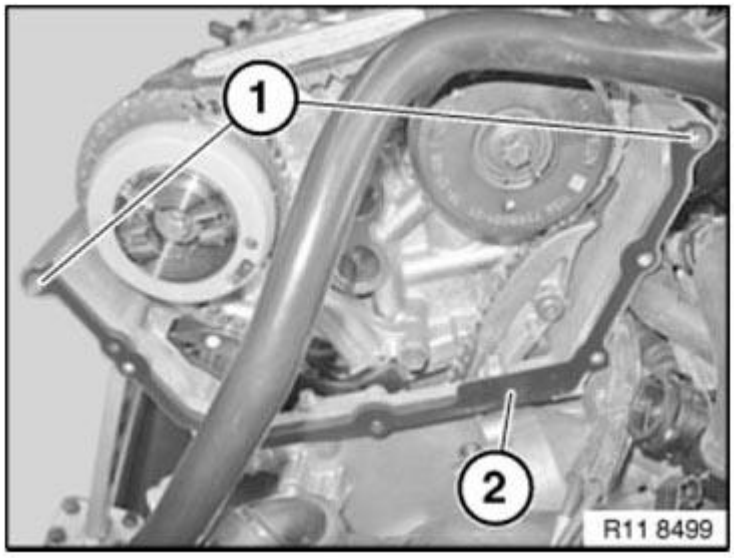


Fig. 128: Identifying Guide Sleeves And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 250 REMOVING AND INSTALLING/SEALING REAR COOLANT END COVER (N74)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Recycling:

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Remove flywheel
- Drain coolant

Release all screws in area (1).

Tightening torque: see 5AZ in **11 14 CASE COVERS**

Remove end cover (2).

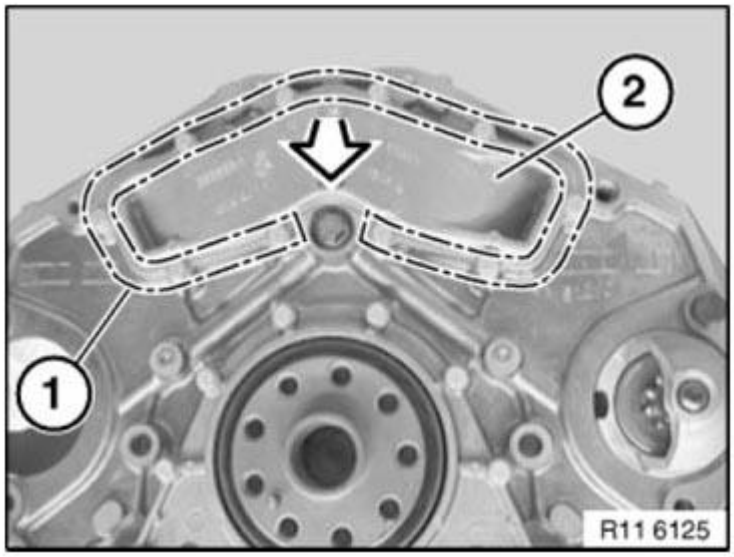


Fig. 129: Identifying Screws And End Cover
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Clean sealing surfaces with special tool 11 4 470 .

Installation:

Replace profile seal (1) .

Assemble engine.

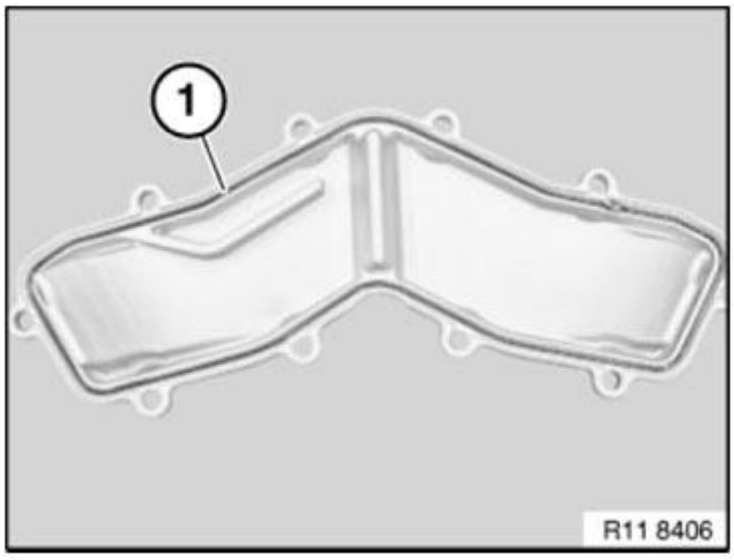


Fig. 130: Identifying Profile Seal
Courtesy of BMW OF NORTH AMERICA, INC.

11 14 151 REPLACING CRANKSHAFT RADIAL SEAL ON TRANSMISSION SIDE (N74)

IMPORTANT: The crankshaft radial seal can only be replaced completely with the end cover. The crankshaft radial seal is an integral part of the end cover and can not be replaced individually.

Necessary preliminary tasks:

- Drain off **ENGINE OIL**
- Remove **FLYWHEEL**

Release screws (1).

Unfasten screws (2).

Carefully remove end cover with crankshaft radial seal.

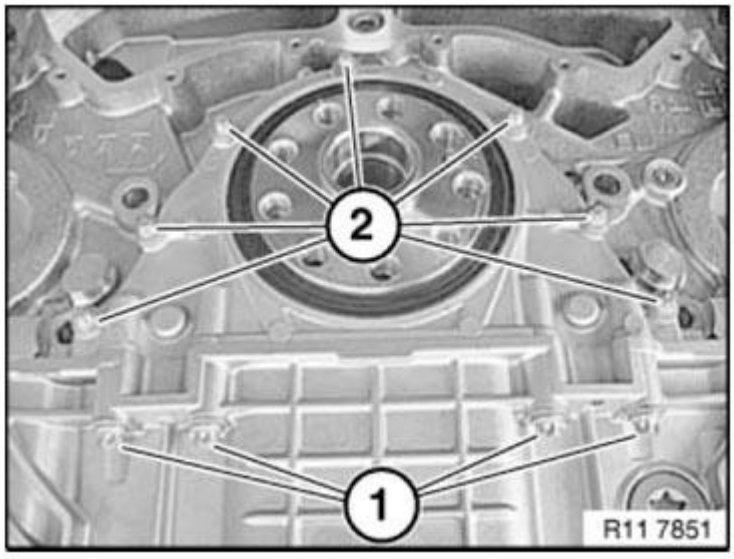


Fig. 131: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support sleeve (2) is included in scope of delivery.

If the crankshaft radial seal (1) is stored for more than six months without the support sleeve (2), its operational reliability will no longer be guaranteed.

Crankshaft radial seal (1) must not be reused in this eventuality!

Support sleeve (2) remains in the crankshaft radial seal (1) and is used as a slip sleeve during subsequently described installation.

IMPORTANT: The sealing lip of the crankshaft radial seal (1) is highly sensitive and must not be kinked.
Do not touch the sealing lip with your fingers.

IMPORTANT: Special tool 11 2 390 must not be used.

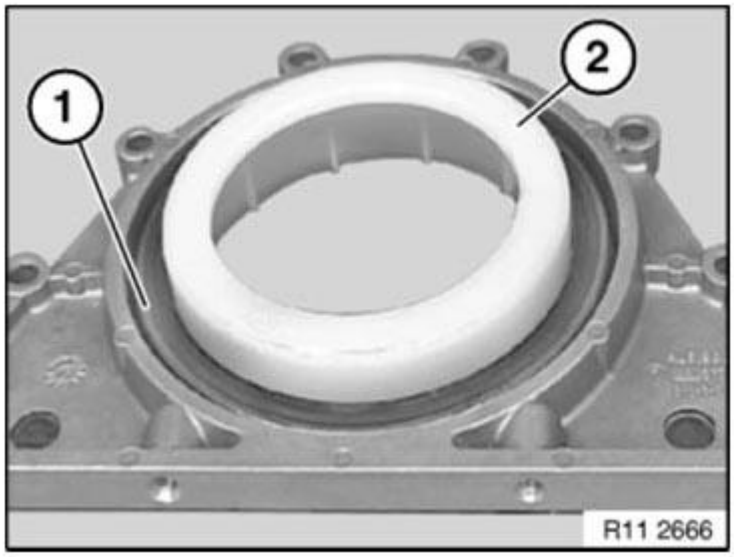


Fig. 132: Identifying Support Sleeve And Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

When the crankshaft radial seal is installed, only the support sleeve included in the scope of delivery may be used as a slip sleeve.

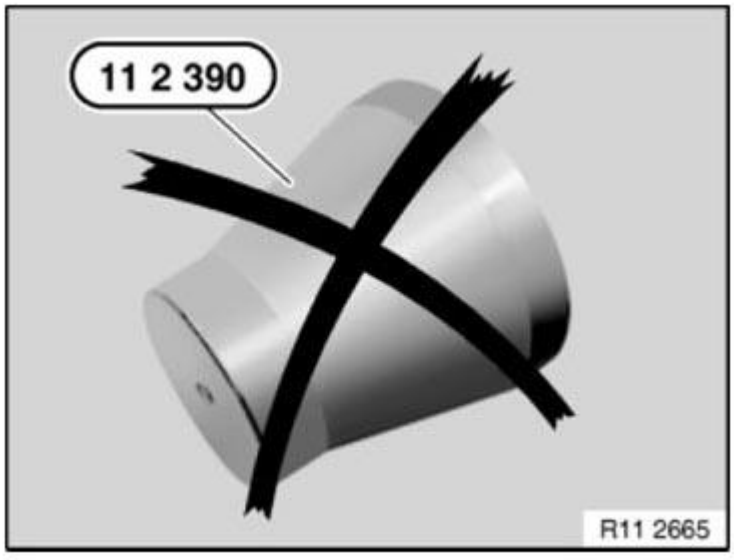


Fig. 133: Do Not Use Special Tool 11 2 390 On Sealing Lip Of Crankshaft Radial Seal

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check dowel sleeves (1) for damage and correct installation position.

Clean sealing face (2) so that it is free from oil and grease.

Coat contact edges on joint along oil sump (see arrows in illustration) with **DREI BOND 1209**.

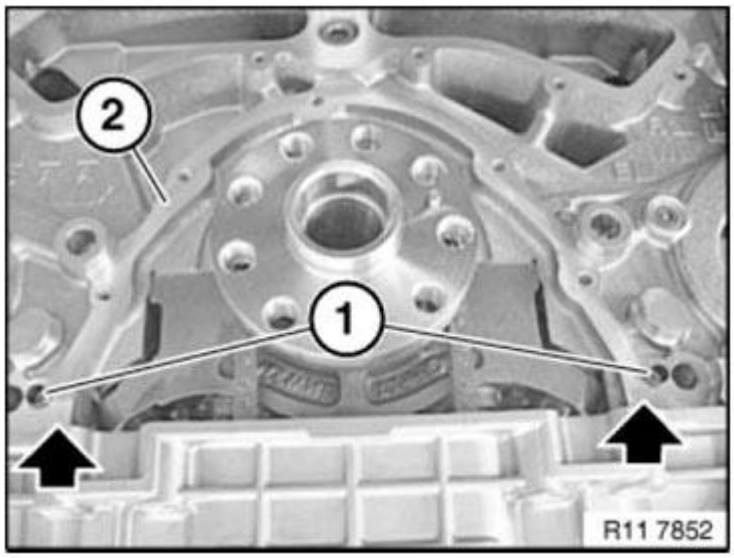


Fig. 134: Identifying Dowel Sleeves, Sealing Face, And Drie Bond 1209 Application Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lightly oil running surface of crankshaft.

Fit end cover (1) with support sleeve (2) on crankshaft and push on carefully.

NOTE: Picture shows (N62TU).

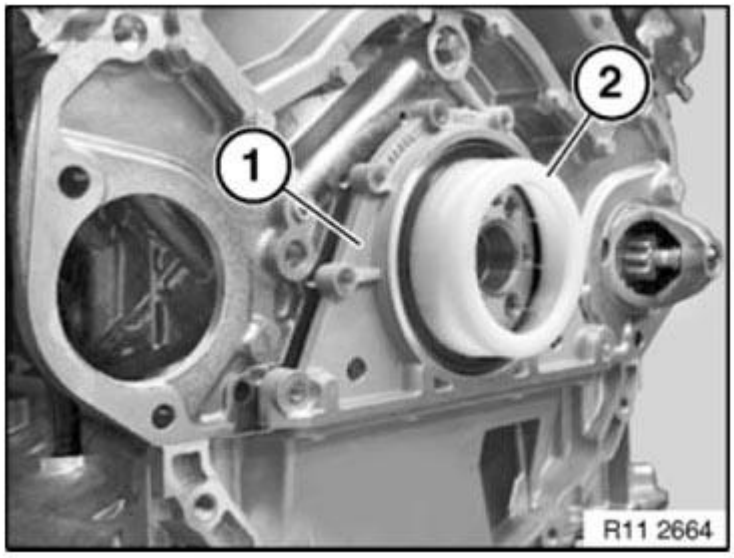


Fig. 135: Identifying End Cover And Support Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (2) and initially tighten without play.

Insert screws (1) and initially tighten without play.

Tighten down bolts (2) from inside outwards.

Tighten down screws (1) from inside outwards.

Tightening torque: see 7AZ in **11 14 CASE COVERS**

Assemble engine.

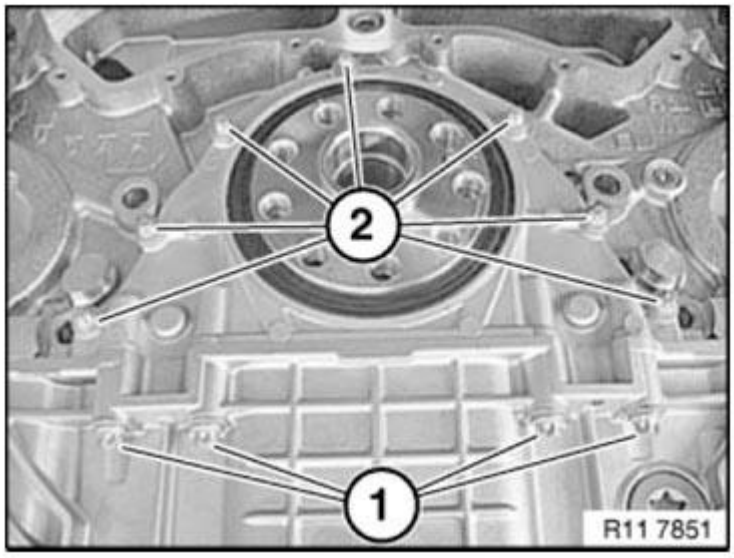


Fig. 136: Identifying Bolts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

11 14 141 REPLACING RADIAL SHAFT SEAL IN LOWER TIMING CASE COVER (N74)

Necessary preliminary tasks:

- Removing **VIBRATION DAMPER**

Position all levers (2) horizontally to pull off radial shaft seal (1).

Turn back spindle of special tool **11 9 410** until all levers (2) can be positioned on sealing lip.

NOTE: Illustrations show N62.

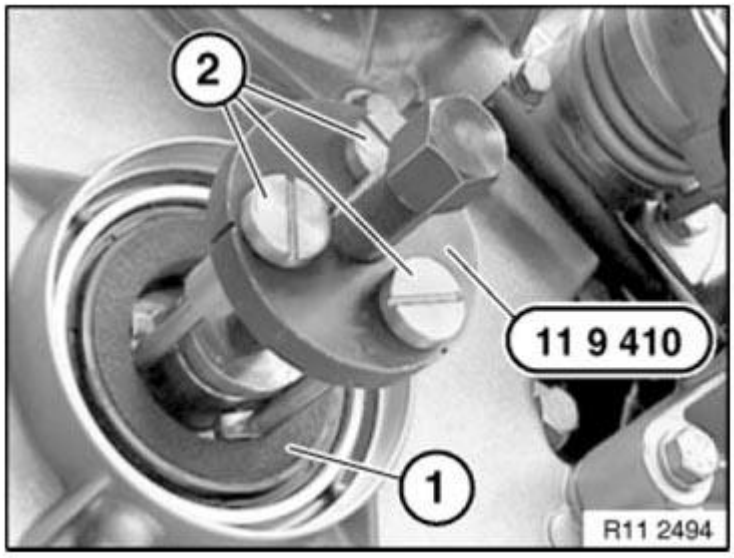


Fig. 137: Positioning Levers Horizontally
Courtesy of BMW OF NORTH AMERICA, INC.

Turn all levers (2) so that they grip behind radial shaft seal (1).

Turn spindle (3) on special tool **11 9 410** to remove radial shaft seal.

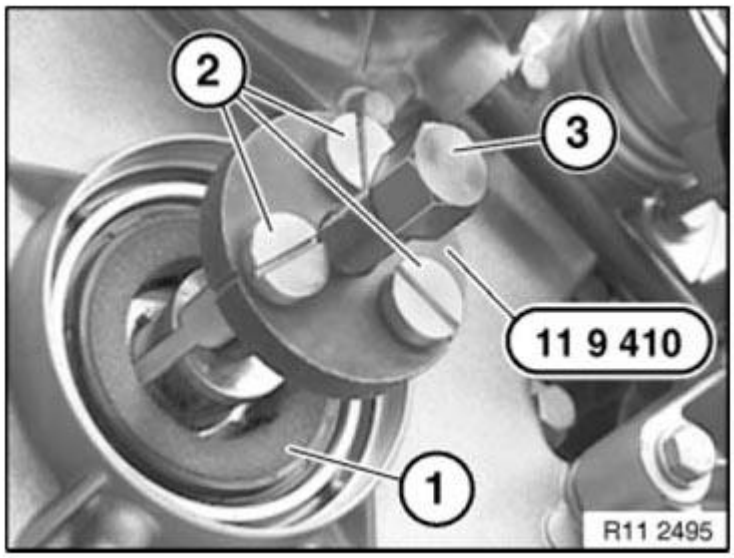


Fig. 138: Identifying Radial Shaft Seal Levers And Spindle Of Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Radial shaft seal (1) may only be supported with "support sleeve" (2).

If the radial shaft seal (1) is stored for more than six months without the support sleeve (2), its operational reliability will no longer be guaranteed.

Radial shaft seal (1) must not be reused in this case!

IMPORTANT: The sealing lip of the radial shaft seal (1) is highly sensitive and must not be kinked under any circumstances.

Do not touch the sealing lip with your fingers.

Remove support sleeve (2) from radial shaft seal (1).

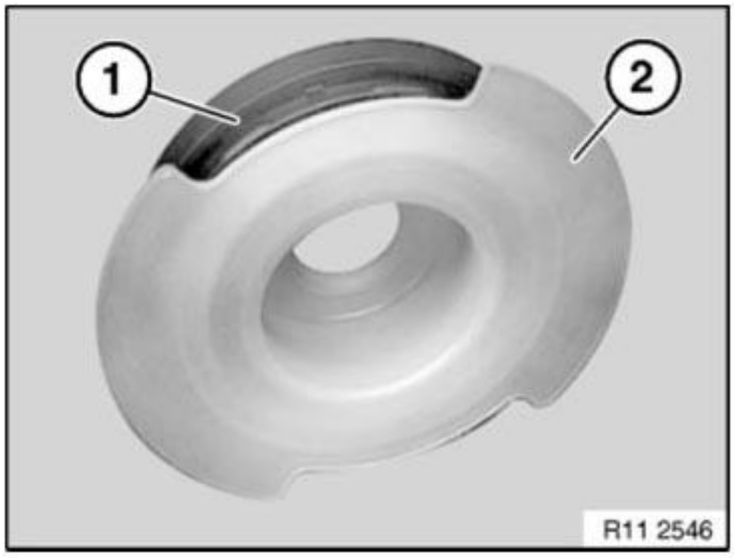


Fig. 139: Identifying Radial Shaft Seal And Support Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Fit radial shaft seal (1) on lower gear case cover.

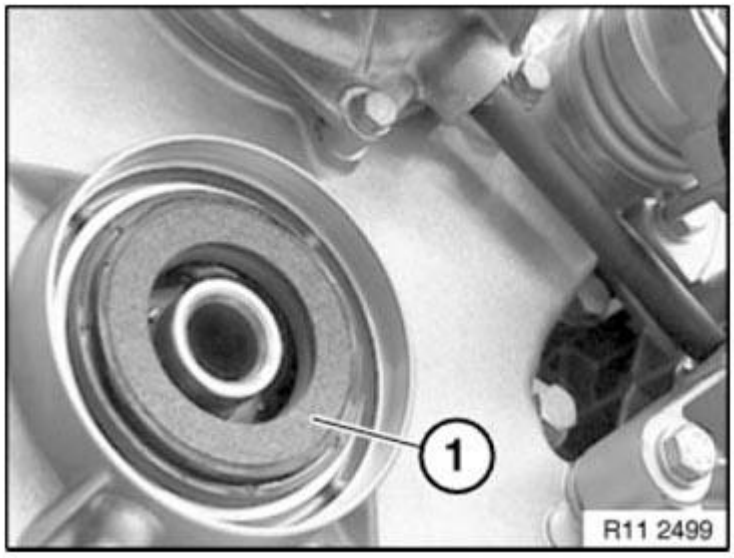


Fig. 140: Identifying Radial Shaft Seal On Lower Gear Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Using special tool 11 9 420 and central bolt (3), screw radial shaft seal into lower gear case cover until flush.

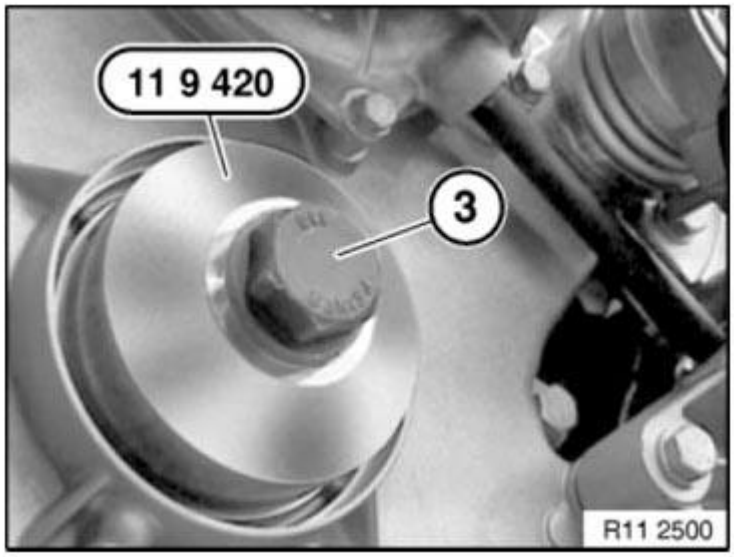


Fig. 141: Identifying Special Tool 11 9 420 And Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

CRANKSHAFT WITH BEARING

11 21 531 REPLACING ALL MAIN CRANKSHAFT BEARING SHELLS (N74)

IMPORTANT: Risk of injury from sharp crankcase edges.

Necessary preliminary tasks:

- Remove **CRANKSHAFT**

NOTE: Main bearing caps 1 to 5 are marked with punched numbers.

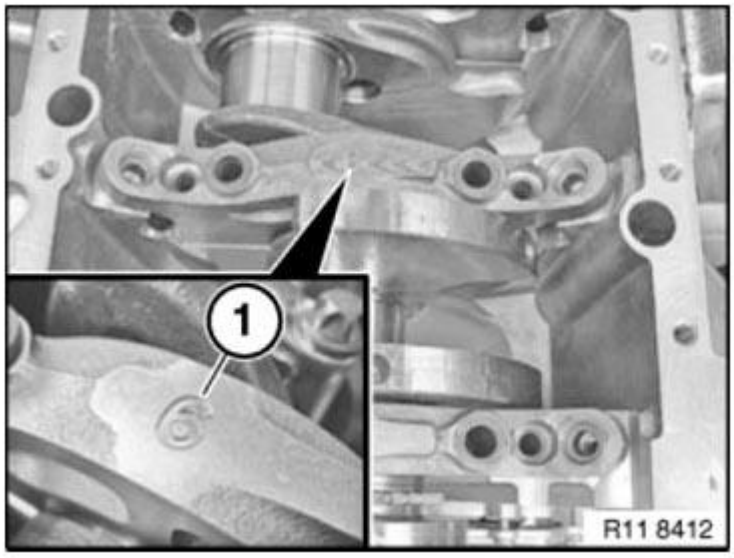


Fig. 142: Identifying Main Bearing Cap Punched Number
Courtesy of BMW OF NORTH AMERICA, INC.

The letters denote the bearing shell classification for the relevant bearing position from 1 to 7 **(main bearing cap)** .

The first letter on the left applies to the first bearing position at the front on the timing chain drive.

Color coding on crankshaft 1 to 57

Y= yellow

G= green

V= violet



Fig. 143: Identifying Bearing Shell Classification For Relevant Bearing Position From 1 To 7 (Main Bearing Cap)
Courtesy of BMW OF NORTH AMERICA, INC.

The letters denote the bearing shell classification for the relevant bearing position from 1 to 7 **crankcase** .

The letters are located on the transmission end in the V-chamber.

The first letter on the left applies to the first bearing position at the front on the timing chain drive.

Color assignment in crankcase 1 to 7.

Y= yellow

G= green

V= violet

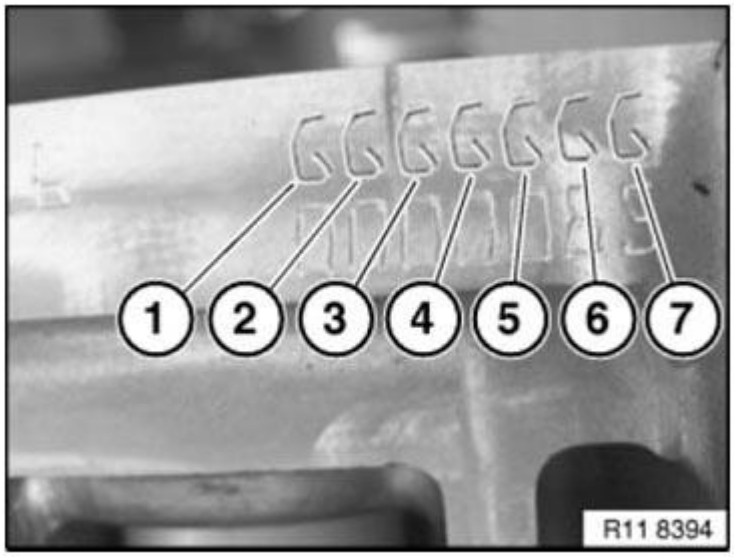


Fig. 144: Identifying Bearing Shell Classification For Relevant Bearing Position From 1 To 7 (Crankcase)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install main bearing shells (1) with lubrication groove in crankcase.

Install main bearing shells (2) without lubrication groove in the main bearing caps.

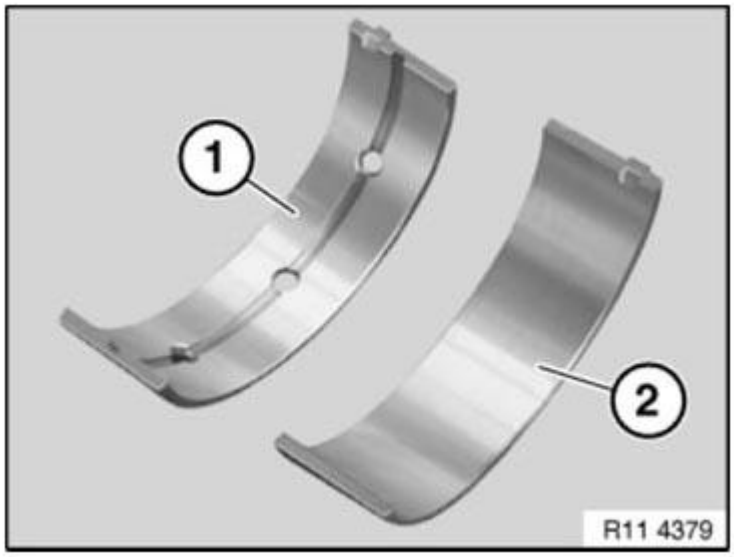


Fig. 145: Identifying Main Bearing Shells With Lubrication Groove And Main Bearing Shells Without Lubrication Groove
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Main bearing cap number 4 can be identified by the surfaces (1) for the thrust

washers discs of the thrust bearing.

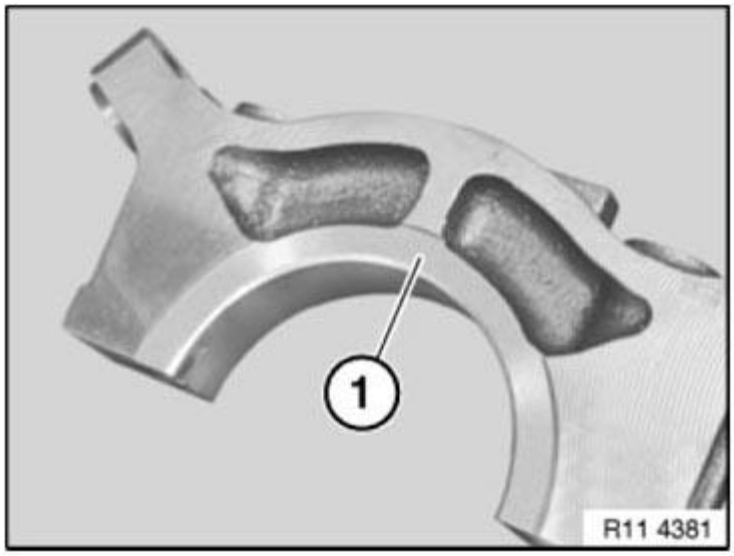


Fig. 146: Identifying Thrust Washers Discs Surface On Main Bearing Cap Number 4
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew thread support bushings in main bearing caps.

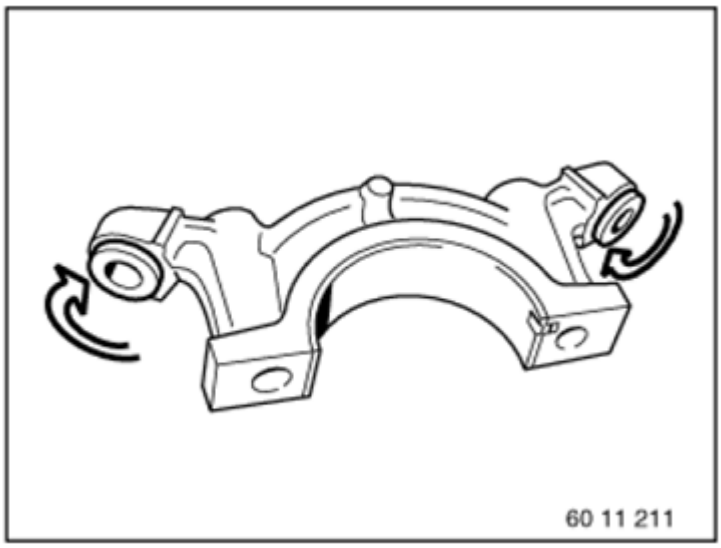


Fig. 147: Unscrewing Thread Support Bushings In Main Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Checking main bearing clearance

To check crankshaft bearing clearance, use the existing main bearing screws.

IMPORTANT: Risk of cracking!

No oil is permitted in the blind bores.

Do not twist crankshaft.

Place special tool **00 2 590** (Plastigage type PG 1) on oil-free crankshaft (see arrow in illustration).

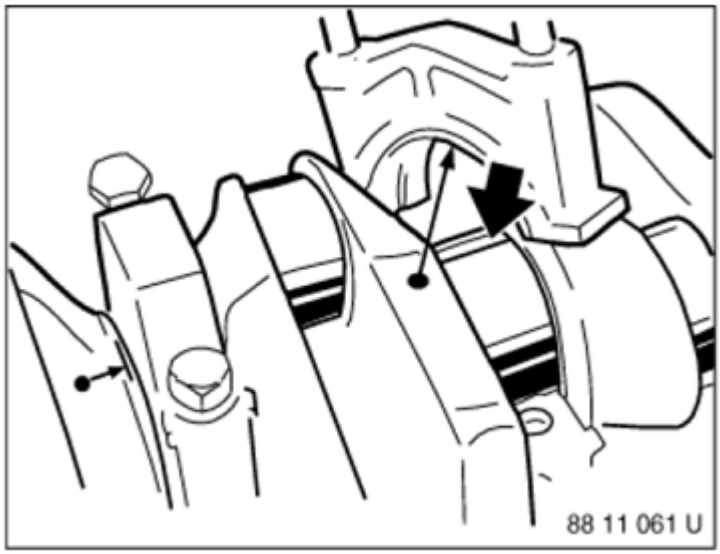


Fig. 148: Checking Main Bearing Clearance
Courtesy of BMW OF NORTH AMERICA, INC.

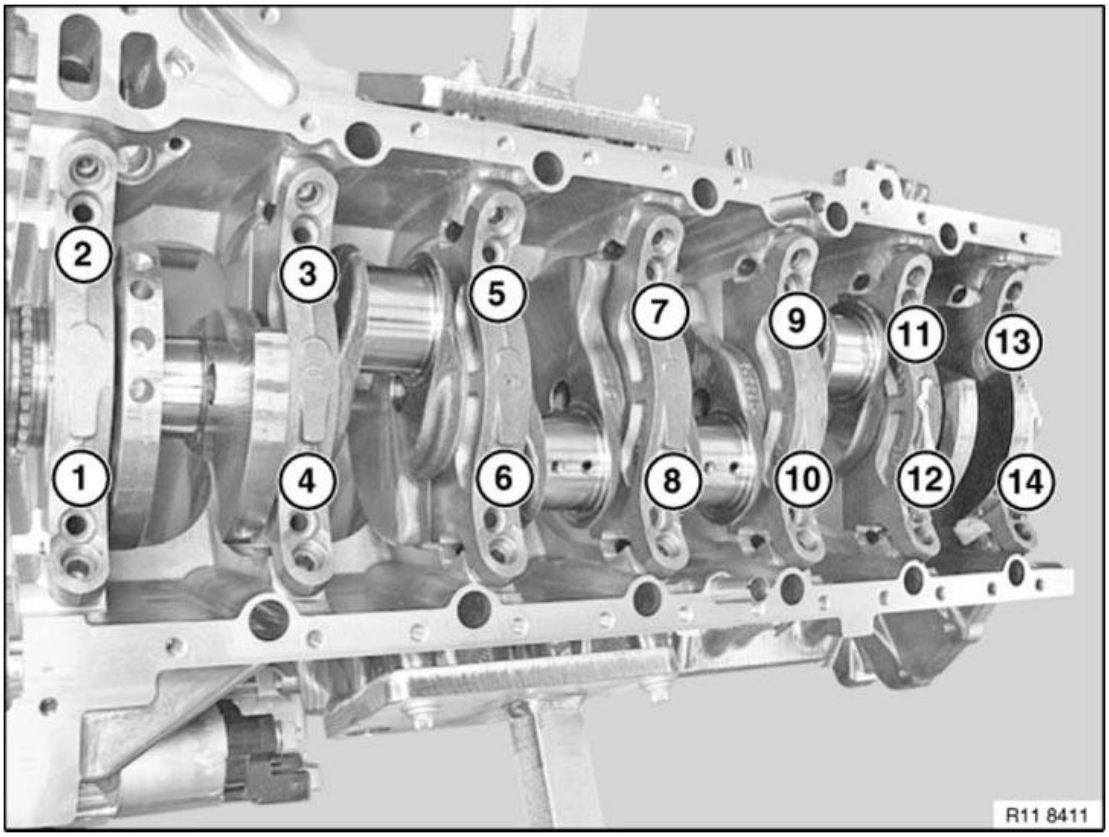


Fig. 149: Identifying Main Bearing Caps Collar Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down all collar bolts (M11) of main bearing caps in sequence 1 to 7 to jointing torque.

Tightening torque: see 1AZ in **11 11 ENGINE BLOCK**

Tighten down all collar bolts (M11) of main bearing caps with special tool **00 9 120** with angle of rotation.

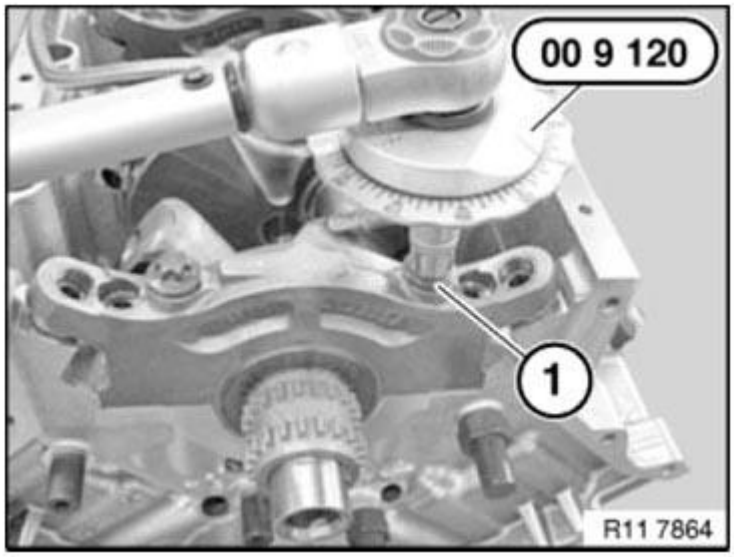


Fig. 150: Tightening Main Bearing Caps Collar Bolts Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove main bearing cap.

Read off main bearing play at width of flattened plastic thread with assistance of measurement scale.

Main bearing play: see **RADIAL CONROD BEARING PLAY** , **CRANKSHAFT AXIAL PLAY** , **BEARING JOURNAL 1** , and **BEARING JOURNALS 2-7** .

- Remove plastic thread
- Apply a coat of oil to new bearing shells and crankshaft

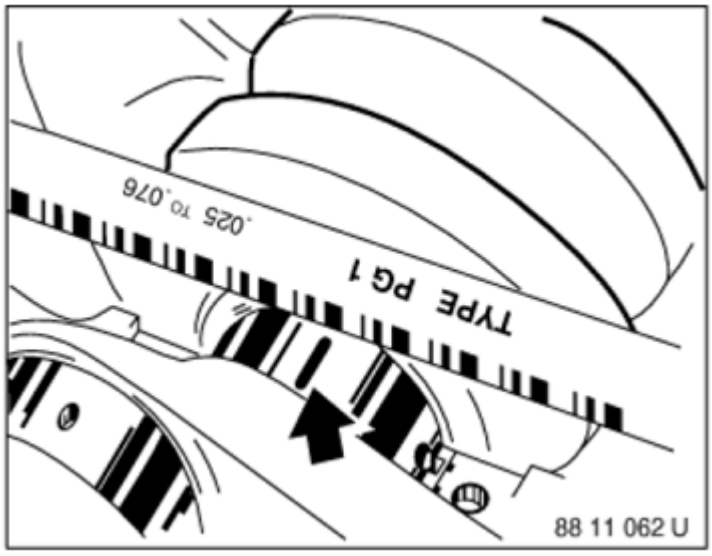


Fig. 151: Measuring Main Bearing Play Using Measurement Scale

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Always replace bolts in main bearing caps with new bolts.

Do not wash off bolt coating.

IMPORTANT: Risk of cracking!

No oil is permitted in the blind bores.

Install **CRANKSHAFT**.

Carefully strike back and front of crankshaft (1) with a plastic hammer to center guide bearing (do not damage crankshaft).

Secure special tool **11 6 252** with magnetic foot on crankcase.

Position special tool **11 6 251** .

Tightening specifications for main bearing:

Check guide bearing shell of crankshaft and crankcase.

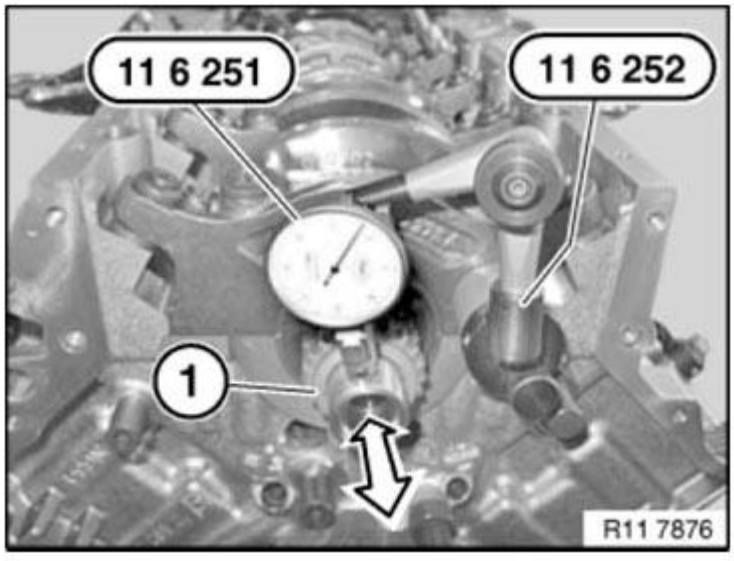


Fig. 152: Checking Crankshaft Axial Play
Courtesy of BMW OF NORTH AMERICA, INC.

Check **AXIAL PLAY.**

Assemble engine.

11 21 500 REPLACING CRANKSHAFT (N74)

IMPORTANT: Weight of crankshaft is approx. 25 kg.

Risk of injury from sharp crankcase edges.

Necessary preliminary tasks:

- Remove **ENGINE**
- Mount engine on assembly stand
- Remove cylinder head. See **LEFT CYLINDER HEAD**/**RIGHT CYLINDER HEAD**.
- Remove **HUB FOR VIBRATION DAMPER**
- Removing lower timing case cover
- **REMOVING OIL PAN**
- Remove **OIL PUMP**
- Removing **PISTON**
- Remove **FLYWHEEL**
- Remove radial shaft seals. See **RADIAL SEAL ON TRANSMISSION SIDE** and **RADIAL SHAFT SEAL IN LOWER TIMING CASE COVER**.
- Remove **TIMING CHAINS**

Installation:

Arrangement of main bearing caps 1 to 7.

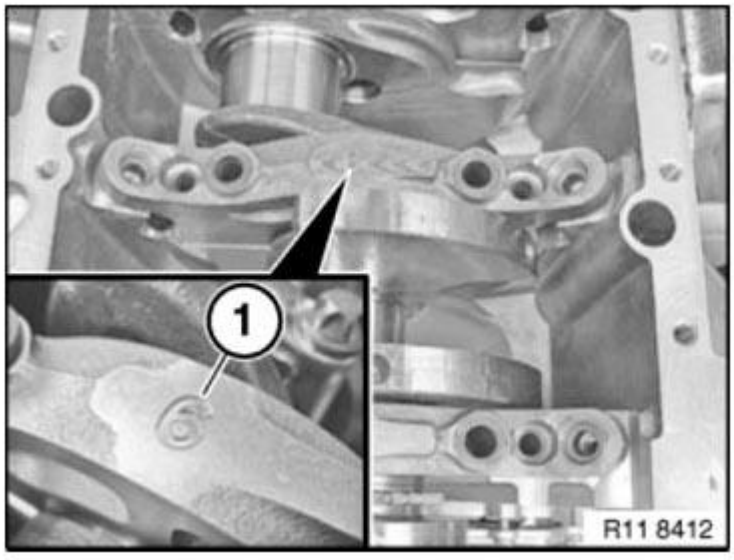


Fig. 153: Identifying Main Bearing Cap Number
Courtesy of BMW OF NORTH AMERICA, INC.

All numbers must be read from the cylinder bank (7 to 12) (see arrows in illustration).

Installation:

All bearing caps are numbered 1 to 6.

The bearing cap on bearing seat 7 has no number.

Main bearing caps 1 to 7 on the output end on the timing chain drive.

Release oil pump spacer bolts (1) with special tool **13 5 020** .

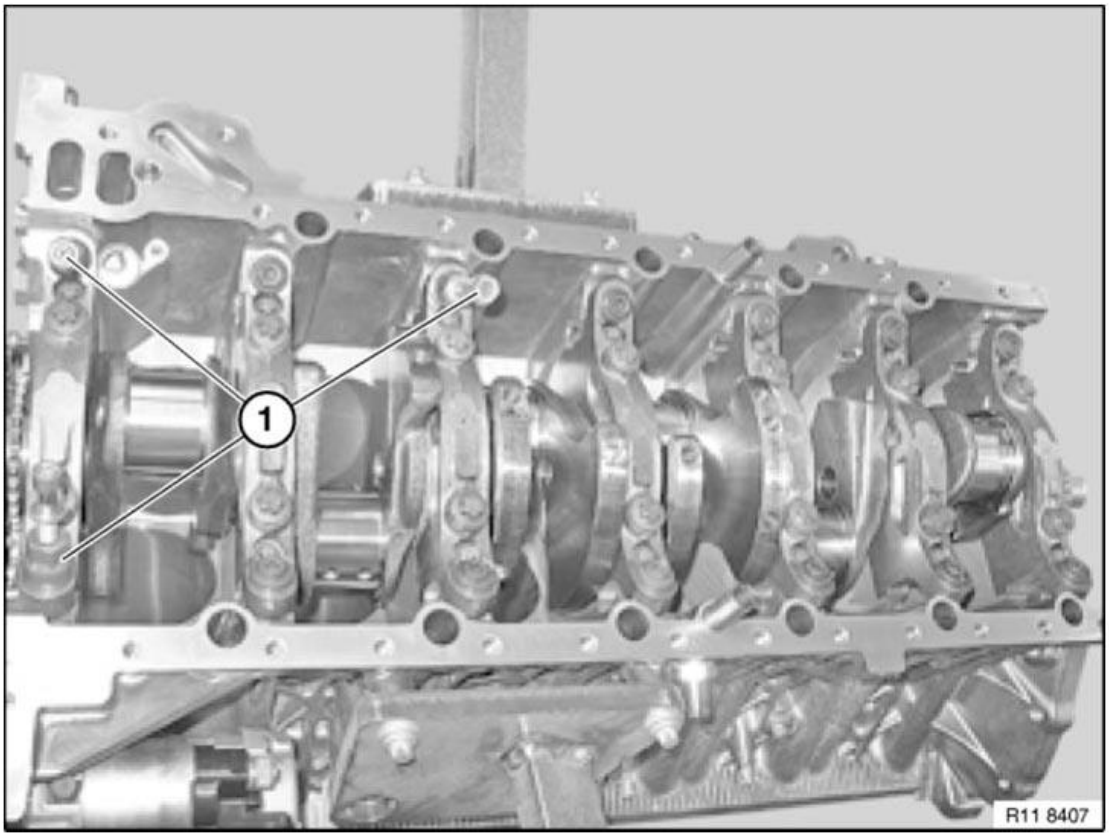


Fig. 154: Identifying Oil Pump Spacer Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

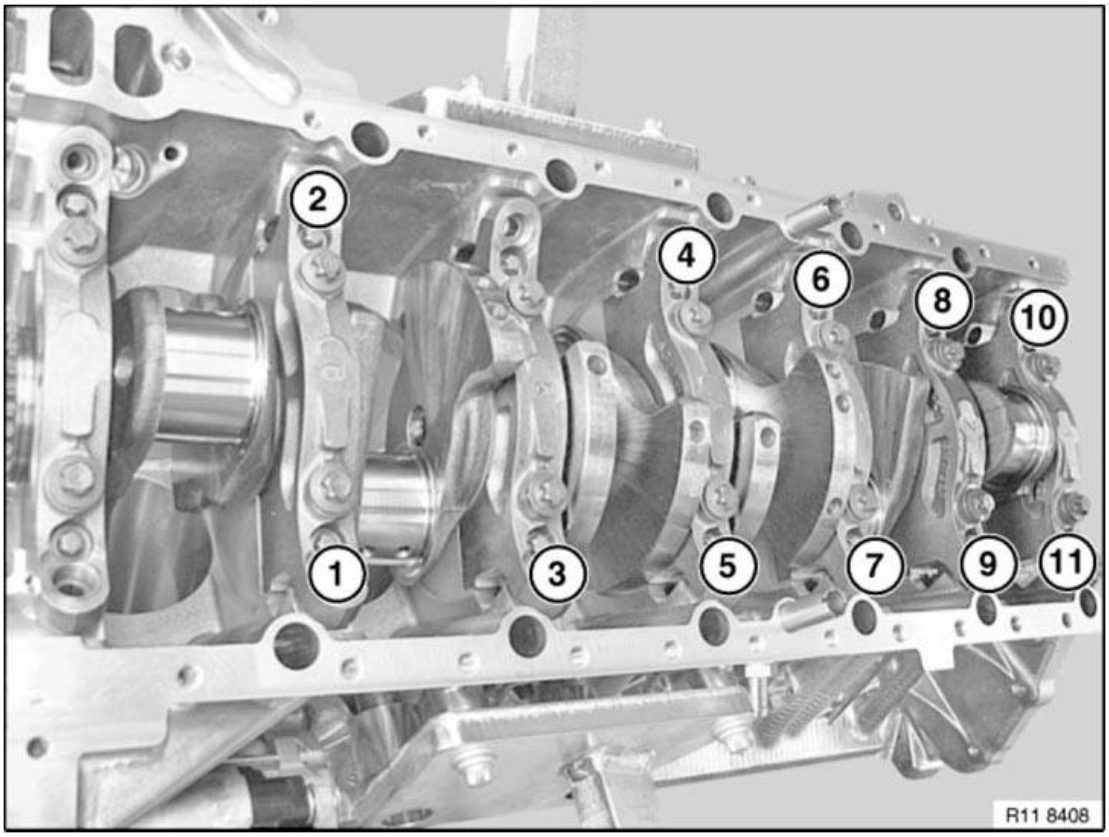


Fig. 155: Identifying Main Bearing Taper Screw Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release main bearing taper screw mounting from 1 to 11.

Release all thread support bushings (1).

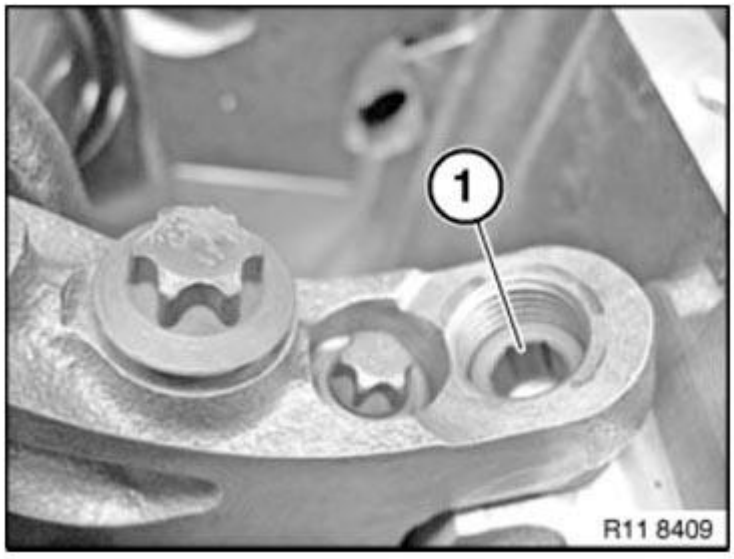


Fig. 156: Identifying Thread Support Bushings
Courtesy of BMW OF NORTH AMERICA, INC.

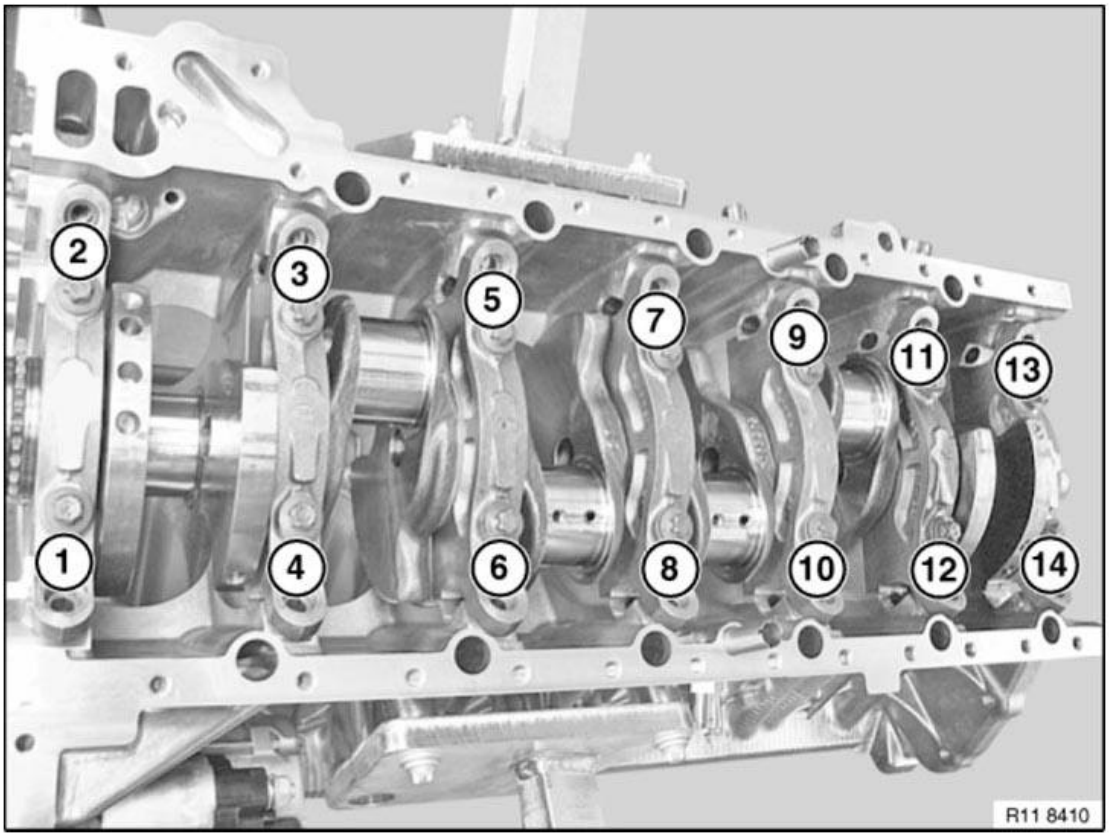


Fig. 157: Identifying Main Bearing Caps Collar Bolts (M8) Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release collar bolts (M8) in sequence 1 to 14.

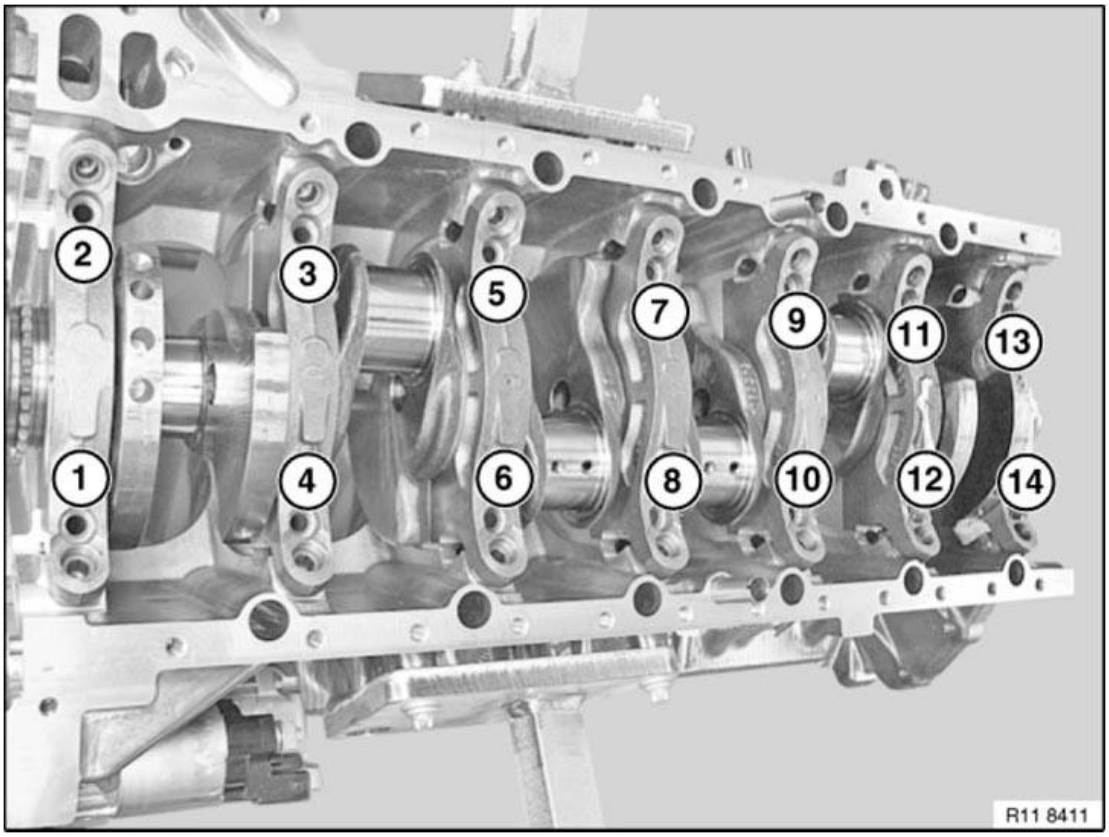


Fig. 158: Identifying Main Bearing Caps Collar Bolts (M11) Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release collar bolts (M11) in sequence 11 to 14.

Remove main bearing caps 1 to 7.

IMPORTANT: Remove crankshaft with a 2nd person, weight approx. 25 kg.

Lift out crankshaft and set down safely (secure against turning).

Release screw for oil nozzle (1).

Tightening torque: see 7AZ in **11 11 ENGINE BLOCK**

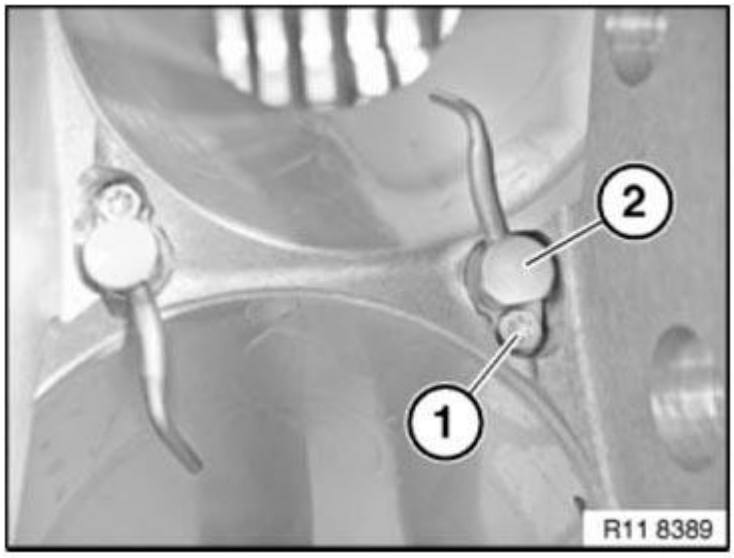


Fig. 159: Identifying Oil Nozzle With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check oil nozzle for clear passage with compressed air.

Observe fastening on oil nozzle.

Replace all O-rings.

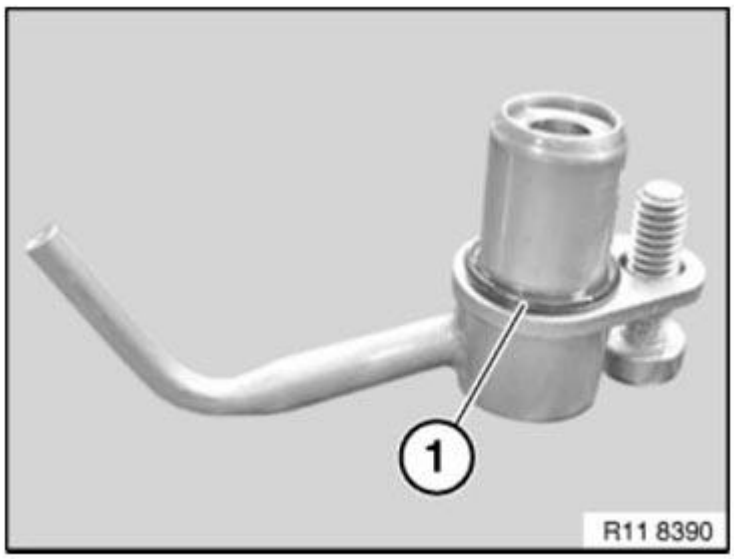


Fig. 160: Identifying Oil Nozzle O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **MAIN CRANKSHAFT BEARING SHELLS**.

IMPORTANT: Install crankshaft with a 2nd person, weight approx. 25 kg.

Install crankshaft.

Installation:

Observe arrangement of main bearing caps (1).

All numbers must be read from the cylinder bank (7 to 12) (see arrows in illustration).

Turn back all thread support bushings hand-tight.

The main bearing cap number 1 is on the timing chain drive.

Installation:

Coat all main bearing points with engine oil.

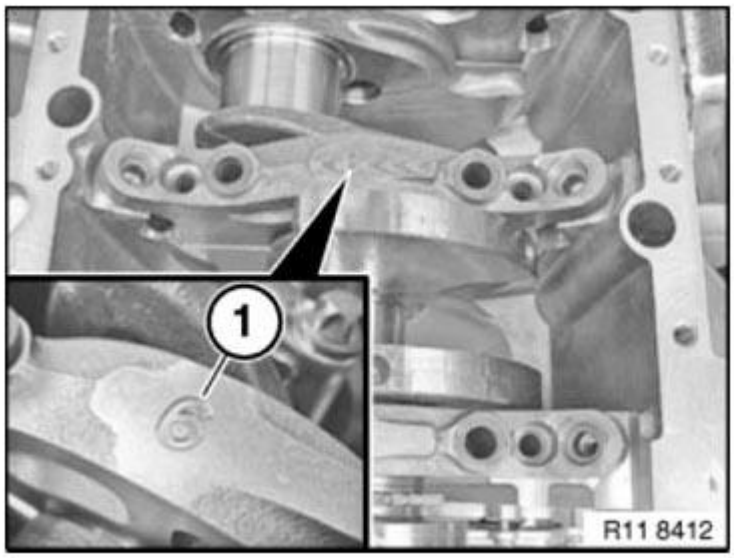


Fig. 161: Identifying Main Bearing Cap Number
Courtesy of BMW OF NORTH AMERICA, INC.

Fit main bearing caps (1 to 7).

Installation:

For a better overview of the screw connection quality, mark the head of all collar bolts after joining with a line (1) using an oil-proof marker pen.

For more accurately checking entire angle adjustment.

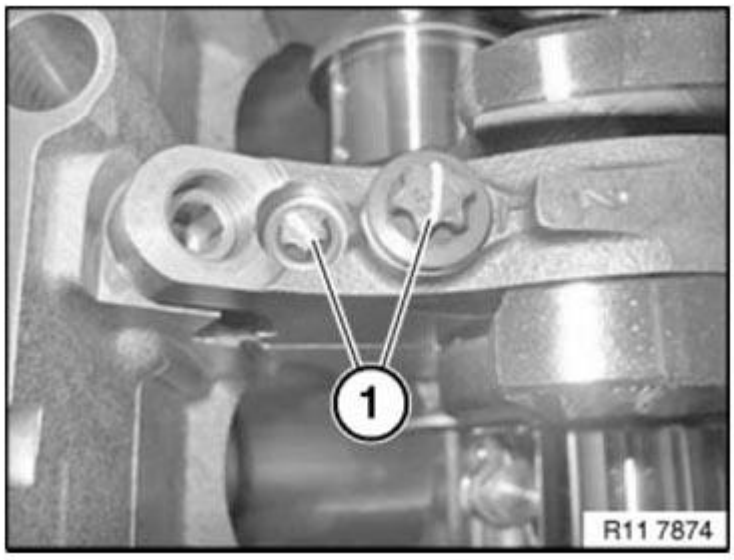


Fig. 162: Identifying Mark On Head Of Collar Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

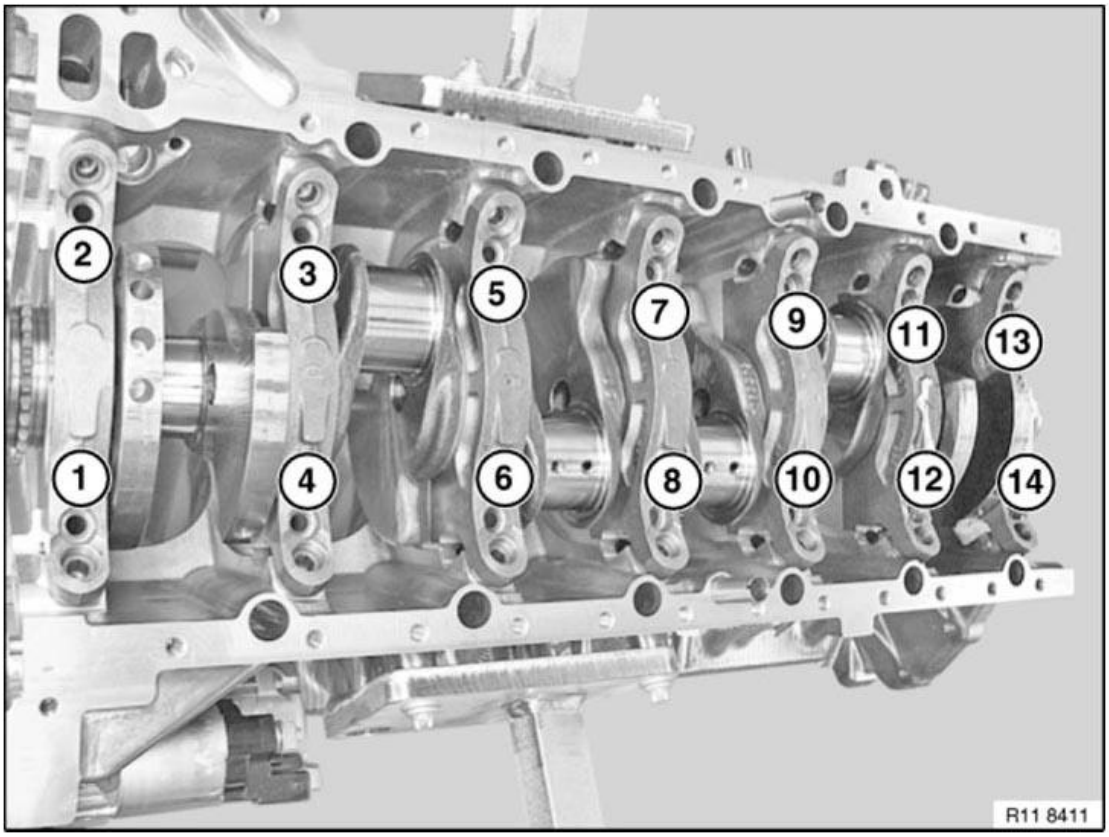


Fig. 163: Identifying Collar Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Insert collar bolts (M11) hand-tight in sequence (1 to 14).

(M11) Connect collar bolts in sequence (1-14) with 20 Nm torque.

To better check the total angular adjustment, mark all collar bolts M 11 with an oil-proof marker.

Secure collar bolts (M11) in sequence (1 to 14).

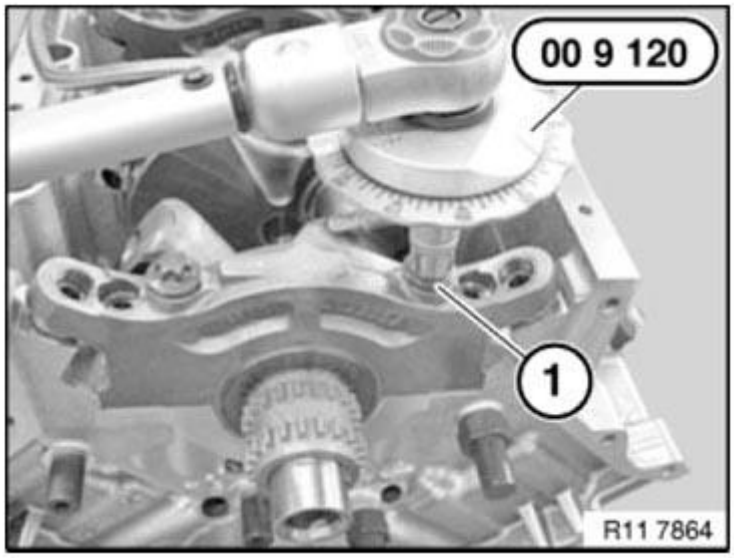


Fig. 164: Tightening Main Bearing Caps Collar Bolts Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure collar bolt (1) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 11 ENGINE BLOCK**

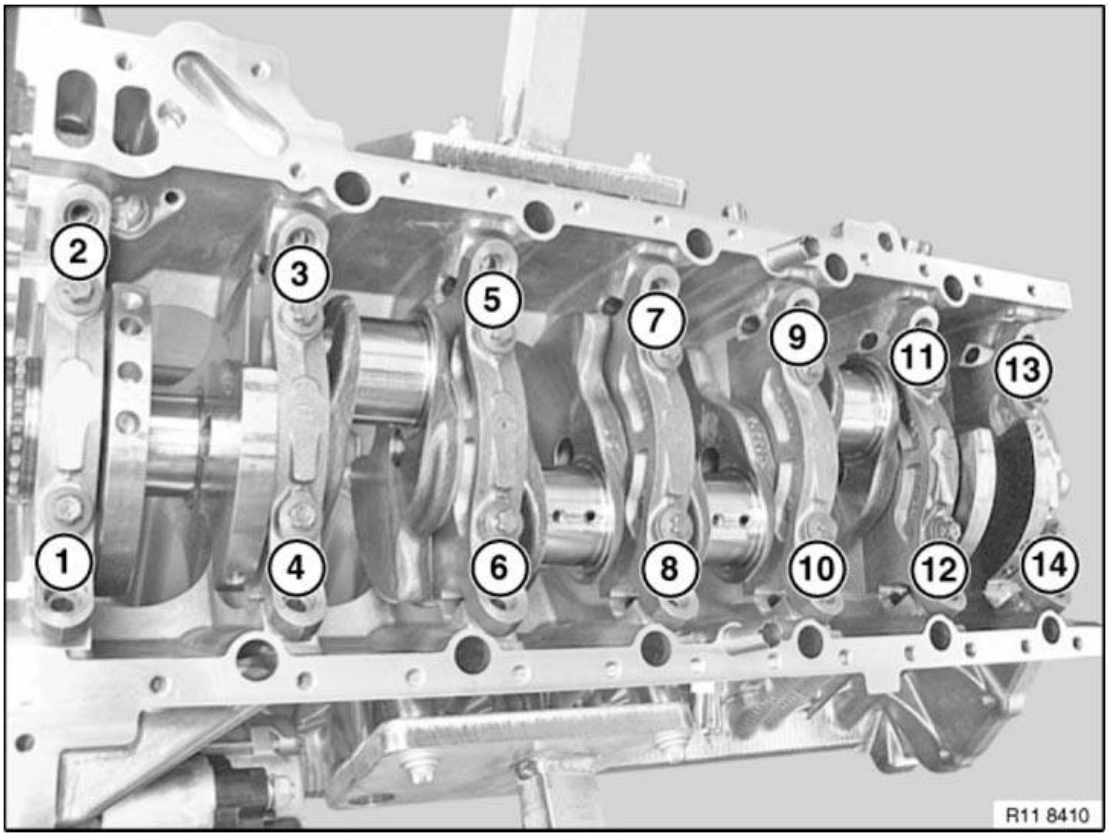


Fig. 165: Identifying Collar Bolts Inserting Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Insert collar bolts (1 to M8) hand-tight in sequence.

(M8) Connect collar bolts in sequence (1-14) with 10 Nm torque.

To better check the total angular adjustment, mark all collar bolts with a line using an oil-proof marker. M8

Secure collar bolts (M8) in sequence (1 to 14).

Secure collar bolt (1) with special tool **00 9 120** .

Tightening torque: see 2AZ in **11 11 ENGINE BLOCK**

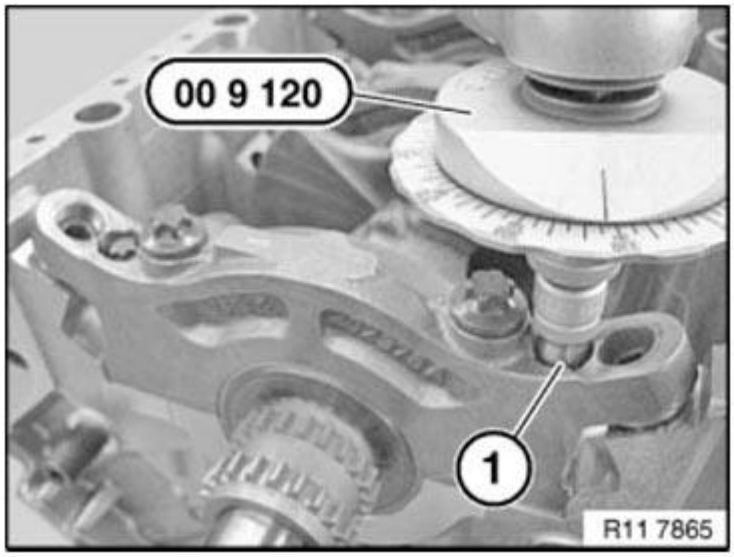


Fig. 166: Securing Collar Bolt Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure all threaded support sleeves (1) with special tool **11 4 350** .

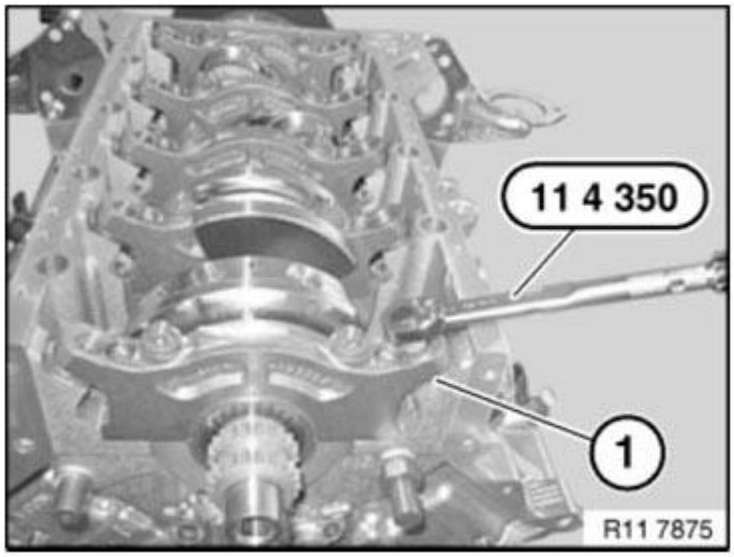


Fig. 167: Securing Threaded Support Sleeves Using Special Tool 11 4 350
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque: see 3AZ in **11 11 ENGINE BLOCK**

Tighten down main bearing taper screw mounting from 1 to 11.

