

2007-08 SUSPENSION**Front Axle - Repair Instructions - X5****00 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!

Possible symptoms are:

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

Protective measures/rules of conduct:

- Wear protective 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.

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.

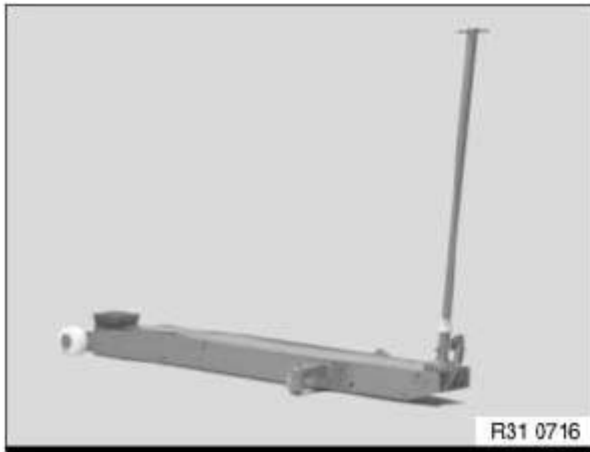


Fig. 1: Identifying Trolley Jack

Courtesy of BMW OF NORTH AMERICA, INC.

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 differential

Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

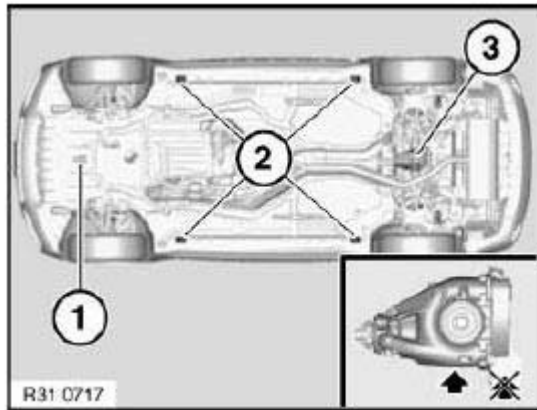
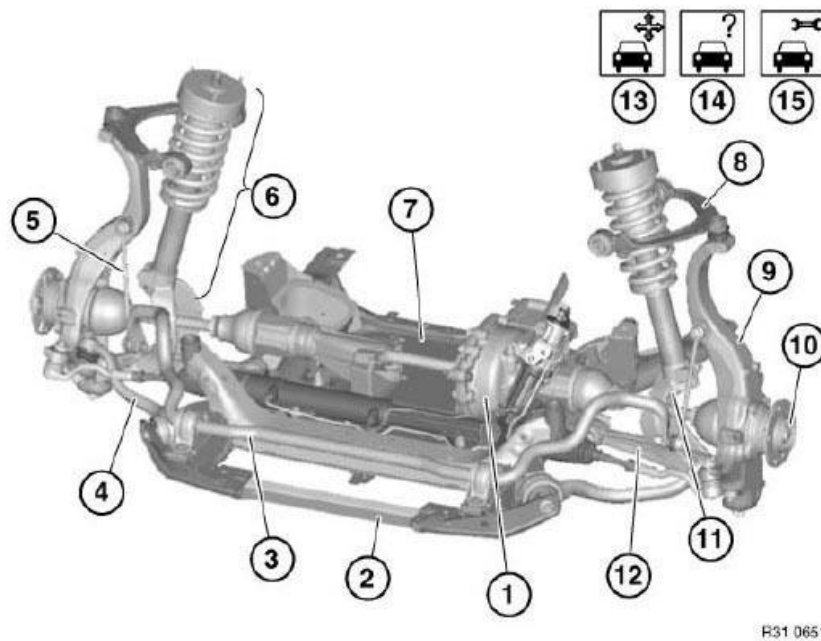


Fig. 2: Identifying Car Jacking Point, Side Car Jacking Point And Rear Differential
 Courtesy of BMW OF NORTH AMERICA, INC.

31 ... FRONT AXLE OVERVIEW



Safety precautions and general information

- | | | |
|----|---|----|
| 1 | <u>Overview of front differential/output shafts</u> | 11 |
| 2 | <u>Front axle support</u> | 12 |
| 3 | <u>Stabiliser</u> | 13 |
| 4 | <u>Tension strut / rubber mount</u> | 14 |
| 5 | <u>Stabilizer link</u> | 15 |
| 6 | <u>Layout of spring strut shock absorber</u> | |
| 7 | <u>Reinforcement plate</u> | |
| 8 | <u>Upper control arm</u> | |
| 9 | <u>Swivel bearing</u> | |
| 10 | <u>Wheel bearing</u> | |

Spring strut holder

Lower control arm / rubber mount

Adjustment work

Testing

Troubleshooting

Overview, active front steering

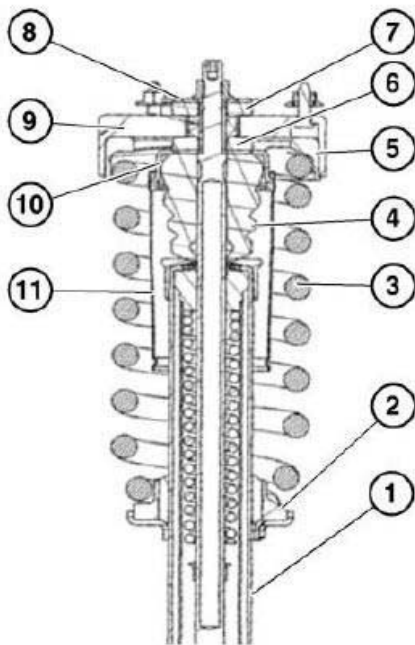
Overview, Dynamic Drive

Overview, vertical dynamics management

Fig. 3: Front Axle Overview

Courtesy of BMW OF NORTH AMERICA, INC.

31 ... LAYOUT OF SPRING STRUT SHOCK ABSORBER



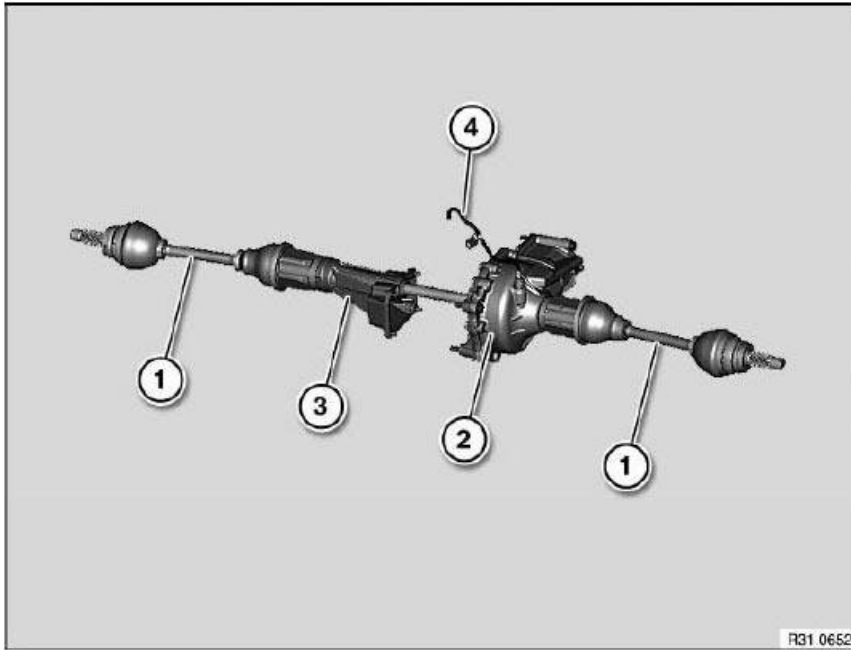
R31 0653

Safety precautions & general information

- | | | | |
|---|--------------------------------------|----|--------------------------------------|
| 1 | <u>Spring strut shock absorber</u> | 7 | <u>Support bearing upper section</u> |
| 2 | <u>Lower spring pad</u> | 8 | Joint seat |
| 3 | <u>Coil spring</u> | 9 | <u>Support bearing flange</u> |
| 4 | <u>Auxiliary damper</u> | 10 | Support pot |
| 5 | <u>Upper spring pad</u> | 11 | <u>Protective tube</u> |
| 6 | <u>Support bearing lower section</u> | | |

Fig. 4: Layout Of Spring Strut Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

31 ... OVERVIEW OF FRONT DIFFERENTIAL/OUTPUT SHAFTS



Safety precautions & general information

- | | | | |
|---|---|---|--------------------------------------|
| 1 | <u>Output shaft / gaiters</u> | 4 | Vent pipe |
| 2 | <u>Front differential</u> (incl. O-ring, shaft seals) | | |
| 3 | <u>Bearing block</u> (incl. O-ring, shaft seal) | | Change <u>front differential oil</u> |

Fig. 5: Overview Of Front Differential/Output Shafts
 Courtesy of BMW OF NORTH AMERICA, INC.

31 00 ... FRONT AXLE + STEERING: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

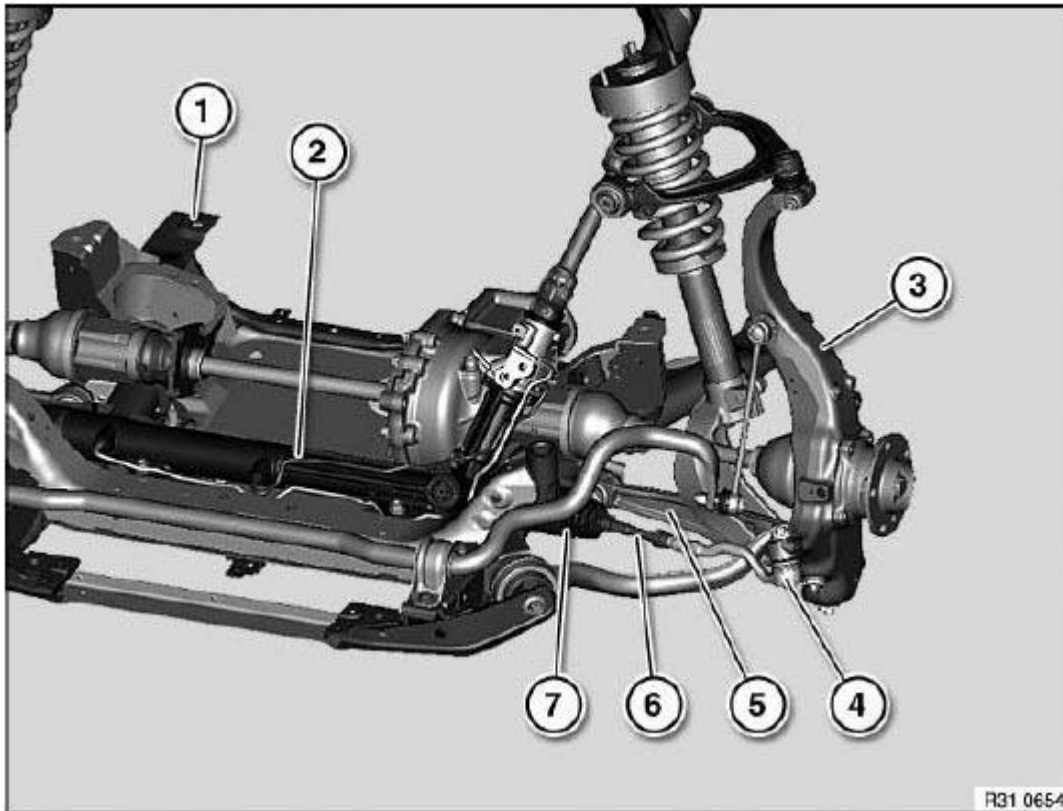


Fig. 6: Identifying Front Axle Components
Courtesy of BMW OF NORTH AMERICA, INC.

A wheel/chassis alignment check must be carried out after the following work. See **32 00 ... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE** .

- Release of following screw/bolt connections:
 - Steering gear to front axle carrier
 - Lower control arm to front axle carrier
 - Tie rod end to tie rod
- Replacement of following parts:
 1. Front axle carrier
 2. Steering gear
 3. Swivel bearing
 4. Tie rod end
 5. Lower control arm / rubber mount
 6. Tie rod
 7. Gaiter (if the tie rod end has to be screwed off)

Facts:

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.

Consequence:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as damaged parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

Shock absorbers may be replaced on one side only until they have completed 50 000 km service.

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 ALUMINUM)

Due to the chemical and corrosion characteristics of aluminum, always comply with the following points when handling aluminum 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

31 00 ... NOTES ON REPAIRING THREADS

IMPORTANT: Install Heli-coil thread inserts so that they are flush with the original thread.

NOTE: Damaged threads in engine carrier may be repaired with Heli-coil thread inserts. Comply with the procedure described in the example.



Fig. 7: Identifying Heli-coil Damaged Threads
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure:

1. Create a clean core hole; if necessary, drill out screw remnants

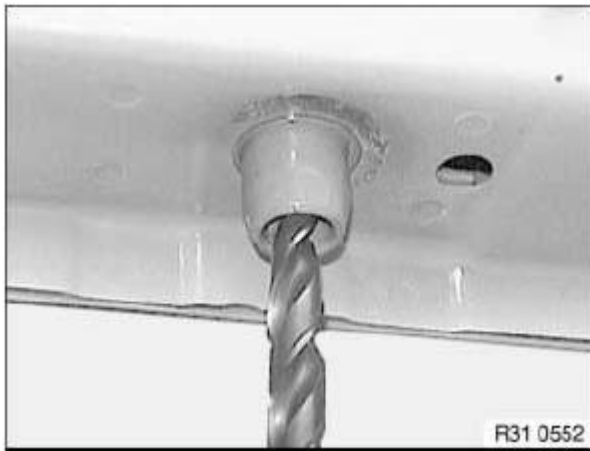


Fig. 8: Creating Clean Core Hole
Courtesy of BMW OF NORTH AMERICA, INC.

2. Create locating thread for Heli-coil thread insert



Fig. 9: Creating Locating Thread For Heli-coil
Courtesy of BMW OF NORTH AMERICA, INC.

3. Pick out Heli-coil thread insert in accordance with the table and screw into the locating thread until flush with the original thread. See **FRONT AXLE - TECHNICAL DATA** .

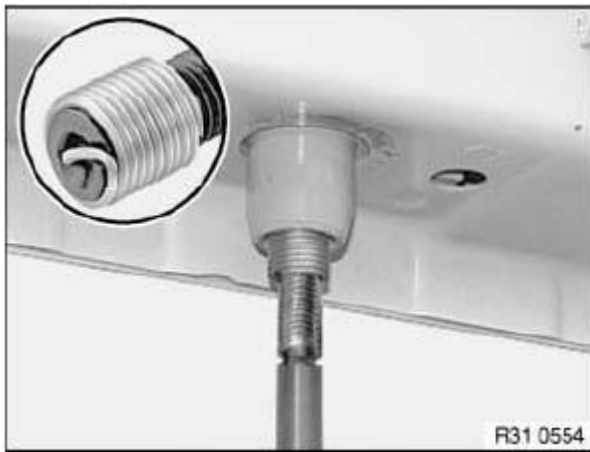


Fig. 10: Identifying Heli-coil Thread Insert
Courtesy of BMW OF NORTH AMERICA, INC.

4. Break drive pin and remove



Fig. 11: Identifying Drive Pin

Courtesy of BMW OF NORTH AMERICA, INC.

51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM

Special tools required:

- 00 2 261
- 00 2 262

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down. See 51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM .

WARNING: Observe the following directions and instructions when handling the 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.
5. Impact screwdrivers may not be used!

IMPORTANT: Risk of corrosion!

Touch up paintwork damage.
Re-establish wax layer.

Remove vehicle jack fixture with a suitable tool from side frame.

Installation:

Check fixture for damage, replace if necessary.

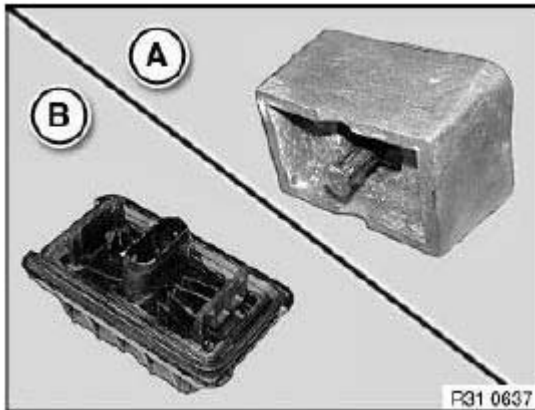


Fig. 12: Identifying Vehicle Jack Fixture
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Following states can be selected on special tool 00 2 261 .

- A. Vehicle unsecured
- B. Vehicle secured (after special tool is lashed to lifting platform arm)

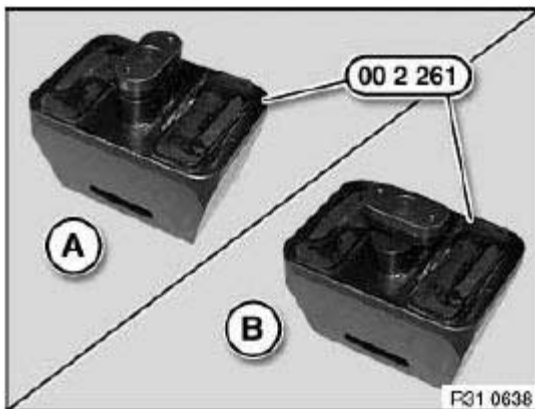


Fig. 13: Identifying Special Tool (00 2 261)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The following procedure must always be carried out on the left and right sides.

Insert special tool 00 2 261 into opening in side frame with 3/8" extension and secure ratchet to body. To do so, turn lock through 90° up to stop.

Check stopping of special tool 00 2 261 on side frame, correct attachment if necessary.

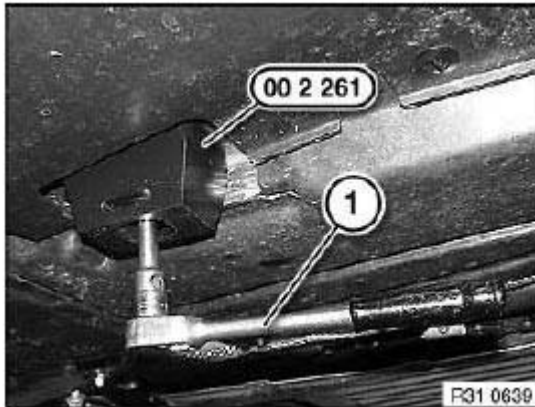


Fig. 14: Identifying Special Tool (00 2 261)

Courtesy of BMW OF NORTH AMERICA, INC.

Lash special tool 00 2 261 with tensioning strap 00 2 262 crosswise (as pictured) to lifting platform arm.

WARNING: Danger to life!

Carry out tensile and visual inspection of tensioning strap 00 2 262 , correct position if necessary.

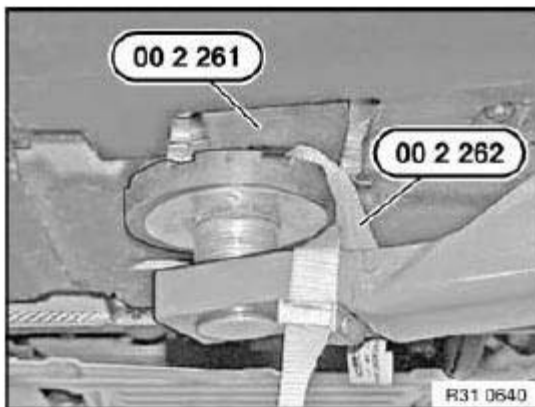


Fig. 15: Identifying Special Tool (00 2 262)

Courtesy of BMW OF NORTH AMERICA, INC.

10 FRONT AXLE SUSPENSION

31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE

IMPORTANT: Observe safety when raising the vehicle.

Driving without reinforcement plate is not permitted!

Release bolts (1) for assembly underside protection at front.

Release bolts (2).

Remove reinforcement plate (3).

Installation:

Replace screws.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

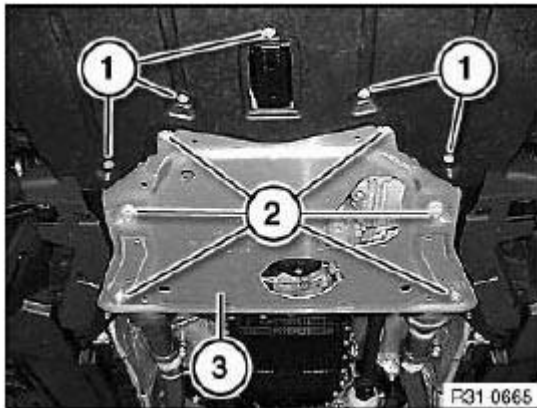


Fig. 16: Identifying Reinforcement Plate And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 490 REMOVING AND INSTALLING / REPLACING FRONT ASSEMBLY UNDERSIDE PROTECTION

NOTE: Illustration created using X5 3.0i as an example. There may be differences in detail in the case of other models.

Release screws (1).

Pull forward assembly underside protection (2) under bumper trim (3) and remove.

Installation:

Center underside protection (2) and tighten down screws (1).

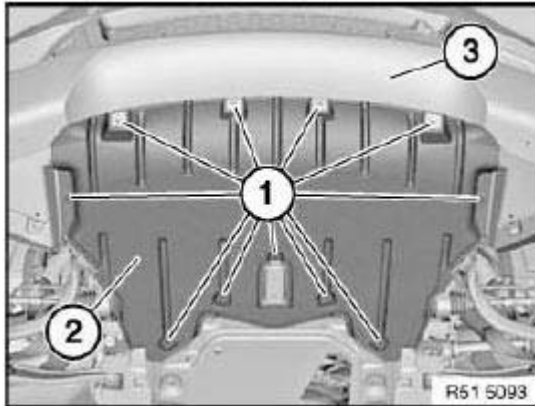


Fig. 17: Identifying Bumper Trim, Underside Protection And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION

NOTE: Illustration created using X5 3.0i as an example. There may be differences in detail in the case of other models.

Release screws (1) and remove underbody protection (2).

Installation:

Center underside protection (2) and tighten down screws (1).

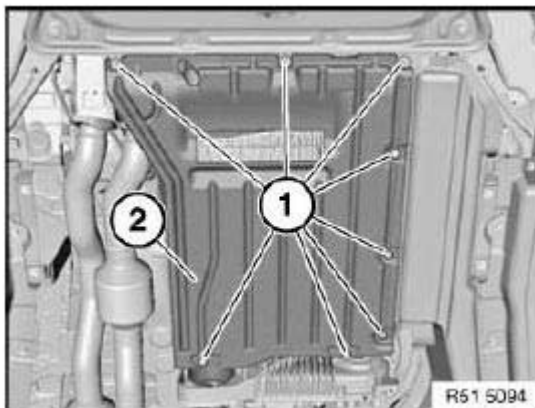


Fig. 18: Identifying Underbody Protection And Screws
 Courtesy of BMW OF NORTH AMERICA, INC.