Tightening torque: see 4AZ in **11 11 ENGINE BLOCK**

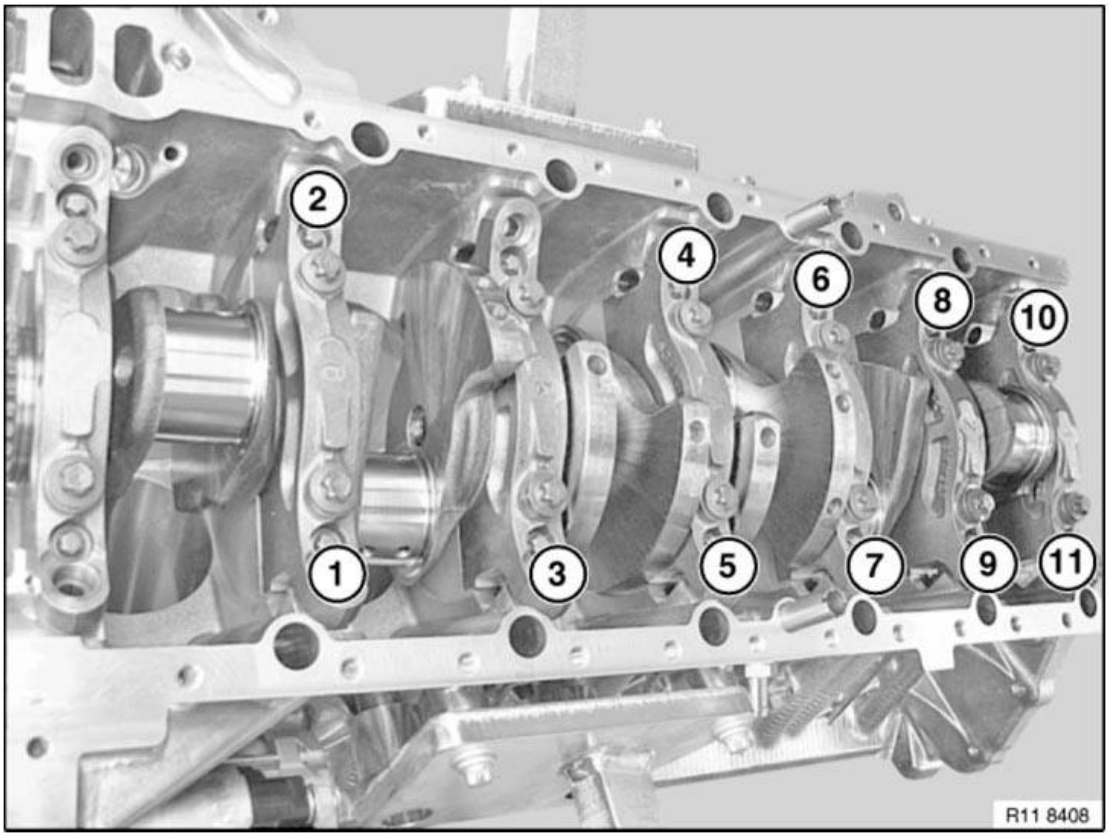


Fig. 168: Identifying Main Bearing Taper Screw Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down oil pump spacer bolts (1) with special tool **13 5 020** .

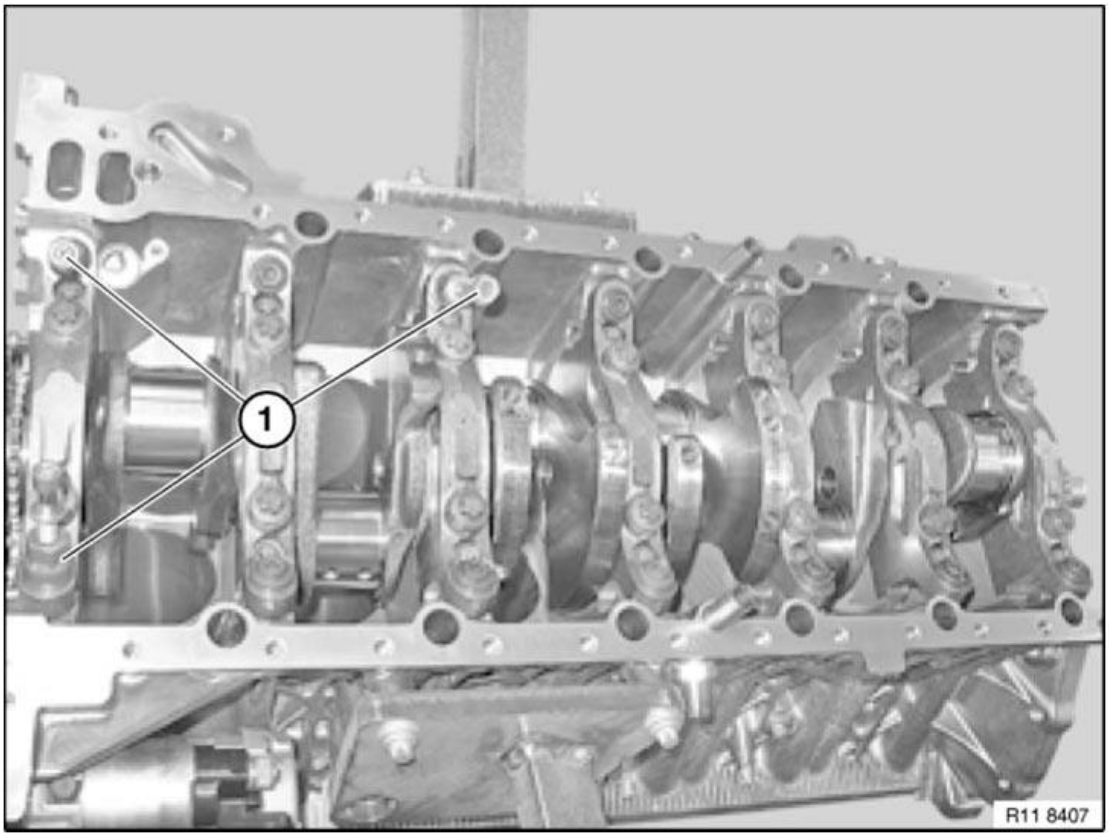


Fig. 169: Identifying Oil Pump Spacer Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque: see 5AZ in **11 11 ENGINE BLOCK**

Check crankshaft **COEFFICIENT OF FRICTION** .

Determine crankshaft **breakaway torque** with special tool **00 2 010** .

Rotate crankshaft at central bolt using special tool **00 2 010** .

If the breakaway torque is too high, it will be necessary to correct the **BEARING CLEARANCE** .

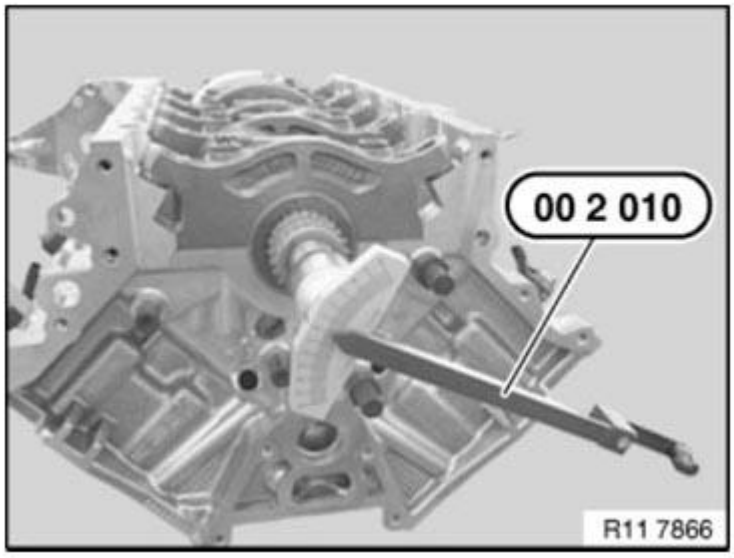


Fig. 170: Rotating Crankshaft Using Special Tool 00 2 010
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 6 252** to crankcase with magnetic base.

Slide crankshaft in direction of arrow forwards as far as it will go.

Set special tool **11 6 251** to zero.

Slide crankshaft (1) in direction of arrow towards rear and determine value.

Check **AXIAL PLAY** .

Assemble engine.

FLYWHEEL

11 22 510 REMOVING AND INSTALLING/REPLACING FLYWHEEL (TRANSMISSION REMOVED - N74)

Necessary preliminary tasks:

- Remove **TRANSMISSION** .

Secure flywheel (1) with special tool **11 9 260** , **11 9 263** and **11 9 264** .

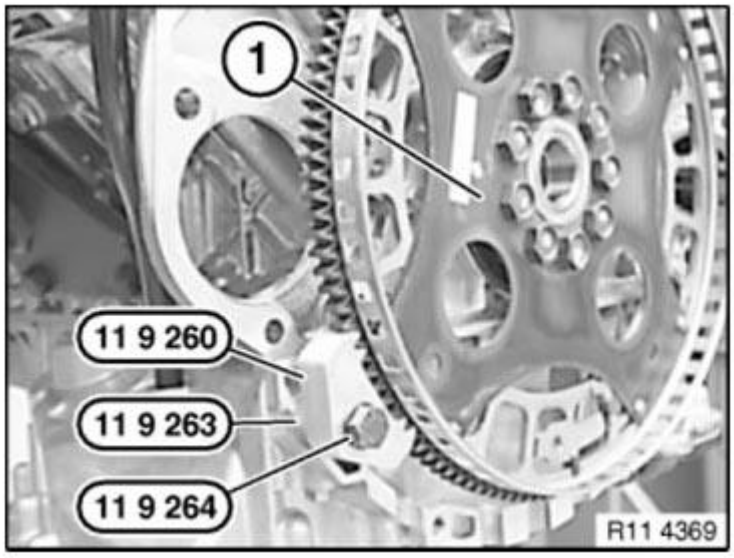


Fig. 171: Securing Flywheel Using Special Tool 11 9 260, 11 9 263 And 11 9 264
Courtesy of BMW OF NORTH AMERICA, INC.

Release flywheel screws in area (1).

Remove flywheel (2).

Installation:

Clean threads on flywheel screws in crankshaft.

Flywheel (2) is secured with an alignment pin.

Fit flywheel (2).

Fit new flywheel screws .

Tightening torque: see 1AZ in **11 22 FLYWHEEL**

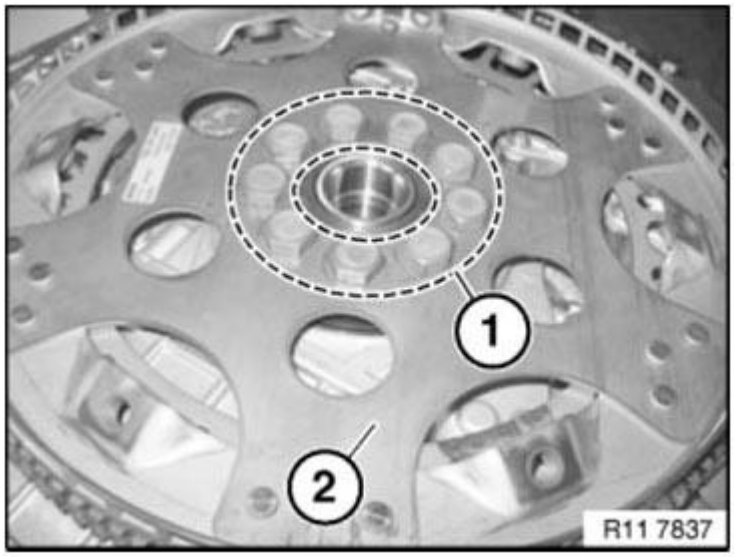


Fig. 172: Identifying Flywheel And Screws Area
Courtesy of BMW OF NORTH AMERICA, INC.

VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N74)

Necessary preliminary tasks:

- Remove **FAN COWL**
- Remove alternator **DRIVE BELT**
- Remove A/C compressor **DRIVE BELT**
- Remove belt pulley for A/C system

Release screw (1).

Tightening torque: see 1AZ in **11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT**

Remove belt tensioner with idler pulley (2).

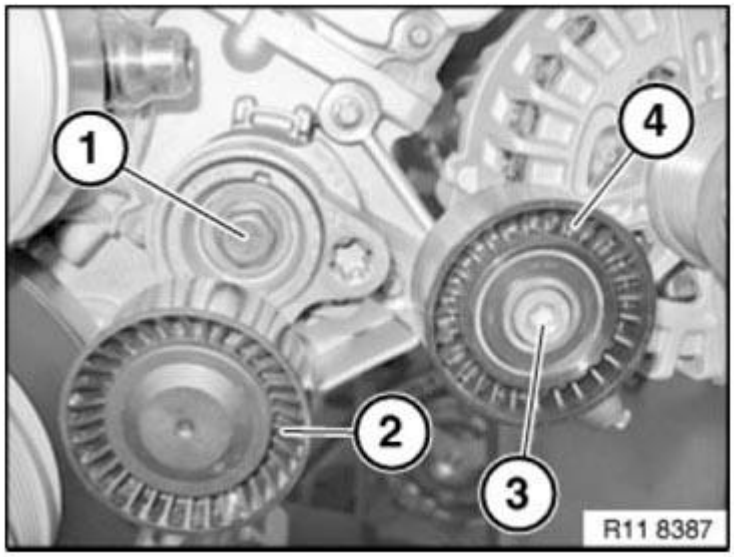


Fig. 173: Identifying Idler Pulley With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe fixture on belt tensioner (1) **(risk of damage!)** .

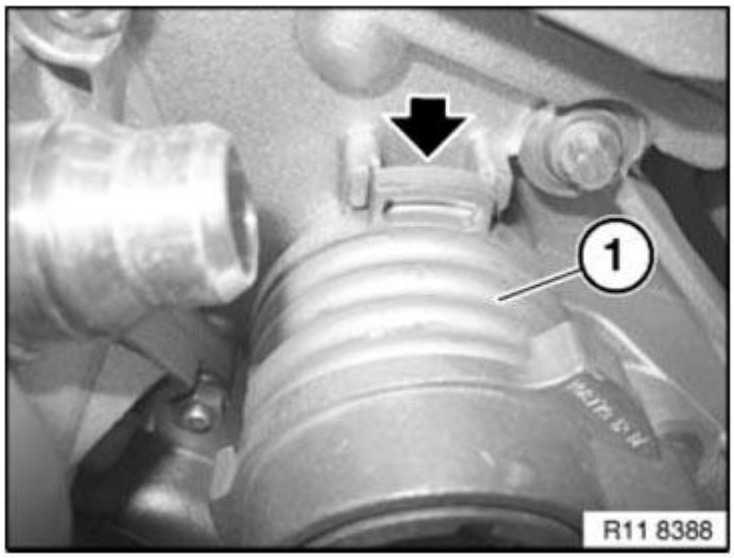


Fig. 174: Identifying Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 8 090** with three screws (1) to vibration damper.

Secure special tool **11 8 090** with belt tensioner bolt (2) to timing case cover.

Tightening torque: see 3AZ in **11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT**

NOTE: A 3/4 inch tool is needed to release the central bolt.

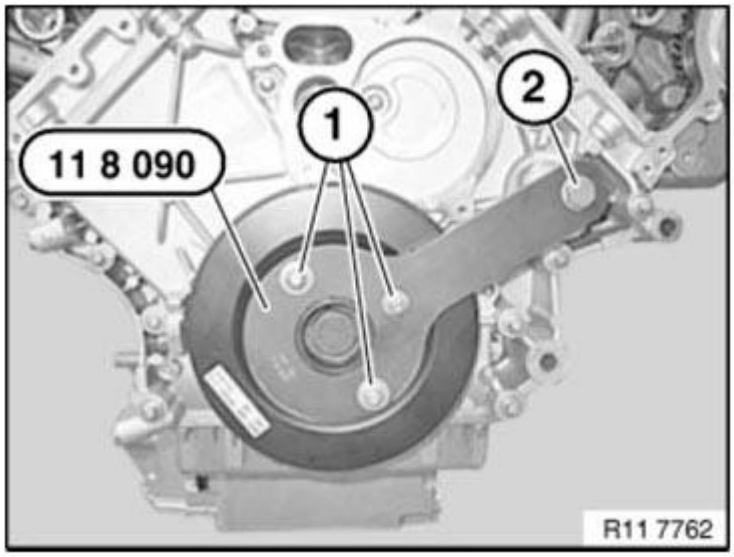


Fig. 175: Securing Special Tool 11 8 090 With Belt Tensioner Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt on vibration damper.

Secure central bolt with special tool **00 9 140** or **11 3 460** .

Position special tool **11 3 460** on special tool **11 8 090** .

Adjust special tool **11 9 453** on special tool **11 9 454** using clamping screw to 0° on scale.

Tightening torque: see 1AZ in **11 23 VIBRATION DAMPER**

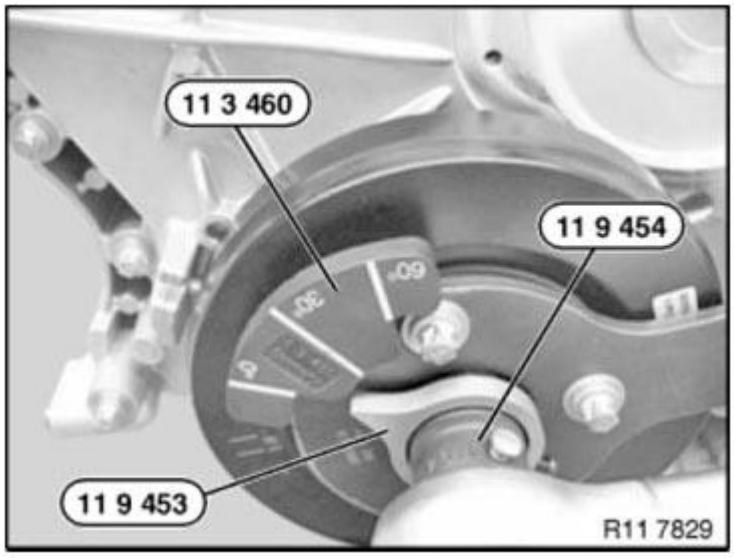


Fig. 176: Adjusting Special Tool 11 9 453 On Special Tool 11 9 454 Using Clamping Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

CONNECTING ROD WITH BEARING

11 24 571 REPLACE ALL BIG-END BEARINGS (N74)

IMPORTANT: Note grinding stages on crankshaft. See CONROD BEARING JOURNALS , CRANKSHAFT GUIDE BEARING , MAIN BEARING JOURNALS (1) , and MAIN BEARING JOURNALS (2-7) .

Necessary preliminary tasks:

- Remove all **PISTONS**.

Install new connecting rod bearing shells.

Install one blue bearing shell (1) and one red bearing shell (2) in each conrod.

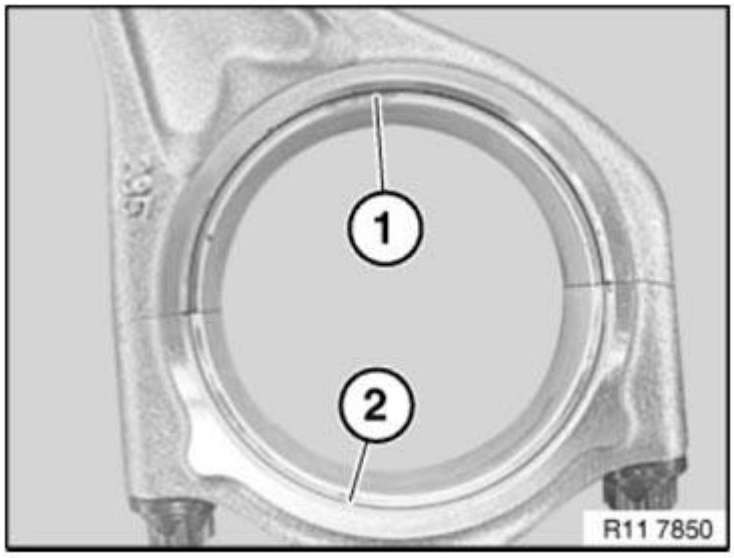


Fig. 177: Identifying Blue And Red Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Install **PISTON**.

Installation:

The bearing shells on the conrod are coded.

Conrod bearing cap (1): the red bearing shell is fitted and the fastening notches are on the left and right sides of the bearing shell (see arrows in illustration).

Conrod (2): the blue bearing shell is fitted and the fastening notches are one side of the bearing shell (see arrows in illustration).

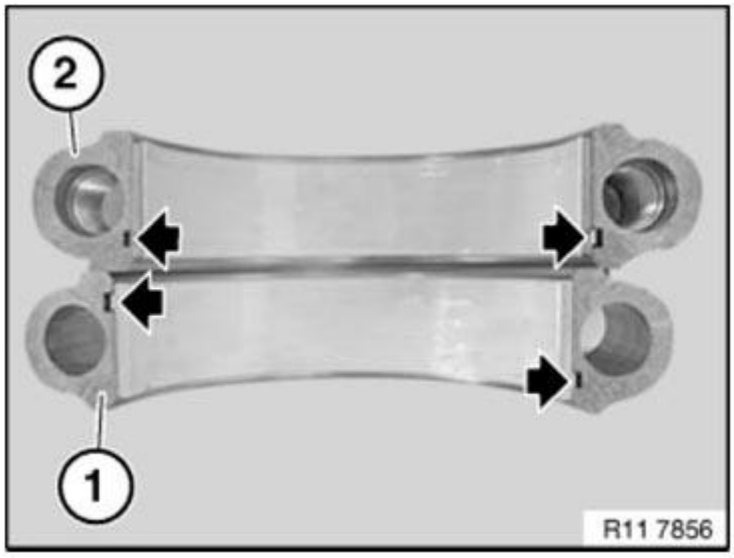


Fig. 178: Identifying Conrod And Conrod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Check connecting rod bearing clearance .

Piston in BDC position.

Fit special tool **00 2 590** (Plastigage type PG 1) to oil-free crankshaft.

Fit bearing caps so that pair numbers match up.

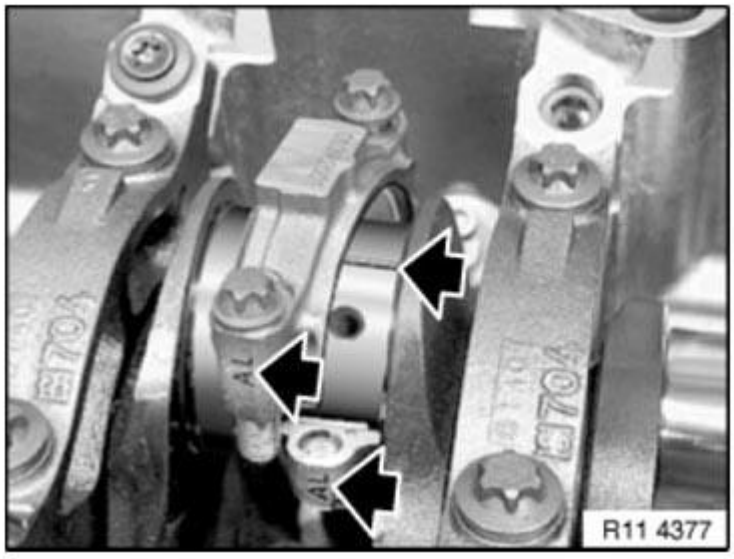


Fig. 179: Locating Bearing Caps Pair Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not distort connecting rods or crankshaft.

Use conrod bolts to check conrod bearing clearance.

Connecting rod bolts with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 24 CONNECTING RODS AND BEARINGS**

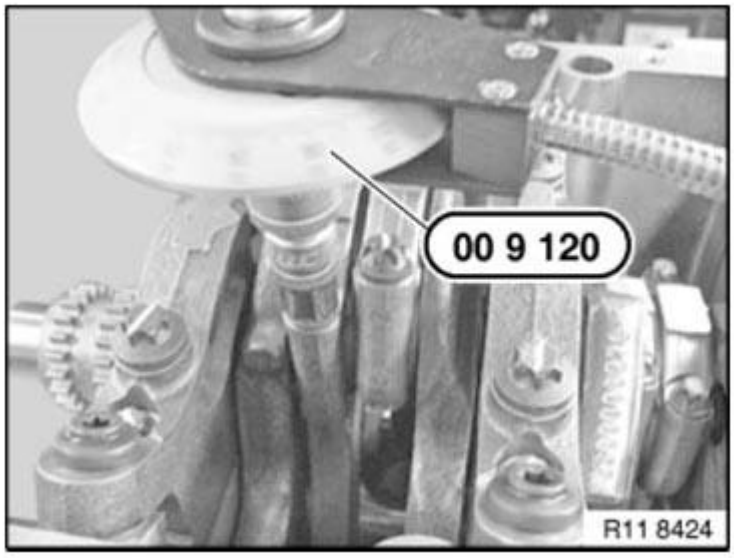


Fig. 180: Tightening Connecting Rod Bolts Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing cap and read off bearing play at width of flattened plastic thread with assistance of measurement scale.

CONROD BEARING CLEARANCE .

- Remove plastic thread.
- Lubricate crankshaft and bearing shells.
- Install new conrod bolts.

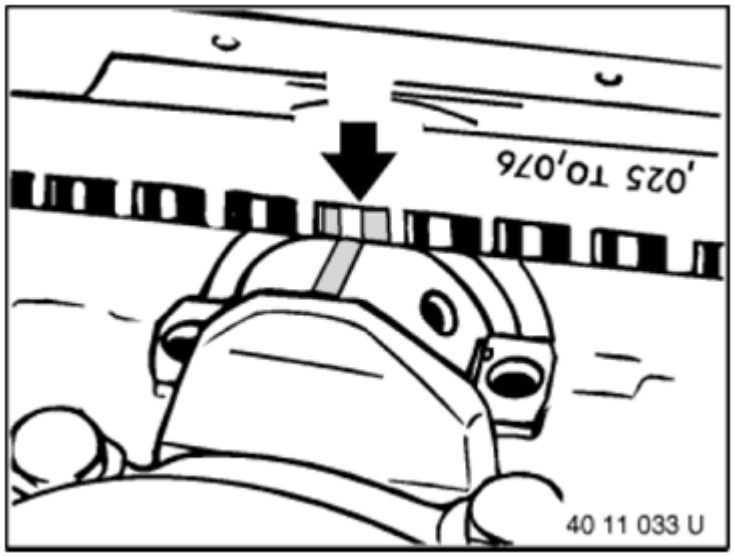


Fig. 181: Measuring Conrod Bearing Clearance Using Measurement Scale
Courtesy of BMW OF NORTH AMERICA, INC.

Join connecting rod bolt (1).

Tightening torque: see 1AZ in **11 24 CONNECTING RODS AND BEARINGS**

Installation:

Check entire angle adjustment.

For better overview of screw connection quality.

After joining, use an oil-resistant marker to apply a stroke (1) on the bolt head (see illustration).

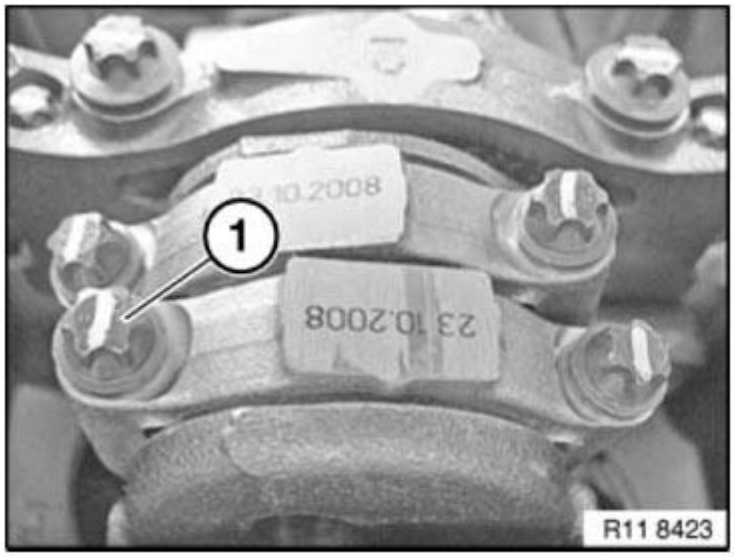


Fig. 182: Identifying Oil-Resistant Marker Stroke On Bolt Head
Courtesy of BMW OF NORTH AMERICA, INC.

Secure connecting rod bolts with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 24 CONNECTING RODS AND BEARINGS**

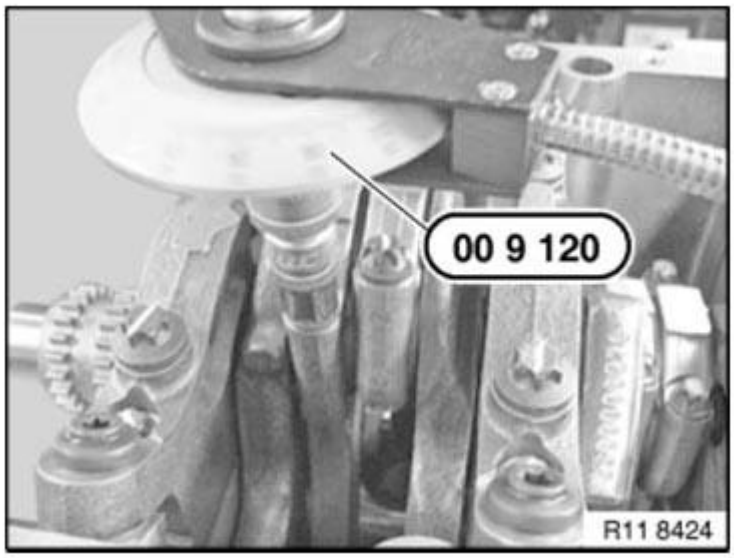


Fig. 183: Tightening Connecting Rod Bolts Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

PISTON WITH RINGS AND PIN

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N74)

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons and connecting rods are reused, they must be reinstalled in the same places.

Piston and piston pin are matched to each other and can only be replaced as a pair.

Conrod and conrod bearing cap are cracked.

Identification is effected by means of identical pairing letters on the connecting rod big end.

Mixing up the components will result in engine damage.

Conrod bearings must always be replaced.

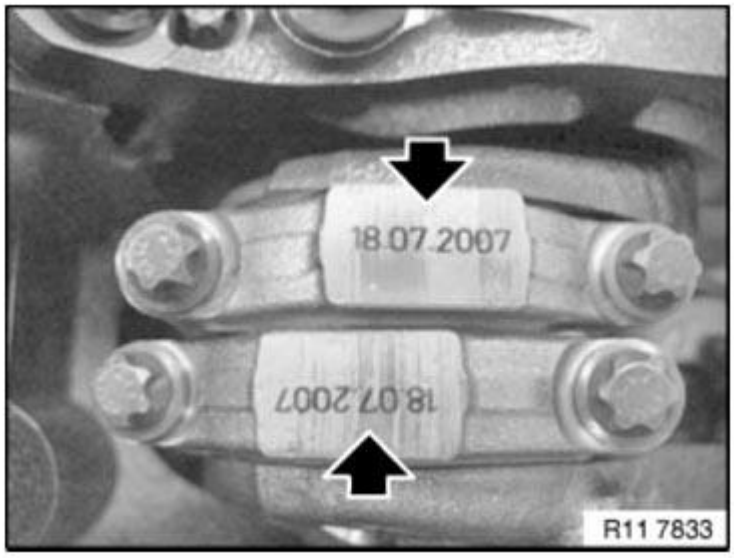


Fig. 184: Locating Stamped Dates On Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove engine
- Mount engine on assembly stand.
- Remove both cylinder heads.
- Remove oil sump.
- Remove oil pump.

Unscrew connecting rod bearing cap.

NOTE: Connecting rods and connecting rod bearing caps are denoted with the same pairing letters.

The stamped dates are always arranged in opposite directions.

Set down conrod bearing caps in order.

NOTE: To install and remove the conrods, it is essential for the crankshaft to be exactly in alignment with the cylinder bore (see dashed line in illustration).

Position crankshaft at central bolt.

Insert special tool **11 8 152** into conrod.

Screw special tool **11 5 440** into conrod with bolt (1).

Remove conrod with piston from cylinder head side.

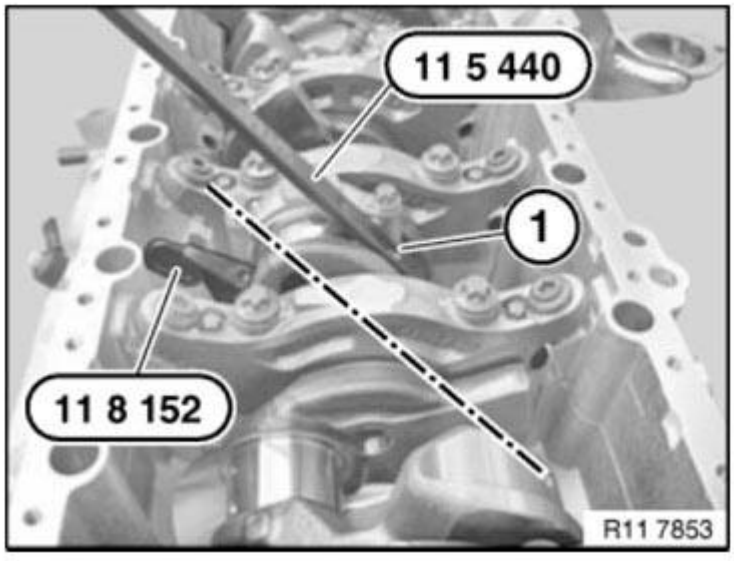


Fig. 185: Removing Conrod Using Special Tool 11 5 440 And 11 8 152
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Piston and piston bolts are paired and must not be fitted individually.

Lift out retaining ring and press out piston pin.

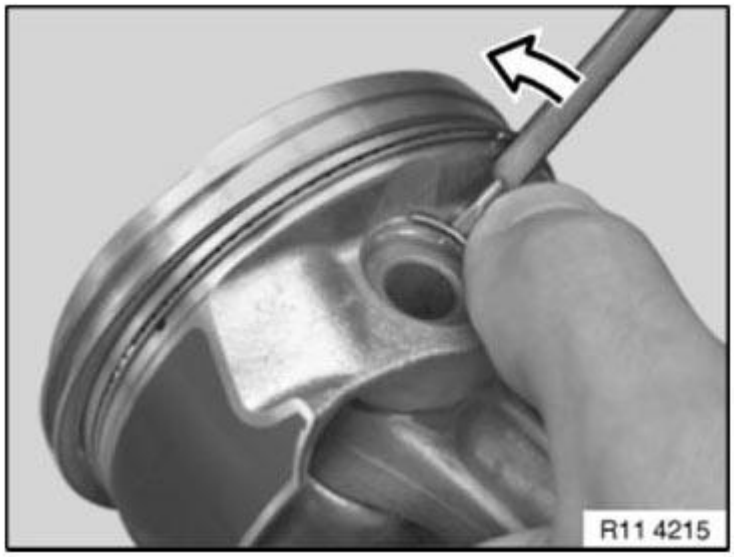


Fig. 186: Lifting Out Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

NOTE: The conrods can also be replaced individually.

The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.

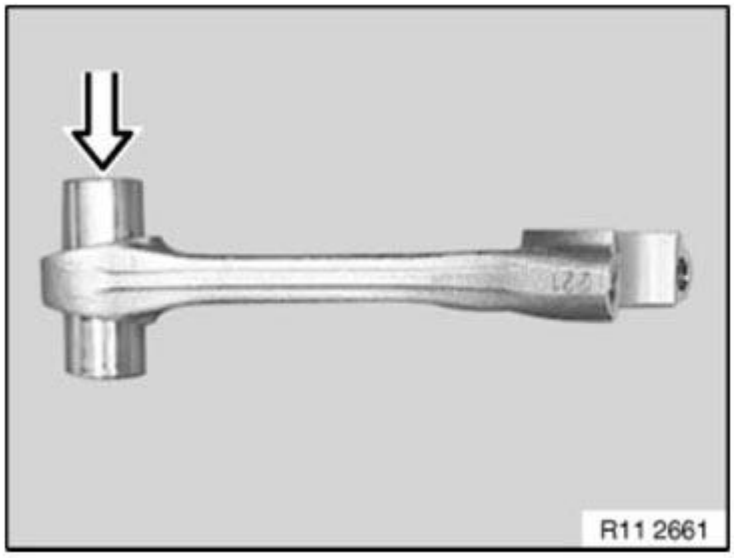


Fig. 187: Pressing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Prior to installation, measure piston installation clearance: Measure piston diameter with micrometer at

measuring point A from lower edge of piston and offset by 90° to piston pin axis.

Measuring point A.

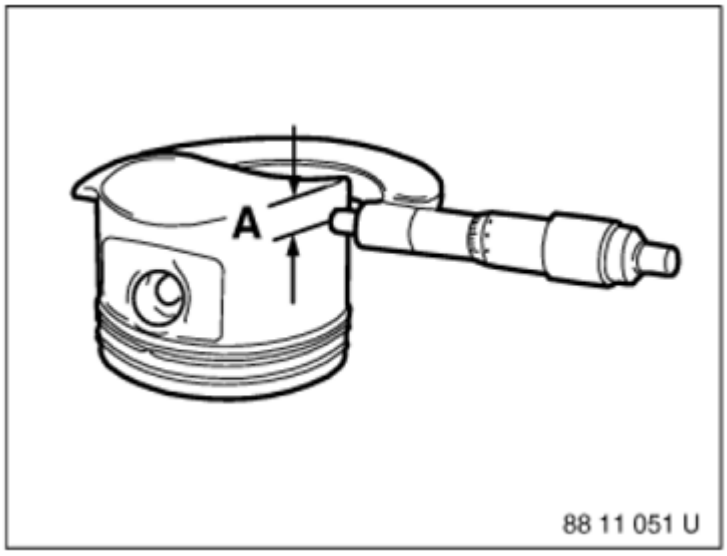


Fig. 188: Measuring Piston Diameter Using Micrometer At Measuring Point A
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal caliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

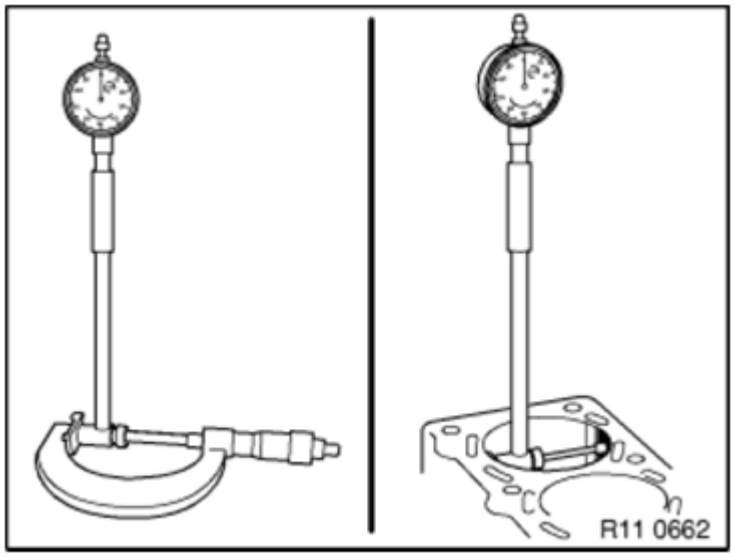


Fig. 189: Measuring Piston Installation Clearance Using Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance.

IMPORTANT: The conrods of cylinder banks 1 to 4 and 5 to 8 are mounted to the pistons differently.

NOTE: The pistons and connecting rods of cylinders 1 to 12 are identical.

Arrow on piston crown (cyl. 1 to 6) points upwards, screw connection on connecting rod points at an angle to right.

Arrow on piston crown (cyl. 7 to 12) points upwards, screw connection on connecting rod points at an angle to left.

NOTE: For purposes of clarity, pistons are shown removed.

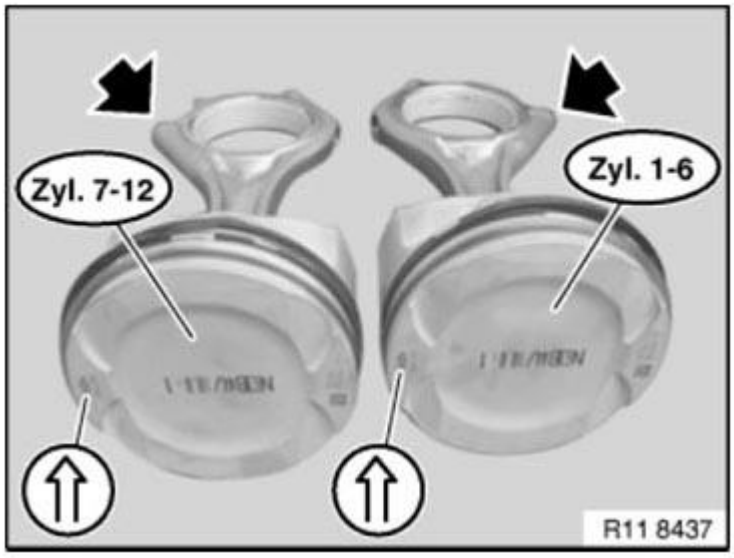


Fig. 190: Identifying Piston Crown And Connecting Rods
Courtesy of BMW OF NORTH AMERICA, INC.

The conrods are correctly mounted on the piston when the bolt connections on the conrods are parallel to each other (see arrow in illustration).

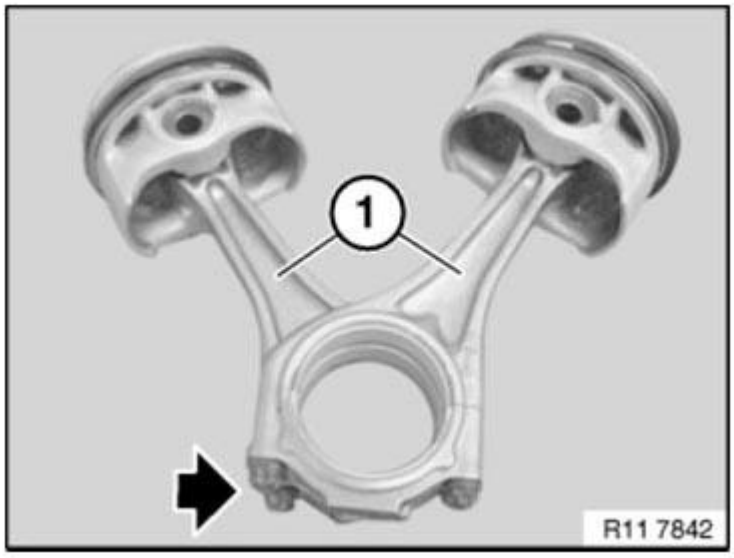


Fig. 191: Identifying Connecting Rods
Courtesy of BMW OF NORTH AMERICA, INC.

Install retaining ring.

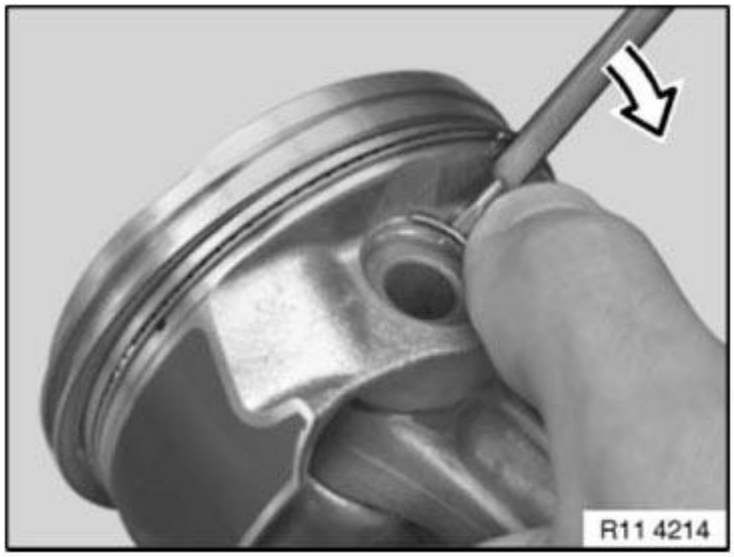


Fig. 192: Installing Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Piston circlip (1) is correctly installed when the opening points upwards.

See illustration.

It must still be possible for the piston pin to moved easily.

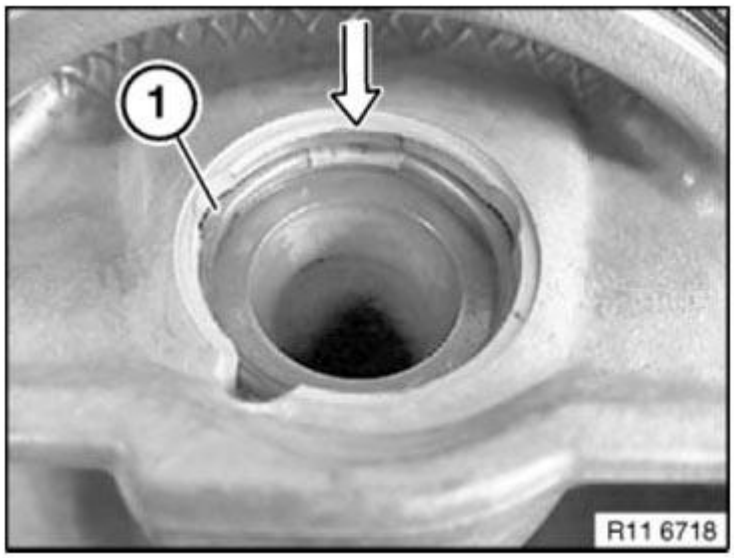


Fig. 193: Identifying Piston Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tools 11 4 440 and **11 8 152** into connecting rods.

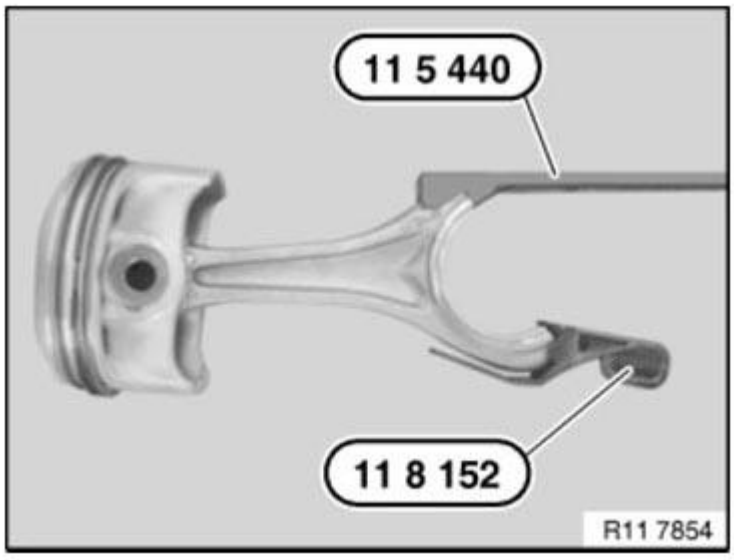


Fig. 194: Inserting Special Tools 11 4 440 And 11 8 152 Into Connecting Rods
Courtesy of BMW OF NORTH AMERICA, INC.

Install connecting rod bearing.

Lightly coat pistons and piston rings with oil.

Offset the contact points of the piston rings by approx. 120° to each other but do not position above the piston pin boss.

NOTE: Picture shows S85.

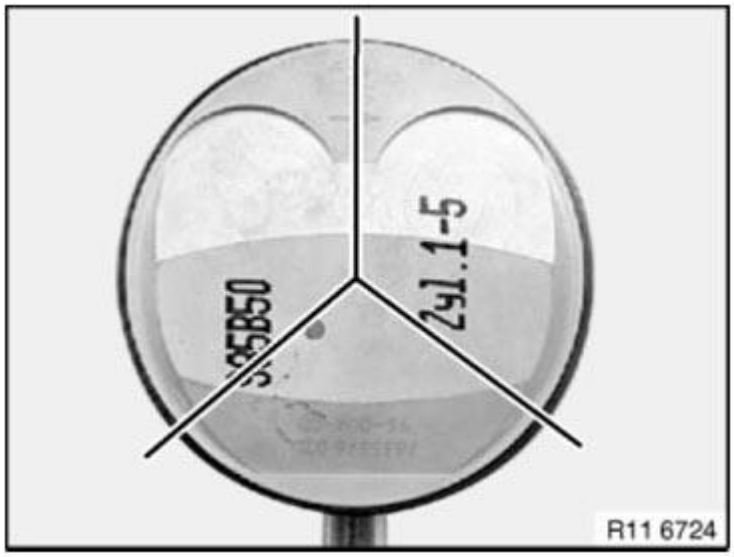


Fig. 195: Identifying Piston Rings Contact Points Offset Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Keep piston rods compressed with special tool **11 7 280** .

Install piston so that arrow points to camshaft drive.

IMPORTANT: Danger of piston ring failure.

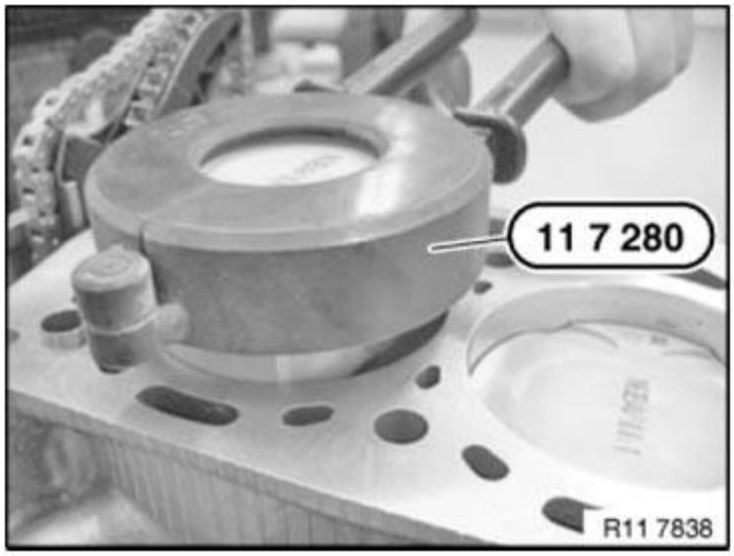


Fig. 196: Compressing Piston Rods Using Special Tool 11 7 280
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of piston ring failure.

Press in piston (1) only with finger force (do not knock in!).

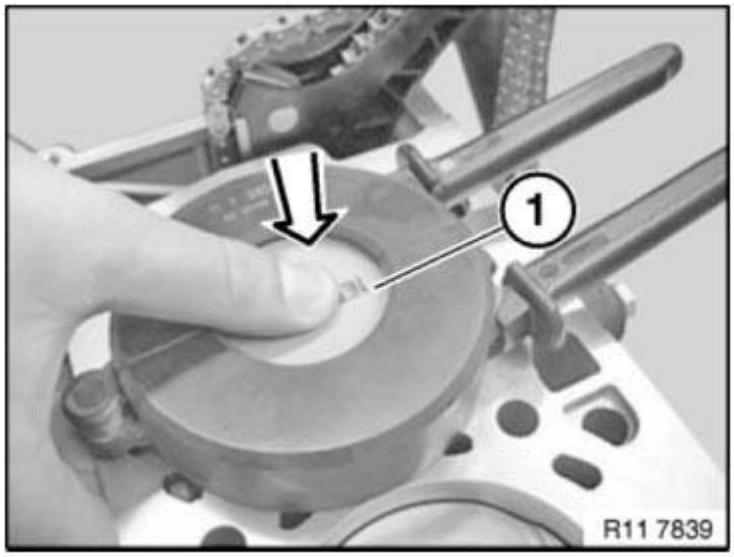


Fig. 197: Pressing Piston With Finger Force
Courtesy of BMW OF NORTH AMERICA, INC.

The direction arrow on the piston crown must point to the camshaft drive (direction of travel towards front).

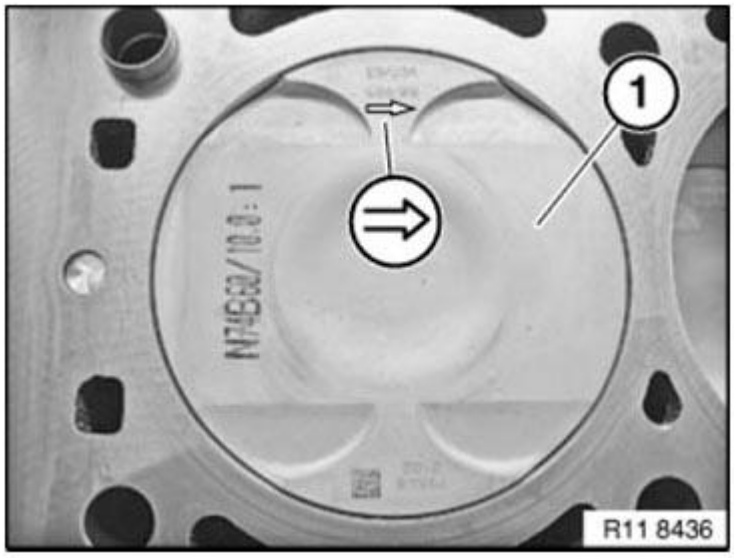


Fig. 198: Identifying Direction Arrow On Piston Crown
Courtesy of BMW OF NORTH AMERICA, INC.

Attach crankshaft journal to connecting rod. Remove special tools **11 5 440** and **11 8 152** .

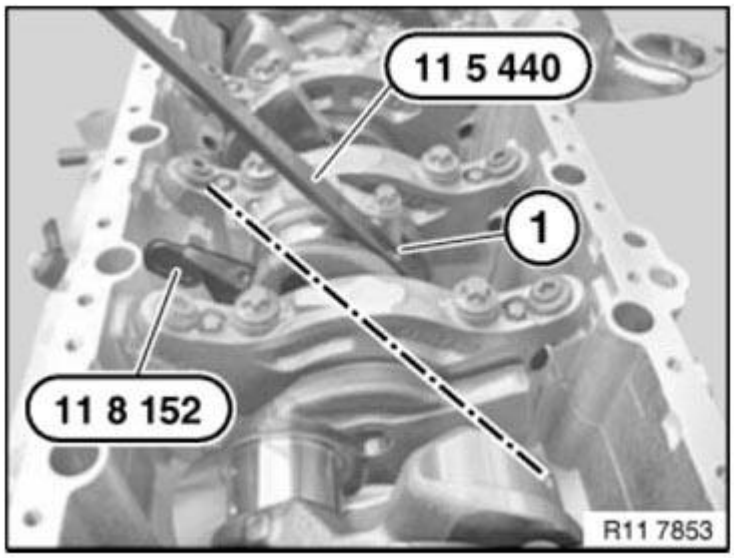


Fig. 199: Removing Special Tool 11 5 440 And 11 8 152
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, the pairing letters (1) are shown on the removed conrod.

IMPORTANT: Conrods and conrod bearing caps are denoted with the same pairing letters (1), do not mix them up.

Fit bearing cap so that pairing letters match up.

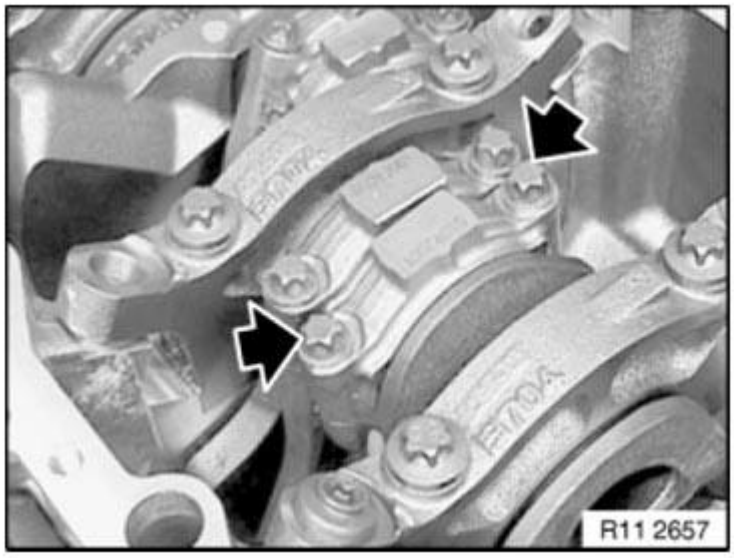


Fig. 200: Locating Conrod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Apply light coat of oil to connecting-rod bearing shells.

Fit bearing cap so that pairing letters match up.

Install new conrod bolts.

Join connecting rod bolt (1).

Tightening torque: see 1AZ in **11 24 CONNECTING RODS AND BEARINGS**

Installation:

Check entire angle adjustment.

For better overview of screw connection quality.

After joining, use an oil-resistant marker to apply a stroke (1) on the bolt head (see illustration).

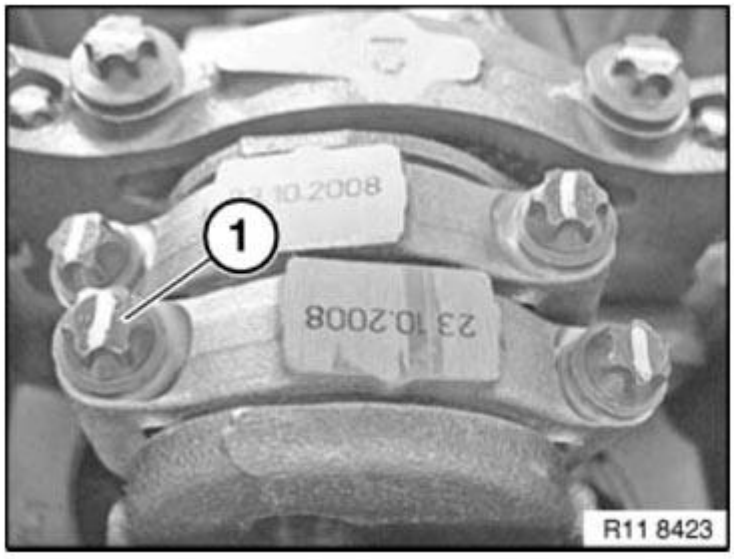


Fig. 201: Identifying Oil-Resistant Marker Stroke On Bolt Head
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten connecting rod bolts (1) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 24 CONNECTING RODS AND BEARINGS**

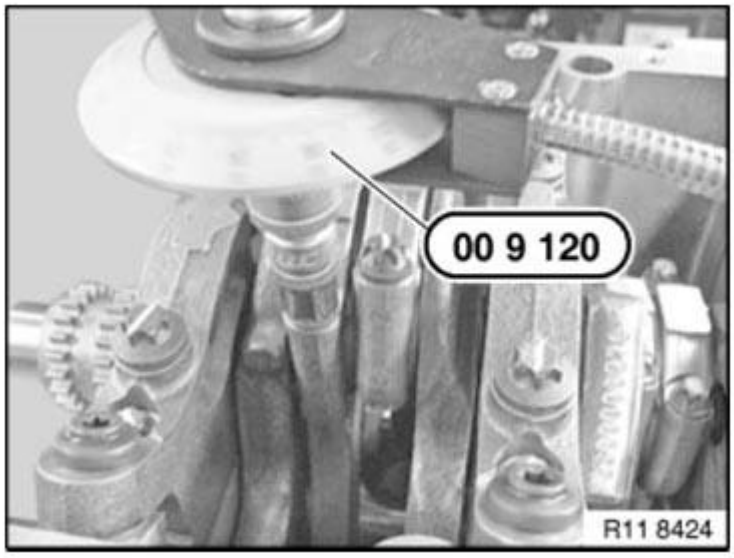


Fig. 202: Tightening Connecting Rod Bolts Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

V-RIBBED BELT WITH TENSIONER

11 28 010 REPLACE ALTERNATOR DRIVE BELT (N74)

IMPORTANT: If contaminated with hydraulic fluid: Replace drive belt.
Belt tensioner is under high initial spring tension.

Installation:

If the drive belt is to be reused, mark direction of travel and reinstall drive belt in same direction of rotation.

Necessary preliminary tasks:

- Remove **FAN COWL**

Slowly and carefully preload belt tensioner (1) with a Torx socket T60 (2) in direction of arrow up to limit position.

Secure special tool **11 0 390** in dowel hole.

Belt tensioner (1) is in installation position.

Remove drive belt (3).

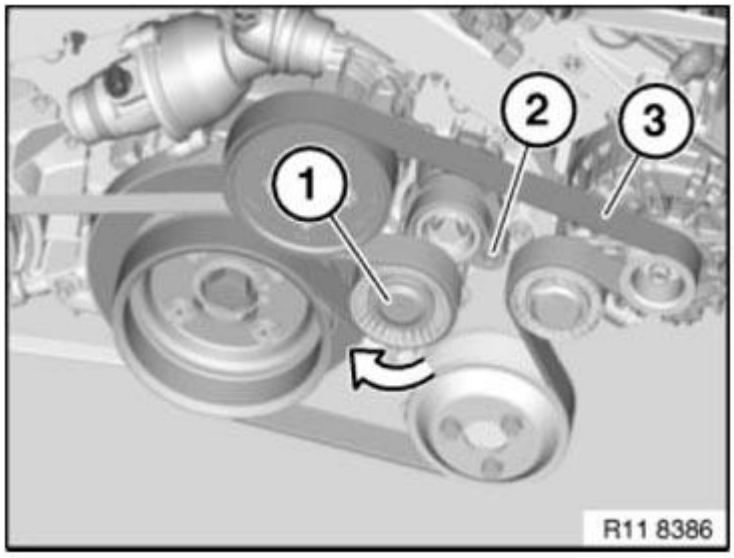


Fig. 203: Identifying Drive Belt, Belt Tensioner And Torx Socket T60
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 28 025 REPLACE TENSIONING DEVICE PULLEY FOR ALTERNATOR DRIVE BELT (N74)

Necessary preliminary tasks:

- Remove alternator **DRIVE BELT**

Remove pulley (2) protective cap.

Release screw (3).

Tightening torque: see 1AZ in **11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT**

Remove idler pulley (4).

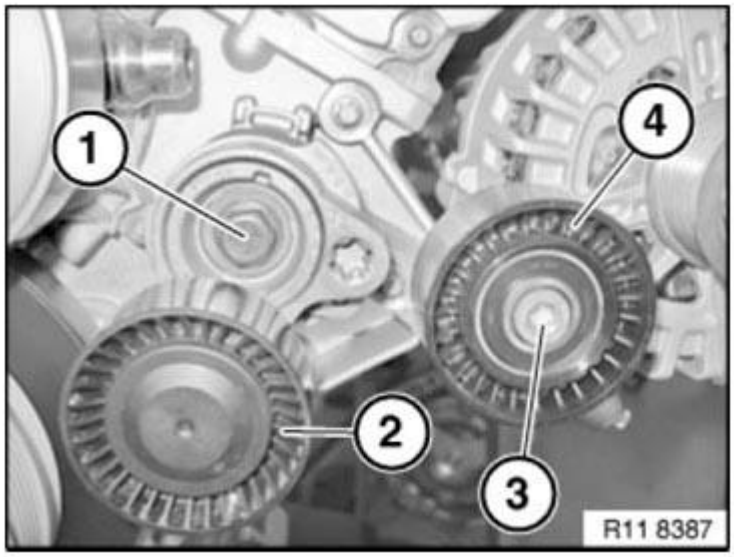


Fig. 204: Identifying Idler Pulley With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 28 050 REPLACING A/C COMPRESSOR DRIVE BELT WITH BELT TENSIONER (N74)

IMPORTANT: Risk of damage!

Release screws (1) on vibration damper only if removal position is adjusted.

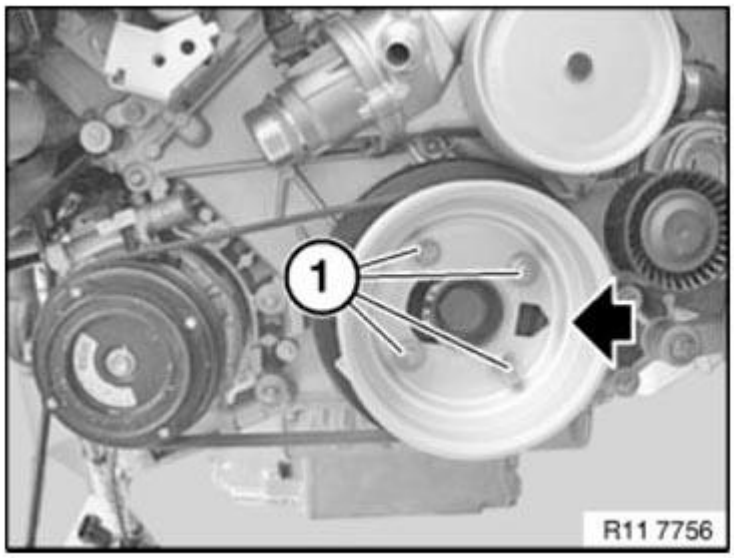


Fig. 205: Identifying Screws On Vibration Damper
Courtesy of BMW OF NORTH AMERICA, INC.

If contaminated with hydraulic fluid: **Replace** drive belt.

Crank engine at central bolt in direction of engine rotation.

Installation:

If the drive belt is to be reused, mark direction of travel and reinstall drive belt in same direction of rotation.

Necessary preliminary tasks:

- Remove alternator **DRIVE BELT**

NOTE: Observe direction of engine rotation.

Crank engine at central bolt until marking (see arrow in illustration) is reached on vibration damper.

Release screws (1).

Tightening torque: see 3AZ in **11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT**

IMPORTANT: Belt pulley is pretensioned.

Belt pulley tension is relieved abruptly during the cranking process!

NOTE: Observe direction of engine rotation.

Crank engine at central bolt until marking (see arrow in illustration) is reached on vibration damper.

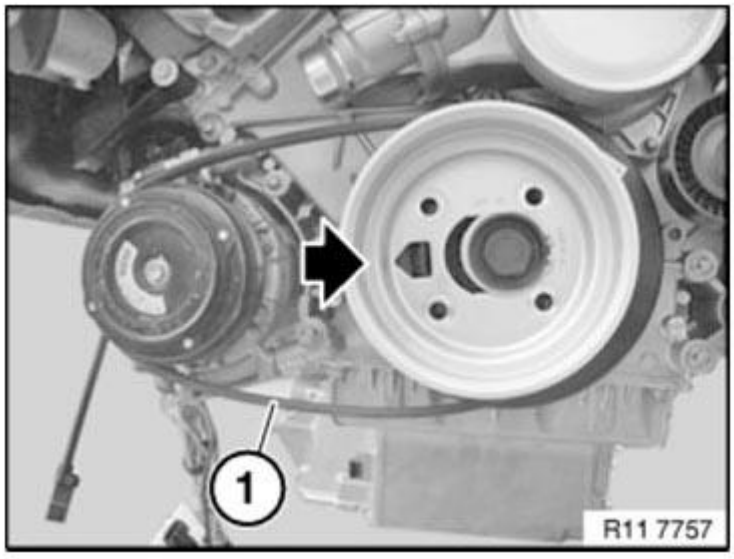


Fig. 206: Removing Elasto-Belt
Courtesy of BMW OF NORTH AMERICA, INC.

Remove elasto-belt.

Assemble engine.

11 28 020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N74)

Necessary preliminary tasks:

- Remove alternator **DRIVE BELT**

If necessary, remove special tool **11 0 390** .

Release screw (1).

Tightening torque: see 1AZ in **11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT**

Remove belt tensioner with idler pulley (2).

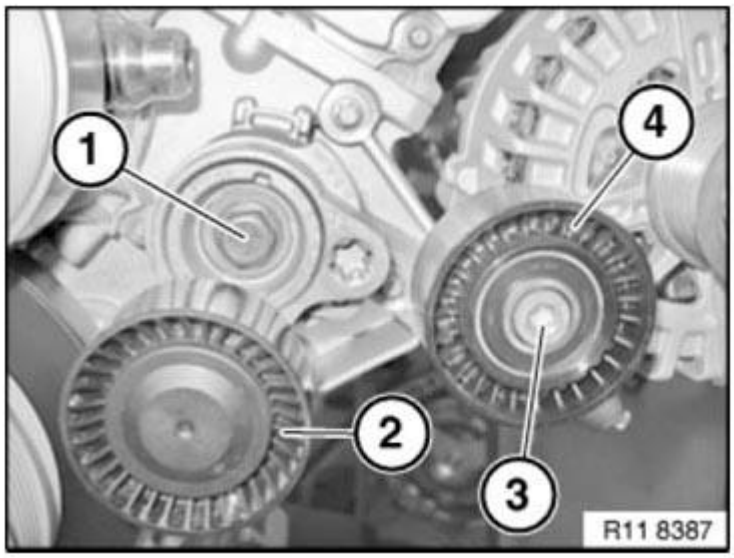


Fig. 207: Identifying Screw And Belt Tensioner With Idler Pulley
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

CAMSHAFT

11 31 573 ADJUSTING CAMSHAFT TIMING ON LEFT SIDE (N74)

IMPORTANT: Release central bolts on adjustment unit only with special tool 11 9 890 .

Risk of damage to timing drive.

If special tool **11 9 890** can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 7 to 12)

Necessary preliminary tasks:

- Remove **LEFT TIMING CASE COVER**
- **CHECK CAMSHAFT TIMING ON LEFT SIDE**

Get special tool **11 9 890** ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.

Special tool **11 9 892** Press-down bar.

Special tool 11 9 893 Gap gauge for inlet and exhaust camshafts.

Special tool **11 9 895** spacer.

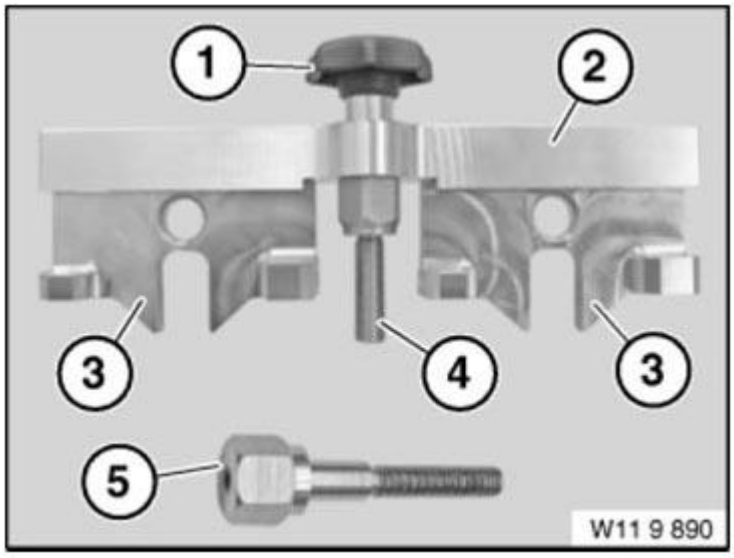


Fig. 208: Identifying Special Tools (11 9 890, 11 9 891, 11 9 892, 11 9 893, 11 9 895)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of inlet and exhaust adjustment units.

Installation:

Replace central bolts after releasing.

Illustrations show cylinders 1 to 6.

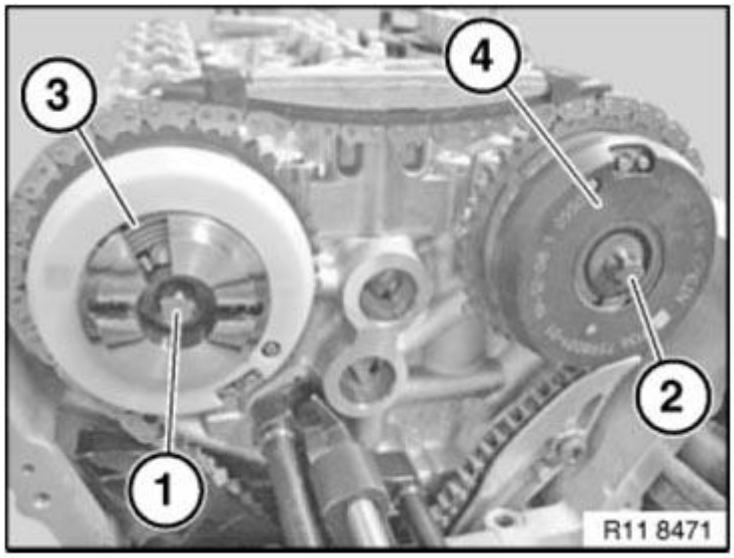


Fig. 209: Identifying Inlet And Exhaust Adjustment Units Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat contact face of new central bolt (1) with copper paste.

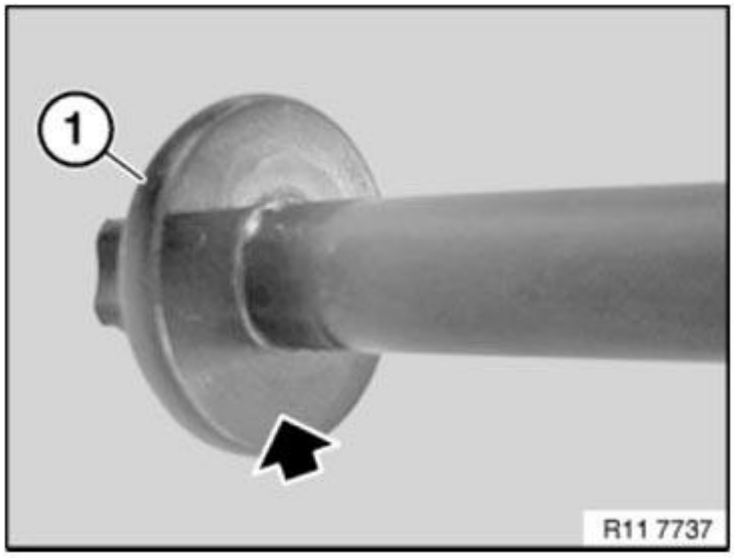


Fig. 210: Locating Central Bolt Coating Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Solenoid valves for VANOS adjustment units must be removed.

Screw special tool **11 9 895** into cylinder head.

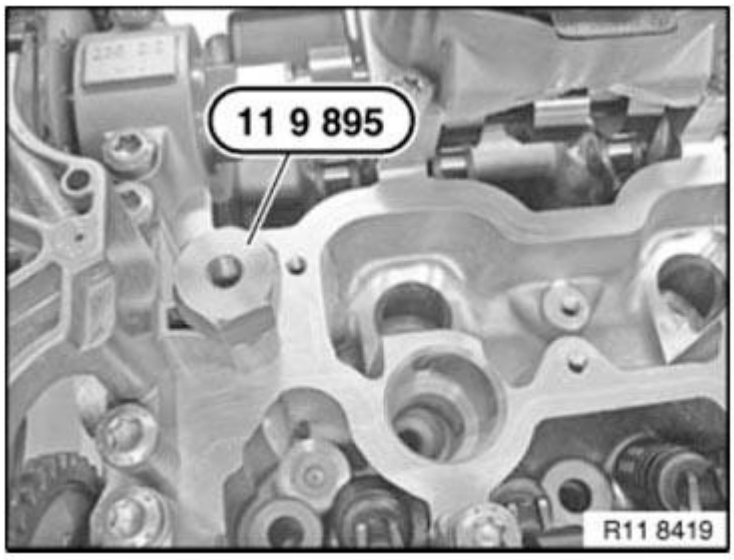


Fig. 211: Screwing Special Tool 11 9 895 Into Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 on inlet and exhaust camshafts.

The special tool 11 9 893 must rest **without a gap** on cylinder head; if necessary, adjust camshaft at hexagon heads.

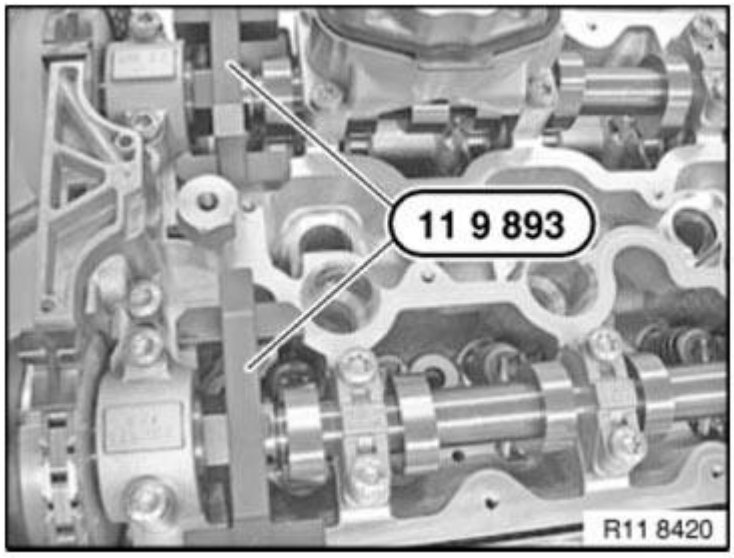


Fig. 212: Positioning Special Tool 11 9 893 On Inlet And Exhaust Camshafts
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 9 892** on special tool 11 9 893.