11 FRONT SUB-FRAME

31 11 001 REPLACING FRONT AXLE CARRIER

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down. See 51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM .

Secure engine in installation position to prevent it from falling down. See 11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52) .

Necessary preliminary tasks:

- Lower front axle support . See 31 11 506 LOWERING/RAISING FRONT AXLE CARRIER (SPECIAL TOOL SWZ00-2040) or 31 11 506 LOWERING/RAISING FRONT AXLE CARRIER (UNIVERSAL LIFTER).
- Remove both lower control arms from front axle carrier . See 31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM.
- Remove both tension struts from front axle carrier . See 31 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT.

Remove both engine mounts from front axle carrier . See 22 11 001 REPLACING RIGHT ENGINE MOUNT (N62TU) and 22 11 110 REPLACING LEFT ENGINE SUPPORT ARM (N62TU) .

Take front axle carrier down and set down on a suitable surface.

Installation:

Use previous front axle carrier as a template for modifying or replacing small parts.

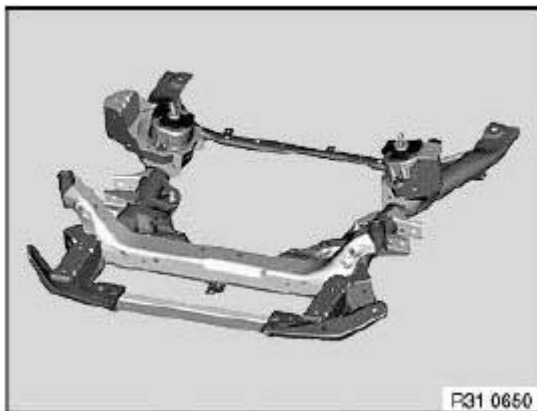


Fig. 19: Identifying Front Axle Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform CHASSIS ALIGNMENT CHECK
- Carry out steering angle sensor adjustment/adjustment for active front steering . See 32 10 005

ADJUSTMENT FOR ACTIVE FRONT STEERING and 61 31 996 CARRY OUT STEERING ANGLE SENSOR ADJUSTMENT .**31 11 506 LOWERING/RAISING FRONT AXLE CARRIER (SPECIAL TOOL SWZ00-2040)****Special tools required:**

- 00 2 030
- 00 2 040
- 31 4 051
- 31 4 100
- 31 4 170

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down. See 51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM .

Secure engine in installation position to prevent it from falling down. See 11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52) .

Necessary preliminary tasks:

- Mount securing fixture for vehicle on lifting platform. See **51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM** .
- Secure engine in installation position
- Remove front wheels

IMPORTANT: Use special tool to avoid preliminary damage to ball joint in upper control arm and the necessary removal of the swivel bearing.

Press plug on left and right out of spring strut dome.

Secure swivel bearing (1) on left and right with special tool 31 4 170 in installation position.

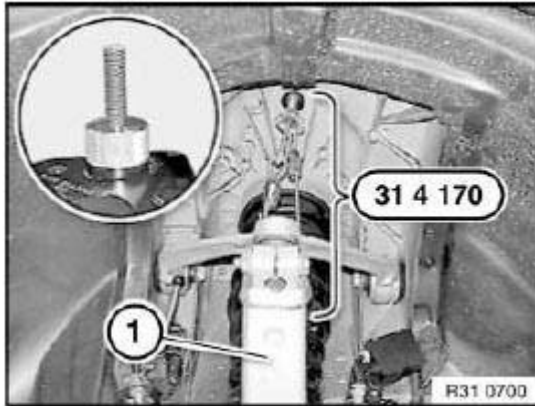


Fig. 20: Identifying Swivel Bearing And Special Tool (31 4 170)

Courtesy of BMW OF NORTH AMERICA, INC.

Remove underbody protection . See 51 47 490 REMOVING AND INSTALLING / REPLACING FRONT ASSEMBLY UNDERSIDE PROTECTION .

Remove steering gear cover at top left and right . See 51 71 ... REMOVING AND INSTALLING/REPLACING TOP LEFT STEERING GEAR COVER and 51 71 ... REMOVING AND INSTALLING/REPLACING TOP RIGHT STEERING GEAR COVER .

Remove reinforcement plate . See 31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE.

Remove lower control arm from spring strut holder . See 31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM.

Version with active steering:

Disconnect plug connection (1) and unclip line (2) from front axle carrier.

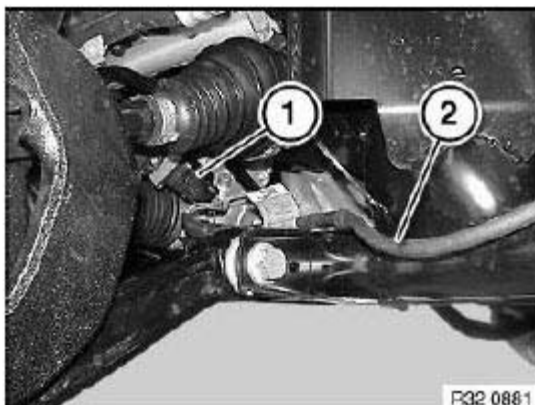


Fig. 21: Identifying Plug Connection And Unclip

Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and remove screws (1) towards bottom.

Tie up power steering gear (2).

Installation:

Replace screws and nuts.

Tightening torque. See **STEERING AND WHEEL ALIGNMENT - TIGHTENING TORQUES**.

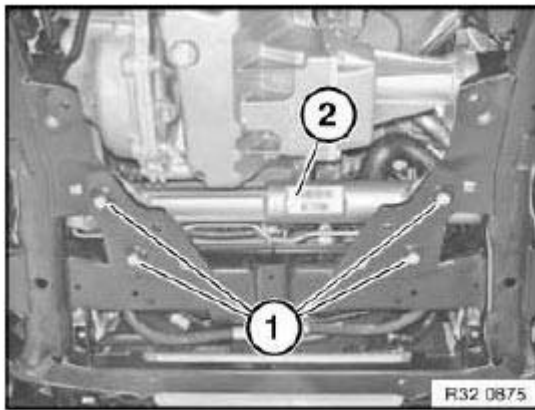


Fig. 22: Identifying Power Steering Gear And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, position special tool 00 2 040 with a 2nd person helping on workshop jack 00 2 030 .

Insert special tools 31 4 051 and 31 4 100 into corresponding mountings of special tool 00 2 040 .

Lower special tool 33 3 274.

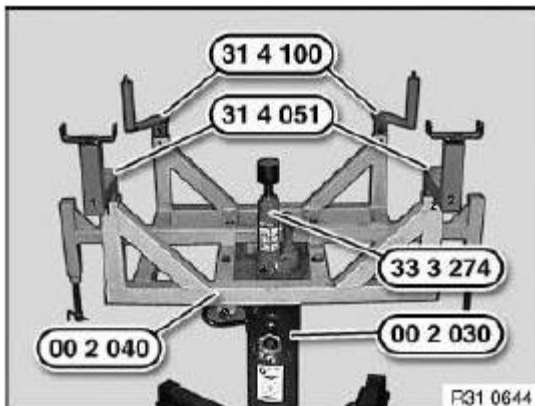


Fig. 23: Identifying Special Tool (00 2 040) (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The jacking points on the left side are shown.

Align special tools 31 4 051 and 31 4 100 to front axle carrier.

Support front axle carrier by operating workshop jack 00 2 030 .

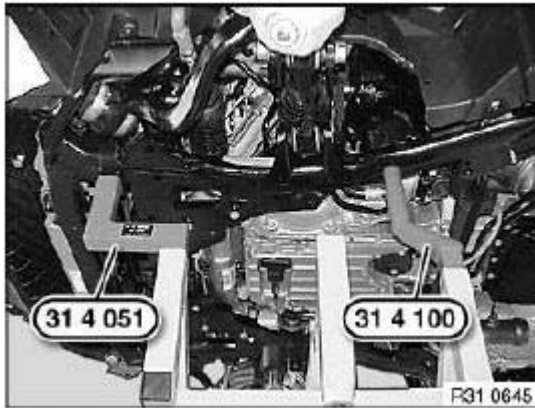


Fig. 24: Identifying Special Tool (31 4 051) (31 4100)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1, 2).

Installation:

Check threads for damage; if necessary, repair with Heli-coil thread inserts.

Tighten down first screws (1) and then screws (2).

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

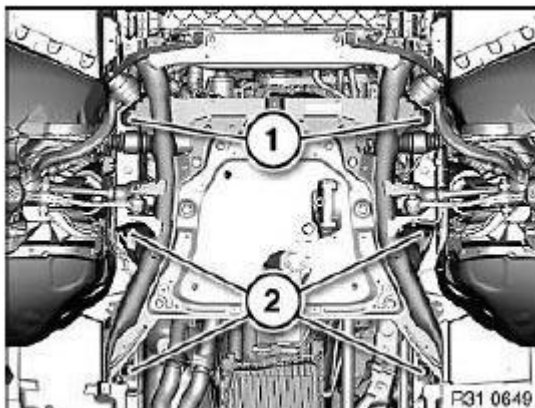


Fig. 25: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Follow operations must be carried out during lowering:

- Remove heat exchanger from front axle carrier and tie up. See 17 22 010 REMOVING AND INSTALLING/REPLACING HEAT EXCHANGER FOR AUTOMATIC TRANSMISSION (N52K) .
- Remove stabilizer (conventional) from front axle carrier and tie back. See 31 35 000 REMOVING AND INSTALLING/REPLACING FRONT STABILIZER.
- Disconnect all hydraulic lines from front axle carrier and tie back
- Remove both control lines (for front axle oscillating motor) on retaining bars of active stabilizer and tie back
- Version with active front steering: Expose connecting line up to power steering gear and tie back

Lower front axle carrier.

After installation:

- Perform CHASSIS ALIGNMENT CHECK
- Carry out steering angle sensor adjustment/adjustment for active front steering . See 32 10 005 ADJUSTMENT FOR ACTIVE FRONT STEERING and 61 31 996 CARRY OUT STEERING ANGLE SENSOR ADJUSTMENT .

31 11 506 LOWERING/RAISING FRONT AXLE CARRIER (UNIVERSAL LIFTER)**Special tools required:**

- 00 2 030
- 31 2 255
- 31 2 256
- 31 4 170
- 31 5 250
- 31 5 255
- 31 5 256

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down. See 51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM .

Secure engine in installation position to prevent it from falling down. See 11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52) .

- Mount securing fixture for vehicle on lifting platform. See **51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM** .
- Secure engine in installation position
- Remove front wheels

IMPORTANT: Use special tool to avoid preliminary damage to ball joint in upper control arm and the necessary removal of the swivel bearing.

Press plug on left and right out of spring strut dome.

Secure swivel bearing (1) on left and right with special tool 31 4 170 in installation position.

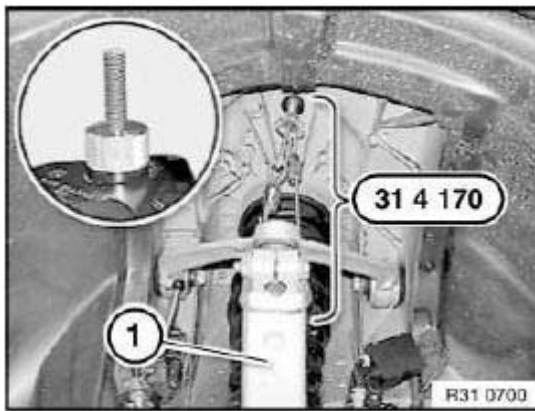


Fig. 26: Identifying Swivel Bearing And Special Tool (31 4 170)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove underbody protection. . See **51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION**.

Remove steering gear cover at top left and right . See **51 71 ... REMOVING AND INSTALLING/REPLACING TOP LEFT STEERING GEAR COVER** and **51 71 ... REMOVING AND INSTALLING/REPLACING TOP RIGHT STEERING GEAR COVER** .

Remove reinforcement plate . See **31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE**.

Remove lower control arm from spring strut holder . See **31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM**.

Version with active steering:

Disconnect plug connection (1) and unclip line (2) from front axle carrier.

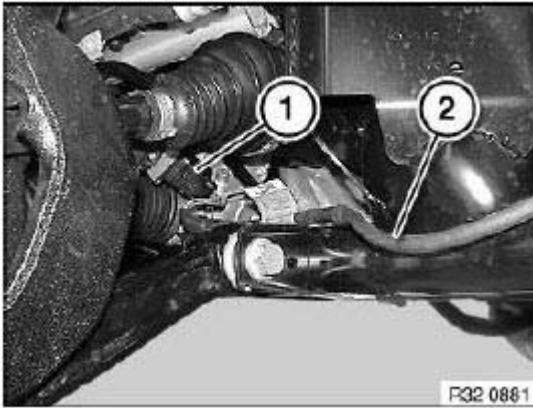


Fig. 27: Identifying Plug Connection And Unclip Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and remove screws (1) towards bottom.

Tie up power steering gear (2).

Installation:

Replace screws and nuts.

Tightening torque. See **STEERING AND WHEEL ALIGNMENT - TIGHTENING TORQUES**.

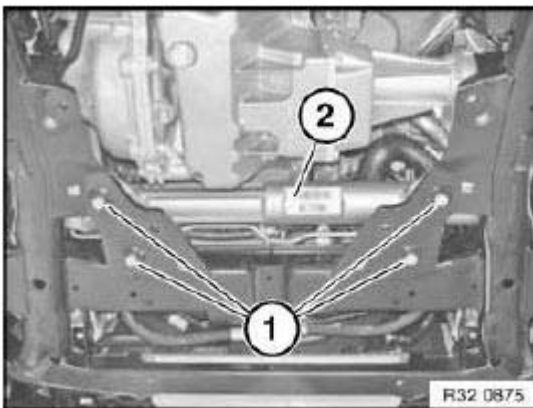


Fig. 28: Identifying Power Steering Gear And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Engage special tool 31 5 250 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 5 256 in telescopic supports of other profile rail pair.

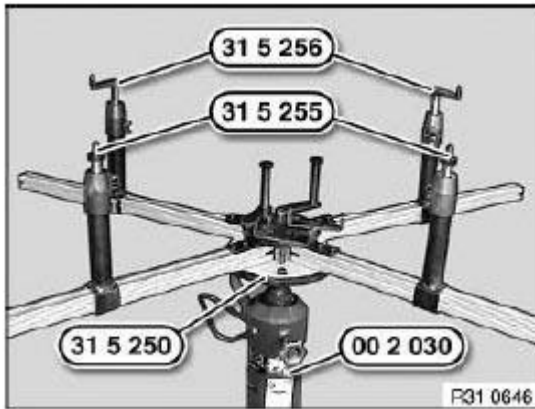


Fig. 29: Identifying Special Tool (31 5 250) (31 5 256)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The jacking points on the left side are shown.

Align special tools 31 2 255 and 31 2 256 to front axle carrier.

Support front axle carrier by operating workshop jack 00 2 030 .

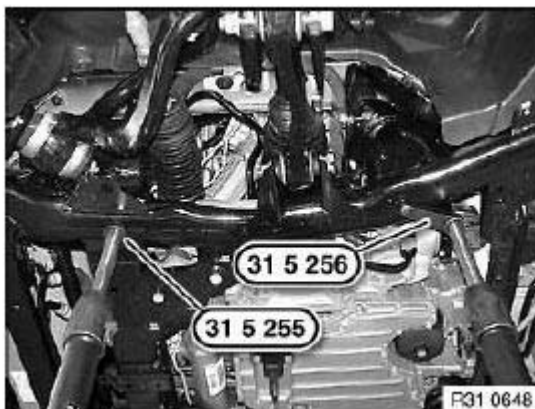


Fig. 30: Identifying Special Tool (31 5 256) (31 5 255)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1, 2).

Installation:

Check threads for damage; if necessary, repair with Heli-coil thread inserts.

Tighten down first screws (1) and then screws (2).^{229 of 3160}

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

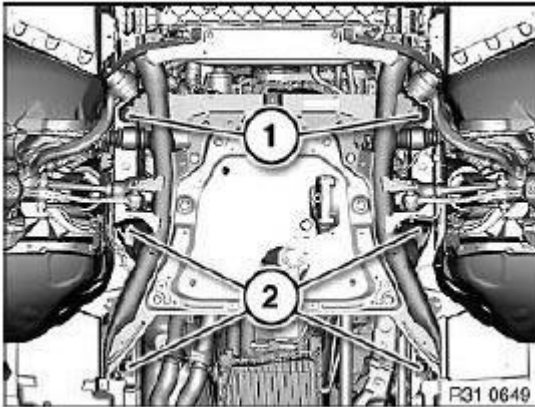


Fig. 31: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Follow operations must be carried out during lowering:

- Remove heat exchanger from front axle carrier and tie up. See **17 22 010 REMOVING AND INSTALLING/REPLACING HEAT EXCHANGER FOR AUTOMATIC TRANSMISSION (N52K)** .
- Remove stabilizer (conventional) from front axle carrier and tie back. See **31 35 000 REMOVING AND INSTALLING/REPLACING FRONT STABILIZER**.
- Disconnect all hydraulic lines from front axle carrier and tie back
- Remove both control lines (for front axle oscillating motor) on retaining bars of active stabilizer and tie back
- Version with active front steering: Expose connecting line up to power steering gear and tie back

Lower front axle carrier.

After installation:

- Perform **CHASSIS ALIGNMENT CHECK**
- Carry out steering angle sensor adjustment/adjustment for active front steering . See **32 10 005 ADJUSTMENT FOR ACTIVE FRONT STEERING** and **61 31 996 CARRY OUT STEERING ANGLE SENSOR ADJUSTMENT** .

12 STRUTS W. RUBBER MOUNTS

31 12 002 REMOVING AND INSTALLING/REPLACING TOP LEFT CONTROL ARM

Special tools required:

- 31 5 220

WARNING: Danger to life!

Secure engine in installation position to prevent it from falling down. See **11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)** .

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.

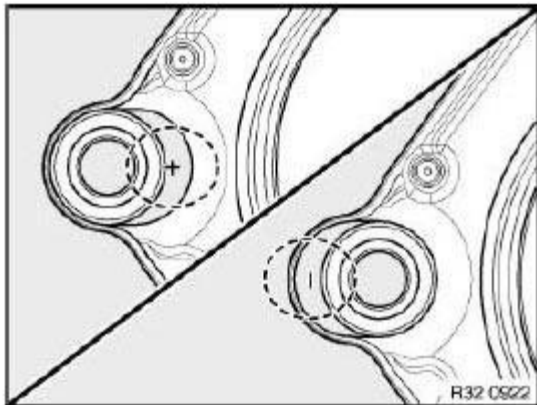


Fig. 32: Identifying Underdimension And Overdimension Variant Marking On Control Arms
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Mount securing fixture for vehicle on lifting platform . See **51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM** .
- Remove left partition wall for equipment compartment . See **51 71 ... REMOVING AND INSTALLING/REPLACING ASSEMBLY COMPARTMENT PARTITION WALL** .
- Detach coolant expansion tank and place to one side. See **17 11 100 REMOVING AND INSTALLING/REPLACING COOLANT EXPANSION TANK (N62TU/N52K)** .

NOTE: Level switch can slip out of the coolant expansion tank in the process.

- Remove front wheel

Unscrew nuts (1).

Installation:

Replace self-locking nuts.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

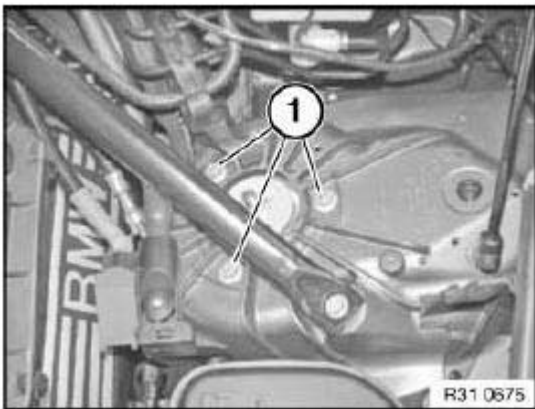


Fig. 33: Identifying Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Remove jointed rod (2) from upper control arm (3).

Installation:

Replace self-locking nut.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

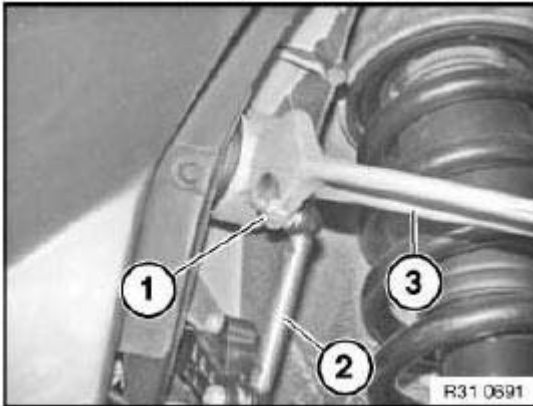


Fig. 34: Identifying Jointed Rod, Upper Control Arm And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 31 5 220 to drive flange with wheel studs.

Support swivel bearing with special tool 31 5 220 and workshop jack.

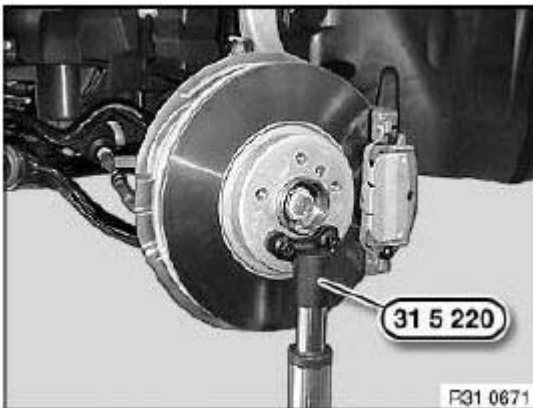


Fig. 35: Identifying Special Tool (31 5 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut (1) and remove screw (2).

Installation:

Keep control arm to swivel bearing connection clean and free from oil and grease.

Note insertion direction of screw.

Screw must rest correctly in groove of ball stud.

Replace self-locking nut.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

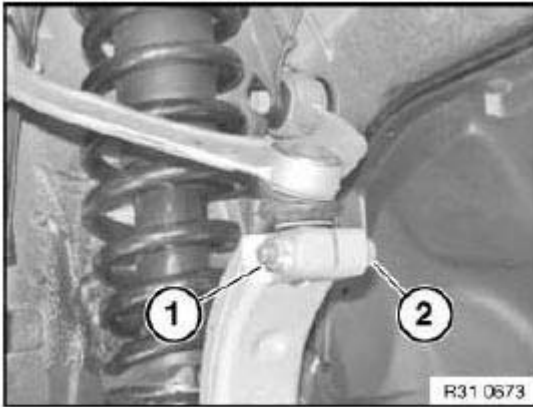


Fig. 36: Identifying Screw And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts of screws (1).

Remove screws (1); if necessary, lower/raise swivel bearing and spring strut using workshop jack.

Remove control arm (2) from swivel bearing.

Installation:

Replace screws and nuts.

Tighten screw connection in normal position .

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .



Fig. 37: Identifying Control Arm And Screws
Courtesy of BMW OF NORTH AMERICA, INC. 34 of 3160

After installation:

- Carry out ride-height-calibration . See **37 12 012 CARRYING OUT RIDE-HEIGHT-CALIBRATION** .

31 12 003 REMOVING AND INSTALLING / REPLACING TOP RIGHT CONTROL ARM**WARNING: Danger to life!**

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down. See 51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM .

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.

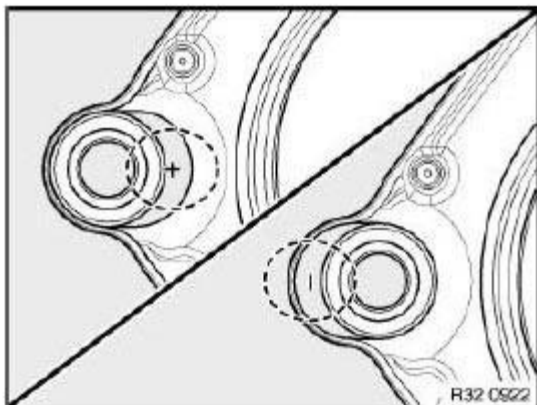


Fig. 38: Identifying Underdimension And Overdimension Variant Marking On Control Arms
 Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Mount securing fixture for vehicle on lifting platform . See **51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM** .
- Remove right partition wall for equipment compartment . See **51 71 ... REMOVING AND INSTALLING/REPLACING ASSEMBLY COMPARTMENT PARTITION WALL** .
- Remove rear right wheel arch cover . See **51 71 041 REMOVING AND INSTALLING/REPLACING**

REAR LEFT OR RIGHT WHEEL ARCH COVER .

Release bolts (1).

Remove auxiliary part (2).

Installation:

When installing, make wiring harness penetration (3) is in correct position.

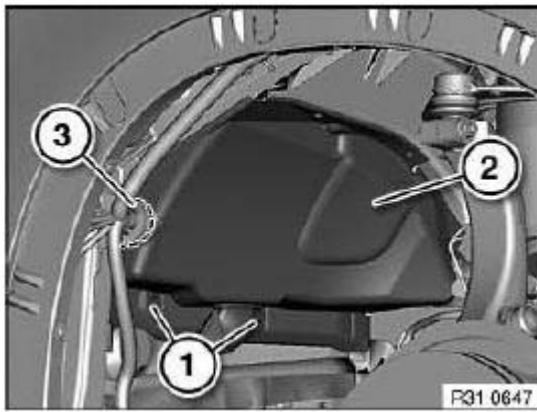


Fig. 39: Identifying Auxiliary Part, Wiring Harness Penetration And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Further procedure is identical to **31 12 002 REMOVING AND INSTALLING/REPLACING TOP LEFT CONTROL ARM.**

31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM

Special tools required:

- 31 2 240
- 31 2 247
- 31 5 220

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down. See 51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM .

NOTE: If the lower control arm is detached from the front axle carrier, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks:

- Remove front wheel
- Remove steering gear cover at side bottom . See **51 71 ... REMOVING AND INSTALLING/REPLACING BOTTOM LEFT OR RIGHT STEERING GEAR COVER** .

Secure special tool 31 5 220 to drive flange with wheel studs.

Support swivel bearing with special tool 31 5 220 and workshop jack.

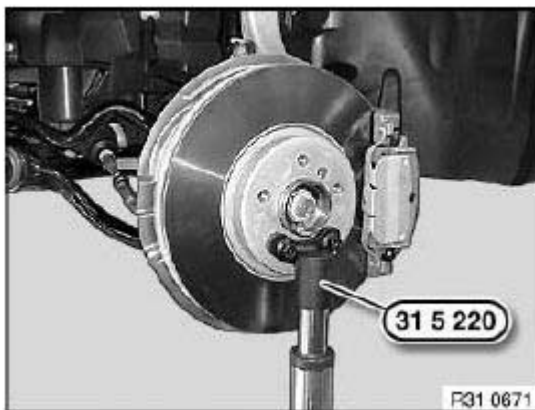


Fig. 40: Identifying Special Tool (31 5 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove screw (2).

Installation:

Replace screw and nut.

Note insertion direction of screw.

Tighten bolt connection in normal position .

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

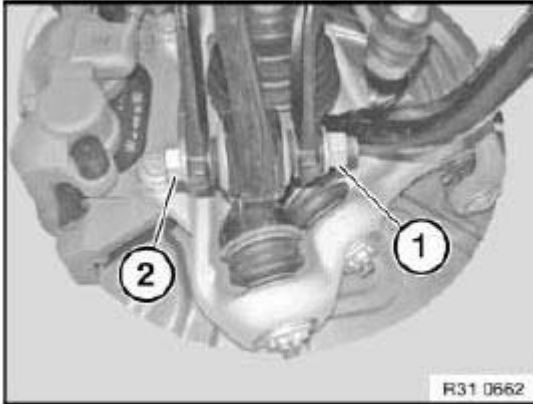


Fig. 41: Identifying Nut And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Remove screw (2) and remove control arm (3) from front axle carrier.

Installation:

Note insertion direction of screw.

Replace self-locking nut.

Tighten screw connection in normal position.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

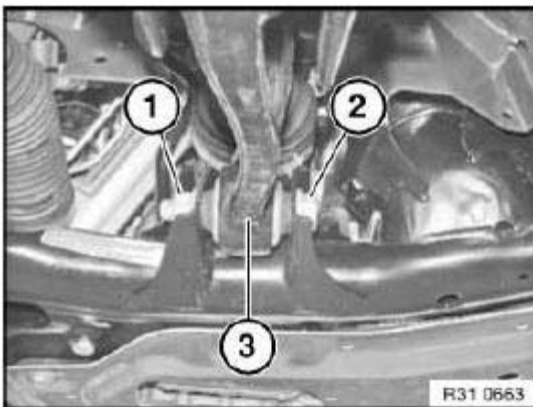


Fig. 42: Identifying Control Arm, Nut And Screw

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not release control arm from swivel bearing with impact tool. Make sure special tool rests correctly on steel bushing of swivel bearing. The

**swivel bearing must be removed if the steel bushing moves.
Rubber gaiter of control arm must not be damaged!
Do not pull stainless steel ring off journal.**

Slacken nut (1) two to three thread turns.

If necessary, replace lower section 31 2 242 with lower section 31 2 247 .

Press control arm (2) with special tool 31 2 240 off swivel bearing.

Unscrew nut (1) and remove control arm (2) from swivel bearing.

Installation:

Keep control arm to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

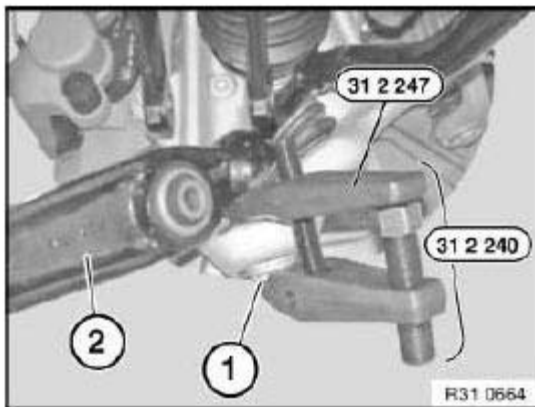


Fig. 43: Identifying Control Arm, Nut And Special Tool (31 2 247)

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform **CHASSIS ALIGNMENT CHECK**
- Carry out steering angle sensor adjustment/adjustment for active front steering . See **32 10 005 ADJUSTMENT FOR ACTIVE FRONT STEERING** and **61 31 996 CARRY OUT STEERING ANGLE SENSOR ADJUSTMENT** .

31 12 007 REPLACING RUBBER MOUNTS FOR FRONT AXLE CARRIER IN BOTH LOWER CONTROL ARMS

Special tools required:

- 31 4 151
- 31 4 152
- 31 4 153

IMPORTANT: For reasons of driving dynamics, the rubber mounts may only be replaced in pairs (refers to left and right control arms)!

Necessary preliminary tasks:

- Check ball joint of both control arms while installed, replace lower control arm if necessary. See **31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM.**
- Remove both lower control arms . See **31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM.**

Press rubber mount with special tools 31 4 151 and 31 4 152 out of control arm.

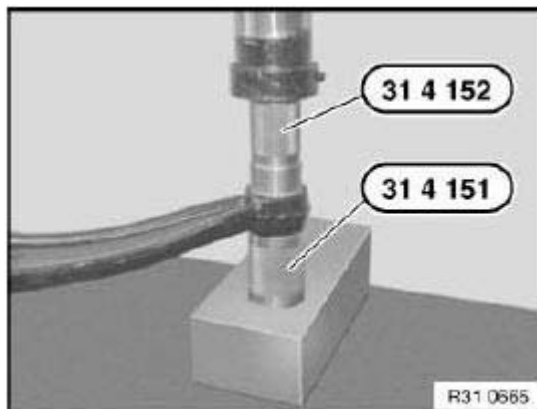


Fig. 44: Identifying Reinforcement Plate And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Use rubber mount with spline teeth (1)!

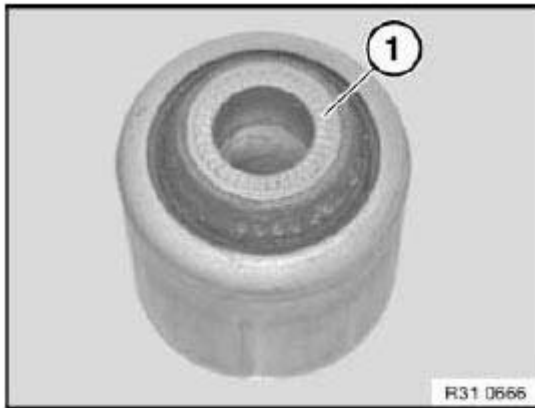


Fig. 45: Identifying Spline Teeth

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep rubber mount (1) and bushing in control arm clean and free from oil and grease.

Press rubber mount (1) (from chamfered end of control arm bushing) with special tools 31 4 152 and 31 4 153 into control arm bushing as far as it will go.

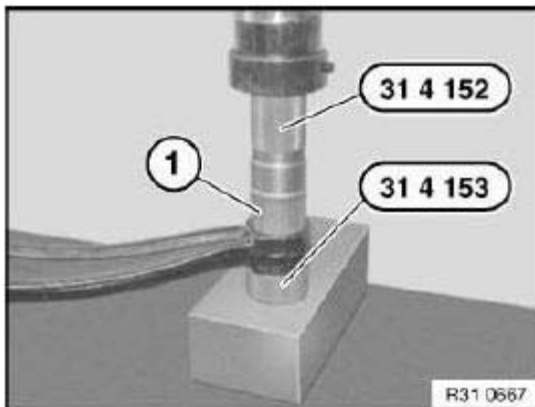


Fig. 46: Identifying Rubber Mount And Special Tool (31 4 153)

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform **CHASSIS ALIGNMENT CHECK**
- Carry out steering angle sensor adjustment/adjustment for active front steering . See **32 10 005 ADJUSTMENT FOR ACTIVE FRONT STEERING** and **61 31 996 CARRY OUT STEERING ANGLE SENSOR ADJUSTMENT** .

Special tools required:

- 31 4 151
- 31 4 152
- 31 4 154

IMPORTANT: For reasons of driving dynamics, the rubber mounts may only be replaced in pairs (refers to left and right control arms)!

Necessary preliminary tasks:

- Check ball joint of both control arms while installed, replace lower control arm if necessary. See **31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM.**
- Remove both lower control arms . See **31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM.**

Press rubber mount with special tools 31 4 151 and 31 4 152 out of control arm.

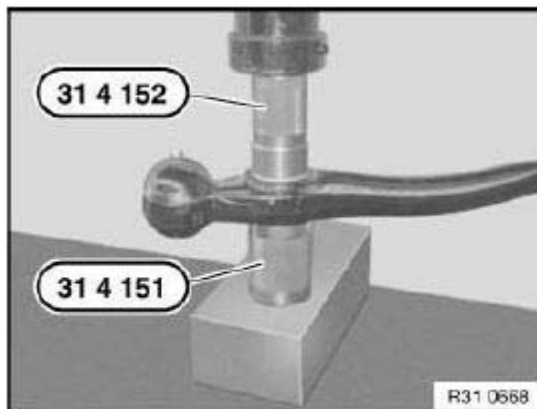


Fig. 47: Identifying Special Tool (31 4 152)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep rubber mount (1) and bushing in control arm clean and free from oil and grease.

Press rubber mount (1) (from chamfered end of control arm bushing) with special tools 31 4 152 and 31 4 154 into control arm bushing as far as it will go.

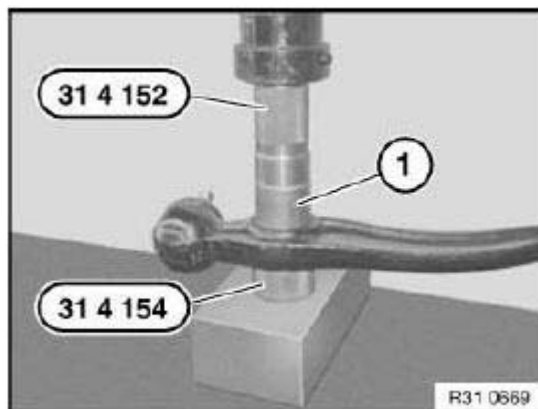


Fig. 48: Identifying Special Tool (31 4 154)

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform **CHASSIS ALIGNMENT CHECK**
- Carry out steering angle sensor adjustment/adjustment for active front steering . See **32 10 005 ADJUSTMENT FOR ACTIVE FRONT STEERING** and **61 31 996 CARRY OUT STEERING ANGLE SENSOR ADJUSTMENT** .

31 12 043 REMOVING AND INSTALLING/REPLACING COMPLETE FRONT LEFT OR RIGHT SPRING STRUT HOLDER

Special tools required:

- 31 2 230
- 31 5 220

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down. See 51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM .

Necessary preliminary tasks:

- Mount securing fixture for vehicle on lifting platform . See **51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM** .
- Remove front wheel
- Remove stabilizer link from swivel bearing . See **31 35 005 REMOVING AND INSTALLING/REPLACING PUSH ROD (STABILIZER LINK) FOR LEFT/RIGHT STABILIZER**.

and workshop jack.

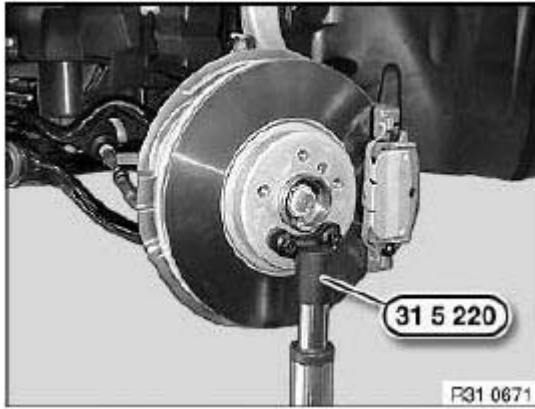


Fig. 49: Identifying Special Tool (31 5 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut (1) and remove screw (2).

Installation:

Keep control arm to swivel bearing connection clean and free from oil and grease.

Note insertion direction of screw.

Screw must rest correctly in groove of ball stud.

Replace self-locking nut.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

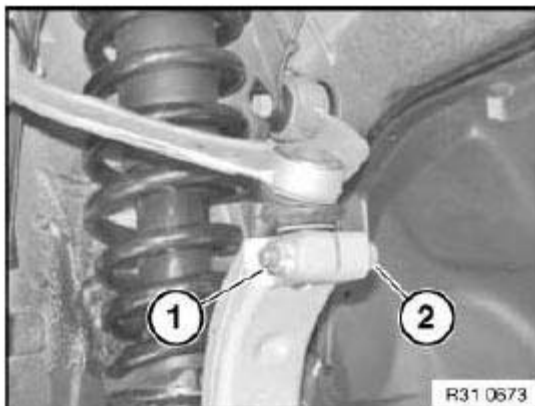


Fig. 50: Identifying Screw And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To be able to lower the swivel bearing far enough, it is necessary to align the output shaft so that one of the marked surfaces (1) points upwards.

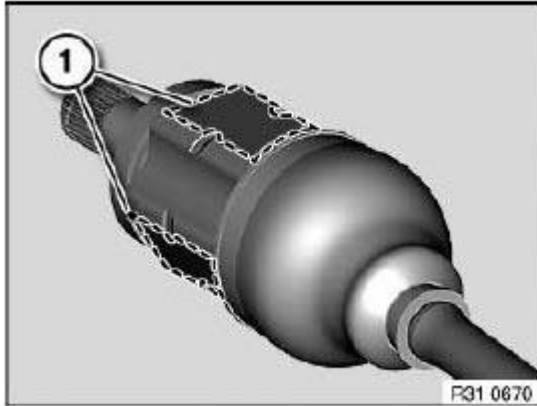


Fig. 51: Identifying Output Shaft Marked Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (2) and remove with holder (1).

Expand spring strut holder (3) with special tool 31 2 230 .

Release nut (5) and remove screw (4).

Lower swivel bearing until spring strut holder (3) is below spring strut.

Remove spring strut holder (3), taking care not to damage the output shaft.

Installation:

Keep spring strut holder to spring strut connection clean and free from oil and grease.

Version with Vertical Dynamics Management: Align spring strut holder by way of gap to positioning pin on back of spring strut.

Release bolt (4) and nut (5).

Note insertion direction of bolt (4).

Tighten down first bolt (4) and then bolt (2) in normal position.

Tighten spring strut.

Tighten lower control arm.

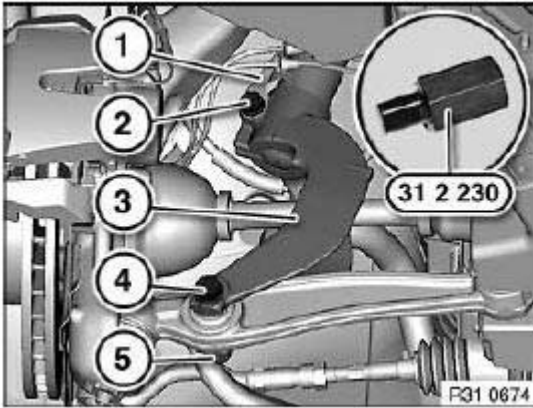


Fig. 52: Identifying Holder, Nut, Bolt And Special Tool (31 2 230)

Courtesy of BMW OF NORTH AMERICA, INC.

31 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT

Special tools required:

- 31 2 240
- 31 2 247

Necessary preliminary tasks:

- Remove front wheel
- Remove front assembly underside protection . See **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT ASSEMBLY UNDERSIDE PROTECTION.**
- Remove steering gear cover at side bottom . See **51 71 ... REMOVING AND INSTALLING/REPLACING BOTTOM LEFT OR RIGHT STEERING GEAR COVER .**

Release bolts (1).

Remove front wheel arch cover (2) from bumper trim.

Installation:

Make sure wheel arch cover is in correct position.

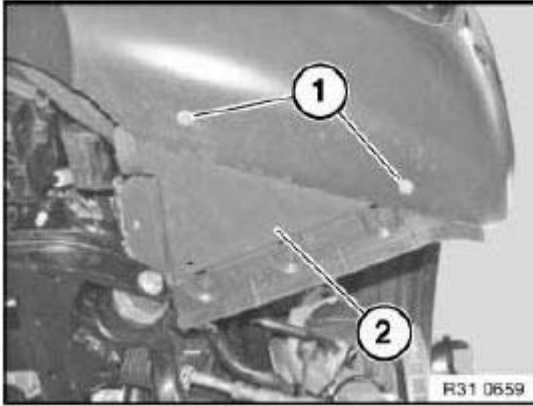


Fig. 53: Identifying Front Wheel Arch Cover And Bolts
 Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove screw (2).

Remove tension strut (3) from front axle carrier.

Installation:

Replace screw and nut.

Tighten bolt connection in normal position.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

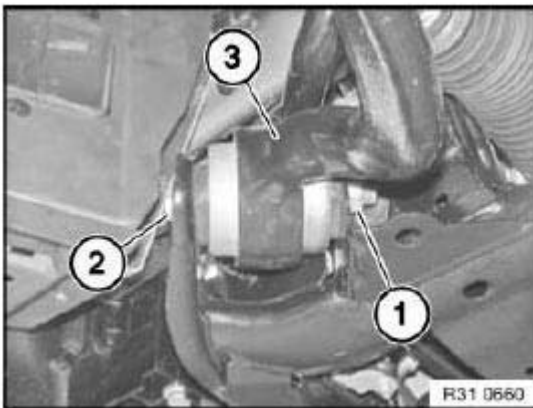


Fig. 54: Identifying Tension Strut, Nut And Screw
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not release tension strut from swivel bearing with impact tool.
 Make sure special tool rests correctly on steel bushing of swivel bearing. 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.

Slacken nut (1) two to three thread turns.

If necessary, replace lower section 31 2 242 with lower section 31 2 247 .

Press tension strut (2) with special tool 31 2 240 off swivel bearing.

Unscrew nut (1) and remove tension strut (2) from swivel bearing.

Installation:

Keep tension strut to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

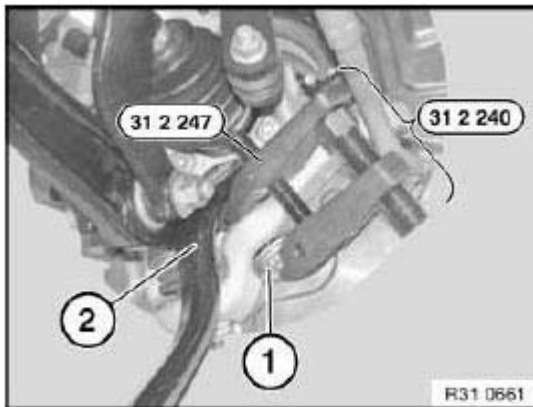


Fig. 55: Identifying Tension Strut, Nut And Special Tool (31 2 247)

Courtesy of BMW OF NORTH AMERICA, INC.

31 12 138 REPLACING RUBBER MOUNTS ON BOTH TENSION STRUTS**Special tools required:**

- 31 3 032
- 33 3 322

Necessary preliminary tasks:

- Check wheel control joints of tension struts while installed, replace tension struts if necessary. See **31 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT**.
- Remove tension struts . See **31 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR**

RIGHT TENSION STRUT.