Both special tools **11 9 891** are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

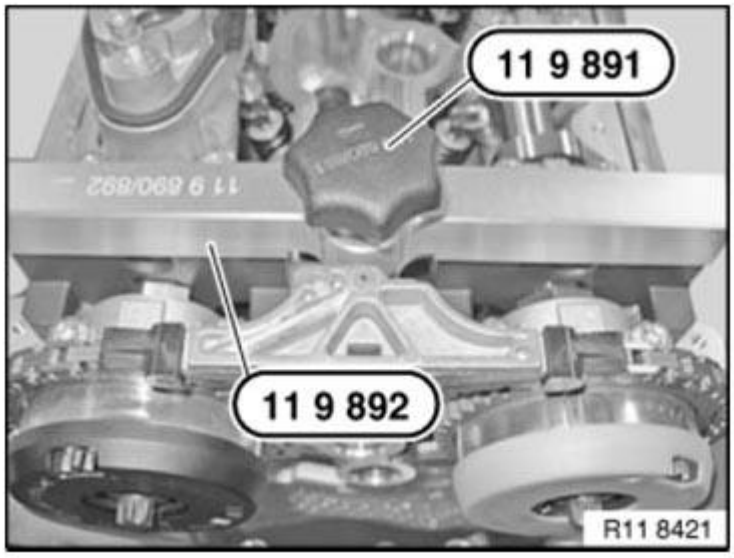


Fig. 213: Identifying Special Tools (11 9 891, 11 9 892)
Courtesy of BMW OF NORTH AMERICA, INC.

Join central bolt (1) of intake adjustment unit (2).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

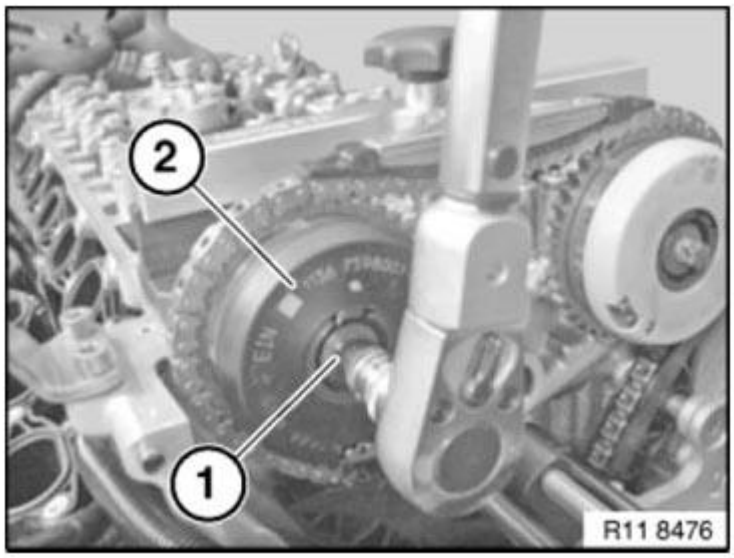


Fig. 214: Tightening Central Bolt Of Intake Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Join central bolt (1) of exhaust adjustment unit (2).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

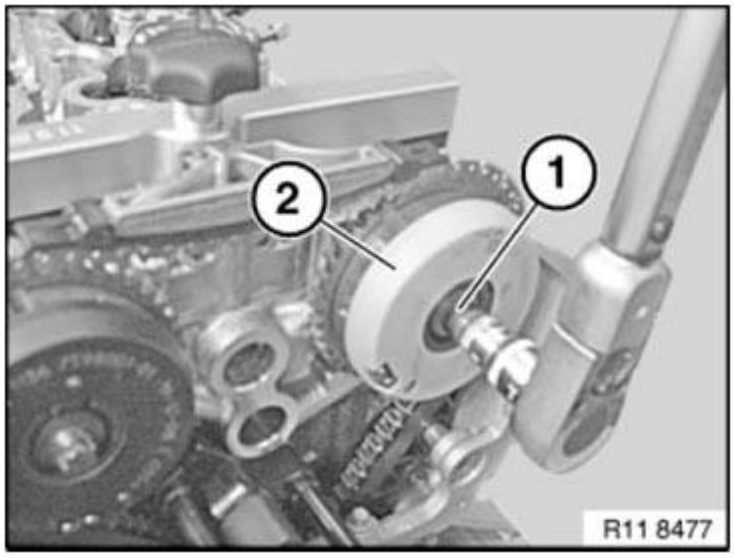


Fig. 215: Tightening Central Bolt Of Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of intake adjustment unit (2) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

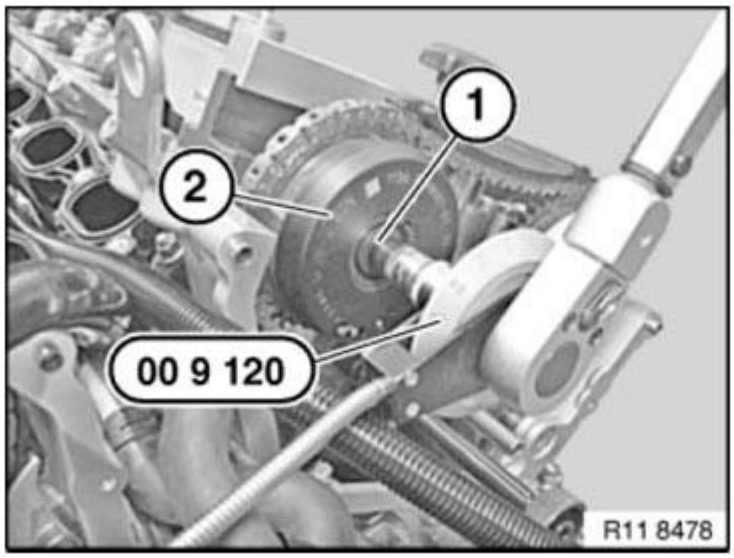


Fig. 216: Securing Intake Adjustment Unit Central Bolt Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of exhaust adjustment unit (2) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

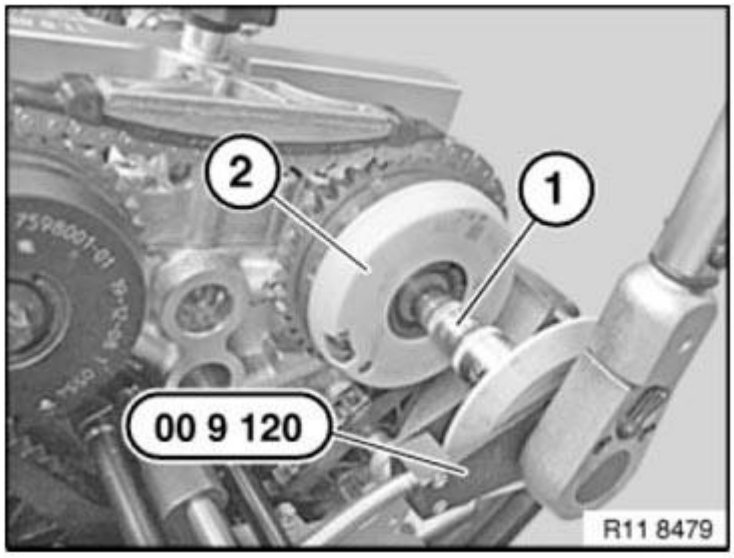


Fig. 217: Securing Exhaust Adjustment Unit Central Bolt Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool **11 9 890** .

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **TDC firing position for cylinder 1** .

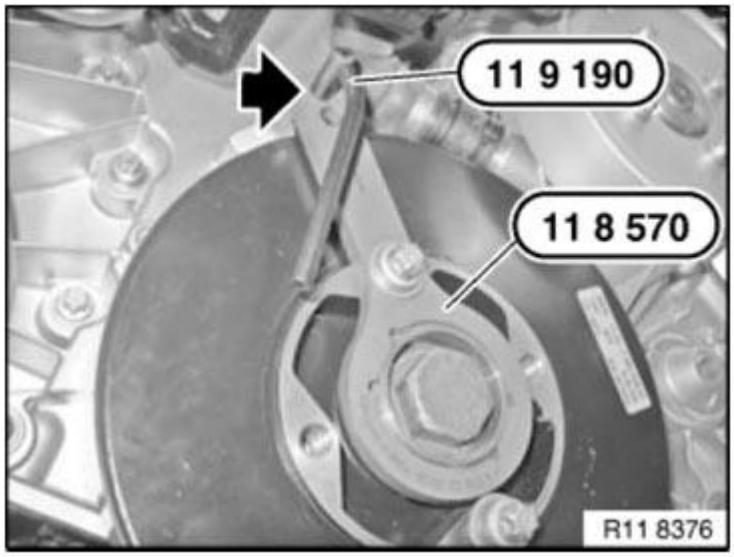


Fig. 218: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Secure vibration damper with special tool **11 9 190** at **TDC firing position for cylinder 1** .

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

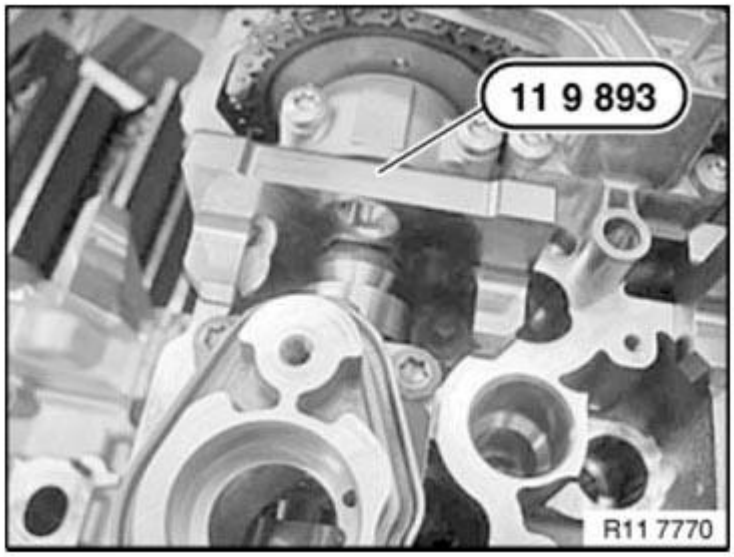


Fig. 219: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

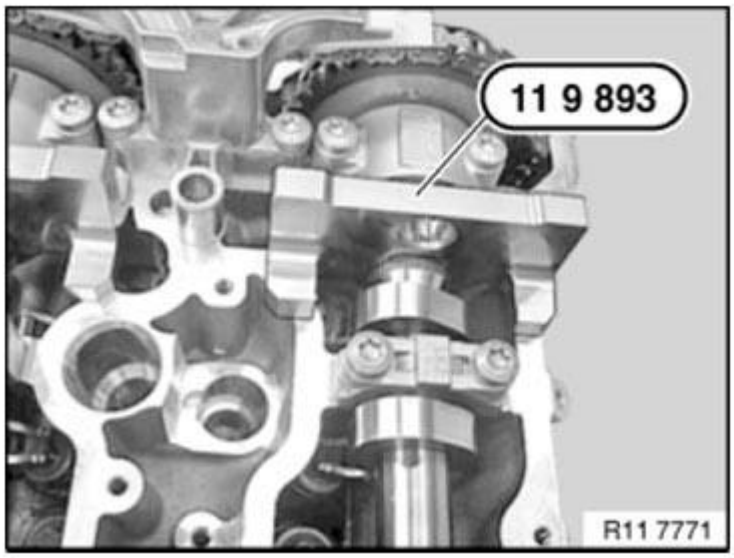


Fig. 220: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 574 ADJUSTING CAMSHAFT TIMING ON RIGHT SIDE (N74)

IMPORTANT: Release central bolts on adjustment unit only with special tool 11 9 890 . Risk of damage to timing drive. If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 1 to 6)

Necessary preliminary tasks:

- Remove **RIGHT TIMING CASE COVER**
- **CHECK CAMSHAFT TIMING ON RIGHT SIDE**.

Get special tool **11 9 890** ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.

Special tool **11 9 892** Press-down bar.

Special tool 11 9 893 Gap gauge for inlet and exhaust camshafts.

Special tool **11 9 895** spacer.

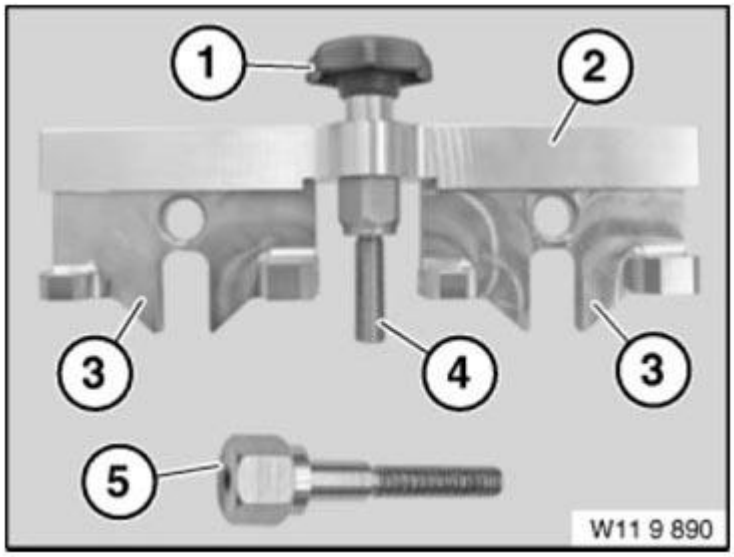


Fig. 221: Identifying Special Tools (11 9 890, 11 9 891, 11 9 892, 11 9 893, 11 9 895)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of inlet and exhaust camshaft adjusters.

Installation:

Replace central bolts after releasing.

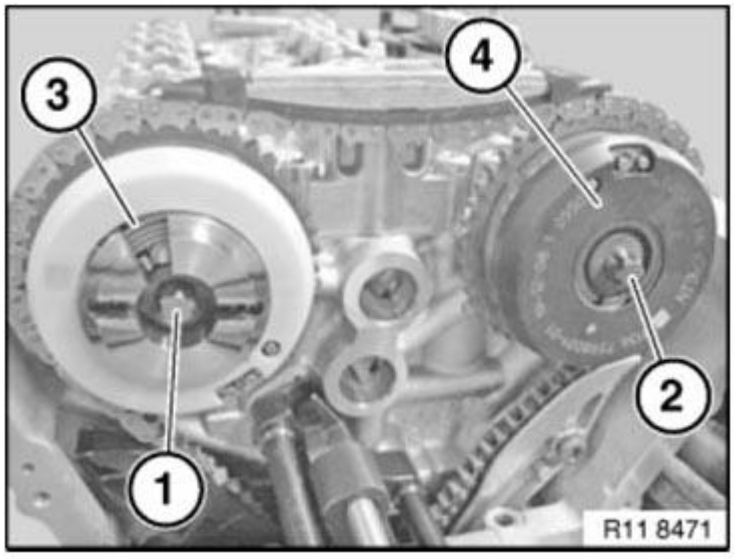


Fig. 222: Identifying Inlet And Exhaust Adjustment Units Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

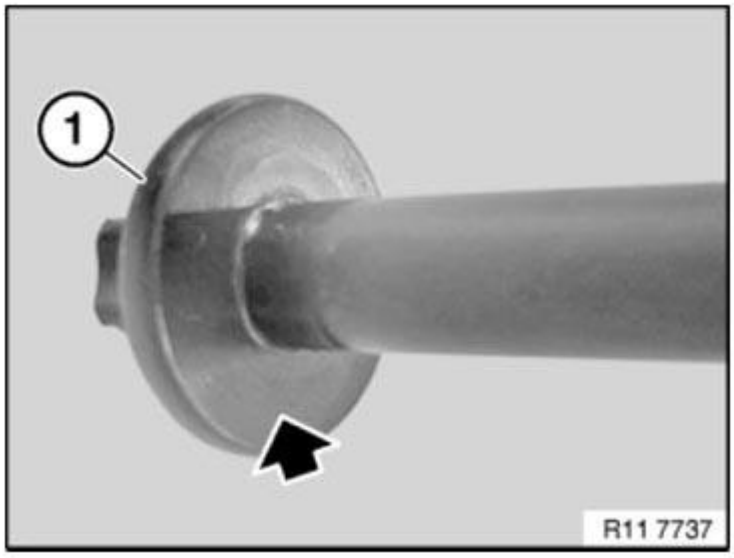


Fig. 223: Locating Central Bolt Coating Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat contact face of new central bolt (1) with copper paste.

IMPORTANT: SOLENOID VALVES for Vanos units must be removed.

Screw special tool **11 9 895** into cylinder head.

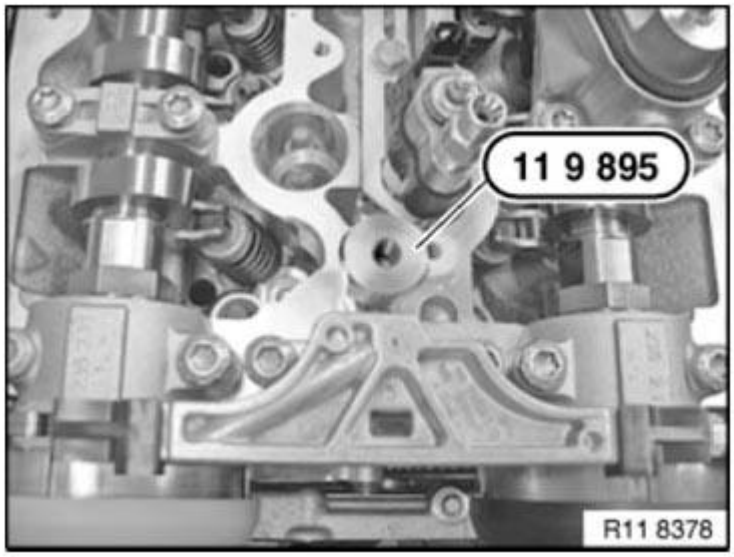


Fig. 224: Screwing Special Tool 11 9 895 Into Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 at the angle between the inlet and exhaust cam shafts.

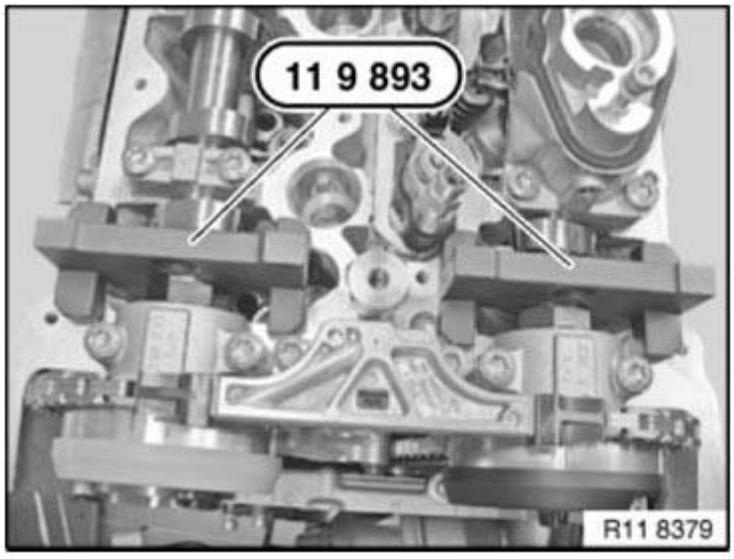


Fig. 225: Positioning Special Tool 11 9 893 At Angle Between Inlet And Exhaust Cam Shafts
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 9 892** on special tool 11 9 893.

Both special tools **11 9 891** are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

Connect inlet camshaft adjuster (2) central screw (1).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

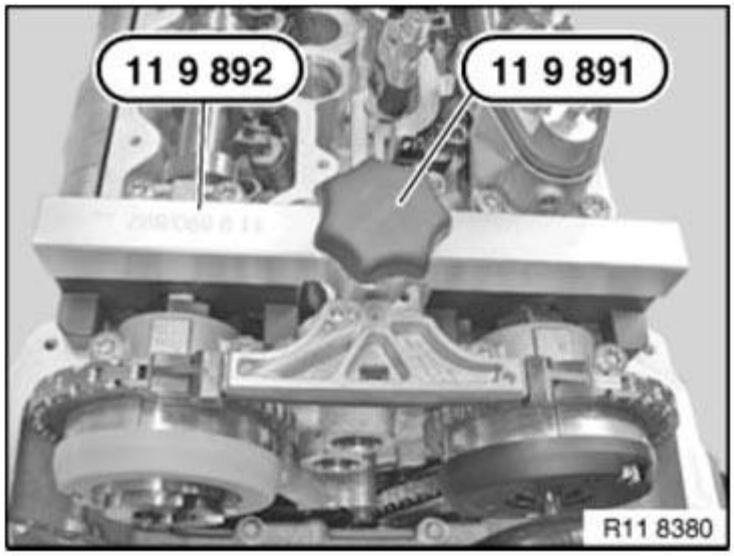


Fig. 226: Identifying Special Tool 11 9 891 And Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Connect exhaust camshaft adjuster (2) central screw (1).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

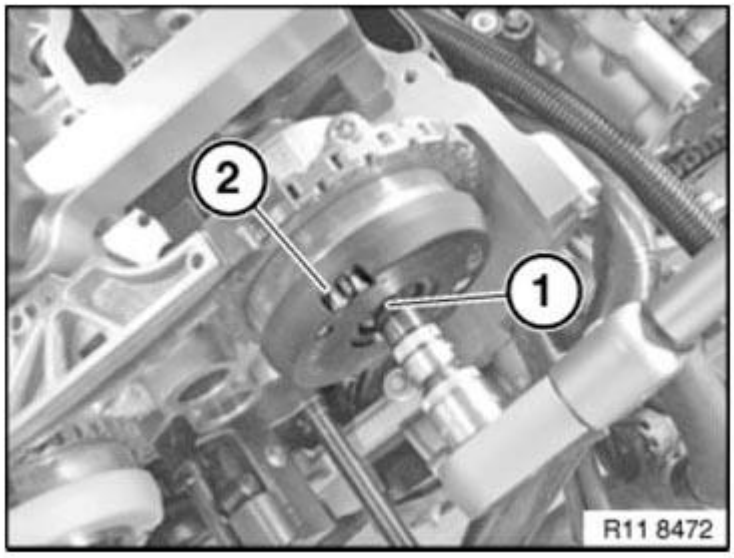


Fig. 227: Tightening Inlet Camshaft Adjuster Central Screw
Courtesy of BMW OF NORTH AMERICA, INC.

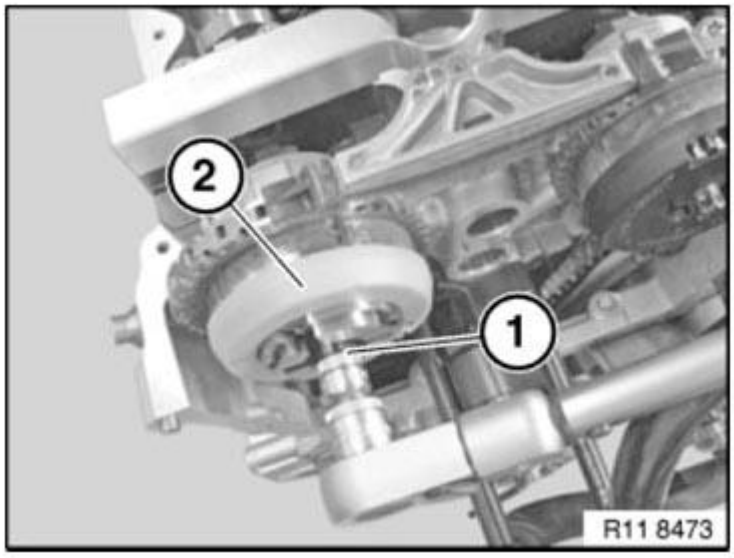


Fig. 228: Tightening Exhaust Camshaft Adjuster Central Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of exhaust camshaft adjuster (2) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

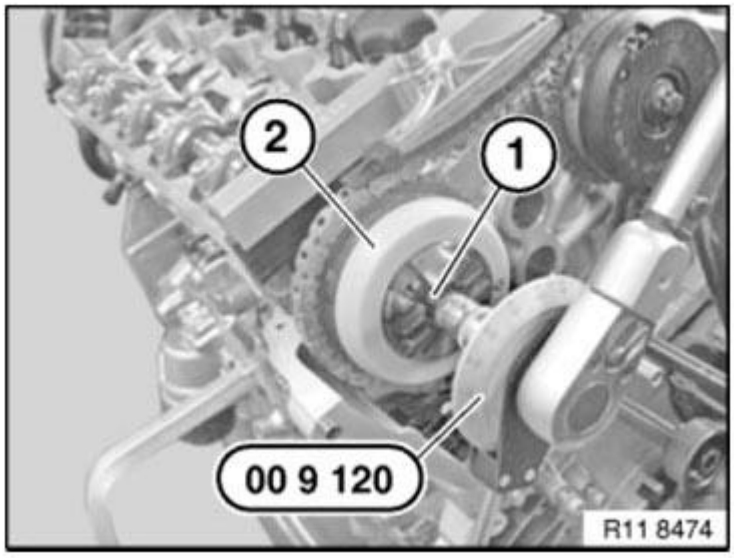


Fig. 229: Tightening Central Bolt Of Exhaust Camshaft Adjuster With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of inlet camshaft adjuster (2) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

Remove special tool **11 9 890** .

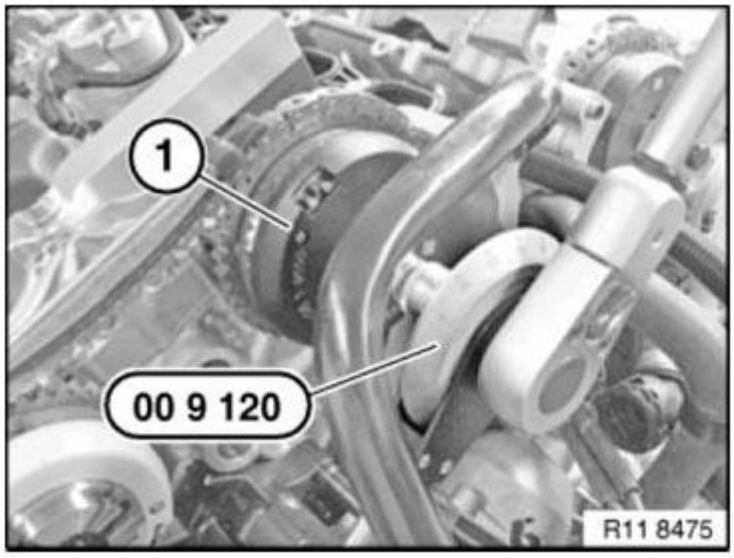


Fig. 230: Securing Central Bolt Of Inlet Camshaft Adjuster With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **cylinder no. 1 TDC firing position** .

Secure vibration damper with special tool **11 9 190** in the **firing TDC position of cylinder 1** .

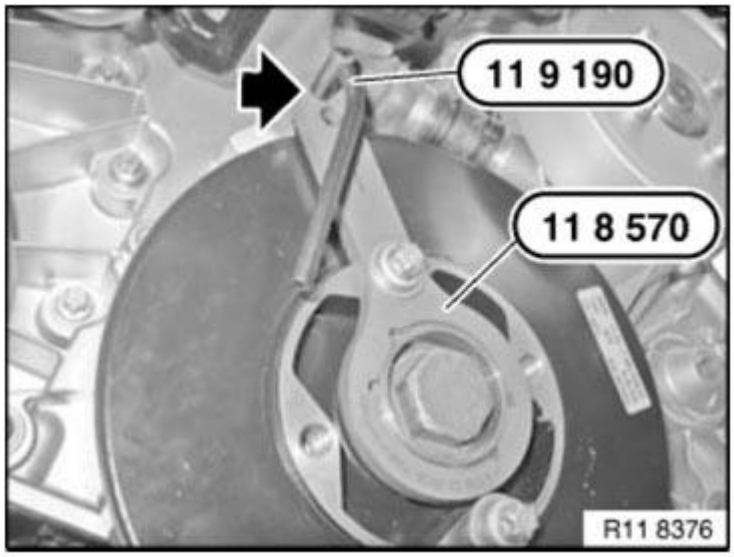


Fig. 231: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

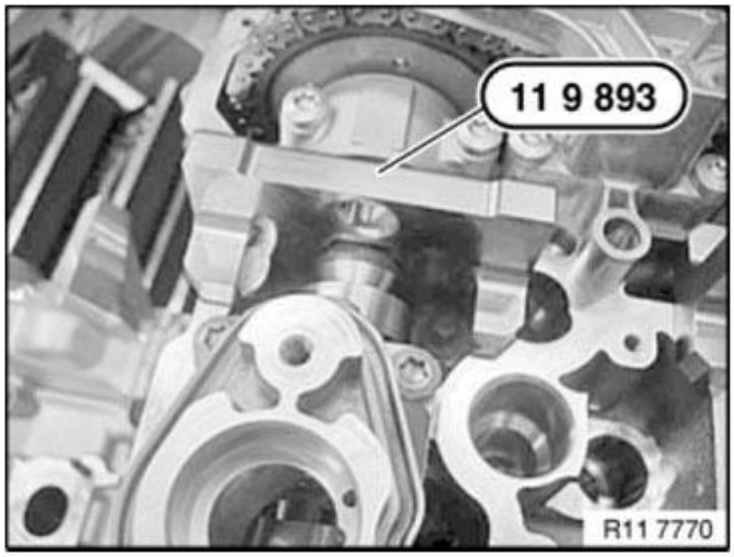


Fig. 232: Fitting Special Tool 11 9 893 On Intake Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

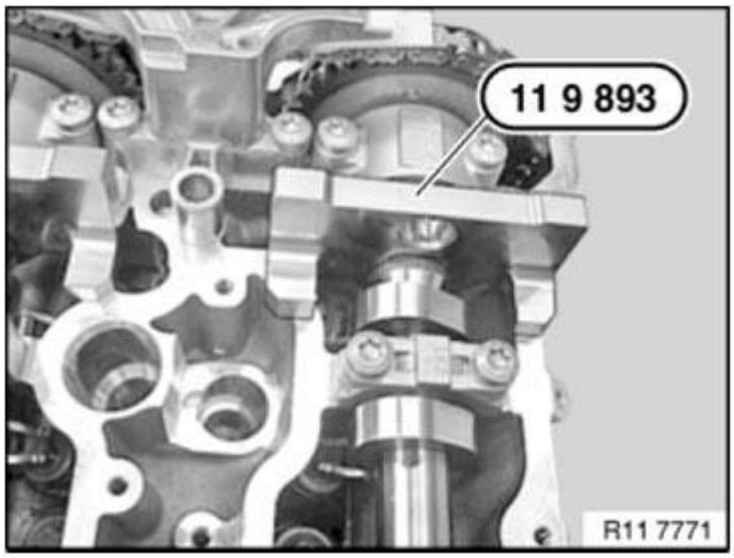


Fig. 233: Fitting Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N74)

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 7 - 12

Necessary preliminary tasks:

- Remove left **CYLINDER HEAD COVER**
- Remove **FAN COWL** with electric fan
- Remove **BELT PULLEY** for air conditioning system
- Remove left **CHAIN TENSIONER**

Mount special tool **11 9 900** at position of chain tensioner.

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm** .

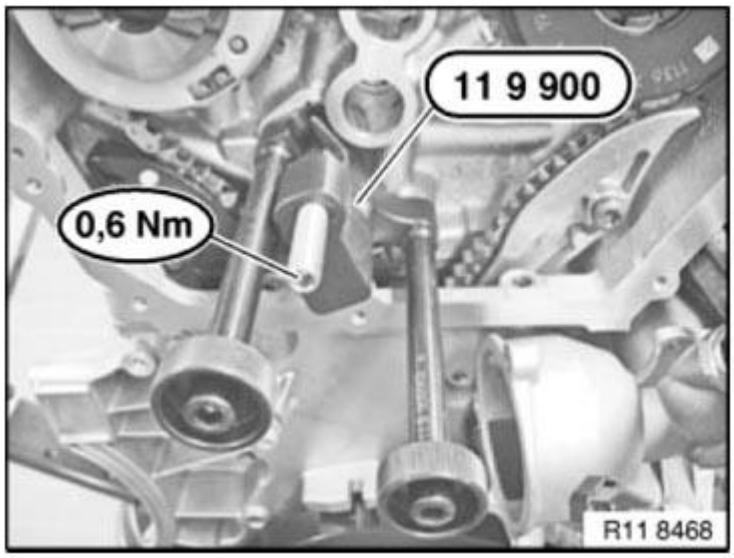


Fig. 234: Mounting Special Tool 11 9 900 At Position Of Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjuster is normally locked in its initial position.

The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjuster.

In order to avoid incorrect timing adjustment, it is essential to check the locking of the adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of inlet and exhaust adjustment units in initial position:

Gripping hexagon head (2) of camshafts with a fork wrench (1), carefully try to rotate camshafts against direction of rotation.

The inlet and exhaust adjustment units are locked in the initial position when the camshafts are non-positively connected to the adjustment units.

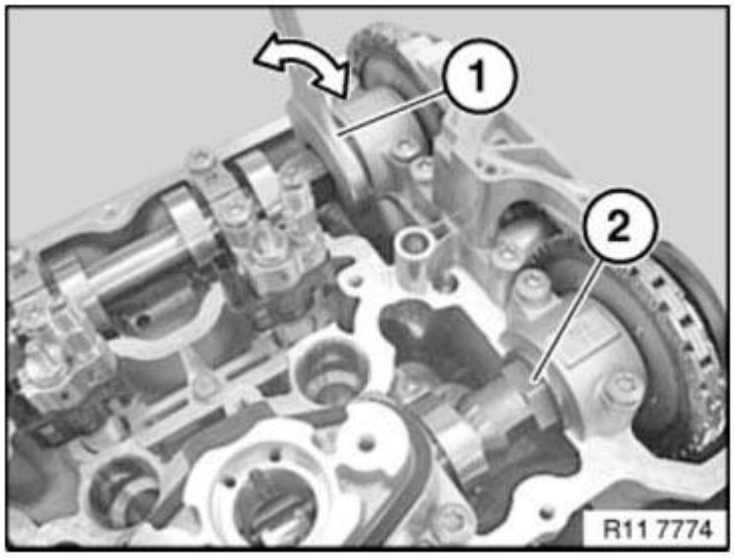


Fig. 235: Rotating Camshafts Using Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the inlet or exhaust camshaft adjuster of the camshafts "can not" be locked as described, the adjuster is faulty and must be replaced.

NOTE: If the camshafts are at the TDC firing position for cylinder 1, the labelling on the exhaust camshaft (1 and 2) can be read from above.

A = exhaust camshaft.

712 = cylinder 7 to 12.

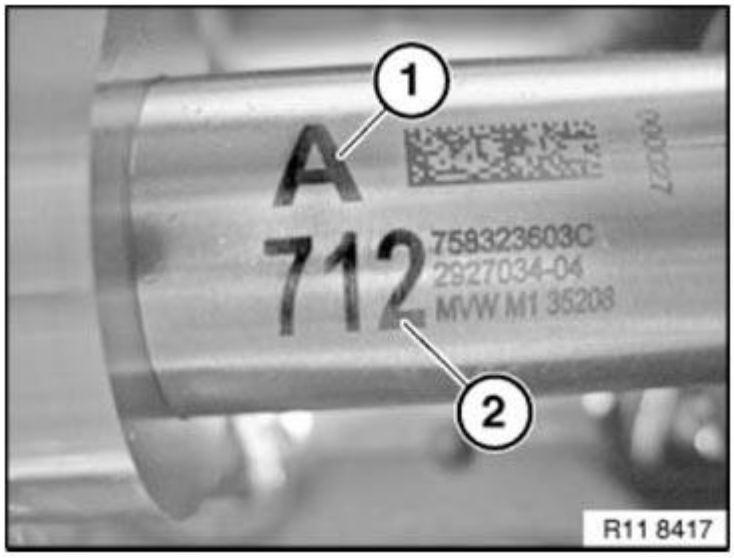


Fig. 236: Identifying Exhaust Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (1) of the 1st cylinder point inward at an angle (see arrow in illustration).

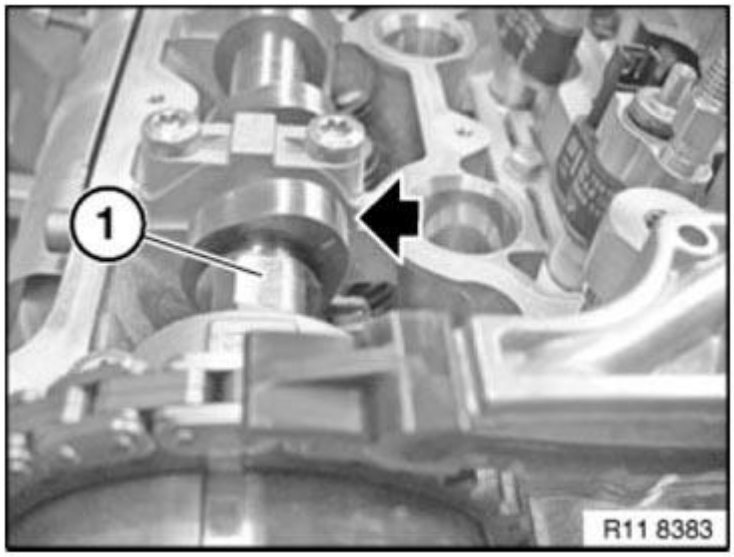


Fig. 237: Identifying Cams Of Exhaust Camshaft Of 1st Cylinder Point Inward At An Angle
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the camshafts are at the TDC firing position for cylinder 1, the labelling on the intake camshaft (1 and 2) can be read from above.

E= intake camshaft.

712 = cylinder 7 to 12.

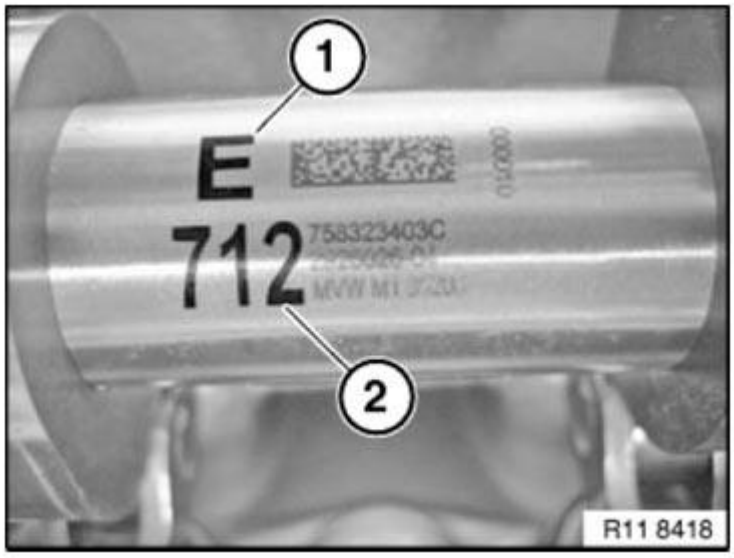


Fig. 238: Identifying Intake Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of intake camshaft (1) of the 1st cylinder point inward at an angle (see arrow in illustration).

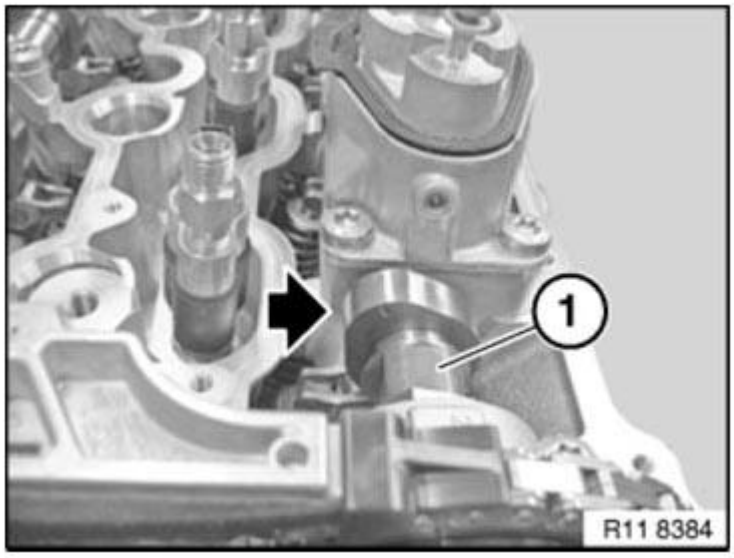


Fig. 239: Identifying Cams Of Intake Camshaft Of 1st Cylinder Point Inward At An Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Lay auxiliary water pump holder to one side.

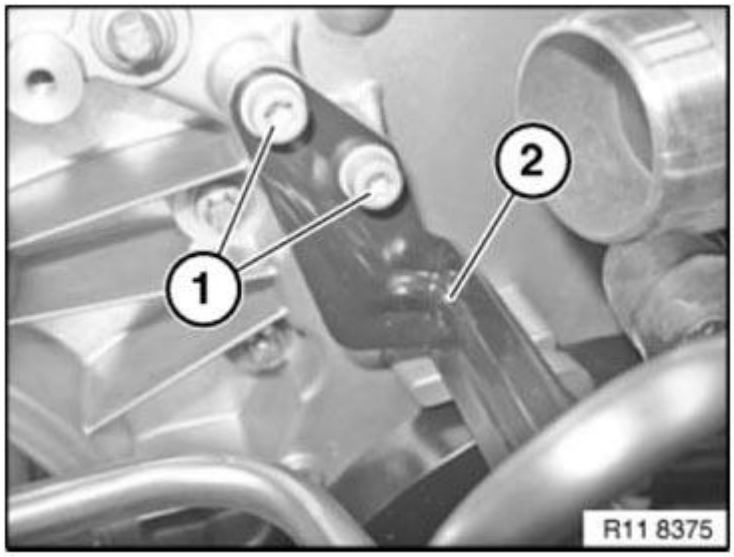


Fig. 240: Identifying Auxiliary Water Pump Holder With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with the mounting flats on the vibration damper at the TDC mark.

Secure special tool **11 8 570** with a screw (1).

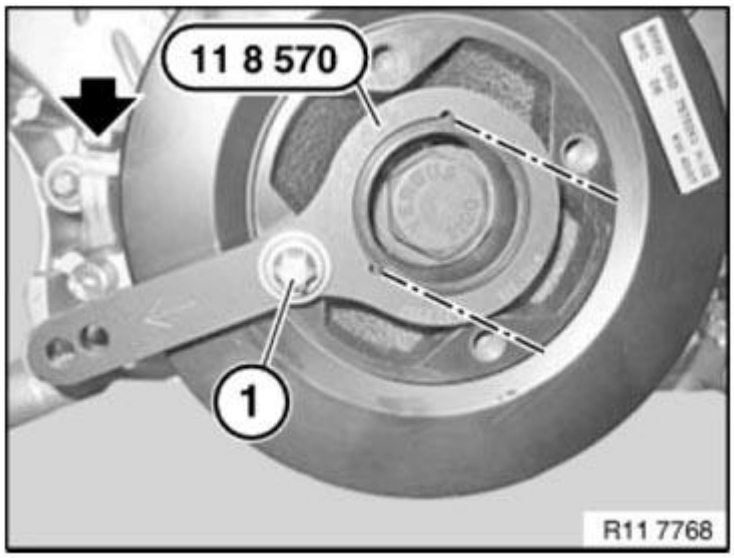


Fig. 241: Securing Special Tool 11 8 570 With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at the central bolt in direction of engine rotation.

Use special tools **11 8 570** and **11 9 190** to insert the vibration damper in the upper bore hole.

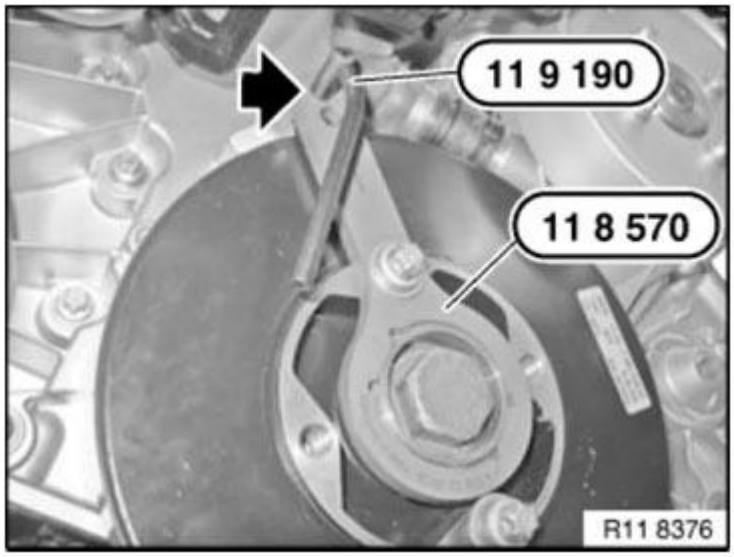


Fig. 242: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

The crankshaft is correctly positioned when the special tool **11 8 570** is locked with **11 9 190** in the groove (see arrow in illustration).

The crankshaft is locked in the **Cylinder 1 firing TDC position** .

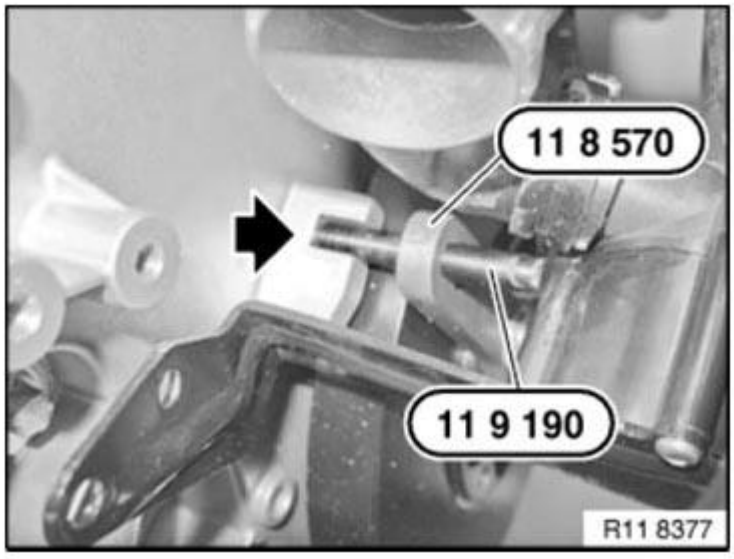


Fig. 243: Locking Crankshaft In Correct Position Using Special Tool 11 8 570 And 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on

cylinder head.

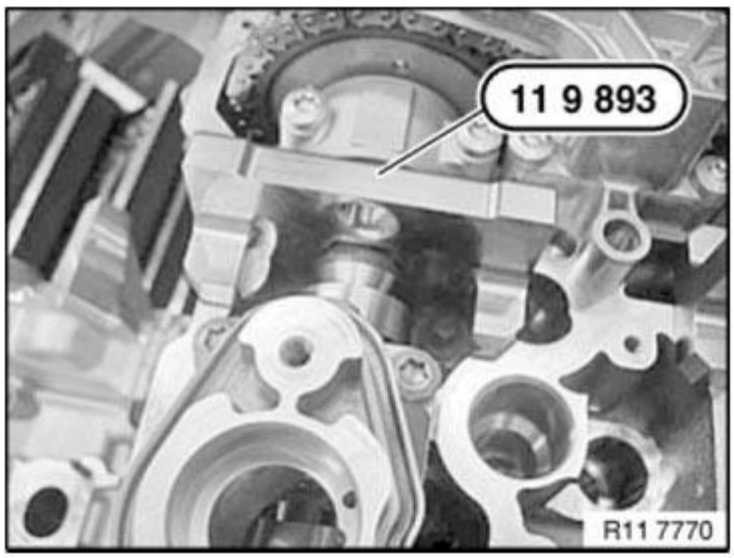


Fig. 244: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on the exhaust camshaft and test timing adjustment.

NOTE: Timing is correctly adjusted if special tool 11 9 893 rests on the cylinder head without any gaps.

If necessary, adjust camshaft **TIMING** on left side.

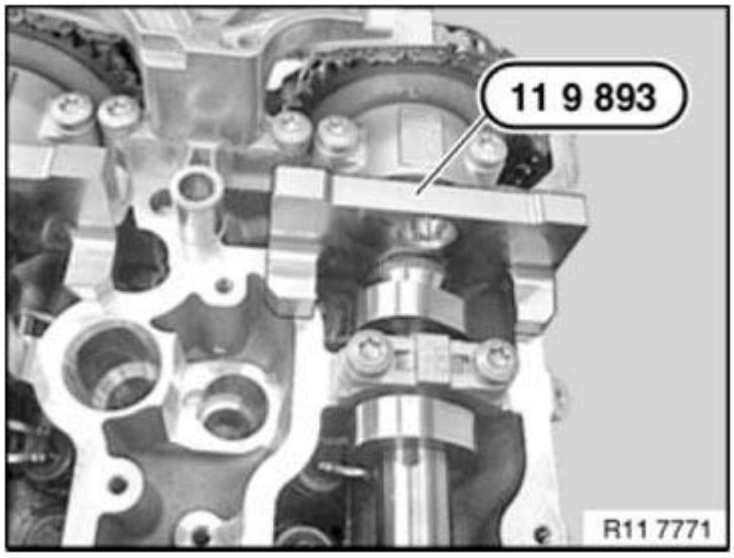


Fig. 245: Fitting Special Tool 11 9 893 On Exhaust Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N74)

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 1 - -6

Necessary preliminary tasks:

- Remove right **CYLINDER HEAD COVER**
- Remove **FAN COWL** with electric fan
- Remove **BELT PULLEY** for air conditioning system
- Remove right **CHAIN TENSIONER**

Mount special tool **11 9 900** at position of chain tensioner.

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm** .

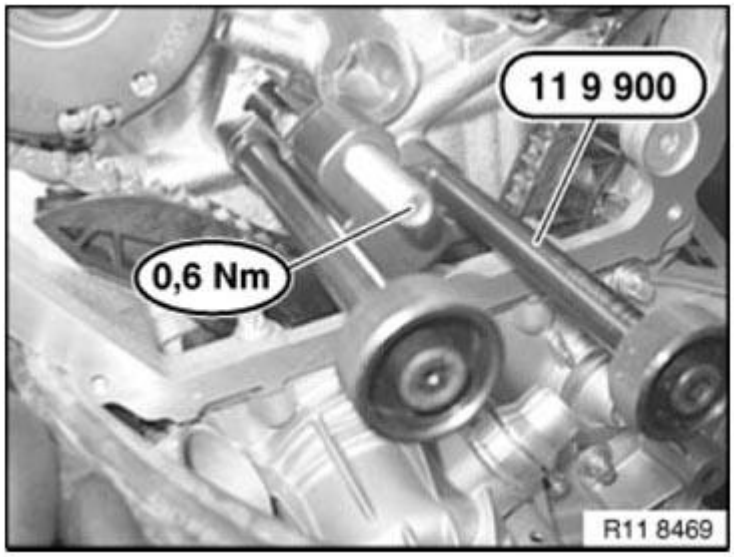


Fig. 246: Mounting Special Tool 11 9 900 At Position Of Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjuster is normally locked in its initial position.

The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjuster.

In order to avoid incorrect timing adjustment, it is essential to check the locking of the adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of inlet and exhaust camshaft adjusters in initial position:

Gripping hexagon head (2) of camshafts with a fork wrench (1), carefully try to rotate camshafts against direction of rotation.

The inlet and exhaust adjustment units are locked in the initial position when the camshafts are non-positively connected to the adjusters.

NOTE: Graphic corresponds to cylinders 7-12.

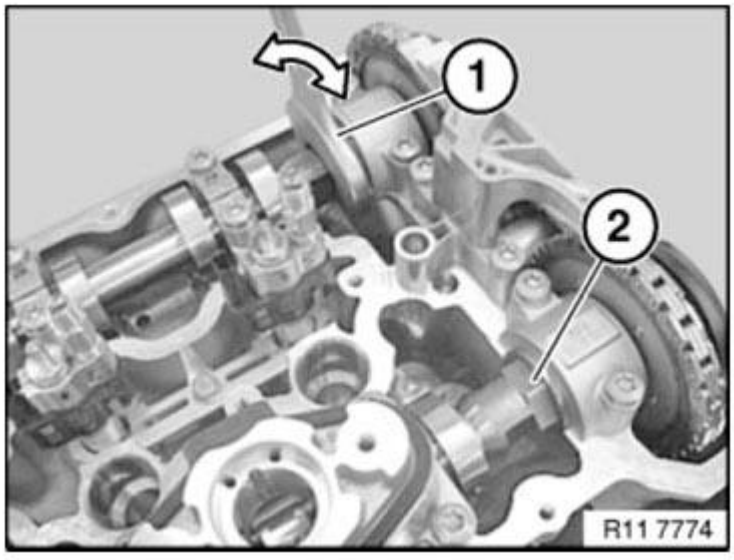


Fig. 247: Rotating Camshafts Using Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the inlet or exhaust camshaft adjuster of the camshafts "cannot" be locked as described, the adjuster is faulty and must be replaced.

NOTE: If the camshafts are at the TDC firing position for cylinder 1, the labelling on the exhaust camshaft (1 and 2) can be read from above.

A = exhaust camshaft.

16 = cylinder 1 to 6.

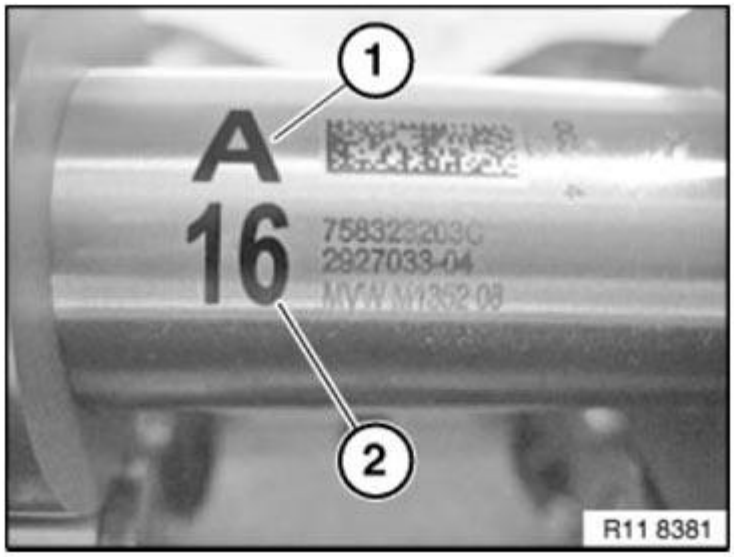


Fig. 248: Identifying Exhaust Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (1) of the 1st cylinder point inward at an angle (see arrow in illustration).

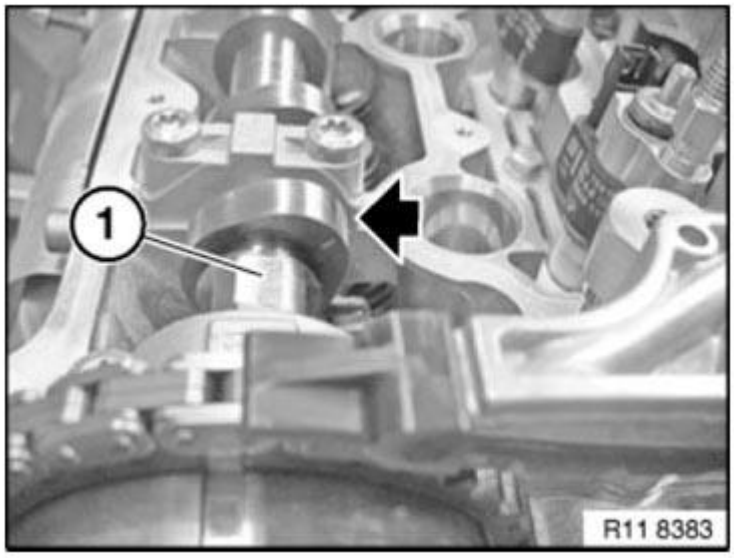


Fig. 249: Locating Cams Of Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the camshafts are at the TDC firing position for cylinder 1, the labelling on the intake camshaft (1 and 2) can be read from above.

E= intake camshaft.

16 = cylinder 1 to 6.

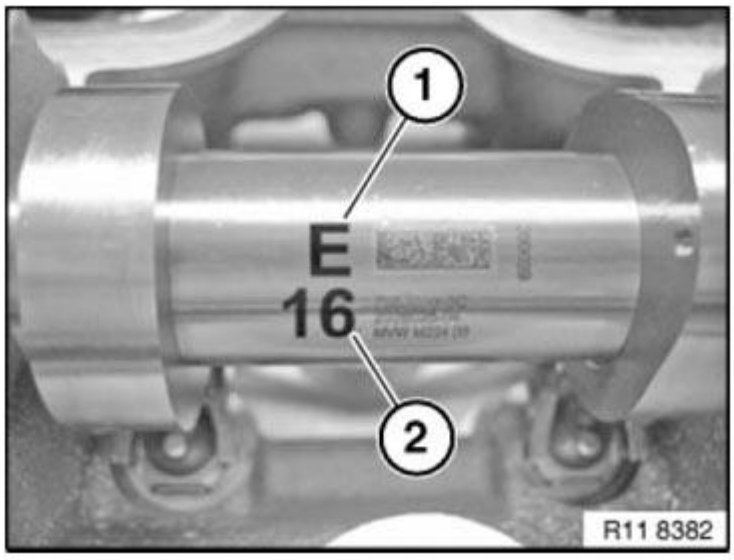


Fig. 250: Identifying Intake Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of intake camshaft (1) of the 1st cylinder point inward at an angle (see arrow in illustration).

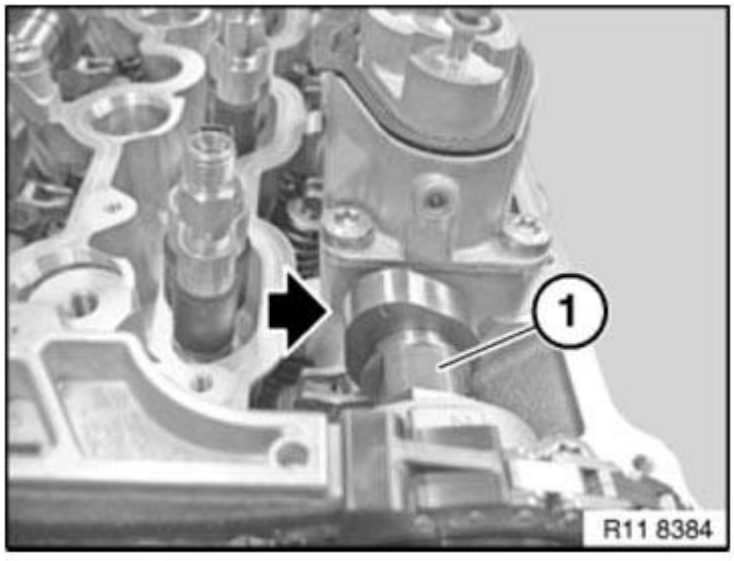


Fig. 251: Identifying Cams Of Intake Camshaft Of 1st Cylinder Point Inward At An Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Lay auxiliary water pump holder to one side.

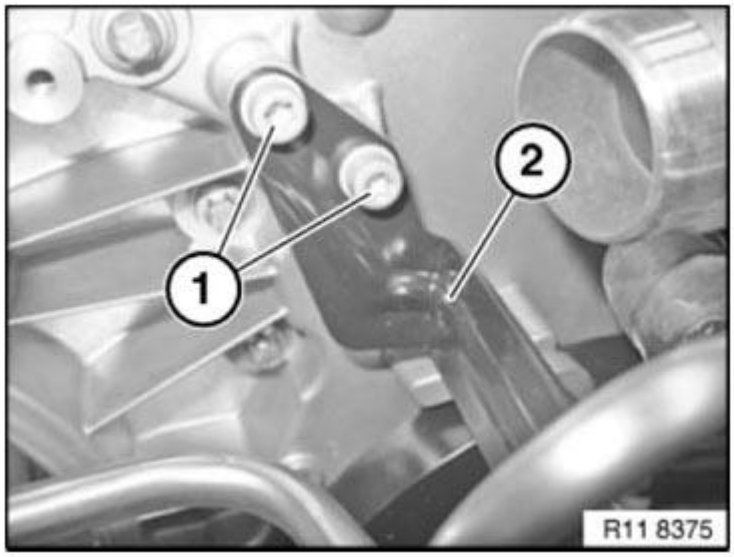


Fig. 252: Identifying Auxiliary Water Pump Holder With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with the mounting flats on the vibration damper at the TDC mark.

Secure special tool **11 8 570** with a screw (1).

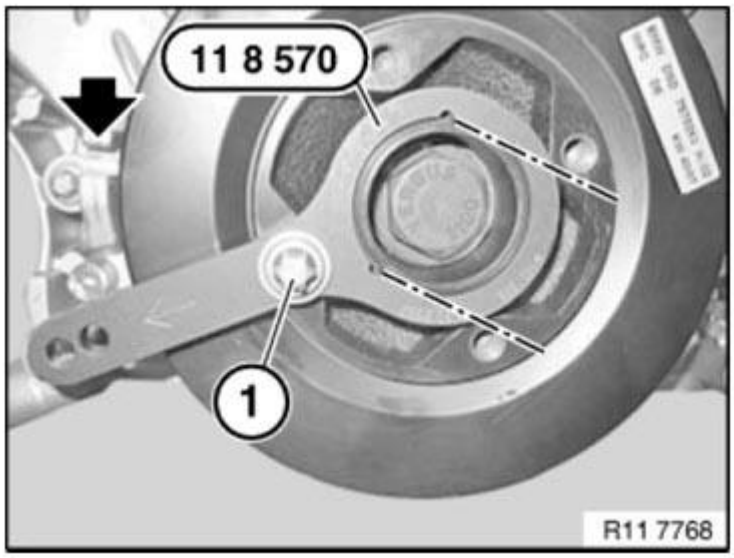


Fig. 253: Securing Special Tool 11 8 570 With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at the central bolt in direction of engine rotation.

Use special tools **11 8 570** and **11 9 190** to insert the vibration damper in the upper bore hole.

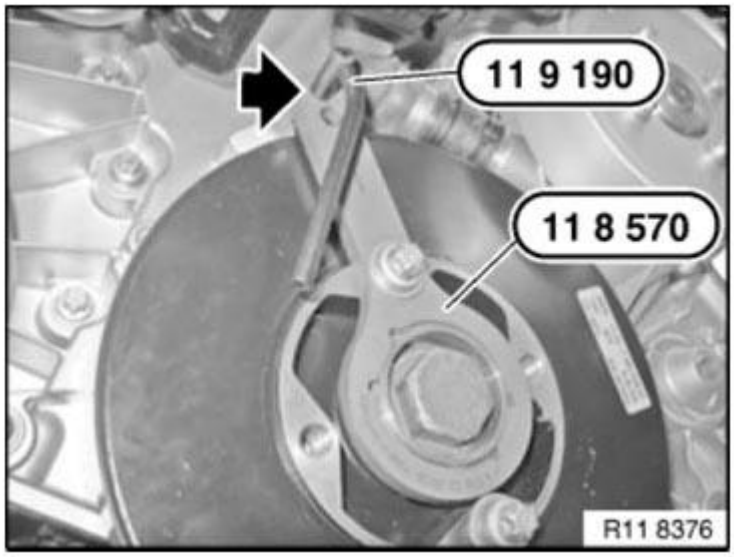


Fig. 254: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

The crankshaft is correctly positioned when the special tool **11 8 570** is locked with **11 9 190** in the groove (see arrow in illustration).

The crankshaft is locked in the **Cylinder 1 firing TDC position** .

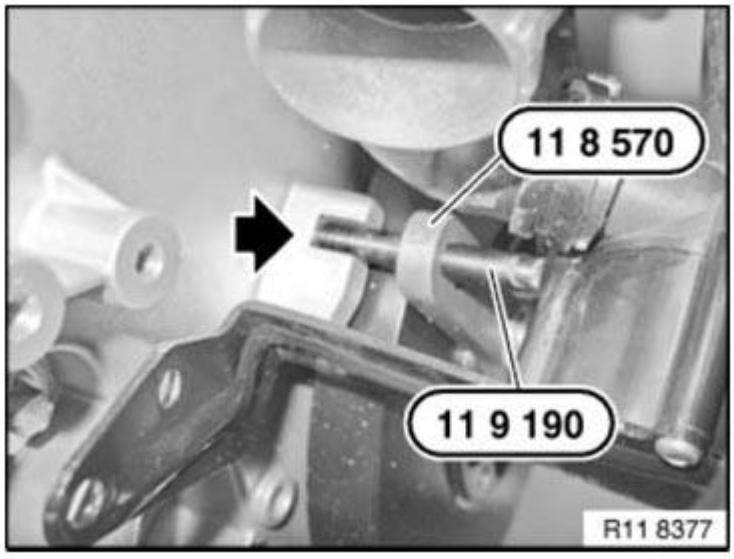


Fig. 255: Locking Crankshaft In Correct Position Using Special Tool 11 8 570 And 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on

cylinder head.

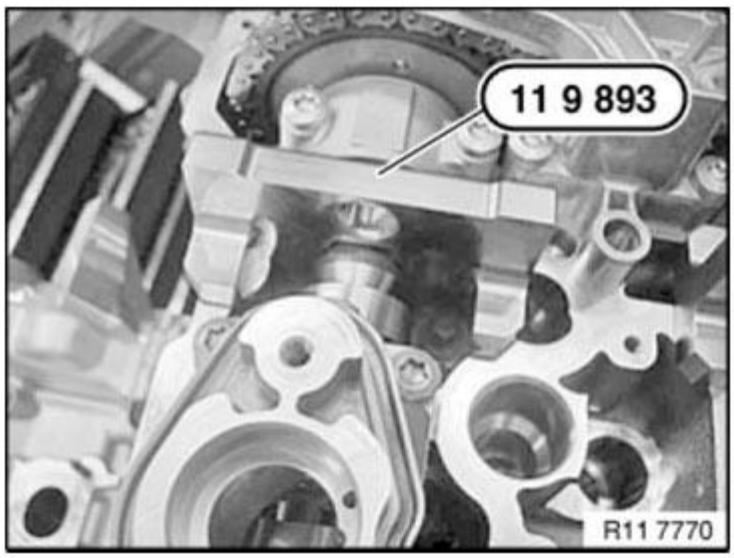


Fig. 256: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on the exhaust camshaft and test timing adjustment.

NOTE: Timing is correctly adjusted if special tool 11 9 893 rests on the cylinder head without any gaps.

If necessary, adjust camshaft **TIMING** on right side.

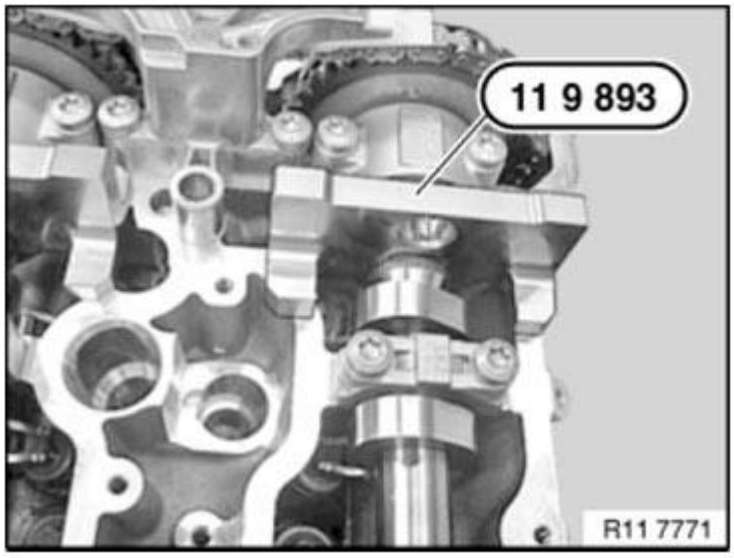


Fig. 257: Fitting Special Tool 11 9 893 On Intake Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 032 REMOVE AND INSTALL/REPLACE LEFT INTAKE CAMSHAFT (N74)

Necessary preliminary tasks:

- Remove **LEFT CYLINDER HEAD COVER**.
- Check **TIMING**.
- Remove **LEFT INTAKE ADJUSTMENT UNIT**.

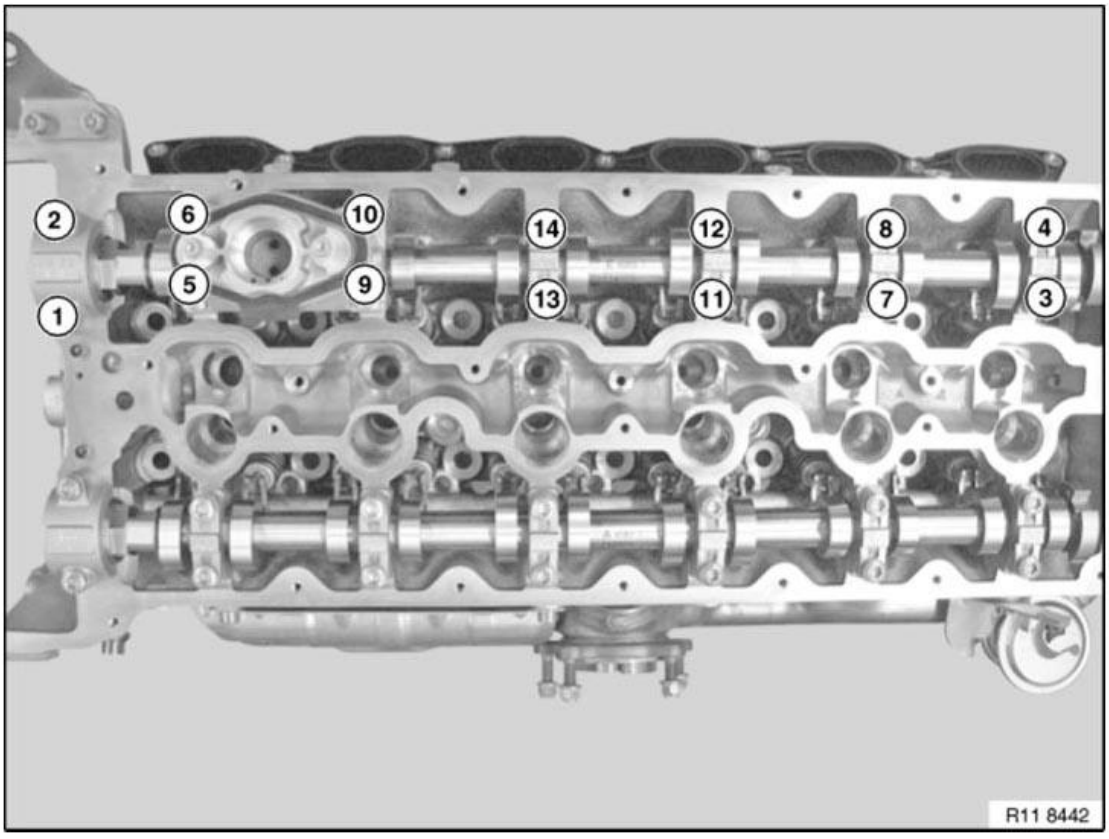


Fig. 258: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (1 to 14) in 1/2 turns .

Set down all bearing caps in a tidy and orderly fashion on special tool 11 4 480 .

Remove intake camshaft in upward direction .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after inlet camshaft has been removed.

Do "not" remove rocker arm (1) on intake side.

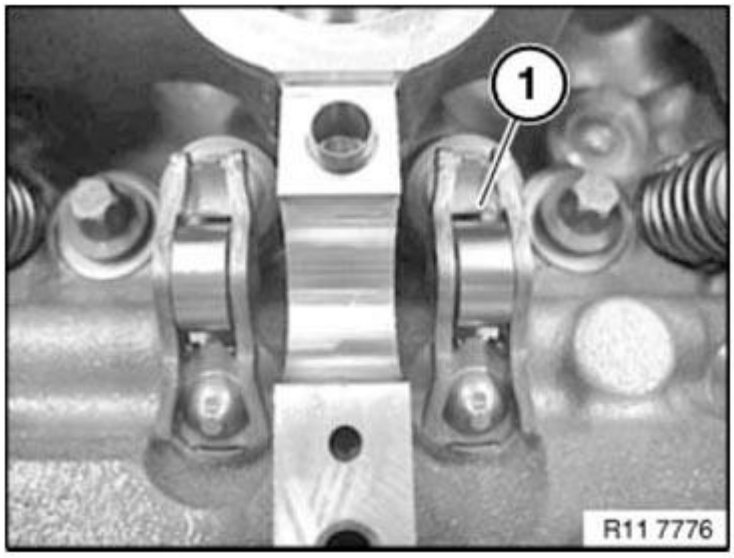


Fig. 259: Identifying Rocker Arms
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain rectangular compression rings (1) can easily break.

Press plain rectangular compression ring (1) on one side into groove, pull up on other side and remove latch mechanism.

Carefully pull plain rectangular compression ring (1) apart and remove towards front.

Ends of plain rectangular compression rings (1) point upwards.

Make sure plain rectangular compression rings (1) are engaged at ends.

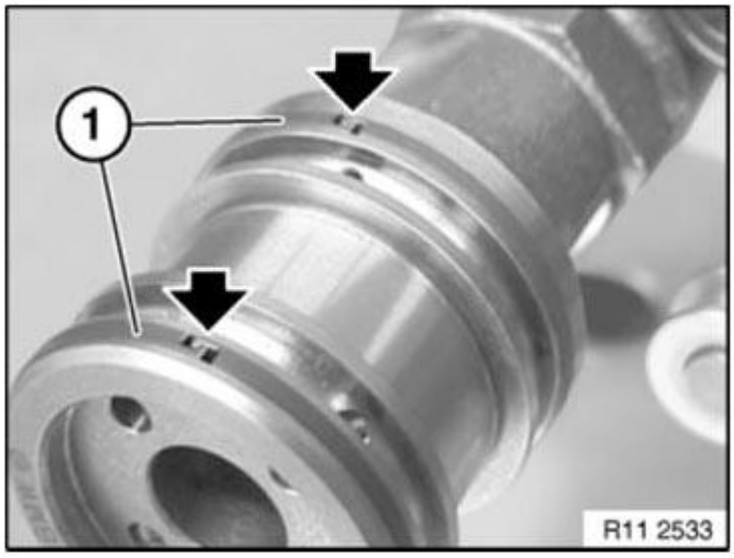


Fig. 260: Identifying Plain Rectangular Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The intake camshaft of cylinder bank 7 to 12 is marked with "E and 712".

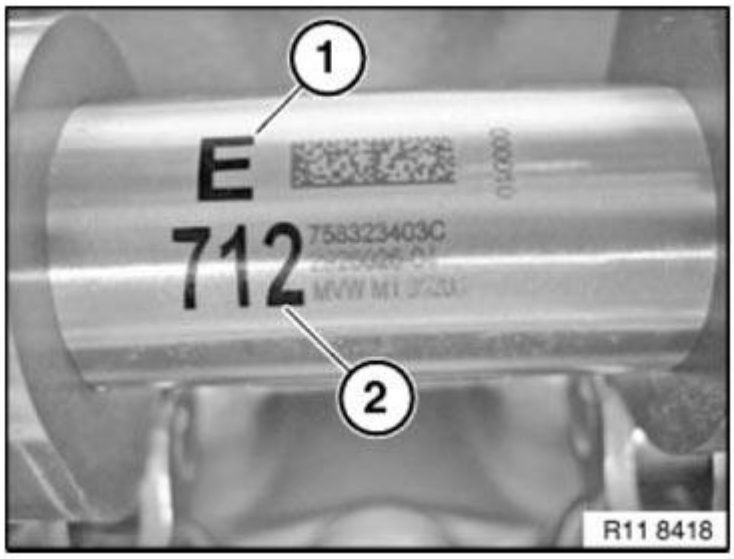


Fig. 261: Identifying Intake Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when inlet camshaft is fitted.

Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

Installation note:

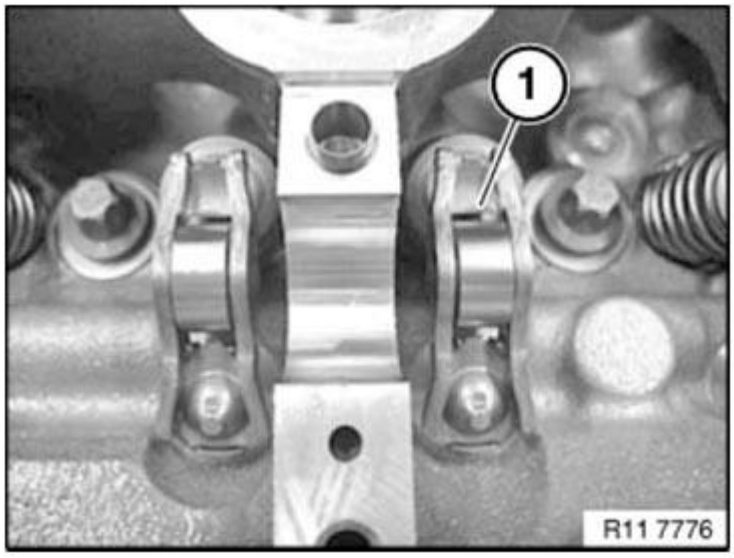


Fig. 262: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Coat all bearing positions with engine oil.

Insert inlet camshaft without strain.

Insert inlet camshaft so that cams point to side at cylinder 7 as shown in picture.

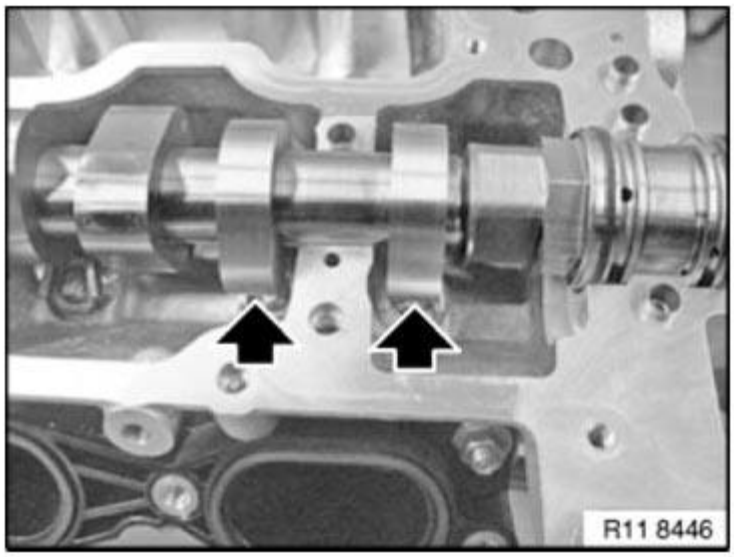


Fig. 263: Locating Inlet Camshaft Cams

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Ends of compression rings point upwards or downwards.

Make sure plain rectangular compression rings are engaged at ends.

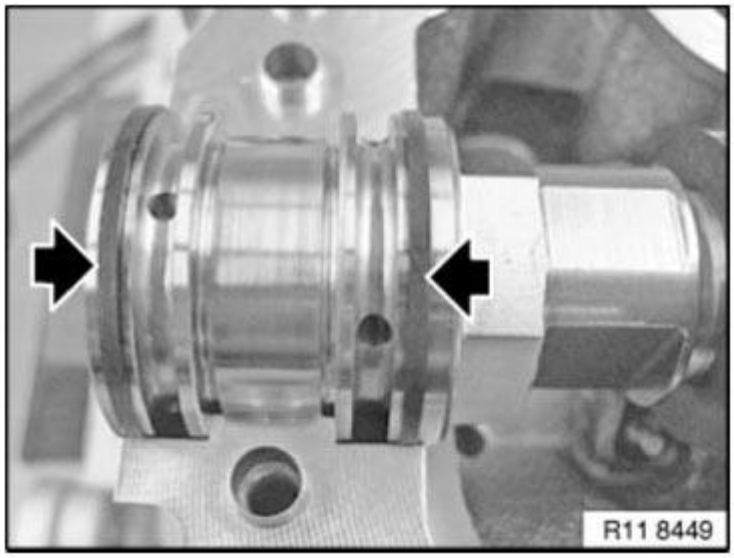


Fig. 264: Locating Plain Rectangular Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 6 and 7 to 12. All bearing caps are coded and must be installed in the same position.

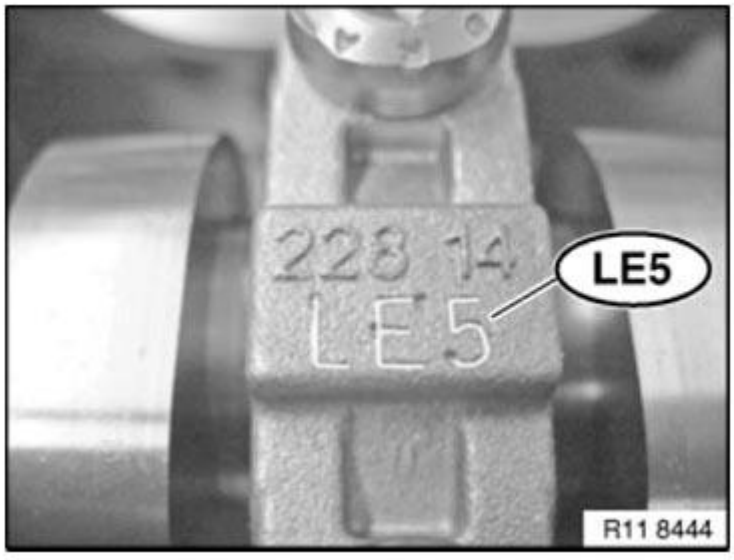


Fig. 265: Identifying Bearing Cap Codes
Courtesy of BMW OF NORTH AMERICA, INC.

All bearing caps are marked:

If both cylinder heads are removed at the same time, the respective bearing caps for each cylinder bank must be marked.

E = Intake side

A = Exhaust side

1 = Designation from 1 to 7

Check roller (1) of bucket tappet for ease of movement.

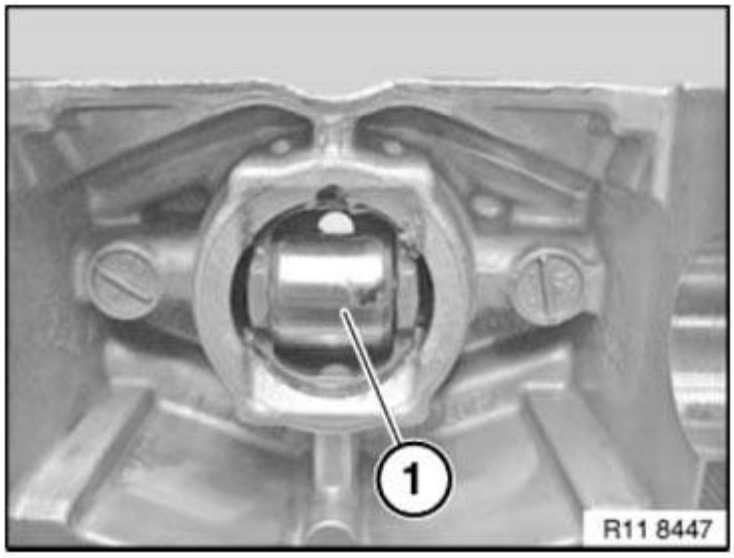


Fig. 266: Identifying Bucket Tappet Roller
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Observe installation lugs of high-pressure carrier and bucket tappet.

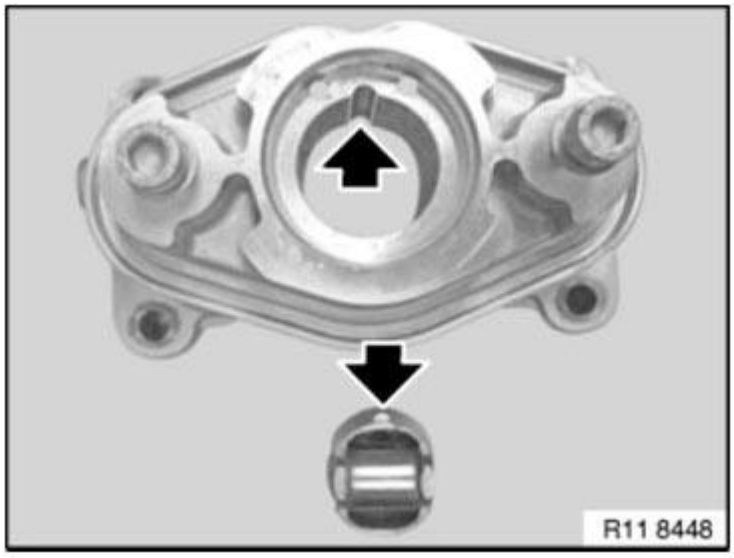


Fig. 267: Locating Lugs Of High-Pressure Carrier And Bucket Tappet
Courtesy of BMW OF NORTH AMERICA, INC.

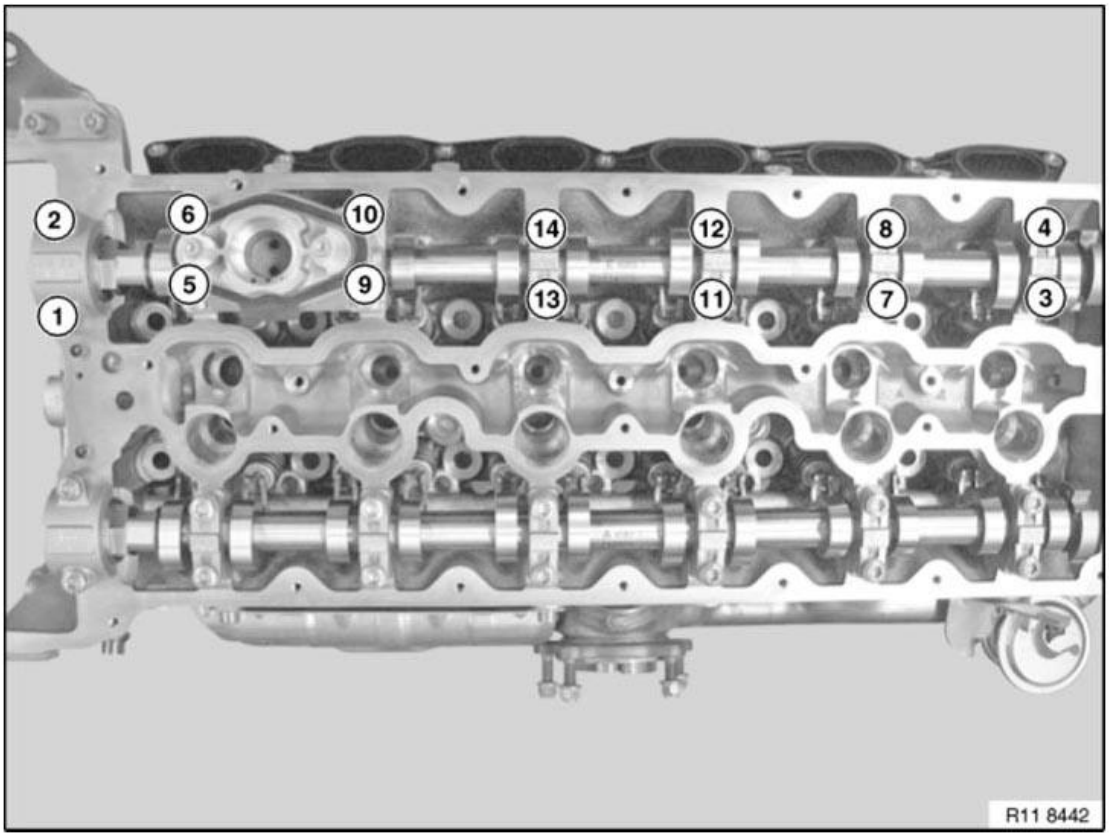


Fig. 268: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Fit all bearing covers .

Insert all bolts .

Tighten down bolts in sequence (14 to 1) in 1/2 turns .

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

Preload intake camshaft with a open-end spanner (2) towards right.

NOTE: Graphic of exhaust camshaft.

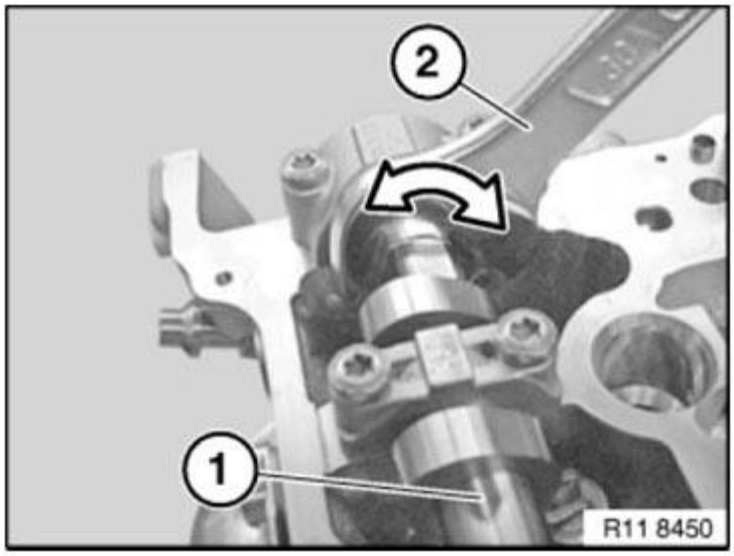


Fig. 269: Preloading Intake Camshaft With Open-End Spanner Towards Right
Courtesy of BMW OF NORTH AMERICA, INC.

Block intake camshaft with special tool 11 9 893.

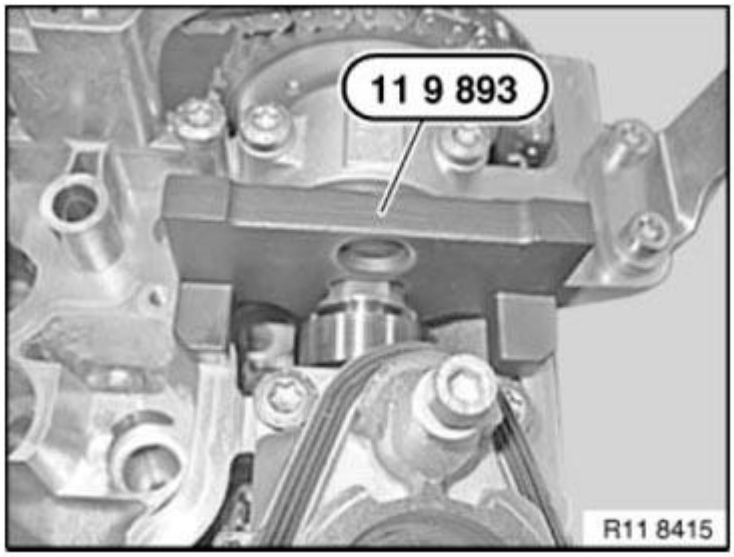


Fig. 270: Blocking Intake Camshaft Using Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Install **INTAKE ADJUSTMENT UNITS**.

Adjust **VALVE TIMING**.

Assemble engine.

11 31 038 REMOVING AND INSTALLING/RENEWING RIGHT EXHAUST CAMSHAFT (N74)

IMPORTANT: (cylinder bank 7 to 12)
With cylinder 1 in TDC firing position, the pistons are at the top in cylinders 1 and 6 Risk of damage!

For safety reasons, crank engine at central bolt back 30°.

Necessary preliminary tasks:

- Remove **LEFT CYLINDER HEAD COVER**.
- Check **TIMING**.
- Remove **LEFT INTAKE ADJUSTMENT UNIT**.

IMPORTANT: For safety reasons, crank engine at central bolt back 30°.

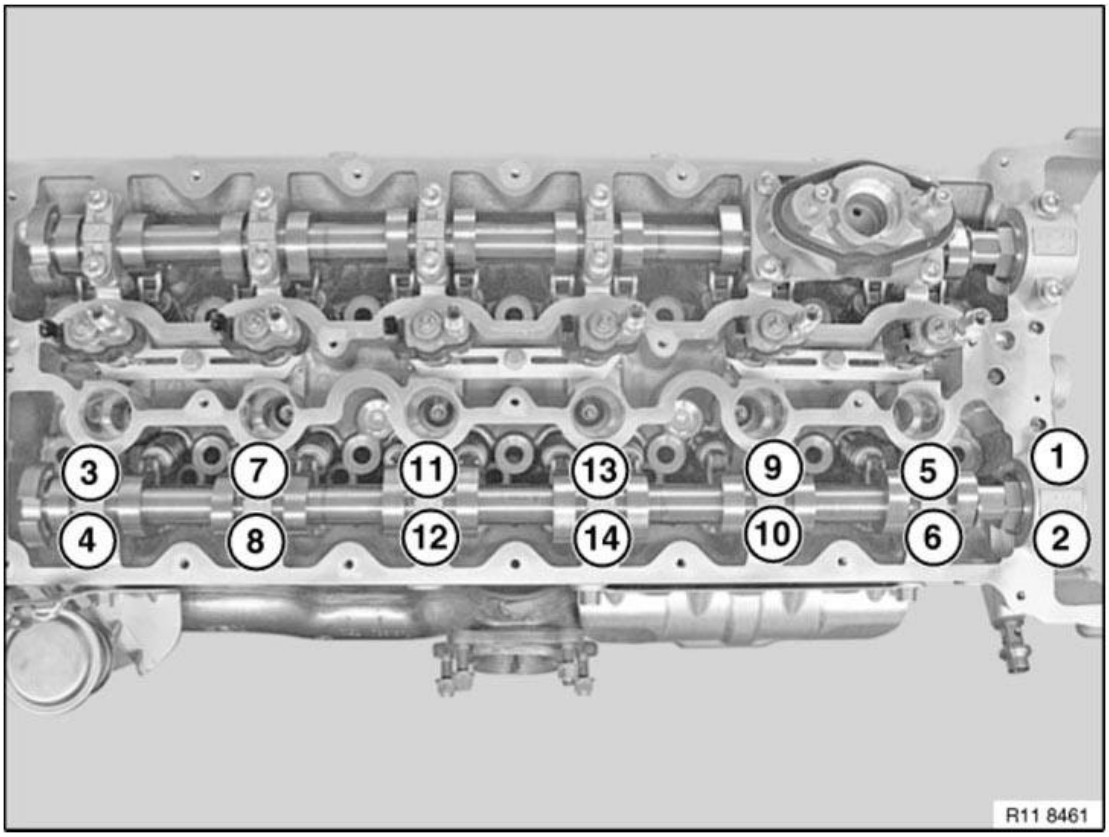


Fig. 271: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (1 to 14) in 1/2 turns .

Set down all bearing caps in a tidy and orderly fashion on special tool 11 4 480 .

Remove exhaust camshaft in upward direction .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after exhaust camshaft has been removed.

Do "not" remove rocker arms (1) on exhaust side.

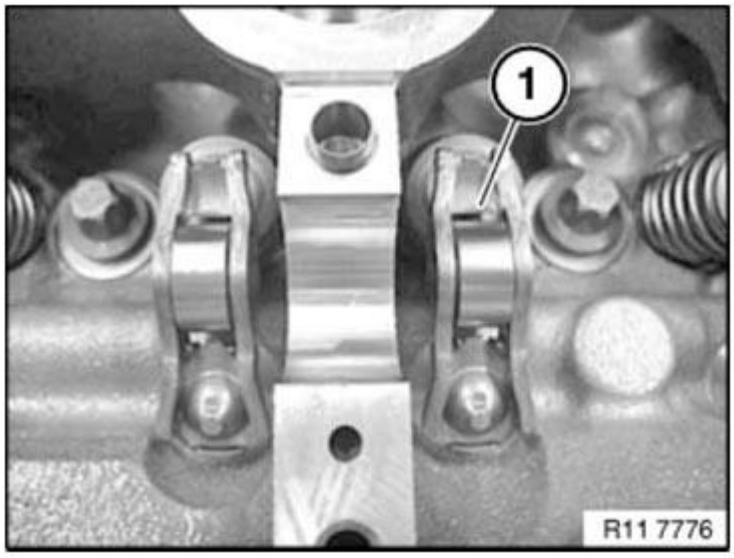


Fig. 272: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain rectangular compression rings (1) can easily break.

Modify plain rectangular compression ring on new camshaft.

Press plain rectangular compression ring (1) on one side into groove, pull up on other side and remove latch mechanism.

Carefully pull plain rectangular compression ring (1) apart and remove towards front.

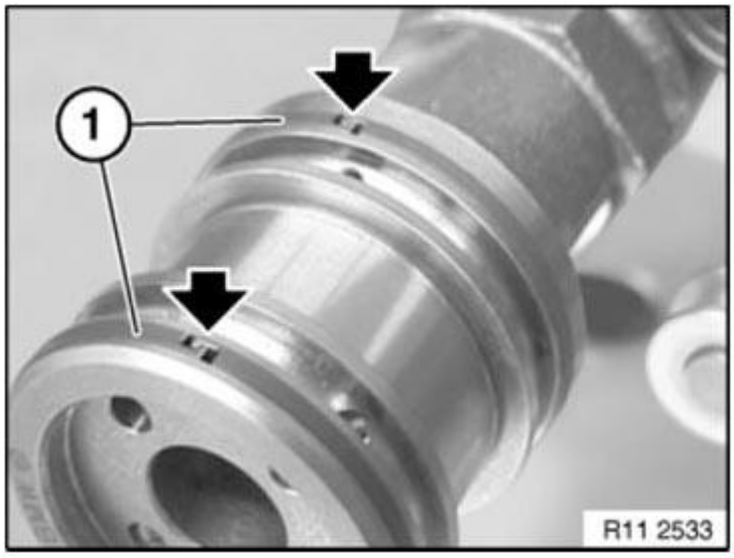


Fig. 273: Identifying Plain Rectangular Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of plain rectangular compression rings (1) point upwards.

Make sure plain rectangular compression rings (1) are engaged at ends.

NOTE: Exhaust camshaft (1) of cylinder bank 1 to 6 is marked with "A and 16".

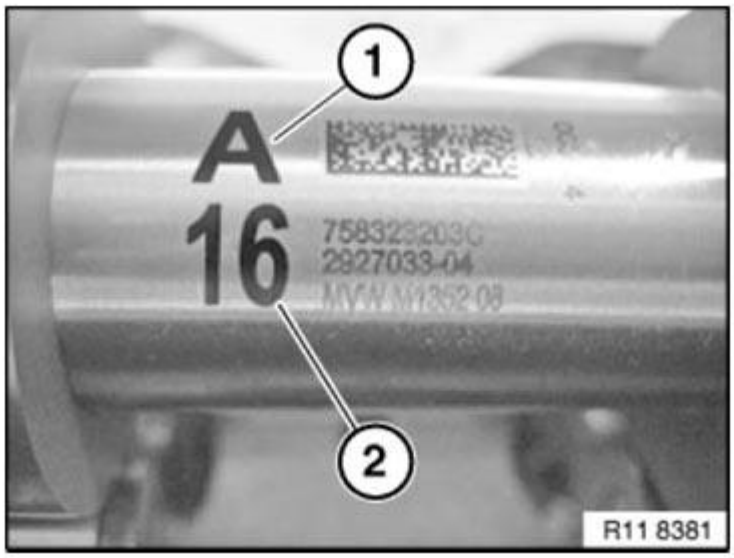


Fig. 274: Identifying Exhaust Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when exhaust camshaft is fitted.

Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

Coat all bearing positions with engine oil. Insert exhaust camshaft.

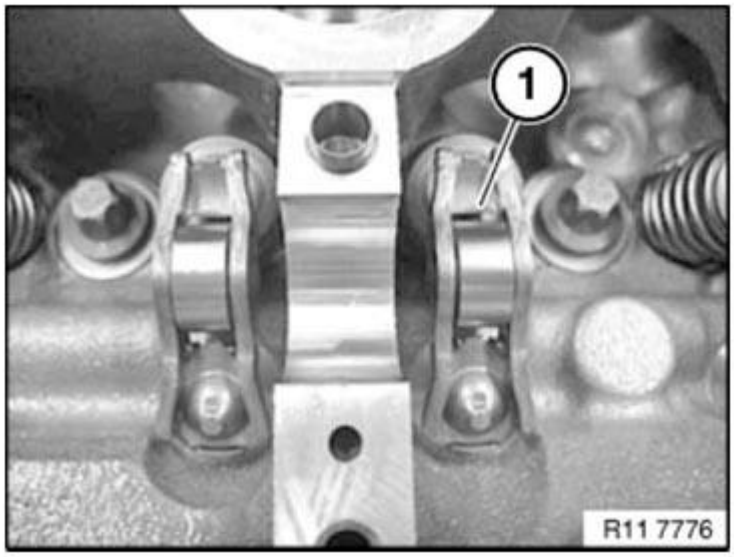


Fig. 275: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Coat all bearing positions with engine oil.

Do not mix up the bearing caps of cylinders 1 to 6 and 7 to 12.

All bearing caps are coded and can only be installed in one position.

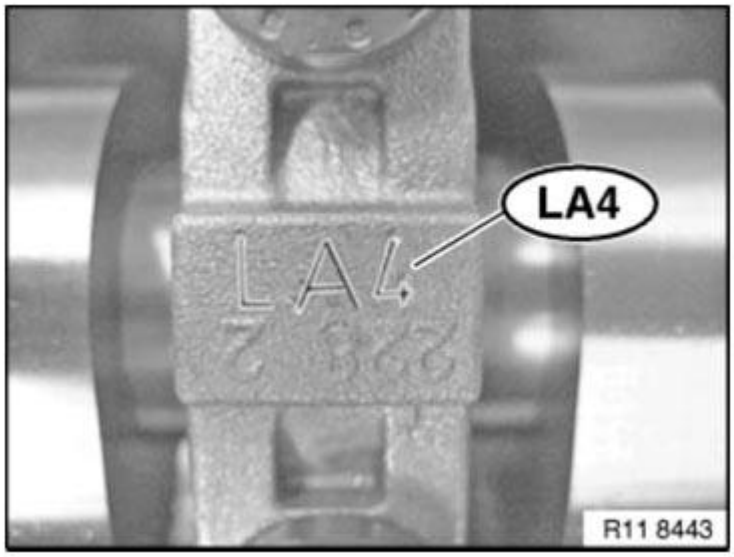


Fig. 276: Identifying Bearing Cap Code
Courtesy of BMW OF NORTH AMERICA, INC.

If both cylinder heads are removed at the same time, the respective bearing caps for each cylinder bank must be marked.

E = Intake side

A = Exhaust side

1 = Designation from 1 to 7

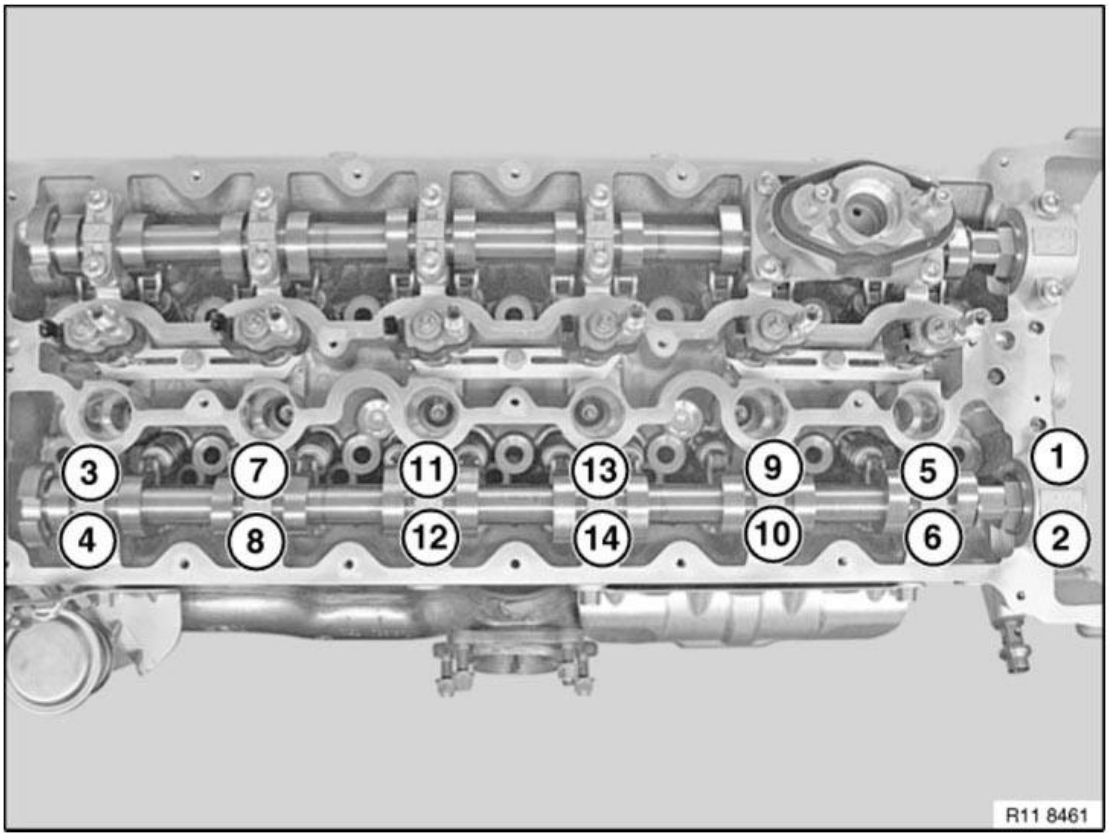


Fig. 277: Identifying Camshaft Bearings Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Fit all bearing covers .

Insert all bolts .

Tighten down bolts in sequence (14 to 1) in 1/2 turns .

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

Preload exhaust camshaft (1) with an open-end spanner (2) towards left.

NOTE: Graphic of cylinders 7 to 12.

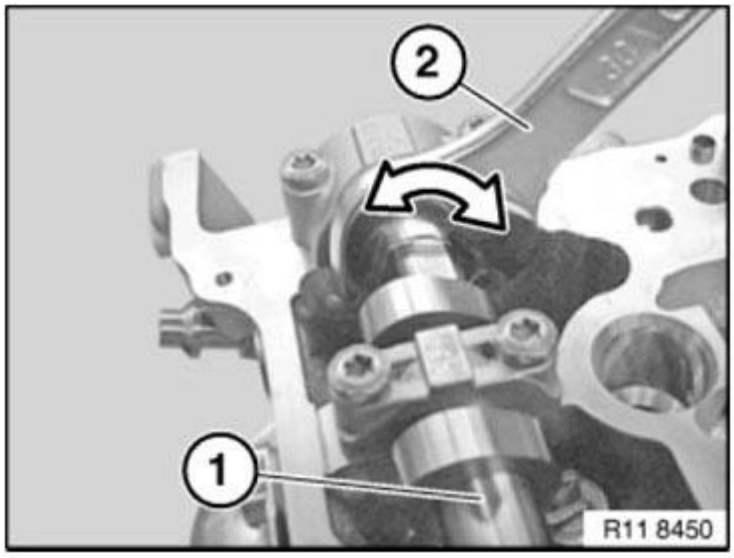


Fig. 278: Preloading Exhaust Camshaft With Open-End Spanner Towards Left
Courtesy of BMW OF NORTH AMERICA, INC.

Block exhaust camshaft with special tool 11 9 893.

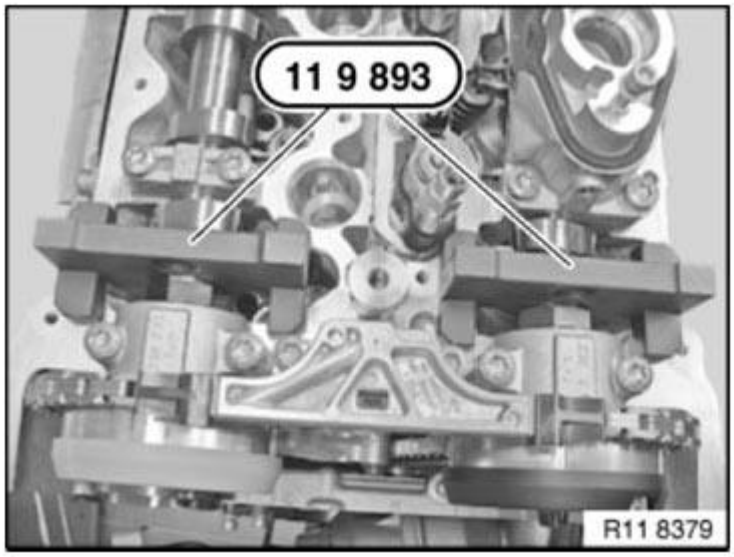


Fig. 279: Blocking Exhaust Camshaft Using Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Install **INTAKE ADJUSTMENT UNITS**.

Adjust **VALVE TIMING**.

Assemble engine.

11 33 052 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS ON LEFT SIDE (N74)

(cylinder bank 7 to 12)

Necessary preliminary tasks:

- Remove **LEFT INTAKE CAMSHAFT**.
- Remove left **EXHAUST CAMSHAFT**.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

Tolerance classes are not required.

Remove rocker arm (1) and set down in a tidy and orderly fashion in special tool 11 4 480.

Install rocker arm (1).

Align all rocker arms (1) straight.

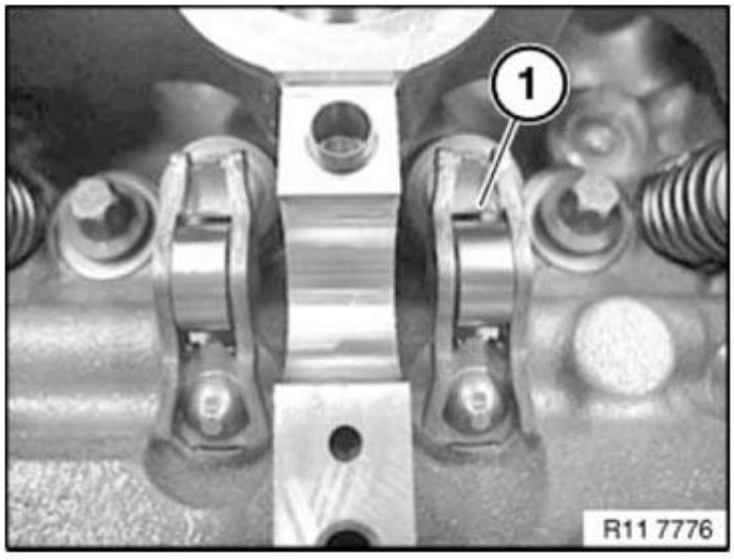


Fig. 280: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 036 REMOVING AND INSTALLING/REPLACING LEFT EXHAUST CAMSHAFT (N74)

(cylinder bank 7 to 12)

Necessary preliminary tasks:

- Remove **LEFT CYLINDER HEAD COVER**.
- Check **TIMING**.
- Remove **LEFT INTAKE ADJUSTMENT UNIT**.

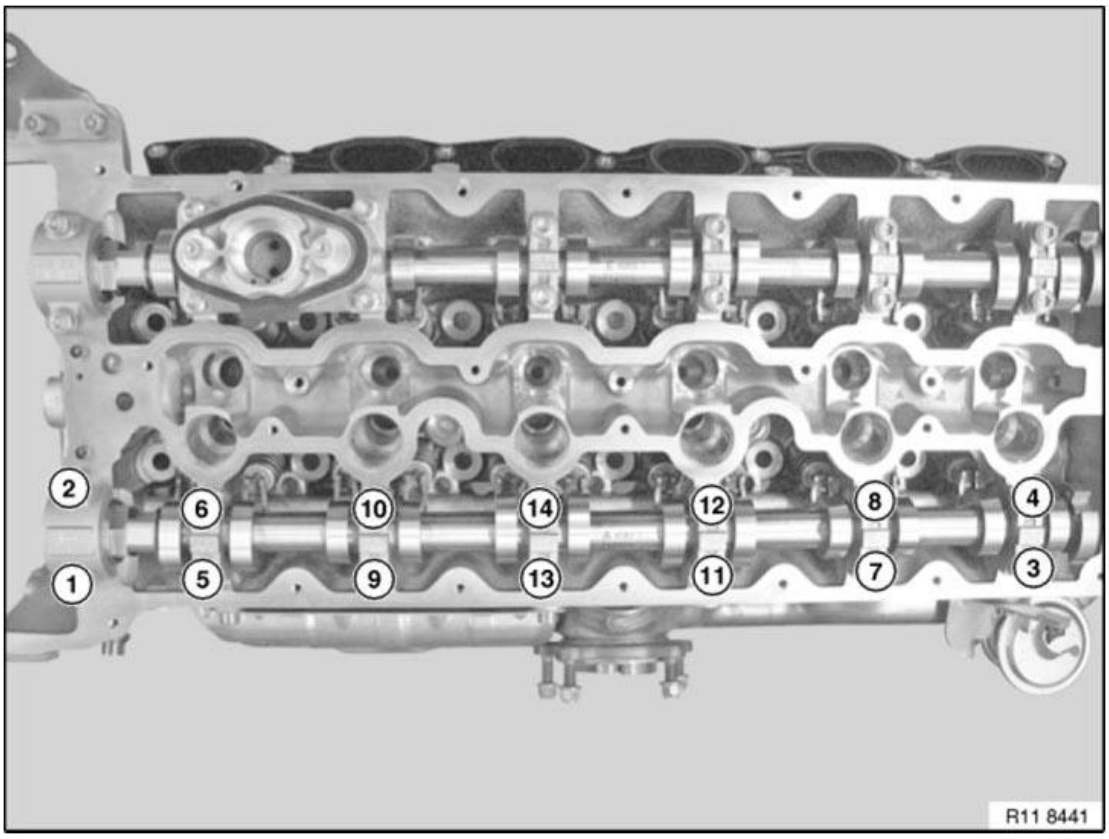


Fig. 281: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (1 to 14) in 1/2 turns .

Set down all bearing caps in a tidy and orderly fashion on special tool 11 4 480 .

Remove exhaust camshaft in upward direction .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after exhaust camshaft has been removed.

Do "not" remove rocker arms (1) on exhaust side.

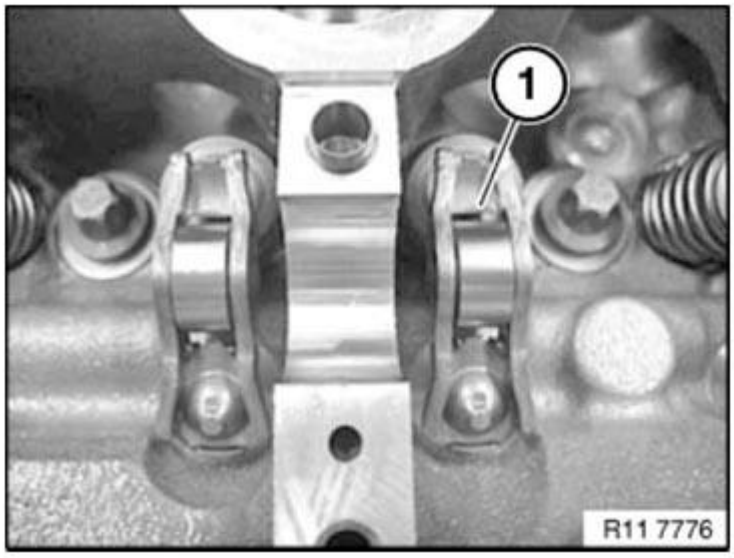


Fig. 282: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain rectangular compression rings (1) can easily break.

Press plain rectangular compression ring (1) on one side into groove, pull up on other side and remove latch mechanism.

Carefully pull plain rectangular compression ring (1) apart and remove towards front.

Modify plain rectangular compression ring on new camshaft.

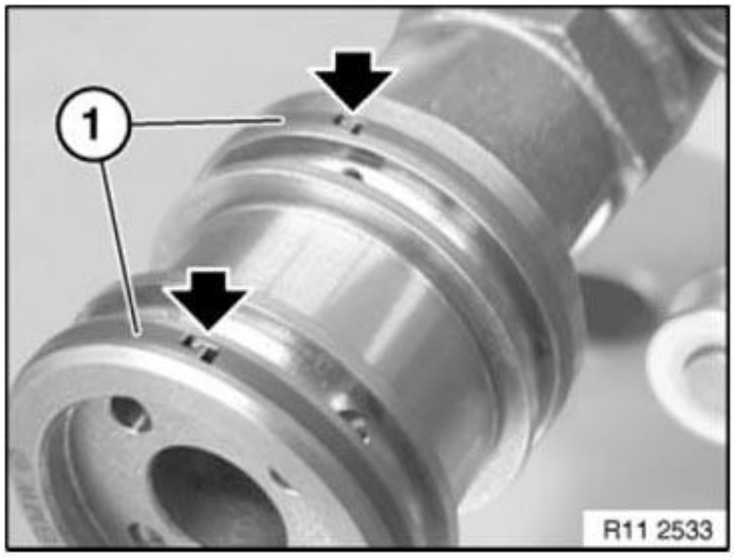


Fig. 283: Identifying Plain Rectangular Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of plain rectangular compression rings (1) point upwards.

Make sure plain rectangular compression rings (1) are engaged at ends.

NOTE: The exhaust camshaft (1) of cylinder bank 7 to 12 is marked with "A and 712".

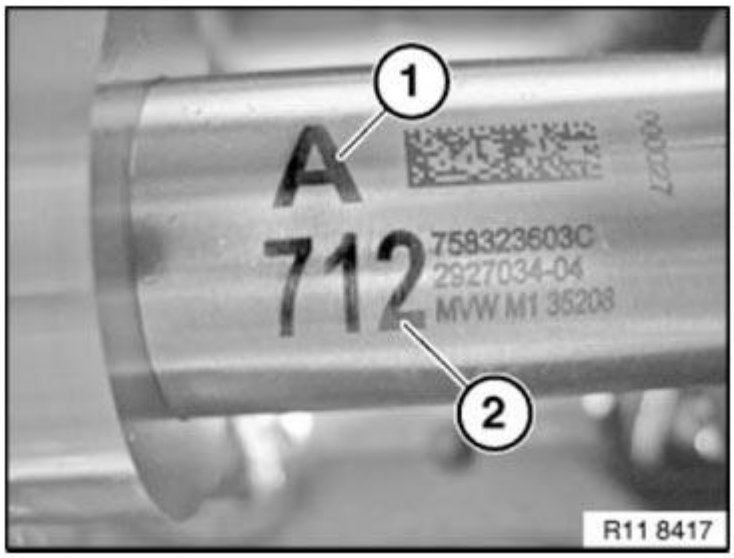


Fig. 284: Identifying Exhaust Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when exhaust camshaft is fitted.

Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

Coat all bearing positions with engine oil.

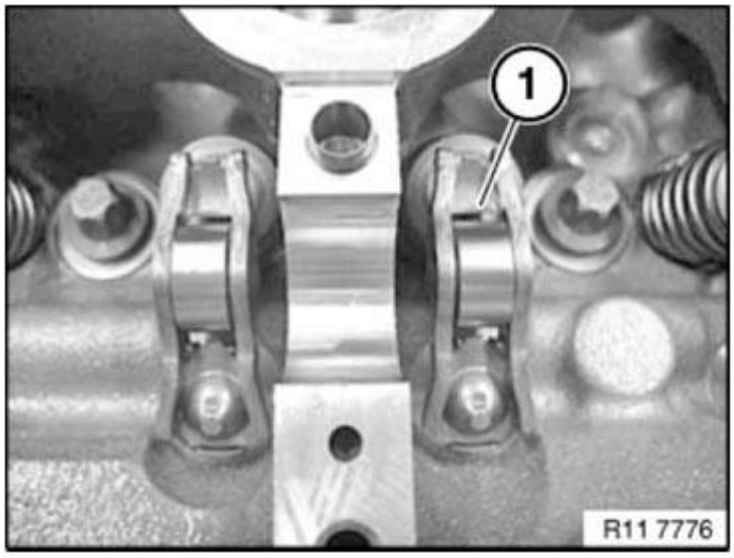


Fig. 285: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Install exhaust camshaft (1).

Insert exhaust camshaft (1) so that cams point to side at cylinder 5 as shown in picture.

Coat all bearing positions with engine oil.

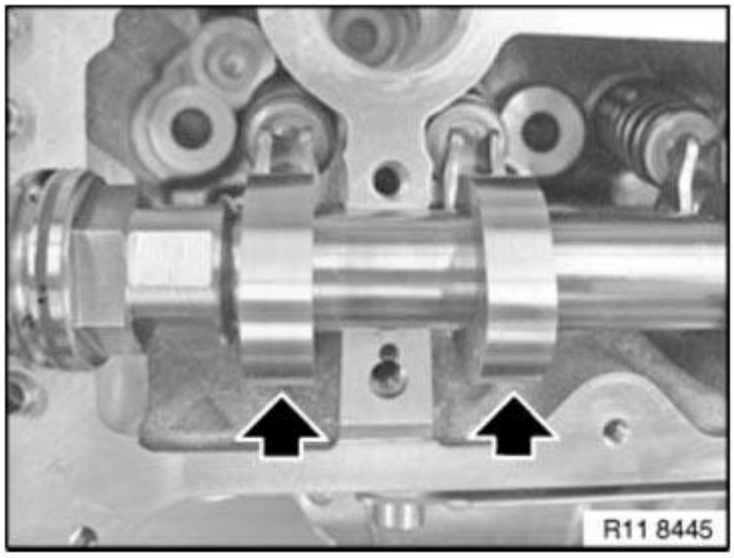


Fig. 286: Locating Exhaust Camshaft Cams
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 6 and 7 to 12.
All bearing caps are coded and can only be installed in one position.

All bearing caps are marked:

If both cylinder heads are removed at the same time, the respective bearing caps for each cylinder bank must be marked.

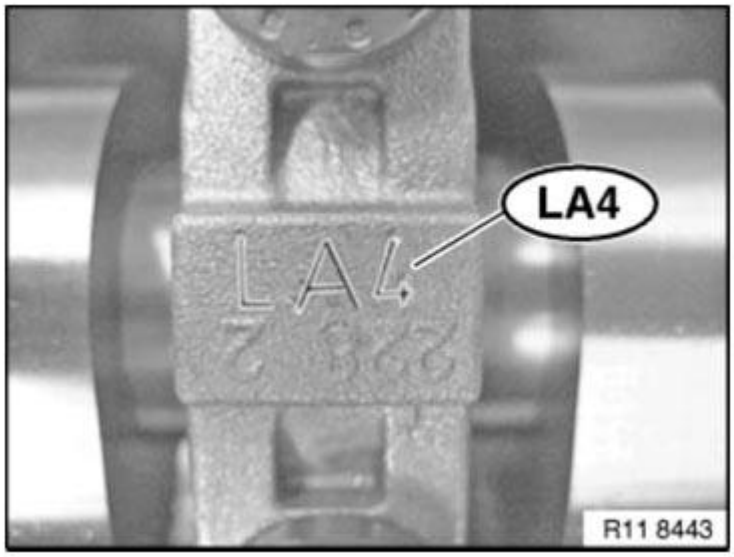


Fig. 287: Identifying Bearing Cap Code
Courtesy of BMW OF NORTH AMERICA, INC.

E = Intake side

A = Exhaust side

1 = Designation from 1 to 7

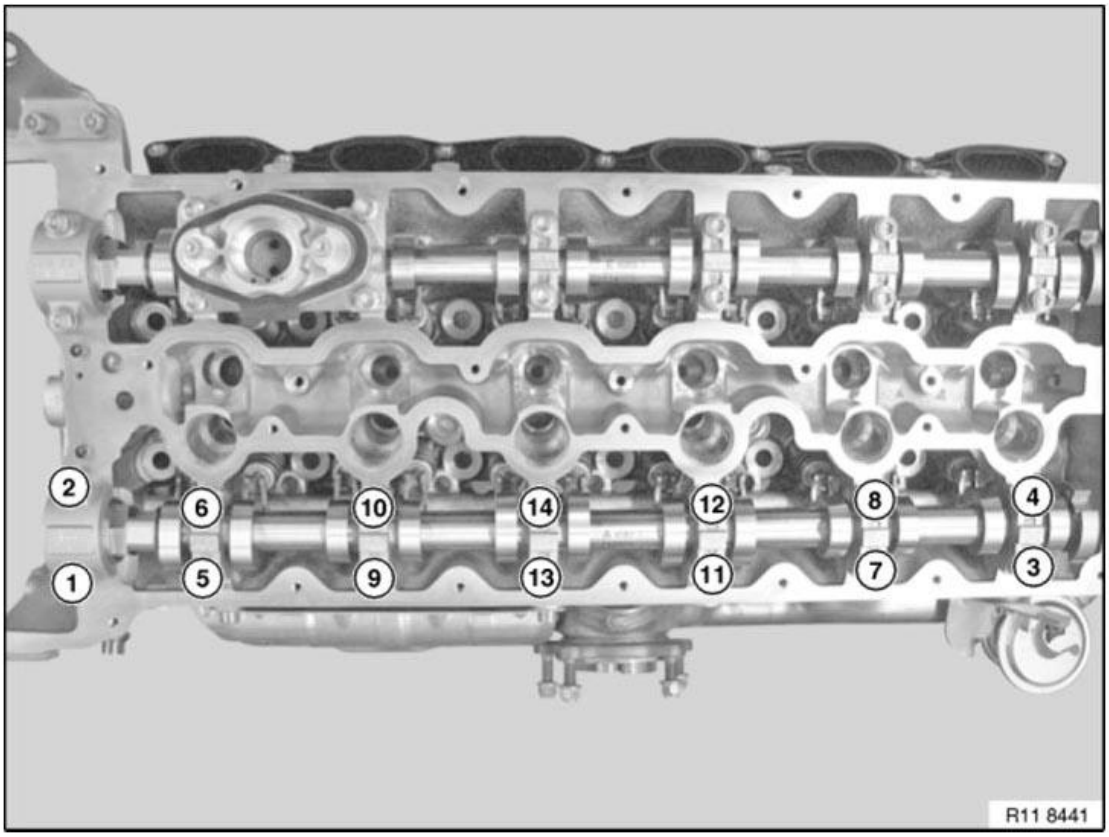


Fig. 288: Identifying Camshaft Bearings Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Coat all bearing positions with engine oil .

Insert all bolts .

Tighten down bolts in sequence (14 to 1) in 1/2 turns .

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

Preload exhaust camshaft (1) with an open-end spanner (2) towards left.

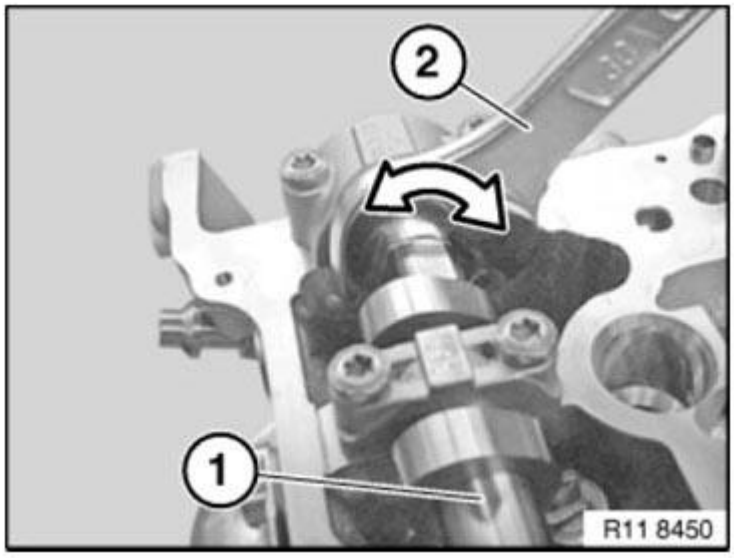


Fig. 289: Preloading Exhaust Camshaft With Open-End Spanner Towards Left
Courtesy of BMW OF NORTH AMERICA, INC.

Block exhaust camshaft with special tool 11 9 893.

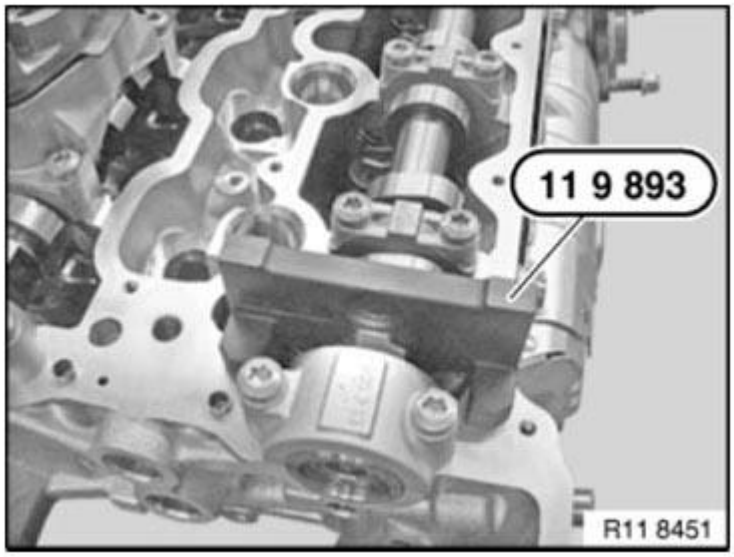


Fig. 290: Blocking Exhaust Camshaft Using Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Install **INTAKE ADJUSTMENT UNITS**.

Adjust **VALVE TIMING**.

Assemble engine.

11 31 034 REMOVING AND INSTALLING/REPLACING RIGHT INLET CAMSHAFT (N74)

(cylinder bank 7 to 12)

IMPORTANT: With cylinder 1 in TDC firing position, the pistons are at the top in cylinders 1 and 6 Risk of damage!

For safety reasons, crank engine at central bolt back 30°.

Necessary preliminary tasks:

- Remove **LEFT CYLINDER HEAD COVER**.
- Check **TIMING**.
- Remove **LEFT INTAKE ADJUSTMENT UNIT**.

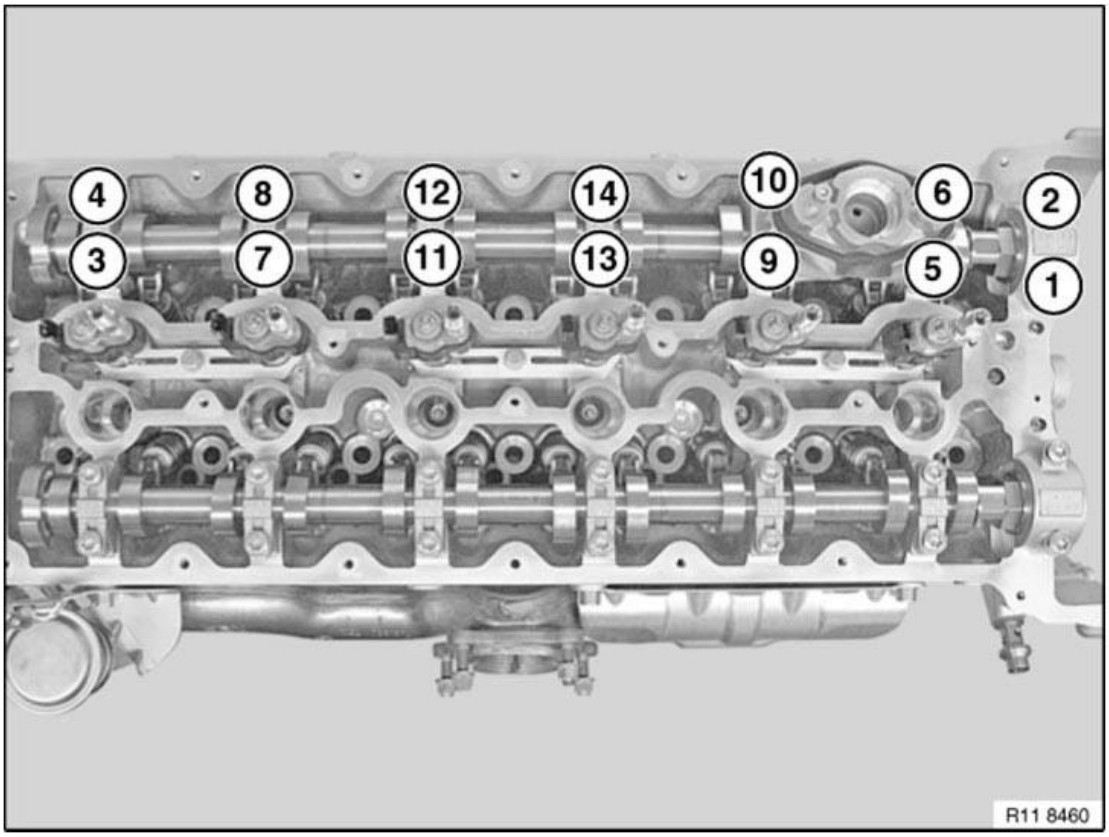


Fig. 291: Identifying Camshaft Bearing Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (1 to 14) in 1/2 turns .

Set down all bearing caps in a tidy and orderly fashion on special tool 11 4 480 .

Remove intake camshaft in upward direction .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after inlet camshaft has been removed.

Do "not" remove rocker arm (1) on intake side.

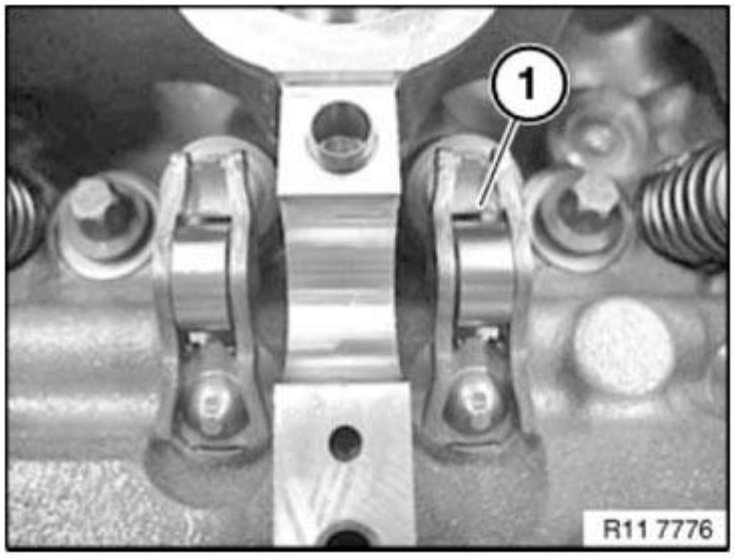


Fig. 292: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain rectangular compression rings (1) can easily break.

Press plain rectangular compression ring (1) on one side into groove, pull up on other side and remove latch mechanism.

Carefully pull plain rectangular compression ring (1) apart and remove towards front. Ends of plain rectangular compression rings (1) point upwards.

Make sure plain rectangular compression rings (1) are engaged at ends.

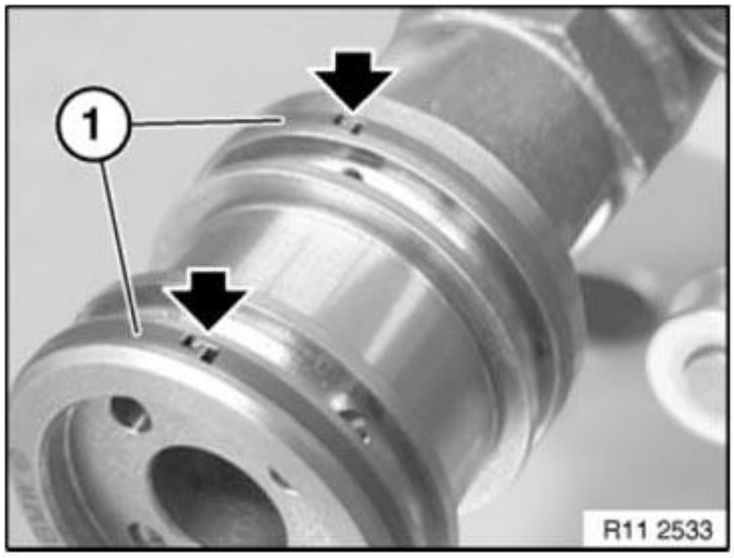


Fig. 293: Identifying Plain Rectangular Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Intake camshaft of cylinder bank 1 to 6 is marked with "E and 16".

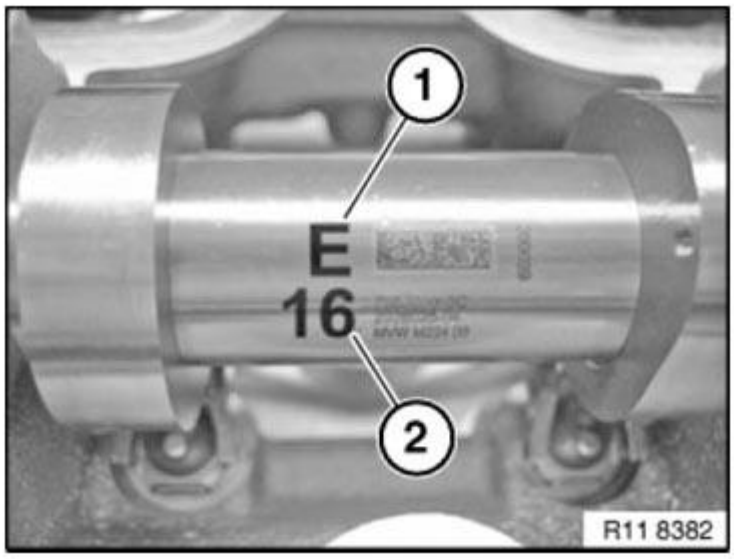


Fig. 294: Identifying Intake Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when inlet camshaft is fitted.

Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

Installation note:

Coat all bearing positions with engine oil.

Insert inlet camshaft without strain.

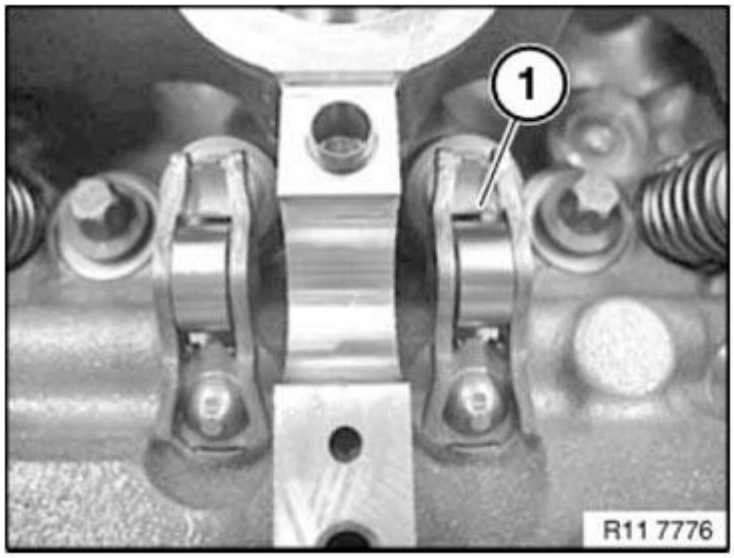


Fig. 295: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Ends of compression rings point upwards or downwards.

Make sure plain rectangular compression rings are engaged at ends.

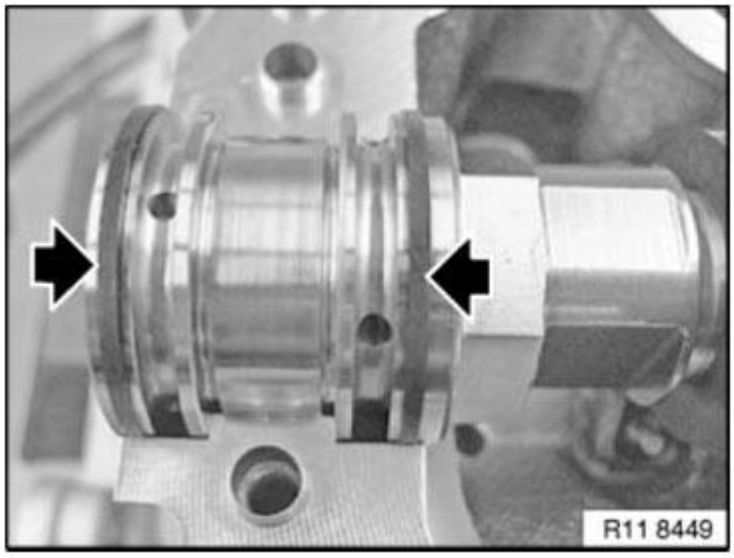


Fig. 296: Locating Plain Rectangular Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 6 and 7 to 12.

All bearing caps are coded and must be installed in the same position.

All bearing caps are marked:

If both cylinder heads are removed at the same time, the respective bearing caps for each cylinder bank must be marked.

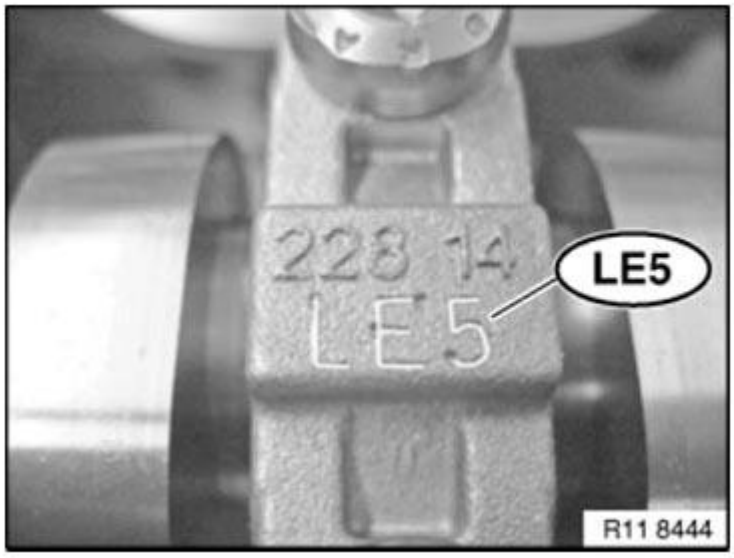


Fig. 297: Identifying Bearing Cap Codes
Courtesy of BMW OF NORTH AMERICA, INC.

E = Intake side

A = Exhaust side

1 = Designation from 1 to 7

Check roller (1) of bucket tappet for ease of movement.

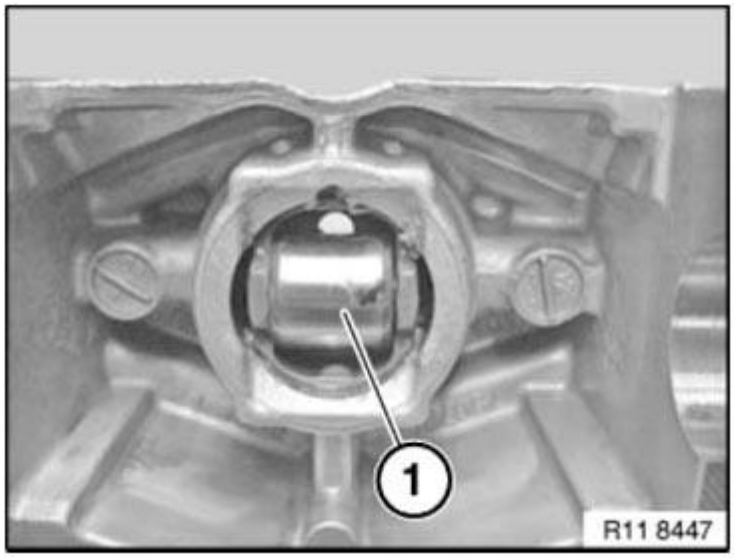


Fig. 298: Identifying Bucket Tappet Roller
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Observe installation lugs of high-pressure carrier and bucket tappet.

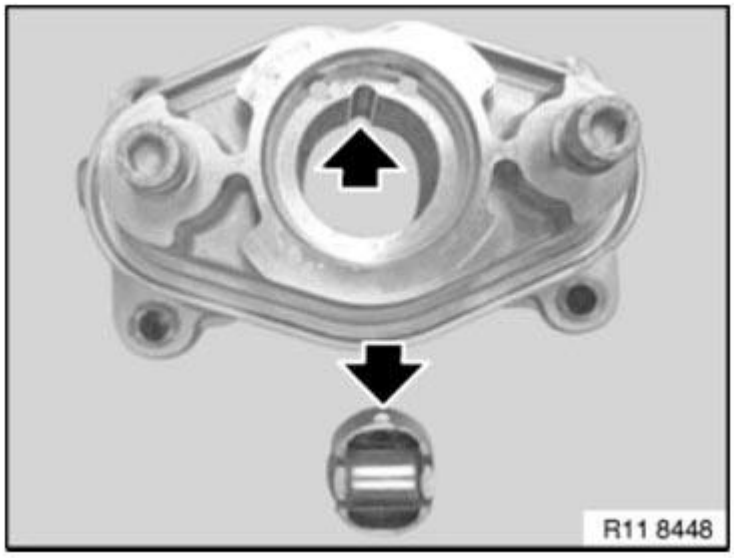


Fig. 299: Locating Lugs Of High-Pressure Carrier And Bucket Tappet
Courtesy of BMW OF NORTH AMERICA, INC.

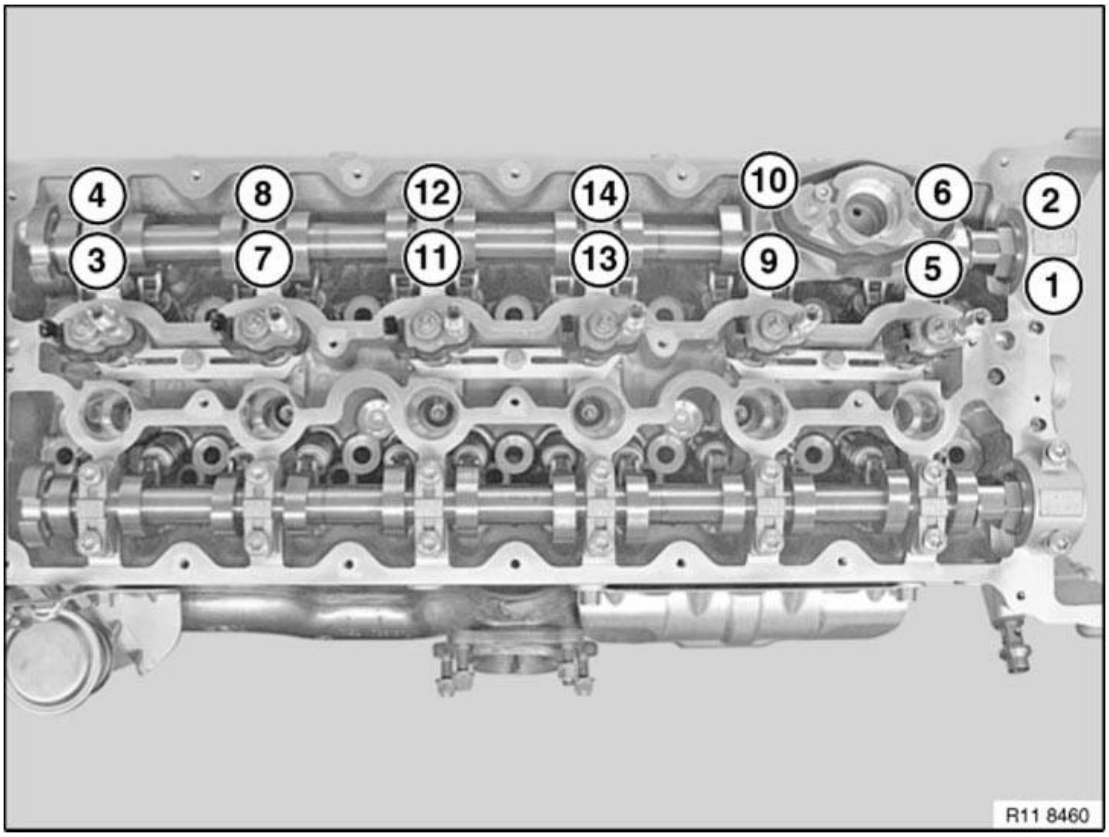


Fig. 300: Identifying Camshaft Bearing Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Fit all bearing covers .

Insert all bolts .

Tighten down bolts in sequence (14 to 1) in 1/2 turns .

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

Preload intake camshaft with a open-end spanner (2) towards right.

NOTE: Image of exhaust camshaft.

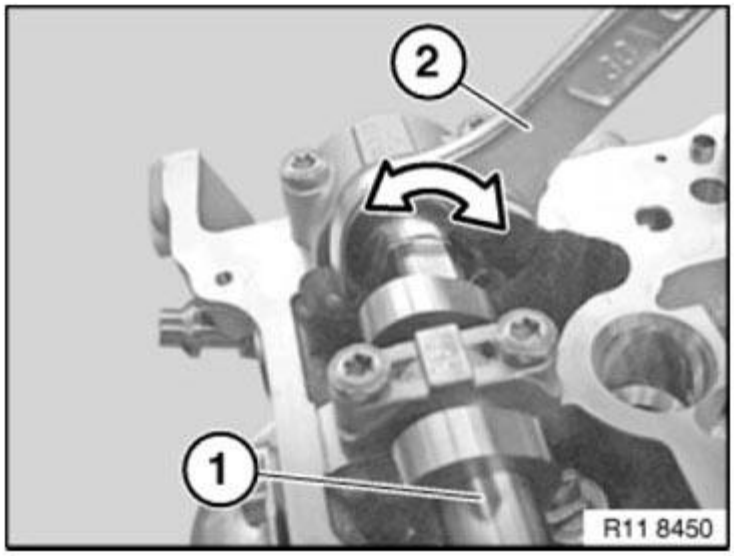


Fig. 301: Preloading Intake Camshaft With Open-End Spanner Towards Right
Courtesy of BMW OF NORTH AMERICA, INC.

Block intake camshaft with special tool 11 9 893.

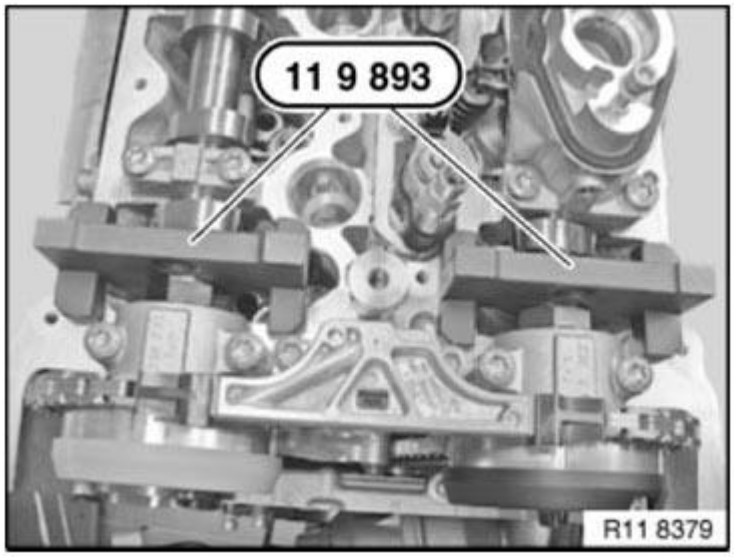


Fig. 302: Blocking Intake Camshaft Using Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Install **INTAKE ADJUSTMENT UNITS**.

Adjust **VALVE TIMING**.

Assemble engine.