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 bushing.

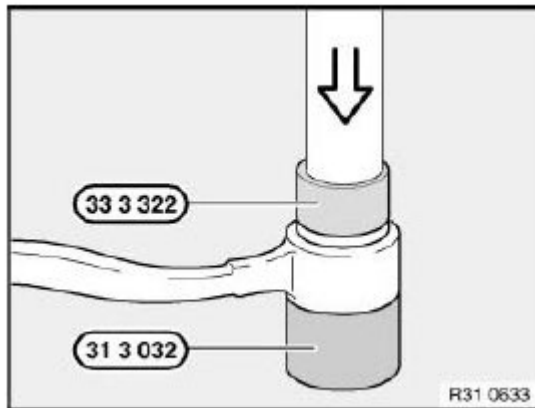


Fig. 56: Identifying Special Tool (33 3 322)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep rubber mount and bushing in tension strut clean and free from grease.

Align rubber mounts to each other using markings and press in. The deviation (A) must not exceed $\pm 5^\circ$.

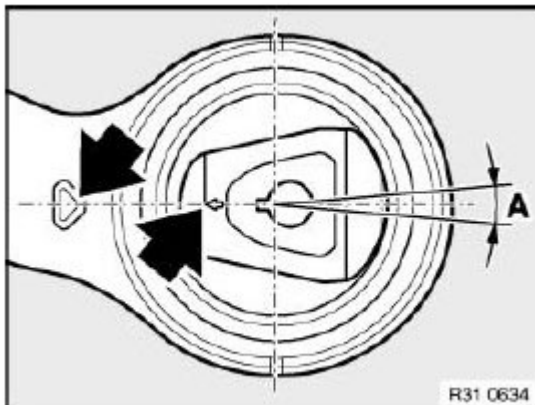


Fig. 57: Aligning Rubber Mounts Using Markings
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Protrusion (A) equally large.

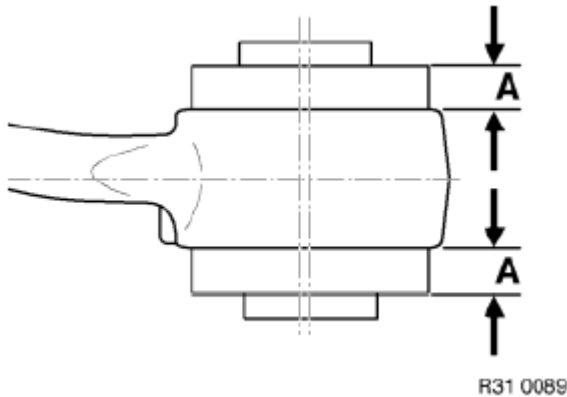


Fig. 58: Identifying Protrusion

Courtesy of BMW OF NORTH AMERICA, INC.

21 WHEEL BEARINGS AND STU

31 21 090 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SWIVEL BEARING

Necessary preliminary tasks:

- Remove wheel bearing . See 31 21 180 REPLACING BEARING (WHEEL BEARING) FOR FRONT WHEEL.

IMPORTANT: Secure swivel bearing against falling out.

Replacement only: Remove brake anchor plate/brake guard plate . See 34 11 250 REMOVING AND INSTALLING / REPLACING A BRAKE CARRIER / BRAKE GUARD PLATE AT FRONT .

Remove stabilizer link from swivel bearing . See 31 35 005 REMOVING AND INSTALLING/REPLACING PUSH ROD (STABILIZER LINK) FOR LEFT/RIGHT STABILIZER.

Remove upper control arm from swivel bearing . See 31 12 002 REMOVING AND INSTALLING/REPLACING TOP LEFT CONTROL ARM and 31 12 003 REMOVING AND INSTALLING / REPLACING TOP RIGHT CONTROL ARM.

Remove tension strut from swivel bearing . See 31 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT.

Remove tie rod end from swivel bearing . See 32 21 151 REPLACING LEFT OR RIGHT TIE ROD .

Remove lower control arm from swivel bearing . See 31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM.

Remove swivel bearing.

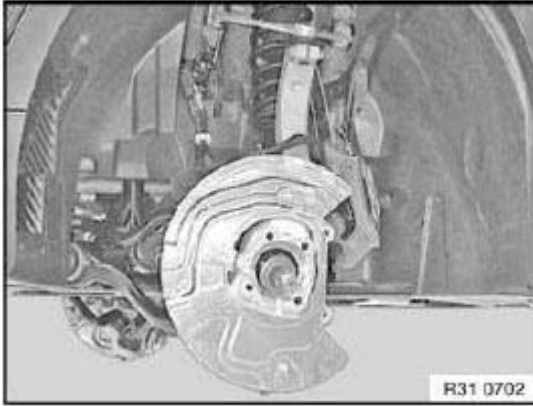


Fig. 59: Identifying Swivel Bearing

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Replacement only: Perform **CHASSIS ALIGNMENT CHECK**

31 21 180 REPLACING BEARING (WHEEL BEARING) FOR FRONT WHEEL

IMPORTANT: Bearing cannot be dismantled.
Do not wash out bearing.

Remove front wheel.

IMPORTANT: Expand turning lock sufficiently to avoid damaging thread when releasing collar nut.

Release collar nut (1), press brake pedal to floor for this purpose.

Installation:

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. See **FRONT AXLE - TIGHTENING TORQUES** .

Secure collar nut by positive peening on flat areas of output shaft.

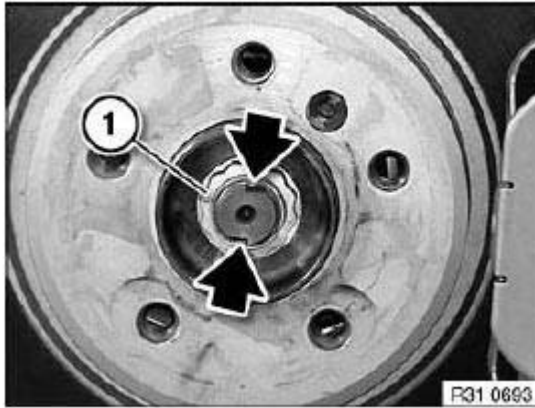


Fig. 60: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Remove brake disk . See **34 11 220 REMOVING AND INSTALLING/REPLACING BOTH FRONT BRAKE DISCS** .

Release screw (1) and pull pulse generator out of bore.

Installation:

Clean bore for pulse generator and lubricate with Staburags NBU 12/K grease.

Tightening torque. See **BRAKES - TIGHTENING TORQUES** .

Release screws (2) and remove holder from swivel bearing.

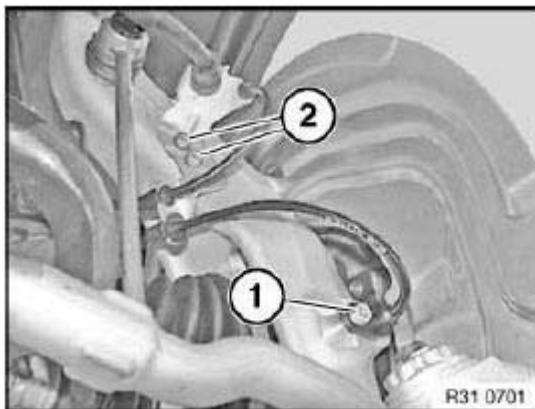


Fig. 61: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Output shaft has been removed only for the purpose of creating the picture.

Release bolts (1) and remove wheel bearing

Installation:

Replace screws.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

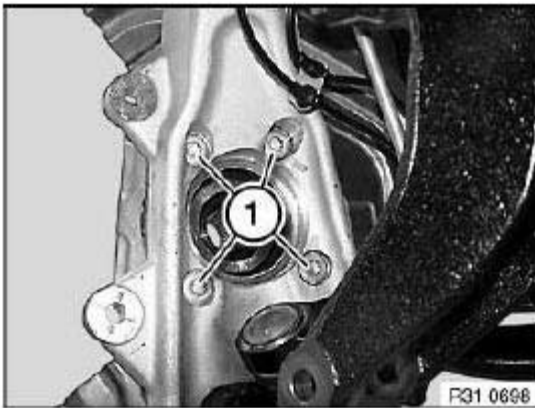


Fig. 62: Identifying Wheel Bearing Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not damage inner race (1) of wheel bearing.

Detach wheel bearing from output shaft (refer to **PRESSING OUTPUT SHAFT OUT OF DRIVE FLANGE**).

Installation:

Keep contact surface of swivel bearing and wheel bearing clean and free from oil and grease.

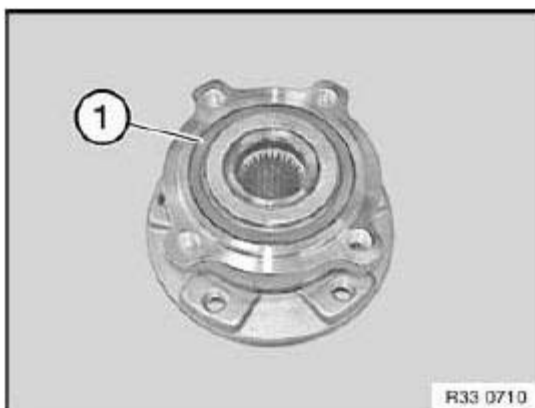


Fig. 63: Identifying Inner Race Of Wheel Bearing

Courtesy of BMW OF NORTH AMERICA, INC.

31 SPRING STRUT

31 00... INFORMATION ON REPLACING SHOCK ABSORBERS

Facts:

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.

Consequence:

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as damaged parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure:

Shock absorbers may be replaced on one side only until they have completed 50 000 km service.

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 12 043 REMOVING AND INSTALLING/REPLACING COMPLETE FRONT LEFT OR RIGHT SPRING STRUT HOLDER

Special tools required:

- 31 2 230
- 31 5 220

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down. See 51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM .

Necessary preliminary tasks:

- Mount securing fixture for vehicle on lifting platform . See 51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM .
- Remove front wheel.
- Remove stabilizer link from swivel bearing . See 31 35 005 REMOVING AND INSTALLING/REPLACING PUSH ROD (STABILIZER LINK) FOR LEFT/RIGHT STABILIZER.

and workshop jack.

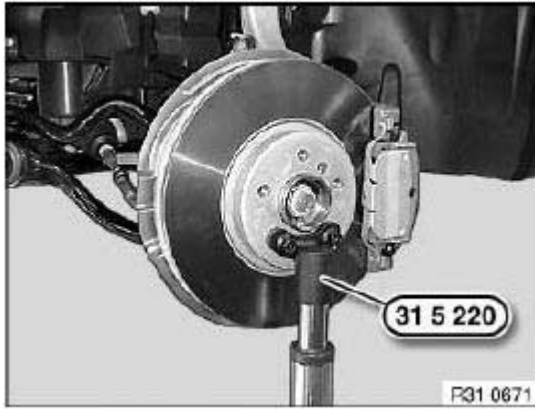


Fig. 64: Identifying Special Tool (31 5 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut (1) and remove screw (2).

Installation:

Keep control arm to swivel bearing connection clean and free from oil and grease.

Note insertion direction of screw.

Screw must rest correctly in groove of ball stud.

Replace self-locking nut.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

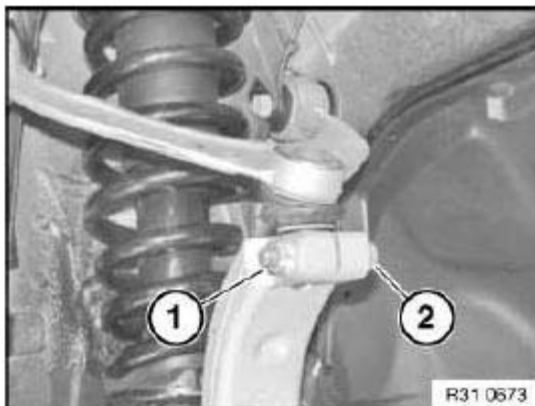


Fig. 65: Identifying Screw And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To be able to lower the swivel bearing far enough, it is necessary to align the output shaft so that one of the marked surfaces (1) points upwards.

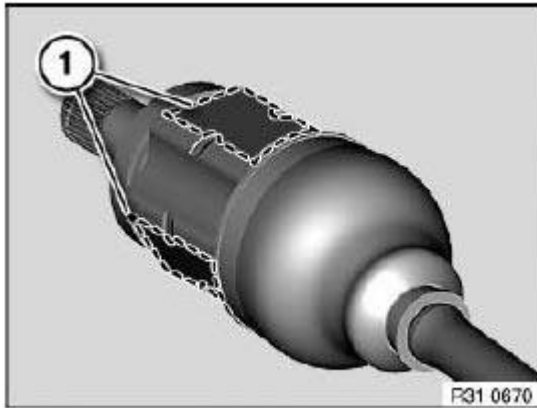


Fig. 66: Identifying Output Shaft Marked Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (2) and remove with holder (1).

Expand spring strut holder (3) with special tool 31 2 230 .

Release nut (5) and remove screw (4).

Lower swivel bearing until spring strut holder (3) is below spring strut.

Remove spring strut holder (3), taking care not to damage the output shaft.

Installation:

Keep spring strut holder to spring strut connection clean and free from oil and grease.

Version with Vertical Dynamics Management: Align spring strut holder by way of gap to positioning pin on back of spring strut.

Release bolt (4) and nut (5).

Note insertion direction of bolt (4).

Tighten down first bolt (4) and then bolt (2) in normal position.

Tighten spring strut to lower control arm.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

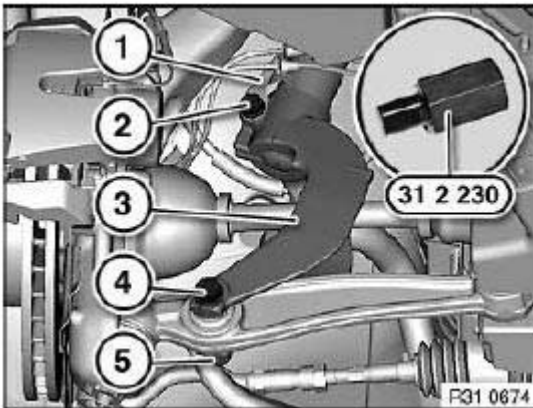


Fig. 67: Identifying Holder, Nut, Bolt And Special Tool (31 2 230)

Courtesy of BMW OF NORTH AMERICA, INC.

31 31 000 REMOVING AND INSTALLING COMPLETE LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down. See 51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM .

Necessary preliminary tasks:

- Remove side assembly compartment partition wall . See **51 71 ... REMOVING AND INSTALLING/REPLACING ASSEMBLY COMPARTMENT PARTITION WALL** .
- Remove spring strut holder . See **31 12 043 REMOVING AND INSTALLING/REPLACING COMPLETE FRONT LEFT OR RIGHT SPRING STRUT HOLDER**.

IMPORTANT: Risk of damage

Secure spring strut against falling out.

Unscrew nuts (1).

Installation:

Clean contact surface in spring strut dome.

Replace self-locking nuts.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

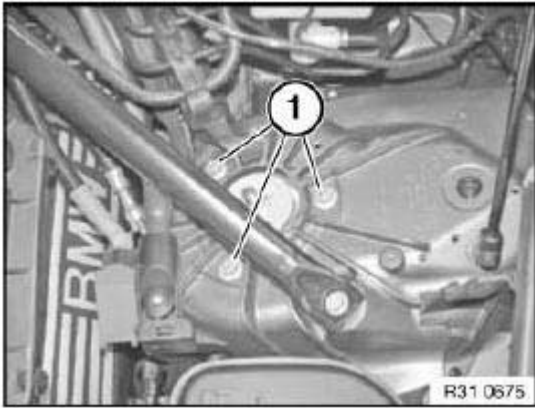


Fig. 68: Identifying Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Version with Vertical Dynamics Management: Disconnect both plug connections (1).

Disconnect plug connection (2) on impulse sensor.

Disconnect plug connection (3) from brake lining sensor.

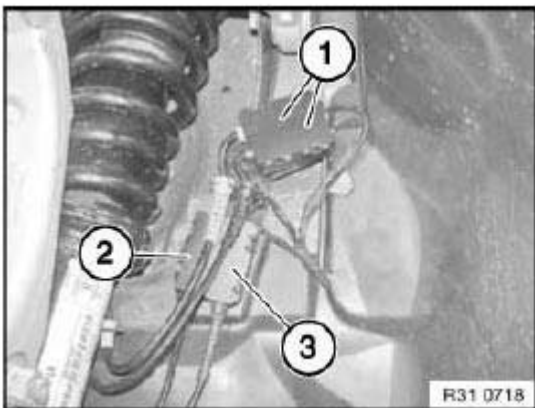


Fig. 69: Identifying Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Remove spring strut downwards out of wheel arch.



Fig. 70: Identifying Spring Strut

Courtesy of BMW OF NORTH AMERICA, INC.

31 31 031 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

Special tools required:

- 31 3 341
- 31 3 351
- 31 3 353

WARNING: Observe the following instructions to avoid any risk of injury by the coil springs.

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 free of grease.
6. Impact screwdrivers may not be used!
7. Do not compress coil spring to full extent.
8. Observe manufacturer's instructions.

Version with Vertical Dynamics Management:

IMPORTANT: Handle the spring strut with care so as to avoid damaging the control unit (1) and control valve (2).

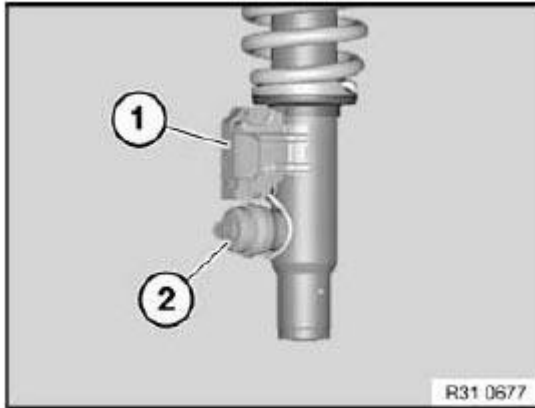


Fig. 71: Identifying Control Unit And Control Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove front spring strut . See **31 31 000 REMOVING AND INSTALLING COMPLETE LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER.**

Removing:

Clamp special tool 31 3 341 in vice.

Fit special tools 31 3 351 and 31 3 353 from above on special tool 31 3 341 until locking pins (1) can be felt and heard to snap into place.

Check seating of special tools 31 3 351 and 31 3 353 , correct if necessary.

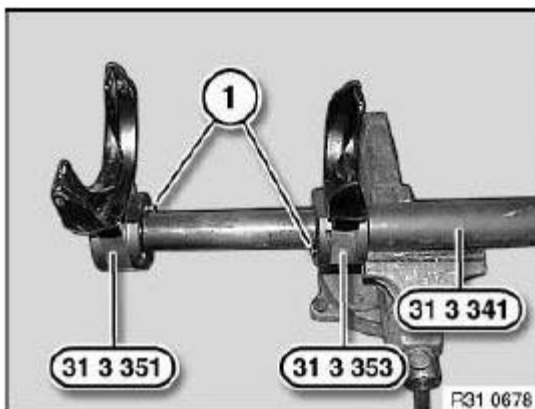


Fig. 72: Identifying Locking Pin And Special Tool (31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Clean coil spring to remove coarse contamination and oil it up with special tools 31 3 351 and 31 3 353 .

Turn spring strut until end of coil spring (1) points upwards.

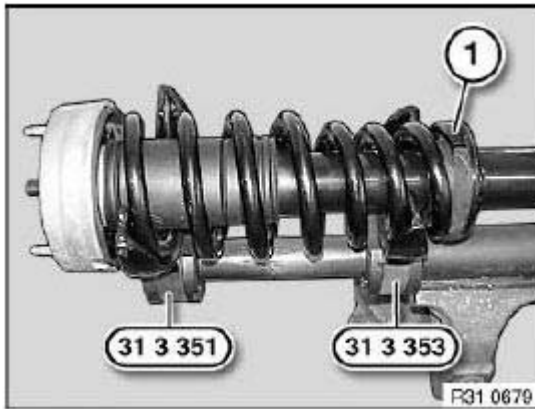


Fig. 73: Identifying Coil Spring And Special Tool (31 3 353)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Coils of coil spring must be located completely in recesses of special tools 31 3 351 and 31 3 353 when tensioned!

Compress coil spring until stress on piston rod is relieved.

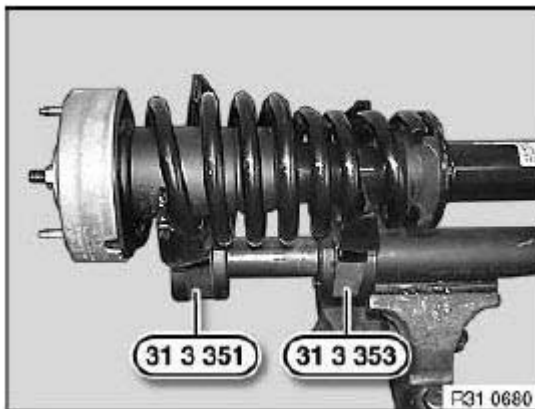


Fig. 74: Identifying Special Tool (31 3 351) (31 3 353)
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Remove joint disc (2), support bearing upper section (3) and support bearing flange (4).

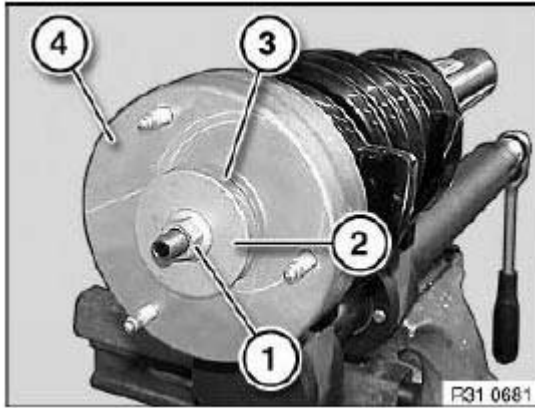


Fig. 75: Identifying Joint Disc, Support Bearing Upper Section, Support Bearing Flange And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove support pot (1) and protective tube (2).

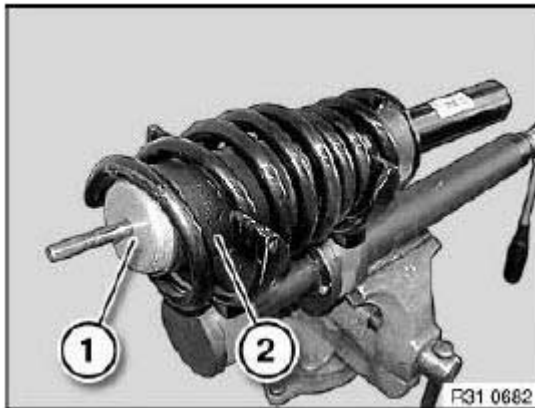


Fig. 76: Identifying Support Pot And Protective Tube
Courtesy of BMW OF NORTH AMERICA, INC.