11 33 054 REMOVING AND INSTALLING/REPLACING ROCKER ARMS ON RIGHT SIDE (N74)

(cylinder bank 1 to 6)

Necessary preliminary tasks:

- Remove right **INTAKE CAMSHAFT**.
- Remove right **EXHAUST CAMSHAFT**.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

Tolerance classes are not required.

Remove rocker arm (1) and set down in a tidy and orderly fashion in special tool 11 4 480.

Install rocker arm (1).

Align all rocker arms (1) straight.

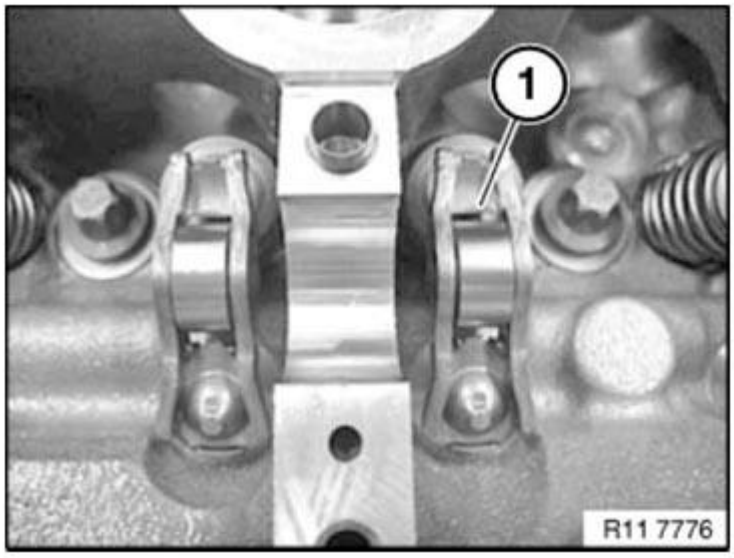


Fig. 303: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 094 REMOVING HYDRAULIC CHAIN TENSIONER FOR TIMING CHAINS ON LEFT SIDE (N74)

WARNING: Chain tensioner is pre-tensioned.
Release lock pin only in installed state.

Risk of injury!

IMPORTANT: Risk of damage!

The engine must not be cranked when the chain tensioner is removed.

The timing chain may jump.

Necessary preliminary tasks:

- Remove **TIMING CASE COVER** at top left

Crank engine back at central bolt (1) against direction of engine rotation by approx. 90°.

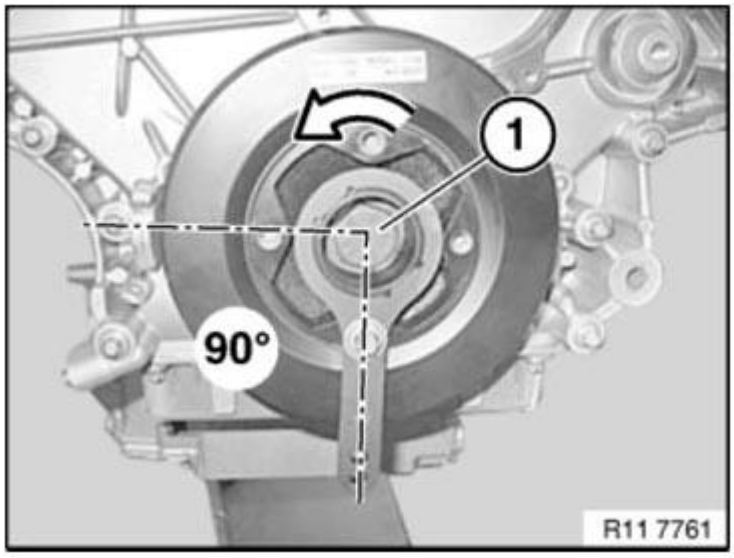


Fig. 304: Turning Central Bolt Approx. 90° Against Direction Of Engine Rotation
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The timing chain on the chain tensioner becomes the tight end on cranking back.

Do not crank engine without chain tensioner or special tool **11 9 900** .

Piston (1) of chain tensioner must be pressed in against oil pressure in housing (see arrow in illustration).

NOTE: Graphics show N63.

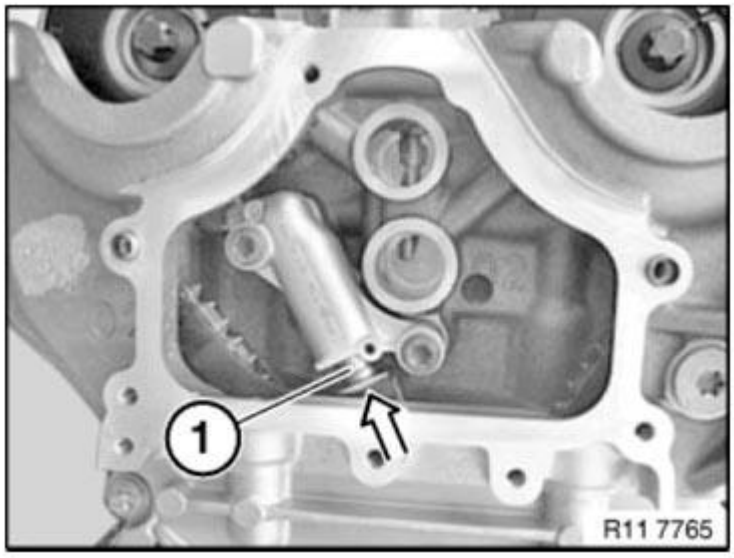


Fig. 305: Pressing Chain Tensioner Piston

Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 4 120** or 3.5 mm drill in drill hole.

WARNING: Piston of chain tensioner is now secured.

Release screws (1).

Tightening torque: see 7AZ in **11 31 CAMSHAFT**

Remove chain tensioner (2).

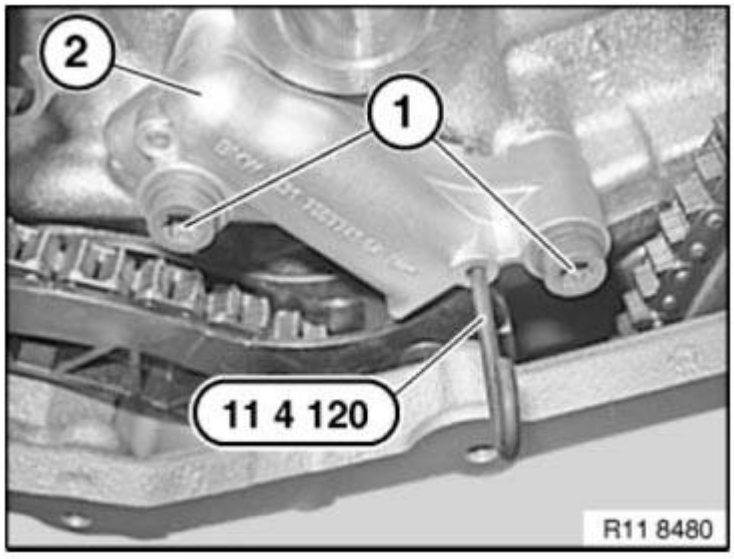


Fig. 306: Removing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of injury!

Chain tensioner is pre-tensioned.

Chain tensioner arrangement:

- Piston
- Expansion element
- Compression spring
- Housing

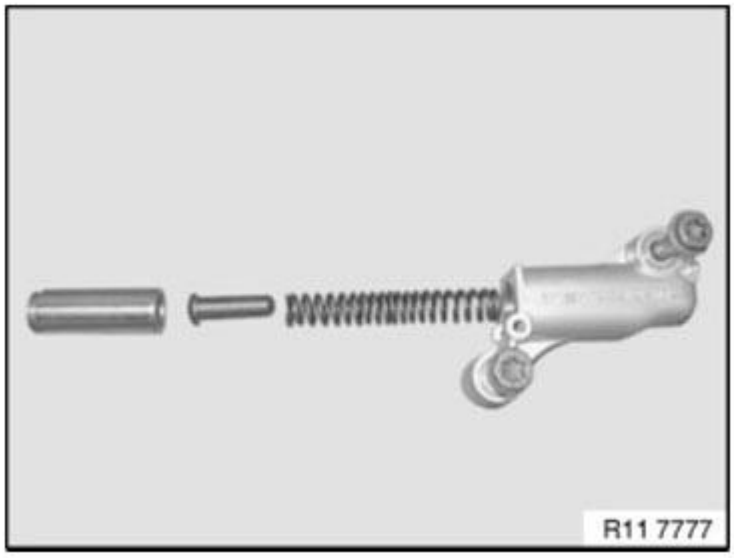


Fig. 307: Identifying Chain Tensioner Components
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all gaskets and sealing rings .

Assemble engine.

11 31 095 REMOVING HYDRAULIC CHAIN TENSIONER FOR TIMING CHAINS ON RIGHT SIDE (N74)

WARNING: Chain tensioner is pre-tensioned.
Release lock pin only in installed state.

Risk of injury!

IMPORTANT: Risk of damage!

The engine must not be cranked when the chain tensioner is removed.

The timing chain may jump.

Necessary preliminary tasks:

- Remove **TIMING CASE COVER** at top right

Crank engine back at central bolt (1) against direction of engine rotation by approx. 180°.

NOTE: Illustration shows N63.

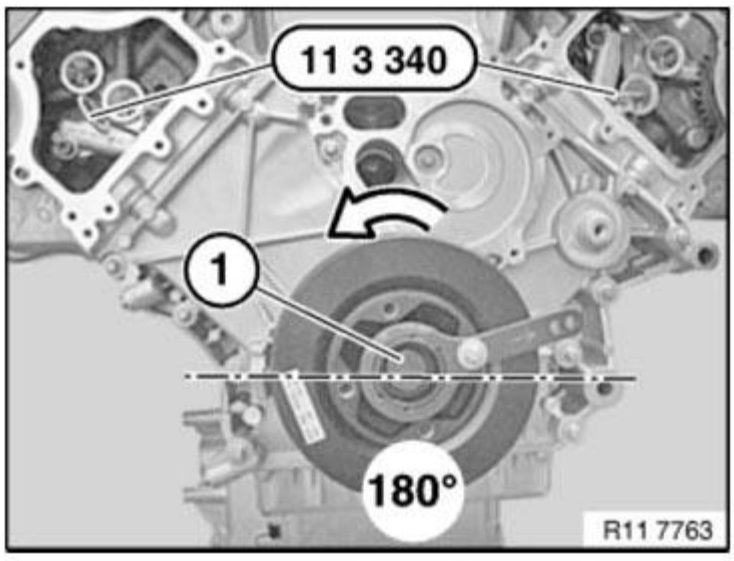


Fig. 308: Turning Central Bolt Against Direction Of Engine Rotation By Approx. 180°
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The timing chain on the chain tensioner becomes the tight end on cranking back.

Do not crank engine without chain tensioner or special tool **11 9 900** .

Piston (1) of chain tensioner must be pressed in against oil pressure in housing (see arrow in illustration).

NOTE: Illustration shows N63.

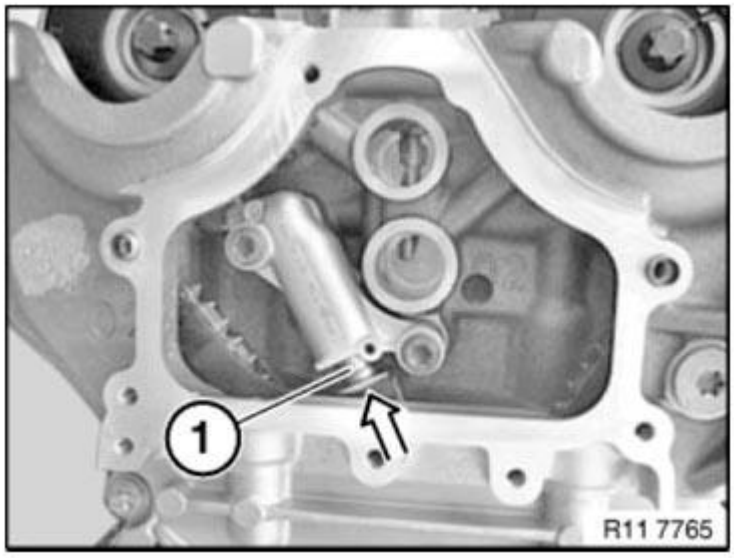


Fig. 309: Pressing Chain Tensioner Piston
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **11 4 120** into bore hole.

Release screws (1).

Tightening torque: see 7AZ in **11 31 CAMSHAFT**

Remove chain tensioner (2).

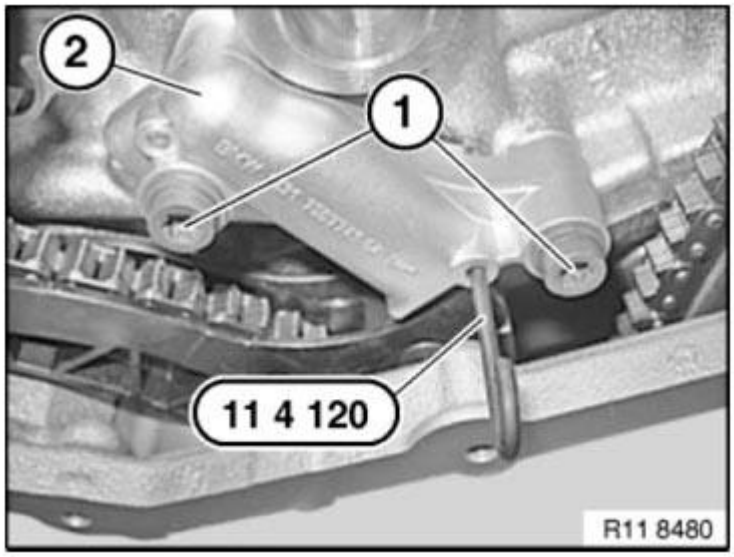


Fig. 310: Removing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of injury!

Chain tensioner is under high preload force.

Chain tensioner arrangement:

- Piston
- Expansion element
- Compression spring
- Housing

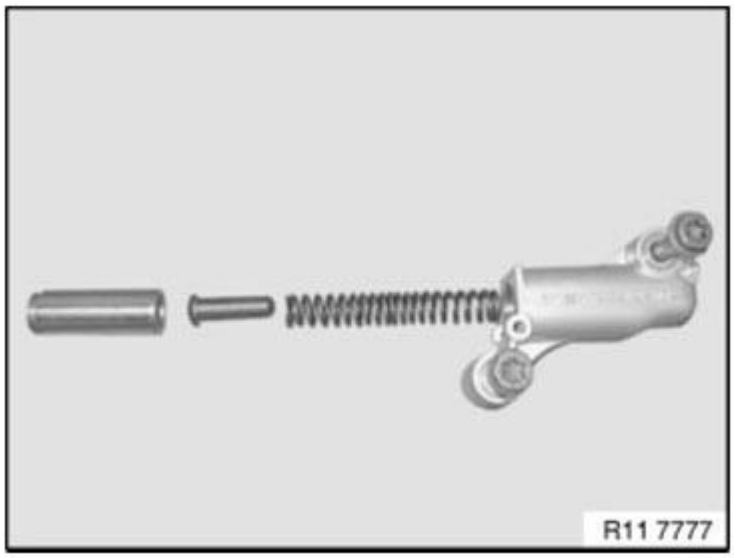


Fig. 311: Identifying Chain Tensioner Components
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all gaskets and sealing rings .

Assemble engine.

11 31 052 REPLACING BOTH TIMING CHAINS (N74)

WARNING: Burning hazard! Wear gloves.

Necessary preliminary tasks:

- Remove lower **TIMING CASE COVER**

- To facilitate removal and installation of timing chains, turn engine over with special tool **00 2 300**

Timing drive, cylinders 1 to 6 .

Remove guide rail (5) from bearing bolt.

Remove timing chain (3) with tensioning rail (4) from bearing bolt.

Timing drive, cylinders 7 to 12 .

Remove guide rail (1) from bearing bolt.

Remove timing chain (2) with tensioning rail (6) from bearing bolt.

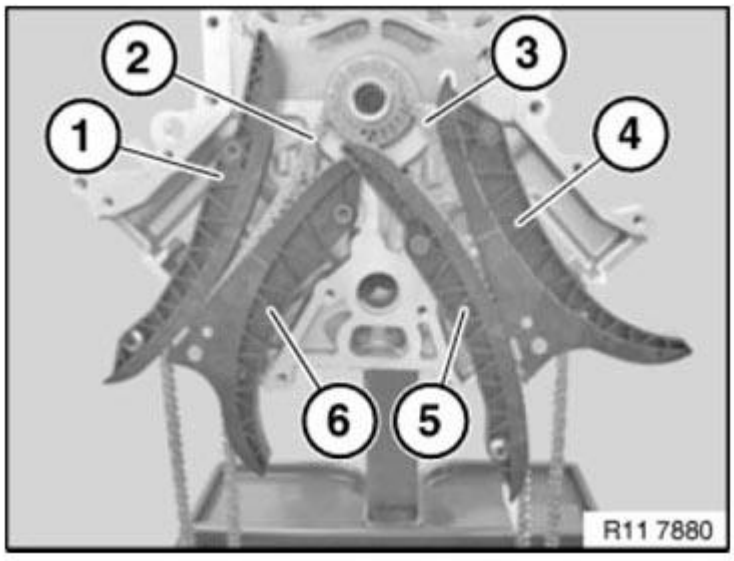


Fig. 312: Identifying Timing Chain, Guide And Tensioning Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Timing drive, cylinders 1 to 6 .

Release bearing bolts (2) with a suitable tool.

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

Timing drive, cylinders 7 to 12 .

Release bearing bolts (1).

Tightening torque: see 2AZ in **11 31 CAMSHAFT**

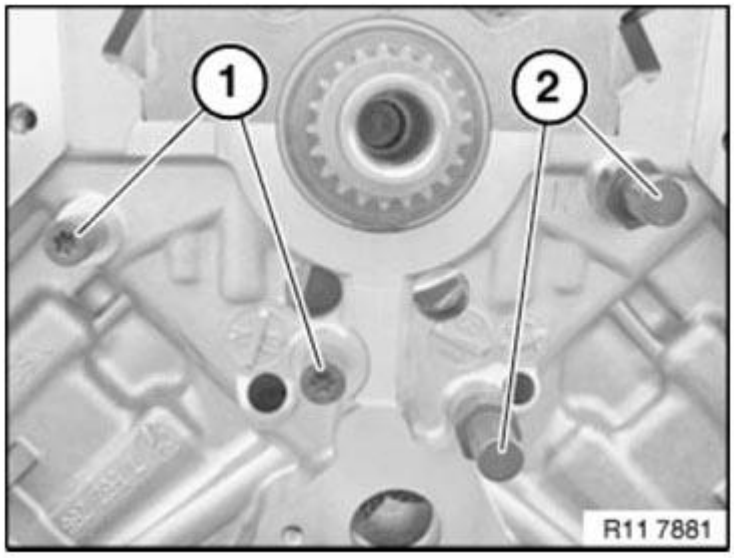


Fig. 313: Identifying Bearing Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tools **11 2 001** and **11 2 002** to the crankshaft.

Insert special tool **11 2 007** and remove sprocket wheel with special tool **11 2 003** .

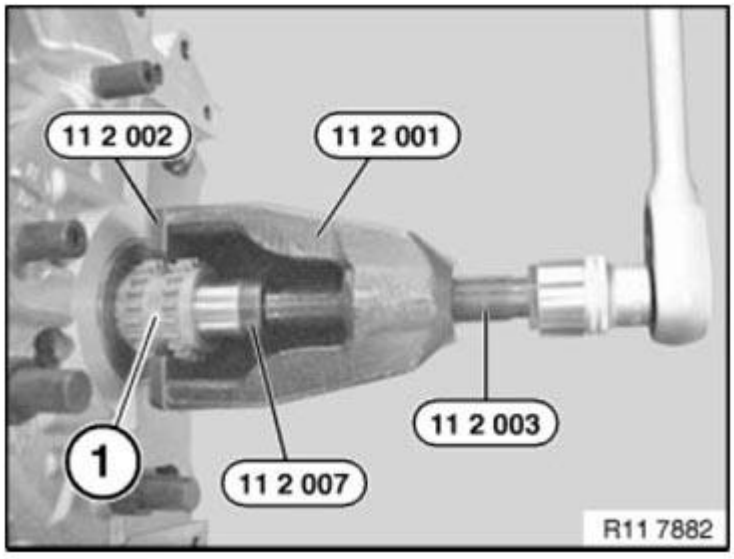


Fig. 314: Removing Sprocket Wheel Using Special Tool 11 2 003
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure Woodruff key (1) is installed in correct position in crankshaft (2).

Installation:

Check sprocket wheels for wear, replace if necessary.

Heat sprocket wheel to **60 °C** .

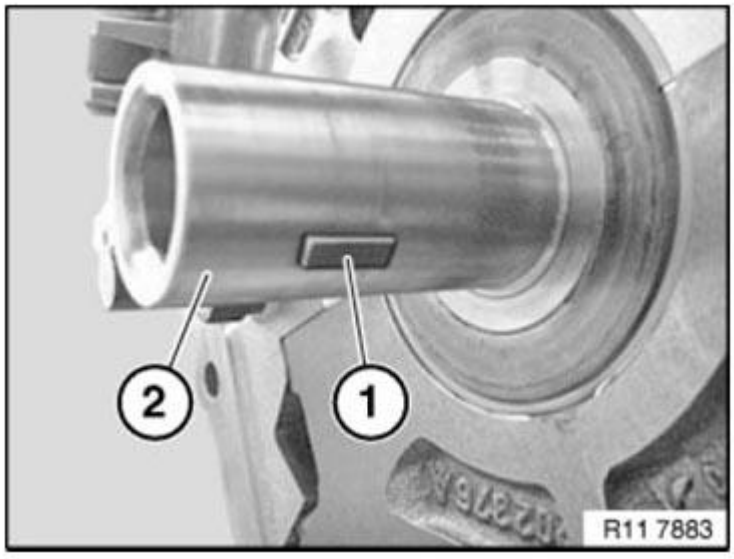


Fig. 315: Identifying Woodruff Key And Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Scalding hazard!
Wear gloves.

Installation:

Maintain tension of timing chains when installing timing case cover.

Observe sparking protection on timing case cover.

Make sure timing chain (1) is correctly installed when placing it in guide rail (3).

Assemble engine.

ROCKER ARM WITH BEARING MOUNT

11 33 062 REMOVING AND INSTALLING/REPLACING ALL HYDRAULIC VALVE CLEARANCE COMPENSATING ELEMENTS (HVC) (N74)

Necessary preliminary tasks:

- Remove all **ROCKER ARMS**.

Remove hydraulic valve clearance compensating elements (1) in direction of arrow.

If the compensating elements are to be reused, set then down in neat order in special tool 11 4 480.

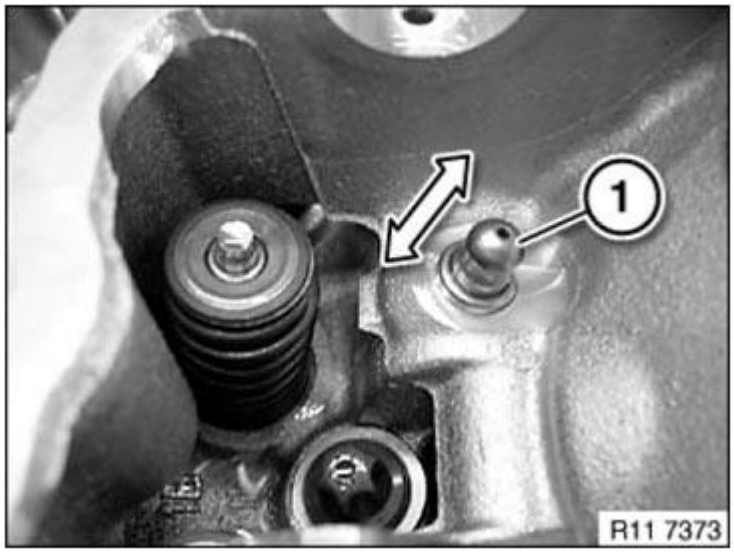


Fig. 316: Identifying Hydraulic Valve Clearance Compensating Elements Removing Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 33 052 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS ON LEFT SIDE (N74)

(cylinder bank 7 to 12)

Necessary preliminary tasks:

- Remove **LEFT INTAKE CAMSHAFT**.
- Remove left **EXHAUST CAMSHAFT**.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

Tolerance classes are not required.

Remove rocker arm (1) and set down in a tidy and orderly fashion in special tool 11 4 480.

Install rocker arm (1).

Align all rocker arms (1) straight

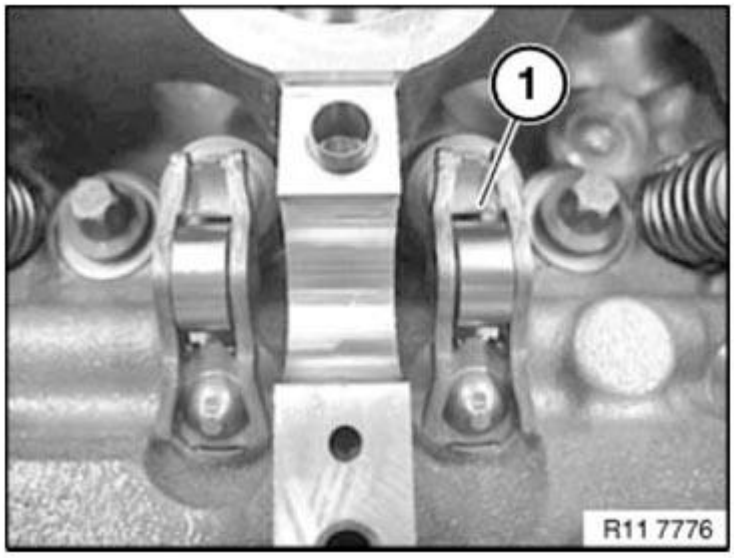


Fig. 317: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 33 054 REMOVING AND INSTALLING/REPLACING ROCKER ARMS ON RIGHT SIDE (N74)

(cylinder bank 1 to 6)

Binary tasks

- Remove right **INTAKE CAMSHAFT**.
- Remove right **EXHAUST CAMSHAFT**.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

Tolerance classes are not required.

Remove rocker arm (1) and set down in a tidy and orderly fashion in special tool 11 4 480.

Install rocker arm (1).

Align all rocker arms (1) straight.

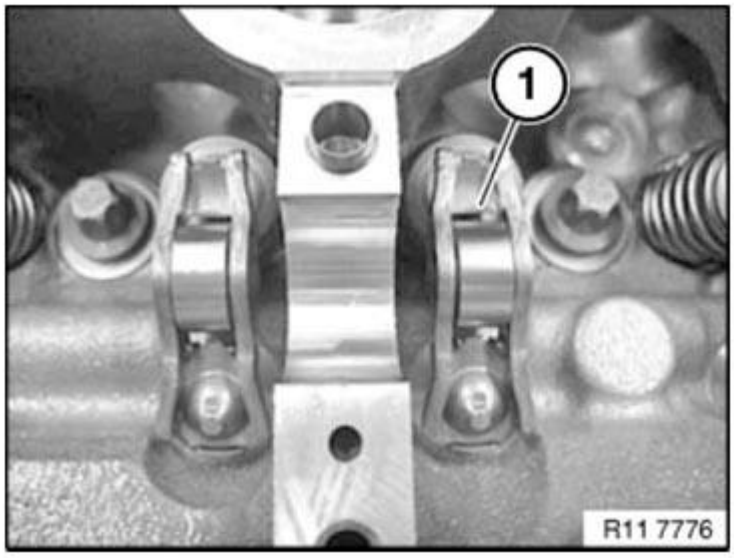


Fig. 318: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING/REPLACING ALL VALVES (N74)

Necessary preliminary tasks:

- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Remove camshafts. See **RIGHT INTAKE CAMSHAFT**, **RIGHT EXHAUST CAMSHAFT**, **LEFT INTAKE CAMSHAFT**, and **LEFT EXHAUST CAMSHAFT**.

Release screws (1).

Remove cable duct.

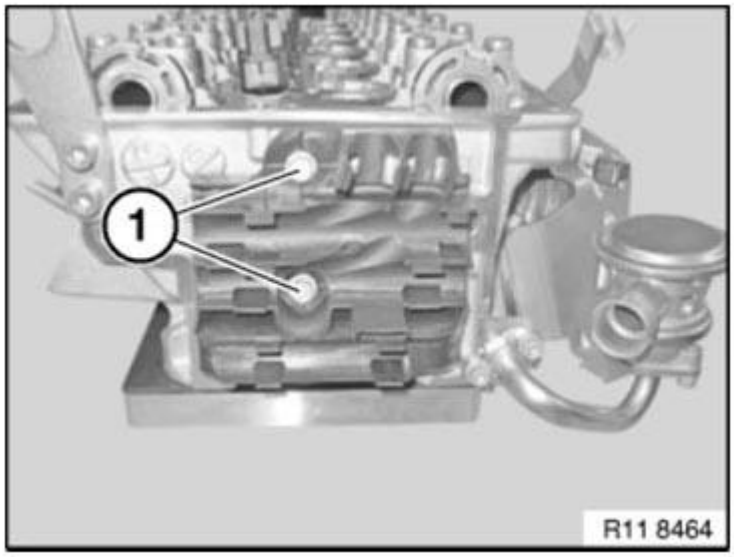


Fig. 319: Identifying Cable Duct Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Mount cylinder head (1) on special tool **11 9 000** .

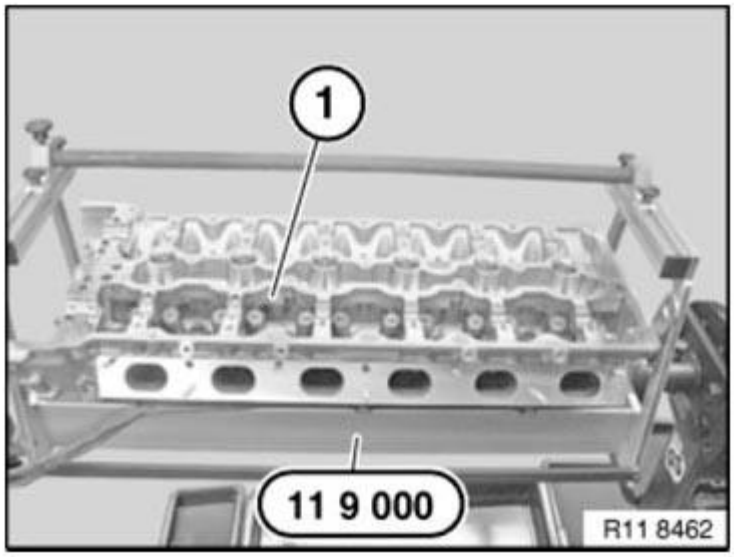


Fig. 320: Mounting Cylinder Head On Special Tool 11 9 000
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool **11 9 008** on special tool **11 9 006** .

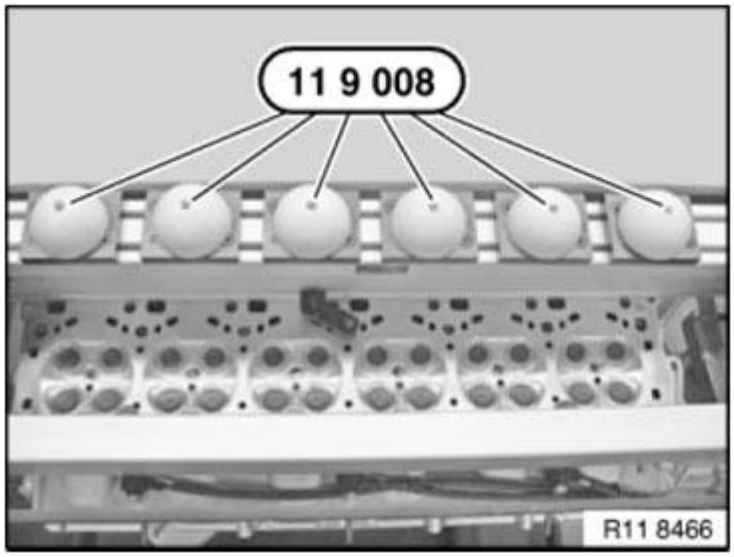


Fig. 321: Identifying Special Tool 11 9 008
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 9 006** with silicone cushion on cylinder head.

Slide locks (1) in direction of arrow and pretension with eccentric shaft.

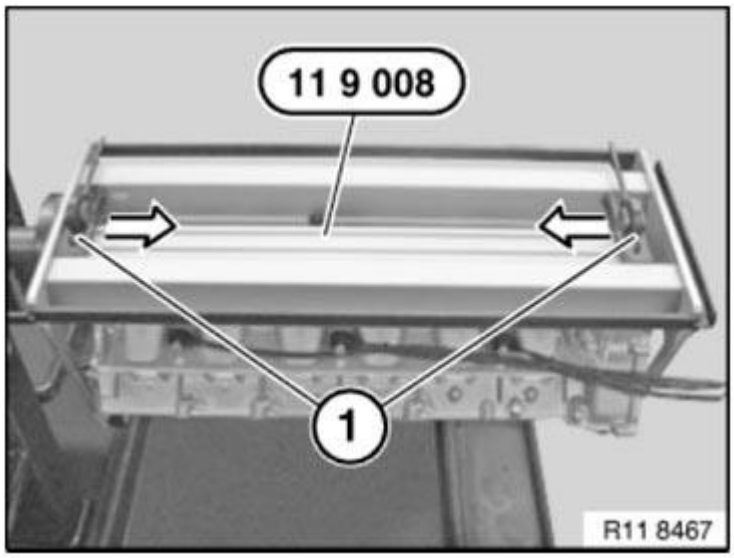


Fig. 322: Sliding Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring with special tool **11 8 840** .

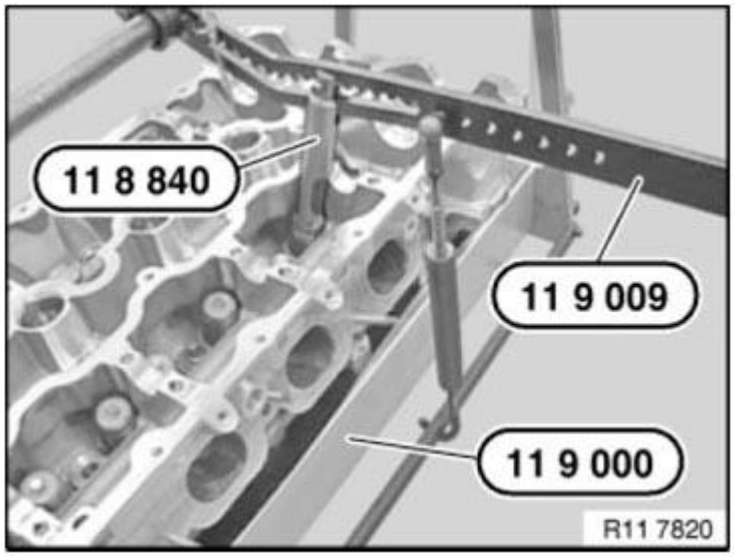


Fig. 323: Pressing Down Valve Spring Using Special Tool 11 8 840
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters (1) with a magnet.

Place valve springs and valve keys on special tool 11 4 480 in an orderly manner.

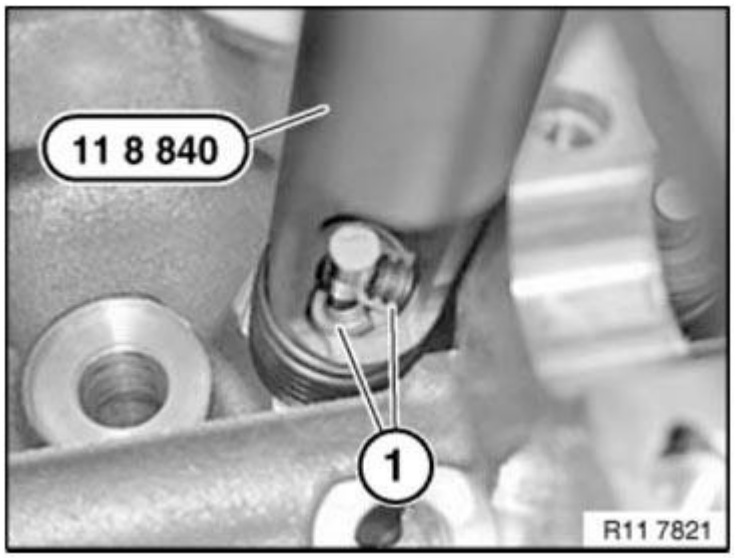


Fig. 324: Identifying Valve Cotters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Incorrect installation will result in valve spring breakage.

Color marking (1) is normally on lower end of valve spring.

Only the diameter is decisive for the correct installation of the valve springs.

Install valve spring so that larger diameter points to spring plate at bottom.

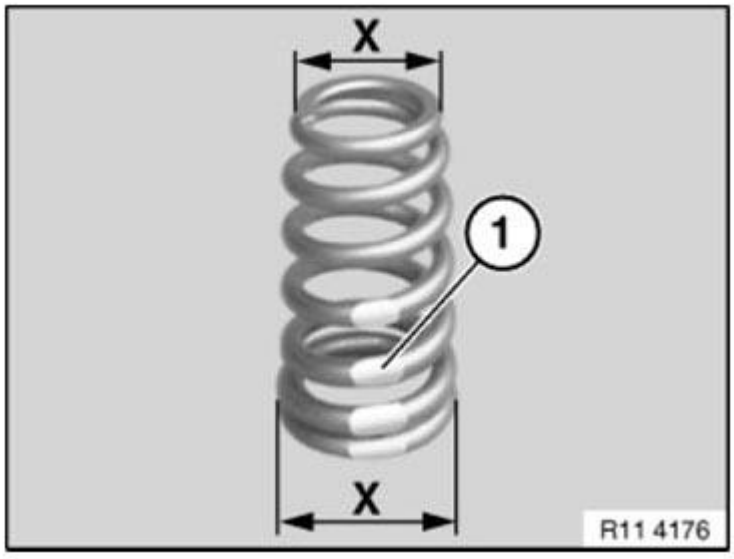


Fig. 325: Identifying Color Marking On Valve Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring
5. Valve keys

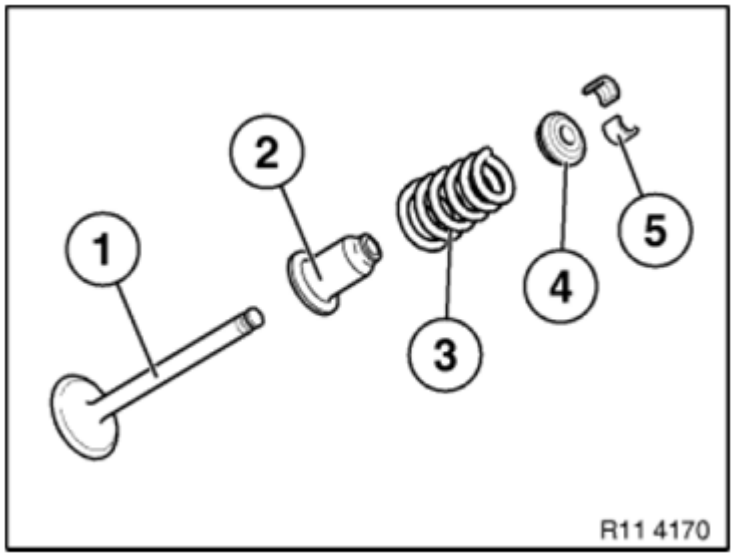


Fig. 326: Identifying Valve, Valve Stem Seal, Keys, Spring And Top Plate Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Release special tool **11 9 006** from cylinder head.

Remove all valves and place on special tool 11 4 480 in an orderly manner.

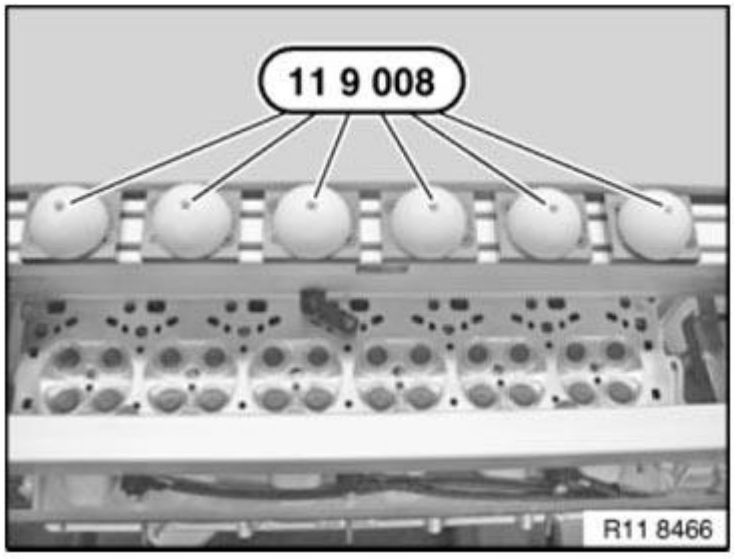


Fig. 327: Identifying Special Tool 11 9 008
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 34 715 REPLACING ALL VALVE SPRINGS (N74)

Necessary preliminary tasks:

- Remove **LEFT CYLINDER HEAD**.
- Remove **RIGHT CYLINDER HEAD**.
- Remove camshafts. See **RIGHT INTAKE CAMSHAFT**, **RIGHT EXHAUST CAMSHAFT**, **LEFT INTAKE CAMSHAFT**, and **LEFT EXHAUST CAMSHAFT**.

Release screws (1).

Remove cable duct.

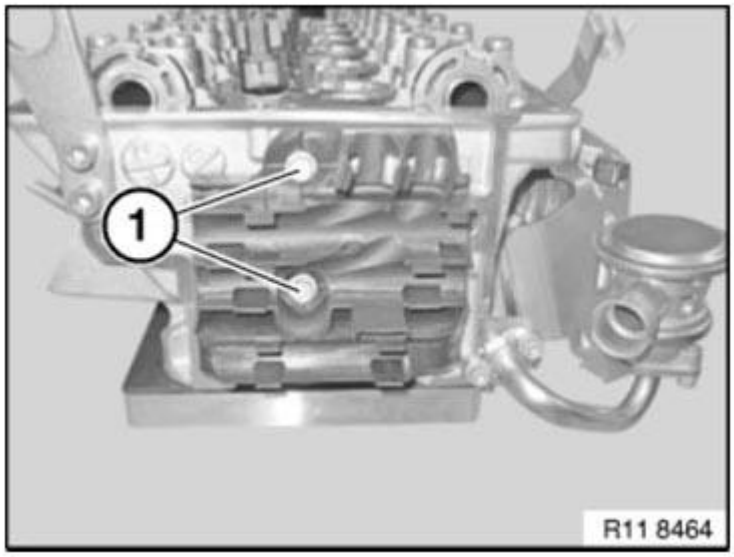


Fig. 328: Identifying Cable Duct Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Mount cylinder head (1) on special tool **11 9 000** .

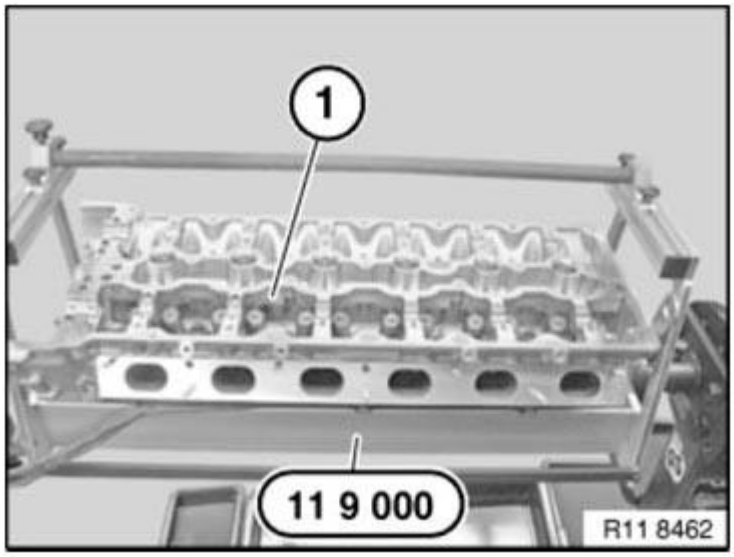


Fig. 329: Mounting Cylinder Head On Special Tool 11 9 000
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool **11 9 008** on special tool **11 9 006** .

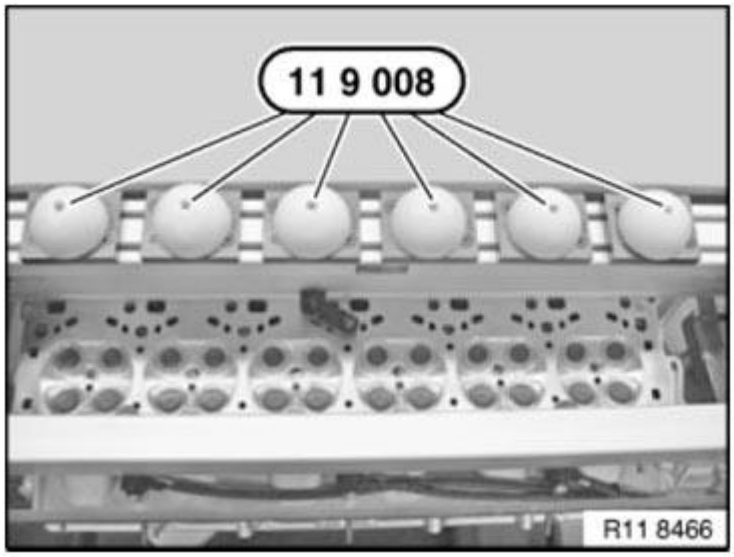


Fig. 330: Identifying Special Tool 11 9 008
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 9 006** with silicone cushion on cylinder head.

Slide locks (1) in direction of arrow and pretension with eccentric shaft.

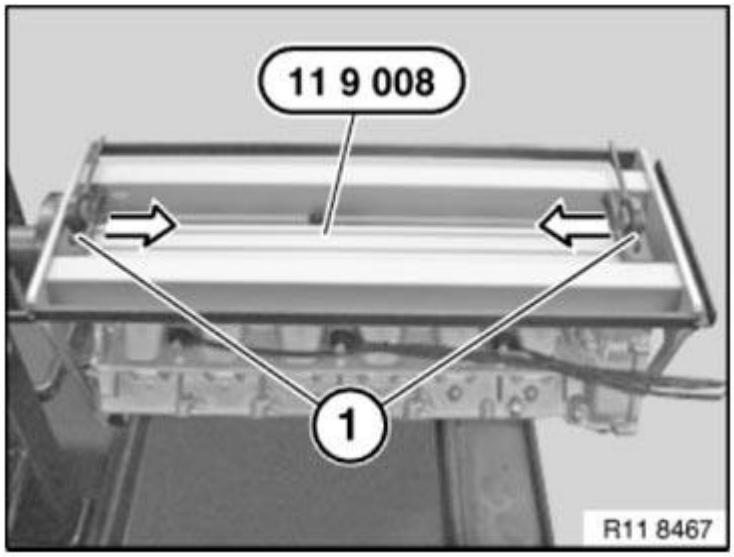


Fig. 331: Sliding Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring with special tool **11 8 840** .

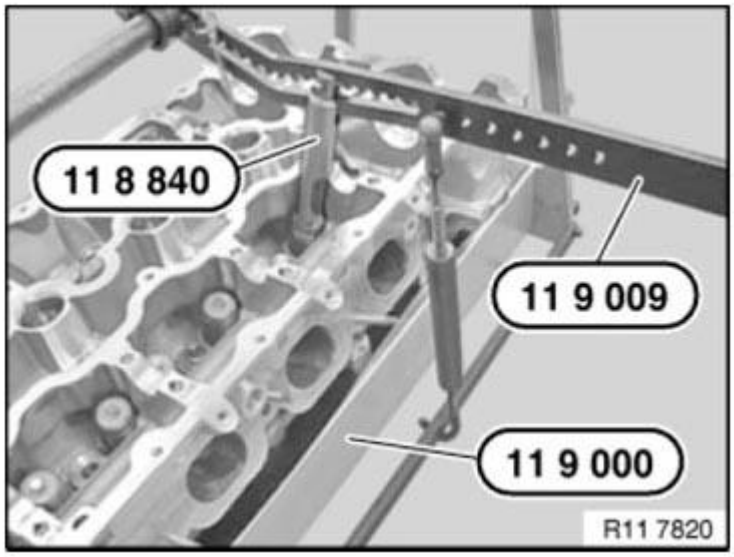


Fig. 332: Pressing Down Valve Spring Using Special Tool 11 8 840
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters (1) with a magnet.

Place valve springs and valve keys on special tool 11 4 480 in an orderly manner.

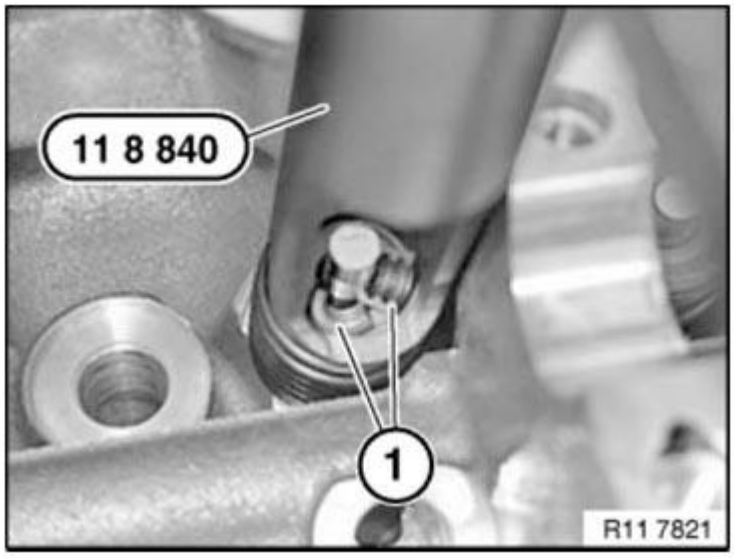


Fig. 333: Identifying Valve Cotters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Incorrect installation will result in valve spring breakage.

Color marking (1) is normally on lower end of valve spring.

Only the diameter is decisive for the correct installation of the valve springs.

Install valve spring so that larger diameter points to spring plate at bottom.

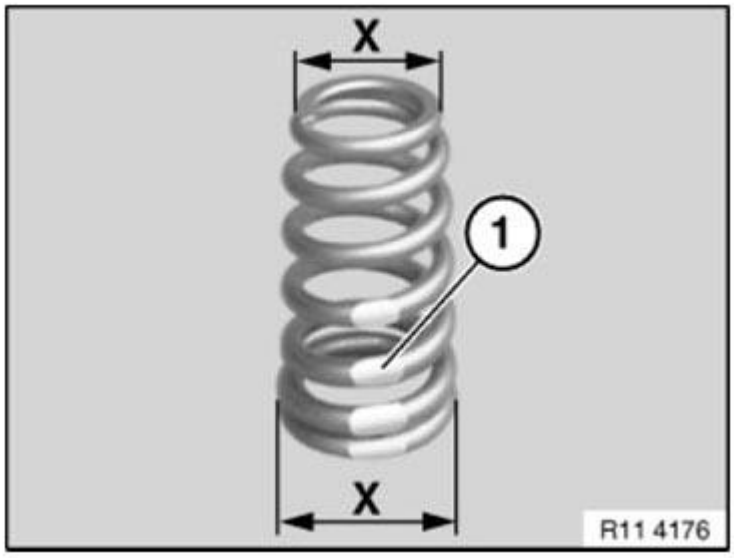


Fig. 334: Identifying Color Marking On Valve Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring
5. Valve keys

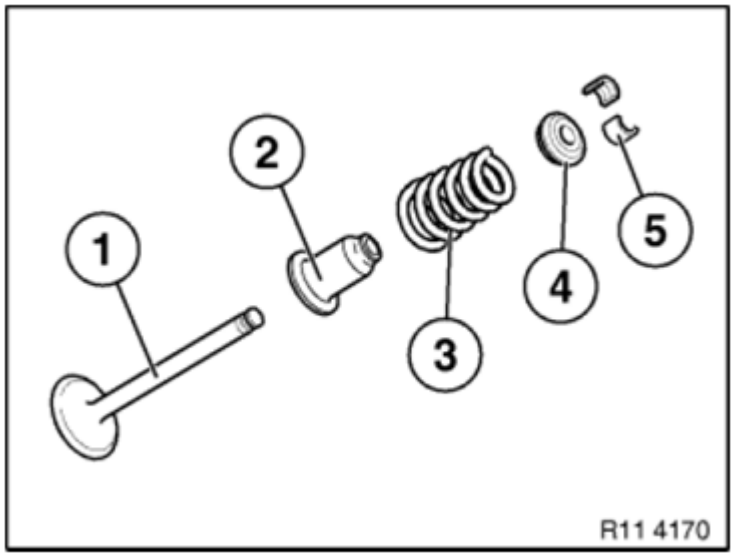


Fig. 335: Identifying Valve, Valve Stem Seal, Keys, Spring And Top Plate Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 34 560 REPLACING ALL VALVE STEM SEALS (N74)

IMPORTANT: Risk of damage to sealing lip on valve stem seal.
Fit new valve stem seals only when all valves have been installed.

Necessary preliminary tasks:

- Remove all **VALVE SPRINGS**.

Press special tool **11 6 370** onto the valve stem seal.

Withdraw valve stem seal by turning and simultaneously unscrewing special tool **11 6 370** .

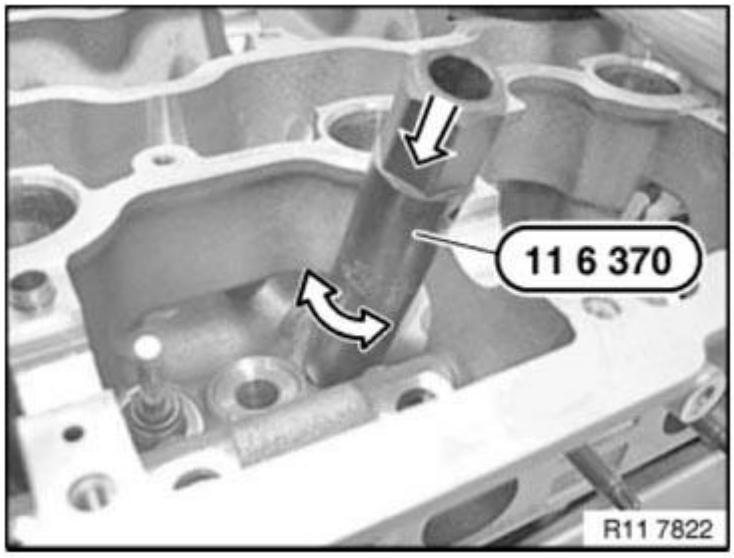


Fig. 336: Pressing Special Tool 11 6 370 Onto Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lubricate valve stem with oil and insert valve.

Installation sleeve **11 1 380** is included in the delivery specification for the valve stem seals.

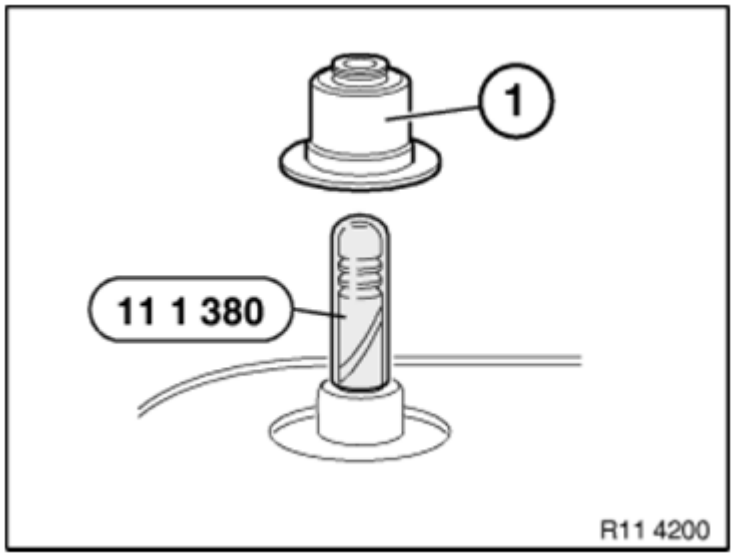


Fig. 337: Identifying Valve Stem Seal And Special Tool 11 1 380
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **11 1 380** .

Coat new valve stem seal (1) with oil and install.

NOTE: For use on the N74 engine, the special tool 11 6 380 must be remachined according to the sketch with a 6.2 mm drill bit dia. to a depth of A = approx. 45 mm.

This modification has already been taken into account for reordering.

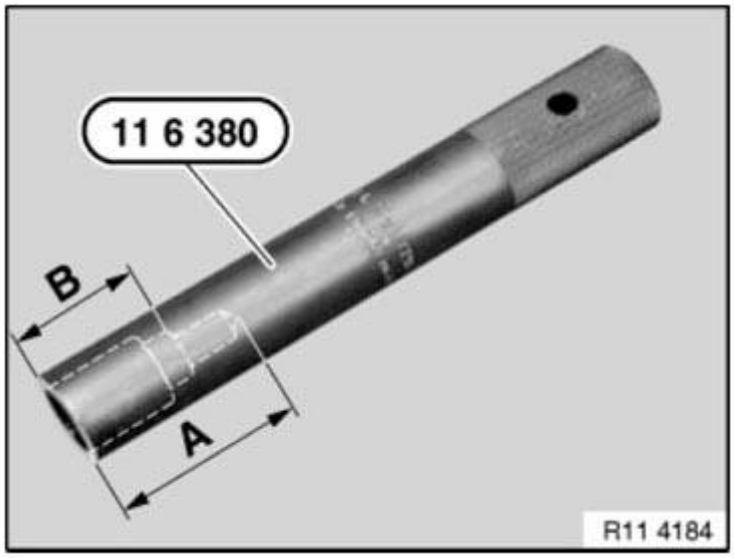


Fig. 338: Identifying Special Tool 11 6 380 Modification Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

Manually press on valve stem seal as far as it will go with special tool **11 6 380** .

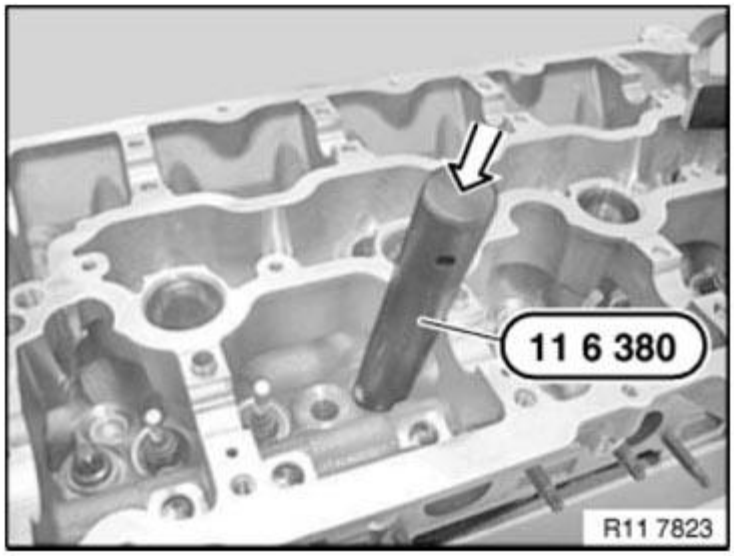


Fig. 339: Pressing Valve Stem Seal Using Special Tool 11 6 380

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

VARIABLE CAMSHAFT TIMING

11 36 720 REMOVING AND INSTALLING/RENEWING BOTH SOLENOID VALVES ON RIGHT SIDE (N74)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunctions if valves are contaminated:

- Rough running
- OBD incorrect entry
- Poor exhaust gas values
- Low engine power

IMPORTANT: Risk of damage!

Do not clean solenoid valves with compressed air.

Solenoid valves, cylinders 1-6

Necessary preliminary tasks:

- Read out fault memory in DME control unit
- Switch off ignition.
- Remove **FAN COWL WITH ELECTRIC FAN** .
- Remove **VACUUM PUMP**.
- Loosen expansion tank and carefully press to the side.

NOTE: Top solenoid valve controls the exhaust adjustment unit.

Bottom solenoid valve controls the inlet adjustment unit.

Unlock plug connections of solenoid valves (2 and 4) and disconnect.

Installation:

Plug connections must snap audibly into place!

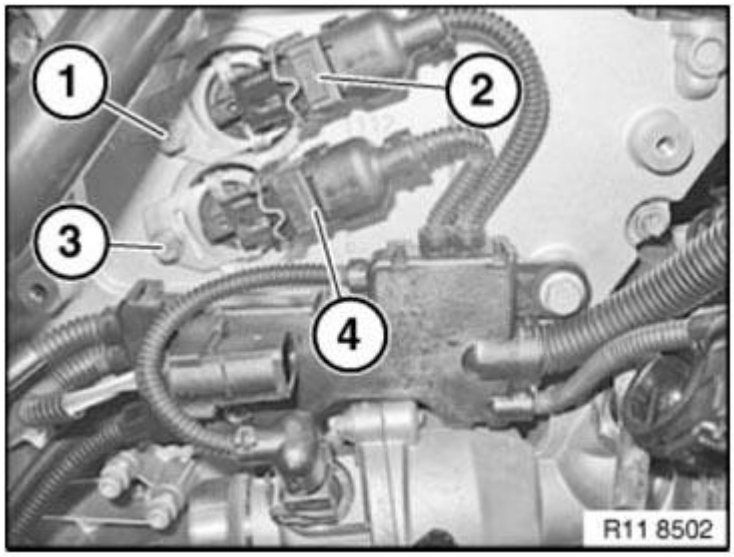


Fig. 340: Identifying Solenoid Valve Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque: see 3AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

Pull out solenoid valves.

Installation:

Replace O-rings (1 and 2) on solenoid valve .

Installation:

To install solenoid valves, coat both O-rings with engine oil.

If the solenoid valve is to be reused, the filter strainer (see arrow in illustration) must be cleaned.

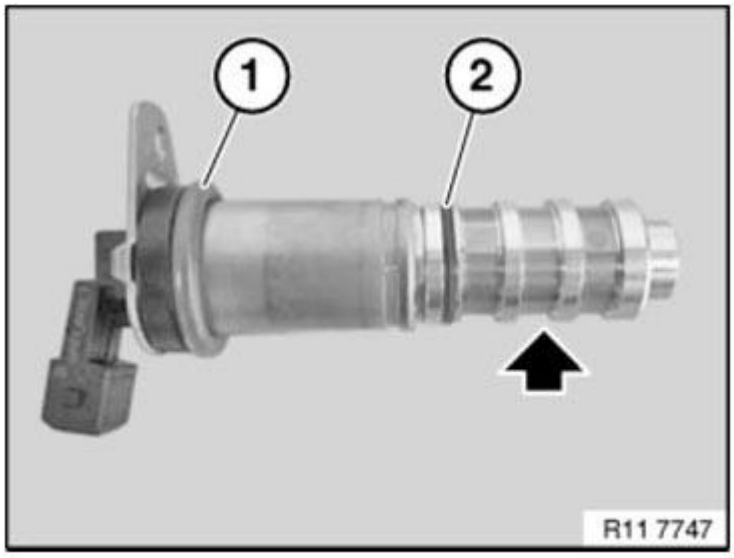


Fig. 341: Identifying Solenoid Valve O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If a filter element is clogged with dirt, the filter element (filter strainer) may be removed.

Release filter elements (1) at contact edges.

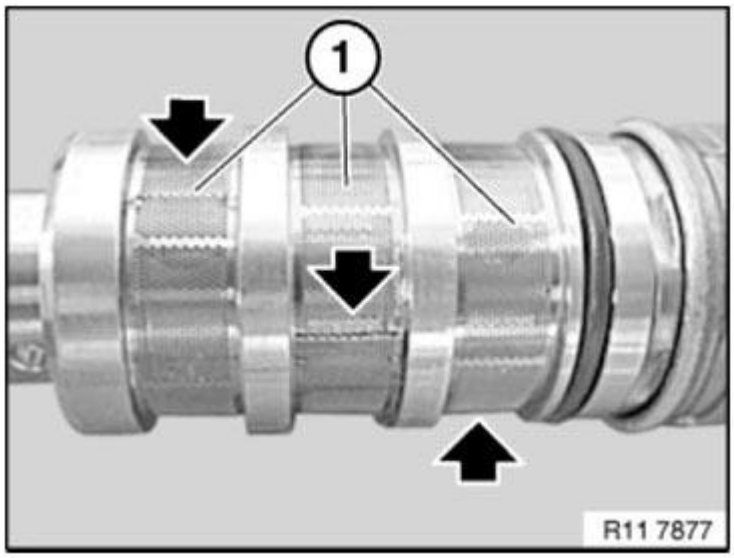


Fig. 342: Identifying Filter Elements
Courtesy of BMW OF NORTH AMERICA, INC.

Bend open welding spots on filter element (1) with a screwdriver (2) in direction of arrow until welding spots are opened.

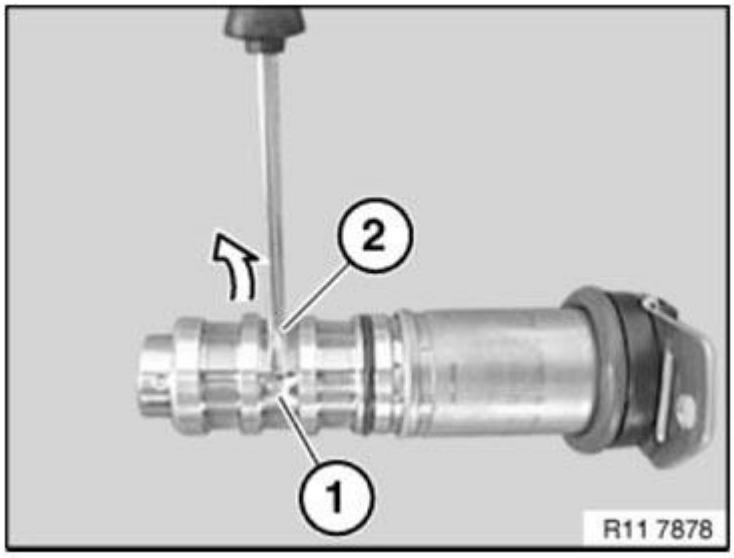


Fig. 343: Bending Open Welding Spots On Filter Element Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Avoid damaging, e.g. notches or scratches, the solenoid valve housing (see arrows in illustration).

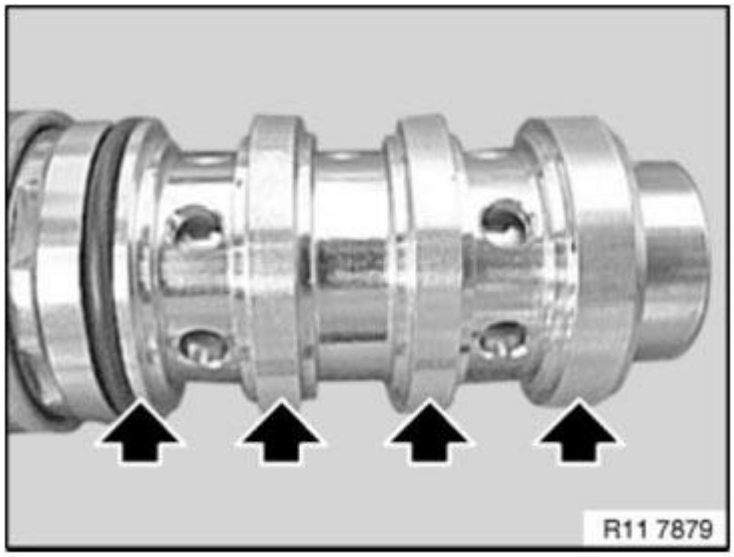


Fig. 344: Locating Solenoid Valve Housing Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully insert solenoid valves as far as they will go.

Ensure correct installation position.

Insert screws (1 and 3) and tighten down.

Tightening torque: see 3AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

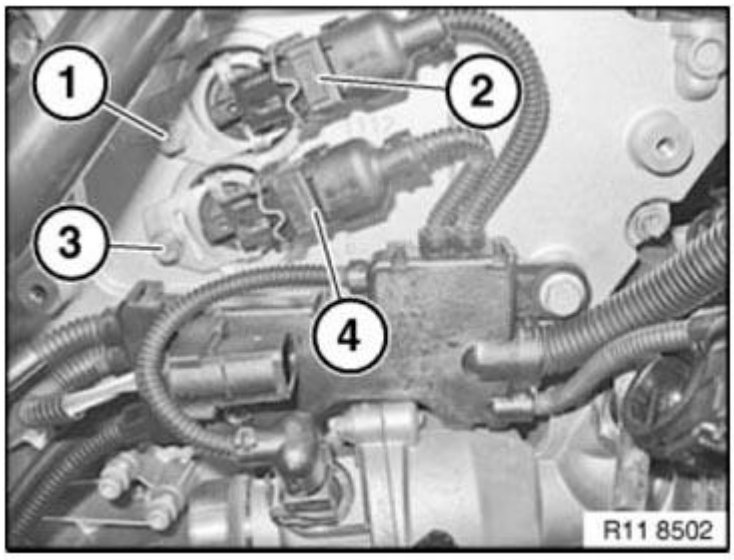


Fig. 345: Identifying Solenoid Valve Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Delete fault memory.

Check function of DME control unit.

11 36 047 REMOVING AND INSTALLING/RENEWING INLET AND EXHAUST CAMSHAFT ADJUSTERS ON LEFT SIDE (N74)

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjusters is normally locked in its initial position.

The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster.

(cylinder bank 7 to 12)

Necessary preliminary tasks:

- **Read fault memory and make a documentary record**
- Remove **LEFT CYLINDER HEAD COVER**
- Remove **LEFT TIMING CASE COVER**
- Check **TIMING**

To release central bolts, use special tool **11 9 890** or grip at hexagon head of camshaft.

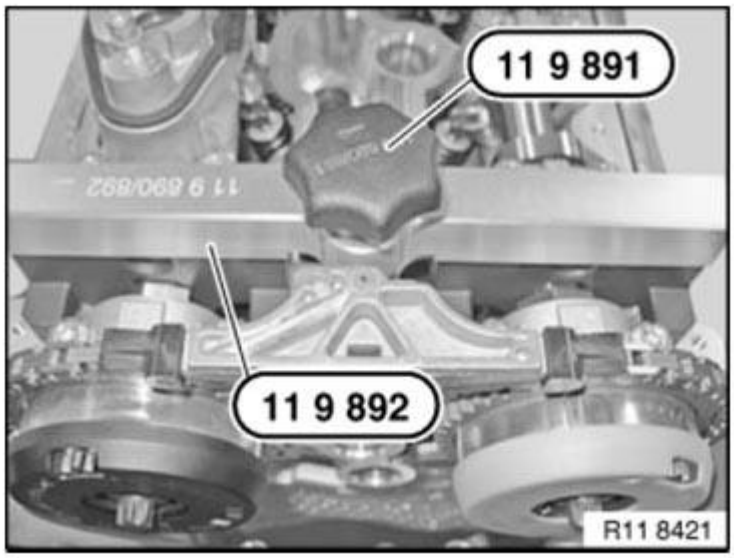


Fig. 346: Pressing Special Tool 11 9 892 Down With Special Tool 11 9 891
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshafts.

Release central bolts (1 and 2) of inlet and exhaust camshaft adjusters.

Installation:

Replace central bolts after releasing.

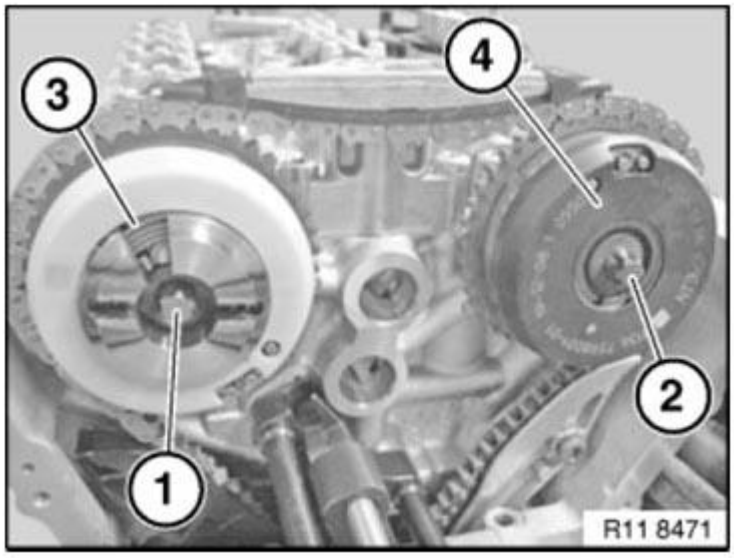


Fig. 347: Identifying Inlet And Exhaust Adjustment Units Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow in illustration).

If no grease can be seen on the bolt head of central bolt (1), the VANOS gear must be replaced for safety reasons.

Installation:

Coat contact face of central bolt (1) with copper paste.

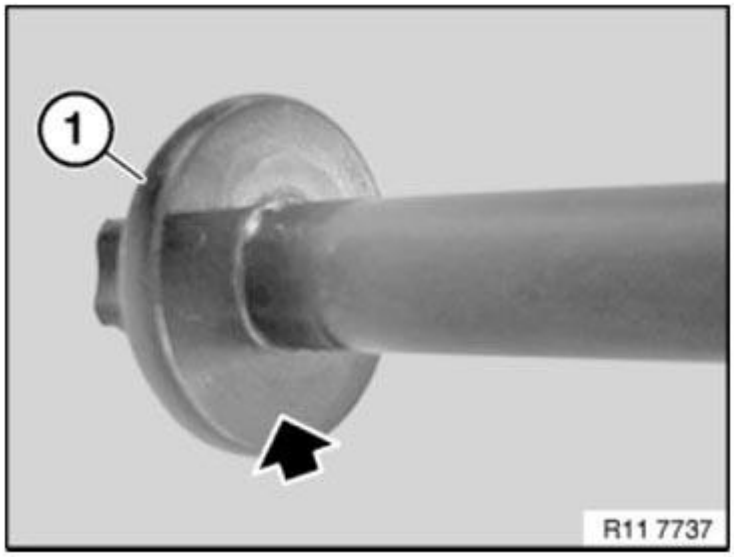


Fig. 348: Locating Central Bolt Coating Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket screw.

Release special tool **11 9 900** at knurled screws and remove.

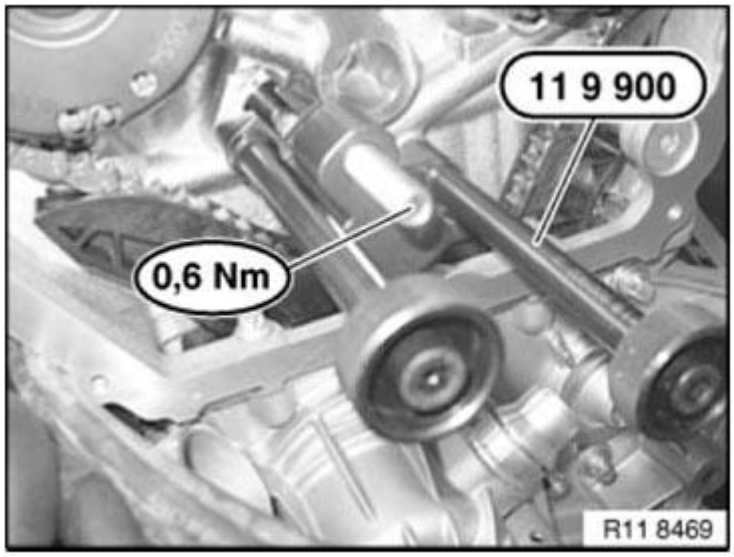


Fig. 349: Pretensioning Timing Chain Using Special Tool 11 9 900
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove upper tensioning rail (2).