Relieve tension on coil spring.

Remove coil spring with spring strut from special tools 31 3 351 and 31 3 353 .

Remove spring strut from coil spring

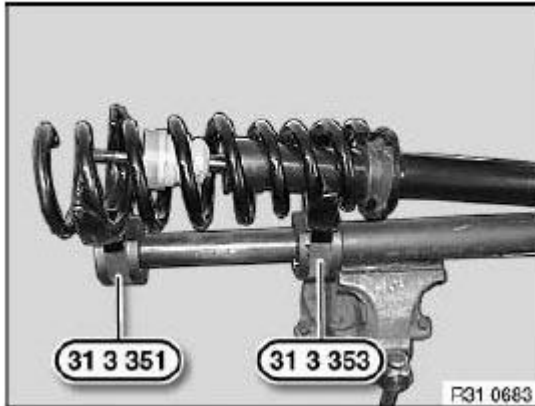


Fig. 77: Identifying Special Tool (31 3 353)

Courtesy of BMW OF NORTH AMERICA, INC.

Remove auxiliary damper (1) and lower spring pad (2) from spring strut.

Assembly:

Check auxiliary damper (1) and lower spring pad (2) for damage, replace if necessary.

Attach lower spring pad (2) to spring plate.

Attach auxiliary damper (1) to piston rod.

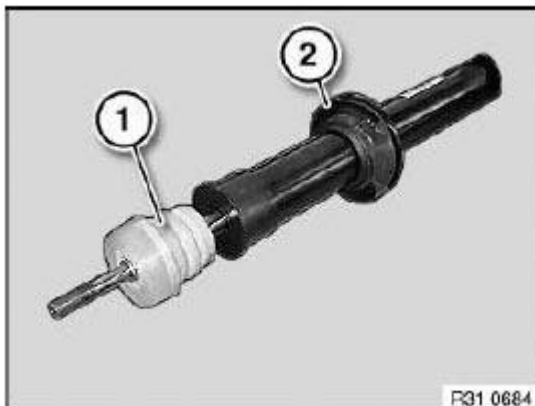


Fig. 78: Identifying Auxiliary Damper And Lower Spring Pad

Courtesy of BMW OF NORTH AMERICA, INC.

Check upper spring pad (1), support bearing lower section (2), protective tube (3) and support bearing upper section (4) for damage, replace if necessary.

NOTE: Align upper spring pad (1) by means of coding to support bearing flange (5).

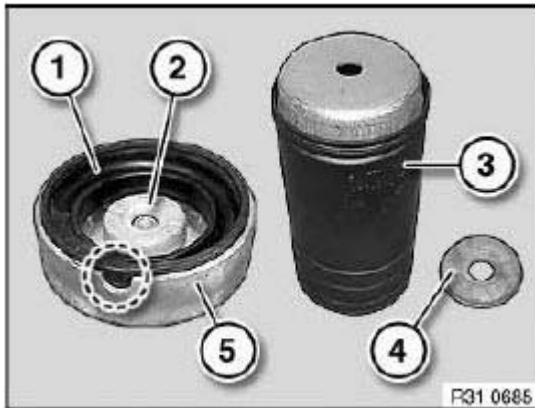


Fig. 79: Identifying Upper Spring Pad And Support Bearing Flange
 Courtesy of BMW OF NORTH AMERICA, INC.

Insert spring strut into coil spring.

Take up coil spring with spring strut in special tools 31 3 351 and 31 3 353 .

NOTE: End of coil spring (1) must point upwards.

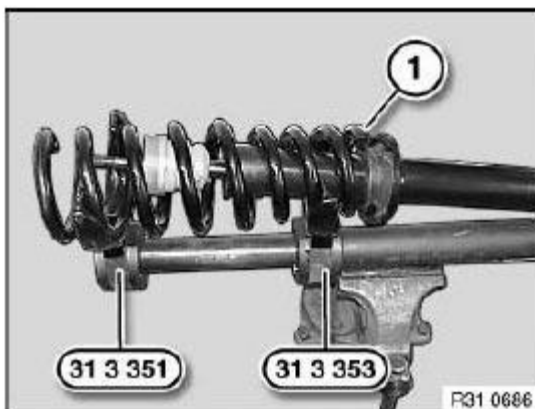


Fig. 80: Identifying Coil Spring And Special Tool (31 3 351)
 Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Coils of coil spring must be located completely in recesses of special tools 31 3 351 and 31 3 353 when tensioned!

Compress coil spring until support bearing flange can be mounted.

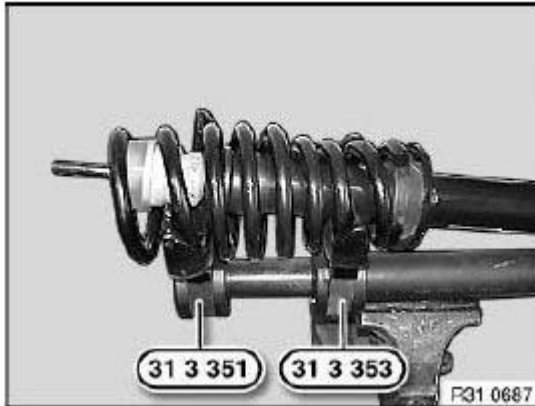


Fig. 81: Identifying Special Tool (31 3 351)

Courtesy of BMW OF NORTH AMERICA, INC.

Attach support pot (1) and protective tube (2) to piston rod.

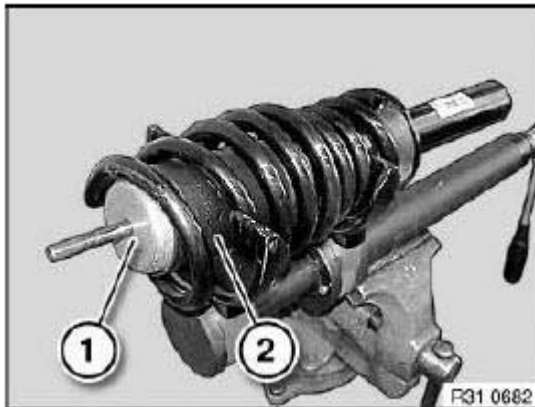


Fig. 82: Identifying Support Pot And Protective Tube

Courtesy of BMW OF NORTH AMERICA, INC.

Version with Vertical Dynamics Management:

IMPORTANT: For spring strut installation, it is essential that the stud bolt (1) and positioning pin (2) are flush with each other!

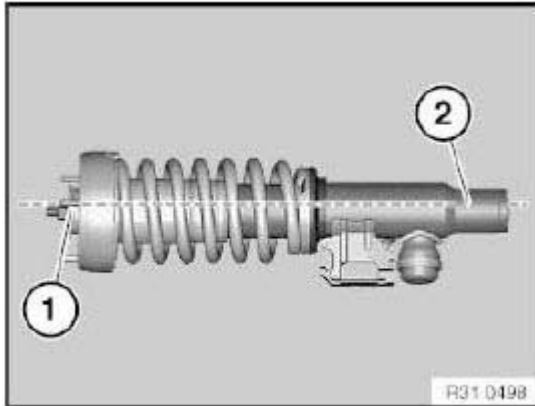


Fig. 83: Identifying Stud Bolt And Positioning Pin
 Courtesy of BMW OF NORTH AMERICA, INC.

Attach support bearing flange (1) to piston rod.

Align support bearing upper section (3) as illustrated and attach to inner section (2) of support bearing flange (1).

NOTE: Pay attention to edge (4) in shown in illustration.

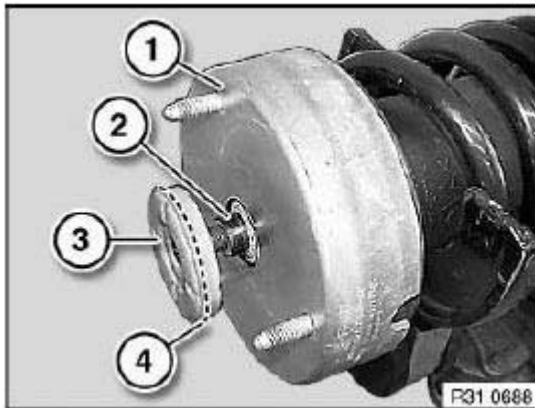


Fig. 84: Identifying Bearing Flange, Inner Section And Edge
 Courtesy of BMW OF NORTH AMERICA, INC.

Attach joint disc (1) to piston rod.

Replace nut (2), screw onto piston rod and tighten down.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

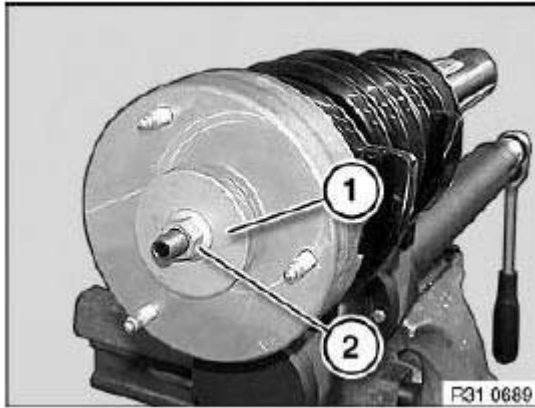


Fig. 85: Identifying Joint Disc And Nut
 Courtesy of BMW OF NORTH AMERICA, INC.

Align support bearing flange (1) and spring strut (3) by means of spring pads to coil spring ends.

Relieve tension on coil spring.

Check installation position of protective tube (2), correct if necessary.

NOTE: Make sure upper and lower coils of coil spring rest correctly against support bearing flange or spring plate.

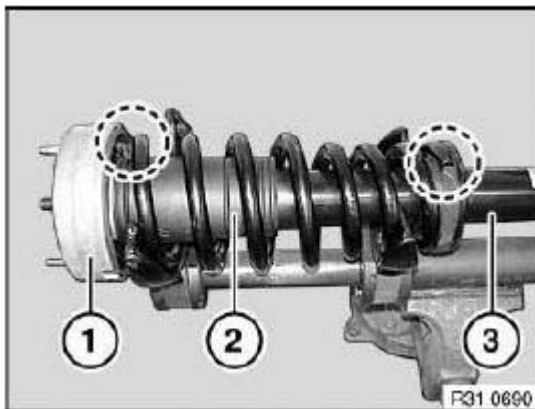


Fig. 86: Identifying Support Bearing Flange, Spring Strut And Protective Tube
 Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Code spring strut with DIS Tester and check software status
- Carry out vertical acceleration sensor adjustment . See **37 PERFORMING VERTICAL ACCELERATION SENSOR ADJUSTMENT (VERTICAL DYNAMICS MANAGEMENT)** .

33 SPRING WITH SUSPENSION

31 33 005 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SUPPORT BEARING

Special tools required:

- 31 3 341
- 31 3 351
- 31 3 353

WARNING: Observe the following instructions to avoid any risk of injury by the coil springs.

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 free of grease.
6. Impact screwdrivers may not be used!
7. Do not compress coil spring to full extent.
8. Observe manufacturer's instructions.

Version with Vertical Dynamics Management:

IMPORTANT: Handle the spring strut with care so as to avoid damaging the control unit (1) and control valve (2).

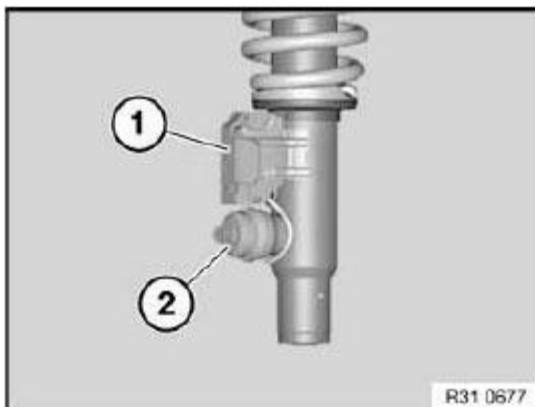


Fig. 87: Identifying Control Unit And Control Valve 3160
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove front spring strut . See **31 31 000 REMOVING AND INSTALLING COMPLETE LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER.**

Removing:

Clamp special tool 31 3 341 in vice.

Fit special tools 31 3 351 and 31 3 353 from above on special tool 31 3 341 until locking pins (1) can be felt and heard to snap into place.

Check seating of special tools 31 3 351 and 31 3 353 , correct if necessary.

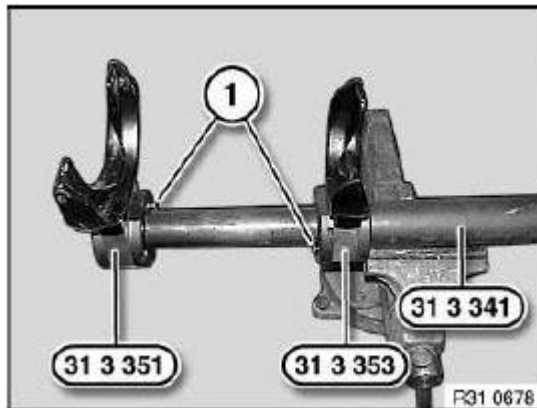


Fig. 88: Identifying Locking Pin And Special Tool (31 3 351)
Courtesy of BMW OF NORTH AMERICA, INC.

Clean coil spring to remove coarse contamination and take up with special tools 31 3 351 and 31 3 353 .

Turn spring strut until end of coil spring (1) points upwards.

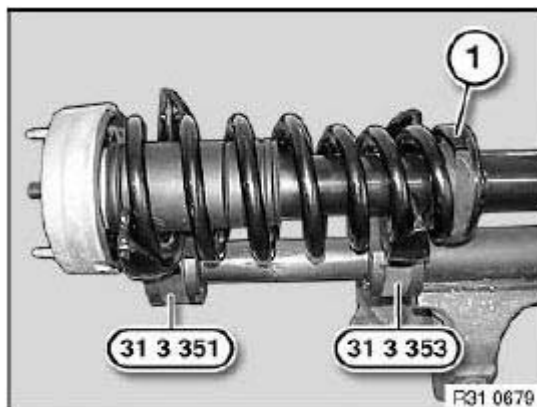


Fig. 89: Identifying Coil Spring And Special Tool (31 3 353)

Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Coils of coil spring must be located completely in recesses of special tools 31 3 351 and 31 3 353 when tensioned!

Compress coil spring until stress on piston rod is relieved.

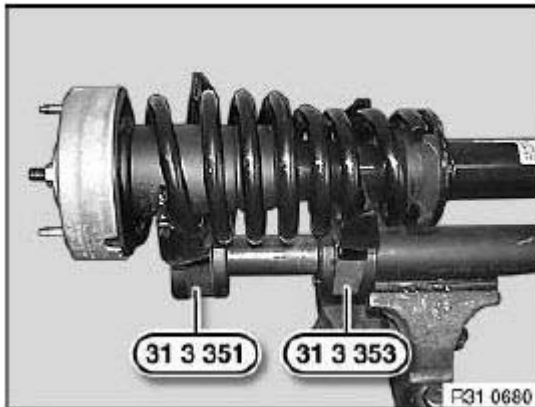


Fig. 90: Identifying Special Tool (31 3 351) (31 3 353)
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Remove joint disc (2), support bearing upper section (3) and support bearing flange (4).

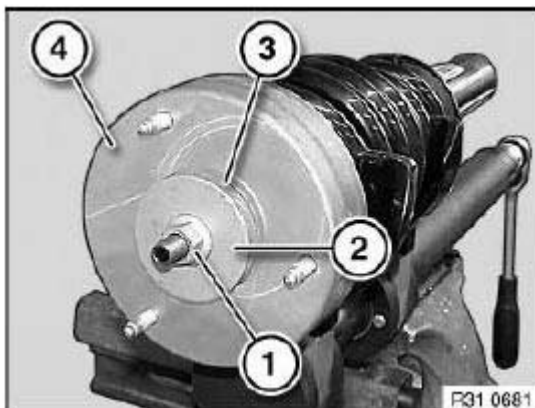


Fig. 91: Identifying Joint Disc, Support Bearing Upper Section, Support Bearing Flange And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly:

Replace support bearing lower section (2), support bearing upper section (4) and support bearing flange (5).

Check upper spring pad (1) and protective tube (3) for damage, replace if necessary.

NOTE: Align upper spring pad (1) by means of coding to support bearing flange (5).

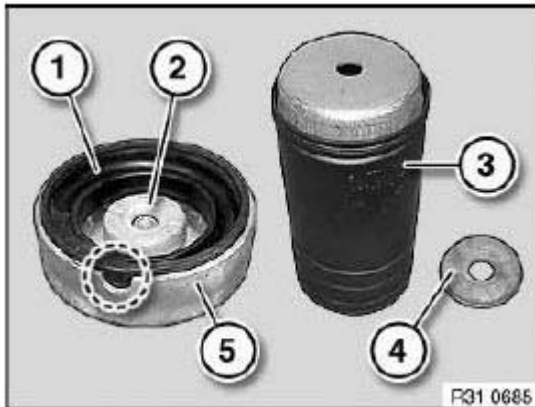


Fig. 92: Identifying Upper Spring Pad And Support Bearing Flange
Courtesy of BMW OF NORTH AMERICA, INC.

Version with Vertical Dynamics Management:

IMPORTANT: For spring strut installation, it is essential that the stud bolt (1) and positioning pin (2) are flush with each other!

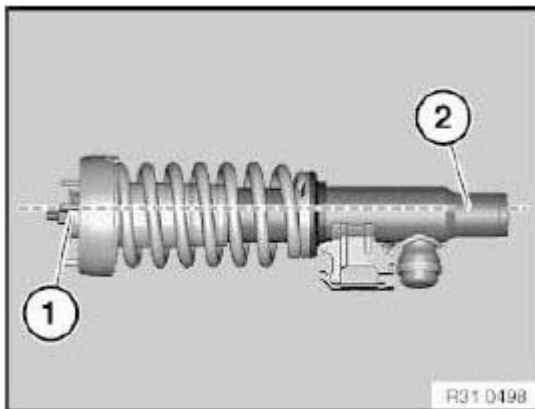


Fig. 93: Identifying Stud Bolt And Positioning Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Attach support bearing flange (1) to piston rod.

Align support bearing upper section (3) as illustrated and attach to inner section (2) of support bearing flange (1).

NOTE: Pay attention to edge (4) in shown in illustration.

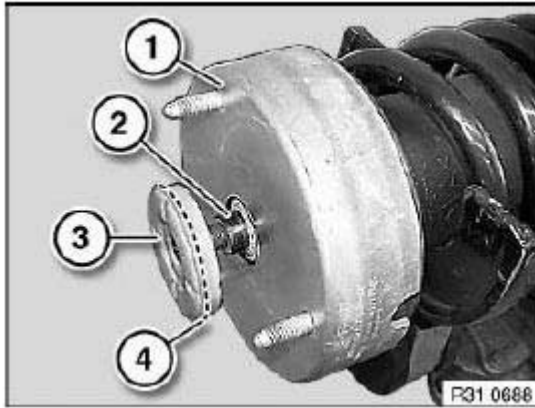


Fig. 94: Identifying Bearing Flange, Inner Section And Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Attach joint disc (1) to piston rod.

Replace nut (2), screw onto piston rod and tighten down.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES**.

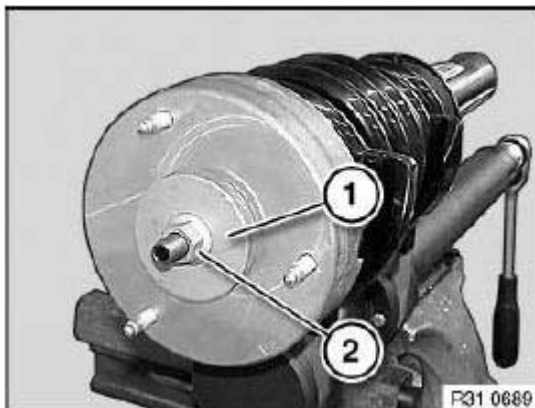


Fig. 95: Identifying Joint Disc And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Align support bearing flange (1) and spring strut (3) by means of spring pads to coil spring ends.

Relieve tension on coil spring.

Check installation position of protective tube (2), correct if necessary.

NOTE: Make sure upper and lower coils of coil spring rest correctly against support bearing flange or spring plate.

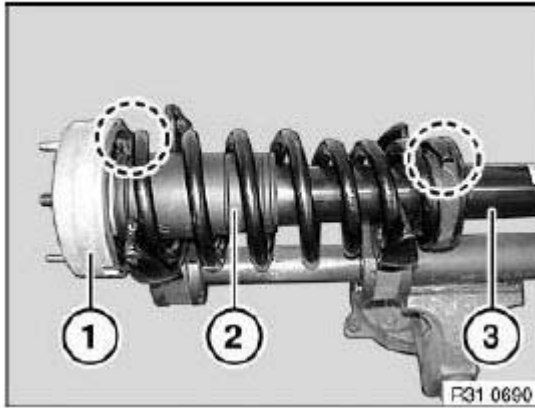


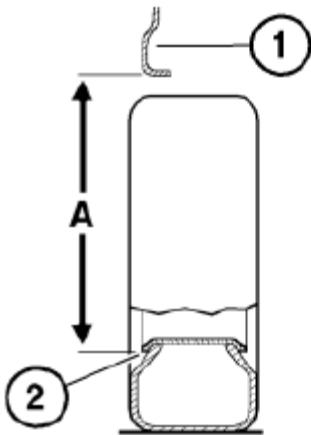
Fig. 96: Identifying Support Bearing Flange, Spring Strut And Protective Tube
Courtesy of BMW OF NORTH AMERICA, INC.

31 33 095 MEASURING RIDE-LEVEL HEIGHT OF VEHICLE

Necessary preliminary tasks:

- Move vehicle into normal position

Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to lower edge of wheel arch (1).



R31 0177

Fig. 97: Identifying Rim Flange Height
Courtesy of BMW OF NORTH AMERICA, INC.

31 33 105 REMOVING AND INSTALLING/REPLACING COIL SPRING FOR LEFT OR RIGHT FRONT SPRING STRUT

NOTE: Procedure is described in **31 31 031 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER**

35 STABILIZER BAR

31 35 000 REMOVING AND INSTALLING/REPLACING FRONT STABILIZER

Necessary preliminary tasks:

- Remove front wheels
- Remove front underbody protection . See **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT ASSEMBLY UNDERSIDE PROTECTION** .
- Remove front right wheel arch cover (front section) . See **51 71 038 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (FRONT SECTION)** .
- Remove radiator air duct . See **51 71 099 REMOVING AND INSTALLING/REPLACING RADIATOR AIR GUIDE** .
- Remove right brake air duct with holder
- Remove fan cowl . See **17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N52K)** .
- Remove heat exchanger from front axle carrier and tie up. See **17 22 010 REMOVING AND INSTALLING/REPLACING HEAT EXCHANGER FOR AUTOMATIC TRANSMISSION (N52K)** .
- Disconnect pressure line for power steering from front axle carrier
- Remove both stabilizer links from stabilizer . See **31 35 005 REMOVING AND INSTALLING/REPLACING PUSH ROD (STABILIZER LINK) FOR LEFT/RIGHT STABILIZER** .

Release screws (1).

Remove both retaining brackets of stabilizer (2).

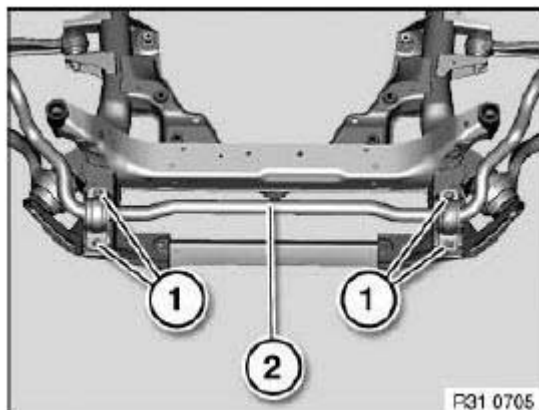


Fig. 98: Identifying Retaining Brackets Of Stabilizer And Screws

Courtesy of BMW OF NORTH AMERICA, INC. 24 of 3160

Installation:

Align retaining bracket (1) so that tapped holes are situated in middle of elongated hole.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

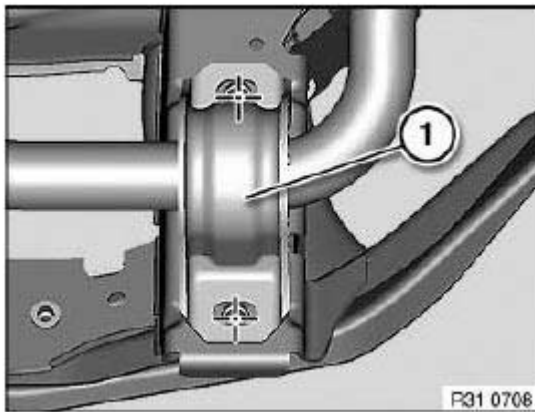


Fig. 99: Identifying Retaining Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

Remove radiator box from engine carrier, extend out, press upwards and support with workshop jack.

IMPORTANT: Do not damage coating of stabilizer.

Remove stabilizer towards front.

Installation:

Check rubber mounting of radiator box for correct seating.

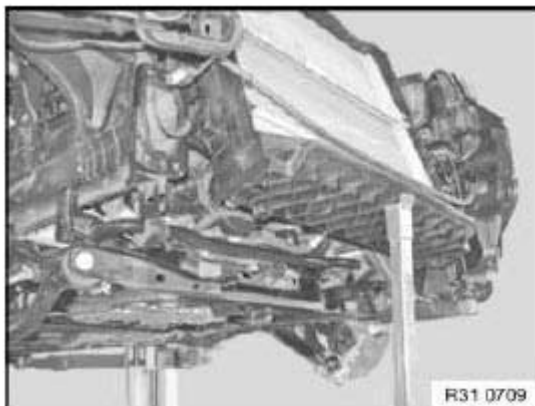


Fig. 100: Identifying Radiator Box

Courtesy of BMW OF NORTH AMERICA, INC.

31 35 005 REMOVING AND INSTALLING/REPLACING PUSH ROD (STABILIZER LINK) FOR LEFT/RIGHT STABILIZER

IMPORTANT: Observe safety when raising the vehicle.
Do not mix up stabilizer links

- A. Stabilizer link for conventional stabilizer
- B. Stabilizer link for active stabilizer

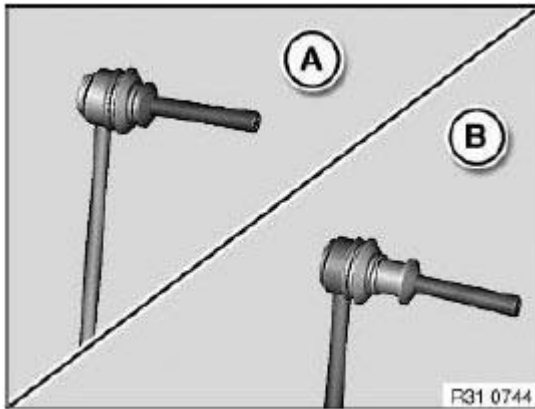


Fig. 101: Identifying Stabilizer Link For Conventional And Active Stabilizer
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Installation:

Replace self-locking nut.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .



Fig. 102: Identifying Self-Locking Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nut (1).

Remove stabilizer link (2).

Installation:

Replace self-locking nut.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

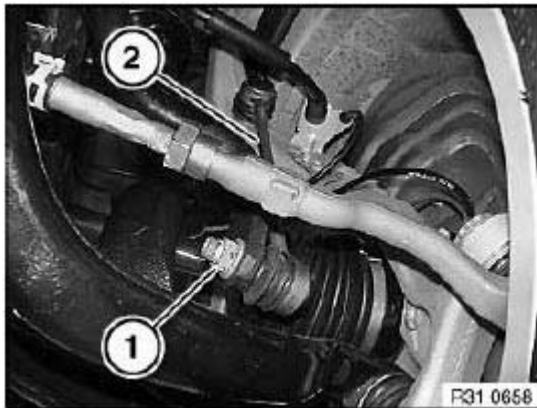


Fig. 103: Identifying Stabilizer Link And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

50 FRONT AXLE GEARBOX

31 50... CHANGING FRONT DIFFERENTIAL OIL

WARNING: Danger of poisoning if oil is ingested/absorbed through the skin! See **00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN.**

Risk of injury if oil comes into contact with eyes and skin! See **00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN.**

IMPORTANT: Use only the approved front differential oil in this front differential. See **FRONT AXLE - OPERATING FLUIDS** .

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

NOTE: Only change oil when front differential is at normal operating temperature.

- Remove reinforcement plate . See **31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE**.
- Remove steering gear cover at top left . See **51 71 ... REMOVING AND INSTALLING/REPLACING TOP LEFT STEERING GEAR COVER** .

Checking/correcting front differential oil level:

Undo oil filler plug (1).

Check front differential oil level.

If necessary, pour in front differential oil up to lower edge of opening for oil filler plug (1).

Installation:

Replace oil filler plug.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

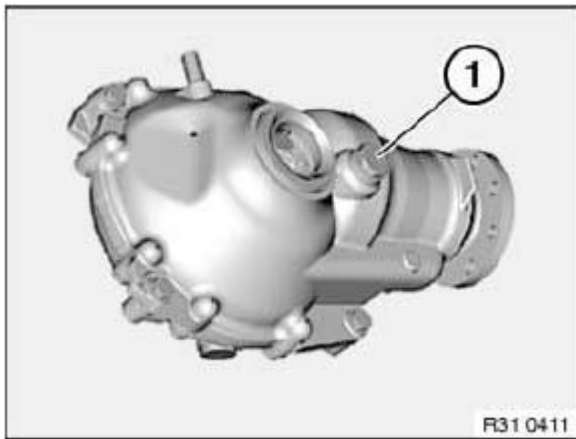


Fig. 104: Identifying Oil Filler Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Changing front differential oil:

Place oil collecting apparatus underneath.

Remove oil drain plug (1).

Drain front differential oil.

Installation:

Replace oil drain plug.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

Undo oil filler plug (2).

Pour in front differential oil up to lower edge of opening for oil filler plug (2).

Installation:

Replace oil filler plug.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

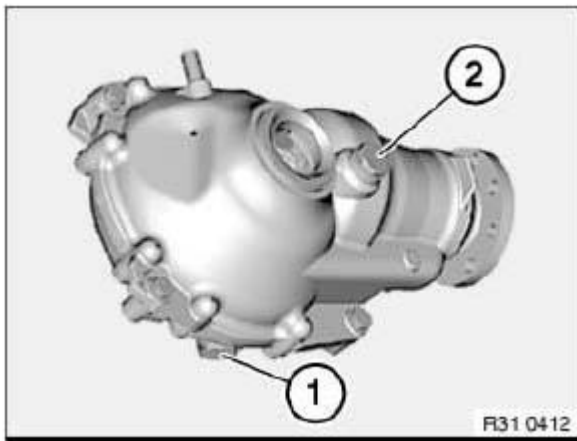


Fig. 105: Identifying Oil Drain Plug And Oil Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

31 50 001 REMOVING AND INSTALLING/REPLACING FRONT DIFFERENTIAL

WARNING: Danger to life!

Mount securing fixture for vehicle on lifting platform to prevent the vehicle from slipping off or tilting down. See **51 71 505 MOUNT SECURING FIXTURE FOR VEHICLE ON LIFTING PLATFORM** .

Secure engine in installation position to prevent it from falling down. See **11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)** .

Necessary preliminary tasks:

- Remove left output shaft . See **31 60 003 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT**.
- Secure right output shaft with special tool . See **31 60 004 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT**.
- Lower front axle support . See **31 11 506 LOWERING/RAISING FRONT AXLE CARRIER (SPECIAL TOOL SWZ00-2040)**.

IMPORTANT: Danger of injury!

When releasing the last bolt, grip the front differential to prevent it from falling down.

Detach vent line (1).

Release bolts (2-4).

Remove front differential downwards.

Installation:

During removal and installation: Replace O-ring . See **31 51 060 REPLACING O-RING FOR FRONT DIFFERENTIAL ON RIGHT**.

Coat O-ring with front differential oil.

Make sure screws are installed in correct positions.

- Bolt (2) M12x60
- Bolt (3) M12x125
- Bolt (4) M12x85

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

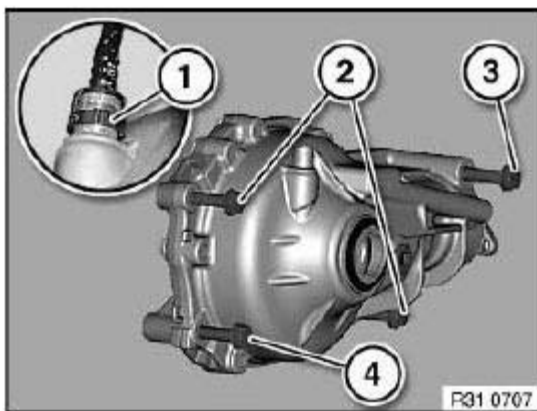


Fig. 106: Identifying Vent Line And Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

Check front differential oil level , correct if necessary. See **31 50... CHANGING FRONT DIFFERENTIAL OIL**.

After installation:

- Perform **CHASSIS ALIGNMENT CHECK**
- Carry out steering angle sensor adjustment/adjustment for active front steering . See **32 10 005 ADJUSTMENT FOR ACTIVE FRONT STEERING** and **61 31 996 CARRY OUT STEERING ANGLE SENSOR ADJUSTMENT** .

31 51 010 REPLACING RADIAL SEAL FOR DRIVE FLANGE OF FRONT DIFFERENTIAL

Special tools required:

- 23 0 020
- 31 5 130
- 33 1 150

Necessary preliminary tasks:

- Remove reinforcement plate . See **31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE**.

Mark position of nut with respect to shaft with punch marks (arrow).

Lever out lockplate (1) with a suitable tool.

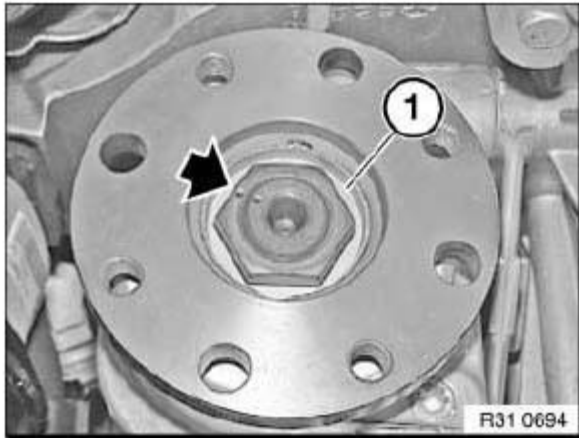


Fig. 107: Locating Lockplate

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Do not place special tool on threaded holes of drive flange.

Secure drive flange with special tool 23 0 020 against turning and release nut (1).

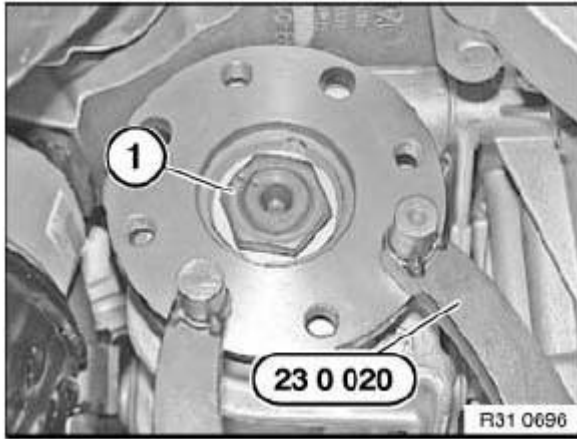


Fig. 108: Identifying Drive Flange Nut And Special Tool
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Mount special tool only with longer screws (M10x30) on drive flange.

Pull drive flange off drive shaft with special tool 33 1 150 .

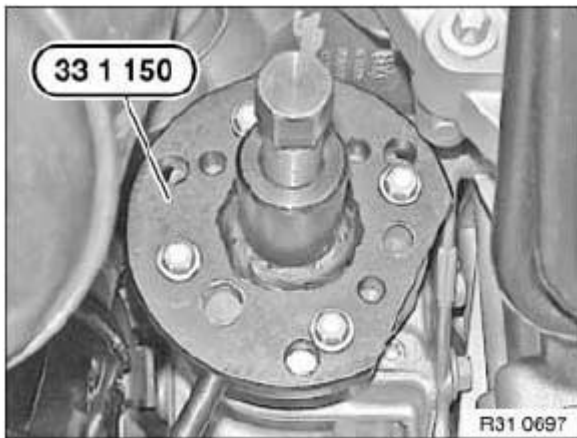


Fig. 109: Identifying Special Tool (33 1 150)
 Courtesy of BMW OF NORTH AMERICA, INC.

Lever shaft seal (1) out of front differential with a suitable screwdriver (2).

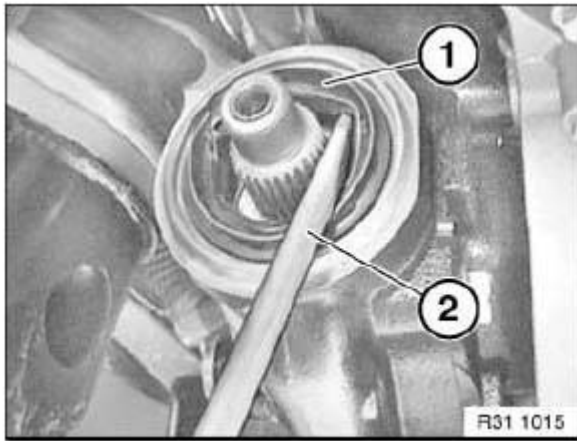


Fig. 110: Identifying Shaft Seal And Screwdriver
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Drive in shaft seal with special tool 31 5 130 as far as it will go.

Coat sealing lips of new shaft seal (1) with front differential oil.

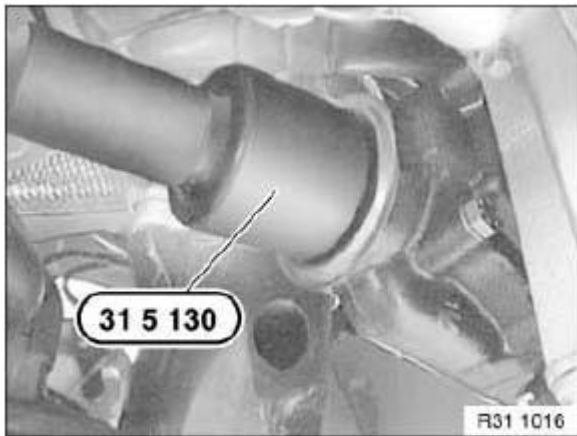


Fig. 111: Identifying Special Tool (31 1 150)
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Do not tighten nut beyond punch marks. Otherwise the clamping sleeve will be damaged.

Clean drive flange and attach.

Tighten down nut until punch marks on nut and shaft are aligned.

Install new lockplate (1).

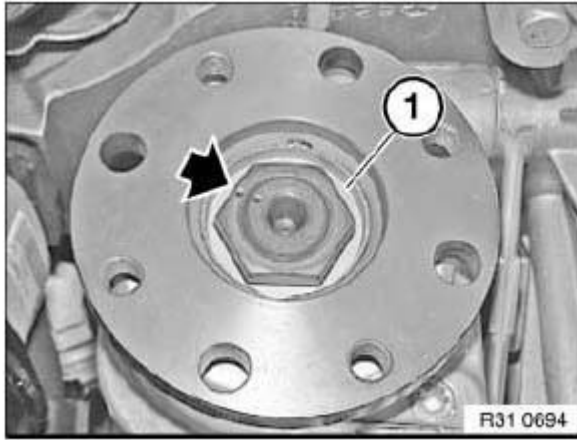


Fig. 112: Locating Lockplate

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check front differential oil level , correct if necessary. See **31 50... CHANGING FRONT DIFFERENTIAL OIL.**

31 51 015 REPLACING SHAFT SEAL FOR LEFT OUTPUT SHAFT

Special tools required:

- 31 4 160

Necessary preliminary tasks:

- Remove left output shaft . See **31 60 003 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT.**

Lever shaft seal (1) out of front differential with a screwdriver (2).

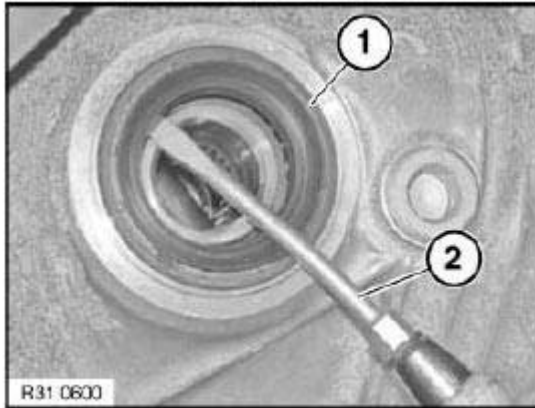


Fig. 113: Identifying Shaft Seal And Screwdriver
 Courtesy of BMW OF NORTH AMERICA, INC.

Installing shaft seal:

NOTE: The installation protective ring (1) serves to protect the sealing lips on shaft seal (2) when the output shaft is being installed.

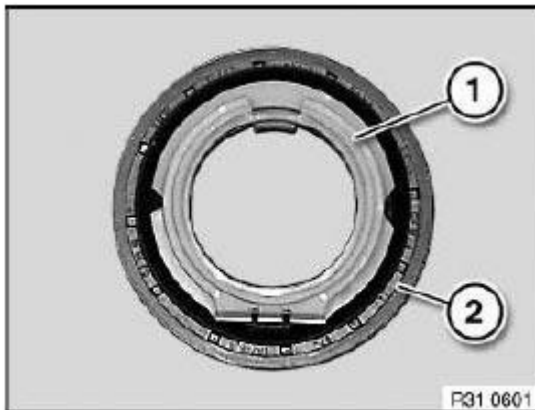


Fig. 114: Identifying Shaft Seal And Protective Ring
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Installation protective ring must not slip out of shaft seal!

Drive in shaft seal with special tool 31 4 160 as far as it will go.

Carefully remove special tool 31 4 160 .

Open installation protective ring (1).

Check front differential oil level , correct if necessary. See 31 50... **CHANGING FRONT DIFFERENTIAL OIL**

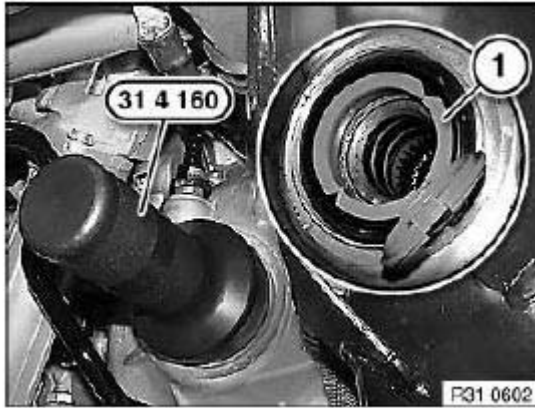


Fig. 115: Identifying Protective Ring And Special Tool (31 4 160)

Courtesy of BMW OF NORTH AMERICA, INC.

31 51 060 REPLACING O-RING FOR FRONT DIFFERENTIAL ON RIGHT

Necessary preliminary tasks:

- Remove front differential . See **31 50 001 REMOVING AND INSTALLING/REPLACING FRONT DIFFERENTIAL**.

Remove O-ring (1) with a suitable tool from front differential.

Installation:

Insert O-ring (1) in groove and coat with front differential oil.

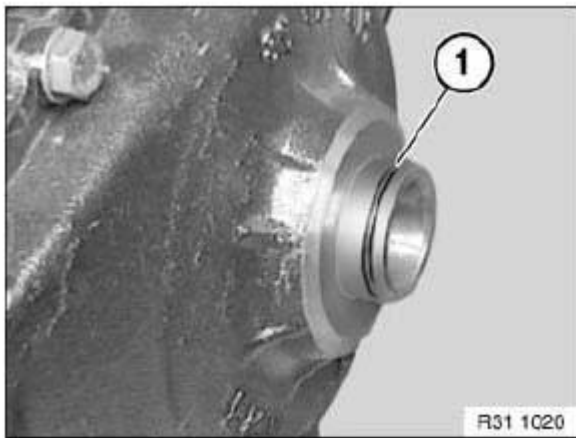


Fig. 116: Identifying Front Differential O-Ring

Courtesy of BMW OF NORTH AMERICA, INC.

31 51 020 REPLACING SHAFT SEAL FOR RIGHT OUTPUT SHAFT**Special tools required:**

- 31 4 160

Necessary preliminary tasks:

- Remove right output shaft . See **31 60 004 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT**.

Lever shaft seal (1) out of bearing block with a screwdriver (2).