Remove camshaft adjusters.

NOTE: Shown without special tools for purposes of clarity.

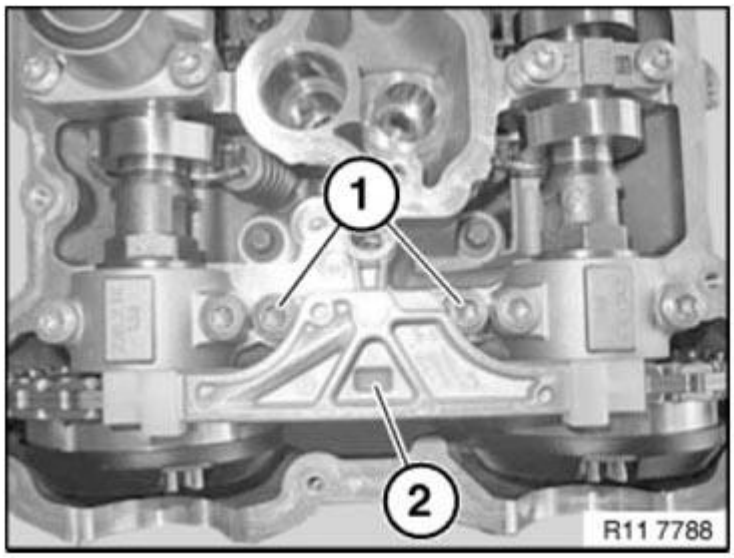


Fig. 350: Identifying Upper Tensioning Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up:

Intake and exhaust camshaft adjusters are different.

Mixing up the inlet and exhaust camshaft adjusters will cause damage to the engine.

1. Inlet camshaft adjuster (1) is marked with **ON**
2. Exhaust (2) is marked with **OFF**

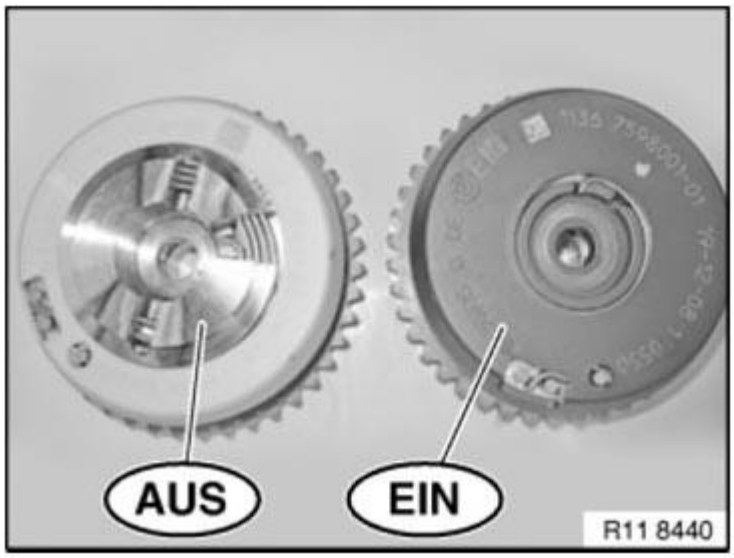


Fig. 351: Identifying Inlet And Exhaust Camshaft Adjusters Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat contact face of central bolt (1) with copper paste.

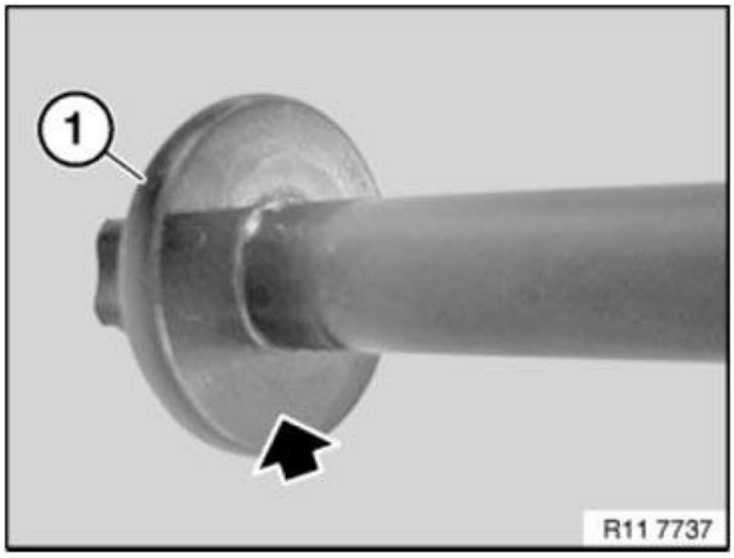


Fig. 352: Locating Central Bolt Coating Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of camshaft adjusters (3 and 4) in relation to timing chain can be freely selected.

Feed camshaft adjuster into timing chain and position on camshafts.

Insert central bolts (1 and 2) on camshaft adjusters without gaps.

Release central bolts (1 and 2) by 90°.

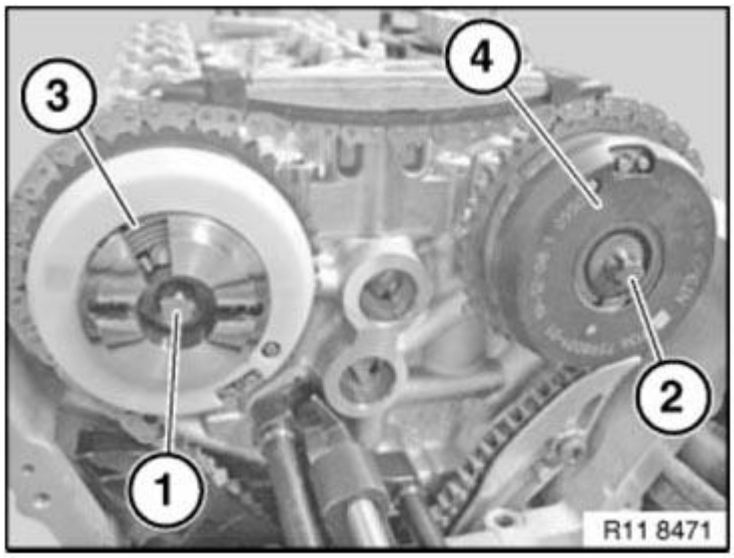


Fig. 353: Identifying Inlet And Exhaust Adjustment Units Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sliding rail (2) and secure with screws (1).

Tightening torque: see 4AZ in **11 31 CAMSHAFT**

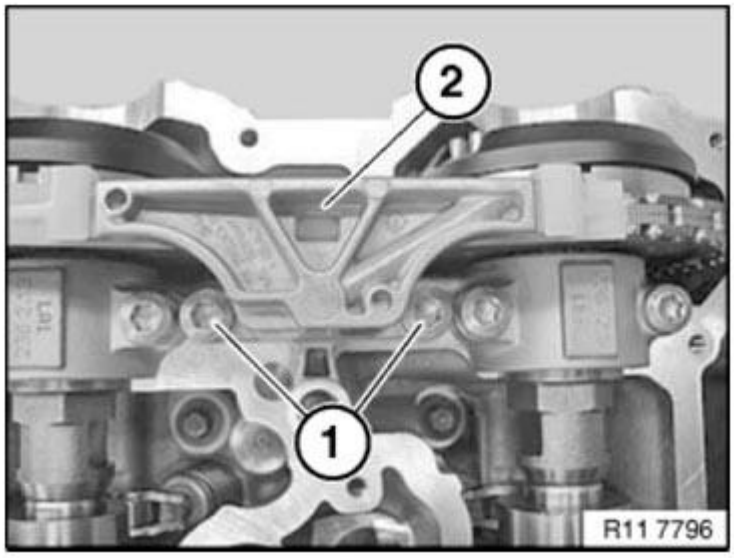


Fig. 354: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Get special tool **11 9 890** ready for securing camshafts.

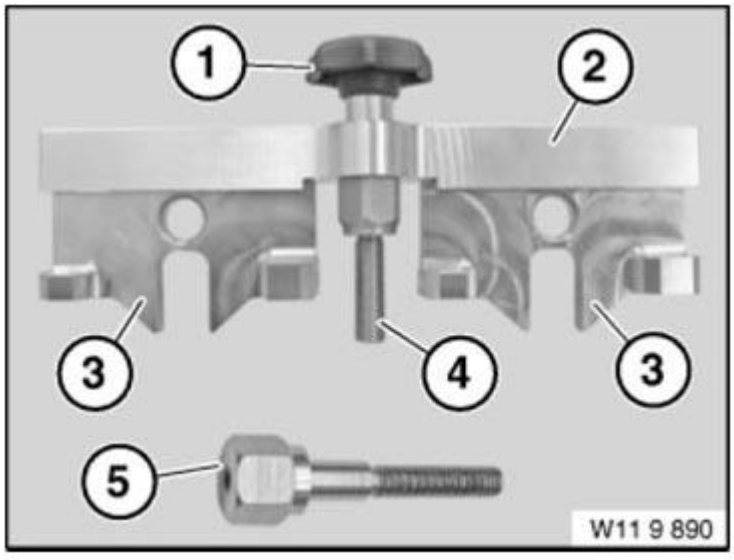


Fig. 355: Identifying Special Tools (11 9 890, 11 9 891, 11 9 892, 11 9 893, 11 9 895)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft.

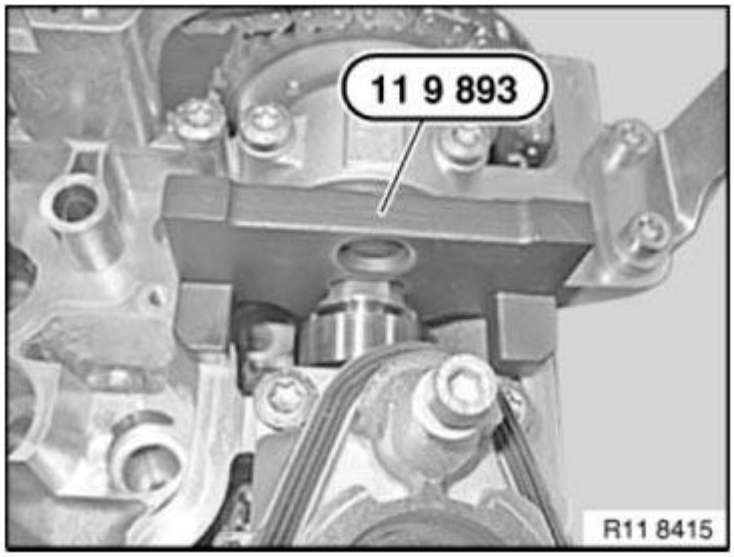


Fig. 356: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on exhaust camshaft.

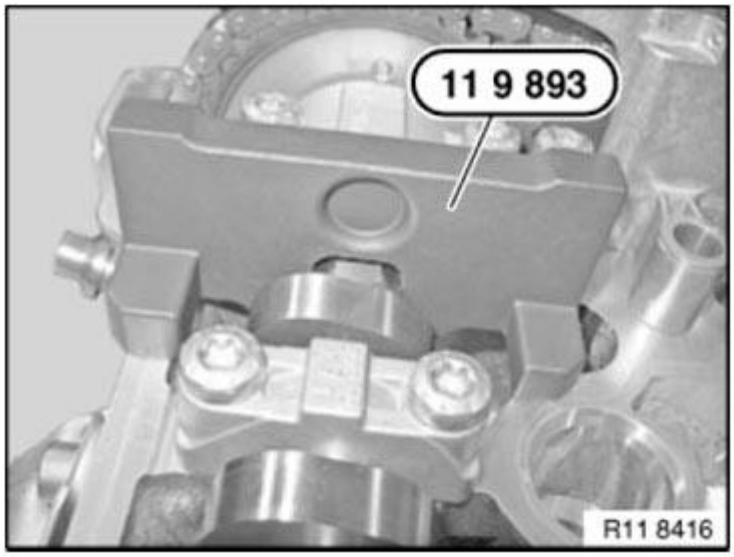


Fig. 357: Placing Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool **11 9 895** into cylinder head.

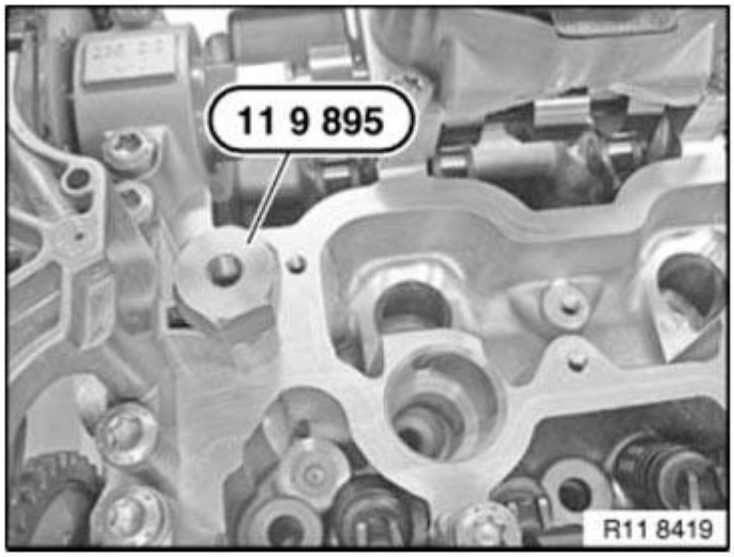


Fig. 358: Screwing Special Tool 11 9 895 Into Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align exhaust and inlet camshafts in such a way that special tools 11 9 893 rest without a gap on the cylinder head.

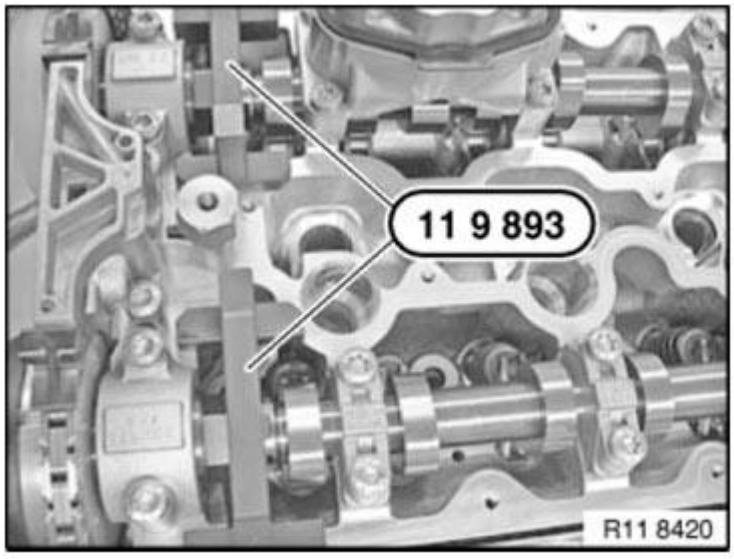


Fig. 359: Positioning Special Tool 11 9 893 On Inlet And Exhaust Camshafts
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool **11 9 892** down with special tool **11 9 891** .

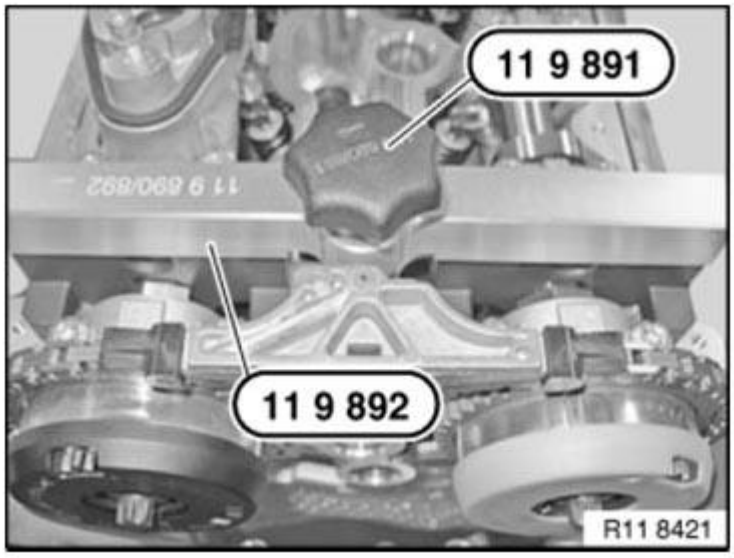


Fig. 360: Pressing Special Tool 11 9 892 Down With Special Tool 11 9 891
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 9 900** .

Pretension timing chain with special tool **11 9 900** .

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm** .

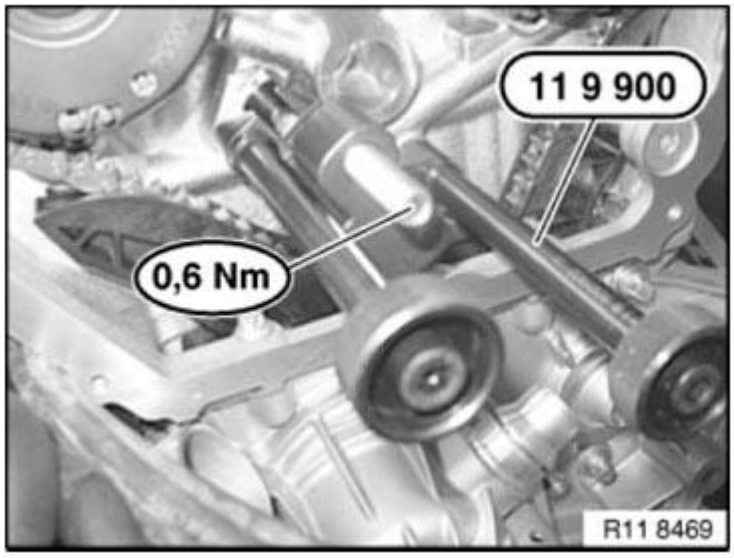


Fig. 361: Pretensioning Timing Chain Using Special Tool 11 9 900
Courtesy of BMW OF NORTH AMERICA, INC.

Check special tools **11 9 190** for correct seating.

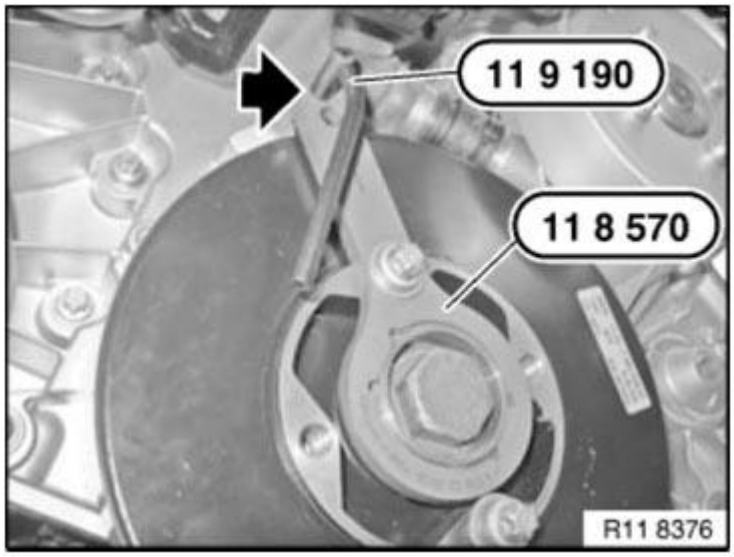


Fig. 362: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Connect intake camshaft adjuster (2) central screw (1).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

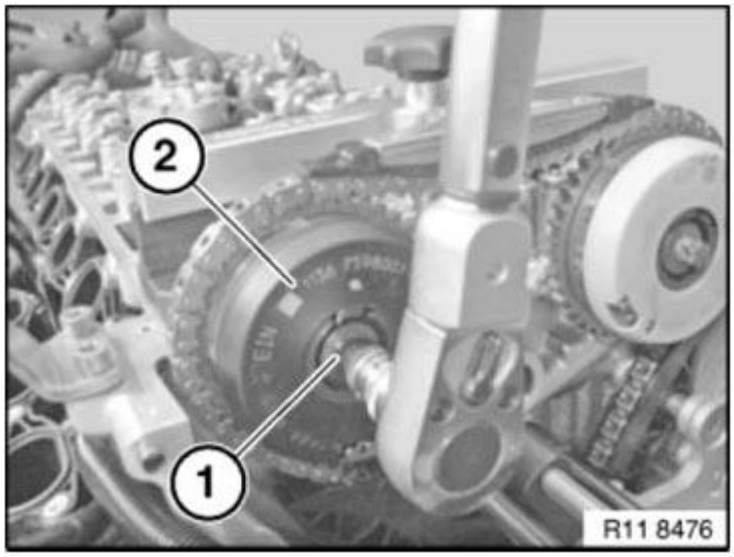


Fig. 363: Identifying Intake Camshaft Adjuster And Central Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Connect exhaust camshaft adjuster (2) central screw (1).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

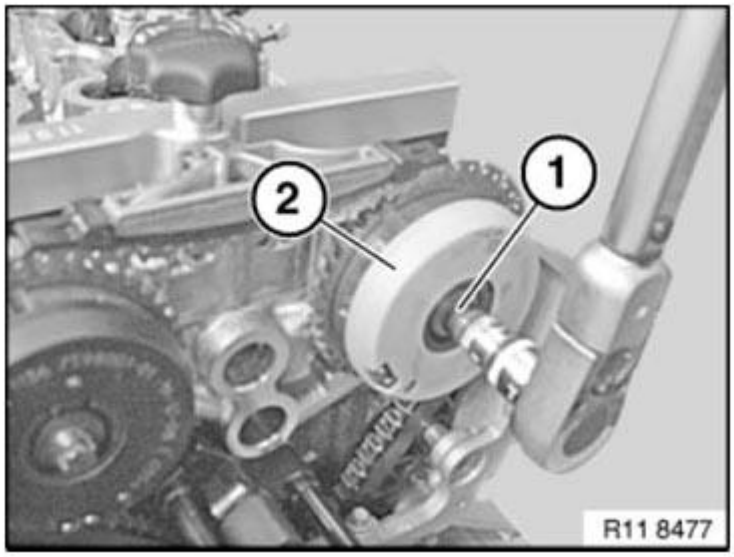


Fig. 364: Tightening Exhaust Camshaft Adjuster Central Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of inlet camshaft adjuster (2) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

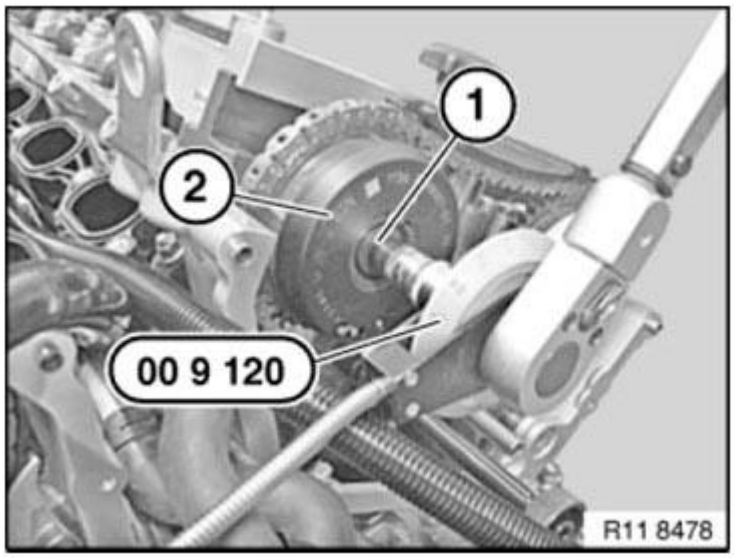


Fig. 365: Securing Intake Adjustment Central Bolt Unit Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of inlet camshaft adjuster (2) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

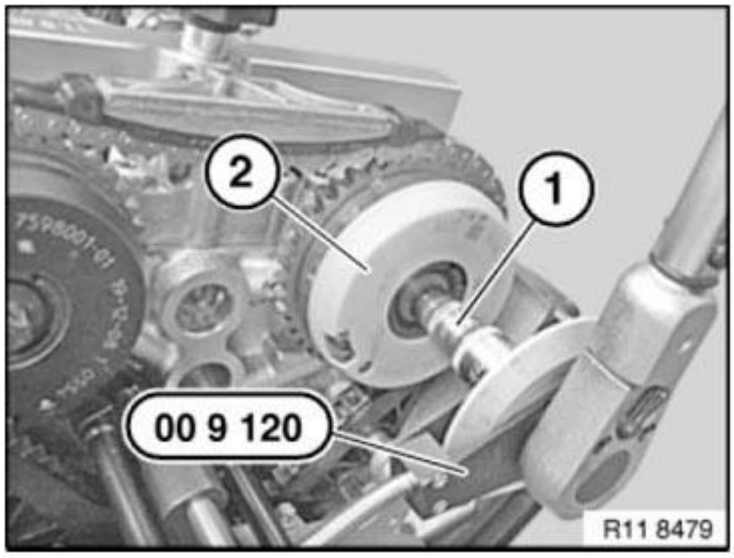


Fig. 366: Securing Inlet Camshaft Adjuster Central Bolt Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt twice in direction of rotation until engine is in the **firing TDC position cylinder** 1 again.

Mount special tool **11 8 570** on vibration damper with a bolt.

Secure special tool **11 9 190** at **cylinder no. 1 TDC firing position** .

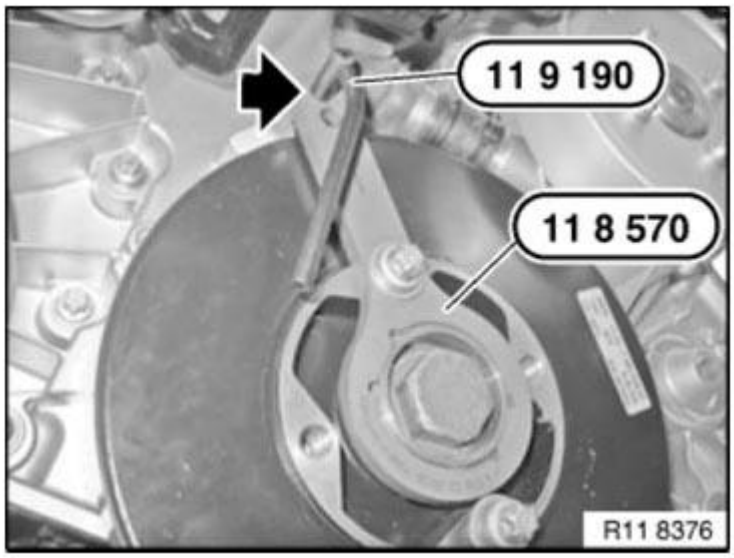


Fig. 367: Removing Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Check **TIMING** again.

Remove all special tools.

11 36 715 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES ON LEFT SIDE (N74)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunctions if valves are contaminated:

- Rough running
- OBD incorrect entry
- Poor exhaust gas values
- Low engine power

IMPORTANT: Risk of damage!

Do not clean solenoid valves with compressed air.

Solenoid valves, cylinders 7-12

Necessary preliminary tasks:

- Read out fault memory in DME control unit
- Turn off ignition
- Remove **FAN COWL WITH ELECTRIC FAN**

NOTE: Top solenoid valve (4) controls the exhaust adjustment unit.

Bottom solenoid valve (2) controls the inlet adjustment unit.

Unlock plug connections of solenoid valves (2 and 4) and disconnect.

Installation:

Plug connections must snap audibly into place!

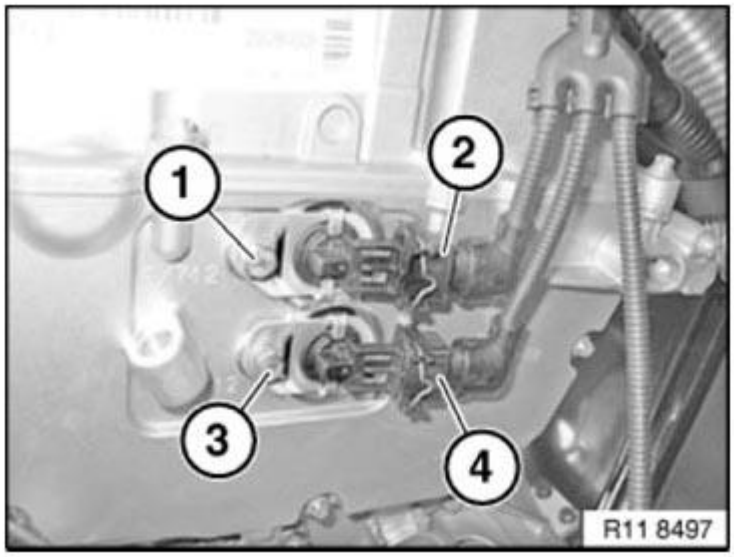


Fig. 368: Identifying Solenoid Valve With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque: see 3AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

Pull out solenoid valves.

Installation:

Replace O-rings (1 and 2) on solenoid valve .

Installation:

To install solenoid valves, coat both O-rings with engine oil.

If the solenoid valve is to be reused, the filter strainer (see arrow in illustration) must be cleaned.

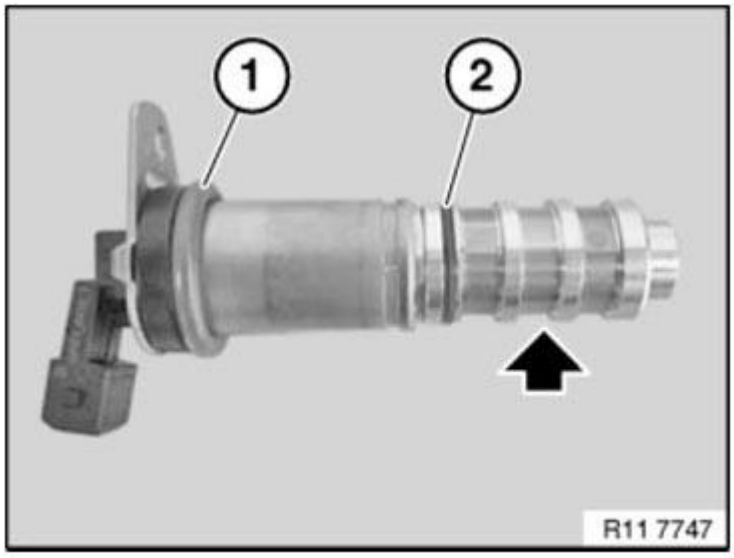


Fig. 369: Identifying Solenoid Valve O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If a filter element is clogged with dirt, the filter element (filter strainer) may be removed.

Release filter elements (1) at contact edges.

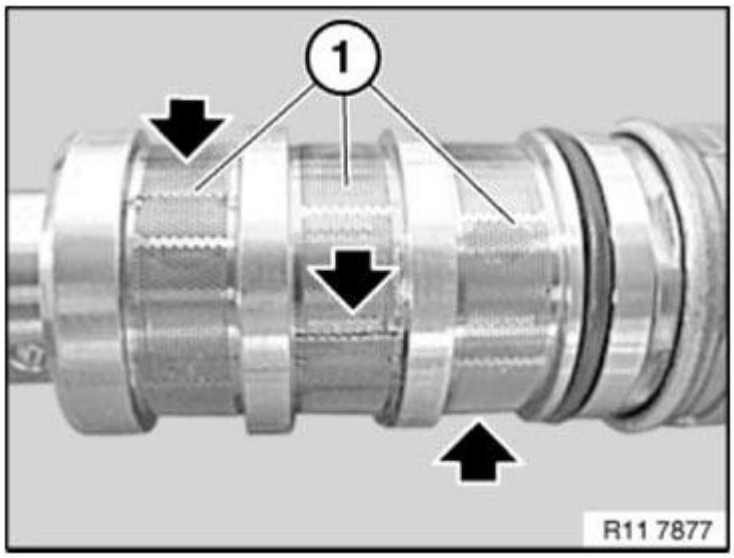


Fig. 370: Identifying Filter Elements
Courtesy of BMW OF NORTH AMERICA, INC.

Bend open welding spots on filter element (1) with a screwdriver (2) in direction of arrow until welding spots are opened.

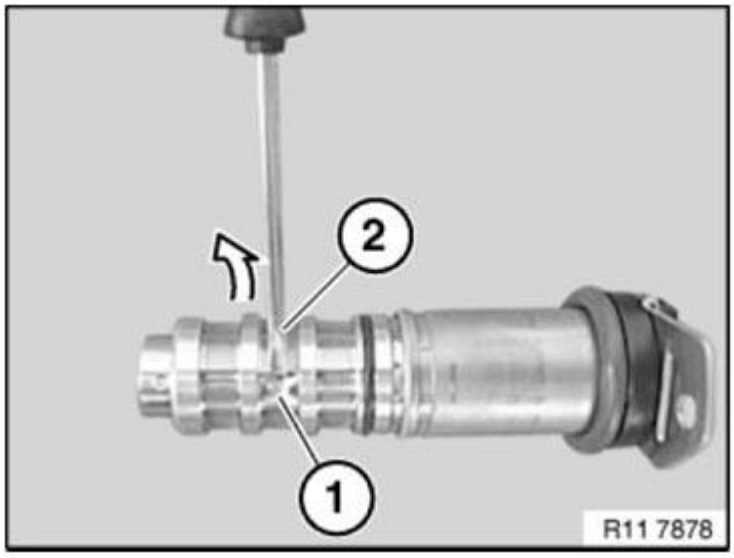


Fig. 371: Bending Open Welding Spots On Filter Element Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Avoid damaging, e.g. notches or scratches, the solenoid valve housing (see arrows in illustration).

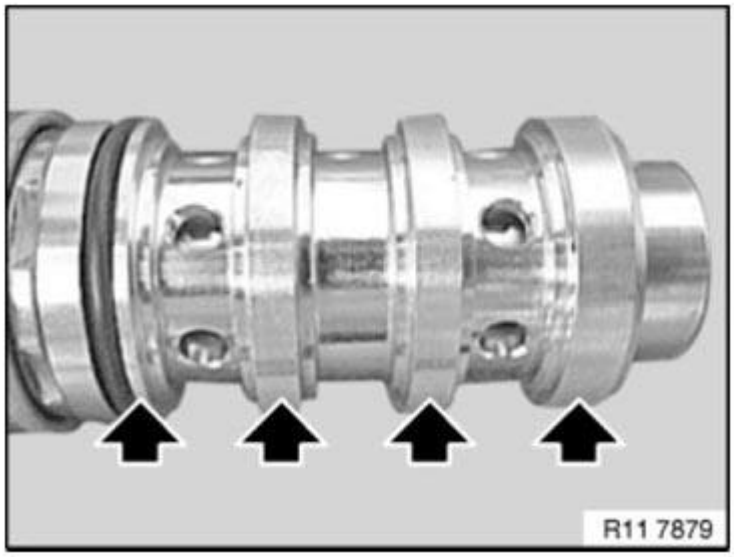


Fig. 372: Locating Solenoid Valve Housing Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Gently insert solenoid valves as far as stop.

Ensure correct installation position.

Insert screws (1 and 3) and tighten down.

Tightening torque: see 3AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

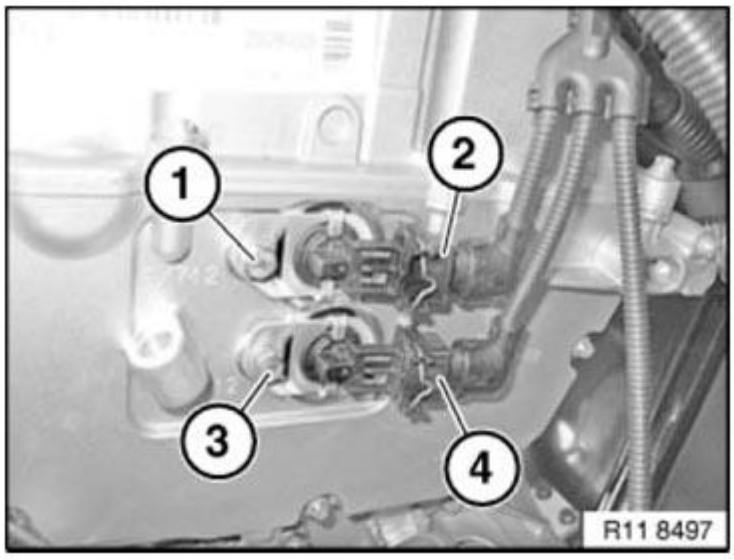


Fig. 373: Identifying Solenoid Valve With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Delete fault memory.

Check function of DME control unit.

11 36 048 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS ON RIGHT SIDE (N74)

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjuster is normally locked in its initial position.

The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjuster.

(cylinder bank 1 to 6)

Necessary preliminary tasks:

- **Read fault memory and make a documentary record**
- Remove **RIGHT CYLINDER HEAD COVER**
- Remove **RIGHT GEAR CASE COVER**
- Check **TIMING**.

To release central bolts, use special tool **11 9 890** or grip at hexagon head of camshaft.

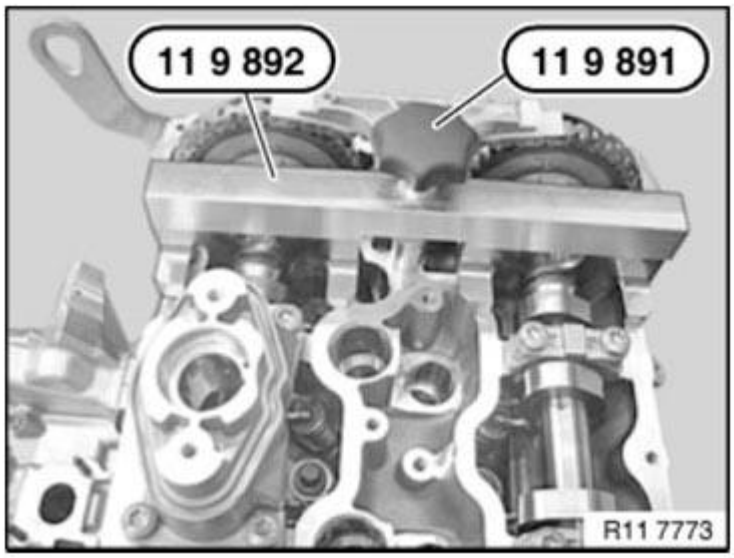


Fig. 374: Gripping Special Tools At Hexagon Head Of Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, counter-hold at hexagon of the relevant camshafts when releasing central bolts.

Release central bolts (1 and 2) of inlet and exhaust adjustment units.

Installation:

Replace central bolts after releasing.

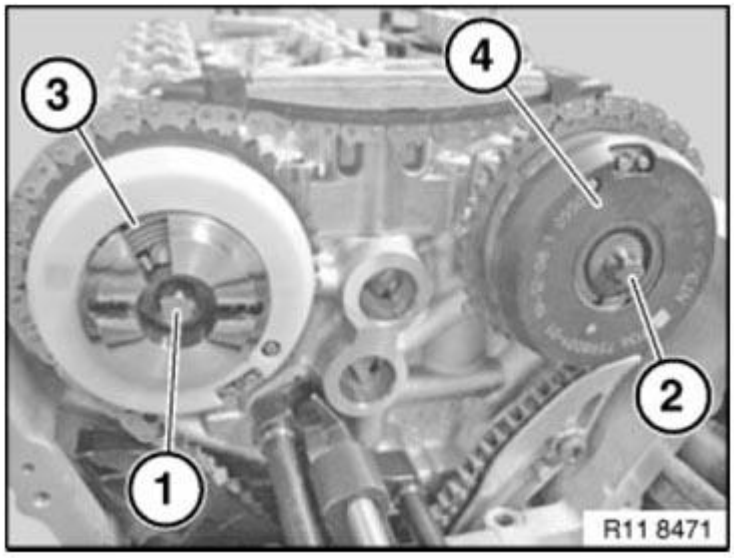


Fig. 375: Identifying Inlet And Exhaust Adjustment Units Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket screw.

Release special tool **11 9 900** at knurled screws and remove.

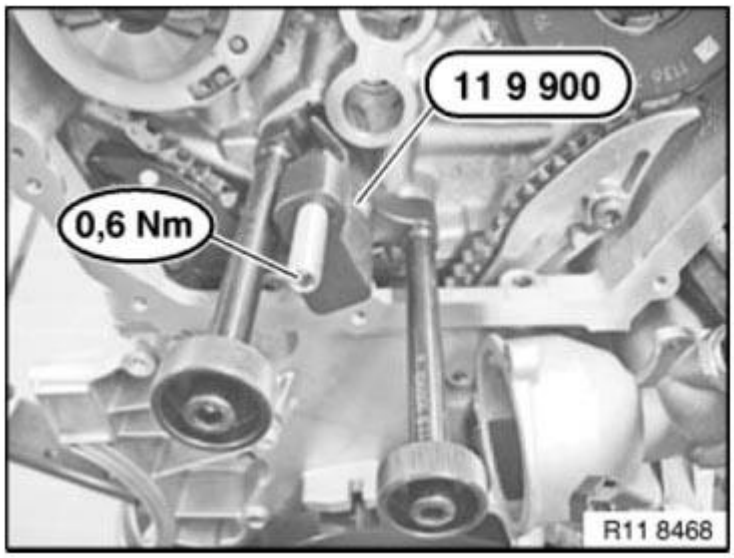


Fig. 376: Pretensioning Chain Using Special Tool 11 9 900
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove upper tensioning rail (2).

Remove adjustment units.

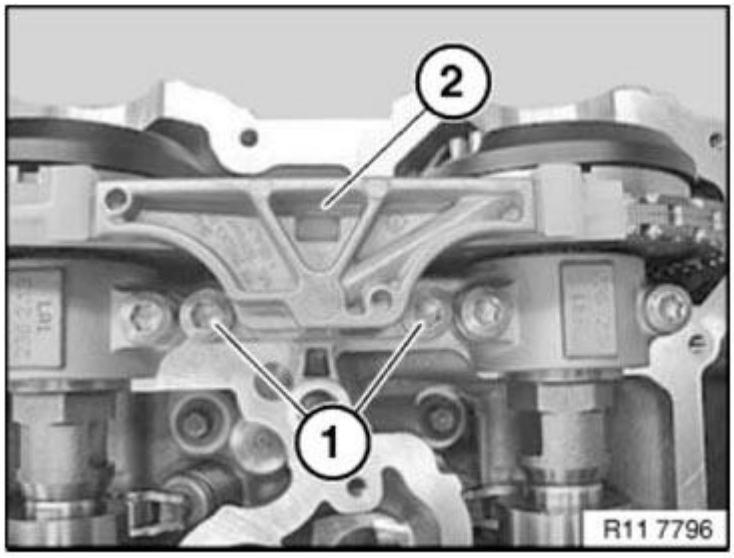


Fig. 377: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up:

Intake and exhaust adjustment units are different.

Mixing up the inlet and exhaust adjustment units will cause damage to the engine.

1. Intake adjuster (1) is marked with **ON** .
2. Exhaust camshaft adjuster (2) is marked with **OFF** .

The exhaust camshaft adjuster is equipped with the fixture for the vacuum pump on cylinder 1 to 6.

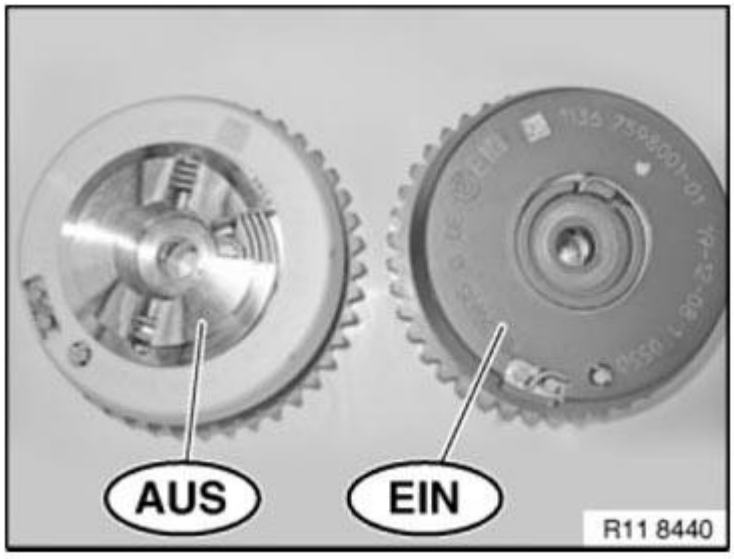


Fig. 378: Identifying Inlet And Exhaust Camshaft Adjusters Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Apply copper paste to the central bolt (1) only on the contact surface for the intake adjuster.

It is not permitted to grease the contact surface for the exhaust camshaft adjuster.

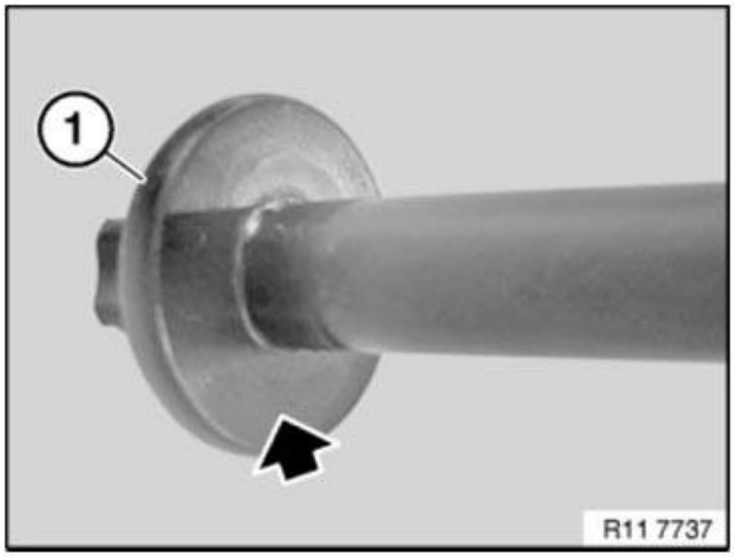


Fig. 379: Locating Central Bolt Coating Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of adjustment units in relation to timing chain can be freely selected.

Feed adjuster into timing chain and position on camshafts.

Insert central bolts (1 and 2) on adjustment units without gaps.

Release central bolts (1 and 2) by **90°** .

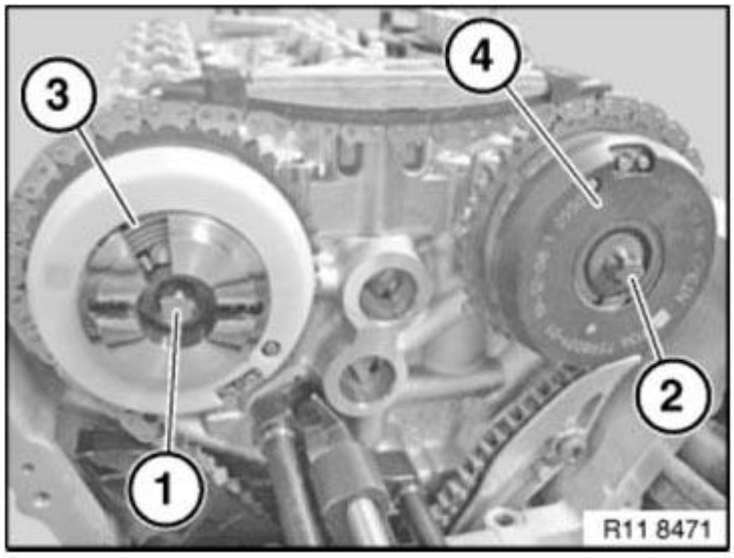


Fig. 380: Identifying Inlet And Exhaust Adjustment Units Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sliding rail (2) and secure with screws (1).

Tightening torque: see 4AZ in **11 31 CAMSHAFT**

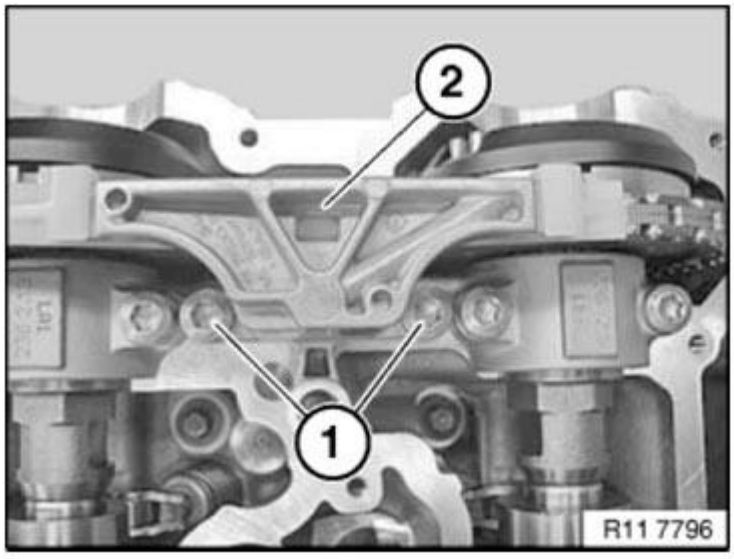


Fig. 381: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Get special tool **11 9 890** ready for securing camshafts.

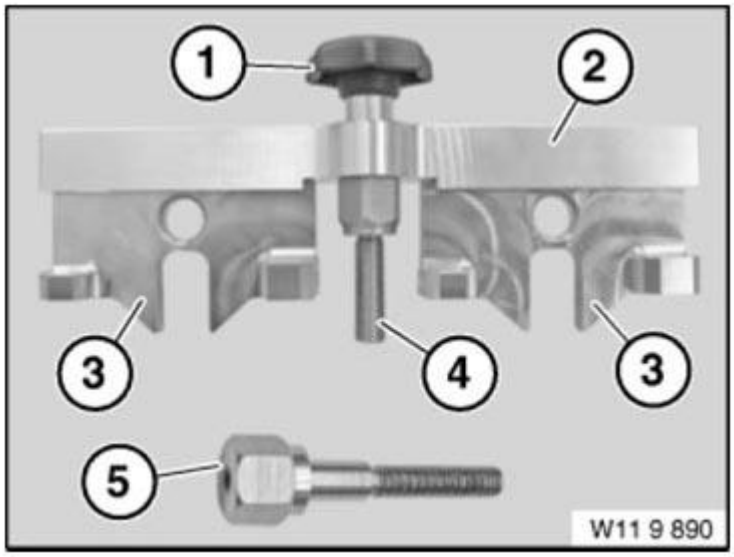


Fig. 382: Identifying Special Tools (11 9 890, 11 9 891, 11 9 892, 11 9 893, 11 9 895)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft.

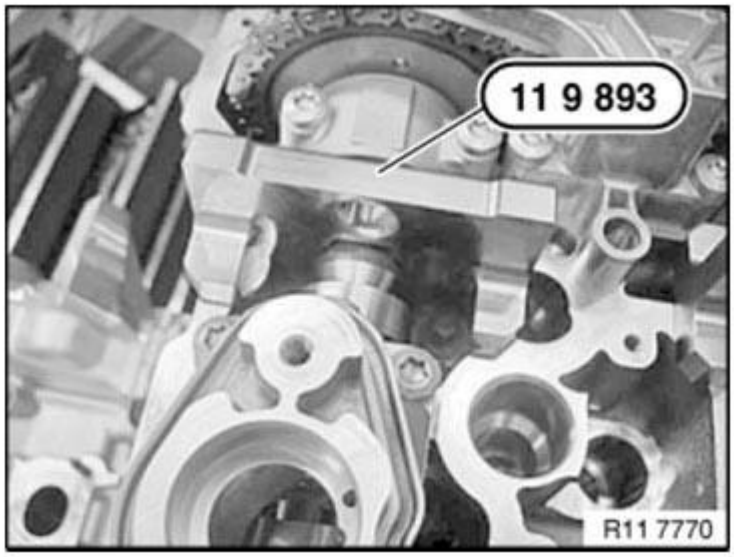


Fig. 383: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on exhaust camshaft.

Installation:

Align exhaust and intake camshafts in such a way that special tools 11 9 893 rest without a gap on the cylinder head.

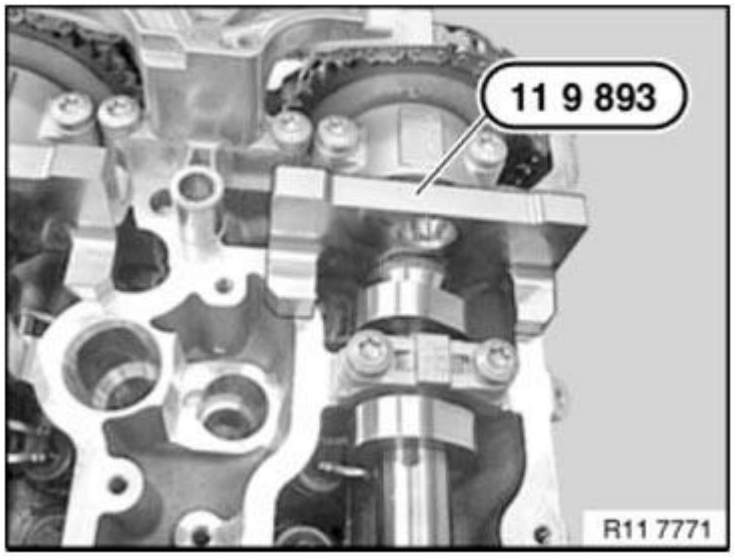


Fig. 384: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool **11 9 894** into cylinder head.

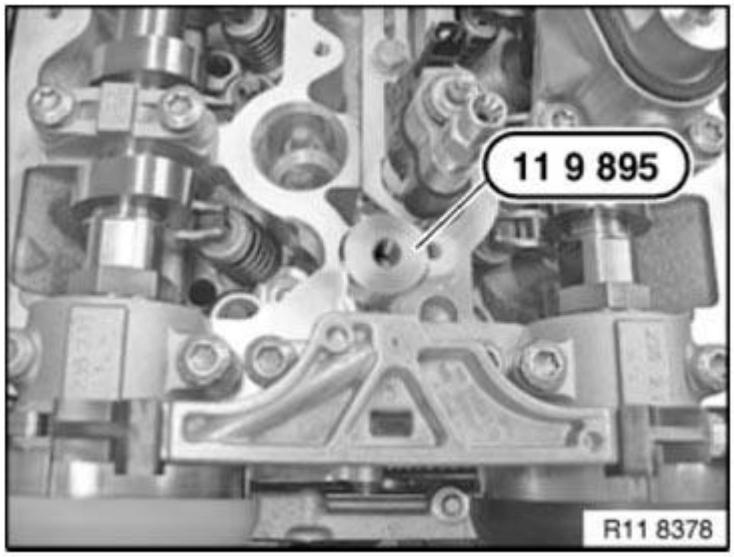


Fig. 385: Screwing Special Tool 11 9 895 Into Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool **11 9 892** down with special tool **11 9 89** 1.

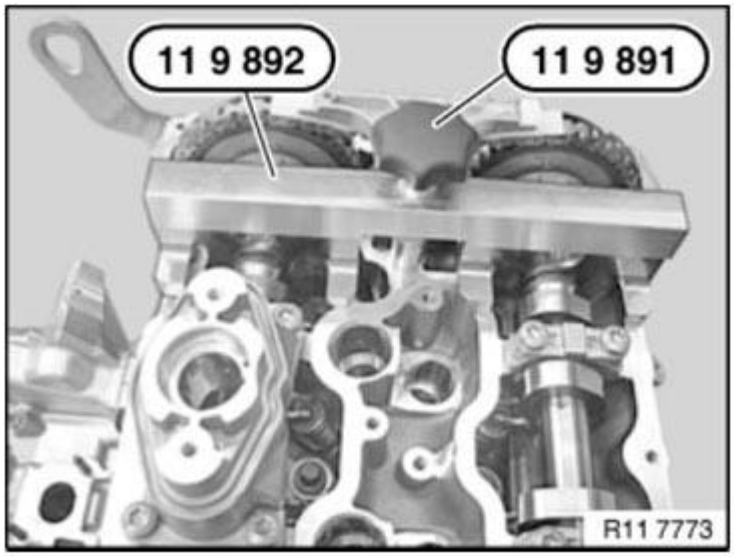


Fig. 386: Releasing Central Bolts Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 9 900** .

Pretension timing chain with special tool **11 9 900** .

Preload hexagon socket screw with special tool **00 9 250** to **0.6 Nm** .

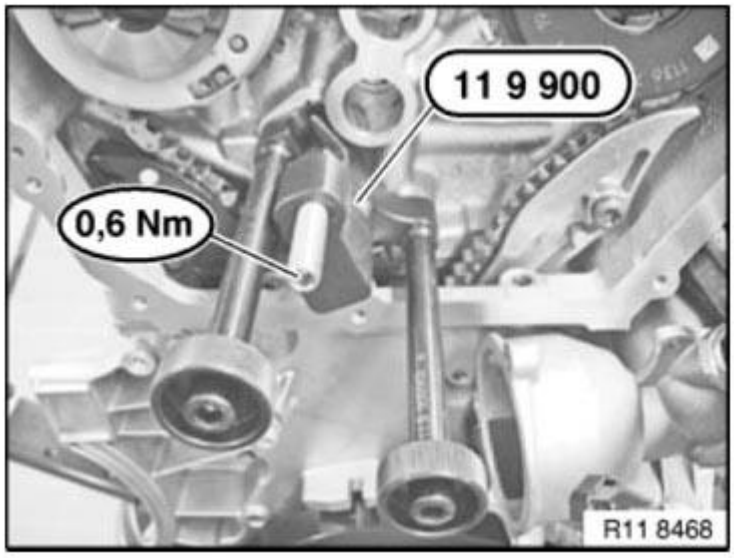


Fig. 387: Pretensioning Chain Using Special Tool 11 9 900
Courtesy of BMW OF NORTH AMERICA, INC.

Check special tools **11 9 190** for correct seating.

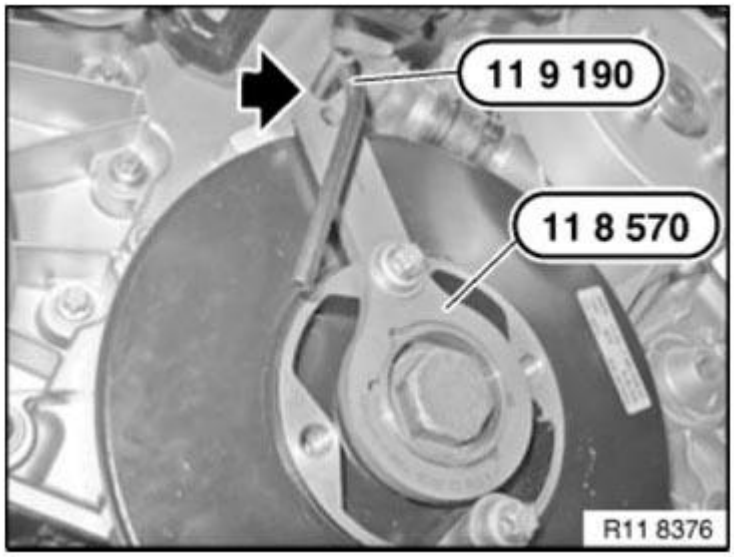


Fig. 388: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Join central bolt (1) of adjuster (2).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

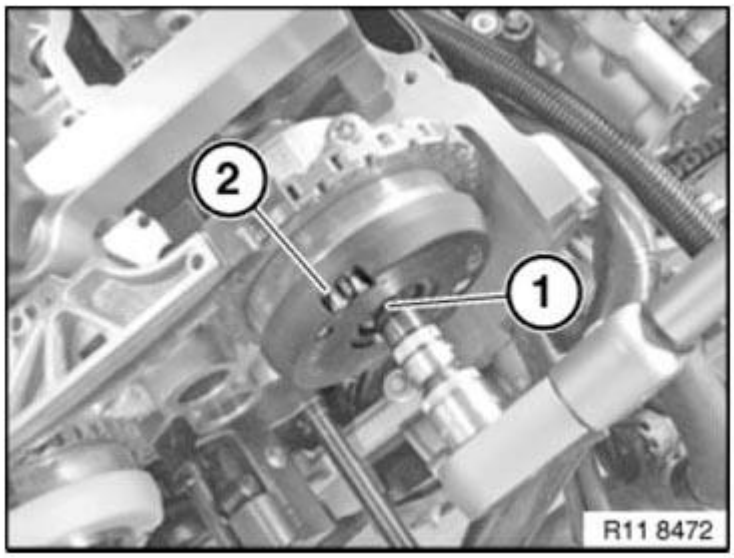


Fig. 389: Tightening Inlet Camshaft Adjuster Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Join central bolt (1) of adjuster (2).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

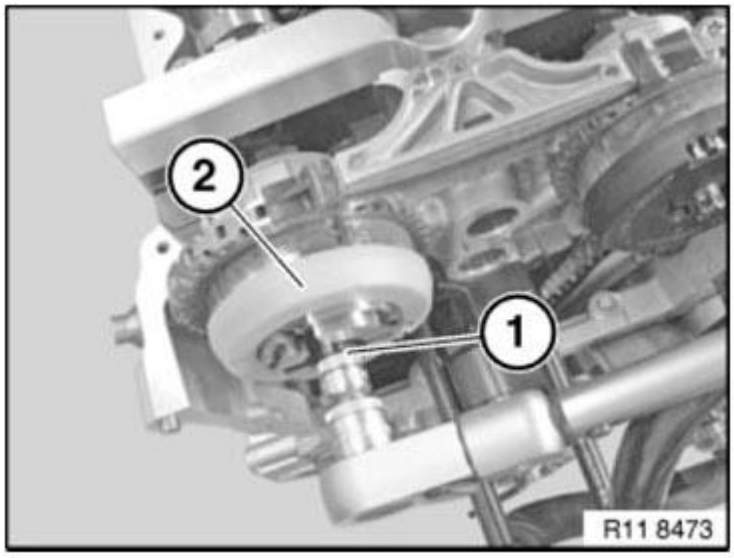


Fig. 390: Tightening Camshaft Adjuster Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of adjuster (2) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

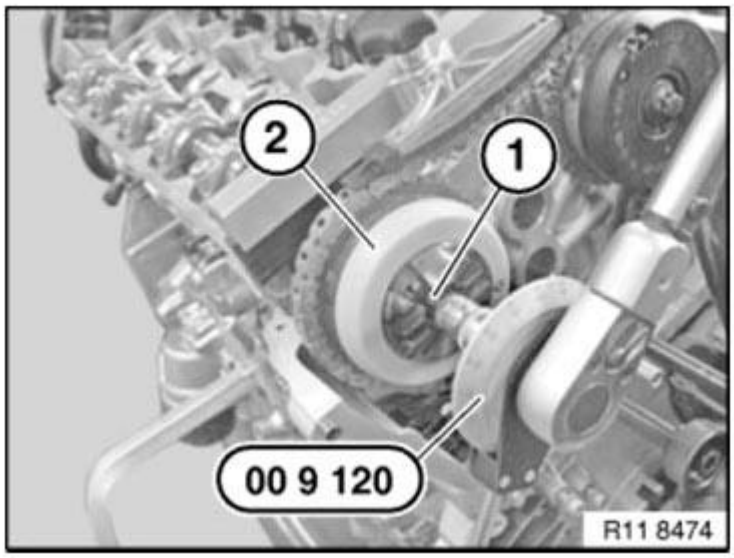


Fig. 391: Tightening Exhaust Camshaft Adjuster Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of adjuster with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

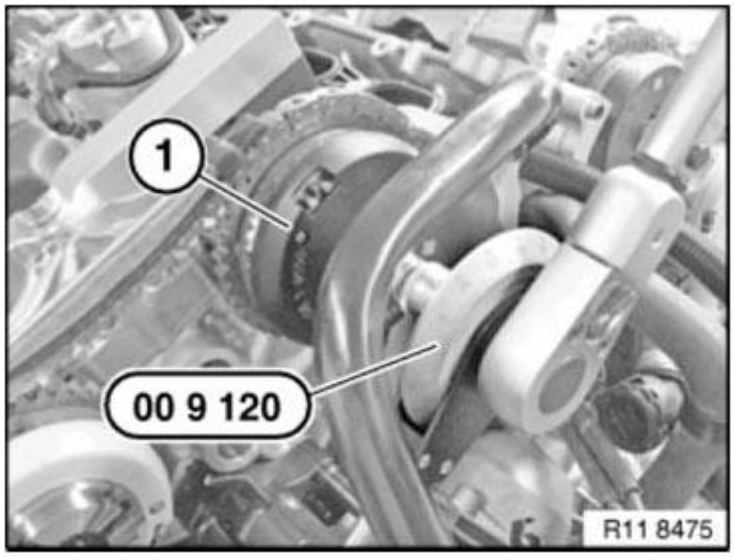


Fig. 392: Securing Central Bolt Of Inlet Camshaft Adjuster With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools **11 9 190** and **11 8 570** .

Crank engine at central bolt two times in direction of rotation.

Mount special tool **11 8 570** on vibration damper with a bolt.

Secure special tool **11 9 190** .

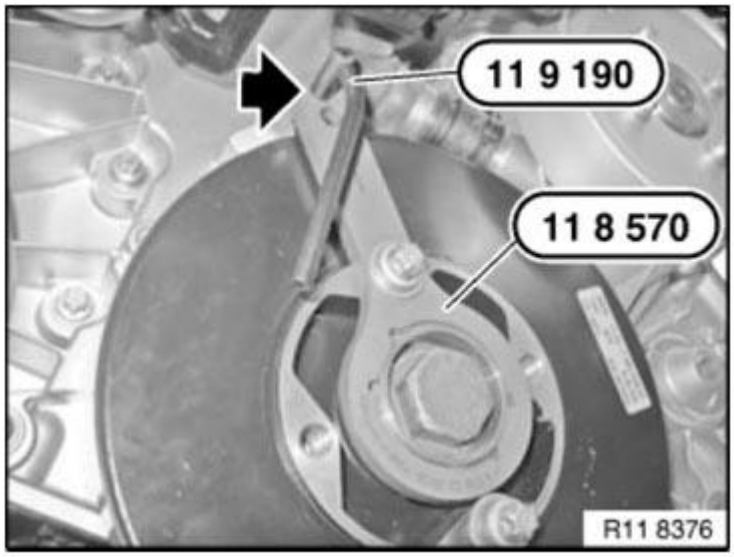


Fig. 393: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Check **TIMING** again.

Remove all special tools.

OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE (N74)

WARNING: Risk of scalding!

NOTE: Engine oil escapes on removal of the oil drain plug.

Keep a suitable collecting vessel on hand!

Necessary preliminary tasks:

- Remove service flap

Loosen oil filter oil drain plug (1).

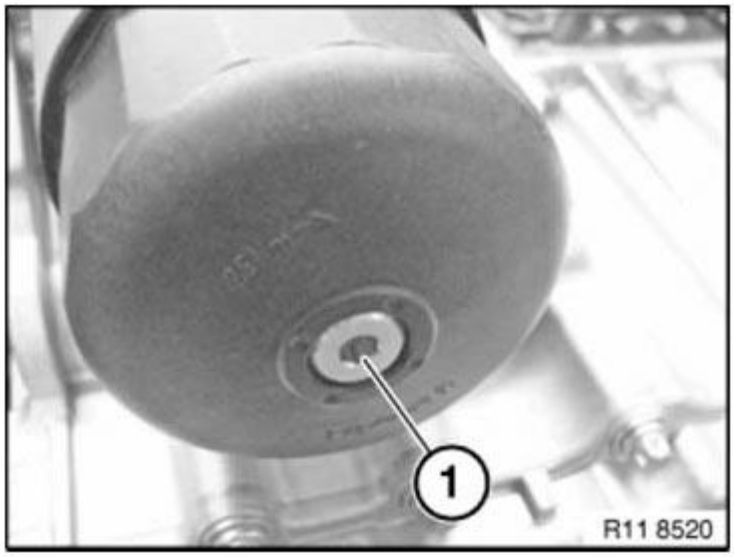


Fig. 394: Identifying Oil Filter Oil Drain Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Check O-ring (1) on special tool **11 7 430** .

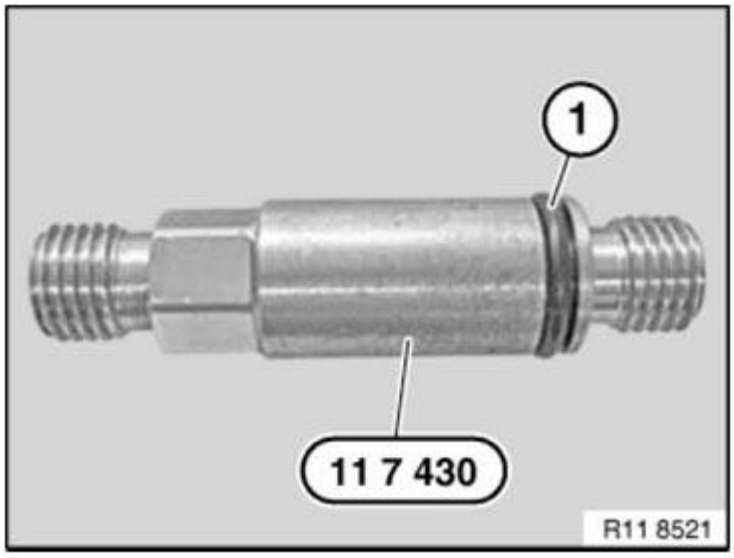


Fig. 395: Identifying O-Ring On Special Tool 11 7 430
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool **11 7 430** into oil filter housing.

Tightening torque: **10 Nm**

Screw special tool 13 5 000pressure gauge together with special tool **11 7 430** .

NOMINAL VALUE .

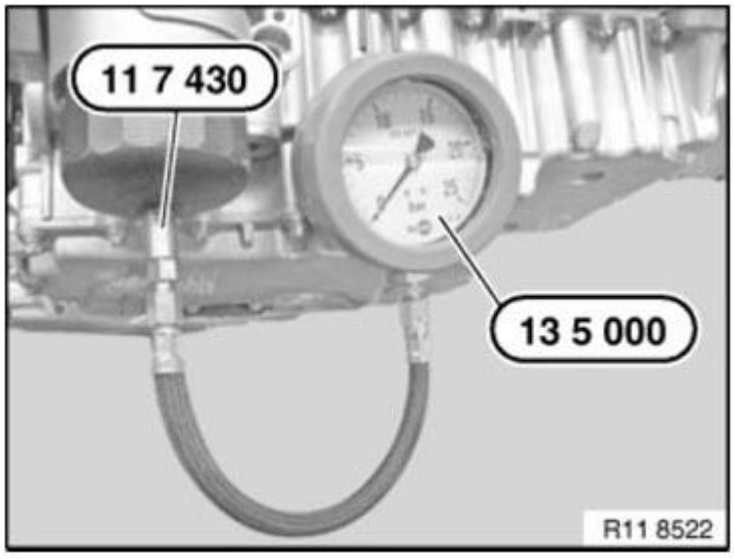


Fig. 396: Checking Engine Oil Pressure Using Pressure Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Engine oil level check by means of diagnosis system (see **SERVICE - ENGINE OIL**).

Assemble engine.

OIL PUMP WITH FILTER AND DRIVE

11 41 000 REMOVING AND INSTALLING/REPLACING OIL PUMP (N74)

IMPORTANT: All the adjustment operations on the chain drive must be observed.

A timing chain which is tensioned too tautly can cause noises in the chain drive.

A timing chain that is too slack can cause the timing chain to jump.

Risk of damage in oil pump drive.

Necessary preliminary tasks:

- **DRAIN ENGINE OIL**.
- **REMOVE UPPER OIL SUMP SECTION**.

Unscrew nuts (2).

Tightening torque: see 1AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

Remove intake pipe (1).

Installation note:

Replace O-ring.

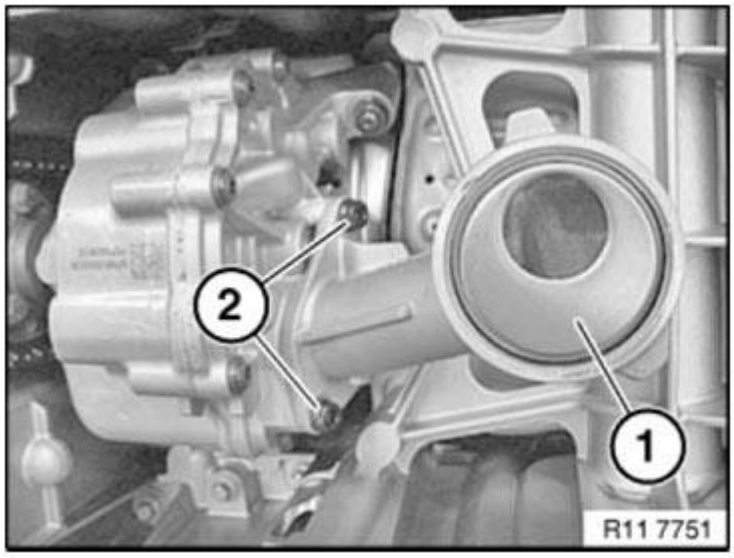


Fig. 397: Identifying Intake Pipe And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release all nuts (1) using special tool 11 7 201.

Tightening torque: see 7AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

Remove oil pump drive gear.

NOTE: Picture shows engine removed.

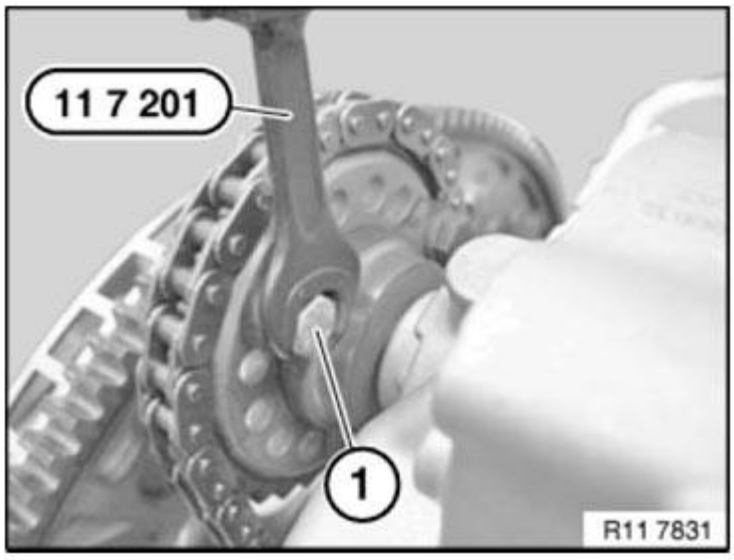


Fig. 398: Releasing All Nuts Using Special Tool 11 7 201
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque: see 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

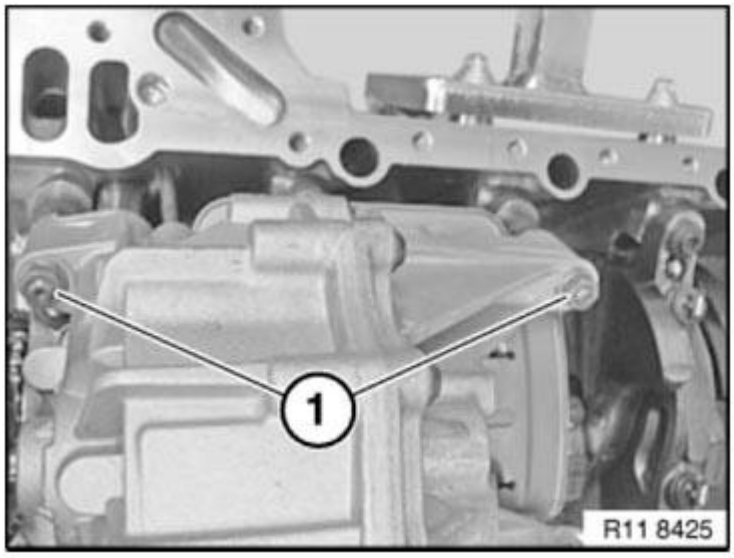


Fig. 399: Identifying Oil Pump Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: see 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

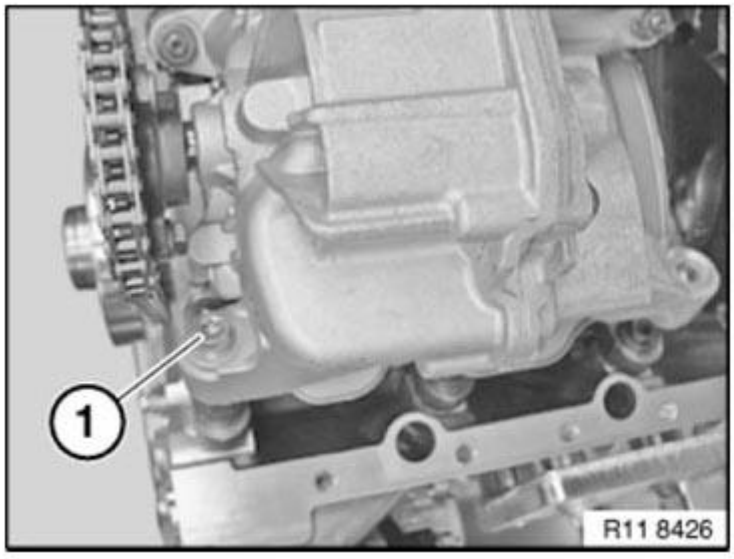


Fig. 400: Identifying Oil Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Detach oil lines (1) upwards in direction of arrow.