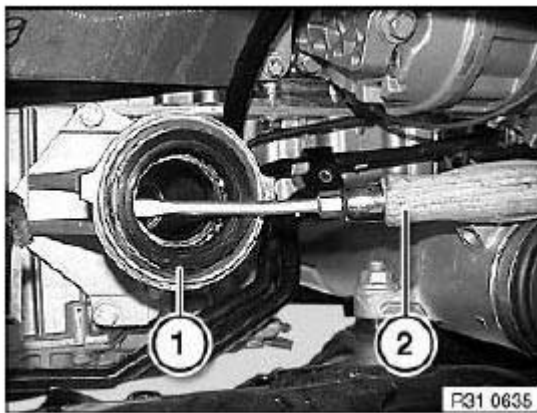


Fig. 117: Identifying Shaft Seal And Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Installing shaft seal:

NOTE: The installation protective ring (1) serves to protect the sealing lips on shaft seal (2) when the output shaft is being installed.

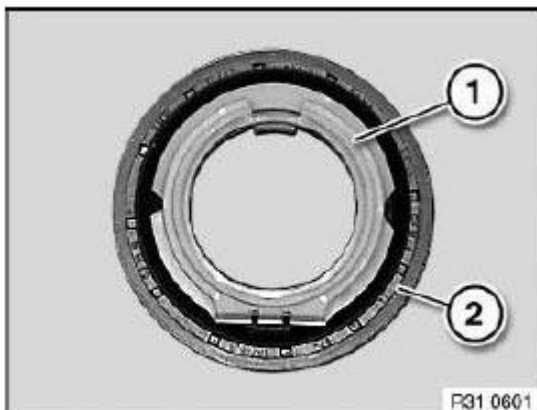


Fig. 118: Identifying Shaft Seal And Protective Ring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Installation protective ring must not slip out of shaft seal!

Drive in shaft seal with special tool 31 4 160 as far as it will go.

Carefully remove special tool 31 4 160 .

Open installation protective ring (1).

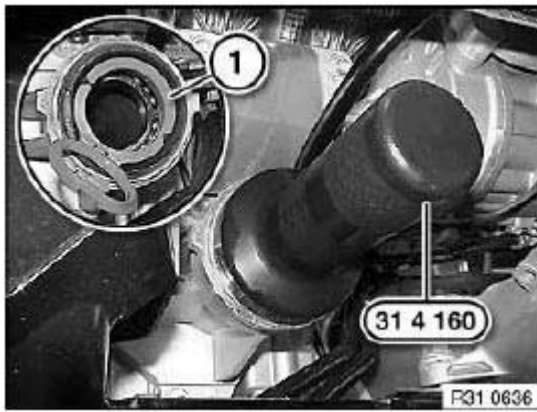


Fig. 119: Identifying Protective Ring And Special Tool (31 4 4160)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check front differential oil level , correct if necessary. See **31 50... CHANGING FRONT DIFFERENTIAL OIL.**

31 51 065 REPLACING O-RING FOR BEARING BLOCK

Necessary preliminary tasks:

- Remove bearing block . See **31 53 040 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT BEARING BLOCK.**

Remove O-ring (1) with a suitable tool from bearing block (2).

Installation:

Insert O-ring (1) in groove and coat with front differential oil.

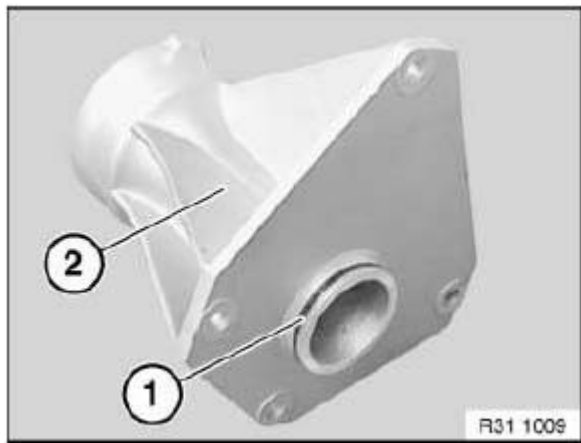


Fig. 120: Identifying O-Ring And Bearing Block
Courtesy of BMW OF NORTH AMERICA, INC.

31 53 040 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT BEARING BLOCK

WARNING: N62:

Danger of explosion!

There is a danger of short circuiting on account of the small distance between the bearing block screw connection and the starter motor.

Disconnect battery negative lead. See 12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .

Necessary preliminary tasks:

- Remove right output shaft . See **31 60 004 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT**.

Release screws (1).

Remove bearing block from oil sump.

Installation:

Replace O-ring. See **31 51 065 REPLACING O-RING FOR BEARING BLOCK**.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

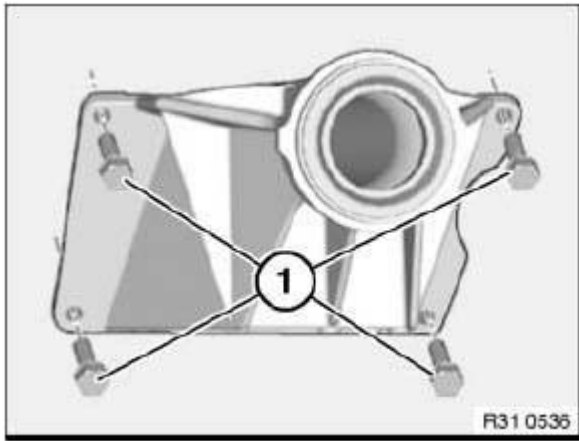


Fig. 121: Identifying Bearing Block Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove sealing caps.

60 OUTPUT SHAFT

31 51 015 REPLACING SHAFT SEAL FOR LEFT OUTPUT SHAFT

Special tools required:

- 31 4 160

Necessary preliminary tasks:

- Remove left output shaft . See **31 60 003 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT.**

Lever shaft seal (1) out of front differential with a screwdriver (2).

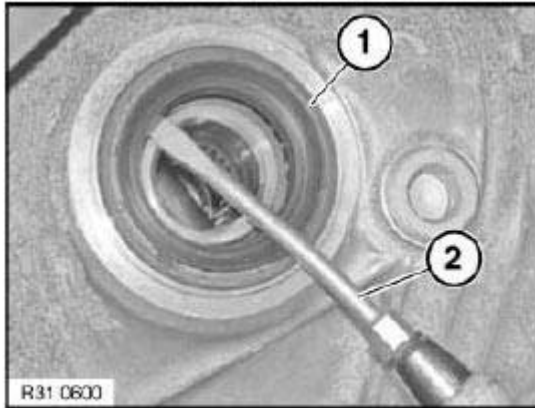


Fig. 122: Identifying Shaft Seal And Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Installing shaft seal:

NOTE: The installation protective ring (1) serves to protect the sealing lips on shaft seal (2) when the output shaft is being installed.

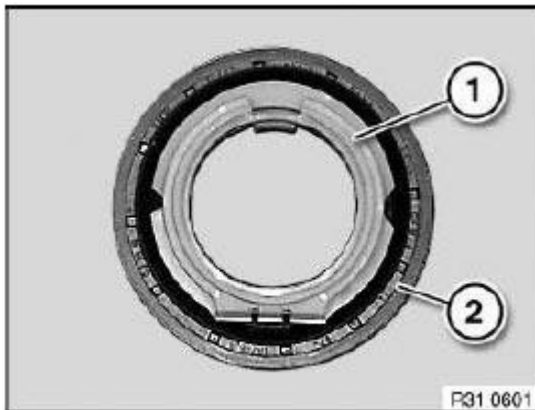


Fig. 123: Identifying Shaft Seal And Protective Ring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Installation protective ring must not slip out of shaft seal!

Drive in shaft seal with special tool 31 4 160 as far as it will go.

Carefully remove special tool 31 4 160 .

Open installation protective ring (1).

Check front differential oil level , correct if necessary. See 31 50... **CHANGING FRONT DIFFERENTIAL OIL.**

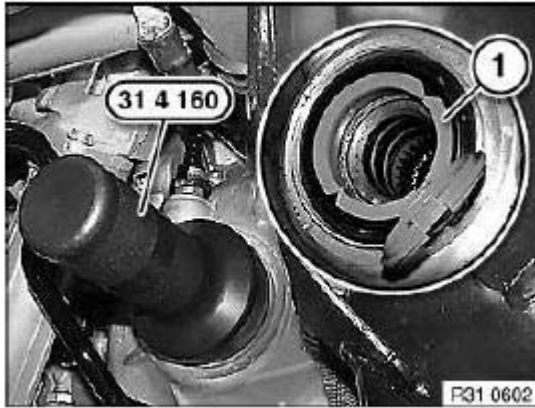


Fig. 124: Identifying Protective Ring And Special Tool (31 4 160)

Courtesy of BMW OF NORTH AMERICA, INC.

31 51 020 REPLACING SHAFT SEAL FOR RIGHT OUTPUT SHAFT

Special tools required:

- 31 4 160

Necessary preliminary tasks:

- Remove right output shaft . See **31 60 004 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT.**

Lever shaft seal (1) out of bearing block with a screwdriver (2).

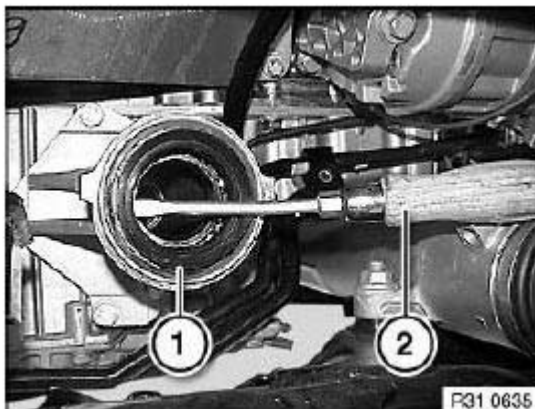


Fig. 125: Identifying Shaft Seal And Screwdriver

Courtesy of BMW OF NORTH AMERICA, INC.

Installing shaft seal:

292 of 3160

NOTE: The installation protective ring (1) serves to protect the sealing lips on shaft

seal (2) when the output shaft is being installed.

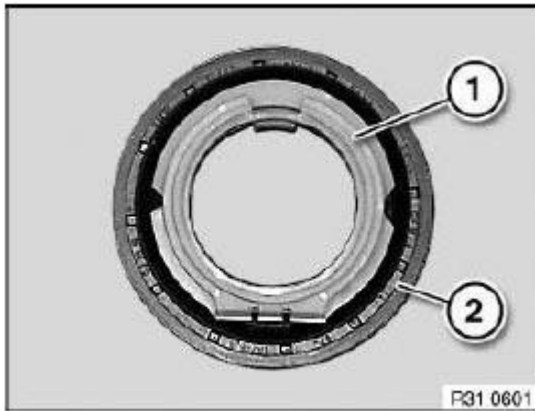


Fig. 126: Identifying Shaft Seal And Protective Ring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Installation protective ring must not slip out of shaft seal!

Drive in shaft seal with special tool 31 4 160 as far as it will go.

Carefully remove special tool 31 4 160 .

Open installation protective ring (1).

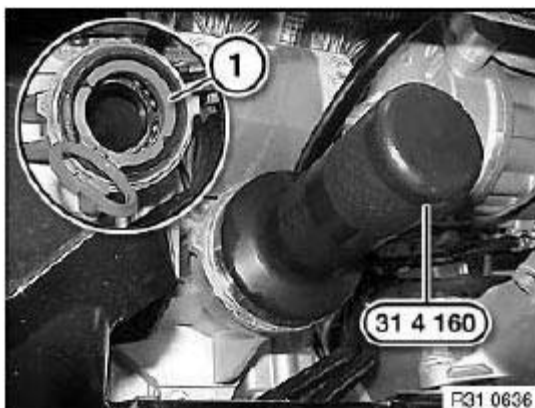


Fig. 127: Identifying Protective Ring And Special Tool (31 4 4160)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Check front differential oil level , correct if necessary. See **31 50... CHANGING FRONT DIFFERENTIAL OIL**.

31 60... NOTES ON REMOVING AND INSTALLING LOW PROFILE BAND CLAMPS**Special tools required:**

- 31 5 200

IMPORTANT: During removal Low Profile band clamp (dotted line) is overstretched and must not be reused!



Fig. 128: Identifying Clamp

Courtesy of BMW OF NORTH AMERICA, INC.

Removing:

Place special tool 31 5 200 on lugs (1, 2).

NOTE: Make sure that the movable piece (3) of the special tool is placed on lug (1).

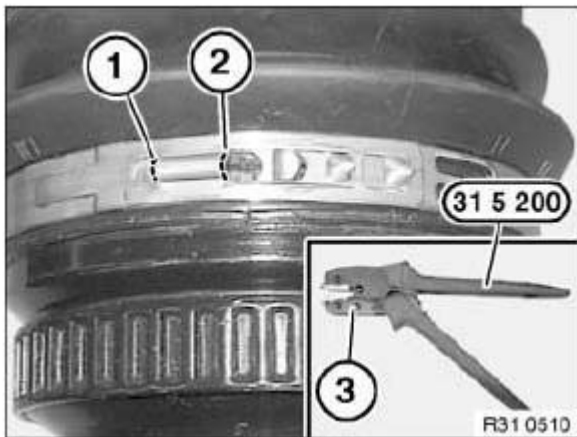


Fig. 129: Identifying Movable Piece And Lug

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.

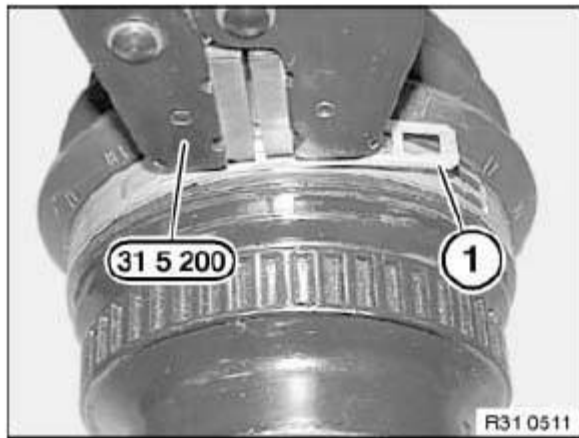


Fig. 130: Identifying Clamp And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly:

Position Low Profile band clamp in installation position (A) on gaiter.

Place special tool 31 5 200 on lugs (1, 2).

NOTE: Make sure that the movable piece (3) of the special tool is placed on lug (1).

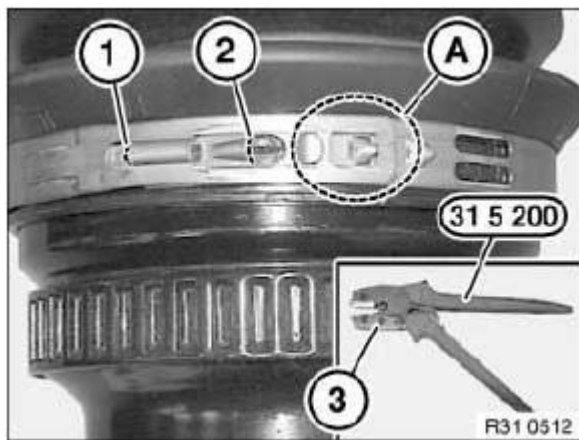


Fig. 131: Identifying Movable Piece And Lug
Courtesy of BMW OF NORTH AMERICA, INC.

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.

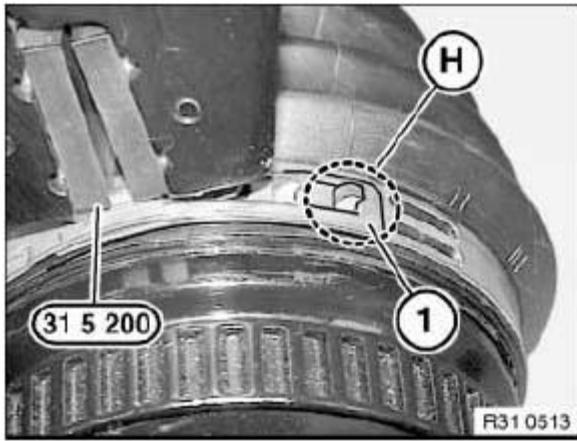


Fig. 132: Identifying Hook Fastener, Clamp And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

31 60... PRESSING OUTPUT SHAFT OUT OF DRIVE FLANGE (WHEEL HUB) AND DRAWING IN

Special tools required:

- 33 2 111
- 33 2 115
- 33 2 116
- 33 2 117
- 33 2 118
- 33 2 160
- 33 2 201
- 33 2 202
- 33 2 203
- 33 2 205
- 33 2 207
- 33 2 208
- 33 5 070

WARNING: Risk of injury!

It is not permitted to use the impact screwdriver to press out and draw in the output shaft.

IMPORTANT: Risk of damage!

To avoid damaging the output shaft and adjoining parts, it is essential during the pressing-out process to repeatedly check and if necessary correct the position of the output shaft.

IMPORTANT: To avoid damaging the dust sleeve, use special tool 33 2 160 to press out and draw in the output shaft after removing the brake disk.

NOTE: Rounded inside edge of special tool 33 2 160 must point to drive flange.

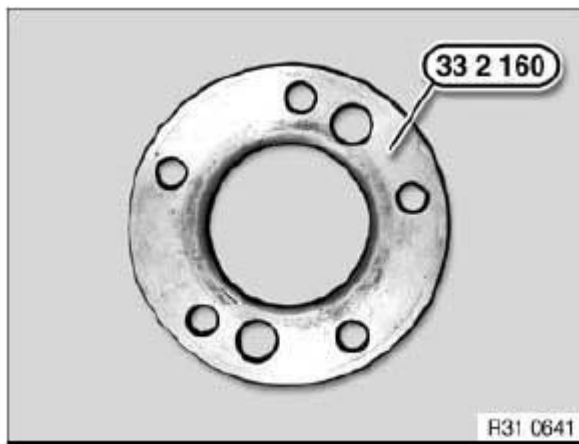


Fig. 133: Identifying Special Tool (33 2 160)

Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 33 2 200:

Screw on special tool 33 2 203 , 33 2 207 and 33 2 201 with all wheel studs to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070 .

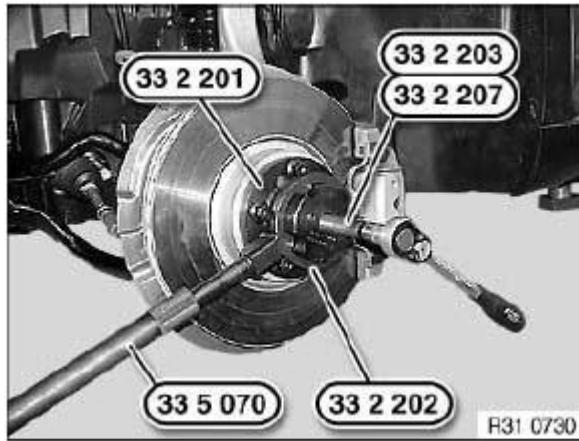


Fig. 134: Identifying Special Tools (33 2 201) (33 2 203)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

Screw special tool 33 2 205 onto output shaft.

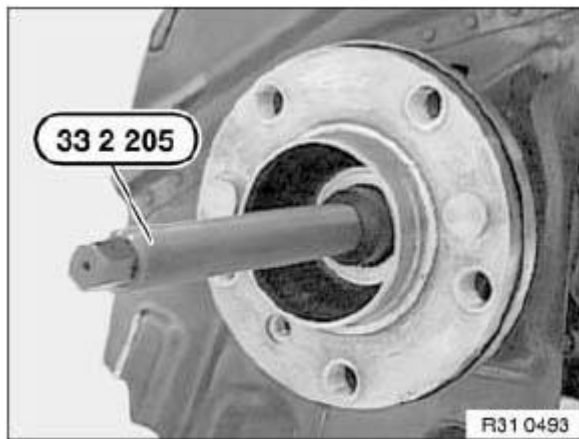


Fig. 135: Identifying Special Tool (33 2 205)

Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 201 with three wheel studs to drive flange.

Draw in output shaft with special tool 33 2 208 up to stop; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070 .

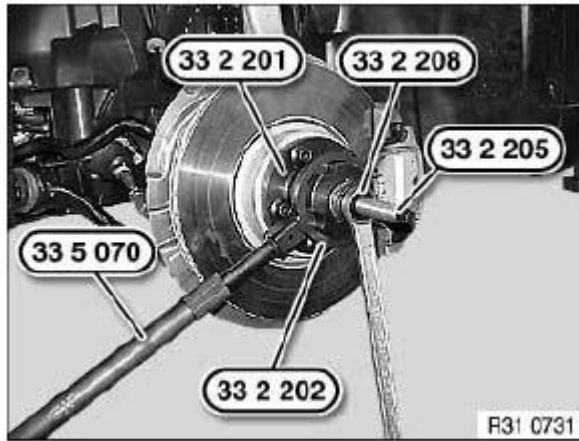


Fig. 136: Identifying Special Tools (33 2 208) (33 2 202)

Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 33 2 100:

Screw on special tool 33 2 111 , 33 2 117 and 33 2 116 with all wheel studs to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 116 with special tools 33 2 202 and 33 5 070 .

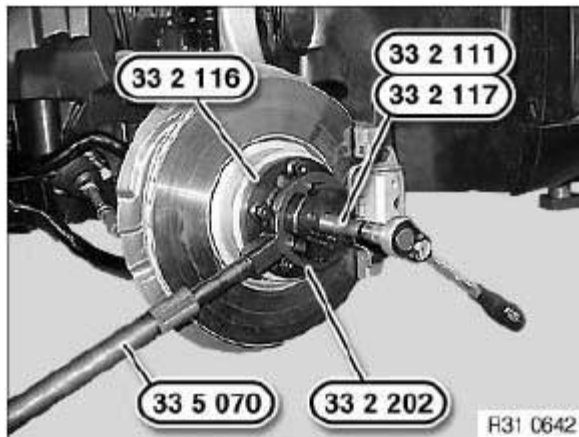


Fig. 137: Identifying Special Tools (33 2 116) (33 2 201)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

Screw special tool 33 2 118 onto output shaft.

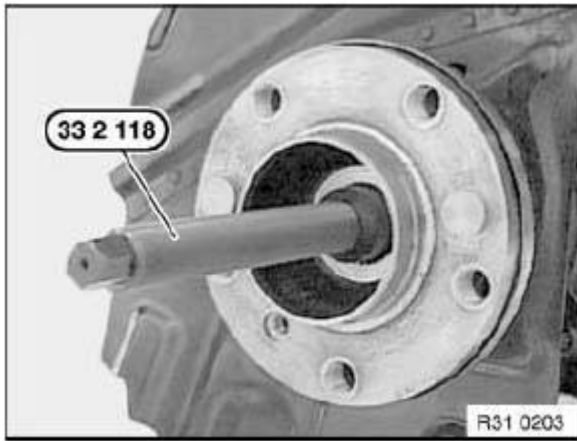


Fig. 138: Identifying Special Tool (33 2 118)

Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 116 with three wheel studs to drive flange.