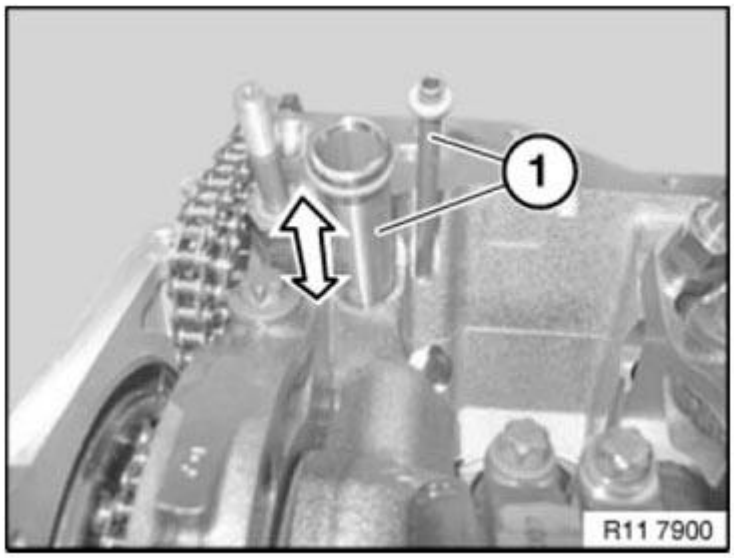


Fig. 401: Detaching Oil Lines In Upwards Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing rings (1).

Apply light coat of oil to sealing ring (1).

Coat sealing ring (2) with suitable lubricant.

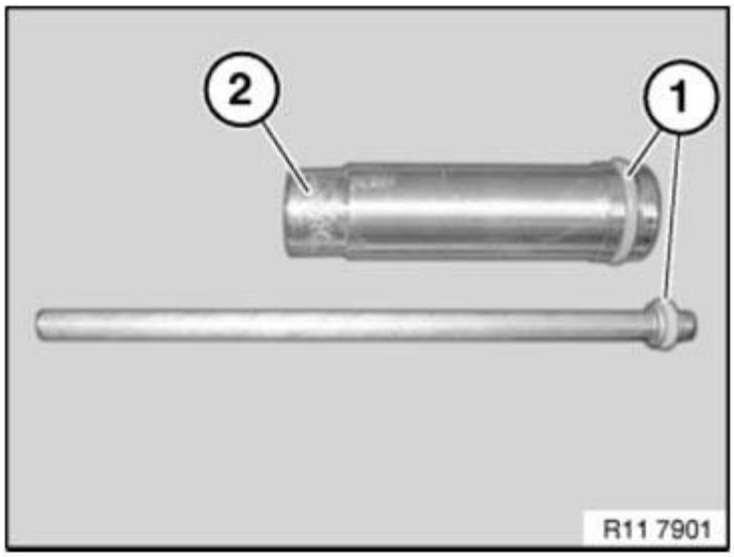


Fig. 402: Identifying Coating Applying Area On Sealing Rings

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace O-ring (1) for oil feed line.

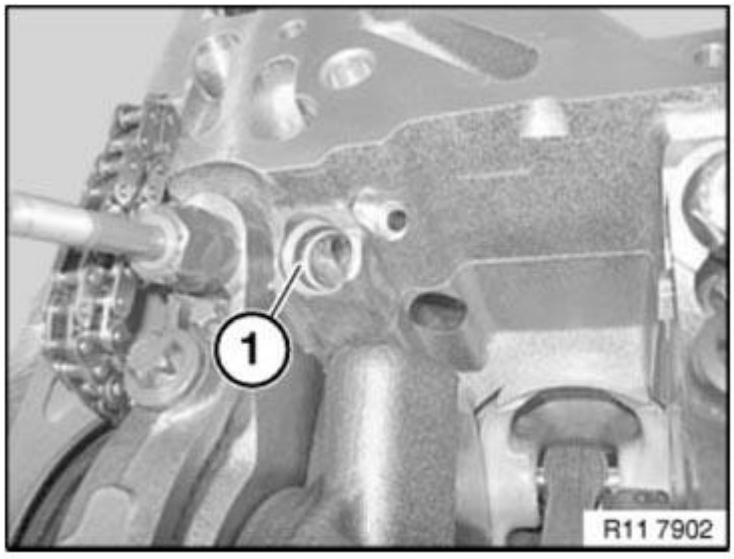


Fig. 403: Identifying Oil Feed Line O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Fit oil lines (1) in direction of arrow.

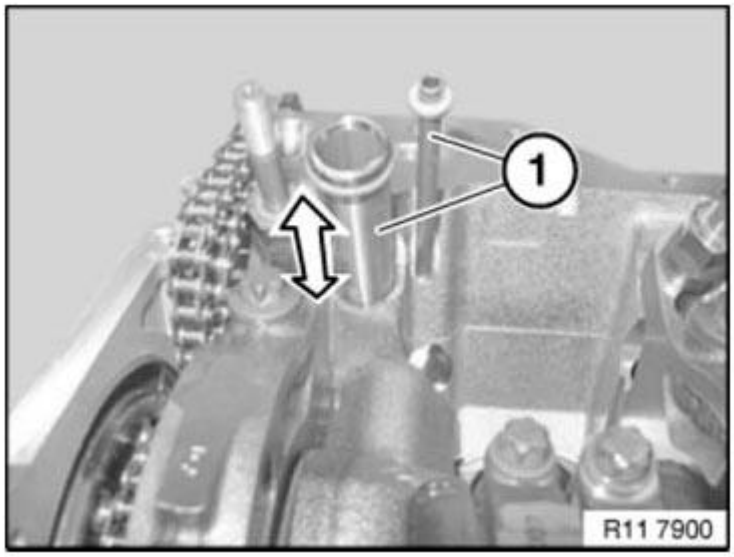


Fig. 404: Fitting Oil Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If the oil pump is replaced, it will be necessary to modify the oil deflector.

Release screws (1).

Tightening torque: see 2AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

Modify oil deflector (2).

NOTE: Graphic shows N63.

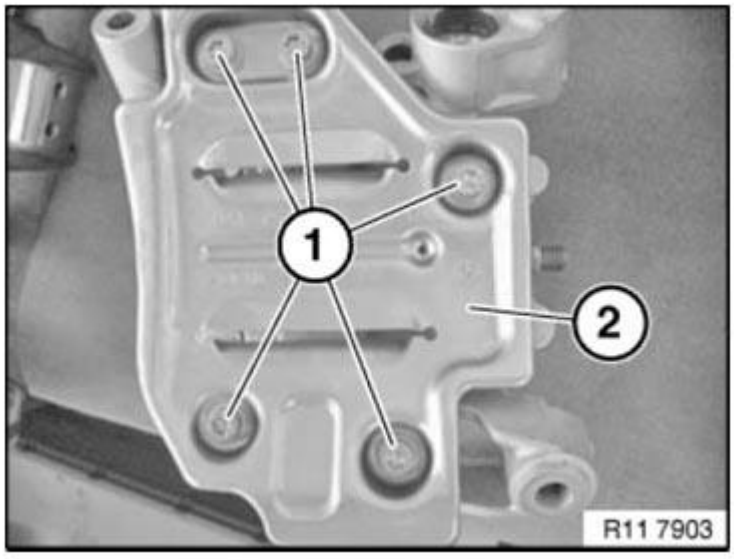


Fig. 405: Identifying Oil Deflector And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **11 8 920** on special tool **11 9 280** .

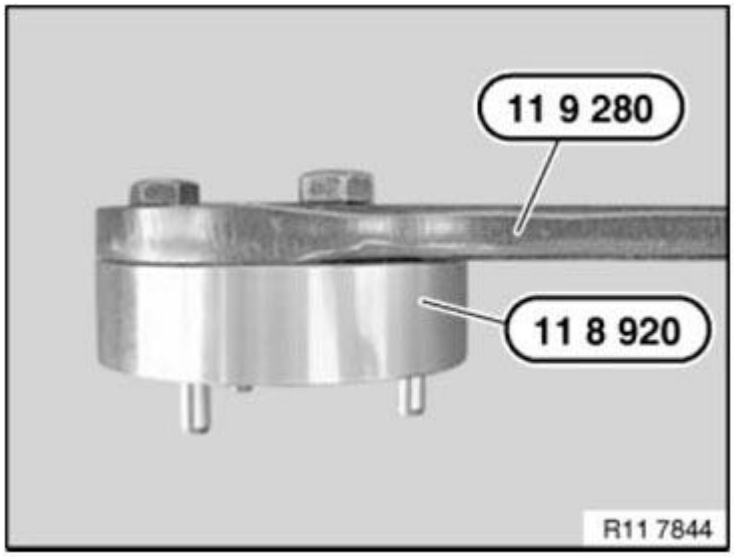


Fig. 406: Fitting Special Tool 11 8 920 On Special Tool 11 9 280
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Left-hand thread on oil pump screw connection.

Do not grip oil pump drive with a pair of pliers **risk of damage** .

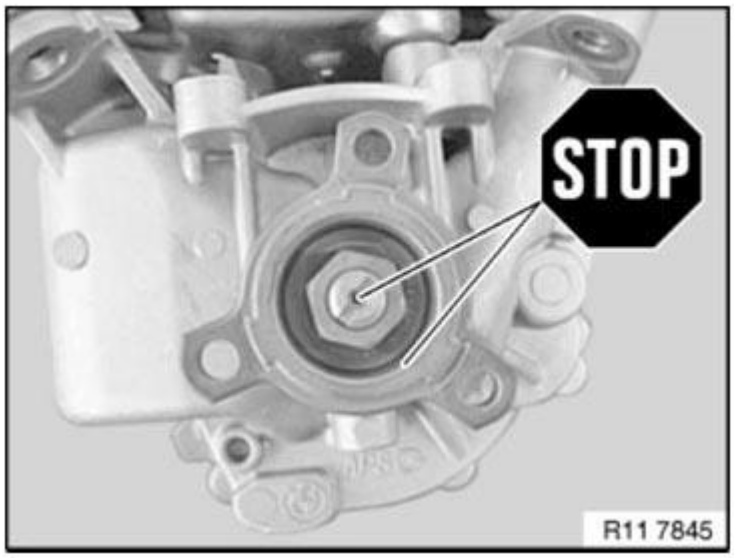


Fig. 407: Identifying Oil Pump Screw Connection Stopping Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Nut (1) has left-hand thread.

Position special tool **11 8 920** on sprocket.

Slacken nut (1).

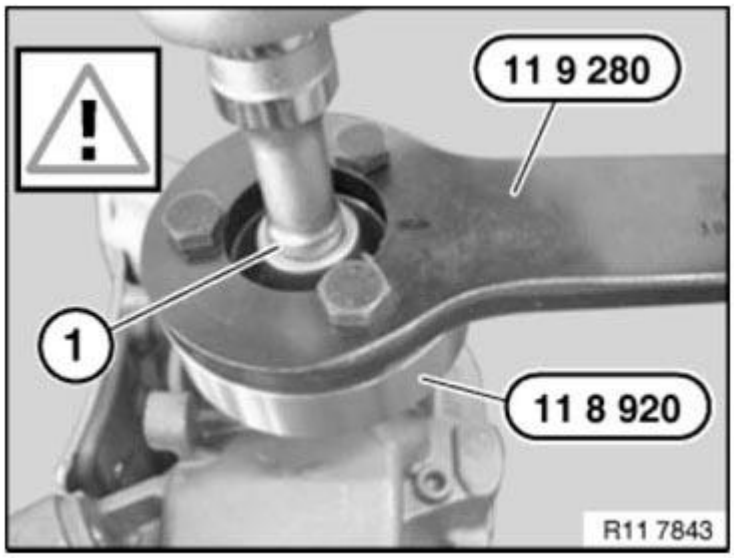


Fig. 408: Positioning Special Tool 11 8 920 On Sprocket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check mounting flats on pump shaft (1) for damage.

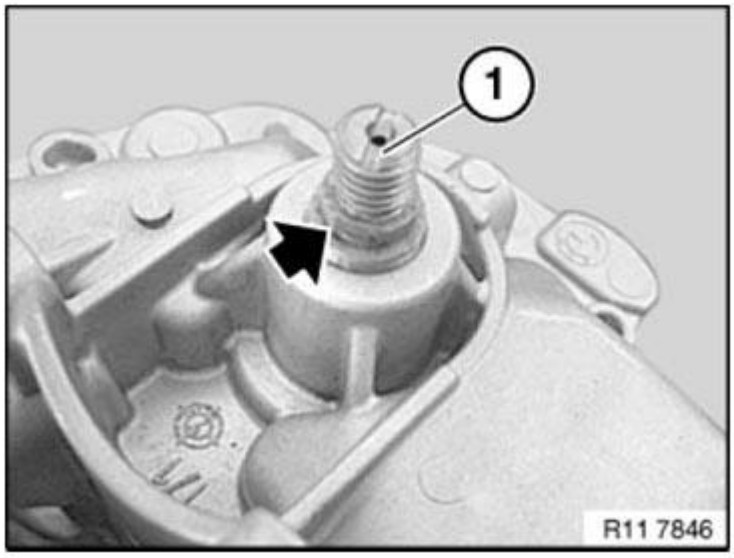


Fig. 409: Locating Mounting Flats On Pump Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Nut (1) has left-hand thread.

Grip pump with assistance of a second person.

Secure nut (1) with special tool **00 9 120** .

Tightening torque: see 6AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

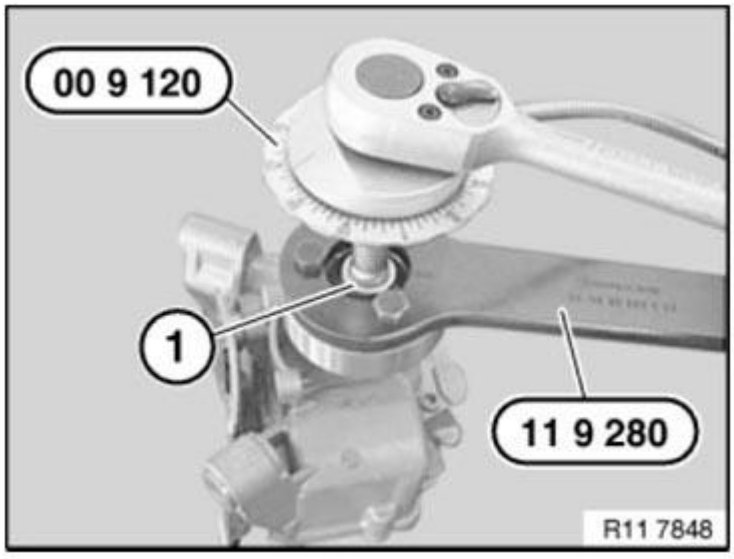


Fig. 410: Securing Nut Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Join and secure nuts (1).

Tightening torque: see 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

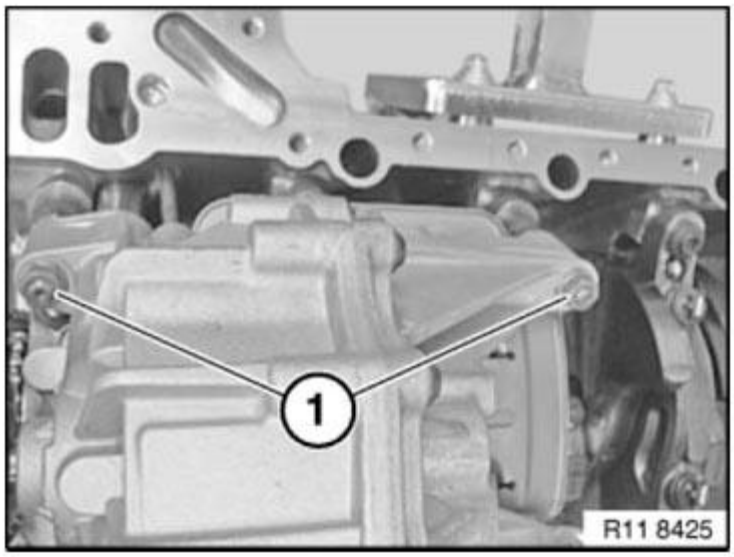


Fig. 411: Identifying Oil Pump Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Install oil pump drive gear.

Secure all nuts (1) with special tool 11 7 201.

Tightening torque: see 7AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

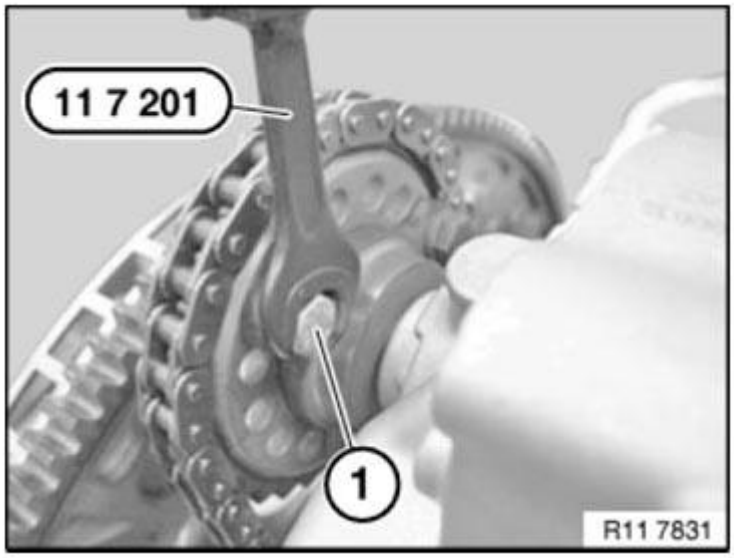


Fig. 412: Securing All Nuts Using Special Tool 11 7 201
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust oil pump timing chain .

Pretension oil pump adjusting sleeve (1) with a hexagon socket wrench.

Adjustment value 9 mm ±2 .

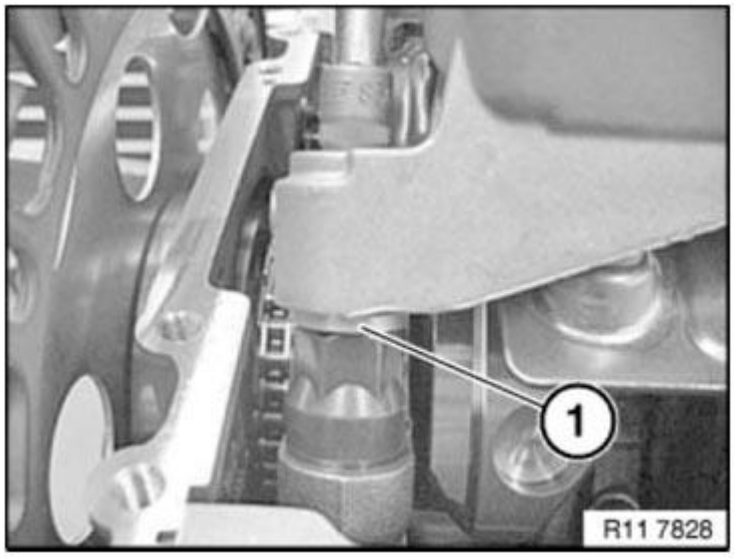


Fig. 413: Identifying Oil Pump Adjusting Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure on removed engine:

Upper oil sump has been removed .

Minimally preload timing chain (1) with special tool **51 0 342** .

Read off measured value A on special tool **51 0 342** and note down.

IMPORTANT: Do not use force to preload timing chain (1).

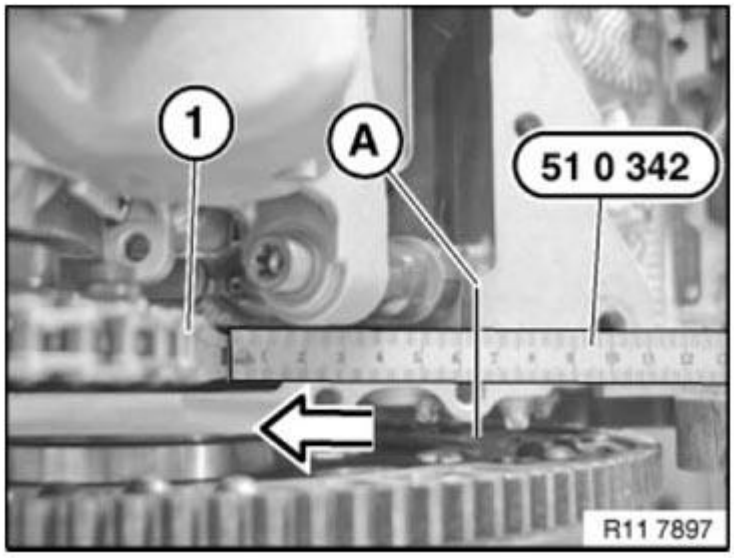


Fig. 414: Checking Measured Value A On Special Tool 51 0 342

Courtesy of BMW OF NORTH AMERICA, INC.

Using a screwdriver (1), preload timing chain to minimal extent in direction of arrow.

Read off measured value B on special tool **51 0 342** and note down.

IMPORTANT: Do not use force preload timing chain.

Measured value **A** minus measured value **B** results in the adjustment value.

Adjustment value **9 mm ±2** .

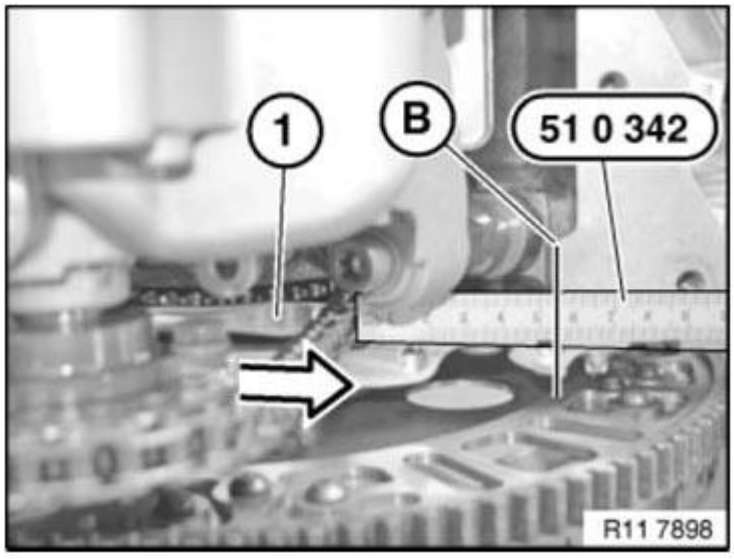


Fig. 415: Measuring Timing Chain Preloading Using Special Tool 51 0 342 (Preloading Using Screwdriver)
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure on installed engine

Upper oil sump has been installed .

Position drag pointer (1) of special tool **2 213 485** on oil pump chain.

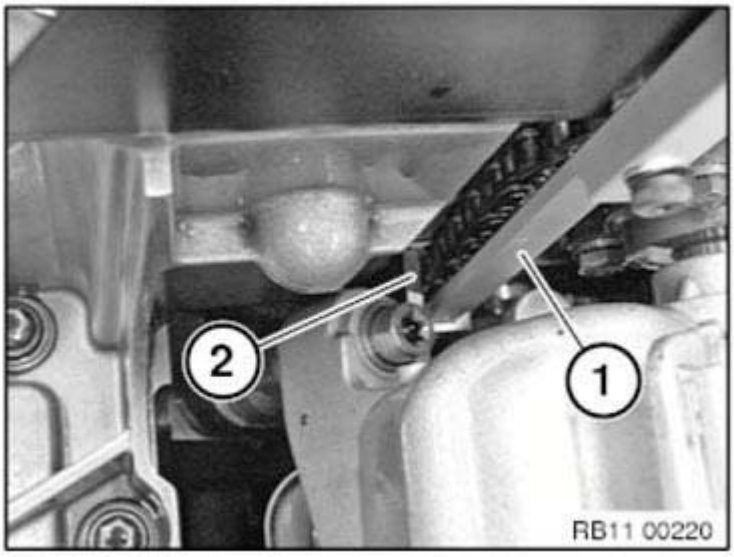


Fig. 416: Positioning Drag Pointer Of Special Tool 2 213 485 On Oil Pump Chain
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Attachment point (1) N63/S63.

Attachment point (2) N74.

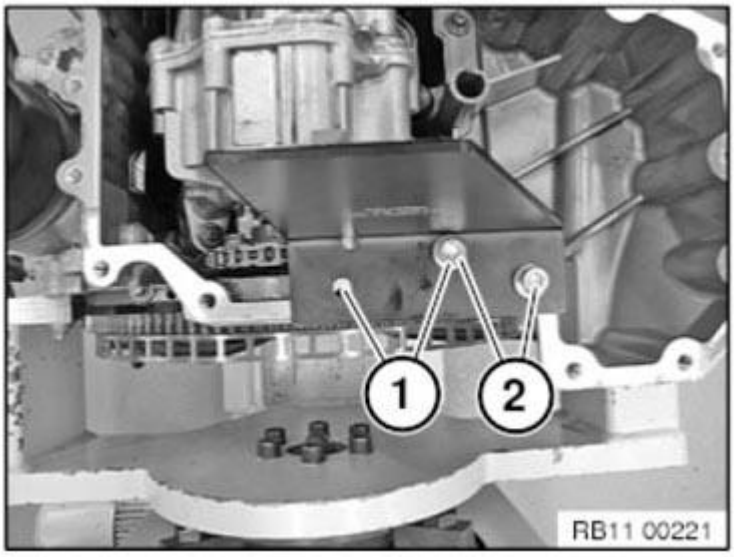


Fig. 417: Identifying Oil Pump Attachment Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not use force preload timing chain.

Push drag pointer (1) to the left and right until value has been determined.

Adjustment value **9 mm ±2** .

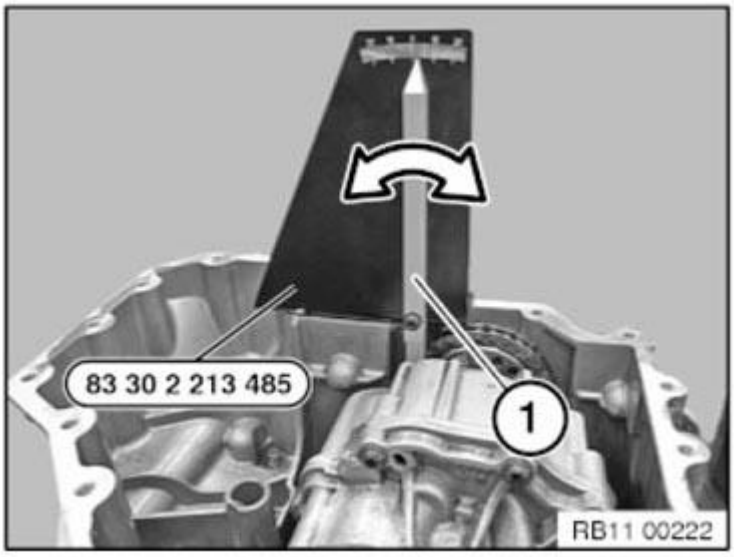


Fig. 418: Determining Timing Chain Preloading Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust oil pump timing chain .

Pretension oil pump adjusting sleeve (1) with a hexagon socket wrench.

Adjustment value **9 mm ±2** .

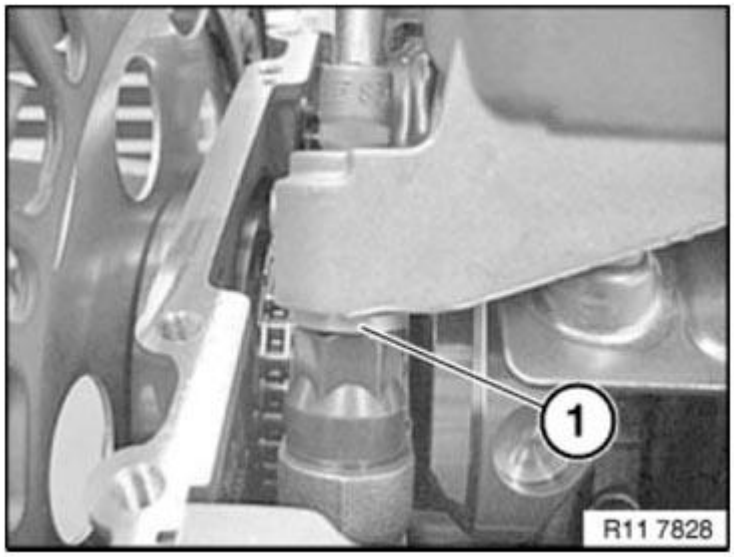


Fig. 419: Identifying Oil Pump Adjusting Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

Join and secure screw (2).

Tightening torque: see 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

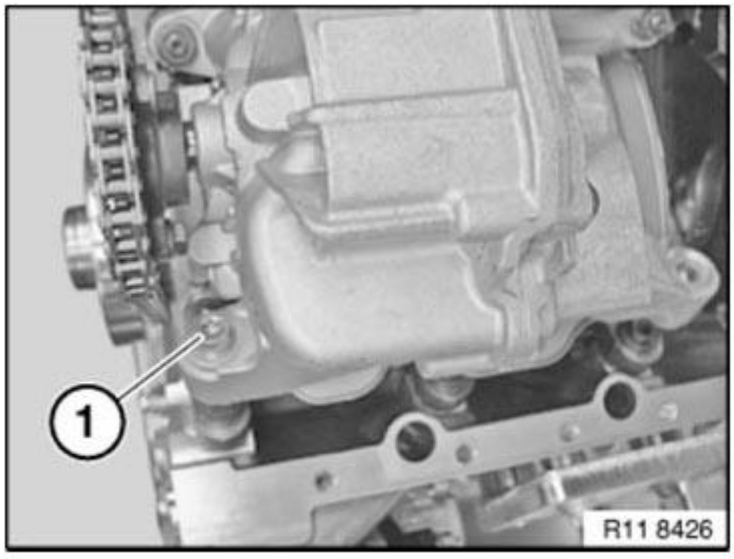


Fig. 420: Identifying Oil Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/RENEWING COOLANT PUMP (N74)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Risk of damage!

Coolant emerges when the coolant hoses are detached from the coolant thermostat and coolant pump.

Cover surrounding components and plug connections with suitable apparatus

Recycling:

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste disposal regulations.

Installation note:

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

Necessary preliminary tasks:

- Drain **COOLANT**
- Remove **FAN COWL** with electric fan.
- Remove alternator **DRIVE BELT**
- Remove **COOLANT THERMOSTAT**.

Remove plug connections (2 and 3).

Installation note:

Plug connections (2 and 3) must snap audibly into place!

Unlock snap fastener on coolant hose (1).

Detach all coolant hoses and lay to one side.

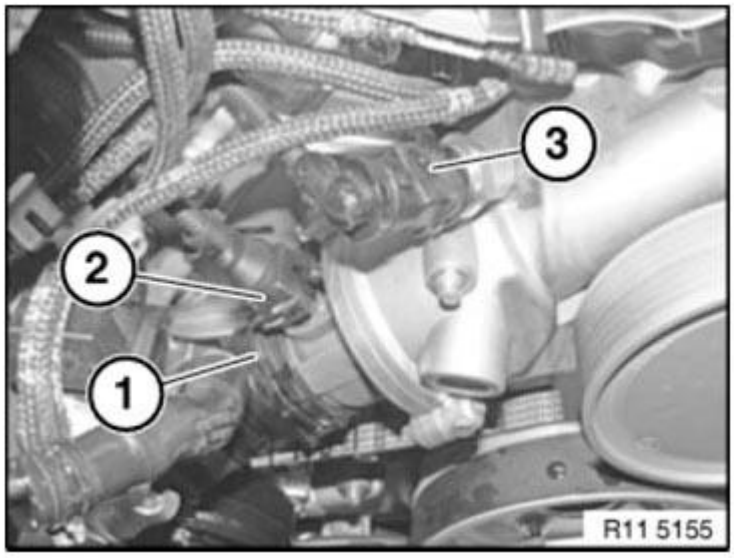


Fig. 421: Identifying Coolant Hose And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: see 2AZ in **11 51 COOLANT PUMP**

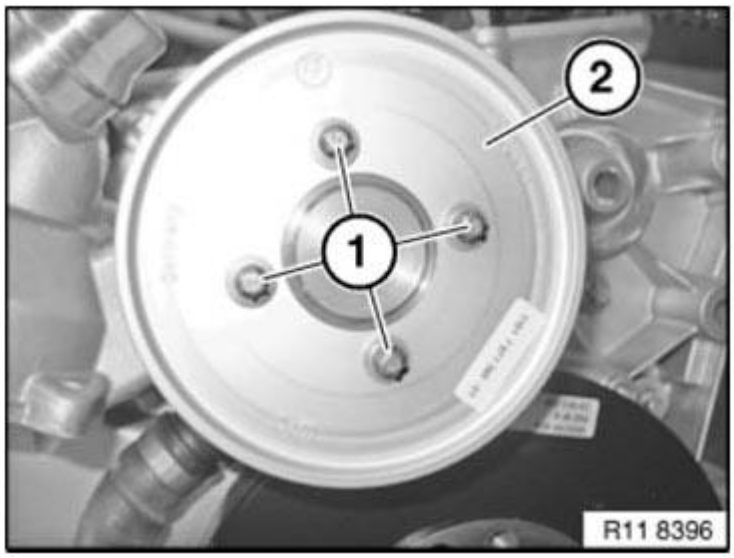


Fig. 422: Identifying Coolant Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **VIBRATION ABSORBER** (1).

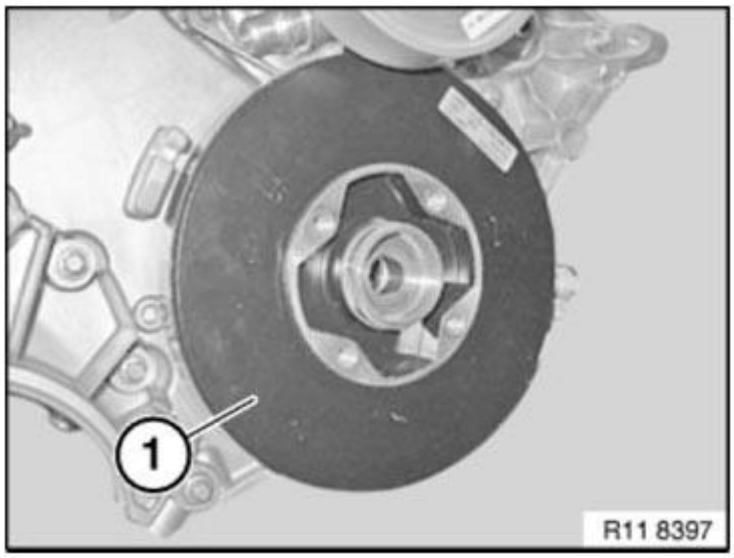


Fig. 423: Identifying Vibration Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque: see 1AZ in **11 51 COOLANT PUMP**

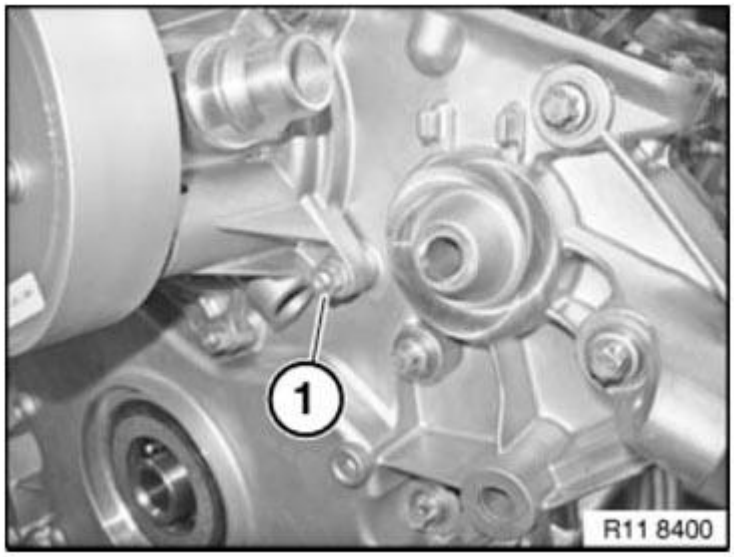


Fig. 424: Identifying Coolant Pump Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Slacken nut (2).

Tightening torque: see 1AZ in **11 51 COOLANT PUMP**

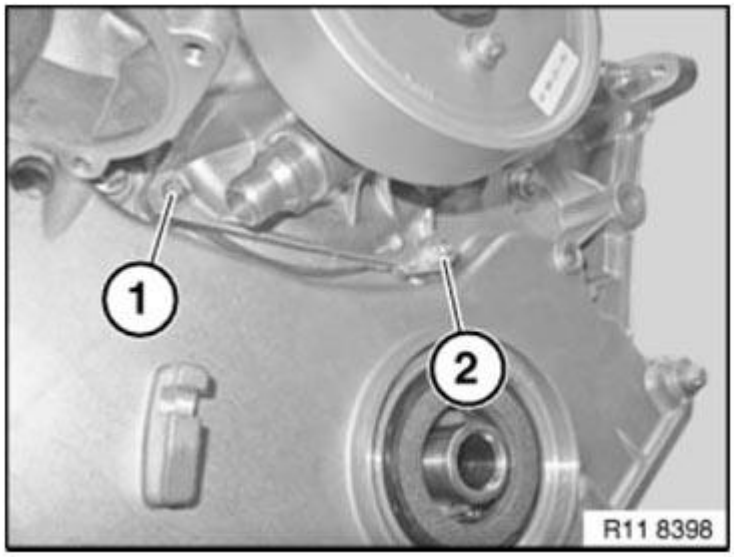


Fig. 425: Identifying Coolant Pump Slacken Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Slacken nut (2).

Tightening torque: see 1AZ in **11 51 COOLANT PUMP**

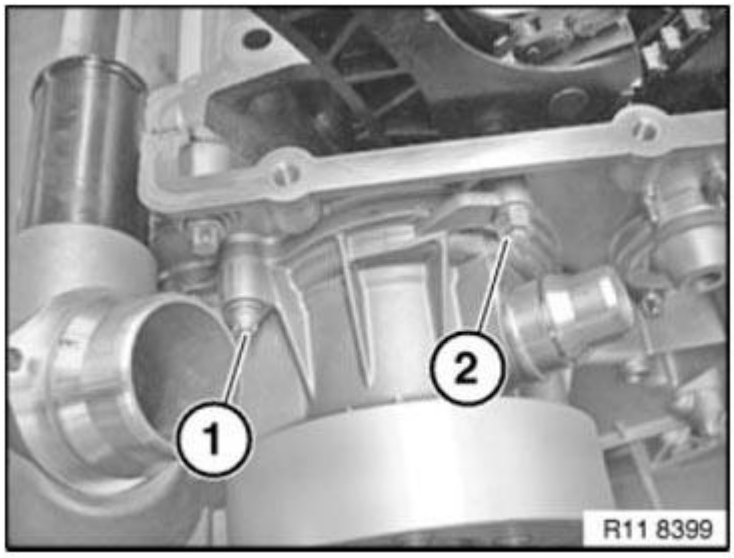


Fig. 426: Identifying Coolant Pump Slacken Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace gasket (1).

Replace coolant pipe (2).

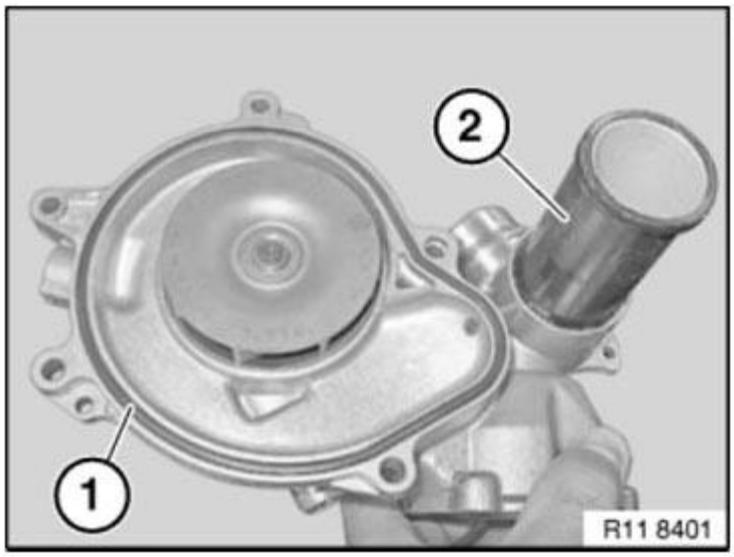


Fig. 427: Identifying Coolant Pipe And Gasket

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

BLEEDING INSTRUCTIONS must be observed **without fail** .

THERMOSTAT AND CONNECTIONS

11 53 090 REMOVING AND INSTALLING/REPLACING AUXILIARY WATER PUMP FOR EXHAUST TURBOCHARGER (N74)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Recycling:

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Remove **FAN COWL** .
- Remove **STIFFENING PLATE**
- Drain **COOLANT** .

Unfasten snap fastener (1), pull off coolant hose (2) and lay to one side

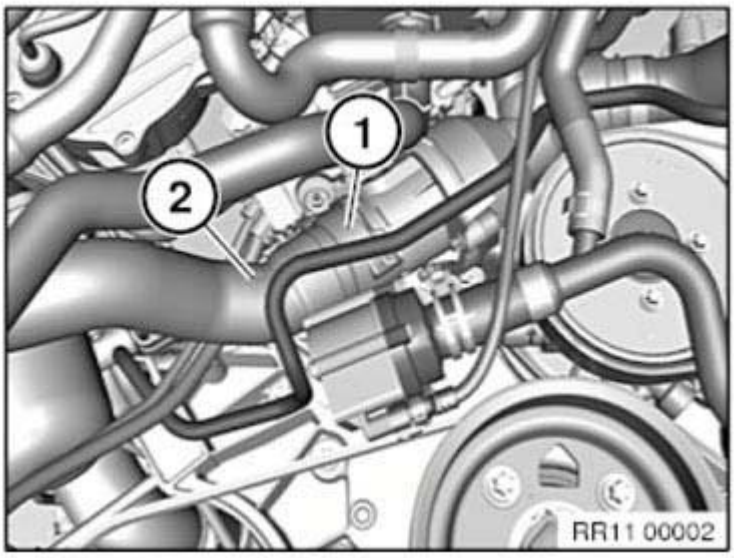


Fig. 428: Identifying Snap Fastener And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Coolant emerges when the coolant hoses are detached from the auxiliary water pump.

Cover surrounding components and plug connections with suitable apparatus

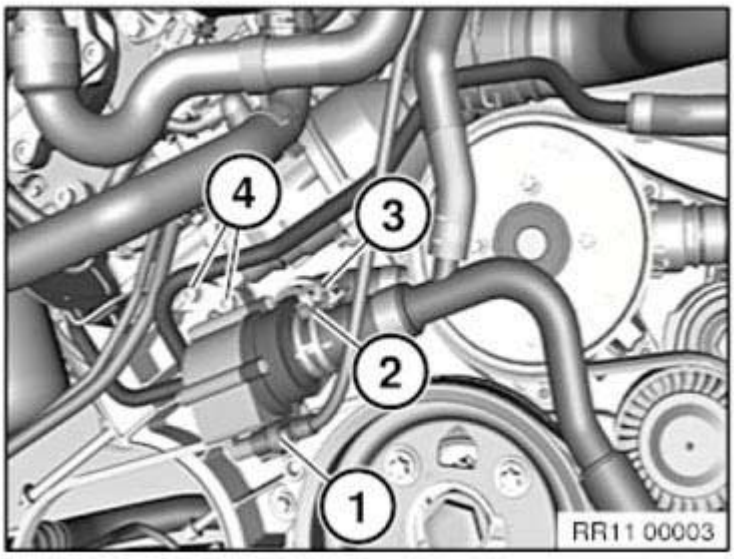


Fig. 429: Identifying Coolant Pump Plug Connection, Hose Clamps And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release hose clamps (2, 3) with a suitable tool.

Pull off coolant hoses and lay to one side.

Release screws (4) and remove coolant pump.

Installation note:

plug connection (1) must snap audibly into place!

Modify holder if replacing auxiliary water pump.

Assemble engine.

Top up **COOLANT** .

VENTING INSTRUCTIONS must be observed **without fail** .

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N74)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Recycling:

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Drain **COOLANT**
- **REMOVE FRONT UNDERBODY PROTECTION** .
- Remove **REAR UNDERBODY PROTECTION**
- Remove **STIFFENING PLATE**
- Remove **FAN COWL** with electric fan
- **REMOVE CHARGE AIR COOLER EXPANSION TANK** .

NOTE: For purposes of clarity, the graphic shows the auxiliary water pump removed.

Disconnect plug connection (3).

Installation note:

Plug connection (3) must snap audibly into place!

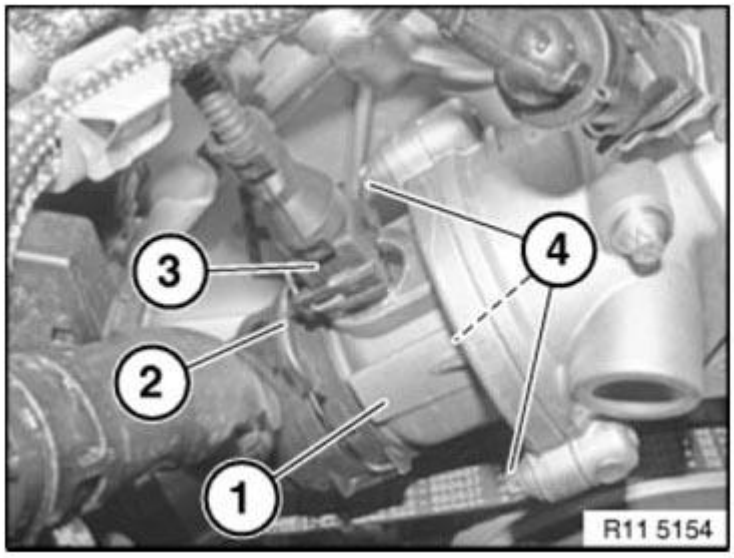


Fig. 430: Identifying Coolant Thermostat, Hose, Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock snap fastener on coolant hose (2).

Detach coolant hose (2) and lay to one side.

NOTE: One of the screws is not shown and is located at the rear under the coolant thermostat (1).

Release screws (4).

Tightening torque: see 1AZ in **11 53 THERMOSTAT AND CONNECTIONS**

Lift out coolant thermostat (1).

Clean sealing surface.

Installation note:

Replace sealing ring (1) .

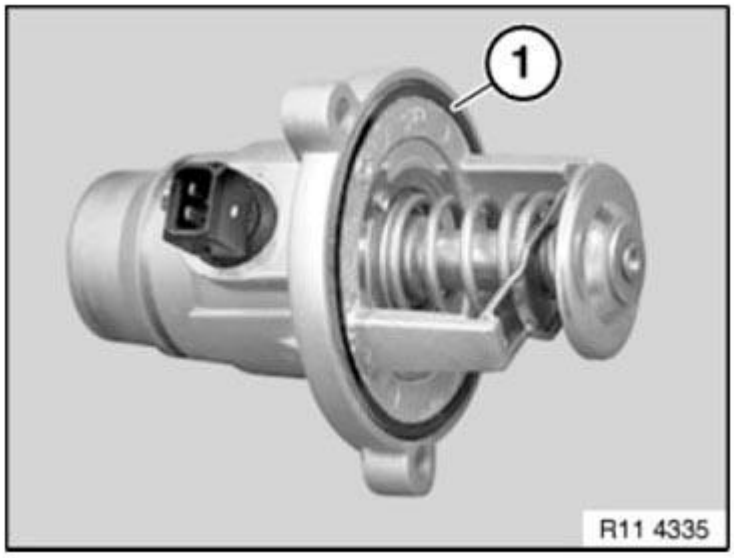


Fig. 431: Identifying Coolant Thermostat Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

VENTING INSTRUCTIONS must be observed **without fail** .

INTAKE MANIFOLD

11 61 068 REMOVING AND INSTALLING/REPLACING AIR INTAKE MANIFOLD (N74)

Necessary preliminary tasks:

- Remove throttle. See **LEFT THROTTLE VALVE ASSEMBLY** and **RIGHT THROTTLE BODY** .
- Remove intercooler. See **RIGHT INTERCOOLER** and **LEFT INTERCOOLER** .
- Remove vacuum reservoir.

Disengage engine ventilation (3) at terminals (1 and 2).

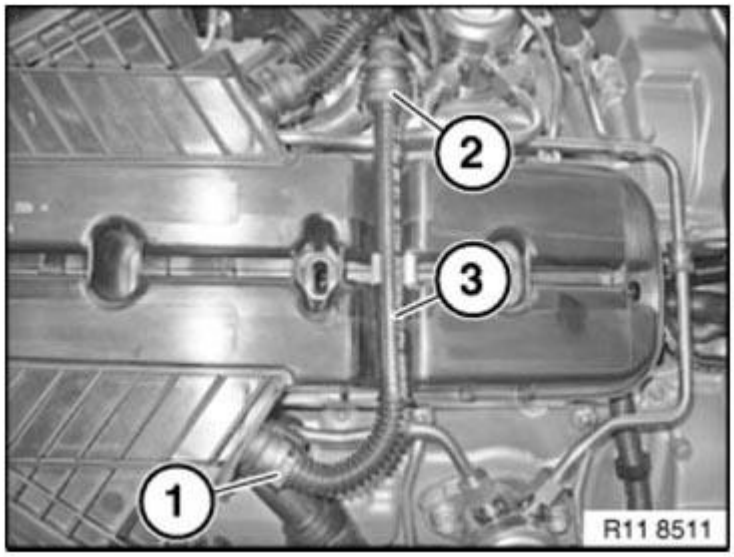


Fig. 432: Identifying Engine Ventilation At Terminals
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

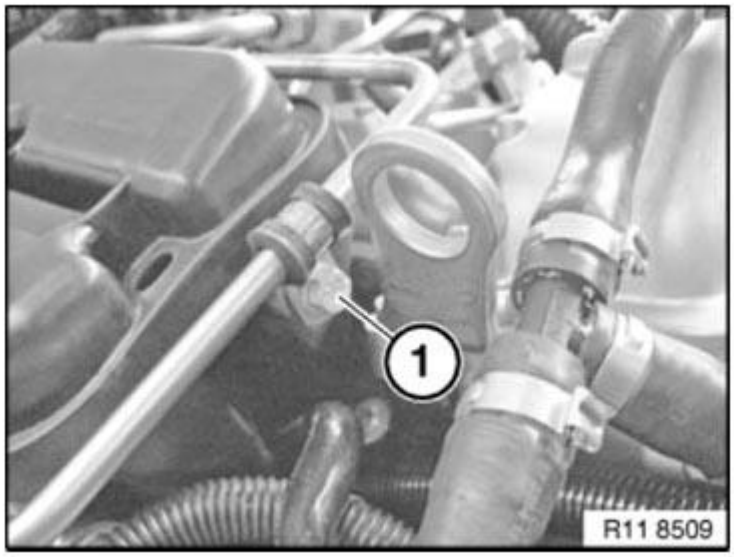


Fig. 433: Identifying Air Intake Manifold Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) at rear of intake plenum.

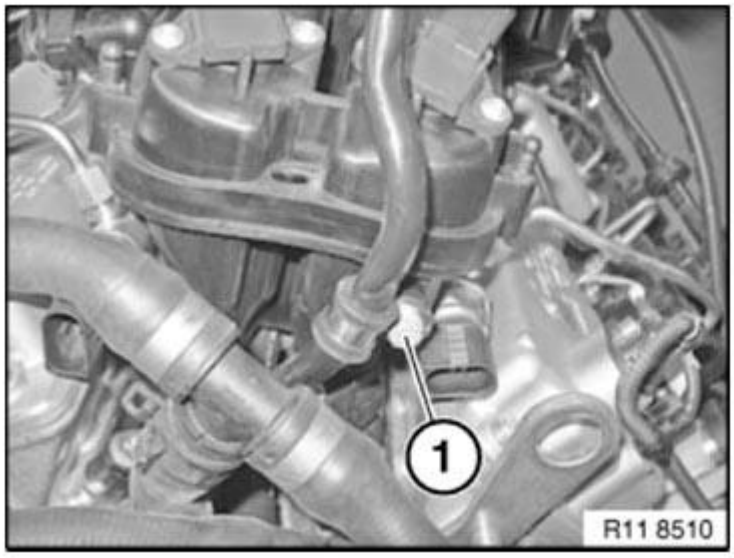


Fig. 434: Identifying Intake Plenum Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1 and 2) at charge-air pressure sensor.

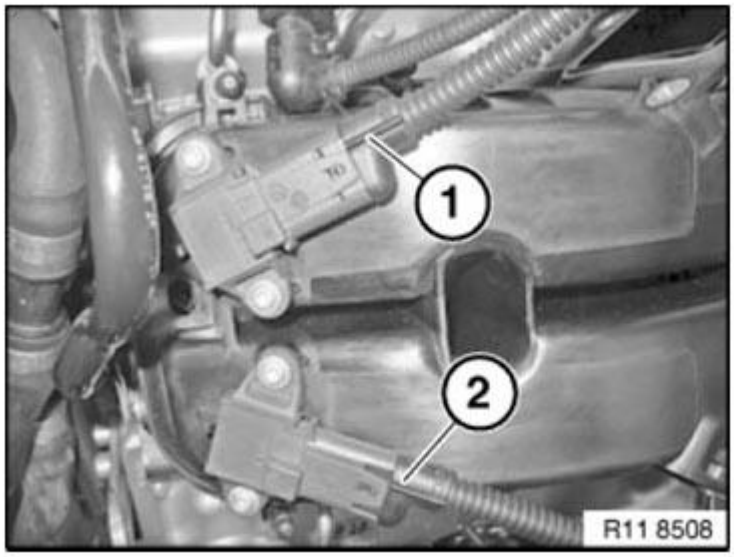


Fig. 435: Identifying Charge-Air Pressure Sensor Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release all bolts (1) on intake plenum using special tool **11 4 410** .

Tightening torque: see 2AZ in **11 61 INTAKE PLENUM**

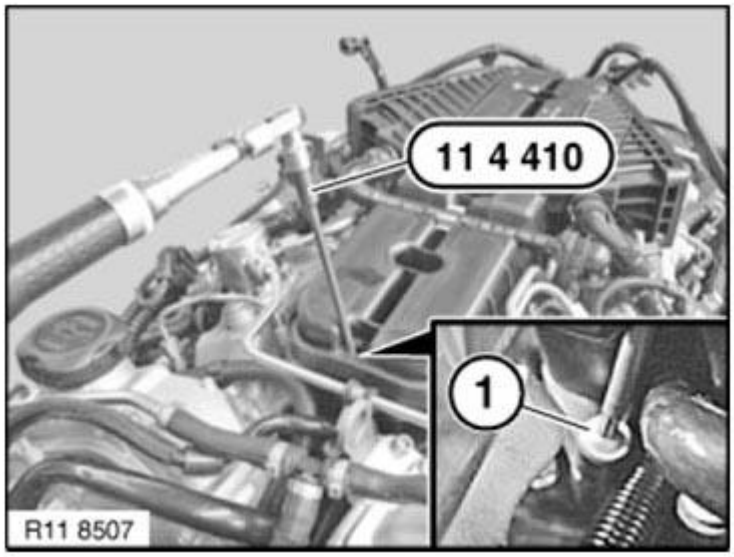


Fig. 436: Releasing Bolts On Intake Plenum Using Special Tool 11 4 410
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all sealing rings (1) on intake lines.

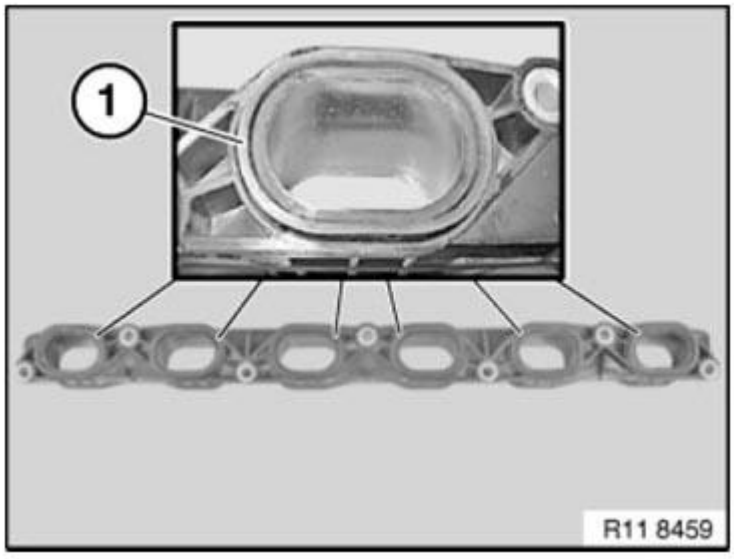


Fig. 437: Identifying Sealing Ring On Intake Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle.

Check air intake system for leaks.

11 61 065 REMOVING AND INSTALLING/REPLACING BOTH INTAKE LINES (N74)

Necessary preliminary tasks:

- Remove intake **PLENUM**

Unscrew nuts (1).

Tightening torque: see 1AZ in **11 61 INTAKE PLENUM**

NOTE: Cylinders 7 to 12 are depicted here; procedure is identical for cylinder 1 to 6.

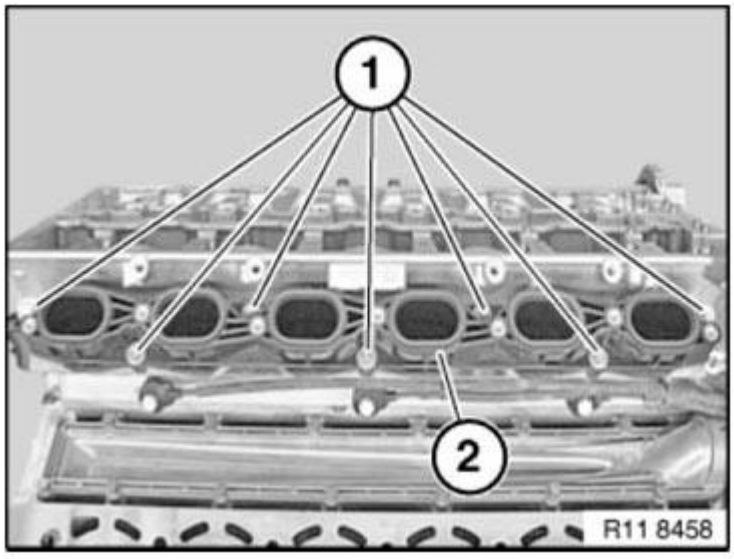


Fig. 438: Identifying Intake Lines Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all sealing rings (1).

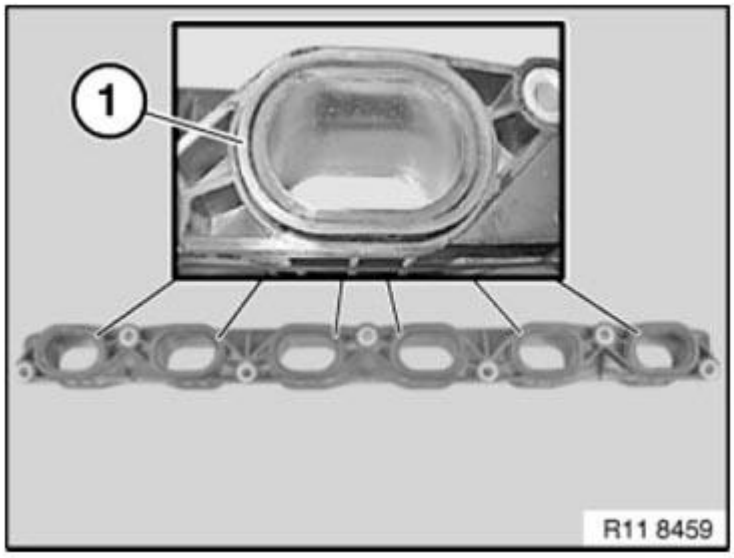


Fig. 439: Identifying Intake Lines Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle.

Check intake system for leaks.

TURBOCHARGER WITH CONTROL

11 65 CONNECTION DIAGRAM, VACUUM ACTIVATION (N74)

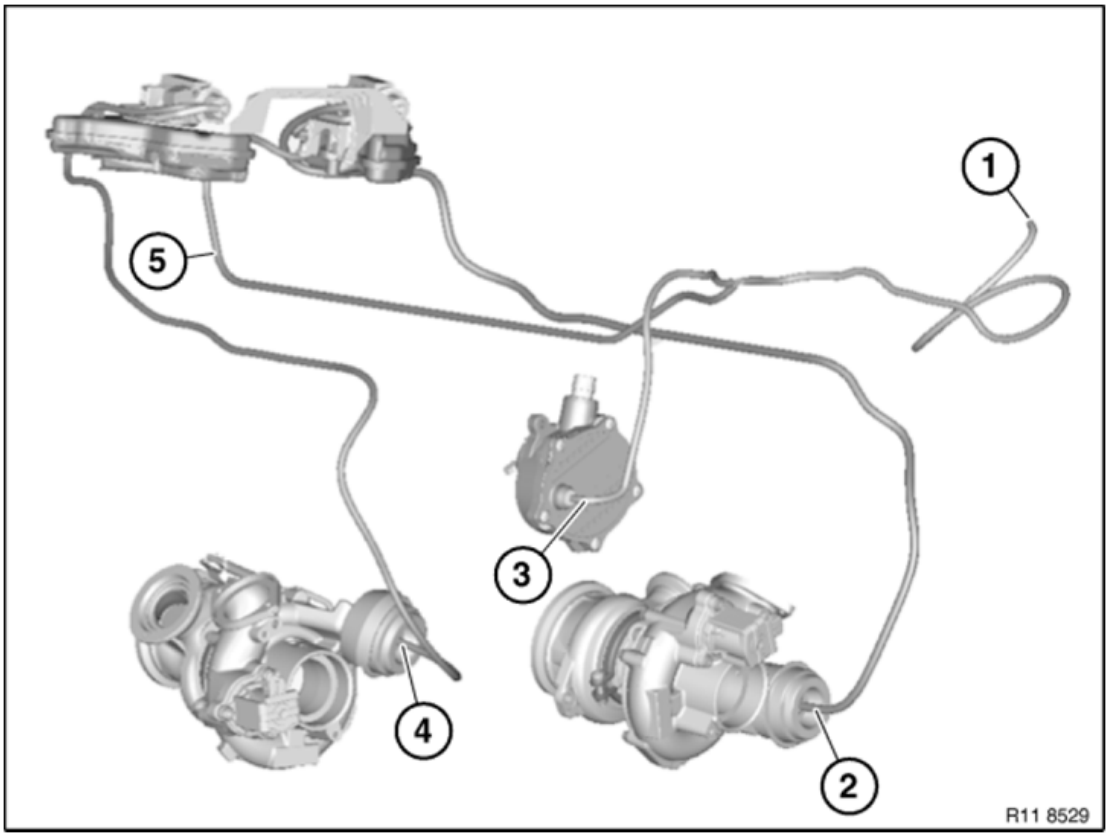


Fig. 440: Vacuum Activation - Connection Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

1. Connector **to the exhaust flaps** .
2. Connection, vacuum unit (wastegate valve), cylinder bank 2, cylinder pair 7 to 12.
3. Vacuum line **to vacuum pump** .
4. Connection, vacuum unit (wastegate valve), cylinder bank 1, cylinder pair 1 to 6.
5. Vacuum line, distributor to vacuum container.

T-piece (1) of vacuum line to the vacuum containers.

Connector (2) vacuum line to electro-pneumatic pressure converter (EPDW), cylinders 7 to 12, VAC connection.

Connector (3) vacuum line to electro-pneumatic pressure converter (EPDW), cylinders 1 to 6, VAC connection.

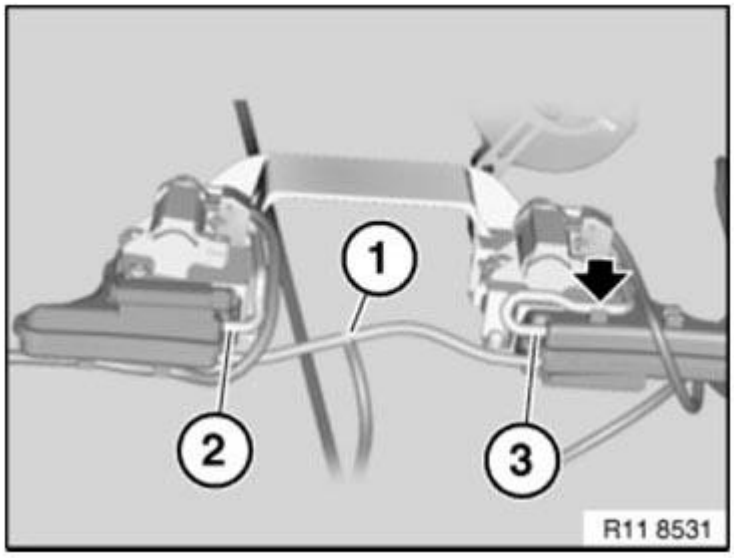


Fig. 441: Identifying Vacuum Line To Electropneumatic Pressure Converter Connector And T-Piece
Courtesy of BMW OF NORTH AMERICA, INC.

11 65 714 REMOVING AND INSTALLING/RENEWING THE ELECTRIC CHANGEOVER VALVE ON THE EXHAUST TURBOCHARGER AT RIGHT (N74)

Necessary preliminary tasks:

- Remove right **TURBOCHARGER**.

Release screws (1).

Remove electric changeover valve (2).

Installation note:

Replace O-ring.

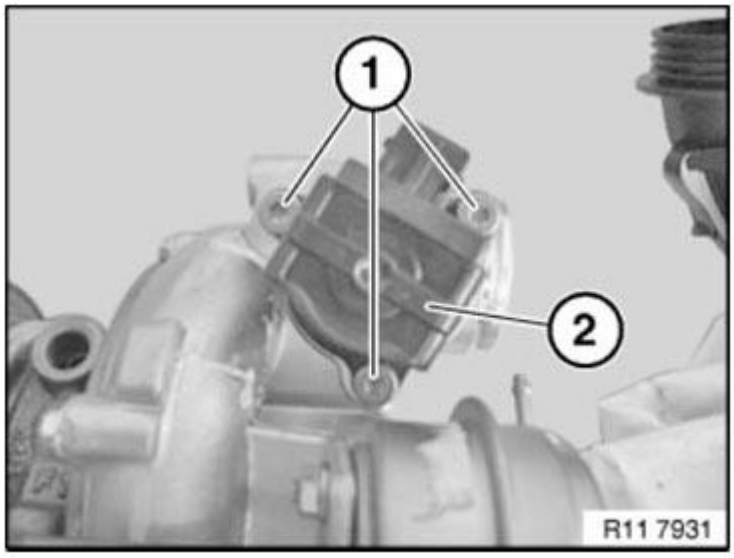


Fig. 442: Identifying Electric Changeover Valve And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Follow diagnosis instruction.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

11 65 712 REMOVING AND INSTALLING/REPLACING ELECTRIC CHANGEOVER VALVE ON EXHAUST TURBOCHARGER, LEFT (N74)

Necessary preliminary tasks:

- Remove left **TURBOCHARGER**.

Release screws (1).

Remove electric changeover valve.

Installation note:

Replace O-ring.

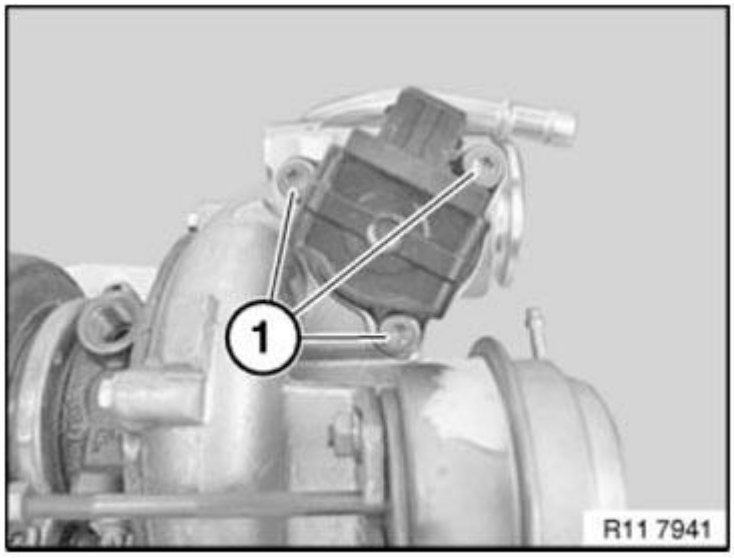


Fig. 443: Identifying Electric Changeover Valve Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Follow diagnosis instruction.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

11 65 030 REMOVING AND INSTALLING/REPLACING EXHAUST TURBOCHARGER, LEFT, CYLINDERS 7 - 12 (N74)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks:

- Remove **CATALYTIC CONVERTER** , cylinders 7 - 12
- Remove power steering gear. See **HYDRAULIC STEERING GEAR** or **ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR** .
- Remove **CHARGE AIR PIPE**
- Remove **CLEAN AIR PIPE**

- Remove **INTERMEDIATE PIPE**

NOTE: Catch leaking engine oil and coolant with suitable auxiliary materials

Release banjo bolt (1).

Tightening torque: see 4AZ in **11 42 OIL FILTER AND LINES**

Replace seals.

Unfasten banjo bolt (2).

Replace seals.

Tightening torque: see 2AZ in **11 53 THERMOSTAT AND CONNECTIONS**

Disconnect vacuum hose (3) from vacuum unit.

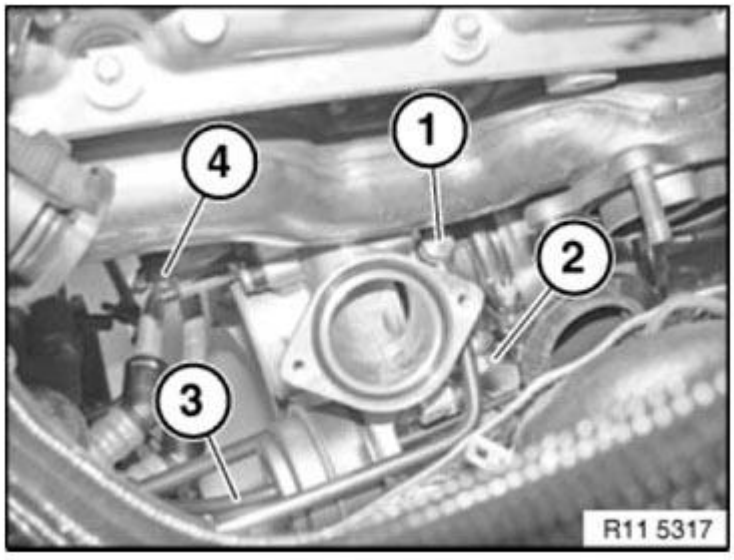


Fig. 444: Identifying Vacuum Hose, Plug Connection And Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (4).

Open hose clip (1).

Tightening torque: see 7AZ in **11 00 STANDARD SCREW CONNECTION**

Pull off coolant line (2).

Installation:

Replace hose clamp (1) .

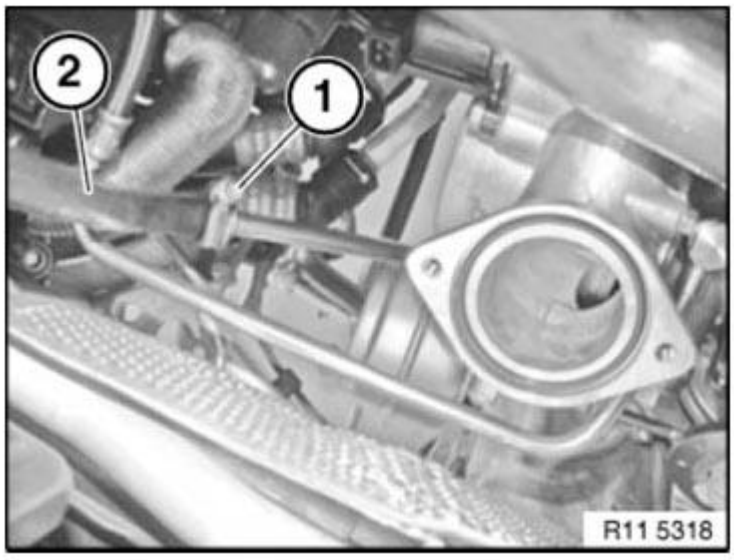


Fig. 445: Identifying Coolant Line And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 5AZ in **11 42 OIL FILTER AND LINES**

Lay oil line from turbocharger to side.

Installation:

Replace seal .

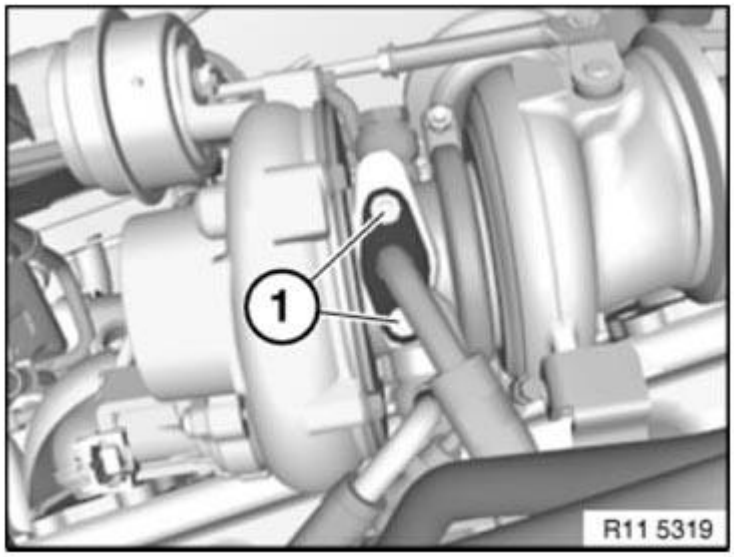


Fig. 446: Identifying Turbocharger Oil Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove heat shield from starter.

Tightening torque: see 2AZ in **12 41 STARTER MOTOR WITH MOUNTING**

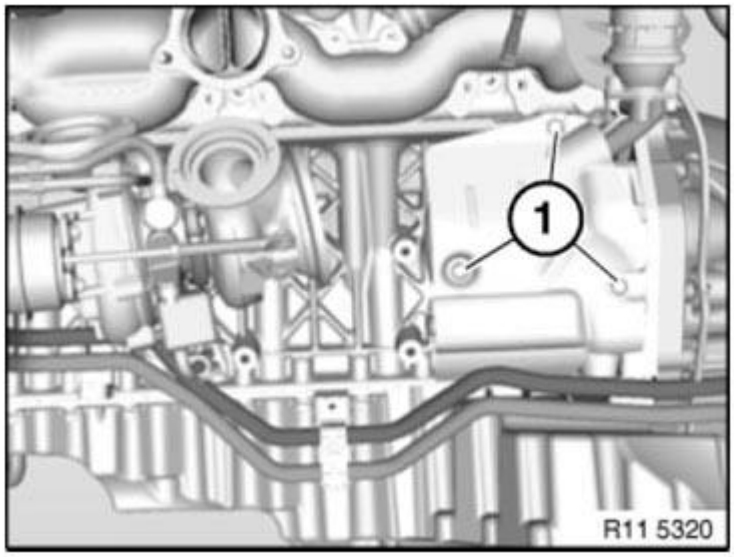


Fig. 447: Identifying Starter Heat Shield Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: see 4AZ in **11 62 EXHAUST MANIFOLD**

IMPORTANT: Do not mechanically deform line remaining on exhaust turbocharger.

Remove exhaust turbocharger with coolant line forwards and downwards.

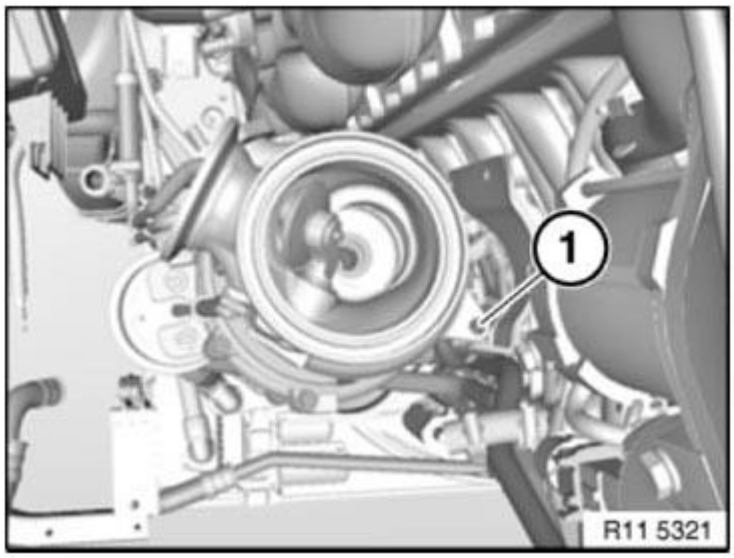


Fig. 448: Identifying Exhaust Turbocharger Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, convert coolant feed line to new turbocharger.

Release banjo bolt (1).

Disconnect line (2).

Replace seals.

Tightening torque: see 3AZ in **11 53 THERMOSTAT AND CONNECTIONS**

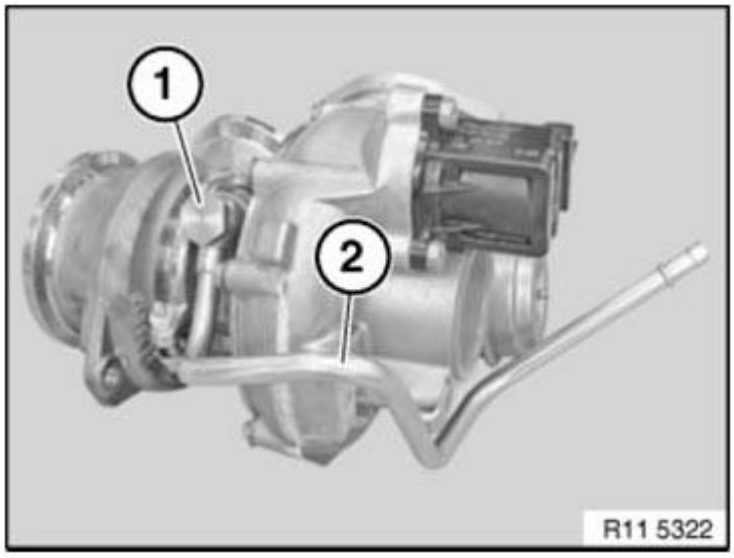


Fig. 449: Identifying Coolant Feed Line And Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Install intermediate tube (3).

Tighten self-locking nut (1).

Tightening torque: see 6AZ in **18 31 EXHAUST SYSTEM**

Position V-ribbon clips on turbocharger.

Tightening torque: see 7AZ in **18 31 EXHAUST SYSTEM**

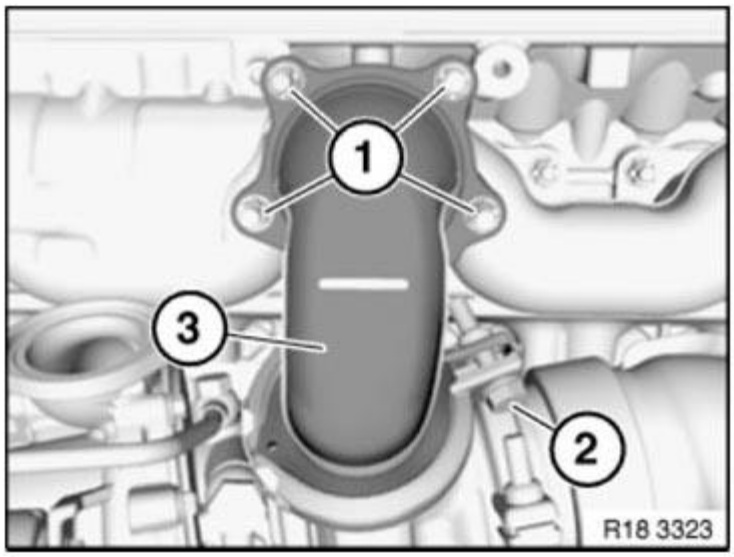


Fig. 450: Identifying Intermediate Tube, Self-Locking Nut And V-Band Clamp

Courtesy of BMW OF NORTH AMERICA, INC.

Tighten bolt (1).

Tightening torque: see 4AZ in **11 62 EXHAUST MANIFOLD**

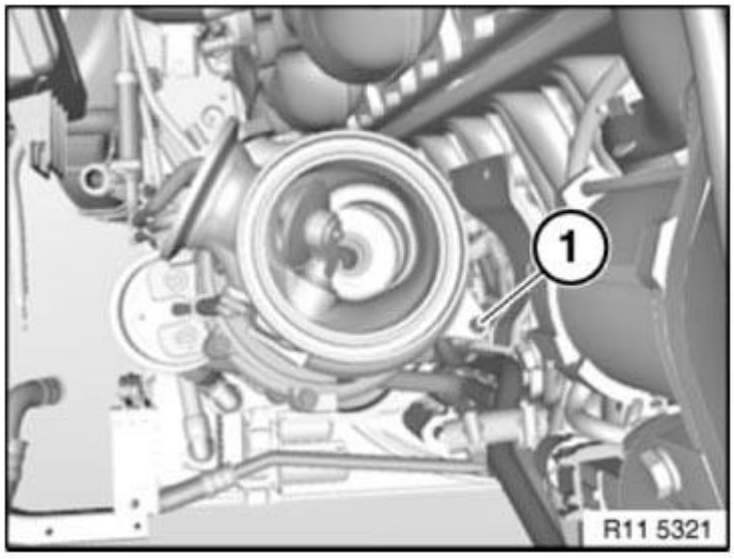


Fig. 451: Identifying Exhaust Turbocharger Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check vacuum connections.

Observe BMW diagnosis instructions.

1. Complete vehicle
2. Drive
3. Engine electrical system
4. Air supply
5. Boost pressure control

11 65 025 REMOVING AND INSTALLING/REPLACING EXHAUST TURBOCHARGER, RIGHT, CYLINDERS 1-6 (N74)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks:

- Remove **CATALYTIC CONVERTER** , cylinders 1-6
- Remove power steering gear. See **HYDRAULIC STEERING GEAR** or **ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR** .
- Remove **CHARGE AIR PIPE**
- Remove **CLEAN AIR PIPE**
- Remove **INTERMEDIATE PIPE**
- Remove **A/C COMPRESSOR**

NOTE: Catch leaking engine oil and coolant with suitable auxiliary materials

Release banjo bolt (1).

Tightening torque: see 4AZ in **11 42 OIL FILTER AND LINES**

Replace seals.

Unfasten banjo bolt (2).

Replace seals.

Tightening torque: see 2AZ in **11 53 THERMOSTAT AND CONNECTIONS**

Disconnect vacuum hose (3) from vacuum unit.

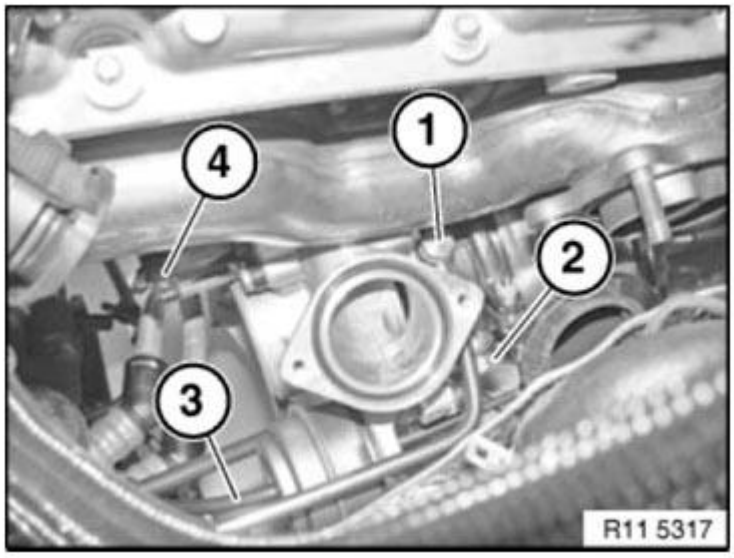


Fig. 452: Identifying Vacuum Hose, Plug Connection And Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (4).

Open hose clip (1).

Tightening torque: see 7AZ in **11 00 STANDARD SCREW CONNECTION**

Pull off coolant line (2).

Installation:

Replace hose clamp (1) .

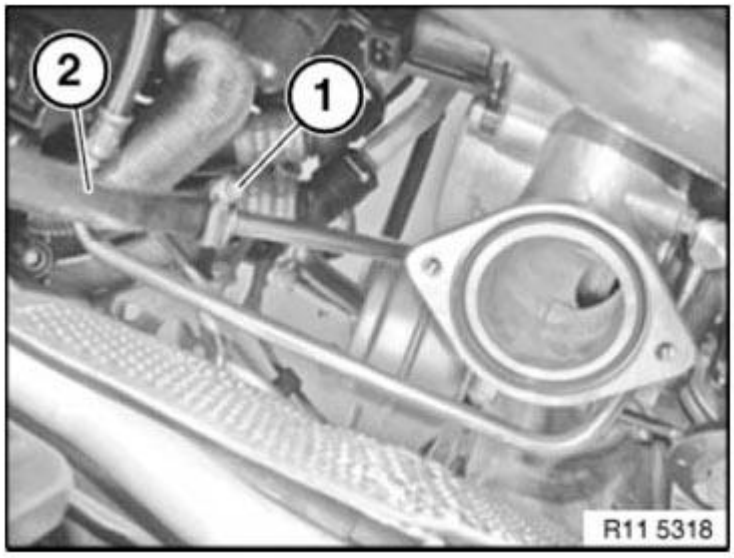


Fig. 453: Identifying Coolant Line And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 5AZ in **11 42 OIL FILTER AND LINES**

Lay oil line from turbocharger to side.

Installation:

Replace seal .

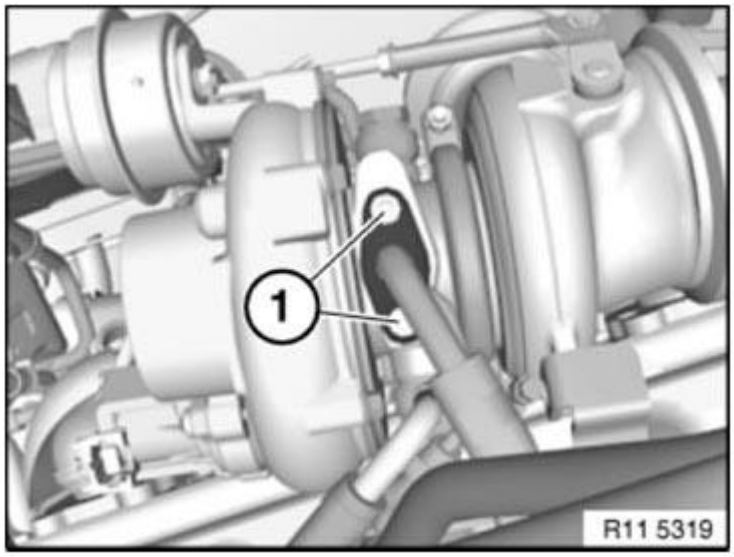


Fig. 454: Identifying Turbocharger Oil Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: see 4AZ in **11 62 EXHAUST MANIFOLD**

IMPORTANT: Do not mechanically deform line remaining on exhaust turbocharger.

Remove exhaust turbocharger with coolant line forwards and downwards.

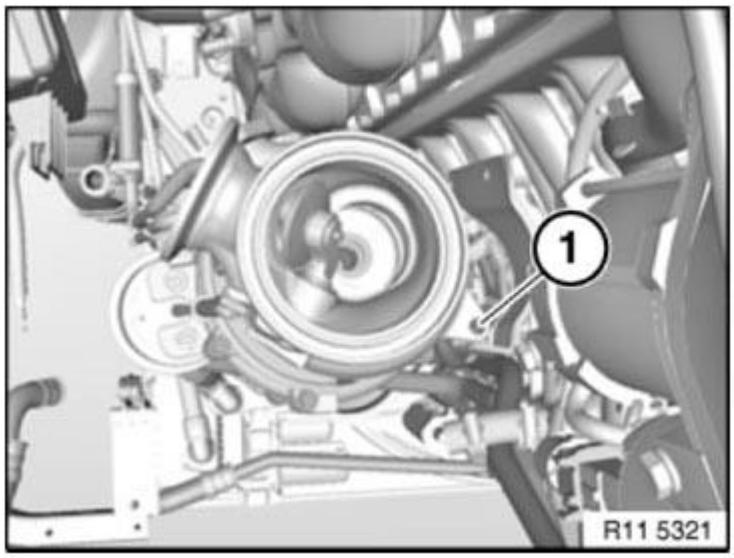


Fig. 455: Identifying Exhaust Turbocharger Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, convert coolant feed line to new turbocharger.

Release banjo bolt (1).

Disconnect line (2).

Replace seals.

Tightening torque: see 3AZ in **11 53 THERMOSTAT AND CONNECTIONS**

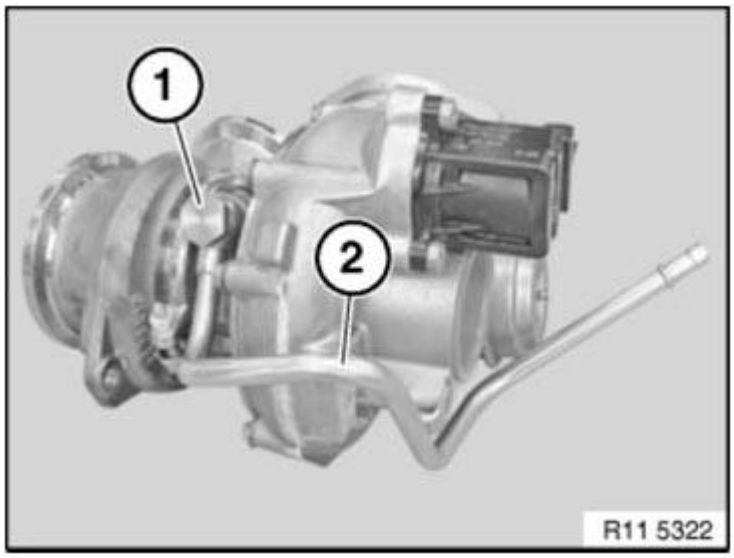


Fig. 456: Identifying Coolant Feed Line And Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Insert intermediate pipe (3).

Tighten self-locking nuts (1).

Tightening torque: see 6AZ in **18 31 EXHAUST SYSTEM**

Position V-band clamp (2) on turbocharger.

Tightening torque: see 7AZ in **18 31 EXHAUST SYSTEM**

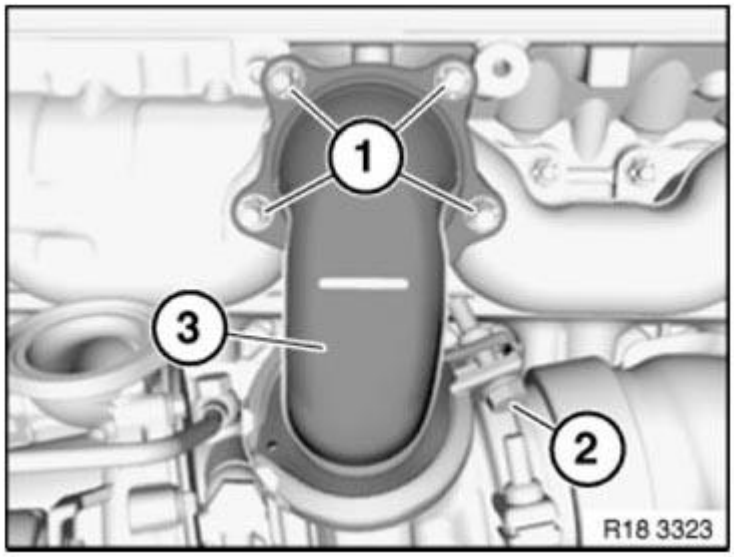


Fig. 457: Identifying Intermediate Tube, Self-Locking Nut And V-Band Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten bolt (1).

Tightening torque: see 4AZ in **11 62 EXHAUST MANIFOLD**

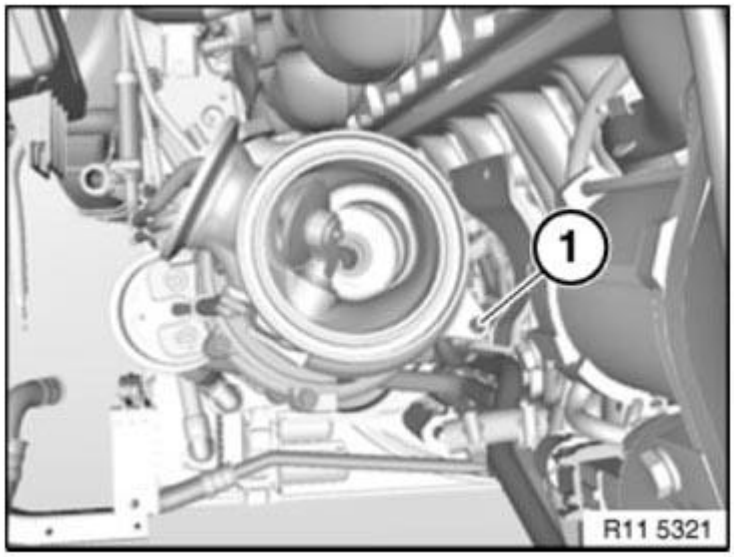


Fig. 458: Identifying Exhaust Turbocharger Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check vacuum connections.

Observe BMW diagnosis instructions.

1. Complete vehicle
2. Drive
3. Engine electrical system
4. Air supply
5. Boost pressure control

11 65 010 REMOVING AND INSTALLING/REPLACING PRESSURE ACCUMULATOR (N74)

Necessary preliminary tasks:

- Remove acoustic cover

Disconnect plug connection at charging pressure sensors (1).

Release cable strap holder (2) at pressure accumulator.

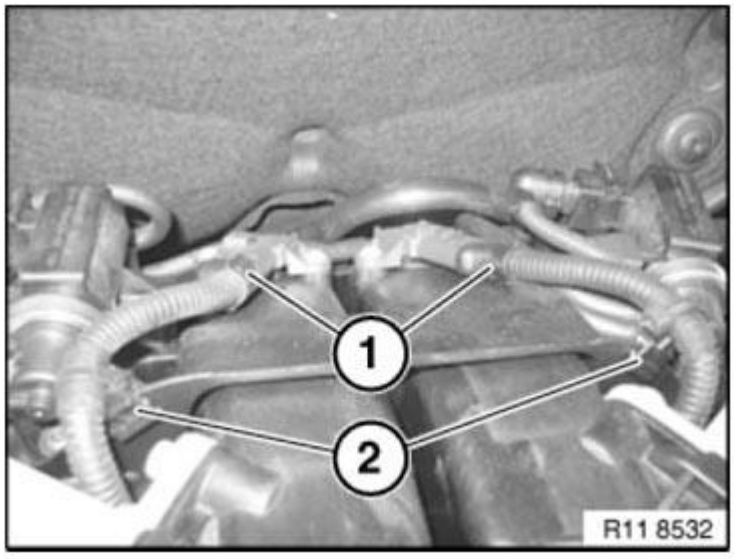


Fig. 459: Identifying Charging Pressure Sensors And Cable Strap Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip vacuum line for brake servo at pressure accumulator.

Disconnect vacuum lines (1) on electro-pneumatic pressure converter (EPDW) OUT for wastegate valves.

Pull off pressure accumulator (2) on left and right upwards in the direction of the arrow.

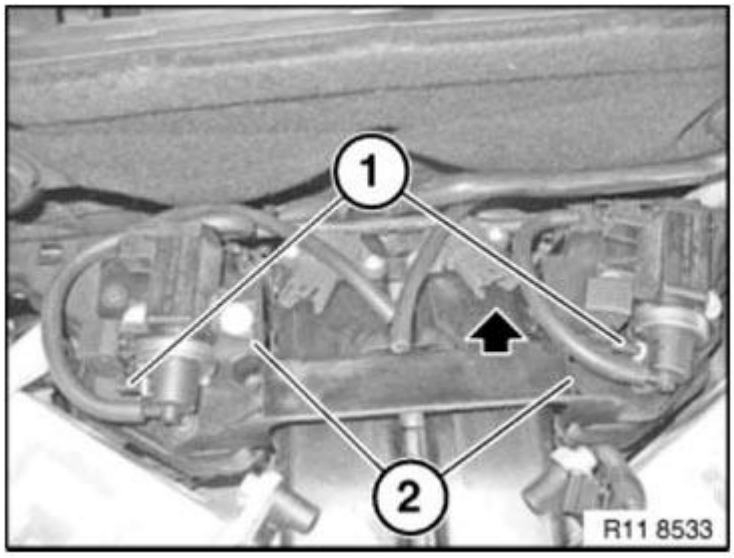


Fig. 460: Identifying Pressure Accumulator And Vacuum Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect vacuum line (1) to vacuum pump at pressure accumulator on left and right.

Installation note:

If necessary, modify the electro-pneumatic pressure converter (EPDW).

Connections (2 and 3) at vacuum container to the pressure converter connector (VAC).

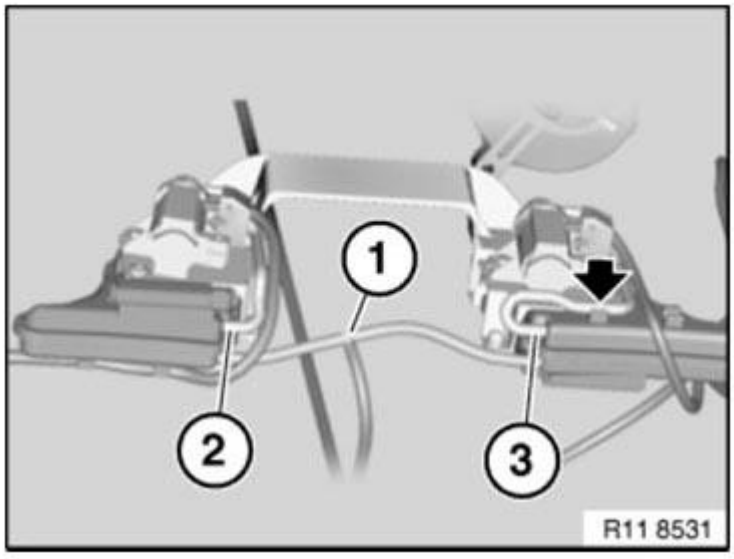


Fig. 461: Identifying Vacuum Line To Electropneumatic Pressure Converter Connector And T-Piece
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check installation position of left-hand vacuum line.

Make sure rubber grommets (1) are not damaged and are in the right position.

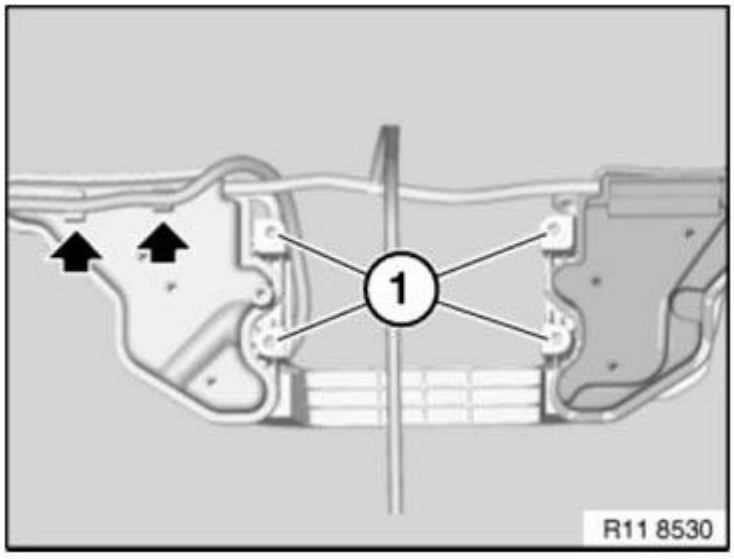


Fig. 462: Identifying Rubber Grommets
Courtesy of BMW OF NORTH AMERICA, INC.

Check vacuum connections for correct routing.

Check vacuum system for leaks.

Assemble engine.

VACUUM PUMP

11 66 000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N74)

IMPORTANT: Installation:
Due to the risk of damage to the engine gaskets/seals and the lack of brake boosting, make sure before starting the engine that all the vacuum lines are connected.

Necessary preliminary tasks:

- Press brake pedal several times in order to reduce vacuum pressure in brake booster.
- Remove **FAN COWL WITH ELECTRIC FAN** .

Unfasten screws (2).

Tightening torque: see 1AZ in **11 66 VACUUM PUMP**

Pull off vacuum hose (3).

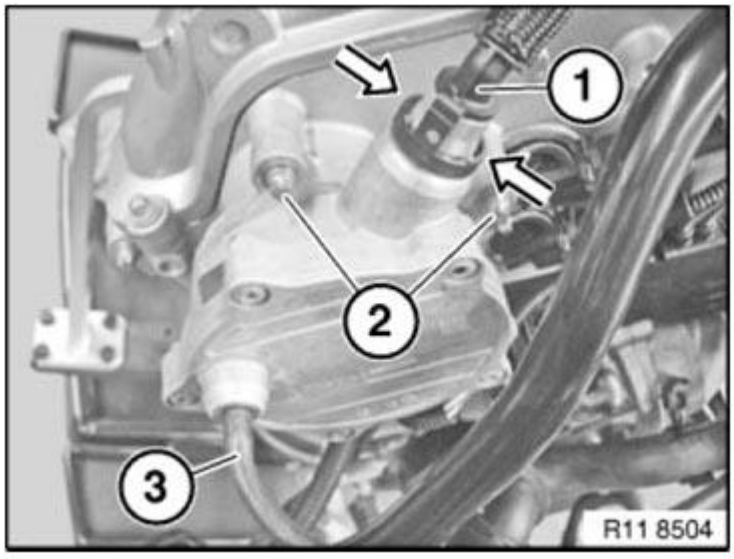


Fig. 463: Identifying Screws, Vacuum Hose And Vacuum Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 1AZ in **11 66 VACUUM PUMP**

Remove vacuum pump (3).

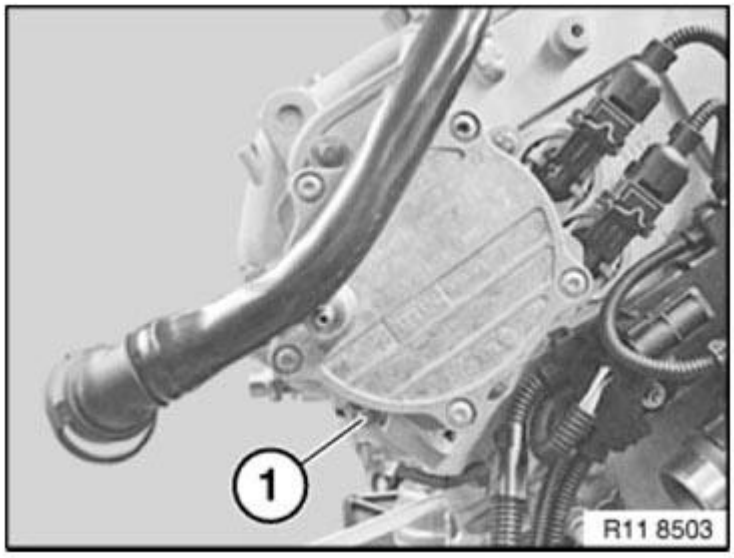


Fig. 464: Identifying Vacuum Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Drive (1) must be rotated into correct position prior to installation.

Installation:

Replace sealing ring (2) and coat with grease to facilitate fitting.

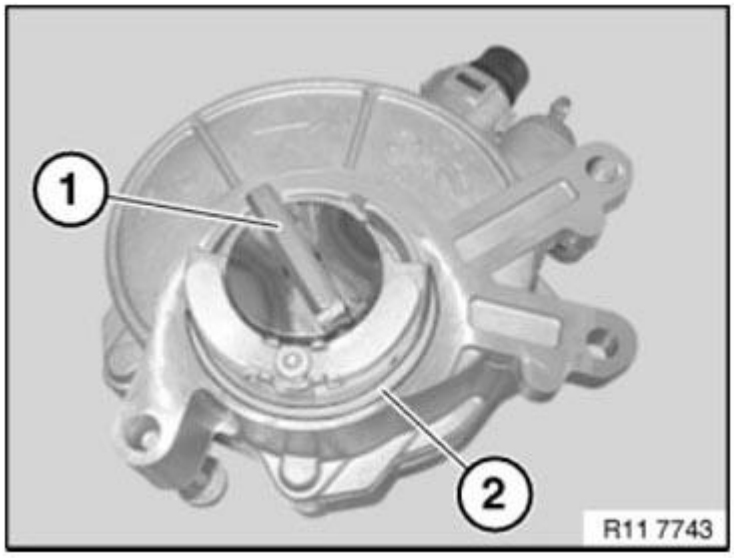


Fig. 465: Identifying Drive And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align vacuum pump drive to groove (1) of intake camshaft.

Vacuum pump can be installed easier when groove (1) is vertically aligned.

NOTE: Illustrations show N73.

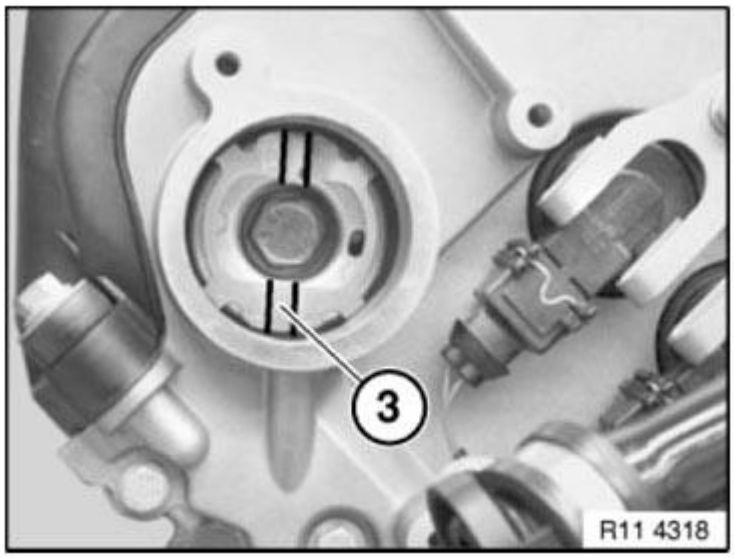


Fig. 466: Identifying Intake Camshaft Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of DME.

Check vacuum pump for leaks and correct operation.

AIR PUMP, LINES AND CONTROL VALVES

11 72 000 REMOVING AND INSTALLING/REPLACING AIR PUMP (N74)

Necessary preliminary tasks:

- Disconnect negative battery cable.
- Remove **FAN COWL WITH ELECTRIC FAN** .
- Remove right-hand **INTAKE SILENCER HOUSING**
- Evacuate **AIR CONDITIONING SYSTEM** .
- Undo both **AIR-CONDITIONING LINES** at condenser.

Disconnect connector (1).

Unlock air hose (2) and remove.

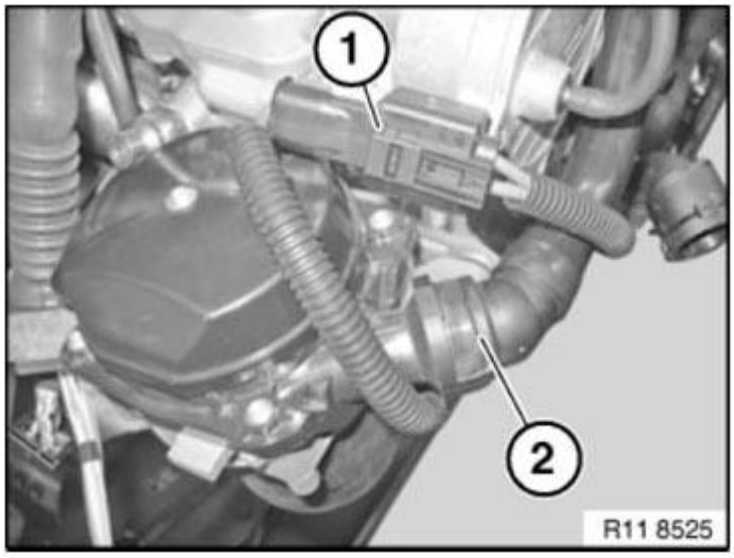


Fig. 467: Identifying Air Hose And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1)

Remove air pump (2).

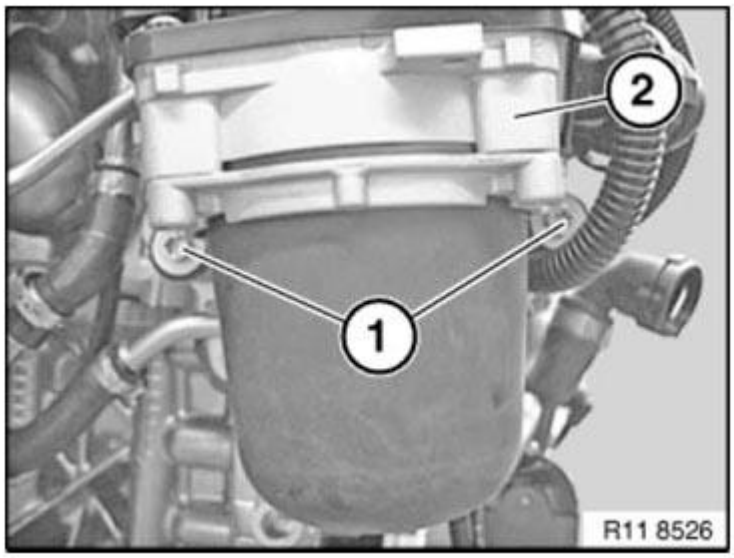


Fig. 468: Identifying Air Pump And Slacken Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of DME.

TURBOCHARGER PRESSURE CONVERTERS

11 74 509 REPLACING BOTH PRESSURE CONVERTERS FOR TURBOCHARGER (N74)

Necessary preliminary tasks:

- Remove **ENGINE COVER**.

Pressure converter, cylinders 1-6

Disconnect plug connection (3) on pressure converter.

Installation note:

Plug connection (3) must snap audibly into place!

Disconnect black vacuum hose (1) at connection (VAC = vacuum reservoir).

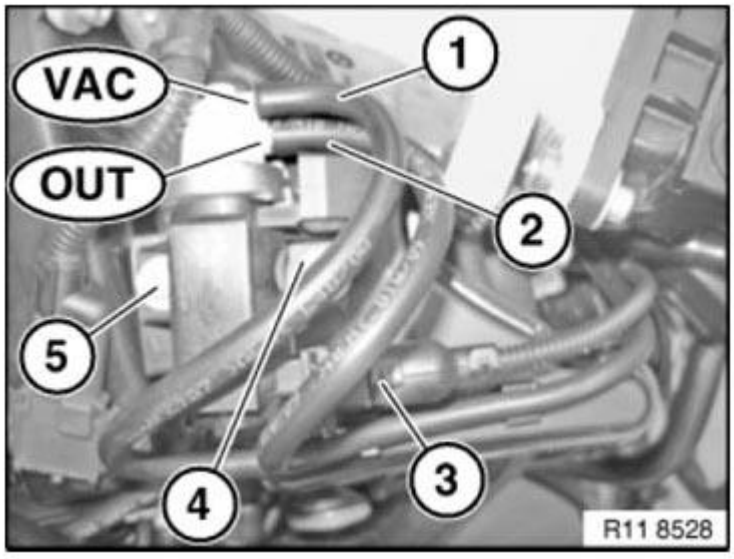


Fig. 469: Identifying Vacuum Hoses, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect black vacuum hose (2) at connection (OUT = vacuum unit of exhaust turbocharger).

Undo screws (4 and 5)

Tightening torque: see 2AZ in **11 00 STANDARD SCREW CONNECTION**

Remove pressure converter.

Pressure converter, cylinders 7-12

Disconnect plug connection (3) on pressure converter.

Installation note:

Plug connection (3) must snap audibly into place!

Disconnect black vacuum hose (1) at connection (VAC = vacuum reservoir).

Disconnect black vacuum hose (2) at connection (OUT = vacuum unit of exhaust turbocharger).

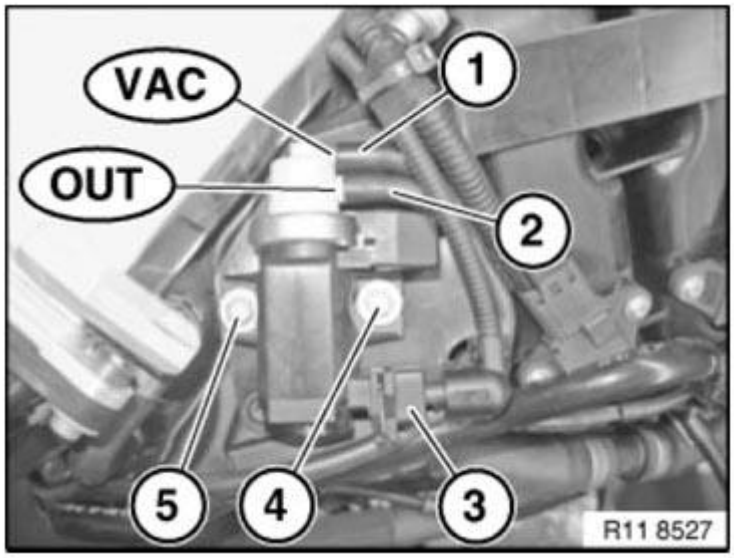


Fig. 470: Identifying Vacuum Hoses, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Undo screws (4 and 5)

Tightening torque: see 2AZ in **11 00 STANDARD SCREW CONNECTION**

Remove pressure converter.

Check activation via BMW diagnosis system.

EMISSION CONTROL, OXYGEN SENSOR

11 78 530 REPLACING LEFT CONTROL SENSOR (N74)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Check function of DME control unit.
- Switch off ignition.
- Remove **PRESSURE PIPE** .

Release plug connector (1) and pull off.

Unclip control sensor cable (2) at retaining clips.

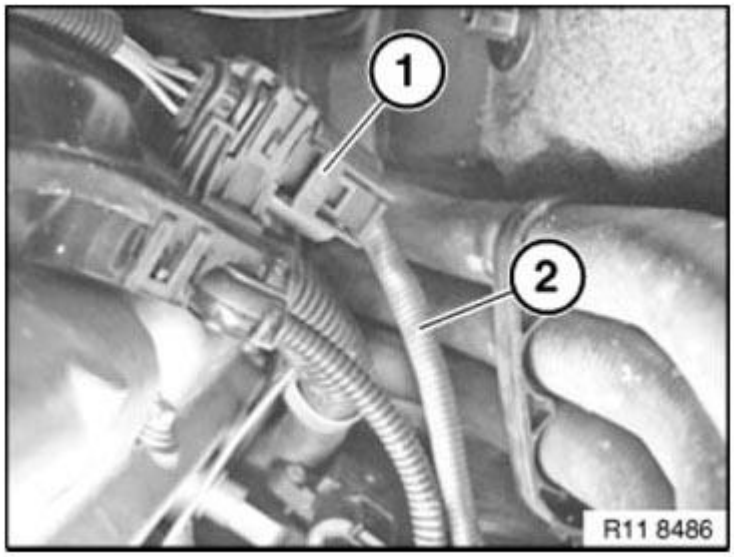


Fig. 471: Identifying Plug Connector And Control Sensor Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Release control sensor with special tool 11 7 020.

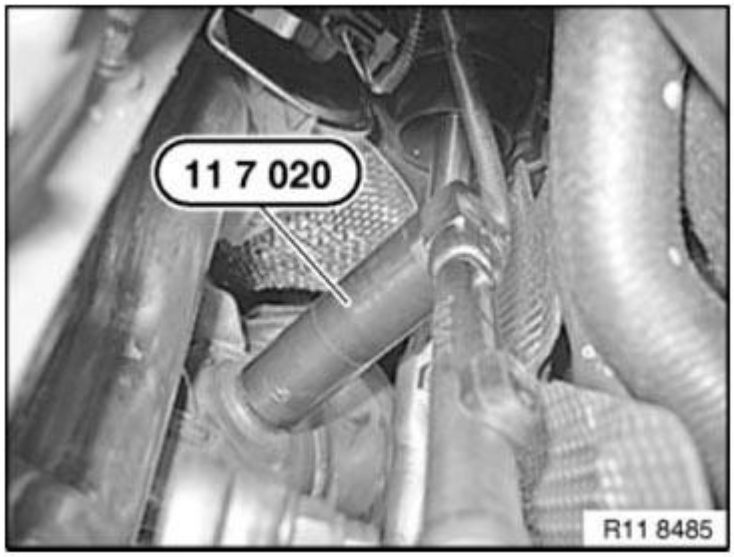


Fig. 472: Releasing Control Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Secure control sensor with special tool 11 7 020 and a torque wrench (1).

Tightening torque: see 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITORING SENSOR**

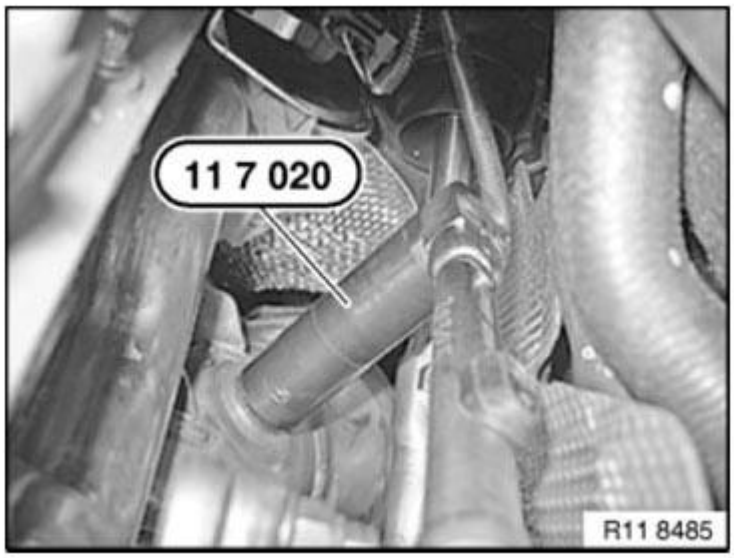


Fig. 473: Securing Control Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check function of DME control unit.

Pay attention to cable routing of control sensor.

11 78 540 REPLACING LEFT MONITOR SENSOR (N74)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Check function of DME control unit
- Turn off ignition
- Remove **REAR UNDERBODY PROTECTION**

Remove heat shield (2) of the left side.

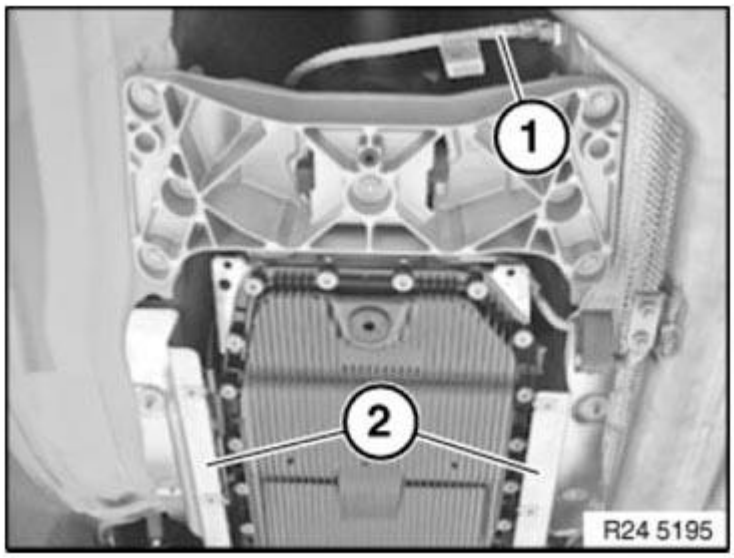


Fig. 474: Identifying Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release exhaust system (1) at the catalytic converters.

Remove (2) sealing ring.

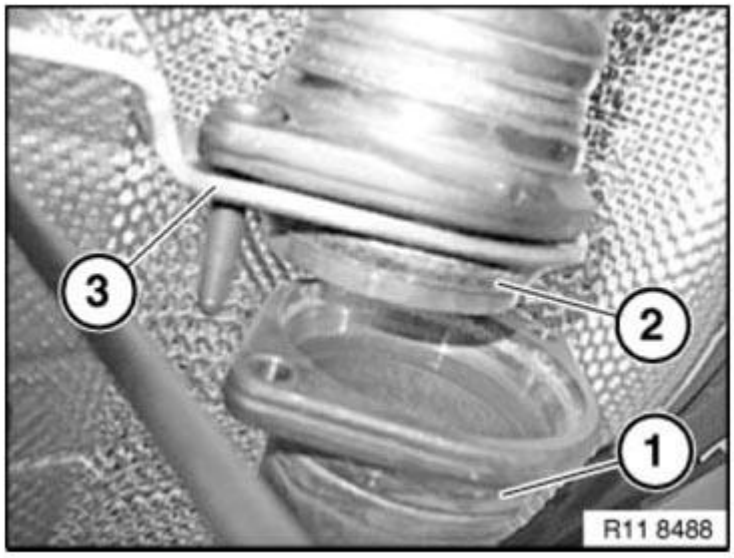


Fig. 475: Identifying Exhaust System And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove exhaust holder (2).

Tightening torque: see 3AZ in **18 31 EXHAUST SYSTEM**

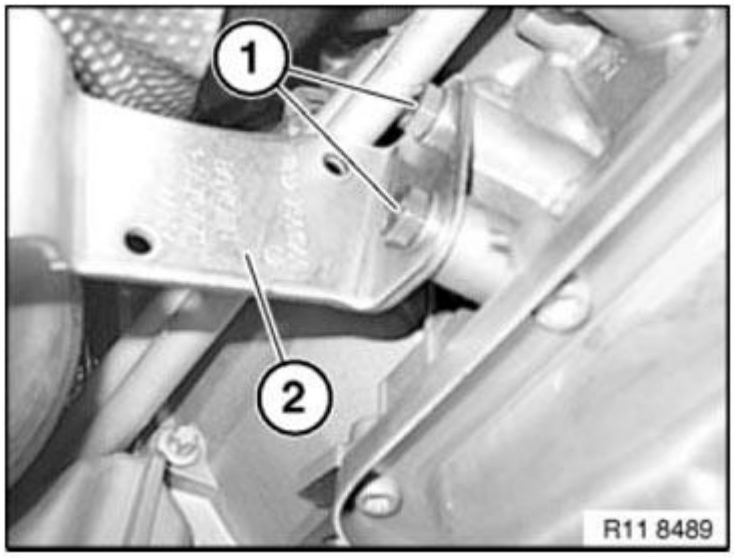


Fig. 476: Identifying Exhaust Holder With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip plug connection (2) of the oxygen sensor from the holder (1).

Release oxygen sensor cable (3) from the retaining clips (4).

Disconnect plug connection of the oxygen sensor (2).

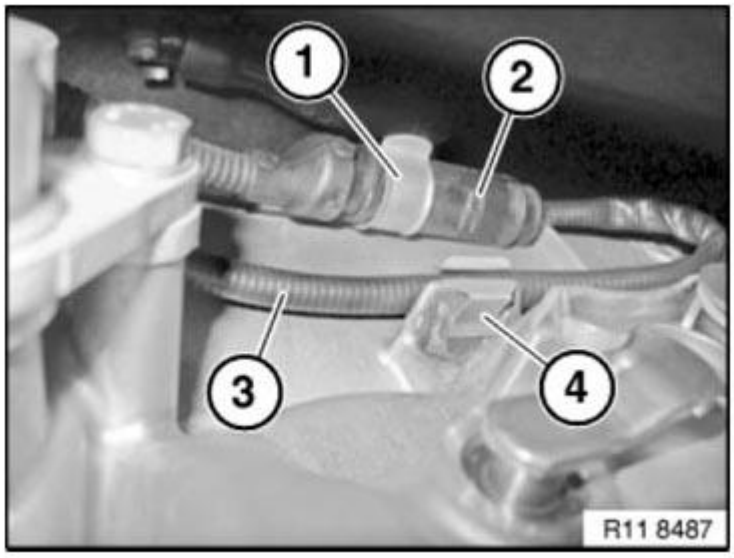


Fig. 477: Identifying Oxygen Sensor, Cable, Plug Connection, Holder And Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Detach oxygen sensor cable (1) from the retaining clips (2).

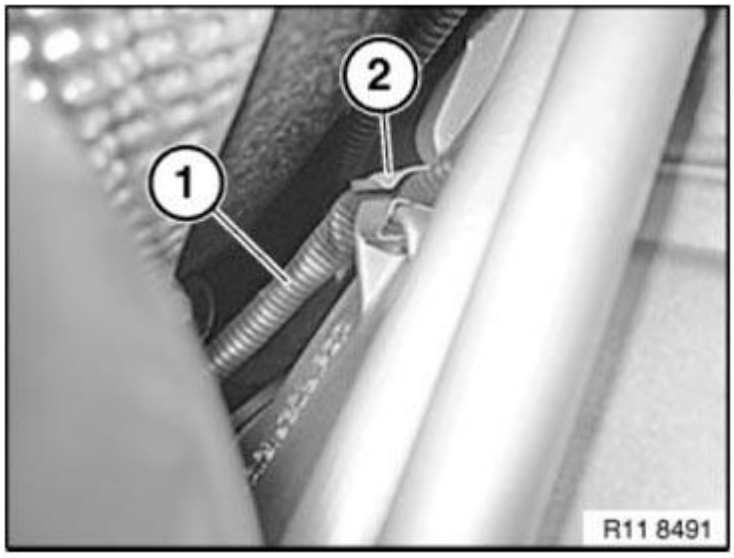


Fig. 478: Identifying Oxygen Sensor Cable And Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Release monitoring sensor (1) with special tools 11 7 030 and 11 9 150.

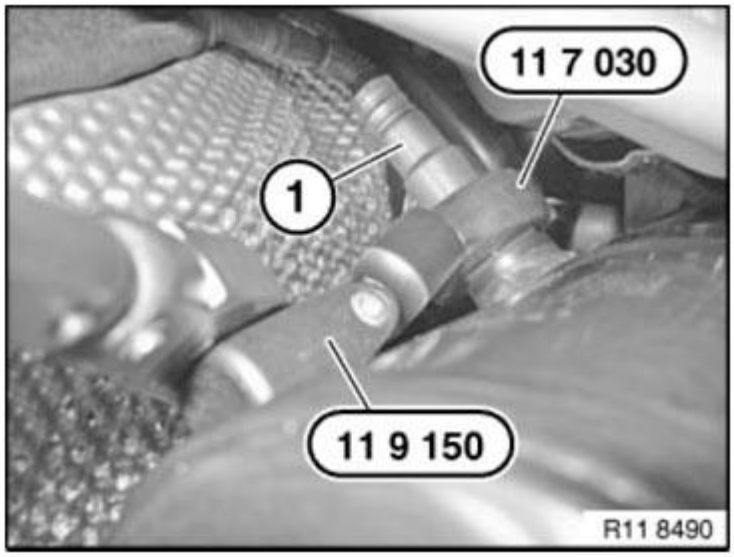


Fig. 479: Releasing Monitoring Sensor Using Special Tools 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Fasten monitoring sensor (1) with special tools 11 7 030 and 11 9 150.

Installation:

When special tool 11 9 150 is used in conjunction with special tool 11 7 030, 47 Nm on the torque wrench dial corresponds to an actual tightening torque of 50 Nm.

Tightening torque: see 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITORING SENSOR**

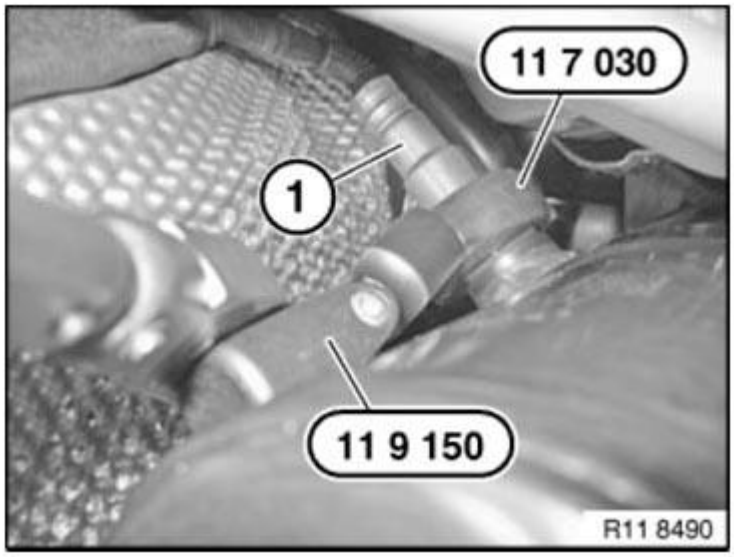


Fig. 480: Tightening Monitoring Sensor Using Special Tools 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check function of DME control unit.

Pay attention to cable routing of monitor sensor.

11 78 533 REPLACING RIGHT CONTROL SENSOR (N74)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Check function of DME control unit
- Turn off ignition
- Remove right **CHARGE AIR PIPE**

Release plug connector (1) and pull off.

Unclip control sensor cable (2) from holder.

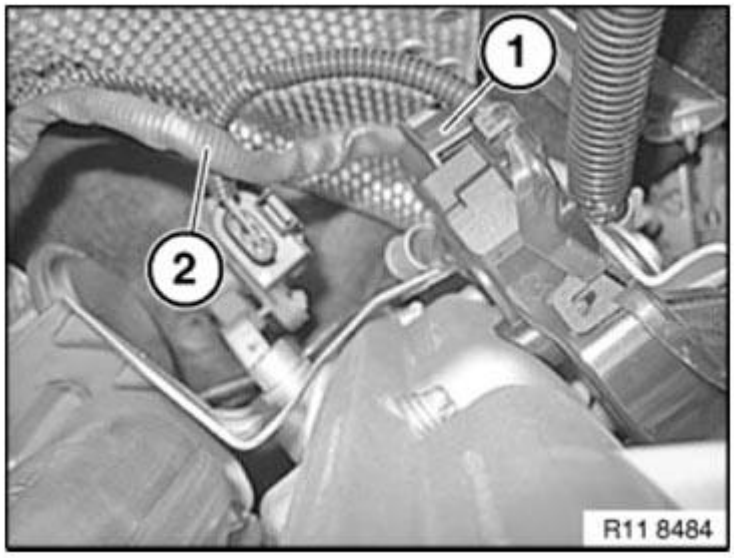


Fig. 481: Identifying Control Sensor Cable And Plug Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool **11 4 260** with a 15° extension (1).

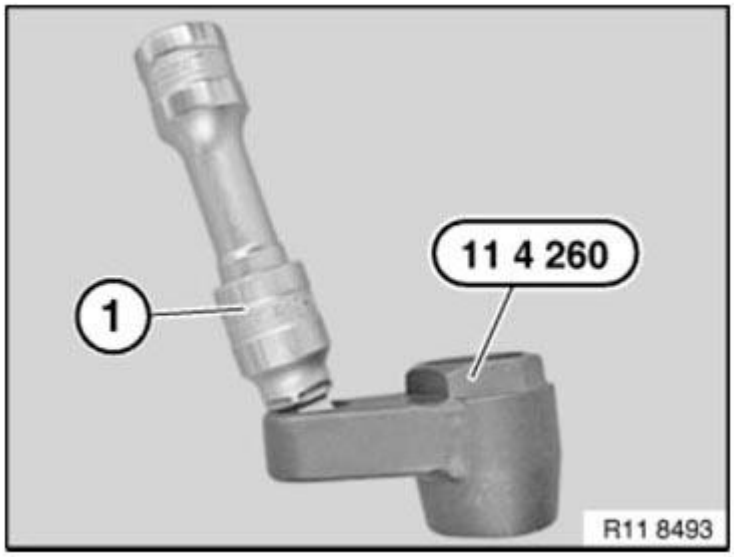


Fig. 482: Preparing Special Tool 11 4 260 With Angle Extension
Courtesy of BMW OF NORTH AMERICA, INC.

Release control sensor with special tool **11 4 260** .

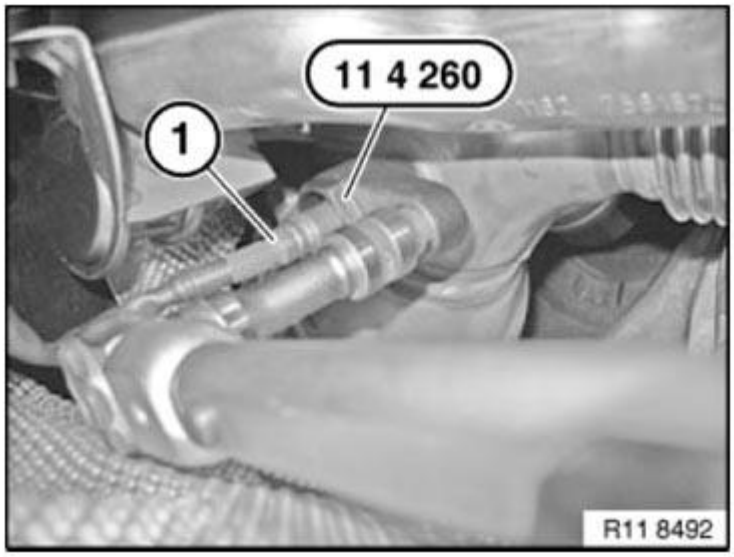


Fig. 483: Releasing Control Sensor Using Special Tool 11 4 260
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Secure control sensor with special tool **11 4 260** and a torque wrench (1).

Tightening torque: see 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITORING SENSOR**

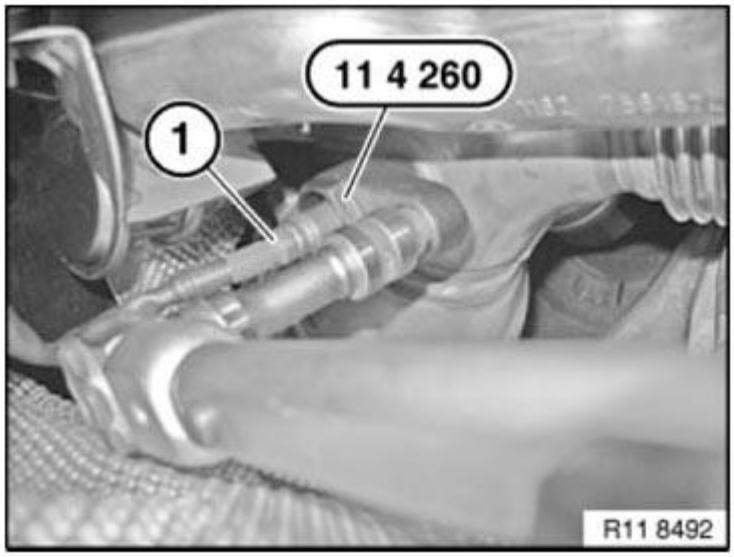


Fig. 484: Securing Control Sensor Using Special Tool 11 4 260
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check function of DME control unit.

Pay attention to cable routing of control sensor.

11 78 543 REPLACING RIGHT MONITOR SENSOR (N74)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Check function of DME control unit
- Switch off ignition.
- Remove engine underbody protection. See **FRONT UNDERBODY PROTECTION** and **REAR UNDERBODY PROTECTION** .

Detach monitoring sensor (1) from catalyst cylinders 1 - 6 with special tool 11 7 030 and 11 9 150.

Remove monitor sensor (1).

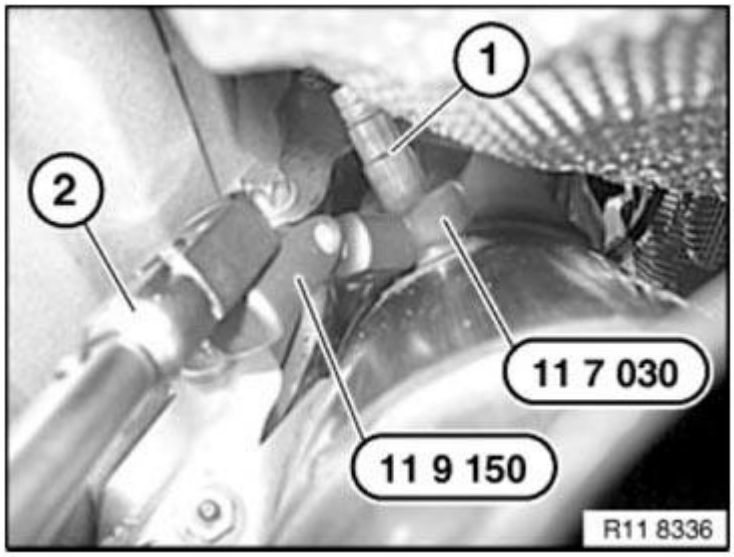


Fig. 485: Removing Monitoring Sensor From Catalyst Cylinders Using Special Tool 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Secure monitoring sensor (1) with special tool 11 7 030 and 11 9 150.

Tightening torque: see 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITORING SENSOR**

IMPORTANT: When using special tool 11 7 030 in conjunction with 11 9 150, it is essential to reduce the prescribed tightening torque by 3 Nm to 47 Nm.

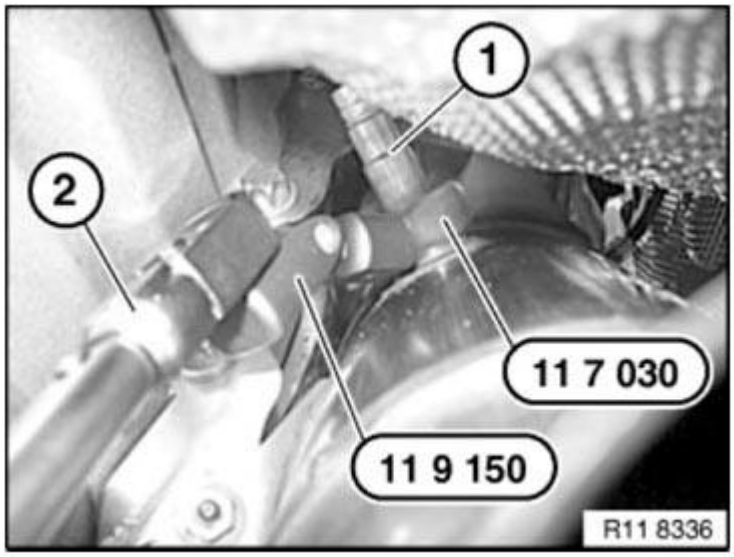


Fig. 486: Securing Monitoring Sensor From Catalyst Cylinders Using Special Tool 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check function of DME control unit.

Pay attention to cable routing of monitor sensor.

BRAKES

Pedals

PEDAL MOUNTING BLOCK

35 11 000 REMOVING AND INSTALLING (REPLACING) COMPLETE BEARING SUPPORT FOR FOOT PEDAL

IMPORTANT: After completion of work, carry out function check.

Necessary preliminary tasks:

- Remove **BRAKE SERVO**

Release screws (1).

Remove control units from holder (2). Plugs remain connected.

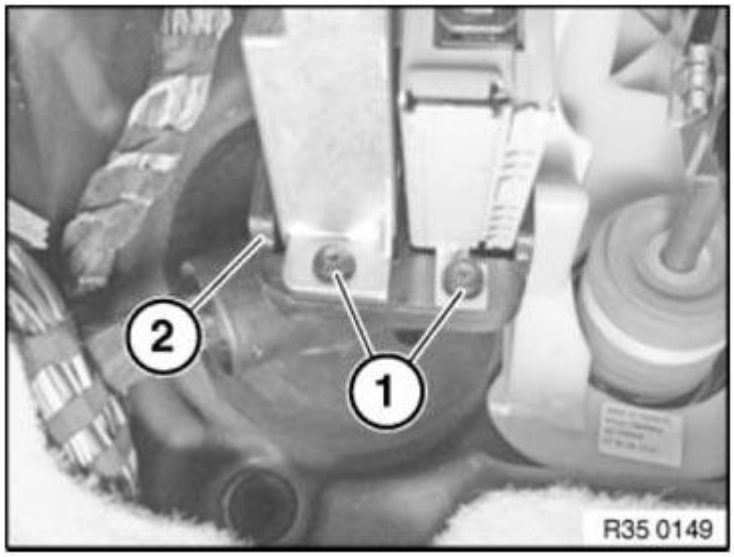


Fig. 1: Identifying Control Units Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Installation note:

Replace self-locking nut.

Tightening torque: see 2AZ in **35 11 PEDAL ASSEMBLY CONSOLE**

Remove bearing support (2).

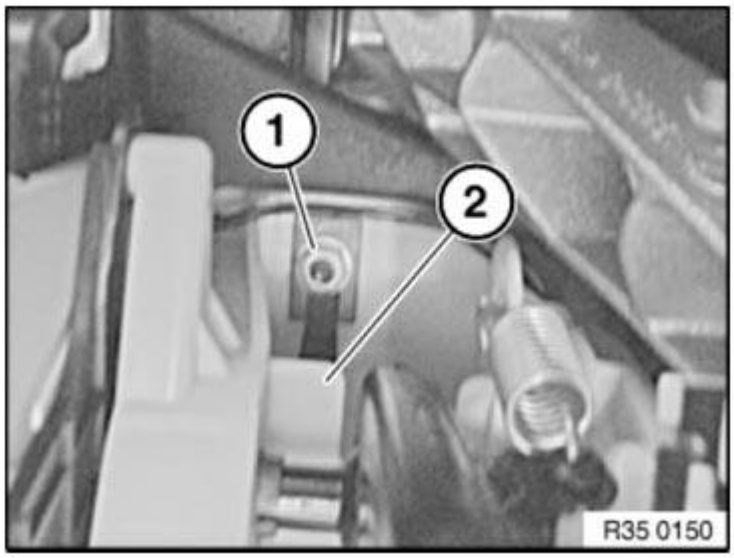


Fig. 2: Identifying Bearing Support And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1).

Disconnect plug connection (2).

Replacement:

- Modify brake light switch
- Modify holder for control units

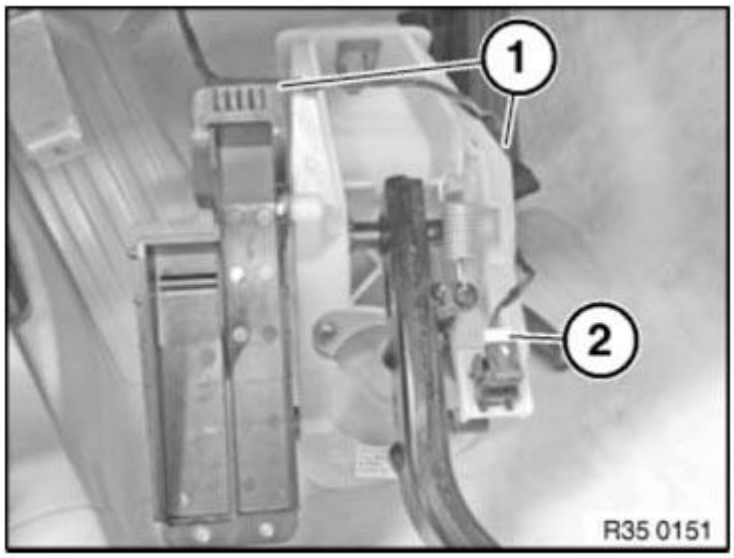


Fig. 3: Identifying Plug Connection And Line
Courtesy of BMW OF NORTH AMERICA, INC.

35 21 041 REPLACING SPRING FOR BRAKE PEDAL

Necessary preliminary tasks:

- Remove footwell trim on driver's side. See **TRIM (US ONLY)** or **TRIM (ECE ONLY)** .

Disconnect return spring (1).

NOTE: Check grommet (2) for damage, replace if necessary.

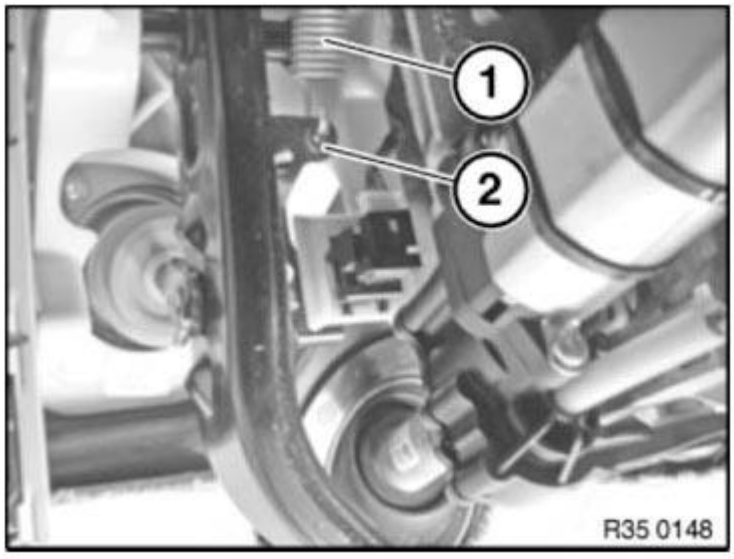


Fig. 4: Identifying Return Spring And Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

BRAKE PEDAL WITH LINKAGE

35 21 041 REPLACING SPRING FOR BRAKE PEDAL

Necessary preliminary tasks:

- Remove footwell trim on driver's side. See **TRIM (US ONLY)** or **TRIM (ECE ONLY)** .

Disconnect return spring (1).

NOTE: Check grommet (2) for damage, replace if necessary.

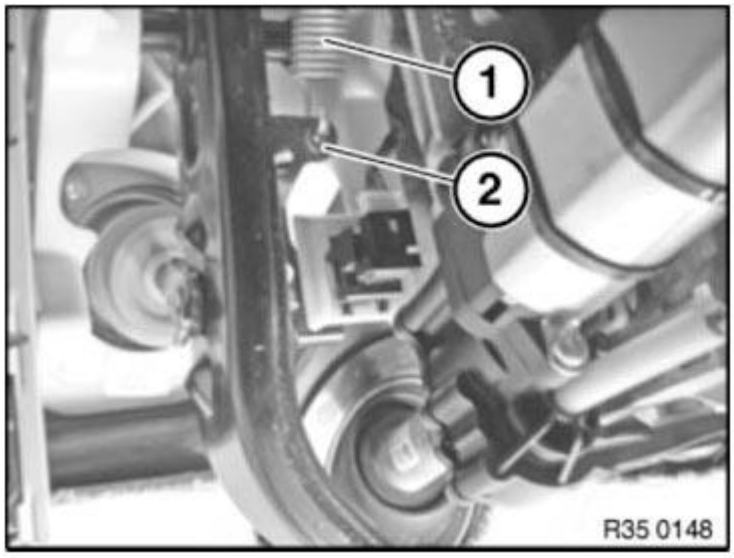


Fig. 5: Identifying Return Spring And Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

ACCELERATOR PEDAL ACTUATION

35 40 001 REMOVING AND INSTALLING OR REPLACING ACCELERATOR PEDAL MODULE

Take off cap.

Release screw.

Pull accelerator pedal module upwards out of fixture.

Installation note:

Tightening torque: see 1AZ in **35 40 PEDALS**

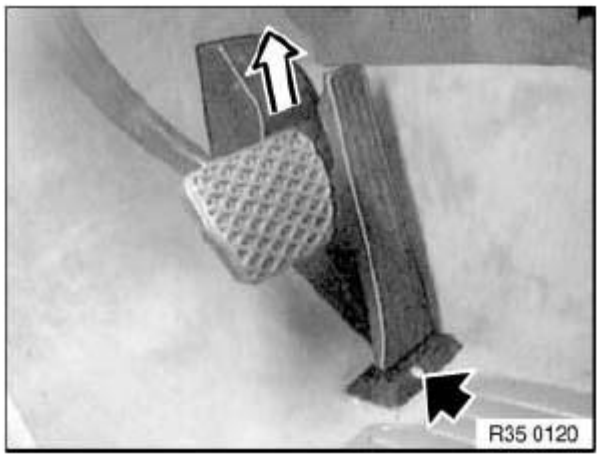


Fig. 6: Pulling Accelerator Pedal Module Upward Out Of Fixture
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off connector (1).

Remove accelerator pedal module.

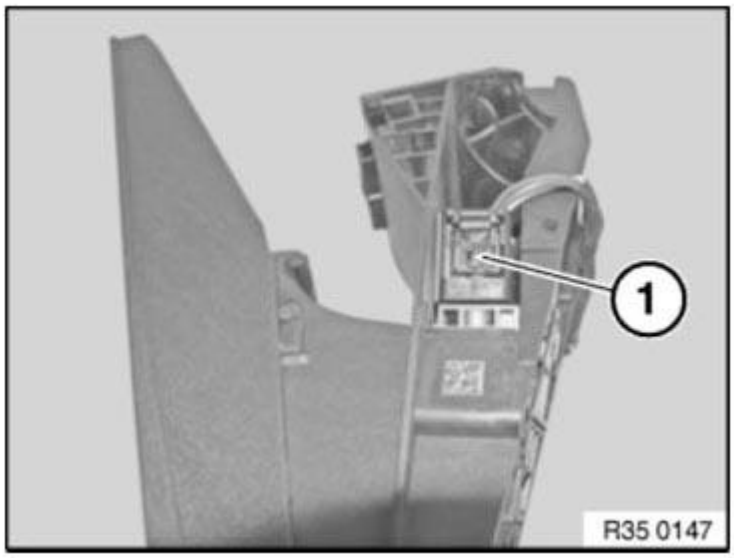


Fig. 7: Identifying Accelerator Pedal Module Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Accelerator pedal module can only be replaced completely with adapter plate.