Draw in output shaft with special tool 33 2 115 up to stop; in so doing, grip basic body 33 2 116 with special tools 33 2 202 and 33 5 070 .

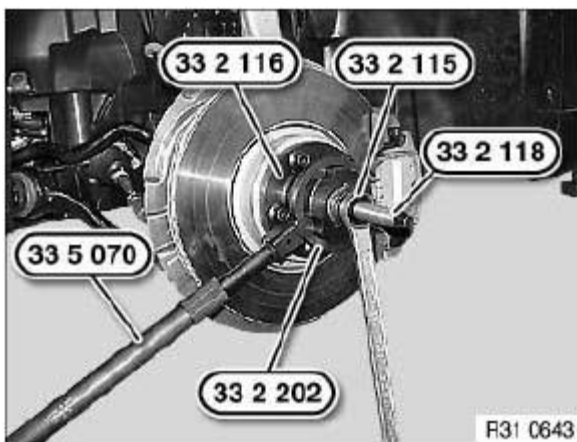


Fig. 139: Identifying Special Tools (33 5 070) (33 2 118)

Courtesy of BMW OF NORTH AMERICA, INC.

31 60 003 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT

Special tools required:

- 31 4 170

Remove front wheel.

collar nut.

Release collar nut (1), press brake pedal to floor for this purpose.

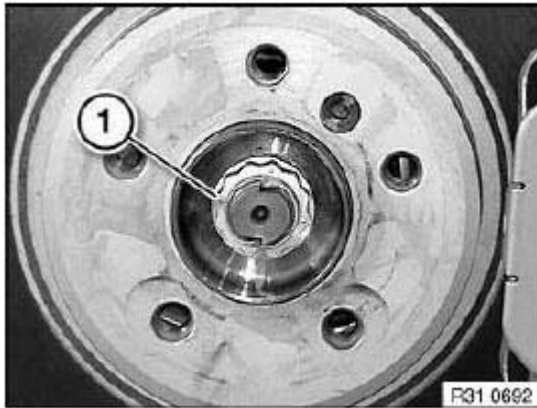


Fig. 140: Identifying Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Remove left microfilter housing cover . See **64 31 101 REMOVING AND INSTALLING/REPLACING LEFT MICROFILTER HOUSING COVER** .

IMPORTANT: Use special tool to avoid preliminary damage to ball joint in upper control arm.

Press plugs out of spring strut dome.

Secure swivel bearing (1) with special tool 31 4 170 in installation position.

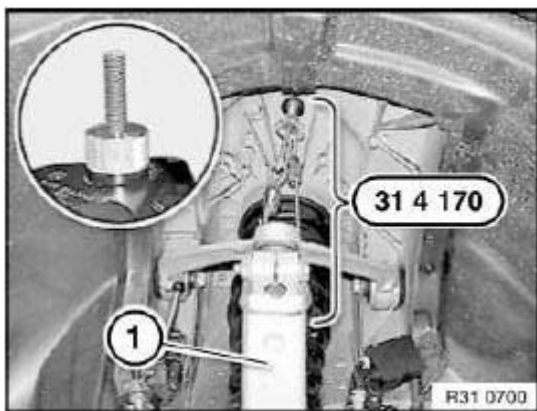


Fig. 141: Identifying Swivel Bearing And Special Tool (31 4 170)

Courtesy of BMW OF NORTH AMERICA, INC.

Remove reinforcement plate. . See **31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE** .

Remove steering gear cover at top and bottom. . See 51 71 ... REMOVING AND INSTALLING/REPLACING TOP LEFT STEERING GEAR COVER and 51 71 ... REMOVING AND INSTALLING/REPLACING TOP RIGHT STEERING GEAR COVER .

Remove lower control arm front spring strut holder and front axle carrier . See 31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM.

Press output shaft out of drive flange . See PRESSING OUTPUT SHAFT OUT OF DRIVE FLANGE.

IMPORTANT: Risk of damage!

Tape off output shaft and secure against falling off.

When removing output shaft, make sure that tripod does not fall into gaiter.

Turn steering wheel to right.

Press swivel bearing slightly to one side and remove output shaft from wheel bearing.

Press output shaft with a suitable tool out of front differential and remove between spring strut holder and control arm.



Fig. 142: Removing Output Shaft From Wheel Bearing

Courtesy of BMW OF NORTH AMERICA, INC.

Installing output shaft:

Replace shaft seal in front differential . See 31 51 015 REPLACING SHAFT SEAL FOR LEFT OUTPUT SHAFT or 31 51 020 REPLACING SHAFT SEAL FOR RIGHT OUTPUT SHAFT.

Check front differential oil level , correct if necessary. See 31 50... CHANGING FRONT DIFFERENTIAL OIL.

IMPORTANT: High installation forces indicate that the output shaft spline teeth are damaged or deformed!

Check spline teeth, replaced damaged parts.

Replace circlip (1).

Coat highlighted contact surface (2) of output shaft with approved front differential oil . See **FRONT AXLE - OPERATING FLUIDS** .

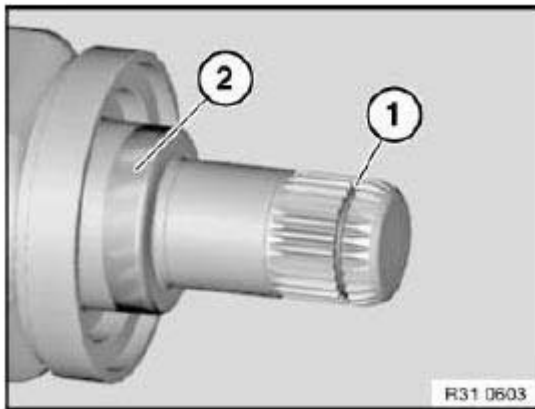


Fig. 143: Identifying Circlip And Contact Surface Of Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When installing output shaft, make sure that tripod does not fall into gaiter.

Press swivel bearing slightly to one side and insert output shaft into front differential.

Pull out assembly protection ring at lug (1) until one of the two programmed rupture points gives.

Slide output shaft as far as it will go into front differential. Output shaft must snap audibly into place.

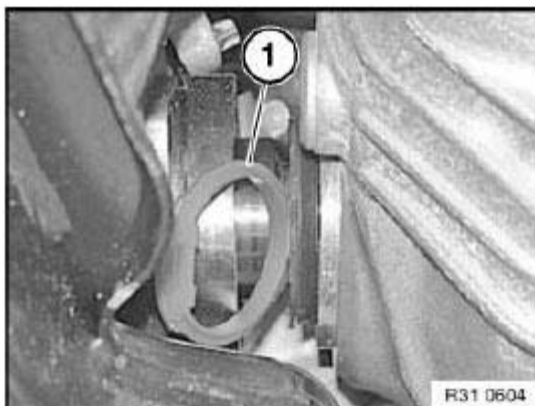


Fig. 144: Identifying Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Press swivel bearing slightly to one side and insert output shaft into wheel bearing.

Move steering to straight-ahead position.



Fig. 145: Removing Output Shaft From Wheel Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Draw output shaft into drive flange . See **31 60... PRESSING OUTPUT SHAFT OUT OF DRIVE FLANGE (WHEEL HUB) AND DRAWING IN.**

Install lower control arm. . See **31 12 004 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT LOWER CONTROL ARM.**

Remove steering gear cover at top and bottom . See **51 71 ... REMOVING AND INSTALLING/REPLACING TOP LEFT STEERING GEAR COVER** and **51 71 ... REMOVING AND INSTALLING/REPLACING TOP RIGHT STEERING GEAR COVER .**

Install reinforcement plate. . See **31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE.**

Remove special tool 31 4 170 for swivel bearing (1).

Use plugs from spring strut dome.

Install left microfilter housing cover . See **64 31 101 REMOVING AND INSTALLING/REPLACING LEFT MICROFILTER HOUSING COVER .**

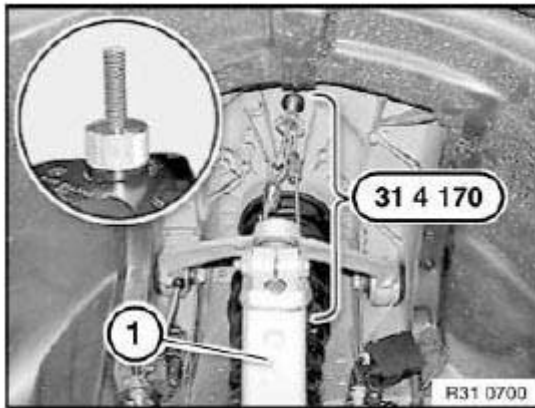


Fig. 146: Identifying Swivel Bearing And Special Tool (31 4 170)

Courtesy of BMW OF NORTH AMERICA, INC.

Replace collar nut (1), oil collar nut/wheel bearing contact surface only and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Tightening torque. See **FRONT AXLE - TIGHTENING TORQUES** .

Secure collar nut by positive peening on flat areas of output shaft.

Install front wheel.

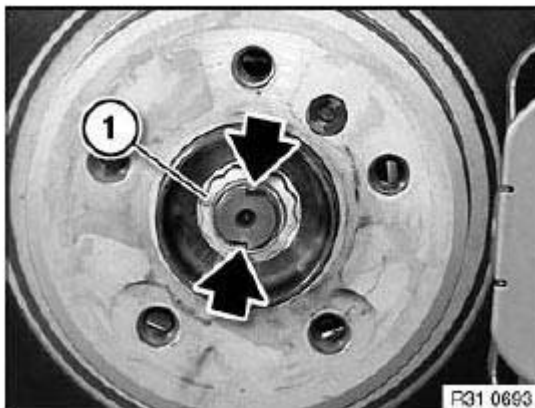


Fig. 147: Locating Collar Nut

Courtesy of BMW OF NORTH AMERICA, INC.

After installation:

- Perform **CHASSIS ALIGNMENT CHECK**
- Carry out steering angle sensor adjustment/adjustment for active steering . See **32 10 005**
ADJUSTMENT FOR ACTIVE FRONT STEERING and **61 31 996 CARRY OUT STEERING**
ANGLE SENSOR ADJUSTMENT .

31 60 004 REMOVING AND INSTALLING / REPLACING RIGHT OUTPUT SHAFT

Necessary preliminary tasks:

- Remove right spring strut . See **31 31 000 REMOVING AND INSTALLING COMPLETE LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER.**

Further procedure is identical to **31 60 003 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT.**

31 60 530 REPLACING AN OUTPUT SHAFT GAITER (ON TRANSMISSION SIDE) (OUTPUT SHAFT REMOVED)

NOTE: Procedure is described in **31 60 535 REPLACING BOTH GAITERS ON LEFT AND RIGHT OF OUTPUT SHAFT (OUTPUT SHAFT REMOVED).**

31 60 535 REPLACING BOTH GAITERS ON LEFT AND RIGHT OF OUTPUT SHAFT (OUTPUT SHAFT REMOVED)

Grip output shaft (1) in vice with aluminum clamping jaws.

NOTE: 2 = Joint, wheel side
3 = Joint, transmission side

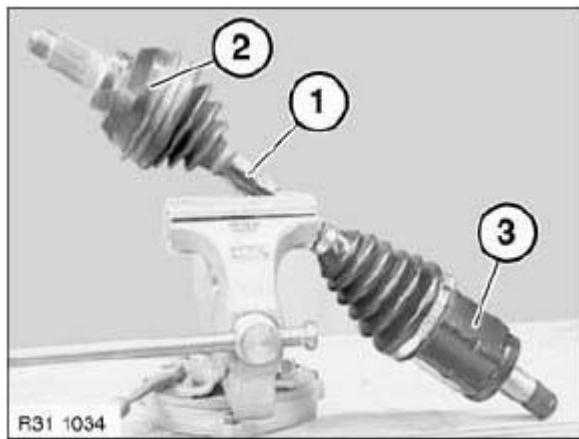


Fig. 148: Identifying Output Shaft, Joint, Wheel And Transmission Side
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing gaiter of wheel-side joint:

Release Low Profile band clamp (1) and band clamp (2). See **31 60... NOTES ON REMOVING AND INSTALLING LOW PROFILE BAND CLAMPS.**

Pull back rubber gaiter (3).

Installation:

Feed gaiter (3) into groove of joint.

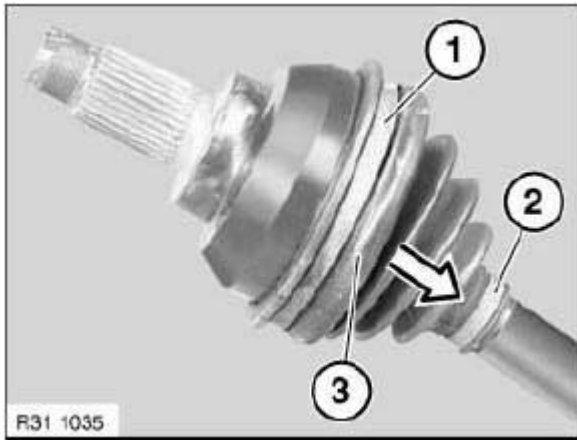


Fig. 149: Pulling Rubber Gaiter

Courtesy of BMW OF NORTH AMERICA, INC.

Press off joint (1) via contact pressure of retaining ring on shaft (2).

Installation:

Push on joint until retaining ring can be heard to snap into place.

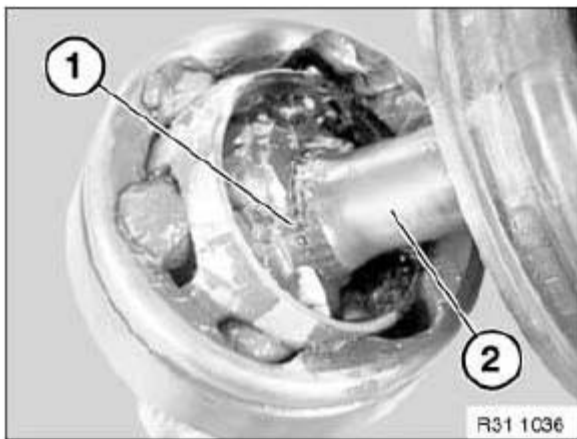


Fig. 150: Identifying Joint And Shaft

Courtesy of BMW OF NORTH AMERICA, INC.

Lift out retaining ring (1).

Installation:

Replace retaining ring (1).

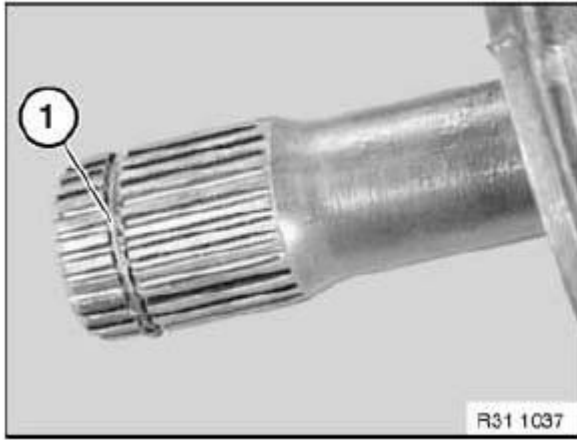


Fig. 151: Identifying Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off gaiter (1) over shaft (2).

Carefully clean all parts with a cloth.

NOTE: Regrease constant-velocity joint with the grease from the repair kit.

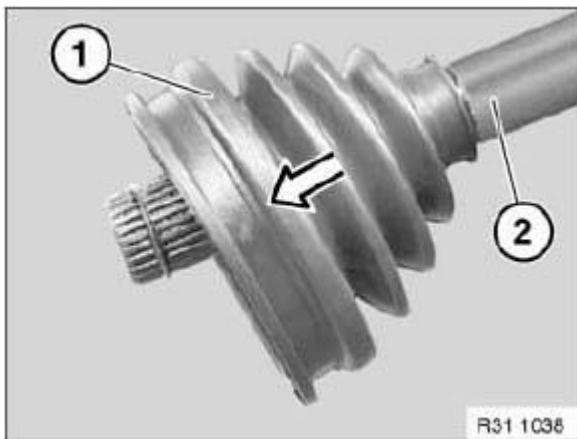


Fig. 152: Pulling Off Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing gaiter of transmission-side joint:

Release band clamps (1, 2).

Pull back rubber gaiter (3).

Detach tulip element (4).

Installation:

Feed gaiter (3) into groove of tulip element (4).

Align band clamp (1) so that hook fastener is as at flat end of tulip element (4).

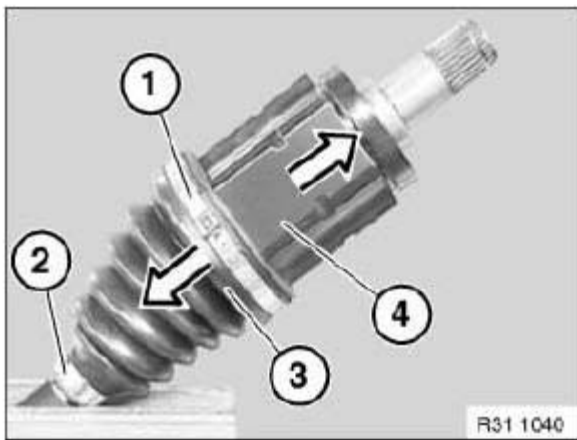


Fig. 153: Releasing Band Clamps

Courtesy of BMW OF NORTH AMERICA, INC.

Remove retaining ring (1).

Installation:

Replace retaining ring (1).

Detach tripod element (2) from shaft (3).

Pull off gaiter over shaft (3).

Carefully clean all parts with a cloth.

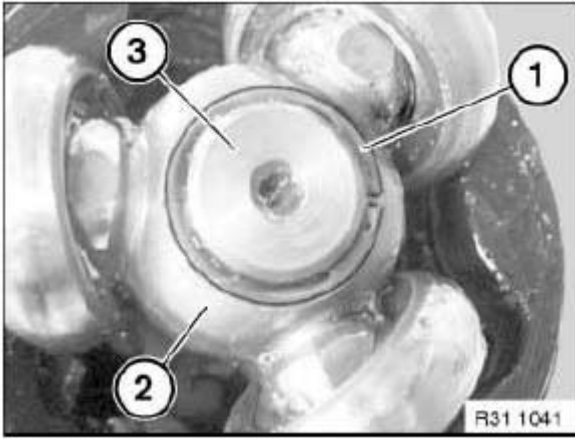


Fig. 154: Identifying Retaining Ring, Tripod Element And Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Flat side (2) of tripod element (1) must point to retaining ring.

NOTE: Regrease constant-velocity joint (tripod element) with the grease from the repair kit.

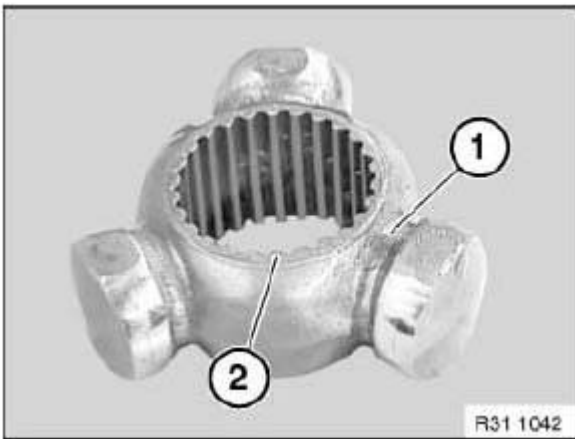


Fig. 155: Identifying Flat Side And Tripod Element
Courtesy of BMW OF NORTH AMERICA, INC.

90 TROUBLESHOOTING

31 90... FRONT AXLE TROUBLESHOOTING

Follow troubleshooting for steering/shock absorbers.

TROUBLESHOOTING CHART - FRONT AXLE

2008 BMW X5 48i

2007-08 SUSPENSION Front Axle - Repair Instructions - X5

Fault	Cause	Remedy
Grinding noise NOTE: Straight-ahead driving/cornering	Wheel bearing worn, dirty	Replace faulty wheel bearing
Cracking / clicking NOTE: In event of road irregularities and steering maneuvers	Front axle carrier loose	Tighten down screw connection as specified in repair instruction
	Front axle carrier / front end distorted	1. Position vehicle over pit / on alignment platform 2. Slacken screw connection of front axle carrier 3. Tighten down screw connection as specified in repair instruction
Rattling NOTE: In event of edged road irregularities	Lower control arm loose	Tighten down screw connections as specified in repair instruction
	Lower control arm ball joint loose / faulty	1. Tighten down screw connection as specified in repair instruction 2. Check ball joint for play, replace lower control arm if necessary
	Tension strut loose	Tighten down screw connection as specified in repair instruction
	Tension strut ball joint loose / faulty	1. Tighten down screw connection as specified in repair instruction 2. Check ball joint for play, replace tension strut if necessary
	Upper control arm loose	Tighten down screw connection as specified in repair instruction
	Upper control arm ball joint loose / faulty	1. Tighten down screw connection as specified in repair instruction 2. Check ball joint for play, replace upper control arm if necessary
Muffled bang NOTE: Repeated impulse braking or road irregularities	Tension strut hydro-mount faulty (no mount fluid)	Examine hydro-mount for leaks, cracks and issue or rubber, replace tension strut if necessary
No conspicuous noise	Upper control arm rubber mount faulty	Examine rubber mount for cracks and issue of rubber, replace upper control arm if necessary
	Lower control arm rubber mount (on spring strut bracket) faulty	Examine rubber mount for cracks and issue of rubber, replace lower control arm if necessary

No conspicuous noise, steering wheel inclination / steering backlash	Lower control arm rubber mount (on front axle carrier) faulty	Examine rubber mount for cracks and issue of rubber, replace lower control arm if necessary
NOTE: In event of edged road irregularities		

NOTE: The tension strut rubber mount has an overload stop, which can cause knocking noises at high loads.

31 90... TROUBLESHOOTING SHOCK ABSORBER

Read and comply with Information on replacing shock absorbers. See **31 00 ... INFORMATION ON REPLACING SHOCK ABSORBERS.**

TROUBLESHOOTING CHART - SHOCK ABSORBER

Fault	Cause	Remedy
Wheel knocking (bottoming)	Auxiliary spring faulty	Visually inspect auxiliary spring for cracking, replace auxiliary spring
	Shock absorber leaking (oil/gas)	Replace shock absorber
Rattling noise	Shock absorber mounting loose	Tighten shock absorber
	Support bearing faulty/hardened	Replace support bearing
	Shock absorber leaking (gas/oil)	Replace shock absorber
Worn down areas (flattened areas) on tire profile	Shock absorber leaking (gas/oil)	Replace shock absorber
Long after-swinging of body after driving over rough road	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber
Building-up of body in case of successive uneven surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber
Wheels jumping even on normal road surfaces	Shock absorber leaking (insufficient shock absorber effect)	Replace shock absorber
Whistling noises	Separating skin in vent holes of auxiliary dampers	Remove separating skin